# Publishing controlled vocabularies for access and reuse

COAR webinar, December 15, 2016
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# Overview

- Making vocabularies available for access and reuse
- What is SKOS.  Why was it developed?  Why use it?
- Expressing a classical vocabulary in SKOS
- Extending and combining SKOS
- Tools for creating, managing, publishing and accessing SKOS vocabularies
- Vocabulary registry interoperability
- Australian Vocabulary Special Interest Group (AVSIG)
    - Getting started with vocabularies

# Why publish vocabularies on the web?

- Vocabularies are relevant to the Internet
- Vocabularies help improve search precision within an indexed collection
- Hierarchical and associative relationships assist collection browsing
- Published vocabularies become independently accessible resources for reuse
- Published vocabularies are visible
- Vocabulary visibility supports discussion about duplication and consolidation
- Published vocabularies may be mapped to each other
- Vocabularies provide points of relation and connection across the Semantic Web

# Why use SKOS?  Why not use OWL?

- OWL provides a formal and precise way to represent domain knowledge.
- Vocabularies are not formally precise representations of domain knowledge.
- Vocabularies are not as complex as ontologies
- SKOS is simpler than OWL
- Translation to OWL can take considerable effort and expertise
- Translation to OWL may introduce misleading logical precision
- SKOS focuses on features typical of vocabularies
- SKOS provides a low-cost migration path to the semantic web

*Simple Knowledge Organization System*

Scope: knowledge organization systems (KOS) such as thesauri, classification systems, subject heading lists…

SKOS is for representing KOSs in RDF in a *simple* way

# Thesaurus example

Animals

cats
- UF (*used for*) domestic cats
- RT (*related term*) wildcats
- BT (*broader term*) animals
- SN (*scope note*) used only for domestic cats

