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Geographic information — Data product specifications

Information géographique — Spécifications de contenu informationnel

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Contents

Page

Foreword ..... **v**
Introduction ..... **vii**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols and abbreviated terms **4**
4.1 Abbreviated terms 4
4.2 Unified Modeling Language 4
4.3 Externally defined classes 4
5 Conformance **5**
5.1 General 5
5.2 Content of a data product specification 5
5.3 XML encoding of a data product specification 6
6 Requirements for data product specifications **6**
6.1 General 6
6.2 Structure and content of a data product specification 8
6.2.1 Data product specifications and data products 8
6.2.2 Sections 8
6.2.3 Specification scopes 9
6.2.4 Specification overview and description 9
6.2.5 Dependency on other standards 9
6.2.6 Requirements 10
6.2.7 Class DataProductSpecification 12
6.2.8 Class TermEntry 15
6.2.9 Class AbbreviationEntry 16
6.3 Identification section 16
6.3.1 Requirements 16
6.3.2 Class IdentificationSection 19
6.3.3 Class Purpose 20
6.3.4 Class UseCase 21
6.4 Scope section 22
6.4.1 Requirements 22
6.4.2 Class ScopeSection 24
6.4.3 Class SpecificationScope 25
6.5 Data content and structure section 26
6.5.1 General 26
6.5.2 Requirements 27
6.5.3 Class DataContentAndStructureSection 30
6.5.4 Class DataContentAndStructure 31
6.6 Reference systems section 31
6.6.1 Requirements 31
6.6.2 Class ReferenceSystemSection 32
6.6.3 Class ReferenceSystem 33
6.7 Data quality section 33
6.7.1 Requirements 33
6.7.2 Class DataQualitySection 34
6.7.3 Class DataQuality 35
6.7.4 Class ConformanceQualityLevel 35
6.8 Data capture and production section 35
6.8.1 Requirements 35
6.8.2 Class DataCaptureAndProductionSection 37
6.8.3 Class DataCaptureAndProduction 37

6.8.4 Class DataAcquisitionAndProcessing 38
6.9 Maintenance section 39
6.9.1 Requirements 39
6.9.2 Class MaintenanceSection 40
6.9.3 Class Maintenance 40
6.9.4 Class MaintenanceAndUpdateFrequency 41
6.10 Portrayal section 41
6.10.1 Requirements 41
6.10.2 Class PortrayalSection 42
6.10.3 Class Portrayal 43
6.11 Delivery section 43
6.11.1 Requirements 43
6.11.2 Class DeliverySection 45
6.11.3 Class Delivery 45
6.11.4 Class DeliveryFormat 46
6.11.5 Class DeliveryMedium 47
6.11.6 Class DeliveryService 47
6.11.7 Class ServiceProperty 48
6.12 Metadata section 48
6.12.1 Requirements 48
6.12.2 Class MetadataSection 50
6.12.3 Class Metadata 50
6.12.4 Class MetadataElement 50
6.13 Additional information section 51
6.13.1 Requirements 51
6.13.2 Class AdditionalInformationSection 52
6.13.3 Class AdditionalInformation 52
6.14 Recommended layout of a data product specification 52
7 Requirements for XML encoding **53**
Annex A (normative) **Abstract test suite** **55**
Annex B (informative) **Backward compatibility** **56**
Annex C (informative) **Documentation of elements in the UML model** **59**
Annex D (informative) **Example of a data product specification (text)** **71**
Annex E (normative) **XML encoding description** **82**
Annex F (informative) **OWL encoding description** **84**
Bibliography **85**

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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

This document was prepared by Technical Committee ISO/TC 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 19131:2007), which has been technically revised. It also incorporates ISO 19131:2007/Amd 1:2011.

The main changes are as follows:

— XML encoding has been added;

— mandatory sections working as place holders have been introduced;

— the UML model has been restructured, introducing new/renamed attributes and elements, and ISO 19115-1 datatypes have been used where possible;

— new attributes and elements have been introduced to separate information in the overview (6.2.7.2).

— in subclause 6.2.7, "Class IdentificationSection,":

  — the description and identification of the data product has been clearly separated from the description and identification of the specification,

  — the data type for attribute *purpose* has been changed to allow explanation of the purpose of the data product using use cases,

  — the attribute *extent* has been changed to allow specification of temporal and vertical extent, in addition to the geographical extent, and

  - a new attribute *restriction* has been introduced, used to describe handling restrictions of the data product;

- in the Scope:
  - relations between scopes have been removed (the concept of super- and sub-scopes), and
  - a provision has been introduced requiring that at least one of the attributes *level*, *levelName*, or *extent* be used for each scope;
- the Data content and structure section (6.5) has been restructured using elements from ISO 19115-1;
- in the Reference systems section (6.6), the data type of the attribute *temporalReferenceSystem* has been changed;
- in the Data quality section (6.7):
  - the requirement to list data quality elements that have no defined quality requirements has been removed, and
  - a new attribute *requirementId* has been introduced, to be able to reference a specific data quality requirement in other contexts;
- in the Data capture and production section (6.8), new elements and attributes have been introduced, to contain information previously located in the attribute *dataCaptureStatement*;
- in the Maintenance section (6.9), information about maintenance has been made mandatory, and the data type of the attribute *maintenanceAndUpdateFrequency* has been changed, with a new mandatory attribute introduced;
- in the Delivery section (6.11), a new attribute *deliveryService* has been introduced;
- the Metadata section (6.12) has been restructured and new attributes introduced to specify the metadata standard and encoding to be used, as well as a possibility to describe how specific metadata elements should be used;
- a recommended layout has been introduced;
- a detailed overview regarding changes and backwards compatibility can be found in Annex B.

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

Introduction

A data product specification is a specification of a dataset or dataset series together with additional information that will enable it to be created, supplied to and used by another party. In this context of creating, supplying and using data products, the specification thereof is of essence in a controlled and standardized process leading to interoperability. The data product specification is the final product in a process that describes the conceptual formalization of semantics and data structure related to specific requirements or use cases. It is a precise and full description of the data product in terms of the requirements that it will or may fulfil. A data product specification is primarily a technical document that may contain non-technical elements such as narrative descriptions of some aspects, like the overview or data capture statements. However, for various reasons compromises can need to be made in the implementation.

The purpose of this document is to provide requirements on the content of data product specifications, in conformance with other existing International Standards for geographic information. This conformance is at different levels. Firstly, there is the aspect of a dataset and its metadata conforming to a data product specification, and secondly that the data product specification conforms to this document. Some of the items used to specify the data product in a data product specification can also be used as metadata for a data product that conforms to the data product specification. Figure 1 shows how a data product specification relates to datasets and their metadata.

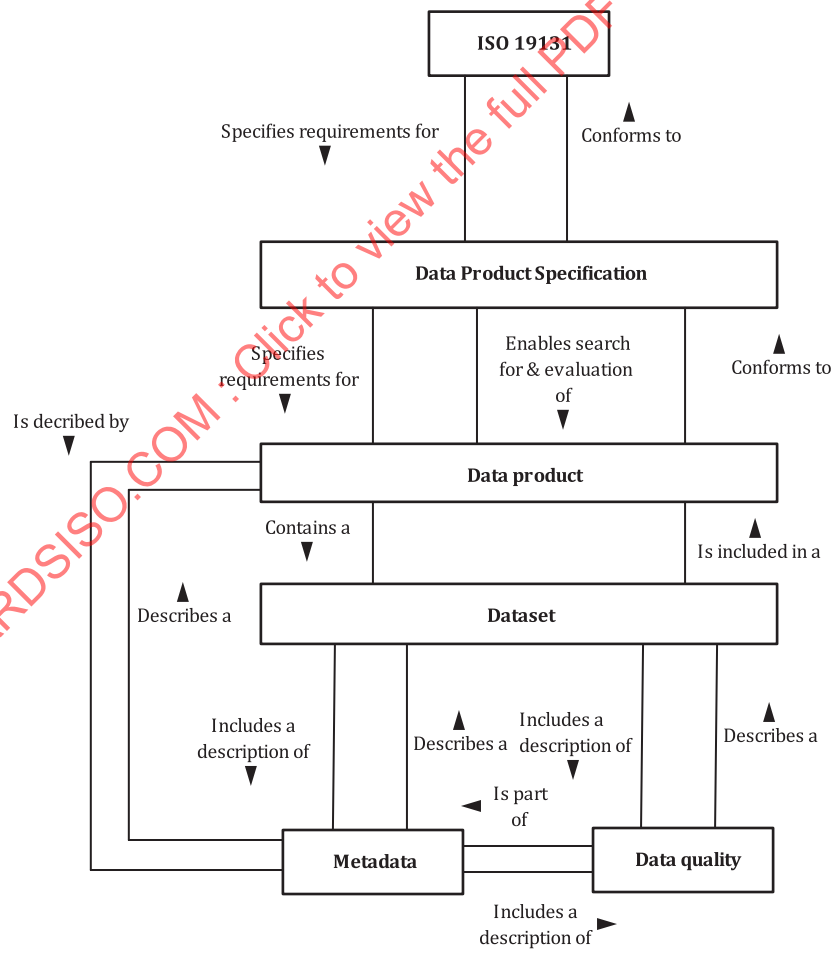

Figure 1 — Relations between this document (ISO 19131), the data product specification and the datasets

A data product specification may be created and used on different occasions, by different parties and for different reasons. It may, for example, be used for the original process of collecting data as well as

for products derived from already existing data. It may be created by producers to specify their product or by users to state their requirements.

This document describes the content, structure and encoding of a data product specification.

This document contains URIs for normative statements, conformance classes, conformance tests and requirements classes. Other International Standards are also referenced with URIs. URIs to normative statements within this document are a combination of the namespace https://standards.isotc211.org/19131/-/2 and the local identifier. The description of elements in the local identifiers can be found at https://committee.iso.org/sites/tc211/home/resolutions/isotc-211-good-practices/--structure-of-uris-in-isotc-211.html.

The name and contact information of the maintenance agency for this document can be found at www.iso.org/maintenance_agencies.

Geographic information — Data product specifications

1 Scope

This document describes requirements for the specification of geographic data products, based upon the concepts of other International Standards in the ISO 19100 family of standards. It also provides guidance in the creation of data product specifications, so that they can be easily understood and fit for their intended purpose.

This document specifies XML encoding of data product specifications.

This document provides OWL representation of the underlying UML model. See Annex F.

This document is intended for use by data producers, data providers, service providers and potential users of data products.

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 639-2, *Codes for the representation of names of languages — Part 2: Alpha-3 code*

ISO 19103, *Geographic information — Conceptual schema language*

ISO 19108, *Geographic information — Temporal schema*

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

ISO 19157, *Geographic information — Data quality*

3 Terms and definitions

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

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

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

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

3.1
application
manipulation and processing of data in support of user requirements

[SOURCE: ISO 19101-1:2014, 4.1.1]

3.2
application schema
conceptual schema (3.4) for data required by one or more *applications* (3.1)

[SOURCE: ISO 19101-1:2014, 4.1.2]

3.3
conceptual model
model that defines concepts of a *universe of discourse* (3.23)

[SOURCE: ISO 19101-1:2014, 4.1.5]

3.4
conceptual schema
formal description of a *conceptual model* (3.3)

[SOURCE: ISO 19101-1:2014, 4.1.6]

3.5
conformance quality level
threshold value or set of threshold values for data *quality* (3.20) results used to determine how well a *dataset* (3.10) meets the criteria set forth in its *data product specification* (3.9) or user requirements

Note 1 to entry: In the context of ISO 19131, dataset refers to data product.

[SOURCE: ISO 19157-1:—[1)], 3.3, modified — Note 1 to entry has been added.]

3.6
coverage
feature (3.13) that acts as a function to return values from its range for any direct position within its domain

[SOURCE: ISO 19123-1:—[2)], 3.1.8]

3.7
data capture
action or process of collecting data

Note 1 to entry: The capture can be by human interaction (such as field observation) or by machines.

3.8
data product
dataset (3.10) or *dataset series* (3.11) that may be supplied

Note 1 to entry: A data product may contain additional information such as *portrayal* (3.19), data *quality* (3.20), *metadata* (3.17) and distribution format.

3.9
data product specification
specification (3.21) of a *data product* (3.8) together with additional information that will enable it to be created, supplied to and used by another party

Note 1 to entry: A data product specification provides a description of the *universe of discourse* (3.23) and a specification for mapping the universe of discourse to a data product. It may be used for production, sales, end-use or other purposes.

3.10
dataset
identifiable collection of data

Note 1 to entry: A dataset may be a smaller grouping of data which, though limited by some constraint such as spatial extent or *feature* (3.13) type, is located physically within a larger dataset. Theoretically, a dataset may be as small as a single feature or *feature attribute* (3.15) contained within a larger dataset. A hardcopy map or chart may be considered a dataset.

[SOURCE: ISO 19115-1:2014, 4.3]

1) Under preparation. Stage at the time of publication: ISO/FDIS 19157-1:2022.

2) Under preparation. Stage at the time of publication: ISO/DIS 19123-1:2022.

3.11
dataset series
collection of *datasets* (3.10) sharing common characteristics

[SOURCE: ISO 19115-1:2014, 4.4]

3.12
domain
well-defined set

Note 1 to entry: "Well-defined" means that the definition is both necessary and sufficient, as everything that satisfies the definition is in the set and everything that does not satisfy the definition is necessarily outside the set.

[SOURCE: ISO 19109:2015, 4.8]

3.13
feature
abstraction of real-world phenomena

Note 1 to entry: A feature may occur as a type or an instance. Feature type or feature instance shall be used when only one is meant.

[SOURCE: ISO 19101-1:2014, 4.1.11]

3.14
feature association
relationship that links instances of one *feature* (3.13) type with instances of the same or a different feature type

Note 1 to entry: A *feature* (3.13) association may occur as a type or an instance. Feature association type or feature association instance is used when only one is meant.

Note 2 to entry: Feature associations include aggregation of features.

[SOURCE: ISO 19110:2016, 3.3]

3.15
feature attribute
characteristic of a *feature* (3.13)

Note 1 to entry: A *feature* (3.13) attribute has a name, a data type and a value *domain* (3.12) associated to it. A feature attribute for a feature instance has an attribute value taken from the value domain.

Note 2 to entry: A *feature* (3.13) attribute may occur as a type or an instance. Feature attribute type or feature attribute instance is used when only one is meant.

[SOURCE: ISO 19101-1:2014, 4.1.12, modified — EXAMPLES 1 and 2 were deleted, Notes 2 and 3 to entry were deleted and a new Note 2 to entry has been added.]

3.16
geographic data
data with implicit or explicit reference to a location relative to the Earth

Note 1 to entry: Geographic information is also used as a term for information concerning phenomena implicitly or explicitly associated with a location relative to the Earth.

[SOURCE: ISO 19109:2015, 4.13]

3.17
metadata
information about a resource

[SOURCE: ISO 19115-1:2014, 4.10]

3.18
model
abstraction of some aspects of reality

[SOURCE: ISO 19109:2015, 4.15]

3.19
portrayal
representation of information for human interpretation

3.20
quality
degree to which a set of inherent characteristics of an object fulfils requirements

[SOURCE: ISO 9000:2015, 3.6.2, modified — Notes 1 and 2 to entry have been deleted.]

3.21
specification
document containing requirements and abstract test cases for those requirements

[SOURCE: ISO 19105:2022, 3.22]

3.22
specification scope
definition of a part of a *data product* (3.8) with certain characteristics

Note 1 to entry: A specification scope may be based on spatial or temporal extent, certain *feature* (3.13) types or properties or product hierarchy, for example.

3.23
universe of discourse
view of the real or hypothetical world that includes everything of interest

[SOURCE: ISO 19101-1:2014, 4.1.38]

4 Symbols and abbreviated terms

4.1 Abbreviated terms

This document adopts the following conventions for presentation purposes:

UML Unified Modeling Language

XML Extensible Markup Language

URI Uniform Resource Identifier

OWL Web Ontology Language

4.2 Unified Modeling Language

In this document, conceptual schemas are presented in the Unified Modeling Language (UML). ISO 19103 presents the specific profile of UML used in this document.

4.3 Externally defined classes

Several model elements used in this document are defined in packages specified in other International Standards; these are listed in Table 1.

Table 1 — Externally defined classes

Class name	Package	International standard
CI_Citation	Citation	ISO 19115-1
CI_Date	Citation	ISO 19115-1
CI_Responsibility	Citation	ISO 19115-1
DQ_ConformanceResult	Data Quality	ISO 19157
DQ_DescriptiveResult	Data Quality	ISO 19157
DQ_Element	Data Quality	ISO 19157
DQ_QuantitativeResult	Data Quality	ISO 19157
EX_Extent	Extent	ISO 19115-1
LanguageCode	Language-characterset localization	ISO 19115-1
LI_ProcessStep	Lineage	ISO 19115-1
LI_Source	Lineage	ISO 19115-1
MD_ApplicationSchemaInformation	Metadata	ISO 19115-1
MD_CharacterSetCode	Metadata	ISO 19115-1
MD_ClassificationCode	Metadata	ISO 19115-1
MD_Constraints	Metadata	ISO 19115-1
MD_ContentInformation	Metadata	ISO 19115-1
MD_CoverageDescription	Metadata	ISO 19115-1
MD_FeatureCatalogue	Metadata	ISO 19115-1
MD_FeatureCatalogueDescription	Metadata	ISO 19115-1
MD_Keywords	Metadata	ISO 19115-1
MD_MaintenanceFrequencyCode	Metadata	ISO 19115-1
MD_ReferenceSystem	Metadata	ISO 19115-1
MD_Resolution	Metadata	ISO 19115-1
MD_ScopeCode	Metadata	ISO 19115-1
MD_SpatialRepresentationTypeCode	Metadata	ISO 19115-1
MD_TopicCategoryCode	Metadata	ISO 19115-1
MediaType		ISO 19103
TM_PeriodDuration	Temporal	ISO 19108

5 Conformance

5.1 General

In this document two conformance classes are defined (see 5.2 and 5.3). The related tests are provided in the abstract test suite in Annex A.

Requirements and recommendations are explicitly marked and assigned a requirement identifier or a recommendation identifier.

5.2 Content of a data product specification

Table 2 describes the conformance class for the content of a data product specification.

Table 2 — Content conformance class

Conformance class	**.../conf/content**
Standardization target type	Instance of a data product specification, regardless of data encoding

Table 2 *(continued)*

Conformance class	.../conf/content
Dependency	https://standards.isotc211.org/19103/-/1/ (Conceptual schema language): — Conformance class UML2 — Conformance class CoreExtendedTypes Classes referred to in this document, as specified in: https://standards.isotc211.org/19108/-/1/ (Temporal schema) https://standards.isotc211.org/19115/-1/1/ (Metadata – Part 1: Fundamentals) https://standards.isotc211.org/19157/-/1/ (Data quality)
Requirements class	.../req/content (see Clause 6)
Tests	All tests in Clause A.1

Requirement URIs in Clause 6 are based on .../req/content/ and are distinguished by the requirement identifier.

Recommendation URIs in Clause 6 are based on .../rec/optionalContent/ and distinguished by the recommendation identifier.

5.3 XML encoding of a data product specification

Table 3 describes the conformance class for the XML representation of a data product specification.

Table 3 — XML encoding conformance class

Conformance class	.../conf/xml
Standardization target type	XML document representing a data product specification
Dependency	.../conf/content
Requirements class	.../req/xml (see Clause 7)
Tests	All tests in A.2

Requirement URIs in Clause 7 are based on .../req/xml/ and are distinguished by the requirement identifier.

6 Requirements for data product specifications

6.1 General

Subclauses 6.2 to 6.13 describe elements of a data product specification based on the conceptual UML model for ISO 19131 (second edition) being part of the ISO/TC 211 harmonized model. Furthermore, additional descriptions, requirements and recommendations are included. A compact documentation of the elements in the UML model is provided in Annex C.

Annex D contains an example of a data product specification's content according to the content in 6.2 to 6.13.

Subclause 6.14 provides a recommendation on how to order the elements described in 6.2 to 6.13 when human readability is prioritized.

The rules that apply for the content of a data product specification comprise a requirements class summarized in Table 4.

