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OGC Geospatial User Feedback Standard: XML Encoding Extension

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Contents

1. Scope.....	6
2. Conformance.....	7
3. References.....	8
4. Terms and Definitions.....	8
5. Conventions	9
5.1 Namespace prefix conventions	9
6. Geospatial User Feedback XML encoding.....	9
7. Geospatial User feedback model: Core.....	10
7.1 Requirements Class Quality Common.....	10
7.2 Requirements Class User Feedback Item	12
8. Geospatial User feedback model: Extensions.....	16
8.1 Requirements Class User Feedback Summary Extension	16
8.2 Requirements Class User Feedback Collection Extension	17
Annex A: Conformance Class Abstract Test Suite (Normative).....	24
A.1 Conformance class: Quality Common	24
A.2 Conformance class: User Feedback-item.....	26
A.3 Conformance class: Feedback-summary	26
A.4 Conformance class: Feedback-collection	27
Annex B: XML Schema Documents	28
Annex C: Revision history.....	29
Bibliography	30

Tables

Table 1 – Namespace mappings	9
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i. Abstract

The Geospatial User Feedback XML encoding standard is based on the OGC Geospatial User Feedback conceptual model [OGC 15-097]. Geospatial User Feedback (GUF) is metadata that is predominantly produced by the consumers of geospatial data products based on their use and experience with those products. This standard complements the 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 internally reuses some elements of ISO 19115-1 (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 can be used in combination with the OGC 15-097 Conceptual Model Standard. In the future, other encodings may be considered, being an alternative using the JSON-LD encoding based on parts of schema.org.

ii. Keywords

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

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

iii. 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 Model¹ 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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¹ <http://schemas.geoviqua.org>

aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.

iv. Submitting organizations

The following organizations submitted this Document to the Open Geospatial Consortium Inc.

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52 North

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1. Scope

This OGC® standard defines an XML encoding for encoding user feedback about geospatial datasets or metadata records describing datasets. This standard reuses and extends the ISO 19115-1:2014 model and follows the ISO 19139 encoding rules. The XML encoding is based on the Geospatial User Feedback Conceptual Model Standard [OGC 15-097].

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. With this standard, the metadata responses can also provide user feedback summaries and detailed user feedback reports. Clients using this standard can provide a user interface to support provision of additional comments or inquiries

about datasets or to complement the producer metadata by presenting additional user feedback information about the data.

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 does not define any query language to request or send user feedback to/from metadata catalogues.

2. Conformance

This standard defines 4 conformance classes.

Requirements for some standardization targets types are considered:

- Requirement Quality Common: [<http://www.opengis.net/spec/geospatial-user-feedback-xml/1.0/req/quality-common>] has a single conformance class, Quality Common: [<http://www.opengis.net/spec/geospatial-user-feedback-xml/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-xml/1.0/req/feedback-item>] has a single pertaining conformance class, Feedback-item [<http://www.opengis.net/spec/geospatial-user-feedback-xml/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-xml/1.0/req/feedback-summary>] has a single conformance class, Feedback-summary:, [<http://www.opengis.net/spec/geospatial-user-feedback-xml/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-xml/1.0/req/feedback-collection>] has a single pertaining conformance class, Feedback-collection, [<http://www.opengis.net/spec/geospatial-user-feedback-xml/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 site².

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

3. 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 / TC 211: ISO 19115-1:2014 Geographic information -- Metadata -- Part 1: Fundamentals (2014)

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

ISO / TC 211: ISO 19139:2007 Geographic information -- Metadata -- XML schema implementation (2007)

ISO / TC 211: ISO 19115-3: Geographic information -- Metadata -- Part 3: XML schemas (2016)

OGC: OGC 15-097 Geospatial User Feedback Standard. Conceptual Model (2016)

The following candidate Standard is still under development in ISO / TC 211 and is referenced herein.

ISO / TC 211: ISO 19157-2 Geographic information -- Data quality-- Part 2: XML schemas (under development)

4. 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.

This document uses the Terms and Definition provided by the OGC 15-097 Geospatial UserFeedback Conceptual Model standard. No additional terms and definitions apply.

² www.opengeospatial.org/cite

5. Conventions

5.1 Namespace prefix conventions

The following namespaces are used in this document. The prefix abbreviations used constitute conventions used here, but are **not** normative. The namespaces to which the prefixes refer to are normative.

Table 1 – Namespace mappings

Prefix	Namespace URI	Description
xsd	http://www.w3.org/2001/XMLSchema	XML Schema namespace
gco	http://standards.iso.org/iso/19115/-3/gco/1.0	ISO 19115 Common classes
mcc	http://standards.iso.org/iso/19115/-3/mcc/1.0	ISO 19115-1 Common classes
mri	http://standards.iso.org/iso/19115/-3/mri/1.0	ISO 19115-1 Identification
mrl	http://standards.iso.org/iso/19115/-3/mrl/1.0	ISO 19115-1 Lineage
gex	http://standards.iso.org/iso/19115/-3/gex/1.0	ISO 19115-1 Extent
cit	http://standards.iso.org/iso/19115/-3/cit/1.0	ISO 19115-1 Citation
mdq	http://standards.iso.org/iso/19157/-2/mdq/1.0	ISO 19157 Quality
lan	http://standards.iso.org/iso/19115/-3/lan/1.0	ISO 19115-3 Language
qcm	http://www.opengis.net/guf/1.0/common	Quality common
guf	http://www.opengis.net/guf/1.0/core	User feedback core
ufc	http://www.opengis.net/guf/1.0/collection	User feedback collection
ufs	http://www.opengis.net/guf/1.0/summary	User feedback summary

