



Trendy Practices and Tools in Ontological Engineering

María Poveda Villalón
Ontology Engineering Group
Universidad Politécnica de Madrid, Spain

Directors: Asunción Gómez-Pérez, Oscar Corcho

Position: 8º ranking UPM (200 groups)

Research group (30 people)

- 4 Full Professors
- 5 Associate Professors
- 3 Assistant Professors
- 7 Senior Postdocs
- 6 PhD Students
- 2 MSc and BSc Students
- 2 software engineers
- 1 system administrator
- 2 project managers

170+ Collaborations

50+ Visitors

<http://www.oeg-upm.net/>



<https://github.com/oeg-upm>



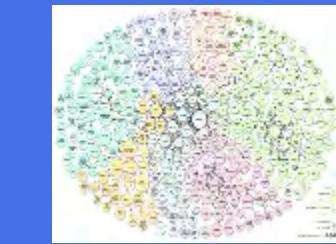
[@oeg-upm](https://twitter.com/oeg-upm)



Ontology Engineering Group at a glance

- Created in 1995
- World-wide known in the research areas
 - Ontologies
 - Semantic Web and Linked Data
 - Multilingual linked Data
 - Open Data
 - eScience
- **Projects (> 12M€)**
 - 27 EU projects (7 as coordinator)
 - 54 National Projects
 - 27 contracts with companies
- **Publications**
 - > 100 journal papers
 - > 400 International conferences and book chapters
 - 7 Books
- **Impact of publications**
 - Asunción Gómez-Pérez (h:58, 20,000 citations)
 - Oscar Corcho García (h: 44, 11,000 citations)
- **Services to the community**
 - Host esDbpedia
 - Host linkeddata.es
 - Ontology development services
- **Awards and Prizes**
 - Ada Byron
 - Aritmel
 - Juan López de Peñalver
 - Fujitsu, Open data, ISWC, ESWC
 - SUR Awards Watson for Tech. Watch
- **Supervision of students**
 - 28 Ph.D thesis (9 awarded best thesis prize)
 - >150 MS.C thesis and BS.C
- **Events organization**
 - 11 editions of the International Summer School on Ontological Engineering and the Semantic Web
 - > 50 WS and tutorials
- **Standardization activities**
 - >25 @ W3C, ISO, OASIS, etc.
- **Mobility**
 - PhD students: 3-6 months abroad
 - Postdocs: 1 month every 2 years
- **Visibility**
 - Program chairs of ESWC, ISWC, KCAP, EKAW, TKE, TIA
 - Editorial board of Journals
 - Invited talks at conferences and events
 - Programme Committee presence



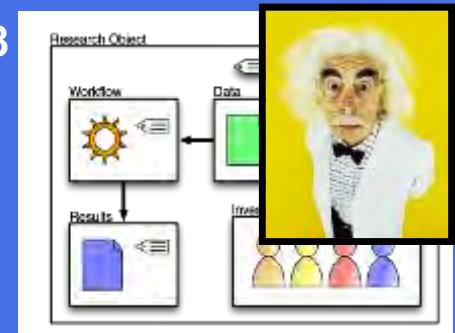


Linked Data-based
Data Integration

2004

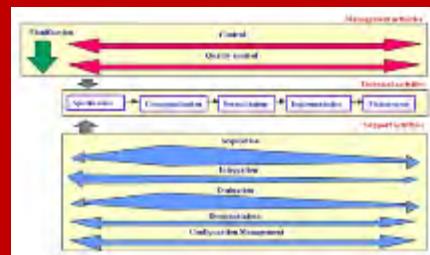
Open
Science

2008



Ontological Engineering

1995

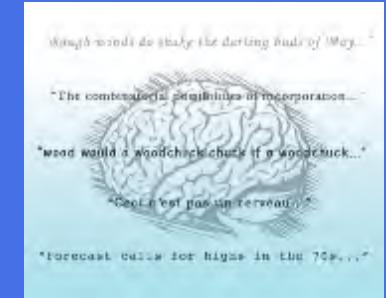


(Social)
Semantic
Web

2000

Data-driven
language technologies

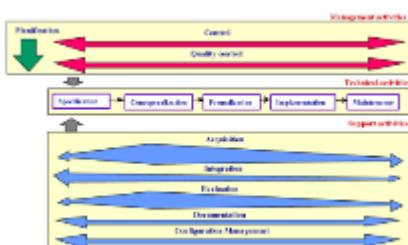
1997



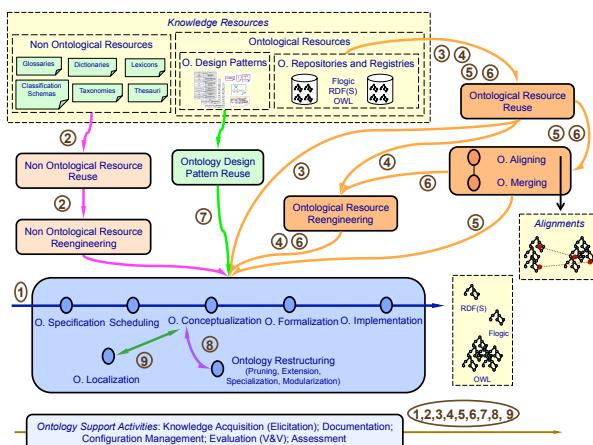
- METHONTOLOGY and NeOn methodologies for building Networks of Ontologies

- World-wide used

METHONTOLOGY (1997)



NeOn (2010)



Ontologies

- Metadata Vocabularies (@W3C)
- Provenance (@W3C)
- Internet of Things (@W3C @ETSI)
- Geography (@IGN, CENIG)
- (Multi)-Media (@W3C)
- Knowledge Management
- Software Engineering (OSLC@OASIS)
- Tourism
- User experience
- AENOR vocab. for smart cities
- Libraries (@BNE)
- Health (@WHO)
- e-Science
- ...

■ Ontology evaluation

- OOPS! OntOlogy Pitfall Scanner
<http://oops.linkeddata.es/>



A screenshot of the OOPS! OntOlogy Pitfall Scanner web application. The top navigation bar includes "Home", "About", "Contact", and "Logout". Below the navigation is a search bar with placeholder text "Search for ontology". The main content area displays a table with several rows of data, likely representing ontology analysis results. The table columns include "Ontology", "Status", "Issues", and "Actions". A "Download" button is located at the bottom right of the table.

■ Vocabulary documentation

- HTML: Widoco
<https://github.com/dgarijo/Widoco/>
- Diagrams: AR2DTool
<http://ar2dtool.linkeddata.es/>



○ Vocabulary registry

- OEG vocabularies
<http://vocab.linkeddata.es/>
- Smart Cities <http://smartcity.linkeddata.es/>



A screenshot of the vocab.linkeddata.es website. At the top, there's a search bar and a "Watch this repo" button. The main area shows a dashboard with sections for "Ontologies" (listing "smartcity.linkeddata.es" and "vocab.linkeddata.es"), "Smart Cities", and "OEG vocabularies". Below this is a "Watched repos" section showing two repositories: "marapoveda/saref-e" and "marapoveda/vicinity-ontology-core". Each repository card includes details like status, last commit date, and a "Watch this repo" button.

○ Vocabulary distributed development

- OnToology <http://ontology.linkeddata.es/>





María Poveda-Villalón, PhD Ontological Engineering

Development Evaluation Conceptualization
Semantic Web Linked Open Data Publication

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 [mariapoveda](https://mariapoveda.com)
 [thepetiteontologist](https://thepetiteontologist.com)
 [MariaPovedaVillalon](https://www.linkedin.com/in/MariaPovedaVillalon)

Education

- 2009 Computer Science (Eng)
- 2010 MsC Artificial Intelligence
- 2016 PhD Artificial Intelligence

Publications

- 6 Journal papers (5 indexed)
- 7 Conference papers
- 3 Book chapters
- 25 Workshop & demo papers
- 1 Journal editor
- 2 WS proc. editor

1029 citations H-index 15

Ontologies

- IoT: SAREF, VICINITY
- Web Of Things
- Video games
- Scientific reviews
- Dataset profiling: agri
- Meteorology
- Patient safety

Software



Organization

- 4 Workshops
- 3 Tutorials, VoCamp
- 2 Open Data Day
- 19 PC member Conf & WS

Skills

- W3C participation
- OWL, RDF, JENA, JAVA
- OpenRefine
- Training & Teaching

Training

- MOOCs, SPOCs,
- Ad-hoc courses

Projects

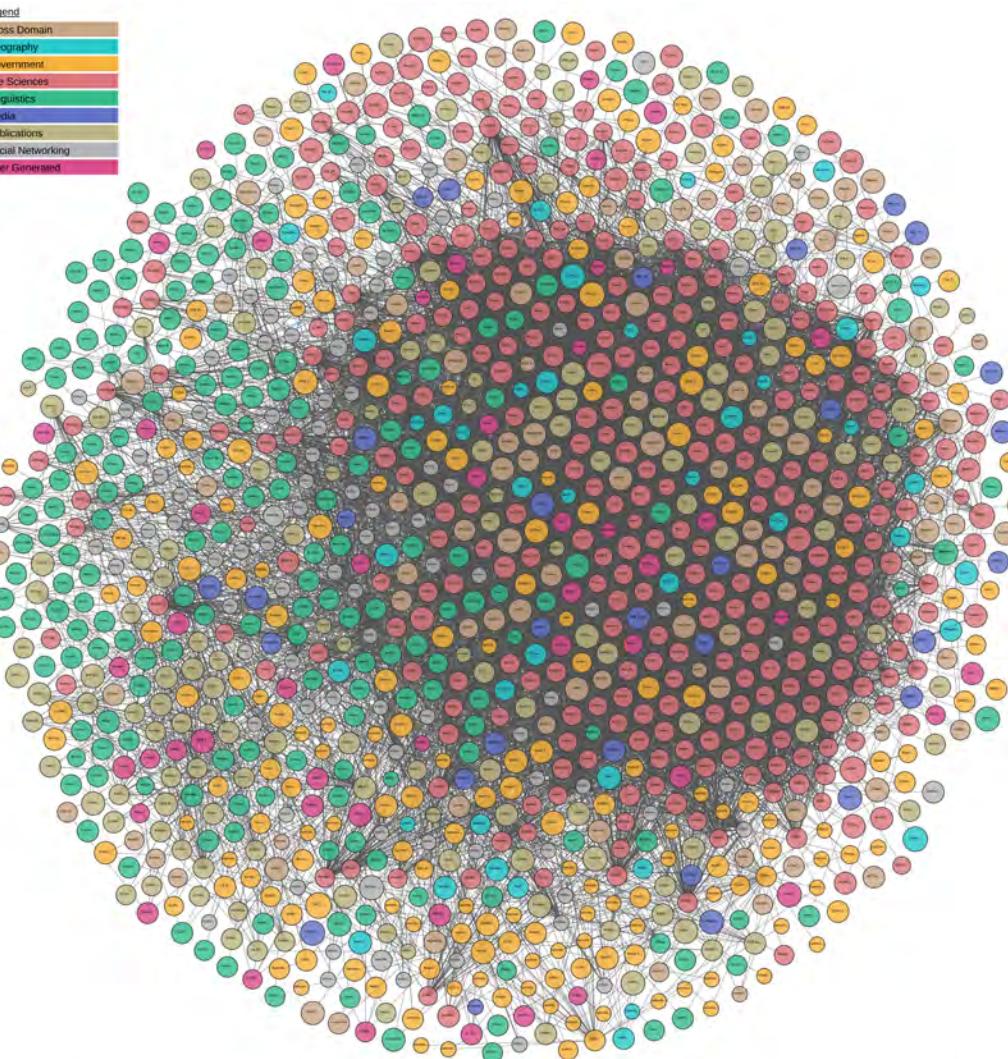
- 5 European
- 5 Spanish

Trendy Practices and Tools in Ontological Engineering

RDF data and vocabularies



Legend
Cross Domain
Geography
Government
Life Sciences
Linguistics
Media
Publications
Social Networking
User Generated



The Linked Open Data Cloud from LOD-Cloud.net

VOCABS TERMS AGENTS SPARQL/DUMP

Linked Open Vocabularies (LOV)

