UK GEMINI Encoding Guidance

Technical guidance on the encoding of
UK GEMINI using XSD Schemas

Edition 1.4
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uk location

DOCUMENT CONTROL

Change Summary

Version	Date	Author/Editor	Change Summary
1.0	30/09/2010	Tim Manning	Base-lined version. Released through UK Location Resource Centre for 'beta' evaluation by UK Location Data Providers, Publishers and their suppliers, as part of deployment of UK Location Discovery Metadata Service.
1.1	21/01/2011	James Rapaport & Peter Parslow	Various minor amendments
1.2	05/05/2011	James Rapaport	Coupled resource encoding
1.3	11/06/2012	Peter Parslow	Explicit description of hierarchy level and associated ISO elements
1.4	25/02/2013	Peter Parslow	Several changes in line with DMS Operational Guide 2.2

References

Ref.	Title/Version/Publication Date/Author
[1]	UK GEMINI, Specification for discovery metadata for geospatial data resources, Version 2.2, December 2012, AGI, http://www.agi.org.uk/uk-gemini/
[2]	INSPIRE Metadata Implementing Rules: Technical Guidelines based on EN ISO 19115 and EN ISO 19119, Version 1.2, 2010-06-16 (Revision), Drafting Team Metadata and European Commission Joint Research Centre
[3]	XML in a Nutshell, Second Edition, June 2002, Elliotte Rusty Harold and W. Scott Means
[4]	EPSG Geodetic Parameter Registry, Version 7.5.6, http://www.epsg-registry.org/
[5]	Canonical XML, Version 1.0, 2001-03-15, W3C http://www.w3.org/TR/xml-c14n
[6]	Ordnance Survey Linked Data, http://data.ordnancesurvey.co.uk/
[7]	Technical Guidance for the implementation of INSPIRE View Services, Version 3.0, 2011-03-21, IOC Task Force for Network Services
[8]	UK Location Discovery Metadata Service, Operational Guide, Edition 2-2, February 2013
[9]	UK Location, "Coordinate Reference Systems for UK Location", v1.1, December 2012

CONTENTS

1 INTRODUCTION

1.1 Purpose of document

1   The purpose of this document is to explain, with the aid of examples, how to encode UK GEMINI metadata using XSD schemas of ISO / TC 211. Examples are in the form of fragments of XML.

2   UK GEMINI metadata may be for a dataset, dataset series or a service. The encoding of all types is covered.

1.2 Scope

3   The scope of this document is the encoding of the UK GEMINI 2.2 metadata standard [1] (henceforth referred to as GEMINI2) according to ISO 19139, ISO 19119 and ISO 19136. In doing this consideration is also given to the INSPIRE technical guidelines [2] for encoding metadata.

4   Outside the scope of this document is the description of GEMINI2 metadata items, their content, obligation and meaning. Readers seeking this information should consult the GEMINI2 standard [1].

1.3 Assumed knowledge

5   It is assumed that readers will be familiar with XML. Readers who require background information are referred to the W3Schools introduction to XML:

   • XML - http://www.w3schools.com/xml/xml_whatis.asp

6   Readers requiring an introduction to XML Schemas are referred to the W3Schools XML Schema tutorial:

   • XSD - http://www.w3schools.com/schema/default.asp

1.4 Terminology

CRS

7   Coordinate Reference System

8   A coordinate system that is related to an object by a datum [ISO 19111]

DTD

9   Document Type Definition

10   DTD is an XML schema language which defines the legal building blocks of an XML document. It is not relevant in the context of GEMINI2 metadata instances where *XSD* schemas are used to define the structure of XML documents.

EDEN

11   l'Equipe D'Experts en Normalisation

12   A collaborative workspace for standardisation in the domain of geographic information. See http://eden.ign.fr/welcome

EPSG

13   European Petroleum Survey Group (defunct but the abbreviation is retained in the name of the EPSG Geodetic Parameter Dataset). Since 2005 *OGP* Surveying and Positioning Committee.

14   Examples are given of the use of EPSG *URI*s in *metadata instances*. This does not imply that the EPSG registry is the *de jure* registry of geodetic parameters for UK Location.

GEMINI2

15   The UK discovery metadata profile of ISO 19115.

16   In this document the term GEMINI2 means version 2.2 of UK GEMINI.

GML

17   Geography Markup Language [ISO 19136]

INSPIRE

18   Infrastructure for Spatial Information in Europe

ISO

19   International Organisation for Standardisation

ISO / TC 211

20   ISO Technical Committee 211 is responsible for standardisation in the field of digital geographic information. The committee is responsible for standards such as ISO 19115, ISO 19136 and ISO 19139.

21   The home page of ISO / TC 211 is http://www.isotc211.org/

Metadata Instance

22   Physically instantiated metadata.

23   In the context of this document a metadata instance will be an *XML document* conforming to ISO / TS 19139 and other associated standards.

Metadata Item

24   A top level metadata concept in the UK GEMINI standard. Title, for example, is a metadata item.

25   Metadata items may comprise sub-items.

OGC

26 Open Geospatial Consortium, Inc.

27 See http://www.opengeospatial.org/

OGP

28 International Association of Oil and Gas Producers

SRS

29 Spatial reference system.

30 A system for specifying position in the real world [ISO 19112]

UKLII

31 UK Location Information Infrastructure

32 See http://location.defra.gov.uk/wp-content/uploads/2009/12/UKLII-Roadmap-20100208-v1-3.pdf

URI

33 Uniform Resource Identifier.

34 URIs identify resources and may allow access to representations of the resources. A URL is a URI.

35 An overview of W3C materials relating to address can be found at http://www.w3.org/Addressing/

URN

36 Uniform Resource Name

37 A URN is a *URI* that uses the URN scheme

38 e.g. urn:ogc:def:crs:EPSG::4258 is the URN for ETRS89 in the *EPSG* Geodetic Parameter Dataset

UTC

39 Coordinated Universal Time

UUID

40 A universally unique identifier, also known as a GUID (Globally Unique Identifier) is a unique 128-bit integer that is represented as a 36 (or 32 ignoring the dashes) character string of hexadecimal numbers. UUIDs are system generated and ideally a UUID will never be generated twice by any computer in existence.

41 Format: xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx

42 Example: 3ce4f380-b394-4e5d-b222-6914ea311156

WAF

43   Web Accessible Folder

44   A Web Accessible Folder (WAF) is an HTTP accessible directory of files, typically metadata files in XML format in which all files and their time-stamps are visible to a web browser or client. Crawlers are able to parse the file listings and date-time stamps and provide a search interface on these documents.

XLink

45   *XML* Linking Language

46   Used to include metadata element data by-reference rather than by-value.

47   The XLink specification can be found at http://www.w3.org/TR/xlink/

XML

48   eXtensible Markup Language

49   The XML specification can be found at http://www.w3.org/TR/REC-xml/

XML Document

50   A collection of data represented in XML.

XML Parser

51   Software component responsible for reading an *XML document* and dividing it into individual elements and attributes.

52   Parsers will check that an *XML document is* well-formed. Some parsers will undertake a schema validation.

XSD

53   XML Schema Definition language.

54   An XSD is a document written in XML that defines the structure of an XML document.

1.5 Structure of document

55   The core section of the document is the Encoding Guidelines. This section is split into three principal sections. The first deals with concepts which are common to all kinds of GEMINI2 metadata instances. The second explains the encoding of metadata for datasets and dataset series. The third section explains the encoding of encoding metadata for services. There is some overlap, and therefore duplication, between the sections but it is felt that this approach is best in that it clearly indicates the requirements for each type of metadata.

56   Sections 2.3 and 2.4 list metadata items from GEMINI2 in the order that they appear in GEMINI2. XML elements in an XML document must follow the order expressed in the XSD schema to which the XML document conforms. The order of XML element expressed by the XSD schema will not be the same as the order of metadata items in GEMINI2.

57   Examples are provided by way of XML fragments throughout the document. Full metadata instances are included in the appendix.

1.6   XML Fragments

58   This document contains examples of XML encoding. The examples are considered fragments in that they are not complete XML documents. The following conventions are used:

- The root element will generally be shown and it shall be gmd:MD_Metadata

- XML element tags will generally be shown on a single line

- XML will be tabbed in where possible to aid reading

- Where an XML element, including the start tag, end tag and content, is too long to show on a single line, it shall break across more than one line automatically (i.e. under the control of the word processing justification and formatting)

- In some cases it might be possible and expedient to express an XML element on a single line but in doing so the tabbing order is broken down

- Missing XML content, removed while forming the fragment, shall be represented by an ellipsis (. . .)

```
<gmd:MD_Metadata>
  <gmd:fileIdentifier>
 <gco:CharacterString>98e25be5-388d-4be3-bc5f-ba07ef6009b2</gco:CharacterString>
  </gmd:fileIdentifier>
  ...
</gmd:MD_Metadata>
```

Figure 1 – XML fragment – tabbing

59   Figure 1 shows an example of an XML fragment. Note that it starts with the XML element gmd:MD_Metadata. The next XML element in order is gmd:fileIdentifier and its start-tag is on the next line and is tabbed in. The following line is the content of gmd:fileIdentifier. This XML element is tabbed out, breaking the convention, because it would otherwise break across more than one line.

60   An ellipsis follows the end tag of the XML element gmd:fileIdentifier indicating that other content is missing.

61   Also deliberately omitted from XML fragments is:

- The XML declaration

- XML namespace identifiers

62   In the example in Figure 1 CharacterString is an XML element in the namespace gco. It has the start-tag `<gco:CharacterString>` and the end-tag `</gco:CharacterString>`. The string `98e25be5-388d-4be3-bc5f-ba07ef6009b2` is the element's content. The CharacterString element forms the content of another element: fileIdentifier. Its start-tag is `<gmd:fileIdentifier>` and its end-tag is `</gmd:fileIdentifier>`.

63   In the example in Figure 2 `gml:id` and `codeSpace` are XML attributes. XML attributes are encoded in the start-tag of an element with the form `[namespace]:[attributeName]="[content]"`.

```
...
<gmx:CodeDefinition gml:id="MD_ScopeCode_dataset">
  <gml:description>information applies to the dataset</gml:description>
  <gml:identifier codeSpace="ISOTC211/19115">dataset</gml:identifier>
</gmx:CodeDefinition>
...
```

Figure 2 – XML attributes

64   Note that there is no reason in practice to tab in XML and to present each XML element on a new line other than to aid humans in reading raw XML. XML parsers, on the other hand, would have no problem reading the XML were it encoded without carriage returns as shown in Figure 3.

```
<gmd:MD_Metadata><gmd:fileIdentifier><gco:CharacterString>98e25be5-388d-4be3-
bc5f-ba07ef6009b2</gco:CharacterString></gmd:fileIdentifier></gmd:MD_Metadata>
```

Figure 3 – XML fragment – no tabbing

65   The UK Location Information Infrastructure will accept any valid XML document that conforms to these guidelines. This includes canonical XML encodings [5] and files laid out with additional white space for human readability, and other variants in between. Similarly, XML attribute values could be delimited using single or double quotes.

1.7   Acknowledgements

66   The primary author of this document was James Rapaport of SeaZone Solutions Limited (now Seazone Solutions). Gratitude is expressed to those who have helped in reviewing the document: Tim Duffy (British Geological Survey), Olivia Merritt (SeaZone Solutions), Peter Parslow (Ordnance Survey), James Passmore (British Geological Survey), Anne Robertson (EDINA) and Justin Rowles (Ordnance Survey).

2 ENCODING GUIDELINES

2.1 Schemas

67   The schemas defining the structure of GEMINI2 metadata instances are required to implement:

- ISO 19139 – for a physical implementation of ISO 19115

- ISO 19119 – for service metadata

- ISO 19136 – for GML

68   The schema set that has been identified as meeting these requirements is provided by EDEN at:

     http://eden.ign.fr/xsd/isotc211/isofull/20090316

69   It is emphasised that this is an <u>unofficial</u> XSD repository. However, schema sets available in the official ISO repository[1] and the OGC repository[2] do not meet the requirements in full.

70   The schema files that shall be used for validating GEMINI2 metadata instances are:

- gmx.xsd (for datasets and series)

- gmx.xsd & srv.xsd (for services)

71   Note: the UK GEMINI schema that was published on GI Gateway[3] encodes GEMINI1, not GEMINI2. Also, it does not conform with INSPIRE technical guidance. Therefore, it cannot be used to encode GEMINI2 and shall not be used for metadata instances within UK Location.

2.2 Common concepts

2.2.1 XML declaration

72   Metadata instances are XML documents. XML documents should, but do not have to, begin with an XML declaration. If a metadata instance has an XML declaration then it must be the first line in the document. It must not be preceded by anything else, other than an invisible Unicode byte-order mark.

73   Figure 4 shows an XML declaration. The version attribute must always have the value 1.0. The encoding attribute is optional. Its value specifies which character set is in use in the document. By default (i.e. if the encoding attribute is omitted) XML documents are assumed to be encoded in the UTF-8 encoding of the Unicode character set. Care should be taken when using text editing software to edit XML, or writing XML using bespoke software code, that the XML's

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[1] http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/

[2] http://schemas.opengis.net/iso/19139/

[3] service withdrawn by 2012

actual physical encoding conforms with the encoding stated with this attribute. It is expected that the UTF-8 character set will be sufficient in nearly all cases.

74 An XML declaration may include a "standalone" attribute. However, this attribute is only relevant if an XML document is using a DTD. Metadata instances of GEMINI2 shall not use a DTD so it is out of scope.

```
<?xml version="1.0" encoding="utf-8"?>
```

Figure 4 – XML Declaration

2.2.2 Root element

75 The root element of a GEMINI2 metadata instance shall be gmd:MD_Metadata. The root element shall contain namespace references to, at least, gmd, gco, gml and xlink. Metadata for services shall, in addition, contain a namespace reference to srv. In addition reference may be made to the gmx namespace if XML elements such as gmx:Anchor are used (for example see section 2.3.14).

76 An example is shown in Figure 5. Subsequent examples omit the namespace references for brevity. An ellipsis is used to indicate that required content has been omitted.

```
<?xml version="1.0" encoding="utf-8"?>
<gmd:MD_Metadata xmlns:gmd="http://www.isotc211.org/2005/gmd"
                 xmlns:gco="http://www.isotc211.org/2005/gco"
                 xmlns:srv="http://www.isotc211.org/2005/srv"
                 xmlns:gml="http://www.opengis.net/gml/3.2"
                 xmlns:xlink="http://www.w3.org/1999/xlink">
  ...
</gmd:MD_Metadata>
```

Figure 5 – Root Element

77 The namespace identifier for gmd shall be: http://www.isotc211.org/2005/gmd

78 The namespace identifier for gco shall be: http://www.isotc211.org/2005/gco

79 The namespace identifier for srv shall be: http://www.isotc211.org/2005/srv

80 The namespace identifier for gmx shall be: http://www.isotc211.org/2005/gmx

81 The namespace identifier for gml shall be: http://www.opengis.net/gml/3.2

82 The namespace identifier for xlink shall be: http://www.w3.org/1999/xlink

83 The root element, and in fact any element in an XML instance, may have an attribute called xsi:schemaLocation which contains a value or set of values hinting at the physical location of schemas which may be used for validation. Since this attribute provides only a hint validating parsers are allowed to ignore it and use other means of locating the relevant schemas.

84 Figure 6 shows a root element containing an xsi:schemaLocation attribute. Here the schemas referenced are in the EDEN XSD repository.

85 Since the xsi:schemaLocation attribute exists in the xsi namespace, this namespace must be referenced. The xsi:schemaLocation attribute contains a pair of space separated values when one schema is identified. The first value specifies the namespace and the second value specifies the schema to use to validate elements in that namespace. When more than schema is identified, as would be the case for validating a service metadata instance, the attribute contains a space separated sequence of namespace / schema pairs. The xsi:schemaLocation attribute is not required in a GEMINI2 metadata instance.

```xml
<?xml version="1.0" encoding="utf-8"?>
<gmd:MD_Metadata xmlns:gmx="http://www.isotc211.org/2005/gmx"
                 xmlns:gmd="http://www.isotc211.org/2005/gmd"
                 xmlns:gco="http://www.isotc211.org/2005/gco"
                 xmlns:srv="http://www.isotc211.org/2005/srv"
                 xmlns:gml="http://www.opengis.net/gml/3.2"
                 xmlns:xlink="http://www.w3.org/1999/xlink"
                 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                 xsi:schemaLocation="http://www.isotc211.org/2005/gmx
                  http://eden.ign.fr/xsd/isotc211/isofull/20090316/gmx/gmx.xsd
                  http://www.isotc211.org/2005/srv
                  http://eden.ign.fr/xsd/isotc211/isofull/20090316/srv/srv.xsd">
   ...
</gmd:MD_Metadata>
```

Figure 6 – Using the xsi:schemaLocation attribute

2.2.3 Dates and Times

86 Dates and date-time shall be expressed in the Gregorian calendar and UTC as per ISO 8601. The formatting shall be as follows, in order of increasing precision:

- yyyy (e.g. 1995)
- yyyy-MM (e.g. 1995-01)
- yyyy-MM-dd (e.g. 1995-01-25)
- yyyy-MM-ddThh:mm:ss (e.g. 1995-01-25T12:01:55)

87 The ISO 8601 encoding also allows negative dates to represent BC. However, gco:Date and gco:DateTime XML elements do not accept negative values.

88 The GEMINI2 standard states that temporal extents may be given with as coarse a granularity as century (e.g. yy or 19). However, unfortunately this cannot be encoded in ISO 19139 XML and will result in a schema validation error. The lowest level of granularity allowable is the year.

2.2.4 Element order

89 XML elements in a metadata instance must follow the order in which the elements are defined in an XSD schema. Failure to do so will result in schema validation errors. The order of XML elements and their corresponding GEMINI2 metadata items is shown in Appendix A.

2.2.5 Patterns for multiple instances

90   Some metadata items, such as alternative title, have cardinalities for more than one. This means that more than one instance of the item can be encoded in metadata instances. The general approach in ISO 19139 XML is that an XML element expressing the property, in Figure 7 gmd:alternateTitle, contains an XML element which expresses the data type and contains the value, in this case gco:CharacterString. Note that more than one alternative title is expressed by repeating the gmd:alternateTitle XML element, not the gco:CharacterString XML element (shown in an invalid example in Figure 8). This pattern is followed throughout ISO 19139 XML including for XML elements that have complex content, such as gmd:identificationInfo (Figure 9).

```
...
<gmd:alternateTitle>
  <gco:CharacterString>Digital Geological Map Data of Great Britain -
625k</gco:CharacterString>
</gmd:alternateTitle>
<gmd:alternateTitle>
  <gco:CharacterString>DiGMapGB-625</gco:CharacterString>
</gmd:alternateTitle>
...
```

Figure 7 – Multiple alternative title elements

```
...
<gmd:alternateTitle>
  <gco:CharacterString>Digital Geological Map Data of Great Britain -
625k</gco:CharacterString>
  <gco:CharacterString>DiGMapGB-625</gco:CharacterString>
</gmd:alternateTitle>
...
```

Figure 8 – Multiple alternative title elements – invalid encoding

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 9 – Multiple identification information XML elements

2.2.6 File identifier

91 The first XML child element of any GEMINI2 metadata instance shall be gmd:fileIdentifier. The content of this XML element is the identifier of the metadata instance. File identifier is not a metadata item of GEMINI2. It is not to be confused with the metadata item Unique Resource Identifier (see section 2.3.23).

92 The content of the XML element shall be a unique managed identifier, such as a system generated UUID. Once the identifier has been set for a metadata instance it shall not change.

```
<gmd:MD_Metadata>
  <gmd:fileIdentifier>
 <gco:CharacterString>98e25be5-388d-4be3-bc5f-ba07ef6009b2</gco:CharacterString>
  </gmd:fileIdentifier>
  ...
</gmd:MD_Metadata>
```

Figure 10 – File identifier

2.2.7 Citation

93 External resources, such as publications, controlled vocabularies, are expressed using the ISO 19115 class CI_Citation and its XML element instance, gmd:CI_Citation. This is a common structure that is used to encode:

- Resource reference information about datasets and series

- Resource reference information about services

- Information about the originating controlled vocabulary of keywords

- The specification for conformance statements

- The authority of Spatial Reference System

- The authority of Extent

94 A citation must include at least a title, a date and a date type. Figure 11 shows the citation structure used to encode information about the GEMET Concepts dictionary.

95 In any one citation there may be more than one date. However, there shall be only one date with a date type of 'creation'.

```
...
<gmd:CI_Citation>
  <gmd:title>
    <gco:CharacterString>GEMET - Concepts, version 2.4</gco:CharacterString>
  </gmd:title>
  <gmd:date>
    <gmd:CI_Date>
      <gmd:date>
        <gco:Date>2010-01-13</gco:Date>
      </gmd:date>
      <gmd:dateType>
        <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
```

```
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
      </gmd:dateType>
    </gmd:CI_Date>
  </gmd:date>
</gmd:CI_Citation>
...
```

Figure 11 – CI_Citation structure

2.2.8 Responsible party

```
...
<gmd:CI_ResponsibleParty>
  <gmd:organisationName>
    <gco:CharacterString>SeaZone Solutions</gco:CharacterString>
  </gmd:organisationName>
  <gmd:positionName>
    <gco:CharacterString>Data Product Manager</gco:CharacterString>
  </gmd:positionName>
  <gmd:contactInfo>
    <gmd:CI_Contact>
      <gmd:phone>
        <gmd:CI_Telephone>
          <gmd:voice>
            <gco:CharacterString>+44 (0) 870 013 0607</gco:CharacterString>
          </gmd:voice>
          <gmd:facsimile>
            <gco:CharacterString>+44 (0) 870 013 0608</gco:CharacterString>
          </gmd:facsimile>
        </gmd:CI_Telephone>
      </gmd:phone>
      <gmd:address>
        <gmd:CI_Address>
          <gmd:deliveryPoint>
            <gco:CharacterString>Red Lion House</gco:CharacterString>
          </gmd:deliveryPoint>
          <gmd:deliveryPoint>
            <gco:CharacterString>Bentley</gco:CharacterString>
          </gmd:deliveryPoint>
          <gmd:administrativeArea>
            <gco:CharacterString>Hampshire</gco:CharacterString>
          </gmd:administrativeArea>
          <gmd:postalCode>
            <gco:CharacterString>GU10 5HY</gco:CharacterString>
          </gmd:postalCode>
          <gmd:electronicMailAddress>
            <gco:CharacterString>info@seazone.com</gco:CharacterString>
          </gmd:electronicMailAddress>
        </gmd:CI_Address>
      </gmd:address>
      <gmd:onlineResource>
        <gmd:CI_OnlineResource>
          <gmd:linkage>
            <gmd:URL>http://www.seazone.com/index.php</gmd:URL>
          </gmd:linkage>
        </gmd:CI_OnlineResource>
      </gmd:onlineResource>
    </gmd:CI_Contact>
  </gmd:contactInfo>
  <gmd:role>
    <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="author">author</gmd:CI_RoleCode>
  </gmd:role>
</gmd:CI_ResponsibleParty>
...
```

Figure 12 – CI_ResponsibleParty structure

96   Addresses are expressed using the ISO 19115 class CI_ResponsibleParty and its XML element instance, gmd:CI_ResponsibleParty. This is a common structure that is used to encode:

- Metadata contact

- Responsible organisation

97   In the context of GEMINI2 a responsible party set shall include at least the organisation name (encoded using gmd:organisationName), an email address (encoded using gmd:electronicMailAddress) and a role (encoded using gmd:role).

98   The XML element role takes values from the ISO 19115 codelist CI_RoleCode. Any value in the code list may be chosen.

99   Additionally, the contact position (encoded using gmd:positionName), the postal address (encoded using a combination of gmd:deliveryPoint, gmd:city, gmd:administrativeArea, gmd:postalCode and gmd:country), telephone number (encoded using gmd:voice) and facsimile number (encoded using gmd:facsimile) may be provided.

2.2.9 Code lists

100   Where a sub-item takes its value from a code list, which may or may not be expressed in ISO 19115, the source code list catalogue and code list value shall be expressed using the attributes gmd:codeList and gmd:codeListValue respectively.

101   Figure 13 shows the encoding where a code list is specified in ISO 19115. The value of the codeList attribute should be the URL for the ISO 19115 code list catalogue that is published on the ISO website:

```
http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml
```

102   plus a hash character acting as a delimiter, and then the identifier of the code list, in this case 'MD_ScopeCode', that contains the code list value that is used. This information could be used to validate the code list value and ensure that it is a member of the code list.

