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SEMIC 2018

Open Standards for Linked Organisations Tools and Methodology

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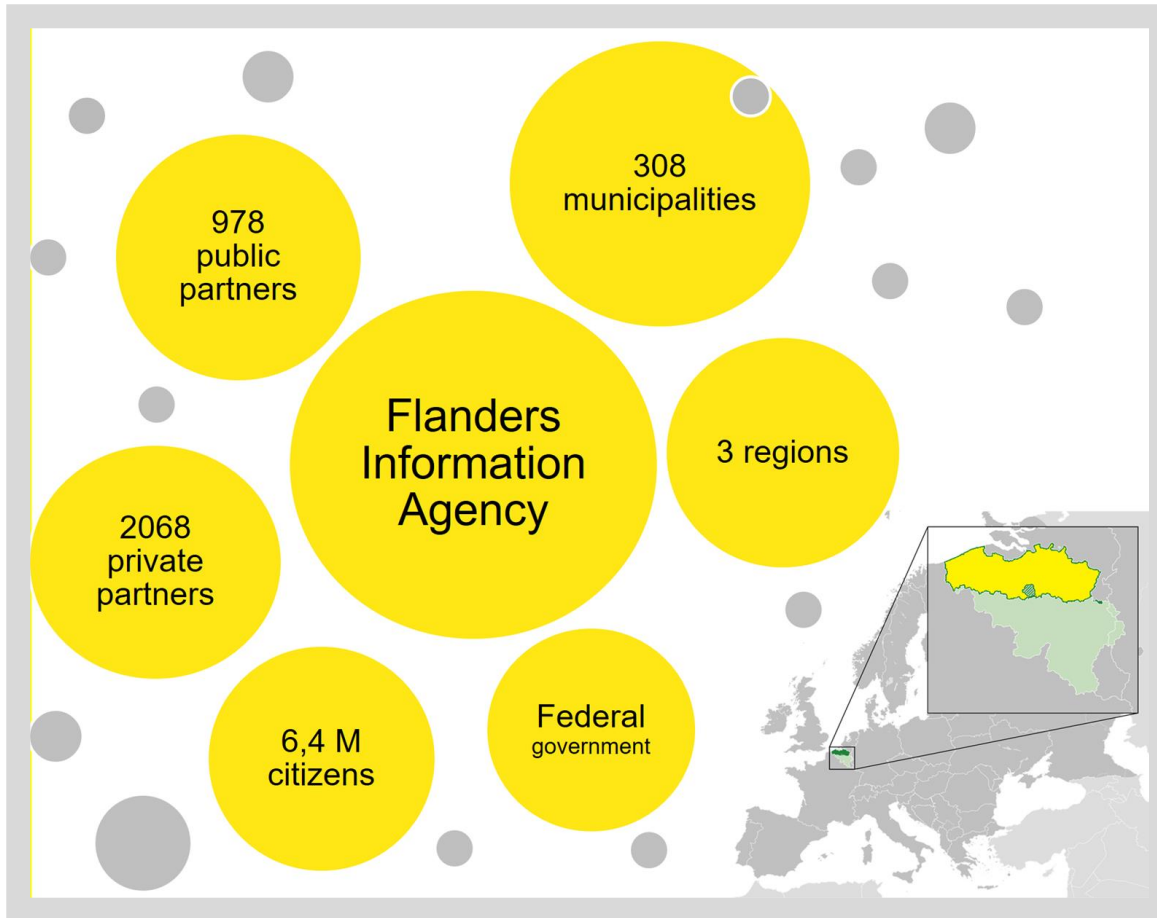
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Initiative supported by the ISA² Programme



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At the crossroads



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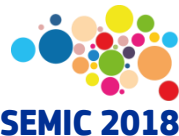


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Semantic interoperability

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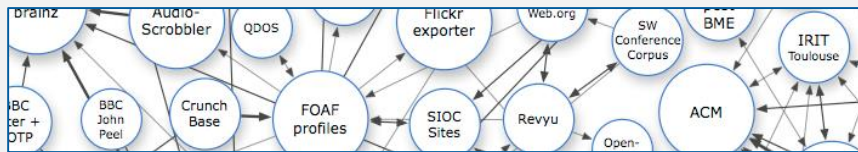


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Interoperability Programme OSLO

