WoT ontology development & current status (v0.0.6)

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17st May, 2017
Osaka F2F (remote)

Ontology Engineering Group

Created in1995

Directors: A. Gómez-Pérez, O. Corcho

Position: 8th in the UPM ranking (200 groups)

Research Group (30 people)

- 2 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+ Past Collaborators

50+ Past Visitors

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

https://github.com/oeg-upm

@oeg-upm

Ontology Engineering Group

- Created in1995
- 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
  - **Awards: SUR IBM Watson**
- **Publications**
  - 106 journals
  - 362 International conferences and book chapters
  - 7 Books
- **Impact of publications H-index**
  - Asunción Gómez-Pérez (h:50, citations 15025)
  - Oscar Corcho García (h: 36, citations 8258)
- **Services to the Spanish community**
  - **Host esDbpedia**
  - **Host linkeddata.es**

DBpedia español

- Awards and Prizes
  - Ada Byron, Fujitsu, Open data, ISWC
  - 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, AENOR, 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
- Collaboration with COM (Center Open Middleware)

VICINITY - vision and Objectives

http://vicinity2020.eu/

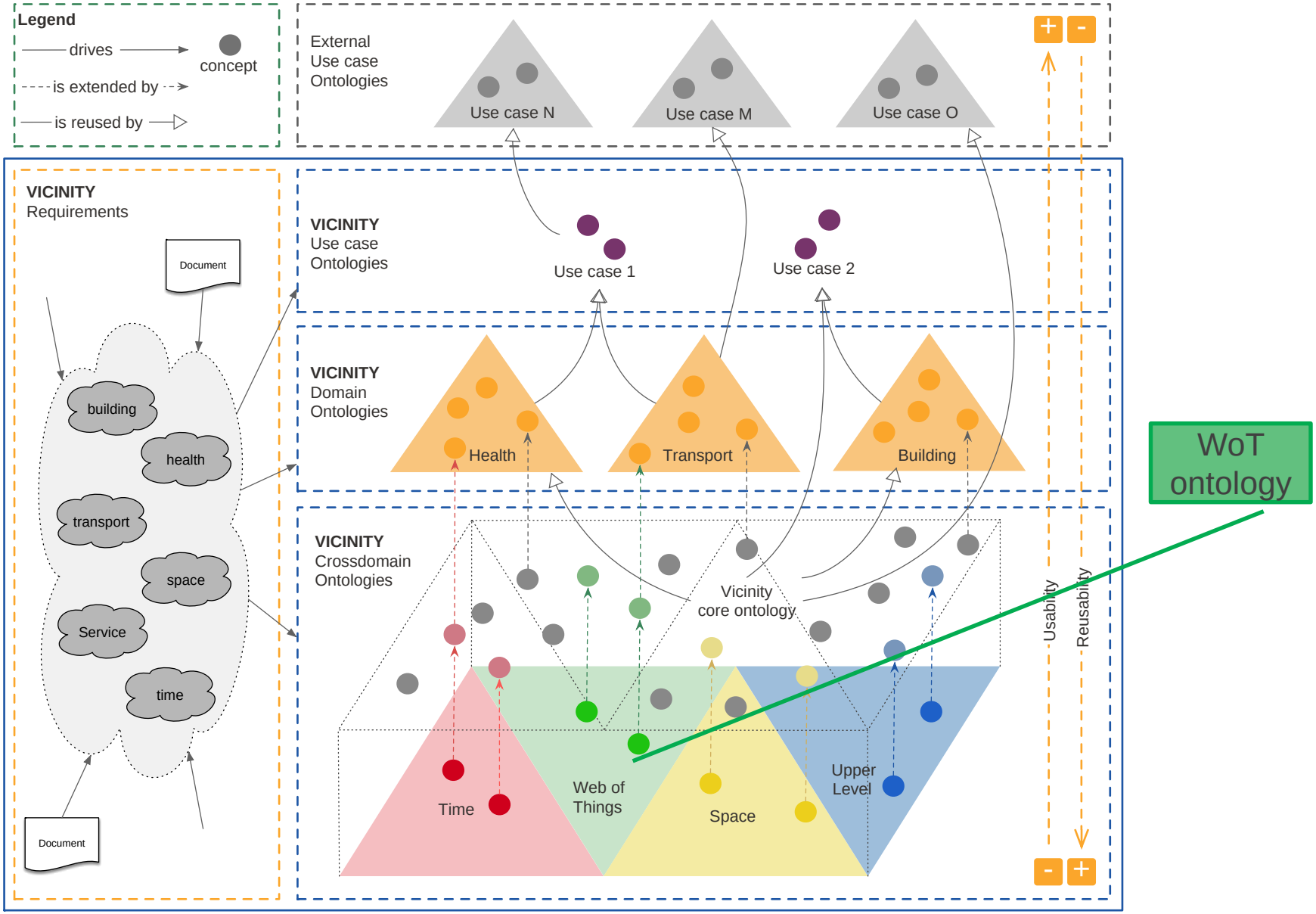
VICINTY's vision is to

- provide **"Interoperability" as a service**
- create a platform for domain-crossing, **value-added services**