103   The value of the code list value attribute (gmd:codeListValue) shall be a valid entry from the specified code list dictionary.

104   The element value (i.e. in Figure 13 `<gmd:MD_ScopeCode ...>`**dataset**`</gmd:MD_ScopeCode>`) is human readable text. It can be omitted or given a value different from that of the attribute codeListValue (e.g. Dataset). For the purposes of GEMINI2 metadata it shall be identical to the value of the attribute codeListValue. Developers of GEMINI2 aware applications should note that reliance should not be placed on the element value of code list elements but rather on the value of the attribute gmd:codeListValue.

```
<gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="dataset">dataset</gmd:MD_ScopeCode>
```

Figure 13 – Code list

105   Figure 14 shows a fragment of the code list catalogue with the entries of MD_ScopeCode that are relevant to GEMINI2 metadata.

```xml
<CT_CodelistCatalogue xmlns="http://www.isotc211.org/2005/gmx"
                      xmlns:gco="http://www.isotc211.org/2005/gco"
                      xmlns:gml="http://www.opengis.net/gml/3.2"
                      xmlns:xlink="http://www.w3.org/1999/xlink"
                      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  ...
  <!--=== MD_ScopeCode ===-->
  <codelistItem>
    <CodeListDictionary gml:id="MD_ScopeCode">
      <gml:description>class of information to which the referencing entity
applies</gml:description>
      <gml:identifier codeSpace="ISOTC211/19115">MD_ScopeCode</gml:identifier>
      ...
      <codeEntry>
        <CodeDefinition gml:id="MD_ScopeCode_dataset">
          <gml:description>information applies to the dataset</gml:description>
          <gml:identifier codeSpace="ISOTC211/19115">dataset</gml:identifier>
        </CodeDefinition>
      </codeEntry>
      <codeEntry>
        <CodeDefinition gml:id="MD_ScopeCode_series">
          <gml:description>information applies to the series</gml:description>
          <gml:identifier codeSpace="ISOTC211/19115">series</gml:identifier>
        </CodeDefinition>
      </codeEntry>
      ...
      <codeEntry>
        <CodeDefinition gml:id="MD_ScopeCode_service">
          <gml:description>information applies to a capability which a service
provider entity makes available to a service user entity through a set of
interfaces that define a behaviour, such as a use case</gml:description>
          <gml:identifier codeSpace="ISOTC211/19115">service</gml:identifier>
        </CodeDefinition>
      </codeEntry>
      ...
    </CodeListDictionary>
  </codelistItem>
</CT_CodelistCatalogue>
```

Figure 14 – Fragment of the code list catalogue

2.2.10 Null Values

106   The ISO 19139 XML schemas provide a means for indicating that the contents of an element may be unknown or withheld, through the use of the gco:nilReason attribute. This attribute can be added to any element in the gmd namespace. It can take the following values:

- inapplicable

- missing

- template

- unknown

- withheld

- other:[any text]

107   Empty XML elements (see Figure 15) are not permitted in ISO 19139 metadata instances. Although this is not checked by the "Table A" schematron rules in use in UK Location, those creating metadata records should avoid creating empty XML elements if at all possible. If an optional element is not required, don't include it; if a mandatory element is not available use gco:nilReason (see 2.2.10 above).

```
<gco:CharacterString/>

<gco:CharacterString></gco:CharacterString>
```

Figure 15 – Examples of empty elements not permitted in GEMINI2 metadata instances

108   The following metadata items shall not be nillable:

- Title

- Abstract

- Bounding box (west, east, south and north coordinates)

- Unique resource identifier

- Responsible organization

- Metadata point of contact

- Topic category

- Originating controlled vocabulary title

- Conformity pass

- File identifier

2.2.11 By Value or By Reference

109   The content of a metadata instance may be expressed *by value* or *by reference*. *By value* means that the metadata instance carries all the necessary information. *By reference* means that a metadata instance indicates that content is to be found in an external repository or another place within the same instance. The *by reference* case is supported by the object reference (gco:ObjectReference) attribute group. This provides two mechanisms for referencing remote resources:

- XLink, primarily using the xlink:href attribute

- By UUID using the uuidref attribute

110   Figure 16 shows the use of the XLink href attribute to specify a vertical CRS by reference to the EPSG Geodetic parameter dataset while Figure 17 shows the same information encoded by value (note however, that in this case the domain of validity (gml:domainOfValidity), vertical

coordinate system (gml:verticalCS) and vertical datum (gml:verticalDatum) are themselves encoded *by reference*).

111   Encoding information *by reference* is clearly advantageous in the sense that it is more efficient (in terms of file size but also avoiding data duplication) than by value. However, it presupposes that an XML software application will 'know' how to dereference the reference. Dereferencing is the act of obtaining the externally referenced information. It is also important that the referenced information is universally available in a structured machine readable form so that it can be incorporated by value. In the case of the examples below the EPSG web service endpoint can be used to dereference the EPSG URN to return the GML encoded vertical CRS. The GML can be directly incorporated in an XML metadata instance, where the metadata element accepts a GML value (noting that there will be a difference in the GML namespace identifier – EPSG returning GML 3.1.1 while metadata instances shall identify the GML 3.2.1 namespace – in the case of the CRS XML elements of GML there is no difference between these versions of GML).

112   Typically, *by reference* shall be used for identifying the vertical CRS of a vertical extent and the implementation of coupled resource (following INSPIRE guidelines) alone. The XLink mechanism shall be used (see Figure 16 for vertical CRS and Figure 18 for coupled resource). Note that in encoding coupled resource by referenced the uuidref attribute may also be used, in addition to XLink. All other metadata items shall be implemented *by value*.

```xml
<gmd:verticalCRS xlink:href=" http://www.opengis.net/def/crs/EPSG/0/5701"/>
```

Figure 16 – Vertical CRS by reference

```xml
...
<gmd:verticalCRS>
  <gml:VerticalCRS gml:id="epsg-crs-5701">
    <gml:identifier codeSpace="OGP">
http://www.opengis.net/def/crs/EPSG/0/5701</gml:identifier>
    <gml:name>ODN height</gml:name>
    <gml:domainOfValidity xlink:href="
http://www.opengis.net/def/crs/EPSG/0/2792"/>
    <gml:scope>Geodetic and engineering surveying.</gml:scope>
    <gml:verticalCS xlink:href=" http://www.opengis.net/def/crs/EPSG/0/6499"/>
    <gml:verticalDatum xlink:href="
http://www.opengis.net/def/crs/EPSG/0/5101"/>
  </gml:VerticalCRS>
</gmd:verticalCRS>
...
```

Figure 17 – Vertical CRS by value

```xml
<srv:operatesOn xlink:title="BGS.1M.surface.GeologicUnit"
xlink:href="http://ogcdev.bgs.ac.uk/geonetwork/srv/en/csw?SERVICE=CSW&amp;amp;REQUES
T=GetRecordById&amp;amp;ID=9df8df52-d788-37a8-e044-
0003ba9b0d98&amp;amp;elementSetName=full&amp;amp;OutputSchema=http://www.isotc211.or
g/2005/gmd&amp;amp;" uuidref="9df8df52-d788-37a8-e044-0003ba9b0d98" />
```

Figure 18 – Coupled resource by reference

2.2.12 Identifiers

113 GML XML elements which are used in metadata have a mandatory gml:id attribute. The value domain of the identifier is referred to as *XML name*. XML names have certain restrictions. They may contain any alphanumeric character, non-English alphanumeric characters, ideograms and the underscore, hyphen and period. They may not contain any other punctuation characters. The colon is allowed, but its use is reserved for namespaces, so it cannot appear in an identifier. XML names may not include any whitespace including spaces and carriage returns. All names beginning with the letters XML (in uppercase, lowercase or any mixture thereof) are reserved (see [3] pages 18 and 19).

114 XML names may only start with letters, ideograms and the underscore character. Consequently, care must be taken when using the value of a UUID as the value of an identifier because these can begin with numeric characters. It is normal to append an underscore to the beginning of identifier values where they begin with numbers.

115 Furthermore, an identifier must be unique within the scope of the XML document (i.e. there shall not be more than one id type attribute with a particular identifier value).

116 If an id type attribute contains an illegally formed XML name the result will be a schema validation error.

2.3 Metadata for datasets and dataset series

2.3.1 Data identification

117   XML elements for encoding metadata for datasets and series of datasets are drawn, primarily, from the gmd and gco namespaces and also the gml and xlink namespaces. Identification information is encoded using the gmd:MD_DataIdentification type (Figure 19).

118   Metadata instances may include more than one gmd:identificationInfo XML element. The first gmd:identificationInfo XML element in a GEMINI metadata instance for datasets or series shall have as its first and only child XML element gmd:MD_DataIdentification. The ISO 19115 hierarchyLevel element shall be set to "dataset" or "series". For a series, ISO 19115 hierarchyLevelName element must also be set, to an appropriate character string.

```
<gmd:MD_Metadata>
  ...
  <gmd:hierarchyLevel>
    <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="dataset">dataset</gmd:MD_ScopeCode>
  </gmd:hierarchyLevel>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 19 – Metadata for datasets using the gmd:MD_DataIdentification type

2.3.2 Title

119 Metadata item definition: name given to the data resource.

120 The encoding example for Title is shown in Figure 20.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          <gmd:title>
            <gco:CharacterString>Digital Geological Map Data of Great Britain -
625k</gco:CharacterString>
          </gmd:title>
          ...
        </gmd:CI_Citation>
      </gmd:citation>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 20 – Title encoding example

2.3.3 Alternative title

121   Metadata item definition: short name, other name, acronym or alternative language title for the data resource.

122   The encoding example for alternative title is shown in Figure 21. Note that more than one alternative title may be presented, as shown in the example below.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          ...
          <gmd:alternateTitle>
            <gco:CharacterString>Geology onshore digital maps 1:625 000
scale</gco:CharacterString>
          </gmd:alternateTitle>
          <gmd:alternateTitle>
            <gco:CharacterString>DiGMapGB-625</gco:CharacterString>
          </gmd:alternateTitle>
          ...
        </gmd:CI_Citation>
      </gmd:citation>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 21 – Alternative title encoding example

2.3.4 Dataset language

123   Metadata item definition: language used in the data resource.

124   Two encoding examples for dataset language are shown in Figure 22 and Figure 23. The two are subtly different in that in Figure 22 the element value repeats the codeListValue attribute. In Figure 23 the element value expresses the name of the codeListValue attribute content in the default language of the metadata. These alternative approaches are shown in the INSPIRE technical guidelines [2] but neither one is favoured over the other.

125   According to GEMINI2 the obligation on dataset language is conditional on the data resource containing textual information. The ISO 19115 constraint is stricter: dataset language is mandatory. Consequently, where a dataset does not contain textual information the dataset language item must still be encoded in metadata. In this case its value shall default to that of metadata language, following the INSPIRE implementing instructions for this item [2].

126   Note that according to the ISO 19115 logical model the language property is typed as a CharacterString. The use of the gco:CharacterString type is permitted by the ISO 19139 schemas but this approach shall not be used to encode GEMINI2 metadata. Instead the XML element gmd:LanguageCode, which substitutes for gco:CharacterString, shall be used.

127   The XML element gmd:LanguageCode is implemented as a code list element. Note that the codeList attribute should have the following value in GEMINI2 metadata instances:

   http://www.loc.gov/standards/iso639-2/php/code_list.php

128   Note however, that this URL resolves to an HTML web page rather than a service endpoint providing ISO 639-2 language codes.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:language>
        <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-
2/php/code_list.php" codeListValue="eng">eng</gmd:LanguageCode>
      </gmd:language>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 22 – Dataset language encoding example (most interoperable)

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:language>
        <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-
2/php/code_list.php" codeListValue="eng">English</gmd:LanguageCode>
      </gmd:language>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 23 – Dataset language encoding example (most compliant)

2.3.5 Abstract

129   Metadata item definition: brief narrative summary of the data resource.

130   The encoding example for abstract is shown in Figure 24.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:abstract>
        <gco:CharacterString>The data shows polygonal and selected linear
geological information, sourced from published BGS 1:625 000 scale maps of Great
Britain. However, geological units are identified using the most up-to-date
nomenclature that may differ from that on the printed maps. The maps are
generally based on published material at 1:50 000 scale and compiled using
techniques of selection, generalisation and exaggeration. The geology is fitted
to a relevant topographic base at the time of production. Full UK coverage is
available. The data is available in vector format. BGS licensing terms and
conditions apply to external use of the data.</gco:CharacterString>
      </gmd:abstract>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 24 – Abstract encoding example

2.3.6 Topic category

131 Metadata item definition: main theme(s) of the data resource.

132 The encoding example for topic category is shown in Figure 25. Note that it is possible to include more than one topic category.

133 The value of the XML element gmd:MD_TopicCategoryCode must not contain whitespace because the values are specified by an enumerated list in the XSD schemas. The encoding shown in Figure 26, for example, will result in an XSD schema validation error because the element content will be parsed as shown in Figure 27 (excluding the square brackets denoting the start and end) resulting in a value that does not exist in the enumerated list.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:topicCategory>
<gmd:MD_TopicCategoryCode>geoscientificInformation</gmd:MD_TopicCategoryCode>
      </gmd:topicCategory>
      <gmd:topicCategory>
        <gmd:MD_TopicCategoryCode>environment</gmd:MD_TopicCategoryCode>
      </gmd:topicCategory>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 25 – Topic category encoding example

```
...
<gmd:topicCategory>
  <gmd:MD_TopicCategoryCode>
    environment
  </gmd:MD_TopicCategoryCode>
</gmd:topicCategory>
...
```

Figure 26 – Topic category encoding invalid example

```
[
    environment
]
```

Figure 27 – Parsing result of invalid Topic category encoding (excluding square brackets)

2.3.7 Keyword

134   Metadata item definition: topic of the content of the data resource.

135   The GEMINI2 keyword item comprises keyword value(s) and, conditionally, the specification of an originating controlled vocabulary. If keywords are not selected from a controlled vocabulary the encoding shown in Figure 28 shall be used.

136   Where keywords do originate from a controlled vocabulary the encoding shown in Figure 29 shall be used. Note the inclusion of the gmd:thesaurusName XML element which contains the XML element gmd:CI_Citation. This element must contain at least a title, reference date and date type. In the example keywords have been selected from the GEMET Concepts controlled vocabulary.

137   Metadata records which describe a dataset that relates to one or more of the INSPIRE themes must include the appropriate keyword(s) from the GEMET INSPIRE themes, as illustrated in Figure 30.

138   Figure 29 and Figure 30 show how the GEMET INSPIRE themes and the GEMET concepts controlled vocabularies should be cited according to the INSPIRE guidance [2].

139   Note that more than one keyword value may be selected from a single controlled vocabulary. Note also that keywords may be selected from more than one controlled vocabulary. In this case the encoding shown in Figure 30 shall be used.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:descriptiveKeywords>
        <gmd:MD_Keywords>
          <gmd:keyword>
            <gco:CharacterString>satellite imagery</gco:CharacterString>
          </gmd:keyword>
          <gmd:keyword>
            <gco:CharacterString>earth observation</gco:CharacterString>
          </gmd:keyword>
        </gmd:MD_Keywords>
      </gmd:descriptiveKeywords>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 28 – Keyword encoding example – without originating controlled vocabulary

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:descriptiveKeywords>
        <gmd:MD_Keywords>
          <gmd:keyword>
            <gco:CharacterString>water monitoring</gco:CharacterString>
          </gmd:keyword>
          <gmd:keyword>
            <gco:CharacterString>water quality</gco:CharacterString>
          </gmd:keyword>
          <gmd:thesaurusName>
            <gmd:CI_Citation>
              <gmd:title>
                <gco:CharacterString>GEMET - Concepts, version
2.4</gco:CharacterString>
              </gmd:title>
              <gmd:date>
                <gmd:CI_Date>
                  <gmd:date>
                    <gco:Date>2010-01-13</gco:Date>
                  </gmd:date>
                  <gmd:dateType>
                    <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                  </gmd:dateType>
                </gmd:CI_Date>
              </gmd:date>
            </gmd:CI_Citation>
          </gmd:thesaurusName>
        </gmd:MD_Keywords>
      </gmd:descriptiveKeywords>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 29 – Keyword encoding example – GEMET Concepts

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:descriptiveKeywords>
        <gmd:MD_Keywords>
          <gmd:keyword>
            <gco:CharacterString>water monitoring</gco:CharacterString>
          </gmd:keyword>
          <gmd:keyword>
            <gco:CharacterString>water quality</gco:CharacterString>
          </gmd:keyword>
          <gmd:thesaurusName>
            <gmd:CI_Citation
```

```xml
                <gmd:title>
                  <gco:CharacterString>GEMET - Concepts, version
2.4</gco:CharacterString>
                </gmd:title>
                <gmd:date>
                  <gmd:CI_Date>
                    <gmd:date>
                      <gco:Date>2010-01-13</gco:Date>
                    </gmd:date>
                    <gmd:dateType>
                      <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                    </gmd:dateType>
                  </gmd:CI_Date>
                </gmd:date>
              </gmd:CI_Citation>
            </gmd:thesaurusName>
          </gmd:MD_Keywords>
        </gmd:descriptiveKeywords>
        <gmd:descriptiveKeywords>
          <gmd:MD_Keywords>
            <gmd:keyword>
              <gco:CharacterString>Land cover</gco:CharacterString>
            </gmd:keyword>
            <gmd:thesaurusName>
              <gmd:CI_Citation>
                <gmd:title>
                  <gco:CharacterString>GEMET - INSPIRE themes, version
1.0</gco:CharacterString>
                </gmd:title>
                <gmd:date>
                  <gmd:CI_Date>
                    <gmd:date>
                      <gco:Date>2008-06-01</gco:Date>
                    </gmd:date>
                    <gmd:dateType>
                      <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/ML_gmx
Codelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                    </gmd:dateType>
                  </gmd:CI_Date>
                </gmd:date>
              </gmd:CI_Citation>
            </gmd:thesaurusName>
          </gmd:MD_Keywords>
        </gmd:descriptiveKeywords>
        ...
      </gmd:MD_DataIdentification>
    </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 30 – Keyword encoding example – keywords from 2 controlled vocabularies

2.3.8 Temporal extent

140 Metadata item definition: date for the content of the data resource.

141 The basic encoding for temporal extent is shown in Figure 31. The temporal extent data shall be encoded using the gml:TimePeriod type from the gml namespace. The underlying schemas and standards in fact allow greater flexibility here but for the purposes of GEMINI2 only the gml:TimePeriod XML element and the gml:TimeInstant XML element (for single dates) shall be used. In addition gml:TimePeriod shall contain only gml:beginPosition followed by gml:endPosition. Time positions shall be expressed in the Gregorian calendar and UTC as per ISO 8601.

142 The gml:TimePeriod and gml:TimeInstant XML elements must have an identifier in order to be schema valid. A UUID can be used, as is shown in Figure 31. The identifier only needs to be unique in the scope of the metadata instance so a value of 't1' (see Figure 32) is acceptable. See section 2.2.12 for more information on the allowable content of id attributes.

143 See section 2.2.3 for more information on the format of date and date-time values.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:extent>
        <gmd:EX_Extent>
          ...
          <gmd:temporalElement>
            <gmd:EX_TemporalExtent>
              <gmd:extent>
                <gml:TimePeriod gml:id="_70093470-47df-45ce-b33a-60450e251c4c">
                  <gml:beginPosition>2009-01-01</gml:beginPosition>
                  <gml:endPosition>2010-01-25</gml:endPosition>
                </gml:TimePeriod>
              </gmd:extent>
            </gmd:EX_TemporalExtent>
          </gmd:temporalElement>
          ...
        </gmd:EX_Extent>
      </gmd:extent>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 31 – Temporal extent (gml:TimePeriod) encoding example

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:extent>
        <gmd:EX_Extent>
          ...
```

```
                    <gmd:temporalElement>
                      <gmd:EX_TemporalExtent>
                        <gmd:extent>
                          <gml:TimeInstant gml:id="t1">
                            <gml:timePosition>2011-04-20</gml:timePosition>
                          </gml:TimeInstant>
                        </gmd:extent>
                      </gmd:EX_TemporalExtent>
                    </gmd:temporalElement>
                    ...
                </gmd:EX_Extent>
              </gmd:extent>
              ...
          </gmd:MD_DataIdentification>
      </gmd:identificationInfo>
      ...
</gmd:MD_Metadata>
```

Figure 32 – Temporal extent (gml:TimeInstant) encoding example (single date)

144   GEMINI2 allows for uncertainty in the temporal extent so that one or other, but not both, begin position or end position may be blank. The corresponding encoding in this case makes use of the indeterminatePosition attribute which may take a value of 'unknown' (Figure 33). The indeterminatePosition attribute may also take the following values:

- 'now' – in which case the current date will be taken as the value

- 'before' – in which case the actual date is unknown but known to be before the specified date

- 'after' – in which case the actual date is unknown but known to be after the specified date

145   Figure 34 shows encoding examples using these values.

```
<gmd:temporalElement>
  <gmd:EX_TemporalExtent>
    <gmd:extent>
      <gml:TimePeriod gml:id="_184029eb-4865-4503-9631-e51ab1f23588">
        <gml:beginPosition>2009-01-01</gml:beginPosition>
        <gml:endPosition indeterminatePosition="unknown" />
      </gml:TimePeriod>
    </gmd:extent>
  </gmd:EX_TemporalExtent>
</gmd:temporalElement>
```

Figure 33 – Temporal extent encoding example (unknown dates)

```
<gml:endPosition indeterminatePosition="now"/>

<gml:endPosition indeterminatePosition="before">2010-01-25</gml:endPosition>

<gml:endPosition indeterminatePosition="after">2010-01-25</gml:endPosition>
```

Figure 34 – Temporal extent encoding example (other unknown or unspecified dates)

2.3.9 Dataset reference date

146   Metadata item definition: reference date for the data resource.

147   The encoding for dataset reference date is shown in Figure 35.

148   Dates may be expressed with low precision, as shown in the example. GEMINI2 also allows the date and time to be published in metadata. In this case the date encoding shown in Figure 36 must be used.

149   See section 2.2.3 for more information on the format of date and date-time values.

150   Dataset reference date shall include a date type. The content of this XML element is drawn from a code list. See section 2.2.9 for more information about code lists.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          ...
          <gmd:date>
            <gmd:CI_Date>
              <gmd:date>
                <gco:Date>1995</gco:Date>
              </gmd:date>
              <gmd:dateType>
                <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
              </gmd:dateType>
            </gmd:CI_Date>
          </gmd:date>
          ...
        </gmd:CI_Citation>
      </gmd:citation>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 35 – Dataset reference date encoding example

```
...
<gmd:date>
  <gco:DateTime>1995-06-10T12:30:59</gco:DateTime>
</gmd:date>
...
```

Figure 36 – Dataset reference date encoding example (date and time)

2.3.10 Lineage

151   Metadata item definition: information about the events or source data used in the construction of the data resource.

152   The encoding for lineage is shown in Figure 37.

153   Note that, in addition to the lineage statement, the data quality scope shall be encoded. For dataset metadata instances the MD_ScopeCode code list value shall be "dataset". For series metadata instances the code list value shall be "series".

```
<gmd:MD_Metadata>
  ...
  <gmd:dataQualityInfo>
    <gmd:DQ_DataQuality>
      <gmd:scope>
        <gmd:DQ_Scope>
          <gmd:level>
            <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="dataset">dataset</gmd:MD_ScopeCode>
          </gmd:level>
        </gmd:DQ_Scope>
      </gmd:scope>
      <gmd:lineage>
        <gmd:LI_Lineage>
          <gmd:statement>
            <gco:CharacterString>The data shows polygonal and selected linear
geological information, sourced from published BGS 1:625 000 scale maps.
</gco:CharacterString>
          </gmd:statement>
        </gmd:LI_Lineage>
      </gmd:lineage>
    </gmd:DQ_DataQuality>
  </gmd:dataQualityInfo>
</gmd:MD_Metadata>
```

Figure 37 – Lineage encoding example

2.3.11 Geographic bounding box

154 Metadata item definition: west bounding longitude, east bounding longitude, south bounding latitude, north bounding latitude. In the 2012 GEMINI revision, this becomes a single "Bounding box" element, with four sub-elements, which aligns better with its representation in ISO 19115.

155 The encoding example for geographic bounding box for datasets is shown in Figure 38.

156 Note that the extent XML element is in the gmd namespace. This differs from service metadata instances where the extent XML element will be in the srv namespace. See 2.4.8.

