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OGC Geospatial User Feedback Standard: Conceptual Model

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Abstract

This standard defines a conceptual Geospatial User Feedback (GUF) data model. Geospatial User Feedback is metadata that is predominantly produced by the consumers of geospatial data products as they use and gain experience with those products. This standard complements existing metadata conventions whereby documents recording dataset characteristics and production workflows are generated by the creator, publisher or curator of a data product. As a part of metadata, the GUF data model reuses some elements of ISO 19115-1:2014 (the updated version of the OGC Abstract Specification Topic 11) but not the general structure. This selective use of ISO metadata elements prioritizes future interoperability with developing ISO metadata models. This standard is designed to be used combination with an encoding standard. Initially an XML encoding following the ISO 19139 encoding rules is specified in a separate OGC implementation standard (OGC 15-098). In the future other encodings may be defined, including examples such as the use of JSON-LD based on parts of schema.org.

Keywords

The following are keywords to be used by search engines and document catalogues.

ogcdoc, ogc documents, user feedback, metadata, fitness-for-use, geospatial

Preface

This standard is based on work done in two European Union 7th Framework program projects called GeoViQua (FP7 FP7/2007-2013 under grant agreement n°265178) and CHARMe (FP7/2007-2013 under grant agreement n°312641). GeoViQua considers user feedback as part of the metadata that allows users to assess the quality and fitness-for-use of geospatial datasets. GeoViQua developed its quality model based on ISO 19115-1:2014 and drafts of ISO19157:2013. The GeoViQua model is divided into the Producer Quality Model and the User Feedback Model. Both models are encoded in XML based on the ISO 19139 rules. The GeoViQua User Feedback Model[[1]](#footnote-1) formed the initial basis of the model defined in this standard. CHARMe also focused on developing means for users to annotate datasets. The approach used in that project was based on W3C annotations and developed annotation conventions in RDF. Parts of the CHARMe conceptual model have been incorporated in the OGC GUF standards.

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# Scope

This OGC® standard defines a data model for encoding user feedback about geospatial datasets or metadata records describing datasets. It reuses and extends the ISO 19115-1:2014 data model. A set of information classes is defined.

This OGC® standard is applicable to metadata catalogue servers and clients that want to exchange geospatial user feedback information.

This OGC® standard is defined to allow implementation of catalogue clients that are able to complement the discovery of geospatial datasets. Catalogue clients present query results, commonly based on summaries of detailed metadata records created and maintained by the producers. Implementation of this standard allows clients to present user feedback summaries and detailed user feedback reports. Clients implementing this standard can provide a user interface to capture use input and comments for datasets or to complement the producer metadata by presenting user feedback information about the data or its metadata.

Geospatial User Feedback as used in this standard encompasses: user comments, questions and answers, user reports of dataset problems and proposed solutions to those problems, ratings, usage reports, citations of related datasets or publications describing usage, quality reports, relevant additional provenance information, and significant events related to the use or interpretation of a dataset.

This standard neither defines an encoding nor a query language to request or send user feedback to catalogues.

# Conformance

This standard defines 4 conformance classes.

Requirements for standardization targets are considered:

* Requirement Quality Common [http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/quality-common] has a single conformance class, Quality Common: [http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/quality-common]. This conformance class targets clients and services implementing quality or user feedback models.
* Requirement Feedback-item [http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-item] has a single conformance class, Feedback-item: [http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/ feedback-item]. This conformance class targets clients and services implementing user feedback models.
* Requirement Feedback-summary [http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-summary] has a single conformance class, Feedback-summary: [http://www.opengis.net/spec/ geospatial-user-feedback /1.0/conf/ feedback-summary]. This conformance class targets clients and services implementing user feedback models.
* Requirement Feedback-collection [http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-collection] has a single conformance class, Feedback-collection: [http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/ feedback-collection]. This conformance class targets clients and services implementing user feedback models.

Conformance with this standard shall be checked using all the relevant tests specified in Annex A (normative) of this document. The framework, concepts, and methodology for testing, and the criteria to be achieved to claim conformance are specified in the OGC Compliance Testing Policies and Procedures and the OGC Compliance Testing web site[[2]](#footnote-2).

In order to conform to this OGC®interface standard, a software implementation shall choose to implement:

1. Any encoding extension associated to this standard. Initially an XML encoding following the ISO 19139 encoding rules are provided in a separated standard document (OGC 15-098). A JSON-LD encoding is also foreseen.

All requirements-classes and conformance-classes described in this document are owned by the standard(s) identified.

# References

The following normative documents contain provisions that, through reference in this text, constitute provisions of this document. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

ISO / TC211: ISO 19115-1:2014 Geographic information -- Metadata -- Part 1: Fundamentals (2014)

ISO / TC 211: ISO 19157:2013 Geographic information -- Data quality (2013)

OGC: OGC 06-121r9 OGC Web Services Common Standard (2010)

OGC: OGC 08-131r3 The Specification Model - A Standard for Modular Specifications (2009)

# Terms and Definitions

This document uses the terms defined in Sub-clause 5.3 of [OGC 06-121r8], which is based on the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. In particular, the word “shall” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this standard.

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

citation

information object containing information that directs a reader's or user's attention from one resource to another [ISO 24619:2011, 3.1.16]

item

anything that can be described and considered separately [ISO 19157:2003, 4.18]

metadata

information about a resource [ISO 19115-1:2014, 4.10]

quality

degree to which a set of inherent characteristics fulfils requirements [ISO 9000:2005, 3.1.1]

rating

component of a user feedback item that subjectively classifies a resource in a short list of ordered categories

NOTE 1: The five star system is one of the most popular rating systems in the web. 5 stars means very good and 1 star means very bad.

user

consumer of a resource

user comment

component of a user feedback item providing textual information with no structure

user feedback

information about a resource directly provided by users

user feedback item

unit of information provided by a user about related resources as a result of its usage

user feedback collection

collection of feedback items that are grouped by criteria, or are the result of a query

user feedback summary

statistical summary of a feedback collection

# Conventions

## Data dictionary tables

The data dictionary for this standard is specified in a series of tables. The contents of the columns in these tables are described in Table 1.

