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Geographic information — Methodology for feature cataloguing

AMENDMENT 1

Information géographique — Méthodologie de catalogage des entités

AMENDEMENT 1

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to ISO 19110:2005 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

Introduction

This amendment is based on experience in implementing ISO 19110:2005, experience and lessons learned by the ISO 19126 project team, harmonization with other ISO/TC 211 standards, and in particular establishment of an eXtensible Mark-up Language (XML) schema encoding for feature catalogues. This amendment provides XML schemas that are meant to enhance interoperability by providing a common specification for describing, validating, and exchanging feature catalogue information.

The changes in this amendment aim to:

— facilitate the use of ISO 19110:2005 to create geographic feature catalogues;

— ensure a consistent description of the feature types of an application schema;

— enhance the compliance of ISO 19110:2005 with ISO 19109;

— enable an XML schema implementation, based on ISO/TS 19139 encoding rules, of ISO 19110:2005-compliant feature catalogues;

— enable the registration of feature catalogues and their feature types.

Geographic information — Methodology for feature cataloguing

AMENDMENT 1

Page 1, Scope

Replace the entire clause with the following:

This International Standard defines the methodology for cataloguing feature types. This International Standard specifies how feature types can be organized into a feature catalogue and presented to the users of a set of geographic data. This International Standard is applicable to creating catalogues of feature types in previously uncatalogued domains and to revising existing feature catalogues to comply with standard practice. This International Standard applies to the cataloguing of feature types that are represented in digital form. Its principles can be extended to the cataloguing of other forms of geographic data. Feature catalogues are independent of feature concept dictionaries defined in ISO 19126 and can be specified without having to use or create a feature concept dictionary.

This International Standard is applicable to the definition of geographic features at the type level. This International Standard is not applicable to the representation of individual instances of each type. This International Standard excludes portrayal schemas as specified in ISO 19117.

This International Standard can be used as a basis for defining the universe of discourse being modelled in a particular application, or to standardize general aspects of real world features being modelled in more than one application.

Page 1, Conformance

Replace the entire clause with the following:

Because this International Standard specifies a number of options that are not required for all feature catalogues, this clause specifies five conformance classes. These classes are differentiated on the basis of the following criteria.

a) Which elements of a feature type are required in a catalogue:

   1) feature attributes only?

   2) feature attributes and feature associations?

   3) feature attributes, feature associations, and feature operations?

b) Is there a requirement for defining global feature attributes, feature associations, and feature operations which may be bound to multiple feature types?

c) Is there a requirement to include inheritance relationships in the feature catalogue?

Annex A specifies a test module for each of the conformance classes, as shown in Table 1.

Table 1 — Conformance classes

Attributes only	Attributes and associations	Attributes, associations and operations	Global properties	Inheritance relationships included	Test module
×	—	—	—	—	A.17
—	×	—	—	—	A.18
—	—	×	—	—	A.19
—	—	—	×	—	A.22
×	—	—	—	×	A.23
—	×	—	—	×	A.24
—	—	×	—	×	A.25

NOTE   The initial test module numbers are kept, even if some of the test modules are removed. The numbering can be subject to change on publication of any new edition of this International Standard.

Page 2, Normative references

Update the entries for ISO/TS 19103:— and ISO 19109:—, delete footnote 1), and add ISO 19135:2005 and ISO/TS 19139:2007:

ISO/TS 19103, *Geographic information — Conceptual schema language*

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

ISO 19135:2005, *Geographic information — Procedures for item registration*

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

Page 3, Terms and definitions

Replace entry 4.4 with the following:

feature catalogue
catalogue containing definitions and descriptions of the **feature** (4.1) types, **feature attributes** (4.3), and **feature relationships** (4.8) occurring in one or more sets of geographic data, together with any **feature operations** (4.5) that may be applied

[ISO 19101:2002, definition 4.13]

Add the following terms and definitions:

4.7
feature inheritance
mechanism by which more specific **features** (4.1) incorporate structure and behaviour of more general features related by behaviour

4.8
feature relationship
feature association (4.2) or **feature inheritance** (4.7)

Page 3, Abbreviations

Add the following heading under "5 Abbreviations"

5.1 Acronyms

Add the following after the new 5.1:

5.2 Namespace abbreviations

In the list below, the item on the left describes the common namespace prefix used to describe the elements in the namespace. The second item is an English description of the namespace prefix, and the item in parenthesis is the URI of the actual namespace. These URIs do not correspond necessarily to an effective location of the schemas.

This list corresponds to the namespaces used by this International Standard.

gco   Geographic Common extensible markup language   (http://www.isotc211.org/2005/gco)

gfc   Geographic Feature Cataloguing   (http://www.isotc211.org/2005/gfc.)

gmd   Geographic MetaData extensible markup language   (http://www.isotc211.org/2005/gmd)

gmx   Geographic Metadata XML Schema   (http://www.isotc211.org/2005/gmx)

Page 4, 6.1

Replace the text in 6.1 with the following:

A feature catalogue shall present the abstraction of reality represented in one or more sets of geographic data. The basic level of abstraction in a feature catalogue shall be the feature type. A feature catalogue shall be available in electronic form for any set of geographic data that contains features. A feature catalogue may also comply with the specifications of this International Standard independently of any existing set of geographic data.

Page 4, 6.2.1

Add the following text at the end of 6.2.1:

Annex E specifies XML encoding for feature catalogue, Annex F specifies concepts that permit the management of feature catalogue either in a multi-part register or in a hierarchical register containing multi-part subregisters, in accordance with ISO 19135. Annex G provides an example of XML implementation of this International Standard.

Page 4, 6.2.2

Replace the first sentence of 6.2.2 with the following:

A template for the representation of feature catalogues is specified in Annex B.

Page 4, 6.2.3.1

Replace the text in 6.2.3.1 with the following:

All feature types and feature properties (i.e. feature attributes, feature associations, association roles, and feature operations) included in a feature catalogue shall be identified by a name. The name of a feature type is unique within that feature catalogue. The name of a feature property (whether the feature property is a global property bound to the feature type or is local to the feature type) is unique within its feature type. The name of a global feature property is unique within that feature catalogue.

Page 6, A.1

In the 2nd and 3rd paragraph, replace "Tables B.1 through B.15" with "Tables B.1 through B.16".

Page 7, A.3

Replace bullet 2) with the following:

2) that all feature types, all feature association and all global feature properties (feature role, feature attribute or feature operation not directly owned by a feature type) are identified by a name that is unique within the feature catalogue,

Add the following bullet point after 6):

7) that all carriers of characteristics of a feature type are identified by a name that is unique in the context of that feature type.

Page 8, A.7

Replace bullet b), with the following [deleting 1) and 2)]:

b) test method: test each attribute and role listed in Table B.5 (and Table B.4) by verifying that for each the specified description, obligation/condition, maximum occurrence, type, and constraint are satisfied;

Page 9, A.10

Replace bullet b) with the following:

b) test method: test each attribute and role listed in Table B.8 and Table B.4 by verifying that for each the specified description, obligation/condition, maximum occurrence, type, and constraint are satisfied;

Page 10, A.11

Delete bullet 2).

Page 12, A.19

Replace bullet b) with the following [deleting 1), 2) and 3)]:

b) test method: perform test module A.18 and test case A.7 (feature operation);

Page 13, A.22

Replace the text in A.22 with the following:

Information for the test module is as follows:

a) test purpose: verify that feature catalogue supports core representation functionality, comprised of feature types, and feature properties (i.e. feature attributes, association roles, and feature operations) either directly owned by a single feature type or globally defined in the feature catalogue;

b) test method: perform test module A.8, A.16 and A.18;

c) reference: A.8, A.16 and A.18;

d) test type: capability.

Page 16, Annex B

In the first paragraph, replace "Tables B.1 through B.15" with "Tables B.1 through B.16".

In the second paragraph, replace "Figure B.1" with "Figure B.1 a), b), and c)".

In the last line, delete "ISO 19109:—[1)]" and insert "ISO 19109:2005".

