OGC® Testbed-10 Service Integration Engineering Report

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Preface

For many years OGC has been developing a suite of web services for geospatial processing. The suite includes a web map service (WMS), a web map tiling service (WMTS), a web feature service (WFS), a web coverage service (WCS), a web catalogue service, etc. These services have, more or less, been developed independently of one another resulting in isolation and poor integration among them. For example, consider a map generated by a WMS; it is not easily possible to determine which source data was used to create the map and how to download that source data though an OGC data service such as WFS or WCS. Furthermore when one considers the Publish-Find-Bind paradigm, OGC can only partially support the full potential of this paradigm because OGC catalogues can only register services in isolation of other related services and cannot automatically determine the relationships among services and the resources they offer. The purpose of this document is to provide a technical description of changes to the OGC web service architecture baseline to support better integration among OGC web services that would allow better automated publishing and richer discovery of those services and related resources.
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1 Introduction

1.1 Scope

This document specifies technical changes to the OGC web service architecture baseline to support better integration among the services. Although integration may be achieved in a number of ways and using a number of other technologies, the goal of this document is to achieve this integration within the current OGC service framework in order to leverage existing investments in OGC web services infrastructure.

Two groups of use cases have been developed to illustrate the needs of an integrated suite of OGC web services: (a) catalogue use cases and (b) direct client-server use cases. The catalogue use cases include the following:

- Service identification use case
- Service discovery use case
- Service harvesting use case
- Rich discovery use case

The direct client-service use cases include the following:

- Efficient data navigation use case
- Rendering use case
- Cascading use case
- Data download use case

This document establishes a new service, called the **Web Integration Service** (WIS), which allows for the discovery and access to integrated sets of OGC web services deployed at an endpoint.

This document specifies a means of discovering and describing associations between web resources (both OGC and non-OGC). The discovery of associations is accomplished by means a new operation named GetAssociations. The description or representation of
associations is accomplished by the definition of an XML Schema for expressing associations in XML. As mentioned earlier, the scope of this document is limited to the existing OGC web service framework, which predominantly uses XML. However, it is anticipated that over time the association schemas defined in this document will be extended to provide a JSON expression, which is a rapidly emerging encoding both within and outside the OGC.

For the purpose of catalogue harvesting it would be very useful to have a unique service identifier for each service instance. This document also specifies changes to the existing OGC Capabilities document schema to include a “ServiceId” element whose value is a UUID (see IETF RFC 4122) that uniquely identifies an OGC web service instance.

Currently, OGC catalogues can harvest the capabilities document of an OGC web service, register that service, register the existence of the individual data items that the service offers and also register the association between the service and the data it offers. Thus, the entire harvesting process is focused on a single OGC web service. There is currently no defined method that allows a catalogue to determine and harvest associations that might exist between the service being harvested and other services and other data offerings. This document also specifies changes to the current OGC web service baseline to support the harvesting of this richer set of metadata by providing the means for a catalogue to register a service, the data the service offers and also all the associations between the service, its data, other OGC web resources (i.e. other OGC services and data offerings) and other non-OGC web resources. A component of this enhanced harvesting capability is the definition of a CSW-ebRIM package that defines ebRIM object types, associations and classifications that support the description of integrated OGC web services and their artifacts within the catalogue.

Having defined the methods and apparatus for harvesting a richer set of metadata about OGC web services, this document also specifies how this metadata can be discovered once it has been registered in a catalogue. For example, a client should be able to find the description of feature data in a catalogue and then be able to find the WFS that offer that data, a WMS that renders those features into a map, a WMTS that has a tiled representation of that data, etc. This enhanced discovery capability is provided by a set of stored queries defined in a CSW-ebRIM package specified in this document to support the description of integrated OGC web services.

The association between web resources described in this document will also have an impact and use for the OWS Context document (see OGC 12-084). An OGC Web Services Context Document (OWS Context) lists a set of configured information resources in a single document. The information resources are primarily OGC services but it also supports inline content. Resources such as OGC Web Feature Service (WFS), Web Map Service (WMS), Web Map Tile Service (WMTS), Web Coverage Service (WCS) or configured processing services defined as a Web Processing Service (WPS) can be listed side by side with GML objects or to offer a “common operating picture”.

OGC 14-013r1

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An OWS Context Document presents a list of items and not necessarily a list of services. An item can have one or more services associated and thus allowing the client to select the preferred end-point and encoding of the information represented in the item. A catalogue or an application producing OWS Context Documents has to obtain those associations and be able to aggregate them as the same item accessed by different services.

Moreover, as in for the catalogue harvesting mentioned above, the OWS Context Document offers no method to define associations that might exist between the different items. It is expected that the association defined in this document will support OWS Context clients in organizing and managing the different information items.

1.2 Document contributor contact points

All questions regarding this document should be directed to the editor or the contributors:

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1.3 Future work

Although any OGC web service can participate as part of an integrated suite of OGC services, this document primarily focuses its discussion and examples of the “classical” OGC web service of WMS, WMTS, WFS, WCS, WPS and CSW. Future revisions would expand the examples and discussion to include a broader range of OGC service including the SOS suite of services.

The data structures defined in this are document are primarily encoded using XML. In the future a JSON encoding will also be required as JSON is quickly emerging as the preferred encoding and serialization of data exchanged on the web.

1.4 Forward

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Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.
2 References

The following documents are referenced in this document. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

IETF RFC 3986, *Uniform Resource Identifier (URI): Generic Syntax*

IETF RFC 4122, *A Universally Unique IDentifier (UUID) URN Namespace*

IETF RFC 5988, *Web Linking*

OASIS regrep-rim-3.0-os, *ebXML Registry Information Model, Version 3.0*

OGC 12-084r2, *OWS Context Atom Encoding*

OGC 12-080, *OWS Context Conceptual Model*

OGC 10-069r2, *OWS-7 Engineering Report - Geosynchronization service*

OGC 09-025r1, *OpenGIS Web Feature Service 2.0 Interface Standard (also ISO 19142)*

OGC 07-110r4, *CSW-ebRIM Registry Service - Part 1: ebRIM profile of CSW*

OGC 07-144r4, *CSW-ebRIM Registry Service - Part 2: Basic extension package*

OGC 07-057r7, *OpenGIS Web Map Tile Service Implementation Standard*

OGC 07-006r1, *OpenGIS Catalogue Service Implementation Specification*

OGC 06-121r9, *OGC® Web Services Common Standard*

OGC 06-042, *OpenGIS Web Map Service (WMS) Implementation Specification*

OGC 05-076, *OpenGIS Web Coverage Service (WCS) Implementation Specification*

In addition to this document, this report includes several XML Schema Document files as specified in Annex A and Annex B.

3 Terms and definitions

For the purposes of this report, the definitions specified in Clause 4 of the OWS Common Implementation Standard [OGC 06-121r3] shall apply. In addition, the following terms and definitions apply.
3.1 attribute
<XML>
name-value pair contained in an element
[ISO 19136:2007]
Note: In this document an attribute is an XML attribute unless otherwise specified.

3.2 association
named or typed connection between two web resources

3.3 baseURL
URL to which parameters of the GetCapabilities operation are appended to form a valid request
NOTE: assuming that the name of root element of the capabilities document is “root_element” the XPath expression for getting the baseURL is:
/\root_element/OperationsMetadata/Operation[name="GetCapabilities"]/DCP/HTTP/Get/@xlink:href

3.4 client
software component that can invoke an operation from a server
[ISO 19128:2005]

3.5 coordinate
one of a sequence on n numbers designating the position of a point in n-dimensional space
[ISO 19111:2007]

3.6 coordinate reference system
coordinate system that is related to an object by a datum
[ISO 19111:2007]

3.7 coordinate system
set of mathematical rules for specifying how coordinate are to be assigned to points
[ISO 19111:2007]

3.8 element
<XML>
basic information item of an XML document containing child elements, attributes and character data
[ISO 19136:2007]
3.9
feature
abstraction of real world phenomena
[ISO 19010:2002]
NOTE: A feature can occur as a type or an instance. The term “feature type” or “feature instance” should be used when only one is meant.

3.10
feature identifier
identifier that uniquely designates a feature instance

3.11
filter expression
predicate expression encoded using XML
[ISO 19143]

3.12
Harvest operation
an operation defined by the CSW standard that may be used to automatically register resources (e.g. services) with the catalogue

3.13
interface
named set of operations that characterize the behavior of an entity

3.14
link
synonym for association

3.15
link relation
identifies the semantics of a link
NOTE: Typically specified using the “rel” attribute of a link or association

3.16
namespace
<XML>
collection of names, identifier by a URI reference which are used in XML documents as element names and attribute names
[W3C XML Namespaces]

3.17
operation
specification of a transformation or query that an object may be called to execute
[ISO 19119:2005]
3.18
**OGC web service resource**
resource that is accessible through an OGC web service
NOTE: Examples of OGC web service resource include WMS layer, WFS feature type & WCS coverage. Essentially any resource that you can only access through a OGC service API is an “OGC web service resource”

3.19
**property**
face or attribute of an object, referenced by name
[ISO 19143]

3.20
**response**
result of an operation returned from a server to a client
[ISO 19128:2005]

3.21
**server**
particular instance of a service
[ISO 19128:2005]

3.22
**service**
distinct part of the functionality that is provided by an entity through interfaces
[ISO 19119:2005]

3.23
**service metadata**
metadata describing the operations and geographic information available at a server
[ISO 19128:2005]

3.24
**Uniform Resource Identifier**
unique identifier for a resource, structured in conformance with IETF RFC 3986
[ISO 19136:2007] and
NOTE: The generate syntax is <scheme>::<scheme-specified-part>. The hierarchical syntax with a namespace is <scheme>://<authority><path>?<query>

3.25
**web resource**
referent of any uniform resource identifier (see RFC 3986), or internationalized resource identifier (see RFC 3987).
4 Conventions

4.1 Abbreviated terms

API Application Program Interface
CSW Catalogue Service Web
CSW-ebRIM ebRIM profile of Catalogue Service Web
GSS GeoSynchronization Service
URL Uniform Resource Location
URI Uniform Resource Identifier
WMS Web Map Service
WMTS Web Map Tiling Service
WFS Web Feature Service
WCS Web Coverage Service
UUID Universally Unique IDentifier

4.2 UML notation

Most diagrams that appear in this standard are presented using the Unified Modeling Language (UML) static structure diagram, as described in Subclause 5.2 of [OGC 06-121r3].

5 Use cases

5.1 Introduction

This clause describes a number of use cases used to guide the development of this engineering report.

5.2 Catalogue use cases

5.2.1 Service identification use case

In order to prevent duplicate harvesting, a catalogue should be able to determine if an OGC web service, arrived at by a variety of different paths, is indeed the same service. It is not trivial, for example, for a catalogue to determine that a WFS arrived at using the URL:

http://www.somecorp.com/wfs?service=WFS&version=2.0&request=GetCapabilities
is in fact the same WFS arrived at using the URL:

http://www.somecorp.com/wfs?REQUEST=GetCapabilities&version=2.0.0&service=wfs&vendorId=somecorp

5.2.2 Service discovery use case

A common deployment pattern for OGC web services is to have a suite of OGC web services deployed on top of one or more spatial data repositories. For example, an enterprise may have one or more databases containing spatial data and several OGC web services are deployed on top of those data resources. The problem is that these services, although notionally deployed as a suite of services, stand in isolation because there is no means of discovering which set of OGC web services are deployed at an endpoint. Enabling the discovery use case this allows clients to discover the set or suite of OGC web services available at an endpoint.

5.2.3 Service harvesting use case

OGC catalogues can automatically harvest the capabilities document of OGC web services in order to register the service, the data that the service offers and the association between the two (e.g. wfs X offers feature type y). However, OGC catalogues cannot automatically discover and create other associations that might exist between the service being harvested and other resources. Enabling the harvesting use case allows a catalogue to not only harvest an OGC web service and its offering but also allows the catalogue to automatically discover and harvest any associations with other OGC and non-OGC resources.

5.2.4 Rich discovery use case

Because a catalogue can currently only discover a very limited set of associations -- typically isolated to a single OGC web service -- the ability for rich discovery is severely curtailed. The discover use case enables a client to search an OGC catalogue for rich associations between a service, its offerings and other OGC and non-OGC resource. An example of such rich discovery would be to search an OGC catalogue and find some feature data. A client should then be able to discover not only the WFS that offers that data (something that is currently possible) but also find a WMS that renders those features onto a map or a WMTS that has a tiled representation of that data thus enabling quick visual navigation of the data.

5.3 Direct client-server use cases

5.3.1 Efficient navigation use case

The efficient navigation use case allows rendering software to determine if there is a faster and more efficient service available for rendering map data. For example, a client...
should be able to interrogate the WMS providing that map layer and determine if there is a WMTS layer that might be used instead to more efficiently render the map.

### 5.3.2 Rendering use case

Given a WFS feature type or WCS coverage, a client should be able to interrogate the corresponding service to determine if there is an available WMS/WMTS layer that renders that data as a map.

### 5.3.3 Cascading use case

Given a cascaded resource a client should be able to interrogate the service to determine the source server of the resource so that the client can decide to bypass the cascading service and access the source service directly.

### 5.3.4 Data download use case

The data download use case allows a client to interactively create a map and then, by interrogating the services used to render the map (e.g. WMS or WMTS) be able download the underlying source data for the map. This use case typically requires the association between WMS or WMTS layers and WFS feature types or WCS coverages to be established.

### 6 Elements of the solution

#### 6.1 Introduction

This clause described at a high level some of the elements of the proposed service integration solution presented in this engineering report.

