



International Coastal Atlas Network Cookbook:

Connecting your Atlas to the ICWA prototype



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Introduction

This document is a step-by-step guide explaining how to connect your atlas as a node in the International Coastal Web Atlas (ICWA) prototype hosted at <http://ican.ucc.ie/>. This document is aimed specifically at members of the International Coastal Atlas Network community and more generally at scientists, data managers, and system developers.

The ICWA prototype

The ICWA prototype is developed by the Technical Working Group (TWG) of the International Coastal Atlas Network (ICAN), with the current prototype (version 3) being funded by the NETMAR project. It provides a common interface for accessing distributed local atlases, such as MIDA (Marine Irish Digital Atlas), OCA (Oregon Coastal Atlas), and Washington Coastal Atlas (WCA). The current version of ICWA only supports catalogue search, including “smart search”. The ICAN TWG are currently investigating the extension of ICWA to support web mapping. ICWA version 3 is based on five components (Figure 1):

- Ontology Browser (OB)
- Discovery interface (Geo Finder)
- Metadata viewer (Meta Viewer)
- ICWA Mediator (CSW Mediator)
- Semantic Web Service (SWS)

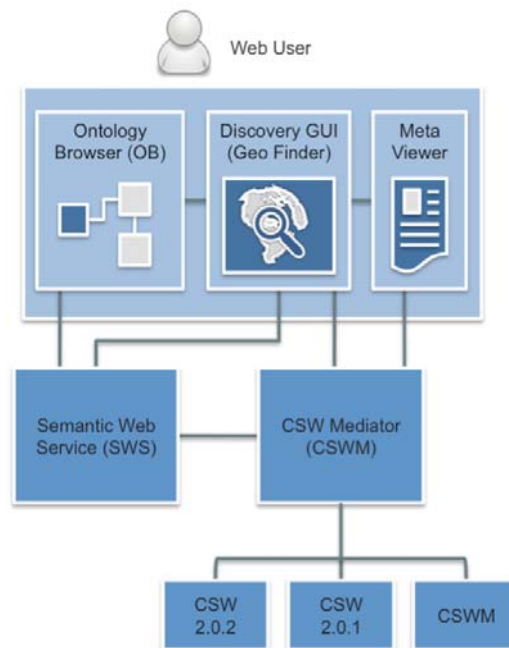


Figure 1: Main components of the ICWA prototype

The first three components are frontend graphical user interfaces hosted at <http://ican.ucc.ie/>. A user can interact with these components in a web browser, and perform tasks such as ontology browsing, data search and metadata visualisation across distributed atlases.

The other components are backend web services. The ICWA mediator (CSW Mediator) communicates with local atlases through standard OGC CSW (Catalogue Service for the Web) interfaces. It queries the knowledge organisation system (KOS) through the semantic web service (SWS) interface. ICWA uses a knowledge organisation system to improve data discovery by exploiting the semantics of keywords and allowing users to search data by “meaning” rather than by “mere keywords”.

For example, as illustrated in Figure 2, a user arrives at the ICAN portal and requests “coastline” data. The ICWA mediator is connected to a global knowledge organisation system that is aware that “coastline” is related to both “shoreline” and “high resolution coastline”. The user request, together with this information from the global knowledge organisation system, is then passed on to the local atlases that search for “coastline”, “shoreline” and “high resolution coastline”. Each local atlas then returns the relevant metadata results to the ICWA mediator. In turn, these individual metadata results are aggregated and passed to the graphical user interface. This is an implementation of the so-called “smart-search”¹.

