BS EN ISO 19126:2021

BSI Standards Publication

Geographic information — Feature concept dictionaries and registers

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National foreword

This British Standard is the UK implementation of EN ISO 19126:2021. It is identical to ISO 19126:2021. It supersedes BS EN ISO 19126:2009, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee IST/36, Geographic information.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Information géographique - Dictionnaires de concepts de caractéristiques et registres (ISO 19126:2021)

Geoinformation - Verzeichnisse und Register für Featurekonzepte (ISO 19126:2021)

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European foreword

This document (EN ISO 19126:2021) has been prepared by Technical Committee ISO/TC 211 "Geographic information/Geomatics" in collaboration with Technical Committee CEN/TC 287 “Geographic Information” the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2021, and conflicting national standards shall be withdrawn at the latest by December 2021.

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Endorsement notice

The text of ISO 19126:2021 has been approved by CEN as EN ISO 19126:2021 without any modification.

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Full document details: BS EN ISO 19126:2021

Contents

Page

Foreword ... **v**
Introduction ... **vi**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Conformance ... **4**
4.1 General ... 4
4.2 Conformance for a feature concept dictionary ... 5
4.3 Conformance for a register of feature concept dictionaries and/or feature catalogues ... 5
5 Concepts ... **5**
5.1 General ... 5
5.2 Feature concept dictionary ... 5
5.3 Registers ... 6
5.3.1 Overview ... 6
5.3.2 Register structure ... 6
5.3.3 Compound registry ... 6
5.3.4 Register management and registration ... 7
5.4 Feature concept dictionary register ... 7
5.5 Register of feature concept dictionary and feature catalogue registers ... 8
5.6 Relationship to data product specifications and application schemas ... 8
5.7 Community implementations ... 8
5.8 Notation ... 9
5.9 Packages ... 9
6 Feature concept dictionary schema ... **10**
6.1 General ... 10
6.2 CD_FeatureConceptDictionary ... 11
6.2.1 General ... 11
6.2.2 Requirements ... 12
6.2.3 Properties ... 13
6.3 CD_Scope ... 14
6.3.1 General ... 14
6.3.2 Requirements ... 14
6.3.3 Properties ... 14
6.4 CD_Concept ... 15
6.4.1 General ... 15
6.4.2 Requirements ... 15
6.4.3 Properties ... 16
6.4.4 Subclasses ... 17
6.5 CD_ConceptRelationship ... 17
6.5.1 General ... 17
6.5.2 Requirements ... 17
6.5.3 Properties ... 17
6.6 CD_ConceptRelationshipType ... 18
6.6.1 General ... 18
6.6.2 Requirements ... 18
6.6.3 Code values ... 18
6.7 CD_FeatureConcept ... 18
6.7.1 General ... 18
6.7.2 Requirements ... 19
6.7.3 Properties ... 19
6.8 CD_FeaturePropertyConcept ... 20
6.8.1 General ... 20

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AVA Documents
Document Sharing Hub
Full document details: BS EN ISO 19126:2021

6.8.2 Requirements ... 20
6.8.3 Properties ... 20
6.8.4 Subclasses ... 20
6.9 CD_FeatureAttributeConcept ... 20
6.9.1 General ... 20
6.9.2 Requirements ... 21
6.9.3 Properties ... 21
6.10 CD_NominalValueConcept ... 22
6.10.1 General ... 22
6.10.2 Requirements ... 22
6.10.3 Properties ... 23
6.11 CD_FeatureAssociationConcept ... 23
6.11.1 General ... 23
6.11.2 Requirements ... 24
6.11.3 Properties ... 24
6.12 CD_FeatureRoleConcept ... 25
6.12.1 General ... 25
6.12.2 Requirements ... 25
6.12.3 Properties ... 25
6.13 CD_FeatureOperationConcept ... 26
6.13.1 General ... 26
6.13.2 Requirements ... 26
6.13.3 Properties ... 26