Page 17, Annex B

Replace Table B.1 with the following:

Table B.1 — Feature catalogue

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence[b]	Type	Constraint
1	Class FC_FeatureCatalogue	a feature catalogue contains the definition of some number of feature types with other information necessary for those definitions	—	—	—	—
	Subtype of CT_Catalogue	see ISO/TS 19139	—	—	—	—
1.1	Attribute producer	name, address, country, and telecommunications address of person or organization having primary responsibility for the intellectual content of this feature catalogue	M	1	ISO 19115 Metadata:: CI_ResponsibleParty	—
1.2	Attribute functionalLanguage	formal functional language in which the feature operation formal definition occurs in this feature catalogue	C/Mandatory if feature operation formal definition occurs in feature catalogue	1	CharacterString	—
1.3	Role featureType	role that links this feature catalogue to the feature types that it contains	M	N	FC_FeatureType	Aggregation
1.4	Role definitionSource	role that links this feature catalogue to the sources of definitions of feature types, property types, and listed values that it contains	O	N	FC_DefinitionSource	Aggregation
1.5	Role inheritanceRelation	role that links this feature catalogue to the inheritance relationships that it contains	O	N	FC_InheritanceRelation	Aggregation
1.6	Role globalProperty	role that links this feature catalogue to the global feature properties, i.e. the feature properties which may be bound to many feature types	O	N	FC_PropertyType	Composition

[a] M = mandatory; O = optional; C = conditional.

[b] N = repeating occurrences.

Pages 18 and 19, Annex B

In Table B.2, replace rows 2, 2.9 and 2.11 with the following:

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence[b]	Type	Constraint
2	Class FC_FeatureType	class of real world phenomena with common properties	—	—	—	typeName realizes GF_FeatureType ::typeName; isAbstract realizes GF_FeatureType ::isAbstract; constrainedBy realizes GF_FeatureType ::constrainedBy
2.9	Role carrierOfCharacteristics	role that links this feature type to the property types that it contains	O	N	FC_CarrierOfChara cteristics	Composition
2.11	Role definitionReference	role that links this feature type to the source of its definition	O	1	FC_DefinitionRefer ence	Aggregation

Page 19, Annex B

In Table B.3, replace row 3.1 with the following:

No.	Name/Role Name	Description	Obligation/ Condition	Maximum Occurrence	Type	Constraint
3.1	Attribute name	text string that uniquely identifies this inheritance relation within the feature catalogue that contains this inheritance relation	O	1	CharacterString	—

Page 20, Annex B

Add the following Table B.4a before Table B.4.

Table B.4a — Carrier of characteristics

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence[b]	Type	Constraint
4bis	Class FC_CarrierOfCharact eristics	abstract class for local feature properties and bound global properties of a feature type	—	—	—	—
4bis. 1	Role featureType	role that links the local and bound properties with the feature type that contains them	C/Mandatory for local properties	1	FC_FeatureType	—
4bis. 2	Role constrainedBy	role that links a carrier of characteristics to the constraints placed upon it	O	N	FC_Constraint	Aggregation
[a] O = optional; C = conditional.						
[b] N = repeating occurrences.						

Page 20, Annex B

Update and extend Table B.4 with the following:

Table B.4 — Property type

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence	Type	Constraint
4	Class FC_PropertyType	abstract class for local and global feature properties	—	—	—	—
	Subtype of FC_CarrierOfCharacteristics	Table B.4a	—	—	—	—
4.1	Attribute memberName	member name that locates this member within a feature type for a local property or within the feature catalogue for a global property	M	1	LocalName	—
4.2	Attribute definition	definition of the member in a natural language: This attribute is required if the definition is not provided by FC_FeatureCatalogue::definitionSource. If not provided, the definitionReference should specify a citation where the definition may be found, and any additional information as to which definition is to be used	C/Mandatory if not provided by definition source	1	CharacterString	—
4.3	Attribute cardinality	cardinality of the member in the feature class. If this is an attribute or operation, the default cardinality is 1. If this is an association role, then the default cardinality is 0..*. For operations, this is the number of return values possible. This is an elaboration of the GFM to allow for complete specifications for various programming and data definition languages	M	1	Multiplicity	Initial value =1
4.6	Role definitionReference	role that links this instance to the source of its definition	O	1	FC_DefinitionReference	Aggregation
4.7	Role featureCatalogue	feature catalogue to which a global property pertains	C/Mandatory for a global property	1	FC_FeatureCatalogue	—
[a] M = mandatory; O = optional; C = conditional.						

Page 21, Annex B

In Table B.5, replace rows 5.3, 5.4 and 5.5 with the following:

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence[b]	Type	Constraint
5.3	Role triggeredByValuesOf	specifies attribute which may trigger an operation	O	N	FC_Carrier OfCharact eristics	Shall be instantiated as FC_FeatureAttribute, FC_BoundFeatureAttribute or one of their derived classes.
5.4	Role observesValuesOf	specifies attribute that may be used as input to perform an operation	O	N	FC_Carrier OfCharact eristics	Shall be instantiated as FC_FeatureAttribute, FC_BoundFeatureAttribute or one of their derived classes.
5.5	Role affectsValuesOf	specifies attribute that will be affected by an operation	O	N	FC_Carrier OfCharact eristics	Shall be instantiated as FC_FeatureAttribute, FC_BoundFeatureAttribute or one of their derived classes.

Page 21, Annex B

Replace Table B.6 with the following:

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence	Type	Constraint
6	Class FC_Binding	class that is used to describe the specifics of how a property type is bound to a particular feature type	—	—	—	—
	Subtype of FC_CarrierOfCh aracteristics	Table B.4a	—	—	—	—
6.1	Attribute description	description of how a property type is bound to a particular feature type	O	1	CharacterString	—
6.2	Role globalProperty	role that links to the bound global property	M	1	FC_PropertyType	—
[a]	M = mandatory; O = optional.					

Page 22, Annex B

In Table B.8, replace rows 8.3 and 8.4 with the following:

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence[b]	Type	Constraint
8.3	Attribute listedValue	if present, it defines the permissible values of this feature attribute as a restriction of the attribute valueType. If not present, there is no restriction on the valueType.	O	1	FC_ListedValue	—
8.4	Attribute valueType	type of the value of this feature attribute; a name from some namespace	C/Mandatory for local feature attribute	1	TypeName	—

Page 23, Annex B

In Table B.9, replace row 9.6 with the following:

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence	Type	Constraint
9.6	Role rolePlayer	type of the target value of this association role	C/Mandatory for a local association role	1	FC_Feature Type	—

Page 24, Annex B

In Table B.11, replace row 11.4 with the following:

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence	Type	Constraint
11.4	Role definitionReference	role that links this instance to the source of its definition	O	1	FC_DefinitionReference	Aggregation

Page 24, Annex B

In Table B.12, replace row 12.1 with the following:

	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence[b]	Type	Constraint
12.1	Role roleName	roles that are a part of this association	M (minimum occurrence: 2)	N	FC_AssociationRole	Composition

Page 25, Annex B

Replace Table B.15 with the following:

Table B.15 — Bound feature attribute

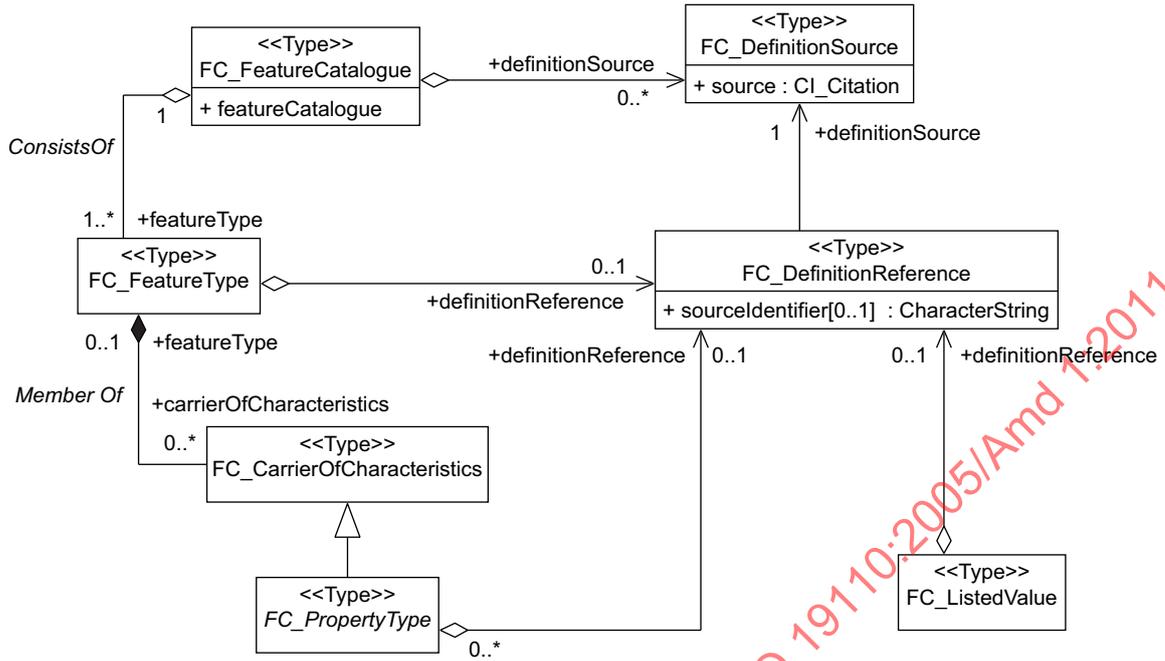| No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence	Type	Constraint
15	Class FC_BoundFeatureAttribute	class that is used to describe the specifics of how a global feature attribute is bound to a particular feature type	—	—	—	—
	Subtype of FC_Binding	Table B.6	—	—	—	—
15.1	Attribute valueType	type of the value of this feature attribute; a name from some namespace	C/Mandatory if the value type of the feature attribute is not defined globally	1	TypeName	—
[a] C = conditional.						