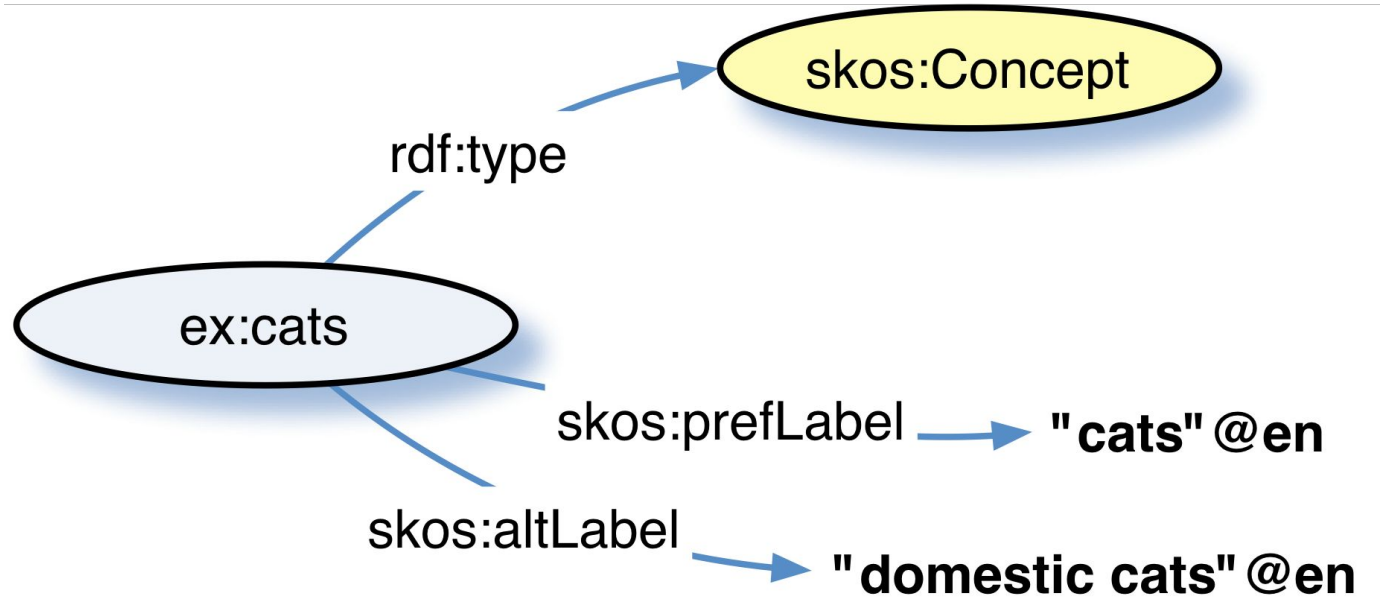
domestic cats
- USE cats

wildcats

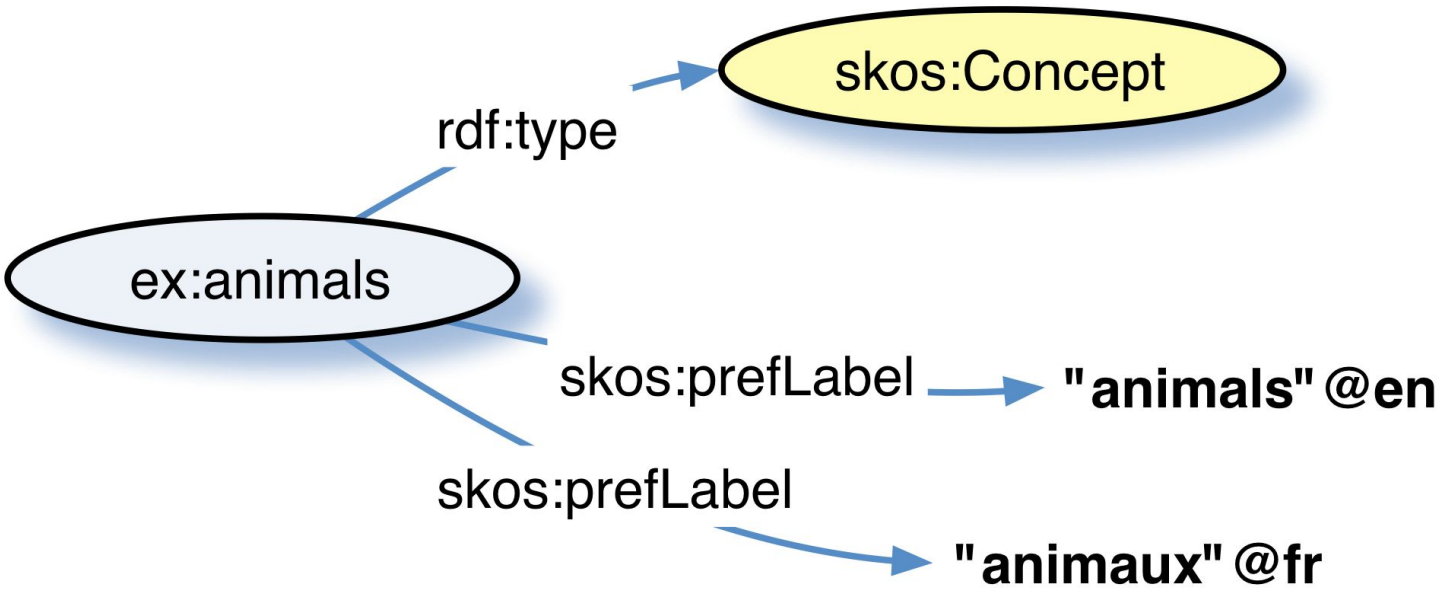
# Concepts and labels

cats

UF (*used for*) domestic cats



# Note: multilingual labels

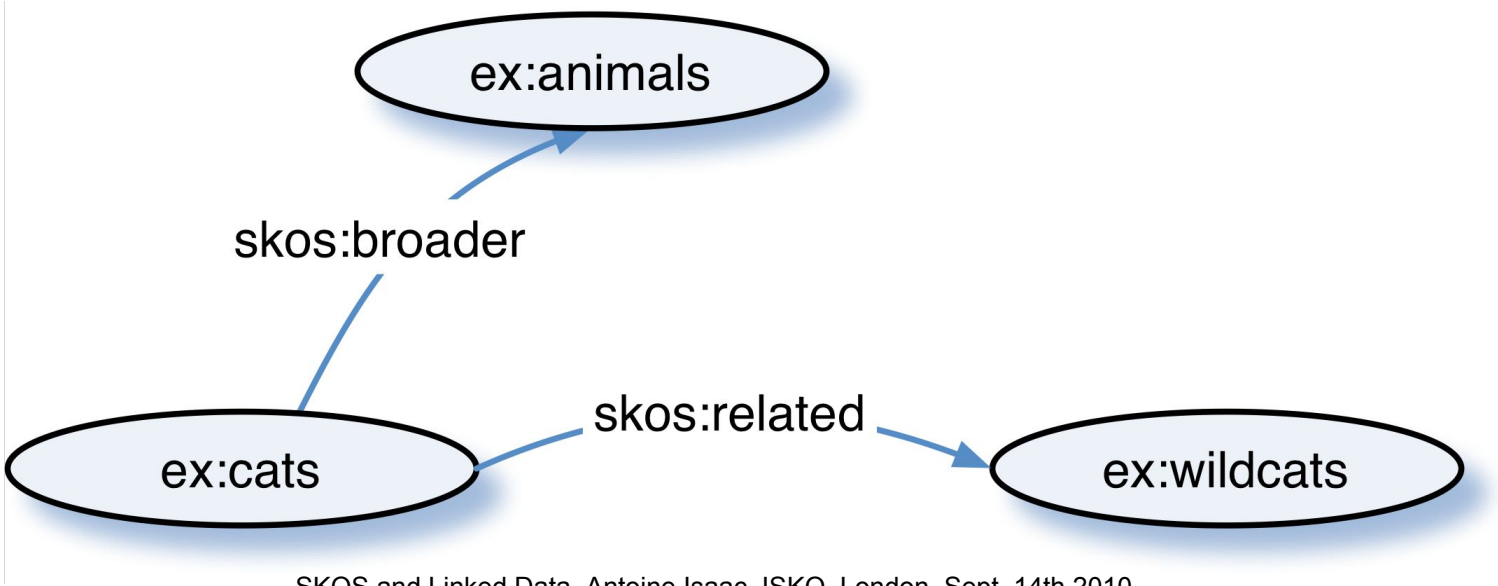


# Semantic relations

cats

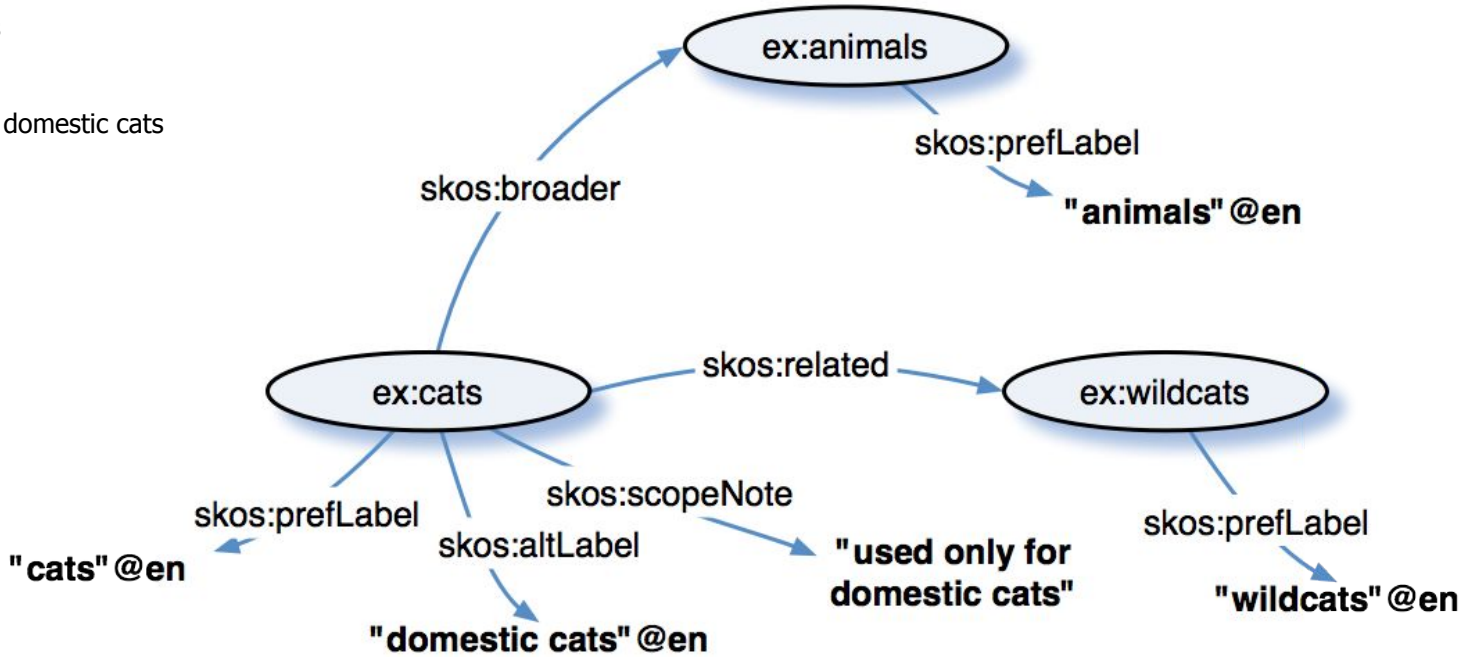
RT (*related term*) wildcats

BT (*broader term*) animals



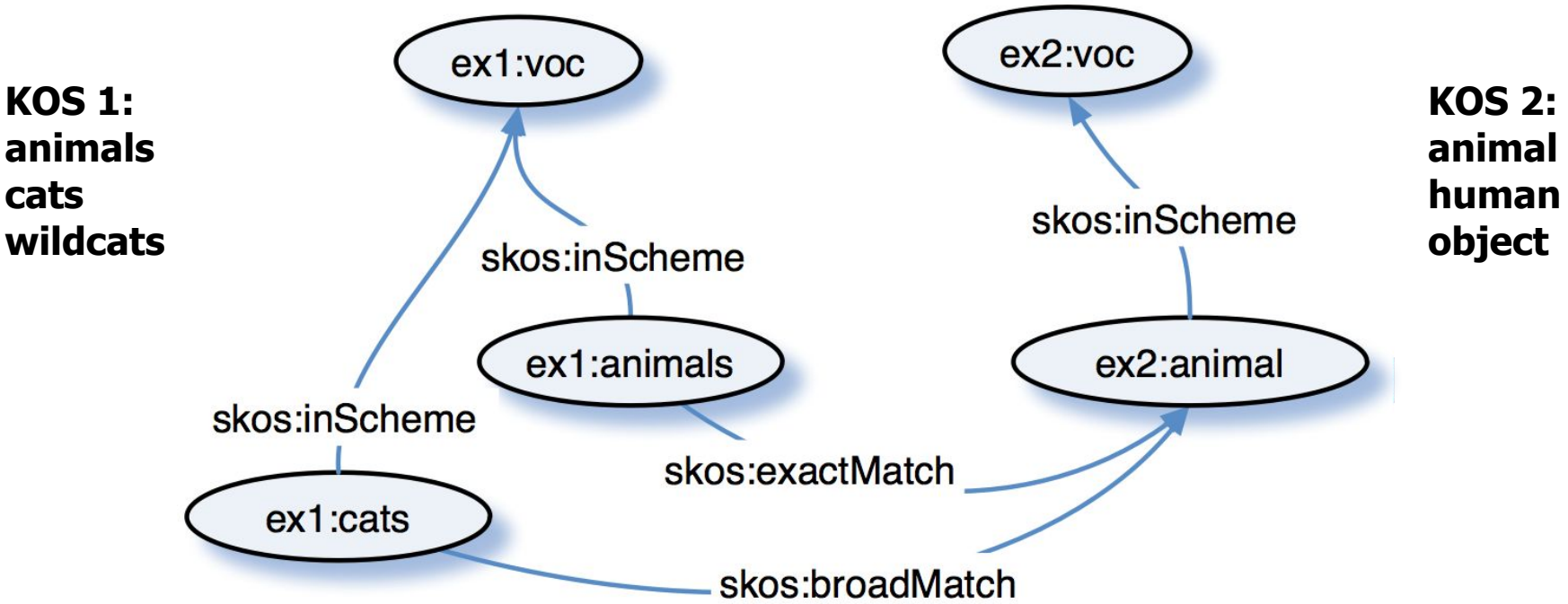
# A SKOS graph

animals
cats
	UF domestic cats
	RT wildcats
	BT animals
	SN used only for domestic cats
domestic cats
	USE cats
wildcats



# SKOS mappings

SKOS allows bridging across KOSs from different contexts

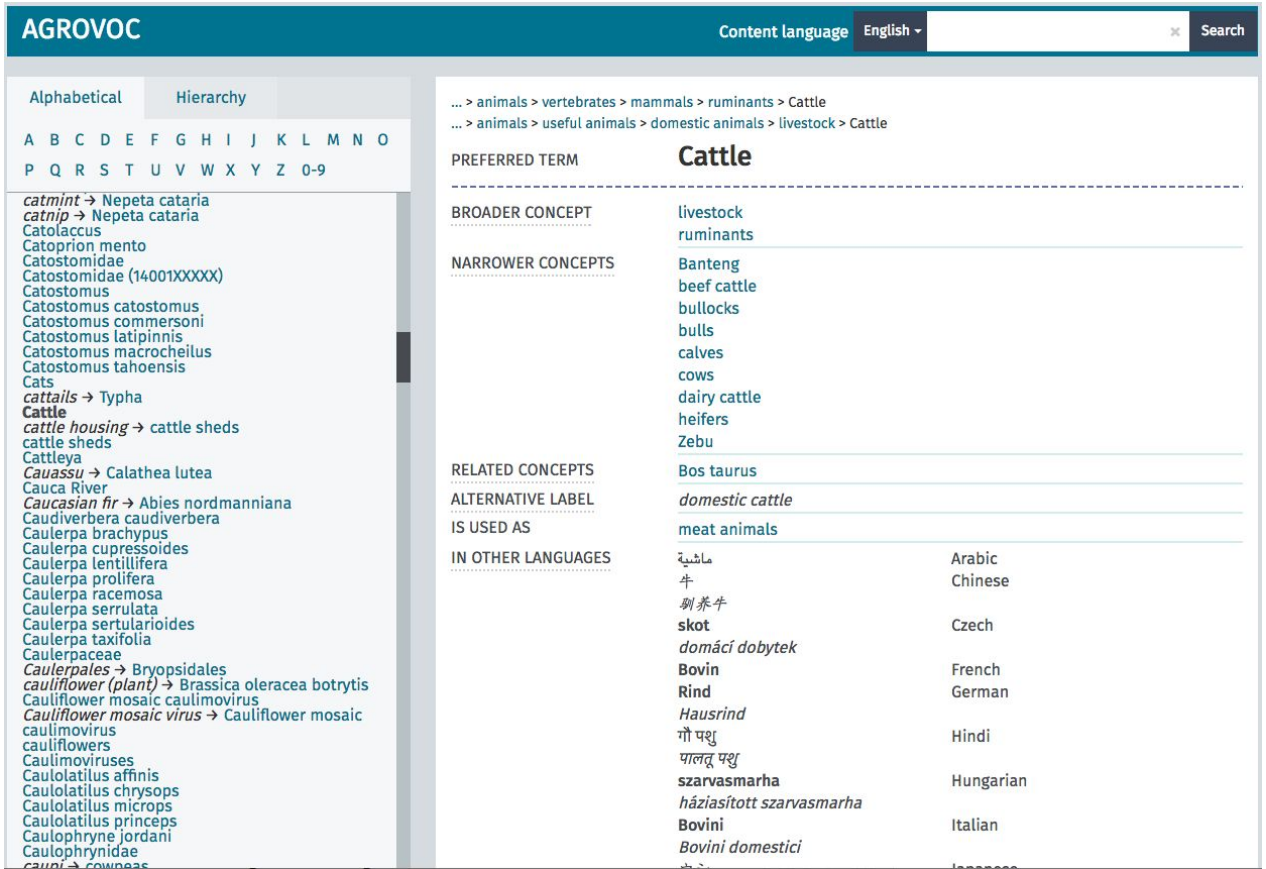


# SKOS mappings: Agrovoc

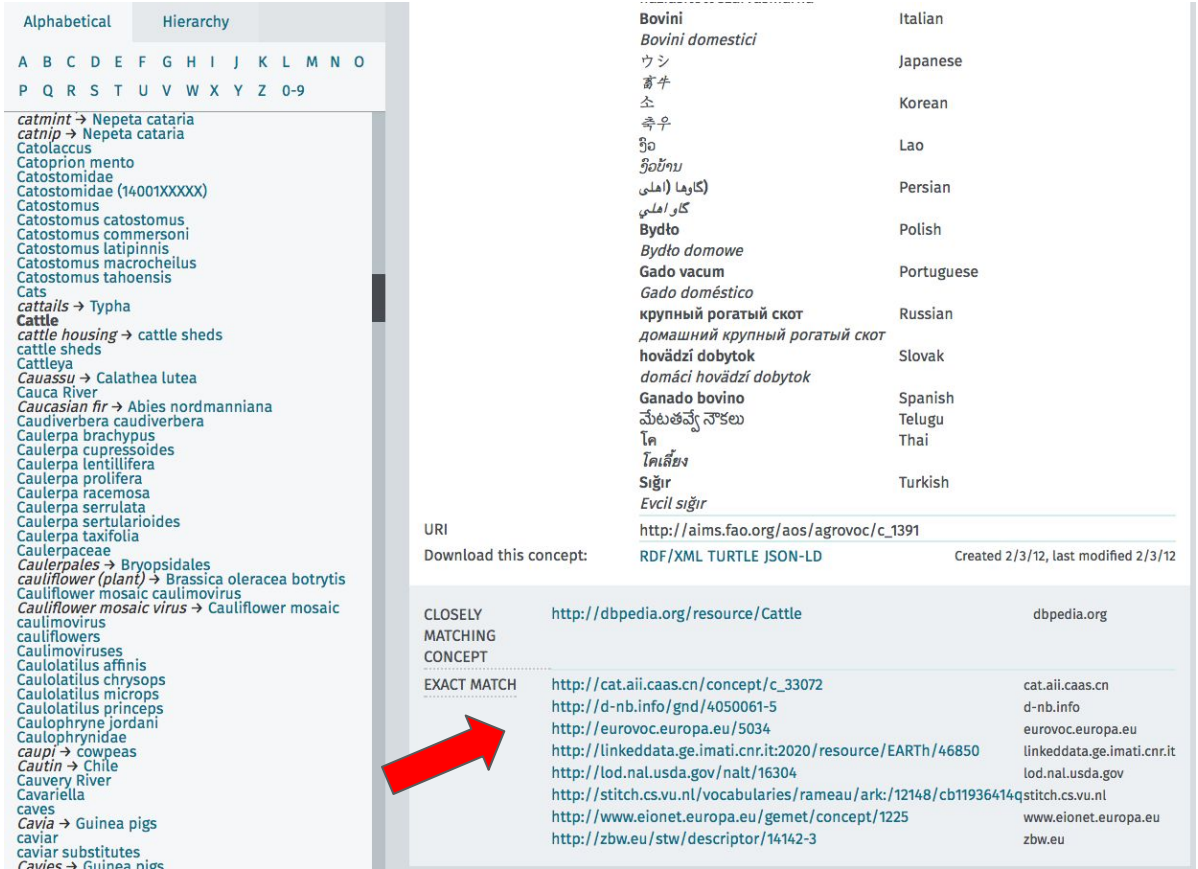
Table 1 below provides some figures about the vocabularies to which AGROVOC is aligned:

| | Resource | Topics | Total # of Linked concepts | Languages | Linked Resource available as LOD? | Type of link (and # of linked concepts) |
|---|---|---|---|---|---|---|
| 1 | ASFA | Fisheries | 1784 | | Yes | skos:closeMatch (38), skosLexactMatch (1741) |
| 2 | Biotechnology Glossary (FAO) | Biotechnologies | 793 | EN, ES, FR, +3 more | Yes | skos:closeMatch (793) |
| 3 | Chinese Agriculture Thesaurus (CAT) | Agriculture | | | Yes | skos:narrowMatch (137)<br>skos:broadMatch (10153)<br>skos:exactMatch (10325) |
| 4 | DBpedia | General | 11009 | EN, ES, FR + 8 more | Yes | skos:closeMatch (11009) |
| 5 | Dewey Decimal Classification (DDC) | General | 401 | EN, ES, FR + 8 more | Yes | skos:closeMatch (2)<br>skos:exactMatch (399) |
| 6 | EUROVOC | General EU | 1 269 | EN, ES, FR + 21 more | Yes | skos:exactMatch (1269) |
| 7 | GEMET | Environment | 1 175 | EN, ES, FR + 30 more | Yes | skos:exactMatch (1175) |
| 8 | GeoNames | Geographical entities | 206 | EN, ES, FR + 63 more | Yes | skos:exactMatch (206) |
| 9 | Geopolical Ontology | Geopolitical entities | 253 | AR, CH, EN, ES, FR, RU | Yes | skos:exactMatch (253) |
| 10 | Library of Congress Subject Headings | General | 1 075 | EN | Yes | skos:exactMatch (1075) |

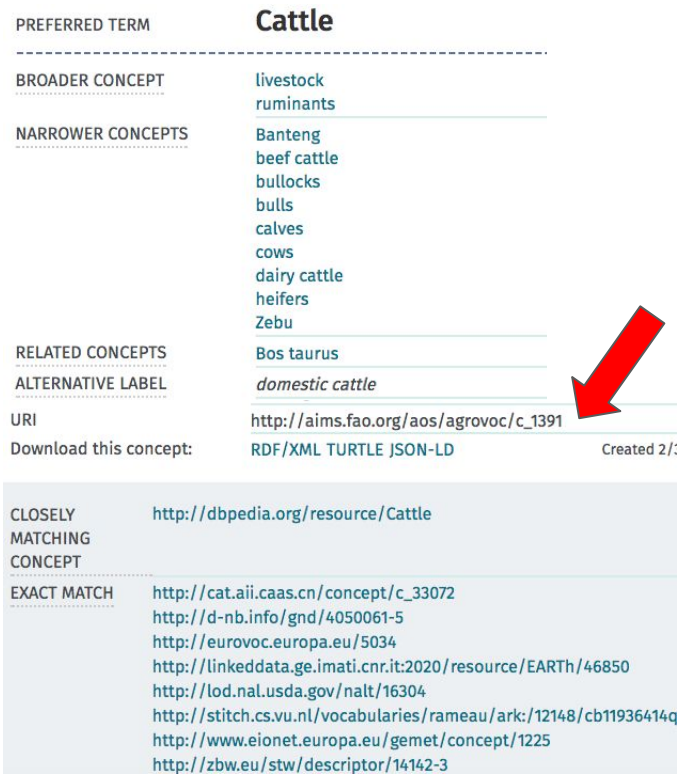
# SKOS mappings: Agrovoc



# SKOS mappings: Agrovoc



# SKOS Concept URIs



| | |
|---|---|
| PREFERRED TERM | **Cattle** |
| BROADER CONCEPT | livestock<br>ruminants |
| NARROWER CONCEPTS | Banteng<br>beef cattle<br>bullocks<br>bulls<br>calves<br>cows<br>dairy cattle<br>heifers<br>Zebu |
| RELATED CONCEPTS | Bos taurus |
| ALTERNATIVE LABEL | *domestic cattle* |
| URI | http://aims.fao.org/aos/agrovoc/c_1391 |
| Download this concept: | RDF/XML TURTLE JSON-LD Created 2/ |
| CLOSELY MATCHING CONCEPT | http://dbpedia.org/resource/Cattle |
| EXACT MATCH | http://cat.aii.caas.cn/concept/c_33072<br>http://d-nb.info/gnd/4050061-5<br>http://eurovoc.europa.eu/5034<br>http://linkeddata.ge.imati.cnr.it:2020/resource/EARTh/46850<br>http://lod.nal.usda.gov/nalt/16304<br>http://stitch.cs.vu.nl/vocabularies/rameau/ark:/12148/cb11936414q<br>http://www.eionet.europa.eu/gemet/concept/1225<br>http://zbw.eu/stw/descriptor/14142-3 |