+ Suggest Documentation G+ Follow

Latest insertion

- otl - The Open Traffic Lights ontology 2016-11-22
- mus - DOREMUS is an extension of the FRBRoo model for describing the music. 2018-11-21
- eupont - EUPont: an ontology for End User Programming of the IoT 2018-10-15
- ocdo - Schema for an Open Connecting Platform (OCDO) 2018-07-03
- cbs - De Centraal Bureau voor de Statistiek (CBS) ontologie 2018-06-29

Latest Updates

- otl - The Open Traffic Lights ontology 2018-11-22
- mus - DOREMUS is an extension of the FRBRoo model for describing the music. 2018-11-22
- dcoc - DoCO, the Document Components Ontology 2018-11-19
- nfo - NEPOMUK File Ontology 2018-10-31
- eupont - EUPont: an ontology for End User Programming of the IoT 2018-10-15

553 Vocabularies in LOV

Category Tags

Methods	Metadata	Geography	Catalogs				
Support	Industry	Services	API	Society	Quality	Environment	IoT
RDF	People	Vocabularies	Time	Geometry	General & Upper		
Government	Events	Multimedia	Tag	FRBR	Biology	W3C Rec	
SPAR	Academy	Travel	PLM	eBusiness			

Linked Open Vocabularies DOCUMENTATION PUBLICATION

ABOUT API documentation Source code Semantic Web Journal '16 ERMIC News '14 Library Hi Tech '13

Ontology Engineering by Crowd Hosted by the Ontology Engineering Group - UPM

Image taken from <https://lod-cloud.net/>

<http://lov.linkeddata.es>

Google Dataset Search Beta

Buscar conjuntos de datos



Probar [boston education data](#) o [weather site:noaa.gov](#)

Google Search

Search

ALL PRODUCTS



SEND FEEDBACK

HOME

GUIDES

REFERENCE

CASE STUDIES

APIs

TOOLS

SUPPORT

Prepare your content

- [Create quality pages](#)
- [Associate your online resources](#)
- [Rendering on Google Search](#)
- [Debug your pages](#)
- [Add voice actions](#)

Index your content

- [Introduction to indexing](#)
- [Create a list of URLs](#)
- [Submit URLs to Google](#)

Mobile-friendly websites

- [Overview](#)
- [Getting Started](#)
- [Mobile SEO configurations](#)
- [Best practices for mobile-first indexing](#)
- [Customize your website software](#)
- [Common Mistakes](#)
- [FAQ](#)
- [Glossary](#)
- [Mobile Friendly Test](#)

AJAX Crawling



- A structured object with data in some other format that you might want to load into a special tool for processing
- Images capturing data
- Files relating to machine learning, such as trained parameters or neural network structure definitions
- Anything that looks like a dataset to you

Our approach to dataset discovery

We can understand structured data in Web pages about datasets, using either [schema.org Dataset markup](#), or equivalent structures represented in [W3C's Data Catalog Vocabulary \(DCAT\) format](#). We also exploring experimental support for structured data based on [W3C CSVW](#), and expect to evolve and adapt our approach as best practices for dataset description emerge. For more information about our approach to dataset discovery, see [Facilitating the discovery of public datasets](#).

Example

Here's an example for datasets using JSON-LD code and the Schema.org [vocabulary](#) in the Structured Data Testing Tool. The following example is based on a [real-world dataset description](#).

[SEE MARKUP](#)

The same [vocabulary](#) can be used in JSON-LD (preferred), RDFa 1.1, or Microdata syntax.

It is also possible to use W3C DCAT [vocabulary](#). Here is a simple example using RDFa:

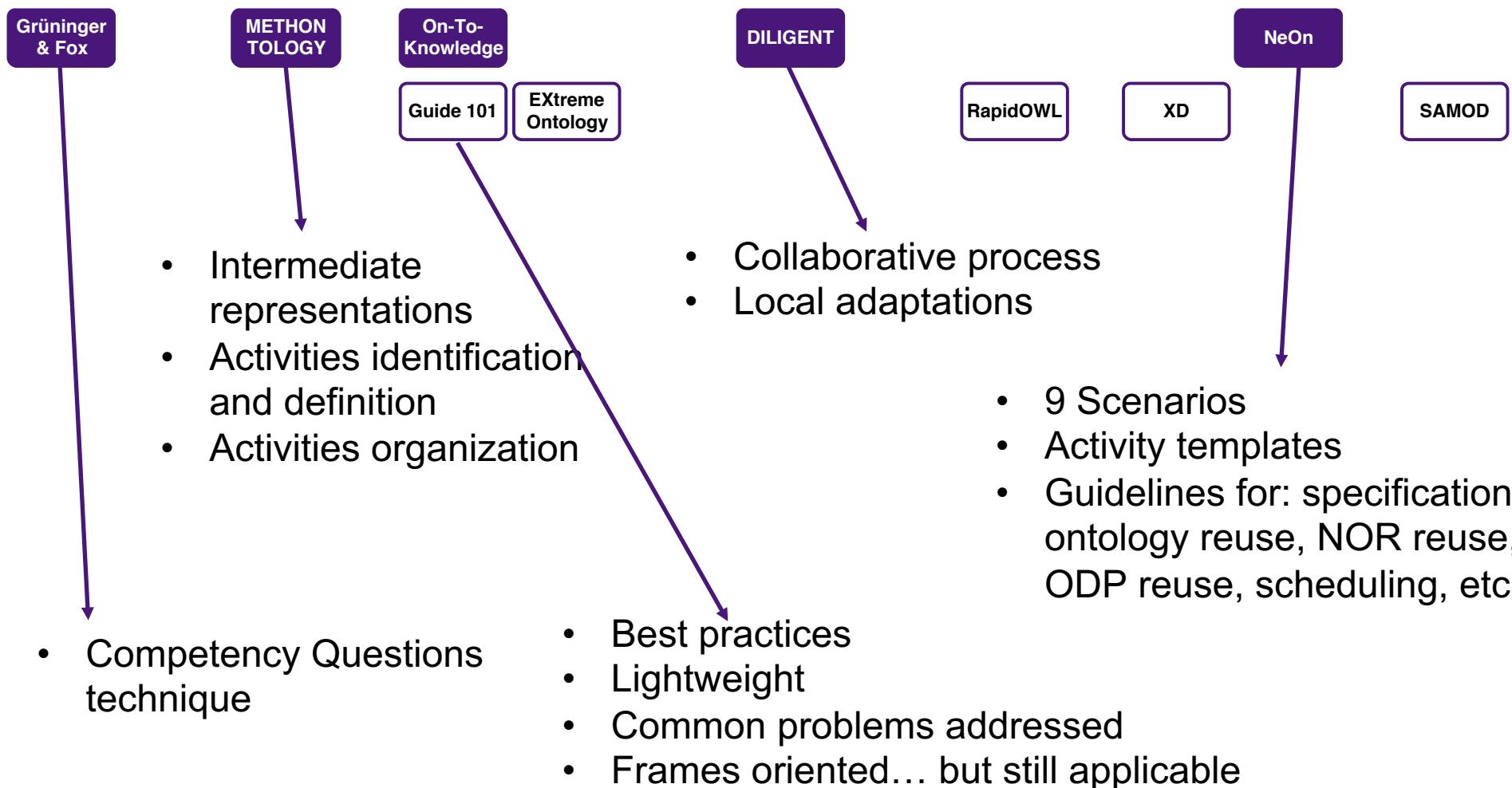
- [Contents](#)
- [Our approach to dataset discovery](#)
- [Example](#)
- [Guidelines](#)
- [Sitemap best practices](#)
- [Source and provenance best practices](#)
- [Known Errors and Warnings](#)
- [Structured data type definitions](#)
- [Dataset](#)
- [DataCatalog](#)
- [DataDownload](#)
- [Provenance and license](#)
- [Tabular datasets](#)
- [Help and tools](#)

<https://toolbox.google.com/datasetsearch>

Vocabularies define the **concepts** and **relationships** used to **describe** and represent an area of concern.

Definition taken from: <http://www.w3.org/standards/semanticweb/ontology>

Some Ontology Development Methodologies



Ontology Development Methodologies



Grüninger
& Fox

METHON
TOLOGY

On-To-
Knowledge

DILIGENT

NeOn

Guide 101

EXtreme
Ontology

RapidOWL

XD

SAMOD

- Towards lightweight and agile processes
- Inspiration from software development practices
- Coupling Software and ontology development

THE WATERFALL PROCESS



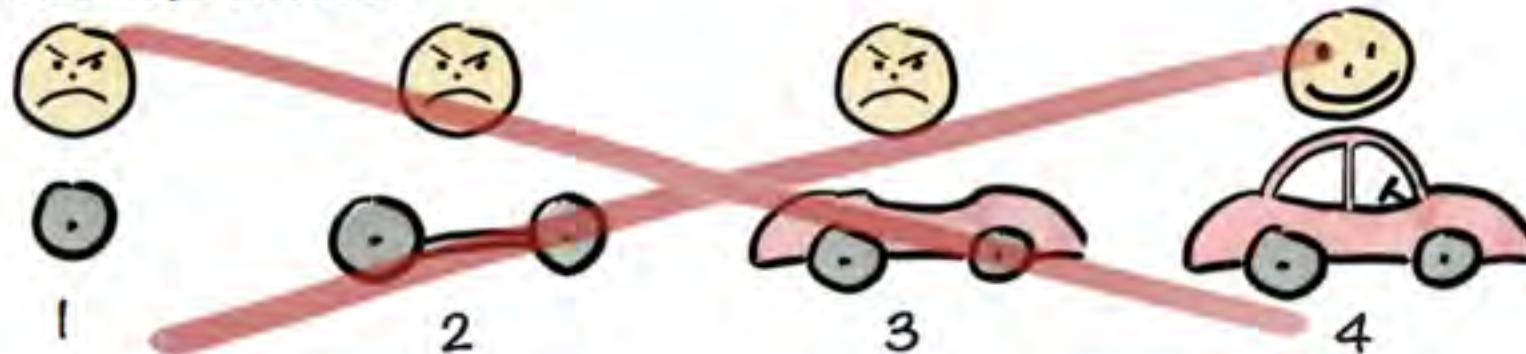
*'This project has got so big,
I'm not sure I'll be able to deliver it!'*

THE AGILE PROCESS

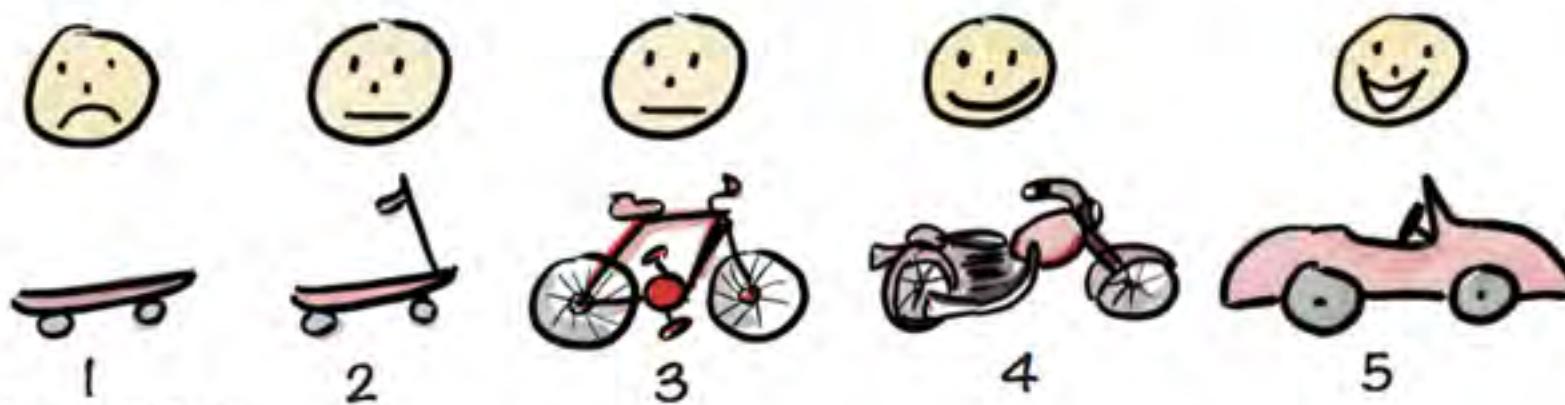


*'It's so much better delivering this
project in bite-sized sections'*

Not like this....