#### 6.2 Evolutionary refinement

During the last 18 years, substantial funding resources have been allocated by OGC and its member organizations across the world to define and implement the current suite of OGC web services. For this reason, a primary requirement of the integration solution presented in this engineering report is that it works within the context of the existing suite of OGC web services. To the extent possible solutions sought by this project reuse existing structures (e.g. capabilities document) that can be easily deployed to enhance existing implementations and significantly improve integration among OGC web services.
6.3 Auto-discovery

Auto-discovery is the automated discovery of OGC services at a specified endpoint. Put another way, given a URL endpoint, an agent should be able to determine which OGC services (WMS, WFS, WCS, WMTS, etc.) are being offered at that endpoint.

6.4 Auto-description

OGC services are already partially self-describing in that they provide metadata in the form of a capabilities document obtained using the GetCapabilities operation that all OGC web services must implement. The OGC capabilities document contains metadata that describes what kind of service is being offered, who is offering the service, what content is being offered and optionally what kind of query capabilities the service offers.

This information is useful and important but it only relates to a single service. In order to have a richer description of a suite of OGC web services, there is a requirement that additional metadata must be published that not only describes a specific service and its offerings but also describes relationships or associations between that service, its offerings and other OGC and non-OGC resources. For example, a WMS would know that a particular layer that it offers is rendered from source feature data offered by a particular WFS. The kind of internal knowledge (e.g. the association between a WMS layer and a WFS feature type) needs to be externalized thus becoming harvestable and discoverable using an OGC catalogue.

6.5 Cataloging

Currently OGC catalogues support the registration of OGC services and the contents that they offer. Because each service is harvested in isolation of other services and resources, only limited discovery is supported allowing a client to, for example, discover a data resource and then find the service that offers that resource (or visa-versa).

An integrated OGC web service environment, however, requires that OGC catalogues be extended to harvest and make discoverable a richer set of linked OGC and non-OGC resources. A catalogue should be able to automatically register services found at an endpoint as well as register all known associations among those services, their offerings and other OGC and non-OGC resources. This involves harvesting a service’s capabilities document to determine what content the service offers but it also involves further interrogating the service to determine of what (if any) other associations it is aware.

Thus, part of the solution proposed in the engineering report involved extending the catalogue information model to be able to describe richly linked OGC and non-OGC resources.
7 Web Integration Service

7.1 Introduction

The Web Integration Service (WIS) is an aggregation service whose only purpose is to provide a list of references to a suite of other, perhaps related OGC services available at an endpoint.

In keeping with the evolutionary refinement and reuse goal stated in Clause 6.1, the web integration service only defines a single operation, GetCapabilities, and responds using a standard OGC capabilities document whose content section lists the available services accessible at that end point.

A web integration service shall implement the KVP-encoding of the GetCapabilities operation.

A web integration service may optionally implement the XML-encoding of the GetCapabilities operation.

7.2 GetCapabilities operation

7.2.1 Request

7.2.1.1 UML

Figure 1 defines the schema of the GetCapabilities request.

```
+ service : ServiceType = "WIS" [frozen]
```

Figure 1 – UML for GetCapabilities request

7.2.1.2 KVP encoding

The KVP encoding of the GetCapabilities request shall be as specified in OGC 06-121r3:2009, 7.2.2. The value of the service parameter shall be fixed to “WIS”.
7.2.1.3 XML encoding

The following XML Schema fragment defines the XML-encoding of the GetCapabilities request.

```xml
<xsd:element name="GetCapabilities" type="wfs:GetCapabilitiesType"/>
<xsd:complexType name="GetCapabilitiesType">
  <xsd:complexContent>
    <xsd:extension base="ows:GetCapabilitiesType">
      <xsd:attribute name="service" type="ows:ServiceType" use="required" fixed="WIS"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

7.2.2 Response

7.2.2.1 UML

The following UML diagram defines the schema for the response of a WIS. The response is essentially a standard OGC capabilities document with a content section composed of zero or more ows:ServiceIdentification sections each describing one OGC web service available at the endpoint.

![UML diagram](image)

**Figure 2 – UML for GetCapabilities response**
Each service is characterized by its type (i.e. WMS, WMTS, WFS, etc.), the base URL of the service and the standard ServiceIdentification description of the service from Web Service Common (see OGC 06-121r9).

The value of the “type” parameter can be a token – such as the three letter acronyms commonly used by OGC – or a URI identifier for the service (see Table 1).

The value of the “baseUrl” parameter is the service URL to which GetCapabilities request (see 06-121r9, Clause 7) parameters are appended to form a valid request URL.

7.2.2.2 XML encoding

The following XML Schema fragment defines the schema for the XML-encoded response to a WIS GetCapabilities request.

```xml
<xsd:element name="Capabilities" type="wis:WIS_CapabilitiesType"/>
<xsd:complexType name="WIS_CapabilitiesType">
  <xsd:complexContent>
    <xsd:extension base="ows:CapabilitiesBaseType">
      <xsd:sequence>
        <xsd:element ref="wis:Contents"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:element name="Contents" type="wis:ContentsType"/>
<xsd:complexType name="ContentsType">
  <xsd:sequence>
    <xsd:element ref="wis:Service" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:element name="Service" type="wis:ServiceType"/>
<xsd:complexType name="ServiceType">
  <xsd:sequence>
    <xsd:element ref="ows:ServiceIdentification"/>
  </xsd:sequence>
  <xsd:attribute name="type" type="wis:TokenOrAnyURI" use="required"/>
  <xsd:attribute name="baseUrl" type="xsd:anyURI" use="required"/>
</xsd:complexType>

<xsd:simpleType name="TokenOrAnyURI">
  <xsd:union memberTypes="xsd:token xsd:anyURI"/>
</xsd:simpleType>
```
7.3 NoOp operation

This engineering report defines an additional WIS operation named “NoOp” that all clients shall ignore. The NoOp operation only exists to satisfy XML validation requirements for capabilities documents imposed by the Web Service Common standard (see OGC 06-121r9, 7.4.6) which requires that OGC web services implement the GetCapabilities operation plus one additional operation. Clearly, the web service common standard did not anticipate the usefulness of a service that only implements the GetCapabilities request. A change request has been posted against OGC 06-121r9 to remove this requirement.

7.4 Example

In response to the following request:

http://www.somcorp.com/wis?service=WIS&request=GetCapabilities

a web integration service might generate the following capabilities document:

```xml
<?xml version="1.0"?><Capabilities version="1.0.0"
 xmlns="http://www.opengis.net/wis/1.0"
 xmlns:ows="http://www.opengis.net/ows/2.0"
 xmlns:xlink="http://www.w3.org/1999/xlink"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.opengis.net/wis/1.0 wis.xsd">
 <ows:ServiceIdentification>
  <ows:Title>SomeSERV</ows:Title>
  <ows:Abstract xml:lang="en">A suite of OGC web services by Some Corp.</ows:Abstract>
  <ows:ServiceType>SomeSERV</ows:ServiceType>
  <ows:ServiceTypeVersion>7.0.1</ows:ServiceTypeVersion>
 </ows:ServiceIdentification>
 <ows:ServiceProvider>
  <ows:ProviderName>Some Corp.</ows:ProviderName>
  <ows:ProviderSite xlink:href="http://www.somecorp.com"/>
  <ows:ServiceContact>
   <ows:IndividualName>John Smith</ows:IndividualName>
   <ows:PositionName>Senior Developer</ows:PositionName>
   <ows:ContactInfo>
    <ows:Phone>
     <ows:Voice>+1-416-555-1234</ows:Voice>
     <ows:Facsimile>+1-416-555-5678</ows:Facsimile>
    </ows:Phone>
   </ows:ContactInfo>
   <ows:DeliveryPoint>1 Main St., Suite 1</ows:DeliveryPoint>
  </ows:ServiceContact>
 </ows:ServiceProvider>
 <ows:ServiceIdentifier>SomeSERV</ows:ServiceIdentifier>
</Capabilities>
```
<ows:Country>Canada</ows:Country>
<ows:ElectronicEmailAddress>jsmith@somecorp.com</ows:ElectronicEmailAddress>

</ows:Address>
</ows:ContactInfo>
</ows:ServiceContact>
</ows:ServiceProvider>
<ows:OperationsMetadata>
<ows:Operation name="GetCapabilities">
<ows:DCP>
<ows:HTTP>
<ows:Constraint name="GetEncoding">
<ows:AllowedValues>
<ows:Value>KVP</ows:Value>
</ows:AllowedValues>
</ows:Constraint>
</ows:Get>
</ows:HTTP>
</ows:DCP>
<ows:Parameter name="Format">
<ows:AllowedValues>
<ows:Value>application/xml</ows:Value>
<ows:Value>application/x-bxml</ows:Value>
</ows:AllowedValues>
</ows:Parameter>
</ows:Operation>
<!-- Clients shall ignore the following operation. -->
<ows:Operation name="NoOp">
<ows:DCP>
<ows:HTTP>
</ows:Get>
</ows:HTTP>
</ows:DCP>
</ows:Operation>
</ows:OperationsMetadata>
<Contents>
<Service type="WMS" baseUrl="http://portal.somecorp.com/somecorp/projects/ows9/someserv.cgi">
<ows:ServiceIdentification>
<ows:Title>SomeSERV WMS</ows:Title>
<ows:Abstract xml:lang="en">OGC-compliant cascading web map server (WMS) by Some Corp.</ows:Abstract>
<ows:ServiceType>WMS</ows:ServiceType>
<ows:ServiceTypeVersion>1.3.2</ows:ServiceTypeVersion>
<ows:ServiceTypeVersion>1.3.1</ows:ServiceTypeVersion>
<ows:ServiceTypeVersion>1.3.0</ows:ServiceTypeVersion>
<ows:ServiceTypeVersion>1.1.1</ows:ServiceTypeVersion>
<ows:ServiceTypeVersion>1.1.0</ows:ServiceTypeVersion>
<ows:ServiceTypeVersion>1.0.0</ows:ServiceTypeVersion>
</ows:ServiceTypeVersion>
</Service>
<Service type="WFS"
?DATASTORE=OWS9">
<ows:ServiceIdentification>
<ows:Title>The USGS National Map Web Feature Service (subset)</ows:Title>
<ows:Abstract>This web feature service offers a subset of the USGS National Map. The National Map is a collaborative effort among the USGS and other Federal, State, and local partners to improve and deliver topographic information for the Nation. The geographic information available from The National Map includes hydrography, boundaries, transportation, structures, and land cover. Other types of geographic information can be added within the viewer or brought in with The National Map data into a Geographic Information System to create specific types of maps or map views. The National Map is a significant contribution to the National Spatial Data Infrastructure (NSDI) and currently is being transformed to better serve the geospatial community by providing high quality, integrated geospatial data and improved products and services including new generation digital topographic maps.</ows:Abstract>
<ows:Keywords>
<ows:Keyword>WFS</ows:Keyword>
<ows:Keyword>USGS</ows:Keyword>
<ows:Keyword>TNM</ows:Keyword>
<ows:Keyword>Web</ows:Keyword>
<ows:Keyword>Feature</ows:Keyword>
<ows:Keyword>Service</ows:Keyword>
<ows:Keyword>hydrography</ows:Keyword>
<ows:Keyword>boundaries</ows:Keyword>
<ows:Keyword>transportation</ows:Keyword>
<ows:Keyword>structures</ows:Keyword>
<ows:Keyword>land</ows:Keyword>
<ows:Keyword>cover</ows:Keyword>
</ows:Keywords>
<ows:Fees>None</ows:Fees>
<ows:AccessConstraints>None</ows:AccessConstraints>
</ows:ServiceIdentification>
</Service>
<Service type="WFS"
?DATASTORE=STDS">
<ows:ServiceIdentification>
<ows:Title>The USGS National Map Web Feature Service (subset)</ows:Title>
<ows:Abstract>This web feature service offers a subset of the USGS National Map. The National Map is a collaborative effort among the USGS and other Federal, State, and local partners to improve and deliver topographic information for the Nation. The geographic information available from The National Map includes hydrography,
boundaries, transportation, structures, and land cover. Other types of geographic information can be added within the viewer or brought in with The National Map data into a Geographic Information System to create specific types of maps or map views. The National Map is a significant contribution to the National Spatial Data Infrastructure (NSDI) and currently is being transformed to better serve the geospatial community by providing high quality, integrated geospatial data and improved products and services including new generation digital topographic maps.<o:abstract>
<o:keywords>
<o:service-type>WFS</o:service-type> <o:service-type-version>2.0.0</o:service-type-version> <o:service-type-version>1.1.0</o:service-type-version> <o:service-type-version>1.0.0</o:service-type-version>
<o:fees>None</o:fees>
<o:access-constraints>None</o:access-constraints>
</o:service-identification>
</o:abstract>
</o:service>
<o:service-identification>
<o:title>SomeSERV WCS - OWS9</o:title>
<o:abstract xml:lang="en">OGC-compliant web coverage server (WCS) by Some Corp.</o:abstract>
<o:service-type>WCS</o:service-type> <o:service-type-version>1.1.2</o:service-type-version> <o:service-type-version>1.1.1</o:service-type-version> <o:service-type-version>1.0.0</o:service-type-version>
</o:service-identification>
</o:service>
<o:service-identification>
<o:title>SomeSERV WCS - STDS</o:title>
<o:abstract xml:lang="en">OGC-compliant web coverage server (WCS) by Some Corp.</o:abstract>
<o:service-type>WCS</o:service-type> <o:service-type-version>1.1.2</o:service-type-version> <o:service-type-version>1.1.1</o:service-type-version> <o:service-type-version>1.0.0</o:service-type-version>
</o:service-identification>
</o:service>
Since this capabilities document is composed mostly of standard OGC components it is an easy task to extend an OGC catalogue to consume this document. The catalogue can then automatically determine which services are offered by this provider and harvest each one in turn also maintaining the associations between the web integration service and its child services.

8 Associations and the GetAssociations operation

8.1 Introduction

When a service provider deploys a suite of OGC web services each component service typically exists in isolation and external clients are unaware of the relationships that might exists between these services, their offerings and other OGC and non-OGC web resources. The services themselves, however, typically have much more internal knowledge about such relationships or associations. Services know what data sources where accessed to provide their offerings; they know what other representations might exist, etc. For example, a WMS knows if the source data for a layer it offers is a SHAPE file, or a WFS feature type, or another WMS layer (i.e. cascading), or if a WMTS layer exists that renders the same information more efficiently. In short OGC web services have a lot of internal association knowledge that is currently inaccessible to client...
applications, especially catalogues. A great deal of added value can be derived if this internal association knowledge can be externalized.

Thus, the scope of this clause is to define methods and apparatus to allow OGC web services to externalize this internal association knowledge. This clause describes how associations between OGC and non-OGC resource can be represented in XML. This clause further defines a new operation; named GetAssociations, that existing OGC web services can implement to allow client applications to interrogate an OGC web service about its internal association knowledge.

8.2 Associations

8.2.1 Introduction

This clause defines a general XML Schema for representation associations between two resources.

An association is logically of the form “SOURCE REL TARGET” where the SOURCE resource is the subject of a directional RELationship of the specified type with the TARGET resource (e.g. layer X renders feature type Y).

8.2.2 Types of association resources

This engineering report distinguishes two types of resources that may participate in an association:

- OGC web service resources
- URL-addressable resources

OGC web service resources are resources that are only accessible from within an OGC web service. The classic set of OGC resources -- WMS map, WFS feature type and WCS coverage -- are examples of OGC web service resources since the only way to access instances of each is through the services that offer them. Thus, OGC web service resources are not addressable using a URL alone.

URL-addressable resources are resources which can be accessed directly via URL. Many OGC resources are URL-addressable. Examples include OGC web services, which are accessible via their base URL (see 3.3) or symbology encoding documents stored in some web-accessible location. For the purposes of this engineering report the only recognized URL-addressable OGC resources are those for which an identifier has been registered with the OGC Naming Authority (OGC NA).

OGC web service resources are distinguished from URL-addressable resources because two components are required for access; the base URL (see 3.3) of the OGC web service...
offering the resource and the service-specific identifier which locates the resource within the service.

**Example**: A WMS layer named Foundation”INWATER_1M and served by an OGC WMS would be identified using the following two components:

- baseURL of the WMS: http://www.somecorp.com/wms
- service-specific identifier: Foundation.INWATERA_1M

Interaction with an OGC web service can only commence once the base URL (see 3.3) of the service has been discovered. Communication with the OGC web service commences with the client obtaining the capabilities document of the service by appending the appropriate GetCapabilities request parameters to the previously-discovered base URL of the service. The service-specific identifiers for the OGC web service resources the service offers can then be obtained from the capabilities document’s content section.

### 8.2.3 UML

The following UML diagram defines the schema of an association.

T.B.D.

### 8.2.4 XML-encoding

The following XML Schema fragments defines the XML-encoding for an association.