Page 25, Annex B

Insert Table B.16 after Table B.15:

Table B.16 — Bound association role

No.	Name/Role Name	Description	Obligation/ Condition[a]	Maximum Occurrence	Type	Constraint
16	Class FC_BoundAssociationRole	class that is used to describe the specifics of how a global association role is bound to a particular feature type	—	—	—	—
	Subtype of FC_Binding	Table B.6	—	—	—	—
16.1	Role rolePlayer	target feature type of this association role	C/Mandatory if the target feature type of this association role is not defined globally	1	FC_FeatureType	—
[a] C = conditional.						

Pages 26 to 30, Annex B

Replace Figures B.1 to B.5 with the following.

a) Conceptual model

Figure B.1 (*continued*)

b) **Definition source and reference**
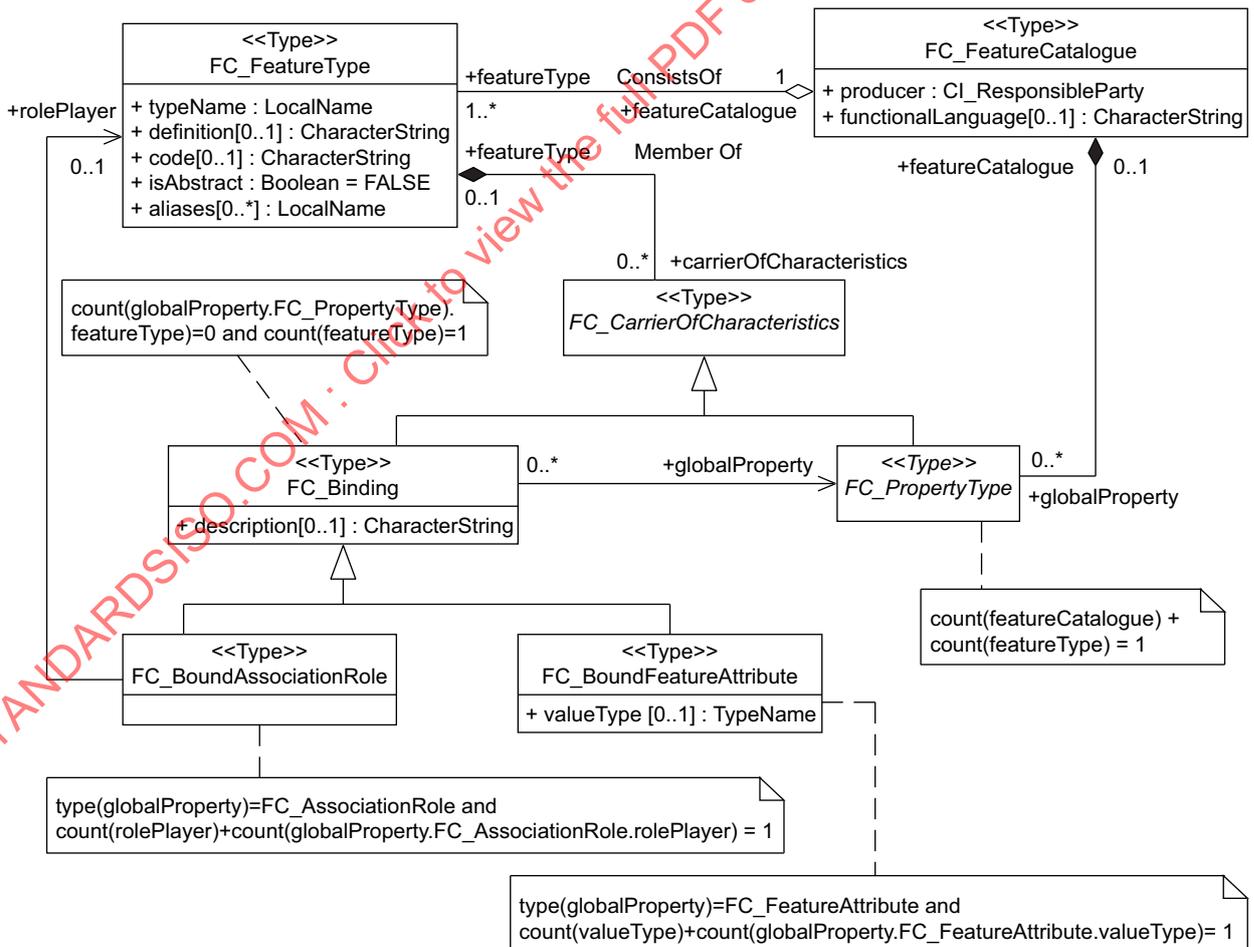
c) **Global properties**