Like this!



by Henrik Kniberg

Slide from Carlos Badenes

And how does it look like for ontological engineering?

- Ontologies are not often the final product. Do not get the customer attention. Like databases?
- Software development are including ontologies as part of the project

Linguist/Ontologist, Google Knowledge Graph

Google

Software Engineering
San Francisco, CA, USA

Linguists work across Google to drive improvements in quality, c
Linguist/Ontologist you will work both on complex projects span
specific product components or answer specific research questi
specialization might involve natural language processing and un
subject research, experimental design, statistics, corpus linguisti
groundbreaking and exciting work at Google. It's our goal to use

Growing the Knowledge Graph requires the development of know
Schema team, you will analyze graph structures and content, dev
the development and usage of knowledge structures to improve
modeling techniques, judging tradeoffs between formality and us
structures. You will work with researchers and ontologists locally
both human and automatic methods.

There is always more information out there, and the Research an
constantly refining our signature search engine to provide better
Search to make it faster and more engaging. We're providing use
enough. We're just getting started.

Responsibilities

- Analyze graph structures and content and develop new sema
- Make decisions and provide guidance about ontologies and s
- Write code to gather, process, and analyze data of various ki
- Work with researchers, engineers, and linguists to develop ne

Screeenshot thanks to Juan Sequeda

The screenshot shows a job listing for a Knowledge Engineer on Amazon Jobs. The job title is "Knowledge Engineer" and the job ID is 630535 | Amazon Spain Services, S.L. The listing includes a description of the role, requirements, and a "DESCRIPTION" section. The job is located in Madrid, Spain, and is related to Editorial, Writing, & Content Management. There are also sections for "Share this job" and "Related jobs".

Job details

- Location: Madrid, Spain
- Job Type: Editorial, Writing, & Content Management

Share this job

Related jobs

Digital Music Content Manager
ES, Madrid

DESCRIPTION

Help mold the future of cloud-based content and services. If you have the right blend of passion, enthusiasm, customer obsession, curiosity and creativity, you may just be right for the Knowledge Engineer role.

The Spanish team is looking for Spanish speaking Knowledge Engineer to help improve the our knowledge base & reach with direct and visible customer impact.

Do you have fluent Spanish language skills? Do you have a strong academic background in a subject such as mathematics, philosophy, linguistics, history or library science? And are you keen to apply those skills at a technology company? This role is for you. As a knowledge engineer, you will work on:

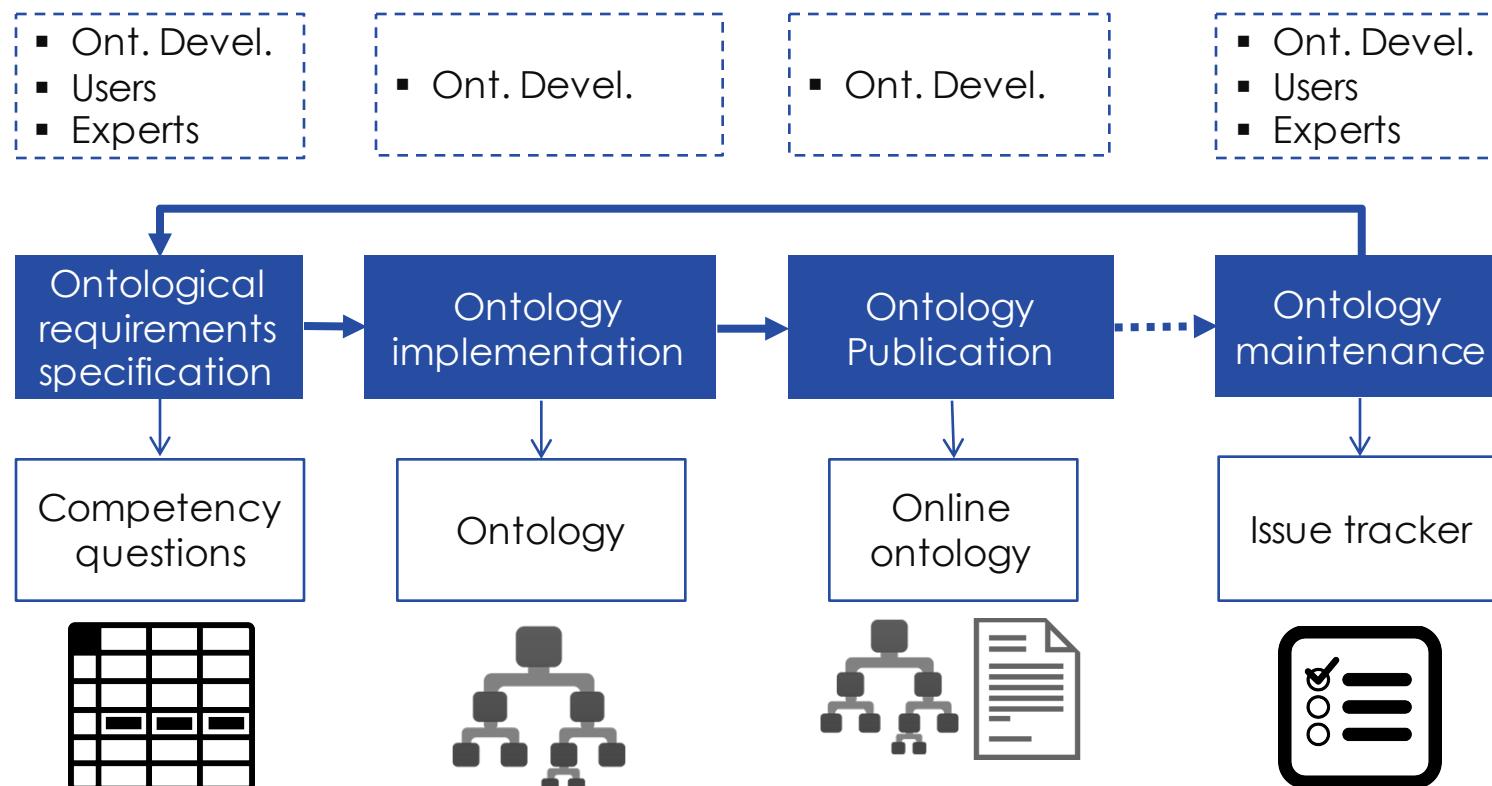
- Representing real-world objects and concepts in ways that both computers and people can understand.
- Working to maintain the quality of the knowledge already in the system.
- Expanding the capabilities of the platform to infer new knowledge.
- Working with the teams of developers and machine learning scientists to enhance the existing technology and invent new techniques



And how does it look like for ontological engineering?

- Ontologies are not often the final product. Do not get the customer attention. Like databases?
- Software development are including ontologies as part of the project
- **Let's try to sneak our processes in SW practices!**

Ontology development process overview



Legend

▪ Actor

Activity

Output

activity flow

Requirement specification

Requirement specification

- Ont. Devel.
- Users
- Experts

Use case specification

Use cases



- Users
- Experts

Data exchange identification

Domain documentation



- Ont. Devel.
- Users
- Experts

- Ont. Devel.

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1.2	How to get started
2.	Terminology
3.	Concepts & Building Blocks
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3.1.1	Resource Model and URIs
3.1.2	Protocol Bindings
3.1.3	Security Mechanisms
3.1.3.1	Simple Request Authorization and Caller Authentication

Unofficial Draft

Purpose
So
ident

On
pur
so

W3C home > Mailing lists > Public > public-wot-ig@w3.org > December 2016

Towards a formal model of thing descriptions

This message: [Message body] [Respond] [More options]
Related messages: [Next message] [Previous message]

From: Dave Raggett <david@w3.org>
Date: Wed, 7 Dec 2016 18:20:25 +0000
Message-ID: <07140C17-A504-48C9-92D3-46ED1399D60F@w3.org>
To: Public Web of Things IG <public-wot-ig@w3.org>

In today's Web of things Interest Group call, I was asked to provide a formal model of the RDF graphs for thing descriptions. The question is what formalism to codify it in. One possibility could be the Shapes Constraint Language (SHACL), see: <http://www.w3.org/TR/shacl/>. This could be used for validating a thing description against the following "grammar", for validating data, and for validating service compositions to check that the components are compatible. What other formalism is there? The following are based upon requirements derived from a broad range of use cases.

Each thing must have a thing description.
A thing description must be a graph of RDF triples rooted in a given thing.
A thing description must have URI with which to access the description.
A thing may have meta-data, i.e. a set of predicate/value pairs.
A thing may have zero or more properties, actions and events.
Each property, action and event must have a string literal as its name.
Each property, action and event may have metadata.
A property must have a data type.
A property may have a default value.
A property may be writable.
A property may be readable.
Each property may itself have properties.
Each property, action and event may have metadata.
A data type is a named data type, or is defined in place, or by reference to a definition.
Common types are boolean, integer, number, string, vector, thing, enum and union.
A property may be a stream.
A property may be a collection.
A collection is either ordered or unordered, but not both.
An enum is an ordered set of string literals.
A union is an unordered set of data types.
A vector is a set of items, where each item has a string literal for its name, and a non-negative integer for its index.
A property may have constraints, which depend on its data type.
An integer or number may have a min and a max value.
A collection may have a max size and a max length.
Each action must define a request.
Each action may define a response.
A request may expect a sequence of zero, one or more responses.
Each request and response may have a data type.
Each action must have a data type.
There are predefined events for signalling updates and life cycle changes.
Metadata includes comments and communication metadata.
A comment is a string literal and may be annotated with its human language.
A link may be a reference to a service.
A service provides a means to notify updates to properties and metadata.
A service provides a means to signal events, action requests and responses.
A service URI may contain named variables.
A property may be part of a thing but not a combination of these.
A link is a stream of samples that applications can generate.
A source is a stream of samples that applications can observe.
A stream may have a sampling rate.
A stream may have a latency.
A stream may carry date stamps.

x Q main ⌂ ⌃ Highlight All Match Case Whole Words 1 of 4 matches

<https://lists.w3.org/Archives/Public/public-wot-ig/2016Dec/0016.html>

- Ont. Devel.

3.2 Thing Description

The WoT Thing Description (TD) provides the semantic metadata of a Thing as well as a functional description of its [WoT Interface](#). For this, it relies on the Relying data model. For now, [\[JSON-LD\]](#) is used vocabulary to express the capabilities of and *Events*. In addition, the TD provides met etc.), mediaTypes (e.g., "application/json", "a tion, etc.). [Fig. 3 Concepts of the Thing Desc TD.](#)

Save

Thing's Interaction Resources
- Property
- Action
- Event

Fig. 3 Co

section will give a brief introduction to the TD elements and their interactions.

- Ont. Devel.
- Ont.