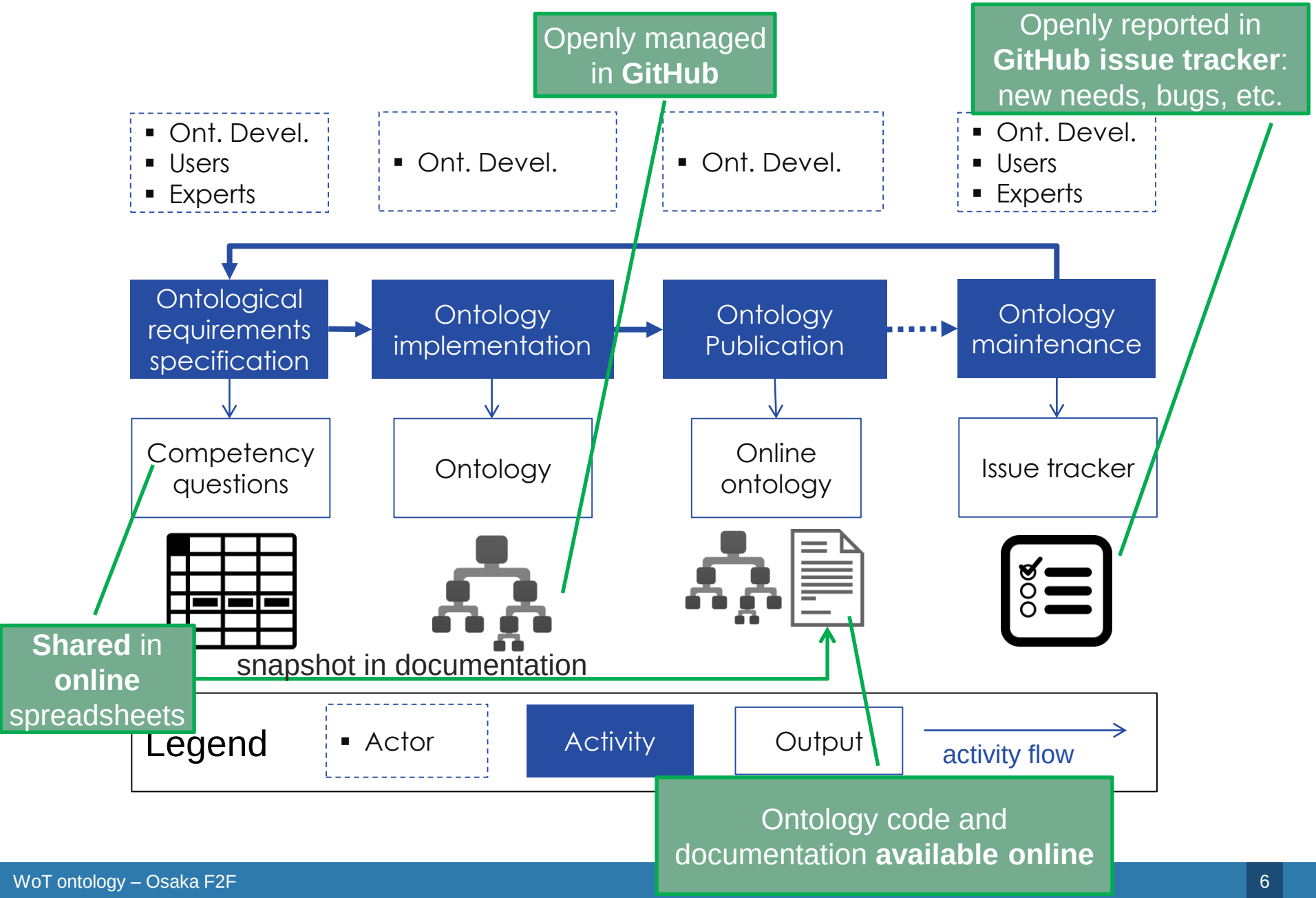
by building and demonstrating a

- **bottom-up** ecosystem of **decentralised interoperability** of IoT infrastructures called **virtual neighbourhood,**
- like social network for things, enabling **value added services**
  - where users can **share** the access to their smart objects **without losing the control** over them
  - where **x-domain services and buisiness models** can be established

