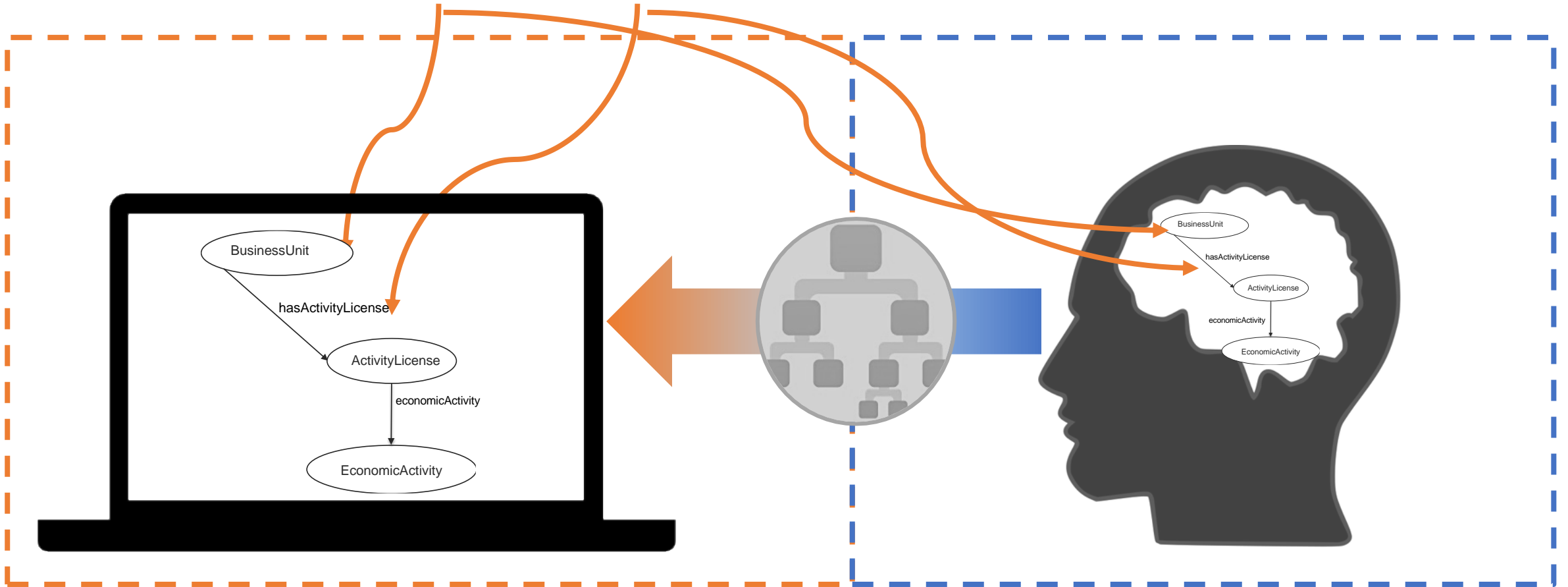




Ontology Registries: current developments and opportunities

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

A vocabulary defines the **concepts** and **relations** used to describe and represent a **domain** of interest



○ Increase interoperability

○ Reduce development time & resources

Within organizations (e.g. OEG)



AURORAL

Here you can find the list of ontologies developed for AURORAL project.
If you want to contribute developing ontologies please follow the [guidelines](#) we provide

Ontology	Description	Requirements	Repository	Issue tracker	Releases	Payloads
AURORAL Core ontology	This ontology aims to model the ETL data exchanged for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Core Payloads
AURORAL Privacy	This ontology aims to model the data privacy for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Privacy Payloads
AURORAL Tourism	This ontology aims to model the tourism data domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Tourism Payloads
AURORAL Adapters	This ontology aims to model the adapters domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Adapters Payloads
AURORAL Marketplace	This ontology aims to model the marketplace domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Market Payloads
AURORAL Biomass	This ontology aims to model the biomass domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Biomass Payloads
AURORAL Logistic	This ontology aims to model the logistic domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Logistic Payloads
AURORAL Energy	This ontology aims to model the energy domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Energy Payloads
AURORAL Car-booking	This ontology aims to model the car booking domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Car-booking Payloads
AURORAL Mobility	This ontology aims to model the Transportation domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Mobility Payloads
AURORAL Farming	This ontology aims to model dairy production of cows for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Farming Payloads
AURORAL Cell-tower	This ontology aims to model the cell tower domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Cell-tower Payloads
AURORAL EV-charger	This ontology aims to model the electrical vehicle charger domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	EV-charger Payloads

Developed by Ontology Engineering Group
Built with Sissotools from OntoGraf
Latest revision July 2021
© Ontology Engineering Group

Specific portals per project, organization



○ Increase interoperability

○ Reduce development time & resources

Home SAREF core Extensions Sources & Issues SmartM2M

ex_device

Smart Applications REFerence Ontology, and extensions

Official ETSI portal for SAREF
This portal contains pointers to the SAREF ontologies and SAREF-related work items.

What is SAREF?

The Smart Applications REFerence (SAREF) ontology is a shared model of consensus that facilitates the matching of existing assets in the smart applications domain.

SAREF provides building blocks that allow separation and recombination of different parts of the ontology depending on specific needs.