Figure B.1 — Feature catalogue

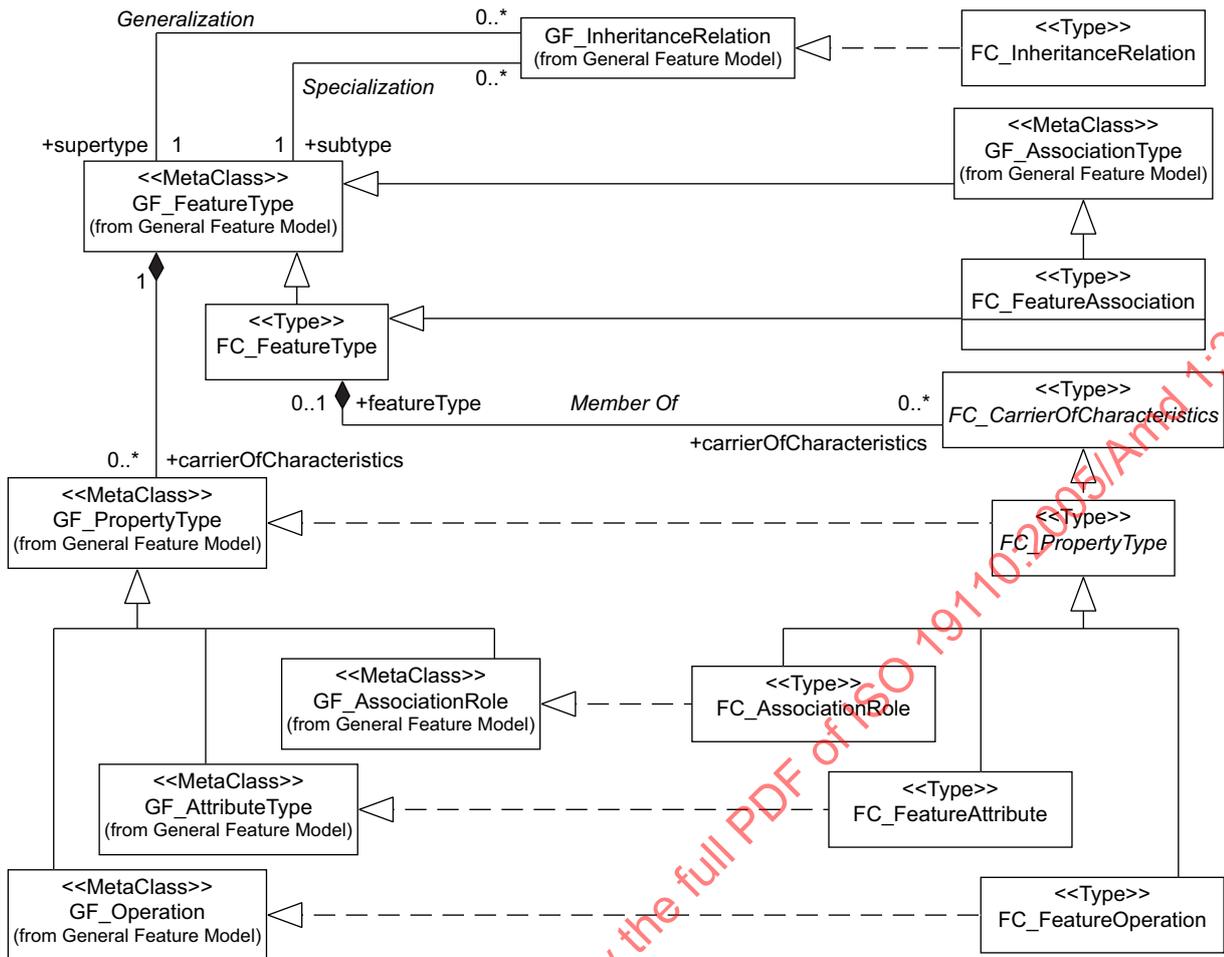**Figure B.2 — Feature cataloguing classes as realizations of general feature model metaclasses**
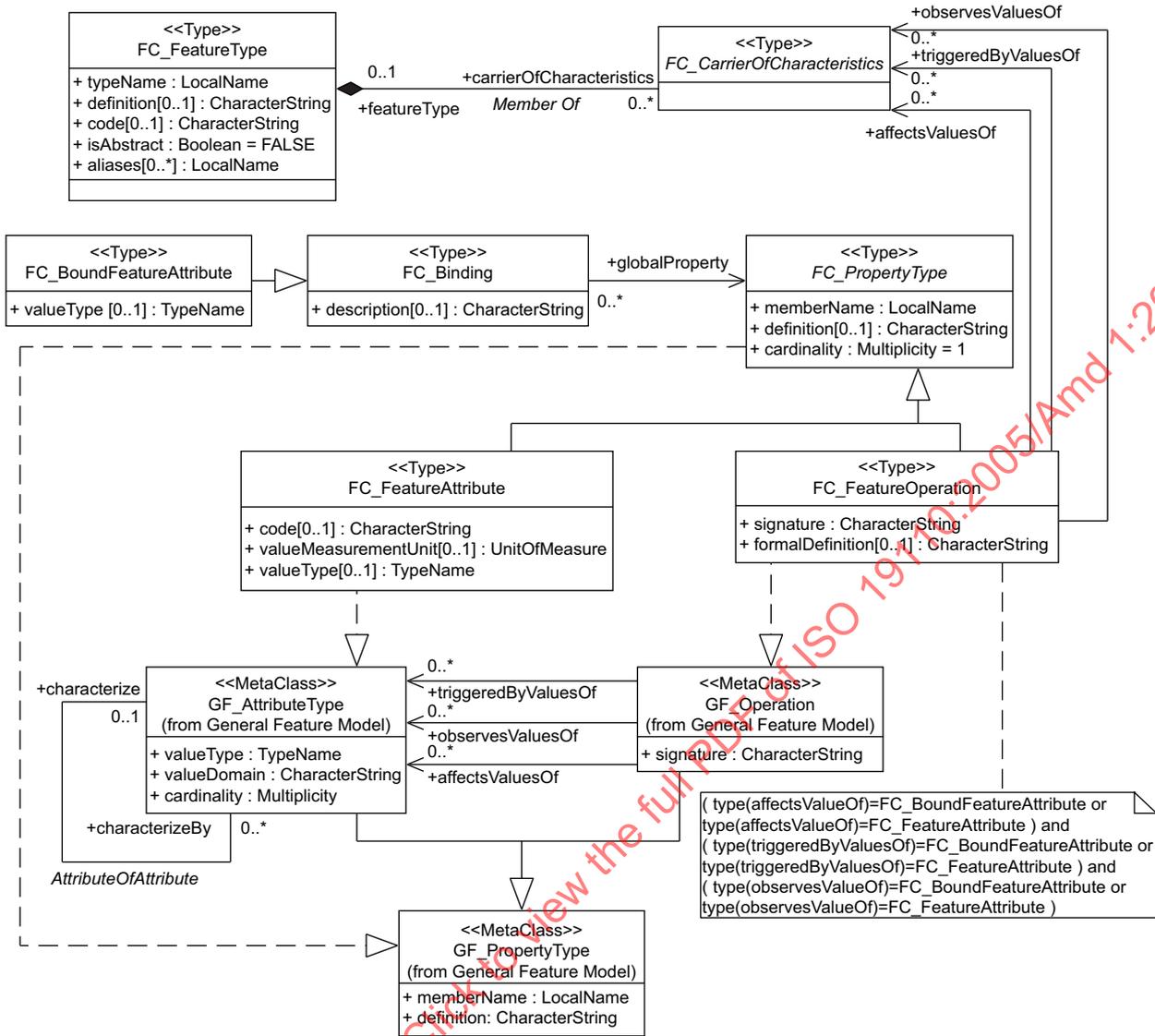
Figure B.3 — Derivation FC_FeatureType, FC_FeatureAttribute, FC_FeatureAssociation, and FC_AssociationRole from general feature model metaclasses

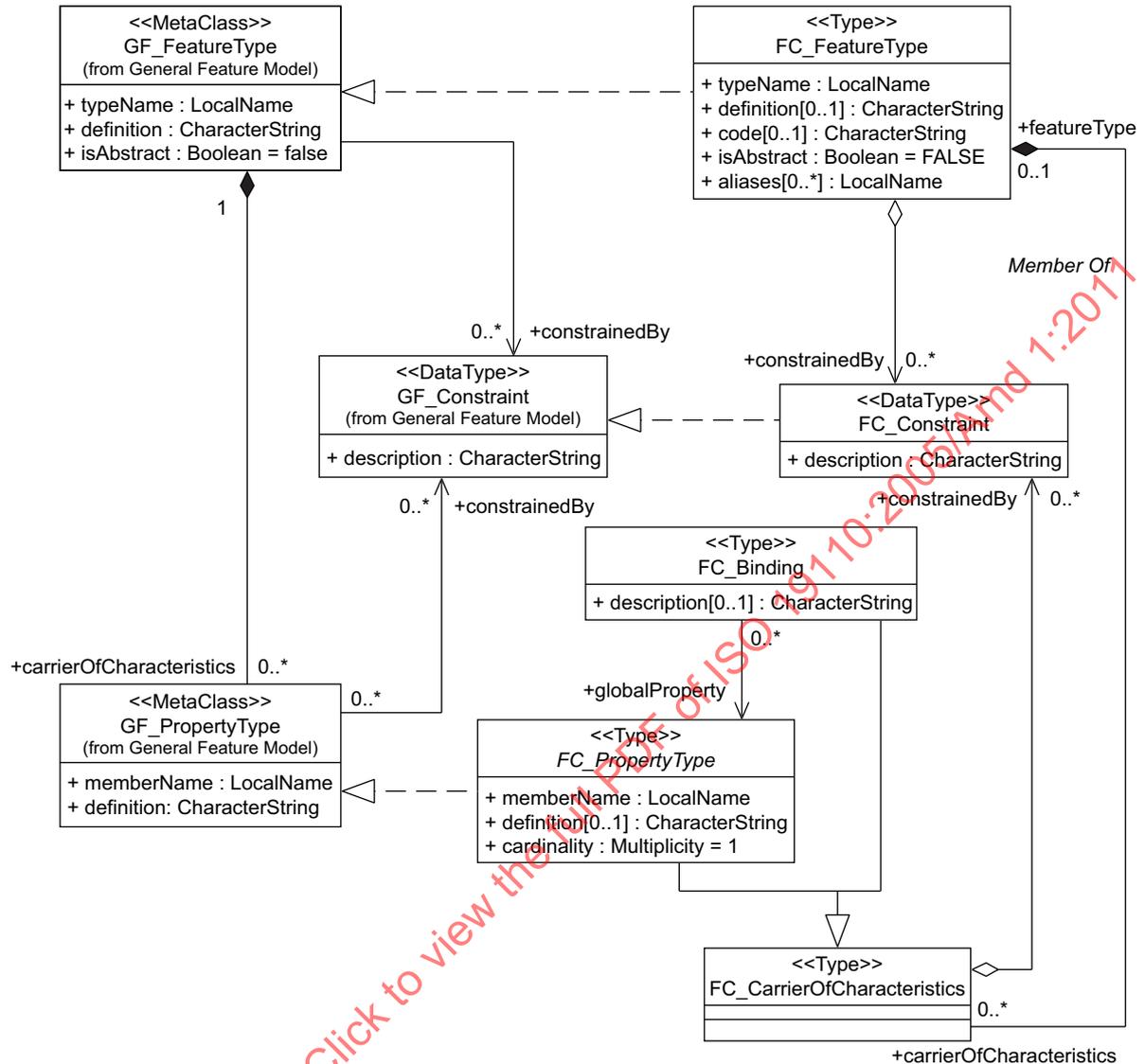**Figure B.4 — Derivation of FC_FeatureOperation from the GF_Operation metaclass**