```xml
<element name="Association">
  <complexType>
    <sequence>
      <element name="Source" type="as:ResourceType"/>
      <element name="Target" type="as:ResourceType"/>
    </sequence>
    <attribute name="rel" type="as:TokenOrAnyURI" use="required"/>
  </complexType>
</element>
```

The “Source” parameter shall identify the source resource of the association.

The “Target” parameter shall identify the target resource of the association.

The “rel” parameter shall be used to specify the association type.

The canonical value of the rel attribute shall either be a token taken from the IANA Link Relations registry (see RFC 5988) or it shall be a URI registered with the OGC Naming Authority.

Vendor or domain specific “rel” values may also be used. However, this engineering report does not assign any specified meaning or interpretation to these values.
Parsers shall not fail on unrecognized “rel” values and are free to ignore associations that specify an unrecognized value.

The following XML fragment defines a reference to a resource that participates as the source or target of an association.

```xml
<complexType name="ResourceType">
  <sequence>
    <element ref="as:Identifier" minOccurs="0"/>
  </sequence>
  <attribute name="type" type="as:TokenOrAnyURI" use="required"/>
  <attribute ref="xlink:href" use="required"/>
</complexType>
<element name="Identifier">
  <complexType>
    <simpleContent>
      <extension base="string">
        <attribute name="namespace" type="anyURI"/>
      </extension>
    </simpleContent>
  </complexType>
</element>
<simpleType name="TokenOrAnyURI">
  <union memberTypes="token anyURI"/>
</simpleType>
```

If the resource is a URL-addressable resource (see 8.2.2) then its URL shall be specified using the “xlink:href” parameter and its type shall be specified using the “type” parameter. The “Identifier” parameter shall be omitted in this case.

If the resource is an OGC web service resource (see 8.2.2), then its base URL (see 3.3) shall be specified using the “xlink:href” parameter, its type shall be specified using the “type” parameter and the service-specific identifier that locates the resource within the OGC service offering the resource shall be specified using the “Identifier” parameter. If the service-specific resource identifier within the OGC web service is scoped then its namespace shall be specified using the “namespace” parameter. The OGC service type serving the resource shall be deduced from the specified resource type. For example, a WMS layer resource is served by a WMS while a WFS feature type resource is served by a WFS.

### 8.2.5 Associations container

The following XML Schema fragment defines a container for a set of associations.

```xml
<element name="Associations">
  <complexType>
    <sequence>
      <element ref="as:Association" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
  </complexType>
</element>
```
The Associations element is a container for zero or more Association elements (see 8.2.3).

**8.2.6 MIME type**

This engineering report defines the following MIME type to represent an XML document that encodes a set of associations: application/ogc-as+xml

**8.3 Standard identifiers**

The following tables define standard identifiers for resources and association types used by OGC. This is by no means a comprehensive list but represents the main set of OGC web services and their resources.

**Table 1 – Service Type Identifiers**

<table>
<thead>
<tr>
<th>Title</th>
<th>Description</th>
<th>HTTP-URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Integration Service</td>
<td>An OGC service whose only function is to identify a collection of other OGC services.</td>
<td><a href="http://www.opengis.net/def/serviceType/ogc/0/wis">http://www.opengis.net/def/serviceType/ogc/0/wis</a></td>
</tr>
<tr>
<td>Web Feature Service</td>
<td>An OGC service for serving and managing features.</td>
<td><a href="http://www.opengis.net/def/serviceType/ogc/0/wfs">http://www.opengis.net/def/serviceType/ogc/0/wfs</a></td>
</tr>
<tr>
<td>Web Map Service</td>
<td>An OGC service that serves maps.</td>
<td><a href="http://www.opengis.net/def/serviceType/ogc/0/wms">http://www.opengis.net/def/serviceType/ogc/0/wms</a></td>
</tr>
<tr>
<td>Web Map Tiling Service</td>
<td>An OGC service that serves map tiles.</td>
<td><a href="http://www.opengis.net/def/serviceType/ogc/0/wmts">http://www.opengis.net/def/serviceType/ogc/0/wmts</a></td>
</tr>
<tr>
<td>Web Processing Service</td>
<td>An OGC service that exposes Web Processing Services</td>
<td><a href="http://www.opengis.net/def/serviceType/ogc/0/wps">http://www.opengis.net/def/serviceType/ogc/0/wps</a></td>
</tr>
<tr>
<td>Web Coverage Service</td>
<td>An OGC service that serves coverages.</td>
<td><a href="http://www.opengis.net/def/serviceType/ogc/0/wcs">http://www.opengis.net/def/serviceType/ogc/0/wcs</a></td>
</tr>
<tr>
<td>Catalogue Service</td>
<td>An OGC catalogue service.</td>
<td><a href="http://www.opengis.net/def/serviceType/ogc/0/csw">http://www.opengis.net/def/serviceType/ogc/0/csw</a></td>
</tr>
<tr>
<td>Web Registry Service</td>
<td>A profile of an OGC catalogue service that uses ebRIM as its information model.</td>
<td><a href="http://www.opengis.net/def/serviceType/ogc/0/csw-ebrim">http://www.opengis.net/def/serviceType/ogc/0/csw-ebrim</a></td>
</tr>
<tr>
<td>Geosynchronization Service</td>
<td>An OGC service supporting data crowdsourcing.</td>
<td><a href="http://www.opengis.net/def/serviceType/ogc/0/gss">http://www.opengis.net/def/serviceType/ogc/0/gss</a></td>
</tr>
</tbody>
</table>
### Table 2 – Object Type Identifiers

<table>
<thead>
<tr>
<th>Title</th>
<th>Description</th>
<th>HTTP-URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFS Feature Type</td>
<td>A feature type served by an OGC Web Feature Service.</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/wfs/featureType">http://www.opengis.net/def/objectType/ogc/0/wfs/featureType</a></td>
</tr>
<tr>
<td>WMS Theme</td>
<td>A collection of WMS layers.</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/wms/theme">http://www.opengis.net/def/objectType/ogc/0/wms/theme</a></td>
</tr>
<tr>
<td>WMS Layer</td>
<td>A map layer served by an OGC Web Map Service.</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/wms/layer">http://www.opengis.net/def/objectType/ogc/0/wms/layer</a></td>
</tr>
<tr>
<td>WMTS Theme</td>
<td>A collection of WMTS layers.</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/wmts/theme">http://www.opengis.net/def/objectType/ogc/0/wmts/theme</a></td>
</tr>
<tr>
<td>WMTS Layer</td>
<td>A tiles map layer served by an OGC Web Map Tiling Service</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/wmts/layer">http://www.opengis.net/def/objectType/ogc/0/wmts/layer</a></td>
</tr>
<tr>
<td>WPS Process</td>
<td>A processing service served by an OGC Web Processing Service</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/wps/process">http://www.opengis.net/def/objectType/ogc/0/wps/process</a></td>
</tr>
<tr>
<td>WCS Theme</td>
<td>A collection of WCS coverages</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/wcs/theme">http://www.opengis.net/def/objectType/ogc/0/wcs/theme</a></td>
</tr>
<tr>
<td>WCS Coverage</td>
<td>A coverage served by an OGC Web Coverage Service</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/wcs/coverage">http://www.opengis.net/def/objectType/ogc/0/wcs/coverage</a></td>
</tr>
<tr>
<td>Metadata</td>
<td>A document, conforming to a well-known standard that contains metadata about the resource.</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/metadata">http://www.opengis.net/def/objectType/ogc/0/metadata</a></td>
</tr>
<tr>
<td>Dublin Core Metadata</td>
<td>Metadata about a resource that uses the Dublin Core set of elements.</td>
<td><a href="http://www.opengis.net/def/objectType/ogc/0/metadata/dublinCore">http://www.opengis.net/def/objectType/ogc/0/metadata/dublinCore</a></td>
</tr>
</tbody>
</table>

### Table 3 – Association Type Identifiers

<table>
<thead>
<tr>
<th>Title</th>
<th>Description</th>
<th>HTTP-URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renders</td>
<td>Associates two resources where one resource renders another resources</td>
<td><a href="http://www.opengis.net/def/associationType/ogc/0/renders">http://www.opengis.net/def/associationType/ogc/0/renders</a></td>
</tr>
<tr>
<td>Association Type</td>
<td>Description</td>
<td>URI</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Tiled By</td>
<td>Associated two resource where one resource is a tiled representation of the other resource (e.g. a WMTS layers that is a tiles representation of a WMS layer).</td>
<td><a href="http://www.opengis.net/def/associationType/ogc/0/tiledBy">http://www.opengis.net/def/associationType/ogc/0/tiledBy</a></td>
</tr>
<tr>
<td>ParentOf</td>
<td>Associates two resources where one resource is the parent of the other resource. This is typically used to register a nested hierarchy of resources.</td>
<td><a href="http://www.opengis.net/def/associationType/ogc/0/parentOf">http://www.opengis.net/def/associationType/ogc/0/parentOf</a></td>
</tr>
<tr>
<td>Cascades</td>
<td>Associates two services where one OGC service is using the other OGC service as a data source. For examples where one WMS &quot;cascades&quot; a number of other WMS's.</td>
<td><a href="http://www.opengis.net/def/associationType/ogc/0/cascades">http://www.opengis.net/def/associationType/ogc/0/cascades</a></td>
</tr>
<tr>
<td>CreatedBy</td>
<td>Associates two services where one is responsible for the other creation.</td>
<td><a href="http://www.opengis.net/def/associationType/ogc/0/createdBy">http://www.opengis.net/def/associationType/ogc/0/createdBy</a></td>
</tr>
<tr>
<td>Symbolizes</td>
<td>Associates the symbology encoding document with a WFS Feature Type.</td>
<td><a href="http://www.opengis.net/def/associationType/ogc/0/symbolizes">http://www.opengis.net/def/associationType/ogc/0/symbolizes</a></td>
</tr>
<tr>
<td>OperatesOn</td>
<td>Associates two resources where one operates on the other.</td>
<td><a href="http://www.opengis.net/def/associationType/ogc/0/operatesOn">http://www.opengis.net/def/associationType/ogc/0/operatesOn</a></td>
</tr>
<tr>
<td>DescribedBy</td>
<td>Associates two resources where one resource is a description of the other using some metadata standard.</td>
<td><a href="http://www.opengis.net/def/associationType/ogc/0/describedBy">http://www.opengis.net/def/associationType/ogc/0/describedBy</a></td>
</tr>
</tbody>
</table>
8.4 GetAssociations operation

8.4.1 Introduction

As previously discussed, OGC web services have internal knowledge about what associations exist between the service, its offerings and other OGC and non-OGC resources. The GetAssociations operation is the means by which an OGC web service may be interrogated about the associations of which it is aware.

Once externalized in this way, this association information can be automatically harvested and made discoverable from OGC catalogues creating a richer environment for discovery.

It is anticipated that existing OGC web services, wishing to participate as part of an integrated suite of OGC web services, would implement this operation as an add-on to the existing set of operations that the service implements.

It is further anticipated that this operation shall eventually be defined as a mandatory operation for all OGC web services in the OGC Web Services Common standard (see OGC 06-121r9). The document shall be posted as a change request against OGC 06-121r9.

8.4.2 UML

The following UML diagram defines the request and response for the GetAssociations operation.
Figure 3 - Request & response UML for GetAssociations operation

The mandatory service parameter of the GetAssociations operation shall encode the service identifier of the service being invoked to execute the operation.

The mandatory version parameter of the GetAssociations operation shall be the fixed values of “1.0.0”.

The optional contents parameter may be used to interrogate the known association of a specified subset of resources that a service offers. If the parameter is omitted the response document shall contains all knows associations.
The optional outputFormat parameter may be used to request the response in a specific format. The default value is application/ogc-as+xml (see 8.3.5). Other output format values are allowed (e.g. a JSON response) to which this engineering report does not assign any meaning.

### 8.4.3 KVP-encoding

The following table defines the KVP-encoding for the GetAssociations operation.

<table>
<thead>
<tr>
<th>URL Component</th>
<th>O/M&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>REQUEST</td>
<td>M</td>
<td>Fixed value of GetAssociations</td>
</tr>
<tr>
<td>SERVICE</td>
<td>M</td>
<td>Identifier for the service invoking the operation</td>
</tr>
<tr>
<td>VERSION</td>
<td>M</td>
<td>Fixed value of 1.0.0</td>
</tr>
<tr>
<td>CONTENTS</td>
<td>O</td>
<td>A comma separated list of service-specific resource identifiers for which the known associations will be returned in the response. If the parameter is omitted then all known associations are returned in the response.</td>
</tr>
<tr>
<td>OUTPUTFORMAT</td>
<td>O</td>
<td>The response format of the operation. The default values is application/ogc-as+xml.</td>
</tr>
</tbody>
</table>

<sup>a</sup> O = Optional, M = Mandatory

### 8.4.4 XML-encoding

The following XML Schema fragment defines the XML-encoding for the GetAssociations operation.