Table 4 — Requirements class for the content of a data product specification

Requirements class	.../req/content
Standardization target type	Instance of a data product specification, regardless of data encoding
Dependency	https://standards.isotc211.org/19103/-/1/ (Conceptual schema language)
Dependency	https://standards.isotc211.org/19108/-/1/ (Temporal schema)
Dependency	https://standards.isotc211.org/19115/-1/1/ (Metadata – Part 1: Fundamentals)
Dependency	https://standards.isotc211.org/19157/-/1/ (Data quality)
Requirement	.../req/content/specificationModel
Requirement	.../req/content/specificationLanguage
Requirement	.../req/content/identificationModel
Requirement	.../req/content/extent
Requirement	.../req/content/scopeModel
Requirement	.../req/content/scopeCover
Requirement	.../req/content/specificationScope
Requirement	.../req/content/scopeIdentification
Requirement	.../req/content/contentModel
Requirement	.../req/content/contentScope
Requirement	.../req/content/referenceModel
Requirement	.../req/content/referenceScope
Requirement	.../req/content/qualityLevel
Requirement	.../req/content/qualityModel
Requirement	.../req/content/qualityScope
Requirement	.../req/content/captureModel
Requirement	.../req/content/captureScope
Requirement	.../req/content/maintenanceModel
Requirement	.../req/content/maintenanceScope
Requirement	.../req/content/maintenanceUpdateFrequency
Requirement	.../req/content/portrayalModel
Requirement	.../req/content/portrayalScope
Requirement	.../req/content/deliveryModel
Requirement	.../req/content/deliveryScope
Requirement	.../req/content/deliverySpecification
Requirement	.../req/content/metadataModel
Requirement	.../req/content/metadataScope
Requirement	.../req/content/additionalModel
Requirement	.../req/content/additionalContent

In addition to the requirements class in Table 4, a recommendations class is defined in Table 5. These recommendations, when implemented, can contribute to improved content of a data product specification. However, recommendations are optional and do not have an impact on the results of conformance testing, thus the recommendations class in Table 5 is not related to any of the conformance classes defined in Clause 4.

Table 5 — Recommendations class for the content of a data product specification

Recommendations class	.../rec/optionalContent
Standardization target type	Instance of a data product specification, regardless of data encoding
Dependency	.../req/content
Recommendation	.../rec/optionalContent/useCase
Recommendation	.../rec/optionalContent/contentFeatures
Recommendation	.../rec/optionalContent/contentCoverage
Recommendation	.../rec/optionalContent/contentApplication
Recommendation	.../rec/optionalContent/contentComplete
Recommendation	.../rec/optionalContent/metadataMinimum
Recommendation	.../rec/optionalContent/dpsLayout

6.2 Structure and content of a data product specification

6.2.1 Data product specifications and data products

A data product specification defines the requirements for a data product. It forms the basis for producing, acquiring and exploiting a data product. It may also help potential users to evaluate the data product to determine its fitness for use.

6.2.2 Sections

A data product specification is divided into sections. Each section covers and specifies a specific aspect of the data product. All sections are always included in the data product specification, even when there is no content. This provides a stable and recognizable structure across different data product specifications.

Each section may be further divided based on specification scopes (see 6.4), to specify different requirements for different parts of the data product.

This document specifies the following sections:

- identification section, as specified in 6.3:
  - title, abstract,
  - use case descriptions;
- scope section, as specified in 6.4:
  - different ranges within the data product;
- data content and structure section, as specified in 6.5:
  - feature concept dictionary (ISO 19126),
  - feature catalogue (ISO 19110),
  - application schema (ISO 19109);
- reference systems section, as specified in 6.6:
  - coordinate reference systems (ISO 19111),
  - system using geographic identifiers (ISO 19112),

  - temporal reference systems (ISO 19108);
- data quality section, as specified in 6.7:
  - data quality measure and threshold values for acceptance (ISO 19157);
- data capture and production section, as specified in 6.8:
  - processing catalogue;
- maintenance section, as specified in 6.9:
  - maintenance statement;
- portrayal section, as specified in 6.10:
  - portrayal catalogue (ISO 19117),
  - map legend;
- delivery section, as specified in 6.11:
  - data media,
  - download services,
  - view services;
- metadata section, as specified in 6.12:
  - metadata standard,
  - metadata profile;
- additional information section, issues not covered by other clauses, as specified in 6.13.

6.2.3 Specification scopes

When, within a section, specific requirements and descriptions are applicable for different parts of a data product, the section contains one object for each specific part. Each such object is associated with one specification scope that describes the specific part.

This is valid for all sections except for the data product identification section, which always addresses the complete data product. All specification scopes shall be defined in the scope section.

Specification scopes are specified in 6.4.

6.2.4 Specification overview and description

The specification overview and description are intended to give information about the data product specification itself. It may be seen as metadata of the data product specification, in addition to terms and abbreviations used in the data product specification.

The overview (6.2.7.2) may include general information about what a data product specification is together with reading instructions, but also information specific to the data product specification itself, such as its conformance to ISO 19131, change history, initiative, collaboration, etc.

The intention of the overview, in contrast to the abstract (6.3.2.4), is not to give information about the data product.

6.2.5 Dependency on other standards

Figure 2 illustrates the dependency of this document on other International Standards.

This document presents a conceptual schema for data product specifications. The conceptual schema is specified using the Unified Modeling Language (UML) profile as described in ISO 19103.

Classes defined in this document refer to, and use as data types, classes defined in other standards. Each class in this document as well as those from other standards, belongs to one UML package. The dependencies between UML packages are described in Figure 2.

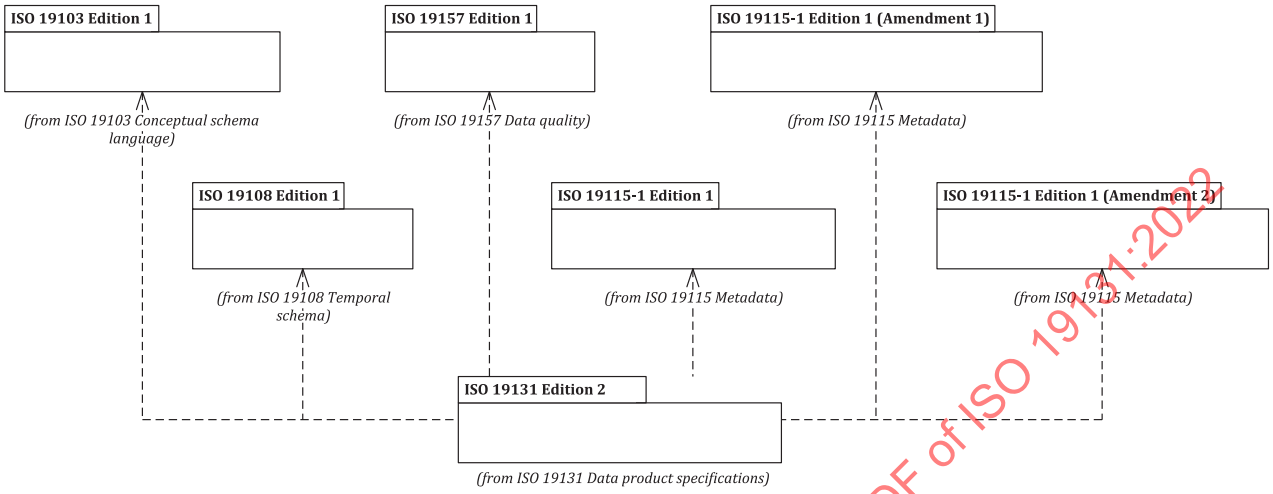

Figure 2 — UML package structure with dependencies

6.2.6 Requirements

Requirement: **.../req/content/specificationModel**
A data product specification shall include sections and data in conformance to the UML model in Figure 3.

Requirement: .../**req/content/specificationLanguage**
A unique *DataProductSpecification* instance shall be used for each language a data product specification is written in.

The UML model in Figure 3 describes class *DataProductSpecification* including all associations to section specific classes. Figure 4 describes dependencies to elements defined in other International Standards.

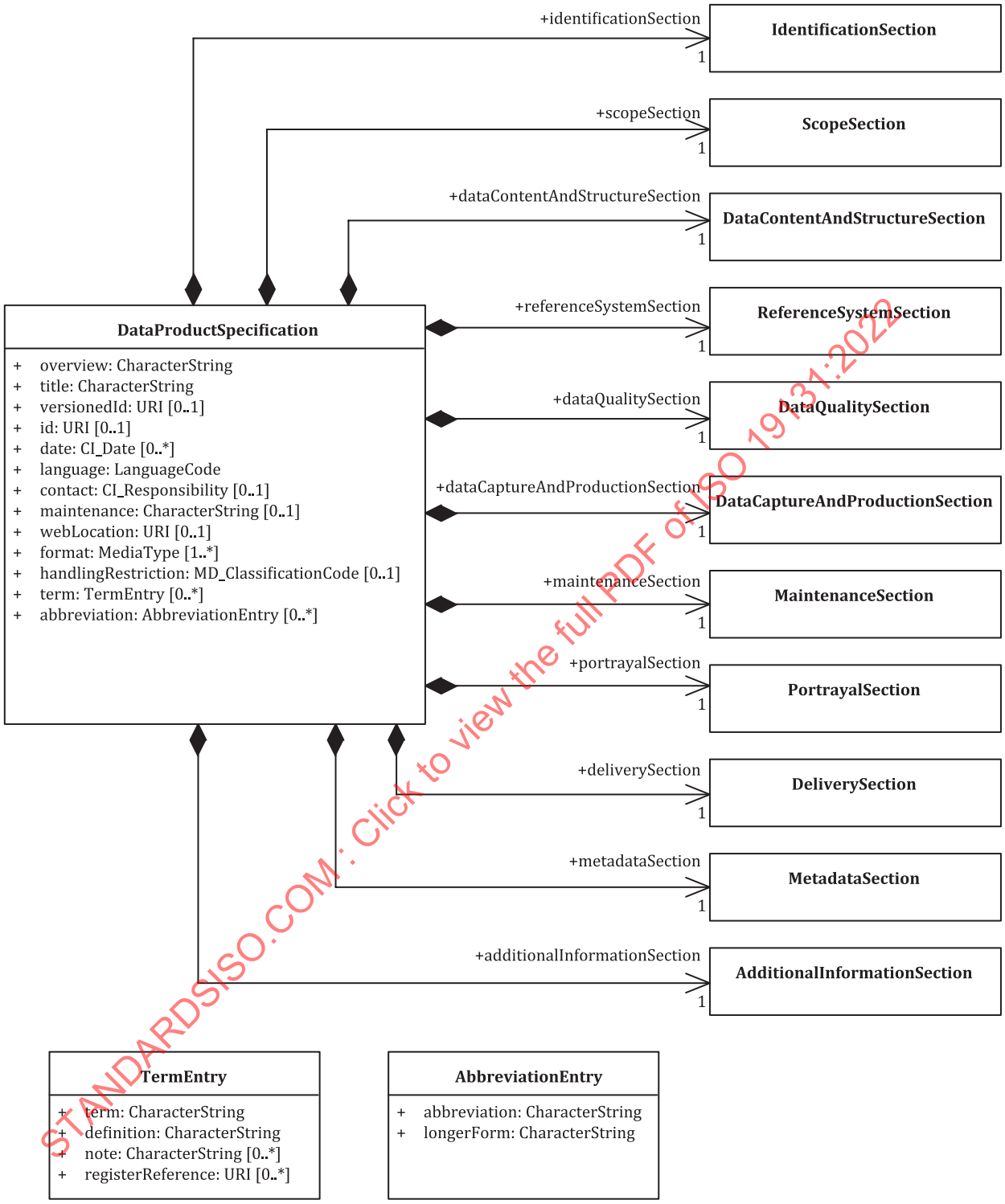

Figure 3 — Class DataProductSpecification and relations to section specific classes

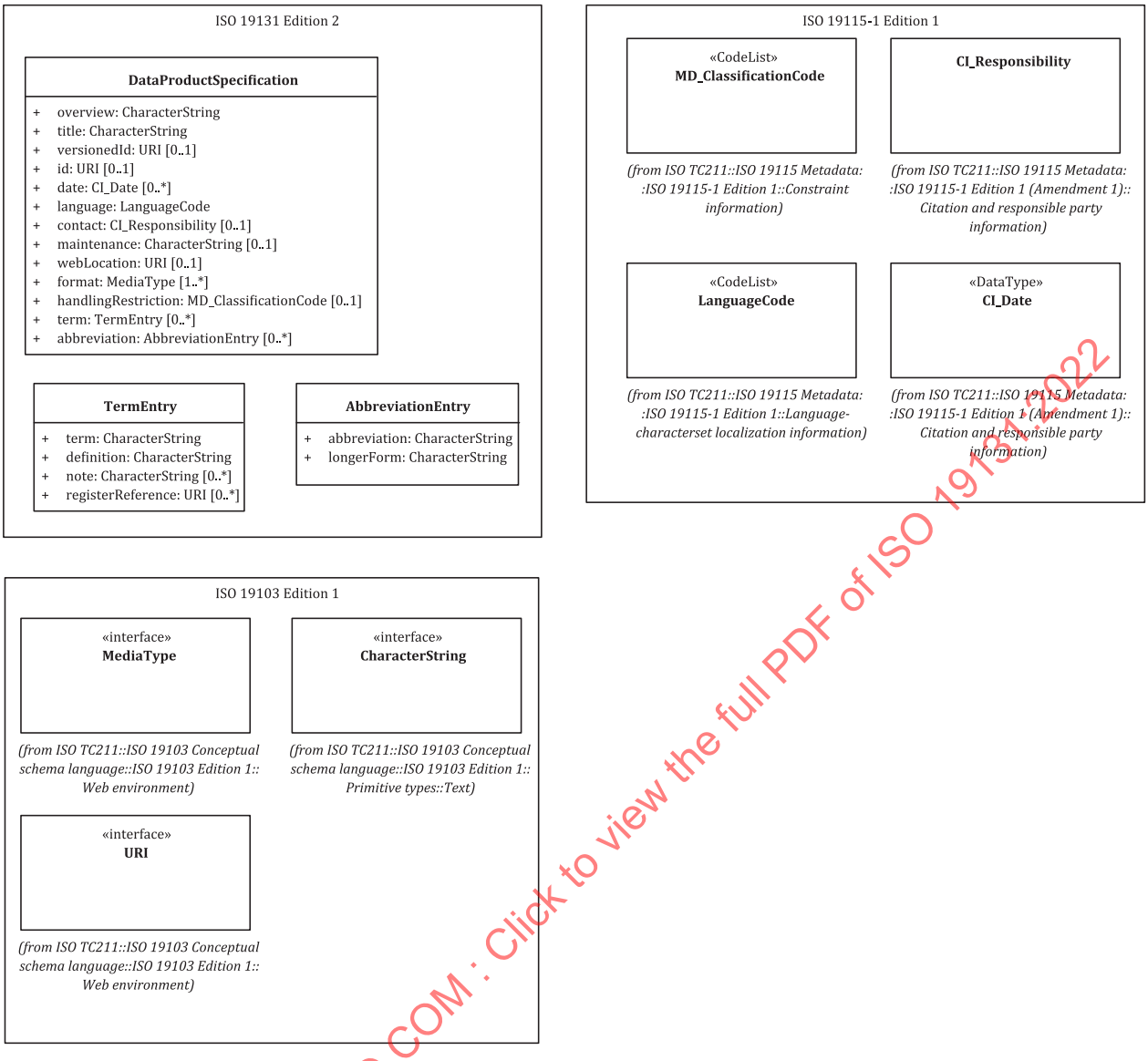

Figure 4 — Data Product Specification — Dependencies to elements defined in other standards including fully qualified namespaces

6.2.7 Class DataProductSpecification

6.2.7.1 Semantics

An object of the *DataProductSpecification* class represents a single instance of a data product specification. Each instance of a data product specification contains a constant set of section objects. Each section object may contain one or more content objects (see 6.3 to 6.13 for section details). Where the specification uses the scope feature, to specify different parts of the product, each section content object relates to exactly one scope.

NOTE All sections in a data product specification are mandatory. The intention with mandatory sections is to provide a recognizable structure. However, some of the parts might not contain any information, which is expressed by 0..* multiplicity from the section classes to the related content classes. This is described in the related paragraphs for the Additional information section (6.13), Data capture and production section (6.8) and Portrayal section (6.10), where there is no content required.

6.2.7.2 Attribute overview

The attribute *overview* contains a short, human-readable, narrative description of the data product specification, see 6.2.4.

```
overview: CharacterString [1]
```

6.2.7.3 Attribute title

The attribute *title* contains the official designation of the data product specification.

```
title: CharacterString [1]
```

6.2.7.4 Attribute versionedId

The optional attribute *versionedId* contains a persistent uniform resource identifier for identifying this version of the data product specification.

```
versionedId: URI [0..1]
```

6.2.7.5 Attribute id

The optional attribute *id* contains a persistent uniform resource identifier for identifying the latest version of the data product specification.

```
id: URI [0..1]
```

6.2.7.6 Attribute date

Each occurrence of the optional attribute *date* contains a date for a significant event in the life cycle of the data product specification.

NOTE Such events include when the data product specification was created, changed, approved and published.

```
date: CI_Date [0..*]
```

6.2.7.7 Attribute language

The attribute *language* contains a language code according to ISO 639-2 for the language that is used in the data product specification.

```
language: LanguageCode [1]
```

6.2.7.8 Attribute contact

The optional attribute *contact* contains contact information for the party that is responsible for the data product specification.

```
contact: CI_Responsibility [0..1]
```

6.2.7.9 Attribute webLocation

The optional attribute *webLocation* contains an URL for a web site location where the data product specification can be downloaded.

```
webLocation: URI [0..1]
```

6.2.7.10 Attribute maintenance

The optional attribute *maintenance* contains a narrative description of the maintenance regime for the data product specification.

```
maintenance: CharacterString [0..1]
```

6.2.7.11 Attribute format

Each occurrence of the attribute *format* contains the file format in which the data product specification is provided at a web site location.

NOTE Examples of formats are “application/pdf” and “text/xml”.

```
format: MediaType [1..*]
```

6.2.7.12 Attribute handlingRestriction

The optional attribute *handlingRestriction* contains a classification code specifying limitations on handling the data product specification.

```
handlingRestriction: MD_ClassificationCode [0..1]
```

6.2.7.13 Attribute term

Each occurrence of the optional attribute *term* contains a word or expression that is applicable to the data product specification.

```
term: TermEntry [0..*]
```

6.2.7.14 Attribute abbreviation

Each occurrence of the optional attribute *abbreviation* contains a shortened form of a written word or phrase that is applicable to the data product specification.

```
abbreviation: AbbreviationEntry [0..*]
```

6.2.7.15 Role identificationSection

The role *identificationSection* represents the identification section which identifies the data product, see 6.3.

```
identificationSection: IdentificationSection [1]
```

6.2.7.16 Role scopeSection

The role *scopeSection* represents the scope section, see 6.4.

```
scopeSection: ScopeSection [1]
```

6.2.7.17 Role dataContentAndStructureSection

The role *dataContentAndStructureSection* represents the data content and structure section, see 6.5.

```
dataContentAndStructureSection: DataContentAndStructureSection [1]
```

6.2.7.18 Role referenceSystemSection

The role *referenceSystemSection* represents the reference systems section, see 6.6.

```
referenceSystemSection: ReferenceSystemSection [1]
```

6.2.7.19 Role dataQualitySection

The role *dataQualitySection* represents the data quality section, see 6.7.

```
dataQualitySection: DataQualitySection [1]
```

6.2.7.20 Role dataCaptureAndProductionSection

The role data*CaptureAndProductionSection* represents the data capture and production section, see 6.8.

```
dataCaptureAndProductionSection: DataCaptureAndProductionSection [1]
```

6.2.7.21 Role maintenanceSection

The role *maintenanceSection* represents the maintenance section, see 6.9.

```
maintenanceSection: MaintenanceSection [1]
```

6.2.7.22 Role portrayalSection

The role *portrayalSection* represents the data portrayal section, see 6.10.

```
portrayalSection: PortrayalSection [1]
```

6.2.7.23 Role deliverySection

The role *deliverySection* represents the data delivery section, see 6.11.

```
deliverySection: DeliverySection [1]
```

6.2.7.24 Role metadataSection

The role *metadataSection* represents the metadata section, see 6.12.

```
metadataSection: MetadataSection [1]
```

6.2.7.25 Role additionalInformationSection

The role *additionalInformationSection* represents the additional information section, see 6.13.

```
additionalInformationSection: AdditionalInformationSection [1]
```

6.2.8 Class TermEntry

6.2.8.1 Semantics

The class *TermEntry* is a datatype for definition of a term.