Figure B.5 — Derivation of FC_Constraint from the GF_Constraint metaclass

Page 31, C.1

Delete the second and third paragraphs.

Page 31, C.2

Replace the two first paragraphs with the following.

A feature catalogue contains its identification and contact information, and definition of some number of feature types with other information necessary for those definitions. Table C.1 illustrates a populated FC_FeatureCatalogue (Table B.1). Only one of the contained feature types is illustrated; in addition, there is one feature association (see C.4) in this sample feature catalogue.

Table C.2 illustrates a populated FC_DefinitionSource (Table B.13) for this sample feature catalogue.

Page 32, C.2

In Table C.1:

delete "Digital Geographic Information Exchange Standard (DIGEST) Feature and Attribute Coding Catalogue (FACC)", insert "A sample feature catalogue" in column 2, row 2;

delete row 8.

Page 33, C.3.1

In Table C.3, delete "**FC_Binding** (identity = 6)" from column 2, row 9.

Page 34, C.3.1

In Table C.4, delete "**FC_Binding** (identity = 6)" from column 2, row 6.

Delete the text immediately after Table C.5 and delete Table C.6.

Page 34, C.3.2

Change the heading as follows:

C.3.2 The abstract representation of a 'berthing structure'

Page 35, C.3.2

In Table C.7, delete "**FC_Binding** (identity = 19)" from column 2, last row.

In Table C.8, delete "**FC_Binding** (identity = 19)" from column 2, row 6.

Page 37, C.3.2

Delete the text immediately after Table C.18 and delete Table C.19.

Page 38, C.4

In Table C.20, delete "**FC_FeatureAssociationRole**", insert "**FC_AssociationRole**" in column 2, row 7.

Delete "**FC_Binding** (*unspecified in this example*)" from column 2, last row.

In Table C.21, delete "**FC_Binding** (*unspecified in this example*)" from column 2, row 8.

Delete the footnote.

In Table C.22, delete "FC_FeatureAssociation.role", insert "FC_FeatureAssociation.roleName" in column 1, rows 7 and 8.

Page 39, C.4

In Tables C.23 and C.24, delete "FC_AssociationRole.valueType", insert "FC_AssociationRole.rolePlayer" in columns 1, last rows.

Page 40, C.5

In Table C.25 and C.26, delete "**FC_FeatureInheritanceRelation**", insert "**FC_InheritanceRelation**", in columns 2, penultimate rows.

Replace the paragraph after Table C.26 with the following:

An instance of a "lighthouse" feature type is also an instance of a "building" feature type; feature properties that apply to the "building" feature type in the sample feature catalogue also apply to the "lighthouse" feature type. Table C.27 illustrates the representation of the "is a" inheritance relation using FC_InheritanceRelation (Table B.3).

Page 41, C.6

In Table C.28, delete "**FC_Binding** (*unspecified in this example*)" from column 2, rows 10, 12, and 14.

In Table C.29, delete "**FC_Binding** (*unspecified in this example*)" from column 2, row 6.

Page 42, C.6

In Table C.30, delete "**FC_Binding** (*unspecified in this example*)" from column 2, row 6.

In Table C.31, delete "**FC_Binding** *s*" from column 2, last row.

In Table C.32, delete "**FC_Binding** (*unspecified in this example*)" from column 2, row 6.

Page 43, C.6

In Table C.33, delete "**FC_Binding** (*unspecified in this example*)" from column 2, row 13 and the last row.

In Table C.34, delete "**FC_Binding** (*unspecified in this example*)" from column 2, row 6.

In Table C.35, delete "**FC_Binding** (*unspecified in this example*)" from column 2, row 6.

Page 44, C.6

In C.6, replace the sixth paragraph (second paragraph on this page) with the following:

The feature operation definition describes the semantics of "raise dam" while the feature operation signature specifies that given a real-valued newHeight and a Dam feature, that feature is accordingly revised.

In Table C.36, delete row 7.

Page 44, C.6

Delete the last paragraph.

Page 45, C.6

Delete Tables C.37, C.38, and C.39.

Page 46, D.1

Replace the first paragraph with the following:

> A feature catalogue forms a repository for a set of definitions to classify real-world phenomena of significance to a particular universe of discourse. The catalogue provides a means for organizing the abstract representation of the data that represent these phenomena, so that the resulting information is as unambiguous, comprehensible, and useful as possible.

Replace the third paragraph with the following:

> Although, for the purposes of this International Standard, feature operations are presented as a fourth major aspect of feature abstraction, they represent a difference in point of view as much as they do a difference in kind. In a functional specification, an operation is triggered by, returns or affects a value (i.e. a feature attribute value) for a given type of geographic feature. If values are observed or affected for more than one feature, the operation also specifies a functional relationship between them. By including feature operations as an additional dimension of feature abstract representation, this International Standard seeks to support the anticipated transition from current practice to a future, more rigorously functional, approach; see Reference [8].

Pages 48 to 54, Annex D

Delete D.6.

Page 55, Bibliography

Update entry [4] as follows and delete footnote 2):

> [4]   ISO 19117, *Geographic information — Portrayal*

Add entry [9]:

> [9]   ISO 19126, *Geographic information — Feature concept dictionaries and registers*

Page 55

Insert Annexes E, F, and G before the Bibliography (see following pages).

Annex E
(normative)

Encoding description

E.1 Introduction

The XML schema implementation of this International Standard follows the encoding rules stated in ISO/TS 19139:2007, Clause 8.

The namespace of the XML implementation of this International Standard is http://www.isotc211.org/2005/gfc. This namespace is abbreviated to gfc, which stands for Geographic Feature Cataloguing.

E.2 XML namespaces

Figure E.1 shows the different namespaces used to implement this International Standard (grey boxes) along with the relationships between these namespaces and the ISO 19100 series packages (white boxes).
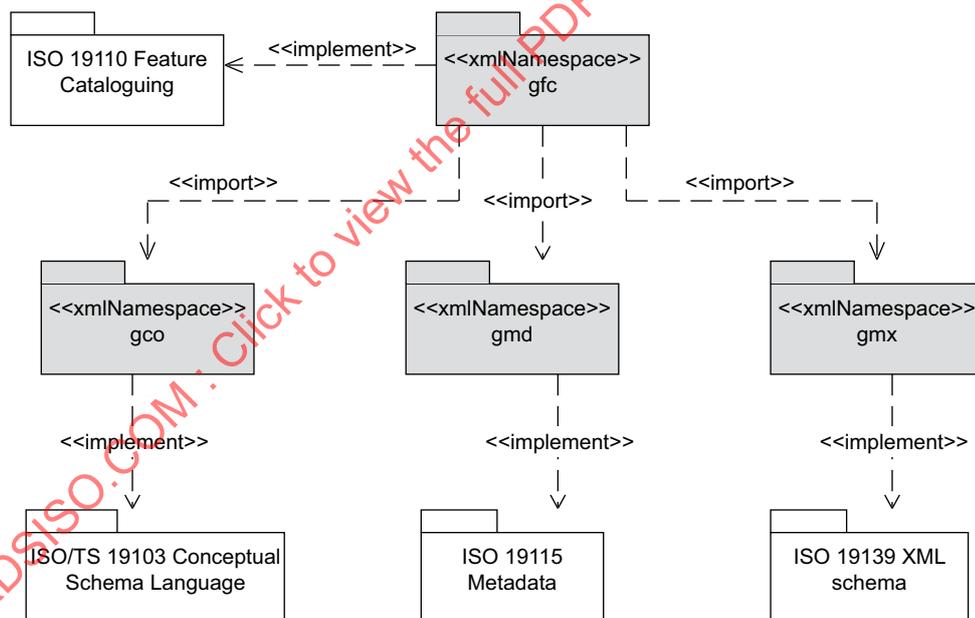
Figure E.1 — XML packaging