Table 1 — Contents of data dictionary tables

| **Column title** | **Column contents** |
| --- | --- |
| Names (left column) | The name is the UML model attribute or association role name. The name capitalization rules used are specified in Subclause 11.6.2 of [OGC 06-121r9]. Some names in the tables may appear to contain spaces, but no names contain spaces. |
| Definition (second column) | Specifies the definition of this parameter (omitting unnecessary words such as “a”, “the”, and “is”). If the parameter value is the identifier of something, not a description or definition, the definition of this parameter should read something like “Identifier of ...”. |
| Data type and value (third column)orData type (if are no second items are included in rows of table) | Normally contains two items:The first item is often the data type used for this parameter, using data types appropriate in a UML model, in which this parameter is a named attribute of a UML class. Alternately, the first item can identify the data structure (or class) referenced by this association, and references a separate table used to specify the contents of that class (or data structure).The optional second item in the third column of each table should indicate the source of values for this parameter, the alternative values, or other value information, unless the values are quite clear from other listed information. |
| Multiplicity and use (right or fourth column)orMultiplicity (if are no second items are included in rows of table) | Normally contains two items:The first item specifies the multiplicity and optionality of this parameter in this data structure, either “One (mandatory)”, “One or more (mandatory)”, “Zero or one (optional)”, or “Zero or more (optional)”.The second item in the right column of each table specify how any multiplicity other than “One (mandatory)” is used. If that parameter is optional, under what condition(s) shall that parameter be included or not included? If that parameter can be repeated, for what is that parameter repeated?  |

When the data type used in the third column of such a table, is an enumeration or code list in which all the values are listed, together with the meaning of each value. When this information is extensive, these values and meanings are specified in a separate table that is referenced in the third column of the table row.

The data type of many parameters, in the third table column, is specified as “Character String type, not empty.”

The contents of these data dictionary tables are normative, including any table footnotes.

## UML notation

Unified Modeling Language (UML) static structure diagrams appearing in this standard are used as described in Sub clause 5.2 of OGC Web Service Common [OGC 06-121r9]. Further, the following conventions hold:

* UML elements in white color come from ISO 19115-1:2014 or ISO 19157:2013;
* UML element names with prefix QCM (Quality Common Metadata) are those defined in the http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/quality-common requirements class of this Standard;
* UML element names with prefix GUF (Geospatial User Feedback) are those defined in the http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-item requirements class of this Standard;
* UML element names with prefix UFS (User Feedback Summary) are those defined in the http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-summary requirements class of this Standard; and
* UML element names with prefix UFC (User Feedback Collection) are those defined in the http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-collection requirements class of this Standard.

## Core and Extension Breakdown

The Geospatial User Feedback standard follows the modular specification design pattern as described in OGC 08-131r3. The contributors to this standard decided that the requirements would be split into a core (quality common and geospatial user feedback item) and extensions (for summary statistics and geospatial user feedback collections). In addition, other standards in the GUF series will potentially provide specific encodings of the data model provided in this document. For example, the OGC Geospatial User Feedback Standard [OGC 15-098] XML Encoding Extension is initially provided. Other encodings may be specified in the future (such as a JSON-LD encoding based on parts of schema.org).

# Geospatial User Feedback

In addition to metadata provided by the original data provider describing geospatial resources, many users report that they come to trust data based on information about studies performed by their peers. An important element of that trust constitutes not only linking datasets with relevant citations in the scholarly literature, but also a desire for less formal feedback mechanisms such as user comments. As user feedback is a key driver for providers to improve their data products, some data providers have also expressed their desire for a standard such as GUF. (Note that ISO 19115 defines a ‘Citation’ class, but currently this is mainly used to specify a mechanism for citing a dataset, not for linking to external publications about the dataset.). In ISO 19115, the MD\_Usage class is a small attempt to address this need, but it appears not to be a suitable or successful means to record user feedback information.

The purpose of providing user feedback is to inform other users and data providers about use cases and experiences using a given geospatial resource. The goal is to collect requirements for data that providers can incorporate into objective quality measures for their products, allowing providers to meet the real needs of users and potentially to find new markets for their data.

The GUF model makes an effort to remain as simple as possible but comprehensive enough, in order to allow for simple user interfaces that can cover different levels of expertise on geospatial data usage. The following are examples of what the GUF model allows: commenting, asking questions, providing answers (the GUF\_UserComment class), rating data (GUF\_Rating), citing publications (QCM\_Publication), providing a quality measure (additionalQuality), documenting additional lineage information (additional LineageSteps), or emphasizing a significant event that conditions the interpretation of a dataset (GUF\_SignificantEvent). Each one of the previous examples is considered an “item” of feedback. Feedback items can be arranged in collections and a summary description of the collection is also modeled. Geospatial User Feedback can be provided both about data or metadata.

## Quality Common

This standard reuses elements of the geospatial metadata work and standard defined and maintained by ISO / TC 211. This forms the basis of a data model class list that is common and useful for both quality metadata and user feedback metadata. Some classes have been added to meet the requirements for expressing user feedback.

# Geospatial User Feedback model: Core

This section describes two requirements classes that are fundamental for describing Geospatial User Feedback items: the Quality Common and the User Feedback Item.

## Requirements Class Quality Common

This requirements class defines the data model classes that are common to, and useful for, both quality metadata generated by producers as well as user feedback metadata. For this reason, the common data model classes are kept in a separate conformance class. In essence, this conformance class represents the foundation for building a user feedback model. This requirements class inherits the ISO19115-1:2014 and the ISO19157:2013 metadata models (such as CI\_Citation, CI\_Date, etc) and adds two extra classes for citing publications (QCM\_Publications) and for reporting discovery issues (QCM\_DiscoveredIssues).

CI\_Citation was initially designed to cite geospatial datasets. In the following requirement, we extend this class to make it more suitable for citing publications.