6.2.8.2 Attribute term

The attribute *term* contains the term to be used for a concept.

```
term: CharacterString [1]
```

6.2.8.3 Attribute definition

The attribute *definition* contains a representation of a concept by a descriptive statement which serves to differentiate it from related concepts.

```
definition: CharacterString [1]
```

6.2.8.4 Attribute note

Each occurrence of the optional attribute *note* contains a note of the concept.

```
note: CharacterString [0..*]
```

6.2.8.5 Attribute registerReference

Each occurrence of the optional attribute *registerReference* contains a reference to an entry in a register defining the concept.

```
registerReference: URI [0..*]
```

6.2.9 Class AbbreviationEntry

6.2.9.1 Semantics

The class *AbbreviationEntry* holds an abbreviation and its full text version.

6.2.9.2 Attribute abbreviation

The attribute *abbreviation* contains a shortened form of a written word or phrase used in place of the whole word or phrase.

```
abbreviation: CharacterString [1]
```

6.2.9.3 Attribute longerForm

The attribute *longerForm* contains the full text version of an abbreviation.

```
longerForm: CharacterString [1]
```

6.3 Identification section

6.3.1 Requirements

The purpose of the identification section is to provide information for identification, search, discovery and first evaluation of data products.

Requirement: **.../req/content/identificationModel**
The identification section shall conform to the UML model described in Figure 5. A single object of the class *IdentificationSection* shall specify information for the entire data product by specifying a specification scope that comprises the entire data product.

Recommendation: **.../rec/optionalContent/useCase**
To increase potential users' understanding of what purposes the data product serves, the data product specification should provide use case(s).

The UML model in Figure 5 describes the identification section and Figure 6 describes dependencies to elements defined in other standards.

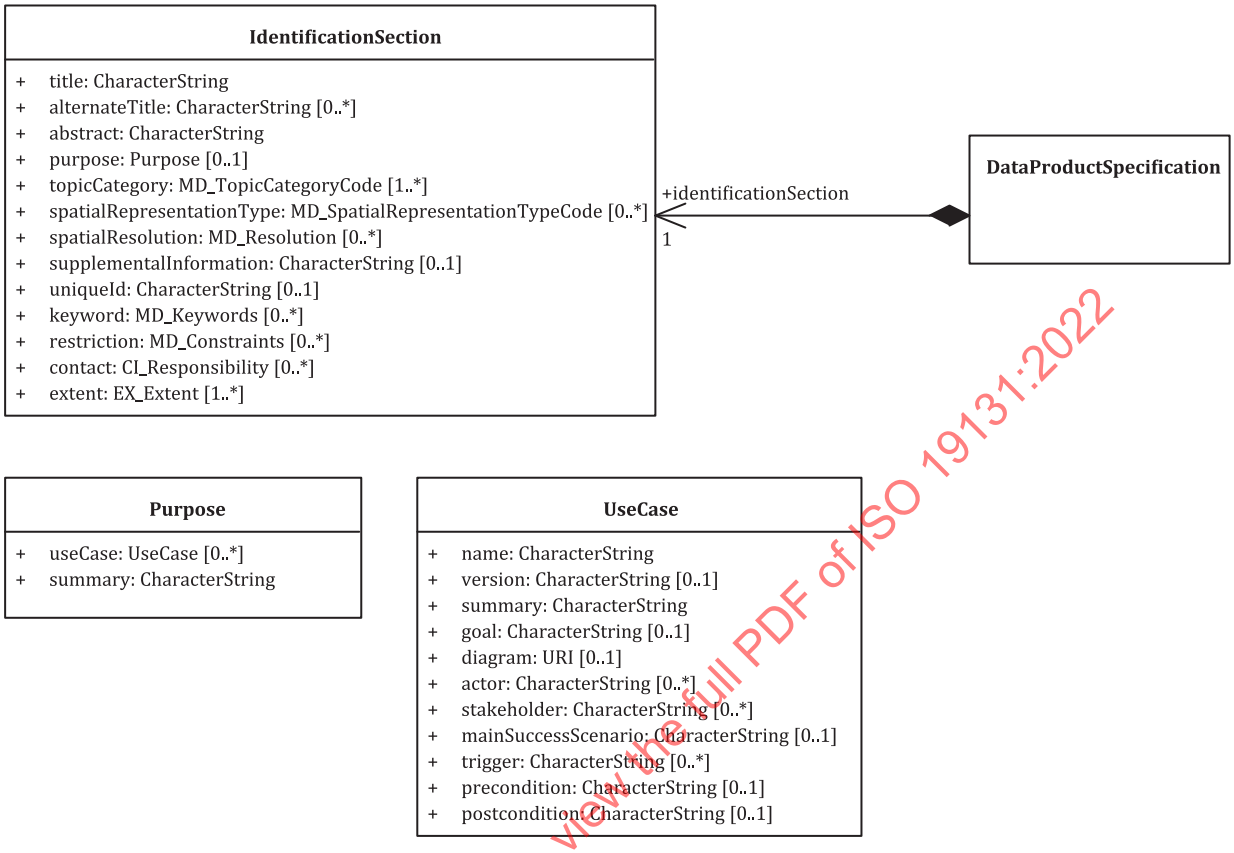

Figure 5 — UML model for identification section

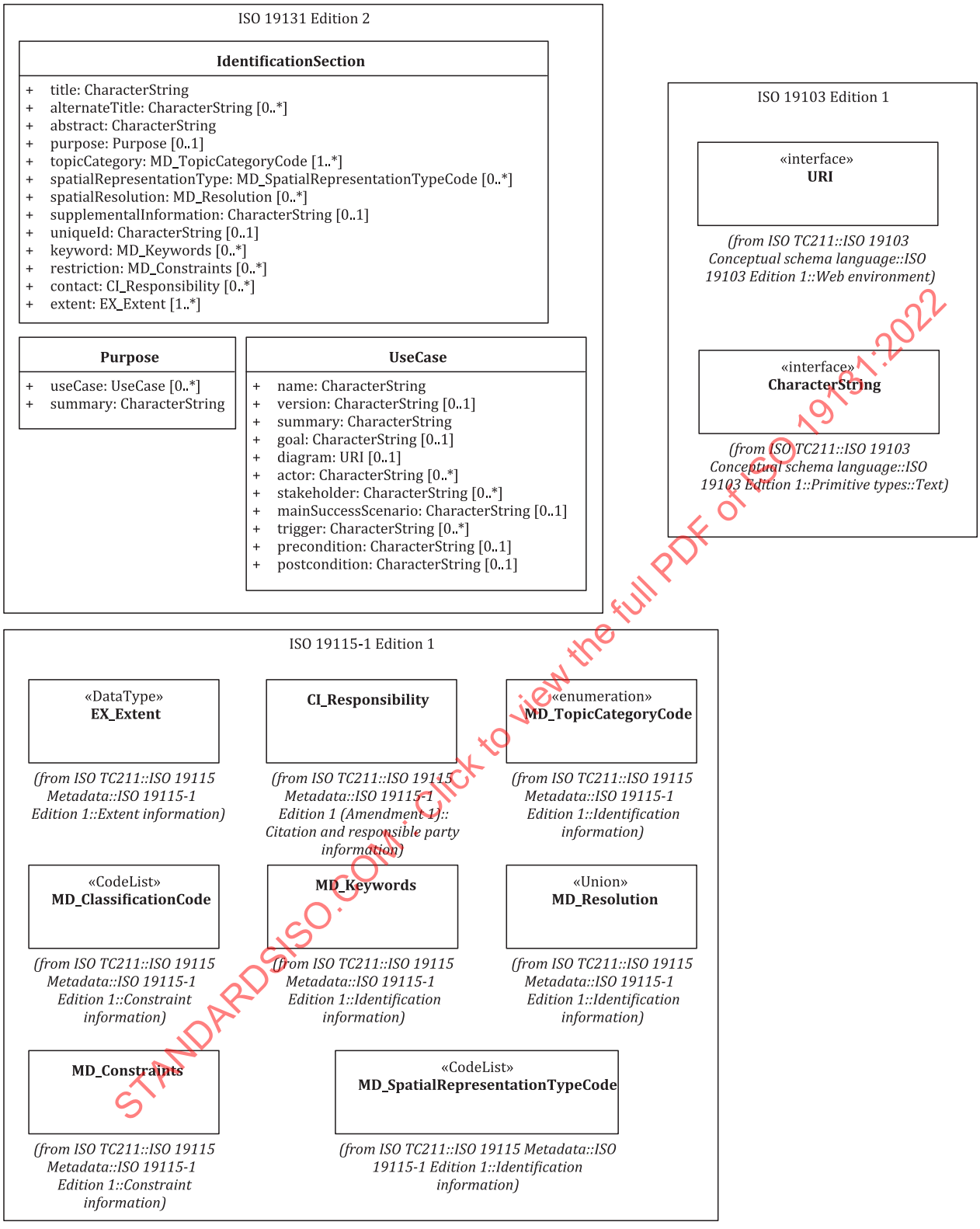

Figure 6 — Identification — Dependencies to elements defined in other standards including fully qualified namespaces

6.3.2 Class IdentificationSection

6.3.2.1 Semantics

For a data product, there is a single object of the *IdentificationSection* class, and its content provides various ways of identifying, searching and categorizing the data product.

6.3.2.2 Attribute title

The attribute *title* contains the official designation of the data product.

```
title: CharacterString [1]
```

6.3.2.3 Attribute alternateTitle

Each occurrence of the optional attribute *alternateTitle* contains a name, other than the official designation, by which the data product is known.

```
alternateTitle: CharacterString [0..*]
```

6.3.2.4 Attribute abstract

The attribute *abstract* contains a brief narrative summary of the content of the data product.

```
abstract: CharacterString [1]
```

6.3.2.5 Attribute purpose

The optional attribute *purpose* contains information regarding the intentions with which the data product is developed.

```
purpose: Purpose [0..1]
```

6.3.2.6 Attribute topicCategory

Each occurrence of the *topicCategory* attribute contains a code for a theme applicable to the data product.

```
topicCategory: MD_TopicCategoryCode [1..*]
```

6.3.2.7 Attribute spatialRepresentationType

Each occurrence of the optional attribute *spatialRepresentationType* contains the form of spatial representation in the data product.

NOTE An example of the form of the spatial representation is vector data.

```
spatialRepresentationType: MD_SpatialRepresentationTypeCode [0..*]
```

6.3.2.8 Attribute spatialResolution

Each occurrence of the optional attribute *spatialResolution* contains a factor which provides a general understanding of the density of spatial data.

```
spatialResolution: MD_Resolution [0..*]
```

6.3.2.9 Attribute supplementalInformation

The optional attribute *supplementalInformation* contains any other descriptive information about the data product.

```
supplementalInformation: CharacterString [0..1]
```

6.3.2.10 Attribute uniqueId

The optional attribute *uniqueId* contains a persistent unique identifier for identifying the data product.

```
uniqueId: CharacterString [0..1]
```

6.3.2.11 Attribute keyword

Each occurrence of the optional attribute *keyword* contains a word, formalized word or phrase that is used to describe the subject of the data product.

```
keyword: MD_Keywords [0..*]
```

6.3.2.12 Attribute restriction

Each occurrence of the optional attribute *restriction* contains a classification code describing handling restrictions on the data product.

```
restriction: MD_Constraints [0..*]
```

6.3.2.13 Attribute contact

Each occurrence of the optional attribute *contact* contains an identification of, and means of communication with, the person(s) and organization(s) associated with the data product

```
contact: CI_Responsibility [0..*]
```

6.3.2.14 Attribute extent

Each occurrence of the attribute *extent* contains the extent of the geographic area, temporal extent, or the vertical extent covered by the data product.

```
extent: EX_Extent [1..*]
```

Requirement: **.../req/content/extent**
For the attribute extent there shall always exist at least one instance describing the geographic area using subtype EX_GeographicExtent of EX_Extent.

6.3.3 Class Purpose

6.3.3.1 Semantics

The class *Purpose* holds information regarding the intentions with which the data product is developed. Information can be provided in the form of a summary. In addition, use cases may be added in order to provide purpose information in a more structured way.

6.3.3.2 Attribute summary

The attribute *summary* contains a summary of the intentions with which the data product is developed.

```
summary: CharacterString [1]
```

6.3.3.3 Attribute useCase

Each occurrence of the optional attribute *useCase* contains a detailed and structured description of a use case for the data product.

```
useCase: UseCase [0..*]
```

6.3.4 Class UseCase

6.3.4.1 Semantics

The class *UseCase* holds information for a detailed documentation of the data product's purpose related to certain user needs.

NOTE The structure of the class is based on the use case template described in ISO 19119:2016, Annex E (informative).

6.3.4.2 Attribute name

The attribute *name* contains the name of the use case.

```
name: CharacterString [1]
```

6.3.4.3 Attribute version

The optional attribute *version* contains the version number of the use case.

```
version: CharacterString [0..1]
```

6.3.4.4 Attribute summary

The attribute *summary* contains a comprehensive textual description of the use case.

```
summary: CharacterString [1]
```

6.3.4.5 Attribute goal

The optional attribute *goal* contains a short description of the goal to be achieved by a realization of the use case.

```
goal: CharacterString [0..1]
```

6.3.4.6 Attribute diagram

The optional attribute *diagram* contains a use case diagram represented by an URL to an image of an UML use case diagram. It is important to have a link to a diagram in the form of a de-referenceable URL and not just an identifier.

```
diagram: URI [0..1]
```

6.3.4.7 Attribute actor

The optional attribute *actor* contains the designation of a user of the use case.

```
actor: CharacterString [0..*]
```

6.3.4.8 Attribute stakeholder

Each occurrence of the optional attribute *stakeholder* contains the designation of a company, an institution or an interest group concerned by the execution of the use case.

```
stakeholder: CharacterString [0..*]
```

6.3.4.9 Attribute mainSuccessScenario

The optional attribute *mainSuccessScenario* contains a numbered sequence of actions to be carried out during the execution of the use case.

```
mainSuccessScenario: CharacterString [0..1]
```

6.3.4.10 Attribute trigger

Each occurrence of the optional attribute *trigger* contains a description of an event that leads to the execution of the use case.

```
trigger: CharacterString [0..*]
```

6.3.4.11 Attribute precondition

The optional attribute *precondition* contains a description of the status that is required to start the execution of the use case.

```
precondition: CharacterString [0..1]
```

6.3.4.12 Attribute postcondition

The optional attribute *postcondition* contains a description of the status after the successful execution of the use case.

```
postcondition: CharacterString [0..1]
```

6.4 Scope section

6.4.1 Requirements

When providing different requirements for different parts of data, a data product specification requires a partitioning of the data content of the data product. Each such part of the data content is regarded as a specification scope.

Criteria that can be used as the basis for partitioning include, but are not limited to:

— spatial or temporal extent,

— feature type,

— property type,

— property value,

— spatial representation,

— product hierarchy.

EXAMPLE Data products to support navigation often contain two sets of feature types: those that provide navigation information that changes rapidly and is essential for safety of navigation, and those that provide background reference information. Maintenance and delivery information would be partitioned on the basis of these groupings; reference system information would not.

Requirement: **.../req/content/scopeModel**
The information describing a specification scope shall conform to the class *SpecificationScope* described in Figure 7, which shall specify the criteria.

Requirement: **.../req/content/scopeCover**
The union of the scopes defined in each of the *SpecificationScope* objects shall cover all the spatial, temporal and semantic extent of the data product.

The UML model in Figure 7 shows the class *SpecificationScope*, and Figure 8 describes dependencies to elements defined in other standards.

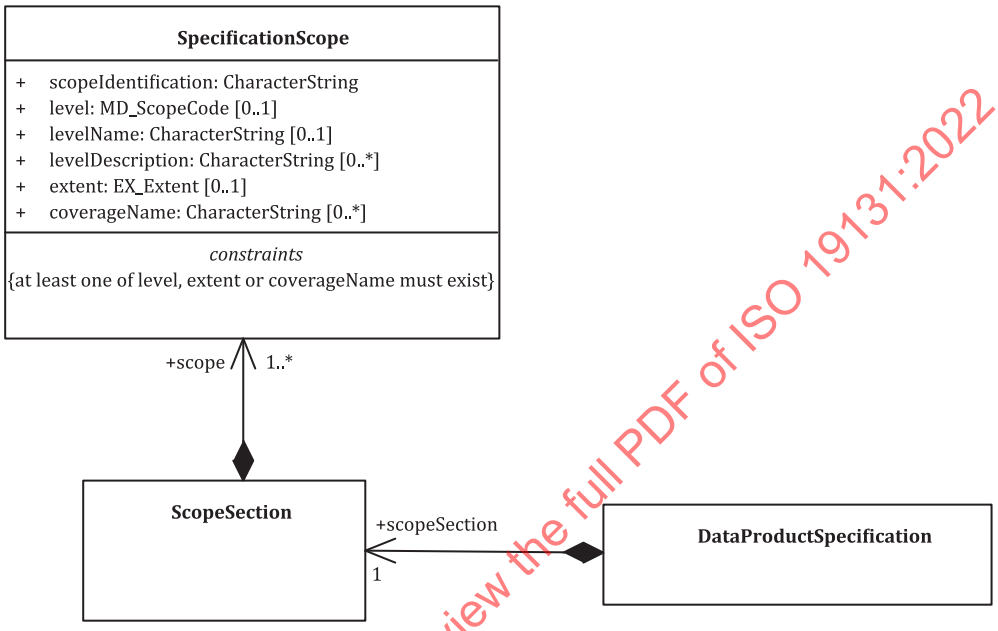

Figure 7 — UML model for specification scope

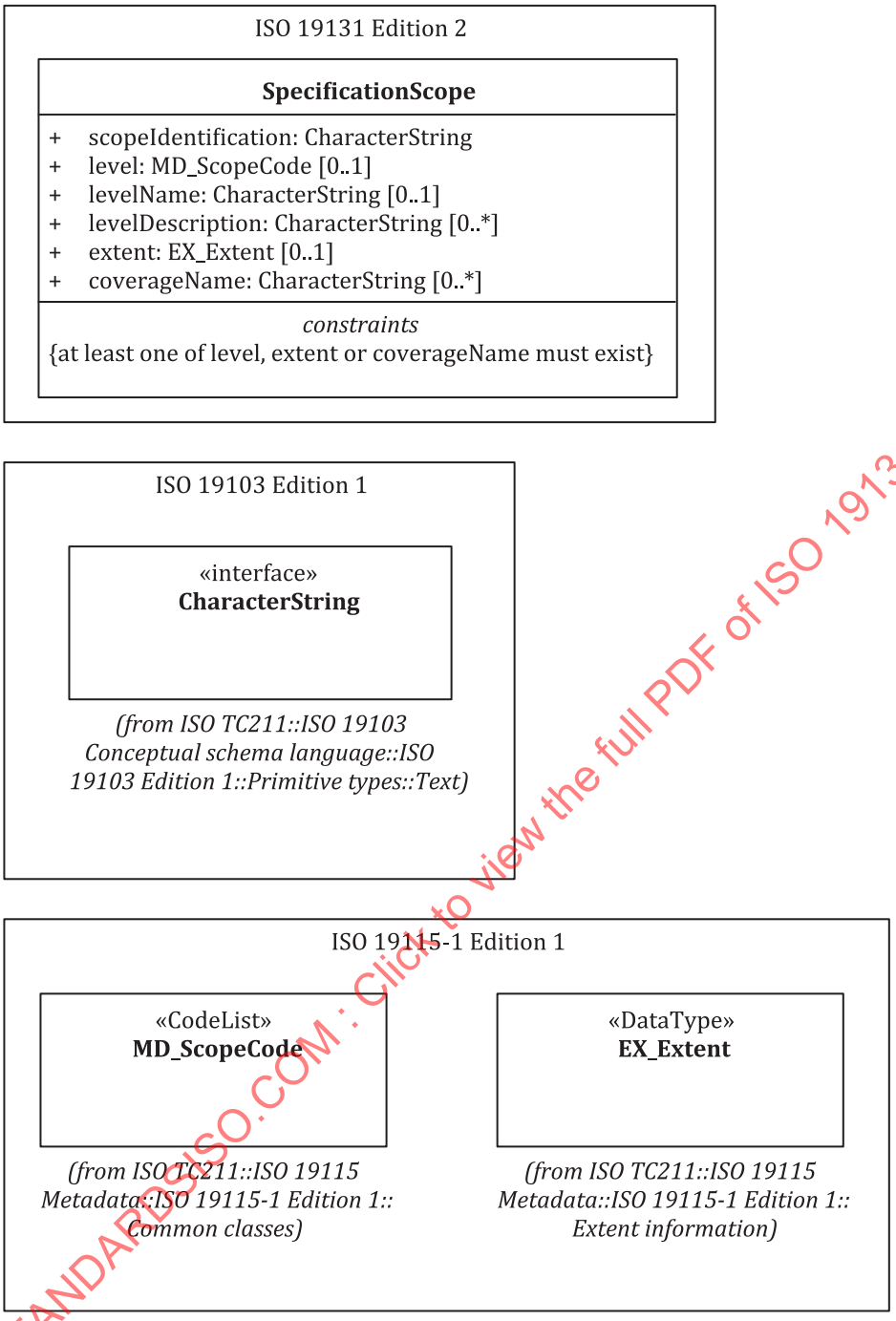

Figure 8 — Scope — Dependencies to elements defined in other International Standards including fully qualified namespaces

6.4.2 Class ScopeSection

6.4.2.1 Semantics

An object of the class *ScopeSection* is a place holder for objects specifying the scopes of the data product.