Why SAREF?

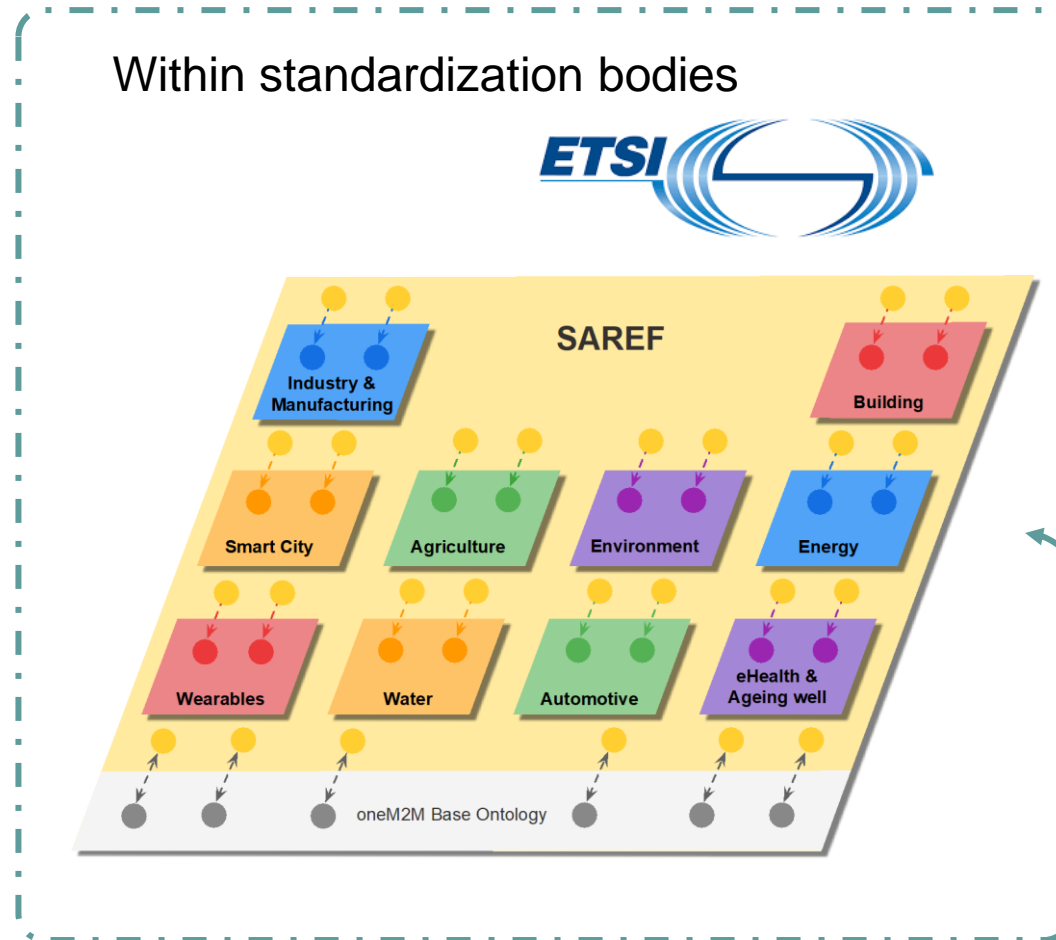
SAREF explicitly specifies recurring core concepts in the smart applications domain, the main relationships between these concepts, and axioms to constrain the usage of these concepts and relationships. SAREF has been created based on the following fundamental principles:

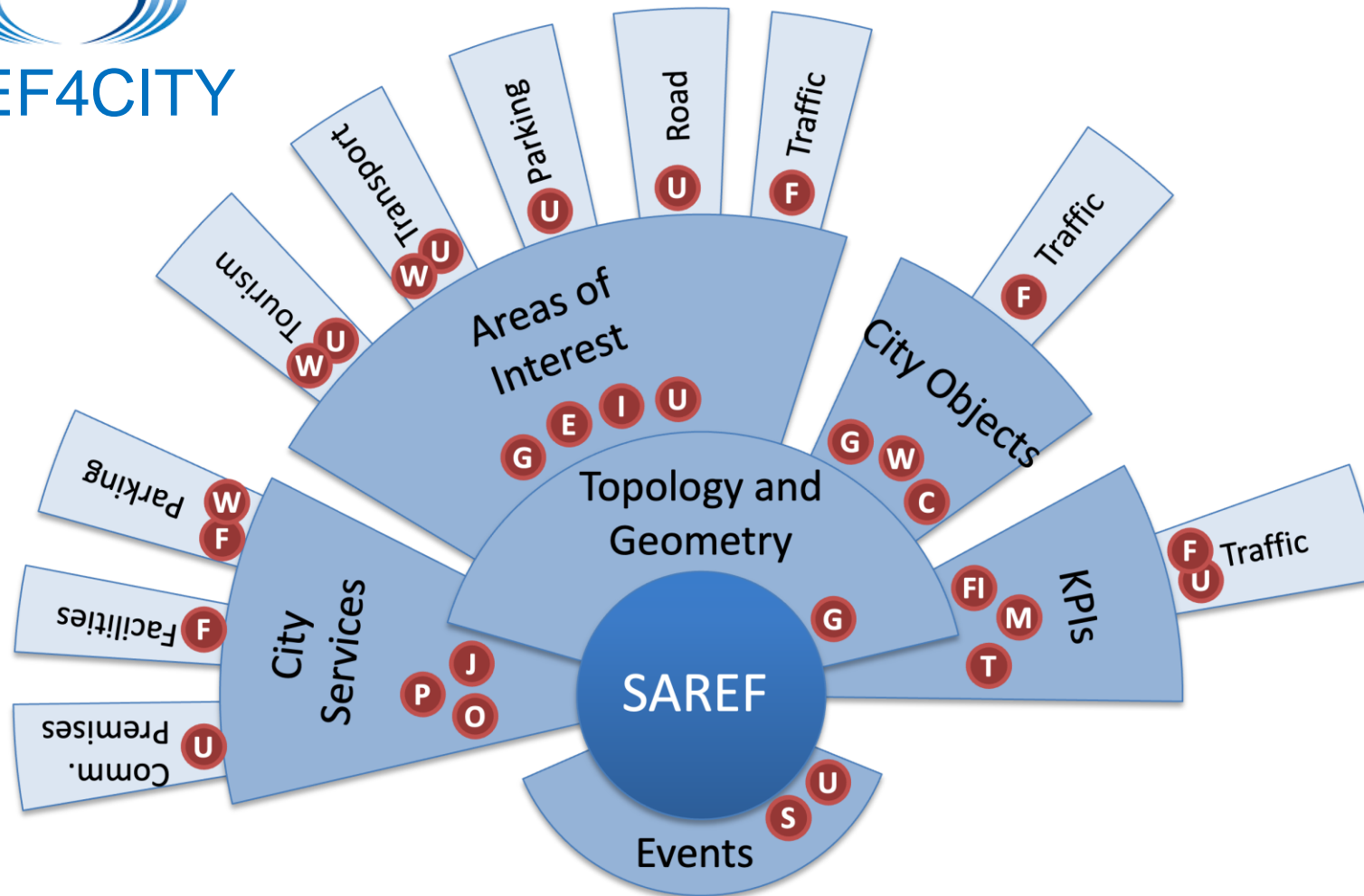
- **Reuse and alignment** of concepts and relationships that are defined in existing assets
- **Modularity** to allow separation and recombination of different parts of the ontology depending on specific needs
- **Extensibility** to allow further growth of the ontology
- **Maintainability** to facilitate the process of identifying and correcting defects, accommodate new requirements, and cope with changes in parts of SAREF

Figure 1 shows an overview of the main classes of SAREF and their relationships.

Figure 1: Overview of the SAREF ontology

Within organizations (e.g. UCL)



