

The GODAN website linked data layer

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1. Introduction

All the contents published in the GODAN website are available as Linked Data (see <https://www.w3.org/DesignIssues/LinkedData.html> for technical details on correctly exposing linked data).

All metadata and contents can be retrieved from a SPARQL endpoint (<http://godan.info/sparql>). A SPARQL endpoint is a REST API that takes a SPARQL query as one of the parameters and returns triples in the format specified in another parameter.

In order to execute meaningful queries on the SPARQL endpoint, users need to know the RDF model used in the triple store. The RDF model is described below in chapter 2.1; the URI pattern in chapter 2.2. Sample queries are provided in chapter 2.2.

Technical details on the implementation of the triple store are provided in chapter 2.4.

2. The GODAN website RDF data model

Model

The GODAN website data model follows widely adopted standards for web contents and more generically “information resources”.

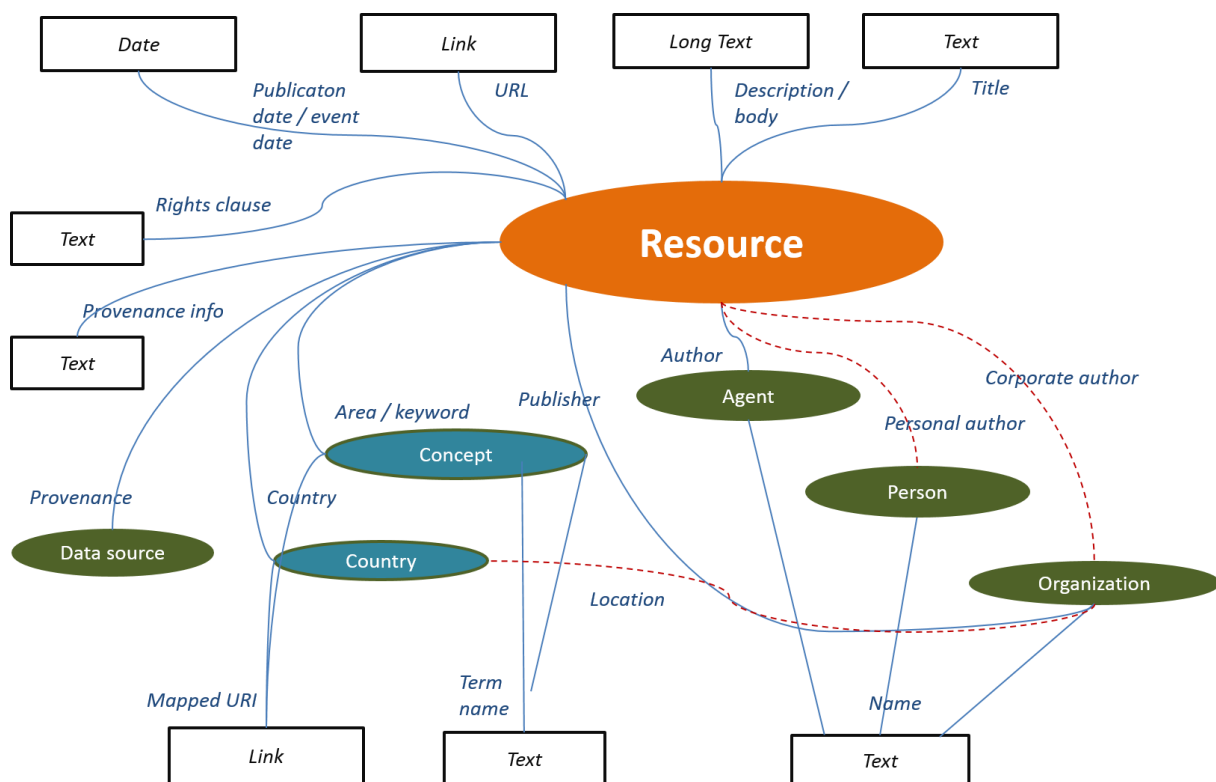
The model is designed on top of the following existing vocabularies:

- [Dublin Core](#) for properties common to most resources
- The [FOAF vocabulary](#) for properties of entities like persons and organizations
- The [Schema.org](#) vocabulary for properties of all relevant entities (creative works, persons, organizations, events, places)
 - The [Bibliographic Ontology](#) for more specialized properties for bibliographic resources
 - The [SKOS vocabulary](#) for all related concepts