Open Standards for Linked Organisations

W3C
International
Standards



EU ISA CO
RE
Vocabularie
s

OSLO
Extension

CORE
PERSON
VOCABULARY

CORE
BUSINESS
VOCABULARY

OSLO
PERSON
VOCABULARY

OSLO
BUSINESS
VOCABULARY

OSLO
ROAD
VOCABULARY

CORE
PUBLIC
ORGANISATION
VOCABULARY

OSLO
ORGANISATI
ON
VOCABULARY

DCAT-AP
FOR
DATA PORTALS
IN EUROPE

OSLO
DCAT-AP VL
VOCABULARY



EU - ISA²
Federal Government
Regional Governme
nt
Local Government
Industry
Academia

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<http://data.vlaanderen.be/ns/>

data.vlaanderen.be/ns/

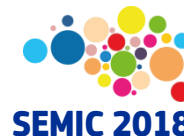
Vocabularia

Generiek Een algemeen ondersteunend vocabularium.	Adres Het Adres vocabularium legt termen en definities vast voor het beschrijven van een Belgisch adres.	Organisatie Het Organisatie vocabularium legt termen en definities vast voor het beschrijven van organisaties en bouwt verder op de vocabularia van W3C en ISA.
Persoon Het Persoon vocabularium legt termen en definities vast voor het beschrijven van personen en hun relaties. Het bouwt verder op vocabularia van W3C en ISA.	Dienst Het Dienst vocabularium legt termen en definities vast voor het beschrijven van publieke dienstverlening. Het is gebaseerd op het Core Public Service Vocabulary Application Profile.	Besluit Het Besluit vocabularium legt termen en definities vast voor het beschrijven van notulen en besluiten. Het bouwt verder op de European Legislation Identifier.
Mandaat Het Mandaat vocabularium legt termen en definities vast voor het beschrijven van mandaten.	Melding (ontwerpdokument) Dit vocabularium is ontwikkeld in voor het beschrijven van een systeem voor het melden van fouten en onvolledigheden in digitale gegevensbronnen en de opvolging ervan.	Notificatie (ontwerpdokument) Het Notificatie vocabularium is ontwikkeld in voor het beschrijven van notificaties in de context van de notificatiecomponent, een generieke bouwsteen van Informatie Vlaanderen.
Subsidie (ontwerpdokument) Het Subsidie vocabularium is een aanvulling op het Dienst vocabularium en definieert extra klassen en attributen voor het beschrijven van subsidiemaatregelen.	Toestemming (ontwerpdokument) Het Toestemming vocabularium is ontwikkeld in voor het beschrijven van toestemming (consent) in de context van de notificatiecomponent en contactvoorkeurenmodule, generieke bouwstenen van Informatie Vlaanderen.	Transactie (ontwerpdokument) Het Transactie vocabularium is een aanvulling op het Dienst vocabularium en definieert extra klassen en attributen voor het beschrijven van publieke dienstverlening in een transactionele context.

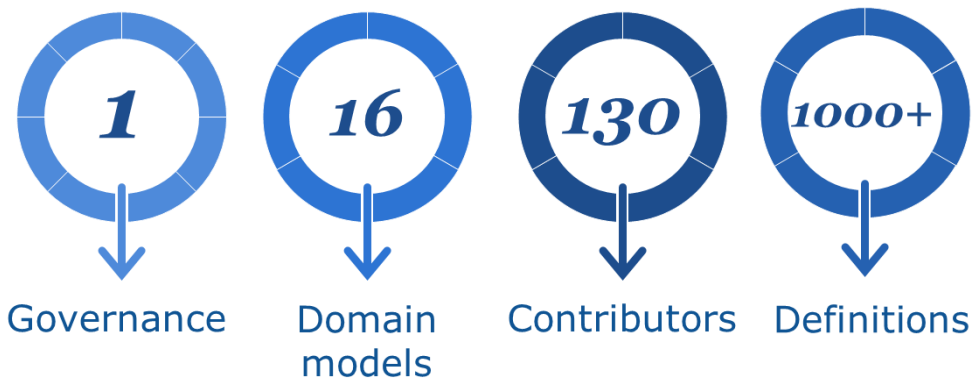
**Person
Organisation
Address
Building
Road
Public Service
Transactional Services
Error Notification
Notification
Consent (GDPR)
Preference
Subsidy
Public Domain
Local Decision
Mandate**

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OSLO Governance



Governance Body empowered by Parliament

A process and method for developing data standards (ISA²/W3C...)