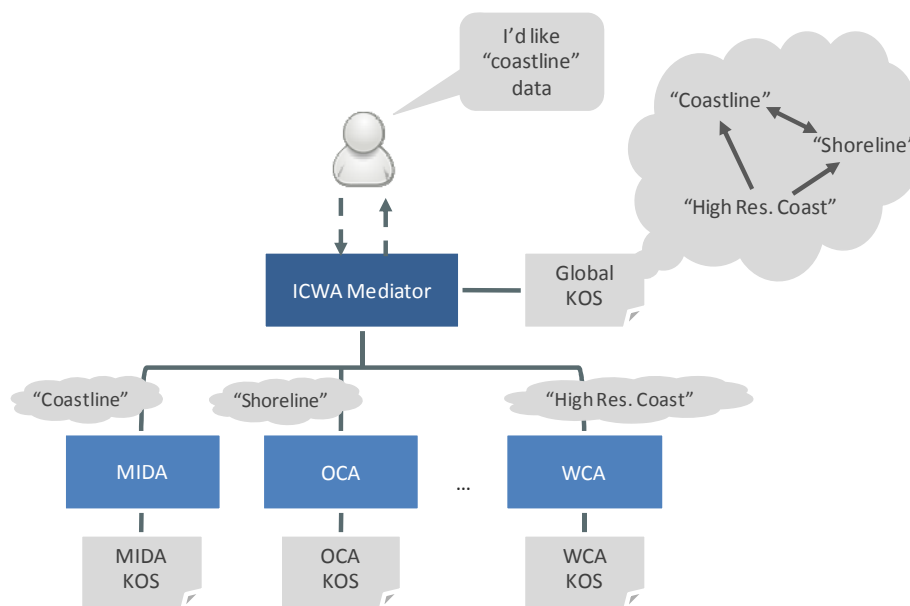


Figure 2: Illustrating the use for knowledge organisation systems in the ICWA

¹ Latham, S. E.; Cramer, R.; Grant, M.; Kershaw, P.; Lawrence, B. N.; Lowry, R.; Lowe, D.; O'Neill, K.; Miller, P.; Pascoe, S.; Pritchard, M.; Snaith, H.; Woolf, A. (2009) The NERC DataGrid services. *Philosophical Transactions of the Royal Society A*, 367 (1890). 1015-1019.

Connection Requirements

In order to connect your atlas as a node in the ICWA, you need to:

1. Provide access to your metadata through a CSW² interface supporting the CSW ISO Metadata Application Profile², which supports both Dublin Core³ and the ISO 19115⁴/19119⁵/19139⁶ metadata standards.
2. Optionally, provide your local KOS that defines the terms used as keywords in your metadata records and specifies how they semantically relate to the ICAN global KOS terms.

The subsequent sections explain these two requirements. Any feedback regarding these requirements and technology compatibility to implement and test these requirements is welcome, and may be provided by contacting the author whose details are listed at the end of this document.

CSW Requirements

The ICWA mediator supports CSW 2.0.2 fully and CSW 2.0.1 partially. Therefore, we recommend that you use CSW 2.0.2 for delivering your metadata to the ICWA mediator.

The ICWA mediator requires CSW 2.0.2 supporting the ISO Metadata Application Profile version 1.0.0, that is able to deliver metadata in Dublin Core and ISO 19115/19139. ISO 19119/19139 service metadata is also supported by the ICWA mediator.

The ICWA mediator has been tested with GeoNetwork 2.4 and later versions. GeoNetwork automatically provides a mapping from ISO 19115/19119 to Dublin Core. The mediator should support other CSW 2.0.2 implementations. Currently, all ICAN CSW nodes use GeoNetwork, and ICWA functionality is tested against this. Other CSW servers will be tested in future, but please contact the author if you have a particular CSW server that requires testing.

There is no particular requirement as to the ISO 19115/19119 metadata profile used, but metadata records need to include keywords expressed in one of the following four encoding forms:

1. As character strings (gco:CharacterString), each containing the URI of a concept from your local KOS (if any). This encoding form is currently the favoured recommendation as it uses a direct URI link to the semantic keyword concept. An example:

```
<gmd:descriptiveKeywords>
  <gmd:MD_Keywords>
    <gmd:keyword>
      <gco:CharacterString>
        http://vocab.nerc.ac.uk/collection/A03/current/Beach
      </gco:CharacterString>
    </gmd:keyword>
  </gmd:MD_Keywords>
</gmd:descriptiveKeywords>
```

² <http://www.opengeospatial.org/standards/cat/>

³ <http://www.dublincore.org/>

⁴ http://www.iso.org/iso/catalogue_detail.htm?csnumber=26020

⁵ http://www.iso.org/iso/catalogue_detail.htm?csnumber=39890

⁶ http://www.iso.org/iso/catalogue_detail.htm?csnumber=32557

```

<gmd:thesaurusName>
  <gmd:CI_Citation>
    <gmd:title>
      <gco:CharacterString>
        Oregon Coastal Atlas Coastal Erosion Thesaurus discovery terms
      </gco:CharacterString>
    </gmd:title>
  </gmd:CI_Citation>
  <gmd:date>
    <gmd:CI_Date>
      <gmd:date>
        <gco>Date>2011-08-19</gco>Date>
      </gmd:date>
      <gmd:dateType>
        <gmd:CI_DateTypeCode>
          <codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCode" codeListValue="revision">
            Revision
          </gmd:CI_DateTypeCode>
        </gmd:dateType>
      </gmd:CI_Date>
    </gmd:date>
  </gmd:CI_Citation>
</gmd:thesaurusName>
</gmd:MD_Keywords>
</gmd:descriptiveKeywords>

```

- As character strings, each containing the label of a concept from your local KOS (if any). However, this does not support a direct link to the concept. Instead, the mediator must search all the local KOS for the relevant concept based on the label. Therefore, this encoding form is not preferred. An example:

```

<gmd:descriptiveKeywords>
  <gmd:MD_Keywords>
    <gmd:keyword>
      <gco:CharacterString>Beach</gco:CharacterString>
    </gmd:keyword>
  <gmd:thesaurusName>
    <gmd:CI_Citation>
      <gmd:title>
        <gco:CharacterString>
          Oregon Coastal Atlas Coastal Erosion Thesaurus discovery terms
        </gco:CharacterString>
      </gmd:title>
    <gmd:date>
      <gmd:CI_Date>
        <gmd:date>
          <gco>Date>2011-08-19</gco>Date>
        </gmd:date>
        <gmd:dateType>
          <gmd:CI_DateTypeCode>
            <codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCode" codeListValue="revision">
              Revision
            </gmd:CI_DateTypeCode>
          </gmd:dateType>
        </gmd:CI_Date>
      </gmd:date>
    </gmd:CI_Citation>
  </gmd:thesaurusName>
</gmd:MD_Keywords>
</gmd:descriptiveKeywords>