6.4.2.2 Role scope

The role *scope* defines the specification scope(s) addressing a certain part of the content of the data product.

```
scope: SpecificationScope [1..*]
```

6.4.3 Class SpecificationScope

6.4.3.1 Semantics

An object of the class *SpecificationScope* defines the specification scope addressing a certain part of the content of the data product.

Requirement: **.../req/content/specificationScope**
If more than one scope exists with the same *level*, a *levelName* shall be provided. If MD_ScopeCode is not sufficient, additional values should be supplied in levelDescription.

6.4.3.2 Attribute scopeIdentification

The attribute *scopeIdentification* contains a short descriptive name for identification of the specification scope of a data product specification.

```
scopeIdentification: CharacterString [1]
```

Requirement: **.../req/content/scopeIdentification**
Each *scopeIdentification* shall be unique within the product specification.

6.4.3.3 Attribute level

The optional attribute *level* contains the hierarchical level (by a code) of the data addressed by the specification scope.

```
level: MD_ScopeCode [0..1]
```

6.4.3.4 Attribute levelName

The optional attribute *levelName* contains a descriptive name of the hierarchical level.

```
levelName: CharacterString [0..1]
```

6.4.3.5 Attribute levelDescription

Each occurrence of the optional attribute *levelDescription* contains a narrative and detailed description of the level of the data specified by the specification scope.

```
levelDescription: CharacterString [0..*]
```

6.4.3.6 Attribute extent

The optional attribute *extent* contains a criteria based on spatial, vertical and temporal extent of the data specified by the specification scope.

```
extent: EX_Extent [0..1]
```

6.4.3.7 Attribute coverageName

Each occurrence of the optional attribute *coverageName* contains the name of one coverage to which the data product specification applies.

NOTE This item is not intended to be used to describe thematic groups within a dataset.

EXAMPLE Annual mean temperature in southern Sweden.

```
coverageName: CharacterString [0..*]
```

6.5 Data content and structure section

6.5.1 General

The data content and structure section has an integrating aspect. The ISO 19100 family of International Standards includes an International Standard on designing application schema (ISO 19109), using a feature catalogue (ISO 19110) for a human-readable description of feature types and characteristics and the feature concept dictionary (ISO 19126) to describe and publish feature concepts. Though these International Standards describe individual products, all within their specific viewpoints, they do become related within the context of the data product specification. Figure 9 shows how they relate to each other and to the reference model of ISO 19101-1.

The relations between elements in Figure 9 in detail can be characterized as described in the following paragraph.

A data product specification describes the characteristics of a dataset as a realization of the specified product. In order to define the content of a product, the data product specification may provide references to an application schema or a feature catalogue, each of which may be realized using the content of the other.

An application schema comprises a set of instances from the elements defined in the General Feature Model (e.g. FeatureType or AttributeType), all being subtypes of IdentifiedType.

The same applies for the content of a Feature Catalogue, except its elements are instances from realizations of the General Feature Model metaclasses defined in ISO 19110.

A Feature Concept Dictionary's content consists of definitions and other information about concepts, describing real world phenomena. A Feature Catalogue may reuse this content.

Concepts, according to Figure 9, are represented by subtypes of IdentifiedType by applying the rules defined in ISO 19109.

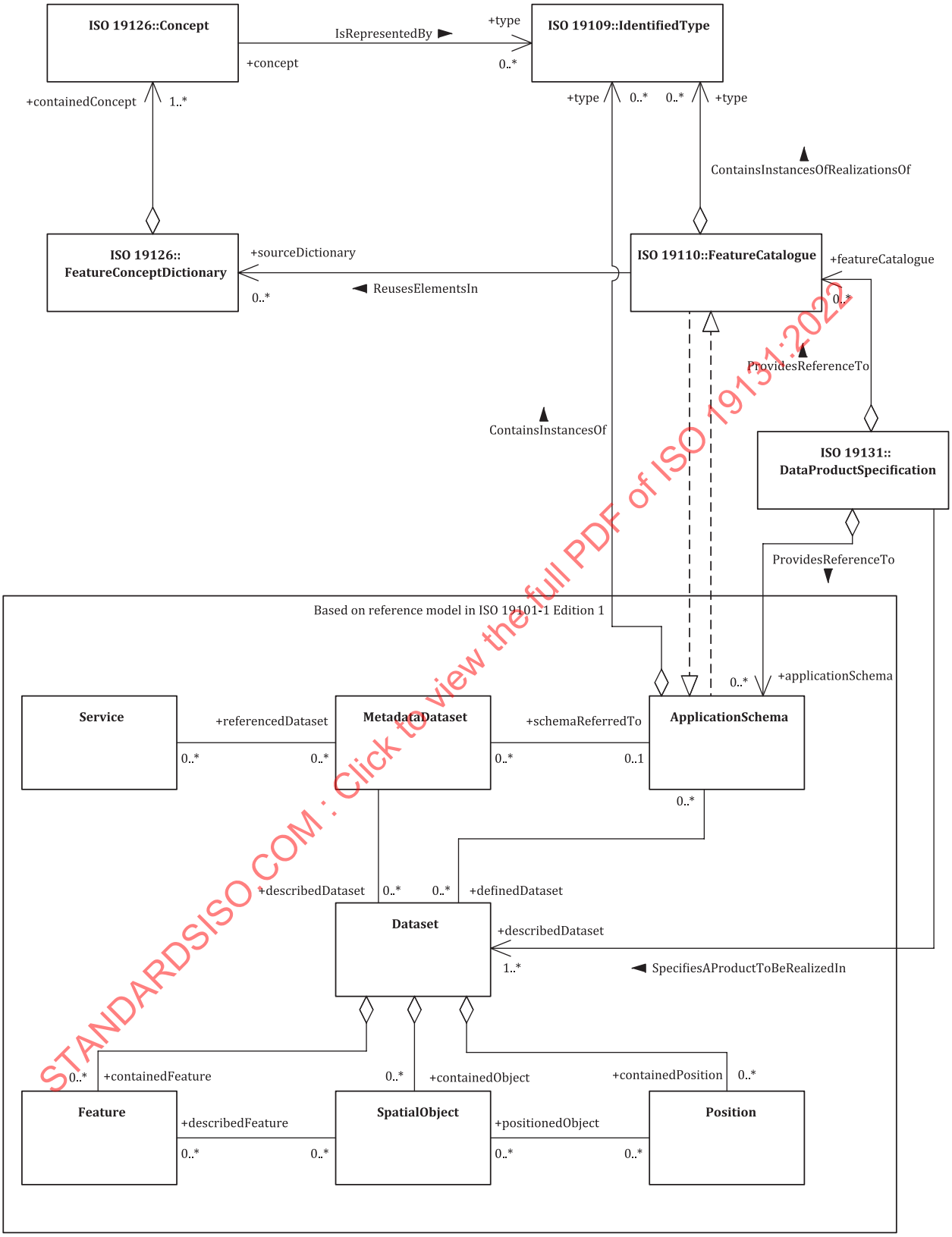

Figure 9 — Data content, structure and semantics viewpoint on a data product specification

6.5.2 Requirements

The purpose of the data content and structure section of a data product specification is to provide information that specifies the data structure and content of the data product.

An application schema provides the formal description of the data structure and content of the data product. It is a conceptual model described using a conceptual schema language such as UML. An application schema describes traditional features as well as coverages.

A feature catalogue is a repository which provides the semantics of all feature types, together with their attributes and attribute value domains, association types between feature types, and feature operations required for describing the data structure and content of the data product. If there is an application schema, the feature catalogue describes all the elements of the application schema. Also, coverages may be regarded as features but may alternatively be specified using coverage descriptions.

Requirement: **.../req/content/contentModel**
The data content and structure section shall be in accordance with the UML model in Figure 10, where each object of class *DataContentAndStructure* shall, for a specified specification scope, provide MD_ApplicationSchemaInformation or one of the subclasses of MD_ContentInformation.

Requirement: **.../req/content/contentScope**
For all instances of the *DataContentAndStructure* class, the union of the scopes defined in each of the associated *SpecificationScope* objects shall cover all the spatial, temporal and semantic extent of the data product.

Recommendation: **.../rec/optionalContent/contentFeatures**
When a feature catalogue is provided, it should be realized in accordance with ISO 19110.

Recommendation: **.../rec/optionalContent/contentCoverage**
When a coverage description is provided, it should be realized in accordance with ISO 19123.

Recommendation: **.../rec/optionalContent/contentApplication**
When an application schema is provided, it should be conformant with the rules in ISO 19109.

Recommendation: **.../rec/optionalContent/contentComplete**
When application schemas are provided, the application schemas should cover the complete data product.

Figure 10 shows the UML model for data content and structure section, and Figure 11 describes dependencies to elements defined in other International Standards.

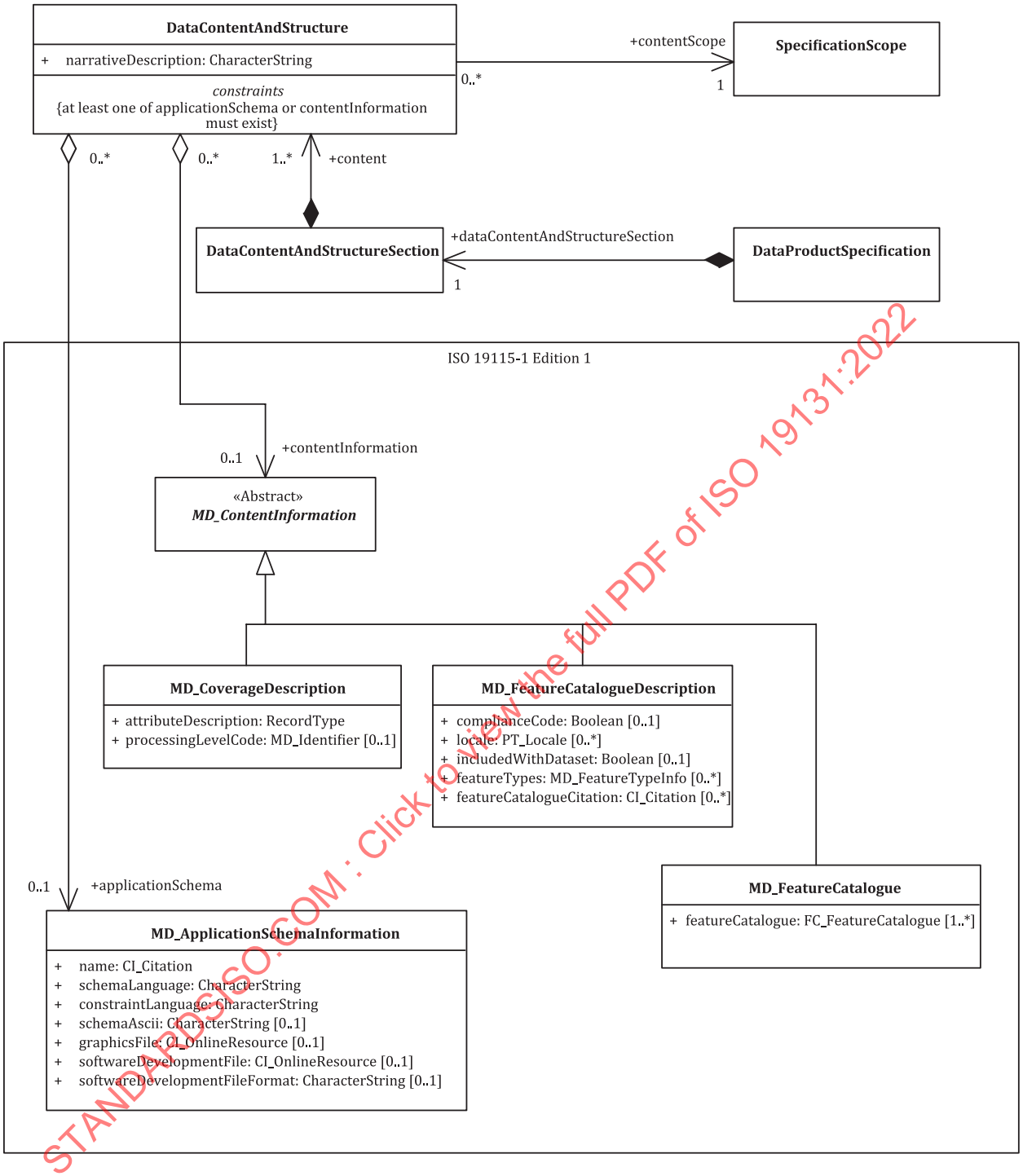

Figure 10 — UML model for data content and structure section

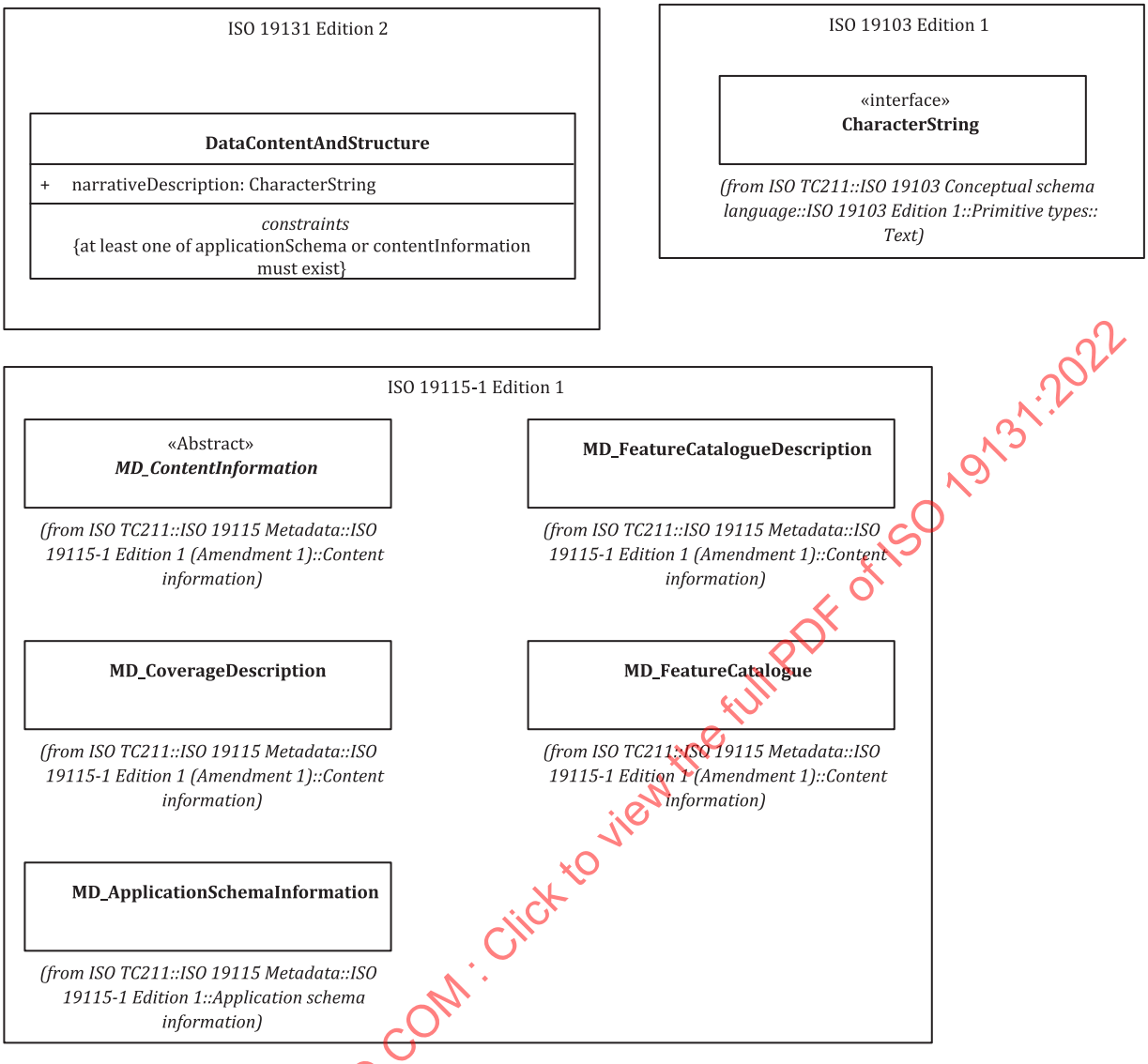

Figure 11 — Content and structure — Dependencies to elements defined in other standards including fully qualified namespaces

6.5.3 Class DataContentAndStructureSection

6.5.3.1 Semantics

An object of the class *DataContentAndStructureSection* is a place holder for objects specifying the data structure and content of the data product.

6.5.3.2 Role content

The role *content* provides the objects.

```
content: DataContentAndStructure [1..*]
```

6.5.4 Class DataContentAndStructure

6.5.4.1 Semantics

An object of the class Data*ContentAndStructure* provides a feature catalogue a reference to one of the following:

— a feature catalogue,

— a coverage description, or

— an application schema.

The information addresses a part of or the complete data product, as specified by the specification scope.

6.5.4.2 Attribute narrativeDescription

The attribute *narrativeDescription* contains an overview description of the application schema and/or feature catalogue for the specified specification scope.

```
narrativeDescription: CharacterString [1]
```

6.5.4.3 Role applicationSchema

The optional role *applicationSchema* provides information on how to find resources that represent the application schema.

```
applicationSchema: MD_ApplicationSchemaInformation [0..1]
```

6.5.4.4 Role contentInformation

The optional role *contentInformation* provides a coverage description or feature catalogue, either by listing each feature type according to ISO 19110 (subclass *MD_FeatureCatalogue* of *MD_ContentInformation*) or as a reference to a feature catalogue (using subclass *MD_FeatureCatalogueDescription* of *MD_ContentInformation*) or, when the data is of coverage type, a coverage description (using subclass *MD_CoverageDescription* of *MD_ContentInformation*).

```
contentInformation: MD_ContentInformation [0..1]
```

6.5.4.5 Role contentScope

The role *contentScope* provides information of the scope of the content and structure.

```
contentScope: SpecificationScope [1]
```

6.6 Reference systems section

6.6.1 Requirements

The purpose of the reference systems section is to specify the spatial and temporal reference systems that are used by the data product. It provides spatial reference system identifiers of either a coordinate reference system (addressed in ISO 19111) or a spatial reference system using geographic identifiers (addressed in ISO 19112), and when relevant, temporal reference system identifiers.

Requirement: **.../req/content/referenceModel**
The reference system section shall be in accordance with the UML model in Figure 12. An object of the class *ReferenceSystem* shall specify information for a certain specification scope of the data product.

Requirement: **.../req/content/referenceScope**
For all instances of the *ReferenceSystem* class, the union of the scopes defined in each of the associated *SpecificationScope* objects shall cover all the spatial, temporal and semantic extent of the data product.

Figure 12 shows the UML model for the reference systems section, and Figure 13 describes dependencies to elements defined in other International Standards.