157 The definition of the equivalent ISO 19115 class, EX_GeographicBoundingBox, is 'Geographic area of the entire dataset referenced to WGS 84'. Consequently, the CRS of the coordinates expressed in metadata is always WGS 84 (identified by the EPSG URI `http://www.opengis.net/def/crs/EPSG/0/4326`). This means that the coordinate values shall be expressed in units of degrees (encoded using decimal numbers) with axes orientated north and east. The geodetic datum is WGS 84.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:extent>
        <gmd:EX_Extent>
          <gmd:geographicElement>
            <gmd:EX_GeographicBoundingBox>
              <gmd:westBoundLongitude>
                <gco:Decimal>-8.14</gco:Decimal>
              </gmd:westBoundLongitude>
              <gmd:eastBoundLongitude>
                <gco:Decimal>2.96</gco:Decimal>
              </gmd:eastBoundLongitude>
              <gmd:southBoundLatitude>
                <gco:Decimal>49.79</gco:Decimal>
              </gmd:southBoundLatitude>
              <gmd:northBoundLatitude>
                <gco:Decimal>60.77</gco:Decimal>
              </gmd:northBoundLatitude>
            </gmd:EX_GeographicBoundingBox>
          </gmd:geographicElement>
          ...
        </gmd:EX_Extent>
      </gmd:extent>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 38 – Geographic bounding box encoding example

2.3.12 Extent

158 Metadata item definition: extent of data resource.

159 The encoding example for extent is shown in Figure 39.

160 Note that the extent XML element is in the gmd namespace. This differs from service metadata instances where the extent XML element will be in the srv namespace. See 2.4.8.

161 The examples shown below use codes (URIs in URL form) from the Ordnance Survey Linked Data [6] boundary data. The code element can be used as a URL returning a page on the internet providing further information. The code in Figure 39, ending in 7000000000041546, is the URL for Central Scotland. Associated with this code is further information, such as the geometry of Central Scotland.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:extent>
        <gmd:EX_Extent>
          <gmd:geographicElement>
            <gmd:EX_GeographicDescription>
              <gmd:geographicIdentifier>
                <gmd:MD_Identifier>
                  <gmd:code>
<gco:CharacterString>
http://data.ordnancesurvey.co.uk/id/7000000000041546</gco:CharacterString>
                  </gmd:code>
                </gmd:MD_Identifier>
              </gmd:geographicIdentifier>
            </gmd:EX_GeographicDescription>
          </gmd:geographicElement>
          ...
        </gmd:EX_Extent>
      </gmd:extent>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 39 – Extent encoding example

162 The entity responsible for managing the extent code can be expressed in GEMINI metadata. An example of the encoding is shown in Figure 40.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:extent>
        <gmd:EX_Extent>
          <gmd:geographicElement>
```

```
                <gmd:EX_GeographicDescription>
                  <gmd:geographicIdentifier>
                    <gmd:MD_Identifier>
                      <gmd:authority>
                        <gmd:CI_Citation>
                          <gmd:title>
    <gco:CharacterString>Ordnance Survey Linked Data</gco:CharacterString>
                          </gmd:title>
                          <gmd:date>
                            <gmd:CI_Date>
                              <gmd:date>
                                <gco:Date>2010-10-25</gco:Date>
                              </gmd:date>
                              <gmd:dateType>
                                <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
                              </gmd:dateType>
                            </gmd:CI_Date>
                          </gmd:date>
                        </gmd:CI_Citation>
                      </gmd:authority>
                      <gmd:code>
<gco:CharacterString>http://data.ordnancesurvey.co.uk/id/7000000000017765
</gco:CharacterString>
                      </gmd:code>
                    </gmd:MD_Identifier>
                  </gmd:geographicIdentifier>
                </gmd:EX_GeographicDescription>
              </gmd:geographicElement>
              ...
          </gmd:EX_Extent>
        </gmd:extent>
        ...
      </gmd:MD_DataIdentification>
    </gmd:identificationInfo>
    ...
</gmd:MD_Metadata>
```

Figure 40 – Extent encoding example with authority

2.3.13 Vertical extent information

163 Metadata item definition: vertical domain of the data resource

164 The encoding of the vertical extent information is explained. The vertical extent information is expressed by a minimum and maximum coordinate value and a vertical CRS. The vertical CRS expresses the CRS of the vertical extent coordinates alone. It does not necessarily express the vertical CRS to which vertical coordinates in the data are referenced – in other words it is possible that the vertical extent is defined in a different CRS from the vertical CRS of the data. This is convenient if it were the case that datasets within a domain were referenced to many different vertical CRSs because it could be decided that all vertical extents in metadata are to be referenced to a single common vertical CRS to aid searching or understanding by users. Searching by vertical extent, referenced to different vertical CRSs, across metadata sets would be complicated by the need to undertake many coordinate operations – which is not necessarily a trivial task – or even possible in all cases.

165 The CRS of vertical extent elements must be provided in order to give meaning to the minimum and maximum coordinates. From the CRS, for example, it is possible to determine the orientation of the coordinate system axis (i.e. do positive values increase upwards or downwards from the zero reference) and the units of the coordinate values.

166 There are two approaches to encoding the vertical CRS: by reference (Figure 41) or by value (Figure 42). These examples express the same information: that the vertical extent coordinates are referenced to Ordnance Datum (Newlyn). Codes and GML CRS data are from the EPSG registry [4].

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
    <gmd:extent>
      <gmd:EX_Extent>
        ...
        <gmd:verticalElement>
          <gmd:EX_VerticalExtent>
            <gmd:minimumValue>
              <gco:Real>42</gco:Real>
            </gmd:minimumValue>
            <gmd:maximumValue>
              <gco:Real>94</gco:Real>
            </gmd:maximumValue>
            <gmd:verticalCRS xlink:href="
http://www.opengis.net/def/crs/EPSG/0/5701"/>
          </gmd:EX_VerticalExtent>
        </gmd:verticalElement>
      </gmd:EX_Extent>
    </gmd:extent>
    ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 41 – Vertical extent information (Vertical CRS by reference)

```xml
<gmd:MD_Metadata>
  ...
  <gmd:dataIdentification>
    <gmd:MD_DataIdentification>
      ...
      <gmd:extent>
        <gmd:EX_Extent>
          ...
          <gmd:verticalElement>
            <gmd:EX_VerticalExtent>
              <gmd:minimumValue>
                <gco:Real>42</gco:Real>
              </gmd:minimumValue>
              <gmd:maximumValue>
                <gco:Real>94</gco:Real>
              </gmd:maximumValue>
              <gmd:verticalCRS>
                <gml:VerticalCRS gml:id="epsg-crs-5701">
                  <gml:identifier
codeSpace="OGP">urn:ogc:def:crs:EPSG::5701</gml:identifier>
                  <gml:name>ODN height</gml:name>
                  <gml:scope>Geodetic and engineering surveying.</gml:scope>
                  <gml:verticalCS>
                    <gml:VerticalCS gml:id="epsg-cs-6499">
                      <gml:identifier
codeSpace="OGP">urn:ogc:def:cs:EPSG::6499</gml:identifier>
    <gml:name>Vertical CS. Axis: height (H). Orientation: up. UoM: m.</gml:name>
    <gml:remarks>Used in vertical coordinate reference systems.</gml:remarks>
                      <gml:axis>
                        <gml:CoordinateSystemAxis gml:id="epsg-axis-114"
gml:uom="urn:ogc:def:uom:EPSG::9001">
                          <gml:descriptionReference xlink:href="
http://www.opengis.net/def/crs/EPSG/0/9904"/>
                          <gml:identifier
codeSpace="OGP">urn:ogc:def:axis:EPSG::114</gml:identifier>
                          <gml:axisAbbrev>H</gml:axisAbbrev>
                          <gml:axisDirection
codeSpace="EPSG">up</gml:axisDirection>
                        </gml:CoordinateSystemAxis>
                      </gml:axis>
                    </gml:VerticalCS>
                  </gml:verticalCS>
                  <gml:verticalDatum>
                    <gml:VerticalDatum gml:id="epsg-datum-5101">
                      <gml:identifier
codeSpace="OGP">urn:ogc:def:datum:EPSG::5101</gml:identifier>
                      <gml:name>Ordnance Datum Newlyn</gml:name>
                      <gml:remarks>Orthometric heights.</gml:remarks>
    <gml:scope>Topographic mapping, geodetic survey.</gml:scope>
    <gml:anchorDefinition>Mean Sea Level at Newlyn between 1915 and
1921.</gml:anchorDefinition>
                    </gml:VerticalDatum>
                  </gml:verticalDatum>
                </gml:VerticalCRS>
              </gmd:verticalCRS>
            </gmd:EX_VerticalExtent>
          </gmd:verticalElement>
        </gmd:EX_Extent>
      </gmd:extent>
      ...
```

```
    </gmd:MD_DataIdentification>
  </gmd:dataIdentification>
  ...
</gmd:MD_Metadata>
```

Figure 42 – Vertical extent information (Vertical CRS by value)

167   Additionally, the gco:nilReason (see section 2.2.6) attribute can be used if the vertical CRS is
       unknown (Figure 43) but this renders the vertical extent information ambiguous at best.
       Consequently it would be better to refrain from including vertical extent information in the
       metadata instance altogether.

```
<gmd:verticalElement>
  <gmd:EX_VerticalExtent>
    <gmd:minimumValue>
      <gco:Real>42</gco:Real>
    </gmd:minimumValue>
    <gmd:maximumValue>
      <gco:Real>94</gco:Real>
    </gmd:maximumValue>
    <gmd:verticalCRS gco:nilReason="unknown"/>
  </gmd:EX_VerticalExtent>
</gmd:verticalElement>
```

Figure 43 – Vertical extent information (Vertical CRS unknown)

2.3.14 Spatial reference system

168 Metadata item definition: identifier of the system of spatial referencing, whether by coordinates or geographic identifiers, used in the data resource.

169 The encoding example for spatial reference system is shown in Figure 44. Ideally, a full and unambiguous definition of the CRS of the data will be provided but the ISO 19139 schemas only allow the spatial reference system to be identified by a code, on the face of it. One source of CRS definitions is the EPSG Geodetic Parameter Dataset [4]. In referencing CRS definitions from the EPSG register it is recommended that the full URN is provided, since EPSG numbers are not necessarily unique within the scope of the register. The full EPSG URI for the ETRS89 Geodetic CRS is:

```
http://www.opengis.net/def/crs/EPSG/0/4258
```

170 This URI can be dereferenced using web services provided by the EPSG to provide the full CRS definition encoded in GML. Thus indicating the CRS by identifier in this way provides an efficient and low risk means of transmitting the CRS information. Note that the URI cannot be provided as the target of an xlink:href (as in Figure 16) because the resulting GML would not be valid content here – the schema expects an identifier.

```
<gmd:MD_Metadata>
  ...
  <gmd:referenceSystemInfo>
    <gmd:MD_ReferenceSystem>
      <gmd:referenceSystemIdentifier>
        <gmd:RS_Identifier>
          <gmd:code>
<gco:CharacterString>http://www.opengis.net/def/crs/EPSG/0/4258
</gco:CharacterString>
          </gmd:code>
        </gmd:RS_Identifier>
      </gmd:referenceSystemIdentifier>
    </gmd:MD_ReferenceSystem>
  </gmd:referenceSystemInfo>
  ...
</gmd:MD_Metadata>
```

Figure 44 – Spatial reference system encoding example

171 If a CRS is not identified in a register such as that provided by the EPSG it is possible to identify the CRS in an external catalogue (Figure 45) which can be under the control of the metadata creator. An example of a CRS catalogue is shown in Appendix A.
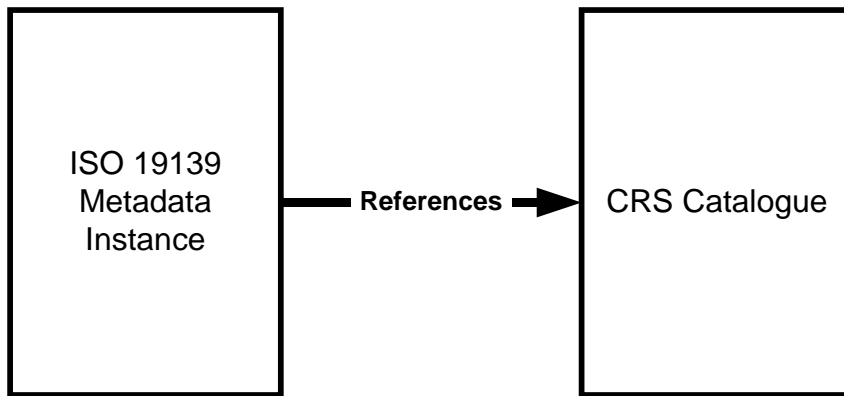
Figure 45 – Referencing an external CRS catalogue

172   The corresponding ISO 19139 XML encoding for this approach makes use of the gmx:Anchor element, as shown in Figure 46. In this case the xlink:href attribute of gmx:Anchor is referencing an XML file CRSCatalogue.xml which is in the same location as the metadata instance. However, the xlink:href attribute could include the URI of the CRS catalogue if it were available on the internet. Indeed this approach could also be used to encode the identifier of the CRS in a registry, such as EPSG, together with a human readable name. Metadata instances using this approach will be validated against the gmx.xsd schema rather than gmd.xsd and include a reference to the gmx namespace in the root element.

```
<referenceSystemInfo>
  <MD_ReferenceSystem>
    <referenceSystemIdentifier>
      <RS_Identifier>
        <code>
          <gmx:Anchor xlink:href="CRSCatalogue.xml#szsl-crs-32792">
            ETRS89 / MSL height
          </gmx:Anchor>
        </code>
      </RS_Identifier>
    </referenceSystemIdentifier>
  </MD_ReferenceSystem>
</referenceSystemInfo>
```

Figure 46 – Referencing an external CRS Catalogue using gmx:Anchor

173   The entity responsible for managing the CRS code can be expressed in GEMINI metadata. An example of the encoding is shown in (Figure 47).

```
<gmd:MD_Metadata>
  ...
  <gmd:referenceSystemInfo>
    <gmd:MD_ReferenceSystem>
      <gmd:referenceSystemIdentifier>
        <gmd:RS_Identifier>
          <gmd:authority>
            <gmd:CI_Citation>
              <gmd:title>
      <gco:CharacterString>EPSG Geodetic Parameter Registry</gco:CharacterString>
```

```
            </gmd:title>
              <gmd:date>
                <gmd:CI_Date>
                  <gmd:date>
                    <gco:Date>2010-11-02</gco:Date>
                  </gmd:date>
                   <gmd:dateType>
                     <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
                   </gmd:dateType>
                 </gmd:CI_Date>
              </gmd:date>
            </gmd:CI_Citation>
          </gmd:authority>
          <gmd:code>
<gco:CharacterString>
http://www.opengis.net/def/crs/EPSG/0/4258</gco:CharacterString>
          </gmd:code>
        </gmd:RS_Identifier>
      </gmd:referenceSystemIdentifier>
    </gmd:MD_ReferenceSystem>
  </gmd:referenceSystemInfo>
  ...
</gmd:MD_Metadata>
```

Figure 47 – Spatial reference system encoding example with authority

2.3.15 Spatial resolution

174 Metadata item definition: measure of the granularity of the data (in metres).

175 The encoding example for spatial resolution is shown in Figure 48.

176 A distance measurement shall be encoded and the unit of measurement shall be identified. The unit of measurement is identified using the uom attribute of the XML element gco:Distance. In the case of GEMINI2 all spatial resolution distance measurements shall be in metres. The value of the uom attribute shall be:

```
urn:ogc:def:uom:EPSG::9001
```

177 This defines the unit of measure as metres by reference to the EPSG registry [4].

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:spatialResolution>
        <gmd:MD_Resolution>
          <gmd:distance>
            <gco:Distance uom="urn:ogc:def:uom:EPSG::9001">20</gco:Distance>
          </gmd:distance>
        </gmd:MD_Resolution>
      </gmd:spatialResolution>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 48 – Spatial resolution encoding example

2.3.16 Resource locator

178 Metadata item definition: location (address) for on-line access using a Uniform Resource Locator (URL) address or similar addressing scheme.

179 The encoding example for resource locator is shown in Figure 49.

180 The gmd:transferOptions XML element of gmd:MD_Distribution is used to encode a URL. Note that the element gmd:MD_Distribution must have the element gmd:distributionFormat as its first child according to a constraint in ISO 19115. Format information may not always be known in which case the encoding of the element gmd:MD_Format shown in Figure 49 shall be used, following the INSPIRE guidelines [2]. If the format and version values are known, then they should be given (see section 2.3.17).

```
<gmd:MD_Metadata>
  ...
  <gmd:distributionInfo>
    <gmd:MD_Distribution>
      <gmd:distributionFormat>
        <gmd:MD_Format>
          <gmd:name>
            <gco:CharacterString>Unknown</gco:CharacterString>
          </gmd:name>
          <gmd:version>
            <gco:CharacterString>Unknown</gco:CharacterString>
          </gmd:version>
        </gmd:MD_Format>
      </gmd:distributionFormat>
      <gmd:transferOptions>
        <gmd:MD_DigitalTransferOptions>
          <gmd:onLine>
            <gmd:CI_OnlineResource>
              <gmd:linkage>
                <gmd:URL>http://ogc.bgs.ac.uk/dppp/wmc/digmap625.xml</gmd:URL>
              </gmd:linkage>
            </gmd:CI_OnlineResource>
          </gmd:onLine>
        </gmd:MD_DigitalTransferOptions>
      </gmd:transferOptions>
    </gmd:MD_Distribution>
  </gmd:distributionInfo>
  ...
</gmd:MD_Metadata>
```

Figure 49 – Resource locator encoding example

181 GEMINI2 allows for a URL which is a link to a point of contact where more information is available or where the dataset can be downloaded. ISO 19115 and the ISO 19139 encoding provides a means of indicating the function of the online resource by means of the CI_OnLineFunctionCode code list. Two values from this code list provide a means of discriminating between a URL that is provided for information (code list value of 'information') and a URL that is the address used for downloading (code list value of 'download') the data. The function may be expressed in GEMINI2 metadata for this purpose and the encoding is shown in Figure 50.

```
<gmd:MD_Metadata>
  ...
  <gmd:distributionInfo>
    <gmd:MD_Distribution>
      <gmd:distributionFormat>
        ...
      </gmd:distributionFormat>
      <gmd:transferOptions>
        <gmd:MD_DigitalTransferOptions>
          <gmd:onLine>
            <gmd:CI_OnlineResource>
              <gmd:linkage>
                <gmd:URL>http://image2000.jrc.ec.europa.eu/</gmd:URL>
              </gmd:linkage>
              ...
              <gmd:function>
                <gmd:CI_OnLineFunctionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_OnLineFunctionCode"
codeListValue="information">information</gmd:CI_OnLineFunctionCode>
              </gmd:function>
            </gmd:CI_OnlineResource>
          </gmd:onLine>
        </gmd:MD_DigitalTransferOptions>
      </gmd:transferOptions>
    </gmd:MD_Distribution>
  </gmd:distributionInfo>
  ...
</gmd:MD_Metadata>
```

Figure 50 – Resource locator encoding including indication of function

2.3.17 Data format

182 Metadata item definition: format in which the digital data can be provided.

183 The encoding example for data format is shown in Figure 51.

184 Both a format name and version shall be provided. In the event that the format is not versioned or the version is unknown the encoding shown in Figure 52 shall be used.

```
<gmd:MD_Metadata>
  ...
  <gmd:distributionInfo>
    <gmd:MD_Distribution>
      <gmd:distributionFormat>
        <gmd:MD_Format>
          <gmd:name>
            <gco:CharacterString>GML</gco:CharacterString>
          </gmd:name>
          <gmd:version>
            <gco:CharacterString>3.2.1</gco:CharacterString>
          </gmd:version>
        </gmd:MD_Format>
      </gmd:distributionFormat>
      ...
    </gmd:MD_Distribution>
  </gmd:distributionInfo>
  ...
</gmd:MD_Metadata>
```

Figure 51 – Data format encoding example

```
...
<gmd:version>
  <gco:CharacterString>Unknown</gco:CharacterString>
</gmd:version>
...
```

Figure 52 – Data format encoding - unknown version

2.3.18 Responsible organisation

185 Metadata item definition: details of the organisation(s) responsible for the establishment, management, maintenance and distribution of the data resource.

186 The encoding example for responsible organisation is shown in Figure 53. The example shows the minimum required information. See section 2.2.8 for a description of the ISO 19115 CI_ResponsibleParty class and its use in the context of GEMINI2 metadata instances.

187 The point of contact role, encoded using the gmd:role XML element, takes its code list value from the ISO 19115 code list CI_RoleCode. Any of the values in the code list may be used. The UK Location portal (data.gov.uk site) interprets ISO "owner" as Data Provider, and ISO "publisher" as Data Publisher.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:pointOfContact>
        <gmd:CI_ResponsibleParty>
          <gmd:organisationName>
            <gco:CharacterString>SeaZone Solutions</gco:CharacterString>
          </gmd:organisationName>
          <gmd:contactInfo>
            <gmd:CI_Contact>
              <gmd:address>
                <gmd:CI_Address>
                  <gmd:electronicMailAddress>
                    <gco:CharacterString>info@seazone.com</gco:CharacterString>
                  </gmd:electronicMailAddress>
                </gmd:CI_Address>
              </gmd:address>
            </gmd:CI_Contact>
          </gmd:contactInfo>
          <gmd:role>
            <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="distributor">distributor</gmd:CI_RoleCode>
          </gmd:role>
        </gmd:CI_ResponsibleParty>
      </gmd:pointOfContact>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 53 – Responsible organisation encoding example

2.3.19 Frequency of update

188   Metadata item definition: frequency with which modifications and deletions are made to the data resource after it is first produced.

189   The encoding example for frequency of update is shown in Figure 54.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:resourceMaintenance>
        <gmd:MD_MaintenanceInformation>
          <gmd:maintenanceAndUpdateFrequency>
            <gmd:MD_MaintenanceFrequencyCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_MaintenanceFrequencyCode"
codeListValue="asNeeded">asNeeded</gmd:MD_MaintenanceFrequencyCode>
          </gmd:maintenanceAndUpdateFrequency>
        </gmd:MD_MaintenanceInformation>
      </gmd:resourceMaintenance>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 54 – Frequency of update encoding example

2.3.20 Limitations on public access

190 Metadata item definition: restrictions imposed on the data resource for security and other reasons.

191 The encoding example for limitations on public access is shown in Figure 55.

192 Access constraints shall be encoded with the code list value 'otherRestrictions'. Limitations shall be encoded using the XML element gmd:otherConstraints with free text. Limitations on public access is a mandatory metadata item in GEMINI2. If there are no limitations the value of gmd:otherConstraints shall be 'no limitations' (see Figure 56).

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:resourceConstraints>
        <gmd:MD_LegalConstraints>
          ...
          <gmd:accessConstraints>
            <gmd:MD_RestrictionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_RestrictionCode"
codeListValue="otherRestrictions">otherRestrictions</gmd:MD_RestrictionCode>
          </gmd:accessConstraints>
          <gmd:otherConstraints>
            <gco:CharacterString>[Document other restrictions
here]</gco:CharacterString>
          </gmd:otherConstraints>
        </gmd:MD_LegalConstraints>
      </gmd:resourceConstraints>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 55 – Limitations on public access encoding example

```
...
<gmd:otherConstraints>
  <gco:CharacterString>no limitations</gco:CharacterString>
</gmd:otherConstraints>
...
```

Figure 56 – Limitations on public access – no limitations

2.3.21 Use constraints

193   Metadata item definition: restrictions and legal restraints on using the data resource.

194   The example encoding for use constraints is shown in Figure 58. Use constraints is a mandatory metadata item.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:resourceConstraints>
        <gmd:MD_Constraints>
          <gmd:useLimitation>
          <gco:CharacterString>Not to be used for navigation</gco:CharacterString>
          </gmd:useLimitation>
          ...
        </gmd:MD_Constraints>
      </gmd:resourceConstraints>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 57 – Use constraints encoding example

195   If no use constraints apply to the data resource the value of the XML element gmd:useLimitation shall be 'no conditions apply' [1]; this is because in INSPIRE the element is known as "conditions applying to access and use".

196   In certain circumstances it might be appropriate to refer to an external document describing constraints. In this case the encoding shown in **Error! Reference source not found.** may be used.