Triple Helix approach: Government, Private Sector, Academia



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Technical interoperability

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Bridging the gap between modelling and implementation

Base registries

Unique identification of objects exposed via data standards



Business oriented web services

Querying, editing and combining data from different sources to meet business use cases

How can we lower costs for data and service integration?

1. Embed semantics into data formats
2. Validation of data resources based on semantic models
3. Building a generic hypermedia client



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The Web as a blueprint

http://bit.ly/joinup_uri

Persistent identifiers: URIs

Links to other information

Dereference-able HTTP URIs

Standardised information (RDF)

Semantic Interoperability Community (SEMIC)

Last update 3 days ago | 248 Members | 30 Solutions

URI Policy Flanders

URI Standard & Guidelines of the Flemish Government

24/10/2017

INFORMATIE VLAANDEREN

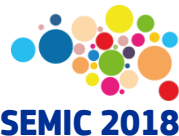
This document describes the **Flemish URI standard** for the disclosure of resources, information and data, by the Flemish authorities and has been specified by Information Flanders. A checklist is included at the end of this document, which can be used as a self-evaluation instrument for the evaluation of URIs.

The **guidelines** concerning the governance of persistent URIs were developed in the context of the Open Standards for Linked Organizations program (OSLO). OSLO is an interoperability program in the Region of Flanders. The program brings together expertise from different business domains and governmental levels, independent of a specific thematic project. The Flemish Government developed a domain model in line with international standards including ISA and **INSPIRE** enriched by data extensions to comply with the local context. The formal specification is published at

<http://data.vlaanderen.be/id/adres/3706808>

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9000 Gent

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The Web as a blueprint

Persistent identifiers: URIs

Links to other information

Dereference-able HTTP URIs

Standardised information (RDF)

<http://data.vlaanderen.be/id/adres/3706808>

The screenshot shows a browser window with the URL <http://data.vlaanderen.be/id/adres/3706808>. The page displays human-readable information for the address 3706808, including details like 'Koningin Maria Hendrikkade 70' and 'Gent'. To the right, a 'Response' window shows the raw RDF data for the same address, including URIs and property values.

Human Readable

Machine friendly

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The Web as a blueprint

Persistent identifiers: URIs

Links to other information

Dereference-able HTTP URIs

Standardised information (RDF)

<https://www.w3.org/ns/locn#adminUnitL2>

W3C International Standards



EU ISA CORE Vocabularies

CORE PERSON VOCABULARY

CORE BUSINESS VOCABULARY

CORE PUBLIC ORGANISATION VOCABULARY

DCAT-AP FOR DATA PORTALS IN EUROPE

OSLO Extention

OSLO PERSON VOCABULARY

OSLO BUSINESS VOCABULARY

OSLO ROAD VOCABULARY

OSLO ORGANISATION VOCABULARY

OSLO DCAT-AP VL VOCABULARY

<http://data.vlaanderen.be/ns/adres>

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The Web as a blueprint

Persistent
identifiers:
URIs

Links to
other
information

Dereference-
able HTTP
URIs

Standardised
information
(RDF)

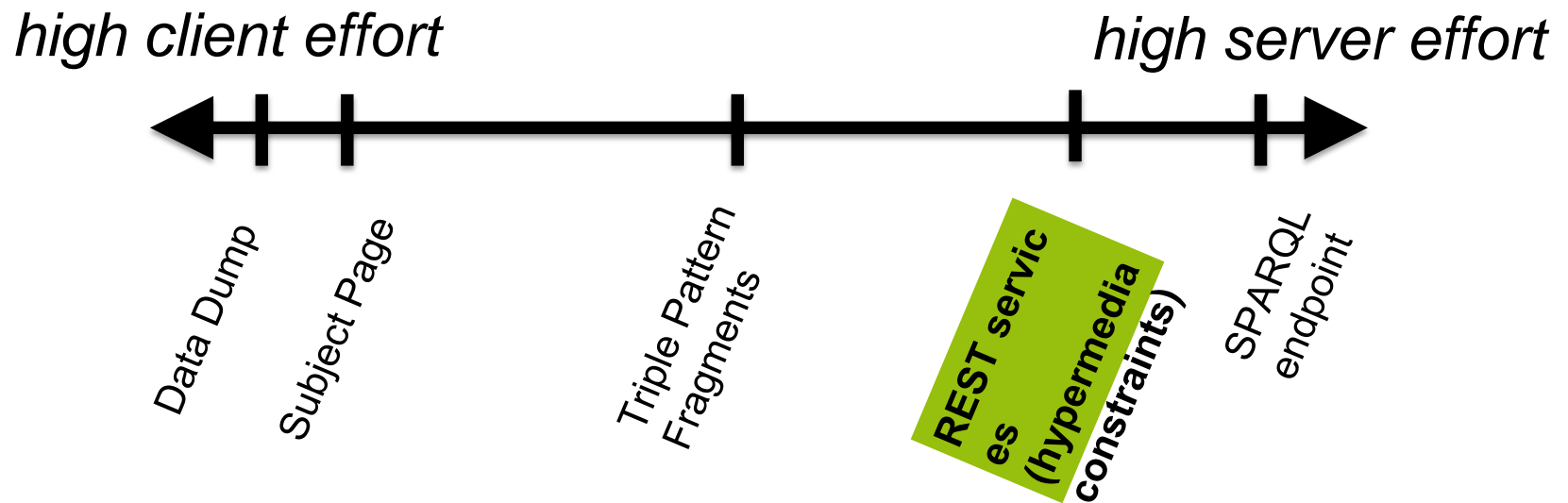
data.vlaanderen.be/id/organisatie/ovo002949