1. /req/quality-common/citation-of-publications:
The implementations of quality common *shall* follow the UML model as shown in Figure 1 . This model extendes ISO 19115-1:2014 CI\_Citation with elements for publications and the specification of the purpose of a citation by adding the properties specified in Table 2, Table 3 and Table 4.
Dependency: ISO19115-1:2014 and ISO19157:2013 data models



Figure 1: QCM\_Publication in UML

Table 2 — QCM\_Publication extension elements

| **Name** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| title | Name by which the cited resource is known | Character String type, not empty | One (mandatory) |
| alternateTitle | Short name or other language name by which the cited information is known | Character String type, not empty | Zero or many (optional) |
| date | Reference date for the cited resource | CI\_Date (ISO 19115-1:2014 B.3.2.6) | Zero or many (optional) |
| edition | Version of the cited resource | Character String type, not empty | Zero or one (optional) |
| editionDate | Date of the edition | DateTime (ISO 19115-1:2014 B.4.2)  | Zero or one (optional) |
| identifier | Value uniquely identifying an object within a namespace | MD\_Identifier (ISO 19115-1:2014 B.3.3.3)  | Zero or more (optional) |
| citedResponsibleParty | Roles, name, contact, and position information for an individual or organization that is responsible for the resource | CI\_Responsibility (ISO 19115-1:2014 B.3.2.2)  | Zero or more (optional) |
| presentationForm | Mode in which the resource is represented | CI\_PresentationFormCode (B.5.4)  | Zero or more (optional) |
| series | Information about the series, or aggregate resource, of which the resource is a part | CI\_Series (ISO 19115-1:2014 B.3.2.9)  | Zero or one (optional) |
| otherCitationDetails | Other information required to complete the citation that is not recorded elsewhere | Character String type, not empty | Zero or more (optional) |
| ISBN | International Standard Book Number | Character String type, not empty | Zero or one (optional) |
| ISSN | International Standard Serial Number | Character String type, not empty | Zero or one (optional) |
| onlineResource | Online reference to the cited resource | CI\_OnlineResource (ISO 19115-1:2014 B.3.2.8)  | Zero or more (optional) |
| graphic | Citation graphic or logo for the cited resource | MD\_BrowseGraphic (ISO 19115-1:2014 B.3.3.4) | Zero or more (optional) |
| target | Link to the actual geospatial resource the publication is about.  | ISO 19115-1 CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | Zero or more (optional)If the target of the citation is specified by another part of the data model this parameter should not be used |
| abstract | Abstract of the publication a | Character String type, not empty | Zero or one (optional) |
| motivation | Purpose of the citation. Why the citation is provided in relation to the parent class or the target. | QCM\_CitationMotivation‌Code type. See Table 3 | Zero or one (optional) |
| related‌Resource | Other resources that are mentioned by the publication cited. | ISO 19115-1 CI\_Citation data type. | Zero or more (optional) |
| scope | Scope of the citation (e.g. the extent the citation is covering). | ISO 19115-1 DQ\_Scope data type | Zero or one (optional).Default value is the whole target |
| category | Type of publication | QCM\_PublicationCategory‌Code type. See Table 4 | One (mandatory) |
| a The need for including an abstract in CI\_Citation was also acknowledged by ISO19157:2013, which defines a StandAloneQualityReport having a summary and a CI\_Citation as parameters |

Table 3 — QCM\_CitationMotivationCode type

| **Name** | **Definition** |
| --- | --- |
| compare | Compares the target resource with others. relatedResource can indicate the compared dataset's identifier. (comes from a GeoViQua use case) |
| derive | Derives a new target from this target resource. relatedResource can indicate the derived target identifier. (comes from a GeoViQua use case) |
| describe | Describes the target. (comes from W3C annotations) |
| evaluate | Evaluates the target, including its quality. This may also be used by producers to append publications on CAL-VAL results. (comes from a GeoViQua use case) |
| comment | Provides comments about the target resource. (comes from W3C annotations) |
| use | Comments on the target resource, including its quality. (comes from a GeoViQua use case) |
| highlight | Highlights a part of the target resource. It may emphasize a problem in a section of the target resource or an interesting discovery. In this case DQ\_Scope should be used to mark the highlighted area. (comes from W3C annotations) |
| moderate | Assignment of value or quality to the target resource. It aims to moderate it up in a trust network or threaded discussion. (comes from W3C annotations) |
| question | Asks a question about the target resource. Can be used to question the veracity or the creation methodology of the target resource. (comes from W3C annotations) |
| reply | Contains a reply/answer to a previous publication. It can be a publication that responds a "question" motivated publication. (comes from W3C annotations) |
| link | Links the target resource to a publication. ,Use this as a default value. In fact, any citation of a publication is a link between a resource and the publication (whatever the motivation is), so by selecting “link” we are expressing no additional motivation. (comes from W3C annotations) |

Table 4 — QCM\_PublicationCategoryCode type

| **Name** | **Definition** |
| --- | --- |
| bookChapter | Book chapter |
| book | Book |
| report | Report |
| journalArticle | Journal article |
| magazineNewspaper | Magazine or a news paper |
| atlasMap | Atlas or a map in printed or digital form |
| applicationProgram | Application program or a piece of software |
| conferenceProceedings | Conference proceeding available in a book or in Internet |
| multimediaContent | A multimedia data package conceived to be distributed as a digital publication in a physical support (e.g. CD, DVD, Blue Ray, Flash Drive, etc) or available in Internet (such as an interactive encyclopedia of old maps) |
| socialMediaComment | Social media comment or entry. E.g. a tweet |
| blogWiki | Blog post or a wiki entry |
| webSite | Complete web site |
| webPage | Web page |
| videoAudio | Video, audio or a similar form of multimedia content |
| tutorialManual | Tutorial or a manual |

ISO 19115 proposes the definition of a MD\_Usage to document usages of the geospatial resource. This element has been extended in ISO 19115-1:2014 by adding a new property identifiedIssues which allows reporting of known issues associated with the resource, as well as proposed solutions if available. As a more comprehensive alternative, the GUF standard proposes the following specific class to describe discovered issues of the resource, workarounds and proposed alternatives and solutions.