VICINITY ontology network

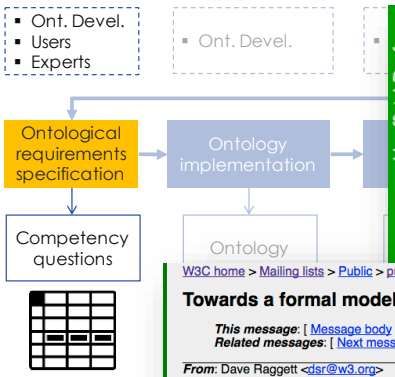


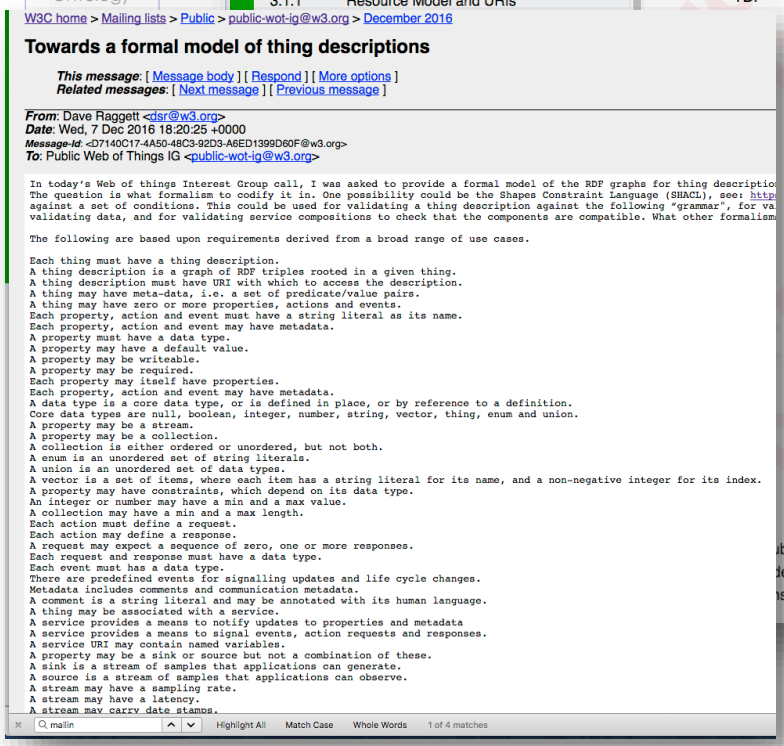
Ontology development process overview

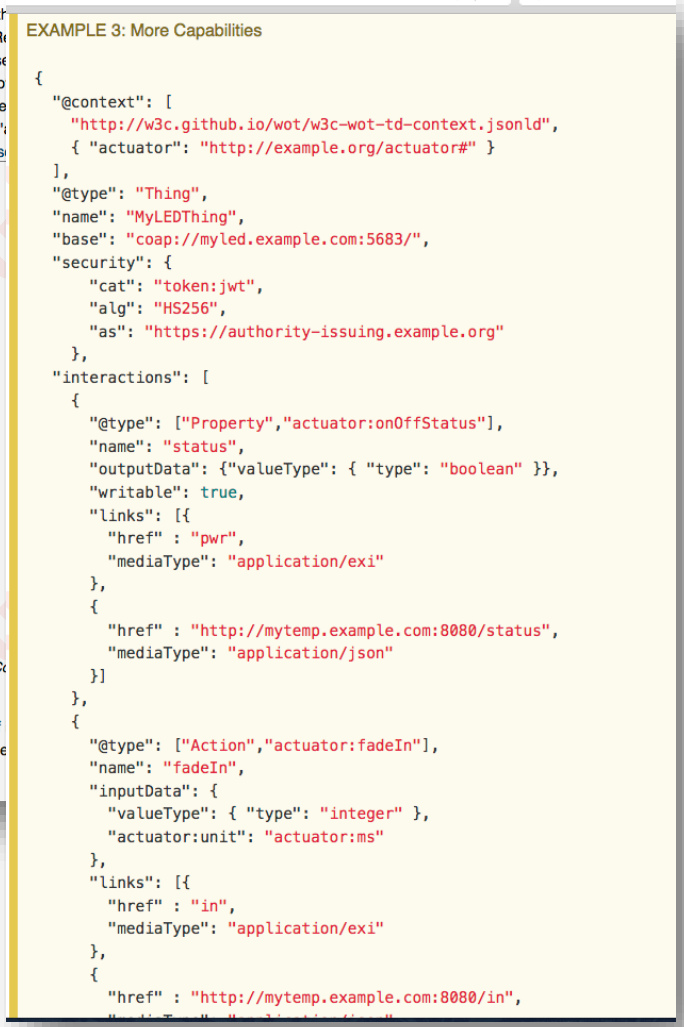


Requirements from WoT WG

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

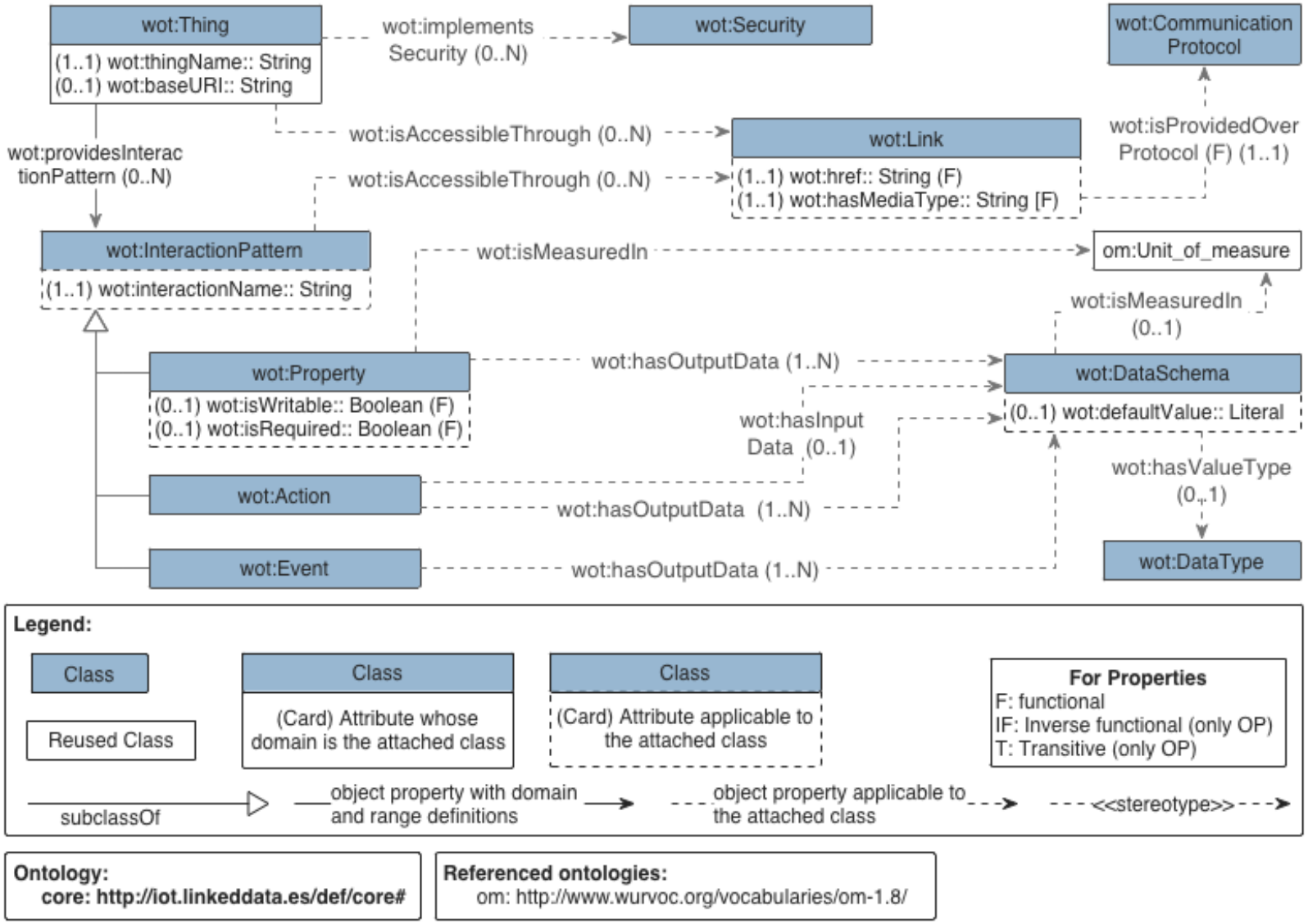




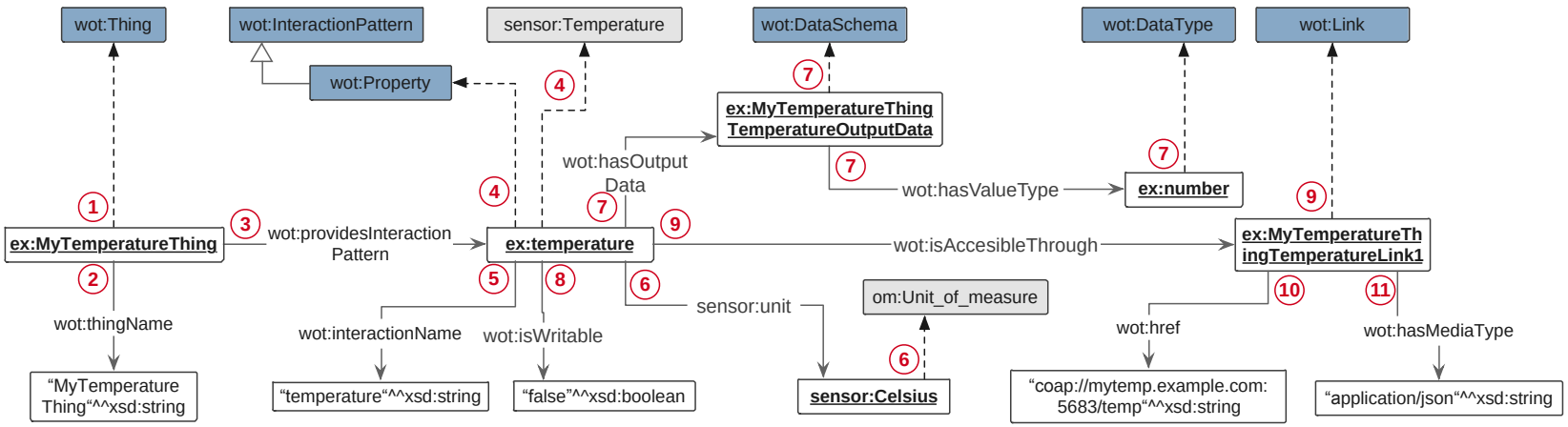


https://lists.w3.org/Archives/Public/public-wot-ig/2016Dec/0016.html

WoT ontology 0.0.6



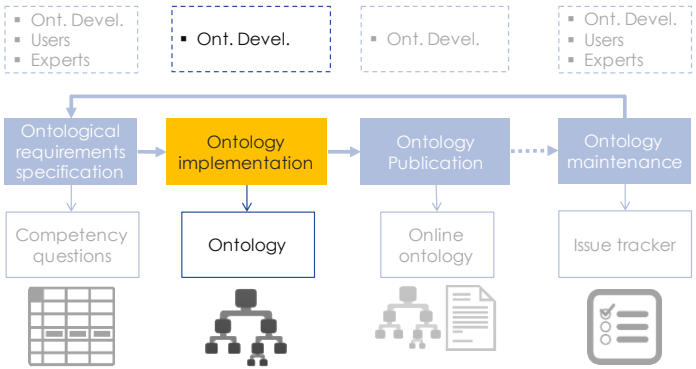
Example



EXAMPLE 2: Semantic Annotations

```
{
"@context": ["http://w3c.github.io/wot/w3c-wot-td-context.jsonld",
                        { "sensor": "http://example.org/sensors#" }
                       ],
1 "@type": "Thing",
2 "name": "MyTemperatureThing",
3 "interactions": [
    {
    4 "@type": ["Property","sensor:Temperature"],
    5 "name": "temperature",
    6 "sensor:unit": "sensor:Celsius",
    7 "outputData": {"valueType": { "type": "number" }},
    8 "writable": false,
    9 "links": [{
      10 "href" : "coap://mytemp.example.com:5683/",
      11 "mediaType": "application/json"
        }]
    }
  ]
}
```

