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Introduction

The PMG Terms of Reference state that the PMG should maintain a map of normative references of ISO/TC 211 standards in order to assist the maintenance of ISO/TC 211 standards as described in the Compatibility Guidelines (n2516):

- to illustrate the overall structure of 191xx
- to show links between standards
- to highlight possible influences of an intended change to one standard on another
- to assist in the meaningful ordering of revisions of standards

This document defines dependencies among standards and then describes the *ISO/TC 211 dependency data model*, a logical model to represent these dependencies. The instance of this model is referred to as the *ISO/TC 211 dependency database* and is maintained by the PMG. The database and its maintenance procedures are also described in this document.

1 Scope

This document describes the logical data model for ISO/TC 211 dependency relationships. The instance of this model that is maintained by the PMG is referred to as the ISO/TC 211 dependency 'database'.

2 Terms and definitions

2.1 dependency

a relationship between two standards where a change to the content of one standard affects the content of the other standard.

2.2 normative dependency

a relationship between two standards where a change to the normative content in the one standard affects the normative content of the other standard.

3 Normative dependencies

A standard consists of normative and informative elements. Normative elements of a standard describe the scope of the document and set out provisions of the standard, while informative elements provide additional information to introduce the content, explain the background and assist in understanding and using the document. Only changes to the normative content of a standard can possibly have an impact on other standards, therefore it is sufficient to analyze dependencies in the normative content in order to understand the impact of a change introduced in a revision. The remainder of this section defines the different types of normative references and describes restrictions on the revision of a standard based on its normative dependency relationships.

3.1 Types of normative dependencies

Table 1 – Definition and notation of normative dependencies

Dependency	Definition
Scope	The scope statement of $S_1:YYYY$ has a dependency on $S_2:YYYY$ The scope statement of $S_1:YYYY$ has a dependency on S_2
Normative reference	$S_1:YYYY$ normatively references S_2 (dated dependency)
Term	$S_1:YYYY$ repeats the definition of a term defined in S_2
Provision	A requirement in $S_1:YYYY$ has a dependency on S_2 A recommendation in $S_1:YYYY$ has a dependency on S_2 A requirement in $S_1:YYYY$ depends on a UML element from S_2 A recommendation in $S_1:YYYY$ depends on a UML element from S_2

Normative elements of a standard include the title, scope, normative references, terms and definitions, symbols and abbreviated terms, and provisions. Table 1 shows the definition of different kinds of normative dependencies between standards. While the title of a standard is a normative element, it does not include dependencies on other standards (or if, these will be repeated in the scope, thus working with scope dependencies is sufficient). In the table $S:YYYY$ is a specific edition of a standard, where $YYYY$ is the year of publication. S collectively refers to all editions, $S:YYYY$, of S . $S:YYYY'$ is the revision of $S:YYYY$.

A normative dependency on an $S:YYYY$ can also be referred to as a dated normative dependency, while with only the S , it is an undated normative dependency. For the scope dependency, the definition for both the dated and undated dependency is shown in the table, while (for simplicity reasons) only the undated dependency is shown for the other kinds of normative dependencies. Table 2 gives examples from published standards for each one of the dependencies.

The *scope* statement of a standard defines the subject of the document and the aspects covered, thereby indicating the limits of applicability of the document or particular parts of it [9]. In some cases the scope statement specifies a dependency on another standard. For example, the scope of an implementation specification could depend on an abstract standard.

Normative references are 'referenced documents cited in the document in such a way as to make them indispensable for the application of the document' [9], implying that a change to the normatively referenced document will change the way in which the document in which it is normatively referenced, is understood and interpreted. In an ISO standard only a reference to the other document is included; no information about the details of the dependency is supplied (i.e. no square brackets in the notation). This is the only kind of normative dependency where the details of the dependency are not provided.

The normative element of a standard that contains the *terms and definitions* includes a normative dependency if a term and its definition are repeated from another document. The reference to the other document could be dated, indicating that the term is repeated from a specific edition of the standard, or undated, indicating that the term is referenced from all past and future editions of that standard.

Table 2 – Examples of normative dependencies from published standards

Type of dependency	Dependency	Reference
Undated scope	This Technical Specification defines Geographic MetaData XML (gmd) encoding, an XML Schema implementation derived from ISO 19115, Geographic information — Metadata.	[ISO/TS 19139:2007], clause 1
Dated normative reference	ISO 19105:2000	[ISO 19112:2003], clause 3
Undated normative reference	ISO 19111	[ISO 19128:2005], clause 3
Dated term	feature [ISO 19101:2002]	[ISO 19118:2005], subclause 4.1
Undated term	coordinate system [ISO 19111]	[ISO 19128:2005], subclause 4.3
Undated requirement	The application schema used for encoding in compliance with this International Standard shall be written in the UML conceptual schema language, in accordance with ISO 19103 and ISO 19109.	[ISO 19118:2005], subclause 6.3
Undated recommendation	As relevant, a platform-specific specification should include the encoding of information according to ISO 19118.	[ISO 19119:2005], subclause 10.3

Provisions stipulate requirements and recommendations that an implementation of the standard has to follow in order to claim compliance. A provision includes a dependency if it relies on the normative content of another standard. A requirement is an 'expression in the content of a document conveying criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted'. A recommendation is an 'expression in the content of a document conveying that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited' [ISO/IEC Directives, Part 2].