# SKOS Concept URIs

Education Services Australia

http://www.esa.edu.au/

ScOT

Find term:

HTML Visual

Australian education vocabularies » Schools Online Thesaurus

English

## Arts

| | |
|---|---|
| Alternative Label | *Art in education*<br>*Arts literacy*<br>*Fine art*<br>*Humanities (Arts)*<br>*Multi arts*<br>*The arts*<br>*Works of art* |
| URI | http://vocabulary.curriculum.edu.au/scot/1556 |
| Hidden Label | Work of art |
| Scope Note | Use for resources about visual arts or performing arts. For resources about written works, use Literature. |
| Narrower Concept | Artistic purpose<br>Films<br>Visual arts<br>Design<br>Dance<br>Drama (Arts)<br>Music<br>Art movements<br>Regional art<br>Media arts<br>Audiences |
| Related Concepts | Commercial art<br>Arts industry |
| Last Modified | 20 February 2014 [AEST: 12:58 PM] |

view more

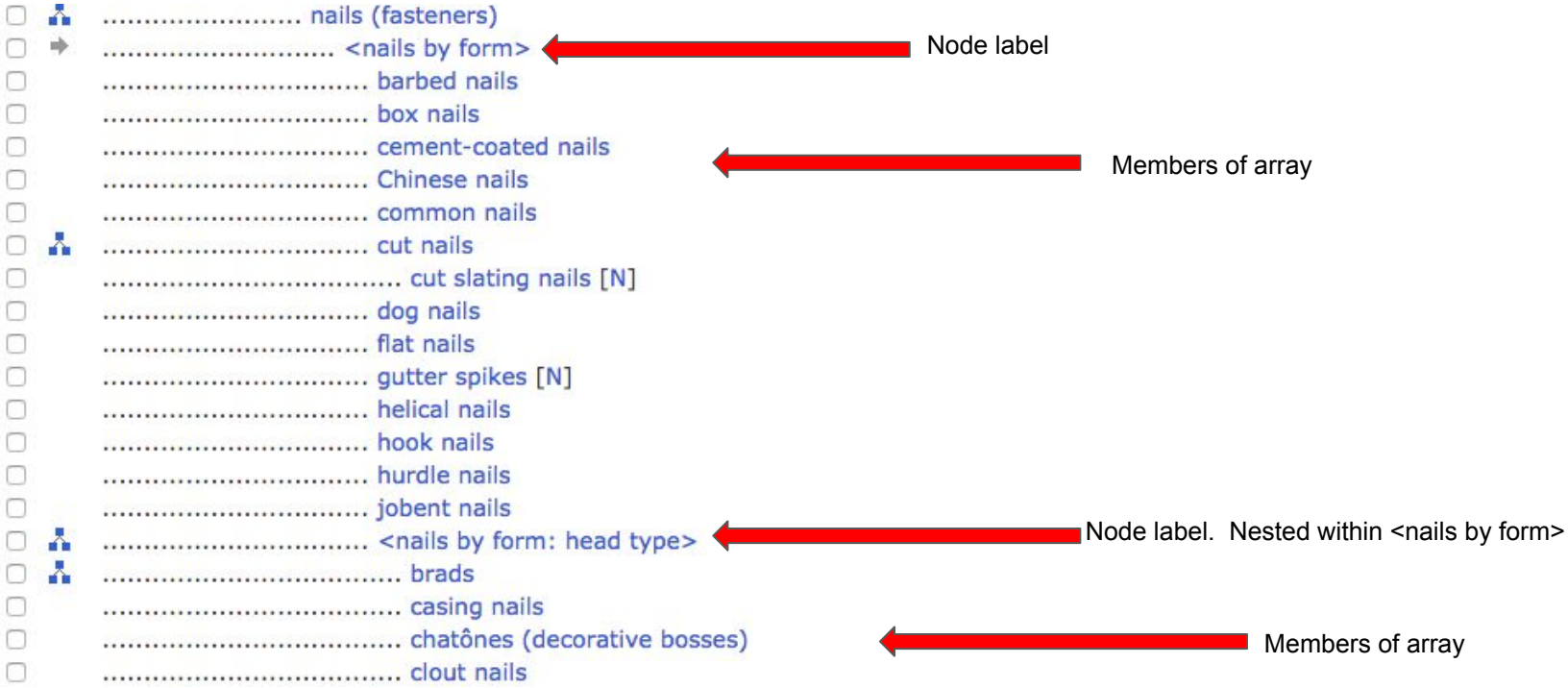
Formats: RDF/XML

SKOS Concepts

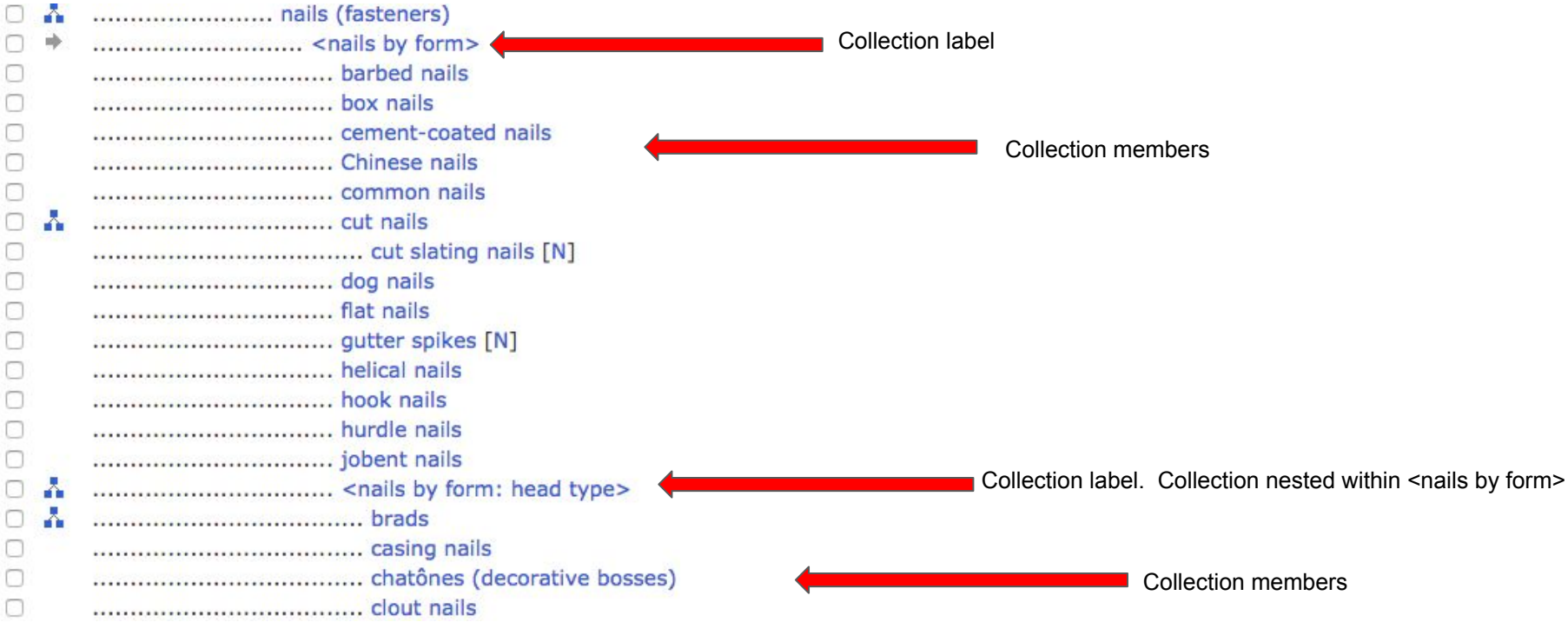
- have labels (such as preferred and alternative)
- may be related to each other (broader, narrower, related)
- may be documented (such as scope notes, definitions, examples)
- are organised into concept schemes
- may be mapped across concept schemes
- are identified using URIs
- may be grouped into collections

# SKOS Collections

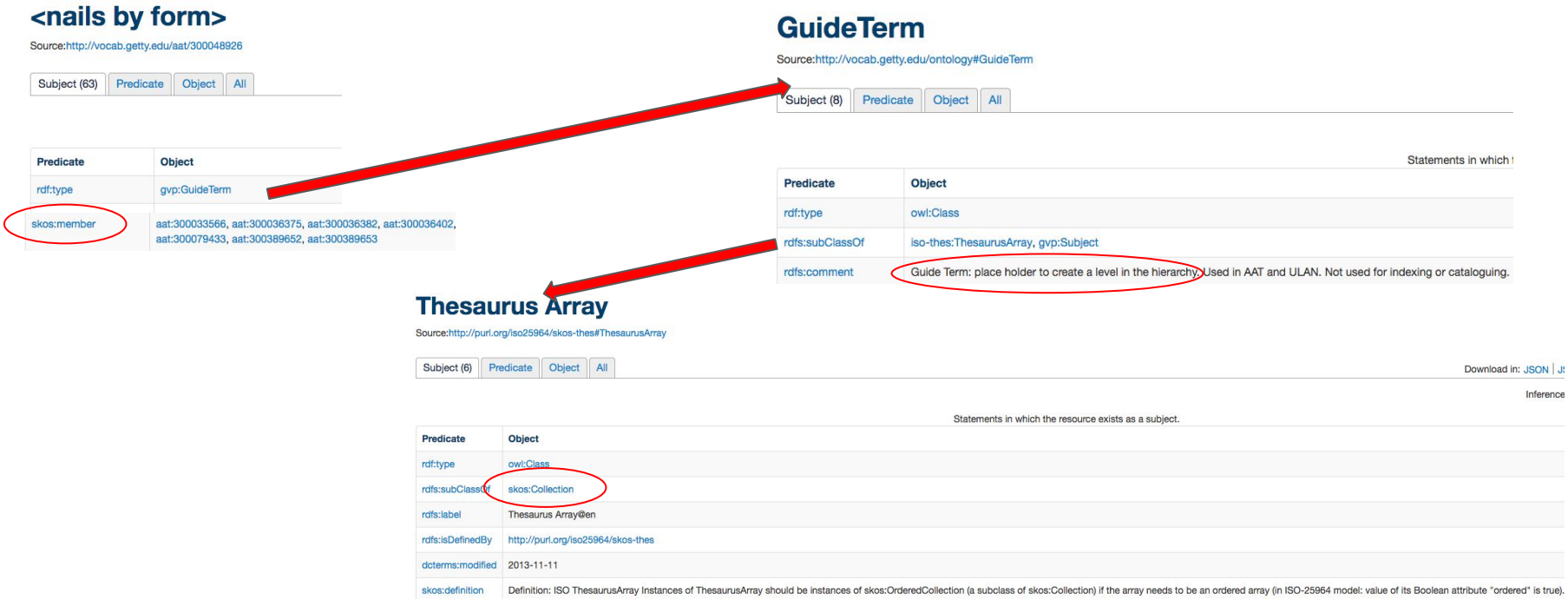
# SKOS Collections (thesaurus nodes and arrays)



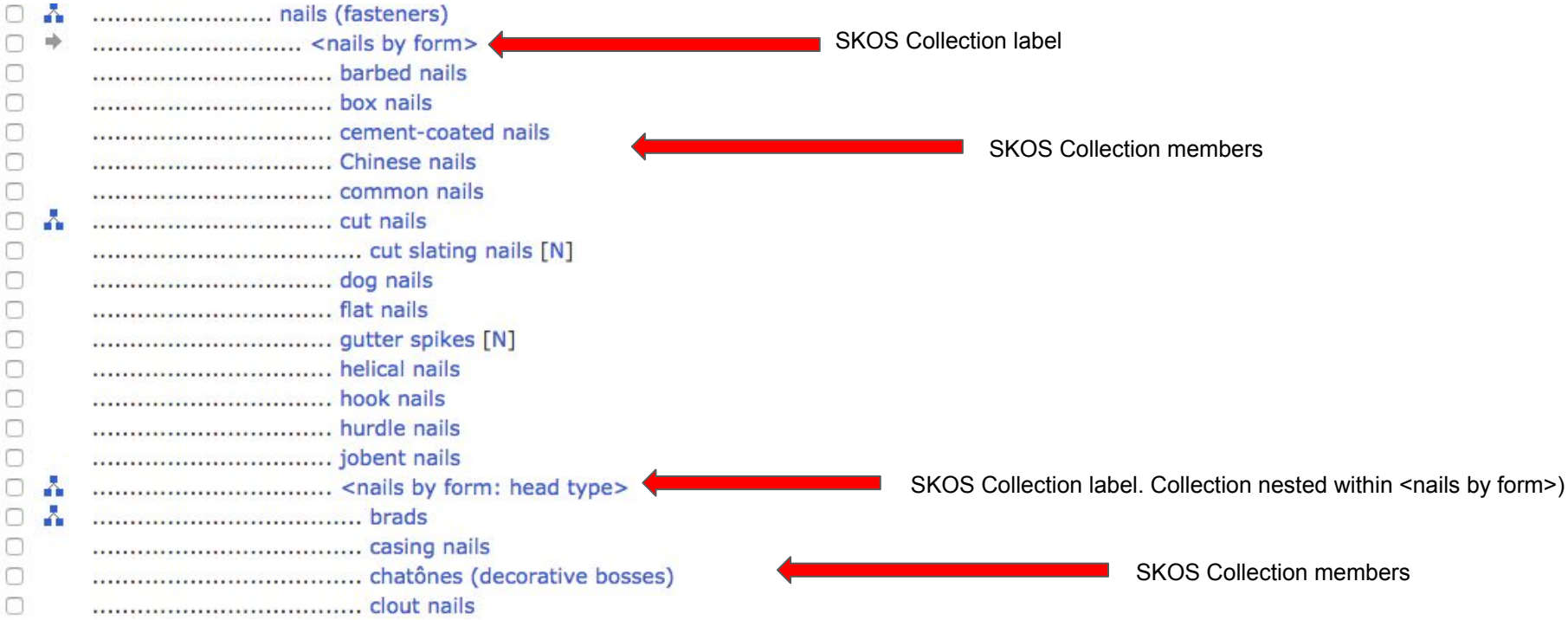
# SKOS Collections (thesaurus nodes and arrays)



