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Geografske informacije - Kakovost podatkov - 1. del: Splošne zahteve (ISO/DIS 19157-1:2022)

Geographic information - Data quality - Part 1: General requirements (ISO/DIS 19157-1:2022)

Geoinformation - Datenqualität - Teil 1: Allgemeine Anforderungen (ISO/DIS 19157-1:2022)

Information géographique - Qualité des données - Partie 1 : Exigences générales (ISO/DIS 19157-1:2022)

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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*.

This first edition cancels and replaces ISO 19157:2013, which has been technically revised. It also incorporates ISO 19157:2013/Amd 1:2018.

The main changes compared to the previous version of ISO 19157 are as follows:

— harmonized terminology;

— unique identification of normative components;

— definition of data quality model extension;

— removal of data quality measures into new project on standard data quality measures register.

A list of all parts in the ISO 19157 series can be found on the ISO website.

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

Geographic data are increasingly being shared, interchanged and used for purposes other than their producers' intended ones. Information about the quality of available geographic data are vital to the process of selecting a dataset in that the value of data are directly related to its quality. A user of geographic data may have multiple datasets from which to choose. Therefore, it is necessary to compare the quality of the datasets to determine which best fulfils the requirements of the user.

The purpose of describing the quality of geographic data is to facilitate the comparison and selection of the dataset best suited to application needs or requirements. Complete descriptions of the quality of a dataset will encourage the sharing, interchange and use of appropriate datasets. Information on the quality of geographic data allows a data producer to evaluate how well a dataset meets the criteria set forth in its product specification and assists data users in evaluating a product's ability to satisfy the requirements for their particular application. For the purpose of this evaluation, clearly defined procedures are used in a consistent manner.

To facilitate comparisons, it is essential that the results of the quality are expressed in a comparable way and that there is a common understanding of the data quality measures that have been used. These data quality measures provide descriptors of the quality of geographic data through comparison with the universe of discourse. The use of incompatible measures makes data quality comparisons impossible to perform. This document standardizes the components and structures of data quality measures and defines commonly used data quality measures.

This document recognizes that a data producer and a data user may view data quality from different perspectives. Conformance quality levels can be set using the data producer's product specification or a data user's data quality requirements. If the data user requires more data quality information than that provided by the data producer, the data user can follow the data producer's data quality evaluation process flow to get the additional information. In this case the data user requirements are treated as a product specification for the purpose of using the data producer process flow.

The objective of this document is to provide a framework for defining the quality of geographic data. This includes principles for evaluating quality, a conceptual model for handling quality information, a structure and content of data quality measures, and guidelines for reporting a quality evaluation. The framework is extensible, with rules for how to add additional data quality measures, and also has provision for complex dimensions of data quality.

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Geographic information — Data quality — Part 1: General requirements

1 Scope

This document establishes the principles for describing the quality of geographic data. It

— defines a well-considered system of components for describing data quality;

— defines the process for defining additional, domain specific components for describing data quality;

— specifies components and content structure of a data quality measures;

— describes general procedures for evaluating the quality of geographic data;

— establishes principles for reporting data quality.

This document is applicable to data producers providing quality information to describe and assess how well a dataset conforms to its product specification and to data users attempting to determine whether or not specific geographic data are of sufficient quality for their particular application.

This document does not attempt to define minimum acceptable levels of quality for geographic data. Such information is usually present as a requirement in a data product specification, for example defined in compliance with ISO 19131.

2 Normative references

The following referenced documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 19108:2002, *Geographic information — Temporal schema*

ISO 19109:2015, *Geographic information — Rules for application schema*

ISO 19115-1:2014, *Geographic information — Metadata — Part 1: Fundamentals*

ISO/FDIS 19131, Geographic information — Data product specifications

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

3 Terms and definitions

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

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

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

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

3.1
accuracy
closeness of agreement between a test result or measurement result and the true value

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Note 1 to entry: In this document, the true value can be a reference value that is accepted as true.

[SOURCE: ISO 3534-2:2006, 3.3.1, modified –Notes 1, 2 and 3 have been deleted. Note has been added.]

3.2
conformance
conformity
fulfilment of a requirement

Note 1 to entry: When no ambiguity, the modifier "conformance" may be omitted, i.e. test report is the same as conformance test report.

[SOURCE: ISO/IEC Directives, Part 1, Consolidated ISO Supplement, modified — conformance is the preferred term and conformity the admitted term]

3.3
conformance quality level
threshold value or set of threshold values for *data quality* results used to determine how well a *dataset* (3.10) meets the criteria set forth in its *data product specification* or user requirements

3.4
correctness
correspondence with the *universe of discourse*

3.5
coverage
feature that acts as a function to return values from its range for any direct position within its domain

[SOURCE: ISO/DIS 19123-1]

3.6
data product specification
specification of a data product 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 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.

