INTERNATIONAL STANDARD

ISO 19126

First edition
2009-11-01

Geographic information — Feature concept dictionaries and registers

Information géographique — Dictionnaires de concepts de caractéristiques et registres

Reference number
ISO 19126:2009(E)

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Published in Switzerland

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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.

ISO 19126 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

Introduction

This International Standard specifies a schema for geographic feature concept dictionaries managed as registers. As described in ISO 19101, geographic features are abstractions of real world phenomena associated with a location relative to the surface of the earth, about which data are collected, maintained and disseminated.

A feature concept dictionary provides basic definitions and related information about a set of concepts that may be used to describe geographic features and shared across multiple application areas. Elements from a feature concept dictionary may be reused in one or more feature catalogues. A feature catalogue is often associated with a particular application schema, product specification and data set. It provides a complete textual specification of a set of feature types and their properties and relationships. See Annex A for further discussion of the relationships between feature concept dictionaries, feature catalogues, application schemas and product specifications.

ISO 19135 specifies procedures for the registration of items of geographic information. Items of geographic information that may be registered are members of object classes specified in technical standards such as those developed by ISO/TC 211. This International Standard defines object classes and specifies rules used to establish and maintain feature concept dictionaries as ISO 19135 conformant register schemas.

ISO 19135 specifies the structure of a hierarchical register in which the principal register holds a set of items that describe the subregisters. This International Standard specifies a schema for a hierarchical register where the subregisters are feature concept dictionaries and/or feature catalogues. This International Standard specifies an accompanying schema. The resulting hierarchical register may be used as a basis for harmonization and the establishment of interoperability between different geographic information communities.

Feature concept dictionaries and feature catalogues maintained as registers may serve as sources of reference for similar registers established by other geographic information communities as part of a system of cross-referencing. Cross-referencing between respective items in registers of items of geographic information may be difficult in cases where the structure of registers differs between information communities. This International Standard may serve as a guide for different information communities to develop compatible registers that can support a system of geographic information cross-referencing.

The Digital Geographic Information Working Group (DGIWG) community feature concept dictionary and register is described as an example implementation of this International Standard.

Geographic information — Feature concept dictionaries and registers

1 Scope

This International Standard specifies a schema for feature concept dictionaries to be established and managed as registers. It does not specify schemas for feature catalogues or for the management of feature catalogues as registers. However, because feature catalogue are often derived from feature concept dictionaries, this International Standard does specify a schema for a hierarchical register of feature concept dictionaries and feature catalogues. These registers are in accordance with ISO 19135.

2 Conformance

2.1 Introduction

To conform to this International Standard, all of the conditions specified for at least one of the two conformance classes described below shall be satisfied.

2.2 Conformance for a feature concept dictionary

Any feature concept dictionary that claims conformance to this International Standard shall satisfy all of the conditions specified in the following abstract test suites:

a) ISO 19135, A.1, for general conformance to ISO 19135, and

b) B.2 of this International Standard.

A feature concept dictionary register established by ISO/TC 211 shall in addition satisfy all of the conditions specified in the ISO 19135 abstract test suite for registers established by ISO/TC 211 (ISO 19135, A.3).

2.3 Conformance for a register of feature concept dictionaries and/or feature catalogues

Any register of feature concept dictionaries and/or feature catalogues that claims conformance to this International Standard shall satisfy all of the conditions specified in the following abstract test suites:

a) ISO 19135, A.1, for general conformance to ISO 19135,

b) ISO 19135, A.2 for conformance to ISO 19135 as a hierarchical register, and

c) B.3 of this International Standard.

A register of feature concept dictionaries and/or feature catalogues established by ISO/TC 211 shall in addition satisfy all of the conditions specified in the ISO 19135 abstract test suite for registers established by ISO/TC 211 (ISO 19135, A.3).

3 Normative references

The following referenced documents are indispensable for the application 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/TS 19103:2005, *Geographic information — Conceptual schema language*

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

ISO 19115:2003, *Geographic information — Metadata*

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

4 Terms, definitions and abbreviations

4.1 Terms and definitions

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

4.1.1
compound registry
registry containing multiple **registers** that share the same **item classes** and coordinated management of a common characteristic

NOTE The common characteristic may be a shared namespace for the assignment of names and/or codes.

4.1.2
data product
dataset or dataset series that conforms to a **data product specification**

[ISO 19131:2007, definition 4.6]

4.1.3
data product specification
detailed description of a dataset or dataset series together with additional information that will enable it to be created, supplied to and used by another party

[ISO 19131:2007, definition 4.7]

4.1.4
data type
specification of a **value domain** with operations allowed on values in this domain

[ISO/TS 19103:2005, definition 4.1.5]

4.1.5
feature
abstraction of real world phenomena

[ISO 19101:2002, definition 4.11]

EXAMPLE The phenomenon named “Eiffel Tower” may be classified with other similar phenomena into a feature type named “tower”.

NOTE 1 A feature may occur as a type or an instance. In this International Standard, feature type is meant unless otherwise specified.

NOTE 2 This International Standard does not address real world phenomena directly; it addresses only their abstractions (feature concepts and feature types) and feature instances (data collected to represent a feature in conformance with a specified feature type).

4.1.6
feature association
relationship that links instances of one **feature** type with instances of the same or a different feature type

[ISO 19110:2005, definition 4.2]

NOTE A feature association may occur as a type or an instance. In this International Standard, feature association type is meant unless otherwise specified.

4.1.7
feature association concept
concept that may be specified in detail as one or more **feature association** types

EXAMPLE A "supports" feature association concept describes a relationship between real world phenomena such as "highways" and "bridges" where the role of one **feature** is that it is *supported-by* the other feature (whose role is *supporter-of*).

4.1.8
feature attribute
characteristic of a **feature**

[ISO 19101:2002, definition 4.12]

EXAMPLE 1 A feature attribute named "colour" may have an attribute value "green" which belongs to the **data type** "text".

EXAMPLE 2 A feature attribute named "length" may have an attribute value "82,4" which belongs to the **data type** "real".

NOTE 1 A feature attribute may occur as a type or an instance. In this International Standard, feature attribute type is meant unless otherwise specified.

NOTE 2 A feature attribute has a name, a data type and a **value domain** associated to it. A feature attribute for a feature instance also has an attribute value taken from the value domain.

4.1.9
feature attribute concept
concept that may be specified in detail as one or more **feature attribute** types

EXAMPLE A "height" feature attribute concept describes length in the vertical direction as a characteristic that may be shared by real world phenomena such as "human", "tree" and "building."

4.1.10
feature catalogue
catalogue containing definitions and descriptions of the **feature** types, **feature attributes** and feature relationships occurring in one or more sets of geographic data, together with any **feature operations** that may be applied

[ISO 19101:2002, definition 4.13]

4.1.11
feature concept
concept that may be specified in detail as one or more **feature** types

EXAMPLE The feature concept "road" may be used to specify several different feature types, each with a different set of properties appropriate for a particular application. For a travel planning application, it might have a limited set of attributes such as name, route number, location and number of lanes, while for a maintenance application it might have an extensive set of attributes detailing the structure and composition of each of the layers of material for which it is composed.

4.1.12
feature concept dictionary
dictionary that contains definitions of, and related descriptive information about, concepts that may be specified in detail in a **feature catalogue**

4.1.13
feature operation
operation that every instance of a **feature** type may perform

[ISO 19110:2005, definition 4.5]

EXAMPLE A feature operation upon a “dam” is to raise the dam. The results of this operation are to raise the height of the “dam” and the level of water in a “reservoir”.

NOTE The values of **feature attributes** of feature instances are affected by feature operations.

4.1.14
feature operation concept
concept that may be specified in detail as one or more **feature operation** types

EXAMPLE A “traffic flow” operation might return the number of persons or vehicles expected to move on or through some kind of transportation **feature** during a period of time specified as input to the operation.

4.1.15
hierarchical register
structured set of **registers** for a domain of register items, composed of a principal register and a set of **subregisters**

[ISO 19135:2005, definition 4.1.4]

EXAMPLE ISO 6523 is associated with a hierarchical register. The principal register contains organization **identifier** schemes and each subregister contains a set of organization identifiers that comply with a single organization identifier scheme.

4.1.16
identifier
linguistically independent sequence of characters capable of uniquely and permanently identifying that with which it is associated

[ISO 19135:2005, definition 4.1.5]

4.1.17
item class
set of items with common properties

[ISO 19135:2005, definition 4.1.6]

NOTE 1 Class is used in this context to refer to a set of instances, not the concept abstracted from that set of instances.

NOTE 2 To avoid potential ambiguity in this International Standard, the expression “register item class” is used.

4.1.18
nominal value
name of an object, type, or category

NOTE Many **feature attributes** take nominal rather than numerical values. The **value domain** of such an attribute is usually specified as an enumeration or a code list.

EXAMPLE “Deciduous needle leaf” is a nominal value that identifies a vegetation type.

4.1.19
register
set of files containing **identifiers** assigned to items with descriptions of the associated items

[ISO 19135:2005, definition 4.1.9]

4.1.20
registry
information system on which a **register** is maintained

[ISO 19135:2005, definition 4.1.13]

4.1.21
subregister
part of **hierarchical register** that contains items from a partition of a domain of information

[ISO 19135:2005, definition 4.1.17]

4.1.22
value domain
set of accepted values

[ISO/TS 19103:2005, definition 4.1.15]

4.2 Abbreviations

DGIWG	Digital Geospatial Information Working Group
DFDD	DGIWG Feature Data Dictionary
IEC	International Electrotechnical Commission
IHO	International Hydrographic Organization
TC	Technical Committee
UML	Unified Modeling Language

5 Concepts

5.1 Introduction

A feature concept dictionary describes concepts that may be used to characterize real world phenomena. Feature types and feature property types may then be specified using these concepts and documented in a feature catalogue. This International Standard specifies a feature concept dictionary schema (5.2 and Clause 6).