```
        ...
      <gmd:resourceConstraints>
        <gmd:MD_Constraints>
          <gmd:useLimitation>
        <gmx:Anchor
xlink:href="http://www.ordnancesurvey.co.uk/opendata/licence/docs/licence.pdf">O
S OpenData licence</gmx:Anchor>
        </gmd:useLimitation>
          ...
        </gmd:MD_Constraints>
      </gmd:resourceConstraints>
        ...
```

Figure 58 – Use constraints encoding example with external file

2.3.22 Additional information source

197 Metadata item definition: other descriptive information about the data resource.

198 The example encoding for additional information source is shown in Figure 59.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:supplementalInformation>
        <gco:CharacterString>Ongoing modifications to dataset as appropriate. UK
coverage except for western and southern margin of Northern Ireland. As accurate
as the underlying geological interpretation. 1:625k scale resolution. Bedrock
theme numerically coded. Superficial theme lex-rock coded.</gco:CharacterString>
      </gmd:supplementalInformation>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 59 – Additional information source example encoding

2.3.23 Unique resource identifier

199 Metadata item definition: value uniquely identifying the data resource.

200 The unique resource identifier can be a globally unique identifier, in which case it is encoded as shown in Figure 60. This is also the form used if the identifier is expressed as a code space and code in URI form:

http://image2000.jrc.it#image2000_1_nl2_multi

201 Where a code and code space is provided the code is not considered globally unique but must be unique within the scope of the code space. If the code and code space are expressed separately the encoding makes use of the gmd:RS_Identifier XML element instead of the gmd:MD_Identifier XML element (Figure 61).

202 Note that the identifier is encoded in the citation of the metadata instance and in the 'id' attribute of the gmd:MD_DataIdentification type. This follows the examples in the INSPIRE guidelines [2].

203 Care must be taken with the value of the code. The attribute 'id' has the data type xs:ID which must have as its value an XML name. This means that it cannot start with a number. Therefore, an underscore has been appended to the start of the UUID code in Figure 60. See section 2.2.12 for more information on the value of id type attributes.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification id="_527c4cac-070c-4bca-9aaf-92bece7be902">
      <gmd:citation>
        <gmd:CI_Citation>
          ...
          <gmd:identifier>
            <gmd:MD_Identifier>
              <gmd:code>
                <gco:CharacterString>527c4cac-070c-4bca-9aaf-
92bece7be902</gco:CharacterString>
              </gmd:code>
              ...
            </gmd:MD_Identifier>
          </gmd:identifier>
          ...
        </gmd:CI_Citation>
      </gmd:citation>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 60 – Unique resource identifier encoding example

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification id="image2000_1_nl2_multi">
      <gmd:citation>
        <gmd:CI_Citation>
          ...
          <gmd:identifier>
            <gmd:RS_Identifier>
              <gmd:code>
                <gco:CharacterString>image2000_1_nl2_multi</gco:CharacterString>
              </gmd:code>
              <gmd:codeSpace>
<gco:CharacterString>http://image2000.jrc.it</gco:CharacterString>
              </gmd:codeSpace>
            </gmd:RS_Identifier>
          </gmd:identifier>
          ...
        </gmd:CI_Citation>
      </gmd:citation>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 61 – Unique resource identifier – code and code space

2.3.24Resource type

204 Metadata item definition: scope to which metadata applies.

205 The encoding example for resource type is shown in Figure 62.

```
<gmd:MD_Metadata>
  ...
  <gmd:hierarchyLevel>
    <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="dataset">dataset</gmd:MD_ScopeCode>
  </gmd:hierarchyLevel>
  ...
</gmd:MD_Metadata>
```

Figure 62 – Resource type encoding example

2.3.25 Conformity

206 Metadata item definition: degree of conformity with the product specification or user requirement against which the data is being evaluated.

207 The encoding for conformity is shown in Figure 63.

208 Note that the encoding of conformity requires a specification (encoded using gmd:CI_Citation), an explanation and a pass (encoded using gco:Boolean). INSPIRE Metadata Implementing Rules state that there are possible conformance results: conformant, not conformant and not evaluated. Since the pass XML element takes a Boolean value, not evaluated cannot be expressed. Not evaluated is expressed by the omission of the conformity statement altogether. In practice this means omitting the gmd:report XML element and, of course, all its contents.

209 In order to measure conformity, reference should be made to the conformance criteria in the specification against which conformance is being claimed.

210 All gmd:dataQualityInfo XML element shall have a gmd:scope XML element, set to "dataset" or "series" as appropriate.

```
<gmd:MD_Metadata>
  ...
  <gmd:dataQualityInfo>
    <gmd:DQ_DataQuality>
      <gmd:scope>
        <gmd:DQ_Scope>
          <gmd:level>
            <gmd:MD_ScopeCode codeListValue="dataset"
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode">dataset</gmd:MD_ScopeCode
>
          </gmd:level>
          ...
        </gmd:DQ_Scope>
      </gmd:scope>
      <gmd:report>
        <gmd:DQ_DomainConsistency>
          <gmd:result>
            <gmd:DQ_ConformanceResult>
              <gmd:specification>
                <gmd:CI_Citation>
                  <gmd:title>
                    <gco:CharacterString>INSPIRE Implementing rules laying down
technical arrangements for the interoperability and harmonisation of
orthoimagery</gco:CharacterString>
                  </gmd:title>
                  <gmd:date>
                    <gmd:CI_Date>
                      <gmd:date>
                        <gco:Date>2011-05-15</gco:Date>
                      </gmd:date>
                      <gmd:dateType>
                        <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                      </gmd:dateType>
```

```
                </gmd:CI_Date>
              </gmd:date>
            </gmd:CI_Citation>
          </gmd:specification>
          <gmd:explanation>
            <gco:CharacterString>See the referenced
specification</gco:CharacterString>
          </gmd:explanation>
          <gmd:pass>
            <gco:Boolean>true</gco:Boolean>
          </gmd:pass>
        </gmd:DQ_ConformanceResult>
      </gmd:result>
    </gmd:DQ_DomainConsistency>
  </gmd:report>
    ...
  </gmd:DQ_DataQuality>
 </gmd:dataQualityInfo>
</gmd:MD_Metadata>
```

Figure 63 – Conformity encoding example

2.3.26 Equivalent scale

211　Metadata item definition: level of detail expressed as the scale denominator of a comparable hardcopy map or chart

212　The encoding example for equivalent scale is shown in Figure 64.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:spatialResolution>
        <gmd:MD_Resolution>
          <gmd:equivalentScale>
            <gmd:MD_RepresentativeFraction>
              <gmd:denominator>
                <gco:Integer>50000</gco:Integer>
              </gmd:denominator>
            </gmd:MD_RepresentativeFraction>
          </gmd:equivalentScale>
        </gmd:MD_Resolution>
      </gmd:spatialResolution>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 64 – Equivalent scale encoding example

2.3.27 Metadata language

213 Metadata item definition: language used for documenting the metadata.

214 The encoding example for metadata language is shown in Figure 65.

```
<gmd:MD_Metadata>
  ...
  <gmd:language>
    <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-
2/php/code_list.php" codeListValue="eng">eng</gmd:LanguageCode>
  </gmd:language>
  ...
</gmd:MD_Metadata>
```

Figure 65 – Metadata language encoding example

2.3.28 Metadata date

215 Metadata item definition: date on which the metadata was last updated, or was confirmed as being up-to-date, or if not updated, then the date it was created.

216 The encoding example for metadata date is shown in Figure 66. Note that it is possible to record the date and time of the metadata instance using the encoding shown in Figure 67.

```
<gmd:MD_Metadata>
  ...
  <gmd:dateStamp>
    <gco:Date>2009-10-15</gco:Date>
  </gmd:dateStamp>
  ...
</gmd:MD_Metadata>
```

Figure 66 – Metadata date encoding example

```
<gmd:MD_Metadata>
  ...
  <gmd:dateStamp>
    <gco:DateTime>2009-10-15T12:01:30</gco:DateTime>
  </gmd:dateStamp>
  ...
</gmd:MD_Metadata>
```

Figure 67 – Metadata date encoding example (date and time)

2.3.29 Metadata point of contact

217 Metadata item definition: party responsible for the creation and maintenance of the metadata.

218 The encoding example for metadata point of contact is shown in Figure 68. Note that the example shows the minimum required information. See section 2.2.8 for more information.

219 More than one metadata point of contact may be expressed in metadata. The role of at least one metadata point of contact shall be 'pointOfContact'.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:contact>
    <gmd:CI_ResponsibleParty>
      <gmd:organisationName>
        <gco:CharacterString>SeaZone Solutions</gco:CharacterString>
      </gmd:organisationName>
      <gmd:contactInfo>
        <gmd:CI_Contact>
          <gmd:address>
            <gmd:CI_Address>
              <gmd:electronicMailAddress>
                <gco:CharacterString>info@seazone.com</gco:CharacterString>
              </gmd:electronicMailAddress>
            </gmd:CI_Address>
          </gmd:address>
        </gmd:CI_Contact>
      </gmd:contactInfo>
      <gmd:role>
        <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="pointOfContact">pointOfContact</gmd:CI_RoleCode>
      </gmd:role>
    </gmd:CI_ResponsibleParty>
  </gmd:contact>
  ...
</gmd:MD_Metadata>
```

Figure 68 – Metadata point of contact encoding example (minimum required)

2.4 Metadata for services

2.4.1 Service identification

220   XML elements for encoding metadata for services are drawn from the gmd, gco, gml, xlink and srv namespaces. Identification information is encoded using the srv:SV_ServiceIdentification type (Figure 69).

221   Metadata may include more than one gmd:identificationInfo XML element. The first gmd:identificationInfo XML element in a GEMINI metadata instance for services shall have as its first child XML element srv:SV_ServiceIdentification. The ISO 19115 hierarchyLevel element shall be set to "service", ISO 19115 hierarchyLevelName element must also be set, to an appropriate character string.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:hierarchyLevel>
    <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="service">service</gmd:MD_ScopeCode>
  </gmd:hierarchyLevel>
  <gmd:hierarchyLevelName>
    <gco:CharacterString>Service</gco:CharacterString>
  </gmd:hierarchyLevelName>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
```

Figure 69 – Metadata for services using the srv:SV_ServiceIdentification type

2.4.2 Title

222 Metadata item definition: name given to the data resource.

223 The encoding example for Title is shown in Figure 70.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          <gmd:title>
            <gco:CharacterString>WMS publishing the Digital Geological Map Data
of Great Britain - 625k</gco:CharacterString>
          </gmd:title>
          ...
        </gmd:CI_Citation>
      </gmd:citation>
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 70 – Title encoding example

2.4.3 Alternative title

224   Metadata item definition: short name, other name, acronym or alternative language title for the data resource.

225   The encoding example for alternative title is shown in Figure 71. Note that more than one alternative title may be presented, as shown in the example above.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          ...
          <gmd:alternateTitle>
            <gco:CharacterString>WMS publishing the Geology onshore digital maps
1:625 000 scale</gco:CharacterString>
          </gmd:alternateTitle>
          <gmd:alternateTitle>
            <gco:CharacterString>Service publishing DiGMapGB-
625</gco:CharacterString>
          </gmd:alternateTitle>
          ...
        </gmd:CI_Citation>
      </gmd:citation>
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 71 – Alternative title encoding example

2.4.4 Abstract

226   Metadata item definition: brief narrative summary of the data resource.

227   The encoding example for abstract is shown in Figure 72. If you wish to express a spatial resolution for the service, do it here.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <gmd:abstract>
        <gco:CharacterString>Europe Mapping Service based on the Image2000
European mosaic (multispectral)</gco:CharacterString>
      </gmd:abstract>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 72 – Abstract encoding example

2.4.5 Keyword

228 Metadata item definition: topic of the content of the data resource.

229 The GEMINI2 keyword item comprises keyword value(s) and, conditionally, the specification of an originating controlled vocabulary. If keywords are not selected from a controlled vocabulary the encoding shown in Figure 73 shall be used.

230 In the context of INSPIRE the presence of at least one keyword is mandated. For service metadata there shall be at least one keyword defining the category or subcategory of the service using its language neutral name as defined in Part D 4 of the Metadata Implementing Rules (the language neutral names are the words in brackets using lower camel case notation). The keyword shown in Figure 74 is an example of this.

231 Where keywords do originate from a controlled vocabulary the encoding shown in Figure 75 shall be used. Note the inclusion of the gmd:thesaurusName XML element which contains the XML element gmd:CI_Citation. This element must contain at least a title, reference date and date type. In the example keywords have been selected from the GEMET Concepts controlled vocabulary.

232 Figure 75 and Figure 76 show how the GEMET INSPIRE themes and GEMET concepts controlled vocabularies should be cited according to the INSPIRE guidance [2].

233 Note that more than one keyword value may be selected from a single controlled vocabulary. Note also that keywords may be selected from more than one controlled vocabulary and / or none. In this case the encoding shown in Figure 73 shall be used.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <gmd:descriptiveKeywords>
        <gmd:MD_Keywords>
          <gmd:keyword>
            <gco:CharacterString>sounding</gco:CharacterString>
          </gmd:keyword>
        </gmd:MD_Keywords>
      </gmd:descriptiveKeywords>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 73 – Keyword encoding example – without originating controlled vocabulary

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <gmd:keywords>
        <gmd:MD_Keywords>
```

```xml
                <gmd:keyword>
                  <gco:CharacterString>humanCatalogueViewer</gco:CharacterString>
                </gmd:keyword>
                <gmd:thesaurusName>
                  <gmd:CI_Citation>
                    <gmd:title>
                      <gco:CharacterString>Commission Regulation (EC) No 1205/2008 of
3 December 2008 implementing Directive 2007/2/EC of the European Parliament and
of the Council as regards metadata</gco:CharacterString>
                    </gmd:title>
                    <gmd:alternateTitle>
<gco:CharacterString>INSPIRE Metadata Implementing Rules</gco:CharacterString>
                    </gmd:alternateTitle>
                    <gmd:date>
                      <gmd:CI_Date>
                        <gmd:date>
                          <gco:Date>2008-12-03</gco:Date>
                        </gmd:date>
                        <gmd:dateType>
                          <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/ML_gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                        </gmd:dateType>
                      </gmd:CI_Date>
                    </gmd:date>
                    <gmd:identifier>
                      <gmd:MD_Identifier>
                        <gmd:code>
<gco:CharacterString>OJ:L:2008:326:0012:01</gco:CharacterString>
                        </gmd:code>
                      </gmd:MD_Identifier>
                    </gmd:identifier>
                    <gmd:otherCitationDetails>
<gco:CharacterString>D 4 CLASSIFICATION OF SPATIAL DATA
SERVICES</gco:CharacterString>
                    </gmd:otherCitationDetails>
                  </gmd:CI_Citation>
                </gmd:thesaurusName>
              </gmd:MD_Keywords>
            </gmd:keywords>
            ...
        </srv:SV_ServiceIdentification>
      </gmd:identificationInfo>
    ...
</gmd:MD_Metadata>
```

Figure 74 – Service keyword from Part D 4 of the INSPIRE Metadata Implementing Rules

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <gmd:descriptiveKeywords>
        <gmd:MD_Keywords>
          <gmd:keyword>
            <gco:CharacterString>water monitoring</gco:CharacterString>
          </gmd:keyword>
          <gmd:keyword>
            <gco:CharacterString>water quality</gco:CharacterString>
          </gmd:keyword>
          <gmd:thesaurusName>
            <gmd:CI_Citation>
              <gmd:title>
                <gco:CharacterString>GEMET - Concepts, version
2.4</gco:CharacterString>
              </gmd:title>
              <gmd:date>
                <gmd:CI_Date>
                  <gmd:date>
                    <gco:Date>2010-01-13</gco:Date>
                  </gmd:date>
                  <gmd:dateType>
                    <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                  </gmd:dateType>
                </gmd:CI_Date>
              </gmd:date>
            </gmd:CI_Citation>
          </gmd:thesaurusName>
        </gmd:MD_Keywords>
      </gmd:descriptiveKeywords>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 75 – Keyword encoding example – GEMET Concepts

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <gmd:descriptiveKeywords>
        <gmd:MD_Keywords>
          <gmd:keyword>
            <gco:CharacterString>humanCatalogueViewer</gco:CharacterString>
          </gmd:keyword>
        </gmd:MD_Keywords>
      </gmd:descriptiveKeywords>
      <gmd:descriptiveKeywords>
        <gmd:MD_Keywords>
          <gmd:keyword>
            <gco:CharacterString>water monitoring</gco:CharacterString>
          </gmd:keyword>
          <gmd:keyword>
            <gco:CharacterString>water quality</gco:CharacterString>
          </gmd:keyword>
          <gmd:thesaurusName>
            <gmd:CI_Citation>
              <gmd:title>
                <gco:CharacterString>GEMET - Concepts, version
2.4</gco:CharacterString>
              </gmd:title>
              <gmd:date>
                <gmd:CI_Date>
                  <gmd:date>
                    <gco:Date>2010-01-13</gco:Date>
                  </gmd:date>
                  <gmd:dateType>
                    <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                  </gmd:dateType>
                </gmd:CI_Date>
              </gmd:date>
            </gmd:CI_Citation>
          </gmd:thesaurusName>
        </gmd:MD_Keywords>
      </gmd:descriptiveKeywords>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 76 – Keyword encoding example – keywords from 2 controlled vocabularies

234   The srv:SV_ServiceIdentification XML element has an optional property srv:keywords which exhibits the same behaviour as gmd:descriptiveKeywords. Consequently keywords for service metadata could be encoded in the way shown in Figure 77. This approach shall not be followed in GEMINI2 metadata instances.

235   This case arises because the XML element gmd:descriptiveKeywords is a an instance of the property (or role in fact) on the ISO 19115 abstract class MD_Identification, from which both

SV_ServiceIdentification and MD_DataIdentification inherit. Therefore, SV_ServiceIdentification inherits the descriptiveKeywords property *and* adds a similar property called keywords.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <srv:keywords>
        <gmd:MD_Keywords>
          <gmd:keyword>
            <gco:CharacterString>humanCatalogueViewer</gco:CharacterString>
          </gmd:keyword>
        </gmd:MD_Keywords>
      </srv:keywords>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 77 – Keywords in the srv namespace (this encoding is not to be used)

2.4.6 Temporal extent

236 Metadata item definition: date for the content of the data resource.

237 The basic encoding for temporal extent is shown in Figure 78. The temporal extent data shall be encoded using the gml:TimePeriod type from the gml namespace. The underlying schemas and standards in fact allow greater flexibility here but for the purposes of GEMINI2 only the gml:TimePeriod XML element and the gml:TimeInstant XML element (for single dates) shall be used. In addition gml:TimePeriod shall contain only gml:beginPosition followed by gml:endPosition. Time positions shall be expressed in the Gregorian calendar and UTC as per ISO 8601.

238 The TimePeriod and gml:TimeInstant XML elements must have an identifier in order to be valid. A UUID can be used, as is shown in Figure 78. The identifier only needs to be unique in the scope of the metadata instance so a value of 't1' (see Figure 79) is acceptable. See section 2.2.12 for more information for more information on the allowable content of the id attributes.

239 See section 2.2.3 for more information on the format of date and date-time values.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <srv:extent>
        <gmd:EX_Extent>
          ...
          <gmd:temporalElement>
            <gmd:EX_TemporalExtent>
              <gmd:extent>
                <gml:TimePeriod gml:id="_70093470-47df-45ce-b33a-60450e251c4c">
                  <gml:beginPosition>2009-01-01</gml:beginPosition>
                  <gml:endPosition>2010-01-25</gml:endPosition>
                </gml:TimePeriod>
              </gmd:extent>
            </gmd:EX_TemporalExtent>
          </gmd:temporalElement>
          ...
        </gmd:EX_Extent>
      </srv:extent>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 78 – Temporal extent (gml:TimePeriod) encoding example

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <srv:extent>
        <gmd:EX_Extent>
          ...
```

```
            <gmd:temporalElement>
              <gmd:EX_TemporalExtent>
                <gmd:extent>
                  <gml:TimeInstant gml:id="t1">
                    <gml:timePosition>2011-04-20</gml:timePosition>
                  </gml:TimeInstant>
                </gmd:extent>
              </gmd:EX_TemporalExtent>
            </gmd:temporalElement>
            ...
          </gmd:EX_Extent>
        </srv:extent>
        ...
      </gmd:MD_DataIdentification>
    </gmd:identificationInfo>
    ...
</gmd:MD_Metadata>
```

Figure 79 – Temporal extent (gml:TimeInstant) encoding example (single date)

240 GEMINI2 allows for uncertainty in the temporal extent so that one or other, but not both, begin position or end position may be blank. The corresponding encoding in this case makes use of the indeterminatePosition attribute which may take a value of 'unknown' (Figure 80). The indeterminatePosition attribute may also take the following values:

- 'now' – in which case the current date will be taken as the value

- 'before' – in which case the actual date is unknown but known to be before the specified date

- 'after' – in which case the actual date is unknown but known to be after the specified date

241 Figure 81 shows encoding examples using these values.