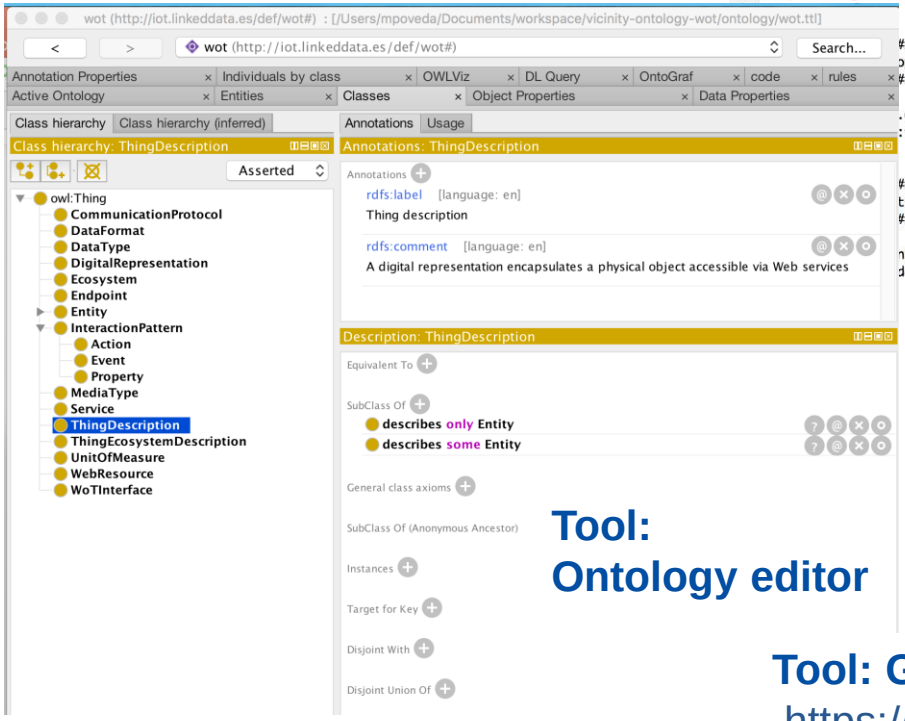
WoT Ontology implementation



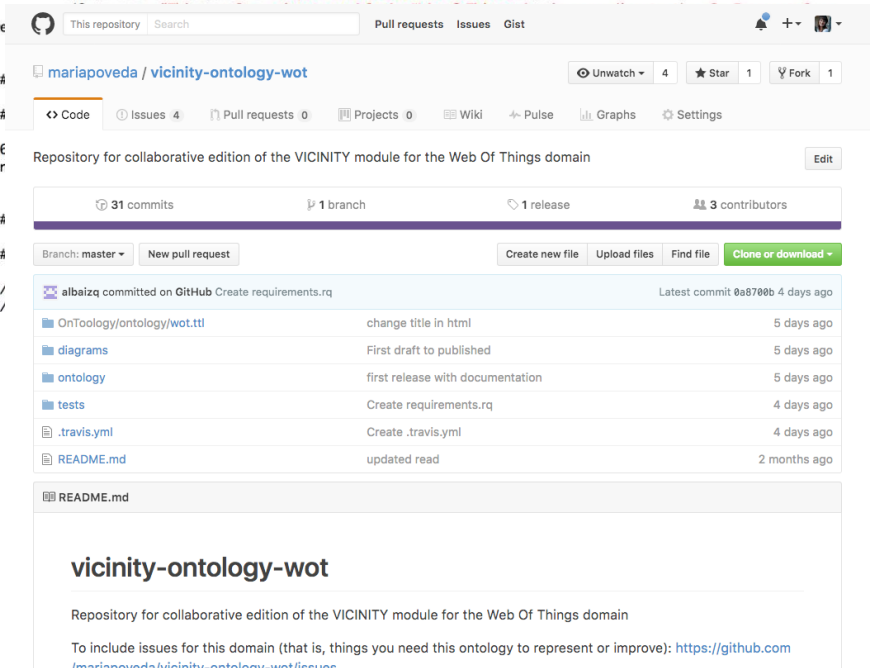

```
@prefix : <http://iot.linkeddata.es/def/wot#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix vs: <http://www.w3.org/2003/06/sw-vocab-status/ns#> .
@prefix geo: <http://www.w3.org/2003/01/geo/wgs84_pos#> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix wot: <http://xmlns.com/wot/0.1/> .
@prefix xml: <http://www.w3.org/XML/1998/namespace> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix vann: <http://purl.org/vocab/vann/> .
@prefix saref: <https://w3id.org/saref#> .
@prefix dcterms: <http://purl.org/dc/terms/> .
@base <http://iot.linkeddata.es/def/wot#> .

<http://iot.linkeddata.es/def/wot#> rdf:type owl:Ontology ;
                                    dcterms:creator <http://purl.org/net/mpoveda> ;