ISO 19135 specifies procedures to be followed in preparing and maintaining registers of items of geographic information. Such registers may be used to support discovery of, access to, and use of the contents of feature concept dictionaries and feature catalogues. This International Standard specifies a schema for feature concept dictionaries as registers and information to be included in item registration proposals (Annex C).

A single authority may need to establish a suite of coordinated feature concept dictionary registers and feature catalogue registers that share a common structure, coding scheme and/or community of interest. This International Standard specifies a compound registry mechanism to support such requirements (5.3.3).

Feature concept dictionaries and feature catalogues maintained as registers may serve as sources of reference for similar registers established by other geographic information communities as part of a system of cross-referencing. Feature concept dictionary registers and feature catalogue registers from different communities may be organized as partitions of a hierarchical register. Based on ISO 19135, this International Standard specifies a schema for a hierarchical register of feature concept dictionaries and feature catalogues (5.5 and Clause 8) and information to be included in item registration proposals (Annex C).

5.2 Feature concept dictionary

A feature concept dictionary establishes a set of concepts that may be used to describe real world phenomena; these include feature concepts, feature attribute concepts, feature association concepts, feature operation concepts and nominal value concepts that may be included in the value domain of a feature attribute concept. Feature types may then be specified using these concepts and documented in a feature catalogue.

The schema presented in Clause 6 of this International Standard provides a detailed specification of the content of feature concept dictionaries.

5.3 Registers

5.3.1 Overview

Registers provide a basis for the flexible management of items of geographic information. Feature concept dictionaries and feature catalogues managed as registers may be published electronically, enabling the discovery and direct use of their contents. They may also be easily extended and used as a basis for harmonization and the establishment of interoperability between different geographic information communities.

5.3.2 Register structure

ISO 19135 specifies several alternatives for structuring registers:

a) A simple register contains items of a single item class (ISO 19135:2005, 7.1.2).

b) A multi-part register contains items from different item classes (ISO 19135:2005, 7.1.3).

c) A hierarchical register is a structured set of registers composed of a principal register and one or more subregisters (ISO 19135:2005, 7.1.4). The principal register holds a set of items that describe the subregisters. Each of the subregisters holds a set of register items from a partition of the information domain.

This International Standard specifies schemas for both multi-part registers (feature concept dictionaries) and hierarchical registers (registers of feature concept dictionaries and/or feature catalogues).

5.3.3 Compound registry

An authority may need to establish a suite of coordinated registers that share a common structure but are separated into individual registers within a compound registry.

EXAMPLE 1 A single community of interest may have geographic information requirements informed by several scientific disciplines. Each discipline may be best handled by a separate set of domain experts and/or domain authorities. For each, a separate control body, register manager and/or register owner may be desirable. While the individuals and organizations responsible for the management of the registers may differ, the resulting collection of geographic information is intended to be used “as a whole” even though its management is partitioned; this goal is facilitated by a common register structure. Proposals for new information items may be sent to the registry “as a whole” and then directed to the register manager responsible for the appropriate scientific discipline.

EXAMPLE 2 Several communities of interest may establish their own geographic information registers. They may require the ability to interchange geographic information according to a common encoding method. It is desirable that a single namespace for assignment of names (or codes) be established across the communities of interest. A common policy is developed so that names (or codes) are assigned by register managers (or control bodies) for each register in a coordinated manner. Possible policies include pre-allocation of portions of the namespace or dynamic assignment (and deconfliction) as proposals are received and acted on. Shared register structure facilitates the establishment of common data product and/or information content specifications among the disparate communities of interest.

This International Standard specifies a compound registry mechanism to support such requirements.

a) A compound registry shall contain multiple registers that share the same item classes.

b) The register shall share a “common characteristic”.

c) The register owners shall have agreed to coordinated management of the “common characteristic”.

Figure 1 shows the organizational relationships (ISO 19135:2005, 5.1) of a compound registry. The registry contains four registers, each with a separate control body. A single register manager under the authority of a single register owner coordinates the acceptance and management of proposals for item registration. The user accesses a single registry in order to obtain information from any of the registers.

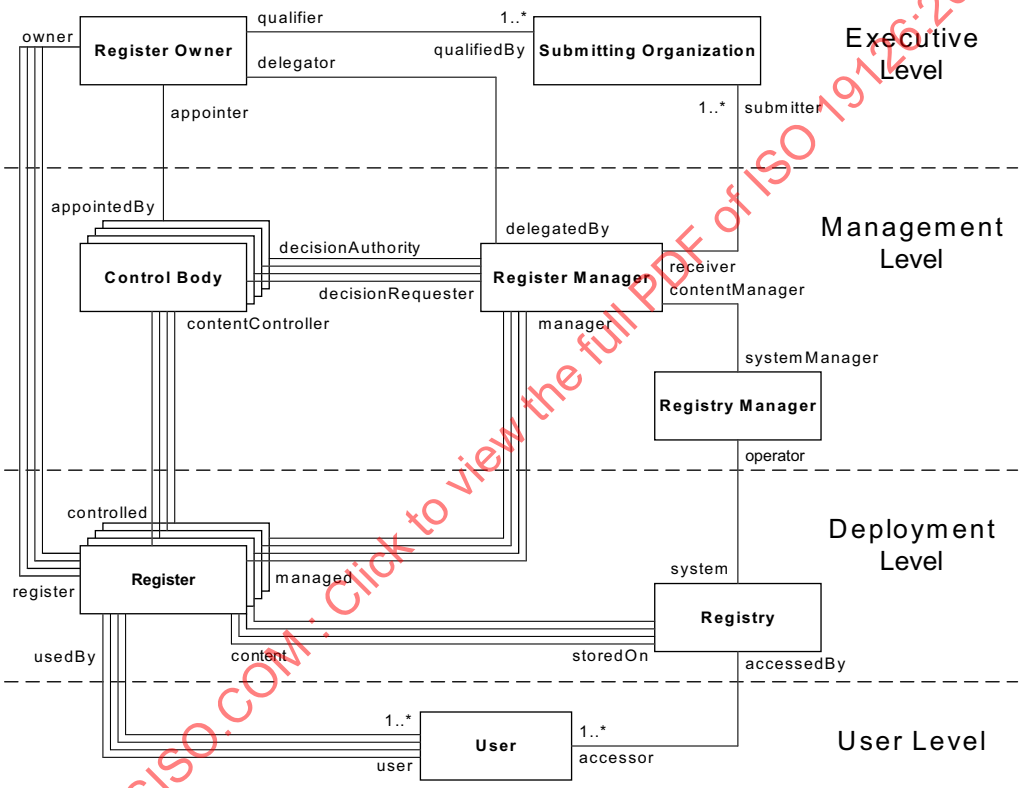

Figure 1 — Example compound registry

5.3.4 Register management and registration

ISO 19135 specifies how registers shall be managed (ISO 19135:2005, Clause 5) and the information that shall be included in any proposal for registration of an item of geographic information (ISO 19135:2005, Annex D).

Annex C of this International Standard specifies the information necessary to submit a proposal to the manager of a feature concept dictionary register or a register of feature concept dictionaries and/or feature catalogues.

5.4 Feature concept dictionary register

A feature concept dictionary register shall consist of

— information about the feature concept dictionary as a whole (including ownership and access),

— the registered items (6.1), and

— information necessary to manage individual items in the register (including item identifier and management status).

Annex C specifies the information to be included in proposals for item registration in feature concept dictionary registers.

5.5 Register of feature concept dictionary and feature catalogue registers

Collections of items of geographic information may be established as a hierarchical register. This International Standard specifies a register of feature concept dictionaries and feature catalogues as a principal register; subregisters establish individual feature concept dictionaries or feature catalogues. Clause 8 specifies a hierarchical register that may be used as a basis for harmonization and the establishment of interoperability between different geographic information communities.

Clause 8 of this International Standard specifies the item classes to be included in the top level of a hierarchical register of feature concept dictionary registers and feature catalogues. Annex C specifies the information to be included in proposals for item registration in registers of feature concept dictionaries and feature catalogues.

5.6 Relationship to data product specifications and application schemas

A data product specification (ISO 19131) defines the requirements for a geographic data product. These requirements form the basis for producing or acquiring data and also allow users to evaluate the data product to determine whether it fulfils their requirements. A data product specification contains multiple major sections, including one on data content and structure.

The content information of a feature-based data product is specified in terms of an application schema and a feature catalogue (ISO 19131:2007, 10.1). The feature catalogue may be either specified within the data product specification or reference may be made to an externally specified feature catalogue. A feature catalogue may contain references to items in an externally specified feature concept dictionary.

An application schema is a conceptual schema for data required by one or more applications (ISO 19101:2002, 4.2). An application schema may be developed from a feature catalogue or it may contain references to items in an externally specified feature catalogue.