3.2 Restrictions on revisions based on normative dependencies

If *S:YYYY* is revised the following applies:

- The normative content in *S:YYYY* can be modified without any impact on existing normative dependencies in which *S:YYYY* relies on other standards.
- If there are normative dependencies that depend on *S:YYYY* (i.e. dated dependencies), changes to the normative content of *S:YYYY* will not violate these dependencies (there are other considerations, such as backward compatibility though).
- However, if there are normative dependencies that depend on *S* (i.e. undated dependencies), there are restrictions on the modifications that can be introduced in the normative content of *S1:YYYY*. Table 3 explains these restrictions.

Table 3 – Restrictions on the normative content of S1:YYYY', the revision of S1:YYYY

Existing normative dependency	Restrictions on S1:YYYY'
The scope of S2:YYYY depends on S1 S2:YYYY normatively references S1	Existing implementations of S2:YYYY shall comply with S1:YYYY'. S1:YYYY' shall include the normative content that makes it indispensable to the application of S2:YYYY.
S2:YYYY repeats a term from S1 S2:YYYY has a requirement that depends on S1	The term shall be included in S1:YYYY' with the same meaning. The requirement as implemented in existing applications of S2:YYYY shall comply with S1:YYYY'
S2:YYYY has a recommendation that depends S1	The recommendation as implemented in existing applications of S2:YYYY shall comply with S1:YYYY'
S2:YYYY has a requirement that depends on a UML element S1	The UML element is included in S1:YYYY' so that existing applications of S2:YYYY comply with S1:YYYY'.
S2:YYYY has a recommendation that depends on a UML element from S1	The UML element is included in S1:YYYY' so that existing applications of S2:YYYY comply with S1:YYYY'.

4 The ISO/TC 211 dependency data model

In this section a logical data model to represent dependencies between ISO/TC 211 standards is described. The model includes both normative and non-normative dependencies, although not all of them are stored in the ISO/TC 211 database. Refer to section 5 for more details. Figure 1 gives an overview of the classes in the ISO/TC 211 dependency data model and their associations with each other. Subsequently, section 4.2 describes the classes and their attributes; section 4.3 describes enumeration types; and section 4.4 describes the associations in the model.

4.1 Classes

4.1.1 Document

This class represents an aggregation of editions with different publications dates of the same document.

NOTE:

In the notation used in section 3, *S* is a document and *S:YYYY* is an edition.

NOTE:

Different editions of a document do not necessarily have the same title. For example, ISO/IEC 11404:1996, *Information technology -- Programming languages, their environments and system software interfaces -- Language-independent datatypes* and ISO/IEC 11404:2007, *Information technology -- General-Purpose Datatypes (GPD)*. For this reason, the Document class does not have title and /longref attributes.

EXAMPLE:

ISO 19111, *Geographic information – Spatial referencing by coordinates* is the document, and ISO 19111:2003, *Geographic information – Spatial referencing by coordinates* and ISO 19111:2007, *Geographic information – Spatial referencing by coordinates* are two editions of this document.

Table 4 – Attributes of the Document class

Name	Alias	Definition	Multiplicity	Type	Domain
number		Number that uniquely identifies the document per publisher EXAMPLE: 19111 in 'ISO 19111, <i>Geographic information – Spatial referencing by geographic coordinates</i> '	1	char(16)	Valid document number
partIdentifier	part	Uniquely identifies the part of the document. Only required if the document consists of more than one part. EXAMPLE: 2 in 'ISO 19111-2, <i>Geographic information – Spatial referencing by geographic coordinates – Part 2: Extension for parametric value</i> '	0..1	char(16)	Valid part indicator
comment		Any additional information about the document	0..1	char(255)	Free text
/shortRef		Short reference for the document, derived from the publisher abbreviation, document number and part indicator EXAMPLES: 'ISO 19111', 'ISO '19111-2'	1	char(32)	Free text (derived)

4.1.2 Edition

This class represents a specific edition (publication) and thus always has a year of publication associated with it. If there is more than one edition of the same document, the editions are associated with a single document instance.

NOTE:

In the notation used in section 3, *S* is a document and *S:YYYY* is an edition.

EXAMPLE:

ISO 19111, *Geographic information – Spatial referencing by coordinates* is the document, and ISO 19111:2003, *Geographic information – Spatial referencing by coordinates* and ISO 19111:2007, *Geographic information – Spatial referencing by coordinates* are two editions of this document.