E.3 gfc namespace

E.3.1 Organization of the gfc namespace

This namespace contains the implementation of ISO 19110:2005 as defined in this amendment. As shown in Figure E.2, the gfc namespace contains only one XML schema: gfc.xsd.
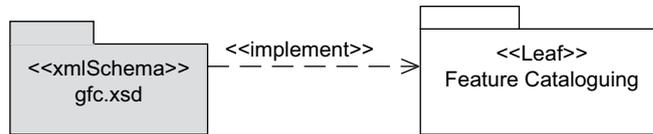

Figure E.2 — Organization of the gfc namespace

E.3.2 gfc.xsd

This XML schema implements all the UML classes defined in ISO 19110:2005: FC_FeatureCatalogue, FC_FeatureType, FC_InheritanceRelation, FC_PropertyType, FC_FeatureOperation, FC_Constraint, FC_FeatureAtttribute, FC_AssociationRole, FC_RoleType, FC_ListedValue, FC_FeatureAssociation, FC_DefinitionSource, FC_DefinitionReference, FC_CarrierOfCharacteristics, FC_BoundFeatureAttribute, FC_BoundAssociationRole, and FC_Binding.

Annex F
(normative)

Management of feature catalogue registers

F.1 Introduction

ISO 19135 specifies procedures for managing a register of items of geographic information, as well as a set of content elements common to all such registers. The content of an instance of RE_Register consists of a set of instances of RE_RegisterItem, which belong to item classes described by instances of RE_ItemClass.

This annex does not prescribe the use of a specific register structure. Instead, it defines concepts that permit the management of feature catalogue either in a multi-part register or in a hierarchical register containing multi-part subregisters. Feature catalogues can indeed be managed as registers, i.e. as instances of RE_Register (ISO 19135), which contain feature types as registered items. They can also be managed as registered items, i.e. as instances of RE_RegisterItem, in a multi-part register.

This annex includes a schema for feature catalogues as a subclass of RE_Register (F.2) as well as a schema for feature catalogues, feature types, feature associations, feature attributes, operations and association roles, inheritance relations, listed values and definition sources as subclasses of RE_RegisterItem (F.3), and specifies a set of instances of RE_ItemClass that describe feature catalogues and their content as item classes (F.4).

F.2 Feature catalogue register as a subclass of RE_Register

F.2.1 Introduction

This annex specifies a subclass of RE_Register (Figure F.1) that represents the description of a feature catalogue. Because the content of this class is in its equivalent class in the feature catalogue schema, it serves only as a pointer from the register to the catalogue, and need not be implemented explicitly.
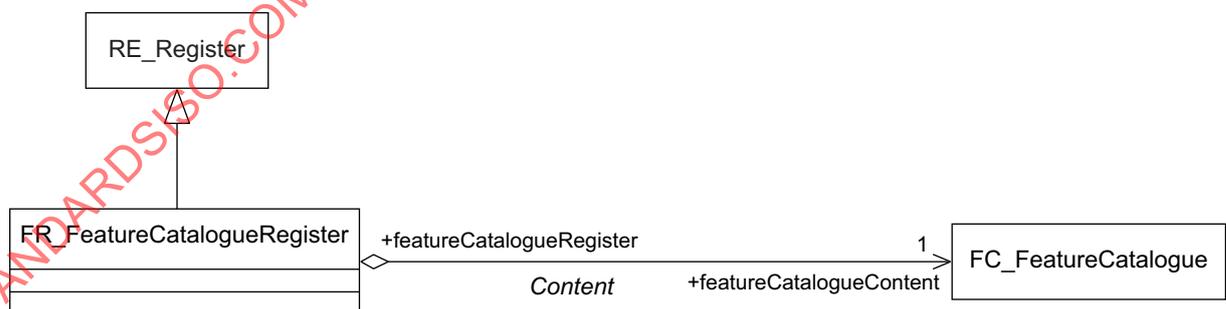

Figure F.1 — Feature catalogue register as a subclass of RE_Register

F.2.2 FR_FeatureCatalogueRegister

F.2.2.1 Introduction

The class FR_FeatureCatalogueRegister shall represent an instance of FC_FeatureCatalogue managed as a register. It inherits all the attributes and associations of RE_Register as specified in ISO 19135:2005, 8.8, and has one additional association.

F.2.2.2 Content

The aggregation association *Content* shall connect the instance of FR_FeatureCatalogueRegister to one and only one instance of FC_FeatureCatalogue. The association shall be navigable from featureCatalogueRegister to featureCatalogueContent, but need not be navigable in the opposite direction.

F.3 Subclasses of RE_RegisterItem for registering the content of a feature catalogue

F.3.1 Introduction

This annex specifies nine subclasses of RE_RegisterItem (Figure F.2) that represent the content of a feature catalogue managed within an instance of RE_Register. These subclasses belong to a single partition of the subclassing of RE_RegisterItem which is identified by the discriminator Feature Catalogue. The generalization relationship carries the constraint {incomplete} because it can be extended to include many different classes of items of geographic information. Because the only content of each of these classes is its equivalent class in the feature catalogue schema, they serve only as pointers from the register to the catalogue, and need not be implemented explicitly.

Figure F.2 — Subclasses of RE_RegisterItem

F.3.2 FR_RegisteredFeatureCatalogue

F.3.2.1 Introduction

The class FR_RegisteredFeatureCatalogue shall represent an instance of FC_FeatureCatalogue managed as a registered item. It inherits all the attributes and associations of RE_RegisterItem as specified in ISO 19135:2005, 8.8, and has one additional association.

F.3.2.2 Content

The aggregation association *Content* shall connect the instance of FR_RegisteredFeatureCatalogue to one and only one instance of FC_FeatureCatalogue. The association shall be navigable from registeredFeatureCatalogue to definedFeatureCatalogue, but need not be navigable in the opposite direction.

F.3.3 FR_RegisteredFeatureType

F.3.3.1 Introduction

The class FR_RegisteredFeatureType shall represent an instance of FC_FeatureType managed as a register item. It inherits all the attributes and associations of RE_RegisterItem as specified in ISO 19135:2005, 8.8, and has one additional association.

F.3.3.2 Content

The aggregation association *Content* shall connect the instance of FR_RegisteredFeatureType to one and only one instance of FC_FeatureType. The association shall be navigable from registeredFeatureType to definedFeatureType, but need not be navigable in the opposite direction.

F.3.4 FR_RegisteredFeatureAttribute

F.3.4.1 Introduction

The class FR_RegisteredFeatureAttribute shall represent an instance of FC_FeatureAttribute managed as a registered item. It inherits all the attributes and associations of RE_RegisterItem as specified in ISO 19135:2005, 8.8, and has one additional association.

F.3.4.2 Content

The aggregation association *Content* shall connect the instance of FR_RegisteredFeatureAttribute to one and only one instance of FC_FeatureAttribute. The association shall be navigable from registeredFeatureAttribute to definedFeatureAttribute, but need not be navigable in the opposite direction.

F.3.5 FR_RegisteredFeatureOperation

F.3.5.1 Introduction

The class FR_RegisteredFeatureOperation shall represent an instance of FC_FeatureOperation managed as a registered item. It inherits all the attributes and associations of RE_RegisterItem as specified in ISO 19135:2005, 8.8, and has one additional association.

F.3.5.2 Content

The aggregation association *Content* shall connect the instance of FR_RegisteredFeatureOperation to one and only one instance of FC_FeatureOperation. The association shall be navigable from registeredFeatureOperation to definedFeatureOperation, but need not be navigable in the opposite direction.