Agentschap Informatie Vlaanderen

<http://data.vlaanderen.be/id/adres/3706808>

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9000 Gent

There is more to publishing linked data than data dumps and SPARQL endpoints



Source: <http://linkeddatafragments.org>

Syntactical interoperability and embedding semantics into services.

JSON Linked Data (JSON-LD)

- ✓ A developer friendly Linked Data format, based on the successful JSON format
- ✓ Machine interpretable semantics through “**context file**”
- ✓ 100% compatible with JSON and easy to retrofit
- ✗ No formal, standardised method for data validation
- ✗ Semantics about data are machine readable, service methods and operations are not



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Upgrading existing web services

Retrofitting the semantics using JSON-LD

```
{  
  "voorkeursNaam": "Agentschap Informatie Vlaanderen",  
  "alternatieveNaam": "AIV",  
}
```



```
{  
  "naam": "Agentschap Informatie Vlaanderen",  
  "afkorting": "AIV",  
}
```

```
{  
  "@context": {  
    "Organisatie": "http://www.w3.org/ns/org#Organization",  
    "voorkeursNaam": "http://www.w3.org/2004/02/skos/core#prefLabel",  
    "alternatieveNaam": "http://www.w3.org/2004/02/skos/core#altLabel"  
  },  
  "@id": "http://data.vlaanderen.be/id/organisatie/OVO002949",  
  "@type": "Organisatie",  
  "voorkeursNaam": " Agentschap Informatie Vlaanderen",  
  "alternatieveNaam": "AIV",  
}
```



```
{  
  "@context": {  
    "Organisatie": "http://www.w3.org/ns/org#Organization",  
    "naam": "http://www.w3.org/2004/02/skos/core#prefLabel",  
    "afkorting": "http://www.w3.org/2004/02/skos/core#altLabel"  
  },  
  "@id": "http://data.vlaanderen.be/id/organisatie/OVO002949",  
  "@type": "Organisatie",  
  "naam": " Agentschap Informatie Vlaanderen",  
  "afkorting": "AIV",  
}
```




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Shared context for new services

Automatically derived from our RDF vocabularies

```
{  
  "@context": {  
    "Organisatie": "http://www.w3.org/ns/org#Organization",  
    "voorkeursNaam": "http://www.w3.org/2004/02/skos/core#prefLabel",  
    "alternatieveNaam": "http://www.w3.org/2004/02/skos/core#altLabel"  
  },  
  "@id": "http://data.vlaanderen.be/id/organisatie/OVO002949",  
  "@type": "Organisatie",  
  "voorkeursNaam": "Agentschap Informatie Vlaanderen",  
  "alternatieveNaam": "AIV"  
}
```

```
{  
  "@context": "http://data.vlaanderen.be/context/organisatie.jsonld"  
  "@id": "http://data.vlaanderen.be/id/organisatie/OVO002949",  
  "@type": "Organisatie",  
  "voorkeursNaam": "Agentschap Informatie Vlaanderen",  
  "alternatieveNaam": "AIV"  
}
```