6. Geospatial User Feedback XML encoding

The encoding rules for creating a XML encoding from a UML model documented in ISO 19139 were used to elaborate the XML schemas described here. These encoding rules are coded in the ShapeChange application. ShapeChange was used to automatically transform the UML model from the OGC 15-097 Geospatial User Feedback Conceptual Model into the XML schemas that are complementing this standard. Since the conversion is automatic, this document will not provide tables describing the semantics of each element and the reader should refer to the conceptual model for details.

This encoding is intended for applications where the use of producer's metadata encoded in 19115-1:2014 is common. In this way we pave the way for extending the current ISO19115-1:2014 metadata editors and catalogues to support this model. This encoding also aims for an easy integration of the producer metadata and the user feedback in client applications.

7. Geospatial User feedback model: Core

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

7.1 Requirements Class Quality Common

This requirements class defines the XML encoding for data model classes that are common to, and useful for, both quality metadata generated by producers and user feedback metadata. For this reason they are kept in a separate conformance class. In essence, this conformance class represents the foundations for building a user feedback model. This requirements class inherits all the necessary elements from 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).

Req 1 /req/quality-common/mime-type:

An XML encoding of a geospatial user feedback shall adopt the XML MIME type of application/xml

Req 2 /req/quality-common/file-extension:

An XML encoding of a geospatial user feedback shall use the file extension '.xml'

Req 3 /req/quality-common/xmlrules:

An XML encoding of a geospatial user feedback shall comply with the encoding rules specified in ISO-19139.

Dependencies: ISO 19139

Req 4 /req/quality-common/iso-schema:

An XML encoding of a geospatial user feedback shall validate using the schemas ISO19115-3 and ISO19157-2 provided at: <http://standards.iso.org/iso/19115/-3> and <http://standards.iso.org/iso/19157/-2> respectively

Dependencies: ISO 19115-3 and ISO 19157-2

Req 5 /req/quality-common/qcm-schema:

An XML encoding of a geospatial user feedback using QCM_Publication or QCM_DiscoveredIssue shall validate using the quality common schema qcm.xsd

Dependencies: <http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/quality-common>

The qcm.xsd schema has been derived automatically from the OGC 15-097 UML model. No tables describing the naming of the elements and subelements are reproduced here as they are specified in the conceptual model.

The following code shows a xml encoding example for QCM_Publication.

```
<QCM_Publication
  xmlns:cit="http://standards.iso.org/iso/19115/-3/cit/1.0"
  xmlns:gco="http://standards.iso.org/iso/19115/-3/gco/1.0"
  xmlns="http://www.opengis.net/guf/1.0/common"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.opengis.net/guf/1.0/common
../qcm.xsd">
  <cit:title>
    <gco:CharacterString>Exploiting synergies of global land cover
products for carbon cycle modeling</gco:CharacterString>
  </cit:title>
  <cit:date>
    <cit:CI_Date>
      <cit:date>
        <gco:DateTime>2006-01-01T00:00:00Z</gco:DateTime>
      </cit:date>
      <cit:dateType>
        <cit:CI_DateTypeCode
codeList="http://wis.wmo.int/2008/catalogues/draft_version_1-
1/WMO_Codelists_ver1_1.xml#CI_DateTypeCode" codeListValue="creation"/>
        </cit:dateType>
      </cit:CI_Date>
    </cit:date>
    <cit:series>
      <cit:CI_Series>
        <cit:name>
          <gco:CharacterString>Remote Sensing of
Environment</gco:CharacterString>
        </cit:name>
      </cit:CI_Series>
    </cit:series>
    <cit:otherCitationDetails>
      <gco:CharacterString>101 (2006) 534-553</gco:CharacterString>
    </cit:otherCitationDetails>
    <motivation><QCM_CitationMotivationCode codeListValue="describe"
codeList="http://www.opengis.net/guf/1.0/resources/codeList.xml#QCM_Pub
licationCategoryCode"></QCM_CitationMotivationCode></motivation>
    <category><QCM_PublicationCategoryCode codeListValue="journalArticle"
codeList="http://www.opengis.net/guf/1.0/resources/codeList.xml#QCM_Pub
licationCategoryCode"></QCM_PublicationCategoryCode></category>
</QCM_Publication>
```