# Nodes & arrays as SKOS Collection & members



# Nodes & arrays as SKOS Collections and members

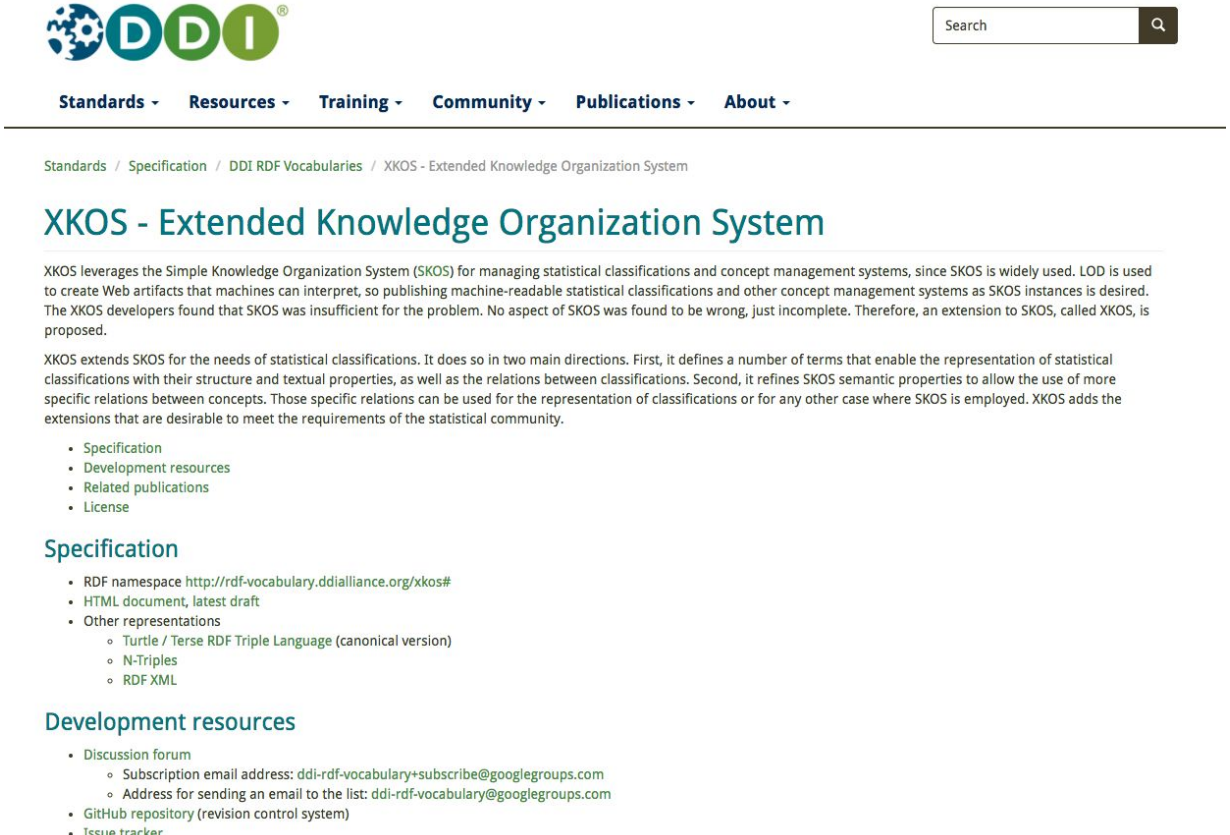


# Combining SKOS with other vocabularies

```
<rdf:Description rdf:about="http://vocabulary.curriculum.edu.au/scot/15977">
    <dcterms:created rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2013-09-24T04:54:18Z</dcterms:created>
    <dcterms:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Education Services Australia Ltd</dcterms:creator>
    <dcterms:hasVersion rdf:datatype="http://www.w3.org/2001/XMLSchema#int">0</dcterms:hasVersion>
    <rdf:type rdf:resource="http://www.w3.org/2004/02/skos/core#Concept"/>
    <skos:broader rdf:resource="http://vocabulary.curriculum.edu.au/scot/435"/>
    <skos:inScheme rdf:resource="http://vocabulary.curriculum.edu.au/scot/6f1bbd29-fccf-4b0a-91d5-9089f768e88c"/>
    <skos:notation rdf:datatype="http://www.w3.org/2001/XMLSchema#string">224111A</skos:notation>
    <skos:prefLabel xml:lang="en">Actuaries</skos:prefLabel>
</rdf:Description>
```

Schools Online Thesaurus. http://scot.curriculum.edu.au

# Extending SKOS (eg. XKOS)



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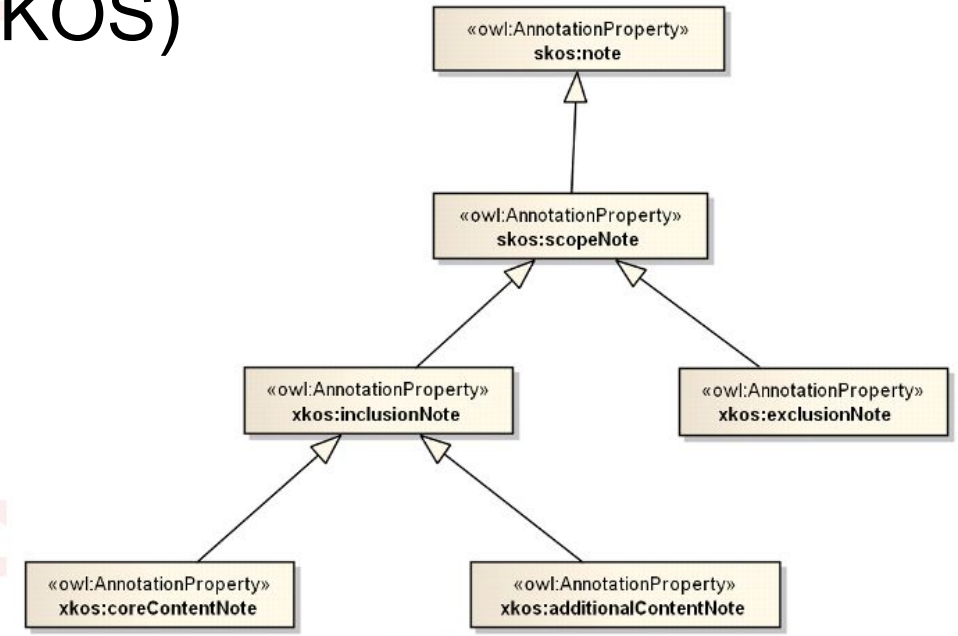


*Figure 5 – XKOS annotations*

### 4.7 On Specializing the SKOS Model

SKOS is intended to serve as a common denominator between different modeling approaches. As such, the current vocabulary specification will allow many existing KOSs to be ported to the Semantic Web. However, the great variety of KOS models makes it impossible to capture every detail of these models while still retaining the first "S" ("simple") in "SKOS".

Applications that require finer granularity will greatly benefit from SKOS's being a Semantic Web vocabulary. SKOS can indeed be seamlessly *extended* to suit the specific needs of a particular KOS community while retaining compatibility with applications that are based on the core SKOS features.



This can mostly be done by *specializing* existing SKOS constructs into more-specific ones. Users can create their own properties and classes and attach them to the standard SKOS vocabulary elements by using the `rdfs:subPropertyOf` and `rdfs:subClassOf` properties from the RDF Schema vocabulary [*RDF-PRIMER*].

# SKOS-XL

- SKOS Core
  - A Concept is a Resource
  - A Label
    - is a property of a Concept
    - cannot be related to other labels
- SKOS-XL
  - A Label is a Resource
  - Supports relationships between labels
    - skosxl:labelRelation
  - Users may define relationships which specialise skosxl:labelRelation
    - ex:isAcronymOf (e.g. FAO isAcronymOf Food and Agriculture Organisation)

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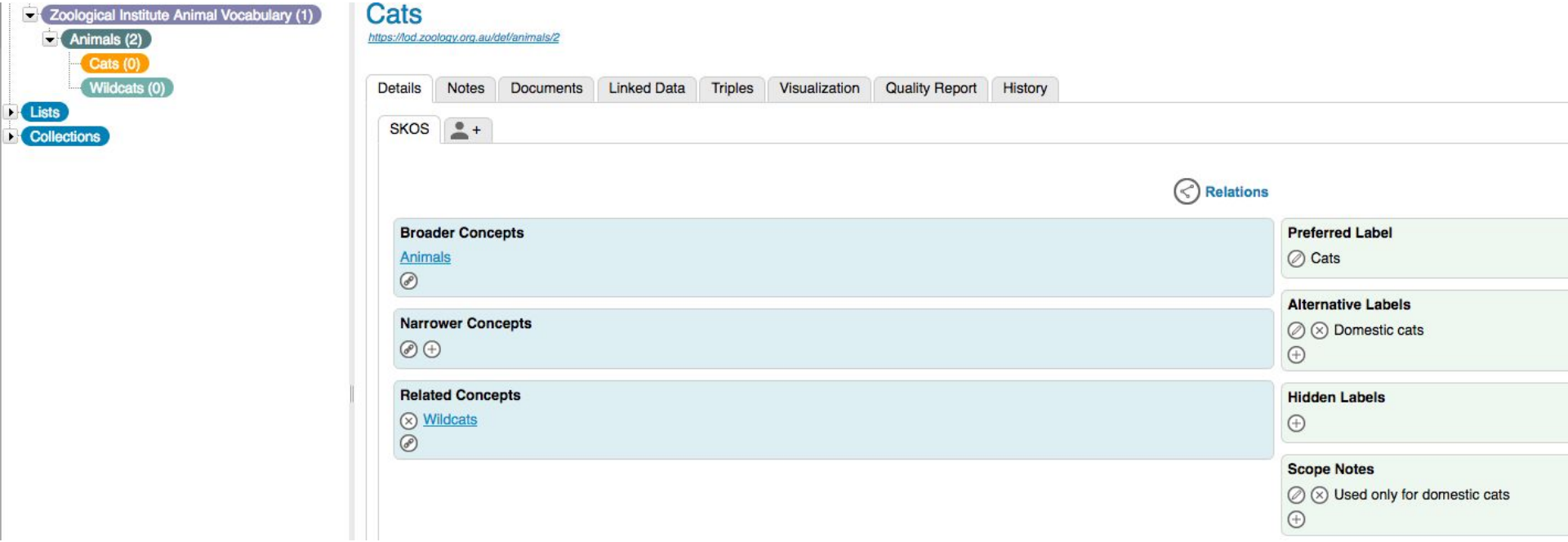
# Research Vocabularies Australia (RVA)

- ANDS provides software and support for
  - Creating and editing
    - Edit existing vocabularies or create new
  - Publishing
    - Description, access, licensing, versioning
  - Discovery
    - Metadata harvested by google
  - Integration
    - Application programming interface and widget

# Using a GUI to edit SKOS



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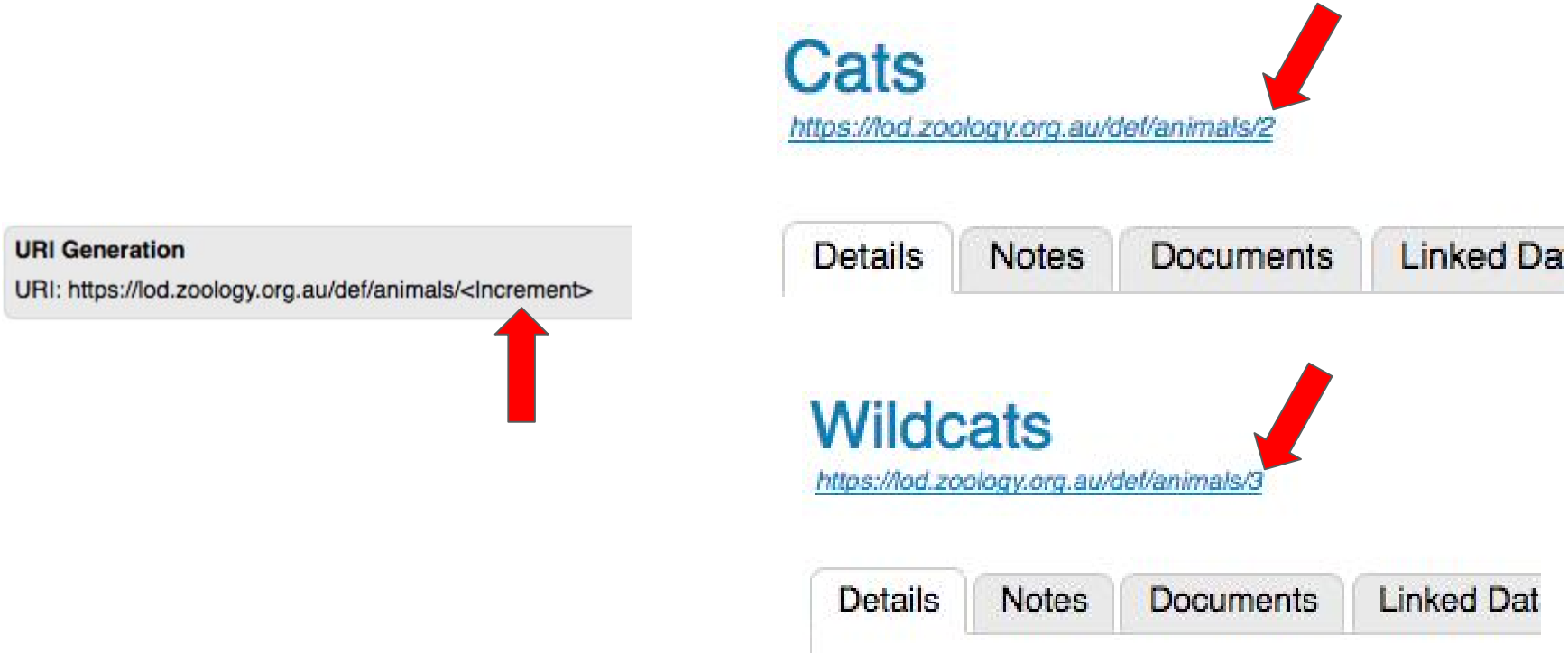