Note 2 to entry: specification is a document stating requirements [ISO 9000:2015, 3.8.7].

Note 3 to entry: data product is a dataset or a dataset series that may be supplied [ISO/FDIS 19131, modified – Note has been removed].

[SOURCE: ISO/FDIS 19131, 3.9 modified – Note 2 and 3 have been added]

3.7
data quality
degree to which a set of inherent characteristics of data fulfils *requirement*

[SOURCE: ISO 8000-2:2020, 3.8.1, modified – Note has been deleted]

3.8
data quality measure
variable to which a value is assigned as the result of measurement of a data quality characteristic

[SOURCE: ISO/IEC 25012:2008, 4.5, modified – Note has been deleted]

3.9
data quality unit
combination of a scope and data quality elements

3.10
dataset
identifiable collection of data

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

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

3.11
dataset series
collection of *datasets* sharing common characteristics

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

3.12
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* will be used when only one is meant.

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

3.13
feature attribute
characteristic of a *feature*

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

[SOURCE: ISO 19101-1:2014, 4.1.12 modified – Examples 1 and 2, and Notes 2 and 3 have been deleted.]

3.14
feature instance
individual of a given *feature type* having specified *feature attribute* values

[SOURCE: ISO 19101-1:2014 4.1.14]

3.15
feature operation
operation that every instance of a *feature type* may perform

[SOURCE: ISO 19110:2016, 4.5 - modified, Example and Note have been removed.]

3.16
feature type
class of *features* having common characteristics

[SOURCE: ISO 19156:2011, 4.7]

3.17
geographic data
data with implicit or explicit reference to a location relative to the Earth

[SOURCE: ISO 19109:2015, 4.13, modified – Note has been deleted.]

3.18
item
anything that can be described and considered separately

Note 1 to entry: An item can be any part of a *dataset*, such as a *feature*, feature relationship, *feature attribute*, or combination of these.

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[SOURCE: ISO 2859-5:2005, 3.4, modified – Example has been removed. Note 1 to entry has been added.]

3.19
lineage
provenance, source(s) and production process(es) used in producing a resource

[SOURCE: ISO 19115-1:2014, 4.9]

3.20
metadata
information about a resource

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

3.21
metaquality
information describing the *quality* of *data quality*

3.22
quality
degree to which a set of inherent characteristics of an object fulfils *requirements*

[SOURCE: ISO 9000:2015, 3.6.2, modified - Note 1 and 2 have been removed.]

3.23
quality evaluation
systematic examination of the extent to which an entity is capable of fulfilling specified requirements

[SOURCE: ISO/IEC/IEEE 24765:2017, 1.42, modified – Note 1 has been removed]

3.24
register
set of files containing identifiers assigned to *items* with descriptions of the associated *items*

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

3.25
requirement
need or expectation that is stated, generally implied or obligatory

[SOURCE: ISO 9000:2015, 3.6.4, modified – Notes 1, 2, 3, 4, 5 and 6 have been removed.]

3.26
quality evaluation report
quality report
free text document providing fully detailed information about *data quality* evaluations, results and measures used

3.27
uncertainty
measurement uncertainty
parameter, associated with the result of measurement, that characterizes the dispersion of values that could reasonably be attributed to a measurand

Note 1 to entry: Uncertainty of measurement comprises, in general, many components. Some of these components may be evaluated from the statistical distribution of the results of series of measurements and can be characterized by experimental standard deviations. The other components, which can also be characterized by standard deviations, are evaluated from assumed probability distributions based on experience or other information.

[SOURCE: ISO 19116: 2019, 3.28, modified – Notes 1 has been removed and replaced with Note 2 from ISO 19101-2: 2018]

3.28
universe of discourse
view of the real or hypothetical world that includes everything of interest

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

4 Abbreviated terms and packages

4.1 Abbreviations

ADQR   aggregated data quality result

AQL   acceptance quality limit

UML   Unified Modeling Language

XML   Extensible Markup Language

4.2 Package abbreviations

Abbreviations are used to denote the package that contains a class. Those abbreviations precede class names, connected by a "_". The standard in which those classes are located is indicated in parentheses. A list of those abbreviations is listed in Table 1.

Table 1 — Package abbreviations

CI	Citation [ISO 19115-1:2014]
DS	Dataset [ISO 19115-1:2014]
GF	General Feature [ISO 19109:2015]
LI	Lineage [ISO 19115-1:2014]
MD	Metadata [ISO 19115-1:2014]

5 Conformance

Any product claiming conformance to this document shall pass all tests described in the abstract test suite presented in Annex A as follows:

a) A data quality evaluation process shall pass the tests outlined in A.1;

b) Data quality model shall comply with all requirements and pass the test outlined in A.3;

c) Data quality metadata shall pass the tests outlined in A.2 and A.4;

d) A data quality measure shall pass the tests outlined in A.5.