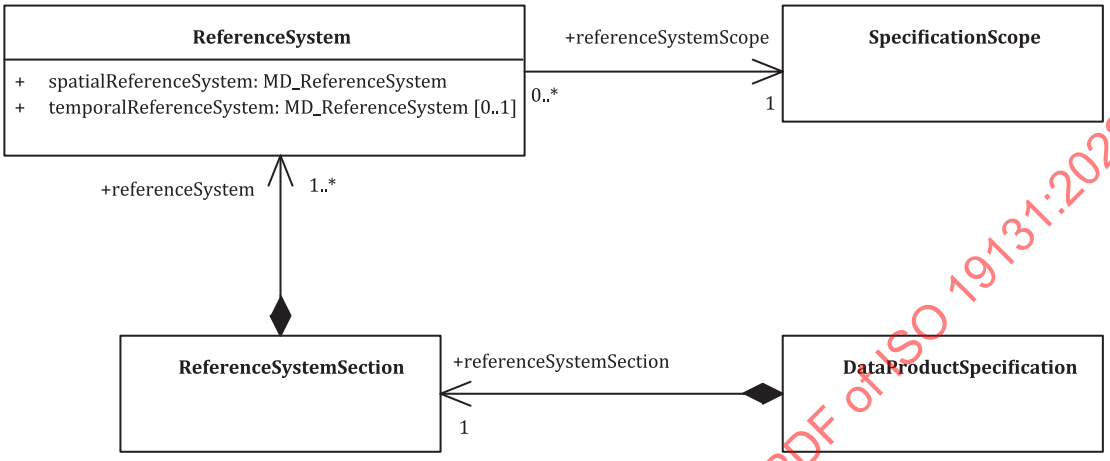

Figure 12 — UML model for reference systems section

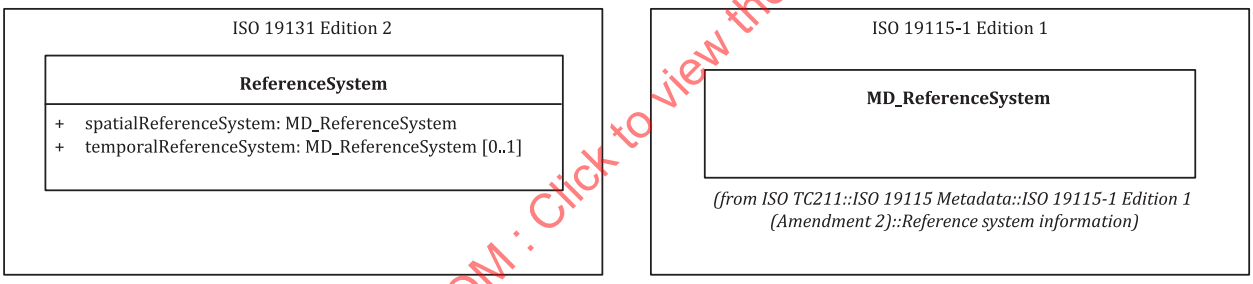

Figure 13 — Reference system — Dependencies to elements defined in other International Standards including fully-qualified namespaces

6.6.2 Class ReferenceSystemSection

6.6.2.1 Semantics

An object of the class *ReferenceSystemSection* is a place holder for objects specifying the spatial and temporal reference systems used in the data product.

Each reference system should be identified by reference to a register (the reference is made to the register and to the reference system's unique identifier in that register).

6.6.2.2 Role referenceSystem

Each occurrence of the role *referenceSystem* contains the reference system used.

```
referenceSystem: ReferenceSystem [1..*]
```

6.6.3 Class ReferenceSystem

6.6.3.1 Semantics

An object of the *ReferenceSystem* class specifies the spatial, and optionally the temporal, reference system used for a certain specification scope.

6.6.3.2 Attribute spatialReferenceSystem

The attribute *spatialReferenceSystem* contains an identifier of a spatial reference system used for the specified specification scope.

```
spatialReferenceSystem: MD_ReferenceSystem [1]
```

6.6.3.3 Attribute temporalReferenceSystem

The optional attribute *temporalReferenceSystem* contains an identifier of a temporal reference system used for the specified specification scope.

```
temporalReferenceSystem: MD_ReferenceSystem [0..1]
```

6.6.3.4 Role referenceSystemScope

The role *referenceSystemscope* provides information of the scope of the reference system information.

```
referenceSystemScope: SpecificationScope [1]
```

6.7 Data quality section

6.7.1 Requirements

The purpose of the data quality section is to provide quality requirements and conformance quality levels for the data product.

A conformance quality level is a specification of acceptable differences between data and the universe of discourse. This can be specified by a threshold value (using the attribute *value* in *DQ_QuantitativeResult*) for a certain data quality measure (using *DQ_MeasureReference*) or by a descriptive statement (using *DQ_DescriptiveResult*) about a data quality element.

Requirement: **.../req/content/qualityLevel**
A conformance quality level shall be specified as either: — a data quality measure and a value that expresses what is acceptable for that data quality measure, or — as a descriptive statement about a data quality element.

Requirement: **.../req/content/qualityModel**
The data quality section shall be in accordance with the UML model in Figure 14, where each object of the class *DataQuality* shall provide information about a set of conformance quality levels and the specification scope for which these are applicable. A conformance quality level shall be specified by an object of class *ConformanceQualityLevel* with an attribute *element* to identify the appropriate data quality element which shall be in conformance with ISO 19157.

Requirement: **.../req/content/qualityScope**
For all instances of the *DataQuality* class, the union of the scopes defined in each of the associated *SpecificationScope* objects shall cover all the spatial, temporal and semantic extent of the data product.

Figure 14 shows the UML model for data quality section, and Figure 15 describes dependencies to elements defined in other International Standards.

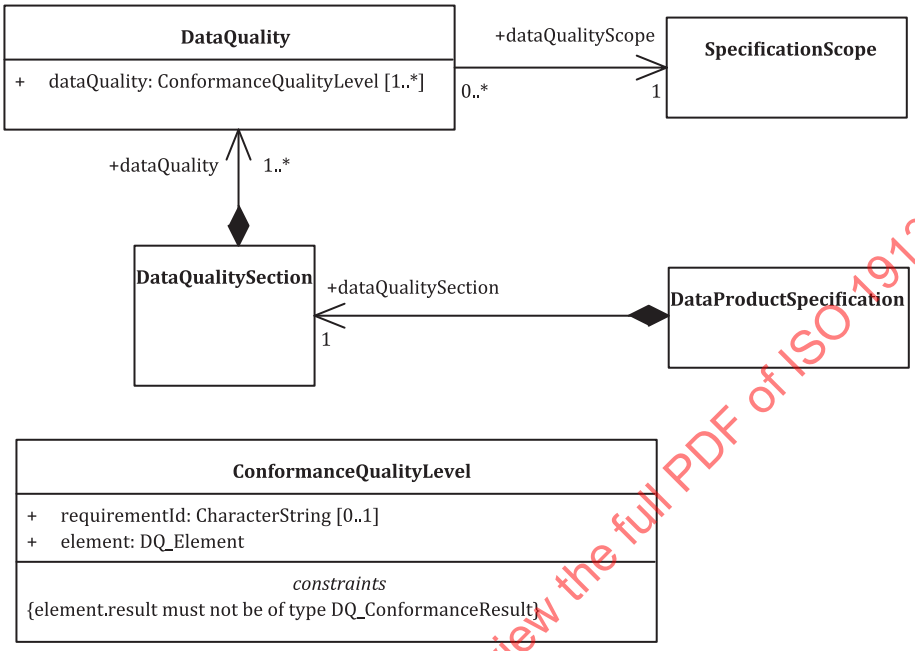

Figure 14 — UML model for data quality section

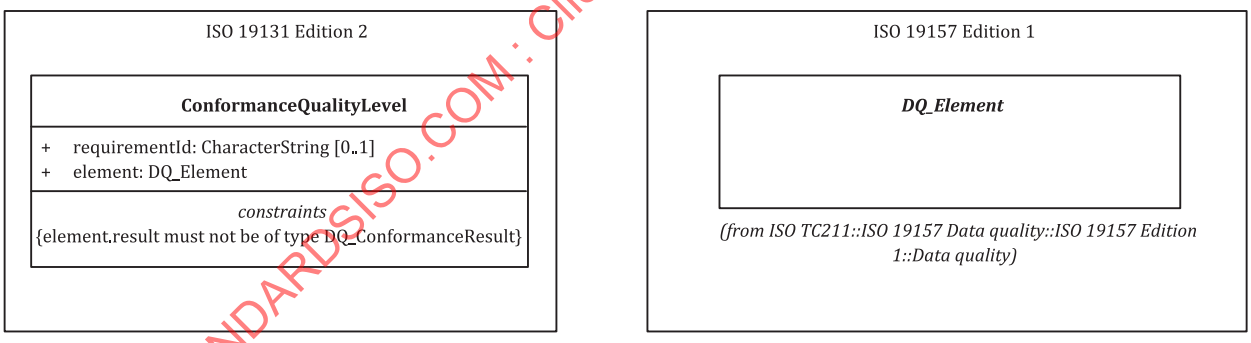

Figure 15 — Data quality — Dependencies to elements defined in other International Standards including fully-qualified namespaces

6.7.2 Class DataQualitySection

6.7.2.1 Semantics

An object of the *DataQualitySection* class is a place holder for objects specifying conformance quality levels of the data product.

6.7.2.2 Role dataQuality

Each occurrence of the role *dataQuality* contains a data quality object.

```
dataQuality: DataQuality[1..*]
```

6.7.3 Class DataQuality

6.7.3.1 Semantics

An object of the *DataQuality* class specifies the conformance quality levels applicable for a certain specification scope.

6.7.3.2 Attribute dataQuality

Each occurrence of the attribute *dataQuality* contains the data quality for the specification scope, i.e. a conformance quality level.

```
dataQuality: ConformanceQualityLevel[1..*]
```

6.7.3.3 Role dataQualityScope

The role *dataQualityScope* contains information of the scope for the quality information.

```
dataQualityScope: SpecificationScope [1]
```

6.7.4 Class ConformanceQualityLevel

6.7.4.1 Semantics

An object of the class *ConformanceQualityLevel* specifies a conformance quality level, i.e. a requirement expressed as a threshold value for a certain data quality measure.

6.7.4.2 Attribute requirementId

The optional attribute *requirementId* contains, within the data product specification, a unique identity of the requirement, to be referred to from metadata by an object of *DQ_ConformanceResult* class.

```
requirementId: CharacterString [0..1]
```

6.7.4.3 Attribute element

The attribute *element* contains a data quality element that, in turn, specifies a data quality measure and a threshold value for conformance (using *DQ_QuantitativeResult*) or, alternatively, specifies a descriptive statement (using *DQ_DescriptiveResult*).

```
element: DQ_Element [1]
```

NOTE Since *DQ_ConformanceResult* describes the outcome of an evaluation regarding a specified conformance quality level (see definition in ISO 19157:2013), it is not allowed to use it in the context of a data product specification since no evaluation results will be available when the specification's content is created. Thus, a constraint related to the attribute *element* has been added to class *ConformanceQualityLevel*.

6.8 Data capture and production section

6.8.1 Requirements

The purpose of the data capture and production section is to provide instructions, requirements and/or descriptions of the data capture and production. This may include details referring to specific methods and/or processing steps. When data sources are specified, they may be described in detail, including specific conformance quality levels required.

Requirement: **.../req/content/captureModel**
The data capture and production section shall be in accordance with the UML model in Figure 16. An object of the class *DataCaptureAndProduction* shall specify information for a certain specification scope of the data product.

Requirement: **.../req/content/captureScope**
For all instances of the *DataCaptureAndProduction* class, the union of the scopes defined in each of the associated *SpecificationScope* objects shall cover all the spatial, temporal and semantic extent of the data product.

The UML model in Figure 16 describes the data capture and production section, and Figure 17 describes dependencies to elements defined in other International Standards.

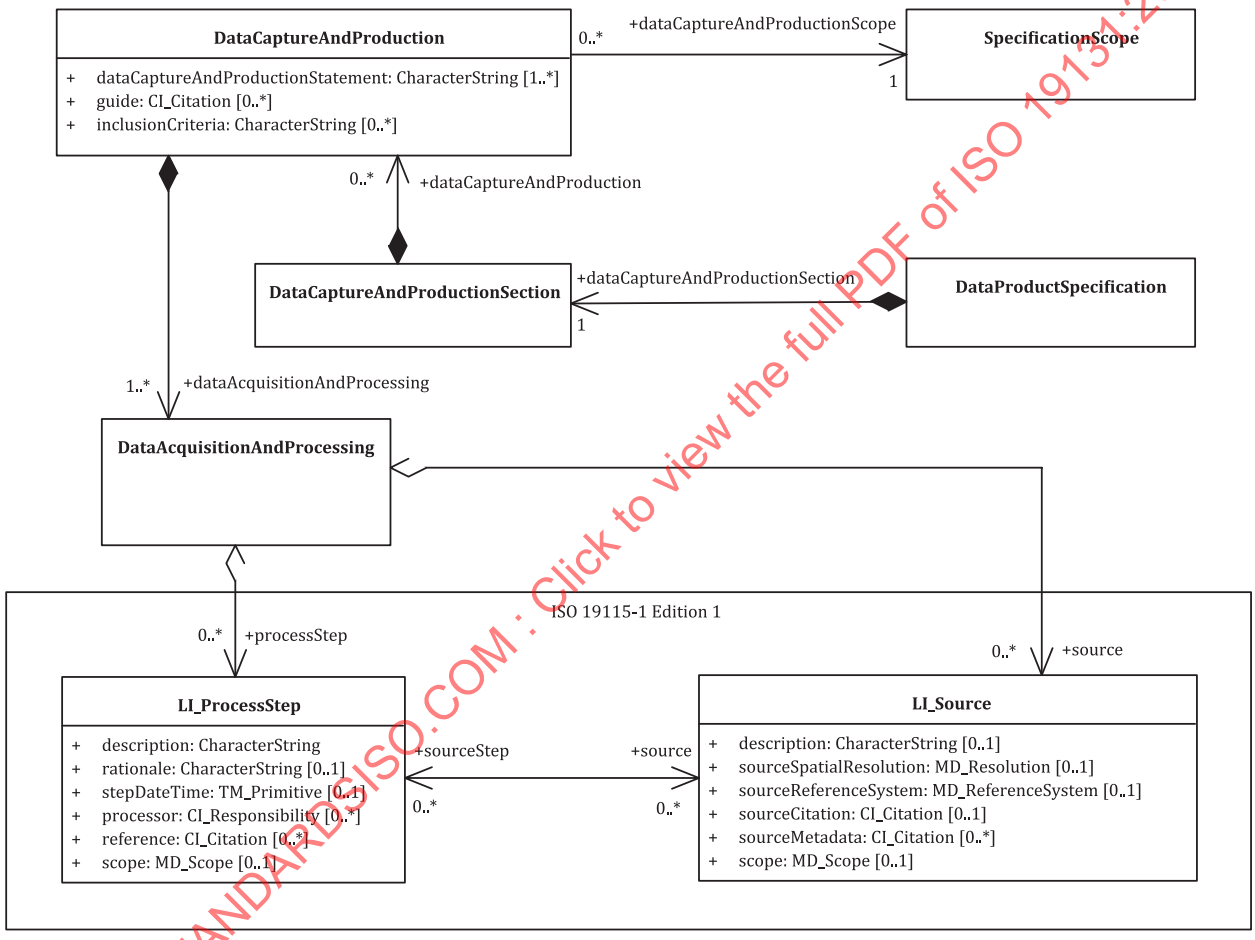

Figure 16 — UML model for data capture and production section

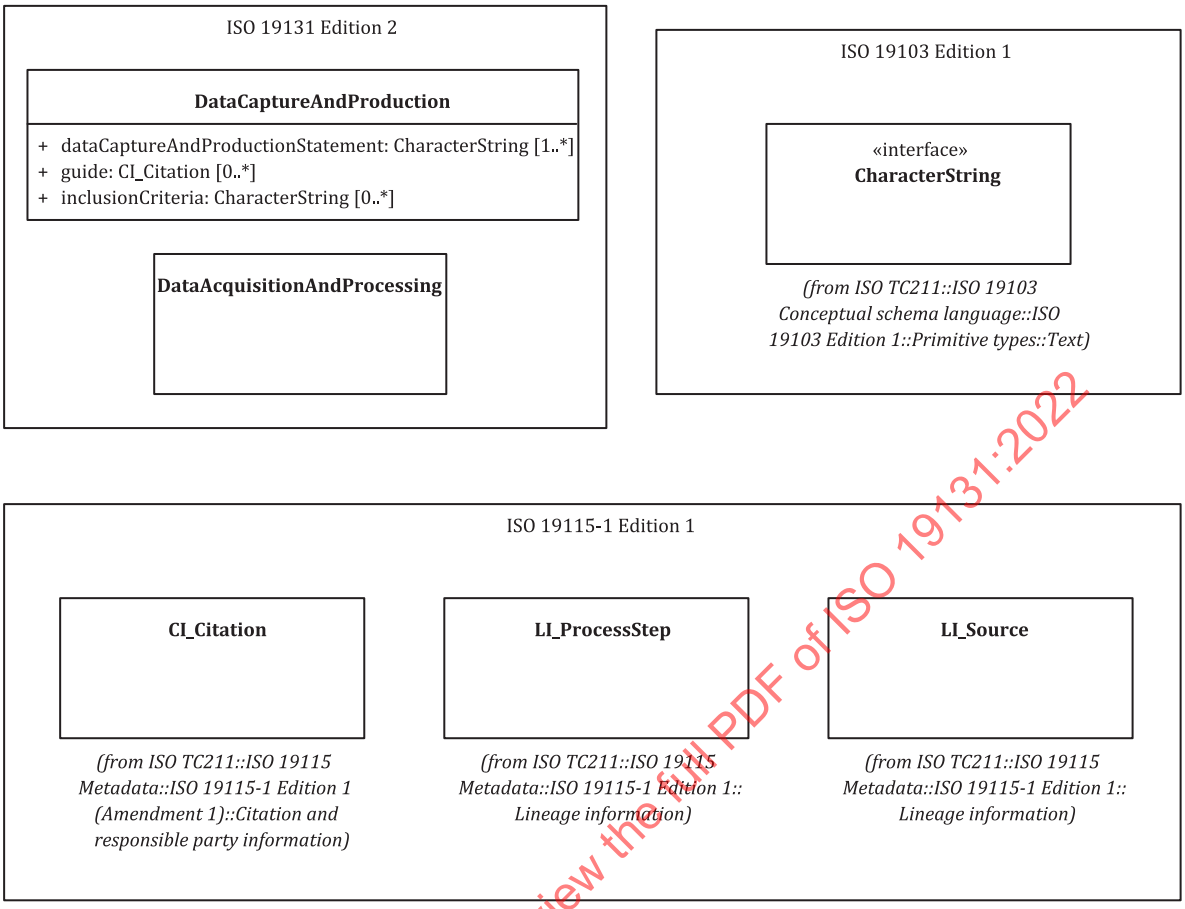

Figure 17 — Data capture and production — Dependencies to elements defined in other International Standards including fully-qualified namespaces

6.8.2 Class DataCaptureAndProductionSection

6.8.2.1 Semantics

An object of the *DataCaptureAndProductionSection* class is a place holder for objects specifying instructions, requirements and/or descriptions of the data capture and production.

6.8.2.2 Role dataCaptureAndProduction

Each occurrence of the optional role *dataCaptureAndProduction* contains a data capture and production object.

```
dataCaptureAndProduction: DataCaptureAndProduction [0..*]
```

6.8.3 Class DataCaptureAndProduction

6.8.3.1 Semantics

An object of the class *DataCaptureAndProduction* specifies instructions, requirements and/or descriptions of the data capture and production for a certain specification scope.

6.8.3.2 Attribute dataCaptureAndProductionStatement

Each occurrence of the attribute *dataCaptureAndProductionStatement* contains a narrative, free text descriptions of the process for the capture and production of the data.

```
dataCaptureAndProductionStatement: CharacterString [1..*]
```

6.8.3.3 Attribute guide

Each occurrence of the optional attribute *guide* contains a reference to a document describing the capture of features and attributes from source information.

```
guide: CI_Citation [0..*]
```

6.8.3.4 Attribute inclusionCriteria

Each occurrence of the optional attribute *inclusionCriteria* contains a logical rule defining when and how features and attributes are to be included in the data.

EXAMPLE A lake with an area <100 m^2 will not be registered, unless the lake is designated administratively because of a natural or administrative significance.

```
inclusionCriteria: CharacterString [0..*]
```

6.8.3.5 Role dataCaptureAndProductionScope

The role *dataCaptureAndProductionScope* references the scope for the data capture information.

```
dataCaptureAndProductionScope: SpecificationScope [1]
```

6.8.3.6 Role dataAcquisitionAndProcessing

Each occurrence of the role *dataAcquisitionAndProcessing* contains information about the source and/or production process used in producing the data product.

```
dataAcquisitionAndProcessing: DataAcquisitionAndProcessing [1..*]
```

6.8.4 Class DataAcquisitionAndProcessing

An object of *DataAcquisitionAndProcessing* class is a placeholder for objects specifying sources and production steps used in producing the data product.

