

WMO Core Metadata Profile 1.3, Key Performance Indicators

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Commission for Observation, Infrastructure and Information Systems (INFCOM) [4: <https://community.wmo.int/governance/commission-membership/infcom>]

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Chapter 1. Overview

1.1. Purpose

This document is intended to define Key Performance Indicators (KPIs) in support of the WMO Core Metadata Profile (WCMP). KPIs provide measurable and valuable quality assessment rules over and above the rulesets put forth by WCMP and ISO 19115:2003/19139:2007.

The core driver of WCMP KPIs is continuous improvement and useability of discovery metadata as part of the WMO Information System (WIS). [5: <https://community.wmo.int/activity-areas/wmo-information-system-wis>]

1.2. Scope

This document is bound to the WCMP 1.3 specification and codelists. All other metadata specifications or representations are not in scope.

1.3. Audience

The target stakeholder audiences for this document include (but are not limited to):

- Metadata providers (NCs, DCPCs)
- Metadata consumers (GISCs)
- WMO World Data Centres (WDCs)
- GAW World Data Centres (WDCs)
- WMO WIS Operations and Monitoring
- Metadata implementors (generation, ingest)

1.4. How to use

The KPIs in this document are designed to help metadata providers in the curation of discovery metadata, as well as GISCs to measure the quality of metadata from NCs and DCPCs.

In order to improve quality:

- providers should use the KPIs to build into their metadata generation
- consumers should use the KPIs in order to quality assess discovery metadata and provide subsequent feedback to providers

1.5. Scoring

Each KPI assesses a number of criteria associated with metadata quality, resulting in a raw score, as well as a percentage. This approach supports weighted rubric scoring.

1.6. Reference implementation

The TT-WISMD maintains pywcmp [6: <https://github.com/wmo-im/pywcmp>], as the reference WCMP validation utility which includes:

- validation against WMO Core Metadata Profile 1.3, specifically Part 2, Section 2
- validation against the KPIs described in this document

Documentation on installation, configuration and usage can be found on the pywcmp website.

pywcmp is provided as a resource to the community, under continuous improvement. Contributions are welcome and can be facilitated by the WMO Task Team on WIS Metadata.

1.7. Codelists rules

WMO and ISO codelists currently exist in numerous locations on the Internet. The authoritative code locations that should be used when validating shall be:

- WMO codelists: <https://wis.wmo.int/2012/codelists/WMOCodeLists.xml>
- ISO codelists: <https://standards.iso.org/iso/19139/resources/gmxCodelists.xml>

1.8. Conventions

1.8.1. Symbols and abbreviated terms

Table 1. Symbols and abbreviated terms

Abbreviation	Term
AJAX	Asynchronous JavaScript and XML
CSV	Comma-separated values
DCPC	Data Collection and Production Centres
DOI	Digital Object Identifier
GAW	Global Atmospheric Watch
GISC	Global Information System Centre
GML	Geography Markup Language
GTS	Global Telecommunication System
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
INSPIRE	Infrastructure for Spatial Information in the European Community
ISO	International Organization for Standardization

Abbreviation	Term
MIME	Multipurpose Internet Mail Extensions
NC	National Centre
OGC	Open Geospatial Consortium
pywcmp	WMO implementation of WCMP validation
URL	Uniform Resource Locator
WCMP	WMO Core Metadata Profile
WDC	World Data Centre
WIS	WMO Information System
WMO	World Meteorological Organization
XHR	XMLHttpRequest
XML	eXtensible Markup Language

Chapter 2. 5.9 Key Performance Indicators of WIS Metadata Records

5.9.1 The Key Performance Indicators (KPIs) of WIS metadata records support the evaluation of the WIS catalogue as a tool to discover and access data shared through WIS. For that purpose, they provide measurable rules to assess compliance to WCMP 1.3 and ISO 19115:2003/19139:2007 and evaluate the metadata's quality and effectiveness for discovery purposes. The primary aim of the KPIs is to provide a quantitative assessment of the WIS metadata records to be communicated to the data publisher for appropriate corrective actions resulting in a continuous improvement of the users' discovery experience.

5.9.2 The WIS metadata KPIs are designed to help data publishers in the curation of discovery metadata. They should be computed at different stages of the publication process and by various participants to ensure an effective improvement process and reduce the number of metadata records with poor KPI scoring present in the WIS catalogue. The metadata KPIs should be computed.

1. by the data publisher before providing the metadata to the relevant GISC,
2. by the GISC before inserting the data in the WIS catalogue,
3. by the Secretariat or relevant GISCs to analyze the content of the WIS catalogue and provide a summary and specific indications to the publishers on how to improve the metadata.