```

- As anchor elements (gmx:Anchor), each containing both the URI and label of a concept from your local KOS (if any). This encoding form is currently not supported by

GeoNetwork (version 2.6.4 and earlier) and, therefore, has not been tested by ICWA. In the long term this will be the preferred encoding form as it supports both a direct URI link to the concept and a label of this concept. An example:

```
<gmd:descriptiveKeywords>
  <gmd:MD_Keywords>
    <gmd:keyword>
      <gmx:Anchor xlink:href="http://vocab.nerc.ac.uk/collection/A03/current/Beach">
        Beach
      </gmx:Anchor>
    </gmd:keyword>
    <gmd:thesaurusName>
      <gmd:CI_Citation>
        <gmd:title>
          <gco:CharacterString>
            Oregon Coastal Atlas Coastal Erosion Thesaurus discovery terms
          </gco:CharacterString>
        </gmd:title>
        <gmd:date>
          <gmd:CI_Date>
            <gmd:date>
              <gco>Date>2011-08-19</gco>Date>
            </gmd:date>
            <gmd:dateType>
              <gmd:CI_DateTypeCode
                codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/
                resources/Codelist/gmxCodelists.xml#CI_DateTypeCode" codeListValue="revision">
                Revision
              </gmd:CI_DateTypeCode>
            </gmd:dateType>
          </gmd:CI_Date>
        </gmd:date>
      </gmd:CI_Citation>
    </gmd:thesaurusName>
  </gmd:MD_Keywords>
</gmd:descriptiveKeywords>
```

4. As character strings containing free text keywords. This is the simplest encoding form. It is not recommended because of its lack of a KOS, but it is supported to enable non-semantic metadata catalogues to be readily connected to the ICWA. Therefore, smart search functionality will not be supported for this encoding form.

```
<gmd:descriptiveKeywords>
  <gmd:MD_Keywords>
    <gmd:keyword>
      <gco:CharacterString>Beach</gco:CharacterString>
    </gmd:keyword>
  </gmd:MD_Keywords>
</gmd:descriptiveKeywords>
```

KOS Requirements

Local knowledge organisation systems are used in ICWA to define the semantics of metadata keywords used within a local atlas and how these relate semantically to the global KOS concepts. A local KOS is a SKOS thesaurus organised into one or many concept schemes and collections. It defines:

- The concepts represented by keywords (themes, parameters, instruments, etc.), their labels (terms), and definitions (free text explaining the meaning of the concepts).

- The semantic relationships between the local concepts.
- The semantic relationships between the local concepts and the global ones. These relationships are referred to as mappings.

You are not required to define your metadata keywords in a KOS. However, you are recommended to do so as this would improve data search as explained earlier in this document.

The ICWA mediator has a built-in SWS connector for querying global and local KOS. Therefore, for your KOS to be accessed and used by the mediator, it must be delivered through SWS. You can implement your own SWS (source code available from CMRC), but this means an extra maintenance load for you. BODC are hosting and maintaining an operational vocabulary server (NERC Vocabulary Server, NVS) that feeds the NETMAR SWS hosted by CMRC. You are strongly recommended to profit from this existing infrastructure and provide BODC with your KOS for inclusion in the NVS. BODC have made available two worksheets in an Excel document for defining your concepts, relationships, and mappings in a very intuitive way, avoiding the hassle of RDF, SKOS and ontology editing tools. Please refer to the “*Understanding Semantics*” cookbook for examples of these worksheets.

Once you have finished filling out the worksheets, BODC can load it onto the NVS.

What is Next?

If your atlas fills the requirements above (CSW and KOS), adding it as a node in ICWA is a very easy process. All you need to do is provide the ICWA administrator (CMRC) with the following details:

1. URL of your CSW server;
2. Login and password for accessing metadata through your CSW server (if metadata records are not public);
3. Optionally, but ideally, a logo of your atlas (250x250 PNG image);
4. Method used for encoding keywords (c.f., methods 1 to 4 listed in the CSW Requirements section above);
5. If you are using method 1, 2 or 3 for keyword encoding then you will need to provide the ICWA with the following information:
 - a. URL of the SWS responsible for delivering your KOS if other than the NVS and the CMRC SWS;
 - b. URI of the concept schemes containing the concepts used as metadata keywords.

Once provided with this information, the ICWA administrator can add your atlas in the ICWA configuration file and it becomes an active node of ICWA.

Acknowledgements

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