1. /req/quality-common/discovered-issues:
The class QCM\_DiscoveredIssue that follows the UML model in Figure 2 with the properties specified in Table 5 *shall* be used when describing discovered issues in geospatial resources.



Figure 2: QCM\_DiscoveredIssue in UML.

Table 5 — QCM\_ DiscoveredIssue data type

| **Name** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| Target | Link to the actual resource the publication is about. | CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | Zero or open (optional)If the target of the citation is specified by another part of the data model this parameter should not be used |
| knownProblem | Known issue with the target | Character String type, not empty | One (mandatory) |
| problemDateTime | Date when the problem was detected | CI\_Date (ISO 19115-1:2014 B.3.2.6) | Zero or one (optional) |
| workAround | Possible way to work around the problem | Character String type, not empty | Zero or one (optional) |
| referenceDoc | A publication that exposes the issue and eventually suggest a solution.  | QCM\_Publication. (See Table 2)  | Zero or more (optional) |
| expectedFix‌Date | Date when a solution is expected to be released by the provider in the form of a fixedResource or directly as a fix in the original target resource. | CI\_Date (ISO 19115-1:2014 B.3.2.6) | Zero or one (optional) |
| fixed‌Resource | A new version of the target resource with the knownProblem is no longer present. | CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | Zero or one (optional) |
| alternative‌Resource | An alternative resource that can be used instead of the target for similar purposes but does not present the knownProblem. | CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | Zero or more (optional) |
|  |

## Requirement Class User Feedback Item

This requirements class defines the data model classes that are involved in the definition of an individual user feedback item. A feedback item is the container of the actual feedback. Every item is set into a context by a combination of target, citations and scope.

1. /req/feedback-item/item:
The class GUF\_FeedbackItem that follows the UML model in Figure 3 and Figure 4 with the properties specified in Table 6, and other tables referenced in Table 6, *shall* be used when describing feedback items relating to geospatial resources.
Dependency: /req/quality-common



Figure 3: GUF\_UserFeedbackItem (fragment), GUF\_UserInformation and GUF\_FeedbackTarget in UML



Figure 4: GUF\_FeedbackItem (fragment) description in UML

Table 6 — GUF\_FeedbackItem data type

| **Name** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| itemIdentifier | Identifier for the feedback item.  | MD\_Identifier data type (ISO 19115-1:2014 B.3.3.3) | One (mandatory) |
| abstract | Brief narrative description of this item, normally for display to a human. | Character String type, not empty | One (mandatory) |
| purpose | Summary of the intentions with which the feedback was provided | Character String type, not empty | Zero or one (optional) |
| contact | Information about the user providing feedback | GUF\_UserInformation data type (see Table 7) | One (mandatory) |
| contactRole | User's role in the context of this feedback item. A user may have several roles recorded in the GUF\_UserInformation, but this is the one that applies for this feedback. a | GUF\_UserRoleCode (see Table 8) | One (mandatory) |
| dateInfo | Date when the feedback item was created, updated etc. | CI\_Date (ISO 19115-1:2014 B.3.2.6) | One or more (mandatory) |
| itemIsReplyTo | Identifiers of one or more items of feedback to which this item is a response.  | MD\_Identifier data type (ISO 19115-1:2014 B.3.3.3) | Zero or more (optional)Populate only if the feedback item is responding to another feedback item (e.g. an answer to a previous comment). |
| descriptiveKeywords | Keyworks that can be useful to search for this item. They are selected from controlled vocabularies | MD\_Keywords data type (ISO 19115-1:2014 B.2.3.2) | Zero or more (optional) |
| Tag | Free text word that can be useful to search for this item. | Character String type, not empty | Zero or more (optional) |
| locale | Language and character set used within the feedback item | PT\_Locale data type (ISO 19115-1:2014 B.3.4.3) | Zero or more (optional) |
| externalFeedback | Link to an item in an external repository that contains the feedback (not described inline). | CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | Zero or one (optional) b |
| additionalQuality | Structured quality assessment result | DQ\_DataQuality data type (ISO 19157:2013 C.2.1.1) | Zero or more (optional) b |
| userComment | Text free user comment | GUF\_UserComment data type (see Table 11) | Zero or one (optional) b |
| usage | Structured usage report | GUF\_UsageReport (see Table 13) | Zero or more (optional) b |
| rating | Rating code reflecting the satisfaction of the user with the resource used | GUF\_Rating (see Table 15) | Zero or one (optional) b |
| citation | Citation of a published resource (e.g.: a report, a peer reviewed paper) that provides and evaluation of the usage of the resource | CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | Zero or more (optional) b |
| additionalLineage | Additional lineage steps not included in the producer metadata | LI\_Lineage data type (ISO 19115-1:2014 B.2.5) | Zero or one (optional) b |
| significantEvent | Significant natural events or sensor or platform anomalies that can affect the interpretation of the data. | GUF\_SignificantEvent (see Table 16) | Zero or more (optional) b |
| target | Identifies a pre-existing resource (e.g., a dataset or a metadata record) from a catalogue. | GUF\_FeedbackTarget (see Table 9) | One or more (mandatory) |
| a The idea is for a single user to be able to embody more than one role, but only one in each item. Thus, a data producer employee may comment and normally speak freely as an end user, but may, for example, issue a metadata override on behalf of the data provider if s/he explicitly chooses that role. S/he would only be allowed to choose roles from his/her user information, and maybe there could be additional restrictions. So users seeking reliable but "semi-official" metadata could look for overrides issued by the provider in that role.b If none of these elements are populated, the item does not provide feedback and should be considered empty. |