6.8.4.1 Role processStep

Each occurrence of the optional role *processStep* contains a step used in producing the data product.

```
processStep: LI_ProcessStep [0..*]
```

6.8.4.2 Role source

Each occurrence of the optional role *source* contains information about the source data used in creating the data product.

```
source: LI_Source [0..*]
```

6.9 Maintenance section

6.9.1 Requirements

The purpose of the maintenance section is to provide instructions, requirements, descriptions, principles and/or criteria for how the data is maintained once it has been captured. This includes frequency with which changes and additions are made to the data product.

Requirement: **.../req/content/maintenanceModel**
The data maintenance section shall conform to the UML model described in Figure 18. An object of the class *Maintenance* shall specify information for a certain specification scope of the data product.

Requirement: **.../req/content/maintenanceScope**
For all instances of the *Maintenance* class, the union of the scopes defined in each of the associated *SpecificationScope* objects shall cover all the spatial, temporal and semantic extent of the data product.

The UML model in Figure 18 describes the structure for the maintenance section, and Figure 19 describes dependencies to elements defined in other International Standards.

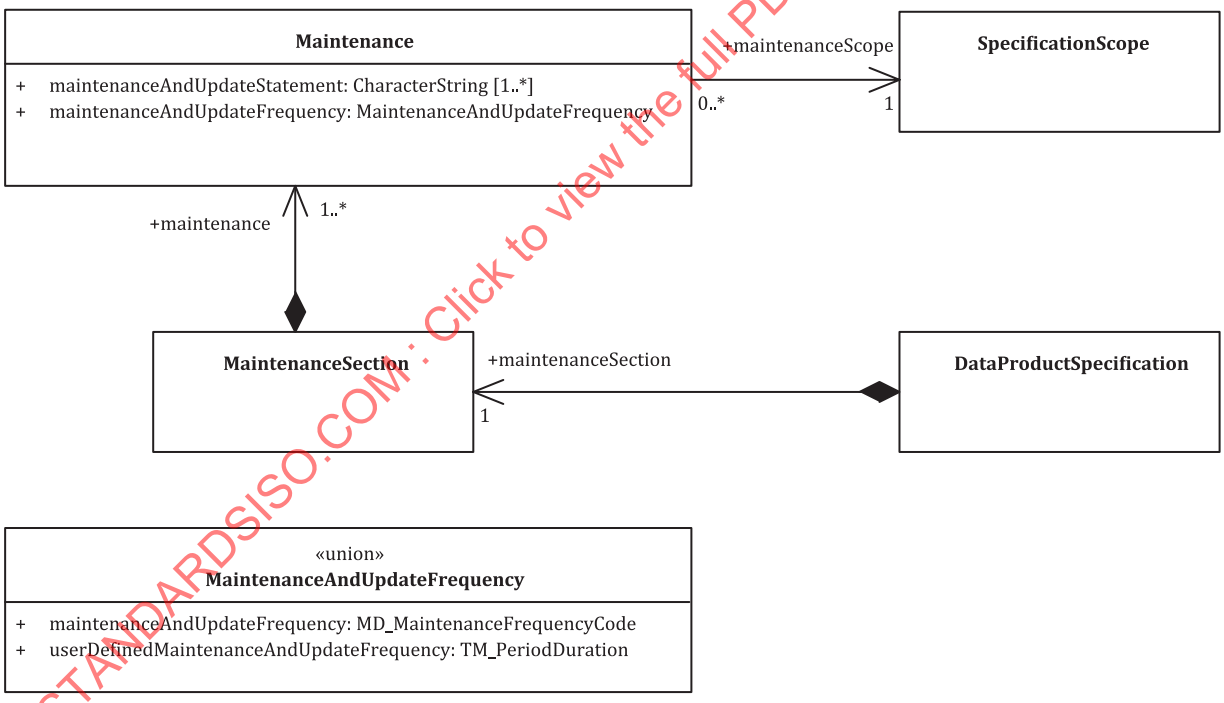

Figure 18 — UML model for maintenance section

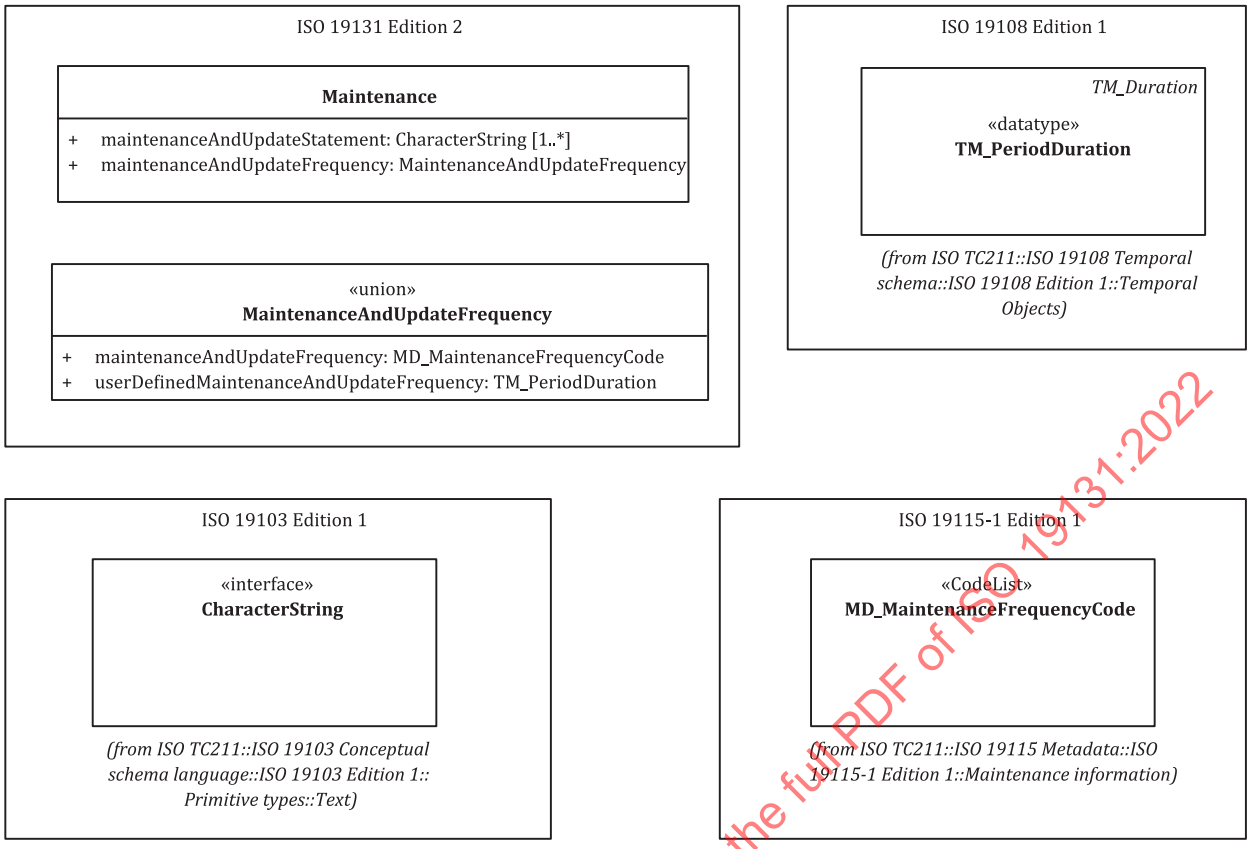

Figure 19 — Maintenance — Dependencies to elements defined in other International Standards including fully-qualified namespaces

6.9.2 Class MaintenanceSection

6.9.2.1 Semantics

An object of the *MaintenanceSection* class is a place holder for objects specifying maintenance information of the data product.

6.9.2.2 Role maintenance

Each occurrence of the role *maintenance* contains a maintenance object.

```
maintenance: Maintenance [1..*]
```

6.9.3 Class Maintenance

6.9.3.1 Semantics

An object of the class *Maintenance* specifies maintenance information for a certain specification scope of the data product.

6.9.3.2 Attribute maintenanceAndUpdateStatement

Each occurrence of the attribute *maintenanceAndUpdateStatement* contains a narrative, free text description of the process for the maintenance of the data.

```
maintenanceAndUpdateStatement: CharacterString [1..*]
```

6.9.3.3 Attribute maintenanceAndUpdateFrequency

The attribute *maintenanceAndUpdateFrequency* contains the frequency with which changes and additions are made to the data product.

```
maintenanceAndUpdateFrequency: MaintenanceAndUpdateFrequency [1]
```

6.9.3.4 Role maintenanceScope

The role *maintenanceScope* references the scope for the maintenance information.

```
maintenanceScope: SpecificationScope [1]
```

6.9.4 Class MaintenanceAndUpdateFrequency

6.9.4.1 Semantics

The class *MaintenanceAndUpdateFrequency* is a union for the frequency with which changes and additions are made to the data product.

Requirement: **.../req/content/maintenanceUpdateFrequency**
The attribute userDefinedMaintenanceAndUpdateFrequency shall only be used if none of the predefined codes in MD_MaintenanceFrequenceCode matches the update frequency for the data product.

NOTE The stereotype union implies that only one of the attributes maintenanceAndUpdateFrequency and userDefinedMaintenanceAndUpdateFrequency is allowed to be used at one time.

6.9.4.2 Attribute maintenanceAndUpdateFrequency

The conditonal attribute *maintenanceAndUpdateFrequency* contains a code that specifies the frequency with which changes and additions are made to the data product.

```
maintenanceAndUpdateFrequency: MD_MaintenanceFrequencyCode [1]
```

6.9.4.3 Attribute userDefinedMaintenanceAndUpdateFrequency

The conditional attribute *userDefinedMaintenanceAndUpdateFrequency* contains the period of time with which changes and additions are made to the data product.

```
userDefinedMaintenanceAndUpdateFrequency: TM_PeriodDuration [1]
```

6.10 Portrayal section

6.10.1 Requirements

The purpose of the portrayal section is to specify how to portray the feature types for human interpretation, usually by means of a portrayal catalogue.

Requirement: **.../req/content/portrayalModel**
Information in the portrayal section shall conform to the model described in Figure 20. An object of the class *Portrayal* shall provide references to portrayal specifications for a certain specification scope.

NOTE Portrayal specifications can be based on ISO 19117 but can also be based on implementation standards such as OGC Symbology Encoding. Even map legends in the form of images can be regarded as portrayal specifications.

Requirement: **.../req/content/portrayalScope**
For all instances of the *Portrayal* class, the union of the scopes defined in each of the associated *SpecificationScope* objects shall cover all the spatial, temporal and semantic extent of the data product.

The UML model in Figure 20 describes the structure for the portrayal section, and Figure 21 describes dependencies to elements defined in other International Standards.

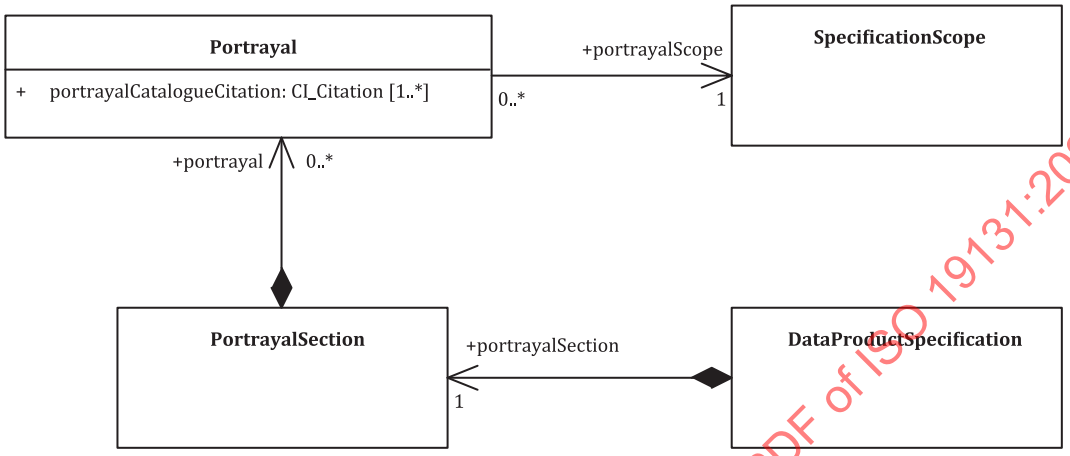

Figure 20 — UML model for portrayal section

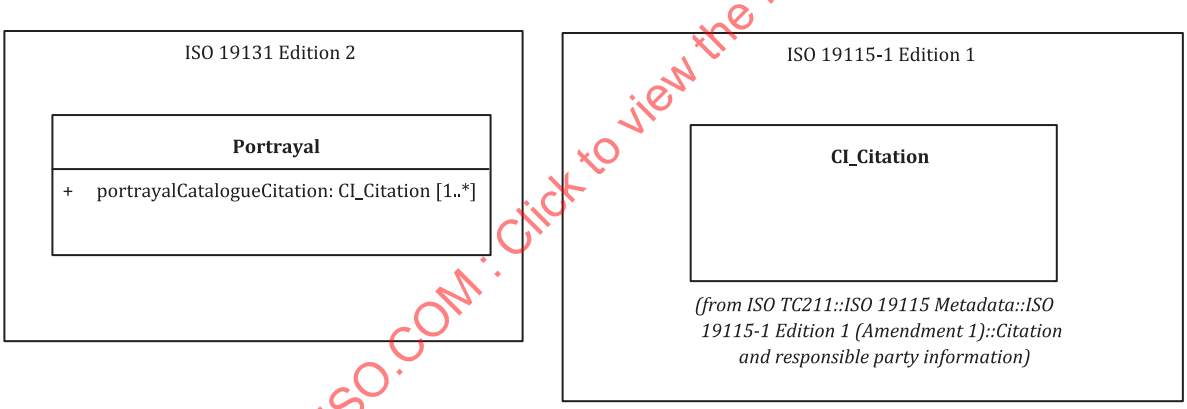

Figure 21 — Portrayal — Dependencies to elements defined in other International Standards including fully-qualified namespaces

6.10.2 Class PortrayalSection

6.10.2.1 Semantics

An object of the *PortrayalSection* class is a place holder for objects specifying portrayal information of the data product.

6.10.2.2 Role portrayal

Each occurrence of the optional role *portrayal* contains a portrayal object.

```
portrayal: Portrayal [0..*]
```

6.10.3 Class Portrayal

6.10.3.1 Semantics

An object of the class *Portrayal* specifies portrayal for a certain specification scope of the data product.

6.10.3.2 Attribute portrayalCatalogueCitation

Each occurrence of the attribute *portrayalCatalogueCitation* contains a bibliographic reference to the portrayal specification.

```
portrayalCatalogueCitation: CI_Citation [1..*]
```

6.10.3.3 Role portrayalScope

The role *portrayalScope* references the scope for the portrayal information.

```
portrayalScope: SpecificationScope [1]
```

6.11 Delivery section

6.11.1 Requirements

The purpose of the data product delivery section is to provide instructions, requirements and/or descriptions of data delivery format and means for physical delivery or for data delivery using download services or view services.

Delivery format can cover exchange formats such as Geography Markup Language, Geopackage and Geotiff. The most suitable format should be selected based on the requirements for the data product specification. If a more detailed description of the encoding (e.g. a GML Application Schema) is required, it may be incorporated as an annex to the data product specification.

Requirement: **.../req/content/deliveryModel**
The data product delivery section shall conform to the UML model described in Figure 22. An object of the class *Delivery* shall specify information for a certain specification scope of the data product.

Requirement: **.../req/content/deliveryScope**
For all instances of the *Delivery* class, the union of the scopes defined in each of the associated *SpecificationScope* objects shall cover all the spatial, temporal and semantic extent of the data product.

Requirement: **.../req/content/deliverySpecification**
If the specified data product is delivered via web services such as Web Map Service (WMS) and Web Feature Service (WFS) interfaces, the specific web service profile to be used shall be referenced.

The UML model in Figure 22 describes the structure for metadata associated to a product specification, and Figure 23 describes dependencies to elements defined in other International Standards.

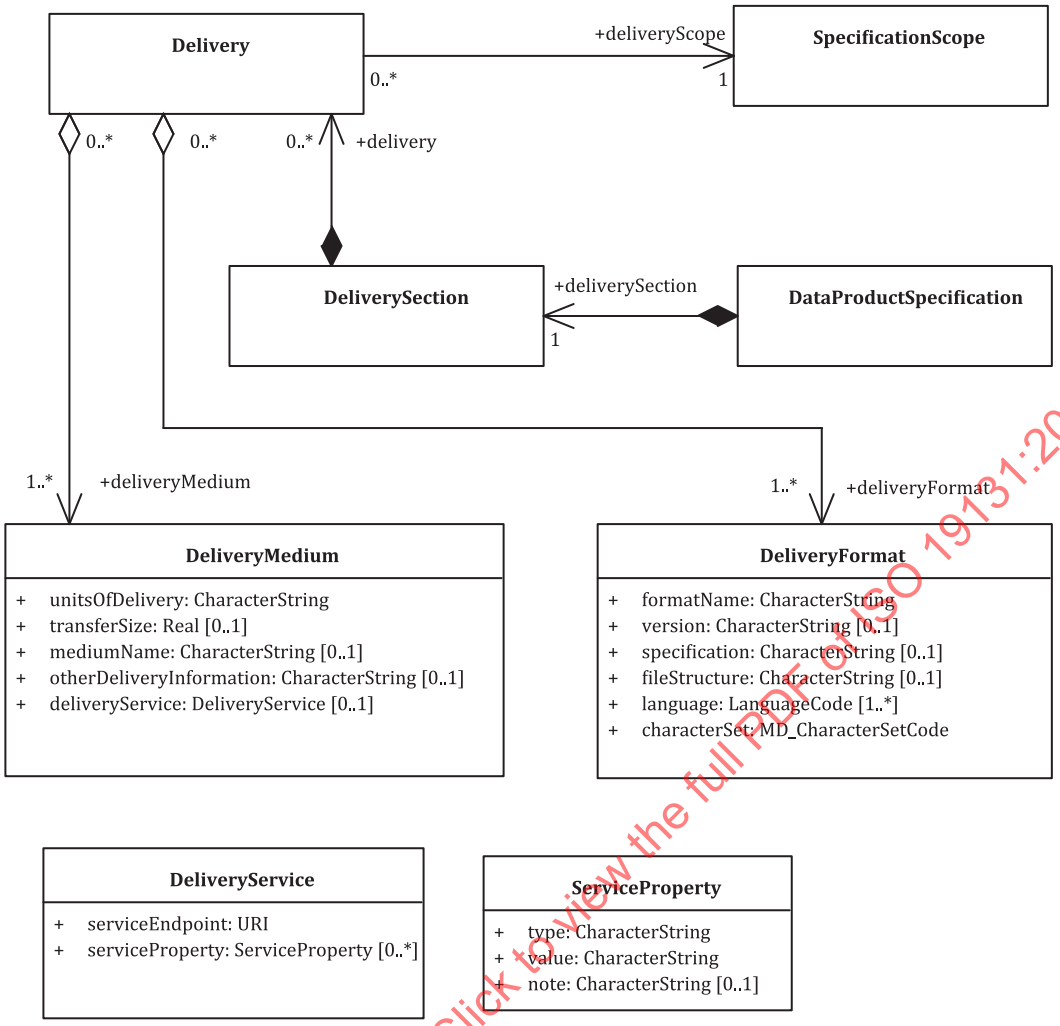

Figure 22 — UML model for data product delivery section

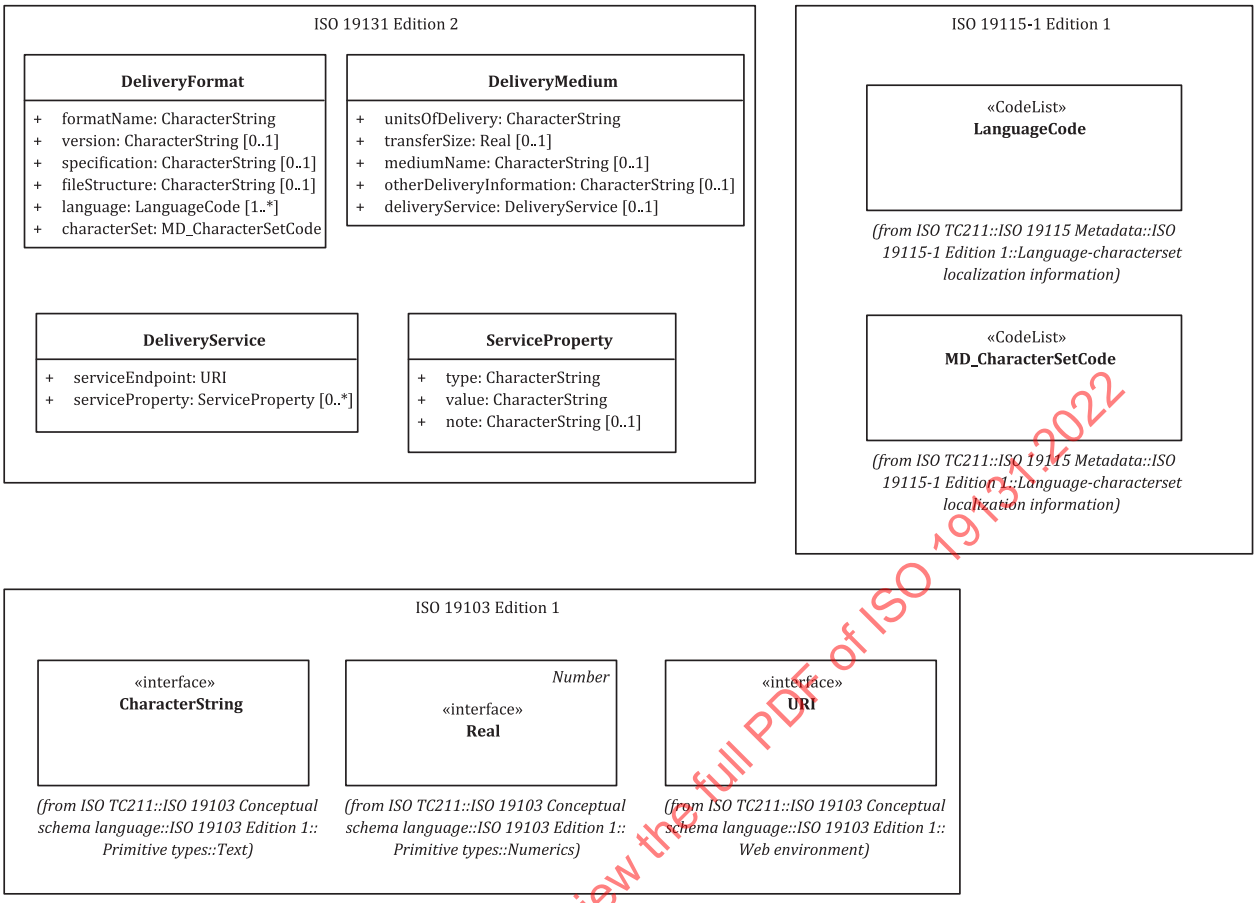

Figure 23 — Delivery — Dependencies to elements defined in other International Standards including fully-qualified namespaces

6.11.2 Class DeliverySection

6.11.2.1 Semantics

An object of the *DeliverySection* class is a place holder for objects specifying how data products are delivered.