```
<gmd:temporalElement>
  <gmd:EX_TemporalExtent>
    <gmd:extent>
      <gml:TimePeriod gml:id="_184029eb-4865-4503-9631-e51ab1f23588">
        <gml:beginPosition>2009-01-01</gml:beginPosition>
        <gml:endPosition indeterminatePosition="unknown" />
      </gml:TimePeriod>
    </gmd:extent>
  </gmd:EX_TemporalExtent>
</gmd:temporalElement>
```

Figure 80 – Temporal extent encoding example (unknown dates)

```
<gml:endPosition indeterminatePosition="now"/>

<gml:endPosition indeterminatePosition="before">2010-01-25</gml:endPosition>

<gml:endPosition indeterminatePosition="after">2010-01-25</gml:endPosition>
```

Figure 81 – Temporal extent encoding example (other unknown or unspecified dates)

2.4.7 Dataset reference date

242 Metadata item definition: reference date for the data resource [service resource].

243 The encoding for dataset reference date is shown in Figure 82. Dates may be expressed with low precision, as shown in the example. GEMINI2 also allows the date and time to be published in metadata. In this case the date encoding shown in Figure 83 must be used.

244 See section 2.2.3 for more information on the format of date and date-time values.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          ...
          <gmd:date>
            <gmd:CI_Date>
              <gmd:date>
                <gco:Date>1995-01</gco:Date>
              </gmd:date>
              <gmd:dateType>
                <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
              </gmd:dateType>
            </gmd:CI_Date>
          </gmd:date>
          ...
        </gmd:CI_Citation>
      </gmd:citation>
      ...
    <srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 82 – Dataset reference date encoding example

```xml
...
<gmd:date>
  <gco:DateTime>1995-06-10T12:30:59</gco:DateTime>
</gmd:date>
...
```

Figure 83 – Dataset reference date encoding example (date and time)

2.4.8 Geographic bounding box

245 Metadata item definition: west bounding longitude, east bounding longitude, south bounding latitude, north bounding latitude. [This will define the aggregate bounding box of the datasets operated upon by the service]. In the 2012 GEMINI revision, this becomes a single "Bounding box" element, with four sub-elements, which aligns better with its representation in ISO 19115.

246 The encoding example for geographic bounding box is shown in Figure 84.

247 The definition of the equivalent ISO 19115 class, EX_GeographicBoundingBox, is 'Geographic area of the entire dataset referenced to WGS 84'. Consequently, the CRS of the coordinates expressed in metadata is always WGS 84 (identified by the EPSG URI `http://www.opengis.net/def/crs/EPSG/0/4326`). This means that the coordinate values shall be expressed in units of degrees (encoded using decimal numbers) with axes orientated north and east. The geodetic datum is WGS 84.

248 Note that the encoding is very similar to that used in metadata instances for datasets or series, except that the extent XML element is in the srv namespace instead of gmd. This is because extent is a property of MD_DataIdentification (ISO 19115) and SV_ServiceIdentification (ISO 19119/Amd 1:2008), not a property of the parent MD_Identification.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <srv:extent>
        <gmd:EX_Extent>
          <gmd:geographicElement>
            <gmd:EX_GeographicBoundingBox>
              <gmd:westBoundLongitude>
                <gco:Decimal>-8.14</gco:Decimal>
              </gmd:westBoundLongitude>
              <gmd:eastBoundLongitude>
                <gco:Decimal>2.96</gco:Decimal>
              </gmd:eastBoundLongitude>
              <gmd:southBoundLatitude>
                <gco:Decimal>49.79</gco:Decimal>
              </gmd:southBoundLatitude>
              <gmd:northBoundLatitude>
                <gco:Decimal>60.77</gco:Decimal>
              </gmd:northBoundLatitude>
            </gmd:EX_GeographicBoundingBox>
          </gmd:geographicElement>
          ...
        </gmd:EX_Extent>
      </srv:extent>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 84 – Geographic bounding box encoding example

2.4.9 Extent

249 Metadata item definition: extent of data resource [operated upon by the service].

250 The encoding example for extent is shown in Figure 85.

251 Note that the extent XML element is in the srv namespace. This differs from dataset metadata instances where the extent XML element will be in the gmd namespace. See 2.3.12.

252 The examples shown below use codes (URIs in URL form) from the Ordnance Survey Linked Data [6] boundary data. The value of the code element is a URL of a page on the internet providing further information. The code in Figure 85, ending in 7000000000041546, is the URL for Central Scotland. Associated with this code is further information, such as the geometry of Central Scotland.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <srv:extent>
        <gmd:EX_Extent>
          <gmd:geographicElement>
            <gmd:EX_GeographicDescription>
              <gmd:geographicIdentifier>
                <gmd:MD_Identifier>
                  <gmd:code>
<gco:CharacterString>
http://data.ordnancesurvey.co.uk/id/7000000000041546</gco:CharacterString>
                  </gmd:code>
                </gmd:MD_Identifier>
              </gmd:geographicIdentifier>
            </gmd:EX_GeographicDescription>
          </gmd:geographicElement>
          ...
        </gmd:EX_Extent>
      </srv:extent>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 85 – Extent encoding example

253 The entity responsible for managing the extent code can be expressed in GEMINI metadata. An example of the encoding is shown in Figure 86.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <srv:extent>
        <gmd:EX_Extent>
          <gmd:geographicElement>
```

```xml
                        <gmd:EX_GeographicDescription>
                          <gmd:geographicIdentifier>
                            <gmd:MD_Identifier>
                              <gmd:authority>
                                <gmd:CI_Citation>
                                  <gmd:title>
    <gco:CharacterString>ISO 3166-2</gco:CharacterString>
                                  </gmd:title>
                                  <gmd:date>
                                    <gmd:CI_Date>
                                      <gmd:date>
                                        <gco:Date>1998</gco:Date>
                                      </gmd:date>
                                      <gmd:dateType>
                                        <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
                                      </gmd:dateType>
                                    </gmd:CI_Date>
                                  </gmd:date>
                                </gmd:CI_Citation>
                              </gmd:authority>
                              <gmd:code>
                                <gco:CharacterString>GB-ENG</gco:CharacterString>
                              </gmd:code>
                            </gmd:MD_Identifier>
                          </gmd:geographicIdentifier>
                        </gmd:EX_GeographicDescription>
                      </gmd:geographicElement>
                    ...
                  </gmd:EX_Extent>
                </srv:extent>
              ...
            </gmd:MD_DataIdentification>
          </gmd:identificationInfo>
        ...
</gmd:MD_Metadata>
```

Figure 86 – Extent encoding example with authority

2.4.10 Vertical extent information

254   Metadata item definition: vertical domain of the data resource [operated upon by the service]

255   The encoding of the vertical extent information is explained. The vertical extent information is expressed by a minimum and maximum coordinate value and a vertical CRS. The vertical CRS expresses the CRS of the vertical extent coordinates alone. It does not necessarily express the vertical CRS to which vertical coordinates in the data are referenced – in other words it is possible that the vertical extent is defined in a different CRS from the vertical CRS of the data. This is convenient if it were the case that datasets within a domain were referenced to many different vertical CRSs because it could be decided that all vertical extents in metadata are to be referenced to a single common vertical CRS to aid searching or understanding by users. Searching by vertical extent, referenced to different vertical CRSs, across metadata sets would be complicated by the need to undertake many coordinate operations – which is not necessarily a trivial task – or even possible in all cases.

256   The CRS of vertical extent elements must be provided in order to give meaning to the minimum and maximum coordinates. From the CRS, for example, it is possible to determine the orientation of the coordinate system axis (i.e. do positive values increase upwards or downwards from the zero reference) and the units of the coordinate values.

257   There are two approaches to encoding the vertical CRS: by reference (Figure 87) or by value (Figure 91). These examples express the same information: that the vertical extent coordinates are referenced to Ordnance Datum (Newlyn). Codes and GML CRS data are from the EPSG registry [4].

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <srv:extent>
        <gmd:EX_Extent>
          ...
          <gmd:verticalElement>
            <gmd:EX_VerticalExtent>
              <gmd:minimumValue>
                <gco:Real>42</gco:Real>
              </gmd:minimumValue>
              <gmd:maximumValue>
                <gco:Real>94</gco:Real>
              </gmd:maximumValue>
              <gmd:verticalCRS xlink:href="
http://www.opengis.net/def/crs/EPSG/0/5701"/>
            </gmd:EX_VerticalExtent>
          </gmd:verticalElement>
        </gmd:EX_Extent>
      </srv:extent>
      ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 87 – Vertical extent information (Vertical CRS by reference)

```xml
<gmd:MD_Metadata>
  ...
  <gmd:dataIdentification>
    <gmd:MD_DataIdentification>
      ...
      <srv:extent>
        <gmd:EX_Extent>
          ...
          <gmd:verticalElement>
            <gmd:EX_VerticalExtent>
              <gmd:minimumValue>
                <gco:Real>42</gco:Real>
              </gmd:minimumValue>
              <gmd:maximumValue>
                <gco:Real>94</gco:Real>
              </gmd:maximumValue>
              <gmd:verticalCRS>
                <gml:VerticalCRS gml:id="epsg-crs-5701">
                  <gml:identifier
codeSpace="OGP">urn:ogc:def:crs:EPSG::5701</gml:identifier>
                  <gml:name>ODN height</gml:name>
                  <gml:scope>Geodetic and engineering surveying.</gml:scope>
                  <gml:verticalCS>
                    <gml:VerticalCS gml:id="epsg-cs-6499">
                      <gml:identifier
codeSpace="OGP">urn:ogc:def:cs:EPSG::6499</gml:identifier>
    <gml:name>Vertical CS. Axis: height (H). Orientation: up. UoM: m.</gml:name>
    <gml:remarks>Used in vertical coordinate reference systems.</gml:remarks>
                      <gml:axis>
                        <gml:CoordinateSystemAxis gml:id="epsg-axis-114"
gml:uom="urn:ogc:def:uom:EPSG::9001">
                          <gml:descriptionReference xlink:href="
http://www.opengis.net/def/crs/EPSG/0/9904"/>
                          <gml:identifier
codeSpace="OGP">urn:ogc:def:axis:EPSG::114</gml:identifier>
                          <gml:axisAbbrev>H</gml:axisAbbrev>
                          <gml:axisDirection
codeSpace="EPSG">up</gml:axisDirection>
                        </gml:CoordinateSystemAxis>
                      </gml:axis>
                    </gml:VerticalCS>
                  </gml:verticalCS>
                  <gml:verticalDatum>
                    <gml:VerticalDatum gml:id="epsg-datum-5101">
                      <gml:identifier
codeSpace="OGP">urn:ogc:def:datum:EPSG::5101</gml:identifier>
                      <gml:name>Ordnance Datum Newlyn</gml:name>
                      <gml:remarks>Orthometric heights.</gml:remarks>
    <gml:scope>Topographic mapping, geodetic survey.</gml:scope>
    <gml:anchorDefinition>Mean Sea Level at Newlyn between 1915 and
1921.</gml:anchorDefinition>
                    </gml:VerticalDatum>
                  </gml:verticalDatum>
                </gml:VerticalCRS>
              </gmd:verticalCRS>
            </gmd:EX_VerticalExtent>
          </gmd:verticalElement>
        </gmd:EX_Extent>
      </srv:extent>
      ...
```

```
      </gmd:MD_DataIdentification>
    </gmd:dataIdentification>
    ...
</gmd:MD_Metadata>
```

Figure 88 – Vertical extent information (Vertical CRS by value)

258   Additionally, the gco:nilReason (see section 2.2.6) attribute can be used if the vertical CRS is
       unknown (Figure 89) but this renders the vertical extent information ambiguous at best.
       Consequently it would be better to refrain from including vertical extent information in the
       metadata instance altogether.

```
<gmd:verticalElement>
  <gmd:EX_VerticalExtent>
    <gmd:minimumValue>
      <gco:Real>42</gco:Real>
    </gmd:minimumValue>
    <gmd:maximumValue>
      <gco:Real>94</gco:Real>
    </gmd:maximumValue>
    <gmd:verticalCRS gco:nilReason="unknown"/>
  </gmd:EX_VerticalExtent>
</gmd:verticalElement>
```

Figure 89 – Vertical extent information (Vertical CRS unknown)

2.4.11 Spatial reference system

259 Metadata item definition: identifier of the system of spatial referencing, whether by coordinates or geographic identifiers, used in the data resource [service resource].

260 The encoding example for spatial reference system is shown in Figure 90. Ideally, a full and unambiguous definition of the CRS of the data will be provided but the ISO 19139 schemas only allow the spatial reference system to be identified by a code, on the face of it. One source of CRS definitions is the EPSG Geodetic Parameter Dataset [4]. In referencing CRS definitions from the EPSG register it is recommended that the full URN is provided, since EPSG numbers are not necessarily unique within the scope of the register. The full EPSG URI for the ETRS89 Geodetic CRS is: http://www.opengis.net/def/crs/EPSG/0/4258

261 This URN can be dereferenced by web services provided by the EPSG to provide the full CRS definition encoded in GML. Thus indicating the CRS by identifier in this way provides an efficient and low risk means of transmitting the CRS information. Note that, in this context, the reference cannot use xlink:href, because the URL returns GML, and gmd:code expects a CharacterString.

```
<gmd:MD_Metadata>
  ...
  <gmd:referenceSystemInfo>
    <gmd:MD_ReferenceSystem>
      <gmd:referenceSystemIdentifier>
        <gmd:RS_Identifier>
          <gmd:code>
<gco:CharacterString>
http://www.opengis.net/def/crs/EPSG/0/4258</gco:CharacterString>
          </gmd:code>
        </gmd:RS_Identifier>
      </gmd:referenceSystemIdentifier>
    </gmd:MD_ReferenceSystem>
  </gmd:referenceSystemInfo>
  ...
</gmd:MD_Metadata>
```

Figure 90 – Spatial reference system encoding example

262 If a CRS is not identified in a register such as that provided by the EPSG it is possible to identify the CRS in an external catalogue (Figure 91) which can be under the control of the metadata creator. An example of a CRS catalogue is shown in Appendix A.
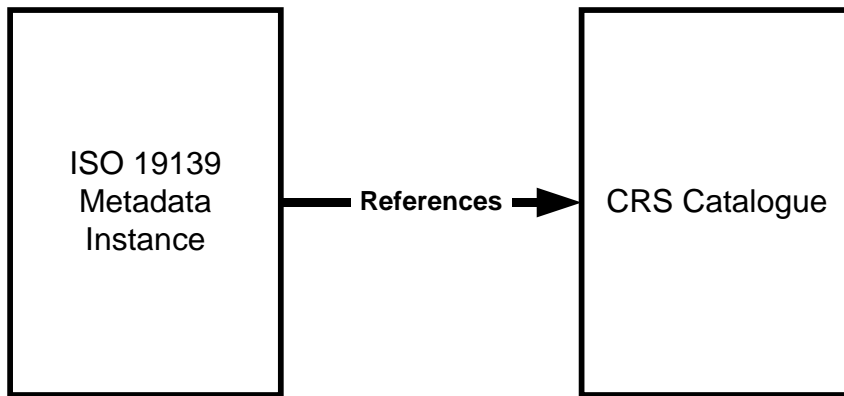
Figure 91 – Referencing an external CRS catalogue

263   The corresponding ISO 19139 XML encoding for this approach makes use of the gmx:Anchor element, as shown in Figure 92. In this case the xlink:href attribute of gmx:Anchor is referencing an XML file CRSCatalogue.xml which is in the same location as the metadata instance. However, the xlink:href attribute could include the URI of the CRS catalogue if it were available on the internet. Indeed this approach could also be used to encode the identifier of the CRS in a registry, such as EPSG, together with a human readable name. Metadata instances using this approach will be validated against the gmx.xsd schema rather than gmd.xsd and include a reference to the gmx namespace in the root element.

```xml
<referenceSystemInfo>
  <MD_ReferenceSystem>
    <referenceSystemIdentifier>
      <RS_Identifier>
        <code>
          <gmx:Anchor xlink:href="CRSCatalogue.xml#szsl-crs-32792">
            ETRS89 / MSL height
          </gmx:Anchor>
        </code>
      </RS_Identifier>
    </referenceSystemIdentifier>
  </MD_ReferenceSystem>
</referenceSystemInfo>
```

Figure 92 – Referencing an external CRS Catalogue using gmx:Anchor

264   The entity responsible for managing the CRS code can be expressed in GEMINI metadata. An example of the encoding is shown in Figure 93.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:referenceSystemInfo>
    <gmd:MD_ReferenceSystem>
      <gmd:referenceSystemIdentifier>
        <gmd:RS_Identifier>
          <gmd:authority>
            <gmd:CI_Citation>
              <gmd:title>
      <gco:CharacterString>EPSG Geodetic Parameter Registry</gco:CharacterString>
```

```
                  </gmd:title>
                <gmd:date>
                  <gmd:CI_Date>
                    <gmd:date>
                       <gco:Date>2010-11-02</gco:Date>
                    </gmd:date>
                     <gmd:dateType>
                       <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
                     </gmd:dateType>
                  </gmd:CI_Date>
                </gmd:date>
              </gmd:CI_Citation>
            </gmd:authority>
            <gmd:code>
<gco:CharacterString>
http://www.opengis.net/def/crs/EPSG/0/4258</gco:CharacterString>
            </gmd:code>
          </gmd:RS_Identifier>
        </gmd:referenceSystemIdentifier>
      </gmd:MD_ReferenceSystem>
    </gmd:referenceSystemInfo>
    ...
</gmd:MD_Metadata>
```

Figure 93 – Spatial reference system encoding example with authority

2.4.12 Resource locator

265   Metadata item definition: location (address) for on-line access using a Uniform Resource Locator (URL) address or similar addressing scheme.

266   The encoding example for resource locator is shown in Figure 94.

267   In the example two URLs are provided, one giving the location of further information about a service and the other being the URL of an OGC GetCapabilities request.

268   The gmd:transferOptions XML element of gmd:MD_Distribution is used to encode a URL. Note that it is also necessary to encode distribution format information in all cases. If the URL that is provided is the location of a point of contact then the distribution format is moot. However, the distribution format property is required by an ISO 19115 constraint. In this case the INSPIRE guidelines show the encoding using gmd:MD_Format in Figure 94.

269   GEMINI2 allows for a URL which is a link to a point of contact where more information is available or where the dataset can be downloaded. ISO 19115 and the ISO 19139 encoding provides a means of indicating the function of the online resource by means of the CI_OnLineFunctionCode code list. Two values from this code list provide a means of discriminating between a URL that is provided for information (code list value of 'information') and a URL that is the address used for downloading (code list value of 'download') the data. Due to limitations in the CI_OnLineFunctionCode code list the XML element function cannot be encoded where the URL links directly to a service but may be included where the URL provides information about the service or links to information about the data upon which the service operates. Figure 94 shows the case where two URLs are expressed. The first, http://image2000.jrc.ec.europa.eu/, links to information about a dataset so the function XML element is included. The second is the URL with parameters to invoke a GetCapabilities request of a service. In this case there is no relevant code list value so the function XML element is not encoded.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:distributionInfo>
    <gmd:MD_Distribution>
      <gmd:distributionFormat>
        <gmd:MD_Format>
          <gmd:name>
            <gco:CharacterString>Unknown</gco:CharacterString>
          </gmd:name>
          <gmd:version>
            <gco:CharacterString>Unknown</gco:CharacterString>
          </gmd:version>
        </gmd:MD_Format>
      </gmd:distributionFormat>
      <gmd:transferOptions>
        <gmd:MD_DigitalTransferOptions>
          <gmd:onLine>
            <gmd:CI_OnlineResource>
              <gmd:linkage>
                <gmd:URL> http://image2000.jrc.ec.europa.eu/</gmd:URL>
              </gmd:linkage>
              ...
              <gmd:function>
```

```
            <gmd:CI_OnLineFunctionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_OnLineFunctionCode"
codeListValue="information">information</gmd:CI_OnLineFunctionCode>
            </gmd:function>
          </gmd:CI_OnlineResource>
        </gmd:onLine>
        <gmd:onLine>
          <gmd:CI_OnlineResource>
            <gmd:linkage>
            <gmd:URL>
http://mapserver.jrc.it/wmsconnector/com.esri.wms.Esrimap/img2k_453_mos?request=
getcapabilities&amp;service=WMS
            </gmd:URL>
          </gmd:linkage>
          </gmd:CI_OnlineResource>
        </gmd:onLine>
      </gmd:MD_DigitalTransferOptions>
    </gmd:transferOptions>
  </gmd:MD_Distribution>
 </gmd:distributionInfo>
 ...
</gmd:MD_Metadata>
```

Figure 94 – Resource locator encoding example

270   Note that the GetCapabilities URL contains an *entity reference* (sometimes known as an escape sequence) for the ampersand character. When an XML parser reads `&` it replaces the sequence with `&`. When writing XML, XML aware software will escape characters automatically but text editing software will not. The ampersand character alone in XML is interpreted as beginning an entity or character reference. XML defines five entity references:

- `<` - The character <

- `&` - The character &

- `>` - The character >

- `"` - The character "

- `'` - The character '

2.4.13 Responsible organisation

271 Metadata item definition: details of the organisation(s) responsible for the establishment, management, maintenance and distribution of the data resource [service resource].

272 The encoding example for responsible organisation is shown in Figure 95. The example shows the minimum required information. See section 2.2.8 for a description of the ISO 19115 CI_ResponsibleParty class and its use in the context of GEMINI2 metadata instances.

273 The point of contact role, encoded using the gmd:role XML element, takes its code list value from the ISO 19115 code list CI_RoleCode. Any of the values in the code list may be used. The UK Location portal (data.gov.uk site) interprets ISO "owner" as Data Provider, and ISO "publisher" as Data Publisher.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <gmd:pointOfContact>
        <gmd:CI_ResponsibleParty>
          <gmd:organisationName>
            <gco:CharacterString>SeaZone Solutions</gco:CharacterString>
          </gmd:organisationName>
          <gmd:contactInfo>
            <gmd:CI_Contact>
              <gmd:address>
                <gmd:CI_Address>
                  <gmd:electronicMailAddress>
                    <gco:CharacterString>info@seazone.com</gco:CharacterString>
                  </gmd:electronicMailAddress>
                </gmd:CI_Address>
              </gmd:address>
            </gmd:CI_Contact>
          </gmd:contactInfo>
          <gmd:role>
            <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="publisher">publisher</gmd:CI_RoleCode>
          </gmd:role>
        </gmd:CI_ResponsibleParty>
      </gmd:pointOfContact>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 95 – Responsible organisation encoding example

2.4.14 Limitations on public access

274 Metadata item definition: restrictions imposed on the data resource [service resource] for security and other reasons.

275 The encoding example for limitations on public access is shown in Figure 96.

276 Access constraints shall be encoded with the code list value 'otherRestrictions'. Limitations shall be encoded using the XML element gmd:otherConstraints with free text.Limitations on public access is a mandatory metadata item in GEMINI2. If there are no limitations the value of gmd:otherConstraints shall be 'no limitations' (see Figure **97**).

```xml
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <gmd:resourceConstraints>
        <gmd:MD_LegalConstraints>
          ...
          <gmd:accessConstraints>
            <gmd:MD_RestrictionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_RestrictionCode"
codeListValue="otherRestrictions">otherRestrictions</gmd:MD_RestrictionCode>
          </gmd:accessConstraints>
          <gmd:otherConstraints>
            <gco:CharacterString>[Document other restrictions
here]</gco:CharacterString>
          </gmd:otherConstraints>
        </gmd:MD_LegalConstraints>
      </gmd:resourceConstraints>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 96 – Limitations on public access encoding example

```xml
...
<gmd:otherConstraints>
  <gco:CharacterString>no limitations</gco:CharacterString>
</gmd:otherConstraints>
...
```

Figure 97 – Limitations on public access – no limitations

2.4.15 Use constraints

277 Metadata item definition: restrictions and legal restraints on using the data resource [service resource].

278 The example encoding for use constraints is shown in Figure 98. Use constraints is a mandatory metadata item.

279 If no use constraints apply to the service the value of the XML element gmd:useLimitation shall be 'no conditions apply'; this is because in INSPIRE the element is known as "conditions applying to access and use".

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <gmd:resourceConstraints>
        <gmd:MD_Constraints>
          <gmd:useLimitation>
            <gco:CharacterString>no conditions apply</gco:CharacterString>
          </gmd:useLimitation>
          ...
        </gmd:MD_Constraints>
      </gmd:resourceConstraints>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 98 – Use constraints encoding example

280 In certain circumstances it might be appropriate to refer to an external document describing constraints. In this case the encoding shown in Figure 99**Error! Reference source not found.** may be used.

```
    ...
    <gmd:resourceConstraints>
     <gmd:MD_Constraints>
      <gmd:useLimitation>
        <gmx:Anchor
xlink:href="http://www.ordnancesurvey.co.uk/oswebsite/opendata/licence/docs/lice
nce.pdf">OS OpenData licence</gmx:Anchor>
      </gmd:useLimitation>
      ...
     </gmd:MD_Constraints>
    </gmd:resourceConstraints>
    ...
```

Figure 99 – Use constraints encoding example with external file

2.4.16 Resource type

291   Metadata item definition: scope to which metadata applies.

292   The encoding example for resource type is shown in Figure 100.

```
<gmd:MD_Metadata>
  ...
  <gmd:hierarchyLevel>
    <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="service">service</gmd:MD_ScopeCode>
  </gmd:hierarchyLevel>
  ...
</gmd:MD_Metadata>
```

Figure 100 – Resource type encoding example

2.4.17 Conformity

293   Metadata item definition: degree of conformity with the product specification or user requirement against which the data [service] is being evaluated.

294   The encoding for conformity is shown in Figure 101.

295   Note that the encoding of conformity requires a specification (encoded using gmd:CI_Citation), an explanation and a pass (encoded using gco:Boolean). INSPIRE Metadata Implementing Rules state that there are possible conformance results: conformant, not conformant and not evaluated. Since the pass XML element takes a Boolean value, not evaluated cannot be expressed. Not evaluated is expressed by the omission of the conformity statement altogether. In practice this means omitting the gmd:report XML element and, of course, all its contents.

296   In order to measure conformity, reference should be made to the conformance criteria in the specification against which conformance is being claimed.

297   It is important to note that because the scope of the data quality information is 'service' in this case, the gmd:levelDescription XML element is required.

```
<gmd:MD_Metadata>
  ...
  <gmd:dataQualityInfo>
    <gmd:DQ_DataQuality>
      <gmd:scope>
        <gmd:DQ_Scope>
          <gmd:level>
            <gmd:MD_ScopeCode codeListValue="service"
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode">service</gmd:MD_ScopeCode
>
          </gmd:level>
          ...
          <gmd:levelDescription>
            <gmd:MD_ScopeDescription>
              <gmd:other>
    <gco:CharacterString>Geographic web service</gco:CharacterString>
              </gmd:other>
            </gmd:MD_ScopeDescription>
          </gmd:levelDescription>
        </gmd:DQ_Scope>
      </gmd:scope>
      <gmd:report>
        <gmd:DQ_DomainConsistency>
          <gmd:result>
            <gmd:DQ_ConformanceResult>
              <gmd:specification>
                <gmd:CI_Citation>
                  <gmd:title>
    <gco:CharacterString>Service Abstract Test Suite</gco:CharacterString>
                  </gmd:title>
                  <gmd:date>
                    <gmd:CI_Date>
                      <gmd:date>
                        <gco:Date>2007-11-21</gco:Date>
                      </gmd:date>
                      <gmd:dateType>
```

```
                         <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/ML_gmx
Codelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                         </gmd:dateType>
                       </gmd:CI_Date>
                     </gmd:date>
                  </gmd:CI_Citation>
               </gmd:specification>
               <gmd:explanation>
      <gco:CharacterString>See the referenced specification</gco:CharacterString>
               </gmd:explanation>
               <gmd:pass>
                  <gco:Boolean>true</gco:Boolean>
               </gmd:pass>
            </gmd:DQ_ConformanceResult>
          </gmd:result>
        </gmd:DQ_DomainConsistency>
      </gmd:report>
      ...
    </gmd:DQ_DataQuality>
  </gmd:dataQualityInfo>
</gmd:MD_Metadata>
```

Figure 101 – Conformity encoding example

2.4.18 Metadata language

298   Metadata item definition: language used for documenting the metadata.

299   The encoding example for metadata language is shown in Figure 102.