<http://w3c.github.io/wot/current-practices/wot-practices>

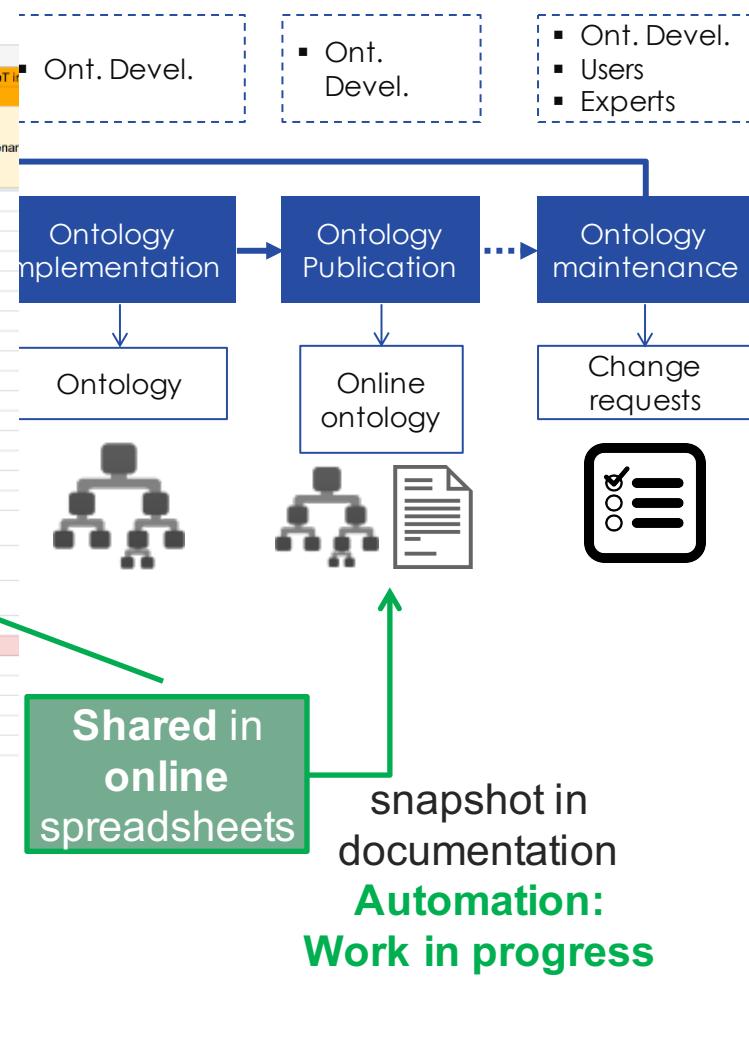
EXAMPLE 3: More Capabilities

```
{
  "@context": [
    "http://w3c.github.io/wot/w3c-wot-td-context.jsonld",
    { "actuator": "http://example.org/actuator#" }
  ],
  "@type": "Thing",
  "name": "MyLEDThing",
  "base": "coap://myled.example.com:5683/",
  "security": {
    "cat": "token:jwt",
    "alg": "HS256",
    "as": "https://authority-issuing.example.org"
  },
  "interactions": [
    {
      "@type": ["Property", "actuator:onOffStatus"],
      "name": "status",
      "outputData": { "valueType": { "type": "boolean" } },
      "writable": true,
      "links": [
        {
          "href": "pwr",
          "mediaType": "application/exi"
        }
      ],
      {
        "href": "http://mytemp.example.com:8080/status",
        "mediaType": "application/json"
      }
    },
    {
      "@type": ["Action", "actuator:fadeIn"],
      "name": "fadeIn",
      "inputData": {
        "valueType": { "type": "integer" },
        "actuator:unit": "actuator:ms"
      },
      "links": [
        {
          "href": "in",
          "mediaType": "application/exi"
        }
      ],
      {
        "href": "http://mytemp.example.com:8080/in",
        "mediaType": "application/json"
      }
    }
  ]
}
```

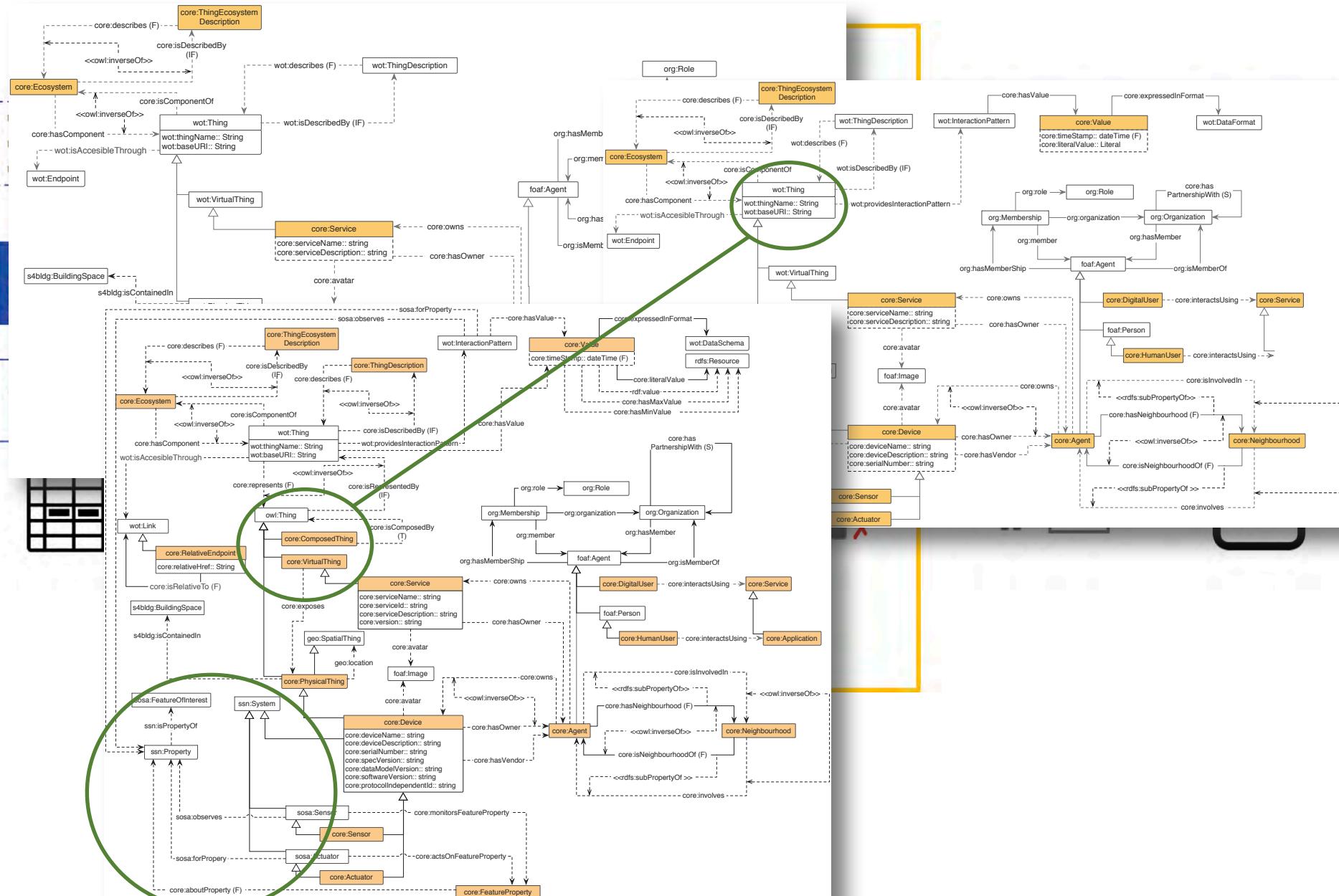
- Ont. Devel.
- Users
- Experts

Requirement specification

	A	B	C	D	E	F	G	H	I
1									
2									Scope: to support the registration, discovery and search of devices in IoT II
3	Identifier (domain+id)	Responsible partner	Sprint	Competency Question / Natural language sentence (fact)	Answer	Status (Proposed, Accepted, Rejected, Deprecated)	Superseded by	Comments	Extracted from (provenance)
76	platform73			What is a system integrator?	R			Is this needed?	D1.5 - Use Case 4 UC0400
77	platform74			What is a hardware platform?	R			Is this needed?	D1.5 - Use Case 4 UC0400
78	platform75		-	What is an audit trail?	R			Repeated	D1.5 - Use Case 4 UC0400
79	platform76			What is a IoT operator account?	R			Is this needed?	D1.5 - Use Case 4 UC0400
80	platform77			What is an added value service agent?	R			Is this needed?	D1.5 - Use Case 4 UC0400
81	platform78			What is an IoT platform agent?	R			Is this needed?	D1.5 - Use Case 4 UC0400
82	platform79		2	What is an IoT device agent?	R			Is this needed?	D1.5 - Use Case 4 UC0400
83	platform80	BVN	2	Which devices are there?	A				25-01-2016 meeting minutes
84	platform81	BVN	2	What are the devices of a given agent or organization?	A				25-01-2016 meeting minutes
85	platform82	BVN	2	Which devices can I see?	A				25-01-2016 meeting minutes
86	platform83	BVN	2	Which services can I see?	A				25-01-2016 meeting minutes
87	platform84	BVN	2	Which devices are located at a CERTH lab?	D	platform158			25-01-2016 meeting minutes
88	platform85	BVN	2	What are the devices of a specific partner?	A				25-01-2016 meeting minutes
89	platform86	BVN	2	What are the services of a specific partner?	A				25-01-2016 meeting minutes
90	platform87	BVN	2	Which is the profile of a given device?	A				25-01-2016 meeting minutes
91	platform88	BVN	2	A device profile indicates the device name	A				25-01-2016 meeting minutes
92	platform89	BVN	2	A device profile indicates the device avatar	A				25-01-2016 meeting minutes
93	platform90	BVN	4	A device profile indicates the type of device, e.g. sensor or actuator	A				25-01-2016 meeting minutes
94							The device vendor and producer are the same		
95	platform91	BVN	2	A device profile indicates the device vendor	A				25-01-2016 meeting minutes
96	platform92	BVN	2	A device profile indicates the device serial number	A				25-01-2016 meeting minutes
97	platform93		-	A device profile indicates the device producer	R				25-01-2016 meeting minutes
98	platform94	BVN	2	A device profile indicates the device owner	A				25-01-2016 meeting minutes
99	platform95	BVN	2	A service profile indicates the service name	A				25-01-2016 meeting minutes
100	platform96	BVN	2	A service profile indicates the service avatar	A				25-01-2016 meeting minutes
101	platform97	BVN	2	A service profile indicates the service owner	A				25-01-2016 meeting minutes
102	platform98	BVN	2	A service profile indicates the service provider	A				25-01-2016 meeting minutes