F.3.6 FR_RegisteredAssociationRole

F.3.6.1 Introduction

The class FR_RegisteredAssociationRole shall represent an instance of FC_AssociationRole managed as a registered item. It inherits all the attributes and associations of RE_RegisterItem as specified in ISO 19135:2005, 8.8, and has one additional association.

F.3.6.2 Content

The aggregation association *Content* shall connect the instance of FR_RegisteredAssociationRole to one and only one instance of FC_AssociationRole. The association shall be navigable from registeredAssociationRole to definedAssociationRole, but need not be navigable in the opposite direction.

F.3.7 FR_RegisteredFeatureAssociation

F.3.7.1 Introduction

The class FR_RegisteredFeatureAssociation shall represent an instance of FC_FeatureAssociation managed as a registered item. It inherits all the attributes and associations of RE_RegisterItem as specified in ISO 19135:2005, 8.8, and has one additional association.

F.3.7.2 Content

The aggregation association *Content* shall connect the instance of FR_RegisteredFeatureAssociation to one and only one instance of FC_FeatureAssociation. The association shall be navigable from registeredFeatureAssociation to definedFeatureAssociation, but need not be navigable in the opposite direction.

F.3.8 FR_RegisteredInheritanceRelation

F.3.8.1 Introduction

The class FR_RegisteredInheritanceRelation shall represent an instance of FC_InheritanceRelation managed as a registered item. It inherits all the attributes and associations of RE_RegisterItem as specified in ISO 19135:2005, 8.8, and has one additional association.

F.3.8.2 Content

The aggregation association *Content* shall connect the instance of FR_RegisteredInheritanceRelation to one and only one instance of FC_InheritanceRelation. The association shall be navigable from registeredInheritanceRelation to definedInheritanceRelation, but need not be navigable in the opposite direction.

F.3.9 FR_RegisteredDefinitionSource

F.3.9.1 Introduction

The class FR_RegisteredDefinitionSource shall represent an instance of FC_DefinitionSource managed as a registered item. It inherits all the attributes and associations of RE_RegisterItem as specified in ISO 19135:2005, 8.8, and has one additional association.

F.3.9.2 Content

The aggregation association *Content* shall connect the instance of FR_RegisteredDefinitionSource to one and only one instance of FC_DefinitionSource. The association shall be navigable from registeredDefinitionSource to definedDefinitionSource, but need not be navigable in the opposite direction.

F.3.10 FR_RegisteredListedValue

F.3.10.1 Introduction

The class FR_RegisteredListedValue shall represent an instance of FC_ListedValue managed as a registered item. It inherits all the attributes and associations of RE_RegisterItem as specified in ISO 19135:2005, 8.8, and has one additional association.

F.3.10.2 Content

The aggregation association *Content* shall connect the instance of FR_RegisteredListedValue to one and only one instance of FC_ListedValue. The association shall be navigable from registeredListedValue to definedListedValue, but need not be navigable in the opposite direction.

F.4 Item classes for feature-related concepts

F.4.1 Introduction

RE_Register has a mandatory association to a set of instances of RE_ItemClass, each of which describes one class of items held in the register. RE_RegisterItem also has a mandatory association to the instance of RE_ItemClass that describes the item class to which it belongs. This subclause specifies the instances of RE_ItemClass that describe the types of feature-related concepts to be held as registered items in a register used to manage a feature catalogue.

There are nine such item class instances, each of which corresponds to one of the types of feature-related concepts. They differ only in the value of the name attribute of RE_ItemClass.

F.4.2 Item class for feature catalogue registers

The item class for feature catalogues managed as registers or subregisters shall be an instance of RE_ItemClass [ISO 19135:2005, 8.6] that shall be assigned the following attribute values.

— The value of the attribute *name:CharacterString* shall be "Feature Catalogue".

— The value of the attribute *technicalStandard:CI_Citation* shall be:

  a) title:CharacterString = "ISO 19110:2005, Geographic information – Methodology for feature cataloguing"

  b) alternateTitle:CharacterString = "ISO 19110:2005"

  c) date:CI_Date

1) date:Date = 2005

2) dateType:CI_DateTypeCode = "publication"

F.4.3 Item class for feature types

The item class for feature types shall be an instance of RE_ItemClass [ISO 19135:2005, 8.6] that shall be assigned the following attribute values.

⎯ The value of the attribute *name:CharacterString* shall be "Feature Type".

⎯ The value of the attribute *technicalStandard:CI_Citation* shall be:

      a) title:CharacterString = "ISO 19110:2005, Geographic information – Methodology for feature cataloguing"

      b) alternateTitle:CharacterString = "ISO 19110:2005"

      c) date:CI_Date

  1) date:Date = 2005

  2) dateType:CI_DateTypeCode = "publication"

F.4.4 Item class for feature attributes

The item class for feature attributes shall be an instance of RE_ItemClass [ISO 19135:2005, 8.6] that shall be assigned the following attribute values.

⎯ The value of the attribute *name:CharacterString* shall be "Feature Attribute".

⎯ The value of the attribute *technicalStandard:CI_Citation* shall be:

      a) title:CharacterString = "ISO 19110:2005, Geographic information – Methodology for feature cataloguing"

      b) alternateTitle:CharacterString = "ISO 19110:2005"

      c) date:CI_Date

  1) date:Date = 2005

  2) dateType:CI_DateTypeCode = "publication"

F.4.5 Item class for feature operations

The item class for feature operations shall be an instance of RE_ItemClass [ISO 19135:2005, 8.6] that shall be assigned the following attribute values.

⎯ The value of the attribute *name:CharacterString* shall be "Feature Operation".

⎯ The value of the attribute *technicalStandard:CI_Citation* shall be:

      a) title:CharacterString = "ISO 19110:2005, Geographic information – Methodology for feature cataloguing"

      b) alternateTitle:CharacterString = "ISO 19110:2005"

      c) date:CI_Date

  1) date:Date = 2005

  2) dateType:CI_DateTypeCode = "publication"

F.4.6 Item class for association roles

The item class for association roles shall be an instance of RE_ItemClass [ISO 19135:2005, 8.6] that shall be assigned the following attribute values.

— The value of the attribute *name:CharacterString* shall be "Association Role".

— The value of the attribute *technicalStandard:CI_Citation* shall be:

    a) title:CharacterString = "ISO 19110:2005, Geographic information – Methodology for feature cataloguing"

    b) alternateTitle:CharacterString = "ISO 19110:2005"

    c) date:CI_Date

1) date:Date = 2005

2) dateType:CI_DateTypeCode = "publication"

F.4.7 Item class for feature associations

The item class for feature associations shall be an instance of RE_ItemClass [ISO 19135:2005, 8.6] that shall be assigned the following attribute values.

— The value of the attribute *name:CharacterString* shall be "Feature Association".

— The value of the attribute *technicalStandard:CI_Citation* shall be:

    a) title:CharacterString = "ISO 19110:2005, Geographic information – Methodology for feature cataloguing"

    b) alternateTitle:CharacterString = "ISO 19110:2005"

    c) date:CI_Date

1) date:Date = 2005

2) dateType:CI_DateTypeCode = "publication"

F.4.8 Item class for inheritance relations

The item class for inheritance relations shall be an instance of RE_ItemClass [ISO 19135:2005, 8.6] that shall be assigned the following attribute values.

— The value of the attribute name:CharacterString shall be "Inheritance Relation".

— The value of the attribute technicalStandard:CI_Citation shall be:

    a) title:CharacterString = "ISO 19110:2005, Geographic information – Methodology for feature cataloguing"

    b) alternateTitle:CharacterString = "ISO 19110:2005"

    c) date:CI_Date

1) date:Date = 2005

2) dateType:CI_DateTypeCode = "publication"

F.4.9 Item class for definition sources

The item class for definition sources shall be an instance of RE_ItemClass [ISO 19135:2005, 8.6] that shall be assigned the following attribute values.

⎯ The value of the attribute name:CharacterString shall be "Definition Source".

⎯ The value of the attribute technicalStandard:CI_Citation shall be:

   a) title:CharacterString = "ISO 19110:2005, Geographic information – Methodology for feature cataloguing"

   b) alternateTitle:CharacterString = "ISO 19110:2005"

   c) date:CI_Date

1) date:Date = 2005

2) dateType:CI_DateTypeCode = "publication"

F.4.10 Item class for listed values

The item class for listed values shall be an instance of RE_ItemClass [ISO 19135:2005, 8.6] that shall be assigned the following attribute values.