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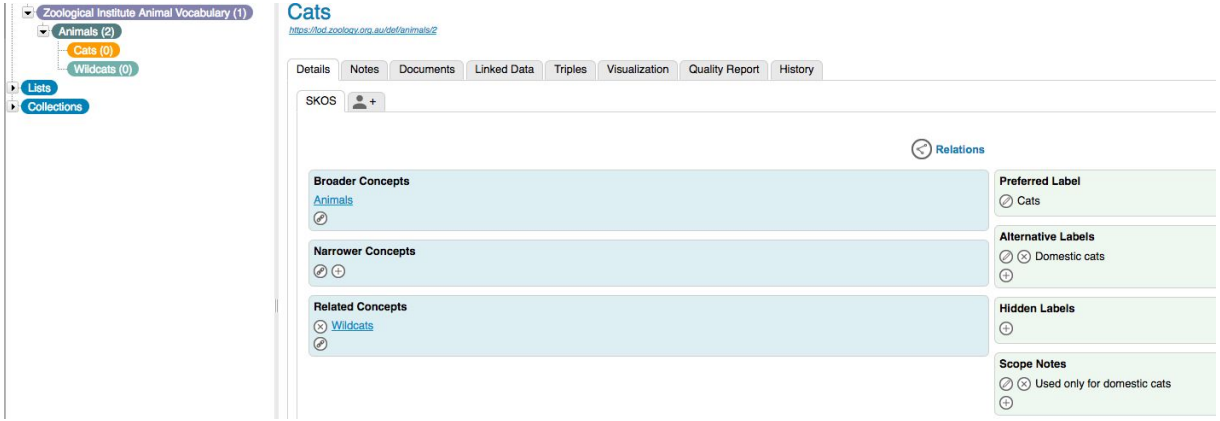


```
<rdf:Description rdf:about="https://lod.zoology.org.au/def/animals/2">
    <dcterms:created rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2016-11-30T04:32:48Z</dcterms:created>
    <dcterms:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">J.Smith</dcterms:creator>
    <rdf:type rdf:resource="http://www.w3.org/2004/02/skos/core#Concept"/>
    <skos:broader rdf:resource="https://lod.zoology.org.au/def/animals/1"/>
    <skos:prefLabel xml:lang="en">Cats</skos:prefLabel>
    <dcterms:contributor rdf:datatype="http://www.w3.org/2001/XMLSchema#string">J.Smith</dcterms:contributor>
    <skos:related rdf:resource="https://lod.zoology.org.au/def/animals/3"/>
    <skos:scopeNote xml:lang="en">Used only for domestic cats</skos:scopeNote>
    <skos:altLabel xml:lang="en">Domestic cats</skos:altLabel>
    <dcterms:modified rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2016-11-30T04:34:23Z</dcterms:modified>
</rdf:Description>
```

# Some examples of software for editing SKOS

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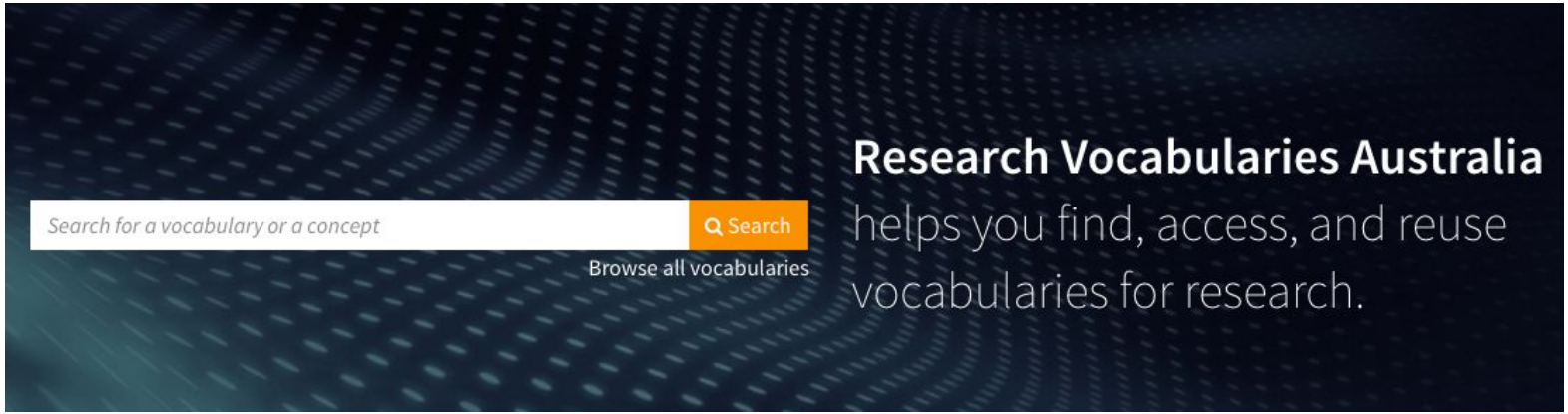
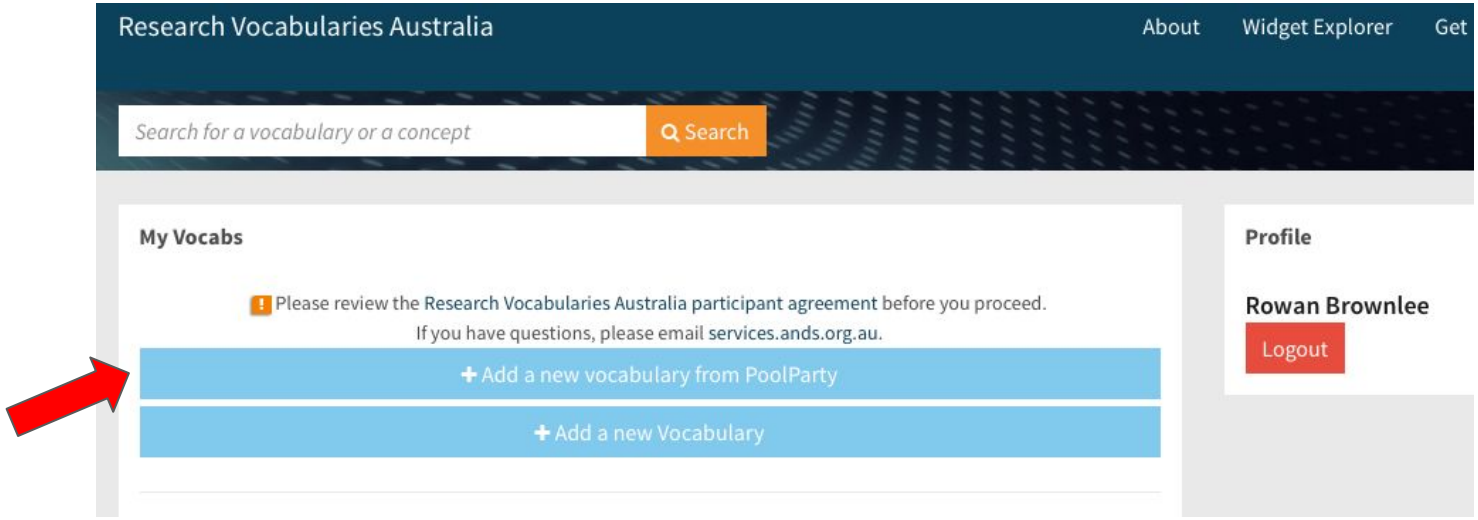
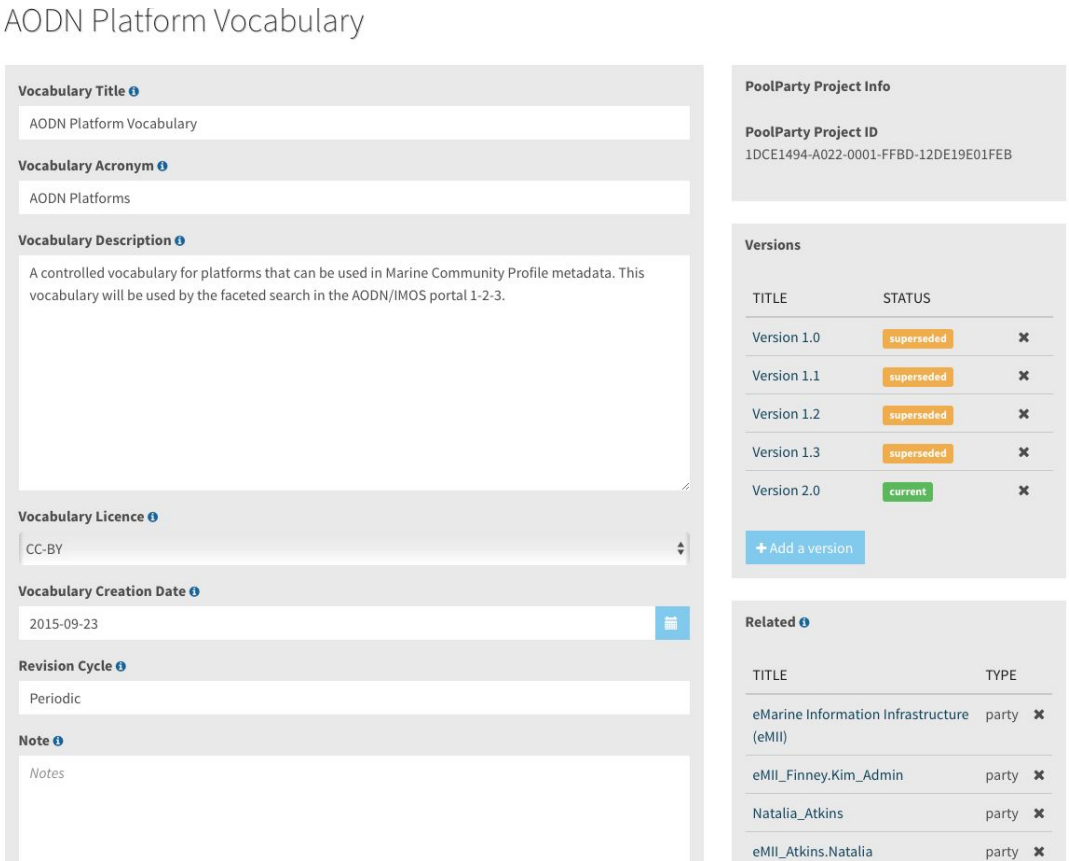
# Publishing


Search for a vocabulary or a concept
Search
Browse all vocabularies
Research Vocabularies Australia
helps you find, access, and reuse
vocabularies for research.