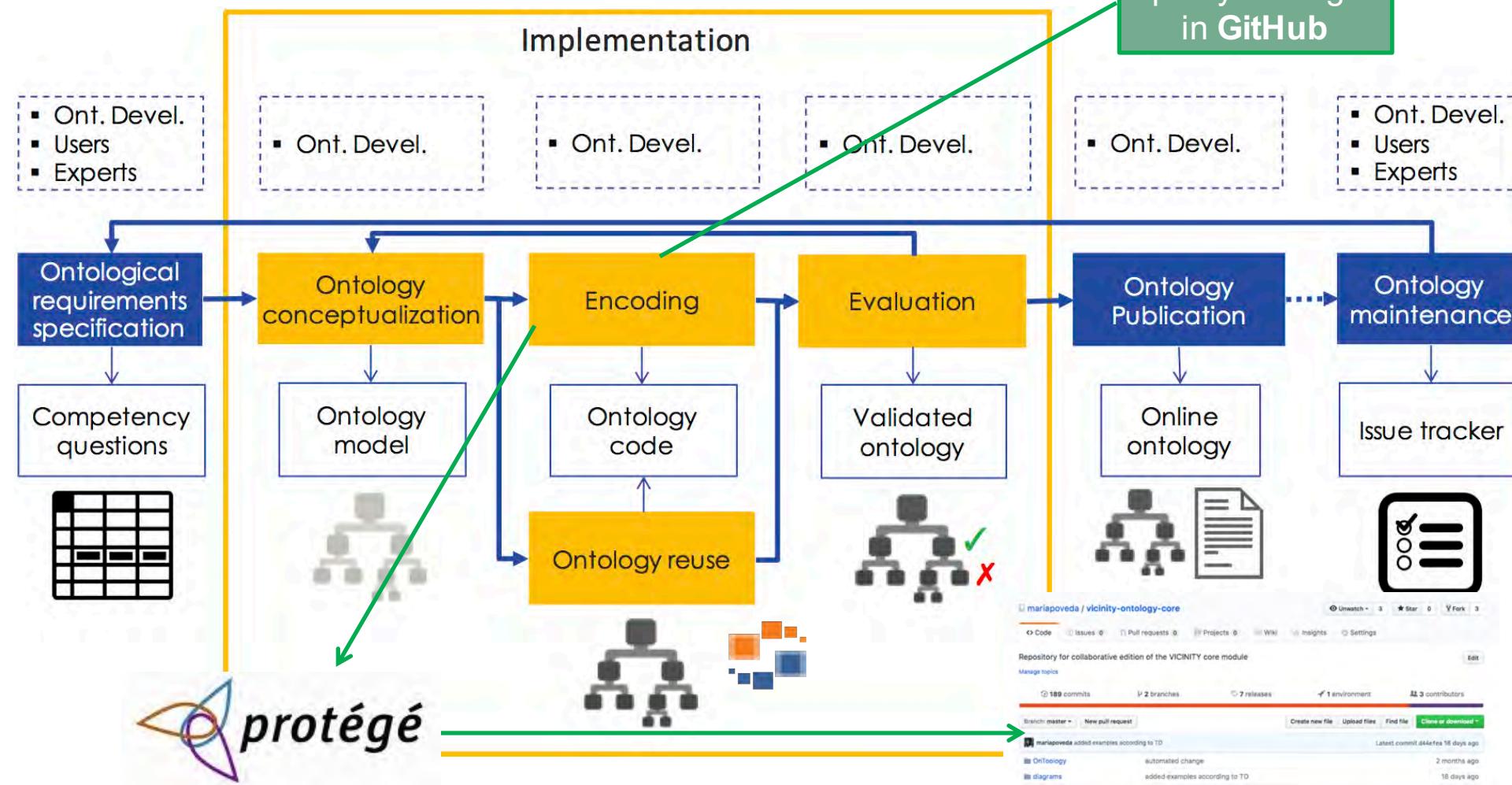


Implementation - Conceptualization



Implementation - Encoding

Openly managed
in GitHub



GitHub repository

<https://github.com/mariapoveda/vicinity-ontology-wot>

<https://github.com/mariapoveda/vicinity-ontology-core>

vicinity-ontology-core

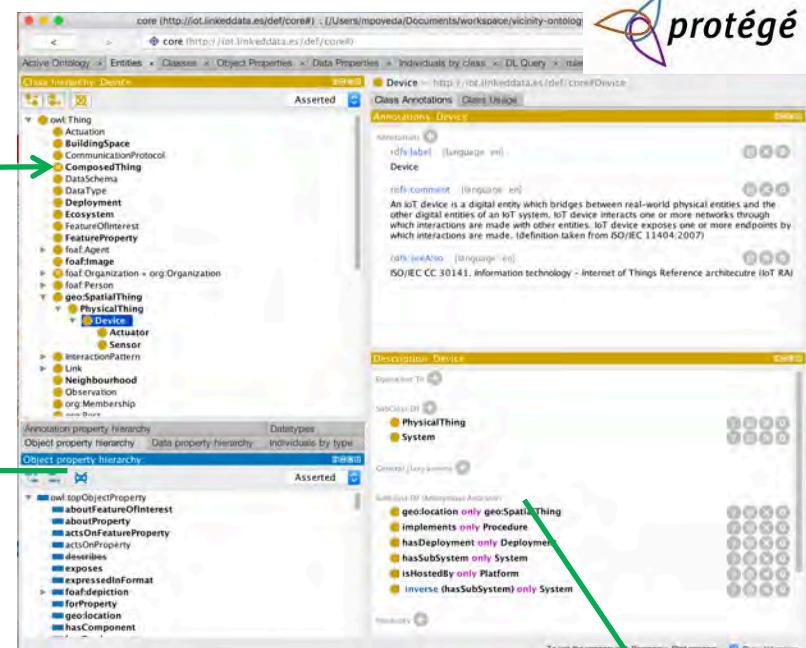
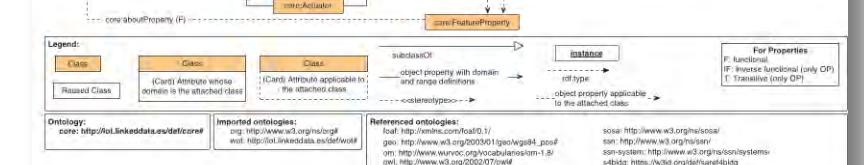
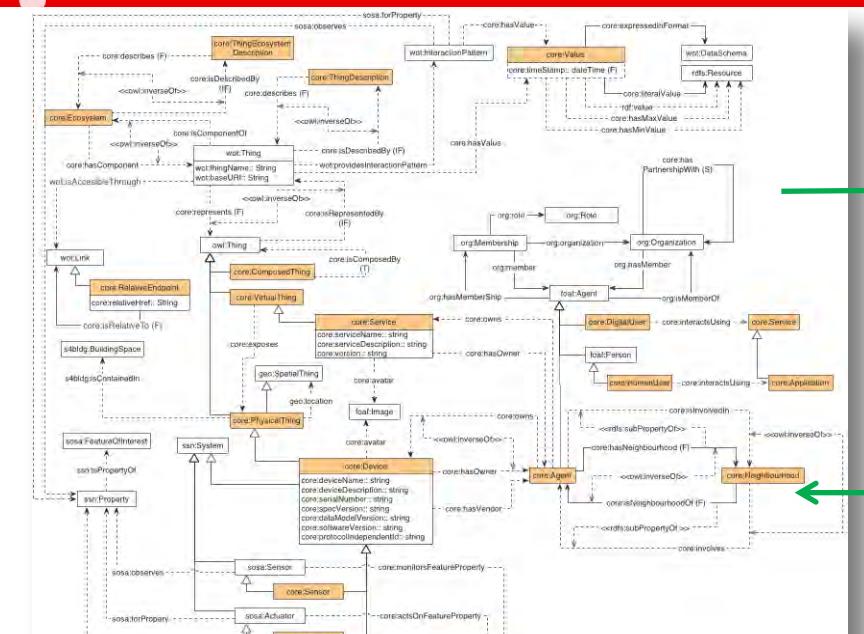
Repository for collaborative edition of the VICINITY core module

To include issues for this domain (that is, things you need this ontology to represent or improve): <https://github.com/mariapoveda/vicinity-ontology-core/issues>

The ontology latest release will be published at <http://iot.linkeddata.es/def/core/>

...

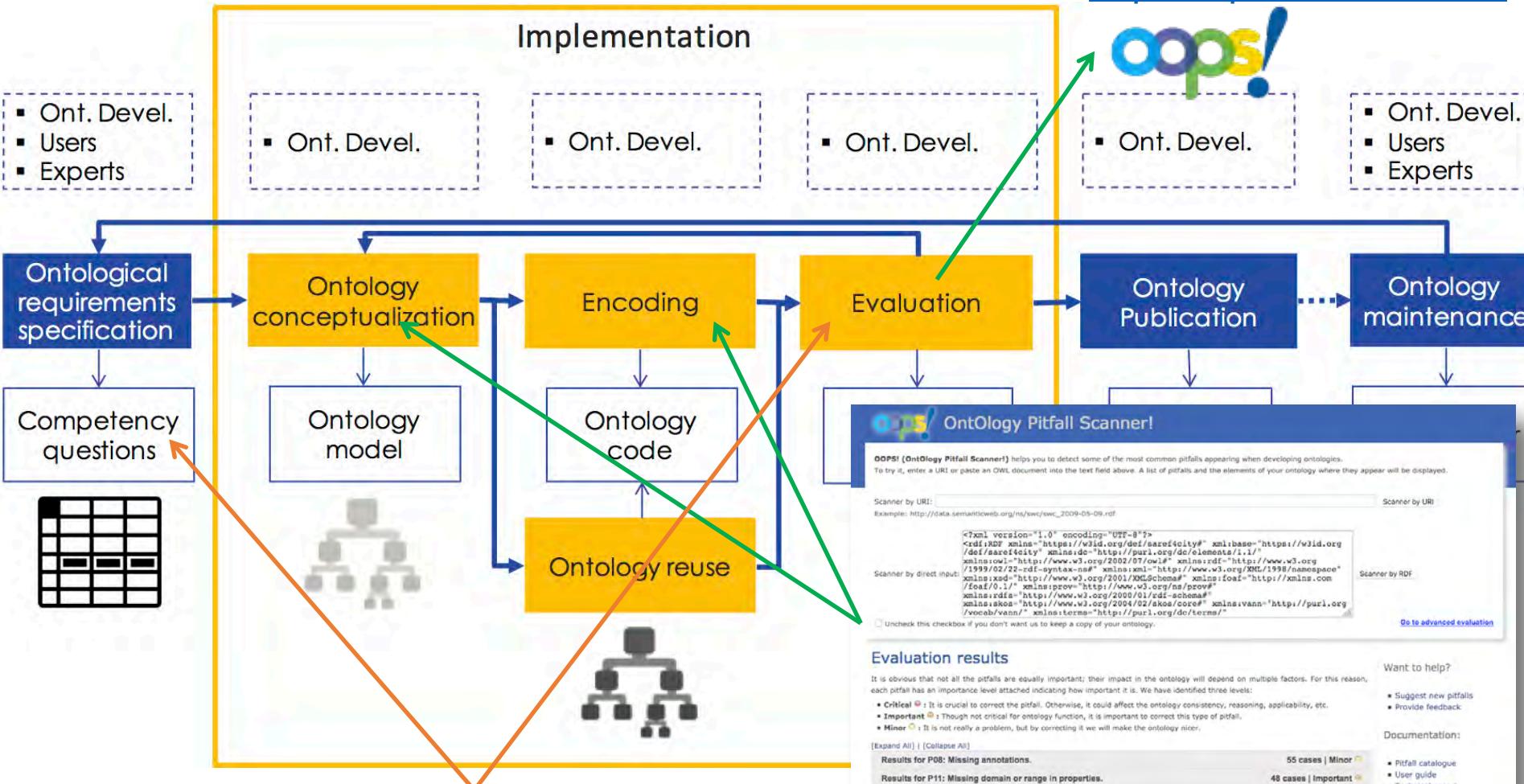
Implementation - Encoding



GitHub

Implementation - Evaluation

<http://oops.linkeddata.es>



Ongoing work: tests from requirements

Online and integrated in OnToology
with result in your GitHub repository

Evaluation - OOPS! – OntOlogy Pitfall Scanner!

- Implements the **48** detection methods for **33** pitfalls
 - Pitfalls selection
 - Selection by dimensions and aspects
- Web user interface <http://oops.linkeddata.es/>
- Web service <http://oops-ws.oeg-upm.net/>

The screenshot shows the OntOlogy Pitfall Scanner interface with the following components:

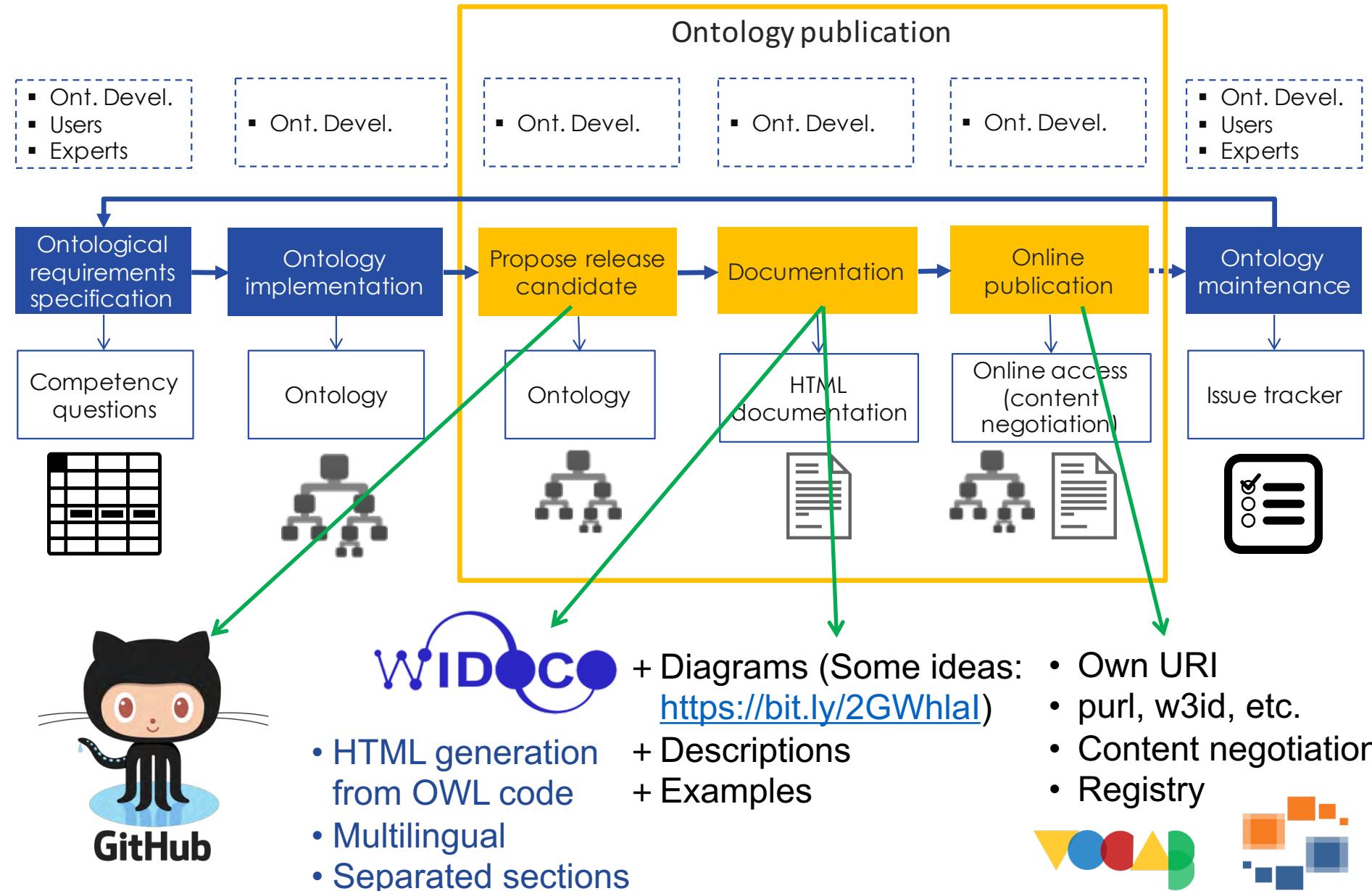
- Pitfall frequency**: A summary box containing "11 cases | Minor" with a green icon.
- Importance level**: A summary box below the frequency box.
- Pitfall name**: A header for the results table.
- URI input**: A text input field with placeholder text "Example: http://data.semanticweb.org/ns/swc/ontology#hasPart".
- OWL code input**: A text input field with placeholder text "If you checked Namespaces".
- Pitfall description**: A section for detailed descriptions of each pitfall, including suggestions for relationships without inverses.
- Affected elements**: A list of URLs for affected ontology elements.
- Results table**: A table with rows for P04, P05, P08, P11, P12, and P13, each with a "Results for [Pitfall]" header and a list of affected elements.
- RDF code**: A large block of RDF XML code corresponding to the detected pitfalls.

Annotations in the screenshot:

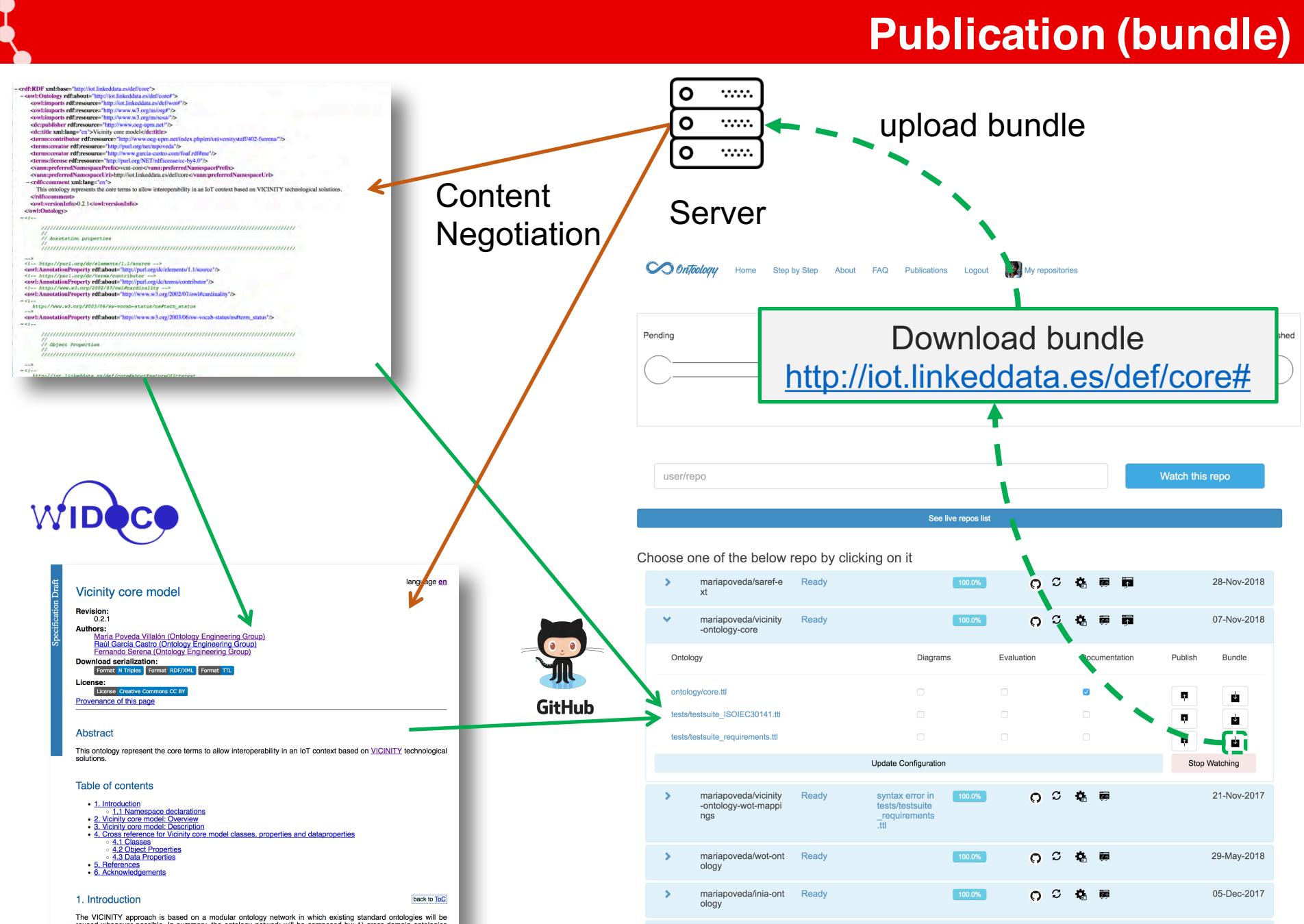
- Arrows point from the labels "Pitfall frequency", "Importance level", "Pitfall name", "URI input", "OWL code input", "Pitfall description", and "Affected elements" to their respective UI elements or sections.
- An arrow points from the "Pitfall description" label to the "P04" result row.
- An arrow points from the "Affected elements" label to the list of URLs under the "P04" result row.
- An arrow points from the "Affected elements" label to the list of URLs under the "P13" result row.
- An arrow points from the "Affected elements" label to the list of URLs under the "P12" result row.

RDF code (extracted from the screenshot):

```
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:oops="http://www.oeg-upm.net/oops#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
<rdf:Description rdf:about="http://www.oeg-upm.net/oops#suggestion">
<rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class"/>
</rdf:Description>
<rdf:Description rdf:about="http://www.oeg-upm.net/oops/fdealaa6-71d6-4557-a17a-dc3244ff536b">
<oops:hasCode rdf:datatype="http://www.w3.org/2001/XMLSchema#string">P10</oops:hasCode>
<oops:hasName rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Missing disjointness [1, 2, 3]</oops:hasName>
<oops:hasDescription rdf:datatype="http://www.w3.org/2001/XMLSchema#string">The ontology lacks disjoint axioms between classes or between properties that should be defined as disjoint.</oops:hasDescription>
<rdf:type rdf:resource="http://www.oeg-upm.net/oops#pitfall"/>
<oops:hasImportanceLevel rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Important</oops:hasImportanceLevel>
<oops:hasNumberAffectedElements rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">1</oops:hasNumberAffectedElements>
</rdf:Description>
<rdf:Description rdf:about="http://www.oeg-upm.net/oops/496ae03d-48c6-406d-807-530bf05c9ac1">
<oops:hasCode rdf:resource="http://www.oeg-upm.net/oops/fdealaa6-71d6-4557-a17a-dc3244ff536b"/>
<rdf:type rdf:resource="http://www.oeg-upm.net/oops#response"/>
</rdf:Description>
<rdf:Description rdf:about="http://www.oeg-upm.net/oops#pitfall">
<rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class"/>
</rdf:Description>
</rdf:RDF>
```



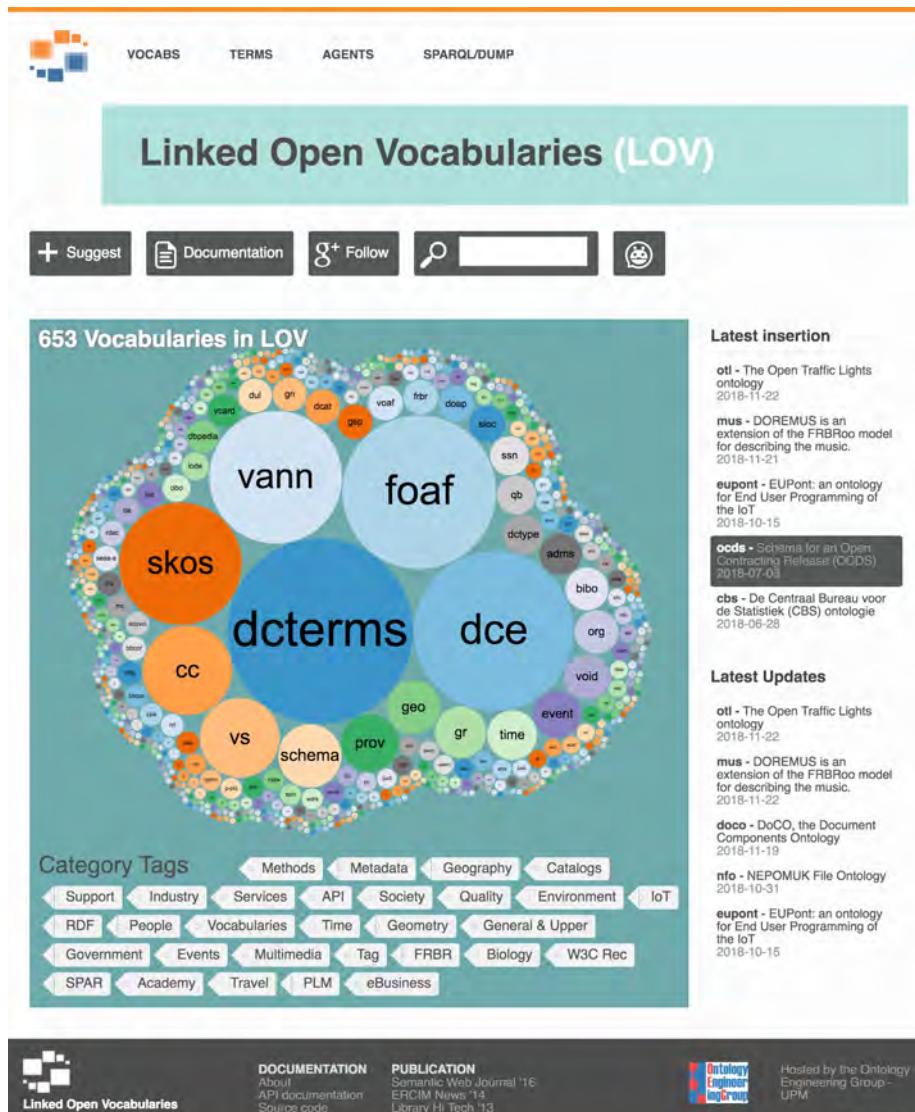
Publication (bundle)



<https://lov.linkeddata.es>

- Mission: promote and facilitate the reuse of well documented vocabularies in the Linked Data ecosystem

- Vocabularies registry and index
- Datalift
 - <http://datalift.org/>
- Started at 2011
- Hosted by OEG





- [VOCABS](#)
- [TERMS](#)
- [AGENTS](#)
- [SPARQL/DUMP](#)

Linked Open Vocabularies (LOV)