5.9.3 GISCs should perform the regular computation of metadata KPIs when new metadata are published and periodically on the entire catalogue. In addition, GISCs should request NCs and DCPCs in the area of responsibility to perform corrective actions to improve the quality of WIS metadata records when KPIs scores indicate doing so.

5.9.4 The WMO Secretariat shall provide, at least twice a year, a WIS metadata KPIs report providing an overview of the quality of the metadata in the available WIS catalogues. GISCs and data publishers will be notified of the publication of the report and requested to address issues concerning low KPI scores.

5.9.5 Tools to compute the WIS metadata KPIs are available at <https://github.com/wmo-im/pywcmp>, they are provided as open-source for the benefit of data publishers and GISCs to encourage the monitoring of compliance and quality at all the metadata publication stages.

5.9.6 Each KPI assesses a number of criteria associated with metadata quality, resulting in a raw score, as well as a percentage. == KPI-1: WCMP 1.3 compliance

2.1. Measurement

Requirements specified in the abstract test suite in *Manual on WIS*, Part C2, 2.1 that provide information about the quality of the metadata content.

2.2. Rational for measurement

This KPI assesses compliance with the requirements of the abstract test suite to ensure that the metadata record is valid, parseable and has base-level information for discovery and access. The metadata record should pass requirement 6.1.1 before further evaluations are performed. A metadata record not passing requirement 6.1.1 should not be accepted in the WIS catalogue.

2.3. Rules

	Rule	Score
Requirement 6.1.1	Each WIS Discovery Metadata record shall validate without error against the XML schemas defined in ISO/TS 19139:2007.	Pass/Fail
Requirement 8.1.1	Each WIS Discovery Metadata record shall include one <code>gmd:MD_Metadata/gmd:fileIdentifier</code> attribute.	1
Requirement 8.2.1	Each WIS Discovery Metadata record shall include at least one keyword from the <code>WMO_CategoryCode</code> code list.	1
Requirement 8.2.2	Keywords from <code>WMO_CategoryCode</code> code list shall be defined as keyword type <code>theme</code> .	1
Requirement 8.2.3	All keywords sourced from a particular keyword thesaurus shall be grouped into a single instance of the <code>gmd:MD_Keywords</code> class.	1
Requirement 8.2.4	Each WIS Discovery Metadata record describing geographic data shall include the description of at least one geographic bounding box defining the spatial extent of the data.	1

	Rule	Score
Requirement 9.1.1	A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the scope of distribution using the keyword GlobalExchange of type dataCenter from thesaurus WMO_DistributionScopeCode .	1
Requirement 9.2.1	A WIS Discovery Metadata record describing data for global exchange via the WIS shall have a gmd:MD_Metadata/gmd:fileIdentifier attribute formatted as follows (where {uid} is a unique identifier derived from the GTS bulletin or file name): urn:x-wmo:md:int.wmo.wis::{uid} .	1
Requirement 9.3.1	A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the WMO Data License as Legal Constraint (type: gmd:otherConstraints) using one and only one term from the WMO_DataLicenseCode code list.	1
Requirement 9.3.2	A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the GTS Priority as Legal Constraint (type: gmd:otherConstraints) using one and only one term from the WMO_GTSPriorityCode code list.	1

Total possible score: 9 (100%)

2.4. Guidance

Use WCMP templates and/or tools to generate the metadata record.

2.4.1. References

- Manual on WIS, Part C2 - Abstract Test Suite, Data Dictionary and Code Lists

2.4.2. XML Examples

2.4.3. XPaths

- /gmd:MD_Metadata/gmd:fileIdentifier
- /gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword
- /gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:type/gmd:MD_KeywordTypeCode
- /gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title
- /gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:geographicElement/gmd:EX_GeographicBoundingBox
- /gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints
- /gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints/gmd:MD_LegalConstraints/gmd:otherConstraints

Chapter 3. KPI-2: Good quality title

3.1. Measurement

The title of the product follows the principles of the WCMP guidance. The length is not too short or too long, contains less than 3 acronyms and is represented in title case. Spelling and grammar are correct.

3.1.1. Rationale for measurement

The title is the first element of metadata information displayed and helps with initial identification. Meaningful and relevant information makes it easier for users to understand the resource.