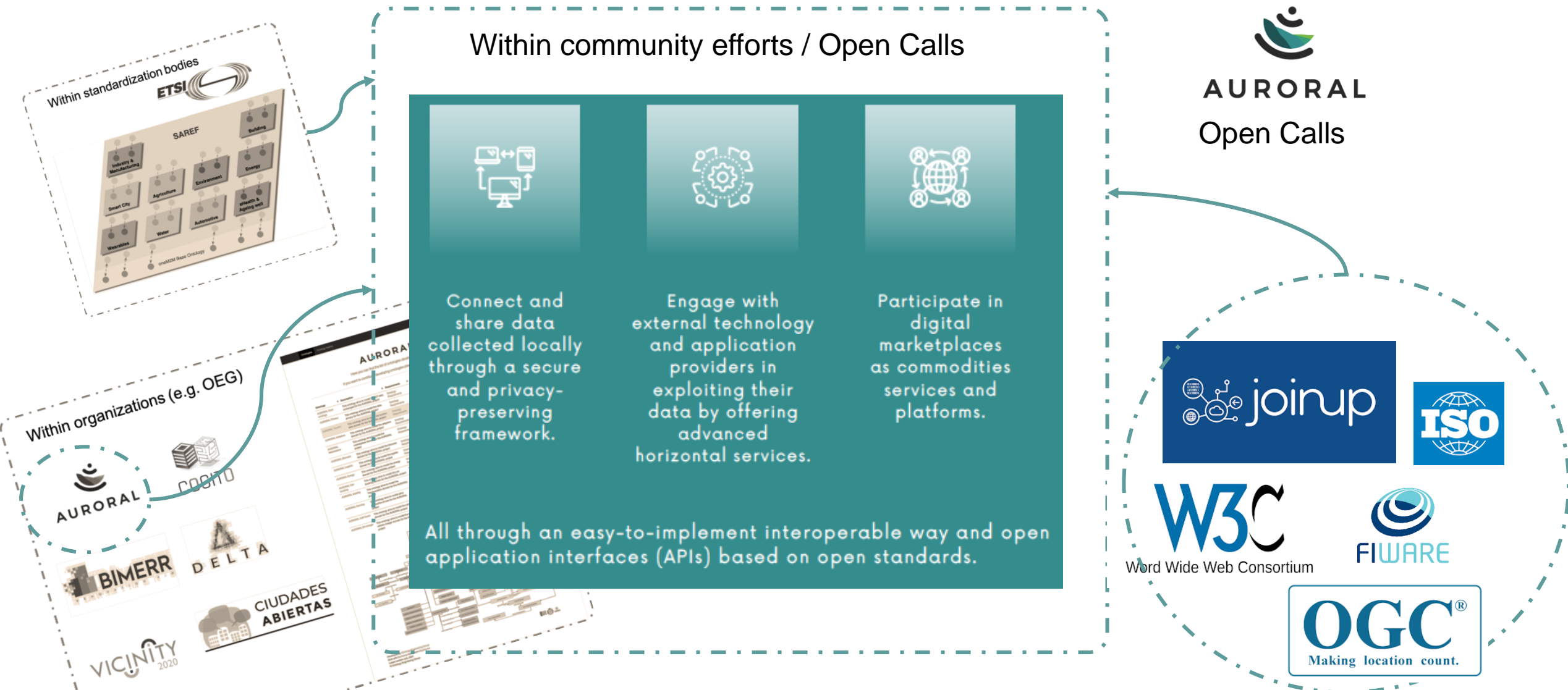


Requirements:

- E** EU Metadata Registry
- F** FEMP Open Data Guide exemplary datasets
- FI** FIWARE data model for KPIs
- I** ISA Programme Location Core Vocabulary
- J** Joinup Core Public Organization Vocabulary
- P** Joinup Core Public Service Vocabulary
- C** OGC CityGML
- G** OGC GeoSPARQL
- S** schema.org
- U** Vocabulary referenced by AENOR UNE 178301:2015
- O** W3C Registered Organization Vocabulary
- W** W3C WGS84 Geo Positioning vocabulary
- M** ISO/IEC 30182:2017
- T** ITU-T Y.4903/L.1603 (10/2016)

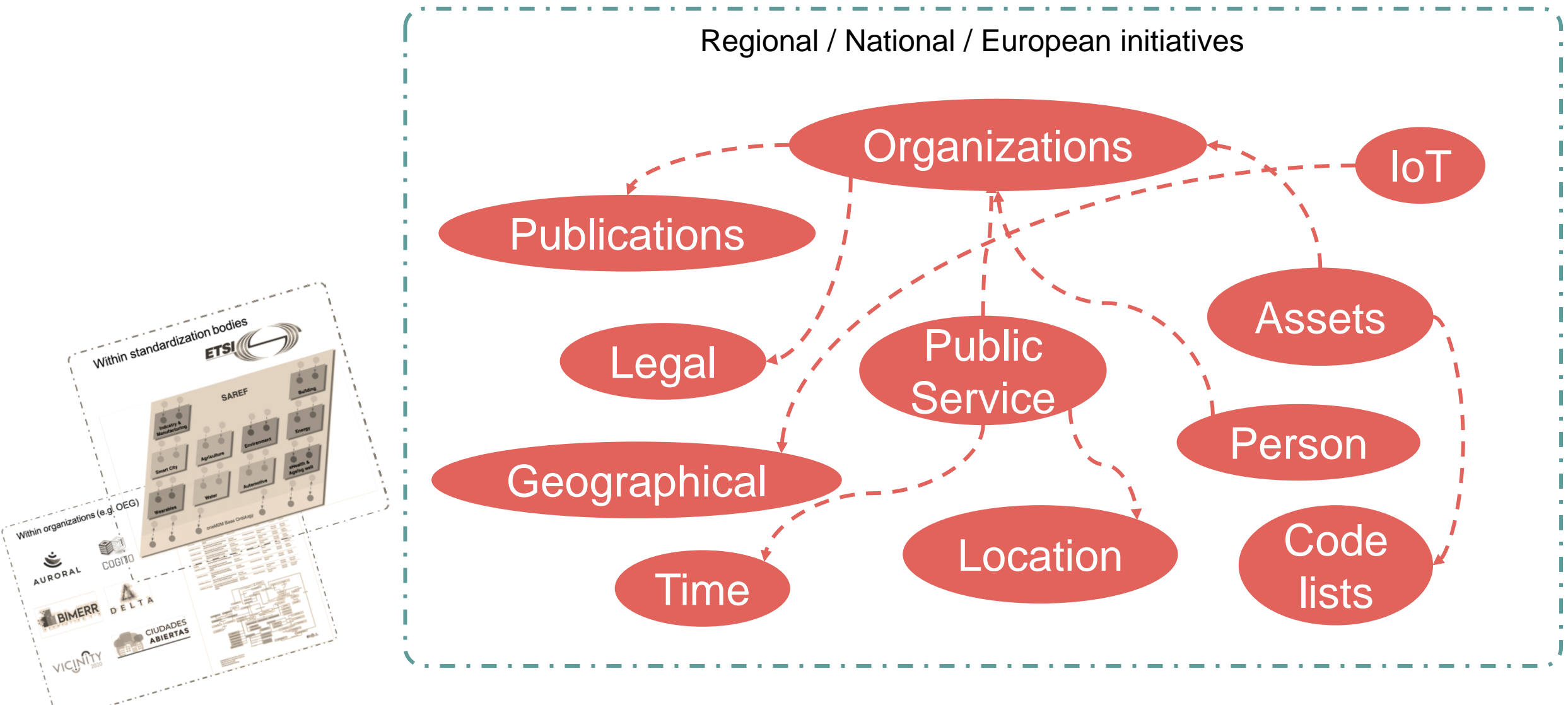
○ Increase interoperability

○ Reduce development time & resources

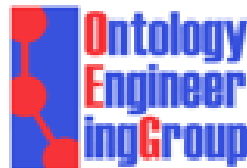


○ Increase interoperability

○ Reduce development time & resources



- Mission: promote and facilitate the **reuse** of **well documented** vocabularies in the Linked Data ecosystem
- Vocabularies registry and index
 - <http://lov.linkeddata.es/>
- Datalift (original project)
 - <http://datalift.org/>
- Started at 2011
- Hosted by OEG