Table 5 – Attributes of the Edition class

Name	Alias	Definition	Multiplicity	Type	Domain
type		Indicates the type of publication.	1	PublicationType	Valid element from PublicationType enumeration
number		Number that uniquely identifies the edition per publisher EXAMPLE: 19111 in 'ISO 19111:2003, <i>Geographic information – Spatial referencing by geographic coordinates</i> '	1	char(16)	Valid document number
partIdentifier	part	Uniquely identifies the part of the edition. Only required if the edition consists of more than one part. EXAMPLE: 2 in 'ISO 19111-2:2009, <i>Geographic information – Spatial referencing by geographic coordinates – Part 2: Extension for parametric value</i> '	0..1	char(16)	Valid part indicator
title		Title of the edition. 'Geographic information – Spatial referencing by geographic coordinates' in 'ISO 19111:2007, <i>Geographic information – Spatial referencing by geographic coordinates</i> '	1	char(255)	Free text
version		Version information for this edition EXAMPLE: '1.3.0' in 'OGC Web Map Server Interface Implementation Specification 1.3.0 (2006)'	0..1	char(16)	Free text
sequence		Sequence information for this edition EXAMPLE: 'ISO 19111:2003, <i>Geographic information – Spatial referencing by coordinates</i> ' is 'Edition 1' and 'ISO 19111:2007, <i>Geographic information – Spatial referencing by coordinates</i> ' is 'Edition 2'.	0..1	char(16)	Free text

Name	Alias	Definition	Multiplicity	Type	Domain
year		Publication year of this edition.	1	char(4)	Four digits that specify a year ???? if the year of publication is unknown
documentNo		Publisher-specific document number as assigned by the editors of the edition. EXAMPLES: 'N 1324' is the ISO/TC 211 document number of the text of the ISO119107:2003 edition, as sent to the ISO Central Secretariat for registration as FDIS. '06-042' is the OGC document number of the OGC WMS 1.3.0 (2006) edition.	0..1	Char(16)	Valid document number
comment		Any additional information about the edition.	0..1	char(255)	Free text
/shortRef		Short reference for the edition, derived from the publisher abbreviation, document number, part indicator, version and year of publication. EXAMPLES: 'ISO 19111:2003', 'ISO 19111:2007', 'OGC WMS 1.3.0 (2006)', 'W3C Xpointer Framework (2003)'	1	char(32)	Free text (derived)
/longRef		Long reference to the edition, derived from the shortRef and the title where applicable, otherwise the complete reference. EXAMPLES: 'ISO 19111:2007, Geographic information – Spatial referencing by geographic coordinates' 'OGC Web Map Server Interface Implementation Specification 1.3.0 (2006)' 'W3C Recommendation (2003): XPointer Framework, W3C Recommendation (25 March 2003)' 'Drugg RD, Egenhofer MJ and Kuhn W (1997): Formalizing Behavior of Geographic Features, Geographical Systems, Vol. 4, No.2, pp159-179'	1	char(255)	Free text (derived)

4.1.3 ISOEdition

The ISOEdition class is derived from the Edition class and has additional ISO edition-specific attributes.

Table 6 – Attributes of the ISOEdition class

Name	Alias	Definition	Multiplicity	Type	Domain
type		Identifies the type of ISO edition, such as International Standard, Technical Report, etc. EXAMPLES: ISO 19103:2005/TS is a Technical Specification. ISO 19115:2003 is an International Standard.	1	ISOEditionType	Valid element from ISOEditionType enumeration
projectStage		Identifies the ISO project stage of an ISO edition. EXAMPLES: On 27 June 2010, these project stages were accurate: ISO 19111:2003 is at 'withdrawalStage_95'. ISO 19111:2007 is 'publicationStage_60'. NOTE: These ISO project stage could change at any stage, therefore this attribute is only populated where the PMG chooses to track the stage, for example for ISO/TC 211 standards where it is important to know the difference between publicationStage_60 and reviewStage_90.	0..1	ISOProjectStage	Valid element from ISOProjectStage enumeration
projectSubstage		Identifies the ISO project substage of an ISO edition. EXAMPLES: On 27 June 2010, the project stages, including sub-stages, were accurate: ISO 19111:2003 is '95.99_WithdrawalOfInternationalStandard' ISO 19115:2003 is '90.92_InternationalStandardToBeRevised'. ISO 19127:2005 is '90.93_InternationalStandardConfirmed'. NOTE: These ISO project substage could change at any stage, therefore this attribute is only populated where the PMG chooses to track the stage, for example for ISO/TC 211 standards where it is important to distinguish between standards that are published, to be revised or confirmed .	0..1	ISOProjectSubstage	Valid element from ISOProjectSubstage enumeration
stageUpdated		The date on which the projectStage and/or projectSubStage were last updated. Only required when one of the projectStage and projectSubstage attributes are populated.	0..1	date	Any valid date

4.1.4 TC211Edition

The TC211Edition class is derived from the ISOEdition class and has additional ISO/TC 211-specific attributes.