The schema for the establishment and use of feature concept dictionaries specified in this International Standard (Clause 6) supports referencing of contained items by feature catalogues included within or used by data product specifications and application schemas,

5.7 Community implementations

There are many different community requirements for collections of information about features; these include:

a) General-purpose feature concept dictionaries establishing a well-known reference set of concepts.

b) Specialized feature concept dictionaries that establish concepts that are community-unique, but may be “promoted” to become part of the shared reference set concepts at a future date. In order to not preclude future promotion, it is desirable that such concepts not conflict with those in existing reference feature concept dictionaries.

c) Mappings and/or correspondences between concepts in different feature concept dictionaries, especially those upon which significant geographic information data repositories depend. This supports both data exchange in the present and identifies a future path for feature concept dictionary integration.

d) General-purpose feature catalogues establishing a well-known reference set of feature types and inheritance relations that support a variety of data interchange requirements. Such catalogues may be:

   1) self-contained, or

   2) reference concepts from external feature concept dictionaries.

e) Specialized feature catalogues establishing the feature content and structure of data product specifications and/or application schemas. Such catalogues may be:

   1) self-contained, or

   2) reference feature types and inheritance relations from external general-purpose feature catalogues, or

   3) reference concepts from external feature concept dictionaries.

f) Mappings and/or correspondences between different specialized and/or general-purpose feature catalogues. This supports both data exchange in the present and identifies a future path for feature catalogue integration.

To support these requirements, communities of interest may establish individual registers of specific types, or may develop compound registries that facilitate a coordinated solution to multiple objectives.

Annex D describes the DGIWG feature concept dictionary.

5.8 Notation

The conceptual schemas specified in this International Standard are described using the Unified Modeling Language (UML)[18], following the guidance of ISO/TS 19103. UML notation is described in Annex E.

As specified in ISO/TS 19103, names of UML classes, with the exception of basic data type classes, include a unique two-letter prefix that identifies the standard and the UML package in which the class is defined. Several model elements used in this International Standard are defined in packages specified in other International Standards; these are given in Table 1 along with the prefixes for the two packages specified in this International Standard.

Table 1 — UML package identifiers

Prefix	Package
CI	Citation (ISO 19115)
FC	Feature Catalogue (ISO 19110)
RE	Register (ISO 19135)
CD	Feature Concept Dictionary
HR	Hierarchical Feature Information Register

In accordance with the guidance of ISO/TS 19103 all data element names are presented as character strings which combine multiple lower-case words as needed to form precise and understandable names without using any intervening characters (such as "_", "-", or space). For attributes and operation names, association roles, and parameters, capitalization is applied to the first letter of each word after the first word. For package, class, type-specification and association names, capitalization is also applied to the first letter of the first word.

Unless otherwise stated all data elements are mandatory.

5.9 Packages

The dependencies among packages specified or referenced in this International Standard are identified in Figure 2.

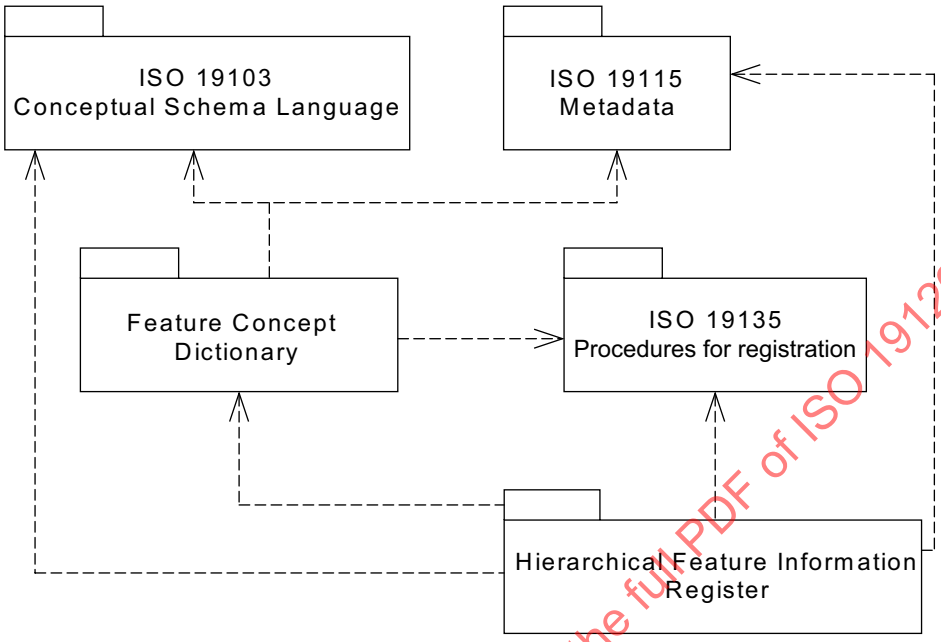

Figure 2 — Dependencies of packages specified in this International Standard

6 Feature concept dictionary schema

6.1 Introduction

This clause specifies the schema for a feature concept dictionary. Feature concept dictionaries may include definitions of:

a) feature concepts;

b) feature attribute concepts;

c) feature association concepts;

d) feature operation concepts

e) nominal value concepts.

The feature concept dictionary schema consists of one package, Feature Concept Dictionary (CD), which specifies classes for describing concepts.

Each class and data type is documented in a separate subclause. Where a class or data type uses or inherits from an element of another ISO standard, it is so identified and the manner in which the realization is achieved is specified.

6.2 CD_FeatureConceptDictionary

6.2.1 Introduction

The class CD_FeatureConceptDictionary (Figure 3) specifies information about the feature concept dictionary itself. CD_FeatureConceptDictionary is a subclass of RE_Register, specified in ISO 19135:2005, 8.2. It has three attributes in addition to the seven attributes and six associations that it inherits from RE_Register (Table 2).

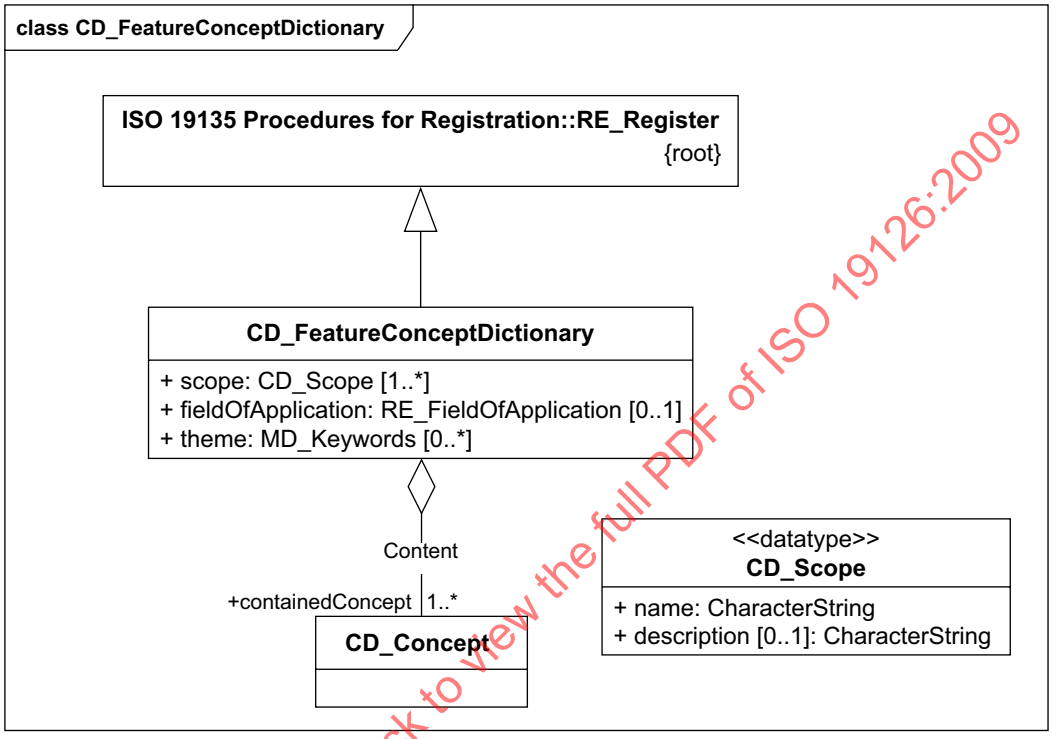

Figure 3 — CD_FeatureConceptDictionary

Table 2 — Elements inherited from RE_Register

Name	Type	Definition
name	attribute	designator that is used to uniquely denote the register within the set of registers maintained by the register owner
contentSummary	attribute	general statement of the purpose for which items in the register are made available
uniformResourceIdentifier	attribute	information about online resources associated with the register
operatingLanguage	attribute	language, country information and character encoding for the proper interpretation of the content of character strings in the register
alternativeLanguages	attribute	additional language used by items in the register
version	attribute	specification of a unique state in the life of the register
dateOfLastChange	attribute	date of the most recent change to the status of an item in the register
manager	role	RE_RegisterManager that manages the register
owner	role	RE_RegisterOwner that owns the register
submitter	role	RE_SubmittingOrganization that has submitted proposals for changes to the content of the register
citation	role	RE_ReferenceSource that describe the sources (documents or registers) from which items in the RE_Register have been taken
containedItem	role	RE_RegisterItem held in the register
containedItemClass	role	RE_ItemClass that describes the characteristics of a class of items held in the register

6.2.2 scope

The attribute *scope* shall be represented as a set of CD_Scope elements (6.3) that describe the subject domains of the concepts in the feature concept dictionary. The value of *scope* may be used as the basis for creating metadata for submission to search engines.