A screenshot of the Linked Open Vocabularies (LOV) website. The page has a white header with navigation links: VOCABS, TERMS, AGENTS, and SPARQL/DUMP. Below the header is a teal banner with the text "Linked Open Vocabularies (LOV)". Underneath the banner is a row of buttons: "+ Suggest", "Documentation", "G+ Follow", a search bar, and a user profile icon. The main content area features a large circular bubble chart titled "595 Vocabularies in LOV". The chart shows various vocabularies as bubbles of different sizes and colors, with larger bubbles labeled "vann", "foaf", "skos", "dcterms", "dce", "cc", "vs", "schema", "geo", "prov", "gr", "event", "time", "void", "org", "bibo", "adms", "scypa", "san", "ob", "stoa", "tbr", "gr", "foaf", "vann", "skos", "dcterms", "dce", "cc", "vs", "schema", "geo", "prov", "gr", "event", "time", "void", "org", "bibo", "adms", "scypa", "san", "ob", "stoa", "tbr", "gr". To the right of the chart is a section titled "Latest insertion" with a list of recent additions, including "losp - Linked open specialties RF" (2017-03-09), "san-lod - SAN Ontologia" (2017-02-07), "sto - I40 Standards Landscape Vocabulary" (2017-01-29), "rami - rami - Reference Architecture Model" (2017-01-29), and "ami - AutomationML Ontology" (2017-01-28). Below this is a "Latest Updates" section with similar information. At the bottom of the main content area is a "Category Tags" section with a grid of tags: Methods, Metadata, Catalogs, Support, Geography, API, Society, Quality, RDF, Industry, Services, People, Vocabularies, Environment, General & Upper, Time, IoT, Events, Geometry, Multimedia, FRBR, Biology, W3C Rec, SPAR, Government, PLM, Academy, eBusiness, Tag, Travel. The footer of the page is dark grey and contains the "Linked Open Vocabularies" logo, a "DOCUMENTATION" section with links to About, API documentation, Source code, and Contact, a "PUBLICATION" section with links to Semantic Web Journal '16, ERCIM News '14, and Library Hi Tech '13, and the Open Knowledge Foundation logo with the text "Hosted by the Open Knowledge Foundation".



VOCABS

TERMS

AGENTS

SPARQL/DUMP

+

Suggest

Documentation

g+

Follow

Search

Avatar

595 Vocabularies in LOV



Latest insertion

losp - Linked open specialties RF

2017-03-09

san-lod - SAN Ontologia

2017-02-07

sto - I40 Standards Landscape Vocabulary

2017-01-29

rami - rami - Reference Architecture Model

2017-01-29

ami - AutomationML Ontology

2017-01-26

Latest Updates

losp - Linked open specialties 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 Landscape Vocabulary

2017-01-29

Category Tags

Methods

Metadata

Catalogs

Support

Geography

API

Society

Quality

RDF

Industry

Services

People

Vocabularies

Environment

General & Upper

Time

IoT

Events

Geometry

Multimedia

FRBR

Biology

W3C Rec

SPAR

Government

PLM

Academy

eBusiness

Tag

Travel

Data Catalog Vocabulary (dcat)

Metadata

URI	http://www.w3.org/ns/dcat
Namespace	http://www.w3.org/ns/dcat#
homepage	http://www.w3.org/TR/vocab-dcat/
Description	DCAT is an RDF vocabulary designed to facilitate interoperability between data catalogs published on the Web @en
Language	<div>Arabic</div> <div>Greek</div> <div>English</div> <div>Spanish</div> <div>French</div> <div>Japanese</div>
Contributor	<div>Richard Cyganiak</div> <div>Phil Archer</div> <div>Fadi Maali</div>