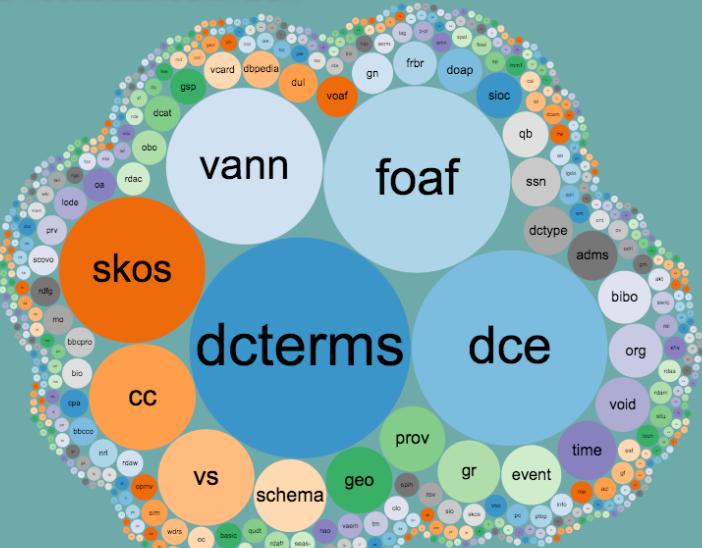
[+ Suggest](#)

[Documentation](#)

[g+ Follow](#)



595 Vocabularies in LOV



Latest insertion

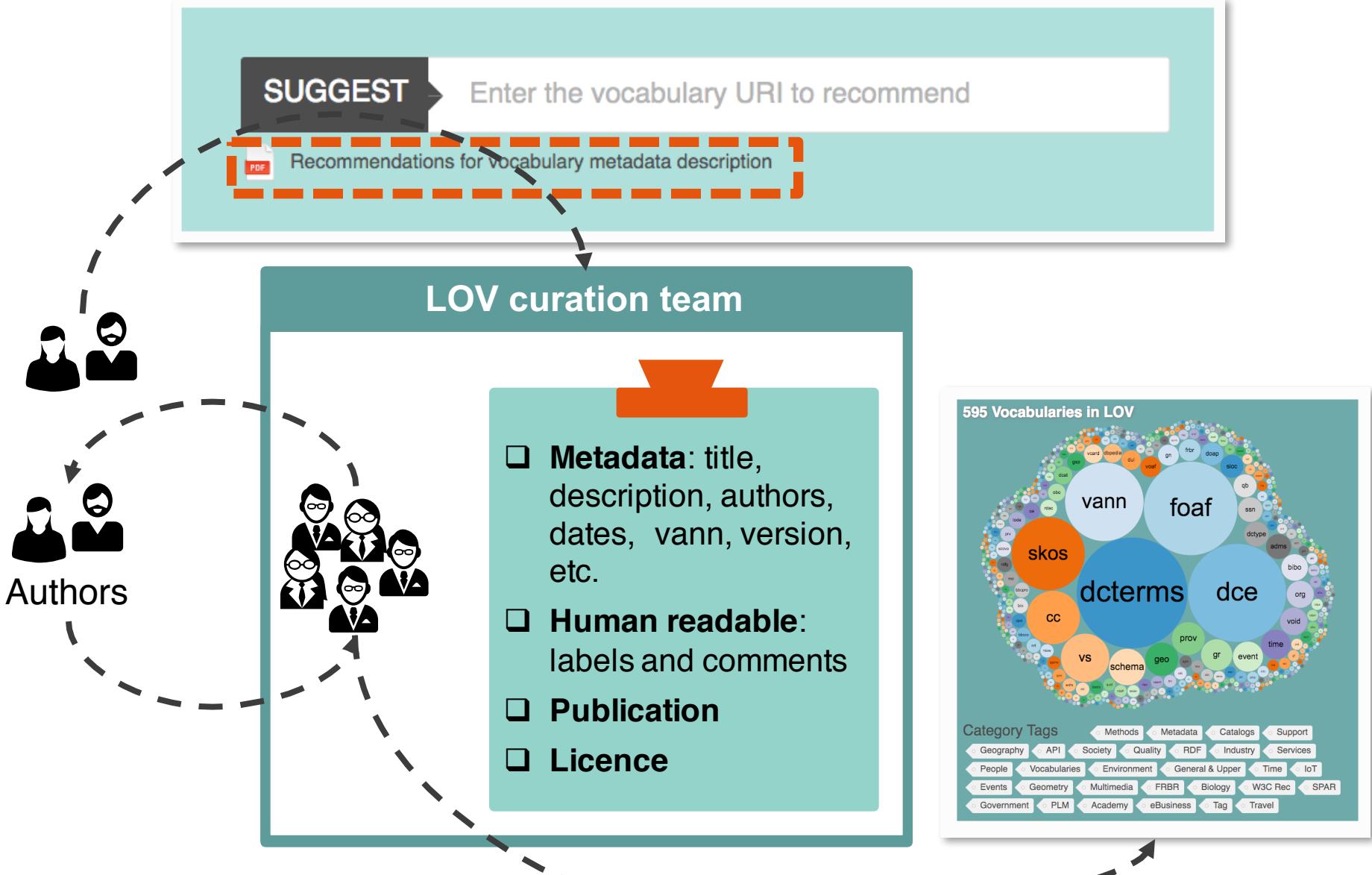
- losp** - Linked open specialities
RF
2017-03-09
- san-lod** - SAN Ontologia
2017-02-07
- sto** - i40 Standards Lanscape Vocabulary
2017-01-29
- rami** - rami - Reference Architecture Model
2017-01-29
- aml** - AutomationML Ontology
2017-01-26

Latest Updates

- losp** - Linked open specialities
RF
2017-03-10
- rdf** - The RDF Concepts Vocabulary
2017-03-09
- oa** - Open Annotation Data Model
2017-02-28
- san-lod** - SAN Ontologia
2017-02-07
- sto** - i40 Standards Lanscape Vocabulary
2017-01-29

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- [API](#)
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- [Biology](#)
- [W3C Rec](#)
- [SPAR](#)
- [Government](#)
- [PLM](#)
- [Academy](#)
- [eBusiness](#)
- [Tag](#)
- [Travel](#)



Openly reported in
GitHub issue tracker:
new needs, bugs, etc.

Ontology maintenance

- Ont. Devel.
- Users
- Experts

Bug detection

Issue tracker

New requirements



Erroneous domain definitions #38

Closed vcharpenay opened this issue on Jun 12, 2017 · 2 comments

vcharpenay commented on Jun 12, 2017

Some domain axioms seem erroneous:

- :providesInteractionPattern rdfs:domain :InteractionPattern . I suppose you mean rdfs:range ?
- :name rdfs:domain :Thing leads to the fact that all interaction patterns are also things, which is unwanted, I guess.

In general, are domain/range axioms supposed to remain in the ontology or removed?

mariapoveda commented on Jun 12, 2017

Thanks for the comments I'll update the ontology.
I'd rather to keep them in the ontology.

mariapoveda added a commit that referenced this issue on Jun 12, 2017

- ↳ 0.0.7 replace erroneous domains issue #38

mariapoveda commented on Jun 12, 2017

Closed in ea30b5a

✖ mariapoveda closed this on Jun 12, 2017

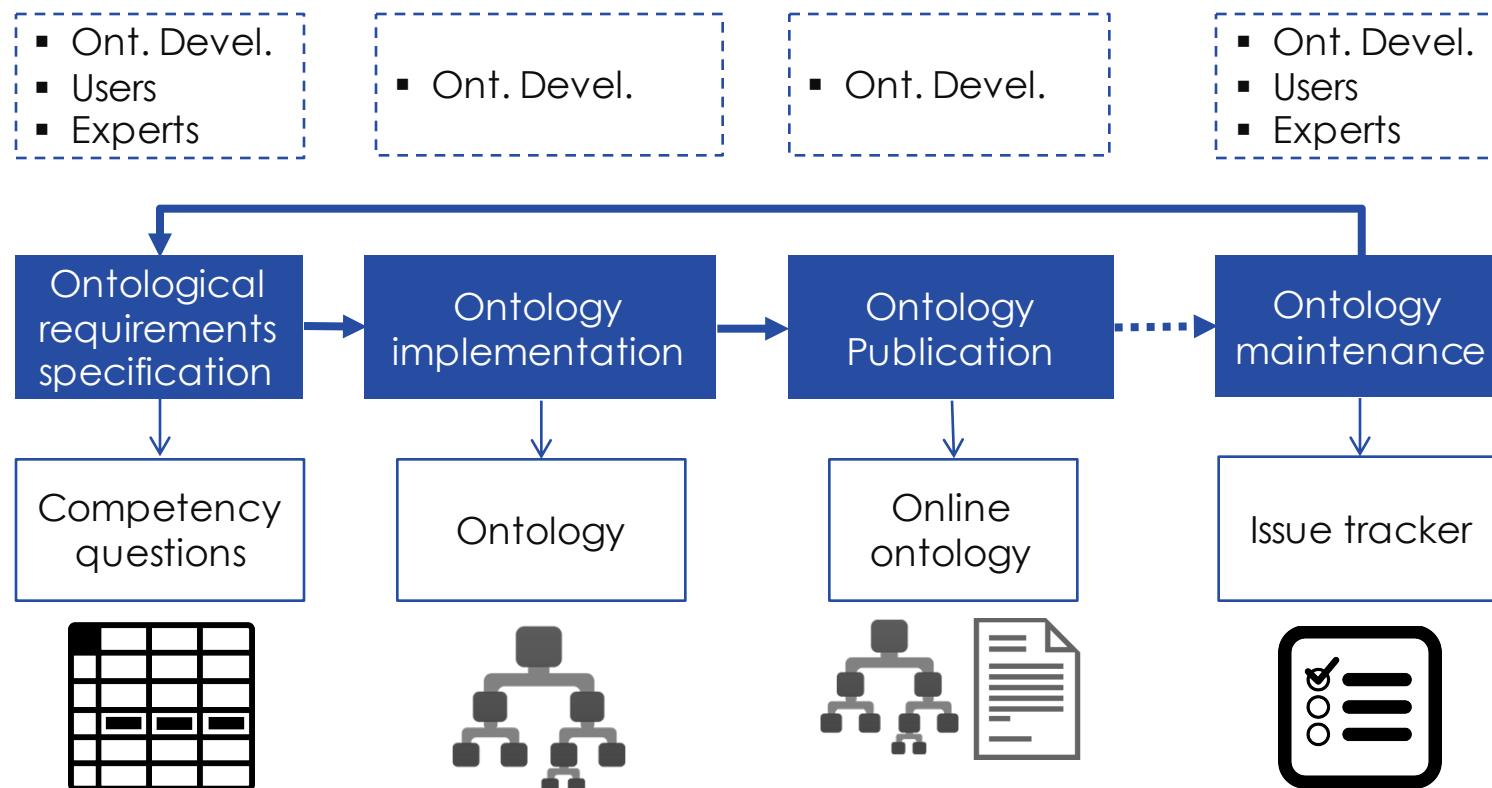
Ontology Publication

Clear current search query, filters, and sorts

Author

- ① 3 Open ✓ 8 Closed
- ⓘ add a queueable attribute to action element #43 by sulio4229 was closed 21 days ago
- ⓘ Erroneous domain definitions #38 by vcharpenay was closed on Jun 12, 2017
- ⓘ Interaction patterns cardinality #30 by mariapoveda was closed on Apr 25, 2017
- ⓘ Delete DigitalRepresentation #20 by mariapoveda was closed on Apr 5, 2017
- ⓘ WoT5 and relation with Thing #5 by mariapoveda was closed on Feb 16, 2017
- ⓘ WoT1 terminology doubt #4 by mariapoveda was closed on Mar 7, 2017
- ⓘ WoT15 #2 by mariapoveda was closed on Feb 16, 2017
- ⓘ WoT11 #1 by mariapoveda was closed on Feb 16, 2017

Ontology development process overview



Aiming at bringing all this together...