```
<gmd:MD_Metadata>
  ...
  <gmd:language>
    <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-
2/php/code_list.php" codeListValue="eng">eng</gmd:LanguageCode>
  </gmd:language>
  ...
</gmd:MD_Metadata>
```

Figure 102 – Metadata language encoding example

2.4.19 Metadata date

300   Metadata item definition: date on which the metadata was last updated, or was confirmed as being up-to-date, or if not updated, then the date it was created.

301   The encoding example for metadata date is shown in Figure 103. Note that it is possible to record the date and time of the metadata instance using the encoding shown in Figure 104.

```
<gmd:MD_Metadata>
  ...
  <gmd:dateStamp>
    <gco:Date>2009-10-15</gco:Date>
  </gmd:dateStamp>
  ...
</gmd:MD_Metadata>
```

Figure 103 – Metadata date encoding example

```
<gmd:MD_Metadata>
  ...
  <gmd:dateStamp>
    <gco:DateTime>2009-10-15T12:01:30</gco:DateTime>
  </gmd:dateStamp>
  ...
</gmd:MD_Metadata>
```

Figure 104 – Metadata date encoding example (date and time)

2.4.20 Metadata point of contact

302 Metadata item definition: party responsible for the creation and maintenance of the metadata.

303 The encoding example for metadata point of contact is shown in Figure 105. Note that the example shows the minimum required information. See section 2.2.8 for more information.

304 More than one metadata point of contact may be expressed in metadata. The role of at least one metadata point of contact shall be 'pointOfContact'.

```xml
<gmd:MD_Metadata>
  ...
  <gmd:contact>
    <gmd:CI_ResponsibleParty>
      <gmd:organisationName>
        <gco:CharacterString>SeaZone Solutions</gco:CharacterString>
      </gmd:organisationName>
      <gmd:contactInfo>
        <gmd:CI_Contact>
          <gmd:address>
            <gmd:CI_Address>
              <gmd:electronicMailAddress>
                <gco:CharacterString>info@seazone.com</gco:CharacterString>
              </gmd:electronicMailAddress>
            </gmd:CI_Address>
          </gmd:address>
        </gmd:CI_Contact>
      </gmd:contactInfo>
      <gmd:role>
        <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="pointOfContact">pointOfContact</gmd:CI_RoleCode>
      </gmd:role>
    </gmd:CI_ResponsibleParty>
  </gmd:contact>
  ...
</gmd:MD_Metadata>
```

Figure 105 – Metadata point of contact encoding example (minimum required)

2.4.21 Spatial data service type

305   Metadata item definition: generic name of the service type

306   The encoding example for spatial data service type is shown in Figure 106. The value domain of the service type (i.e. the list of acceptable values to encode in `<gco:LocalName>`**view**`</gco:LocalName>`) is specified in Part D 3 of the INSPIRE Metadata Implementing Rules and is repeated below (the words are to be encoded in lower case):

- discovery
- view
- download
- transformation
- invoke
- other

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <srv:serviceType>
        <gco:LocalName>view</gco:LocalName>
      </srv:serviceType>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 106 – Spatial data service type encoding example

2.4.22 Coupled resource

307 Metadata item definition: identifier of datasets that the service operates on.

308 INSPIRE technical guidance [2] states that coupled resource shall be implemented by reference using XLinking. The value of the XLink attribute, as shown in the INSPIRE technical guidance, is the value of the metadata item Unique Resource Identifier (not to be confused with the W3C URI). However, the guidance for GEMINI metadata is different. The value of the attribute shall be a URL that allows access to an unambiguous metadata instance, which may be:

- an OGC CS-W GetRecordById request

- an address of a metadata instance in a WAF

309 The approach defined here follows INSPIRE technical guidance for view services [7] (see page 22 Implementation Requirement 14).

310 The obligation on coupled resource is conditional: it is mandatory (in INSPIRE metadata regulations and hence GEMINI2) if a linkage to the datasets on which the service operates is available. This is always the case for view services so if the service metadata is about a view service, coupled resource is effectively mandatory. Other types of service, such as transformation, may not be coupled to a data resource so the constraint on the element is not enforced by validation (i.e. XSD schema or Schematron). Implementers may wish to declare a coupled resource for other non-view service types and in these cases the coupled resource will not necessarily be a dataset.

311 Figure 107 shows an example of encoding coupled resource using an OGC CS-W GetRecordById request. Note that the ampersand XML escape (&) sequence is used to encode the & symbol.

312 Figure 108 shows an example of encoding coupled resource with a reference to a metadata instance in a WAF.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <srv:operatesOn
xlink:href="http://ogcdev.bgs.ac.uk/geonetwork/srv/en/csw?SERVICE=CSW&amp;REQUEST=Ge
tRecordById&amp;ID=9df8df52-d788-37a8-e044-
0003ba9b0d98&amp;elementSetName=full&amp;OutputSchema=http://www.isotc211.org/2005/g
md"/>
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 107 – Coupled resource encoding example using the OGC CS-W request

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
```

```
   <srv:SV_ServiceIdentification>
     ...
     <srv:operatesOn xlink:href="http://mywaf.com/metadata/dataset.xml"/>
   </srv:SV_ServiceIdentification>
 </gmd:identificationInfo>
 ...
</gmd:MD_Metadata>
```

Figure 108 – Coupled resource encoding example using WAF

2.4.23 Service metadata null values

313 The ISO 19119 class SV_ServiceIdentification includes two mandatory properties that are out of scope of GEMINI2 metadata. These are srv:couplingType and srv:containsOperations. Both shall be implemented with null values with the nil reason being missing (Figure 109).

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <srv:couplingType gco:nilReason="missing"/>
      <srv:containsOperations gco:nilReason="missing"/>
      ...
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 109 – Coupling Type and Contains Operations – Null values

APPENDIX A – XML ELEMENT ORDER

Table 1 – XML element order (Dataset and Series Metadata)

ISO 19139 XML Element	GEMINI2 Item Number	GEMINI2 Item Name
gmd:MD_Metadata		
gmd:fileIdentifier	-	-
gmd:language	33	Metadata language
gmd:hierarchyLevel	39	Resource type
gmd:hierarchyLevelName	-	Not required for dataset metadata
gmd:contact	35	Metadata point of contact
gmd:dateStamp	30	Metadata date
gmd:referenceSystemInfo	17	Spatial reference system
gmd:identificationInfo		
gmd:MD_DataIdentification		
gmd:citation		
gmd:CI_Citation		
gmd:title	1	Title
gmd:alternateTitle	2	Alternative title
gmd:date	8	Dataset reference date
gmd:identifier	36	Unique resource identifier
gmd:abstract	4	Abstract
gmd:pointOfContact	23	Responsible organisation
gmd:resourceMaintenance	24	Frequency of update
gmd:descriptiveKeywords	6	Keyword
gmd:resourceConstraints		
gmd:MD_LegalConstraints		

gmd:accessConstraints		
gmd:otherConstraints	25	Limitations on public access
gmd:resourceConstraints		
gmd:MD_Constraints		
gmd:useLimitation	26	Use constraints
gmd:spatialResolution		
gmd:MD_Resolution		
gmd:distance	18	Spatial resolution
gmd:spatialResolution		
gmd:MD_Resolution		
gmd:equivalentScale	43	Equivalent scale
gmd:language	3	Dataset language
gmd:topicCategory	5	Topic category
gmd:extent		
gmd:EX_Extent		
gmd:geographicElement		
gmd:EX_GeographicDescription	15	Extent
gmd:EX_GeographicBoundingBox	44	(the bounding coordinates)
gmd:temporalElement	7	Temporal extent
gmd:verticalElement	16	Vertical extent information
gmd:supplementalInformation	27	Additional information source
gmd:distributionInfo		
gmd:distributionFormat	21	Data format
gmd:transferOptions	19	Resource locator
gmd:dataQualityInfo		

gmd:scope	-	
gmd:report	41	Conformity
gmd:lineage	10	Lineage

Table 2 – XML element order (Service Metadata)

ISO 19139 XML Element	GEMINI2 Item Number	GEMINI2 Item Name
gmd:MD_Metadata		
gmd:fileIdentifier	-	-
gmd:language	33	Metadata language
gmd:hierarchyLevel	39	Resource type
gmd:hierarchyLevelName	-	
gmd:contact	35	Metadata point of contact
gmd:dateStamp	30	Metadata date
gmd:referenceSystemInfo	17	Spatial reference system
gmd:identificationInfo		
srv:SV_Identification		
gmd:citation		
gmd:CI_Citation		
gmd:title	1	Title
gmd:alternateTitle	2	Alternative title
gmd:date	8	Dataset reference date
gmd:identifier	36	Unique resource identifier
gmd:abstract	4	Abstract
gmd:pointOfContact	23	Responsible organisation
gmd:resourceMaintenance	24	Frequency of update

gmd:descriptiveKeywords	6	Keyword
gmd:resourceConstraints		
gmd:MD_LegalConstraints		
gmd:accessConstraints		
gmd:otherConstraints	25	Limitations on public access
gmd:resourceConstraints		
gmd:MD_Constraints		
gmd:useLimitation	26	Use constraints
srv:serviceType	37	Spatial data service type
srv:extent		
gmd:EX_Extent		
gmd:geographicElement		
gmd:EX_GeographicDescription	15	Extent
gmd:EX_GeographicBoundingBox	44	(the bounding coordinates)
gmd:temporalElement	7	Temporal extent
gmd:verticalElement	16	Vertical extent information
srv:couplingType	-	-
srv:containsOperations	-	-
srv:operatesOn	38	Coupled resource
gmd:distributionInfo		
gmd:distributionFormat	21	Data format
gmd:transferOptions	19	Resource locator
gmd:dataQualityInfo		
gmd:scope	-	(including levelDescription)
gmd:report	41	Conformity

APPENDIX B – CRS CATALOGUE EXAMPLE

Example of a CRS Catalogue

```xml
<?xml version="1.0" encoding="utf-8"?>
<CT_CrsCatalogue xmlns="http://www.isotc211.org/2005/gmx"
                 xmlns:gco="http://www.isotc211.org/2005/gco"
                 xmlns:gml="http://www.opengis.net/gml/3.2"
                 xmlns:gmd="http://www.isotc211.org/2005/gmd"
                 xmlns:xlink="http://www.w3.org/1999/xlink">
  <!-- Description of Catalogue -->
  <name>
    <gco:CharacterString>Example CRS Parameter Dictionary</gco:CharacterString>
  </name>
  <scope>
    <gco:CharacterString>CRS parameters dictionary</gco:CharacterString>
  </scope>
  <fieldOfApplication>
    <gco:CharacterString>GMX (and imported) namespace</gco:CharacterString>
  </fieldOfApplication>
  <versionNumber>
    <gco:CharacterString>1.1</gco:CharacterString>
  </versionNumber>
  <versionDate>
    <gco:Date>2009-06-10</gco:Date>
  </versionDate>
  <!-- Compound CRS - ETRS89 / MSL height -->
  <crs>
    <gml:CompoundCRS gml:id="szsl-crs-32792">
      <gml:identifier codeSpace="szsl">urn:x-
szsl:def:crs:EPSG::32792</gml:identifier>
      <gml:name>ETRS89 / MSL height</gml:name>
      <gml:domainOfValidity xlink:href="urn:ogc:def:area:EPSG::2792"/>
      <gml:scope>Hydrographic.</gml:scope>
      <gml:componentReferenceSystem xlink:href="urn:ogc:def:crs:EPSG::4258"/>
      <gml:componentReferenceSystem xlink:href="#szsl-crs-32773"/>
    </gml:CompoundCRS>
  </crs>
  <!-- Compound CRS - ETRS89 / MSL depth -->
  <crs>
    <gml:CompoundCRS gml:id="szsl-crs-32793">
      <gml:identifier codeSpace="OGP">urn:x-
szsl:def:crs:EPSG::32793</gml:identifier>
      <gml:name>ETRS89 / MSL depth</gml:name>
      <gml:domainOfValidity xlink:href="urn:ogc:def:area:EPSG::2792"/>
      <gml:scope>Hydrographic.</gml:scope>
      <gml:componentReferenceSystem xlink:href="urn:ogc:def:crs:EPSG::4258"/>
      <gml:componentReferenceSystem xlink:href="#szsl-crs-32774"/>
    </gml:CompoundCRS>
  </crs>
  <!-- Mean Sea Level - Height -->
  <crs>
```

```xml
    <gml:VerticalCRS gml:id="szsl-crs-32773">
      <gml:identifier codeSpace="szsl">urn:x-
szsl:def:crs:EPSG::32773</gml:identifier>
      <gml:name>MSL height</gml:name>
      <gml:remarks>Added by SeaZone Solutions</gml:remarks>
      <gml:domainOfValidity xlink:href="urn:ogc:def:area:EPSG::2792"/>
      <gml:verticalCS xlink:href="urn:ogc:def:cs:EPSG::6499"/>
      <gml:verticalDatum xlink:href="#szsl-datum-32777"/>
    </gml:VerticalCRS>
  </crs>
  <!-- Mean Sea Level - Depth -->
  <crs>
    <gml:VerticalCRS gml:id="szsl-crs-32774">
      <gml:identifier codeSpace="szsl">urn:x-
szsl:def:crs:EPSG::32774</gml:identifier>
      <gml:name>MSL depth</gml:name>
      <gml:remarks>Added by SeaZone Solutions</gml:remarks>
      <gml:domainOfValidity xlink:href="urn:ogc:def:area:EPSG::2792"/>
      <gml:verticalCS xlink:href="urn:ogc:def:cs:EPSG::6498"/>
      <gml:verticalDatum xlink:href="#szsl-datum-32777"/>
    </gml:VerticalCRS>
  </crs>
  <!-- Mean Sea Level Vertical Datum -->
  <crs>
    <gml:VerticalDatum gml:id="szsl-datum-32777">
      <gml:identifier codeSpace="szsl">urn:x-
szsl:def:datum:EPSG::32777</gml:identifier>
      <gml:name>Mean Sea Level</gml:name>
      <gml:remarks>
        Generic definition of Mean Sea Level.
      </gml:remarks>
      <gml:domainOfValidity xlink:href="urn:ogc:def:area:EPSG::2792"/>
      <gml:scope>Hydrography.</gml:scope>
    </gml:VerticalDatum>
  </crs>
</CT_CrsCatalogue>
```

APPENDIX C – DATASET METADATA INSTANCE EXAMPLE

314 An example of a schema and Schematron valid dataset metadata instance is shown below.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<gmd:MD_Metadata xmlns:gmd="http://www.isotc211.org/2005/gmd"
                 xmlns:gsr="http://www.isotc211.org/2005/gsr"
                 xmlns:xlink="http://www.w3.org/1999/xlink"
                 xmlns:gss="http://www.isotc211.org/2005/gss"
                 xmlns:gts="http://www.isotc211.org/2005/gts"
                 xmlns:gml="http://www.opengis.net/gml/3.2"
                 xmlns:gmx="http://www.isotc211.org/2005/gmx"
                 xmlns:gco="http://www.isotc211.org/2005/gco"
                 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                 xsi:schemaLocation="http://www.isotc211.org/2005/gmx
http://eden.ign.fr/xsd/isotc211/isofull/20090316/gmx/gmx.xsd">
  <gmd:fileIdentifier>
      <gco:CharacterString>ae0e855d-f0a2-438e-855c-
6ef5400f4ef3</gco:CharacterString>
  </gmd:fileIdentifier>
  <gmd:language>
      <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-
2/php/code_list.php" codeListValue="eng">eng</gmd:LanguageCode>
  </gmd:language>
  <gmd:hierarchyLevel>
      <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="dataset">dataset</gmd:MD_ScopeCode>
  </gmd:hierarchyLevel>
  <gmd:contact>
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          <gmd:organisationName>
              <gco:CharacterString>Ordnance Survey, Great
Britain</gco:CharacterString>
          </gmd:organisationName>
          <gmd:positionName>
              <gco:CharacterString>Customer Services</gco:CharacterString>
          </gmd:positionName>
          <gmd:contactInfo>
              <gmd:CI_Contact>
                  <gmd:phone>
                      <gmd:CI_Telephone>
                          <gmd:voice>
                              <gco:CharacterString>+44 (0)8456
050505</gco:CharacterString>
                          </gmd:voice>
                      </gmd:CI_Telephone>
                  </gmd:phone>
                  <gmd:address>
                      <gmd:CI_Address>
                          <gmd:deliveryPoint>
                              <gco:CharacterString>Explorer House, Adanac
Drive</gco:CharacterString>
                          </gmd:deliveryPoint>
                          <gmd:city>
                              <gco:CharacterString>Southampton</gco:CharacterString>
                          </gmd:city>
                          <gmd:postalCode>
                              <gco:CharacterString>SO16 0AS</gco:CharacterString>
                          </gmd:postalCode>
```

```xml
                    <gmd:country>
                        <gco:CharacterString>United Kingdom</gco:CharacterString>
                    </gmd:country>
                    <gmd:electronicMailAddress>
<gco:CharacterString>customerservices@ordnancesurvey.co.uk</gco:CharacterString>
                    </gmd:electronicMailAddress>
                </gmd:CI_Address>
            </gmd:address>
          </gmd:CI_Contact>
        </gmd:contactInfo>
        <gmd:role>
            <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="pointOfContact">pointOfContact</gmd:CI_RoleCode>
        </gmd:role>
      </gmd:CI_ResponsibleParty>
  </gmd:contact>
  <gmd:dateStamp>
      <gco:DateTime>2010-12-02T11:39:34</gco:DateTime>
  </gmd:dateStamp>
  <gmd:referenceSystemInfo>
      <gmd:MD_ReferenceSystem>
        <gmd:referenceSystemIdentifier>
          <gmd:RS_Identifier>
              <gmd:code>
<gco:CharacterString>
http://www.opengis.net/def/crs/EPSG/0/27700</gco:CharacterString>
              </gmd:code>
          </gmd:RS_Identifier>
        </gmd:referenceSystemIdentifier>
      </gmd:MD_ReferenceSystem>
  </gmd:referenceSystemInfo>
  <gmd:identificationInfo>
      <gmd:MD_DataIdentification>
        <gmd:citation>
          <gmd:CI_Citation>
              <gmd:title>
                  <gco:CharacterString>Boundary-Line™</gco:CharacterString>
              </gmd:title>
              <gmd:date>
                  <gmd:CI_Date>
                      <gmd:date>
                          <gco:Date>1996-04-01</gco:Date>
                      </gmd:date>
                      <gmd:dateType>
                          <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="creation">creation</gmd:CI_DateTypeCode>
                      </gmd:dateType>
                  </gmd:CI_Date>
              </gmd:date>
              <gmd:identifier>
                  <gmd:RS_Identifier>
                      <gmd:code>
                          <gco:CharacterString>Boundary-Line™</gco:CharacterString>
                      </gmd:code>
                  </gmd:RS_Identifier>
              </gmd:identifier>
          </gmd:CI_Citation>
        </gmd:citation>
        <gmd:abstract>
          <gco:CharacterString>Boundary-Line is a specialist 1:10 000 scale
```

boundaries dataset. It contains all levels of electoral and administrative
boundaries, from district, wards and civil parishes (or communities) up to
parliamentary, assembly and European constituencies.

The information is represented as vector digital data.

The boundary information is updated twice a year, in May and October. The May
release contains the boundaries that have become live in the first week of May, in
the year of release. The October release contains the May boundaries plus additional
information. Customers can choose either May or October releases.

    * County - The named county, district, district ward, civil parish, county
electoral division (ED).
    * European constituencies - The named European region.
    * Greater London Authority - The Greater London Authority, Greater London
Authority Assembly constituency, London borough, London borough ward.
    * Metropolitan districts - The named metropolitan district, metropolitan
district ward, civil parish where appropriate.
    * Scottish parliamentary electoral region - The named Scottish Parliamentary
electoral region, Scottish parliamentary constituency.
    * Unitary authorities- The named unitary authority, unitary authority ward or
unitary authority ED as appropriate, civil parish where appropriate, together with
community in Wales.
    * Welsh Assembly Electoral Region - The named Welsh Assembly electoral region,
Welsh assembly constituency.
    * Westminster constituencies - The named Westminster constituency.
    * Extent of the realm - Low water mark or seaward boundary extension.
    * High water mark
    * Unique identifiers - For administrative areas, polygons and links.
    * Area measurements
    * Definitive names
    * Census codes</gco:CharacterString>
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          <gmd:CI_ResponsibleParty>
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                <gco:CharacterString>Ordnance Survey, Great
Britain</gco:CharacterString>
            </gmd:organisationName>
            <gmd:positionName>
                <gco:CharacterString>Customer Services</gco:CharacterString>
            </gmd:positionName>
            <gmd:contactInfo>
              <gmd:CI_Contact>
                <gmd:phone>
                  <gmd:CI_Telephone>
                    <gmd:voice>
                        <gco:CharacterString>+44 (0)8456
050505</gco:CharacterString>
                    </gmd:voice>
                  </gmd:CI_Telephone>
                </gmd:phone>
                <gmd:address>
                  <gmd:CI_Address>
                    <gmd:deliveryPoint>
                        <gco:CharacterString>Explorer House, Adanac
Drive</gco:CharacterString>
                    </gmd:deliveryPoint>
                    <gmd:city>
                        <gco:CharacterString>Southampton</gco:CharacterString>
                    </gmd:city>
                    <gmd:postalCode>
                        <gco:CharacterString>SO16 0AS</gco:CharacterString>
                    </gmd:postalCode>

```xml
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Kingdom</gco:CharacterString>
                                    </gmd:country>
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                                    </gmd:electronicMailAddress>
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                            </gmd:address>
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                                <gmd:CI_OnlineResource>
                                    <gmd:linkage>
                                        <gmd:URL>http://www.ordnancesurvey.co.uk/</gmd:URL>
                                    </gmd:linkage>
                                    <gmd:description>
                                        <gco:CharacterString>Ordnance Survey, Great Britain
top level website</gco:CharacterString>
                                    </gmd:description>
                                </gmd:CI_OnlineResource>
                            </gmd:onlineResource>
                        </gmd:CI_Contact>
                    </gmd:contactInfo>
                    <gmd:role>
                        <gmd:CI_RoleCode
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/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="publisher">publisher</gmd:CI_RoleCode>
                    </gmd:role>
                </gmd:CI_ResponsibleParty>
            </gmd:pointOfContact>
            <gmd:resourceMaintenance>
                <gmd:MD_MaintenanceInformation>
                    <gmd:maintenanceAndUpdateFrequency>
                        <gmd:MD_MaintenanceFrequencyCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#MD_MaintenanceFrequencyCode"
codeListValue="biannually">biannually</gmd:MD_MaintenanceFrequencyCode>
                    </gmd:maintenanceAndUpdateFrequency>
                </gmd:MD_MaintenanceInformation>
            </gmd:resourceMaintenance>
            <gmd:graphicOverview>
                <gmd:MD_BrowseGraphic>
                    <gmd:fileName>
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                    </gmd:fileName>
                    <gmd:fileDescription>
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                    </gmd:fileDescription>
                    <gmd:fileType>
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                    </gmd:fileType>
                </gmd:MD_BrowseGraphic>
            </gmd:graphicOverview>
            <gmd:descriptiveKeywords>
                <gmd:MD_Keywords>
                    <gmd:keyword>
                        <gco:CharacterString>Geographical names</gco:CharacterString>
                    </gmd:keyword>
                    <gmd:thesaurusName>
                        <gmd:CI_Citation>
                            <gmd:title>
                                <gco:CharacterString>GEMET - INSPIRE themes, version
1.0</gco:CharacterString>
                            </gmd:title>
```