7 Management of feature concept dictionaries as registers ... 27
7.1 General ... 27
7.2 Item class for feature concepts ... 27
7.3 Item class for feature attribute concepts ... 28
7.4 Item class for nominal value concepts ... 28
7.5 Item class for feature association concepts ... 29
7.6 Item class for feature operation concepts ... 29

8 Register of feature concept dictionaries and feature catalogues ... 29
8.1 General ... 29
8.2 HR_FeatureInformationSubregisterDescription ... 30
8.2.1 General ... 30
8.2.2 Requirements ... 31
8.2.3 Properties ... 32
8.2.4 Constraints on inherited attributes and associations ... 32
8.3 HR_FeatureInfoSubRegisterType ... 33
8.3.1 Requirements ... 33
8.3.2 Code values ... 33
8.4 Item classes for feature information subregisters ... 33
8.4.1 General ... 33
8.4.2 Item class for feature concept dictionaries ... 34
8.4.3 Item class for feature data catalogues ... 34

Annex A (normative) **Abstract test suite ... 35**

Annex B (normative) **Information to be included in registration proposals ... 44**

Bibliography ... 49

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Full document details: BS EN ISO 19126:2021

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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

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This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 287, *Geographic Information,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 19126:2009), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the UML diagrams has been improved to conform to the current style and the UML to the ISO/TC 211 Harmonized Model for both the 2009 version and this document has been added;

— minor updates have been made to take into account changes to other standards, particularly ISO 19135-1.

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

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Introduction

This document specifies a schema for geographic feature concept dictionaries managed as registers. As described in ISO 19101-1, 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 can 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 19135-1 specifies procedures for the registration of items of geographic information. Items of geographic information that can be registered are members of object classes specified in other standards. This document defines object classes and specifies rules used to establish and maintain feature concept dictionaries as ISO 19135-1 conformant register schemas.

ISO 19135-1 specifies the structure of a hierarchical register in which the principal register holds a set of items that describe the subregisters. This document specifies a schema for a hierarchical register where the subregisters are feature concept dictionaries and/or feature catalogues. This document specifies an accompanying schema. The resulting hierarchical register can 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 can 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 can be difficult in cases where the structure of registers differs between information communities. This document can serve as a guide for different information communities to develop compatible registers that can support a system of geographic information cross-referencing.

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Geographic information — Feature concept dictionaries and registers

1 Scope

This document 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, as feature catalogues are often derived from feature concept dictionaries, this document does specify a schema for a hierarchical register of feature concept dictionaries and feature catalogues. These registers are in accordance with ISO 19135-1.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19103:2015, *Geographic information — Conceptual schema language*

ISO 19115-1, *Geographic information — Metadata — Part 1: Fundamentals*

ISO 19135-1:2015, *Geographic information — Procedures for item registration — Part 1: Fundamentals*

3 Terms and definitions

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

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

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

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

3.1
compound registry
registry (3.20) containing multiple *registers* (3.19) that share the same *item classes* (3.17) and coordinated management of a common characteristic

Note 1 to entry: The common characteristic can be a shared namespace for the assignment of names and/or codes.

3.2
data product
dataset or dataset series that conforms to a *data product specification* (3.3)

[SOURCE: ISO 19131:2007, 4.6]

3.3
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

[SOURCE: ISO 19131:2007, 4.7, modified — The Note has been removed.]

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3.4
data type
specification of a *value domain* (3.22) with operations allowed on values in this domain

[SOURCE: ISO 19103:2015, 4.14, modified — Note 1 to entry and the Example have been removed.]

3.5
feature
abstraction of real world phenomena

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

Note 1 to entry: A feature can occur as a type or an instance. In this document, feature type is meant unless otherwise specified.

Note 2 to entry: This document 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).

[SOURCE: ISO 19101-1:2014, 4.1.11, modified — Note 2 to entry and the Example have been added.]