Table 7 – Attributes of the TC211Edition class

Name	Alias	Definition	Multiplicity	Type	Domain
isJointCEN		True if the edition is jointly developed with CEN under the Vienna agreement. EXAMPLE: ISO 19105:2000 was developed under the Vienna agreement.	1	Boolean	True or False
isJointOGC		True if the edition is jointly developed with OGC. EXAMPLE: The Web Map Server interface was developed jointly with OGC.	1	Boolean	True or False
numberOfTerms		Number of terms listed in section 4 of the edition. EXAMPLE: Section 4, Terms and definitions, of ISO 19106:2004 lists five terms.	0..1	int	Any Integer value ≥ 0
/termDependency		The percentage terms in this TC211Edition that are referenced from another document or edition EXAMPLE: In ISO 19106:2004 one of the five terms is defined, while four terms are referenced from other documents. Thus the term dependency is $4/5 = 80\%$.	0..1	double	(derived)

4.1.5 Modification

A modification modifies an Edition. Three classes derive from Modification: Amendment, Corrigendum and Supplement, representing the different kinds of modifications. No additional attributes are defined for these derived classes.

Table 8 – Attributes of the Modification class

Name	Alias	Definition	Multiplicity	Type	Domain
sequenceNo		The sequence number that identifies this modification. EXAMPLE: '1' in ISO 19115:2003/Cor 1:2006 shows that it is the first correction to ISO 19115:2003.	1	int	Integer values ≥ 1

Name	Alias	Definition	Multiplicity	Type	Domain
year		Publication year of this modification. EXAMPLE: The publication year for the Corrigendum, ISO 19115:2003/Cor 1:2006, is '2006'.	1	char(4)	Four digits that specify a year ???? if the year of publication is unknown
comment		Any additional information about the document	0..1	char(255)	Free text
/shortRef		Short reference for the modification, derived from the shortRef of the original document together with the modification type, sequence and year of publication. EXAMPLES: ISO 19115:2003/Cor 1:2006	1	char(32)	Free text (derived)
/longRef		Long reference for the modification, derived from the shortRef and the title where applicable, otherwise the complete reference. EXAMPLE: 'ISO 19115:2003/Cor 1:2006, Geographic information – Metadata – Corrigendum 1'	1	char(255)	Free text (derived)

4.1.6 Publisher

This class represents the organization that publishes editions.

NOTE:

The publisher could be a standards organization, such as ISO or CEN, but it does not have to be. Bibliography entries could, for example, be published in journals or as conference proceedings or as books.

Table 9 – Attributes of the Publisher class

Name	Alias	Definition	Multiplicity	Type	Domain
name		Full name of the publisher. EXAMPLE: 'International Organization for Standardization', 'European Committee for Standardization', 'Open Geospatial Consortium'	1	char(128)	Free text
abbreviation		Abbreviation of the publisher's name. EXAMPLE: 'ISO', 'CEN', 'OGC'	1	char(32)	Free text
isStandardsOrganization		True if the publisher is a standards organization.	1	Boolean	True or False

Name	Alias	Definition	Multiplicity	Type	Domain
hasLiaisonWithTC211		True if this publisher has a liaison relationship with ISO/TC 211. NOTE: Liaison relationships are established with committees or with organizations, such as commercial associations, industrial consortia, user groups and professional and scientific societies.	1	Boolean	True or False

4.1.7 Committee

This class represents a committee, typically within a standards organization, that prepares editions, typically of standards.

EXAMPLE:

ISO/TC 211, *Geographic information/Geomatics* is a technical committee of the publisher ISO and prepares editions of standards, e.g. ISO 19115:2003.

Table 10 – Attributes of the Committee class

Name	Alias	Definition	Multiplicity	Type	Domain
name		Name of the committee EXAMPLE: The name of ISO/TC 211 is 'Geographic information/Geomatics'.	1	char(128)	Free text
abbreviation		Abbreviation by which the committee is known. EXAMPLES: 'ISO/TC 211', 'ISO/TC 154', 'ISO/IEC JTC 1/SC 2', 'CEN/TC 287'	1	char(32)	Free text
hasLiaisonWithTC211		True if the committee has a liaison relationship with ISO/TC 211. NOTE: Liaison relationships are established with committees or with organizations, such as commercial associations, industrial consortia, user groups and professional and scientific societies.	1	Boolean	True or False

4.1.8 ReferencedTerm

This class represents any term in section 4 of an instance of a TC211Edition that is referenced from another edition or document.