```
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                                </gmd:date>
                                <gmd:dateType>
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codeListValue="publication">publication</gmd:CI_DateTypeCode>
                                </gmd:dateType>
                            </gmd:CI_Date>
                        </gmd:date>
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                </gmd:thesaurusName>
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        </gmd:descriptiveKeywords>
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boundaries</gco:CharacterString>
                </gmd:keyword>
                <gmd:keyword>
                    <gco:CharacterString>Mapping</gco:CharacterString>
                </gmd:keyword>
                <gmd:keyword>
                    <gco:CharacterString>Mid-Scales</gco:CharacterString>
                </gmd:keyword>
                <gmd:keyword>
                    <gco:CharacterString>Electorial Boundaries</gco:CharacterString>
                </gmd:keyword>
                <gmd:keyword>
                    <gco:CharacterString>administrative
boundaries</gco:CharacterString>
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                <gmd:keyword>
                    <gco:CharacterString>GSS codes</gco:CharacterString>
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                </gmd:keyword>
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                </gmd:keyword>
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        </gmd:descriptiveKeywords>
        <gmd:resourceConstraints>
            <gmd:MD_LegalConstraints>
                <gmd:accessConstraints>
                    <gmd:MD_RestrictionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#MD_RestrictionCode"
codeListValue="otherRestrictions">otherRestrictions</gmd:MD_RestrictionCode>
                </gmd:accessConstraints>
                <gmd:otherConstraints>
                    <gco:CharacterString>For further details on licensing see
http://www.ordnancesurvey.co.uk/oswebsite/business/licences/index.html</gco:Characte
rString>
                </gmd:otherConstraints>
            </gmd:MD_LegalConstraints>
        </gmd:resourceConstraints>
        <gmd:resourceConstraints>
            <gmd:MD_Constraints>
```

```xml
                <gmd:useLimitation>
                    <gco:CharacterString>Use limitation dependent upon
licence</gco:CharacterString>
                </gmd:useLimitation>
            </gmd:MD_Constraints>
        </gmd:resourceConstraints>
        <gmd:spatialResolution>
            <gmd:MD_Resolution>
                <gmd:equivalentScale>
                    <gmd:MD_RepresentativeFraction>
                        <gmd:denominator>
                            <gco:Integer>10000</gco:Integer>
                        </gmd:denominator>
                    </gmd:MD_RepresentativeFraction>
                </gmd:equivalentScale>
            </gmd:MD_Resolution>
        </gmd:spatialResolution>
        <gmd:language>
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2/php/code_list.php" codeListValue="eng">eng</gmd:LanguageCode>
        </gmd:language>
        <gmd:topicCategory>
            <gmd:MD_TopicCategoryCode>boundaries</gmd:MD_TopicCategoryCode>
        </gmd:topicCategory>
        <gmd:extent>
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                                <gml:endPosition>2010-09-30</gml:endPosition>
                            </gml:TimePeriod>
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(Shapefile)</gco:CharacterString>
                </gmd:name>
```

```xml
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        </gmd:distributionFormat>
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                    <gmd:CI_OnlineResource>
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                        </gmd:linkage>
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                            <gmd:CI_OnLineFunctionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
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codeListValue="information">information</gmd:CI_OnLineFunctionCode>
                        </gmd:function>
                    </gmd:CI_OnlineResource>
                </gmd:onLine>
            </gmd:MD_DigitalTransferOptions>
        </gmd:transferOptions>
    </gmd:MD_Distribution>
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      <gmd:DQ_DataQuality>
        <gmd:scope>
            <gmd:DQ_Scope>
                <gmd:level>
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codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="dataset">dataset</gmd:MD_ScopeCode>
                </gmd:level>
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        </gmd:scope>
        <gmd:lineage>
            <gmd:LI_Lineage>
                <gmd:statement>
                    <gco:CharacterString>Captured and maintained solely from legal
boundary changes</gco:CharacterString>
                </gmd:statement>
            </gmd:LI_Lineage>
        </gmd:lineage>
      </gmd:DQ_DataQuality>
  </gmd:dataQualityInfo>
</gmd:MD_Metadata>
```

APPENDIX D – SERIES METADATA EXAMPLE

315 An example of a schema and Schematron valid metadata instance is shown below.

```xml
<?xml version="1.0" encoding="utf-8"?>
<gmd:MD_Metadata xmlns:gsr="http://www.isotc211.org/2005/gsr"
                 xmlns:xlink="http://www.w3.org/1999/xlink"
                 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                 xmlns:gss="http://www.isotc211.org/2005/gss"
                 xmlns:gts="http://www.isotc211.org/2005/gts"
                 xmlns:gml="http://www.opengis.net/gml/3.2"
                 xmlns:gmx="http://www.isotc211.org/2005/gmx"
                 xmlns:srv="http://www.isotc211.org/2005/srv"
                 xmlns:gco="http://www.isotc211.org/2005/gco"
                 xmlns:gmd="http://www.isotc211.org/2005/gmd">
  <gmd:fileIdentifier>
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99b92de8b5bb</gco:CharacterString>
  </gmd:fileIdentifier>
  <gmd:language>
    <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-
2/php/code_list.php" codeListValue="eng">eng</gmd:LanguageCode>
  </gmd:language>
  <gmd:hierarchyLevel>
    <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="series">series</gmd:MD_ScopeCode>
  </gmd:hierarchyLevel>
  <gmd:hierarchyLevelName>
    <gco:CharacterString>10k Raster</gco:CharacterString>
  </gmd:hierarchyLevelName>
  <gmd:contact>
    <gmd:CI_ResponsibleParty>
      <gmd:organisationName>
        <gco:CharacterString>Ordnance Survey</gco:CharacterString>
      </gmd:organisationName>
      <gmd:contactInfo>
        <gmd:CI_Contact>
          <gmd:phone>
            <gmd:CI_Telephone>
              <gmd:voice>
                <gco:CharacterString>+44 (0)8456 050505</gco:CharacterString>
              </gmd:voice>
              <gmd:facsimile>
                <gco:CharacterString>+44 (0)23 80792615</gco:CharacterString>
              </gmd:facsimile>
            </gmd:CI_Telephone>
          </gmd:phone>
          <gmd:address>
            <gmd:CI_Address>
              <gmd:deliveryPoint>
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              </gmd:deliveryPoint>
              <gmd:deliveryPoint>
                <gco:CharacterString>Romsey Road</gco:CharacterString>
              </gmd:deliveryPoint>
              <gmd:city>
                <gco:CharacterString>Southampton</gco:CharacterString>
```

```xml
            </gmd:city>
            <gmd:postalCode>
              <gco:CharacterString>SO16 4GU</gco:CharacterString>
            </gmd:postalCode>
            <gmd:electronicMailAddress>
<gco:CharacterString>customerservices@ordnancesurvey.co.uk</gco:CharacterString>
            </gmd:electronicMailAddress>
          </gmd:CI_Address>
        </gmd:address>
        <gmd:onlineResource>
          <gmd:CI_OnlineResource>
            <gmd:linkage>
              <gmd:URL>http://www.ordnancesurvey.co.uk</gmd:URL>
            </gmd:linkage>
          </gmd:CI_OnlineResource>
        </gmd:onlineResource>
      </gmd:CI_Contact>
    </gmd:contactInfo>
    <gmd:role>
      <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="pointOfContact">pointOfContact</gmd:CI_RoleCode>
    </gmd:role>
  </gmd:CI_ResponsibleParty>
</gmd:contact>
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</gmd:dateStamp>
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    <gmd:referenceSystemIdentifier>
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<gco:CharacterString>
http://www.opengis.net/def/crs/EPSG/0/27700</gco:CharacterString>
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  </gmd:MD_ReferenceSystem>
</gmd:referenceSystemInfo>
<gmd:identificationInfo>
  <gmd:MD_DataIdentification>
    <gmd:citation>
      <gmd:CI_Citation>
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        </gmd:alternateTitle>
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            </gmd:date>
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emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
```

```
              </gmd:dateType>
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          </gmd:date>
          <gmd:identifier>
            <gmd:RS_Identifier>
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            </gmd:RS_Identifier>
          </gmd:identifier>
        </gmd:CI_Citation>
      </gmd:citation>
      <gmd:abstract>
        <gco:CharacterString>Detailed raster mapping generated from 1:10 000
scale vector Landplan data. For overlay of information, particularly useful for
site analysis, planning and marketing in urban areas.</gco:CharacterString>
      </gmd:abstract>
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        <gmd:CI_ResponsibleParty>
          <gmd:organisationName>
            <gco:CharacterString>Ordnance Survey</gco:CharacterString>
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          <gmd:contactInfo>
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                  <gmd:voice>
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050505</gco:CharacterString>
                  </gmd:voice>
                  <gmd:facsimile>
                    <gco:CharacterString>+44 (0)23
80792615</gco:CharacterString>
                  </gmd:facsimile>
                </gmd:CI_Telephone>
              </gmd:phone>
              <gmd:address>
                <gmd:CI_Address>
                  <gmd:deliveryPoint>
                    <gco:CharacterString>Ordnance Survey</gco:CharacterString>
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                    <gco:CharacterString>Romsey Road</gco:CharacterString>
                  </gmd:deliveryPoint>
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                    <gco:CharacterString>Southampton</gco:CharacterString>
                  </gmd:city>
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                    <gco:CharacterString>SO16 4GU</gco:CharacterString>
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              <gmd:onlineResource>
                <gmd:CI_OnlineResource>
                  <gmd:linkage>
```

```xml
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          </gmd:contactInfo>
          <gmd:role>
            <gmd:CI_RoleCode
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emas/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="originator">originator</gmd:CI_RoleCode>
          </gmd:role>
        </gmd:CI_ResponsibleParty>
      </gmd:pointOfContact>
      <gmd:resourceMaintenance>
        <gmd:MD_MaintenanceInformation>
          <gmd:maintenanceAndUpdateFrequency>
            <gmd:MD_MaintenanceFrequencyCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_MaintenanceFrequencyCode"
codeListValue="continual">continual</gmd:MD_MaintenanceFrequencyCode>
          </gmd:maintenanceAndUpdateFrequency>
        </gmd:MD_MaintenanceInformation>
      </gmd:resourceMaintenance>
      <gmd:descriptiveKeywords>
        <gmd:MD_Keywords>
          <gmd:keyword>
            <gco:CharacterString>raster</gco:CharacterString>
          </gmd:keyword>
          <gmd:keyword>
            <gco:CharacterString>map</gco:CharacterString>
          </gmd:keyword>
          <gmd:thesaurusName>
            <gmd:CI_Citation>
              <gmd:title>
                <gco:CharacterString>GEMET - Concepts, version
2.4</gco:CharacterString>
              </gmd:title>
              <gmd:date>
                <gmd:CI_Date>
                  <gmd:date>
                    <gco:Date>2010-01-13</gco:Date>
                  </gmd:date>
                  <gmd:dateType>
                    <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication" />
                  </gmd:dateType>
                </gmd:CI_Date>
              </gmd:date>
              <gmd:edition>
                <gco:CharacterString>version 2.4</gco:CharacterString>
              </gmd:edition>
            </gmd:CI_Citation>
          </gmd:thesaurusName>
        </gmd:MD_Keywords>
      </gmd:descriptiveKeywords>
      <gmd:resourceConstraints>
        <gmd:MD_LegalConstraints>
          <gmd:accessConstraints>
```

```xml
                <gmd:MD_RestrictionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_RestrictionCode"
codeListValue="otherRestrictions">otherRestrictions</gmd:MD_RestrictionCode>
            </gmd:accessConstraints>
            <gmd:otherConstraints>
                <gco:CharacterString>Ordnance Survey data licensing terms and
conditions</gco:CharacterString>
            </gmd:otherConstraints>
        </gmd:MD_LegalConstraints>
    </gmd:resourceConstraints>
    <gmd:resourceConstraints>
        <gmd:MD_Constraints>
            <gmd:useLimitation>
                <gco:CharacterString>Annual license fee for use of the data for
internal business use including paper copies. Separate license fees and
conditions for specific use to third parties</gco:CharacterString>
            </gmd:useLimitation>
        </gmd:MD_Constraints>
    </gmd:resourceConstraints>
    <gmd:spatialResolution>
        <gmd:MD_Resolution>
            <gmd:equivalentScale>
                <gmd:MD_RepresentativeFraction>
                    <gmd:denominator>
                        <gco:Integer>10000</gco:Integer>
                    </gmd:denominator>
                </gmd:MD_RepresentativeFraction>
            </gmd:equivalentScale>
        </gmd:MD_Resolution>
    </gmd:spatialResolution>
    <gmd:language>
        <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-
2/php/code_list.php" codeListValue="eng">eng</gmd:LanguageCode>
    </gmd:language>
    <gmd:topicCategory>
<gmd:MD_TopicCategoryCode>imageryBaseMapsEarthCover</gmd:MD_TopicCategoryCode>
    </gmd:topicCategory>
    <gmd:extent>
        <gmd:EX_Extent>
            <gmd:geographicElement>
                <gmd:EX_GeographicBoundingBox>
                    <gmd:westBoundLongitude>
                        <gco:Decimal>-8.45472</gco:Decimal>
                    </gmd:westBoundLongitude>
                    <gmd:eastBoundLongitude>
                        <gco:Decimal>1.78024</gco:Decimal>
                    </gmd:eastBoundLongitude>
                    <gmd:southBoundLatitude>
                        <gco:Decimal>49.8634</gco:Decimal>
                    </gmd:southBoundLatitude>
                    <gmd:northBoundLatitude>
                        <gco:Decimal>60.8599</gco:Decimal>
                    </gmd:northBoundLatitude>
                </gmd:EX_GeographicBoundingBox>
            </gmd:geographicElement>
            <gmd:temporalElement>
                <gmd:EX_TemporalExtent>
                    <gmd:extent>
                        <gml:TimePeriod gml:id="_75c1e6a9-44ff-4aef-b923-c1b6f59d53a6">
                            <gml:beginPosition>2003-03-04</gml:beginPosition>
```

```xml
                <gml:endPosition>2010-05-12</gml:endPosition>
              </gml:TimePeriod>
            </gmd:extent>
          </gmd:EX_TemporalExtent>
        </gmd:temporalElement>
      </gmd:EX_Extent>
    </gmd:extent>
    <gmd:supplementalInformation>
<gco:CharacterString>http://www.ordnancesurvey.co.uk/oswebsite/products/10kraste
r/</gco:CharacterString>
    </gmd:supplementalInformation>
  </gmd:MD_DataIdentification>
 </gmd:identificationInfo>
 <gmd:dataQualityInfo>
   <gmd:DQ_DataQuality>
     <gmd:scope>
       <gmd:DQ_Scope>
         <gmd:level>
           <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sch
emas/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="series">series</gmd:MD_ScopeCode>
         </gmd:level>
       </gmd:DQ_Scope>
     </gmd:scope>
     <gmd:lineage>
       <gmd:LI_Lineage>
         <gmd:statement>
           <gco:CharacterString>Unknown</gco:CharacterString>
         </gmd:statement>
       </gmd:LI_Lineage>
     </gmd:lineage>
   </gmd:DQ_DataQuality>
 </gmd:dataQualityInfo>
</gmd:MD_Metadata>
```

APPENDIX E – SERVICE METADATA INSTANCE EXAMPLE

316   An example of a schema and Schematron valid service metadata instance is shown below.

```xml
<?xml version="1.0" encoding="UTF-8"?>
  <gmd:MD_Metadata xmlns:gmd="http://www.isotc211.org/2005/gmd"
                    xmlns:gco="http://www.isotc211.org/2005/gco"
                    xmlns:gml="http://www.opengis.net/gml/3.2"
                    xmlns:gmx="http://www.isotc211.org/2005/gmx"
                    xmlns:gsr="http://www.isotc211.org/2005/gsr"
                    xmlns:gss="http://www.isotc211.org/2005/gss"
                    xmlns:gts="http://www.isotc211.org/2005/gts"
                    xmlns:srv="http://www.isotc211.org/2005/srv"
                    xmlns:xlink="http://www.w3.org/1999/xlink">
    <gmd:fileIdentifier>
      <gco:CharacterString>a0a82d76-657c-2a78-e044-
0003ba9b0d98</gco:CharacterString>
    </gmd:fileIdentifier>
    <gmd:language>
      <gmd:LanguageCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/ML_gmxCodelists.xml#LanguageCode"
codeListValue="eng">eng</gmd:LanguageCode>
    </gmd:language>
    <gmd:hierarchyLevel>
      <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="service">service</gmd:MD_ScopeCode>
    </gmd:hierarchyLevel>
    <gmd:hierarchyLevelName>
      <gco:CharacterString>Service</gco:CharacterString>
    </gmd:hierarchyLevelName>
    <gmd:contact>
      <gmd:CI_ResponsibleParty>
        <gmd:organisationName>
          <gco:CharacterString>British Geological Survey</gco:CharacterString>
        </gmd:organisationName>
        <gmd:contactInfo>
          <gmd:CI_Contact>
            <gmd:phone>
              <gmd:CI_Telephone>
                <gmd:voice>
                  <gco:CharacterString>+44 115 936 3100
Ex:3115</gco:CharacterString>
                </gmd:voice>
              </gmd:CI_Telephone>
            </gmd:phone>
            <gmd:address>
              <gmd:CI_Address>
                <gmd:deliveryPoint>
                  <gco:CharacterString>Murchison House, West Mains Road, Edinburgh,
Lothian, United Kingdom, EH9 3LA, NG12 5GG</gco:CharacterString>
                </gmd:deliveryPoint>
                <gmd:city>
                  <gco:CharacterString>EDINBURGH</gco:CharacterString>
                </gmd:city>
                <gmd:administrativeArea>
                  <gco:CharacterString>LOTHIAN</gco:CharacterString>
                </gmd:administrativeArea>
                <gmd:postalCode>
                  <gco:CharacterString>EH9 3LA</gco:CharacterString>
                </gmd:postalCode>
```

```xml
                        <gmd:country>
                            <gco:CharacterString>United Kingdom</gco:CharacterString>
                        </gmd:country>
                        <gmd:electronicMailAddress>
                            <gco:CharacterString>enquiries@bgs.ac.uk</gco:CharacterString>
                        </gmd:electronicMailAddress>
                    </gmd:CI_Address>
                </gmd:address>
            </gmd:CI_Contact>
        </gmd:contactInfo>
        <gmd:role>
            <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="pointOfContact">pointOfContact</gmd:CI_RoleCode>
        </gmd:role>
      </gmd:CI_ResponsibleParty>
    </gmd:contact>
    <gmd:dateStamp>
      <gco:Date>2011-04-11</gco:Date>
    </gmd:dateStamp>
    <gmd:metadataStandardName>
      <gco:CharacterString>ISO19115:2003(E)</gco:CharacterString>
    </gmd:metadataStandardName>
    <gmd:metadataStandardVersion>
      <gco:CharacterString>GEMINI:2</gco:CharacterString>
    </gmd:metadataStandardVersion>
    <gmd:referenceSystemInfo>
      <gmd:MD_ReferenceSystem>
        <gmd:referenceSystemIdentifier>
          <gmd:RS_Identifier>
            <gmd:authority>
              <gmd:CI_Citation>
                <gmd:title>
                  <gco:CharacterString>www.epsg.org</gco:CharacterString>
                </gmd:title>
                <gmd:date>
                  <gmd:CI_Date>
                    <gmd:date>
                      <gco:Date>2005</gco:Date>
                    </gmd:date>
                    <gmd:dateType>
                      <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
                    </gmd:dateType>
                  </gmd:CI_Date>
                </gmd:date>
              </gmd:CI_Citation>
            </gmd:authority>
            <gmd:code>
              <gco:CharacterString>
http://www.opengis.net/def/crs/EPSG/0/4326</gco:CharacterString>
            </gmd:code>
            <gmd:codeSpace>
              <gco:CharacterString>OGP</gco:CharacterString>
            </gmd:codeSpace>
          </gmd:RS_Identifier>
        </gmd:referenceSystemIdentifier>
      </gmd:MD_ReferenceSystem>
    </gmd:referenceSystemInfo>
    <gmd:identificationInfo>
      <srv:SV_ServiceIdentification
```

```xml
          <gmd:citation>
            <gmd:CI_Citation>
              <gmd:title>
                <gco:CharacterString>BGS Surface geology (OGC WxS INSPIRE
IOC)</gco:CharacterString>
              </gmd:title>
              <gmd:date>
                <gmd:CI_Date>
                  <gmd:date>
                    <gco:Date>1995</gco:Date>
                  </gmd:date>
                  <gmd:dateType>
                    <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                  </gmd:dateType>
                </gmd:CI_Date>
              </gmd:date>
              <gmd:identifier>
                <gmd:RS_Identifier>
                  <gmd:code>
                    <gco:CharacterString>13605559</gco:CharacterString>
                  </gmd:code>
                  <gmd:codeSpace>
<gco:CharacterString>http://data.bgs.ac.uk/id/dataHolding/</gco:CharacterString>
                  </gmd:codeSpace>
                </gmd:RS_Identifier>
              </gmd:identifier>
            </gmd:CI_Citation>
          </gmd:citation>
          <gmd:abstract>
            <gco:CharacterString>Data from the DiGMap covering the whole of the United
Kingdom at a scale of 1:625 000 is available in this OGC WMS service for personal,
non-commercial use only. The service is a contribution to the OneGeology-Europe
initiative. The layers can be displayed either by age or by lithology. For more
information about the digital maps available from the British Geological Survey,
please visit
http://www.bgs.ac.uk/products/digitalmaps/digmapgb.html.</gco:CharacterString>
          </gmd:abstract>
          <gmd:pointOfContact>
            <gmd:CI_ResponsibleParty>
              <gmd:individualName>
                <gco:CharacterString>Westhead,Keith Robert</gco:CharacterString>
              </gmd:individualName>
              <gmd:organisationName>
                <gco:CharacterString>British Geological Survey</gco:CharacterString>
              </gmd:organisationName>
              <gmd:positionName>
                <gco:CharacterString>HoS - Information Delivery</gco:CharacterString>
              </gmd:positionName>
              <gmd:contactInfo>
                <gmd:CI_Contact>
                  <gmd:phone>
                    <gmd:CI_Telephone>
                      <gmd:voice>
                        <gco:CharacterString>+44 131 667 1000
Ex:364</gco:CharacterString>
                      </gmd:voice>
                    </gmd:CI_Telephone>
                  </gmd:phone>
                  <gmd:address>
                    <gmd:CI_Address>
                      <gmd:deliveryPoint>
```

```xml
                   <gco:CharacterString>Murchison House, West Mains Road,
Edinburgh, Lothian, United Kingdom, EH9 3LA, NG12 5GG</gco:CharacterString>
                 </gmd:deliveryPoint>
                 <gmd:city>
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                 </gmd:city>
                 <gmd:administrativeArea>
                   <gco:CharacterString>LOTHIAN</gco:CharacterString>
                 </gmd:administrativeArea>
                 <gmd:postalCode>
                   <gco:CharacterString>EH9 3LA</gco:CharacterString>
                 </gmd:postalCode>
                 <gmd:country>
                   <gco:CharacterString>United Kingdom</gco:CharacterString>
                 </gmd:country>
                 <gmd:electronicMailAddress>
                   <gco:CharacterString>enquiries@bgs.ac.uk</gco:CharacterString>
                 </gmd:electronicMailAddress>
               </gmd:CI_Address>
             </gmd:address>
           </gmd:CI_Contact>
         </gmd:contactInfo>
         <gmd:role>
           <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="distributor">distributor</gmd:CI_RoleCode>
         </gmd:role>
       </gmd:CI_ResponsibleParty>
     </gmd:pointOfContact>
     <gmd:resourceMaintenance>
       <gmd:MD_MaintenanceInformation>
         <gmd:maintenanceAndUpdateFrequency>
           <gmd:MD_MaintenanceFrequencyCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#MD_MaintenanceFrequencyCode"
codeListValue="asNeeded">asNeeded</gmd:MD_MaintenanceFrequencyCode>
         </gmd:maintenanceAndUpdateFrequency>
       </gmd:MD_MaintenanceInformation>
     </gmd:resourceMaintenance>
     <gmd:descriptiveKeywords>
       <gmd:MD_Keywords>
         <gmd:keyword>
           <gco:CharacterString>Geology</gco:CharacterString>
         </gmd:keyword>
         <gmd:thesaurusName>
           <gmd:CI_Citation>
             <gmd:title>
               <gco:CharacterString>GEMET Thesaurus version
1.0</gco:CharacterString>
             </gmd:title>
             <gmd:date>
               <gmd:CI_Date>
                 <gmd:date>
                   <gco:Date>2009-06-30</gco:Date>
                 </gmd:date>
                 <gmd:dateType>
                   <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                 </gmd:dateType>
               </gmd:CI_Date>
             </gmd:date>
```