EXAMPLE 1 CD_Scope.name = “Hydrography”,
CD_Scope.description = “Features that are or are related to artefacts involving bodies of water.”,

EXAMPLE 2 CD_Scope.name = “Ports and Harbours”,
CD_Scope.description = “Features that are related to marine ports and harbours, including their associated anchorage, docking and related cultural facilities.”

6.2.3 theme

The optional attribute *theme* shall use a set of MD_Keywords (ISO 19115:2003, B.2.2.3) elements to describe aspects of the content of the feature concept dictionary not provided by the attribute *scope*.

EXAMPLE MD_Keywords.keyword = "Atlantic Ocean"
MD_Keywords.type = "place."

6.2.4 fieldOfApplication

The optional attribute *fieldOfApplication* shall be represented as a set of RE_FieldOfApplication elements (ISO 19135:2005, 8.19) that describe the purposes for which items in the feature concept dictionary are used. The value of *fieldOfApplication* may be used as the basis for creating metadata for submission to search engines.

EXAMPLE 1 RE_FieldOfApplication.name = “Agricultural Production”,
RE_FieldOfApplication.description = “Pertaining to the science, art and business of cultivating soil, producing crops and raising livestock.”

EXAMPLE 2 RE_FieldOfApplication.name = “Marine Navigation”
RE_FieldOfApplication.description = “Pertaining to the science or art of conducting ships or vessels from one place to another at sea.”

6.2.5 containedItem

The role name *containedItem* aggregates instances of CD_Concept through the Content association. This is a refinement of the Content association inherited from RE_Register.

6.3 CD_Scope

6.3.1 Introduction

The <<DataType>> class CD_Scope (Figure 3) contains two attributes that describe an information domain represented by concepts in the feature concept dictionary.

6.3.2 name

The attribute *name* shall be represented as a CharacterString that identifies the information domain.

6.3.3 description

The optional attribute *description* shall be represented as a CharacterString that describes the information domain.

6.4 CD_Concept

6.4.1 Introduction

The class CD_Concept (Figure 4) specifies the description of a concept in the feature concept dictionary. As a subclass of RE_Register item (ISO 19135:2005, 8.8), it and all of its subclasses inherit nine attributes and eight associations (Table 3), notably including name and definition. It has two additional associations and four subclasses.

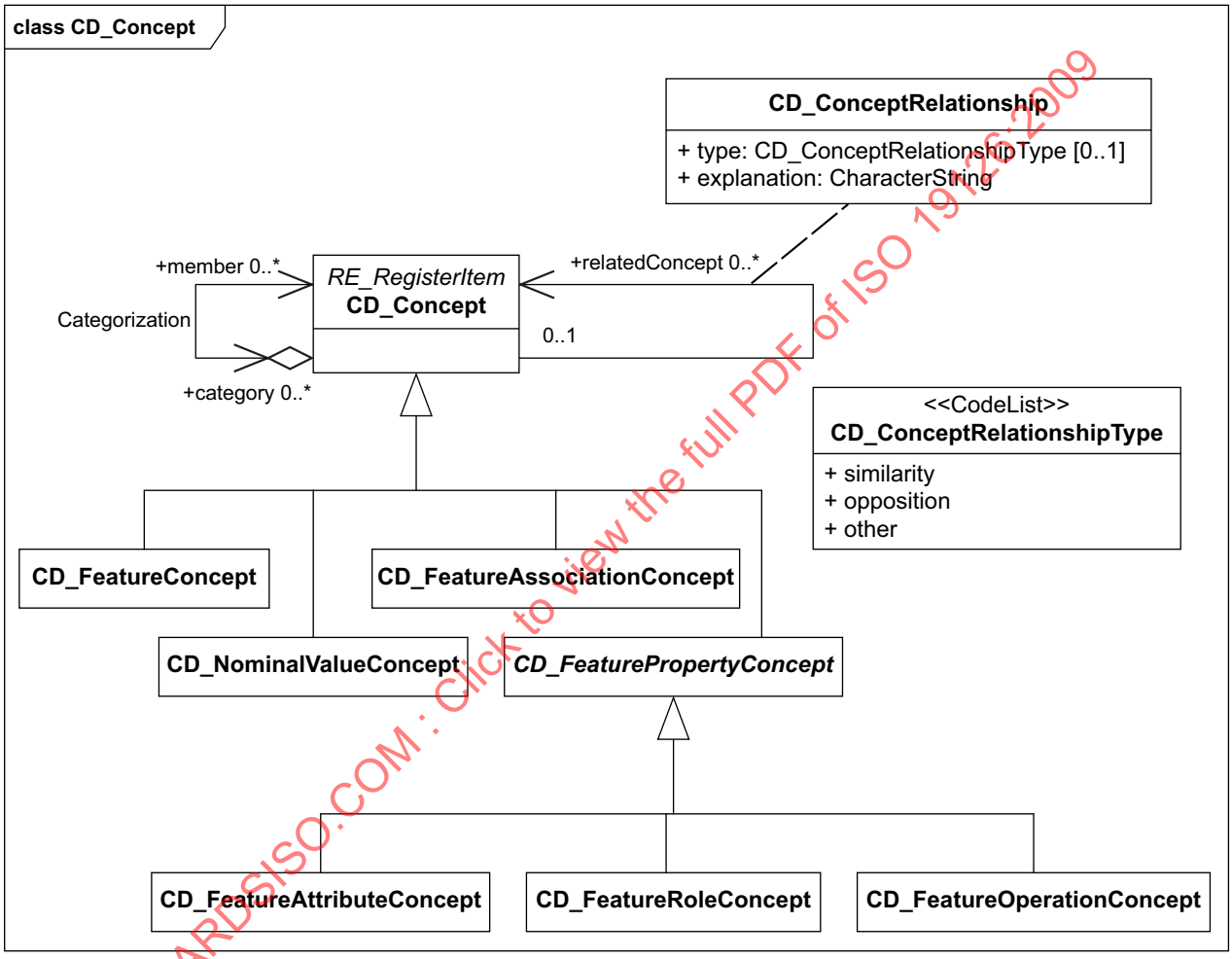

Figure 4 — CD_Concept

Table 3 — Elements inherited from RE_RegisterItem

Name	Type	Definition
itemIdentifier	attribute	positive integer that is used to uniquely denote the item within the register
name	attribute	compact and human-readable designator that is used to denote a register concept
status	attribute	registration status of the RE_RegisterItem
dateAccepted	attribute	date on which a proposal to add the item to the register was accepted
dateAmended	attribute	date on which a proposal to supersede or retire the item was accepted
definition	attribute	precise statement of the nature, properties, scope, or essential qualities of the concept realized by the item
description	attribute	nature, properties, scope, or non-essential qualities of the concept realized by the item
fieldOfApplication	attribute	instance of RE_FieldOfApplication that describes a kind of use of the item
alternativeExpressions	attribute	instances of RE_AlternativeExpression each specifying an alternative name and optionally additional information about the item in a language other than the *operatingLanguage* of the register
register	role	RE_Register in which the register item is contained
itemClass	role	RE_ItemClass that describes the item class of which the register item is a member
additionInformation	role	instance of RE_AdditionInformation that contains information about the process of adding this RE_RegisterItem to the register
amendmentInformation	role	instance of RE_AmendmentInformation that contains information about the process of amending this RE_RegisterItem..
clarificationInformation	role	instance of RE_ClarificationInformation that contains information about the process of clarifying this RE_RegisterItem.
specificationSource	role	instance of RE_Reference that identifies the source of the register item
specificationLineage	role	instances of RE_Reference that provide information about the development of the item specification
predecessor	role	instance of RE_RegisterItem that was replaced by this instance
successor	role	instance of RE_RegisterItem that superseded this instance

6.4.2 category and member

As shown by the association *Categorization* a concept may categorize many other *member* concepts; it may also be categorized by many other *category* concepts. In the first case, the conditional role name *category* shall identify an instance of CD_Concept that categorizes other instances of CD_Concept. In the second case, the conditional role name *member* shall identify an instance of CD_Concept that is categorized by the *category* concept.

EXAMPLE The concepts “buoy” and “VOR” may be categorized by the concept “aid to navigation”; the concept “buoy” may be also categorized by the concept “marker”.

6.4.3 relatedConcept

The role name *relatedConcept* shall identify zero or more concepts that have some kind of relationship to this concept as described by the association class CD_Concept Relationship (6.5).

6.4.4 Subclasses

The classes CD_FeatureConcept (6.5), CD_FeaturePropertyConcept (6.8), CD_FeatureAssociationConcept (6.11) and CD_NominalValueConcept (6.10) are subclasses of CD_Concept that specify information about types of concepts in feature concept dictionaries.

6.5 CD_ConceptRelationship

6.5.1 Introduction

The association class CD_ConceptRelationship may connect an instance of CD_Concept to a related instance of CD_Concept. This association shall not be used to describe a categorization (6.4.2) or a contextual relationship (6.8.2, 6.12.4). The association class has two attributes. This association shall be used to describe relationships between concepts as such. Relationships between features as such are described by instances of FC_FeatureAssociationConcept.

6.5.2 type

The attribute *type* shall identify the general nature of the relationship between concepts. It takes a value from the code list CD_ConceptRelationshipType.

6.5.3 explanation

The attribute *explanation* shall use a CharacterString to provide an explanation of the specific relationship.

EXAMPLE The feature concept specified by the name “dome” is similar to the feature concept specified by the name “cupola”. The value of the attribute *type* would be “similarity” and the value of the attribute *explanation* could be “a dome has the same shape as a cupola but a dome is usually distinguished from a cupola by its larger size”.