Table 11 – Attributes of the ReferencedTerm class

Name	Alias	Definition	Multiplicity	Type	Domain
name		Name of the term	1	char(128)	Free text
comment		Any additional information about the term.	0..1	char(255)	Free text

4.1.9 ReferencedUMLElement

This class represents any UML element that is defined in another edition or document and used in TC211Edition.

Table 12 – Attributes of the ReferencedUMLElement class

Name	Alias	Definition	Multiplicity	Type	Domain
name		Name of the UML element.	1	char(128)	Free text
umlElementType		The kind of UML element. EXAMPLES: Class, datatype, enumeration, interface.	1	UMLElementType	Valid element from the UMLElementType enumeration
paragraphNo		The paragraph number in the TC211Edition where the UML element is referenced.	1	char(16)	Free text
figureNo		The Figure number in the TC211Edition where the UML element is displayed.	0..1	char(16)	Free text
comment		Any additional information about the UML element.	0..1	char(255)	Free text

4.1.10 Provision

This class represents a provision in an instance of a TC211Edition. Two classes derive from Provision: Requirement and Recommendation, representing the different kinds of provisions, as defined in the ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards* and identified by their verbal forms as described in Annex H of the ISO/IEC Directives, Part 2.

Table 13 – Attributes of the Provision class

Name	Alias	Definition	Multiplicity	Type	Domain
paragraphNo		The paragraphNo in the TC211Edition where the provision appears.	1	char(16)	Free text
provisionText		The text that specifies the provision.	1	char(255)	Free text
comment		Any additional information about the provision.	0..1	char(255)	Free text

4.1.11 ConformanceClass

This class represents a conformance class, as specified in ISO 19105:2000.

Table 14 – Attributes of the ConformanceClass class

Name	Alias	Definition	Multiplicity	Type	Domain
name		Name of the conformance class	1	char(128)	Free text
comment		Any additional information about the conformance class.	0..1	char(255)	Free text

4.1.12 AbstractTestModule

This class represents an abstract test module, as specified in ISO 19105:2000.

Table 15 – Attributes of the AbstractTestModule class

Name	Alias	Definition	Multiplicity	Type	Domain
name		Name of the abstract test module	1	char(128)	Free text
paragraphNo		The paragraph number in the TC211Edition where the abstract test module is specified.	1	char(16)	Free text
comment		Any additional information about the abstract test module	0..1	char(255)	Free text

4.1.13 AbstractTestCase

This class represents an abstract test case, as specified in ISO 19105:2000.

Table 16 – Attributes of the AbstractTestCase class

Name	Alias	Definition	Multiplicity	Type	Domain
name		Name of the abstract test case	1	char(128)	Free text
paragraphNo		The paragraph number in the TC211Edition where the abstract test case is specified.	1	char(16)	Free text
testPurpose		A description of the objective which is intended to be achieved by the test.	1	char(255)	Free text
testType		Indicates the type of conformance test.	1	TestType	Any valid element from the TestType enumeration
comment		Any additional information about the abstract test cas	0..1	char(255)	Free text

4.2 Enumerations

The following subsections describe the enumeration types that are used for some of the attributes in the previous section.

4.2.1 ISOEditionType

This enumeration specifies the deliverables of ISO/IEC technical work. The development of International Standards, Technical Specifications, Publicly Available Specifications and Technical Reports are described in ISO/IEC Directives, Part 1, *Procedures for the technical work*. In addition, the enumeration has the following three elements:

- 'directives': A document that is published by ISO and/or IEC as a directive.
- 'guide': A document that is published by ISO and/or IEC as a guide on matters related to international standardization.
- 'reviewSummary': The deliverable (report) produced by a stage zero project.

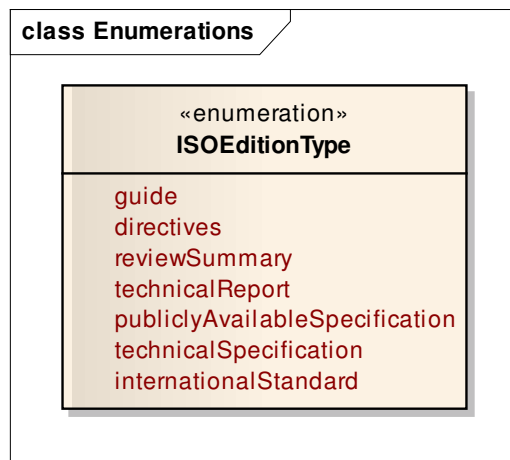


Figure 2 – ISOEditionType enumeration type

4.2.2 ISOPreStage

This enumeration specifies the sequence of project stages through which the ISO/IEC technical work is developed, as described in ISO/IEC Directives, Part 1, *Procedures for the technical work*. The ISO harmonized stage code is included as a suffix in the element name, e.g. '_00' in 'preliminaryStage_00'.