```xml
<xsd:element name="GetAssociations" type="as:GetAssociationsType"/>
<xsd:complexType name="GetAssociationsType">
  <xsd:sequence>
    <xsd:element name="Content" type="as:StringOrQName"
      minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="service"
    type="ows:ServiceType" use="required"/>
  <xsd:attribute name="version" type="xsd:string"
    use="required" fixed="1.0.0"/>
  <xsd:attribute name="outputFormat"
    type="xsd:string" default="application/as+xml"/>
</xsd:complexType>
<xsd:simpleType name="StringOrQName">
  <xsd:union memberTypes="xsd:string xsd:QName"/>
</xsd:simpleType>
```
8.4.5 Response

The response to a GetAssociations operation, when the output format is the default value application/ogc-as+xml, shall be a set of associations encoded as an XML document that validates against the schema describe is clause 8.2.4.

8.4.6 Example

In response to the following request:

```xml
<?xml version="1.0"?>
<as:GetAssociations
  service="WMS"
  version="1.0.0"
  outputFormat="application/ogc-as+xml"
  xmlns:as="http://www.opengis.net/as/1.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.opengis.net/as/1.0 association.xsd">
</as:GetAssociations>
```

an OGC web map service might generate the following response:

```xml
<?xml version="1.0"?>
<Associations xmlns="http://www.opengis.net/as/1.0"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.opengis.net/as/1.0 ../owsGetAssociations.xsd"
  version="1.0.0">
  <Association
    rel="http://www.opengis.net/def/associationType/0/cascades">
    <Source type="http://www.opengis.net/def/objectType/ogc/0/wms"
      xlink:href="https://onestop.somecorp.com/srvr"/>
    <Target type="http://www.opengis.net/def/objectType/ogc/0/wms"
      xlink:href="https://demo.somecorp.com/srvr"/>
  </Association>
  <Association
    rel="http://www.opengis.net/def/associationType/0/cascades">
    <Source
      type="http://www.opengis.net/def/objectType/ogc/0/wms/layer"
      xlink:href="https://onestop.somecorp.com/srvr">
      <Identifier>Demo.Foundation.aerofacp_1m</Identifier>
    </Source>
    <Target
      type="http://www.opengis.net/def/objectType/ogc/0/wms/layer"
      xlink:href="https://demo.somecorp.com/srvr">
      <Identifier>Foundation.aerofacp_1m</Identifier>
    </Target>
  </Association>
  <Association
    rel="http://www.opengis.net/def/associationType/0/tiledBy">
    <Source
      type="http://www.opengis.net/def/objectType/ogc/0/wms/layer"
      xlink:href="https://onestop.somecorp.com/srvr"/>
  </Association>
</Associations>
```
9 Catalogue extensions

9.1 Introduction

A central component of a deployed suite of integrated OGC web services is a catalogue. The catalogue encapsulates the knowledge of the system making the resources that the system offers and the associations between those resources discoverable to both internal components of the system as well as external clients.

For this OWS-10 work item, the CSW-ebRIM profile (see OGC 07-110r4), a profile of the OGC catalogue (see OGC 07-006r1) that uses ebRIM (see OASIS regrep-rim-3.0-os), is chosen as the primary catalogue. This choice is motivated by the fact that ebRIM is a flexible meta-model that already includes structures to register resources and the
associations between them as well as allow resource to be classified using internal as well as external classification schemes.

The primary means of harvesting or registering an OGC web service into a CSW-ebRIM catalogue is to use the Harvest operation (see OGC 07-110r4, Clause 14) to read the service’s capabilities document and then map that document into the catalogue’s ebRIM information model.

This clause defines a service integration ebRIM package that encapsulates all the identifiers, associations and classification schemes necessary to allow an OGC CSW-ebRIM catalogue to register OGC web services, the resource those services offer and the associations between those services, their offerings and other OGC and non-OGC resources.

9.2 Identifiers

9.2.1 Introduction

This clause defines a set of identifiers that shall be used to map the capabilities document of an OGC web service into the ebRIM information model of an OGC web registry service (see OGC 07-110r4).

9.3 Identifiers for OGC web services for ebRIM

The following table lists a set of identifiers for classification nodes within the ebRIM model that allow ebRIM Service records to be classified according to the type of service being represented. These identifiers are used to define a canonical ebRIM service type classification scheme (see Annex B).

These identifiers may also be used as the name of a slot, named “resourceType” (see Table 11) that may also be used to tag a service record with the type of OGC web service it represents.

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>wis</td>
<td>Web Integration Service</td>
</tr>
<tr>
<td>wfs</td>
<td>Web Feature Service</td>
</tr>
<tr>
<td>wms</td>
<td>Web Map Service</td>
</tr>
<tr>
<td>wmts</td>
<td>Web Map Tiling Service</td>
</tr>
</tbody>
</table>

Table 5 – OGC Service Type Identifiers for ebRIM
The complete identifier is formed by appending this prefix to the value in the Identifier column.

9.4 **Identifier for the content of OGC web services for ebRIM**

The following table lists a set of identifiers that may be used as the value of the “objectType” parameter within ebRIM to identify the type of OGC web service content being represented by the catalogue record. These identifiers are used to extend the canonical ebRIM object type classification scheme.

<table>
<thead>
<tr>
<th>prefix¹: urn:ogc:def:objectType:OGC-CSW-ebRIM::</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifier</td>
<td>Description</td>
</tr>
<tr>
<td>wfs:featureType</td>
<td>A feature type offered by a WFS.</td>
</tr>
<tr>
<td>wms:theme</td>
<td>A theme offered by a WMS.</td>
</tr>
<tr>
<td>wms:layer</td>
<td>A map layer offered by a WMS.</td>
</tr>
<tr>
<td>wmts:theme</td>
<td>A theme offered by a WMTS.</td>
</tr>
<tr>
<td>wmts:layer</td>
<td>A map layer offered by a WMTS.</td>
</tr>
<tr>
<td>wps:process</td>
<td>A process being offered by a WPS.</td>
</tr>
<tr>
<td>wcs:theme</td>
<td>A theme offered by a WCS.</td>
</tr>
<tr>
<td>wcs:coverage</td>
<td>A coverage offered by a WCS.</td>
</tr>
</tbody>
</table>

1. The complete identifier is formed by appending this prefix to the value in the Identifier column.
9.5 Identifiers for OGC documents for ebRIM

The following table lists a set of identifiers for OGC and non-OGC document types commonly used to describe OGC resources. These identifiers are used to define a canonical ebRIM classification scheme named HarvestResourceType (see Annex B).

Table 7 – OGC Object Type Identifiers (document) for ebRIM

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>capabilities:wis</td>
<td>WIS capabilities document</td>
</tr>
<tr>
<td>capabilities:wfs</td>
<td>WFS capabilities document</td>
</tr>
<tr>
<td>capabilities:wms</td>
<td>WMS capabilities document</td>
</tr>
<tr>
<td>capabilities:wmts</td>
<td>WMTS capabilities document</td>
</tr>
<tr>
<td>capabilities:wcs</td>
<td>WCS capabilities document</td>
</tr>
<tr>
<td>fgdc</td>
<td>Metadata document conforming to the FGDC standard.</td>
</tr>
<tr>
<td>anzlic</td>
<td>Metadata document conforming to the ANZLIC standard.</td>
</tr>
<tr>
<td>iso19139</td>
<td>Metadata document conforming to the ISO 19139 standard.</td>
</tr>
<tr>
<td>iso19119</td>
<td>Metadata document conforming to the ISO 19119 standard.</td>
</tr>
<tr>
<td>classificationScheme</td>
<td>A metadata document containing an ebRIM classification scheme.</td>
</tr>
<tr>
<td>symbologyEncoding</td>
<td>A symbology encoding document</td>
</tr>
<tr>
<td>xmlSchema</td>
<td>An XML schema document.</td>
</tr>
</tbody>
</table>

1. The complete identifier is formed by appending this prefix to the value in the Identifier column.

Harvesting OGC web service is accomplished by reading and mapping the service’s capabilities document into the information model of the CSW-ebRIM catalogue. A
A service’s capabilities document can be identified by a client providing the complete URL to the capabilities document (e.g. http://www.someserver.com/wfs?service=WFS&request=GetCapabilities) or by providing the baseURL of the OGC web service and letting the catalogue form the necessary GetCapabilities request. The latter case gives the catalogue server more control about what to harvest especially in the case of a suite of OGC web services offered through a WIS. The following set of identifiers may be used in the latter case to identify that a base URL is being used to identify the capabilities document of the OGC web service – and thus the catalogue needs to formulate a complete GetCapabilities request in order to obtain the capabilities document. These identifiers will typically be used as the values of the “resourceType” parameter of the CSW Harvest operation.

### Table 8 – Identifiers for Service Base URLs for ebRIM

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wis</td>
<td>WIS base URL.</td>
</tr>
<tr>
<td>urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wfs</td>
<td>WFS base URL.</td>
</tr>
<tr>
<td>urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wms</td>
<td>WMS base URL.</td>
</tr>
<tr>
<td>urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wmts</td>
<td>WMTS base URL.</td>
</tr>
<tr>
<td>urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wps</td>
<td>WPS base URL.</td>
</tr>
<tr>
<td>urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:csw</td>
<td>CSW base URL.</td>
</tr>
<tr>
<td>urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:csw-ebRIM</td>
<td>WRS base URL.</td>
</tr>
<tr>
<td>urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:gss</td>
<td>GSS base URL.</td>
</tr>
</tbody>
</table>

#### 9.6 Identifiers for associations for ebRIM

The following table lists a set of identifiers for association types that may exist between two resources represented in ebRIM. The identifiers in this table are used to extend the canonical ebRIM association type classification scheme.

These values shall be used as the value of the “associationType” property of the Association object within ebRIM to represent the type of association between registered resources.

### Table 9 – OGC Association Type Identifiers for ebRIM
The following table lists association identifiers that are useful in the context of OGC service integration and are already defined in the canonical ebRIM AssociationType classification scheme.

**Table 10 – Additional Association Type Identifiers for ebRIM**

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:AssociationType:HasMember</td>
<td>Associates two resources where one resource is a description, using some metadata format, of another resource (e.g. an FGDC document might be used to describe a WFS feature type).</td>
</tr>
</tbody>
</table>
a common theme).

| urn:oasis:names:tc:ebxml-regrep:AssociationType:OffersService | Associates two resources where one resource is a web integration service and the other resource is another OGC web service offered by the WIS. |

9.7 Identifiers for ebRIM slot names

The ebRIM model provides extensible metadata via a *slot* mechanism. Slots are a name and value list pair that provides additional metadata about a registered object. Among other things, slots are used in this standard to map values found in an OGC’s capabilities document into the ebRIM model.

The following table lists a set of identifiers that may be used as the value of the “name” parameter of a slot. These identifiers are used to define a canonical ebRIM SlotName classification scheme.

Table 11 – Slot Name Identifiers for ebRIM

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>accessConstraints</td>
<td>Describes any access constraints associated with the resource.</td>
</tr>
<tr>
<td>baseTableName</td>
<td>The base table name within an RDBMS used to store a resource.</td>
</tr>
<tr>
<td>baseUrl</td>
<td>The base URL of the resource (e.g. the base URL of a service)</td>
</tr>
<tr>
<td>contactInstructions</td>
<td>Instruction for contacting a responsible party for the resource.</td>
</tr>
<tr>
<td>crs</td>
<td>A CRS associated with the resource.</td>
</tr>
<tr>
<td>fees</td>
<td>Any fees associated with obtaining the resource or a copy of the resource.</td>
</tr>
<tr>
<td>hasRepositoryItem</td>
<td>A Boolean flag indicating that the catalogue record representing a resource also has an associated repository item entry.</td>
</tr>
<tr>
<td>hoursOfService</td>
<td>Any hours of service associated with the resource.</td>
</tr>
<tr>
<td>keyword</td>
<td>A list of keywords associated with the resource.</td>
</tr>
<tr>
<td>Property</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>layerLimit</td>
<td>The layer limit associated with a WMS service.</td>
</tr>
<tr>
<td>legendUrl</td>
<td>The legend URL for a WMS.</td>
</tr>
<tr>
<td>method</td>
<td>HTTP method name for a service binding.</td>
</tr>
<tr>
<td>maxHeight</td>
<td>The maximum map height that a WMS can serve.</td>
</tr>
<tr>
<td>maxWidth</td>
<td>The maximum map width that a WMS can serve.</td>
</tr>
<tr>
<td>onlineResource</td>
<td>May be used to provide a reference to the provider of the resource.</td>
</tr>
<tr>
<td>outputFormat</td>
<td>A list of formats indicating the representations available for the resource.</td>
</tr>
<tr>
<td>position</td>
<td>The position with an organization if the resource is a person.</td>
</tr>
<tr>
<td>queryable</td>
<td>A Boolean indicating whether a WMS map layer is queryable.</td>
</tr>
<tr>
<td>resourceType</td>
<td>A subtype for a resource represented in a CSW-ebRIM catalogue. This slot is typically used to differentiate one OGC web service type from another.</td>
</tr>
<tr>
<td>role</td>
<td>A role associated with a resource.</td>
</tr>
<tr>
<td>supportedVersions</td>
<td>The list of supported version of the resource; typically supported server versions.</td>
</tr>
<tr>
<td>scheme</td>
<td>An identifier from a classification scheme that is associated with the resource.</td>
</tr>
<tr>
<td>spatialPropertyName</td>
<td>The name of the spatial property of a resource (e.g. the spatial property name of a WFS feature type)</td>
</tr>
<tr>
<td>spatialPropertyType</td>
<td>The type of the spatial property of a resource (e.g. the spatial property of a WFS is of type POINT)</td>
</tr>
<tr>
<td>supportedOperations</td>
<td>A list of operations supported by the resource.</td>
</tr>
<tr>
<td>targetNamespace</td>
<td>A namespace associated with the resource.</td>
</tr>
<tr>
<td>title</td>
<td>A human-readable title associated with a resource.</td>
</tr>
<tr>
<td>url</td>
<td>A URL associated with a resource. Typically used to provide a link for accessing the resource directly.</td>
</tr>
</tbody>
</table>
where | A location or geometry associated with a resource

| 1. The complete identifier is formed by appending this prefix to the value in the Identifier column.

9.8 Identifiers for data types for ebRIM

The following tables list identifiers for spatial and non-spatial data types. These values may be used to indicate the value type of a slot parameter.