3.2. Rules

	Rule	Score
2.1	The <code>gmd:title</code> element is not empty in the <code>gmd:CI_Citation</code> class of <code>gmd:MD_DataIdentification</code> .	1
2.2	The title has 3 words or more.	1
2.3	The title has 150 characters or less.	1
2.4	The title only has printable characters (numbers and letters).	1
2.5	Words in the title are represented in "Title Case".	1
2.6	The title contains less than 3 acronyms (words with all upper case).	1
2.7	The title does not contain bulletin header (regular expression: <code>[A-Z]{4}\d{2}[\s_]*[A-Z]{4}</code>).	1
2.8	The title passes a basic spellcheck.	1

Total possible score: 8 (100%)

3.3. Guidance

3.3.1. References

- 5.8.1.1 Product title

3.3.2. XPaths

- `/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation/gmd:CI_Citation/gmd:title`

Chapter 4. KPI-3: Good quality abstract

4.1. Measurement

The length of the content in the abstract element is not too short or too long. The spelling and grammar are correct and does not contain HTML markup. Bulletin templates are not used to populate the abstract.

4.1.1. Rationale

The abstract must facilitate ease of understanding and discovery. The abstract is a critical element of metadata information displayed as part of search results. Complete and meaningful abstract information allows users to understand and properly evaluate a metadata record and its respective resource in support of product access, visualization and exploitation.

4.2. Rules

	Rule	Score
3.1	Abstract has between 16 and 2048 characters.	1
3.2	Abstract does not contain HTML markup.	1
3.3	Abstract passes a basic spellcheck.	1
3.4	Abstract does not contain a bulletin template.	1

Total possible score: 4 (100%)

4.3. Guidance

The abstract should provide a clear and concise statement that enables the reader to understand the content of the product. For guidance when completing the abstract, consider the following recommendations:

- State what the “things” are that are recorded.
- State the key aspects recorded about these things.
- State what form the data takes.
- State any other limiting information, such as time period of validity of the data.
- Add purpose of data resource where relevant (e.g. for survey data).
- Aim to be understood by non-experts.
- Do not include general background information.

- Avoid jargon and unexplained abbreviations.

Further recommendations:

- Avoid adding a scientific abstract.
- Limit information in the abstract to the specific resource that is being described.
- Describe the contents of the resource and the key aspects and/or attributes that are represented.
- Explain briefly what is unique about this resource and, if appropriate, how it differs from similar resources.
- Avoid citing external sources to this resource.
- Avoid spelling out commonly used acronym which are already understood by the general public.
- Spell out uncommon acronyms only once.
- Avoid including HTML/CSV tables, extra spaces or other markup to control display of text. Use simple paragraph(s) only.
- Avoid copying text from a journal article verbatim. This can lead to copyright violation concerns. Additionally, abstracts for journal articles are not intended to describe the provided resource and do not meet the metadata requirements. Related papers can be referenced from and/or tied to the metadata.
- Avoid using future verb tense when possible. Write using present or past tenses.

Spell checking recommendations:

- Dictionary by Merriam-Webster: <https://www.merriam-webster.com>
- Cambridge Dictionary: <https://dictionary.cambridge.org>

4.3.1. References

- 5.8.1.2 Product abstract
- Manual on WIS, Appendix C, 8.2 Provision of information to support discovery within the WIS DAR metadata (WIS discovery metadata) catalogue

4.3.2. XML Examples

4.3.3. XPaths

- `/gmd:MD_Metadata/gmd:identificationInfo//gmd:abstract`

Chapter 5. KPI-4: Temporal information

5.1. Measurement

The temporal extent, frequency of resource updates and status elements are present.

5.1.1. Rationale for measurement

Temporal information is a significant characteristic of WMO data and it is critical for users to know the time periods that are covered by the products, how often new products are available and the status.

5.2. Rules

	Rule	Score
4.1	The <code>gmd:EX_TemporalExtent</code> class is present.	1
4.2	The <code>gml:beginPosition</code> and <code>gml:endPosition</code> elements are present.	1
4.3	The begin date time is less than or equal to the end date time.	1
4.4	The <code>gmd:maintenanceAndUpdateFrequency</code> elements are present.	1
4.5	The <code>gmd:status</code> element is present.	1

Total possible score: 5 (100%)

5.3. Guidance

If it is not relevant or necessary to provide information regarding the product update frequency, `gmd:MD_MaintenanceFrequencyCode` can be set to `asNeeded`:

5.3.1. References

- 5.8.1.5 Temporal extent
- 5.8.1.13 Frequency of resource updates

5.3.2. XML Examples

Example for the product status using the `gmd:MD_ProgressCode` codelist.


```

<gmd:status>
  <gmd:MD_ProgressCode
codeList="https://standards.iso.org/iso/19139/resources/gmxCodeLists.xml#MD_ProgressCo
de" codeSpace="ISOTC211/19115" codeListValue="onGoing">onGoing</gmd:MD_ProgressCode>
</gmd:status>