6.11.2.2 Role delivery

Each occurrence of the optional role *delivery* contains a delivery object.

```
delivery: Delivery [0..*]
```

6.11.3 Class Delivery

6.11.3.1 Semantics

An object of the class *Delivery* specifies delivery information for a certain specification scope of the data product.

6.11.3.2 Role deliveryMedium

The role *deliveryMedium* specifies the medium in which the product is delivered.

```
deliveryMedium: DeliveryMedium [1..*]
```

6.11.3.3 Role deliveryFormat

The role *deliveryFormat* specifies the format in which the product is delivered.

```
deliveryFormat: DeliveryFormat [1..*]
```

6.11.3.4 Role deliveryScope

The role *deliveryScope* references the scope for the delivery information.

```
deliveryScope: SpecificationScope [1]
```

6.11.4 Class DeliveryFormat

6.11.4.1 Semantics

Class *DeliveryFormat* is a datatype for description of a data format.

6.11.4.2 Attribute formatName

The attribute *formatName* contains a name of the data format.

```
formatName: CharacterString [1]
```

6.11.4.3 Attribute version

The optional attribute *version* contains a version identification string for the data format (date, number, etc.).

```
version: CharacterString [0..1]
```

6.11.4.4 Attribute specification

The optional attribute *specification* contains a name of a subset, profile or product specification of the format.

```
specification: CharacterString [0..1]
```

6.11.4.5 Attribute fileStructure

The optional attribute *fileStructure* contains the structure of a delivery file.

```
fileStructure: CharacterString [0..1]
```

6.11.4.6 Attribute language

Each occurrence of the attribute *language* contains a code according to ISO 639-2 for the languages that are used within the data product.

```
language: LanguageCode [1..*]
```

6.11.4.7 Attribute characterSet

The attribute *characterSet* contains the full name of the character coding standard used for the data product.

```
characterSet: MD_CharacterSetCode [1]
```

6.11.5 Class DeliveryMedium

6.11.5.1 Semantics

Class *DeliveryMedium* is a datatype for description of physical storage media and on-line services for delivery of data.

6.11.5.2 Attribute unitsOfDelivery

The attribute *unitsOfDelivery* contains the unit of delivery (e.g. tiles, layers, geographic areas, single objects, feature types, full dataset).

```
unitsOfDelivery: CharacterString [1]
```

6.11.5.3 Attribute transferSize

The optional attribute *transferSize* contains an estimated size of a unit in the specified format, expressed in Mbytes.

```
transferSize: Real [0..1]
```

6.11.5.4 Attribute mediumName

The optional attribute *mediumName* contains a name of the data medium.

```
mediumName: CharacterString [0..1]
```

6.11.5.5 Attribute otherDeliveryInformation

The optional attribute *otherDeliveryInformation* contains any other information about the delivery method.

```
otherDeliveryInformation: CharacterString [0..1]
```

6.11.5.6 Attribute deliveryService

The optional attribute *deliveryService* contains information about a delivery service.

```
deliveryService: DeliveryService [0..1]
```

6.11.6 Class DeliveryService

Class *DeliveryService* is a datatype describing information about a delivery service.

6.11.6.1 Semantics

6.11.6.2 Attribute serviceEndpoint

The attribute *serviceEndpoint* contains an URL at which clients can access a specific service.

```
serviceEndpoint: URI [1]
```

6.11.6.3 Attribute serviceProperty

Each occurrence of the optional attribute *serviceProperty* contains information about a service property as a set of key-value pairs.

```
serviceProperty: ServiceProperty [0..*]
```

6.11.7 Class ServiceProperty

6.11.7.1 Semantics

Class *ServiceProperty* is a datatype describing a property of a service by providing the type of property and the value of that property.

NOTE Interface standards like WFS, WMS and WCS define a set of request parameters that can be used as service properties. Examples are SERVICE, VERSION and LAYERS.

6.11.7.2 Attribute type

The attribute *type* contains a property that characterizes the service.

```
type: CharacterString [1]
```

6.11.7.3 Attribute value

The attribute *value* contains a text that is the value of the property.

```
value: CharacterString [1]
```

6.11.7.4 Attribute note

The optional attribute *note* contains any other information associated with the property.

```
note: CharacterString [0..1]
```

6.12 Metadata section

6.12.1 Requirements

The purpose of the metadata section is to provide requirements on the metadata to be provided with a data product. In addition to metadata being provided with a data product, metadata may exist in a catalogue with the purpose of discovering and comparing data products. The metadata section in a data product specification does however not specify requirements on this kind of metadata.

The metadata elements to be applied in the metadata to be provided with a data product are specified in terms of a standard, profile or specification for metadata and, when needed, with a description of how to apply specific metadata elements.

Requirement: **.../req/content/metadataModel**
Information in the metadata section shall conform to the model described in Figure 24. An object of class Metadata shall specify information for a certain specification scope of the data product.

Requirement: **.../req/content/metadataScope**
For all instances of the *Metadata* class, the union of the scopes defined in each of the associated *SpecificationScope* objects shall cover all the spatial, temporal and semantic extent of the data product.

Recommendation: **.../rec/optionalContent/metadataMinimum**
The data product specification should at least specify that metadata about the owner of the data product and when the data product was last updated, shall be included in the metadata for the data product.

The UML model in Figure 24 describes the structure for metadata associated to a product specification, and Figure 25 describes dependencies to elements in other International Standards.

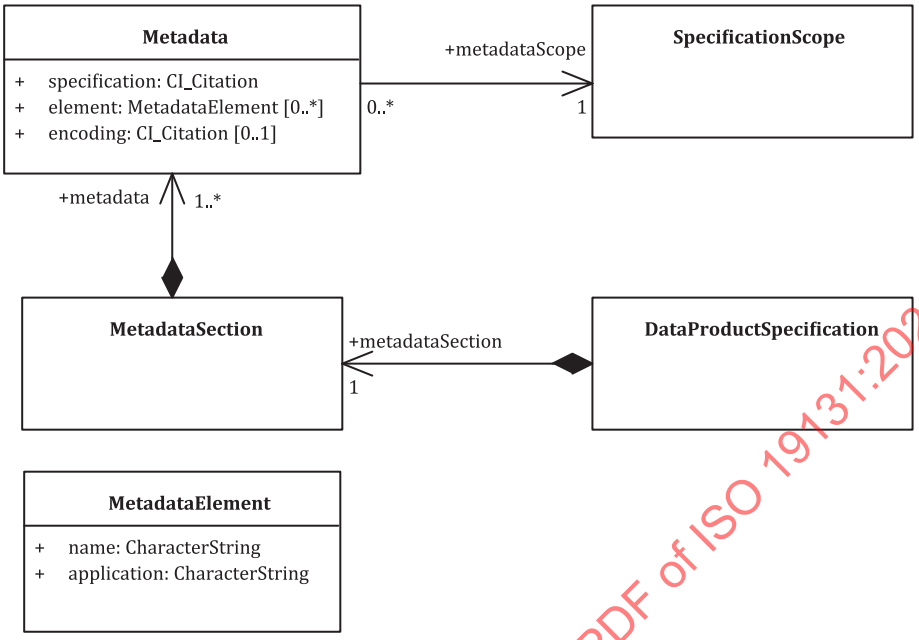

Figure 24 — UML model for metadata section

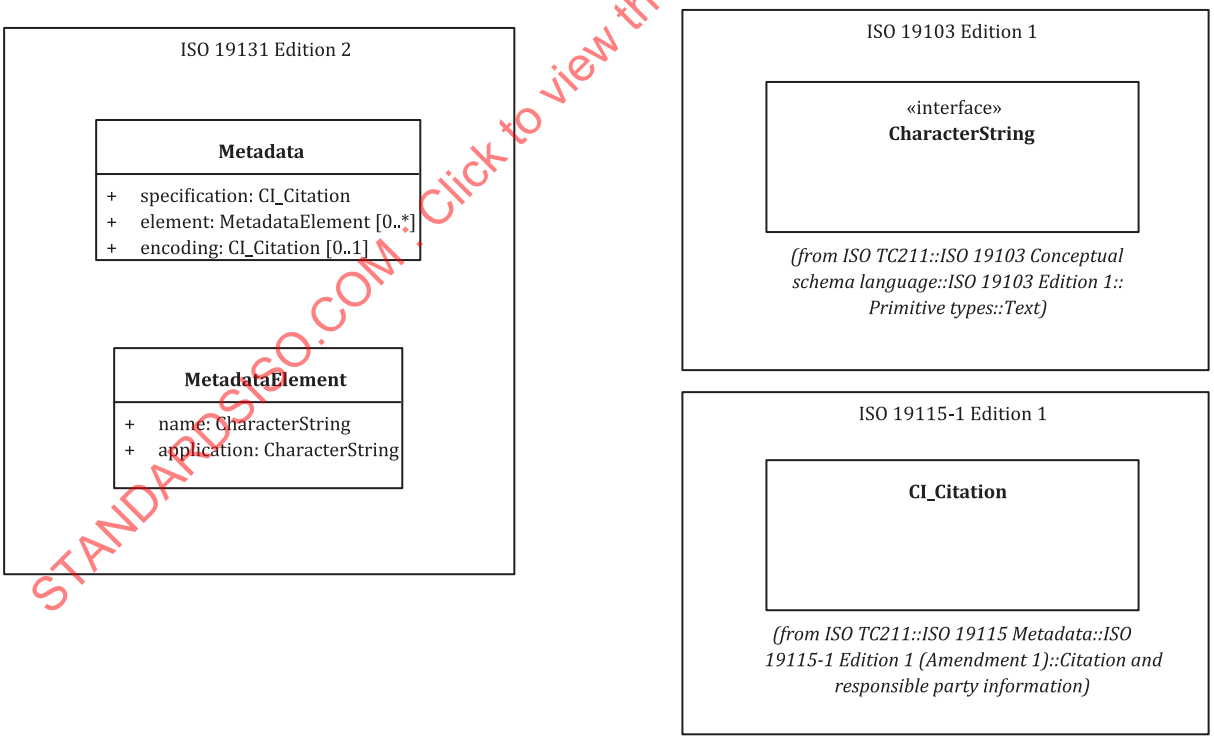

Figure 25 — Metadata — Dependencies to elements defined in other International Standards including fully-qualified namespaces

6.12.2 Class MetadataSection

6.12.2.1 Semantics

An object of the *MetadataSection* class is a place holder for objects specifying metadata for data products.

6.12.2.2 Role metadata

Each occurrence of the role *metadata* contains a metadata object.

```
metadata: Metadata [1..*]
```

6.12.3 Class Metadata

6.12.3.1 Semantics

An object of class *Metadata* holds an instruction of how to use a set of metadata elements and the specification scope for which the instruction is applicable.

6.12.3.2 Attribute specification

The attribute *specification* specifies a standard, a standard profile or other specification to be used as a base for the metadata.

```
specification: CI_Citation [1]
```

6.12.3.3 Attribute element

Each occurrence of the optional attribute *element* contains information on how to use specific metadata elements defined by the selected standard, standard profile or specification.

```
element: MetadataElement [0..*]
```

6.12.3.4 Attribute encoding

The optional attribute *encoding* contains a format and/or encoding for the metadata.

```
encoding: CI_Citation [0..1]
```

6.12.3.5 Role metadataScope

The role *metadataScope* references the scope for the metadata information.

```
metadataScope: SpecificationScope [1]
```

6.12.4 Class MetadataElement

6.12.4.1 Semantics

The class *MetadataElement* is a datatype for specification of the application of a single metadata element.

6.12.4.2 Attribute name

The attribute *name* contains the identity of the metadata element.

```
name: CharacterString [1]
```

6.12.4.3 Attribute application

The attribute *application* contains the application of the metadata element.

NOTE The attribute can for example specify elements that are required or code lists to be used.

```
application: CharacterString [1]
```

6.13 Additional information section

6.13.1 Requirements

The purpose of the additional information section is to provide requirements and descriptions not covered elsewhere in the data product specification.

Requirement: **.../req/content/additionalModel**
The additional information section shall conform to the model described in Figure 26. An object of the class *AdditionalInformation* shall specify information for a certain specification scope.

Requirement: **.../req/content/additionalContent**
The additional information section shall not contain information covered elsewhere in the data product specification.

The UML model in Figure 26 describes the structure for AdditionalInformation, and Figure 27 describes dependencies to elements defined in other International Standards.

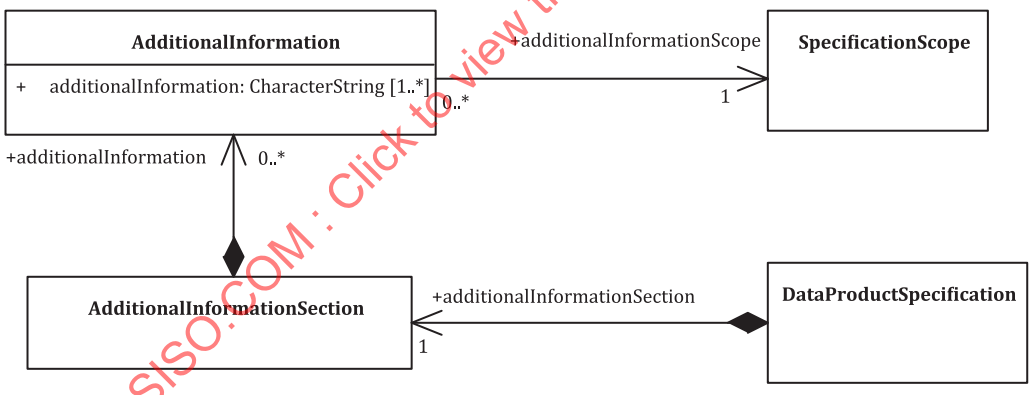

Figure 26 — UML model for additional information section

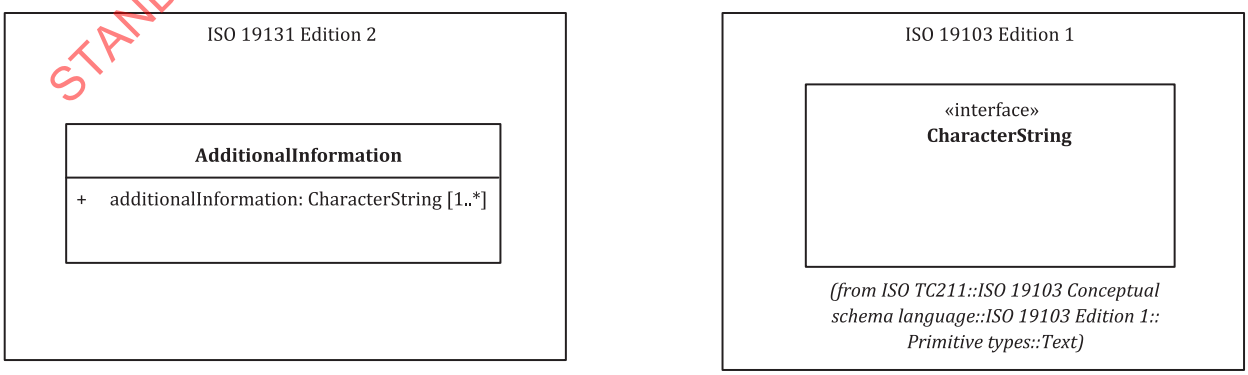

Figure 27 — Additional information — Dependencies to elements defined in other International Standards including fully-qualified namespaces

6.13.2 Class AdditionalInformationSection

6.13.2.1 Semantics

An object of the *AdditionalInformationSection* class is a place holder for objects specifying additional information about the data product.

6.13.2.2 Role additionalInformation

Each occurrence of the optional role *additionalInformation* contains an additional information object.

```
additionalInformation: AdditionalInformation [0..*]
```

6.13.3 Class AdditionalInformation

6.13.3.1 Semantics

An object of the class *AdditionalInformation* specifies information on additional aspects for a certain specification scope.

6.13.3.2 Attribute additionalInformation

Each occurrence of the attribute *additionalInformation* contains a narrative description of one aspect.

```
additionalInformation: CharacterString [1..*]
```

6.13.3.3 Role additionalInformationScope

The role *additionalInformationScope* references the scope applicable to the additional information.

```
additionalInformationScope: SpecificationScope [1]
```

6.14 Recommended layout of a data product specification

Recommendation: **.../rec/optionalContent/dpsLayout**
A data product specification instance where human readability is prioritized may be arranged in the following order: — abstract, keywords, topic categories and extent of the data product, for quick evaluation, as specified in 6.3.2.4, 6.3.2.6, 6.3.2.11 and 6.3.2.14; — about the data product specification, as specified in 6.2.7; — terms and abbreviations, as specified in 6.2.8 and 6.2.9; — identification section, as specified in 6.3; — scope section, as specified in 6.4; — data content and structure section, as specified in 6.5; — reference systems section, as specified in 6.6; — data quality section, as specified in 6.7; — data capture and production section, as specified in 6.8; — maintenance section, as specified in 6.9; — portrayal section, as specified in 6.10; — delivery section, as specified in 6.11; — metadata section, as specified in 6.12; — additional information section, issues not covered by other clauses, as specified in 6.13.

Annex D contains an example of a data product specification in conformance with recommendation .../rec/optionalContent/dpsLayout.

7 Requirements for XML encoding

The exchange of data product specifications in XML format requires encoding rules. This clause specifies such rules and an XML schema. The requirements class for the XML encoding is documented in Table 6.