3.6
feature association
relationship that links instances of one *feature* (3.5) type with instances of the same or a different feature type

Note 1 to entry: A feature association can occur as a type or an instance. In this document, feature association type is meant unless otherwise specified.

[SOURCE: ISO 19110:2016, 3.3 modified — Note 1 to entry has been added.]

3.7
feature association concept
concept that can be specified in detail as one or more *feature association* (3.6) 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*).

3.8
feature attribute
characteristic of a feature

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

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

Note 1 to entry: 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.

Note 2 to entry: A feature attribute can occur as a type or an instance. In this document, feature attribute type is meant unless otherwise specified.

[SOURCE: ISO 19101-1:2014, 4.1.12, modified — Note 2 to entry has been changed and Note 3 to entry has been removed.]

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3.9
feature attribute concept
concept that can be specified in detail as one or more *feature attribute* (3.8) types

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

3.10
feature catalogue
catalogue containing definitions and descriptions of the *feature* (3.5) types, *feature attributes* (3.8), and feature relationships occurring in one or more sets of geographic data, together with any *feature operations* (3.13) that can be applied

[SOURCE: ISO 19101-1:2014, 4.1.13]

3.11
feature concept
concept that can be specified in detail as one or more *feature* (3.5) types

EXAMPLE The feature concept "road" can 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 can have a limited set of attributes such as name, route number, location and number of lanes, while for a maintenance application it can have an extensive set of attributes detailing the structure and composition of each of the layers of material for which it is composed.

3.12
feature concept dictionary
dictionary that contains definitions of, and related descriptive information about, concepts that can be specified in detail in a *feature catalogue* (3.10)

3.13
feature operation
operation that every instance of a *feature* (3.7) type may perform

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 1 to entry: The values of feature attributes of feature instances are affected by feature operations.

[SOURCE: ISO 19110:2016, 3.7 modified — Note 1 to entry has been changed.]

3.14
feature operation concept
concept that can be specified in detail as one or more *feature operation* (3.13) types

EXAMPLE A "traffic flow" operation can 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.

3.15
hierarchical register
structured set of *registers* (3.19) for a domain of register items, composed of a principal register and a set of *subregisters* (3.21)

EXAMPLE The ISO 6523 series 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.

[SOURCE: ISO 19135-1:2015, 4.1.4 modified — Example updated]

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3.16
identifier
linguistically independent sequence of characters capable of uniquely and permanently identifying that with which it is associated

[SOURCE: ISO 19135-1:2015, 4.1.5]

3.17
item class
set of items with common properties

Note 1 to entry: 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 entry: To avoid potential ambiguity in this document, the expression "register item class" is used.

[SOURCE: ISO 19135-1:2015, 4.1.7 modified — Note 2 to entry has been added.]

3.18
nominal value
name of an object, type, or category

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

Note 1 to entry: 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.

3.19
register
set of files containing *identifiers* (3.16) assigned to items with descriptions of the associated items

[SOURCE: ISO 19135-1:2015, 4.1.9]

3.20
registry
information system on which a *register* (3.19) is maintained

[SOURCE: ISO 19135-1:2015, 4.1.13]

3.21
subregister
part of a *hierarchical register* (3.15) that contains items from a partition of a domain of information

[SOURCE: ISO 19135-1:2015, 4.1.16]

3.22
value domain
set of accepted values

[SOURCE: ISO 19103:2015, 4.37 modified — The Example has been removed.]

4 Conformance

4.1 General

To conform to this document, all of the conditions specified for at least one of the two conformance classes described in the following subclauses shall be satisfied.

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4.2 Conformance for a feature concept dictionary

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

a) ISO 19135-1:2015, A.1, for general conformance to ISO 19135-1; and

b) Subclause A.2.