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Person	http://data.vlaanderen.be/context/persoon.jsonld
Organisation	http://data.vlaanderen.be/context/organisatie.jsonld
Address	http://data.vlaanderen.be/context/adres.jsonld
Public Service	http://data.vlaanderen.be/context/dienst.jsonld
Feedback	http://data.vlaanderen.be/context/melding.jsonld
Notification	http://data.vlaanderen.be/context/notificatie.jsonld
Consent	http://data.vlaanderen.be/context/toestemming.jsonld
Loan	http://data.vlaanderen.be/context/transactie.jsonld
Transactional Service	http://data.vlaanderen.be/context/transactie.jsonld

Data validation using SHACL

- ✓ Shapes Constraint Language
- ✓ W3C Recommendation since 20 July 2017
- ✓ A standard for validating RDF data against a set of constraints (cardinalities, domain, range, code lists,...)
- ✓ SHACL files available for all Vocabularies & Application Profiles



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Data validation using SHACL

To describe a public service

An attribute "naam" is specified

With datatype "langString"

Defined by "dcterms:title"

A second attribute
"heeftVerantwoordelijke" is
specified

With range "cv:PublicOrganisation"

And is defined by
cv:hasCompetentAuthority

```
504 ▼ dienst:PublicServiceShape
505   a sh:NodeShape ;
506   sh:targetClass <http://purl.org/vocab/cpsv#PublicService> ;
507 ▼ sh:property [
508   sh:name "naam" ;
509   sh:description "Officiële naam van de publieke dienstverlening." ;
510   sh:datatype <http://www.w3.org/1999/02/22-rdf-syntax-ns#langString> ;
511   sh:minCount 1 ;
512   sh:maxCount 1 ;
513   sh:path <http://purl.org/dc/terms/title> ;
514 ] ;
515 ▼ sh:property [
516   sh:name "heeftVerantwoordelijke" ;
517   sh:description "Publieke organisatie die verantwoordelijk is voor
518   het aanbieden en beheren van de publieke dienstverlening." ;
519   sh:class <http://data.europa.eu/m8g/PublicOrganisation> ;
520   sh:minCount 1 ;
521   sh:maxCount 1 ;
522   sh:path <http://data.europa.eu/m8g/hasCompetentAuthority> ;
523 ] ;
```

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Data validation using SHACL

Reusable open source tooling

Terug

Resultaat in TTL **Resultaat in tabel** Data Regels

Resultaat in tabel

Hieronder ziet u overzicht van de validatieresultaten.

Show entries

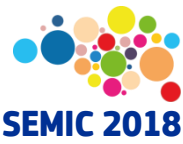
Focus Node	Result Message	Result Path
http://data.vlaanderen.be/doc/dienst/00001	Less than 1 values	http://data.europa.eu/m8g/hasCompetentAuthor
http://data.vlaanderen.be/doc/dienst/00001	More than 1 values	http://purl.org/dc/terms/title
http://data.vlaanderen.be/id/organisatie/0002	Value does not have datatype rdf:langString	http://www.w3.org/2004/02/skos/core#prefLabel

Showing 1 to 3 of 3 entries

```
[ a
  shValidationReport ;
  sh:conforms false ;
  sh:result [ a
    shValidationResult ;
    sh:focusNode <http://data.vlaanderen.be/doc/dienst/00001> ;
    sh:resultMessage "More than 1 values" ;
    sh:resultPath dct:terms:title ;
    sh:resultSeverity sh:Violation ;
    sh:sourceConstraintComponent sh:MaxCountConstraintComponent ;
    sh:sourceShape []
  ] ;
  sh:result [ a
    shValidationResult ;
    sh:focusNode <http://data.vlaanderen.be/doc/dienst/00001> ;
    sh:resultMessage "Less than 1 values" ;
    sh:resultPath eu:hasCompetentAuthority ;
    sh:resultSeverity sh:Violation ;
    sh:sourceConstraintComponent sh:MinCountConstraintComponent ;
    sh:sourceShape []
  ] ;
  sh:result [ a
    shValidationResult ;
    sh:focusNode <http://data.vlaanderen.be/id/organisatie/0002> ;
    sh:resultMessage "Value does not have datatype rdf:langString" ;
    sh:resultPath skos:prefLabel ;
    sh:resultSeverity sh:Violation ;
    sh:sourceConstraintComponent sh:DatatypeConstraintComponent ;
    sh:sourceShape [] ;
    sh:value "organisatie X"
  ]
] .
```

Demo https://bit.ly/semic_shacl
Source https://bit.ly/semic_shacl_src

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Generic hypermedia client

- **As-is:** data is semantically annotated using web standards, but the operations and methods for using the data through APIs are not
- **Problem:** still high integration costs due to the need for bespoke connectors between API's to exchange information in real time.
- **To-be:** standardisation of frequently used methods (pagination, querying, CRUD,...) using Hypermedia and API standards/best practices.