⎯ The value of the attribute name:CharacterString shall be "Listed Value".

⎯ The value of the attribute technicalStandard:CI_Citation shall be:

   a) title:CharacterString = "ISO 19110:2005, Geographic information – Methodology for feature cataloguing"

   b) alternateTitle:CharacterString = "ISO 19110:2005"

   c) date:CI_Date

1) date:Date = 2005

2) dateType:CI_DateTypeCode = "publication"

Annex G
(informative)

XML implementation example

G.1 Introduction

G.3 presents the XML implementation of a sample feature catalogue following the encoding description detailed in Annex E. The UML application schema being described by this feature catalogue is presented for convenience in G.2. This example is neither intended to satisfy the needs of any particular application nor to be complete or comprehensive in any other sense. It is intended merely to illustrate aspects of the form and content of an ISO-conformant feature catalogue implemented as described in Annex E.

G.2 UML application schema

The application schema consists of the following.

— Three feature types: Road, Motorway and Bridge, each with feature attributes. Road also has a feature operation. Road and Bridge have a reference to a DGIWG Feature Data Dictionary code.

— A unidirectional association between Road and Bridge. According to the feature catalogue conceptual model described in Figure B.1, the two roles of the association require description in the feature catalogue. Therefore, the role played by the Road feature type in the association is pictured on the UML model and described in the XML file as a default non-navigable role "theRoad" with the default cardinality "0..*".

— An inheritance relationship between Motorway and Road.

This UML application schema is depicted in Figure G.1.

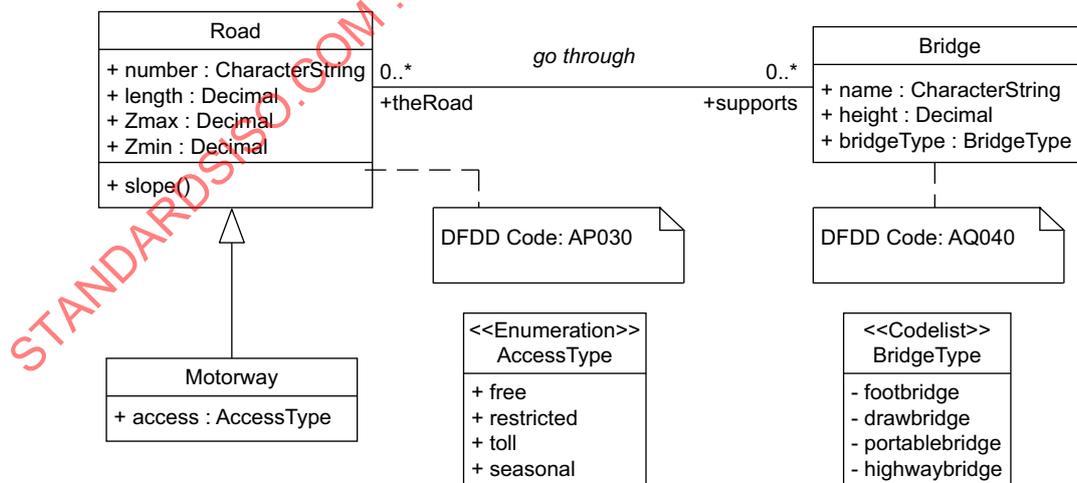

Figure G.1 — Application schema

G.3 XML instance document

```
<?xml version="1.0" encoding="UTF-8"?>
<gfc:FC_FeatureCatalogue id="FC" xmlns:gfc="http://www.isotc211.org/2005/gfc"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:gco="http://www.isotc211.org/2005/gco"
xmlns:gmd="http://www.isotc211.org/2005/gmd"
xmlns:gmx="http://www.isotc211.org/2005/gmx"
xsi:schemaLocation="http://www.isotc211.org/2005/gfc\gfc.xsd">
    <gmx:name>
        <gco:CharacterString>RoadsBridgesCatalogue</gco:CharacterString>
    </gmx:name>
    <gmx:scope>
        <gco:CharacterString>Roads and bridges : the restrictions of the highway
network</gco:CharacterString>
    </gmx:scope>
    <gmx:fieldOfApplication>
        <gco:CharacterString>Transport, Traffic safety</gco:CharacterString>
    </gmx:fieldOfApplication>
    <gmx:versionNumber>
        <gco:CharacterString>V1.0</gco:CharacterString>
    </gmx:versionNumber>
    <gmx:versionDate>
        <gco:Date>2007-02-21</gco:Date>
    </gmx:versionDate>
    <gmx:language>
        <gco:CharacterString>eng</gco:CharacterString>
    </gmx:language>
    <gmx:characterSet>
        <gmd:MD_CharacterSetCode
codeList="resources/Codelist/gmxcodelists.xml#MD_CharacterSetCode"
codeListValue="utf8">UTF-8</gmd:MD_CharacterSetCode>
    </gmx:characterSet>
    <gfc:producer>
        <gmd:CI_ResponsibleParty>
            <gmd:organisationName>
                <gco:CharacterString>Department of Transport</gco:CharacterString>
            </gmd:organisationName>
            <gmd:role>
                <gmd:CI_RoleCode
                    codeList="./resources/codeList.xml#CI_RoleCode"
                    codeListValue="custodian">custodian</gmd:CI_RoleCode>
            </gmd:role>
        </gmd:CI_ResponsibleParty>
    </gfc:producer>
    <gfc:featureType> <!-- the Road feature type (id FT1)-->
        <gfc:FC_FeatureType id="FT1">
            <gfc:typeName>
                <gco:LocalName>Road</gco:LocalName>
            </gfc:typeName>
            <gfc:definition>
                <gco:CharacterString>A route with a specially prepared surface that
is maintained for use by motor vehicles.</gco:CharacterString>
            </gfc:definition>
            <gfc:isAbstract>
                <gco:Boolean>false</gco:Boolean>
            </gfc:isAbstract>
            <gfc:aliases>
                <gco:LocalName>truck road</gco:LocalName>
            </gfc:aliases>
```

```xml
<gfc:inheritsTo xlink:href="#IR1"/>
<gfc:featureCatalogue xlink:href="#FC"/>
<gfc:carrierOfCharacteristics> <!-- the "number" attribute -->
    <gfc:FC_FeatureAttribute>
        <gfc:memberName>
            <gco:LocalName>number</gco:LocalName>
        </gfc:memberName>
        <gfc:cardinality>
            <gco:Multiplicity>
                <gco:range>
                    <gco:MultiplicityRange>
                        <gco:lower>
                            <gco:Integer>1</gco:Integer>
                        </gco:lower>
                        <gco:upper>
                            <gco:UnlimitedInteger>1</gco:UnlimitedInteger>
                        </gco:upper>
                    </gco:MultiplicityRange>
                </gco:range>
            </gco:Multiplicity>
        </gfc:cardinality>
        <gfc:featureType xlink:href="#FT1"/>
        <gfc:valueType>
            <gco:TypeName>
                <gco:aName>
                    <gco:CharacterString>CharacterString</gco:CharacterString>
                </gco:aName>
            </gco:TypeName>
        </gfc:valueType>
    </gfc:FC_FeatureAttribute>
</gfc:carrierOfCharacteristics>
<gfc:carrierOfCharacteristics> <!-- the "length" attribute -->
    <gfc:FC_FeatureAttribute>
        <gfc:memberName>
            <gco:LocalName>length</gco:LocalName>
        </gfc:memberName>
        <gfc:cardinality>
            <gco:Multiplicity>
                <gco:range>
                    <gco:MultiplicityRange>
                        <gco:lower>
                            <gco:Integer>1</gco:Integer>
                        </gco:lower>
                        <gco:upper>
                            <gco:UnlimitedInteger>1</gco:UnlimitedInteger>
                        </gco:upper>
                    </gco:MultiplicityRange>
                </gco:range>
            </gco:Multiplicity>
        </gfc:cardinality>
        <gfc:featureType xlink:href="#FT1"/>
        <gfc:valueType>
            <gco:TypeName>
                <gco:aName>
                    <gco:CharacterString>Decimal</gco:CharacterString>
                </gco:aName>
            </gco:TypeName>
        </gfc:valueType>
    </gfc:FC_FeatureAttribute>
</gfc:carrierOfCharacteristics>
<gfc:carrierOfCharacteristics> <!-- the "zMax" attribute -->
```