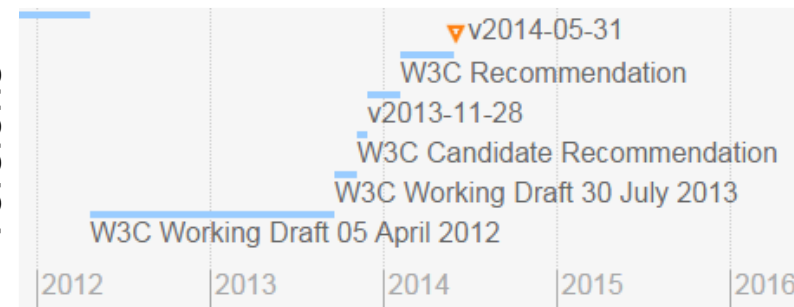
Connection
with other
applications



Relationships



Versions



TERMS

Train Stop

149 results

transit:stop (transit) <small>4,036,585 occurrences in 3 LOD datasets http://vocab.org/transit/terms/stop</small> rdfs:label Stop @en rdfs:comment The physical stop associated with this service stop. @en localName stop	0.608
igdo:RailwayHalt (igdo) <small>n/a (see in LOD) http://linkedgeodata.org/ontology/RailwayHalt</small> rdfs:label Trajinihi Stop @ain rdfs:label Arrêt de train @fr rdfs:label Train Stop @en-gb	0.556
transit:sequence (transit) <small>4,044,842 occurrences in 3 LOD datasets http://vocab.org/transit/terms/sequence</small> rdfs:comment A sequence number for a stop along a route or @en	0.460
transit:routeStop (transit) <small>8,238 occurrences in 2 LOD datasets http://vocab.org/transit/terms/routeStop</small> rdfs:label Route Stop @en rdfs:comment Links a route to a particular stop and the, sequence of that stop in the route. @en localName routeStop	0.359
transit:arrivalTime (transit) <small>3,943,133 occurrences in 1 LOD datasets http://vocab.org/transit/terms/arrivalTime</small> rdfs:comment the stop. The time is measured from "noon minus 12h., Services that span multiple dates will have stop., on the following day, the stop times would be 22:30:00 and 26:15:00. @en	0.335
transit:departureTime (transit) <small>3,942,908 occurrences in 1 LOD datasets http://vocab.org/transit/terms/departureTime</small> rdfs:comment stop. The time is measured from "noon minus 12h., Services that span multiple dates will have stop times, the following day, the stop times would be 22:30:00 and 26:15:00. @en	0.335
transit:RouteStop (transit) <small>3,992 occurrences in 2 LOD datasets http://vocab.org/transit/terms/RouteStop</small> rdfs:label Route Stop @en localName RouteStop	0.330
transit:Stop (transit) <small>3,888 occurrences in 2 LOD datasets http://vocab.org/transit/terms/Stop</small> rdfs:label Transit Stop @en localName Stop	0.330
dbpedia-owl:Train (dbpedia-owl) <small>n/a (see in LOD) http://dbpedia.org/ontology/Train</small> rdfs:label train @fr rdfs:label train @en localName Train	0.241
gold:Stop (gold) <small>n/a (see in LOD) http://purl.org/linguistics/gold/Stop</small> rdfs:label Stop @eng localName Stop	0.222

Filters

Type

vocabulary >

property/class

property (91)

class (58)

agent >

Tag

Travel (37)

Health (34)

General & Upper (30)

Society (16)

eBusiness (6)

Services (5)

Vocabularies (5)

Geography (4)

Biology (3)

IoT (3)

show more...

Vocabulary

dicom (32)

transit (19)

km4c (14)

schema (14)

dbpedia (12)

owi (12)

gtfs (11)

st (7)

gold (5)

saref (5)

show more...

Ranked

- Term appearing in primary and secondary annotations
- Vocabulary popularity in LOV
- Term use in LOD

LOV SPARQL Endpoint / Data Dump

SPARQL

Query Examples

```

1 PREFIX vann:<http://purl.org/vocab/vann/>
2 PREFIX voaf:<http://purl.org/vocommons/voaf/#>
3
4 ### Vocabularies contained in LOV and their prefix
5 SELECT DISTINCT ?vocabPrefix ?vocabURI {
6   GRAPH <http://lov.okfn.org/dataset/lov>{
7     ?vocabURI a voaf:Vocabulary.
8     ?vocabURI vann:preferredNamespacePrefix ?vocabPrefix.
9   } ORDER BY ?vocabPrefix


```

Table Raw Response

SPARQL query

Data Dump

 n3 LOV

 nq LOV + vocabs

APIs

Consider using LOV APIs when appropriate

Dumps

LOV API documentation

Functions defined in LOV can be called with an HTTP GET request. The response to the function you call is in JSON format. Browser plugins like [JSONView for Firefox](#) or [Chrome](#) will format and color LOV's JSON response nicely in your browser.

Vocabulary Term (Class, Property, Datatype, Instance)

GET	/api/v2/term/search	Search Term API v2
GET	/api/v2/term/autocomplete	Autocomplete Term API v2
GET	/api/v2/term/suggest	Suggest Term API v2

Vocabulary

GET	/api/v2/vocabulary/list	List Vocab API v2
GET	/api/v2/vocabulary/search	Search Vocab API v2
GET	/api/v2/vocabulary/autocomplete	Autocomplete Vocab API v2
GET	/api/v2/vocabulary/info	Info Vocab API v2

Agent

GET	/api/v2/agent/list	List Agent API v2
GET	/api/v2/agent/search	Search Agent API v2
GET	/api/v2/agent/autocomplete	Autocomplete Agent API v2
GET	/api/v2/agent/info	Info Agent API v2

Linked Open Vocabularies (LOV)

[+ Suggest](#)