The following code shows a xml encoding example for QCM_DiscoveredIssue.

```
<QCM_DiscoveredIssue
  xmlns:gco="http://standards.iso.org/iso/19115/-3/gco/1.0"
  xmlns="http://www.opengis.net/guf/1.0/common"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```

        xsi:schemaLocation="http://www.opengis.net/guf/1.0/common
../qcm.xsd">
    <knownProblem>
        <gco:CharacterString>These maps cannot be used for land cover
change detection since the error in the original map is higher than the
change detected (e.g. GLC-2000 versus GlobCover). Due to the large
disagreements between these land cover products, we recommend that
the user community does not, by default, use the latest product with
the highest resolution, but carefully examines the sensitivity of these
products within a specific application..</gco:CharacterString>
    </knownProblem>
    <workAround>
        <gco:CharacterString> In the situation where the maps are used for
national and regional applications, we would recommend examining the
disagreement of the products in the areas of interest and also to
compare them with high resolution ground data or aerial photography.
One way to do this would be to use geo-wiki.org (Fritz et al 2009), a
global land cover validation tool, which can be used to visualize
the global land cover products and the disagreement directly on top
of Google Earth. By exploring the discrepancies at the level of an
individual country in combination with local knowledge, the user can
gain insight into which product is better in a specific region and which
product is better suited for a particular application. Crowd-sourced
data in the form of geo-tagged photos and information collected
through Web 2.0 applications like geo-wiki and smart phones could
also be harnessed as a rich source of training and calibration
data for global land cover algorithms. </gco:CharacterString>
    </workAround>
</QCM_DiscoveredIssue>

```

7.2 Requirements Class User Feedback Item

This requirements class defines the data model classes that are involved in the definition of an individual user feedback item. The GUF model makes an effort to remain as simple as possible but comprehensive enough 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. Geospatial User Every item is set into a context by a combination of target, citations and scope. Feedback can be provided both about data or metadata.

Req 6 /req/feedback-item/guf-schema:

An XML encoding of a geospatial user feedback item shall use GUF_FeedbackItem and shall validate using the geospatial user feedback item schema guf.xsd

Dependencies: /req/quality-common

<http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-item>

The guf.xsd schema has been derived automatically from the OGC 15-097 UML model. No tables describing the naming of the elements and subelements are reproduced here as they are specified in the conceptual model.

The following code shows a xml encoding example for GUF_FeedbackItem.

```

<GUF_FeedbackItem
  xmlns:mcc="http://standards.iso.org/iso/19115/-3/mcc/1.0"
  xmlns:mdq="http://standards.iso.org/iso/19157/-2/mdq/1.0"
  xmlns:mri="http://standards.iso.org/iso/19115/-3/mri/1.0"
  xmlns:cit="http://standards.iso.org/iso/19115/-3/cit/1.0"
  xmlns:gco="http://standards.iso.org/iso/19115/-3/gco/1.0"
  xmlns:gcm="http://www.opengis.net/guf/1.0/common"
  xmlns="http://www.opengis.net/guf/1.0/core"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xsi:schemaLocation="http://www.opengis.net/guf/1.0/core
  ../guf.xsd">
  <itemIdentifier>
    <mcc:MD_Identifier>
      <mcc:code>

      <gco:CharacterString>GCL2000_feedack_item_1</gco:CharacterString>
    </mcc:code>
    </mcc:MD_Identifier>
  </itemIdentifier>
  <abstract>
    <gco:CharacterString>Comparson with other land cover products is
difficults because legends are not compatible</gco:CharacterString>
  </abstract>
  <contactRole>
    <GUF_UserRoleCode codeListValue="researchEndUser"
codeList="">researchEndUser</GUF_UserRoleCode>
  </contactRole>
  <dateInfo>
    <cit:CI_Date>
      <cit:date><gco:DateTime>2006-03-
01T00:00:00Z</gco:DateTime></cit:date>
      <cit:dateType>
        <cit:CI_DateTypeCode
codeList="http://wis.wmo.int/2008/catalogues/draft_version_1-
1/WMO_Codelists_ver1_1.xml#CI_DateTypeCode" codeListValue="creation"/>
      </cit:dateType>
    </cit:CI_Date>
  </dateInfo>
  <citation>
    <cit:CI_Citation>
      <cit:title>
        <gco:CharacterString>Towards the global monitoring of
biodiversity change</gco:CharacterString>
      </cit:title>
      <cit:date>
        <cit:CI_Date>
          <cit:date>
            <gco:DateTime>2006-03-01T00:00:00Z</gco:DateTime>
          </cit:date>
        </cit:CI_Date>
      </cit:date>
    </cit:CI_Citation>
  </citation>