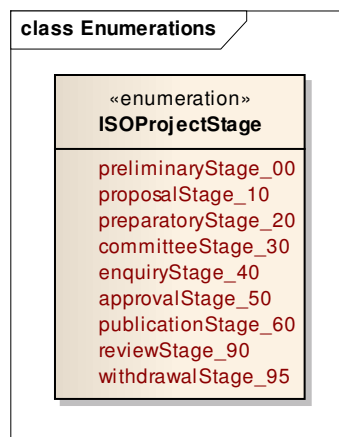


Figure 3 – ISOPreStage enumeration type

4.2.3 ISOProjectSubstage

This enumeration provides a further refinement of the stages through which the ISO/IEC technical work is developed (http://www.iso.org/iso/standards_development/processes_and_procedures/stages_description/stages_table.htm). The harmonized substage code is included as a prefix in each element name, e.g. '00.00' in '00.00_ProposalForNewProjectReceived'.



Figure 4 – ISOProjectSubstage enumeration type

4.2.4 PublicationType

The elements of this enumeration identify the type of publication. This enumeration might not be complete and might therefore be augmented as the dependency database is populated.

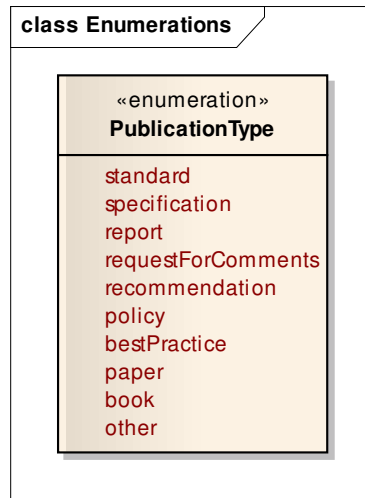


Figure 5 – PublicationType enumeration type

4.2.5 TestType

This enumeration identifies the two types of abstract test cases, as specified in ISO 19105:2000.

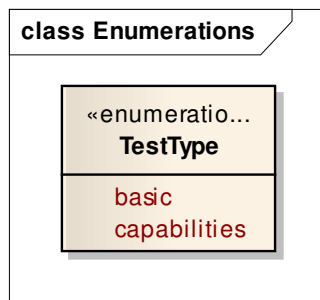


Figure 6 – TestType enumeration type

4.2.6 UMLElementType

The elements of this enumeration identify the type of UML element. This enumeration is not complete.

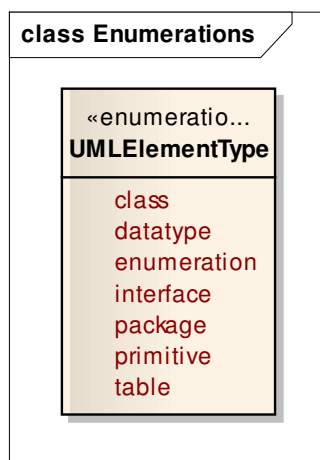


Figure 7 – UMLElementType enumeration type

4.3 Associations

Table 17 – Associations

Source class	Source role	Association label	Target class	Target role	Description of the association
AbstractTestCase	test	tests	Requirement	requirement	An abstract test case is a generalized test for a specific requirement in an ISO/TC 211 edition. An abstract test case tests one or more requirements, and a requirement is always by an abstract test case. EXAMPLE: The 'Construction' abstract test case specified in A.2.2 of ISO 19112:2003, test the requirements specified in 8.1 of the edition.
AbstractTestModule			AbstractTestCase		An abstract test module is a set of related abstract test cases. EXAMPLE: In Annex D of ISO 19115:2003, the abstract test cases are grouped into 'Metadata', 'User-defined extensions metadata', and 'Metadata profiles'.
AbstractTestModule	parent		AbstractTestModule	child	Abstract test modules can be arranged in a hierarchy of abstract test modules and abstract test cases, with abstract test cases at the lowest level (leafs) (ISO 19105:2000).
Amendment		inherits from	Modification		The Amendment class is derived from the Modification class.
Committee		prepares	Edition		An edition can be prepared by a committee. EXAMPLE: ISO 19111:2003 was prepared by ISO/TC 211; ISO/IEC 10646:2003 was prepared by JTC 1/SC 2. Other editions are not prepared by committees, e.g. 'Drugg RD, Egenhofer MJ and Kuhn W (1997): Formalizing Behavior of Geographic Features, Geographical Systems, Vol. 4, No.2, pp159-179'
ConformanceClass		specifies	AbstractTestModule	abstractTestSuite	An abstract test suite is the abstract test module specifying all the requirements to be satisfied for the conformance class (ISO 19105:2000). EXAMPLE: The 'Conformance of a gazetteer' abstract test suite specified in A.2 of ISO 19112:2003, specifies the tests to be satisfied for the conformance class 'Gazetteer'.
Corrigendum		inherits from	Modification		The Corrigendum class is derived from the Modification class.