6.6 CD_ConceptRelationshipType

The code list CD_ConceptRelationshipType contains a set of keywords that identify the general nature of the relationships between concepts. They include

a) similarity – describes a relationship such that two concepts share many significant characteristics but differ in other, generally less significant, characteristics,

b) opposition – describes a relationship such that the connotation of one concept is contrary to that of the other, and

c) other – describes a relation of a type not otherwise identified by a keyword in the code list.

6.7 CD_FeatureConcept

6.7.1 Introduction

The class CD_FeatureConcept (Figure 5) specifies the description of a feature concept. In addition to the properties it inherits from RE_RegisterItem and CD_Concept (6.4), it has one additional association.

6.7.2 propertyConcept

The role name *propertyConcept* identifies zero or more instances of CD_FeaturePropertyConcept (6.8) that may be relevant within the context of the CD_FeatureConcept.

EXAMPLE A feature concept of “building” may have property concepts such as the attribute concepts “floor count” or “roof type” or the role concept “manager”.

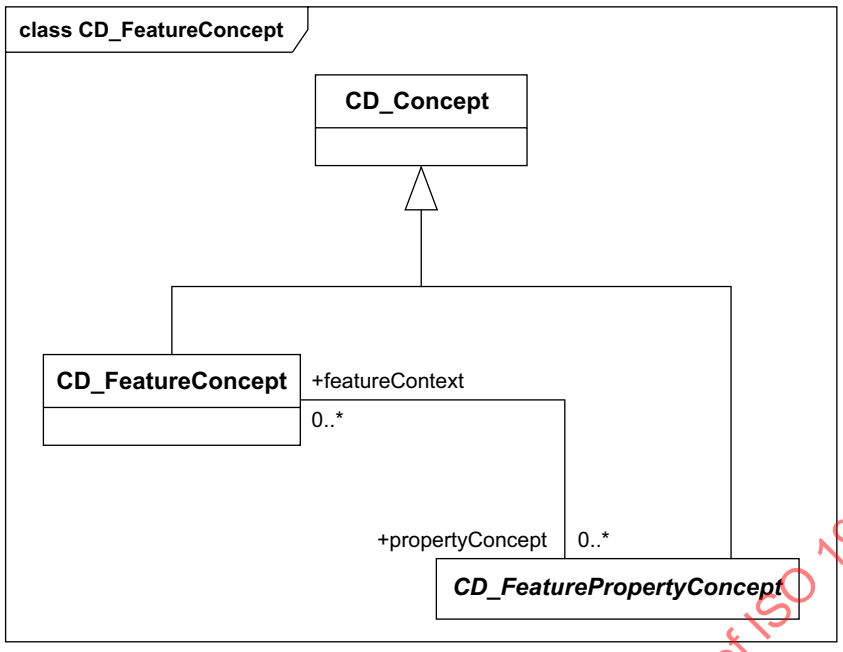

Figure 5 — CD_FeatureConcept

6.8 CD_FeaturePropertyConcept

6.8.1 Introduction

The abstract class CD_FeaturePropertyConcept is a subclass of CD_Concept (Figure 4) that specifies the description of a feature property concept. In addition to the properties that it inherits from CD_Concept, it has one association (Figure 5) and three subclasses.

6.8.2 featureContext

The role name *featureContext* may identify zero or more instances of CD_FeatureConcept for which the CD_FeaturePropertyConcept is relevant.

EXAMPLE A feature attribute concept of “water depth” is only meaningful when assigned to feature concepts regarding phenomena normally containing water, such as “lake”, “river” or “swimming pool”.

6.8.3 Subclasses

The classes CD_FeatureAttributeConcept (6.9), CD_FeatureRoleConcept (6.12) and CD_FeatureOperationConcept (6.13) are subclasses of CD_FeaturePropertyConcept that specify information about types of feature property concepts in feature concept dictionaries.

6.9 CD_FeatureAttributeConcept

6.9.1 Introduction

The class CD_FeatureAttributeConcept (Figure 6) specifies the description of a feature attribute concept in the feature concept dictionary. In addition to the properties it inherits from CD_FeaturePropertyConcept, it has two attributes and one association.

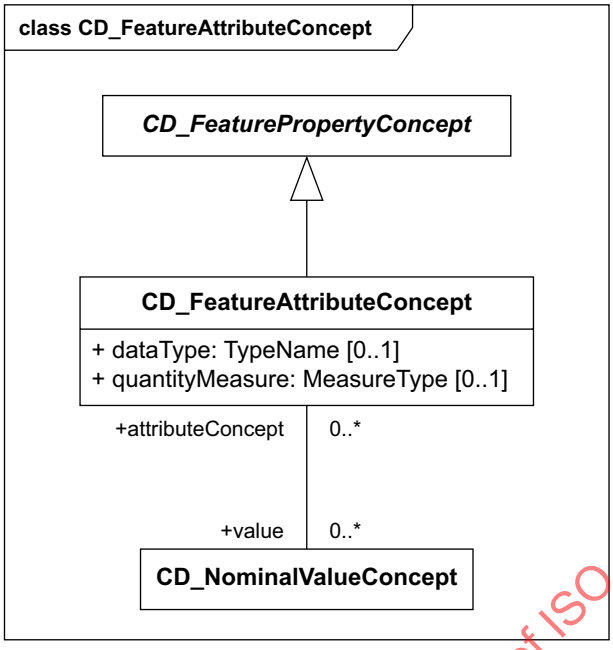

Figure 6 — CD_FeatureAttributeConcept

6.9.2 dataType

The attribute *dataType* shall be represented as a TypeName (ISO/TS 19103:2005, 6.5.5.2) that specifies the allowed data type of the feature attribute concept.

EXAMPLE "Number", "CharacterString" or "Boolean".

NOTE A TypeName is a LocalName that references either a recordType or an object type in some form of schema.

6.9.3 quantityMeasure

The conditional attribute *quantityMeasure* shall be represented as an instance of MeasureType (ISO/TS 19103) that specifies the quantity type of the feature attribute concept quantity. The *quantityMeasure* shall be specified when the value of the feature attribute concept is the measure of a quantity.

6.9.4 value

The *dataType* of an instance of CD_FeatureAttributeConcept may be either an <<Enumeration>> or a <<Codelist>>. If that is the case, the conditional role name *value* shall identify one or more instances of CD_NominalValueConcept that my be included in the enumeration or code list. Otherwise, the minimum multiplicity of zero applies.

6.10 CD_NominalValueConcept

6.10.1 Introduction

The class CD_NominalValueConcept (Figure 7) shall specify a category, class, kind, or type that may be identified as an element of an enumeration or code list that is to be used as the data type of a feature attribute concept. It has one association in addition to the attributes and associations it inherits from CD_Concept (6.4).

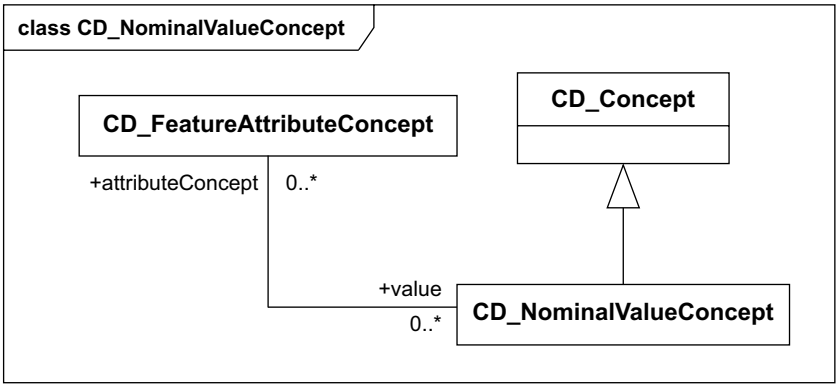

Figure 7 — CD_NominalValueConcept

6.10.2 attributeConcept

The role name *attributeConcept* shall identify one or more instances of CD_FeatureAttributeConcept (6.9) for which this instance of CD_NominalValueConcept may serve as an element of an enumeration or code list *dataType*.

6.11 CD_FeatureAssociationConcept

6.11.1 Introduction

The class CD_FeatureAssociationConcept (Figure 8) specifies the description of a feature association concept. It has one association in addition to the properties it inherits from CD_Concept (6.4).