API https://bit.ly/semic_api
Client https://bit.ly/semic_client
Source code https://bit.ly/oslo_api_src



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Generic hypermedia client

Demo: public organisations

← → ↻ 🏠 Ⓞ Niet beveiligd | lodi.ilabt.imec.be:8000/#

Hydra Console

Enter an URL: ↻ Load

Response

Hi,

This is the Hydra Console - a generic client for Hydra-powered Web APIs. The user interface consists of three parts: the address bar on the top, this response pane, and the documentation pane.

As the name suggests, the address bar allows you to enter an URL to access the Web API. The response will then be rendered in the response pane and in the pane to the right you'll find the corresponding documentation.

When you move your mouse over a property, the corresponding item in the documentation will be highlighted. Additionally, a tooltip with the full IRI of the property will be shown. If you move your mouse over a context definition, the active context at that level will be shown.

All links are blue and underlined. To invoke an operation, simply click on it and follow the instructions. If you want to browse an API and GET the target of a link, simply press the SHIFT-key while clicking on a link.

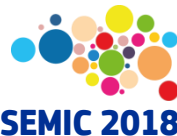
To get started, enter the URL of the API in the address bar above and click on "Load". If you wish, you can use the demo API featuring a simple issue tracker at <http://www.markus-lanthaler.com/hydra/event-api/>.

Documentation:

Hydra API documentation not available.

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Generic hypermedia client

← → ↻ 🏠 Niet beveiligd | lodi.ilabt.imec.be:8000/#

Hydra Console

Enter an URL:

Load

Response

```

{
  "@context": [
    {
      "hydra": "http://www.w3.org/ns/hydra/core#",
      "vocab": "http://193.190.127.142:3000/oslo-api/apiDocumentation#",
      "EntryPoint": "vocab:EntryPoint",
      "organizations": {
        "@id": "vocab:EntryPoint/organizations",
        "@type": "@id"
      }
    },
    "http://193.190.127.142:3000/oslo-api/organisatie.jsonld"
  ],
  "@id": "/oslo-api",
  "@type": "EntryPoint",
  "organizations": "/oslo-api/organizations"
}

```



Documentation: **EntryPoint** ▾

The main entry point or homepage of the API.

@id	IRI readonly	The entity's IRI Operations
Organizations	OrganizationCollection readonly	The Organizations collection Operations

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Generic hypermedia client

Response

```
{
  "@context": [
    "http://193.190.127.142:3000/oslo-api/organisatie.jsonld",
    {
      "hydra": "http://www.w3.org/ns/hydra/core#",
      "vocab": "http://193.190.127.142:3000/oslo-api/apiDocumentation#",
      "OrganizationCollection": "vocab:OrganizationCollection",
      "PagedCollection": "hydra:PagedCollection",
      "members": "hydra:member",
      "firstPage": {
        "@id": "hydra:first",
        "@type": "@id"
      },
      "nextPage": {
        "@id": "hydra:next",
        "@type": "@id"
      },
      "previousPage": {
        "@id": "hydra:previous",
        "@type": "@id"
      }
    }
  ],
  "@id": "/oslo-api/organizations/",
  "@type": "OrganizationCollection",
  "firstPage": "/oslo-api/organizations?page=0",
  "nextPage": "/oslo-api/organizations?page=1",
  "members": [
    {
      "@id": "/oslo-api/organizations/http%3A%2F%2Fdata.vlaanderen.be%2Fid%2Forganisatie%2FOV00177",
      "@type": "Organisatie"
    },
    {
      "@id": "/oslo-api/organizations/http%3A%2F%2Fdata.vlaanderen.be%2Fid%2Forganisatie%2FOV00177",
      "@type": "Organisatie"
    }
  ]
}
```



Documentation: [OrganizationCollection](#)

A collection of Organizations

@id	IRI	The entity's IRI
	readonly	Operations

members	n/a	The Organizations
----------------	------------	-------------------

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Generic hypermedia client

Enter an URL:

Response

```
{
  "@context": [
    "http://www.w3.org/ns/hydra/context.jsonld",
    {
      "hydra": "http://www.w3.org/ns/hydra/core#",
      "vocab": "http://localhost:3000/oslo-api/apiDocumentation#",
      "name": "http://schema.org/name",
      "description": "http://schema.org/description",
      "seeAlso": {
        "@id": "rdfs:seeAlso",
        "@type": "@id"
      },
      "uuid": "http://mu.semte.ch/vocabularies/core/uuid",
      "label": "http://www.w3.org/2004/02/skos/core#prefLabel",
      "status": {
        "@id": "http://www.w3.org/ns/regorg#orgStatus",
        "@type": "@id"
      },
      "altLabel": "http://www.w3.org/2004/02/skos/core#altLabel",
      "identifier": "http://www.w3.org/ns/org#identifier",
      "classification": "http://www.w3.org/ns/org#classification"
    }
  ],
  "http://localhost:3000/oslo-api/organisatie.jsonld"
},
"@id": "/oslo-api/organizations/http%3A%2F%2Fdata.vlaanderen.be%2Fid%2Forganisatie%2F0V0001771",
"@type": "Organisatie",
"seeAlso": "https://wegwijs.vlaanderen.be/#/organisations/190d6f0f-062b-40a1-b44b-7d17854c9efa",
"uuid": "0V0001771",
"label": "Dienst Aangiftes",
"status": "http://data.vlaanderen.be/id/concept/organisatiestatus/actief",
"classification": "http://data.vlaanderen.be/id/concept/organisatieclassificatie/16d70a87-43aa-4279-bd6f-d182eb3e15eb",
"identifier": "0V0001771"
}
```