The identifiers in Table 11 are defined in the ebRIM standard (see OASIS regrep-rim-3.0-os). The identifiers in Table 12 are defined as part of the Basic Package of the csw-ebRIM standard (see OGC 07-144r4).

**Table 12 – Datatype Identifiers**

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:Boolean</td>
<td>Boolean</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:Date</td>
<td>Date</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:DateTime</td>
<td>DateTime</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:Double</td>
<td>Double</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:Float</td>
<td>Float</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:Integer</td>
<td>Integer</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:Number</td>
<td>Number</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:Raw</td>
<td>Raw</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:String</td>
<td>String</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>urn:oasis:names:tc:ebxml-regrep:DataType:URI</td>
<td>URI</td>
</tr>
</tbody>
</table>

**Table 13 – Spatial Datatype Identifiers**
9.9 Classification schemes for ebRIM

Annex B defines an ebRIM packages for service integration that defines that following classification schemes: ServiceTypes, HarvestResourceTypes, SlotNames.

9.10 Mapping OGC capabilities documents into ebRIM

9.10.1 Introduction

The process of registering an OGC web service into the catalogue involves reading the service’s capabilities document and then mapping the contents of that document into ebRIM thus making the information discoverable to catalogue clients.

OGC capabilities documents are composed of a number of sections some of which are common to all services and some of which are specific to a particular service. This clause describes the mapping of the common sections into ebRIM and further describes the mapping of the content sections for the WIS, WMS, WMTS, WFS and WCS services into ebRIM.

9.10.2 ServiceIdentification section

The following table maps the element of the ServiceIdentification section of an OGC capabilities document into ebRIM.

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>urn:ogc:def:dataType:ISO-19107:GM_Point</td>
<td>Point</td>
</tr>
<tr>
<td>urn:ogc:def:dataType:ISO-19107:GM_Curve</td>
<td>Line</td>
</tr>
<tr>
<td>urn:ogc:def:dataType:ISO-19107:GM_Surface</td>
<td>Polygon</td>
</tr>
<tr>
<td>urn:ogc:def:dataType:ISO-19107:GM_MultiPoint</td>
<td>Multi-point</td>
</tr>
<tr>
<td>urn:ogc:def:dataType:ISO-19107:GM_MultiCurve</td>
<td>Multi-line</td>
</tr>
<tr>
<td>urn:ogc:def:dataType:ISO-19107:GM_MultiSurface</td>
<td>Multi-polygon</td>
</tr>
<tr>
<td>urn:ogc:def:dataType:ISO-19107:GM_Aggregate</td>
<td>Geometry collection</td>
</tr>
<tr>
<td>urn:ogc:def:dataType:ISO-19107:GM_Object</td>
<td>Geometry object of any type</td>
</tr>
</tbody>
</table>

Table 14 – Mapping of ServiceIdentification Section into ebRIM
<table>
<thead>
<tr>
<th>XPath</th>
<th>ebRIM XPath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Service/Slot[@name=&quot;Title&quot;]/ValueList/Value[1]</td>
</tr>
<tr>
<td>Abstract</td>
<td>Service/Description/LocalizedString/@value</td>
</tr>
<tr>
<td>Keywords</td>
<td>Service/Slot[@name=&quot;keyword&quot;]/ValueList/Value[1..*]</td>
</tr>
<tr>
<td>ServiceType</td>
<td>Service/Slot[@name=&quot;resourceType&quot;]/ValueList/Value[1]</td>
</tr>
<tr>
<td>ServiceTypeVersion</td>
<td>Service/Slot[@name=&quot;supportedVersion&quot;] /ValueList/Value[1..*]</td>
</tr>
<tr>
<td>Fees</td>
<td>Service/Slot[@name=&quot;fees&quot;]/ValueList/Value[1]</td>
</tr>
<tr>
<td>AccessConstraints</td>
<td>Service/Slot[@name=&quot;accessConstraints&quot;]/ValueList/Value[1]</td>
</tr>
</tbody>
</table>

9.10.3 ServiceProvider section

The following table maps the elements of the ServiceProvider section of an OGC capabilities document into ebRIM.

Table 15 – Mapping of ServiceProvider Section into ebRIM

<table>
<thead>
<tr>
<th>OGC Capabilities XPath</th>
<th>ebRIM XPath</th>
</tr>
</thead>
<tbody>
<tr>
<td>ProviderName</td>
<td>Organization/Name</td>
</tr>
<tr>
<td>ProviderSite</td>
<td>Organization/Slot[@name=&quot;onlineResource&quot;] /ValueList/Value[1]</td>
</tr>
<tr>
<td>ServiceContact</td>
<td>See Table 16</td>
</tr>
</tbody>
</table>

NOTE: Organization/@parent = Service/@lid

Table 16 -- Mapping of ServiceProvider/ServiceContact into ebRIM

<table>
<thead>
<tr>
<th>OGC Capabilities XPath</th>
<th>ebRIM XPath</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServiceContact/IndividualName</td>
<td>Person/PersonName/@lastName</td>
</tr>
<tr>
<td>ServiceContact/PostitionName</td>
<td>Person/Slot[@name=&quot;position&quot;] /ValueList/Value[1]</td>
</tr>
<tr>
<td>OGC Capabilities XPath</td>
<td>ebRIM XPath</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>OnlineResource</td>
<td>Organization/Slot[@name=&quot;onlineResource&quot;]/ValueList/Value[1]</td>
</tr>
<tr>
<td>HoursOfService</td>
<td>Organization/Slot[@name=&quot;hoursOfService&quot;]/ValueList/Value[1]</td>
</tr>
<tr>
<td>ContactInstructions</td>
<td>Organization/Slot[@name=&quot;contactInstructions&quot;]/ValueList/Value[1]</td>
</tr>
<tr>
<td>Phone/Voice</td>
<td>Person/TelephoneNumber[@phoneType=&quot;Voice&quot;]/number</td>
</tr>
<tr>
<td>Phone/Facsimile</td>
<td>Person/TelephoneNumber[@phoneType=&quot;ContactInfo&quot;]/number</td>
</tr>
<tr>
<td>Address/DeliveryPoint</td>
<td>Organization/Address/@streetNumber</td>
</tr>
<tr>
<td>Address/City</td>
<td>Organization/Address/@city</td>
</tr>
<tr>
<td>Address/AdministrativeArea</td>
<td>Organization/Address/@stateOrProvince</td>
</tr>
<tr>
<td>Address/PostalCode</td>
<td>Organization/Address/@postalCode</td>
</tr>
<tr>
<td>Address/Country</td>
<td>Organization/Address/@country</td>
</tr>
<tr>
<td>Address/ElectronicMailAddress</td>
<td>Organization/EmailAddress/@address</td>
</tr>
</tbody>
</table>

### 9.10.4 OperationsMetadata section

The following table maps the elements of the OperationsMetadata section of an OGC capabilities document into ebRIM.

**Table 18 – Mapping of OperationsMetadata Section into ebRIM**
OGC Capabilities XPath | ebRIM XPath
--- | ---
Operation/@name | ServiceBinding/Name/LocalizedString/@value
Operation/DCP/HTTP/Get/@xlink | ServiceBinding/@accessURI
 | ServiceBinding/Slot[@name="method"]
 | /ValueList/Value[1]=GET
Operation/DCP/HTTP/Post/@xlink | ServiceBinding/@accessURI
 | ServiceBinding/Slot[@name="method"]
 | /ValueList/Value[1]=POST

9.10.5 Content section

9.10.5.1 Introduction

This clause defines the mapping of the content sections of the WIS, WMS, WFS and WCS into the ebRIM model.

9.10.5.2 WIS content

The content section of a WIS is simply of list of ServiceIdentification sections describing the set of services that the WIS offers. The content section of a WIS is not harvested directly. Rather each service listed in the WIS content section is harvested and an “OffersService” association (see Table 10) is registered between the WIS and the harvested child service.

9.10.5.3 WMS content

9.10.5.3.1 WMS theme

The following table maps the metadata describing a WMS layer that contains nested layers into ebRIM. Layers that in turn contain child layers are referred to as themes in this standard.

The relationship between a WMS offering a theme and the theme itself shall be encoded in ebRIM using the “operatesOn” association (see Table 9).

The relationship between a WMS layer or theme and its child WMS layers shall be encoded in ebRIM using the “HasMember” association (see Table 10).

**Table 19 – Mapping of WMS Theme metadata into ebRIM**
Layer (child)  Each child layer is encoded into ebRIM as a sub-theme of WMS layer (see Table 20). The association between a layer and a child layer or theme is encoded into ebRIM using the “HasMember” association (see Table 10).

### 9.10.5.3.2 WMS layer

The following table maps the metadata describing a WMS layer into ebRIM.

The relationship between a WMS offering a layer and the layer itself shall be encoded in ebRIM using the “operatesOn” association (see Table 9).

The relationship between a WMS theme and a WMS layer it contains shall be encoded in ebRIM using the “HasMember” association (see Table 10).

**Table 20 – Mapping of WMS Layer metadata into ebRIM**

<table>
<thead>
<tr>
<th>OGC Capabilities XPath</th>
<th>ebRIM XPath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>ExtrinsicObject[@objectType=”wms:layer”]/Name /LocalizedString/@value</td>
</tr>
<tr>
<td>Description/Title</td>
<td>ExtrinsicObject[@objectType=”wms:layer”]/Slot[@name=”title”] /ValueList/Value[1]</td>
</tr>
<tr>
<td>Description/Abstract</td>
<td>ExtrinsicObject[@objectType=”wms:layer”]/Description /LocalizedString/@value</td>
</tr>
<tr>
<td>Description/Keywords</td>
<td>ExtrinsicObject[@objectType=”wms:layer”]/Slot[@name=”keyword”] /ValueList/Value[1..*]</td>
</tr>
<tr>
<td>CRS</td>
<td>ExtrinsicObject[@objectType=”wms:layer”]/Slot[@name=crs] /ValueList/Value[1]</td>
</tr>
<tr>
<td>EX_Geographic BoundingBox or BoundingBox</td>
<td>ExtrinsicObject[@objectType=”wms:layer”]/Slot[@name=”where” &amp;&amp; @type=”urn:ogc:def:dataType:ISO-19107:2003:GM_Envelope”] /ValueList/Value[1..*]</td>
</tr>
</tbody>
</table>
Table 21 – Mapping of WMTS Theme metadata into ebRIM

<table>
<thead>
<tr>
<th>OGC Capabilities XPath</th>
<th>ebRIM XPath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>ExtrinsicObject[@objectType=&quot;wmts:theme&quot;]/Slot[@name=&quot;title&quot;]/ValueList/Value[1]</td>
</tr>
<tr>
<td>Abstract</td>
<td>ExtrinsicObject[@objectType=&quot;wmts:theme&quot;]/Description/LocalizedString[@value=&quot;…&quot;]</td>
</tr>
<tr>
<td>Keywords</td>
<td>ExtrinsicObject[@objectType=&quot;wmts:theme&quot;]/Slot[@name=&quot;keyword&quot;]/ValueList/Value[1..*]</td>
</tr>
<tr>
<td>Identifier</td>
<td>ExtrinsicObject[@objectType=&quot;wmts:theme&quot;]/Name/LocalizedString/@value</td>
</tr>
</tbody>
</table>

9.10.5.4 WMTS content

9.10.5.4.1 WMTS themes

The following table maps the metadata describing a WMTS theme into ebRIM. In addition to these mappings, an “operatesOn” association (see Table 9) shall be created between the service offering the WMTS layer and the WMTS layer itself.

The relationship between a theme, its sub-themes and any WMTS layers shall be encoded in ebRIM using the “HasMember” association (see Table 10).
This is encoded in ebRIM as a “HasMember” association (see Table 10) between the theme and each child layer.

### 9.10.5.4.2 WMTS layers

The following table maps the metadata describing a WMTS layer into ebRIM. In addition to these mappings, an “operatesOn” association (see Table 9) shall be created between the service offering the WMTS layer and the WMTS layer itself.

<table>
<thead>
<tr>
<th>OGC Capabilities XPath</th>
<th>ebRIM XPath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>ExtrinsicObject[@objectType=&quot;wmts:layer”]/Slot[@name=”title”] /ValueList/Value[1]</td>
</tr>
<tr>
<td>Abstract</td>
<td>ExtrinsicObject[@objectType=”wmts:layer”]/Description /LocalizedString[@value=”…”]</td>
</tr>
<tr>
<td>Keywords</td>
<td>ExtrinsicObject[@objectType=”wmts:layer”]/Slot[@name=”keyword”] /ValueList/Value[1..*]</td>
</tr>
<tr>
<td>WGS84BoundingBox</td>
<td>ExtrinsicObject[@objectType=”wmts:layer”]/Slot[@name=”where” &amp;&amp; @type=”urn:ogc:def:dataType:ISO-19107:2003:GM_Envelope”] /ValueList/Value[1..*]</td>
</tr>
<tr>
<td>Identifier</td>
<td>ExtrinsicObject[@objectType=”wmts:layer”]/Name/LocalizedString/@value</td>
</tr>
<tr>
<td>Format</td>
<td>ExtrinsicObject[@objectType=”wmts:layer”]/Slot[@name=”outputFormat”] /ValueList/Value[1..*]</td>
</tr>
</tbody>
</table>
9.10.5.5 WFS feature types

The following table maps the metadata describing a WFS feature type into ebRIM. In addition to these mappings, an “operatesOn” association (see Table 9) shall be created between the service offering the feature type and the feature type itself.

Table 23 – Mapping of WFS FeatureType metadata into ebRIM

<table>
<thead>
<tr>
<th>OGC Capabilities XPath</th>
<th>ebRIM XPath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>ExtrinsicObject[@objectType=&quot;wfs:featureType&quot;]/Name /LocalizedString/@value</td>
</tr>
<tr>
<td>Title</td>
<td>ExtrinsicObject[@objectType=&quot;wfs:featureType&quot;] /Slot[@name=&quot;title&quot;]/ValueList/Value[1]</td>
</tr>
<tr>
<td>Abstract</td>
<td>ExtrinsicObject[@objectType=&quot;wfs:featureType&quot;]/Description /LocalizedString/@value</td>
</tr>
<tr>
<td>Keywords</td>
<td>ExtrinsicObject[@objectType=&quot;wfs:featureType&quot;] /Slot[@name=&quot;keyword&quot;]/ValueList/Value[1..*]</td>
</tr>
<tr>
<td>DefaultCRS or OtherCRS</td>
<td>ExtrinsicObject[@objectType=&quot;wfs:featureType&quot;] /Slot[@name=&quot;crs&quot;]/ValueList/Value[1] = DefaultCRS ExtrinsicObject[@objectType=&quot;wfs:featureType&quot;] /Slot[@name=&quot;crs&quot;]/ValueList/Value[2..*] = OtherCRS</td>
</tr>
<tr>
<td>OutputFormats</td>
<td>ExtrinsicObject[@objectType=&quot;wfs:featureType&quot;] /Slot[@name=&quot;outputFormat&quot;]/ValueList/Value[1..*]</td>
</tr>
<tr>
<td>WGS84BoundingBox</td>
<td>ExtrinsicObject[@objectType=&quot;wfs:featureType&quot;] /Slot[@name=&quot;where&quot; &amp;&amp; @type=&quot; urn:ogc:def:dataType:ISO-19107:2003:GM_Envelope&quot;]/ValueList/Value[1..*]</td>
</tr>
<tr>
<td>MetadataURL</td>
<td>ExtrinsicObject[@objectType=&quot;wfs:featureType&quot;] /Slot[@name=&quot;metadataURL&quot;]/ValueList/Value[1]</td>
</tr>
</tbody>
</table>

9.10.5.6 WCS Converage

The following table maps the metadata describing a WCS coverage offering into ebRIM. In addition to these mappings, an “operatesOn” association (see Table 9) shall be created between the service offering the coverage and the coverage itself.

Table 24 – Mapping of WCS Coverage Offering into ebRIM
### OGC Capabilities XPath vs. ebRIM XPath

<table>
<thead>
<tr>
<th>OGC Capabilities XPath</th>
<th>ebRIM XPath</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>ExtrinsicObject[@objectType=&quot;wcs:coverage&quot;]/Slot[@name=&quot;title&quot;]/ValueList/Value[1]</td>
</tr>
<tr>
<td><strong>Abstract</strong></td>
<td>ExtrinsicObject[@objectType=&quot;wcs:coverage&quot;]/Description/LocalizedString/@value</td>
</tr>
<tr>
<td><strong>Keywords</strong></td>
<td>ExtrinsicObject[@objectType=&quot;wcs:coverage&quot;]/Slot[@name=&quot;keyword&quot;]/ValueList/Value[1..*]</td>
</tr>
<tr>
<td><strong>WGS84BoundingBox</strong> or <strong>BoundingBox</strong></td>
<td>ExtrinsicObject[@objectType=&quot;wcs:coverage&quot;]/Slot[@name=&quot;where&quot; &amp;&amp; @type=&quot;urn:ogc:def:dataType:ISO-19107:2003:GM_Envelope&quot;]/ValueList/Value[1..*]</td>
</tr>
<tr>
<td><strong>CoverageId</strong></td>
<td>ExtrinsicObject[@objectType=&quot;wcs:coverage&quot;]/Name/LocalizedString/@value</td>
</tr>
<tr>
<td><strong>CoverageSubtype</strong></td>
<td>ExtrinsicObject[@objectType=&quot;wcs:coverage&quot;]/Slot[@name=&quot;resourceType&quot;]/ValueList/Value[1]</td>
</tr>
</tbody>
</table>

### 9.11 GetAssociations stored query

CSW-ebRIM implementations shall implement a stored query names “GetAssociations” that allows clients to query associations in the catalogue. The prototype of the stored query shall be:

```
getAssociations( sourceId anyURI, associationType TokenOrAnyURI, targetId anyURI)
```

Any combination of sourceId, associationType and targetId can be specified as arguments and the query shall return the association records that satisfy the request. For example, specifying a sourceId and an associationType will return the Id of the resource that the
Annex A

XML Schema Documents
(normative)

B.1 Introduction

This annex contains the normative schemas for the Web Integration Service (WIS) and the GetAssociations operation. The WIS is described in clause 7. The GetAssociations operation is described in clause 8.

B.2 wis.xsd

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema
 targetNamespace="http://www.opengis.net/wis/1.0"
 xmlns:xsd="http://www.w3.org/2001/XMLSchema"
 xmlns:wis="http://www.opengis.net/wis/1.0"
 xmlns:ows="http://www.opengis.net/ows/2.0"
 xmlns:xlink="http://www.w3.org/1999/xlink"
 elementFormDefault="qualified" version="1.0.0">
 <xs:annotation>
  <xs:documentation>This XML Schema Document includes and imports, directly or indirectly, all the XML Schemas defined by the Web Integration Service (WIS) Implementation Specification.

  WIS is an OGC Engineering Report.
  Copyright (c) 2014 Open Geospatial Consortium.
  To obtain additional rights of use, visit http://www.opengeospatial.org/legal/.
  </xs:documentation>
 </xs:annotation>
 <!-- =========================================================== -->
 <!-- =   GETCAPABILITIES Request and Response                  = -->
 <!-- =========================================================== -->
 <!-- REQUEST -->
 <xs:element name="GetCapabilities" type="wis:GetCapabilitiesType"/>
 <xs:complexType name="GetCapabilitiesType">
  <xs:complexContent>
   <xs:extension base="ows:GetCapabilitiesType">
    <xs:attribute name="service" type="ows:ServiceType"
 use="required" fixed="WIS"/>
   </xs:extension>
  </xs:complexContent>
 </xs:complexType>
</xs:schema>
```
<xsd:complexContent>
  <xsd:complexContent>
    <xsd:extension base="ows:CapabilitiesBaseType">
      <xsd:sequence>
        <xsd:element ref="wis:Contents"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:element name="Capabilities" type="wis:WIS_CapabilitiesType"/>

<xsd:complexType name="WIS_CapabilitiesType">
  <xsd:complexContent>
    <xsd:extension base="ows:CapabilitiesBaseType">
      <xsd:sequence>
        <xsd:element ref="wis:Contents" maxOccurs="unbounded"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:element name="Contents" type="wis:ContentsType"/>

<xsd:complexType name="ContentsType">
  <xsd:sequence>
    <xsd:element ref="wis:Service" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:element name="Service" type="wis:ServiceType"/>

<xsd:complexType name="ServiceType">
  <xsd:sequence>
    <xsd:element ref="ows:ServiceIdentification"/>
  </xsd:sequence>
  <xsd:attribute name="type" type="wis:TokenOrAnyURI" use="required"/>
  <xsd:attribute name="baseUrl" type="xsd:anyURI" use="required"/>
</xsd:complexType>

<xsd:simpleType name="TokenOrAnyURI">
  <xsd:union memberTypes="xsd:token xsd:anyURI"/>
</xsd:simpleType>

<!-- RESPONSE -->
<xsd:element name="Capabilities" type="wis:WIS_CapabilitiesType"/>

<xsd:complexType name="WIS_CapabilitiesType">
  <xsd:complexContent>
    <xsd:extension base="ows:CapabilitiesBaseType">
      <xsd:sequence>
        <xsd:element ref="wis:Contents"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:element name="Contents" type="wis:ContentsType"/>

<xsd:complexType name="ContentsType">
  <xsd:sequence>
    <xsd:element ref="wis:Service" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:element name="Service" type="wis:ServiceType"/>

<xsd:complexType name="ServiceType">
  <xsd:sequence>
    <xsd:element ref="ows:ServiceIdentification"/>
  </xsd:sequence>
  <xsd:attribute name="type" type="wis:TokenOrAnyURI" use="required"/>
  <xsd:attribute name="baseUrl" type="xsd:anyURI" use="required"/>
</xsd:complexType>

<xsd:simpleType name="TokenOrAnyURI">
  <xsd:union memberTypes="xsd:token xsd:anyURI"/>
</xsd:simpleType>

B.2 owsGetAssociation.xsd

<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema
targetNamespace="http://www.opengis.net/as/1.0"
xmlns:as="http://www.opengis.net/as/1.0"
xmlns:ows="http://www.opengis.net/ows/2.0"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xlink="http://www.w3.org/1999/xlink"
elementFormDefault="qualified"
version="1.0.0">
  <xsd:annotation>
    <xsd:documentation>
      This XML schema document provides a schema for the 
      communication of associations between resources.
      