```

Example for product maintenance with 'asNeeded' code value.

```

<gmd:resourceMaintenance>
  <gmd:MD_MaintenanceInformation>
    <gmd:maintenanceAndUpdateFrequency>
      <gmd:MD_MaintenanceFrequencyCode
codeList="https://standards.iso.org/iso/19139/resources/gmxCodeLists.xml#MD_Maintenanc
eFrequencyCode" codeListValue="asNeeded"/>
    </gmd:maintenanceAndUpdateFrequency>
  </gmd:MD_MaintenanceInformation>
</gmd:resourceMaintenance>

```

5.3.3. XPath

- /gmd:MD_Metadata/gmd:identificationInfo//gmd:temporalElement/gmd:EX_TemporalExtent/gmd:extent
- /gmd:MD_Metadata/gmd:identificationInfo//gmd:temporalElement/gmd:EX_TemporalExtent/gmd:extent//gml:beginPosition
- /gmd:MD_Metadata/gmd:identificationInfo//gmd:temporalElement/gmd:EX_TemporalExtent/gmd:extent//gml:endPosition
- /gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceMaintenance//gmd:maintenanceAndUpdateFrequency
- /gmd:MD_Metadata/gmd:identificationInfo//gmd:status

Chapter 6. KPI-6: Keywords

6.1. Measurement

Keywords are present, grouped by type and referenced to controlled vocabularies or thesauri.

WCMP 1.3 defines other rules for keywords that are not included in this measurement.

6.1.1. Rationale for measurement

Encouraging metadata providers to make use of keywords that are published in controlled vocabularies will ultimately help the end user to search for well-known domain related terms.

Keywords are indexed by search engines to narrow down full text searches, adding to the user experience and making products easier to discover. Keywords can be user-defined or specified from controlled vocabularies.

6.2. Rules

	Rule	Score
6.1	There are one to many <code>gmd:keyword</code> elements present.	1
6.2	The <code>MD_KeywordTypeCodeType</code> is present.	1
6.3	The <code>gmd:title</code> element for the thesaurus name is present.	1
6.4	Keywords and thesaurus names are implemented in the <code>gmx:Anchor</code> element .	1

Total possible score: 4 (100%) (4 for each `gmd:MD_Keywords` class / count of `gmd:MD_Keywords` classes)

6.3. Guidance

Examples of controlled vocabularies:

- [WMO Codes Registry](#)
- [WMO Codelists](#)
- [General Multilingual Environmental Thesaurus \(GEMET\) - INSPIRE Spatial Data Themes](#)
- [Global Change Master Directory \(GCMD\)](#)
- [Climate and Forecast \(CF\) Standard Names](#)
- [Government of Canada Core Subject Thesaurus \(CST\)](#)

6.3.1. References

- 5.8.1.8 Descriptive keywords

6.3.2. XML Examples

The **keyword** value is included in a **gmx:Anchor** element with a resolvable HTTP URL.

```
<gmd:MD_Keywords>
  <gmd:keyword>
    <gmx:Anchor
      xlink:href="http://wis.wmo.int/2012/codelists/WMOCodeLists.xml#WMO_CategoryCode_meteorology">meteorology</gmx:Anchor>
    </gmd:keyword>
  </gmd:MD_Keywords>
```

The **gmd:type** of keyword is given in **MD_KeywordTypeCode** element, the "codelist" indicates URL of the code list.

```
<gmd:type>
  <gmd:MD_KeywordTypeCode
    codelist="https://standards.iso.org/iso/19139/resources/gmxCodeLists.xml#MD_KeywordTypeCode_theme" codelistValue="theme">theme</gmd:MD_KeywordTypeCode>
  </gmd:type>
```

The thesaurus name is included in an **gmx:Anchor** element with a resolvable HTTP URL.

```

<gmd:thesaurusName>
  <gmd:CI_Citation>
    <gmd:title>
      <gmx:Anchor
xlink:href="http://wis.wmo.int/2012/codelists/WMOCodeLists.xml#WMO_CategoryCode">WMO_C
ategoryCode</gmx:Anchor>
    </gmd:title>
    <gmd:date>
      <gmd:CI_Date>
        <gmd:date>
          <gco>Date>2016-05-26</gco>Date>
        </gmd:date>
        <gmd:dateType>
          <gmd:CI_DateTypeCode
codelist="https://standards.iso.org/iso/19139/resources/gmxCodeLists.xml#CI_DateTypeCo
de" codelistValue="revision">revision</gmd:CI_DateTypeCode>
        </gmd:dateType>
      </gmd:CI_Date>
    </gmd:date>
  </gmd:CI_Citation>
</gmd:thesaurusName>

```

6.3.3. XPaths

- `//gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword`
- `//gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:type`
- `//gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:thesaurusName`

Chapter 7. KPI-7: Graphic overview

7.1. Measurement

When the `gmd:graphicOverview` is present it contains a URL to a common web image file type.