Methodology in practice

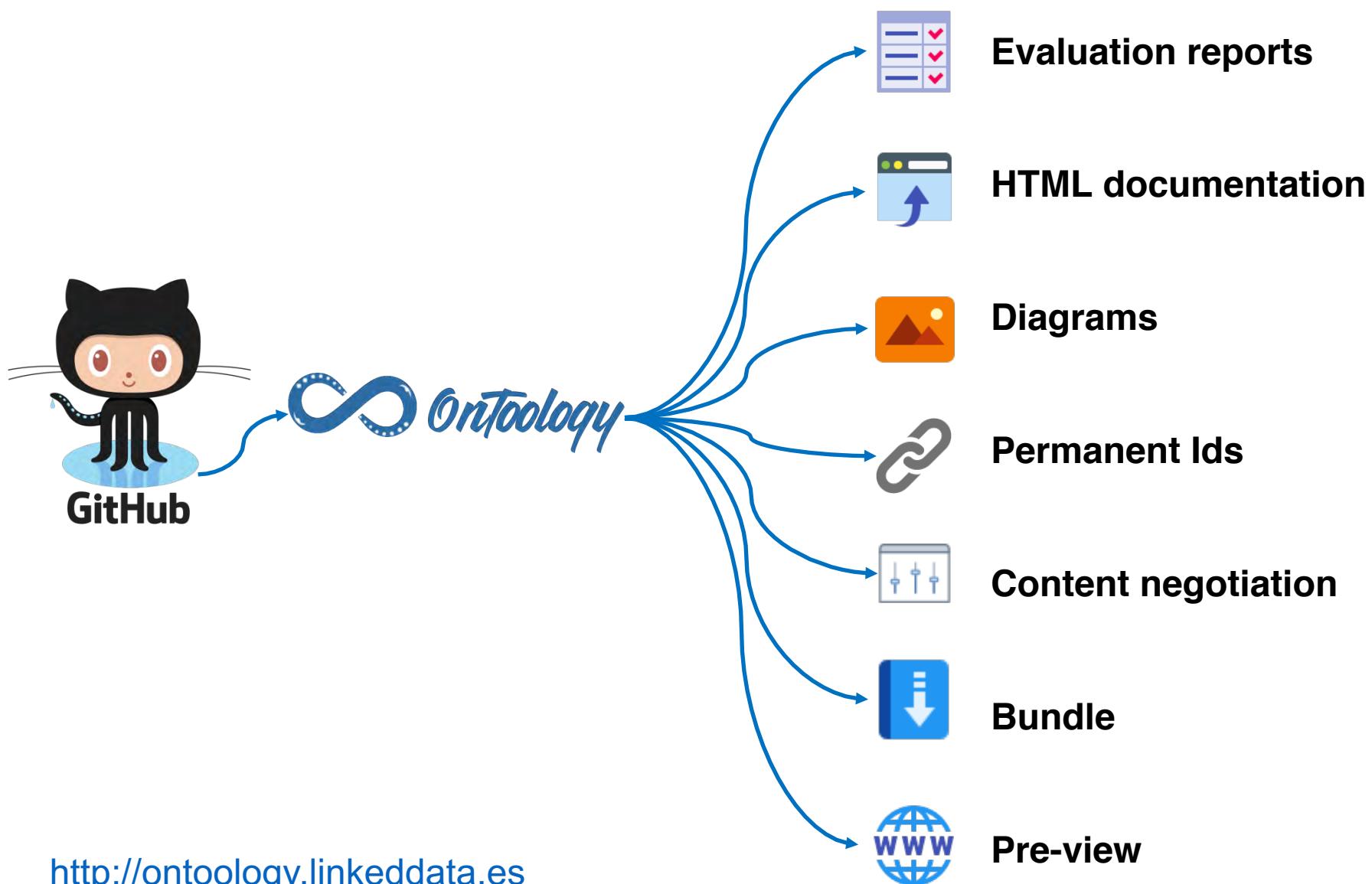
<http://vicinity.io.linkeddata.es/>

The screenshot shows the VICINITY GitHub repository interface. At the top, there are tabs for 'Ontologies', 'Ontology report', and 'Ontology testing'. Below the tabs are several circular icons representing different stages of the methodology: 'Evaluation' (with 'oops!' text), 'Testing' (with gears icon), the VICINITY logo, 'Version control' (with GitHub icon), 'Issue tracker' (with GitHub icon), 'Requirements' (with document and gear icon), and 'Deployment' (with infinity symbol icon). A sidebar on the left has a 'Documentation' section for 'WIDOCO'. The main content area displays a table of ontologies:

Ontology	Description	Repository	Issue tracker	Requirements	Releases
Ontology model for Web of Things ⓘ	This ontology aims to model the Web of Things domain according to the w3c Interest Group (http://w3c.github.io/wot/)	wot-ontology	ontology issues	ontology requirements	ontology releases
Vicinity core model ⓘ	This ontology represent the core terms to allow interoperability in an IoT context based on VICINITY technological solutions.	vicinity-ontology-core	core issues	core requirements	core releases
Vicinity WoT mappings model ⓘ	This ontology represent the mapping definitions between WoT to allow interoperability in an IoT context based on VICINITY ... See more	vicinity-ontology-wot-mappings	mappings issues	mappings requirements	mappings releases
Vicinity adapters model ⓘ	This ontology represents the terms needed to represent the devices involved in the VICINITY pilot cases	vicinity-ontology-adapters	adapters issues		adapters releases
Ontology model for datatypes ⓘ	This ontology aims to model the datatypes commonly used in the Web of Things domain	vicinity-ontology-datatypes	datatypes issues		datatypes releases

This slide has been taken from Raúl García Castro presentation at EMSE

Handle versions and distributed environments



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Add repository to track

user/repo

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Choose one of the below repo by clicking on it

>	mariapoveda/saref-ext	Ready	100.0%						15-Nov-2017
▼	mariapoveda/vicinity-ontology-core	Ready	100.0%						21-Nov-2017
Ontology			Diagrams	Evaluation	Documentation	Publish	Bundle		
			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>				
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Update Configuration								Stop Watching	
>	mariapoveda/vicinity-ontology-wot-mappings	Ready	syntax error in tests/testsuite_requirements.ttl	100.0%					21-Nov-2017
>	mariapoveda/wot-ontology	Ready		100.0%					20-Nov-2017
>	mariapoveda/wot-thing-description	Ready		100.0%					27-Sep-2017
>	mariapoveda/inia-ontology	Ready		100.0%					27-Nov-2017
>	mariapoveda/vocab	Ready		100.0%					20-Nov-2017

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 Contact: ontology (at) delicias.dia.fi.upm.es
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List of user repositories registered in OnToology

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	mariapoveda/saref-ext	Ready	100.0%						15-Nov-2017
	mariapoveda/vicinity-ontology-core	Ready	100.0%						21-Nov-2017
Ontology			Diagrams	Evaluation	Documentation	Publish	Bundle		
ontology/core.ttl			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>				
tests/testsuite_ISOIEC30141.ttl			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
tests/testsuite_SPRINT2.ttl			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Update Configuration								Stop Watching	
	mariapoveda/vicinity-ontology-wot-mappings	Ready	syntax error in tests/testsuite_requirements.ttl	100.0%					21-Nov-2017
	mariapoveda/wot-ontology	Ready		100.0%					20-Nov-2017
	mariapoveda/wot-thing-description	Ready		100.0%					27-Sep-2017
	mariapoveda/inia-ontology	Ready		100.0%					27-Nov-2017
	mariapoveda/vocab	Ready		100.0%					20-Nov-2017

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RDF files management by repository

		Diagrams	Evaluation	Documentation	Publish	Bundle	
▼	mariapoveda/vicinity-ontology-c ore	100.0%					15-Nov-2017
Ontology							
ontology/core.ttl		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	21-Nov-2017
tests/testsuite_ISOIEC30141.ttl		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
tests/testsuite_SPRINT2.ttl		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Update Configuration						Stop Watching	
▶	mariapoveda/vicinity-ontology-wot-mappings	Ready	syntax error in tests/testsuite_requirements.ttl	100.0%			21-Nov-2017
▶	mariapoveda/wot-ontology	Ready		100.0%			20-Nov-2017
▶	mariapoveda/wot-thing-description	Ready		100.0%			27-Sep-2017
▶	mariapoveda/inia-ontology	Ready		100.0%			27-Nov-2017
▶	mariapoveda/vocab	Ready		100.0%			20-Nov-2017

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When the ontology (RDF file) is updated, regenerate:

Choose one of the below repo by clicking on it

> mariapoveda/saref-ext	Ready	100.0%		15-Nov-2017
▼ mariapoveda/vicinity-ontology-c ore	Ready	100.0%		21-Nov-2017
Ontology				
ontology/core.ttl				
tests/testsuite_ISOIEC30141.ttl				
tests/testsuite_SPRINT2.ttl				
Update Configuration				
> mariapoveda/vicinity-ontology-wot-mappings	Ready	syntax error in tests/te stsuite_requirements.t tl 100.0%		21-Nov-2017
> mariapoveda/wot-ontology	Ready	100.0%		20-Nov-2017
> mariapoveda/wot-thing-descrip tion	Ready	100.0%		27-Sep-2017
> mariapoveda/inia-ontology	Ready	100.0%		27-Nov-2017
> mariapoveda/vocab	Ready			0-Nov-2017

Or when forcing the generation of resources

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Publish the ontology under a w3id URI

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	mariapoveda/saref-ext	Ready	100.0%					15-Nov-2017
▼	mariapoveda/vicinity-ontology-c ore	Ready	100.0%					21-Nov-2017
	Ontology		Diagrams	Evaluation	Documentation			
	ontology/core.ttl		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
	tests/testsuite_ISOIEC30141.ttl		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
	tests/testsuite_SPRINT2.ttl		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
			Update Configuration					
▶	mariapoveda/vicinity-ontology-wot-mappings	Ready	syntax error in tests/te stsuite_requirements.t tl	100.0%				21-Nov-2017
▶	mariapoveda/wot-ontology	Ready		100.0%				20-Nov-2017
▶	mariapoveda/wot-thing-descript ion	Ready		100.0%				27-Sep-2017
▶	mariapoveda/inia-ontology	Ready		100.0%				27-Nov-2017
▶	mariapoveda/vocab	Ready		100.0%				20-Nov-2017

Or download the resources needed to publish it in your server

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Generate portal for the ontologies in the repo

user/repo

Go to portal

Watch this repo

Choose one of the below repo by clicking on it

mariapoveda/saref-ext	Ready	<div style="width: 100%;">100.0%</div>		15-Nov-2017
mariapoveda/vicinity-ontology-core	Ready	<div style="width: 100%;">100.0%</div>		21-Nov-2017
Ontology		Diagrams	Evaluation	Documentation
ontology/core.ttl		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
tests/testsuite_ISOIEC30141.ttl		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
tests/testsuite_SPRINT2.ttl		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Update Configuration				Stop Watching
mariapoveda/vicinity-ontology-wot-mappings	Ready	syntax error in tests/testsuite_requirements.ttl <div style="width: 100%;">100.0%</div>		21-Nov-2017
mariapoveda/wot-ontology	Ready	<div style="width: 100%;">100.0%</div>		20-Nov-2017
mariapoveda/wot-thing-description	Ready	<div style="width: 100%;">100.0%</div>		27-Sep-2017
mariapoveda/inia-ontology	Ready	<div style="width: 100%;">100.0%</div>		27-Nov-2017
mariapoveda/vocab	Ready	<div style="width: 100%;">100.0%</div>		20-Nov-2017

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- Since 2015
- **531 ontologies from 113 repositories**
- Some examples:
 - opencitydata/medio-ambiente-contaminacion-acustica
 - opencitydata/medio-ambiente-calidad-aire
 - mariapoveda/wot-ontology
 - vcharpenay/wot-ontology
 - jpcik/medred
 - marianofl1971/dul-es
 - GeorgFerdinandSchneider/bot
 - ...



- Which approaches could be adopted from SE? And which ones just do not fit?
- What could be done to bridge the gap between ontologies and software developers?

Thanks for your attention!

 mpoveda@fi.upm.es

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 [thepetiteontologist](https://thepetiteontologist.wordpress.com)

 [@MariaPovedaV](https://twitter.com/MariaPovedaV)

 [mariapoveda](https://github.com/mariapoveda)

 [MariaPovedaVillalon](https://github.com/MariaPovedaVillalon)