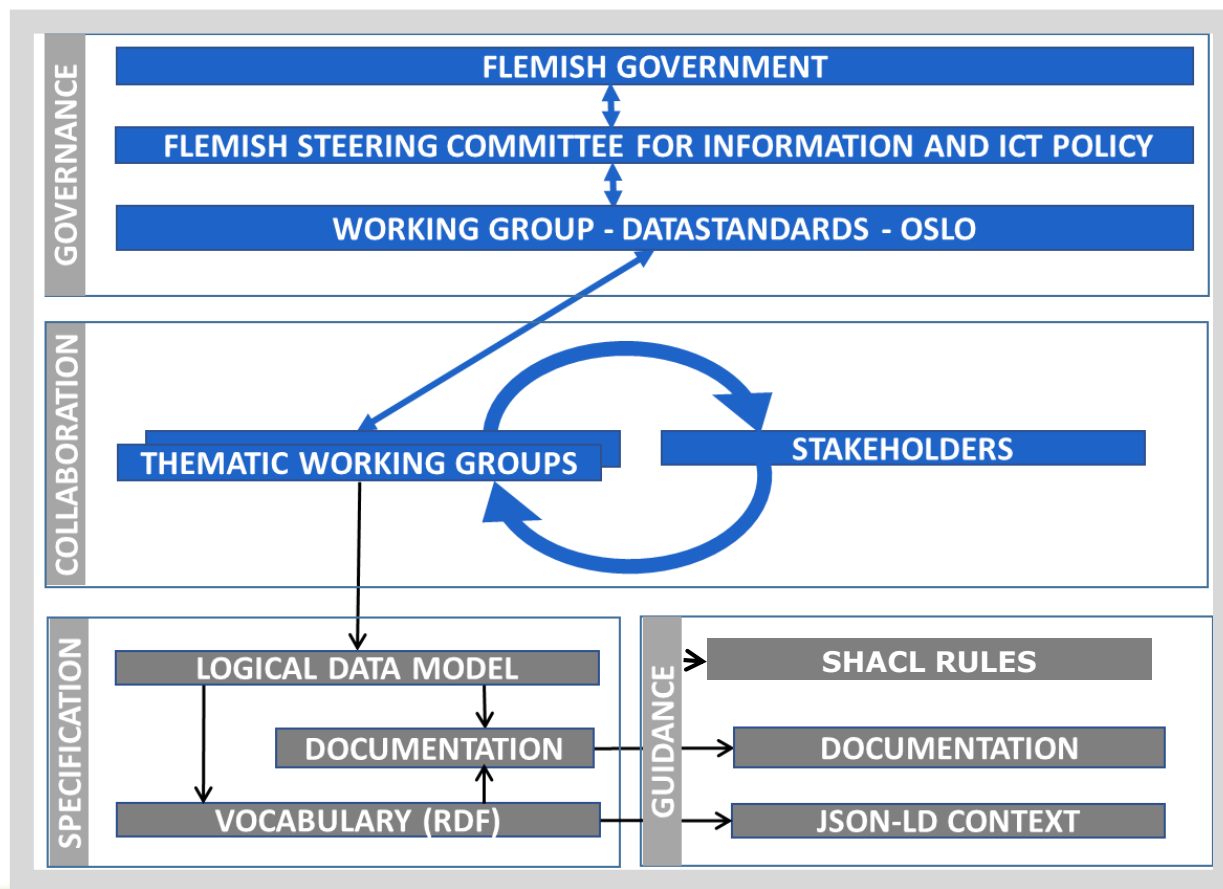
Documentation: Organization ▾

@id	<input type="text" value="n/a"/>	The entity's IRI <small>readonly</small> Operations
label	<input type="text" value="n/a"/>	The Organization's label
seeAlso	<input type="text" value="n/a"/>	Related link
uuid	<input type="text" value="n/a"/>	UUID of the organization
status	<input type="text" value="n/a"/>	Status of the organization
classification	<input type="text" value="n/a"/>	Classifier for the organization.
status	<input type="text" value="n/a"/>	Internal organization identifier



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Wrap-up: end to end process

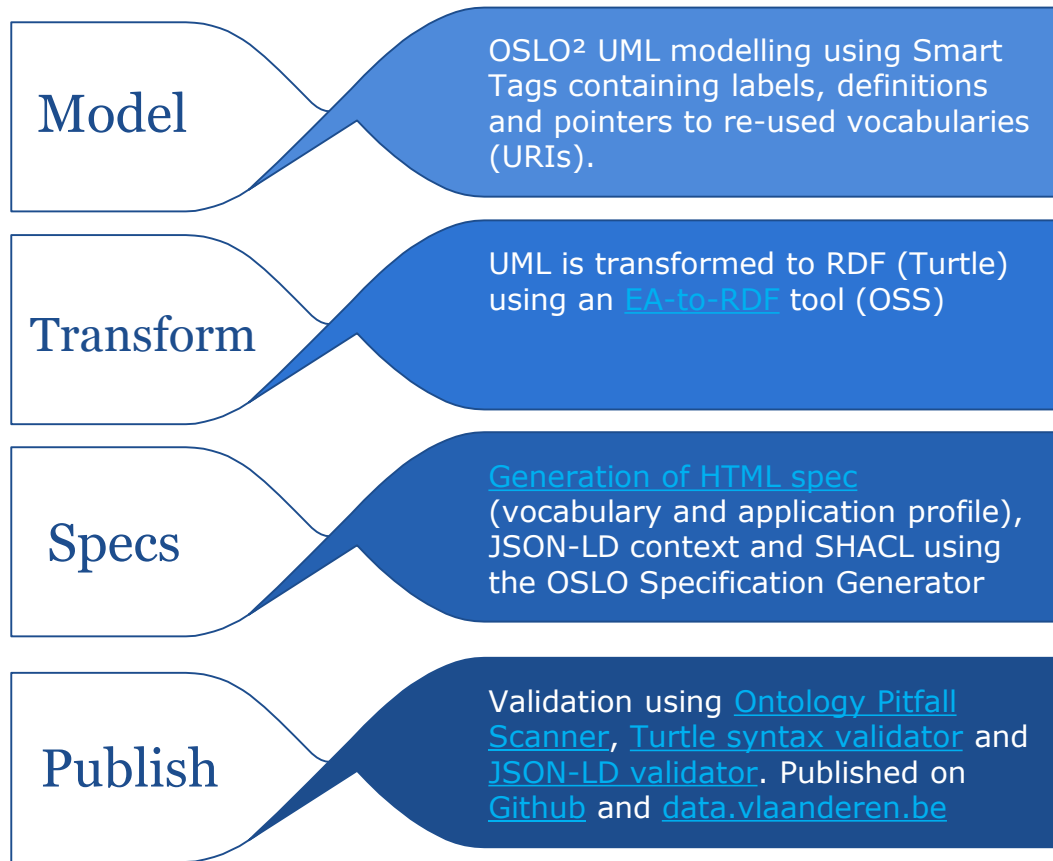


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Based on an open source toolchain



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Questions?



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Raf Buyle



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@rafke

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