7.1.1. Rationale for measurement

Images provide the user with a high-level preview of the product which can assist in a visual assessment in the search results presentation in catalogues.

7.2. Rules

	Rule	Score
7.1	The URL in the <code>gmd:graphicOverview</code> resolves successfully.	1
7.2	The URL in this element is a common web image file type.	1

Total possible score: 2 (100%)

7.3. Guidance

In addition to the presence of the graphic overview image it would also be valuable to provide consistent image dimensions (e.g. 800x800 pixels) such that all images are normalized and scaling/alignment of overview images can be applied consistently by web applications rendering search results.

Examples of catalogues using graphic overview images are here:

- [GISC DWD](#)
- [EUMETSAT Product Navigator](#)

7.3.1. References

- 5.8.1.9 Product sample visualization URL

7.3.2. XML Examples

```
<gmd:graphicOverview>
  <gmd:MD_BrowseGraphic>
    <gmd:fileName>
      <gmx:Anchor
        xlink:href="https://navigator.eumetsat.int/preview/meteosat-
msg_naturalenhncd.jpg">Meteosat MSG Natural Enhanced Color<gmx:Anchor>
    </gmd:fileName>
  </gmd:MD_BrowseGraphic>
</gmd:graphicOverview>
```

7.3.3. XPaths

- `//gmd:identificationInfo/gmd:MD_DataIdentification/gmd:graphicOverview/gmd:MD_BrowseGraphic/gmd:fileName`

Chapter 8. KPI-8: Links health

8.1. Measurement

Links are valid (no 4xx or 5xx HTTP status errors) and are available through the HTTPS protocol.

8.2. Rationale for measurement

Broken links damage the user experience and gives the impression to users that a website is not maintained.

HTTPS is increasingly becoming a requirement for numerous agencies. Metadata records with non-HTTPS links often leads to mixed content errors in web applications deployed via HTTPS. HTTPS supports secure, authoritative and trustworthy links as part of WIS metadata.

8.3. Rules

	Rule	Score
8.1	The link resolves, when it is present in <code>gmd:URL</code> element, <code>gmd:fileName</code> element, <code>xlink:href</code> attribute, or <code>codeList</code> attribute.	1
8.2	Each link is a valid HTTPS URL.	1

Total possible score: (resolved links + valid HTTPS links) / (total links * 2) (100%)

8.4. Guidance

Ensure that all links are up to date in the metadata and are accessible via HTTPS. Don't put URLs in the abstract or other elements that are intended for free text.

For more information about HTTP status errors, visit <https://httpstatuses.com>.

8.4.1. XML Examples

```
<gmd:CI_OnlineResource>
  <gmd:linkage>

  <gmd:URL>https://eumetview.eumetsat.int/mapviewer/?product=EO:EUM:DAT:MSG:SNOW</gmd:URL>
  </gmd:linkage>
</gmd:CI_OnlineResource>
```

```

<gmd:graphicOverview>
  <gmd:MD_BrowseGraphic>
    <gmd:fileName>
      <gco:CharacterString>https://navigator.eumetsat.int/preview/0deg-
snow.jpg</gco:CharacterString>
    </gmd:fileName>
  </gmd:MD_BrowseGraphic>
</gmd:graphicOverview>

```

```

<gmd:code>
  <gmx:Anchor xlink:actuate="onRequest"
xlink:href="https://dx.doi.org/10.14287/100000004"
xlink:title="DOI">doi:10.14287/100000004</gmx:Anchor>
</gmd:code>

```

```

<gmd:dateType>
  <gmd:CI_DateTypeCode
codeList="https://standards.iso.org/iso/19139/resources/gmxCodeLists.xml#CI_DateTypeCo
de" codeListValue="revision" codeSpace="ISOTC211/19115">revision</gmd:CI_DateTypeCode>
</gmd:dateType>

```

8.4.2. XPaths

- `//gmd:URL`
- `//gmd:graphicOverview//gmd:fileName`
- `//gmx:Anchor/@xlink:href`
- `//@codeList`

Chapter 9. KPI-9: Data policy and exchange

9.1. Measurement

This KPI extends ATS requirements 9.1.1, 9.3.1 and 9.3.2 to evaluate data that is not only global exchange.

Distribution URLs are present when the `WMO_DataLicenseCode` code value is `WMOEssential`, keyword section is complete for `WMO_DistributionScopeCode` values and codes are encoded with `gmx:Anchor` elements for resource constraints and keywords.