Table 7 — GUF\_UserInformation data type

| **Name** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| userDetails | Contact details about the user and its organization. | CI\_Responsibility data type (ISO 19115-1:2014 B.3.2.2) | One (mandatory) |
| applicationDomain | Application domain(s) a user works in. | Character String type, not empty | Zero or more (optional) |
| expertiseLevel | User level of expertise in this particular context | GUF\_RatingCode numeric code list (see Table 15) | One (mandatory) |
| userRole | The roles the user can play | GUF\_UserRoleCode code list (see Table 8) | Zero or more (optional) |
| externalUserID | User ID in an external system such as an ORCID. | MD\_Identifier data type (ISO 19115-1:2014 B.3.3.3) | Zero or more (optional) |

Table 8 — GUF\_UserRoleCode code list

| **Name** | **Definition** |
| --- | --- |
| commercialDataProducer | Commercial Data Producer |
| commercialAddedValue | Commercial Added Value |
| researchDataProducer | Scientific Data Producer |
| researchEndUser | Research End User |
| decisionMaker | Decision Maker |
| generalPublic | General Public |

Table 9 — GUF\_FeedbackTarget data type

| **Name** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| resourceRef a | Reference to a geospatial resource that is target of the feedback item or a super set of it b | CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | One or more (mandatory) c |
| metadataIdentifier | Identifier for a metadata record about the resource | MD\_Identifier data type (ISO 19115-1:2014 B.3.3.3) | Zero or more (optional) |
| scope | Describes a type of resource the feedback is about; typically a dataset, a metadata record, a feature... or a subsets of a dataset or resource. | MD\_scope data type (ISO 19115-1:2014 B.3.3.1) | Zero or one (optional) b |
| targetType | The role of the target with respect to the feedback item | GUF\_TargetRoleCode code (see Table 10) | One (mandatory) |
| parent | Parent of the cited resource d | GUF\_FeedbackTarget data type (see this table) | Zero or one (optional) |
| child | Child of the cited resource e | GUF\_FeedbackTarget data type (see this table) | Zero or more (optional) |
| a Do not confuse this data type with itemIsReplyTo in GUF\_FeedbackItem. In the case where a feedback item replies to another feedback item, this is indicated in itemIsReplyTo. It is expected that the targets of both items are identical including the same resourceRef.b If the reference cites a superset of the feedback target, use ‘scope’ to define the right subset of the resource referenced.c If more than one is provided they shall point to the same resource. If you have more than one resource, use more than one GUF\_FeedbackTarget elements.d This may be used to present feedback to users grouped by the parent resources: for example, a user evaluating the quality of a single remotely-sensed image tile may also wish to see feedback on the global set of tiles, or all feedback relating to the entire data collection campaign.e If the target is a collection, this can be used to mention its members |

Table 10 — GUF\_TargetRoleCode code list

| **Name** | **Definition** |
| --- | --- |
| primary | Identifies a pre-existing resource that is the subject of the feedback item, i.e. points to the resources the feedback is about. |
| secondary | Referenced resources, implying that the feedback item might be relevant to the referenced resource. |
| supplementary | Identifiers to additional references, e.g., another region in another dataset with similar problems. It is used to formally model references that somehow are related to the feedback item at hand, but does not imply that the feedback is relevant for the referenced subject. (An exemplary resource reference should be of this code; such feedback would not typically be shown with the resource). |

Table 11 — GUF\_UserComment data type

| **Name** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| comment | Free text | Character String type, not empty | One (mandatory) |
| motivation | Motivation of the comment: it can be a comment, a question, an answer or a justification (e.g. a justification for a rating) | GUF\_MotivationCode code list (see Table 12) |  |

Table 12 — GUF\_MotivationCode code list

| **Names** | **Definition** |
| --- | --- |
| comment | Isolated comment or a part of a discussion (a sequence of interrelated comments) |
| question | Question about a feedback target that awaits an answer |
| answer | Answer (possibly one of several, possibly incorrect) to a previous “question” formulated in a previous feedback item (use itemIsReplyTo to refer to a previous question or comment) |
| acceptedAnswer | The answer that has been accepted as best to a previous question formulated in a previous feedback item (use itemIsReplyTo to refer to a previous question or comment) |
| response | Response or a reaction of the producer or other responsible party to another feedback item (e.g., a “comment” or a “discovered issue” of a usage problem) (use itemIsReplyTo to refer to the item that motivated the response) |
| justification | Justification or explanation clarifying the reasoning in another part of the feedback item e.g., a rating |
| resolution | Resolution declaring a discussion thread (a sequence of interrelated questions, answers and comments) closed (use itemIsReplyTo to refer to the last question, answer or comment) |
| moderation | Reason why another feedback item has been moderated or censored |

Table 13 — GUF\_UsageReport data type

| **Name** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| reportAspect | Aspect reported | GUF\_ReportAspectCode code list (see Table 12) | One (mandatory) |
| usageDescription | Usage description or limitation of the target | MD\_Usage code list (ISO 19115-1:2014 B.2.3.6) | Zero or more (optional) |
| discoveredIssue | Discovered issue in the target resource | QCM\_DiscoveredIssue data type (see Table 5) | Zero or more (optional) |

Table 14 — GUF\_ReportAspectCode code list

| **Name** | **Definition** |
| --- | --- |
| usage | Description of a usage of the target resource. At least one MD\_Usage should be populated |
| fitnessForPurpose | Description of a usage of the target resource that was appropriated for the intended purpose. At least one MD\_Usage should be populated |
| limitation | Description of a limitation of the target resource. At least one userDeterminedLimitations in MD\_Usage should be populated |
| alternative | Alternative route that helps to avoid a problem or a limitation. At least workAround or alternativeResource in one QCM\_DiscoveredIssue should be populated |
| problem | A report of a problem or an issue. At least one QCM\_DiscoveredIssue should be populated |

Table 15 — GUF\_Rating data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| rating | Rating in the form of a simple numeric code that qualifies subjectively the feedback target | GUF\_RatingCode (see Table 18), GUF\_ThumbsCode (see Table 19), GUF\_SignCode (see Table 20) or other numerical code for rating | One (mandatory) |