Table 1. Namespaces used in the GODAN website RDF data model

PREFIX	NAMESPACE
dc	http://purl.org/dc/terms/
foaf	http://xmlns.com/foaf/0.1/
rdfs	http://www.w3.org/2000/01/rdf-schema#
skos	http://www.w3.org/2004/02/skos/core#
owl	http://www.w3.org/2002/07/owl#
rdf	http://www.w3.org/1999/02/22-rdf-syntax-ns#
bibo	http://purl.org/ontology/bibo/
schema	http://schema.org/

Fig. 1 Overview of the content model, without vocabulary-specific classes and properties



Details of all the RDF entities and related properties

The RDF model and the Drupal content model have been designed together so that they were aligned to each other. Each RDF entity corresponds to a Drupal entity and all the properties of an entity correspond to fields of the Drupal entity.

Entities:

- Content / Resource (with sub-types: Blog entry, Document, news item, Event...)
- Organization
- Event
- Country
- Generic concepts (GODAN areas, keywords, resource types...)

Below is a detailed mapping between entity types and RDF classes and between entity fields and RDF properties.

Entity: Resource

Sub-types:

Blog entry

RDF Types: sioc:Post, sioct:BlogPost, foaf:Document, schema:BlogPosting, dc:BibliographicResource

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Body	content:encoded, schema:text, dc:description	property	
GODAN area	dc:subject, schema:about	rel	
Keywords	dc:subject, schema:about	rel	
Type of resource	dc:type, schema:additionalType	rel	
Geographic scope	dc:spatial, schema:contentLocation	rel	
Media	schema:image	property	
Title	dc:title, schema:name	property	
created	dc:date, dc:created	property	xsd:dateTime
changed	dc:modified	property	xsd:dateTime
uid	sioc:has_creator	rel	

Dataset

RDF Types: foaf:Document, schema:Dataset, dcat:Dataset

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Body	schema:description, dc:description	property	
Author	dc:creator, schema:author	rel	
URL	schema:url, dcat:landingPage	property	
RING URL	owl:sameAs	rel	
Type of resource	dc:type	rel	
Title	dc:title, schema:name	property	
created	dc:date, dc:created	property	xsd:dateTime
Owner local ID	dc:publisher	rel	

Document

RDF Types: sioc:Item, foaf:Document, dc:BibliographicResource, schema:CreativeWork

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Abstract	content:encoded, dc:description, schema:description	property	
Author	dc:creator, schema:author	property	
Type of resource	dc:type, schema:additionalType	rel	
GODAN area	dc:subject, schema:about	rel	

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Keywords	dc:subject, schema:about	rel	
Geographic scope	dc:spatial, schema:contentLocations	rel	
Date	dc:dateIssued, schema:datePublished	property	xsd:date
URL	schema:url, foaf:homepage	property	
Attachment	schema:downloadUrl	property	
Image	schema:image	property	
Image / cover	schema:image	property	
Title	dc:title, schema:name	property	
created	dc:date, dc:created	property	xsd:dateTime

Event

RDF Types: foaf:Document, schema:Event

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Body	content:encoded, schema:description	property	
GODAN area	dc:subject, schema:about	rel	
Keywords	dc:subject, schema:about	rel	
Country	dc:spatial, schema:location	rel	

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Media	schema:image	property	
Event dates	dc:date, schema:startDate	property	xsd:date
Title	dc:title, schema:name	property	
created	dc:date, dc:created	property	xsd:dateTime

News item

RDF Types: sioc:Item, foaf:Document, schema:NewsArticle

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Image	schema:image	rel	
Tags	dc:subject	rel	
Body	content:encoded, dc:description, schema:articleBody	property	
GODAN area	dc:subject, schema:about	rel	
Geographic scope	dc:spatial, schema:contentLocation	rel	
Keywords	dc:subject, schema:about	rel	
Media	schema:image	property	
Title	dc:title, schema:name	property	
created	dc:date, dc:created	property	xsd:dateTime
changed	dc:modified	property	xsd:dateTime