9.2. Rationale for measurement

Data policy provides information to the users about how the data should be handled. Data providers also have the obligation to define the scope of the distribution of the data within WIS and when applicable the GTS priority.

9.3. Rules

	Rule	Score
9.1	"WMO_DistributionScopeCode" is present in the "gmd:keyword" element and it is associated with the value of "WMO_DistributionScopeCode" in "gmd:thesaurusName//gmd:title" element and "dataCentre" or "dataCenter" in the "gmd:MD_KeywordTypeCode" element.	1
9.2	"WMO_DataLicenseCode" is present in the "gmd:otherConstraints" element in the "gmd:MD_LegalConstraints" class.	1
9.3	The "WMO_GTSProductCategoryCode" is present in the "gmd:otherConstraints" element when the value of "WMO_DistributionScopeCode" is <code>GlobalExchange</code> or <code>RegionalExchange</code> .	1

9.4	One to many distribution links are present when <code>WMO_DataLicenseCode</code> is <code>WMOEssential</code> .	1
9.5	The code value <code>otherRestrictions</code> is present in both the <code>gmd:accessConstraints</code> and <code>gmd:useConstraints</code> elements in the <code>gmd:MD_LegalConstraints</code> class where the <code>WMO_DataLicenseCode</code> and/or <code>WMO_GTSPProductCategoryCode</code> are present.	1
9.6	The <code>WMO_DataLicenseCode</code> , <code>WMO_GTSPProductCategoryCode</code> , <code>WMO_DistributionScopeCode</code> , <code>WMO_DistributionScopeCode</code> code values are implemented in the <code>gmx:Anchor</code> element, instead of the <code>gco:CharacterString</code> element.	1

Total possible score: 6 (100%)

9.4. Guidance

Requirement 9.1.1 tests for the existence of 'GlobalExchange', but `WMO_DistributionScopeCode` should be used to describe any type of metadata record in WIS. To score well in KPI 9.1 use "OriginatingCenter" for all data not published with 'GlobalExchange' or 'RegionalExchange' codes.

To score well on KPI 9.2, always include a "WMO_DataLicenseCode" for all types of data. If the license is unknown, then use "WMOOther" code.

Additional descriptions to explain the referred `WMO_DataLicenseCode` could be added in additional `gmd:otherRestrictions` elements.

There can be free text explanations in additional `gmd:otherConstraints` or `gmd:useLimitation` elements.

Summary of elements evaluated in the `gmd:MD_LegalConstraints` class.

Element	Description
<code>gmd:accessConstraints</code>	<code>gmd:MD_RestrictionCode = otherRestrictions</code>
<code>gmd:useConstraints</code>	<code>gmd:MD_RestrictionCode = otherRestrictions</code>

Element	Description
<code>gmd:otherConstraints</code>	Vocabulary controlled: <code>WMO_DataLicenseCode</code> (<code>WMOEssential</code> , <code>WMOAdditional</code> , <code>WMOther</code> , <code>NoLimitation</code>)
<code>gmd:otherConstraints</code>	Vocabulary controlled: <code>WMO_GTSPProductCategoryCode</code> (<code>GTSPriority1</code> , <code>GTSPriority2</code> , <code>GTSPriority3</code> , <code>GTSPriority4</code>)

9.4.1. References

- Manual on WIS
 - Abstract Test Suite
 - Appendix C, 9.2 Identifiers for metadata describing data published for global exchange
 - Appendix C, 9.3 Defining WMO data policy and GTS priority for data published for global exchange
- Guide to WIS
 - 5.8.1.10 Data policy information

9.4.2. XML Examples

Example of `gmd:MD_LegalConstraints` section.

```

<gmd:resourceConstraints>
  <gmd:MD_LegalConstraints>
    <gmd:accessConstraints>
      <gmd:MD_RestrictionCode
        codeList=
"https://wis.wmo.int/2012/codelists/WMOCodeLists.xml#MD_RestrictionCode"
        codeListValue="otherRestrictions">
          otherRestrictions
        </gmd:MD_RestrictionCode>
      </gmd:accessConstraints>
    <gmd:useConstraints>
      <gmd:MD_RestrictionCode
        codeList=
"https://wis.wmo.int/2012/codelists/WMOCodeLists.xml#MD_RestrictionCode"
        codeListValue="otherRestrictions">
          otherRestrictions
        </gmd:MD_RestrictionCode>
      </gmd:useConstraints>
    <gmd:otherConstraints>
      <gmx:Anchor
xlink:href="https://wis.wmo.int/2012/codelists/WMOCodeLists.xml#WMO_DataLicenseCode">W
MOEssential</gmx:Anchor>
      </gmd:otherConstraints>
    <gmd:otherConstraints>
      <gmx:Anchor
xlink:href="https://wis.wmo.int/2012/codelists/WMOCodeLists.xml#WMO_GTSPriority3">GTSPriority3</gmx:Anchor>
      </gmd:otherConstraints>
    </gmd:MD_LegalConstraints>
  </gmd:resourceConstraints>