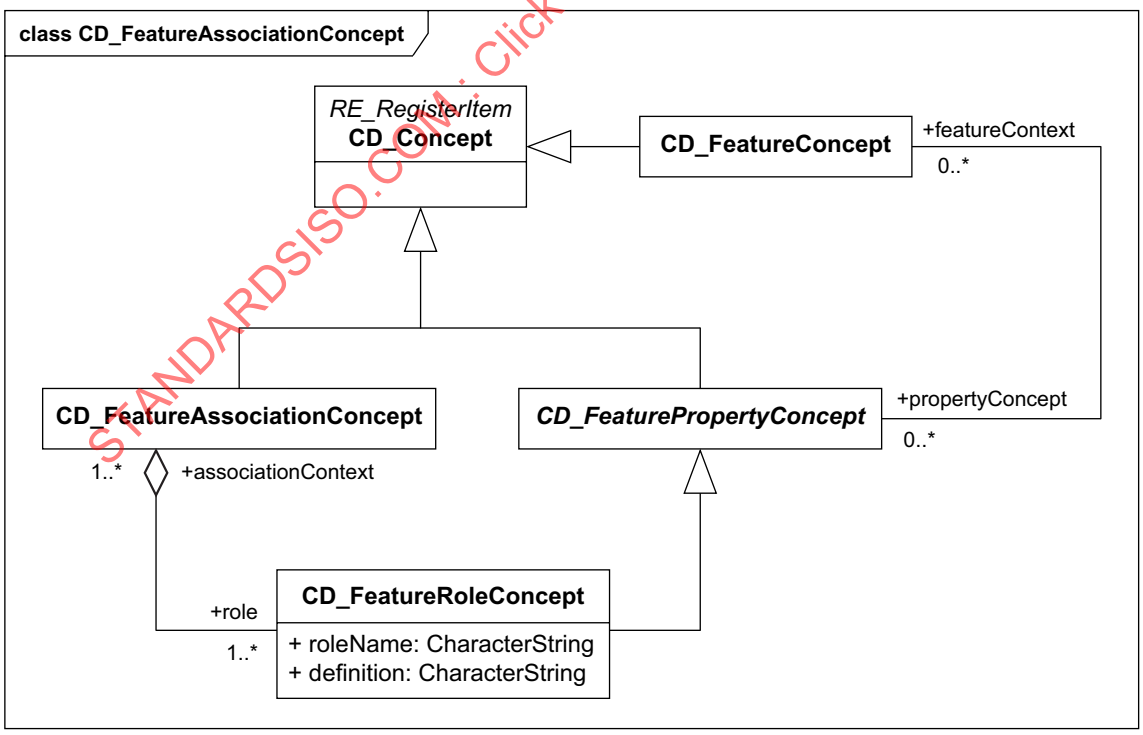

Figure 8 — CD_FeatureAssociationConcept and CD_FeatureRoleConcept

6.11.2 role

The role name *role* shall identify one or more instances of CD_FeatureRoleConcept (6.12), each of which identifies a *role* that an instance of a feature concept may serve in an instance of CD_FeatureAssociationConcept. As a subclass of CD_FeaturePropertyConcept, an instance of CD_FeatureRoleConcept may be assigned to a CD_FeatureConcept that acts in the named role.

EXAMPLE A "supports" feature association concept describes a relationship between two real world phenomena. The association involves two roles. One, "supported-by", could be assigned to a road, a railroad or a canal, for example, and the other, "supporter-of" could be assigned to a bridge, a culvert or a causeway.

6.12 CD_FeatureRoleConcept

6.12.1 Introduction

The class CD_FeatureRoleConcept (Figure 8) describes a feature role concept. It has two attributes and one additional association in addition to the properties it inherits from CD_FeaturePropertyConcept (6.8).

6.12.2 roleName

The attribute *roleName* shall be represented as a CharacterString that identifies the role played by an instance of a feature type in an instance of the feature association concept to which the role concept belongs.

6.12.3 definition

The attribute *definition* shall be represented as a CharacterString that specifies the role played by an instance of a feature type in the feature association concept to which the role concept belongs.

6.12.4 associationContext

The role name *associationContext* shall identify an instance of CD_FeatureAssociationConcept (6.11) that identifies the *association* in which a feature role concept serves.

6.13 CD_FeatureOperationConcept

6.13.1 Introduction

The class CD_FeatureOperationConcept (Figure 9) specifies the description of a feature operation concept. It has one attribute in addition to the properties it inherits from CD_FeaturePropertyConcept (6.8).

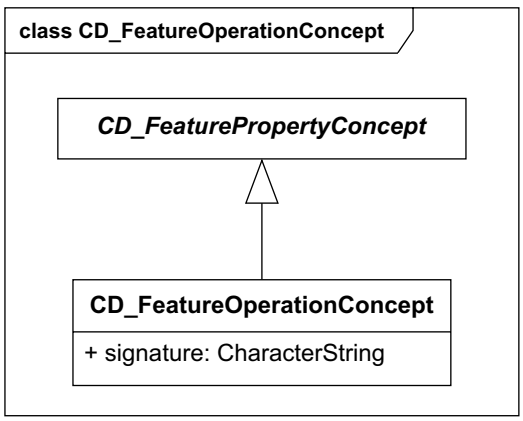

Figure 9 — CD_FeatureOperationConcept

6.13.2 signature

The attribute *signature* shall be represented by a CharacterString containing the name and parameters for the feature operation.

7 Management of feature concept dictionaries as registers

7.1 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. As shown in Table 2, these include a number of elements of management information. A feature concept dictionary is an instance of RE_Register (ISO 19135). According to ISO 19135, all of the registered items contained in a register shall belong to item classes, each of which is described by an instance of RE_ItemClass. This clause specifies five instances of RE_ItemClass that describe each of the five kinds of concepts listed in 6.1 and shown in Figure 3.

7.2 Item class for feature concepts

The item class for feature concepts 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 Concept”.

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

a) title:CharacterString = “ISO 19126, Geographic information – Feature concept dictionaries and registers”;

b) alternateTitle:CharacterString = “ISO 19126”;

c) date:CI_Date:

   1) date:Date = 2009,

   2) dateType:CI_DateTypeCode = “publication”.

7.3 Item class for feature attribute concepts

The item class for feature attribute concepts 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 Concept”.

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

a) title:CharacterString = “ISO 19126, Geographic information – Feature concept dictionaries and registers”;

b) alternateTitle:CharacterString = “ISO 19126”;

c) date:CI_Date:

   1) date:Date = 2009,

   2) dateType:CI_DateTypeCode = “publication”.

7.4 Item class for nominal value concepts

The item class for nominal value concepts 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 “Nominal Value Concept”.

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

a) title:CharacterString = “ISO 19126, Geographic information – Feature concept dictionaries and registers”;

b) alternateTitle:CharacterString = “ISO 19126”;

c) date:CI_Date:

   1) date:Date = 2009,

   2) dateType:CI_DateTypeCode = “publication”.

7.5 Item class for feature association concepts

The item class for feature association concepts 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 Concept”.

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

a) title:CharacterString = “ISO 19126, Geographic information – Feature concept dictionaries and registers”;

b) alternateTitle:CharacterString = “ISO 19126”;

c) date:CI_Date:

   1) date:Date = 2009,

   2) dateType:CI_DateTypeCode = “publication”.

7.6 Item class for feature operation concepts

The item class for feature operation concepts 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 Concept”.

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

a) title:CharacterString = “ISO 19126, Geographic information – Feature concept dictionaries and registers”;

b) alternateTitle:CharacterString = “ISO 19126”;

c) date:CI_Date:

   1) date:Date = 2009,

   2) dateType:CI_DateTypeCode = “publication”.

8 Register of feature concept dictionaries and feature catalogues

8.1 Introduction

A set of feature concept dictionaries and/or feature catalogues may be managed as a hierarchical register (ISO 19135). Feature catalogues that are derived from feature concept dictionaries should be managed as part of the hierarchical register that contains the source feature concept dictionary.

The principal register of a hierarchical register contains instances of RE_SubregisterDescription, each of which describes one of the subregisters. The Hierarchical Register package specified in this International Standard contains a subclass of RE_SubregisterDescription that adds attributes pertinent to feature concept dictionaries (8.2).

As an instance of RE_Register, the principal register also has a mandatory association to a set of instances of RE_ItemClass, each of which describes one class of items held in the register. This International Standard specifies the instance of RE_ItemClass that describes feature concept dictionary registers (8.3).

8.2 HR_FeatureInformationSubregisterDescription

8.2.1 Introduction

The class HR_FeatureInformationSubregisterDescription (Figure 10) shall be derived from the class RE_SubregisterDescription (ISO 19135:2005, 8.14) and specify information about a feature information subregister.

Instances of HR_FeatureInformationSubregisterDescription shall be populated only with information identifying and describing feature concept dictionary registers or feature catalogue registers.

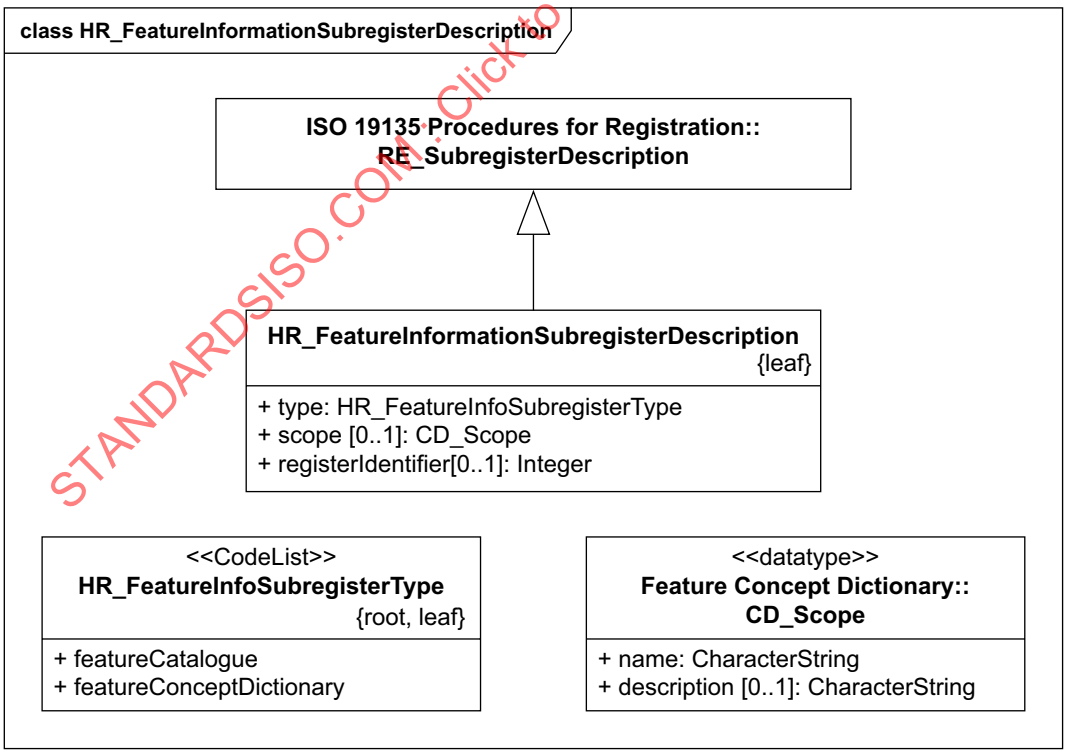

Figure 10 — HR_FeatureInformationSubregisterDescription

8.2.2 type

The attribute *type* shall contain an instance of HR_FeatureInfoSubregisterType that indicates whether the feature information subregister is a feature concept dictionary or a feature catalogue.