Documentation

G⁺ Follow

595 Vocabularies in LOV

Category Tags

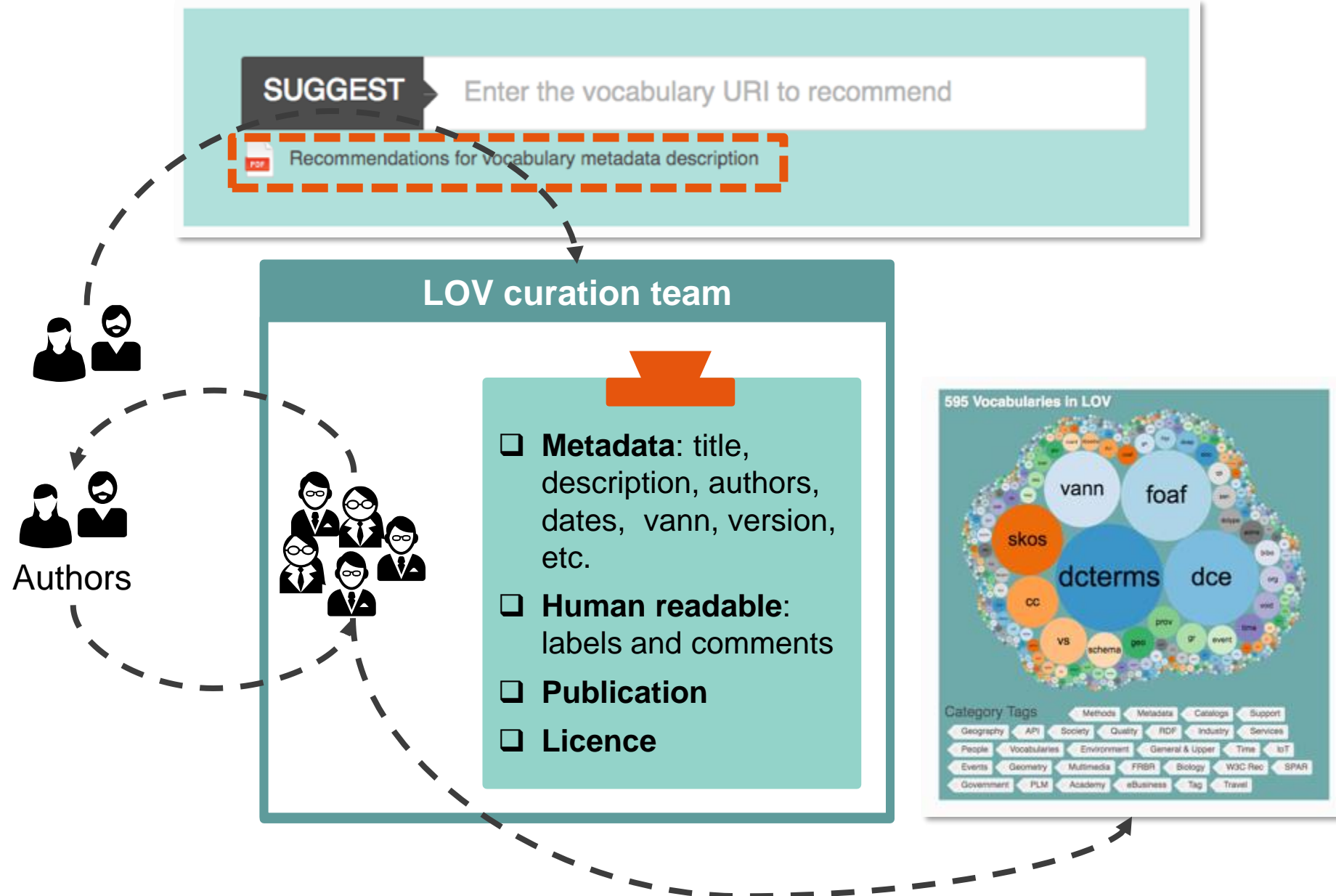
Geography	API	Society	Quality	RDF	Industry	Services
People	Vocabularies	Environment	General & Upper	Time	IoT	
Events	Geometry	Multimedia	FRBR	Biology	W3C Rec	SPAR
Government	PLM	Academy	eBusiness	Tag	Travel	

Latest insertion

- losp** - Linked open specialties RF
2017-03-09
- san-lod** - SAN Ontologia
2017-02-07
- sto** - I40 Standards Landscape Vocabulary
2017-01-29
- rami** - rami - Reference Architecture Model
2017-01-29
- aml** - AutomationML Ontology
2017-01-26

Latest Updates

- losp** - Linked open specialties 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 Landscape Vocabulary
2017-01-29

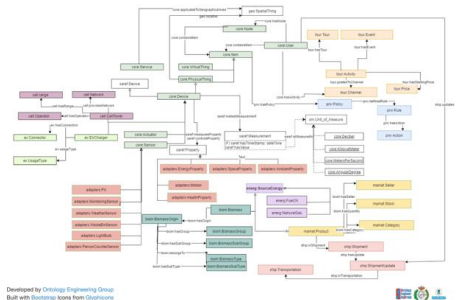




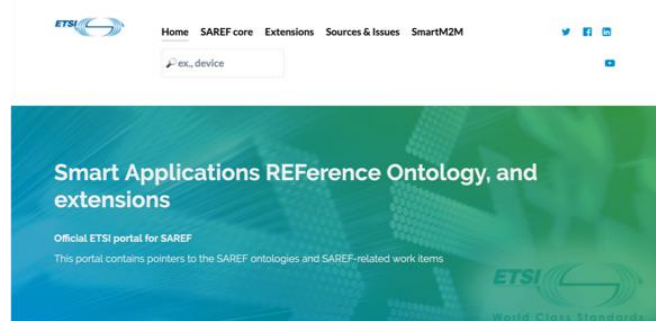
AURORAL

Here you can find the list of ontologies developed for AURORAL project.
If you want to contribute developing ontologies please follow the guidelines we provide