```

9.5. XPaths

- //gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword
- //gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:type
- //gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:thesaurusName
- /gmd:MD_Metadata/gmd:distributionInfo/gmd:MD_Distribution/gmd:transferOptions/gmd:MD_DigitalTransferOptions/gmd:onLine/gmd:CI_OnlineResource/gmd:linkage
- //gmd:identificationInfo//gmd:resourceConstraints/gmd:MD_LegalConstraints/gmd:accessConstraints/gmd:MD_RestrictionCode
- //gmd:identificationInfo//gmd:resourceConstraints/gmd:MD_LegalConstraints/gmd:useConstraints/gmd:MD_RestrictionCode
- //gmd:identificationInfo//gmd:resourceConstraints/gmd:MD_LegalConstraints/gmd:otherConstraints

Chapter 10. KPI-10: Distribution information

10.1. Measurement

Distribution information for accessing the data, data formats, and contact details are present.

10.2. Rationale for measurement

Distribution information allows the user to understand what formats are available, where to get them and who to contact for distribution details.

10.3. Rules

	Rule	Score
10.1	The <code>gmd:MD_Format</code> class is present.	1
10.2	The <code>gmd:specification</code> element in the <code>gmd:MD_Format</code> class has an <code>gmx:Anchor</code> with a resolvable HTTP URL.	1
10.3	The <code>gmd:organisationName</code> element in the <code>gmd:MD_Distributor</code> class is present.	1
10.4	The <code>gmd:electronicMailAddress</code> in the <code>gmd:MD_Distributor</code> class is present.	1
10.5	One to many <code>gmd:MD_DigitalTransferOptions</code> options are present.	1

Total possible score: 5 (100%)

10.4. Guidance

- Include the relevant WMO data formats in the `gmd:MD_Format` classes with a link to the specification of the data format.
- Include all relevant URLs in the `gmd:MD_DigitalTransferOptions` class for accessing the data.
- A distributor contact does not have to be the same as the other contacts in the metadata and should always have a contact email.

10.4.1. References

- 5.8.1.11 Distribution information

10.4.2. XML Examples

```
<gmd:distributionInfo>
  <gmd:MD_Distribution>
    <gmd:distributionFormat>
      <gmd:MD_Format>
        <gmd:name>
          <gco:CharacterString>FM 94 (BUFR)</gco:CharacterString>
        </gmd:name>
        <gmd:version>
          <gco:CharacterString>XII EXT.</gco:CharacterString>
        </gmd:version>
        <gmd:specification>
          <gmx:Anchor xlink:title="FM 94 (BUFR)"
xlink:href="https://www.wmo.int/pages/prog/www/WMOCodes.html">FM 94
(BUFR)</gmx:Anchor>
        </gmd:specification>
      </gmd:MD_Format>
    </gmd:distributionFormat>
    <gmd:distributor>
      <gmd:MD_Distributor>
        <gmd:distributorContact>
          <gmd:CI_ResponsibleParty>
            <gmd:organisationName>
              <gco:CharacterString>NMC FRANCE - Météo-France</gco:CharacterString>
            </gmd:organisationName>
            <gmd:contactInfo>
              <gmd:CI_Contact>
                <gmd:phone/>
                <gmd:address>
                  <gmd:CI_Address>
                    <gmd:deliveryPoint>
                      <gco:CharacterString>Direction des Systèmes d'Information, 42
avenue Gaspard CORIOLIS</gco:CharacterString>
                    </gmd:deliveryPoint>
                    <gmd:city>
                      <gco:CharacterString>TOULOUSE</gco:CharacterString>
                    </gmd:city>
                    <gmd:postalCode>
                      <gco:CharacterString>31057</gco:CharacterString>
                    </gmd:postalCode>
                    <gmd:country>
                      <gco:CharacterString>France</gco:CharacterString>
                    </gmd:country>
                    <gmd:electronicMailAddress>
                      <gco:CharacterString>gisc_support@meteo.fr</gco:CharacterString>
```

```

        </gmd:electronicMailAddress>
    </gmd:CI_Address>
</gmd:address>
<gmd:onlineResource>
    <gmd:CI_OnlineResource>
        <gmd:linkage>
            <gmd:URL>https://meteofrance.com</gmd:URL>
        </gmd:linkage>
    </gmd:CI_OnlineResource>
</gmd:onlineResource>
</gmd:CI_Contact>
</gmd:contactInfo>
<gmd:role>
    <gmd:CI_RoleCode codeListValue="pointOfContact"
codeList="https://standards.iso.org/iso/19139/resources/gmxCodeLists.xml#CI_RoleCode">
pointOfContact</gmd:CI_RoleCode>
</gmd:role>
</gmd:CI_ResponsibleParty>
</gmd:distributorContact>
</gmd:MD_Distributor>
</gmd:distributor>
<gmd:transferOptions>
    <gmd:MD_DigitalTransferOptions>
        <gmd:onLine>
            <gmd:CI_OnlineResource>
                <gmd:linkage>
                    <gmd:URL>http://wispi.meteo.fr/openwis-user-
portal/srv/en/main.home?urn=urn:x-wmo:md:int.wmo.wis::ISMN10LFPW</gmd:URL>
                </gmd:linkage>
                <gmd:protocol>
                    <gco:CharacterString>WWW:LINK-1.0-http--link</gco:CharacterString>
                </gmd:protocol>
                <gmd:name>
                    <gco:CharacterString>Permanent link</gco:CharacterString>
                </gmd:name>
                <gmd:description>
                    <gco:CharacterString>GISC Toulouse</gco:CharacterString>
                </gmd:description>
            </gmd:CI_OnlineResource>
        </gmd:onLine>
    </gmd:MD_DigitalTransferOptions>
</gmd:transferOptions>
</gmd:MD_Distribution>
</gmd:distributionInfo>