```

```

        <cit:dateType>
            <cit:CI_DateTypeCode
codeList="http://wis.wmo.int/2008/catalogues/draft_version_1-
1/WMO_Codelists_ver1_1.xml#CI_DateTypeCode" codeListValue="creation"/>
            </cit:dateType>
        </cit:CI_Date>
    </cit:date>
    <cit:series>
        <cit:CI_Series>
            <cit:name>
                <gco:CharacterString>TRENDS in Ecology and
Evolution</gco:CharacterString>
            </cit:name>
        </cit:CI_Series>
    </cit:series>
    <cit:otherCitationDetails>
        <gco:CharacterString>Vol.21 No.3</gco:CharacterString>
    </cit:otherCitationDetails>
</cit:CI_Citation>
</citation>
<contact>
    <GUF_UserInformation>
        <userDetails>
            <cit:CI_Responsibility>
                <cit:role>
                    <cit:CI_RoleCode
codeList="http://wis.wmo.int/2008/catalogues/draft_version_1-
1/WMO_Codelists_ver1_1.xml#CI_RoleCode" codeListValue="user"/>
                </cit:role>
            <cit:party>
                <cit:CI_Individual>
                    <cit:name>
                        <gco:CharacterString>Henrique M.
Pereira</gco:CharacterString>
                    </cit:name>
                </cit:CI_Individual>
            </cit:party>
        </cit:CI_Responsibility>
    </userDetails>
    <expertiseLevel>
        <GUF_RatingCode codeListValue="5"
codeList="http://www.opengis.net/guf/1.0/resources/codeList.xml#GUF_Rat
ingCode"></GUF_RatingCode>
    </expertiseLevel>
</GUF_UserInformation>
</contact>
<userComment>
    <GUF_UserComment>
        <comment>
            <gco:CharacterString>Surprisingly, there are no directly
comparable sets of global land-cover data for two different
dates. For instance, the Global Land Cover for the year 2000 (GLC 2000)
based on SPOT VEGETATION (http://www-gvm.jrc.it/glc2000) is not
directly comparable
with the International Geosphere-Biosphere Programme (IGBP) Land Cover
(1992-1993, http://edcdaac.usgs.gov/glcc/globdoc2\_0.asp) based on
the National Oceanic

```

and Atmospheric Administration Advanced Very High Resolution Radiometer (NOAA-AVHRR). The difficulties arise from the use of different sensors, different land-cover classification systems (including different definitions of forest) and different classification methods. </gco:CharacterString>

```
</comment>
</GUF_UserComment>
</userComment>
<target>
  <GUF_FeedbackTarget>
    <resourceRef xlink:href="http://www-gvm.jrc.it/glc2000">
      <cit:CI_Citation>
        <cit:title></cit:title>
        <cit:identifier>
          <mcc:MD_Identifier>
            <mcc:code>
              <gco:CharacterString>GLC2000</gco:CharacterString>
            </mcc:code>
            <mcc:codeSpace>

<gco:CharacterString>jrc.ec.europa.eu</gco:CharacterString>
          </mcc:codeSpace>
          </mcc:MD_Identifier>
        </cit:identifier>
      </cit:CI_Citation>
    </resourceRef>
    <scope>
      <mcc:MD_Scope>
        <mcc:level>
          <mcc:MD_ScopeCode codeListValue="dataset"
codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/cod
eLists.xml#MD_ScopeCode"/>
        </mcc:level>
      </mcc:MD_Scope>
    </scope>
    <role>
      <GUF_TargetRoleCode codeListValue="primary"
codeList="http://www.opengis.net/guf/1.0/resources/codeList.xml#GUF_Tar
getRoleCode"></GUF_TargetRoleCode>
    </role>
  </GUF_FeedbackTarget>
</target>
<target>
  <GUF_FeedbackTarget>
    <resourceRef
xlink:href="http://edcdaac.usgs.gov/glcc/globdoc2_0.asp"/>
    <scope>
      <mcc:MD_Scope>
        <mcc:level>
          <mcc:MD_ScopeCode codeListValue="dataset"
codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/cod
eLists.xml#MD_ScopeCode"/>
        </mcc:level>
      </mcc:MD_Scope>
    </scope>
    <role>
```

```

        <GUF_TargetRoleCode codeListValue="primary"
codeList="http://www.opengis.net/guf/1.0/resources/codeList.xml#GUF_Tar
getRoleCode"></GUF_TargetRoleCode>
    </role>
</GUF_FeedbackTarget>
</target>
</GUF_FeedbackItem>

```

8. Geospatial User feedback model: Extensions

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

8.1 Requirements Class User Feedback Summary Extension

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

Req 7 /req/feedback-summary/ufs-schema:

An XML Encoding of a geospatial user feedback summary shall use UFS_FeedbackSummary and shall validate using the geospatial user feedback summary schema ufs.xsd

Dependencies: /req/feedback-item

<http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-summary>

The ufs.xsd schema has been derived automatically from the OGC 15-097 UML model. No tables describing the naming of the elements and subelements are reproduced here as they are specified in the conceptual model.

The following code shows a xml encoding example for UFS_FeedbackSummary.

```

<UFS_FeedbackSummary
  xmlns:mcc="http://standards.iso.org/iso/19115/-3/mcc/1.0"
  xmlns:mri="http://standards.iso.org/iso/19115/-3/mri/1.0"
  xmlns:cit="http://standards.iso.org/iso/19115/-3/cit/1.0"
  xmlns:gco="http://standards.iso.org/iso/19115/-3/gco/1.0"
  xmlns:guf="http://www.opengis.net/guf/1.0/core"
  xmlns="http://www.opengis.net/guf/1.0/summary"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xsi:schemaLocation="http://www.opengis.net/guf/1.0/summary
  ../ufs.xsd">
  <target>
    <cit:CI_Citation>
      <cit:title></cit:title>
      <cit:identifier>
        <mcc:MD_Identifier>
          <mcc:code>
            <gco:CharacterString>GLC2000</gco:CharacterString>
          </mcc:code>
          <mcc:codeSpace>