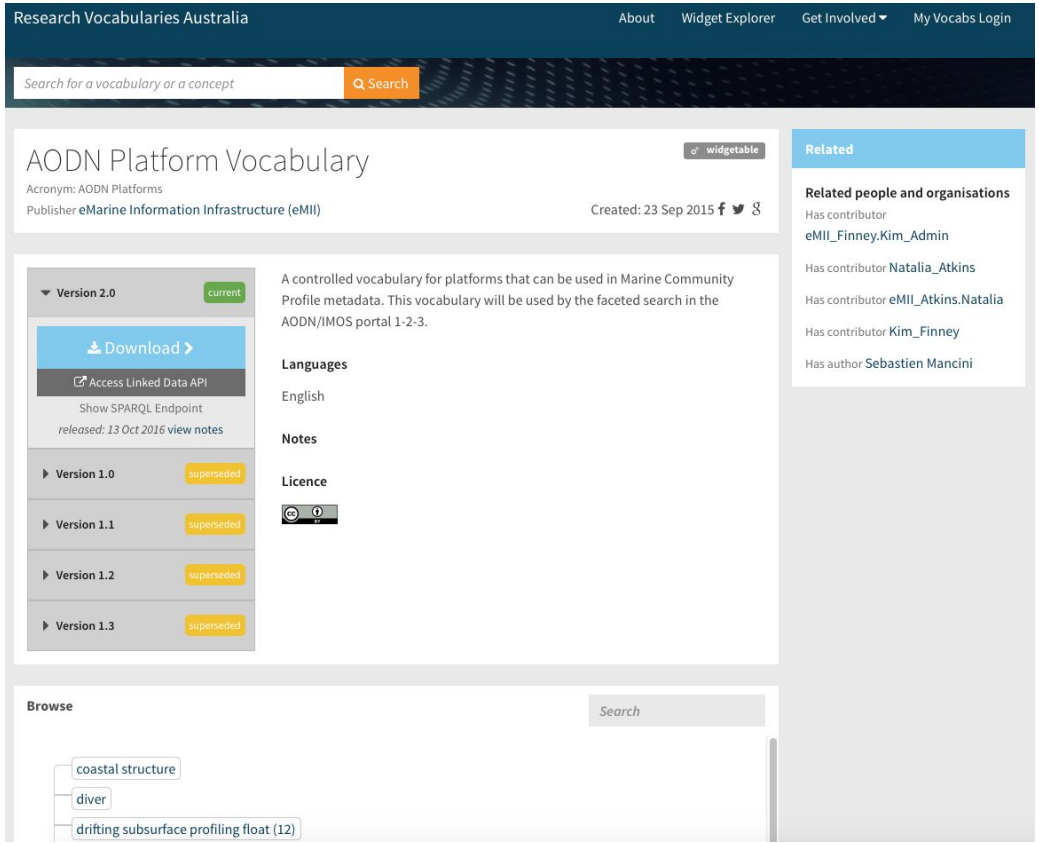
# Publishing


Research Vocabularies Australia
About
Widget Explorer
Get
Search for a vocabulary or a concept
Search
My Vocabs
Please review the Research Vocabularies Australia participant agreement before you proceed.
If you have questions, please email services.ands.org.au.
+ Add a new vocabulary from PoolParty
+ Add a new Vocabulary
Profile
Rowan Brownlee
Logout

# Publishing


AODN Platform Vocabulary
Vocabulary Title
AODN Platform Vocabulary
Vocabulary Acronym
AODN Platforms
Vocabulary Description
A controlled vocabulary for platforms that can be used in Marine Community Profile metadata. This vocabulary will be used by the faceted search in the AODN/IMOS portal 1-2-3.
Vocabulary Licence
CC-BY
Vocabulary Creation Date
2015-09-23
Revision Cycle
Periodic
Note
Notes
PoolParty Project Info
PoolParty Project ID
1DCE1494-A022-0001-FFBD-12DE19E01FEB
Versions
TITLE
STATUS
Version 1.0
superseded
Version 1.1
superseded
Version 1.2
superseded
Version 1.3
superseded
Version 2.0
current
+ Add a version
Related
TITLE
TYPE
eMarine Information Infrastructure (eMII)
party
eMII_Finney.Kim_Admin
party
Natalia_Atkins
party
eMII_Atkins.Natalia
party

# Publishing

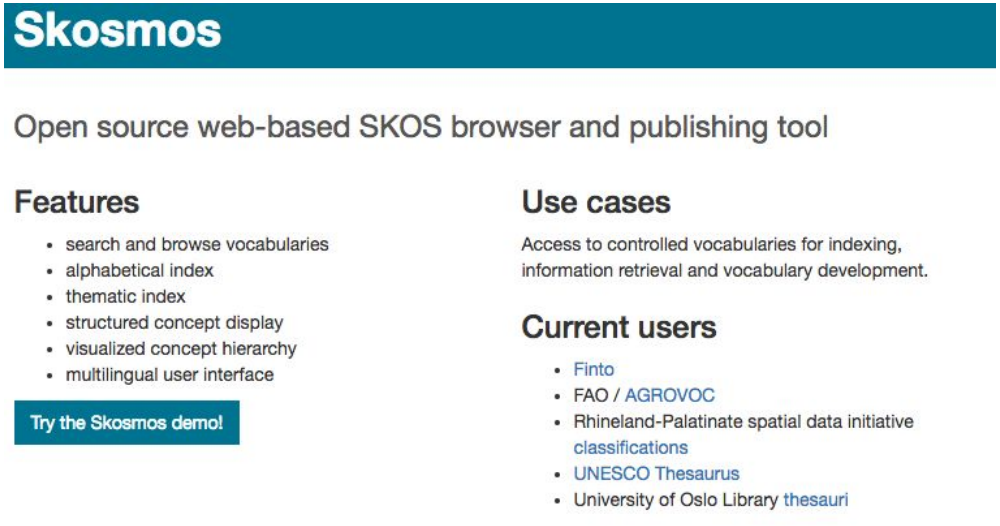

Research Vocabularies Australia
About
Widget Explorer
Get Involved
My Vocabs Login
Search for a vocabulary or a concept
Search
AODN Platform Vocabulary
widgetable
Acronym: AODN Platforms
Publisher eMarine Information Infrastructure (eMII)
Created: 23 Sep 2015
Related
Related people and organisations
Has contributor
eMII_Finney.Kim_Admin
Has contributor Natalia_Atkins
Has contributor eMII_Atkins.Natalia
Has contributor Kim_Finney
Has author Sebastien Mancini
Version 2.0
current
Download
Access Linked Data API
Show SPARQL Endpoint
released: 13 Oct 2016 view notes
Version 1.0
superseded
Version 1.1
superseded
Version 1.2
superseded
Version 1.3
superseded
A controlled vocabulary for platforms that can be used in Marine Community Profile metadata. This vocabulary will be used by the faceted search in the AODN/IMOS portal 1-2-3.
Languages
English
Notes
Licence
Browse
Search
coastal structure
diver
drifting subsurface profiling float (12)

# RVA Repository & endpoints

- OpenRDF Sesame
  - RDF repository & SPARQL 1.1 query endpoints
- SISSVoc
  - Linked data API

| Endpoint template | Type | Query |
|---|---|---|
| `/collection` | List | List of all Collections and OrderedCollections |
| `/concept` | List | List of all Concepts |
| `/concept/broader?anylabel={text}` | List | List of all Concepts broader than the one where a label matches the text |
| `/concept/broader?uri={baseConcept}` | List | List of all Concepts broader than the one identified by this IRI |
| `/concept/broaderTransitive?anylabel={text}` | List | List of all Concepts broaderTransitive than the one where a label matches the text |
| `/concept/broaderTransitive?uri={baseConcept}` | List | List of all Concepts broaderTransitive than the one identified by this IRI |
| `/concept/narrower?anylabel={text}` | List | List of all Concepts narrower than the one where a label matches the text |
| `/concept/narrower?uri={baseConcept}` | List | List of all Concepts narrower than the one identified by this IRI |
| `/concept/narrowerTransitive?anylabel={text}` | List | List of all Concepts narrowerTransitive than the one where a label matches the text |
| `/concept/narrowerTransitive?uri={baseConcept}` | List | List of all Concepts narrowerTransitive than the one identified by this IRI |
| `/concept/topConcepts` | List | List of all topConcepts |
| `/concept/topConcepts?scheme={schemeIRI}` | List | List of all topConcepts that belong to the given ConceptScheme |
| `/concept?anylabel={text}` | List | List of all Concepts where a label matches the text |
| `/concept?labelcontains={text}` | List | List of all Concepts where a label contains the text, any language, case-insensitive |
| `/conceptscheme` | List | List of all ConceptSchemes |
| `/resource?uri={IRI}` | Item | Describe the given resource |

# Skosmos




finto

1640
THE NATIONAL LIBRARY OF FINLAND

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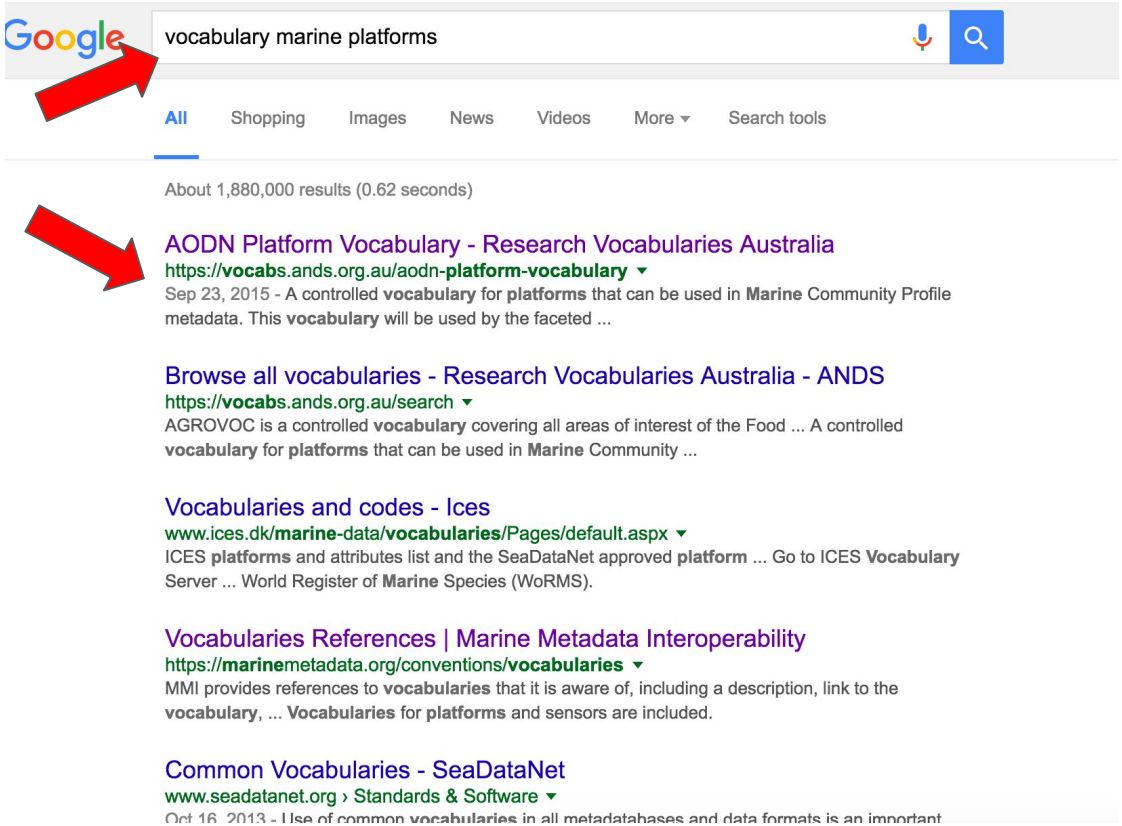
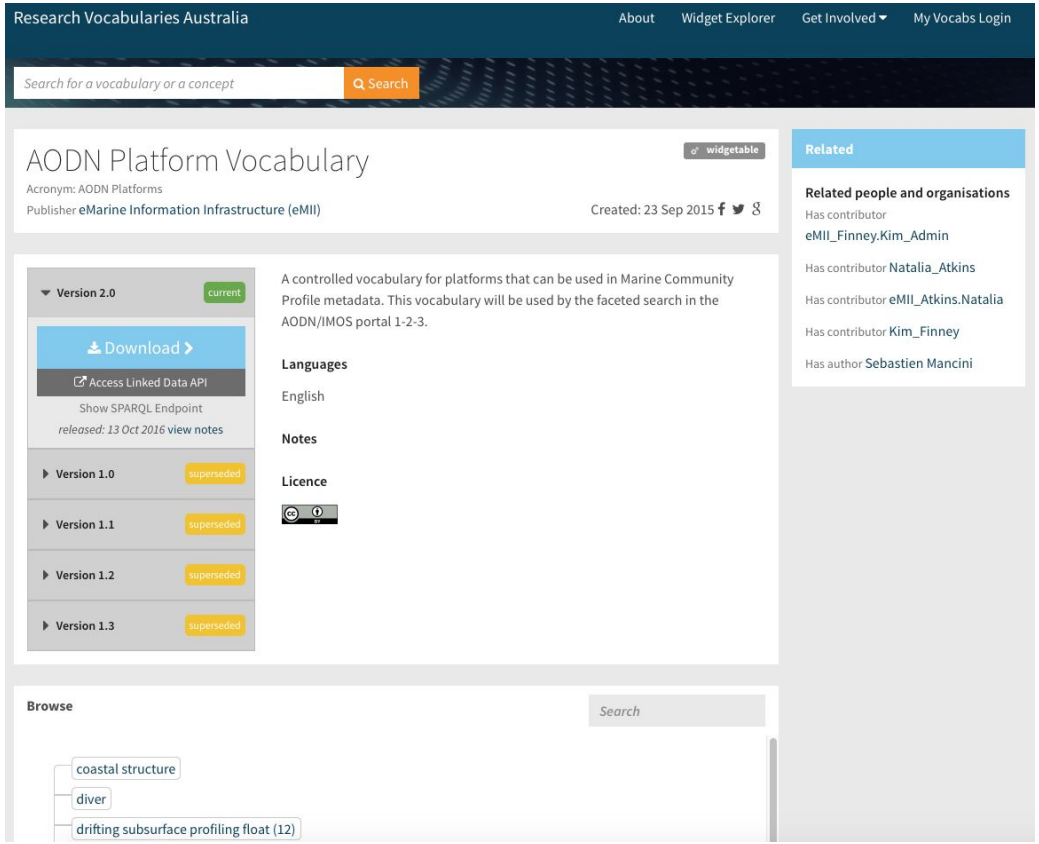
    - Application programming interface and widget

# Discovery


Google
vocabulary marine platforms
All
Shopping
Images
News
Videos
More
Search tools
About 1,880,000 results (0.62 seconds)
AODN Platform Vocabulary - Research Vocabularies Australia
https://vocabs.ands.org.au/aodn-platform-vocabulary
Sep 23, 2015 - A controlled vocabulary for platforms that can be used in Marine Community Profile metadata. This vocabulary will be used by the faceted ...
Browse all vocabularies - Research Vocabularies Australia - ANDS
https://vocabs.ands.org.au/search
AGROVOC is a controlled vocabulary covering all areas of interest of the Food ... A controlled vocabulary for platforms that can be used in Marine Community ...
Vocabularies and codes - Ices
www.ices.dk/marine-data/vocabularies/Pages/default.aspx
ICES platforms and attributes list and the SeaDataNet approved platform ... Go to ICES Vocabulary Server ... World Register of Marine Species (WoRMS).
Vocabularies References | Marine Metadata Interoperability
https://marinemetadata.org/conventions/vocabularies
MMI provides references to vocabularies that it is aware of, including a description, link to the vocabulary, ... Vocabularies for platforms and sensors are included.
Common Vocabularies - SeaDataNet
www.seadatanet.org › Standards & Software
Oct 16, 2013 - Use of common vocabularies in all metadatabases and data formats is an important