Table 16 — GUF\_SignificantEvent data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| abstract | Brief narrative description of this event, normally for display to a human. | Character String type, not empty | One (mandatory) |
| citation | Citation of the event (e.g.: a report describing the event, or a event identifier) | CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | Zero or more (optional) |
| extent | Spatio-temporal extent of the event | EX\_Extent data type (ISO 19115-1:2014 B.3.1.1) | One (mandatory) |
| eventType | Type of event | GUF\_SignificantEventTypeCode (see Table 17) | Zero or one (optional) |

Table 17 — GUF\_SignificantEventTypeCode code list

| **Names** | **Definition** |
| --- | --- |
| hurricaneNatural | Hurricane episode |
| volcanicEruptionNatural | Volcanic Eruption episode |
| elNinoNatural | El Nino natural event  |
| droughtNatural | Remarkable drought episode |
| stormNatural | Remarkable Storm natural event |
| wildfireNatural | Remarkable Wildfire natural event |
| floodNatural | Remarkable Flood natural event |
| earthquakeNatural | Remarkable Earthquake natural event |
| tsunamiNatural | Remarkable Tsunami natural event |
| ifsEvent | Integrated Forecast System event (e.g. a problem) |
| systemEvent | Acquisition or distribution system event (e.g. a problem etc) |
| satelliteAnomaly | Abnormal data in a satellite system (e.g. a sensor glitch) |
| dropsondeAnomaly | Abnormal data from a dropsonde |
| aircraftAnomaly | Abnormal data from a airborne system (e.g. a sensor glitch) |
| buoyAnomaly | Abnormal data from a buoy |
| shipAnomaly | Abnormal data from a ship sensing system (e.g. a sensor glitch) |
| landStationAnomaly | Abnormal data from a land station (e.g. a sensor glitch) |
| mobileSensorAnomaly | Abnormal data from a mobile sensor anomaly (e.g. a sensor glitch) |
| sensorAlarm | Abnormal acquisition above or below normal parameters. |

NOTE: This codelist is based on the CHARMe project, which focused primarily on hazards and climatic analysis. ([https://software.ecmwf.int/wiki/display/CHAR/Significant+Events](https://software.ecmwf.int/wiki/display/CHAR/Significant%2BEvents)). Here, as in other parts of the data model, the codelist approach allows further domain-specific entities to be described and modeled.

## Numeric Codelist for rating

A numeric is a codelist that has a correspondence to a numeric code. This allows for item sorting and numerical calculations such as totals and averages based on the numeric code. Table 18, Table 19 and Table 20 are examples of numeric codelists that can be used for rating.

GUF\_RatingCode is intended for implementing a 5 star rating system. This can be used for target resources or for user expertiseLevel. This system is currently used in amazon.com and many other websites.

Table 18 — GUF\_RatingCode numeric code type

| **Number** | **Code** | **Definition** |
| --- | --- | --- |
| 1 | oneStar | Very bad |
| 2 | twoStars | Bad |
| 3 | threeStars | Regular |
| 4 | fourStars | Good |
| 5 | fiveStars | Excellent |

GUF\_ThumbsCode is intended for implementing an “I like” system. GUF\_ThumbsCode is expected to be used to give feedback on another feedback item, e.g. to rate the comment of another user about a target resource. This system is currently used in facebook.com “I like” and many other websites.

Table 19 — GUF\_ThumbsCode numeric code type

| **Number** | **Code** | **Definition** |
| --- | --- | --- |
| -1 | thumbsDown | Thumbs down |
| 1 | thumbsUp | Thumbs up |

GUF\_SignCode could be used to accompany textual GUF\_UserComment to give an indication if the comment is emphasizing a positive aspect, a neutral or a negative aspect (e.g. a complaint). This system is currently used to rate user reputation in ebay.com.

Table 20 — GUF\_SignCode numeric code type

| **Number** | **Code** | **Definition** |
| --- | --- | --- |
| -1 | negative | Negative |
| 0 | neutral | Neutral |
| 1 | positive | Positive |

# Geospatial User Feedback model: Extensions

This section describes two requirements classes that are considered extensions of the core: the User Feedback Summary and the User Feedback Collection.

## Requirements Class User Feedback Summary Extension

This requirements class defines the data model classes that allow for encoding summary statistics of feedback items that share the same target.

1. /req/feedback-summary/summary-model:
The class UFS\_FeedbackSummary that follows the UML model in Figure 5 with the properties specified in Table 21 *shall* be used when a grouping of feedback items is needed.
Dependency: /req/feedback-item