      Copyright (c) 2014 Open Geospatial Consortium. 
      To obtain additional rights of use, 
    </xsd:documentation>
  </xsd:annotation>

  <!-- Includes and Imports -->
schemaLocation="http://www.w3.org/2001/XMLSchema"/>
  <xsd:import namespace="http://www.w3.org/1999/xlink"
schemaLocation="http://www.w3.org/1999/xlink.xsd"/>
<xsd:extension base="xsd:string">
    <xsd:attribute name="namespace" type="xsd:anyURI"/>
</xsd:extension>
</xsd:simpleContent>
</xsd:complexType>
</xsd:element>
<xsd:simpleType name="TokenOrAnyURI">
    <xsd:union memberTypes="xsd:token xsd:anyURI"/>
</xsd:simpleType>
</xsd:schema>
Annex B

OGC Service Integration ebRIM Package
(normative)

C.1 ebRIM Package

The following ebRIM package defines object identifiers, classification schemes and association that may be used by a CSW-ebRIM catalogue to harvest and register the resources described by the capabilities documents of OGC web services.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<csw:Transaction
 xmlns="http://www.opengis.net/cat/csw/2.0.2"
 xmlns:csw="http://www.opengis.net/cat/csw/2.0.2"
 xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.opengis.net/cat/csw/2.0.2
 http://schemas.opengis.net/csw/2.0.2/CSW-discovery.xsd
 urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0
 http://docs.oasis-open.org/regrep/v3.0/schema/rim.xsd"
 service="CSW" version="2.0.2">
  <!-- ============================================================== -->
  <!-- OGC Association types                                      -->
  <!-- ============================================================== -->
  <csw:Insert>
   <rim:ClassificationNode code="OGC-Association-Types"
    id="urn:ogc:def:associationType:OGC-CSW-ebRIM"
    parent="urn:oasis:names:tc:ebxml-regrep:classificationScheme:AssociationType">
     <rim:Name>
      <rim:LocalizedString charset="UTF-8" value="OGC-AssociationType"/>
     </rim:Name>
     <rim:Description>
      <rim:LocalizedString charset="UTF-8" value="A sub-tree defining association types defined by OGC"/>
     </rim:Description>
     <rim:ClassificationNode code="Renders"
      id="urn:ogc:def:associationType:OGC-CSW-ebRIM::renders">
      <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
       <rim:ValueList>
        <rim:Value>Renders</rim:Value>
       </rim:ValueList>
      </rim:Slot>
      <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:reverseAssociationTitle">
       <rim:ValueList>
        <rim:Value>Rendered by</rim:Value>
       </rim:ValueList>
      </rim:Slot>
     </rim:ClassificationNode>
     </rim:ClassificationNode>
  </csw:Insert>
</csw:Transaction>
```
<rim:Description>
  <rim:LocalizedString charset="UTF-8" value="Associates one or more data sources (typically WFS Feature Types) that are rendered by a WMS or WMTS layers."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="TiledBy" id="urn:ogc:def:associationType:OGC-CSW-ebRIM::tiledBy">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Tiled By</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:reverseAssociationTitle">
    <rim:ValueList>
      <rim:Value>Tiles</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="Tiled By"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="Associates one or more WMTS layers with the WMS layer that they tile."/>
  </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="ParentOf" id="urn:ogc:def:associationType:OGC-CSW-ebRIM::parentOf">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Parent Of</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:reverseAssociationTitle">
    <rim:ValueList>
      <rim:Value>Child Of</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="Parent Of"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="Associates a registry entry with a parent entry and is typically used to register a nested hierarchy of objects."/>
  </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="Cascades" id="urn:ogc:def:associationType:OGC-CSW-ebRIM::cascades">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Cascades</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:reverseAssociationTitle">
    <rim:ValueList>
      <rim:Value>Cascades</rim:Value>
    </rim:ValueList>
  </rim:Slot>
</rim:ClassificationNode>
<rim:ValueList>
  <rim:Value>Cascaded By</rim:Value>
</rim:ValueList>

<rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="Cascades"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="Associates two services where one OGC web service is using the other OGC web service as a data source. For examples where one WMS cascades a number of other WMS's"/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="CreatedBy" id="urn:ogc:def:associationType:OGC-CSW-ebRIM::createdBy">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Created By</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:reverseAssociationTitle">
    <rim:ValueList>
      <rim:Value>Creates</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="Created By"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="Associates two resources where one is responsible for the other's creation."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="Symbolizes" id="urn:ogc:def:associationType:OGC-CSW-ebRIM::symbolizes">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Symbolizes</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:reverseAssociationTitle">
    <rim:ValueList>
      <rim:Value>Symbolized by</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="Symbolizes"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="Associates the symbology encoding document with a WFS Feature Type."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="OperatesOn"
id="urn:ogc:def:associationType:OGC-CSW-ebRIM::operatesOn">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Operates On</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:reverseAssociationTitle">
    <rim:ValueList>
      <rim:Value>Operated On</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="OperatesOn"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="Associates two resource when one resource operates upon the other resource (e.g. a WFS service operates on feature types)."/>
  </rim:Description>
</rim:ClassificationNode>
</csw:Insert>

<!-- OGC Service Types -->
<!-- ============================================================ -->
<csw:Insert>
  <rim:ClassificationScheme
    id="urn:ogc:names:tc:ebxml-regrep:classificationScheme:serviceTypes"
    isInternal="true"
    nodeType="urn:oasis:names:tc:ebxml-regrep:NodeType:UniqueCode">
    <rim:Name>
      <rim:LocalizedString charset="UTF-8" value="ServiceTypes"/>
    </rim:Name>
    <rim:Description>
      <rim:LocalizedString charset="UTF-8" value=""/>
    </rim:Description>
  </rim:ClassificationScheme>
</csw:Insert>
This is the canonical classification scheme of OGC web service types.

<rim:ClassificationNode code="wis"
  id="urn:ogc:def:serviceType:OGC-CSW-ebRIM::wis">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Web Integration Service</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="wis"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="An aggregation service that offers other OGC web services."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="wfs"
  id="urn:ogc:def:serviceType:OGC-CSW-ebRIM::wfs">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Web Feature Service</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="wfs"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A service offering features."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="wms"
  id="urn:ogc:def:serviceType:OGC-CSW-ebRIM::wms">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Web Map Service</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="wms"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A service offering maps."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="wmts"
  id="urn:ogc:def:serviceType:OGC-CSW-ebRIM::wmts">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Web Map Tiling Service</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="wmts"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A service offering maps."/>
  </rim:Description>
</rim:ClassificationNode>
<rim:Value>CSW-ebRIM Registry Service - Part 1: ebRIM profile of CSW</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="csw-ebRIM"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="A catalogue profile using ebRIM."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="gss"
id="urn:ogc:def:serviceType:OGC-CSW-ebRIM::gss">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Web GeoCollaboration Service</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="csw-ebRIM"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="A service supporting crowd sourced access to transaction OGC web services."/>
</rim:Description>
</rim:ClassificationNode>
</rim:ClassificationScheme>
</csw:Insert>
<!-- ============================================================ -->
<!-- OGC Service Content types. -->
<!-- ============================================================ -->
<csw:Insert>
<rim:ClassificationNode code="OGC-Service-Content-Types"
id="urn:ogc:def:objectType"
parent="urn:oasis:names:tc:ebxml-regrep:classificationScheme:ObjectType">
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="OGC-ObjectType"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="A sub-tree defining OGC object types."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="FeatureType"
id="urn:ogc:def:objectType:OGC-CSW-ebRIM::wfs:featureType">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>WFS Feature Type</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="WFS Feature Type"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="A feature type served by an OGC Web Feature Service."/>
</rim:Description>
</rim:ClassificationNode>
</csw:Insert>
<rim:ClassificationNode code="WMS Theme" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::wms:theme">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>WMS Theme</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="WMS Theme"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A collection of WMS layers."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="WMS Layer" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::wms:layer">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>WMS Layer</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="WMS Layer"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A map layer served by an OGC Web Map Service."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="WMTS Theme" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::wmts:theme">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>WMTS Theme</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="WMTS Theme"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A collection of WMTS layers."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="WMTS Layer" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::wmts:layer">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>WMTS Layer</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="WMTS Layer"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A map layer served by an OGC Web Map Service."/>
  </rim:Description>
</rim:ClassificationNode>
value="A WMTS map layer served by an OGC Web Map Service."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="WCS Theme"
  id="urn:ogc:def:objectType:OGC-CSW-ebRIM::wcs:theme">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-
  ebRIM::slotName:title">
  <rim:ValueList>
    <rim:Value>WCS Theme</rim:Value>
  </rim:ValueList>
</rim:Slot>
<rim:Name>
  <rim:LocalizedString charset="UTF-8" value="WCS Theme"/>
</rim:Name>
<rim:Description>
  <rim:LocalizedString charset="UTF-8" value="A collection of WCS coverages."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="WCS Coverage"
  id="urn:ogc:def:objectType:OGC-CSW-ebRIM::wcs:coverage">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-
  ebRIM::slotName:title">
  <rim:ValueList>
    <rim:Value>WCS Coverage</rim:Value>
  </rim:ValueList>
</rim:Slot>
<rim:Name>
  <rim:LocalizedString charset="UTF-8" value="WCS Coverage"/>
</rim:Name>
<rim:Description>
  <rim:LocalizedString charset="UTF-8" value="A coverage served by an OGC Web Coverage Service."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="Process"
  id="urn:ogc:def:objectType:OGC-CSW-ebRIM::wps:process">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-
  ebRIM::slotName:title">
  <rim:ValueList>
    <rim:Value>WPS Process</rim:Value>
  </rim:ValueList>
</rim:Slot>
<rim:Name>
  <rim:LocalizedString charset="UTF-8" value="WPS Process"/>
</rim:Name>
<rim:Description>
  <rim:LocalizedString charset="UTF-8" value="A process served by an OGC Web Processing Service."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="Unknown"
  id="urn:ogc:def:objectType:OGC-CSW-ebRIM::unknown">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-
  ebRIM::slotName:title">
  <rim:ValueList>
    <rim:Value>Unknown</rim:Value>
  </rim:ValueList>
</rim:Slot>
</rim:ClassificationNode>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="Unknown"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="An artifact of unknown type."/>
</rim:Description>
</rim:ClassificationNode>
</rim:ClassificationNode>
</csw:Insert>
<!-- Harvestable resource types. -->
<!-- ============================================================ -->
<rim:ClassificationScheme
id="urn:ogc:names:tc:ebxml-regrep:classificationScheme:HarvestResourceType"
isInternal="true"
nodeType="urn:oasis:names:tc:ebxml-regrep:NodeType:UniqueCode">
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="HarvestResourceType"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="This is the canonical classification scheme for harvest resource types used by the CSW-ebRIM catalogue."/>
</rim:Description>
</rim:ClassificationScheme>
<!-- Service capabilities documents. -->
<rim:ClassificationNode code="wis"
id="urn:ogc:def:objectType:OGC-CSW-ebRIM::document:capabilities:wis">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Web Integration Service Capabilities Document</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="wis"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="The capabilities document of a WIS."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="wfs"
id="urn:ogc:def:objectType:OGC-CSW-ebRIM::document:capabilities:wfs">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Web Feature Service Capabilities Document</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="wfs"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="The capabilities document of a Web Feature Service"/>
</rim:Description>
</rim:ClassificationNode>
<rim:ValueList>
  <rim:Value>Web Processing Service Capabilities Document</rim:Value>
</rim:ValueList>
</rim:Slot>
</rim:Name>
<rim:Description>
  <rim:LocalizedString charset="UTF-8" value="The capabilities document of a Web Processing Service"/>
</rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="csw" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::document:capabilities:csw">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Catalogue Service Web Capabilities Document</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="csw"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The capabilities document of a Catalogue Service Web"/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="csw-ebRIM" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::document:capabilities:csw-ebRIM">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Web Registry Service Capabilities Document</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="csw-ebRIM"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The capabilities document of a Web Registry Service"/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="gss" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::document:capabilities:gss">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Web GeoCollaboration Service (formerly GeoSynchronization Service) Capabilities Document</rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="gss"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The capabilities document of a Web GeoCollaboration Service (formerly GeoSynchronization Service)"/>
  </rim:Description>
</rim:ClassificationNode>
<rim:LocalizedString charset="UTF-8" value="gss"/>
</rim:Name>
</rim:Description>
<rim:LocalizedString charset="UTF-8" value="The capabilities document of a Web GeoCollaboration Service (formerly GeoSynchronization Service)."/>
</rim:Description>
</rim:ClassificationNode>
<!-- Service capabilities documents referenced by base URL. -->
<rim:ClassificationNode code="wisBaseUrl" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wis">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Web Integration Service Capabilities Document (accessed via the server's base URL)</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="wisBaseUrl"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="A capabilities document for a Web Integration Service obtained using a URL created by appending GetCapabilities request parameters to the server's base URL."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="wfsBaseUrl" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wfs">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Web Feature Service Capabilities Document (accessed via the server's base URL)</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="wfsBaseUrl"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="A capabilities document for a Web Feature Service obtained using a URL created by appending GetCapabilities request parameters to the server's base URL."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="wmsBaseUrl" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wms">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Web Map Service Capabilities Document (accessed via the server's base URL)</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="wmsBaseUrl"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="A capabilities document for a Web Map Service obtained using a URL created by appending GetCapabilities request parameters to the server's base URL."/>
</rim:Description>
</rim:ClassificationNode>
value="A capabilities document for a Web Map Service obtained using a URL created by appending GetCapabilities request parameters to the server's base URL." />
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="wmtsBaseUrl"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wmts">
    <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
        <rim:ValueList>
            <rim:Value>Web Map Tiling Service Capabilities Document (accessed via the server's base URL)</rim:Value>
        </rim:ValueList>
    </rim:Slot>
    <rim:Name>
        <rim:LocalizedString charset="UTF-8" value="wmtsBaseUrl"/>
    </rim:Name>
    <rim:Description>
        <rim:LocalizedString charset="UTF-8" value="A capabilities document for a Web Map Tiling Service obtained using a URL created by appending GetCapabilities request parameters to the server's base URL."/>
    </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="wcsBaseUrl"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wcs">
    <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
        <rim:ValueList>
            <rim:Value>Web Coverage Service Capabilities Document (accessed via the server's base URL)</rim:Value>
        </rim:ValueList>
    </rim:Slot>
    <rim:Name>
        <rim:LocalizedString charset="UTF-8" value="wcsBaseUrl"/>
    </rim:Name>
    <rim:Description>
        <rim:LocalizedString charset="UTF-8" value="A capabilities document for a Web Coverage Service obtained using a URL created by appending GetCapabilities request parameters to the server's base URL."/>
    </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="wpsBaseUrl"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:wps">