```



```

    <gco:CharacterString>jrc.ec.europa.eu</gco:CharacterString>
      </mcc:codeSpace>
      </mcc:MD_Identifier>
      </cit:identifier>
      </cit:CI_Citation>
    </target>
    <numberOfFeedbackItems><gco:Integer>4</gco:Integer></numberOfFeedback
Items>
    <minimumPossibleRating><gco:Real>1.0</gco:Real></minimumPossibleRatin
g>
    <maximumPossibleRating><gco:Real>5.0</gco:Real></maximumPossibleRatin
g>
    <averageRating><gco:Real>5.0</gco:Real></averageRating>
    <numberOfRatings><gco:Integer>0</gco:Integer></numberOfRatings>
    <numberOfUserComments><gco:Integer>3</gco:Integer></numberOfUserComme
nts>
    <numberOfUsageReports><gco:Integer>2</gco:Integer></numberOfUsageRepo
rts>
    <numberOfCitations><gco:Integer>4</gco:Integer></numberOfCitations>
    <numberOfAdditionalQualities><gco:Integer>3</gco:Integer></numberOfAd
ditionalQualities>
    <numberOfAdditionalLineages><gco:Integer>0</gco:Integer></numberOfAdd
itionalLineages>
    <numberOfSignificantEvents><gco:Integer>0</gco:Integer></numberOfSign
ificantEvents>
  </UFS_FeedbackSummary>

```

8.2 Requirements Class User Feedback Collection Extension

This requirements class defines the XML encoding 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.

Req 8 /req/feedback-collection/ufc-schema:

An XML Encoding of a geospatial user feedback collection shall use UFC_FeedbackCollection and shall validate using the geospatial user feedback collection schema ufc.xsd

Dependencies: /req/feedback-collection

<http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-collection>

The ufc.xsd schema has been derived automatically from the OGC 15-097 UML model. No tables describing the naming of the elements and subelements are reproduced here as they are specified in the conceptual model.

The following code shows a xml encoding example for UFC_FeedbackCollection.

```

<?xml version="1.0" encoding="UTF-8"?>
<UFC_FeedbackCollection
  xmlns:mcc="http://standards.iso.org/iso/19115/-3/mcc/1.0"
  xmlns:mdq="http://standards.iso.org/iso/19157/-2/mdq/1.0"
  xmlns:mri="http://standards.iso.org/iso/19115/-3/mri/1.0"
  xmlns:cit="http://standards.iso.org/iso/19115/-3/cit/1.0"
  xmlns:gco="http://standards.iso.org/iso/19115/-3/gco/1.0"
  xmlns:qcm="http://www.opengis.net/guf/1.0/common"
  xmlns:guf="http://www.opengis.net/guf/1.0/core"
  xmlns="http://www.opengis.net/guf/1.0/collection"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xsi:schemaLocation="http://www.opengis.net/guf/1.0/collection
  ../ufc.xsd">
  <item>
    <guf:GUF_FeedbackItem>
      <guf:itemIdentifier>
        <mcc:MD_Identifier>
          <mcc:code>

          <gco:CharacterString>GCL2000_feedack_item_2</gco:CharacterString>
        </mcc:code>
        </mcc:MD_Identifier>
      </guf:itemIdentifier>
      <guf:abstract>
        <gco:CharacterString>Comparing several global land cover
        products, i.e. the Global Land Cover Characterization Database (GLCC),
        Global Land Cover 2000 (GLC2000), and the MODIS land cover product,
        reveal individual strengths and weaknesses of mapping
        approaches.</gco:CharacterString>
      </guf:abstract>
      <guf:contactRole>
        <guf:GUF_UserRoleCode codeListValue="researchEndUser"
        codeList="">researchEndUser</guf:GUF_UserRoleCode>
      </guf:contactRole>
      <guf:dateInfo>
        <cit:CI_Date>
          <cit:date>
            <gco:DateTime>2006-01-01T00:00:00Z</gco:DateTime>

            </cit:date>
            <cit:dateType>
              <cit:CI_DateTypeCode
              codeList="http://wis.wmo.int/2008/catalogues/draft_version_1-
              1/WMO_Codelists_ver1_1.xml#CI_DateTypeCode" codeListValue="creation"/>
            </cit:dateType>
          </cit:CI_Date>
        </guf:dateInfo>
        <guf:citation>
          <cit:CI_Citation>
            <cit:title>
              <gco:CharacterString>Exploiting synergies of global land
              cover products for carbon cycle modeling</gco:CharacterString>
            </cit:title>
            <cit:date>
              <cit:CI_Date>
                <cit:date>