Source class	Source role	Association label	Target class	Target role	Description of the association
Document			Edition		A document has one or more editions, each with a different year of publication, associated with it. EXAMPLE: ISO 19111:2003 and ISO 19111:2007 are two editions associated to the ISO 19111 document.
Edition		same as	Edition		An edition could be identical to another edition in the case of jointly developed standards. EXAMPLE: ISO 19128:2005 is identical to OGC WMS 1.3.0 (2006)
ISOEdition		Inherits from	Edition		The ISOEdition class is derived from the Edition class.
Modification	modification	modifies	Edition	original	An edition can be modified by a modification. EXAMPLE: ISO 19115:2003/Cor 1:2006 makes corrections to ISO 19115:2003.
Modification	modification	modifies	Modification	original	A modification could modify a modification.
Permission		inherits from	Provision		The Requirement class is derived from the Provision class.
Provision		references (undated)	Document	reference	A document can be referenced zero or more times in a provision. A provision could reference zero or more documents in its text. EXAMPLE: The following provision in ISO 19101:2002, paragraph 6.4.3, references the ISO 19109 document: 'An application schema shall be created using rules defined in ISO 19109, for the specific conceptual schema language that assure that the application schema conforms to the relevant standards in the ISO 19100 series of standards.'
Provision		references (dated)	Edition	reference	An edition can be referenced zero or more times in a provision. A provision could reference zero or more editions in its text.

Source class	Source role	Association label	Target class	Target role	Description of the association
					<p>EXAMPLE:</p> <p>The following provision in ISO 19106:2004, paragraph 8.2.2, references the ISO/IEC TR 10000-1:1998 edition:</p> <p>'In those cases where a required element of functionality needs to be described that does not exist in an approved base standard, the profile shall be drafted in such a way that it clearly identifies what required functionality is missing from the profile. In addition, the profile may make informative reference to examples of possible specifications which the user of the profile may choose to implement in conjunction with the profile to complete the desired function [adapted from: ISO/IEC TR 10000-1:1998, 6.1.4 c].'</p>
Publisher		publishes	Edition		<p>A publisher publishes zero or more editions. An edition is always published by a publisher.</p> <p>EXAMPLE:</p> <p>ISO published ISO 19111:2003; OGC published the OGC WMS 1.3.0 (2006); and ISO/IEC published ISO/IEC 10646:2003.</p>
Recommendation		inherits from	Provision		The Requirement class is derived from the Provision class.
ReferencedTerm		referenced from (undated)	Document	termReference	<p>A referenced term could be referenced from a document (or an edition, see row below).</p> <p>EXAMPLE:</p> <p>In ISO 19111:2007, the term 'tuple' (<i>ReferencedTerm</i>) is referenced from ISO 19136 (<i>Document</i>).</p>
ReferencedTerm		referenced from (dated)	Edition	termReference	<p>A referenced term could be referenced from an edition (or a document, see row above).</p> <p>EXAMPLE:</p> <p>In ISO 19118:2005, the term 'dataset' (<i>ReferencedTerm</i>) is referenced from ISO 19115:2003 (<i>Edition</i>).</p>
ReferencedUMLElement		referenced from (undated)	Document	umlReference	<p>A referenced UML element could be referenced from a document (or an edition, see row below).</p> <p>EXAMPLE:</p> <p>In ISO 19111:2007, paragraph 7.1 and Figure 5, RS_Identifier (<i>ReferencedUMLElement</i>) from ISO 19115 (<i>Document</i>) is used:</p> <p>'Object primary names have a data type RS_Identifier which is defined in ISO 19115 whilst aliases have a data type GenericName which is defined in ISO/TS 19103.'</p>

Source class	Source role	Association label	Target class	Target role	Description of the association
ReferencedUMLElement		referenced from (dated)	Edition	umlReference	A referenced UML element could be referenced from an edition (or a document, see row above).
Requirement		inherits from	Provision		The Requirement class is derived from the Provision class.
Supplement		inherits from	Modification		The Supplement class is derived from the Modification class.
TC211Edition		specifies	AbstractTestModule	abstractTestSuite	An abstract test suite is the abstract test module specifying all the requirements to be satisfied for conformance with a TC211Edition (ISO 19105:2000). EXAMPLE: The abstract test suite specified in Annex D of ISO 19115:2003, specifies the tests to be satisfied for conformance with the standard.
TC211Edition		defines	ConformanceClass		A TC211Edition may define different kinds of conformance requirements, each represented by a conformance class. EXAMPLE: In section 2 of ISO 19111:2003, two conformance classes are defined: Spatial reference system and Gazetteer.
TC211Edition		references (undated)	Document	bibliographyEntry	An ISO/TC 211 edition may list of zero or more documents in its bibliography. EXAMPLE: ISO ISO 3166-1 is listed in the bibliography of ISO 19112:2003.
TC211Edition		normatively references (undated)	Document	normativeReference	An ISO/TC 211 edition lists one or more documents in its section 3, Normative References. EXAMPLE: In section 3, Normative references, of ISO 19111:2007, ISO 19108 is listed as a normative reference.
TC211Edition		references (dated)	Edition	bibliographyEntry	An ISO/TC 211 edition may list zero or more editions in its bibliography. EXAMPLE: ISO 19101:2002 is listed in the bibliography of ISO 19110:2005.
TC211Edition		normatively references (dated)	Edition	normativeReference	An ISO/TC 211 edition lists one or more editions in its section 3, Normative References.