    <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
        <rim:ValueList>
            <rim:Value>Web Processing Service Capabilities Document (accessed via the server's base URL)</rim:Value>
        </rim:ValueList>
    </rim:Slot>
    <rim:Name>
        <rim:LocalizedString charset="UTF-8" value="wpsBaseUrl"/>
    </rim:Name>
    <rim:Description>
        <rim:LocalizedString charset="UTF-8" value="A capabilities document for a Web Processing Service obtained using a URL created by appending GetCapabilities request parameters to the server's base URL."/>
    </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="cswBaseUrl" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:csw">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Catalogue Service Web Capabilities Document (accessed via the server's base URL)</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="cswBaseUrl"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A capabilities document for a Catalogue Service Web obtained using a URL created by appending GetCapabilities request parameters to the server's base URL."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="csw-ebRIMBaseUrl" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:csw-ebRIM">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Web Registry Service Capabilities Document (accessed via the server's base URL)</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="csw-ebRIMBaseUrl"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A capabilities document for a Web Registry Service obtained using a URL created by appending GetCapabilities request parameters to the server's base URL."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="gssBaseUrl" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::baseUrl:gss">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Web GeoCollaboration Service Capabilities Document (accessed via the server's base URL)</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="gssBaseUrl"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="A capabilities document for a Web GeoCollaboration Service (formerly GeoSynchronization Service) obtained using a URL created by appending GetCapabilities request parameters to the server's base URL."/>
  </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="fgdc" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::document:fgdc">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>FGDC Metadata Text Document (accessed via the server's base URL)</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="fgdc"/>
  </rim:Name>
</rim:ClassificationNode>
The Content Standard for Digital Geospatial Metadata (CSDGM), Vers. 2 (FGDC-STD-001-1998) is the current US Federal Metadata standard. The FGDC originally adopted the CSDGM in 1994 and revised it in 1998. According to Executive Order 12096, all Federal agencies are ordered to use this standard to document geospatial data created as of January 1995. The standard is often referred to as the 'FGDC Metadata Standard' and has been implemented beyond the federal level with State and local governments adopting the metadata standard as well."

"This document provides a formal description of the ANZLIC Metadata Profile which is based on AS/NZS ISO 19115:2005, Geographic information -- Metadata. Changes introduced by ISO 19115:2003/Cor.1:2006, Geographic information -- Metadata -- Technical Corrigendum 1 have also been considered. Implementation of the Profile is based on ISO/TS 19139:2007, Geographic information -- Metadata -- XML schema implementation."

This International Standard provides a framework for platform neutral and platform specific specification of services that can enable users to access, process and manage geographic data from a variety of sources, potentially for various distributed computing platforms.


OASIS ebRIM Classification Scheme XML Document
<rim:ClassificationScheme>

<rim:ClassificationNode code="symbologyEncoding"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::document:symbologyEncoding">
    <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
        <rim:ValueList>
            <rim:Value>OGC Symbology Encoding Document</rim:Value>
        </rim:ValueList>
    </rim:Slot>
    <rim:Name>
        <rim:LocalizedString charset="UTF-8" value="symbologyEncoding"/>
    </rim:Name>
    <rim:Description>
        <rim:LocalizedString charset="UTF-8" value="*** Place holder ***"/>
    </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="xmlSchema"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::document:xmlSchema">
    <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
        <rim:ValueList>
            <rim:Value>W3C XML Schema Document</rim:Value>
        </rim:ValueList>
    </rim:Slot>
    <rim:Name>
        <rim:LocalizedString charset="UTF-8" value="xmlSchema"/>
    </rim:Name>
    <rim:Description>
        <rim:LocalizedString charset="UTF-8"
            value="The XML Schema Definition Language, which offers facilities for describing the structure and constraining the contents of XML documents, including those which exploit the XML Namespace facility. The schema language, which is itself represented in an XML vocabulary and uses namespaces, substantially reconstructs and considerably extends the capabilities found in XML document type definitions (DTDs)."/>
    </rim:Description>
</rim:ClassificationNode>

<rim:ClassificationNode code="unknown"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::document:unknown">
    <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
        <rim:ValueList>
            <rim:Value>Unknown (or other) Resource Type</rim:Value>
        </rim:ValueList>
    </rim:Slot>
    <rim:Name>
        <rim:LocalizedString charset="UTF-8" value="unknown"/>
    </rim:Name>
    <rim:Description>
        <rim:LocalizedString charset="UTF-8"
            value="In general, a CSW-ebRIM catalogue can harvest any resource that is described by a MIME type. Any harvested resource that is not one of the well-known resource types described in the CSW specification or listed in the CSW's capabilities document is considered to be of type "unknown"."/>
    </rim:Description>
</rim:ClassificationNode>
</rim:ClassificationScheme>
</csw:Insert>

<!-- ============================================================ -->
<!-- OGC Slot Names                                               -->
<!--  ============================================================ -->
<csw:Insert>
<rim:ClassificationScheme
  id="urn:ogc:names:tc:ebxml-regrep:classificationScheme:SlotName"
  isInternal="true"
  nodeType="urn:oasis:names:tc:ebxml-regrep:NodeType:UniqueCode">
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="SlotName"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8"
      value="This is the canonical ClassificationScheme for slot names used by the OGC CSW-ebRIM catalogue."/>
  </rim:Description>
  <rim:ClassificationNode code="accessConstraints"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:accessConstraints">
    <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
      <rim:ValueList>
        <rim:Value>Access Constraints</rim:Value>
      </rim:ValueList>
    </rim:Slot>
    <rim:Name>
      <rim:LocalizedString charset="UTF-8" value="accessConstraints"/>
    </rim:Name>
    <rim:Description>
      <rim:LocalizedString charset="UTF-8"
        value="The name of a slot used to describe any constraints (e.g. temporal, volumetric) associated with accessing or using an object represented as a catalogue entry."/>
    </rim:Description>
  </rim:ClassificationNode>
  <rim:ClassificationNode code="baseTableName"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:baseTableName">
    <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
      <rim:ValueList>
        <rim:Value>Base Table Name</rim:Value>
      </rim:ValueList>
    </rim:Slot>
    <rim:Name>
      <rim:LocalizedString charset="UTF-8" value="baseTableName"/>
    </rim:Name>
    <rim:Description>
      <rim:LocalizedString charset="UTF-8"
        value="The name of a slot used to store the name of a database table used to store an object represented as an entry in the catalogue. For example, the spatial table name used to store data for a WMS layer or WFS feature type."/>
    </rim:Description>
  </rim:ClassificationNode>
  <rim:ClassificationNode code="baseUrl"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:baseUrl">
    <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
      <rim:ValueList>
        <rim:Value>Base URL</rim:Value>
      </rim:ValueList>
    </rim:Slot>
    <rim:Name>
      <rim:LocalizedString charset="UTF-8" value="BaseUrl"/>
    </rim:Name>
    <rim:Description>
      <rim:LocalizedString charset="UTF-8"
        value="The name of a slot used to store the URL of an object represented as a catalogue entry."/>
    </rim:Description>
  </rim:ClassificationNode>
</rim:ClassificationScheme>
</csw:Insert>
<rim:LocalizedString charset="UTF-8" value="baseUrl"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8"
value="A slot used to store the base GetCapabilities URL of an object represented as an entry in the catalogue. The base GetCapabilities URL is the URL to which GetCapabilities parameters are appended to form a GetCapabilities request."
/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="crs" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:crs">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Coordinate Reference System</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="crs"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8"
value="The name of a slot used to store the name or code of a coordinate reference system associated with a catalogue entry."
/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="fees" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:fees">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Fees</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="fees"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8"
value="The name of a slot used to describe any fees associated with accessing or using an object represented as a catalogue entry."
/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="hasRepositoryItem" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:hasRepositoryItem">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Has Repository Item</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="hasRepositoryItem"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8"
value="The name of a slot used to store a boolean that indicates whether a catalogue entry has an associated item in the catalogue's repository."
/>
Keyword is the name of a slot used to store a list of keywords associated with a catalogue entry.

Layer Limit is the name of a slot used to store an integer that represents the maximum number of layers that a client can specify in a WMS request.

Legend Graphic URL is the name of a slot used to store the URL of legend graphic associated with an entry in the catalogue that represents a WMS layer.

Maximum Map Height is the name of a slot used to store a list of keywords.
<rim:ValueList>
  <rim:Value>Maximum Map Width</rim:Value>
</rim:Slot>
<rim:Name>
  <rim:LocalizedString charset="UTF-8" value="maxHeight"/>
</rim:Name>
<rim:Description>
  <rim:LocalizedString charset="UTF-8" value="The name of a slot used to store, in pixels, the maximum map height that a WMS service generates."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="maxWidth" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:maxWidth">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Maximum Map Width</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="maxWidth"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The name of a slot used to store, in pixels, the maximum map width that a WMS service generates."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="onlineResource" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:onlineResource">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Online Resource</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="onlineResource"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The name of a slot used to store the URL that points to additional information about the object represented by a catalogue entry."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="outputFormat" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:outputFormat">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Output Format</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="outputFormat"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The name of a slot used to store a list of formats that may be used to represent the object represented by a catalogue entry."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="queryable" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:queryable">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Queryable</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="queryable"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The name of a slot used to store a boolean value indicating whether the object represented by a catalogue entry is queryable or not (usually used to indicate whether a WMS layer is queryable or not)."/>
  </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="resourceType" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:resourceType">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Resource Type</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="resourceType"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The name of a slot used to store the name or code of a standardized metadata type for the object represented by a catalogue entry."/>
  </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="reverseAssociationTitle" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:reverseAssociationTitle">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Reverse Association Title</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="reverseAssociationTitle"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The name of a slot used to store the reverse title for an association. For example, the reverse title of 'Serves' would be 'Served By'."/> 
  </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="scheme" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:scheme">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Scheme</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="scheme"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8" value="The name of a slot used to store a reference to a standard or scheme used for metadata. For example, the reference for the "GML 3.2.1" standard would be 'http://www.opengis.net/gml/3.2.1'."/>
  </rim:Description>
</rim:ClassificationNode>

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</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="scheme"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="The name of a slot used to store the name of a scheme associated with a catalogue entry."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="spatialPropertyName" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:spatialPropertyName">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Spatial Property Name</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="spatialPropertyName"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="The name of a slot used to store the name of the spatial property of a catalogue entry (usually representing a feature type)."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="supportedOperations" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:supportedOperations">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Supported Operations</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="supportedOperations"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="The name of a slot used to store a list of operations supported by a catalogue entry (usually representing a service)."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="title" id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Title</rim:Value>
</rim:ValueList>
</rim:Slot>
<rim:Name>
<rim:LocalizedString charset="UTF-8" value="title"/>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="title"/>
</rim:Description>
<rim:LocalizedString charset="UTF-8" value="title"/>
value="The name of a slot used to store a human-readable
title associated with a catalogue entry."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="where"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:where">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-
    ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Where</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="where"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8"
      value="The name of a slot used to store a location or
      geometry associated with a catalogue entry"/>
  </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="position"
    id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:position">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-
    ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>PositionName</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="position"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8"
      value="The name of a slot used to store the role or position
      of a responsible person."/>
  </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="role" id="urn:ogc:def:objectType:OGC-CSW-
    ebRIM::slotName:role">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-
    ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>Role</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="role"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8"
      value="The name of a slot used to store the function
      performed by the responsible party. Possible values of this Role shall include
      the values and the meanings listed in Subclause B.5.5 of ISO 19115:2003."/>
  </rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="url" id="urn:ogc:def:objectType:OGC-CSW-
    ebRIM::slotName:url">
  <rim:Slot name="urn:ogc:def:objectType:OGC-CSW-
    ebRIM::slotName:title">
    <rim:ValueList>
      <rim:Value>URL</rim:Value>
    </rim:ValueList>
  </rim:Slot>
  <rim:Name>
    <rim:LocalizedString charset="UTF-8" value="url"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString charset="UTF-8"
      value="The name of a slot used to store a URI representing the location
      or endpoint address of a resource.">
        <!-- Note: The description value is truncated here for brevity. -->
    </rim:Description>
</rim:ClassificationNode>
<rim:Value>URL</rim:Value>
</rim:ValueList>
</rim:Slot>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="url"/>
value="The name of a slot used to store a url associated with the a catalogue entry."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="hoursOfService"
id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:hoursOfService">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Hours of Service</rim:Value>
</rim:ValueList>
</rim:Slot>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="hoursOfService"/>
value="The name of a slot used to store the hours of service associated with the a catalogue entry."/>
</rim:Description>
</rim:ClassificationNode>
<rim:ClassificationNode code="contactInstructions"
id="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:contactInstructions">
<rim:Slot name="urn:ogc:def:objectType:OGC-CSW-ebRIM::slotName:title">
<rim:ValueList>
<rim:Value>Contact Instructions</rim:Value>
</rim:ValueList>
</rim:Slot>
</rim:Name>
<rim:Description>
<rim:LocalizedString charset="UTF-8" value="contactInstructions"/>
value="The name of a slot used to store any special contact instructions associated with the a catalogue entry."/>
</rim:Description>
</rim:ClassificationNode>
</rim:ClassificationScheme>
</csw:Insert>
</csw:Transaction>