Figure 5: UFS\_FeedbackSumary data model UML diagram

Table 21 — UFS\_FeedbackSummary data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| target | Common geospatial resource the summary is about.  | ISO 19115-1 CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | Zero or one (optional)If the target of the citation is specified by another part of the data model this parameter should not be used |
| numberOfFeedbackItem | Number of Feedback items this summary is about | Integer type | One (mandatory) |
| latestItemDate | The date of the last item | CI\_Date (ISO 19115-1:2014 B.3.2.6) | Zero or one (optional) |
| numberOfPrimaryTargets | Total number of primary targets | Integer type | Zero or one (optional) |
| numberOfSecondaryTargets | Total number of secondary targets | Integer type | Zero or one (optional) |
| numberOfSupplementaryTargets | Total number of supplementary targets | Integer type | Zero or one (optional) |
| averageUserExpertiseLevel | Average user expertise level | Real type | Zero or one (optional) |
| minimumPossibleRating | Minimum numeric value for a rating | Real type | One (mandatory) |
| maximumPossibleRating | Maximum numeric value for a rating | Real type | One (mandatory) |
| averageRating | Average rating | Real type | One (mandatory) |
| numberOfRatings | Number of feedback items with a valid rating | Integer type | One (mandatory) |
| numberOfUserComments | Number of feedback items with a valid comment | Integer type | One (mandatory) |
| numberOfUsageReports | Number of populated usage reports | Integer type | One (mandatory) |
| numberOfCitations | Number of populated citations | Integer type | One (mandatory) |
| numberOfAdditionalQualities | Number of populated quality elements | Integer type | One (mandatory) |
| numberOfAdditionalLineages | Number of feedback items with a valid reported lineage | Integer type | One (mandatory) |
| numberOfSignificantEvents | Number of populated significant events | Integer type | One (mandatory) |
| feedbackItemsByExpertiseLevelCount | Number of feedback items by each level of expertise  | UFS\_ExpertiseLevelCount data type (see Table 22) | Zero or more (optional) a |
| userByRoleCount | Number of feedback items for each user role | UFS\_UserRoleCount data type (see Table 23) | Zero or more (optional) b |
| byTagCount | Number of feedback items for each tag | UFS\_TagCount data type (see Table 24) | Zero or more (optional) c |
| byKeywordCount | Number of feedback items for each keyword | UFS\_KeywordCount data type (see Table 25) | Zero or more (optional) d |
| byRatingCount | Number of feedback items for each rating value | UFS\_RatingCount data type (see Table 26) | Zero or more (optional) e |
| ratingByExpertiseLevelCount | Number of feedback items for each rating and level of expertise | UFS\_RatingExpertiseLevelCount data type (see Table 27) | Zero or more (optional) f |
| a In the case where feedbackItemsByExpertiseLevelCount occurs more than once, the expertiseLevel values shall be different for each.b In the case where userByRoleCount occurs more than once, its userRole values shall be different.c In the case where byTagCount occurs more than once, its tag values shall be different.d In the case where byKeywordCount occurs more than once, its keyword values shall be different.e In the case where byRatingCount occurs more than once, its rating values shall be different.f In the case where ratingByExpertiseLevelCount occurs more than once, their rating / expertiseLevel pair values shall be different. |

Table 22 — UFS\_ExpertiseLevelCount data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| expertiseLevel | A possible value of expertise level | GUF\_RatingCode data type (see Table 18) | One (mandatory) |
| count | Number of feedback items that were populated by this expertiseLevel code | Integer data type | One (mandatory) |

Table 23 — UFS\_UserRoleCount data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| userRole | A possible value of expertise level | GUF\_UserRoleCode data type (see Table 8) | One (mandatory) |
| count | Number of time that a feedback items was populated by a user acting with this userRole code | Integer data type | One (mandatory) |

Table 24 — UFS\_TagCount data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| tag | A possible value of expertise level | Character String data type not empty | One (mandatory) |
| count | Number of feedback items that were populated with this tag value | Integer data type | One (mandatory) |

Table 25 — UFS\_KeywordCount data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| keyword | A possible value of expertise level | MD\_Keywords data type (ISO 19115-1:2014 B.2.3.2) | One (mandatory) |
| count | Number of feedback items that were populated with this keyword | Integer data type | One (mandatory) |

Table 26 — UFS\_RatingCount data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| rating | A possible value of expertise level | GUF\_RatingCode (see Table 18), GUF\_ThumbsCode (see Table 19), GUF\_SignCode (see Table 20) or other numerical code for rating | One (mandatory) |
| count | Number of feedback items that were populated with this rating code | Integer data type | One (mandatory) |

Table 27 — UFS\_RatingExpertiseLevelCount data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| rating | A possible value of rating  | GUF\_RatingCode (see Table 18), GUF\_ThumbsCode (see Table 19), GUF\_SignCode (see Table 20) or other numerical code for rating | One (mandatory) |
| expertiseLevel | A possible value of expertise level | GUF\_RatingCode data type (see Table 18) | One (mandatory) |
| count | Number of feedback items that were populated with this rating-expertiseLevel code pair | Integer data type | One (mandatory) |

## Requirements Class User Feedback Collection Extension

This requirements class defines the data model classes that allow for grouping of feedback items into a feedback response and feedback collection with summary statistics. A feedback collection is a collection of a feedback items that share a common target and share the same rating code list.

1. /req/feedback-collection/response:
The class UFC\_FeedbackResponse that follows the UML model in Figure 6 with the properties specified in Table 28 *shall* be used when a grouping of feedback items is needed as a response to a feedback catalogue request.
Dependencies: /req/feedback-summary/



Figure 6: User Feedback Collection Extension classes in a UML diagram

Table 28 — UFC\_FeedbackResponse data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| collection | Collection of feedback items | UFC\_FeedbackCollection data type (see Table 29) | One or more (mandatory) |

1. /req/feedback-collection/collection:
The class UFC\_FeedbackCollection that follows the UML model in Figure 6 with the properties specified in Table 29 *shall* be used when a grouping of feedback items is needed.
Dependencies: /req/feedback-summary/

Table 29 — UFC\_FeedbackCollection data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| target | Common geospatial resource to which the collection refers.  | ISO 19115-1 CI\_Citation data type (ISO 19115-1:2014 B.3.2.1) | Zero or one (optional)If the target of the citation is specified by another part of the data model this parameter should not be used |
| item | Feedback item | GUF\_FeedbackItem data type (see Table 6) | Zero or more (optional) |
| summary | Summary of the feedback items | UFS\_FeedbackSummary data type (see Table 21) | Zero or one (optional) |
| pagination | Information about the page structure of the collection | UFC\_ResponsePagination (see Table 30) | Zero or one (optional) |

1. /req/feedback-collection/pagination:
The class UFC\_ResponsePagination that follows the UML model in Figure 6 with the properties specified in Table 30 *shall* be used when pagination of a catalogue response is needed.
Dependencies: /req/feedback-summary/

Table 30 — UFC\_ResponsePagination data type

| **Names** | **Definition** | **Data type and values** | **Multiplicity and use** |
| --- | --- | --- | --- |
| numberOfFeedbackItems | Number of feedback items in the collection | Integer data type | One (mandatory) |
| limit | Maximum feedback items per page | Integer data type | Zero or one (optional). It not present, there is no limit |
| offset | Number of the first items in the complete collection that has been skipped | Integer data type | Zero or one (optional). It not present, no item was skipped |
| count | Number of feedback, items in this page | Integer data type | One (mandatory) |

Annex A: Conformance Class Abstract Test Suite (Normative)

A GUF implementation of this standard must satisfy the following system characteristics to be conformant with this specification.