                                    dc:title "Vicinity model for Web of Things"@en ;
                                    dcterms:creator <http://www.garcia-castro.com/foaf.rdf#me> ;
                                    vann:preferredNamespacePrefix "wot" ;
                                    dcterms:license <http://purl.org/NET/rdflicense/cc-by4.0> ;
                                    owl:versionInfo "1.0" ;
                                    vann:preferredNamespaceUri "http://iot.linkeddata.es/def/wot" ;
```

Output: Ontology code



Tool: Ontology editor

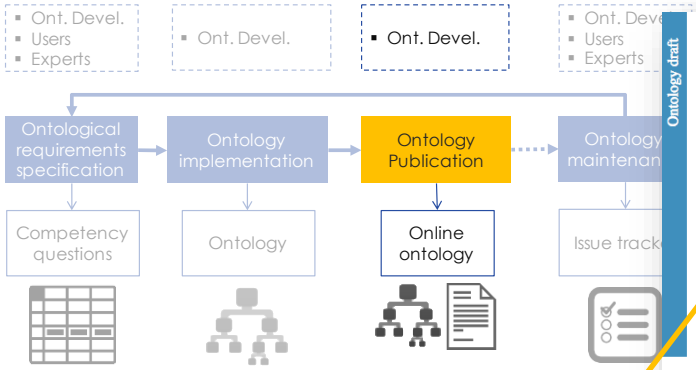


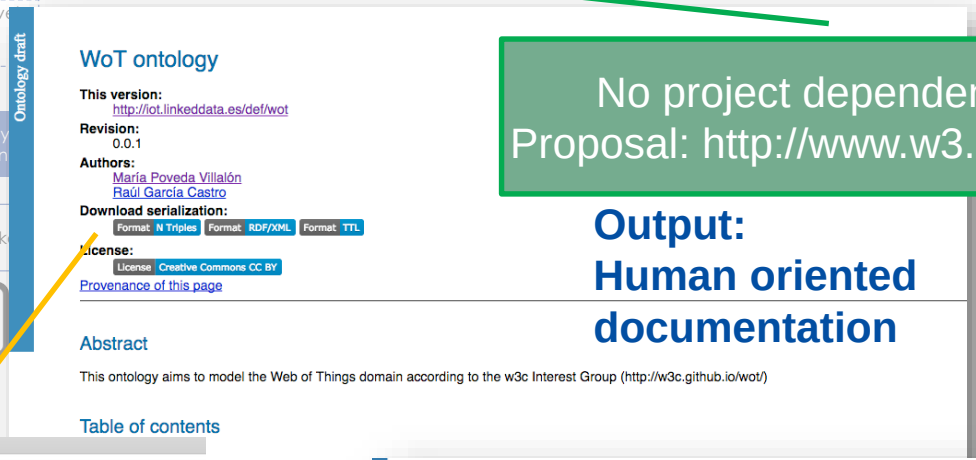
Tool: GitHub repository

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

WoT ontology publication (so far)