```

```

        <gco:DateTime>2006-01-01T00:00:00Z</gco:DateTime>
    </cit:date>
    <cit:dateType>
        <cit:CI_DateTypeCode
codeList="http://wis.wmo.int/2008/catalogues/draft_version_1-
1/WMO_Codelists_ver1_1.xml#CI_DateTypeCode" codeListValue="creation"/>
    </cit:dateType>
</cit:CI_Date>
</cit:date>
<cit:series>
    <cit:CI_Series>
        <cit:name>
            <gco:CharacterString>Remote Sensing of
Environment</gco:CharacterString>
        </cit:name>
    </cit:CI_Series>
</cit:series>
    <cit:otherCitationDetails>
        <gco:CharacterString>101 (2006) 534-
553</gco:CharacterString>
    </cit:otherCitationDetails>
</cit:CI_Citation>
</guf:citation>
<guf:additionalQuality>
    <mdq:DQ_DataQuality><mdq:scope><mcc:MD_Scope>
        <mcc:level><mcc:MD_ScopeCode
codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/cod
eLists.xml#MD_ScopeCode" codeListValue="dataset"/></mcc:level>
    </mcc:MD_Scope></mdq:scope>
    <mdq:report><mdq:DQ_DomainConsistency>
        <mdq:result>
            <mdq:DQ_DescriptiveResult>
                <mdq:statement><gco:CharacterString>14% of the area of
the GLCC, GLC2000, and MODIS land cover maps, reclassified to the
SIMPLE legend disagree in the all three land cover maps. Areas where
all maps disagree or only two maps agree seem to be associated with
mainly transitional ecozones with mixtures of the three main components
trees, shrubs and grasses such as tropical savannas including the
Sahel, Mediterranean Europe, and
tundra.</gco:CharacterString></mdq:statement>
            </mdq:DQ_DescriptiveResult>
        </mdq:result>
    </mdq:DQ_DomainConsistency></mdq:report>
</mdq:DQ_DataQuality>
</guf:additionalQuality>
<guf:usage>
    <guf:GUF_UsageReport>
        <guf:usageDescription>
            <mri:MD_Usage>
                <mri:specificUsage><gco:CharacterString>GLCC, GLC2000
and MODIS land cover products
comparison</gco:CharacterString></mri:specificUsage>
            </mri:MD_Usage>
        </guf:usageDescription>
        <guf:discoveredIssue>
            <qcm:QCM_DiscoveredIssue>
                <qcm:knownProblem>

```

<gco:CharacterString>None of legends of all three global land cover products are easily translated into the land cover classes of vegetation models without introducing uncertainty due to poor definition of mixed classes or a lack of information about leaf type and phenology.</gco:CharacterString>

</qcm:knownProblem>
</qcm:QCM_DiscoveredIssue>
</guf:discoveredIssue>
</guf:GUF_UsageReport>
</guf:usage>
<guf:contact>
<guf:GUF_UserInformation>
<guf:userDetails>
<cit:CI_Responsibility>
<cit:role>
<cit:CI_RoleCode
codeList="http://wis.wmo.int/2008/catalogues/draft_version_1-1/WMO_Codelists_ver1_1.xml#CI_RoleCode" codeListValue="user"/>
</cit:role>
<cit:party>
<cit:CI_Individual>
<cit:name>
<gco:CharacterString>Martin
Jung</gco:CharacterString>
</cit:name>
</cit:CI_Individual>
</cit:party>
</cit:CI_Responsibility>
</guf:userDetails>
<guf:expertiseLevel>
<guf:GUF_RatingCode codeListValue="5"
codeList="http://www.opengis.net/guf/1.0/resources/codeList.xml#GUF_RatingCode"></guf:GUF_RatingCode>
</guf:expertiseLevel>
</guf:GUF_UserInformation>
</guf:contact>
<guf:userComment>
<guf:GUF_UserComment>
<guf:comment>

<gco:CharacterString> GLCC is based on poorly or uncorrected raw data, using only monthly NDVI composites that also have some geometric problems. The VEGA data set of GLC2000 with daily composites of calibrated spectral bands and NDVI offers significantly improved data and more flexibility for classification. A further advantage of the VEGA2000 is the effective geometric correction procedures (Bartholomé & Belward, 2005). The input data sets of the MODIS product supersede GLCC and GLC2000 in terms of the spectral properties of the MODIS instrument, specifically designed for land surface mapping. Also, the MODIS data are based on higher spatial resolution of the raw data (250m/500m) and comprehensive strategies of data correction and calibration. Regarding the applied classification methods, MLCCA (MODIS land cover classification algorithm) clearly seems the most sophisticated algorithm. In contrast to GLCC and GLC2000, it is purely objective, reproducible and operational for the