4.3 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 document shall satisfy all of the conditions specified in the following abstract test suites:

a) ISO 19135-1:2015, A.1, for general conformance to ISO 19135-1;

b) ISO 19135-1:2015, A.3, for conformance to ISO 19135-1 as a hierarchical register; and

c) Subclause A.3.

5 Concepts

5.1 General

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

ISO 19135-1 specifies procedures to be followed in preparing and maintaining registers of items of geographic information. Such registers can be used to support discovery of, access to, and use of the contents of feature concept dictionaries and feature catalogues. This document specifies a schema for feature concept dictionaries as registers and information that shall be included in item registration proposals (Annex B).

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 document 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 19135-1, this document 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.

5.2 Feature concept dictionary

The set of concepts of a feature concept dictionary includes 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 document provides a detailed specification of the content of feature concept dictionaries.

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5.3 Registers

5.3.1 Overview

Registers provide a basis for the flexible management of items. Feature concept dictionaries and feature catalogues managed as registers may be published electronically, enabling the discovery and direct use of their contents. They can 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 19135-1 specifies several alternatives for structuring registers.

a) A simple register contains items of a single item class. This is the simplest structure to manage, since the same elements of information are recorded for all items in the register, and it imposes a smaller cost burden on any one register manager. A disadvantage, for any organization that wishes to establish registers for multiple item classes, is that it may scatter such registers across several register managers.

b) A multi-part register contains items from different item classes. It is organized into sections based on the different elements of information recorded for each class. For example, a feature catalogue that conforms to ISO 19110 may be instantiated as a multi-part register. Such a register would include distinct item classes for feature types, for feature attributes, for feature associations, and for feature operations.

c) A hierarchical register is a structured set of registers composed of a principal register and one or more subregisters (ISO 19135-1:2015, Clause 8). 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 document 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 can need to establish a suite of coordinated registers that share a common structure but are separated into individual registers within a compound registry. A compound registry contains several registers, each of which may be simple, multi-part or hierarchical, as described in 5.3.2.

EXAMPLE 1 A single community of interest may have geographic information requirements from several scientific disciplines. Each discipline can be best handled by a separate set of experts and/or authorities. For each, a separate control body, register manager and/or register owner can 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 can 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 can establish their own geographic information registers. They can 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 document 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”.

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

Figure 1 shows the organizational relationships (ISO 19135-1:2015, 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.