http://iot.linkeddata.es/def/wot/





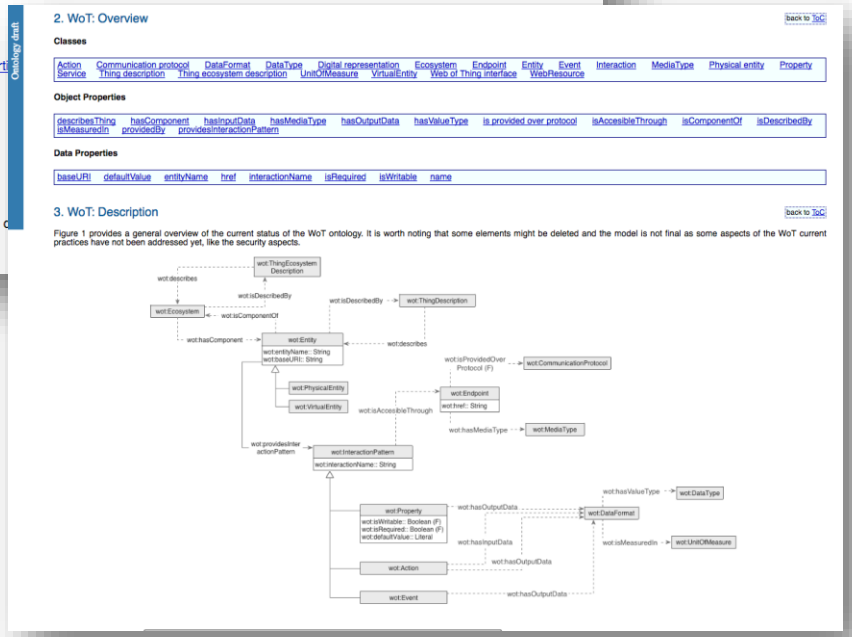
No project dependencies.
Proposal: http://www.w3.org/ns/td#

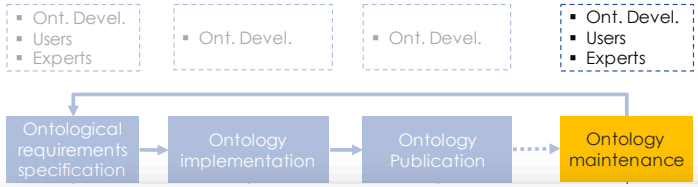
Output:
Human oriented documentation

Ontology code

```
Close                                   Live Find                Advanced Find
 1 @prefix : <http://iot.linkeddata.es/def/wot#> .
 2 @prefix dc: <http://purl.org/dc/elements/1.1/> .
 3 @prefix vs: <http://www.w3.org/2003/06/sw-vocab-status/ns#> .
 4 @prefix geo: <http://www.w3.org/2003/01/geo/wgs84_pos#> .
 5 @prefix owl: <http://www.w3.org/2002/07/owl#> .
 6 @prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
 7 @prefix wot: <http://xmlns.com/wot/0.1/> .
 8 @prefix xml: <http://www.w3.org/XML/1998/namespace> .
 9 @prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
10 @prefix foaf: <http://xmlns.com/foaf/0.1/> .
11 @prefix prov: <http://www.w3.org/ns/prov#> .
12 @prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
13 @prefix vann: <http://purl.org/vocab/vann/> .
14 @prefix saref: <https://w3id.org/saref#> .
15 @prefix dcterms: <http://purl.org/dc/terms/> .
16 @base <http://iot.linkeddata.es/def/wot#> .
17
18 <http://iot.linkeddata.es/def/wot#> rdf:type owl:Ontology ;
19                                      dcterms:creator <http://purl.org/net/mpoveda> ;
20                                      dc:title "Vicinity model for Web of Things"@en ;
21                                      dcterms:creator <http://www.garcia-castro.com/foaf.rdf#me> ;
22                                      vann:preferredNamespacePrefix "wot" ;
23                                      dcterms:license <http://purl.org/NET/rdflicense/cc-by4.0> ;
24                                      owl:versionInfo "1.0" ;
25                                      vann:preferredNamespaceUri "http://iot.linkeddata.es/def/wot" ;
26                                      rdfs:comment "This ontology aims to model the Web of Things domain according to the w3c Interest Grou
 (http://w3c.github.io/wot/)"@en ;
27                                      dc:publisher <http://www.oeg-upm.net/> .
28
29 ################################################################
30 #    Annotation properties
31 ################################################################
32
33 ###  http://www.w3.org/2003/06/sw-vocab-status/ns#term_status
34 vs:term_status rdf:type owl:AnnotationProperty .
35
36
37 ################################################################
38 #    Object Properties
39 ################################################################
40
41 ###  http://iot.linkeddata.es/def/wot#describes
42 <http://iot.linkeddata.es/def/wot#describes> rdf:type owl:ObjectProperty ;
43                                               owl:inverseOf <http://iot.linkeddata.es/def/wot#isDescribedBy> ;
44                                               rdfs:label "describesThing"@en .
```