whole globe, thus seems most suitable for change detection. GLCC offers the most flexibility for users in terms of available reclassifications including the Olsen classification with 94 classes. MODIS is also available in different legends, which is not the case for GLC2000. LCCS of GLC2000 is the most advanced and flexible classification system with a clear rationale and standardized definition of the classes. Although GLC2000 benefits strongly from the use of LCCS and its regional bottom-up approach, its global map lacks some internal consistency associated with the individual mapping initiatives by different project participants.

```

    </guf:comment>
  </guf:GUF_UserComment>
</guf:userComment>
<guf:target>
  <guf:GUF_FeedbackTarget>
    <guf:resourceRef xlink:href="http://www-gvm.jrc.it/glc2000">
      <cit:CI_Citation>
        <cit:title></cit:title>
        <cit:identifier>
          <mcc:MD_Identifier>
            <mcc:code>

<gco:CharacterString>GLC2000</gco:CharacterString>
          </mcc:code>
          <mcc:codeSpace>

<gco:CharacterString>jrc.ec.europa.eu</gco:CharacterString>
          </mcc:codeSpace>
          </mcc:MD_Identifier>
        </cit:identifier>
      </cit:CI_Citation>
    </guf:resourceRef>
    <guf:scope>
      <mcc:MD_Scope>
        <mcc:level>
          <mcc:MD_ScopeCode codeListValue="dataset"
codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/cod
eLists.xml#MD_ScopeCode"/>
        </mcc:level>
      </mcc:MD_Scope>
    </guf:scope>
    <guf:role>
      <guf:GUF_TargetRoleCode codeListValue="primary"
codeList="http://www.opengis.net/guf/1.0/resources/codeList.xml#GUF_Tar
getRoleCode"></guf:GUF_TargetRoleCode>
    </guf:role>
  </guf:GUF_FeedbackTarget>
</guf:target>
<guf:target>
  <guf:GUF_FeedbackTarget>
    <guf:resourceRef
xlink:href="http://edcdaac.usgs.gov/glcc/globdoc2_0.asp">
      <cit:CI_Citation>
        <cit:title></cit:title>
        <cit:identifier>

```

```

        <mcc:MD_Identifier>
            <mcc:code>
                <gco:CharacterString>Global Land Cover
Characterization DataBase (GLCC)</gco:CharacterString>
            </mcc:code>
        </mcc:MD_Identifier>
    </cit:identifier>
</cit:CI_Citation>
</guf:resourceRef>
<guf:scope>
    <mcc:MD_Scope>
        <mcc:level>
            <mcc:MD_ScopeCode codeListValue="dataset"
codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/cod
eLists.xml#MD_ScopeCode"/>
        </mcc:level>
    </mcc:MD_Scope>
</guf:scope>
<guf:role>
    <guf:GUF_TargetRoleCode codeListValue="primary"
codeList="http://www.opengis.net/guf/1.0/resources/codeList.xml#GUF_Tar
getRoleCode"></guf:GUF_TargetRoleCode>
</guf:role>
</guf:GUF_FeedbackTarget>
</guf:target>
<guf:target>
    <guf:GUF_FeedbackTarget>
        <guf:resourceRef>
            <cit:CI_Citation>
                <cit:title></cit:title>
                <cit:identifier>
                    <mcc:MD_Identifier>
                        <mcc:code>
                            <gco:CharacterString>The MODIS land cover
product</gco:CharacterString>
                        </mcc:code>
                    </mcc:MD_Identifier>
                </cit:identifier>
            </cit:CI_Citation>
        </guf:resourceRef>
        <guf:scope>
            <mcc:MD_Scope>
                <mcc:level>
                    <mcc:MD_ScopeCode codeListValue="dataset"
codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/cod
eLists.xml#MD_ScopeCode"/>
                </mcc:level>
            </mcc:MD_Scope>
        </guf:scope>
        <guf:role>
            <guf:GUF_TargetRoleCode codeListValue="primary"
codeList="http://www.opengis.net/guf/1.0/resources/codeList.xml#GUF_Tar
getRoleCode"></guf:GUF_TargetRoleCode>
            </guf:role>
        </guf:GUF_FeedbackTarget>
    </guf:target>
</guf:GUF_FeedbackItem>

```

```
</item>
<pagination>
  <UFC_ResponsePagination>

    <numberOfFeedbackItems><gco:Integer>1</gco:Integer></numberOfFeedback
Items>
      <count><gco:Integer>1</gco:Integer></count>
    </UFC_ResponsePagination>
  </pagination>
</UFC_FeedbackCollection>
```

Annex A: Conformance Class Abstract Test Suite (Normative)

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

A.1 Conformance class: Quality Common

The OGC URI identifier of this conformance class is:

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

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

A.1.1 MIME type

Test id: **conf/quality-common/mime-type**

Test Purpose: **Req 1** /req/quality-common/mime-type:
An XML encoding of a geospatial user feedback shall adopt the XML MIME type of application/xml

Test method: Validate the MIME type

Test passes if the encoded instances have the associated MIME type application/xml.

A.1.2 File extension

Test id: **/conf/quality-common/file-extension**

Test Purpose: **Req 2** /req/quality-common/file-extension:
An XML encoding of a geospatial user feedback shall use the file extension ‘.xml’

Test method: Validate the file extension

Test passes if a file system is used and the encoded instances are files with ‘.xml’ file extension

A.1.3 ISO XML rules

Test id: **/conf/quality-common/xmlrules**

Test Purpose: **Req 3** /req/quality-common/xmlrules:
An XML encoding of a geospatial user feedback shall comply with the encoding rules specified in ISO-19139.
Dependencies: ISO 19139

Test method: Validate the encoding rules followed

Test passes if the encoded instances follow ISO-19139 conformance classes.

A.1.4 ISO XML schema

Test id: /conf/quality-common/iso-schema

Test Purpose: **Req 4** /req/quality-common/iso-schema:
An XML encoding of a geospatial user feedback shall validate using the schemas ISO19115-3 and ISO19157-2 provided at:
<http://standards.iso.org/iso/19115/-3> and
<http://standards.iso.org/iso/19157/-2> respectively
Dependencies: ISO 19115-3 and ISO 19157-2

Test method: Validate the XML against the right XML schema

Test passes if encoded instances validates under the ISO XML schemas for ISO19115-1 and ISO19157-1 that are provided by ISO19115-3 and ISO19157-2 respectively.