```
          </gmd:CI_Citation>
        </gmd:thesaurusName>
      </gmd:MD_Keywords>
    </gmd:descriptiveKeywords>
    <gmd:descriptiveKeywords>
      <gmd:MD_Keywords>
        <gmd:keyword>
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        </gmd:keyword>
        <gmd:keyword>
          <gco:CharacterString>Digital maps</gco:CharacterString>
        </gmd:keyword>
        <gmd:keyword>
          <gco:CharacterString>Spatial data</gco:CharacterString>
        </gmd:keyword>
        <gmd:keyword>
          <gco:CharacterString>Geology</gco:CharacterString>
        </gmd:keyword>
        <gmd:keyword>
          <gco:CharacterString>Data</gco:CharacterString>
        </gmd:keyword>
        <gmd:thesaurusName>
          <gmd:CI_Citation>
            <gmd:title>
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Geosciences</gco:CharacterString>
            </gmd:title>
            <gmd:date>
              <gmd:CI_Date>
                <gmd:date>
                  <gco:Date>2009</gco:Date>
                </gmd:date>
                <gmd:dateType>
                  <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
                </gmd:dateType>
              </gmd:CI_Date>
            </gmd:date>
          </gmd:CI_Citation>
        </gmd:thesaurusName>
      </gmd:MD_Keywords>
    </gmd:descriptiveKeywords>
    <gmd:descriptiveKeywords>
      <gmd:MD_Keywords>
        <gmd:keyword>
          <gco:CharacterString>infoMapAccessService</gco:CharacterString>
        </gmd:keyword>
        <gmd:thesaurusName>
          <gmd:CI_Citation>
            <gmd:title>
              <gco:CharacterString>ISO 19119:2005</gco:CharacterString>
            </gmd:title>
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                </gmd:date>
                <gmd:dateType>
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codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
```

```xml
                    </gmd:dateType>
                  </gmd:CI_Date>
                </gmd:date>
              </gmd:CI_Citation>
            </gmd:thesaurusName>
          </gmd:MD_Keywords>
        </gmd:descriptiveKeywords>
        <gmd:descriptiveKeywords>
          <gmd:MD_Keywords>
            <gmd:keyword>
              <gco:CharacterString>NERC_DDC</gco:CharacterString>
            </gmd:keyword>
          </gmd:MD_Keywords>
        </gmd:descriptiveKeywords>
        <gmd:resourceConstraints>
          <gmd:MD_LegalConstraints>
            <gmd:useLimitation>
              <gco:CharacterString>otherRestrictions</gco:CharacterString>
            </gmd:useLimitation>
            <gmd:accessConstraints>
              <gmd:MD_RestrictionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#MD_RestrictionCode"
codeListValue="otherRestrictions">otherRestrictions</gmd:MD_RestrictionCode>
            </gmd:accessConstraints>
            <gmd:otherConstraints>
              <gco:CharacterString>The 1:625k DiGMap data is made available for all
uses - including commercial use, however the British Geological Survey (BGS) at all
times retains the copyright in this material and you are not permitted, without an
appropriate licence, to set up a service selling on this material. Your own use of
any information provided by the British Geological Survey (BGS) is at your own risk.
Neither BGS nor the Natural Environment Research Council (NERC) gives any warranty,
condition or representation as to the quality, accuracy or completeness of the
information or its suitability for any use or purpose. All implied conditions
relating to the quality or suitability of the information, and all liabilities
arising from the supply of the information (including any liability arising in
negligence) are excluded to the fullest extent permitted by
law.</gco:CharacterString>
            </gmd:otherConstraints>
          </gmd:MD_LegalConstraints>
        </gmd:resourceConstraints>
        <srv:serviceType>
          <gco:LocalName codeSpace="INSPIRE">view</gco:LocalName>
        </srv:serviceType>
        <srv:extent>
          <gmd:EX_Extent>
            <gmd:geographicElement>
              <gmd:EX_GeographicDescription>
                <gmd:geographicIdentifier>
                  <gmd:MD_Identifier>
                    <gmd:authority>
                      <gmd:CI_Citation>
                        <gmd:title>
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                        </gmd:title>
                        <gmd:date>
                          <gmd:CI_Date>
                            <gmd:date>
                              <gco:Date>2009-01-07</gco:Date>
                            </gmd:date>
                            <gmd:dateType>
                              <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
```

```
codeListValue="revision">revision</gmd:CI_DateTypeCode>
                            </gmd:dateType>
                        </gmd:CI_Date>
                    </gmd:date>
                </gmd:CI_Citation>
            </gmd:authority>
            <gmd:code>
                <gco:CharacterString>UKM</gco:CharacterString>
            </gmd:code>
        </gmd:MD_Identifier>
      </gmd:geographicIdentifier>
    </gmd:EX_GeographicDescription>
  </gmd:geographicElement>
  <gmd:geographicElement>
    <gmd:EX_GeographicDescription>
      <gmd:geographicIdentifier>
        <gmd:MD_Identifier>
          <gmd:authority>
            <gmd:CI_Citation>
              <gmd:title>
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              </gmd:title>
              <gmd:date>
                <gmd:CI_Date>
                  <gmd:date>
                    <gco:Date>2009-01-07</gco:Date>
                  </gmd:date>
                  <gmd:dateType>
                    <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>
                  </gmd:dateType>
                </gmd:CI_Date>
              </gmd:date>
            </gmd:CI_Citation>
          </gmd:authority>
          <gmd:code>
            <gco:CharacterString>GB</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmd:geographicIdentifier>
    </gmd:EX_GeographicDescription>
  </gmd:geographicElement>
  <gmd:geographicElement>
    <gmd:EX_GeographicBoundingBox>
      <gmd:westBoundLongitude>
        <gco:Decimal>-6.8647</gco:Decimal>
      </gmd:westBoundLongitude>
      <gmd:eastBoundLongitude>
        <gco:Decimal>2.9603</gco:Decimal>
      </gmd:eastBoundLongitude>
      <gmd:southBoundLatitude>
        <gco:Decimal>49.7974</gco:Decimal>
      </gmd:southBoundLatitude>
      <gmd:northBoundLatitude>
        <gco:Decimal>60.7719</gco:Decimal>
      </gmd:northBoundLatitude>
    </gmd:EX_GeographicBoundingBox>
  </gmd:geographicElement>
  <gmd:temporalElement>
    <gmd:EX_TemporalExtent>
      <gmd:extent>
        <gml:TimePeriod gml:id="ID1">
```

```xml
                    <gml:beginPosition>1995</gml:beginPosition>
                    <gml:endPosition>1995</gml:endPosition>
                  </gml:TimePeriod>
                </gmd:extent>
              </gmd:EX_TemporalExtent>
            </gmd:temporalElement>
          </gmd:EX_Extent>
        </srv:extent>
        <srv:couplingType>
          <srv:SV_CouplingType codeListValue="tight"
codeList="http://www.isotc211.org/2005/iso19119/resources/codelist/gmxCodelists.xml#
SV_CouplingType" />
        </srv:couplingType>
        <srv:containsOperations gco:nilReason="missing" />
        <srv:operatesOn xlink:title="BGS.1M.surface.GeologicUnit"
xlink:href="http://ogcdev.bgs.ac.uk/geonetwork/srv/en/csw?SERVICE=CSW&amp;amp;REQUES
T=GetRecordById&amp;amp;ID=9df8df52-d788-37a8-e044-
0003ba9b0d98&amp;amp;elementSetName=full&amp;amp;OutputSchema=http://www.isotc211.or
g/2005/gmd&amp;amp;" uuidref="9df8df52-d788-37a8-e044-0003ba9b0d98" />
        <srv:operatesOn xlink:title="BGS.1M.surface.GeologicUnit.age"
xlink:href="http://ogcdev.bgs.ac.uk/geonetwork/srv/en/csw?SERVICE=CSW&amp;amp;REQUES
T=GetRecordById&amp;amp;ID=9df8df52-d788-37a8-e044-
0003ba9b0d98&amp;amp;elementSetName=full&amp;amp;OutputSchema=http://www.isotc211.or
g/2005/gmd&amp;amp;" uuidref="9df8df52-d788-37a8-e044-0003ba9b0d98" />
      </srv:SV_ServiceIdentification>
    </gmd:identificationInfo>
    <gmd:distributionInfo>
      <gmd:MD_Distribution>
        <gmd:distributionFormat>
          <gmd:MD_Format>
            <gmd:name>
              <gco:CharacterString>image/gif</gco:CharacterString>
            </gmd:name>
            <gmd:version>
              <gco:CharacterString>NotApplicable</gco:CharacterString>
            </gmd:version>
          </gmd:MD_Format>
        </gmd:distributionFormat>
        <gmd:distributionFormat>
          <gmd:MD_Format>
            <gmd:name>
              <gco:CharacterString>image/png; mode=24bit</gco:CharacterString>
            </gmd:name>
            <gmd:version>
              <gco:CharacterString>NotApplicable</gco:CharacterString>
            </gmd:version>
          </gmd:MD_Format>
        </gmd:distributionFormat>
        <gmd:distributionFormat>
          <gmd:MD_Format>
            <gmd:name>
              <gco:CharacterString>image/jpeg</gco:CharacterString>
            </gmd:name>
            <gmd:version>
              <gco:CharacterString>NotApplicable</gco:CharacterString>
            </gmd:version>
          </gmd:MD_Format>
        </gmd:distributionFormat>
        <gmd:distributionFormat>
          <gmd:MD_Format>
            <gmd:name>
              <gco:CharacterString>image/png</gco:CharacterString>
            </gmd:name>
            <gmd:version>
```

```xml
          <gco:CharacterString>NotApplicable</gco:CharacterString>
        </gmd:version>
      </gmd:MD_Format>
    </gmd:distributionFormat>
    <gmd:distributionFormat>
      <gmd:MD_Format>
        <gmd:name>
          <gco:CharacterString>image/vnd.wap.wbmp</gco:CharacterString>
        </gmd:name>
        <gmd:version>
          <gco:CharacterString>NotApplicable</gco:CharacterString>
        </gmd:version>
      </gmd:MD_Format>
    </gmd:distributionFormat>
    <gmd:distributionFormat>
      <gmd:MD_Format>
        <gmd:name>
          <gco:CharacterString>image/tiff</gco:CharacterString>
        </gmd:name>
        <gmd:version>
          <gco:CharacterString>NotApplicable</gco:CharacterString>
        </gmd:version>
      </gmd:MD_Format>
    </gmd:distributionFormat>
    <gmd:distributionFormat>
      <gmd:MD_Format>
        <gmd:name>
          <gco:CharacterString>image/svg+xml</gco:CharacterString>
        </gmd:name>
        <gmd:version>
          <gco:CharacterString>NotApplicable</gco:CharacterString>
        </gmd:version>
      </gmd:MD_Format>
    </gmd:distributionFormat>
    <gmd:distributionFormat>
      <gmd:MD_Format>
        <gmd:name>
          <gco:CharacterString>text/xml; subtype=gml/3.1.1</gco:CharacterString>
        </gmd:name>
        <gmd:version>
          <gco:CharacterString>3.1.1</gco:CharacterString>
        </gmd:version>
      </gmd:MD_Format>
    </gmd:distributionFormat>
    <gmd:distributionFormat>
      <gmd:MD_Format>
        <gmd:name>
          <gco:CharacterString>GeoSciML</gco:CharacterString>
        </gmd:name>
        <gmd:version>
          <gco:CharacterString>2</gco:CharacterString>
        </gmd:version>
      </gmd:MD_Format>
    </gmd:distributionFormat>
    <gmd:distributionFormat>
      <gmd:MD_Format>
        <gmd:name>
          <gco:CharacterString>text/plain</gco:CharacterString>
        </gmd:name>
        <gmd:version>
          <gco:CharacterString>NotApplicable</gco:CharacterString>
        </gmd:version>
      </gmd:MD_Format>
    </gmd:distributionFormat>
```

```
                <gmd:distributionFormat>
                  <gmd:MD_Format>
                    <gmd:name>
                      <gco:CharacterString>text/html</gco:CharacterString>
                    </gmd:name>
                    <gmd:version>
                      <gco:CharacterString>NotApplicable</gco:CharacterString>
                    </gmd:version>
                  </gmd:MD_Format>
                </gmd:distributionFormat>
                <gmd:distributionFormat>
                  <gmd:MD_Format>
                    <gmd:name>
                      <gco:CharacterString>application/vnd.ogc.gml</gco:CharacterString>
                    </gmd:name>
                    <gmd:version>
                      <gco:CharacterString>NotApplicable</gco:CharacterString>
                    </gmd:version>
                  </gmd:MD_Format>
                </gmd:distributionFormat>
                <gmd:distributionFormat>
                  <gmd:MD_Format>
                    <gmd:name>
                      <gco:CharacterString>text/xml</gco:CharacterString>
                    </gmd:name>
                    <gmd:version>
                      <gco:CharacterString>NotApplicable</gco:CharacterString>
                    </gmd:version>
                  </gmd:MD_Format>
                </gmd:distributionFormat>
                <gmd:distributor>
                  <gmd:MD_Distributor>
                    <gmd:distributorContact>
                      <gmd:CI_ResponsibleParty>
                        <gmd:organisationName>
                          <gco:CharacterString>British Geological
Survey</gco:CharacterString>
                        </gmd:organisationName>
                        <gmd:contactInfo>
                          <gmd:CI_Contact>
                            <gmd:phone>
                              <gmd:CI_Telephone>
                                <gmd:voice>
                                  <gco:CharacterString>+44 131 667 1000
Ex:364</gco:CharacterString>
                                </gmd:voice>
                              </gmd:CI_Telephone>
                            </gmd:phone>
                            <gmd:address>
                              <gmd:CI_Address>
                                <gmd:deliveryPoint>
                                  <gco:CharacterString>Murchison House, West Mains Road,
Edinburgh, Lothian, United Kingdom, EH9 3LA, NG12 5GG</gco:CharacterString>
                                </gmd:deliveryPoint>
                                <gmd:city>
                                  <gco:CharacterString>EDINBURGH</gco:CharacterString>
                                </gmd:city>
                                <gmd:administrativeArea>
                                  <gco:CharacterString>LOTHIAN</gco:CharacterString>
                                </gmd:administrativeArea>
                                <gmd:postalCode>
                                  <gco:CharacterString>EH9 3LA</gco:CharacterString>
                                </gmd:postalCode>
                                <gmd:country>
```

```xml
                        <gco:CharacterString>United Kingdom</gco:CharacterString>
                    </gmd:country>
                    <gmd:electronicMailAddress>
<gco:CharacterString>enquiries@bgs.ac.uk</gco:CharacterString>
                    </gmd:electronicMailAddress>
                </gmd:CI_Address>
            </gmd:address>
        </gmd:CI_Contact>
    </gmd:contactInfo>
    <gmd:role>
        <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="distributor">distributor</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://ogc.bgs.ac.uk/BGS_Bedrock_and_Surface_Geology/wms.php?SERVICE=WMS&am
p;REQUEST=getCapabilities&amp;</gmd:URL>
                </gmd:linkage>
                <gmd:protocol>
                    <gco:CharacterString>OGC:WMS-1.3.0-http-get-
capabilities</gco:CharacterString>
                </gmd:protocol>
                <gmd:name>
<gco:CharacterString>BGS.Bedrock.and.Surface.Geology</gco:CharacterString>
                </gmd:name>
                <gmd:description>
                    <gco:CharacterString>BGS Bedrock and Surface
geology</gco:CharacterString>
                </gmd:description>
                <gmd:function>
                    <gmd:CI_OnLineFunctionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_OnLineFunctionCode"
codeListValue="download">download</gmd:CI_OnLineFunctionCode>
                </gmd:function>
            </gmd:CI_OnlineResource>
        </gmd:onLine>
    </gmd:MD_DigitalTransferOptions>
</gmd:transferOptions>
<gmd:transferOptions>
    <gmd:MD_DigitalTransferOptions>
        <gmd:onLine>
            <gmd:CI_OnlineResource>
                <gmd:linkage>
<gmd:URL>http://ogc.bgs.ac.uk/BGS_Bedrock_and_Surface_Geology/wms.php</gmd:URL>
                </gmd:linkage>
                <gmd:protocol>
                    <gco:CharacterString>OGC:WMS-1.3.0-http-get-
map</gco:CharacterString>
                </gmd:protocol>
                <gmd:name>
<gco:CharacterString>BGS.1M.surface.GeologicUnit.age</gco:CharacterString>
                </gmd:name>
                <gmd:description>
                    <gco:CharacterString>BGS 1M surface Geologic Unit Age. The  layer
```

```
shows the rocks and superficial deposits present at the land surface, clasified by
Geological age</gco:CharacterString>
                  </gmd:description>
                  <gmd:function>
                    <gmd:CI_OnLineFunctionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_OnLineFunctionCode"
codeListValue="download">download</gmd:CI_OnLineFunctionCode>
                  </gmd:function>
                </gmd:CI_OnlineResource>
              </gmd:onLine>
            </gmd:MD_DigitalTransferOptions>
          </gmd:transferOptions>
          <gmd:transferOptions>
            <gmd:MD_DigitalTransferOptions>
              <gmd:onLine>
                <gmd:CI_OnlineResource>
                  <gmd:linkage>
<gmd:URL>http://ogc.bgs.ac.uk/BGS_Bedrock_and_Surface_Geology/wms.php</gmd:URL>
                  </gmd:linkage>
                  <gmd:protocol>
                    <gco:CharacterString>OGC:WMS-1.3.0-http-get-
map</gco:CharacterString>
                  </gmd:protocol>
                  <gmd:name>
<gco:CharacterString>BGS.1M.surface.GeologicUnit</gco:CharacterString>
                  </gmd:name>
                  <gmd:description>
                    <gco:CharacterString>BGS 1M surface Geologic Unit. The  layer
shows the rocks and superficial deposits present at the land surface, clasified by
lithology</gco:CharacterString>
                  </gmd:description>
                  <gmd:function>
                    <gmd:CI_OnLineFunctionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#CI_OnLineFunctionCode"
codeListValue="download">download</gmd:CI_OnLineFunctionCode>
                  </gmd:function>
                </gmd:CI_OnlineResource>
              </gmd:onLine>
            </gmd:MD_DigitalTransferOptions>
          </gmd:transferOptions>
        </gmd:MD_Distribution>
      </gmd:distributionInfo>
      <gmd:dataQualityInfo>
        <gmd:DQ_DataQuality>
          <gmd:scope>
            <gmd:DQ_Scope>
              <gmd:level>
                <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="service">service</gmd:MD_ScopeCode>
              </gmd:level>
              <gmd:levelDescription>
                <gmd:MD_ScopeDescription>
                  <gmd:other>
                    <gco:CharacterString>Geographic web service</gco:CharacterString>
                  </gmd:other>
                </gmd:MD_ScopeDescription>
              </gmd:levelDescription>
            </gmd:DQ_Scope>
          </gmd:scope>
          <gmd:report>
```

```
                    <gmd:DQ_DomainConsistency>
                      <gmd:result>
                        <gmd:DQ_ConformanceResult>
                          <gmd:specification>
                            <gmd:CI_Citation>
                              <gmd:title>
                                <gco:CharacterString>COMMISSION REGULATION (EU) No 1089/2010
of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and
of the Council as regards interoperability of spatial data sets and
services</gco:CharacterString>
                              </gmd:title>
                              <gmd:date>
                                <gmd:CI_Date>
                                  <gmd:date>
                                    <gco:Date>2010-12-08</gco:Date>
                                  </gmd:date>
                                  <gmd:dateType>
                                    <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/ML_gmx
Codelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                                  </gmd:dateType>
                                </gmd:CI_Date>
                              </gmd:date>
                            </gmd:CI_Citation>
                          </gmd:specification>
                          <gmd:explanation>
                            <gco:CharacterString>See http://eur-
lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:323:0011:0102:EN:PDF</gco:Chara
cterString>
                          </gmd:explanation>
                          <gmd:pass>
                            <gco:Boolean>true</gco:Boolean>
                          </gmd:pass>
                        </gmd:DQ_ConformanceResult>
                      </gmd:result>
                      <gmd:result>
                        <gmd:DQ_ConformanceResult>
                          <gmd:specification>
                            <gmd:CI_Citation>
                              <gmd:title>
                                <gco:CharacterString>Technical Guidance for the implementation
of INSPIRE View Services Version 3.0</gco:CharacterString>
                              </gmd:title>
                              <gmd:date>
                                <gmd:CI_Date>
                                  <gmd:date>
                                    <gco:Date>2011-03-21</gco:Date>
                                  </gmd:date>
                                  <gmd:dateType>
                                    <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas
/resources/codelist/ML_gmx
Codelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                                  </gmd:dateType>
                                </gmd:CI_Date>
                              </gmd:date>
                            </gmd:CI_Citation>
                          </gmd:specification>
                          <gmd:explanation>
                            <gco:CharacterString>See the referenced specification at
http://inspire.jrc.ec.europa.eu/documents/Network_Services/TechnicalGuidance_ViewSer
```

```
vices_v3.0.pdf</gco:CharacterString>
                </gmd:explanation>
                <gmd:pass>
                   <gco:Boolean>true</gco:Boolean>
                </gmd:pass>
              </gmd:DQ_ConformanceResult>
            </gmd:result>
          </gmd:DQ_DomainConsistency>
        </gmd:report>
        <gmd:lineage>
          <gmd:LI_Lineage>
            <gmd:statement>
              <gco:CharacterString>For lineage of datasets served by this service
please refer to the metadata for those data</gco:CharacterString>
            </gmd:statement>
          </gmd:LI_Lineage>
        </gmd:lineage>
      </gmd:DQ_DataQuality>
    </gmd:dataQualityInfo>
  </gmd:MD_Metadata>
```

APPENDIX F – COUPLED RESOURCE

317 Coupled resource shall be implemented by reference. The guidance is to use the XLink mechanism and to encode either an OGC CS-W GetRecordById request or the address of a WAF as the value of the xlink:href attribute.

318 Coupled resource is encoded using the operatesOn XML element in the srv namespace. The data type of this element is the MD_DataIdentification XML element in the gmd namespace.

319 Figure 110 shows the encoding of coupled resource using the *by reference* mechanism and an OGC CS-W GetRecordById request.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <srv:operatesOn
xlink:href="http://ogcdev.bgs.ac.uk/geonetwork/srv/en/csw?SERVICE=CSW&amp;REQUEST=Ge
tRecordById&amp;ID=9df8df52-d788-37a8-e044-
0003ba9b0d98&amp;elementSetName=full&amp;OutputSchema=http://www.isotc211.org/2005/g
md"/>
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 110 – Coupled resource implemented *by reference*

320 The *by value* encoding of the example shown in Figure 110 is shown in Figure 111. Note that the xlink:href attribute of the operatesOn element has been removed and that the operatesOn element now contains an MD_DataIdentification element.

```
<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <srv:SV_ServiceIdentification>
      ...
      <srv:operatesOn>
        <gmd:MD_DataIdentification>
          <gmd:citation>
            <gmd:CI_Citation>
              <gmd:title>
                <gco:CharacterString>Digital Geological Map Data of Great Britain -
625k (DiGMapGB-625)</gco:CharacterString>
              </gmd:title>
              ...
            </gmd:CI_Citation>
          </gmd:citation>
          ...
        </gmd:MD_DataIdentification>
      </srv:operatesOn>
    </srv:SV_ServiceIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>
```

Figure 111 – Coupled resource implemented *by value*

321 It should be noted that both an OGC CS-W GetRecordById and a WAF available metadata instance are full metadata instances which may contain more than one MD_DataIdentification element, in accordance with ISO 19115. Therefore, an application wishing to dereference the operatesOn element must 'know' which MD_DataIdentification element to obtain from the metadata instance. In the case of GEMINI and INSPIRE metadata it will be the first MD_DataIdentification element in the instance.

322 An OGC CS-W GetRecordById request response wraps the metadata instance in a GetRecordByIdResponse XML element in the csw namespace (see Figure 112).

```xml
<?xml version="1.0" encoding="UTF-8"?>
<csw:GetRecordByIdResponse xmlns:csw="http://www.opengis.net/cat/csw/2.0.2">
  <gmd:MD_Metadata>
    <gmd:fileIdentifier>
      <gco:CharacterString>9df8df52-d788-37a8-e044-
0003ba9b0d98</gco:CharacterString>
    </gmd:fileIdentifier>
    ...
  </gmd:MD_Metadata>
</csw:GetRecordByIdResponse>
```

Figure 112 – CS-W GetRecordByIdResponse

323 The XPath for accessing the MD_DataIdentification element is: //gmd:identificationInfo[1]