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
uid	sioc:has_creator	rel	

Organization

RDF Types: sioc:Item, foaf:Document, foaf:Organization, schema:Organization

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Public profile	content:encoded, dc:description, schema:description	property	
Type of institution	dc:type, schema:additionalType	rel	
Country	dc:spatial, foaf:based_near, schema:location	rel	
Website	foaf:homepage, schema:url	property	
Logo	schema:logo	property	
Godan topics	dc:subject, schema:about	rel	
Name	dc:title, schema:name	Property	
RING URI	owl:sameAs	rel	
CRM record	rdfs:seeAlso	rel	

Person

RDF Types: foaf:Person, schema:Person

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Bio (Optional)	content:encoded, dc:description, schema:description	property	
Name	dc:title, foaf:name, schema:name	property	
CRM record	rdfs:seeAlso	rel	
Affiliation	Foaf:knows, schema:affiliation	property	xsd:dateTime

Presentation

RDF Types: sioc:Item, foaf:Document, dc:BibliographicResource, schema:CreativeWork

FIELDS	RDF PREDICATES	MAPPING TYPE	DATATYPE
Description	content:encoded, dc:description, schema:description	property	
Presentation	schema:url	property	
GODAN area	dc:subject, schema:about	rel	
Keywords	dc:subject, schema:about	rel	
Geographic scope	dc:spatial, schema:contentLocation	rel	
Author	dc:creator, schema:author	property	
Type of resource	dc:type, schema:additionalType	rel	
Title	dc:title, schema:name	property	
created	dc:date, dc:created	property	xsd:dateTime

Entity: Country

RDF classes: skos:Concept, schema:Place, dc:Location

Properties	RDF predicates	Predicate type
description	skos:definition	literal
FAO Geopolitical Ontology URI	owl:sameAs, skos:exactMatch	resource
ISO3	dc:identifier	literal
Name	rdfs:label, skos:prefLabel	literal
Parent	skos:broader	resource
Vocabulary	skos:inScheme	resource

Entity: Taxonomy term

RDF classes: skos:Concept

Properties	RDF predicates	Predicate type
Description	skos:definition	property
Name	rdfs:label, skos:prefLabel	property
Parent	skos:broader	rel
Vocabulary	skos:inScheme	rel

3. URI patterns

URIs have been designed as follows:

[http://godan.info/\[resource_type\]/\[resource-ID\]](http://godan.info/[resource_type]/[resource-ID])

The **content negotiation** mechanism (see <http://linkeddata.org/conneg-303-redirect-code-samples>) will resolve these URIs to:

- the corresponding Drupal page URL (aliased) for HTML requests;
- the canonical Drupal RDF path (canonical path + .rdf) for RDF requests.

The resource types paths are:

- **node** for GODAN website resources
- **taxonomy_term** for all concepts used in taxonomies

Sample URIs:

- Resource "How can we improve agriculture, food and nutrition with open data?":
<http://godan.info/node/1895>
- Concept "Research":
http://godan.info/taxonomy_term/350
- Country "Kenya":
http://godan.info/taxonomy_term/197

4. Sample queries

List all organizations

```
SELECT * {  
  ?s rdf:type <http://schema.org/Organization>.  
}
```

Describe an organization (<http://godan.info/node/3408>)

```
SELECT * {  
  <http://godan.info/node/3408> ?p ?o.  
}
```

List all publications

```
SELECT * {  
  ?s rdf:type <http://purl.org/ontology/bibo/Document>.  
}
```

Describe a publication (<http://godan.info/node/1895>)

```
SELECT * {  
  <http://godan.info/node/1895> ?p ?o.  
}
```

Get labels and URIs of all concepts used in the website:

```
PREFIX rdf: http://www.w3.org/1999/02/22-rdf-syntax-ns#
PREFIX schema: http://schema.org/
PREFIX dc: http://purl.org/dc/terms/
PREFIX skos: http://www.w3.org/2004/02/skos/core#
DESCRIBE ?uri WHERE {
  ?uri rdf:type skos:Concept .
  ?uri skos:prefLabel ?label .
}
```

Query to get all the resources of type "Research":

```
PREFIX rdf: http://www.w3.org/1999/02/22-rdf-syntax-ns#
PREFIX schema: http://schema.org/
PREFIX dc: http://purl.org/dc/terms/
PREFIX skos: http://www.w3.org/2004/02/skos/core#
DESCRIBE ?uri WHERE {
  ?uri dc:title ?title .
  ?uri dc:type http://www.godan.info/taxonomy\_term/350
}
```