TOWARDS A COMMON SEMANTIC DATA MODEL FOR SMART CITIES

María Poveda-Villalón (UPM), Raúl García-Castro (UPM), Laura Daniele (TNO)

1st ITU Workshop on Data Processing and Management for IoT and Smart Cities & Communities
Brussels, 19 February 2018
SAREF OVERVIEW

SMART 2013/0077 Standardization Initiative
European Commission & ETSI EC SmartM2M
- Agreed semantics for smart appliances
- Build a reference ontology

3 SAREF extensions
- SAREF4ENER
- SAREF4ENVI
- SAREF4BLDG

Requirements for 3 new extensions

- 2014 SAREF Study
- 2015 Publication SAREF Ontology
- 2017 New STF534
  - SAREF4CITY
  - SAREF4INMA
  - SAREF4AGRI
- 2018 3 new Extensions Publication
- 2019

past  ongoing
SAREF FAMILY OF ONTOLOGIES

http://saref.linkeddata.es/ Catalogue (UPM’s site, not official)

Includes:
- SAREF ontology
- SAREF4ENVI
- SAREF4BLDG
- SAREF4ENER

To be included (when available):
- SAREF4CITY
- SAREF4INMA
- SAREF4AGRI
SAREF4CITY PROCESS

Related initiatives & stakeholders search

**Public Administrations**
- Madrid
- ...

**Associations**
- AIOTI
- FEMP
- ...

**Projects**

**Platforms**
- FIWARE
- ...

**Standardization**
- AENOR CTN 178
- OGC CityGML
- ETSI ISG CIM
- CityInd
- oneM2M
- ...

© ETSI 2018. All rights reserved
SAREF4CITY PROCESS

Related initiatives & stakeholders search

- AENOR
- FEMP
- FIWARE
- VICINITY
- EXPRESO
- Madrid town hall

Categories

- Business catalog
- Cultural Agenda
- Population
- Air quality
- Contracts, public procurement and service providers
- Municipal budget and budget execution
- Public park loads
- Bus timetable, line, stops and fares
- Traffic
- Touristic places
- City street guide
SAREF4CITY PROCESS

Related initiatives & stakeholders search
- AENOR
- FEMP
- FIWARE
- VICINITY
- EXPRESO
- Madrid town hall

Identify categories
- Territory
- Location
- Equipment
- Events
- Public service
- Service request
- KPI
- Organization
- Business
- Transport
- Traffic
- Parking
- Tourism

Resources search

Resources
- GeoSPARQL standard proposed by Open Geospatial Consortium
  http://www.opengis.net/ont/geosparql
- WGS84 Geo Positioning vocabulary proposed by the W3C
  https://www.w3.org/2003/01/geo/wgs84_pos
- FEMP Open Data guide exemplary datasets from Alcobendas, Barcelona, Malaga, Zaragoza and Valencia.
SAREF4CITY PROCESS

Related initiatives & stakeholders search
- AENOR
- FEMP
- FIWARE
- VICINITY
- EXPRESO
- Madrid town hall

Identify categories
- Territory
- Location
- Equipment
- Events
- Public service
  - Service request
  - KPI
- Organization
  - Business
  - Transport
  - Traffic
  - Parking
  - Tourism

Resources
- “Registered Organization Vocabulary” proposed by the W3C [https://www.w3.org/TR/vocab-regorg/](https://www.w3.org/TR/vocab-regorg/)

Reviewed after OASC Connected Smart Cities Conference 2018
SAREF4CITY PROCESS

**Related initiatives & stakeholders search**
- AENOR
- FEMP
- FIWARE
- VICINITY
- EXPRESO
- Madrid town hall

**Requirements**
- From [https://www.w3.org/ns/locn](https://www.w3.org/ns/locn)

- A resource can have a location
- A resource can have an address
- An address has a full address
- An address can have a post office box number
- ...

**Resources**

**Reverse engineering & generalization**
## SAREF4CITY PROCESS

### Related initiatives & stakeholders search
- AENOR
- FEMP
- FIWARE
- VICINITY
- EXPRESO
- Madrid town hall

### Identify categories
- Territory
- Location
- Equipment
- Events
- Public service
- Service request
- KPI
- Organization
- Business
- Transport
- Traffic
- Parking
- Tourism

### Resources search
- Ontologies
- Data models
- Datasets
- Standards

### Reverse engineering & generalization
- Territory (26)
- Location (20)
- Equipment (7)
- Events (10)
- Public service (15)
- Service request (18)
- KPI (23)
- Organization (15)
- Business (9)
- Transport (7)
- Traffic (13)
- Parking (6)
- Tourism (17)
NEXT STEPS

Requirement **validation** with

- European **projects** for example VICINITY, SYNCHRONICITY...
  - Abstract and group requirements to ease the validation
- IoT Week workshop, Bilbao June 2018

**Implementation**

- **Reuse** stable models, used for the requirements and others:
  - [http://lov.okfn.org/](http://lov.okfn.org/)
  - [http://smartcity.linkeddata.es/](http://smartcity.linkeddata.es/)
  - [http://sensormeasurement.appspot.com/?p=ontologies#city](http://sensormeasurement.appspot.com/?p=ontologies#city)
- **Create** new conceptualizations when needed

Explore **relations** with other approaches, like **Web of Things? IoT**
CONCLUSIONS

We are aware we are not the only ones doing this

- **Requirements** extracted in a methodical way from **existing resources**
- **Plug** existing **solutions** rather than reinvent the wheel
  - Reuse what is already done (and **working**)
  - Incorporate stakeholders **feedback**

We are still on time to include your input:

- **Use cases**
- **Models**
Thank you for your attention!