Conformance class: Quality Common

The OGC URI identifier of this conformance class is:

http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/quality-common

Tests identifiers below are relative to http://www.opengis.net/spec/geospatial-user-feedback/1.0

* + 1. Publications

|  |  |
| --- | --- |
| **Test id:** | **/conf/quality-common/citation-of-publications** |
| **Test Purpose:** | **Req 1** /req/quality-common/citation-of-publications:The implementations of quality common *shall* follow the UML model as shown in Figure 1 . This model extends ISO 19115-1:2014 CI\_Citation with elements for publications and the specification of the purpose of a citation by adding the properties specified in Table 2, Table 3 and Table 4.Dependency: ISO19115-1:2014 and ISO19157:2013 data models |
| **Test method:** | Validate the requirements of publication citationsTest passes if publication citations instances are conformant to ISO 19115-1:2014 CI\_Citation and point to the QCM\_Publication data type and follow the data model specified in Table 2, Table 3 and Table 4. |

* + 1. Discovered issues

|  |  |
| --- | --- |
| **Test id:** | **/conf/** **quality-common/discovered-issues** |
| **Test Purpose:** | **Req 2** /req/quality-common/discovered-issues:The class QCM\_DiscoveredIssue that follows the UML model in Figure 2 with the properties specified in Table 5 shall be used when describing discovered issues in geospatial resources. |
| **Test method:** | Validate the requirements of discovered issues.Test passes if discovered issues instances point to the QCM\_DiscoveredIssue data type and follow the data model specified in Table 5 |

Conformance class: User Feedback-item

The OGC URI identifier of this conformance class is:

http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/feedback-item

Tests identifiers below are relative to http://www.opengis.net/spec/geospatial-user-feedback/1.0

* + 1. Feedback item

|  |  |
| --- | --- |
| **Test id:** | **/conf/feedback-item/item** |
| **Test Purpose:** | **Req 3** /req/feedback-item/item:The class GUF\_FeedbackItem that follows the UML model in Figure 3 and Figure 4 with the properties specified in Table 6, and other tables referenced in Table 6, *shall* be used when describing feedback items relating to geospatial resources.Dependency: /req/quality-common |
| **Test method:** | Validate the requirements of feedback itemsTest passes if feedback item instances point to the GUF\_FeedbackItem data type and follow the data model specified in Table 6 and its dependencies. |

Conformance class: Feedback-summary

The OGC URI identifier of this conformance class is:

http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/feedback-summary

Tests identifiers below are relative to http://www.opengis.net/spec/geospatial-user-feedback/1.0

* + 1. Feedback summary

|  |  |
| --- | --- |
| **Test id:** | **/conf/feedback-summary/summary-model** |
| **Test Purpose:** | **Req 4** /req/feedback-summary/summary-model:The class UFS\_FeedbackSummary that follows the UML model in Figure 5 with the properties specified in Table 21 *shall* be used when a grouping of feedback items is needed.Dependency: /req/feedback-item |
| **Test method:** | Validate the requirements of feedback summaryTest passes if feedback summary instances point to the UFS\_FeedbackSummary data type and follow the data model specified in Table 21 and its dependencies. |

Conformance class: Feedback-collection

The OGC URI identifier of this conformance class is:

http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/feedback-collection

Tests identifiers below are relative to http://www.opengis.net/spec/geospatial-user-feedback/1.0

* + 1. Feedback collection response

|  |  |
| --- | --- |
| **Test id:** | **/conf/feedback-collection/response** |
| **Test Purpose:** | **Req 5** /req/feedback-collection/response:The class UFC\_FeedbackResponse that follows the UML model in Figure 6 with the properties specified in Table 28 *shall* be used when a grouping of feedback items is needed as a response to a feedback catalogue request.Dependencies: /req/feedback-summary/ |
| **Test method:** | Validate the requirements of feedback collection responsesTest passes if feedback collection response instances point to the UFC\_FeedbackResponse data type and follow the data model specified in Table 28 and its dependencies. |

* + 1. Feedback collection

|  |  |
| --- | --- |
| **Test id:** | **/conf/feedback-collection/collection** |
| **Test Purpose:** | **Req 6** /req/feedback-collection/collection:The class UFC\_FeedbackCollection that follows the UML model in Figure 6 with the properties specified in Table 29 shall be used when a grouping of feedback items is needed.Dependencies: /req/feedback-summary/ |
| **Test method:** | Validate the requirements of feedback collectionsTest passes if feedback collection instances point to the UFC\_FeedbackCollection data type and follow the data model specified in Table 29 and its dependencies. |

* + 1. Feedback collection response pagination

|  |  |
| --- | --- |
| **Test id:** | **/conf/feedback-collection/pagination** |
| **Test Purpose:** | **Req 7** /req/feedback-collection/pagination:The class UFC\_ResponsePagination that follows the UML model in Figure 6 with the properties specified in Table 30 *shall* be used when pagination of a catalogue response is needed.Dependencies: /req/feedback-summary/ |
| **Test method:** | Validate the requirements of feedback collection responses with paginationTest passes if feedback collection response instances that were requested with a pagination mechanism point to the UFC\_ResponsePagination data type and follow the data model specified in Table 30. |

Annex B: Revision history

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date | Release | Author | Paragraph modified | Description |
| 2015-06-13 | 0.1 | Joan Maso | All | First version |
| 2015-08.25 | 0.2 | Lucy Bastin | All | Careful revision |
| 2015-08-31 | 0.3 | Simon Thum | All | Provided input and minor edits |

Bibliography

ISO: ISO 24619:2011 Language resource management -- Persistent identification and sustainable access (2011)

ISO: ISO 9000:2005 Quality management systems -- Fundamentals and vocabulary (2005)

1. http://schemas.geoviqua.org [↑](#footnote-ref-1)
2. [www.opengeospatial.org/cite](http://www.opengeospatial.org/cite) [↑](#footnote-ref-2)