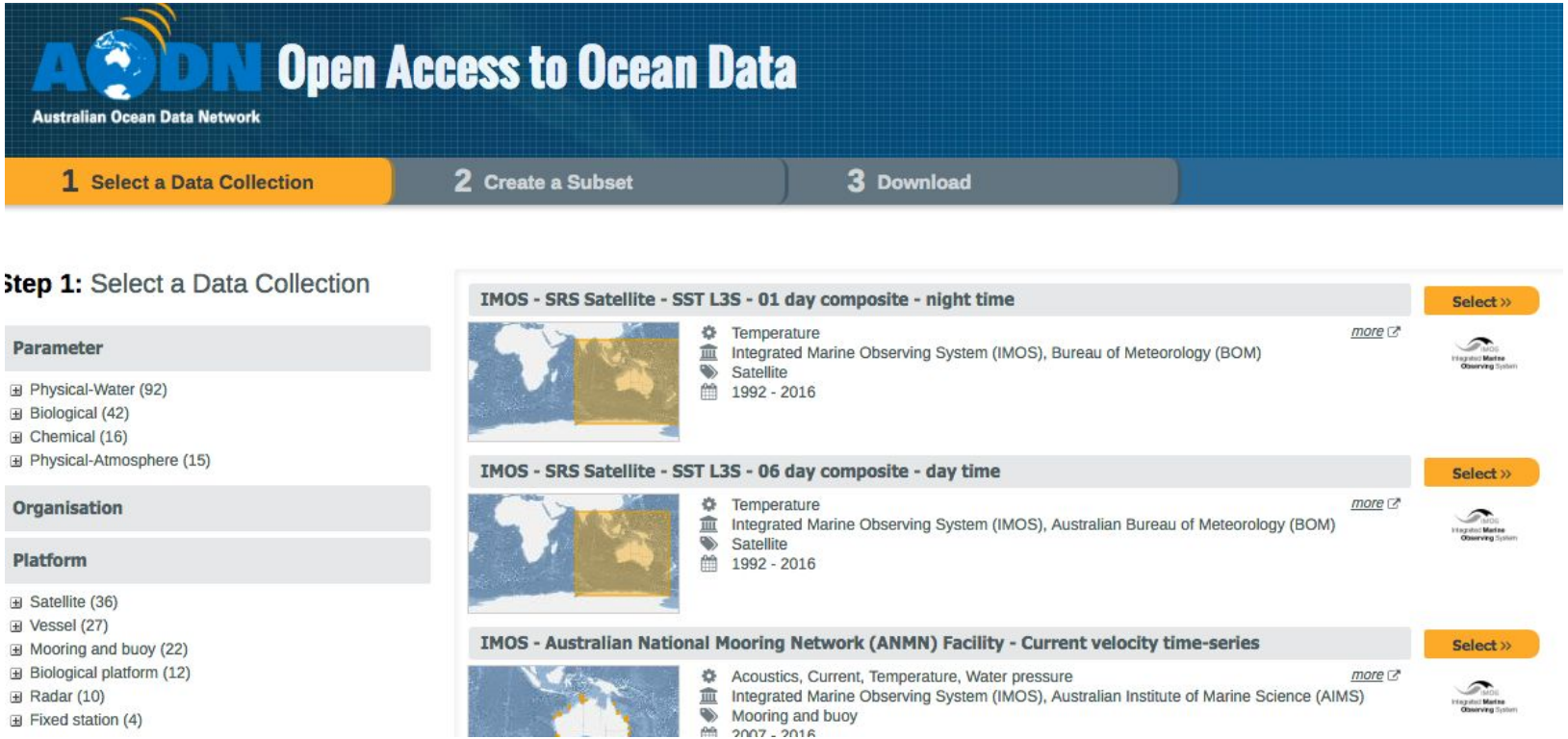
# Discovery


Research Vocabularies Australia
About
Widget Explorer
Get Involved
My Vocabs Login
Search for a vocabulary or a concept
Search
AODN Platform Vocabulary
widgetable
Acronym: AODN Platforms
Publisher eMarine Information Infrastructure (eMII)
Created: 23 Sep 2015
Version 2.0
current
Download
Access Linked Data API
Show SPARQL Endpoint
released: 13 Oct 2016 view notes
Version 1.0
superseded
Version 1.1
superseded
Version 1.2
superseded
Version 1.3
superseded
A controlled vocabulary for platforms that can be used in Marine Community Profile metadata. This vocabulary will be used by the faceted search in the AODN/IMOS portal 1-2-3.
Languages
English
Notes
Licence
Related
Related people and organisations
Has contributor
eMII_Finney.Kim_Admin
Has contributor Natalia_Atkins
Has contributor eMII_Atkins.Natalia
Has contributor Kim_Finney
Has author Sebastien Mancini
Browse
Search
coastal structure
diver
drifting subsurface profiling float (12)

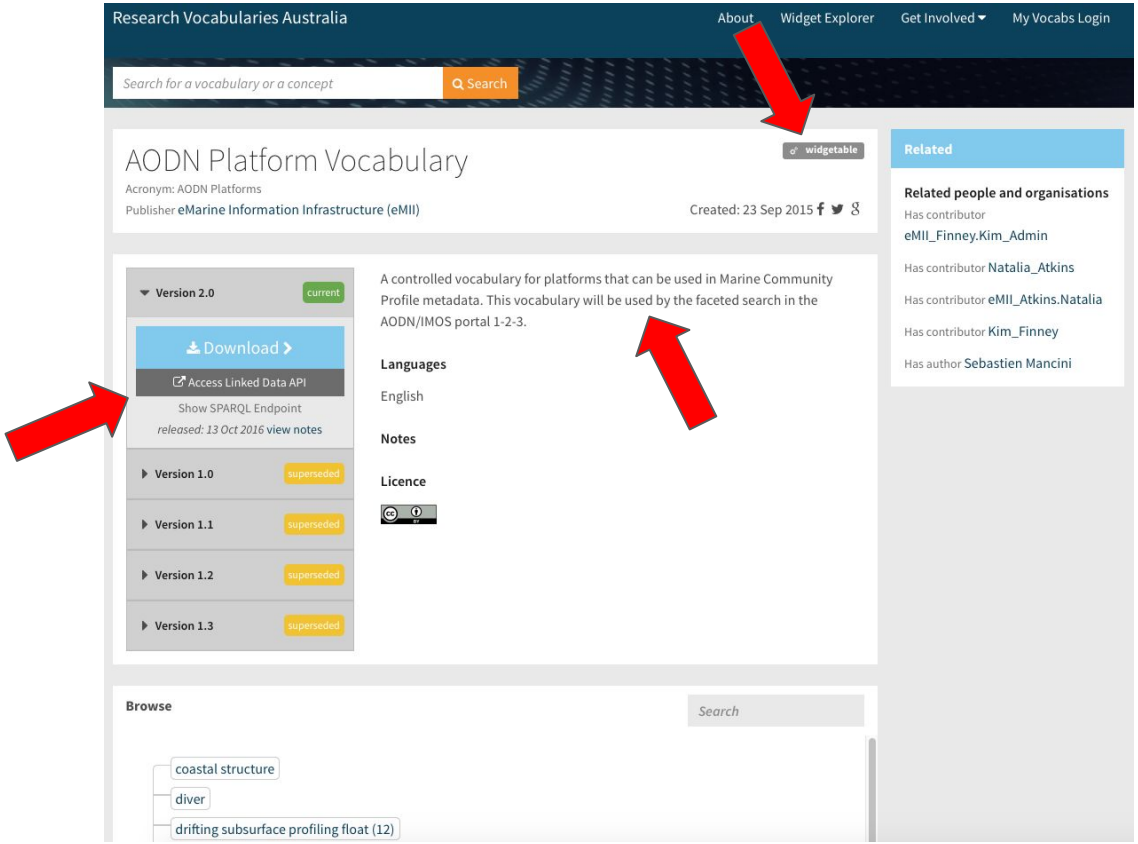
# Research Vocabularies Australia (RVA)

- ANDS provides software and support for
  - Creating and editing
    - Edit existing vocabularies or create new
  - Publishing
    - Description, access, licensing, versioning
  - Discovery
    - Metadata harvested by google
  - Integration
    - Application programming interface and widget

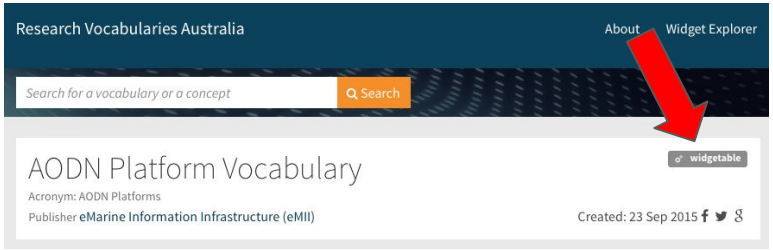
# Integration



# Integration



# Integration




## What is this widget?

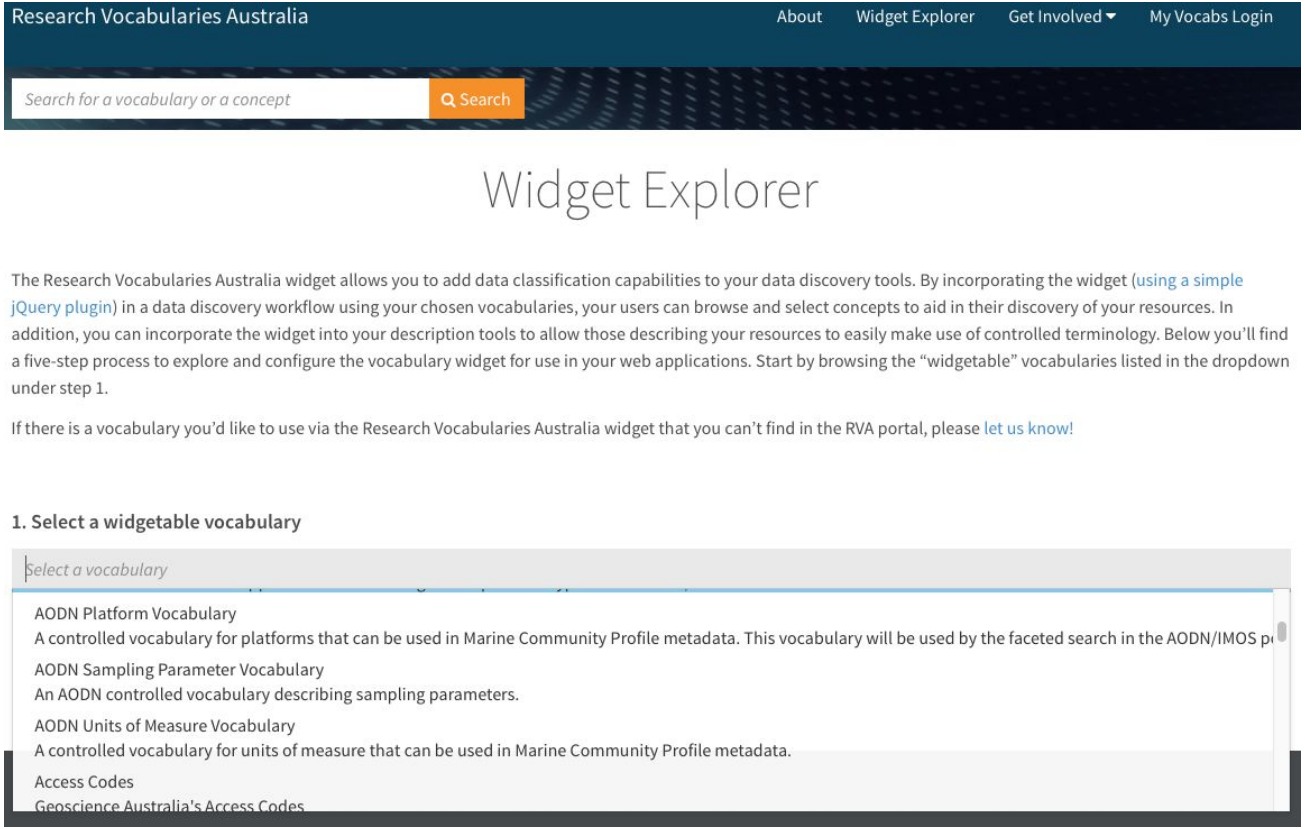
The ANDS Vocabulary Widget allows you to **instantly add Data Classification capabilities** to your data capture tools through the ANDS Vocabulary Service.

The widget has been written in the style of a jQuery plugin, allowing complete control over styling and functionality with just a few lines of javascript. The widget also ships with some UI helper modes for:

- Searching for vocabulary terms
- Creates a **navigable "autocomplete" widget**, with users able to search for the appropriate controlled vocabulary classification when inputting data.
- Narrowing on a (hierarchical) vocabulary item
- **Populates a select list (or autocomplete textbox)** with items comprising a base vocabulary classification URI.
- Browsing a (hierarchical) vocabulary set as a tree
- Creates a **tiered term tree** (such as that used in the RDA "Browse" screen)

It is also possible to use the widget in a more programmatic manner; refer to the 'core usage' section below for more details.