Ontology	Description	Requirements	Repository	Issue tracker	Releases	Payments
AURORAL Core ontology	This ontology aims to model the OLT data exchanged for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Core Payments
AURORAL Privacy	This ontology aims to model the data privacy for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Privacy Payments
AURORAL Tourism	This ontology aims to model the tourism data domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Tourism Payments
AURORAL Adapters	This ontology aims to model the adapters domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Adapters Payments
AURORAL Marketplace	This ontology aims to model the marketplace domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Market Payments
AURORAL Business	This ontology aims to model the business domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Business Payments
AURORAL Logistics	This ontology aims to model the logistic domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Logistic Payments
AURORAL Energy	This ontology aims to model the energy domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Energy Payments
AURORAL Car-sharing	This ontology aims to model the car sharing domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Car-sharing Payments
AURORAL Mobility	This ontology aims to model the Transportation domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Mobility Payments
AURORAL Farming	This ontology aims to model dairy production of cow for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Farming Payments
AURORAL Cell-Tower	This ontology aims to model the cell tower domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	Cell-tower Payments
AURORAL EV-charger	This ontology aims to model the electrical vehicle charger domain for the AURORAL project	Ontology Requirements	Ontology Repository	Ontology Issue Tracker	Ontology Releases	EV-charger Payments



Developed by Ontology Engineering Group
Built with Squeaky Horns Onto-Tools
Latest version July, 2021
© Ontology Engineering Group



What is SAREF?

The **Smart Applications REFERENCE (SAREF)** ontology is a shared model of consensus that facilitates the matching of existing assets in the smart applications domain.

SAREF provides building blocks that allow separation and recombination of different parts of the ontology depending on specific needs.

Why SAREF?

SAREF explicitly specifies recurring core concepts in the smart applications domain, the main relationships between these concepts, and axioms to constrain the usage of these concepts and relationships. SAREF has been created based on the following fundamental principles:

- **Reuse and alignment** of concepts and relationships that are defined in existing assets
- **Modularity** to allow separation and recombination of different parts of the ontology depending on specific needs
- **Extensibility** to allow further growth of the ontology
- **Maintainability** to facilitate the process of identifying and correcting defects, accommodate new requirements, and cope with changes in (parts of) SAREF

Figure 1 shows an overview of the main classes of SAREF and their relationships.

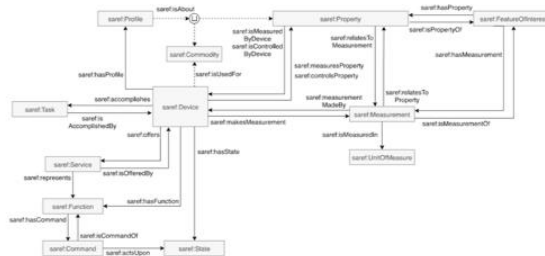
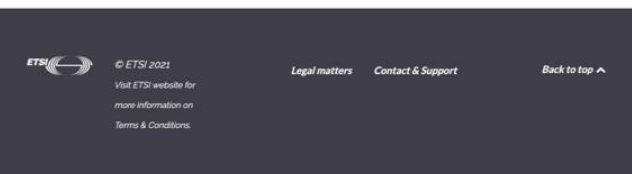
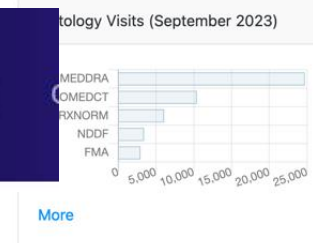


Figure 1: Overview of the SAREF ontology

This SAREF public portal, the SAREF sources with continuous integration and deployment, the SAREF Pipeline software, and ETSI Technical Specification TS 103 673 v1.11 "SAREF Development Framework and Workflow: Streamlining the Development of SAREF and its Extensions", have been developed in the context of the ETSI STF 576, which followed the ETSI STF 566.



Welcome to BioPortal, the world's most comprehensive repository of biomedical ontologies



Find an ontology

Start typing ontology name, tl

[Browse Ontologies](#)

BioPortal Statistics	
Ontologies	1,073
Classes	14,658,732
Properties	36,286
Mappings	79,636,946



- To ease transfer of knowledge



<https://chowlk.linkeddata.es/>



Meet together

Work together

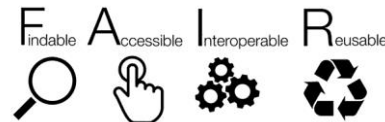
Co-create

Co-evolve

Sustain

- Federated services
- Ontology parliament
- Ontology reuse support
- Combination
- Understandability

- Governance



- FAIR principles for Semantic Artefacts
 - Minimum metadata & recommendations
 - Best practices for vocabulary publishing
 - FAIR by design methodology

- API & metadata alignments



<https://w3id.org/foops/>

Slide adapted from
Raúl García-Castro



Acknowledgments: Raúl García-Castro

Image by tartila / Freepik