8.2.3 scope

The optional attribute *scope* shall be represented as a set of CD_Scope elements (6.3) that describe subject domains of the referenced feature concept dictionary or feature catalogue.

The value of the attribute *scope* shall be identical to that of the *CD_FeatureConceptDictionary.scope* of the referenced feature concept dictionary or the *FC_FeatureCatalogue.scope* (ISO 19110) of the referenced feature catalogue.

8.2.4 registerIdentifier

The conditional attribute *registerIdentifier* shall be represented as a positive integer that is used to uniquely denote the feature information subregister within the scope of the principal register within which that subregister resides.

NOTE The *registerIdentifier* allows information processing activities to distinguish individual subregisters that together comprise a compound registry (5.3.3). It may be used in conjunction with the value of *uniformResourceIdentifier* to electronically access the resource described by the subregister.

8.2.5 Constraints on inherited attributes and associations

The class HR_FeatureInformationSubregisterDescription inherits eleven attributes and ten associations from the class RE_SubregisterDescription (ISO 19135:2005, 8.14). For those attributes and association roles not related to item management, Table 4 specifies the intended use in populating instances of HR_FeatureInformationSubregisterDescription.

Table 4 — HR_FeatureInformationSubregisterDescription inherited attributes and roles

RE_SubregisterDescription	Use
Attribute *name*	Identical to the *CD_FeatureConceptDictionary.name* of the referenced feature concept dictionary or *FC_FeatureCatalogue.name* of the referenced feature catalogue.
Attribute *definition*	A precise statement of the nature, properties, scope, or essential qualities of the feature concept dictionary or feature catalogue; generally a specification of the intended community of use.
Attribute *description*	May be used to capture the contents of the *RE_Register.contentSummary*, *RE_Register.version* and/or *RE_Register.dateOfLastChange* of the referenced feature concept dictionary register or feature catalogue register.
Attribute *fieldOfApplication*	Identical to the *RE_Register.fieldOfApplication* of the referenced feature concept dictionary register or feature catalogue register.
Attribute *operatingLanguage*	Identical to the *RE_Register.operatingLanguage* of the referenced feature concept dictionary register or feature catalogue register.
Attribute *alternativeExpression*	May be used to describe the feature concept dictionary or feature catalogue in one or more different operating languages.
Attribute *uniformResourceIdentifier*	Specifies a resource providing access to the complete content of the feature concept dictionary register or feature catalogue register; generally the same as the *RE_Register.uniformResourceIdentifier* of the referenced feature concept dictionary register or feature catalogue register.
Role *subregisterManager*	Identical to the *RE_Register.manager* of the referenced feature concept dictionary register or feature catalogue register.
Role *itemClass*	Either of the instances of RE_ItemClass specified in 8.3.
Role *containedItemClass*	One or more subclasses of the allowed item classes of a feature concept dictionary register or feature catalogue register.

8.3 Item classes for feature information subregisters

8.3.1 Introduction

This International Standard specifies two instances of RE_ItemClass that describe subregisters for feature concept dictionaries and for feature catalogues.

8.3.2 Item class for feature concept dictionaries

The item class for feature concept dictionaries managed as 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 Concept Dictionaries and Registers”.

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

a) *title*:CharacterString = “ISO 19126, Geographic information – Feature concept dictionaries and registers”;

b) *alternateTitle*:CharacterString = “ISO 19126”;

c) *date*:CI_Date:

   1) date:Date = 2009,

   2) dateType:CI_DateTypeCode = “publication”.

8.3.3 Item class for feature data catalogues

The item class for feature concept dictionaries managed as 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 Register”.

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

a) title:CharacterString = “ISO 19110, Geographic information – Methodology for feature cataloguing”;

b) alternateTitle:CharacterString = “ISO 19110”;

c) date:CI_Date:

   1) date:Date = 2005,

   2) dateType:CI_DateTypeCode = “publication”.

Annex A
(informative)

Feature concepts in dictionaries, catalogues and application schemas

ISO 19101 defines feature as an abstraction of real world phenomena. A note adds that a feature may occur as either a type or an instance.

Abstraction is defined[17] as the act of isolating or considering apart the common properties or characteristics of distinct objects, the formation of a concept or an idea by such an act, and the construction of a class name as the result of concept formation. In this sense, an abstraction of real world phenomena can only be a feature type; a feature instance is an instance of the class of objects from which the underlying concept has been abstracted.

A concept[17] is an abstract idea comprehending the essential attributes of a class or logical species, or, conversely, an expression of the meaning of a universal term. A feature type is a form of concept.

In the context of the ISO/TC 211 standards, a feature type may be represented in several ways:

a) As a definition: “definition” is defined[17] as “a word or a phrase expressing the essential nature of a person or a thing or of a class of persons or things”. Feature concept definitions are contained in a feature concept dictionary as specified in this International Standard.

b) As a specification: “specification” is defined[17] as “a detailed, precise, explicit presentation of something; a written statement containing a minute description or enumeration of particulars”. In the context of the ISO/TC 211 standards, a feature type specification has two forms corresponding to these two definitions:

   1) a class in an application schema (ISO 19109), i.e. a detailed graphic presentation, or

   2) a complete textual description in a feature catalogue (ISO 19110), i.e. a written statement containing a minute description.

A feature catalogue is developed for a particular context, such as an application area or a product specification. It is directly associated with an application schema and one or more data sets developed in compliance with that application schema. It contains a complete specification of each feature type, including a list of its mandatory or optional properties. Each of its properties are also explicitly specified. Within the context for which the catalogue was developed, a feature may not have properties not specified for that feature type in the catalogue.

A feature concept dictionary, on the other hand, is developed in a broader context. It may be intended to cross multiple application areas or to support a variety of product specifications. It is not directly linked to either an application schema or a data product specification. It contains definitions that identify the essential characteristics of a feature type, but does not specify what property types shall be contained in the feature type. It may include definitions of feature property types and may even identify the feature types within which such property types might appropriately be contained, but it states no requirements for doing so.

Given the above, it is apparent that there are a number of dependencies between the ISO/TC 211 standards that deal with feature types (Figure A.1).

A product specification (ISO 19131) contains an application schema (ISO 19109) and either contains or references a feature catalogue (ISO 19110).

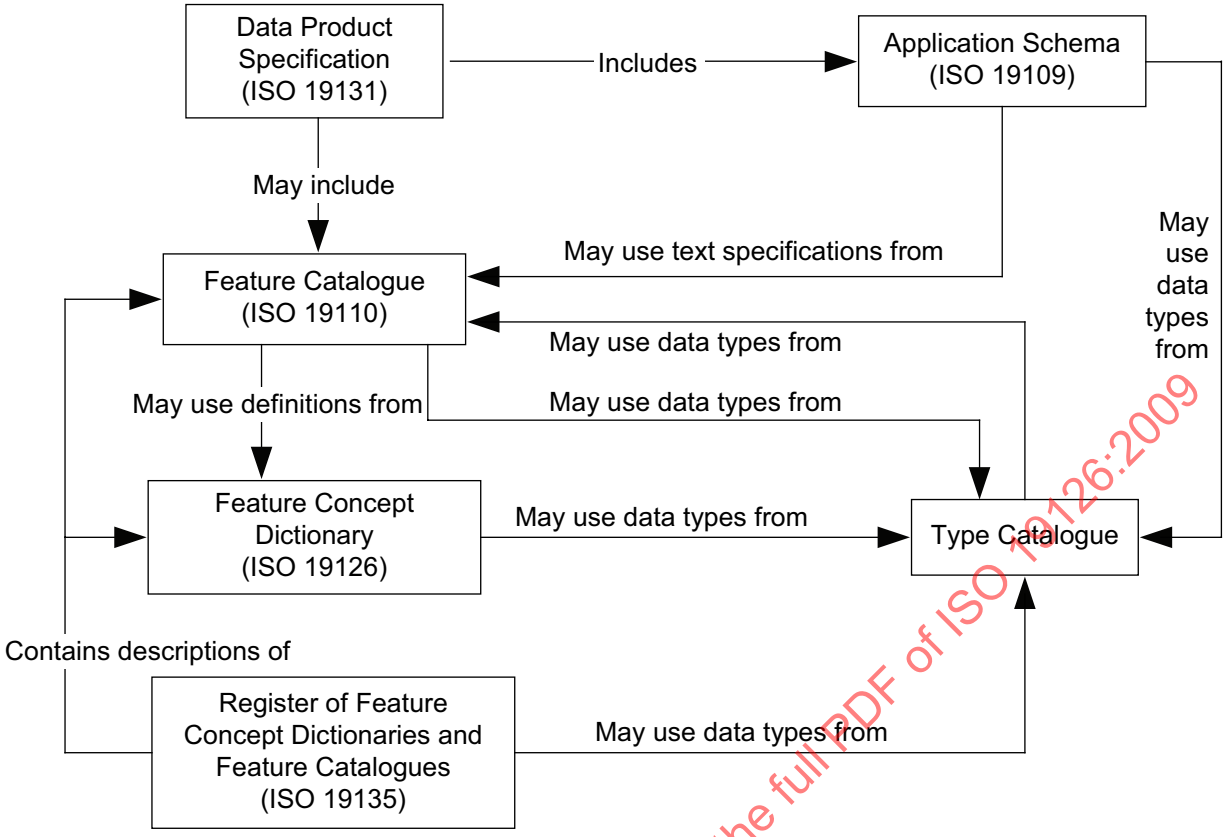

Figure A.1 — Dependencies between standards

An application schema may reference a feature catalogue as its source for definitions of feature types and their property types.