# Integration



# RVA service components. Pick & mix

| | Edit using PoolParty | Publish to portal (available for reuse) | Describe in portal (without publishing) |
|---|---|---|---|
| 1 | | | ✓ |
| 2 | ✓ | ✓ | |
| 3 | | ✓ | |
| 4 | ✓ | | |
| | | | |

# How to access RVA services

- RVA portal
  - Anyone may search, browse and access the vocabularies described in the RVA portal
  - Anyone may self-register to describe or upload a vocabulary.
- RVA software interfaces
  - Anyone may use the linked data API, SPARQL endpoint and widget
- PoolParty editor
  - Commercial software licensed for use by Australian research organisations including
    - universities
    - research institutes
    - collecting organisations (such as libraries, archives, galleries, museums)
    - government agencies

# Research Vocabularies Australia (RVA)

- ANDS provides software and support for
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  - Publishing
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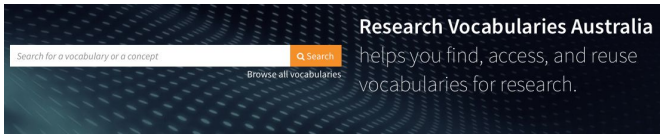
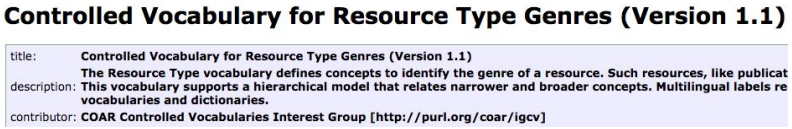
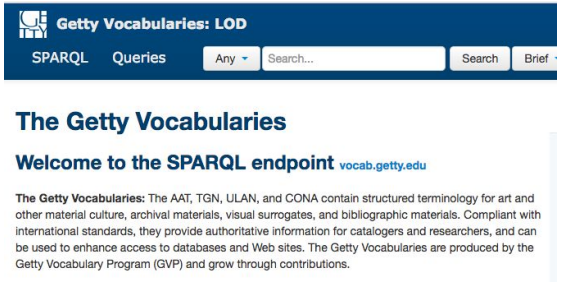
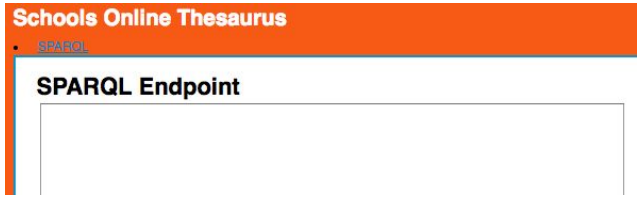
  - Discovery
    - Metadata harvested by google
  - Integration
    - Application programming interface and widget

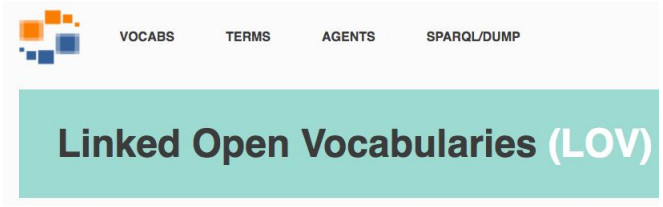
# Registry interoperability

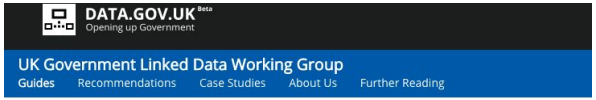


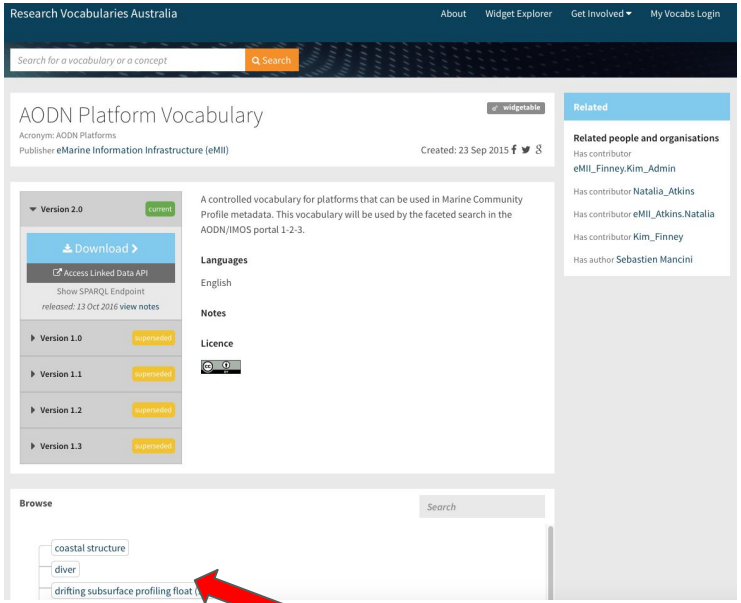




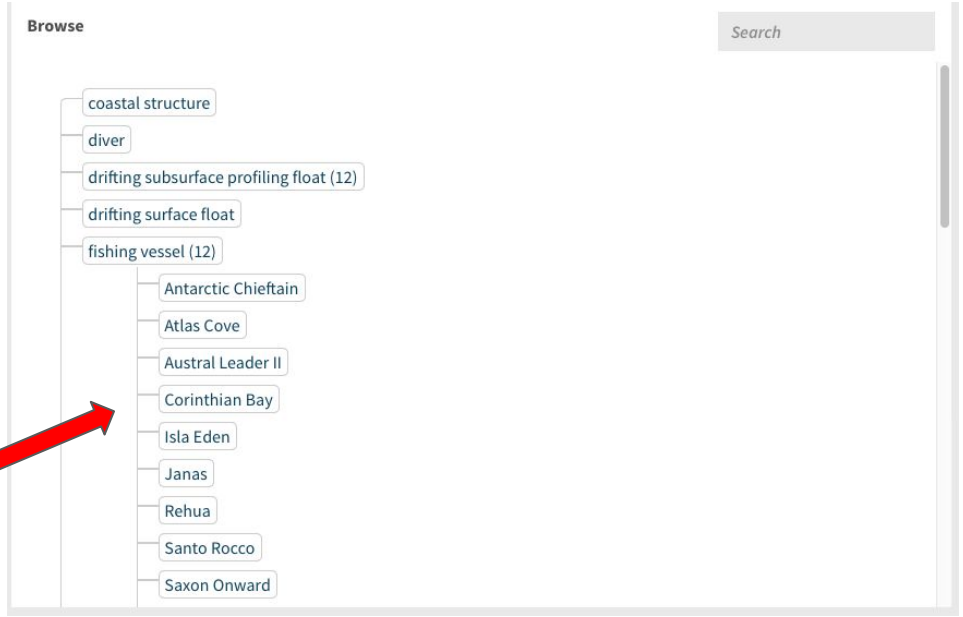




Linked Data Registry

# Registry interoperability

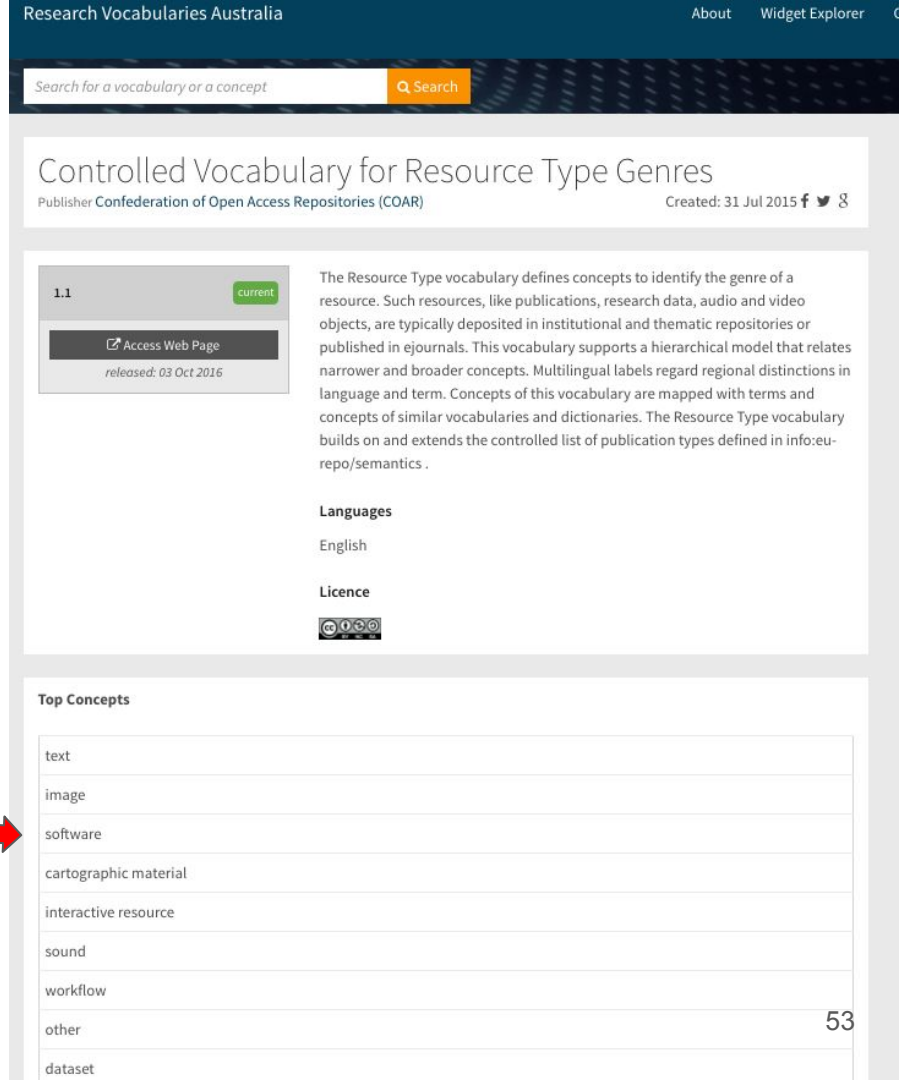



Browse hosted vocabularies

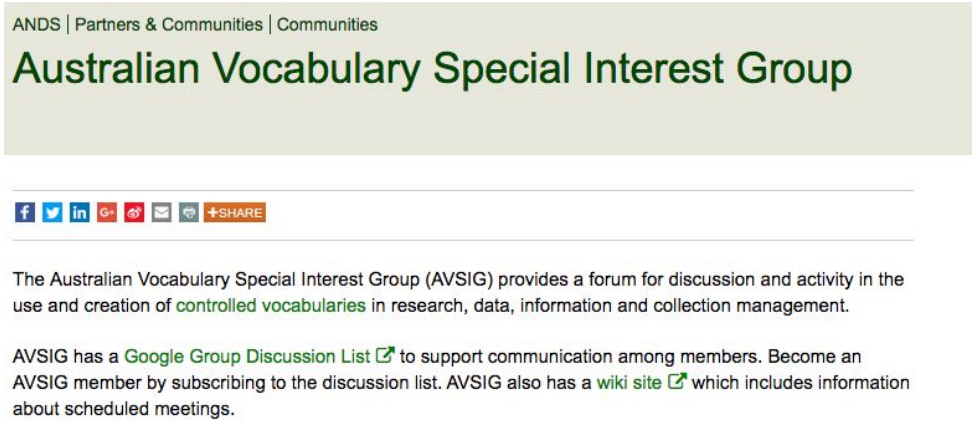


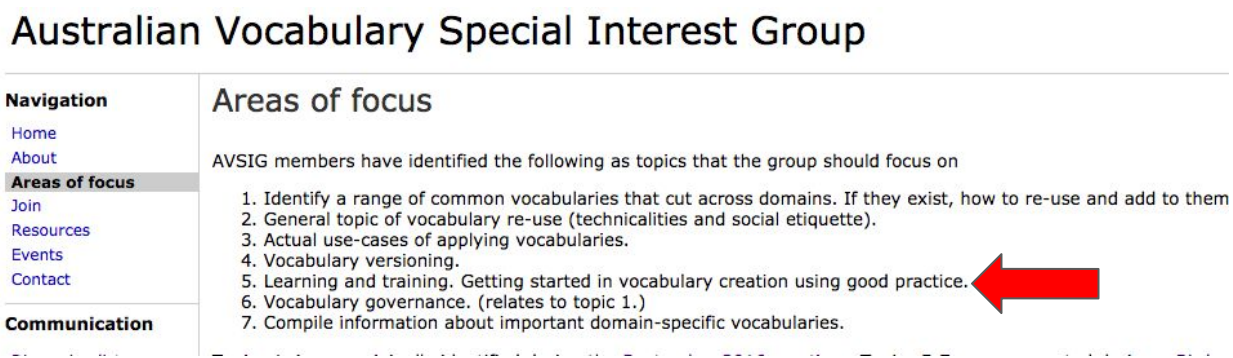
# Registry interoperability

This vocabulary is described but not hosted
Top concepts recorded as flat text



# Australian Vocabulary Special Interest Group



# Links

- Key Choices in the Design of Simple Knowledge Organization System (SKOS)
  - https://arxiv.org/abs/1302.1224
- SKOS Primer
  - https://www.w3.org/TR/skos-primer/
- ANDS Research Vocabularies Australia (RVA)
  - https://vocabs.ands.org.au/
  - https://documentation.ands.org.au/display/DOC/Research+Vocabularies
- SISSVoc: A Linked Data API for access to SKOS vocabularies
  - http://www.semantic-web-journal.net/system/files/swj880.pdf
- Publishing SKOS Vocabularies with Skosmos
  - skosmos.org/publishing-skos-vocabularies-with-skosmos.pdf
- Reuse of library thesaurus data as ontologies for the public sector
  - http://library.ifla.org/819/1/086-lappalainen-en.pdf
- Australian Vocabulary Special Interest Group (AVSIG)
  - http://www.ands.org.au/partners-and-communities/ands-communities/avsig