```

10.5. XPaths

- `//gmd:distributionInfo//gmd:distributionFormat/gmd:MD_Format`
- `//gmd:distributionInfo//gmd:MD_DigitalTransferOptions//gmd:onLine//gmd:URL`

- //gmd:distributionInfo//gmd:MD_Distributor//gmd:organisationName
- //gmd:distributionInfo//gmd:MD_Distributor//gmd:contactInfo//gmd:electronicMailAddress/gco:CharacterString

Chapter 11. KPI-11: Codelists validation

11.1. Measurement

Each code value in the metadata is an exact match to the code in one of the authoritative codelists below.

- ISO Codelists: <https://standards.iso.org/iso/19139/resources/gmxCodelists.xml>
- WMO Codelists/ISO extensions: <https://wis.wmo.int/2012/codelists/WMOCodeLists.xml>

11.1.1. Rationale for measurement

WCMP records can reference codelists from several locations, for example, online copies of the authoritative sources. In many cases codes are included but are not identical to the official values on the codelists (e.g. spelling mistakes, case sensitivity errors, etc.). Software applications may look for exact matches to codelists and handle metadata incorrectly if they are not properly referenced.

11.2. Rules

	Rule	Score
11.1	Code value is valid against authoritative codelists with an exact match.	1

Total possible score: valid codes / total codes (100%)

11.3. Guidance

An exact match means that there are no differences with spacing or capitalization. For example, `Other restrictions` and `other_restrictions` will not validate. Only the code value `otherRestrictions` from the `MD_RestrictionCode` codelist will validate.

11.3.1. XPaths

Codelist	XPath	Authoritative list
<code>CI_DateTypeCode</code>	<code>//gmd:date/gmd:CI_Date/gmd:dateType/gmd:CI_DateTypeCode</code>	WMOCodeLists (ISO Extended)
<code>CI_RoleCode</code>	<code>//gmd:CI_ResponsibleParty/gmd:role/gmd:CI_RoleCode</code>	gmxCodelists (ISO)
<code>MD_KeywordTypeCode</code>	<code>//gmd:MD_Keywords/gmd:type/gmd:MD_KeywordTypeCode</code>	WMOCodeLists (ISO Extended)

Codelist	XPath	Authoritative list
MD_RestrictionCode	//gmd:resourceConstraints//gmd:MD_RestrictionCode	gmxCodelists (ISO)
MD_ScopeCode	//gmd:scope//gmd:MD_ScopeCode	gmxCodelists (ISO)
MD_TopicCategoryCode	//gmd:topicCategory/gmd:MD_TopicCategoryCode	gmxCodelists (ISO)
WMO_DataLicenseCode	//gmd:resourceConstraints//gmd:otherConstraints/[gco:CharacterString gmx:Anchor]	WMOCodeLists
WMO_GTSProductCategoryCode	//gmd:resourceConstraints//gmd:otherConstraints/[gco:CharacterString gmx:Anchor]	WMOCodeLists
WMO_CategoryCode	//gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/[gco:CharacterString gmx:Anchor]	WMOCodeLists
WMO_DistributionScopeCode	//gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/[gco:CharacterString gmx:Anchor]	WMOCodeLists

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