A feature catalogue may draw its definitions for feature types and their property types from a feature dictionary (ISO 19126).

Feature concept dictionaries are maintained as registers (ISO 19135); feature catalogues may be maintained as registers, but they may also be incorporated into documents such as product specifications. Both feature catalogues and feature dictionaries may be incorporated into systems of feature dictionaries and feature catalogues that reference each other.

Data types that may be assigned to feature attribute types or included in signatures of feature operations are specified in ISO/TS 19103. In the future, ISO/TS 19103 may support data type catalogues.

Annex B
(normative)

Abstract test suite

B.1 Introduction

This annex presents the abstract test suite for evaluating conformance to this International Standard. The abstract test suite contains a test module for a feature concept dictionary (B.2) and a test module for a register of feature concept dictionary registers and/or feature catalogue registers (B.3).

B.2 Test module for a feature concept dictionary

a) Test Purpose: Verify that the items in the feature concept dictionary contain the minimum specified content.

b) Test Method: Inspect each of a sample of entries in the feature concept dictionary to ensure that they include all elements of information required by this International Standard.

c) Reference: Clause 6.

d) Test type: Capability.

B.3 Test module for a register of feature concept dictionaries and/or feature catalogues

a) Test Purpose: Verify that the items in the register contain the minimum specified content.

b) Test Method: Inspect each of a sample of entries in the register to ensure that they include all elements of information required by this International Standard.

c) Reference: Clauses 7 and 8.

d) Test type: Capability.

Annex C
(normative)

Information to be included in registration proposals

C.1 Introduction

This annex specifies the information necessary to submit a proposal to a register manager for either a feature concept dictionary register or a register of feature concept dictionaries and/or feature catalogues. Details can be obtained from the relevant registration authority.

C.2 Elements of information required for proposal to any register

C.2.1 General elements of information required for all proposals

The following information shall be included in any proposal for registration of an item of geographic information:

a) Name of submitting organization (19135:2005, 8.5.2);

b) Contact information for the submitting organization (19135:2005, 8.5.3);

c) Date the proposal was submitted (19135:2005, 8.9.2);

d) Statement as to whether the proposal is for addition (19135:2005, 6.2.2), clarification (19135:2005, 6.2.3), supersession (19135:2005, 6.2.4), or retirement (19135:2005, 6.2.5) of an item;

e) Justification for accepting the proposal (19135:2005, 8.9.3).

C.2.2 Elements of information for all proposals to add new items to a register

C.2.2.1 Mandatory elements of information

The following basic elements of information shall be included in any proposal to add an item of geographic information:

a) Name of the item class to which the item belongs (19135:2005, 8.6.2);

b) Name of the item (19135:2005, 8.8.3);

c) Definition of the item (19135:2005, 8.8.7).

C.2.2.2 Conditional elements of information

The following basic elements of information shall be conditionally included in any proposal to add an item of geographic information:

a) Citation information that describes the source from which an externally referenced item was obtained (19135:2005, 8.7.2);

b) Identifier assigned to the item at its source (19135:2005, 8.13.2);

c) Type of changes made to the item specification as compared to that at its source (19135:2005, 8.13.3).

C.2.2.3 Optional elements of information

The following basic elements of information may be optionally included in any proposal to add an item of geographic information:

a) A description of the item (19135:2005, 8.8.8);

b) Field(s) of application for which the item is to be used (19135:2005, 8.8.9);

c) Name, definition, description and field(s) of application for the item in alternative languages (19135:2005, 8.8.10);

d) Citation information that describes the lineage(s) of the item (19135:2005, 8.8.14);

e) Positive integer designator used to denote the item in data interchange;

f) Character string designator used to denote the item in data interchange;

g) Additional comments.

C.2.3 Elements of information required for proposals to clarify a registered item

The following basic elements of information shall be included in any proposal to clarify an item of geographic information:

a) Item identifier (19135:2005, 8.8.2);

b) Name of the item (19135:2005, 8.8.3);

c) Proposed change to the item (19135:2005, 8.11.2).

C.2.4 Elements of information required for proposals to supersede a registered item

The following basic elements of information shall be included in any proposal to supersede an item of geographic information:

a) For the registered item to be superseded:

   1) Item identifier (19135:2005, 8.8.2);

   2) Name of the item (19135:2005, 8.8.3).

b) For the new item to supersede it, all elements specified for proposals to add new items of geographic information (C.2.2) and all elements required for the new geographic information item.

C.2.5 Elements of information required for proposals to retire a registered item

The following basic elements of information shall be included in any proposal to retire an item of geographic information:

a) Item identifier (19135:2005, 8.8.2);

b) Name of the item (19135:2005, 8.8.3).

C.3 Additional elements of information required for feature concept dictionary proposals

C.3.1 Additional elements of information for proposals for feature concept items

C.3.1.1 Mandatory elements of information

There are no additional mandatory elements of information for proposals for feature concept items.

C.3.1.2 Conditional elements of information

There are no additional conditional elements of information for proposals for feature concept items.

C.3.1.3 Optional elements of information

The following additional optional element of information may be included for proposals for feature concept items:

any *propertyConcept* that the feature concept may use (6.7.2).

C.3.2 Additional elements of information for proposals for feature attribute concept items

C.3.2.1 Mandatory elements of information

The following additional element of information shall be included for proposals for feature attribute concept items:

dataType of the feature attribute concept (6.9.2)

C.3.2.2 Conditional elements of information

The following additional elements of information shall be conditionally included for proposals for feature attribute concept items:

a) *quantityMeasure* assigned to the feature attribute concept if it is a measure of a quantity (6.9.3),

b) any *value* assigned to the feature attribute concept if its *dataType* is either enumeration or codelist (6.9.4).

C.3.2.3 Optional elements of information

The following additional element of information may be included for proposals for feature attribute concept items:

featureContext that identifies feature concepts that may use the feature attribute concept (6.8.2).

C.3.3 Additional elements of information for proposals for feature association concept items

C.3.3.1 Mandatory elements of information

The following additional element of information shall be included for proposals for feature association concept items:

role that may be played by a feature concept within the feature association concept (6.11.2).

C.3.3.2 Conditional elements of information

There are no additional conditional elements of information for proposals for feature association concept items.

C.3.3.3 Optional elements of information

There are no additional optional elements of information for proposals for feature association concept items.

C.3.4 Additional elements of information for proposals for feature operation concept items

C.3.4.1 Mandatory elements of information

There are no additional mandatory elements of information for proposals for feature operation concept items.

C.3.4.2 Conditional elements of information

There are no additional conditional elements of information for proposals for feature operation concept items.

C.3.4.3 Optional elements of information

The following additional element of information may be included for proposals for feature operation concept items:

featureContext that identifies feature concepts that may use the feature operation concept (6.8.2).

C.3.5 Additional elements of information for proposals for nominal value concept items

C.3.5.1 Mandatory elements of information

The following additional element of information shall be included for proposals for nominal value concept items:

any *attributeConcept* for which the nominal value concept is a possible value (6.10.2)

C.3.5.2 Conditional elements of information

There are no additional conditional elements of information for proposals for nominal value concept items.

C.3.5.3 Optional elements of information

There are no additional optional elements of information for proposals for nominal value concept items.

C.4 Additional elements of information for proposals for feature information subregister description items

C.4.1 Mandatory elements of information

The following additional elements of information shall be included for proposals for feature information subregister description items:

a) *itemClass* that describes the class of items contained in the subregister (ISO 19135:2005, 8.8.12),

b) *uniformResourceIdentifier* that specifies a resource providing access to the complete content of the subregister (ISO 19135:2005, 8.14.5),

c) *operatingLanguage* that specifies the language used for the content of the subregister (ISO 19135:2005, 8.14.6),

d) *type* of the subregister (8.2.2).

C.4.2 Conditional elements of information

There are no additional conditional elements of information for proposals for feature information subregister description items:

C.4.3 Optional elements of information

The following additional elements of information may be optionally included for feature information subregister description items:

a) *scope* of the feature information subregister (8.2.3),

b) *registerIdentifier* that is used to distinguish the subregister from other subregisters within the same compound or hierarchical set of registers (8.2.4).