Table 6 — Requirements class for the XML encoding of a data product specification

Requirements class	**.../req/xml**
Standardization target type	XML document representing a data product specification
Dependency	.../req/content
Requirement	.../req/xml/xmlEncoding

Requirement: **.../req/xml/xmlEncoding**
A data product specification XML document shall be conformant with the XML schema https://schemas.isotc211.org/19131/-/dps/2.0.0/dps.xsd.

The XML schema follows the rules stated in ISO/TS 19139-1 for transformation of UML models to XML schema.

The XML schema also uses the patterns for decoupling XML namespaces outlined in ISO/TS 19115-3:2016, Clause 8.

The XML schema definitions pertain to the following namespace: https://schemas.isotc211.org/19131/-/dps/2.0. This namespace is abbreviated dps.

This XML schema implements all the UML classes defined in this document and imports all relevant classes from other International Standards.

More details regarding the XML encoding can be found in Annex E.

Annex A
(normative)

Abstract test suite

A.1 Content of a data product specification

Conformance test	**.../conf/content/allContent**
Reference	All normative statements in requirements class: .../req/content (see Table 4 in Clause 6)
Test purpose:	Verify that the content of a data product specification conforms to the UML model and additional requirements related to elements in the UML model.
Test method:	Identify the individual objects and their attributes and associations to other objects. Verify that each such element is in conformance with multiplicity and data type as expressed in the UML model. For each individual object check for additional requirements beyond the semantics in the model. Verify that each such element meets the specified criteria.
Test type:	Basic

A.2 XML encoding

Conformance test	**.../conf/xml/xmlEncoding**
Reference	All normative statements in requirements class: .../req/xml (see Table 6 in Clause 7)
Test purpose:	Verify the syntax of a data product specification in the form of an XML document.
Test method:	Validate the XML document using the XML schema https://schemas.isotc211.org/19131/-/dps/2.0.0/dps.xsd.
Test type:	Basic

Annex B
(informative)

Backward compatibility

Data product specifications conformant with ISO 19131:2007 can potentially not be conformant with this edition of the document. Table B.1 describes changes that have been made that may cause a data product specification to no longer be conformant with this document. The table is not a comprehensive list of all changes made in this edition.

Table B.1 — Backward compatibility

Description of change	Suggested action
XML encoding has been added.	Make sure that the data product specification does not contain information that cannot be translated into a model element. If so, information in the data product specification may go missing when transformed into an XML document.
Mandatory sections working as place holders have been introduced.	Make sure that all sections are included in the data product specification. If not applicable, leave the section empty. See 6.2.2.
The UML model has been restructured introducing new/renamed attributes and elements, and ISO 19115-1 datatypes have been used where possible.	If the data product specification is dependent on the actual structure of the UML model or the attribute names used, it must be adopted to the new edition of the standard.
Overview of the data product specification The attribute *overview* in ISO 19131:2007 was used to include information such as: — Title — Reference dates — Responsible party — Language — Topic category — Terms and abbreviations In this edition of this document, new attributes and elements have been introduced to separate this kind of information.	Where applicable, move content from the *overview* attribute into other attributes and elements. See 6.2 and 6.3.
Identification section Description and identification of the data product has been clearly separated from description and identification of the specification.	Read 6.2 and 6.3 to make sure the data product specification is conformant with these subclauses.
Identification section The data type for attribute *purpose* has been changed to allow explanation of the purpose of the data product using use cases.	No action required, the purpose can still be described with free text, but by using the attribute *summary* in class Purpose (data type for attribute *purpose*). See 6.3.2.5.

Table B.1 *(continued)*

Description of change	Suggested action
Identification section The *extent* attribute in the identification section has been changed to allow specification of temporal and vertical extent, in addition to the geographical extent.	If temporal or vertical extent is described elsewhere, the attribute *extent* should be used. See 6.3.2.14.
Identification section New attribute *restriction* has been introduced, which can be used to describe handling restrictions of the data product.	If handling restrictions have been described elsewhere, the attribute *restriction* should be used. See 6.3.2.12.
Scope section Relations between scopes have been removed.	Remove the relation to super and sub scopes. It may be necessary to edit all other sections referencing scopes, since a scope no longer can contain sub scopes. See 6.4.
Scope section A requirement has been introduced that at least one of the attributes *level*, *levelName*, or *extent* shall be used for each scope.	Make sure that one of the attributes exists in the data product specification. See 6.4.1.
Data content and structure section The section is restructured using elements from ISO 19115-1.	Read 6.5 to make sure the data product specification is conformant with this subclause.
Reference system section The data type of the attribute *temporalReferenceSystem* has been changed.	Read 6.6. In general, no action is required.
Quality section The requirement to list data quality elements that have no defined quality requirements has been removed.	No action is required. See 6.7.
Quality section The new attribute *requirementId* has been introduced.	No action is required. See 6.7.4.2.
Data capture and production section New elements and attributes have been introduced, to contain information previously located in the *dataCaptureStatement* attribute.	Where applicable, move content from the *dataCaptureStatement* attribute into other attributes and elements. See 6.8.
Maintenance section Information about maintenance is mandatory and the datatype of the attribute *maintenanceAndUpdateFrequency* has been changed, with a new mandatory attribute introduced.	Read 6.9 to make sure the data product specification is conformant with this subclause.
Delivery section The new attribute *deliveryService* has been introduced.	If applicable, use the *deliveryService* attribute for information that has previously been written elsewhere. See 6.11.5.6.
Metadata section The metadata section is restructured and new attributes have been introduced to specify metadata standard and encoding to be used, as well as a possibility to describe how specific metadata elements should be used.	Read 6.12 to make sure the data product specification is conformant with this subclause.

Table B.1 *(continued)*

Description of change	Suggested action
A recommended layout has been introduced.	Optional to adopt the recommended layout. See 6.14.

Annex C
(informative)

Documentation of elements in the UML model

This annex contains a compact overview of all elements in the UML model. It contains the elements' name, definition, multiplicity, and the value type.

Clauses C.1 to C.12 in this annex relate to 6.2 to 6.13 in the main part of this document.

Tables C.1 to C.34 represent the content of one class in the UML model. The first row of each table contains the name and the definition of the class. The following rows contain the properties of attributes if any attributes are defined. After, attributes, roles and their properties are documented. Each role is prefixed by "Role:".

C.1 Package: Data product specification

C.1.1 DataProductSpecification

Table C.1 — DataProductSpecification

Name	Definition	Mult.	Value Type
DataProductSpecification	**represents a single instance of a data product specification. Each instance of a data product specification contains a constant set of section objects. Where the specification uses the scope feature, to specify different parts of the product, each section object relates to exactly one scope**		
overview	short human-readable, narrative description of the data product specification	1	CharacterString
title	the official designation of the data product specification	1	CharacterString
versionedId	a persistent uniform resource identifier for identifying this version of the data product specification	0..1	URI
id	a persistent uniform resource identifier for identifying the latest version of the data product specification	0..1	URI
date	date for a significant event in the life cycle of the data product specification NOTE Such events include when the data product specification was created, changed, approved and published.	0..*	CI_Date
language	language code according to ISO 639-2 for the language that is used in the data product specification	1	LanguageCode
contact	contact information for the party that is responsible for the data product specification	0..1	CI_Responsibility

Table C.1 *(continued)*

Name	Definition	Mult.	Value Type
maintenance	narrative description of the maintenance regime for the data product specification	0..1	CharacterString
webLocation	URL for a web site location where the data product specification can be downloaded	0..1	URI
format	file format in which the data product specification is provided at a web site location NOTE Examples of formats are "application/pdf" and "text/xml".	1..*	MediaType
handlingRestriction	classification code specifying limitations on handling the data product specification	0..1	MD_ClassificationCode
term	word or expression that is applicable to the data product specification	0..*	TermEntry
abbreviation	shortened form of a written word or phrase that is applicable to the data product specification	0..*	AbbreviationEntry
Role: identificationSection	identification section which identifies the data product	1	IdentificationSection
Role: scopeSection	scope section	1	ScopeSection
Role: dataContentAndStructure Section	data content and structure section	1	DataContentAnd StructureSection
Role: referenceSystemSection	reference system section	1	ReferenceSystemSection
Role: dataQualitySection	data quality section	1	DataQualitySection
Role: dataCaptureAndProduction Section	data capture and production section	1	DataCaptureAnd ProductionSection
Role: maintenanceSection	data maintenance section	1	MaintenanceSection
Role: portrayalSection	data portrayal section	1	PortrayalSection
Role: deliverySection	data delivery section	1	DeliverySection
Role: metadataSection	metadata section	1	MetadataSection
Role: additionalInformation Section	additional information section	1	AdditionalInformation Section

C.1.2 AbbreviationEntry

Table C.2 — AbbreviationEntry

Name	Definition	Mult.	Value Type
AbbreviationEntry	**abbreviation and its full text version**		
abbreviation	a shortened form of a written word or phrase used in place of the whole word or phrase	1	CharacterString
longerForm	full text version of an abbreviation	1	CharacterString

C.1.3 TermEntry

Table C.3 — TermEntry

Name	Definition	Mult.	Value Type
TermEntry	**datatype for definition of a term**		
term	the term to be used for a concept	1	CharacterString
definition	representation of a concept by a descriptive statement which serves to differentiate it from related concepts	1	CharacterString
note	notes of the concept	0..*	CharacterString
registerReference	reference to an entry in a register defining the concept	0..*	URI

C.2 Package: Specification identification

C.2.1 IdentificationSection

Table C.4 — IdentificationSection

Name	Definition	Mult.	Value Type
IdentificationSection	**for a data product there is a single object of the Identification class and with a content that provides various ways of identifying, searching and categorizing the data product**		
title	official designation of the data product	1	CharacterString
alternateTitle	name, other than the official designation, by which the data product is known	0..*	CharacterString
abstract	brief narrative summary of the content of the data product	1	CharacterString
purpose	intentions with which the data product is developed	0..1	Purpose
topicCategory	theme applicable to the data product	1..*	MD_TopicCategoryCode
spatialRepresentationType	form of spatial representation in the data product NOTE An example of form of the spatial representation is vector data.	0..*	MD_Spatial RepresentationType Code
spatialResolution	factor which provides a general understanding of the density of spatial data	0..*	MD_Resolution
supplementalInformation	any other descriptive information about the data product	0..1	CharacterString
uniqueId	persistent unique identifier for identifying the data product	0..1	CharacterString
keyword	word, formalized word or phrase that is used to describe the subject of the data product	0..*	MD_Keywords
restriction	classification code describing a handling restriction on the data product	0..*	MD_Constraints
contact	identification of, and means of communication with, person(s) and organization(s) associated with the data product	0..*	CI_Responsibility

Table C.4 *(continued)*

Name	Definition	Mult.	Value Type
extent	extent of geographic area and temporal extent covered by the data product	1..*	EX_Extent

C.2.2 Purpose

Table C.5 — Purpose

Name	Definition	Mult.	Value Type
Purpose	**information regarding the intentions with which the data product is developed. Information can be provided in the form of a summary. In addition, use cases may be added in order to provide purpose information in a more structured way**		
useCase	detailed and structured description of a use case for the data product	0..*	UseCase
summary	summary of the intentions with which the data product is developed	1	CharacterString

C.2.3 UseCase

Table C.6 — UseCase

Name	Definition	Mult.	Value Type
UseCase	**detailed documentation of the data product's purpose related to certain user needs**		
name	name of the use case	1	CharacterString
version	version number of the use case	0..1	CharacterString
summary	comprehensive textual description of the use case	1	CharacterString
goal	short description of the goal to be achieved by a realization of the use case	0..1	CharacterString
diagram	use case diagram represented by an URL to an image of an UML use case diagram NOTE It is important to have a link to a diagram in the form of a de-referenceable URL and not just an identifier.	0..1	URI
actor	designation of a user of the use case	0..*	CharacterString
stakeholder	the designation of a company, institution or interest group concerned by the execution of the use case	0..*	CharacterString
mainSuccessScenario	numbered sequence of actions to be carried out during the execution of the use case	0..1	CharacterString
trigger	event that leads to the execution of the use case	0..*	CharacterString
precondition	description of the status that is required to start the execution of the use case	0..1	CharacterString
postcondition	description of the status after the successful execution of the use case	0..1	CharacterString

C.3 Package: Specification scope

C.3.1 ScopeSection

Table C.7 — ScopeSection

Name	Definition	Mult.	Value Type
ScopeSection	**place holder for objects specifying the scopes of the data product**		
Role: scope	scope addressing a certain part of content of a data product	1..*	SpecificationScope

C.3.2 SpecificationScope

Table C.8 — SpecificationScope

Name	Definition	Mult.	Value Type
SpecificationScope	**specification scope of a certain part of the content of the data product**		
scopeIdentification	short descriptive name for identification of the specification scope of a data product specification	1	CharacterString
level	hierarchical level (by code) of the data addressed by the specification scope	0..1	MD_ScopeCode
levelName	descriptive name of the hierarchical level	0..1	CharacterString
levelDescription	narrative and detailed description of the level of the data specified by the specification scope	0..*	CharacterString
extent	spatial, vertical and temporal extent of the data specified by the specification scope	0..1	EX_Extent
coverageName	the name of one coverage to which the data product specification applies NOTE This item is not intended to be used to describe thematic groups within a dataset.	0..*	CharacterString

C.4 Package: Specification content and structure

C.4.1 DataContentAndStructureSection

Table C.9 — DataContentAndStructureSection

Name	Definition	Mult.	Value Type
DataContentAndStructure-Section	**place holder for objects specifying the data structure and content of a data product**		
Role: content	content and structure of a data product	1..*	DataContentAnd Structure

C.4.2 DataContentAndStructure

Table C.10 — DataContentAndStructure

Name	Definition	Mult.	Value Type
Data Content and Structure	**provides a feature catalogue, a reference to a feature catalogue or a coverage description and optionally an application schema, specified by the specification scope, or the complete data product**		
narrativeDescription	overview description of an application schema and/or feature catalogue for a specified scope	1	CharacterString
Role: applicationSchema	information on how to find resources that represents the application schema	0..1	MD_ApplicationSchemaInformation
Role: contentInformation	coverage description or feature catalogue, either by listing each feature type according to ISO 19110 (subclass MD_FeatureCatalogue of MD_ContentInformation) or as a reference to a feature catalogue (using subclass MD_FeatureCatalogueDescription of MD_ContentInformation) or, when the data is of coverage type, a coverage description (using subclass MD_CoverageDescription of MD_ContentInformation)	0..1	MD_Content Information
Role: contentScope	scope for the data content and structure information	1	SpecificationScope

C.5 Package: Specification reference system

C.5.1 ReferenceSystemSection

Table C.11 — ReferenceSystemSection

Name	Definition	Mult.	Value Type
ReferenceSystemSection	**place holder for objects specifying the spatial and temporal reference systems used in a data product**		
Role: referenceSystem	reference system used	1..*	ReferenceSystem

C.5.2 ReferenceSystem

Table C.12 — Reference System

Name	Definition	Mult.	Value Type
ReferenceSystem	**spatial, and optionally the temporal, reference system used for a certain specification scope**		
spatialReferenceSystem	identifier of a spatial reference system used for the specified specification scope	1	MD_ReferenceSystem
temporalReferenceSystem	identifier of a temporal reference system used for the specified specification scope	0..1	MD_ReferenceSystem
Role: referenceSystem-Scope	scope for the reference system information	1	SpecificationScope

C.6 Package: Specification data quality

C.6.1 DataQualitySection

Table C.13 — DataQualitySection

Name	Definition	Mult.	Value Type
DataQualitySection	**place holder for objects specifying conformance quality levels for a data product**		
Role: dataQuality	conformance quality levels applicable for a certain specification scope	1..*	DataQuality

C.6.2 DataQuality

Table C.14 — DataQuality

Name	Definition	Mult.	Value Type
DataQuality	**specifies the conformance quality levels applicable for a certain specification scope**		
dataQuality	specifies the data quality for the specification scope, that is, either a conformance quality level or a reason for not specifying a certain data quality aspect	1..*	ConformanceQuality Level
Role: dataQualityScope	scope for the quality information	1	SpecificationScope

C.6.3 ConformanceQualityLevel

Table C.15 — ConformanceQualityLevel

Name	Definition	Mult.	Value Type
ConformanceQualityLevel	**conformance quality level, that is, a requirement expressed as a threshold value for a certain data quality measure**		
requirementId	within a data product specification, a unique identity of the requirement, to be referred to from metadata by an object of DQ_ConformanceResult class	0..1	CharacterString
element	specifies a data quality element that, in turn, specifies a data quality measure and a threshold value for conformance (using DQ_QuantitativeResult) or, alternatively, specifies a descriptive statement (using DQ_DescriptiveResult) NOTE Since DQ_ConformanceResult describes the outcome of an evaluation regarding a specified conformance quality level (see definition in ISO 19157), it is not permitted to be used in the context of a data product specification since no evaluation results will be available when the specification's content is created. Thus, a constraint related to the attribute element has been added to class ConformanceQualityLevel.	1	DQ_Element

C.7 Package: Specification data capture

C.7.1 DataCaptureAndProductionSection

Table C.16 — DataCaptureAndProductionSection

Name	Definition	Mult.	Value Type
DataCaptureAnd ProductionSection	**place holder for objects specifying instructions, requirements and/or descriptions of the data capture and processing**		
Role: dataCaptureAndProduction	capture and production information for a data product	0..*	DataCaptureAnd Production

C.7.2 DataCaptureAndProduction

Table C.17 — DataCaptureAndProduction

Name	Definition	Mult.	Value Type
DataCaptureAndProduction	**instructions, requirements and/or descriptions of the data capture and production for a certain scope**		
dataCaptureAndProduction-Statement	narrative, free text description of the process for the capture and production of the data	1..*	CharacterString
guide	reference to document describing the capture of features and attributes from source information	0..*	CI_Citation
inclusionCriteria	logical rules defining when and how features and attributes are to be included in the data	0..*	CharacterString
Role: dataCaptureAndProductionScope	scope for the data capture and production information	1	SpecificationScope
Role: dataAcquisitionAnd Processing	source and/or production process used in producing a data product	1..*	DataAcquisitionAnd Processing

C.7.3 DataAcquisitionAndProcessing

Table C.18 — DataAcquisitionAndProcessing

Name	Definition	Mult.	Value Type
DataAcquisitionAndProcessing	**placeholder for objects specifying sources and production steps in producing the data product**		
Role: processStep	steps used in producing a data product	0..*	LI_ProcessStep
Role: source	source data used in creating a data product	0..*	LI_Source

C.8 Package: Specification maintenance

C.8.1 MaintenanceSection

Table C.19 — MaintenanceSection

Name	Definition	Mult.	Value Type
MaintenanceSection	**place holder for objects specifying maintenance information about a data product**		

Table C.19 *(continued)*

Name	Definition	Mult.	Value Type
Role: maintenance	maintenance information for the data product	1..*	Maintenance

C.8.2 Maintenance

Table C.20 — Maintenance

Name	Definition	Mult.	Value Type
Maintenance	**maintenance information for a certain specification scope of a data product**		
maintenanceAndUpdate Statement	narrative, free text descriptions of the process for the maintenance of the data	1..*	CharacterString
maintenanceAndUpdate Frequency	frequency with which changes and additions are made to a data product	1	MaintenanceAnd UpdateFrequency
Role: maintenanceScope	scope for the maintenance information	1	SpecificationScope

C.8.3 MaintenanceAndUpdateFrequency (union data type)

Table C.21 — MaintenanceAndUpdateFrequency (union data type)

Name	Definition	Mult.	Value Type
MaintenanceAndUpdate Frequency	**frequency with which changes and additions are made to the data product**		
maintenanceAndUpdate Frequency	code that specifies the frequency with which changes and additions are made to the data product	1	MD_Maintenance FrequencyCode
userDefinedMaintenance AndUpdateFrequency	period of time within which changes and additions are made to the data product	1	TM_PeriodDuration

C.9 Package: Specification portrayal

C.9.1 PortrayalSection

Table C.22 — PortrayalSection

Name	Definition	Mult.	Value Type
PortrayalSection	**place holder for objects specifying portrayal information of a data product**		
Role: portrayal	portrayal information for a data product	0..*	Portrayal

C.9.2 Portrayal

Table C.23 — Portrayal

Name	Definition	Mult.	Value Type
Portrayal	**portrayal information for a certain specification scope of the data product**		
portrayalCatalogue Citation	bibliographic reference to a portrayal specification	1..*	CI_Citation
Role: portrayalScope	scope for the portrayal information	1	SpecificationScope