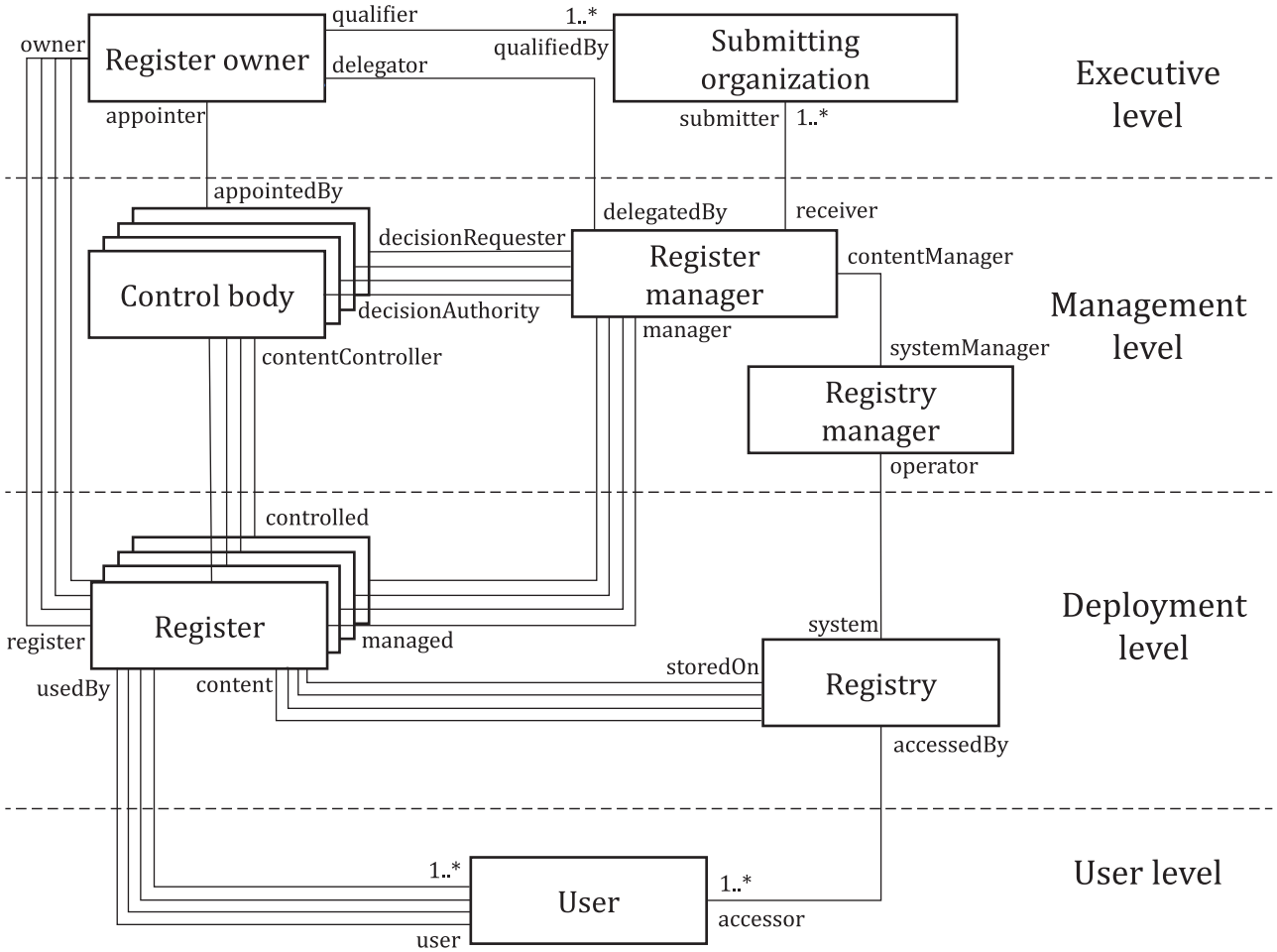

Figure 1 — Example compound registry (ISO 19135-1:2015, 5.1)

5.3.4 Register management and registration

Registers shall be managed as per ISO 19135-1:2015, Clause 5 and the information that shall be included in any proposal for registration of an item of geographic information (ISO 19135-1:2015, Annex E).

ISO 19135-1:2015, Annex D 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

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

ISO 19135-1:2015, Annex D 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 document 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 specifies the item classes to be included in the top level of a hierarchical register of feature concept dictionary registers and feature catalogues. ISO 19135-1:2015, Annex D 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 19101-1:2014, 4.1.2). 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 document (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 do not conflict with those in existing reference feature concept dictionaries;

c) mappings and/or correspondences between concepts in different feature concept dictionaries, especially those on 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;

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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;

   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.

5.8 Notation

The conceptual schemas specified in this document are described using the unified modelling language (UML)[11], following the guidance of ISO 19103.

As specified in ISO 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 document 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 document.

Table 1 — UML package identifiers

Prefix	Package
CI	Citation (ISO 19115-1)
FC	Feature catalogue (ISO 19110)
RE	Register (ISO 19135-1, Annex B)
CD	Feature concept dictionary
HR	Hierarchical feature information register

In accordance with the guidance of ISO 19103, all data element names are presented as character strings which combine multiple lowercase 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 document are identified in Figure 2.