6 General requirements for geographic information quality

6.1 General

Clauses 8 to 11 describe the components of data quality based on the conceptual UML model for ISO 19157-1, this standard, which is part of the ISO/TC 211 harmonized model. Furthermore, additional descriptions, requirements and recommendations are included. A dictionary of elements in the UML model is provided in Annex C.

The requirements, recommendations and permissions defined in this standard summarized in Tables 3, 4, 5 and 6.

6.2 Conformance requirements

Table 2 lists the conformance classes URI for the conceptual model defined in this document

Table 2 — Conformance requirements

Conformance test	Conformance class URI	Clause
Quality Evaluation Process	https://standards.isotc211.org/19157/-1/1/conf/QualityEvaluation	A.1
Data quality metadata	https://standards.isotc211.org/19157/-1/1/conf/Metadata/DataQuality	A.2
Data quality requirements	https://standards.isotc211.org/19157/-1/1/conf/Metadata/DataQualityRequirements	A.3
Metadata conformance	https://standards.isotc211.org/19157/-1/1/conf/Metadata	A.4
Data quality measures	https://standards.isotc211.org/19157/-1/1/conf/DataQualityMeasures	A.5

6.3 Data quality – general requirements, recommendations and permissions

Table 3 lists the requirements defined in this standard.

Table 3 – List of requirements

Requirement class	Identifier	Clause
Requirement 1	https://standards.isotc211.org/19157/-1/1/req/DataQuality	7
Requirement 2	https://standards.isotc211.org/19157/-1/1/req/QualityElement/AdditionalQualityElement	8.4
Requirement 3	https://standards.isotc211.org/19157/-1/1/req/QualityMeasure	9.1
Requirement 4	https://standards.isotc211.org/19157/-1/1/req/Quality/AdditionalQualityMeasure	9.3
Requirement 5	https://standards.isotc211.org/19157/-1/1/req/Metadata/DataQuality	11.1
Requirement 6	https://standards.isotc211.org/19157/-1/1/req/DataQuality/QualityEvaluationReport	11.1
Requirement 7	https://standards.isotc211.org/19157/-1/1/req/DataQuality/QualityEvaluationReport/AggregatedResult/Metadata	11.2.1

Table 4 lists the recommendation defined in this standard.

Table 4 — List of recommendations

Recommendation class	Identifier	Clause
Recommendation 1	https://standards.isotc211.org/19157/-1/1/rec/QualityElement/EvaluationMethod/dateTime	8.5.3
Recommendation 2	https://standards.isotc211.org/19157/-1/1/rec/QualityElement/QualityResult/ConformanceResult/identifier	8.5.4.3
Recommendation 3	https://standards.isotc211.org/19157/-1/1/rec/QualityMeasure/AdditionalQualityMeasure	9.2.5
Recommendation 4	https://standards.isotc211.org/19157/-1/1/rec/QualityMeasure/description	9.2.7
Recommendation 5	https://standards.isotc211.org/19157/-1/1/rec/content/QualityEvaluationProcess	10.1.2
Recommendation 6	https://standards.isotc211.org/19157/-1/1/rec/QualityEvaluationMethod/evaluationMethodType	10.2.1
Recommendation 7	https://standards.isotc211.org/19157/-1/1/rec/DataQuality/QualityEvaluationReport/reportReference	11.1
Recommendation 8	https://standards.isotc211.org/19157/-1/1/rec/DataQuality/QualityEvaluationReport/AggregatedResult	11.2.1
Recommendation 9	https://standards.isotc211.org/19157/-1/1/rec/DataQuality/QualityEvaluationReport/aggregatedResult/SameQualityElement	11.2.1
Recommendation 10	https://standards.isotc211.org/19157/-1/1/rec/DataQuality/QualityEvaluationReport/AggregatedResult/DifferentQualityElement	11.2.1
Recommendation 11	https://standards.isotc211.org/19157/-1/1/rec/DataQuality/QualityEvaluationReport/DerivedResult/QualityEvaluationReport	11.2.2
Recommendation 12	https://standards.isotc211.org/19157/-1/1/rec/DataQuality/QualityEvaluationReport/DerivedResult/Metadata	11.2.2
Recommendation 13	https://standards.isotc211.org/19157/-1/1/rec/DataQuality/Hierarchy	11.2.4

Table 5 lists the permissions defined in this standard.

Table 5 — List of permissions

Permission class	Identifier	Clause
Permission 1	https://standards.isotc211.org/19157/-1/1/per/QualityElement/AdditionalQualityElement	8.3.1
Permission 2	https://standards.isotc211.org/19157/-1/1/per/QualityElement/QualityResult/ConformanceResult	8.5.4.3
Permission 3	https://standards.isotc211.org/19157/-1/1/per/DataQuality/Metadata/SourceReference	11.2.3