Source class	Source role	Association label	Target class	Target role	Description of the association
					EXAMPLE: In section 3, Normative references, of ISO 19109:2005, ISO 19108:2002 is listed as a normative reference.
TC211Edition		inherits from	ISOEdition		The TC211edition class is derived from the ISOEdition class.
TC211Edition		has	Provision		An ISO/TC 211 edition has zero or more provisions that specify criteria for conformance.
TC211Edition		references	ReferencedTerm		A TC211Edition references zero or more terms, the referenced terms. A referenced term is always referenced from a TC211Edition. EXAMPLE: In ISO 19111:2007 (<i>TC211Edition</i>), the term 'tuple' (<i>ReferencedTerm</i>) is referenced from ISO 19136.
TC211Edition		uses	ReferencedUMLElement		A TC211Edition uses zero or more UML elements, the referenced UML elements. A referenced UML element is always used from a TC211Edition. EXAMPLE: In ISO 19111:2007 (<i>TC211Edition</i>), paragraph 7.1 and Figure 5, RS_Identifier (<i>ReferencedUMLElement</i>) from ISO 19115 is used: 'Object primary names have a data type RS_Identifier which is defined in ISO 19115 whilst aliases have a data type GenericName which is defined in ISO/TS 19103.'

NOTE:

A modification of a TC211Edition can have the same associations as a TC211Edition but they are not listed here for simplicity reasons.

5 The ISO/TC 211 dependency database

The instance of the logical model described in the previous section is referred to as the ISO/TC 211 dependency database. The database is maintained by the PMG.

5.1 Dependencies recorded in the database

All types of dependencies as they appear in both the normative and informative content of a standard are described by the logical data model in section 4. However, not all of them are recorded in the ISO/TC 211 dependency database. The scope, normative reference, term and provision dependencies are recorded in the *ScopeDependency*, *NormativeReference*, *ReferencedTerm* and *ProvisionDependency* tables, which implement the respective dependencies in the database. UML dependencies are not recorded in this database because they are inherently part of the ISO/TC 211 Harmonized Model, which is maintained by the HMMG.

5.2 Maintenance

Maintenance of the ISO/TC 211 dependency database is the responsibility of the PMG.

Information about the scope, normative reference, term and provision dependencies shall be provided in a spreadsheet to the PMG chair who will load the dependency information into the database. The spreadsheet is available at <http://www.isotc211.org/pmg/dependencies.htm>.

Dependency information shall be provided as follows:

For standards under development (including revisions), by the *project leader and/or editor* at the time of publication from the a committee stage onwards

For standards coming up for systematic review by the *working group convenor* in whose group the standard was developed, four months prior to the systematic review

For other published standards by the *PMG chair* provision dependencies (others are already in the database) from time to time as required.

5.3 Publication

The PMG chair publishes the ISO/TC 211 dependency database at least twice a year between plenary weeks at <http://www.isotc211.org/pmg/dependencies.htm>

The ISO/TC 211 dependency database is published as a Microsoft Access database (MDB) and as a number of spreadsheets (XLS).

Release notes are published to describe changes and additions since the previous version.

6 Bibliography

ISO 19101:2002, *Geographic information – Reference model*

ISO 19105:2000, *Geographic information – Conformance and testing*

ISO 19106:2004, *Geographic information – Terminology*

ISO 19109:2005, *Geographic information – Rules for application schema*

ISO 19110:2005, *Geographic information – Methodology for feature cataloguing*

ISO 19111:2003, *Geographic information – Spatial referencing by coordinates*

ISO 19111:2007, *Geographic information – Spatial referencing by coordinates*

ISO 19112:2003, *Geographic information – Spatial referencing by geographic identifiers*

ISO 19115:2003, *Geographic information – Metadata*

ISO 19118:2005, *Geographic information – Encoding*

ISO 19119:2005, *Geographic information – Services*

ISO 19128:2005, *Geographic information – Web Map Server interface*

ISO/TS 19139:2007, *Geographic information – Metadata – XML implementation*

ISO/IEC Directives, Part 1, Procedures for the technical work.

ISO/IEC Directives, Part 2, Procedures for the structure and drafting of International Standards.