A.1.5 Quality common XML schema

Test id: /conf/ quality-common/qcm-schema

Test Purpose: **Req 5** /req/quality-common/qcm-schema:
An XML encoding of a geospatial user feedback using QCM_Publication or QCM_DiscoveredIssue shall validate using the quality common schema qcm.xsd
Dependencies: <http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/quality-common>

Test method: Validate the XML against the right XML schema

Test passes if XML elements of the data type QCM_Publication and QCM_DiscoveredIssue conform to the
<http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/quality-common> and validate against the quality common schema with the XML namespace <http://www.opengis.net/guf/1.0/common> and encoded

in the qcm.xsd

A.2 Conformance class: User Feedback-item

The OGC URI identifier of this conformance class is:

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

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

A.2.1 Feedback item XML schema

Test id: **`/conf/feedback-item/item`**

Test Purpose: **Req 6** /req/feedback-item/guf-schema:

An XML encoding of a geospatial user feedback item shall use GUF_FeedbackItem and shall validate using the geospatial user feedback item schema `guf.xsd`

Dependencies: /req/quality-common

<http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-item>

Test method: Validate the XML against the right XML schema

Test passes if XML elements of the data type GUF_FeedbackItem conform to the <http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/feedback-item> and validate against the quality common schema with the XML namespace

<http://www.opengis.net/guf/1.0/core> and encoded in the `guf.xsd`

A.3 Conformance class: Feedback-summary

The OGC URI identifier of this conformance class is:

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

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

A.3.1 Feedback summary XML schema

Test id: **`/conf/feedback-summary/summary-model`**

Test Purpose: **Req 7** /req/feedback-summary/ufs-schema:

An XML Encoding of a geospatial user feedback summary shall use UFS_FeedbackSummary and shall validate using the geospatial user

feedback summary schema ufs.xsd
Dependencies: /req/feedback-item
<http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-summary>

Test method: Validate the XML against the right XML schema

Test passes if XML elements of the data type UFS_FeedbackSummary conform to the <http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/feedback-summary> and validate against the quality common schema with the XML namespace <http://www.opengis.net/guf/1.0/summary> and encoded in the ufs.xsd.

A.4 Conformance class: Feedback-collection

The OGC URI identifier of this conformance class is:

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

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

A.4.1 Feedback collection XML schema

Test id: /conf/feedback-collection/response

Test Purpose: **Req 8** /req/feedback-collection/ufc-schema:
An XML Encoding of a geospatial user feedback collection shall use UFC_FeedbackCollection and shall validate using the geospatial user feedback collection schema ufc.xsd
Dependencies: /req/feedback-collection
<http://www.opengis.net/spec/geospatial-user-feedback/1.0/req/feedback-collection>

Test method: Validate the XML against the right XML schema

Test passes if XML elements of the data type UFC_FeedbackCollection conform to the <http://www.opengis.net/spec/geospatial-user-feedback/1.0/conf/feedback-collection> and validate against the quality common schema with the XML namespace <http://www.opengis.net/guf/1.0/collection> and encoded in the ufc.xsd

Annex B: XML Schema Documents

In addition to this document, this standard includes several XML Schema Documents. These XML Schema Documents are available at <http://schemas.opengis.net/guf/1.0>.

These XML Schema Documents and examples combine the XML schema fragments listed in various subclauses of this document, eliminating duplications. These XML Schema Documents match the GUF UML packages described in the OGC 15-097 Geospatial User Feedback Conceptual Model and were derived from them using ShapeChange application, and are named:

- qcm.xsd
- guf.xsd
- ufs.xsd
- ufc.xsd

These XML Schema Documents use and build on the ISO19115-3 and ISO19157-2 XML Schema Documents specified by ISO and that are available at <http://standards.iso.org/iso>, named:

- 19115/-3/mcc/1.0/mcc.xsd
- 19157/-2/mdq/1.0/mdq.xsd
- 19115/-3/gex/1.0/gex.xsd
- 19115/-3/mri/1.0/mri.xsd
- 19115/-3/cit/1.0/cit.xsd
- 19115/-3/gco/1.0/gco.xsd
- 19115/-3/mrl/1.0/mrl.xsd
- 19115/-3/lan/1.0/lan.xsd
- 19115/-3/mdb/1.0/mdb.xsd

All these XML Schema Documents contain documentation of the meaning of each element and attribute, and this documentation shall be considered normative as specified in Subclause 11.6.3 of [OGC 06-121r3].

Annex C: Revision history

Date	Release	Author	Paragraph modified	Description
2016-10-24	1.0	Scott Simmons	Throughout document	Preparation for final publication

Bibliography

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

OGC: OGC 12-093 OWS-9: UML-to-GML-Application-Schema (UGAS) Conversion Engineering Report. Clemens Portele (ed.) (2013)

ShapeChange: Processing application schemas for geographic information. Website: <http://shapechange.net/>