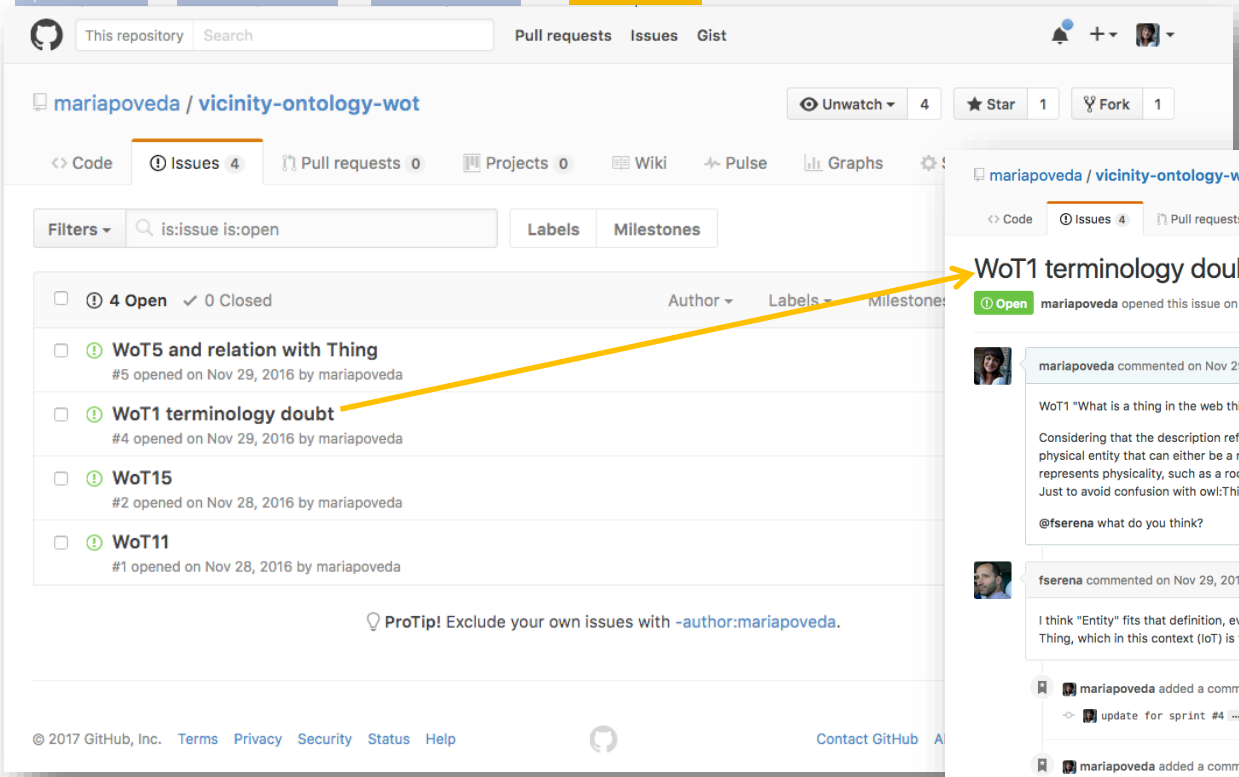
Output:
Machine oriented code

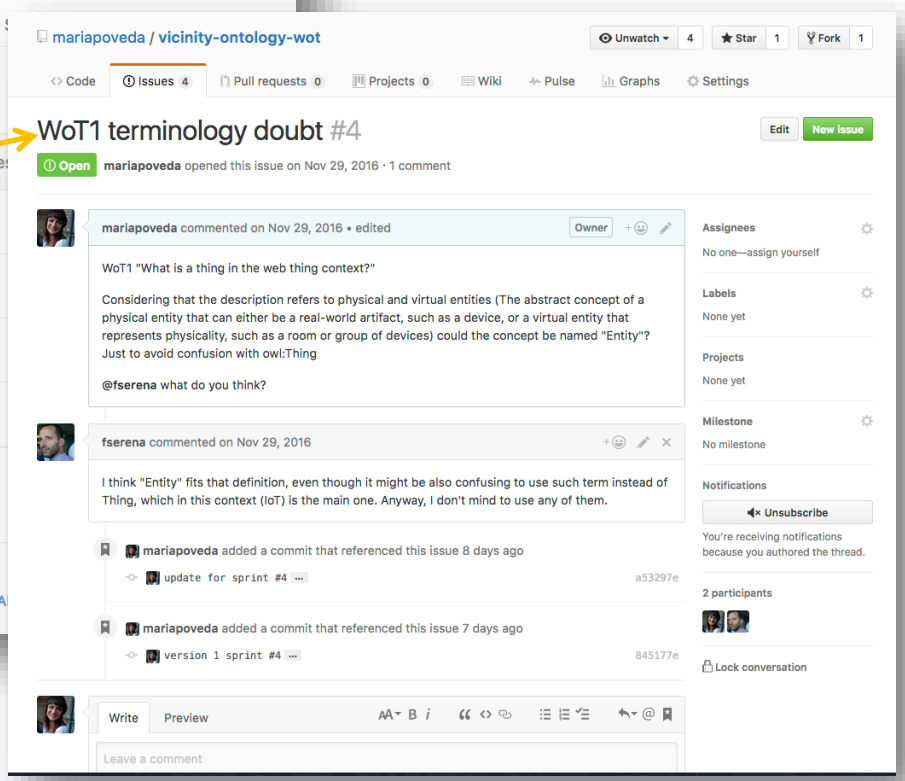




Tool: GitHub issue tracker

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





WoT evolution

- **Done**
  - Remove
    - Physical thing, Virtual thing, Relative endpoint, Thing description ecosystem (VICINITY concept),
  - Rename
    - Data schema (data format), Link (endpoint),
  - Add
    - Security (not described yet)
  - Changed model
    - Default value (Property → DataSchema), Media type (concept → datatype), added cardinalities
- Next steps: Currently discussing
  - Need of communication protocol?
  - Model types?
  - Coupling IG JSON model with ontology conceptual model?
    - Rename properties?
    - Not following OE good practices vs space reducing in TD?
  - Security

Questions?

Thanks for you attention

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