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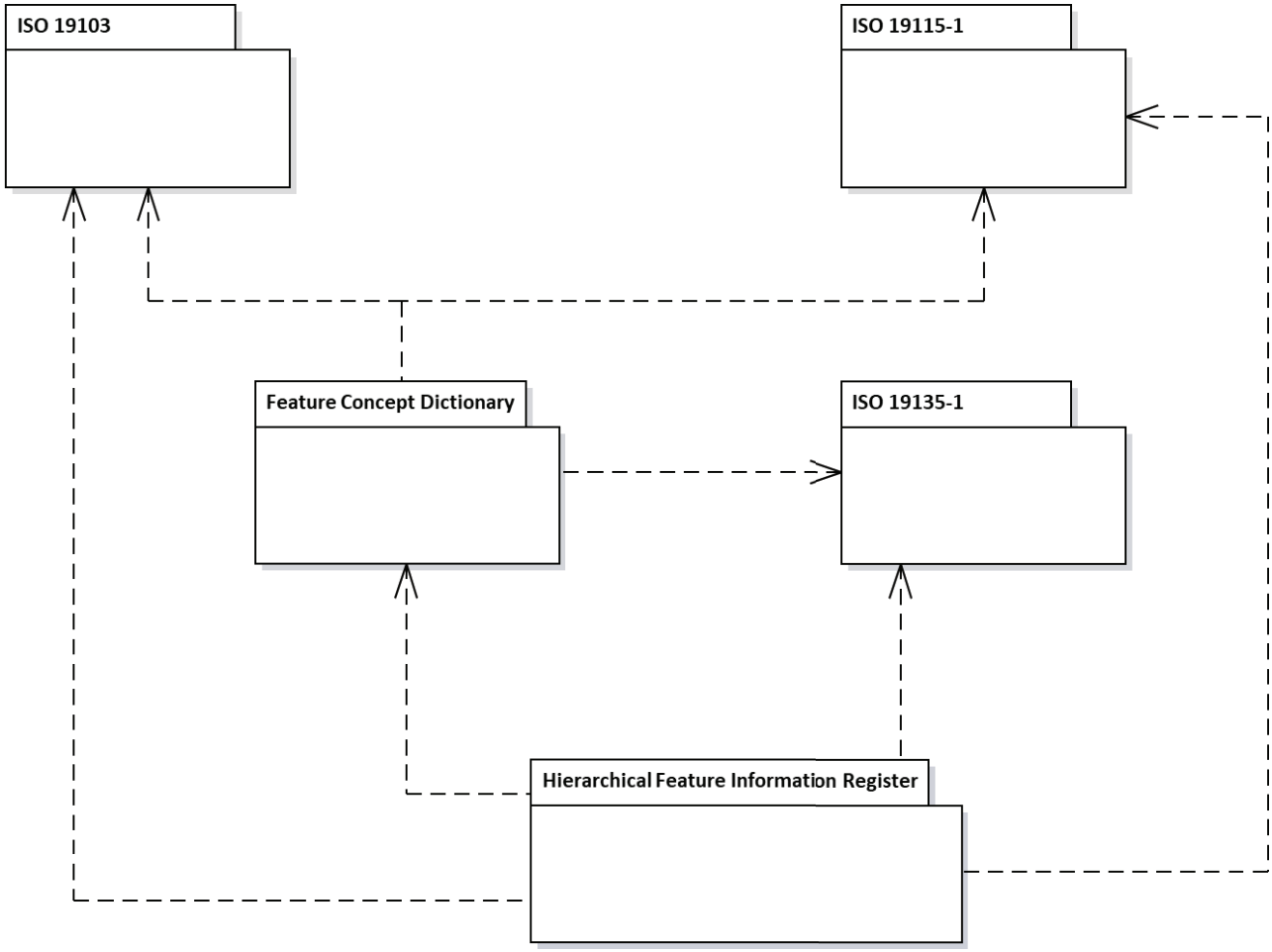

Figure 2 — Dependencies of packages specified in this document

6 Feature concept dictionary schema

6.1 General

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 depicted in UML in Figures 3 to 9.

Each class and data type are 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.

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