Implementing OSLO standards at AWV

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Using an OSLO open data standard in a closed world asset management environment at the Flemish road & traffic agency (AWV)

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AGENTSCHAP WEGEN & VERKEER

1 OSLO

Open Standards for Linked Organisations (OSLO)

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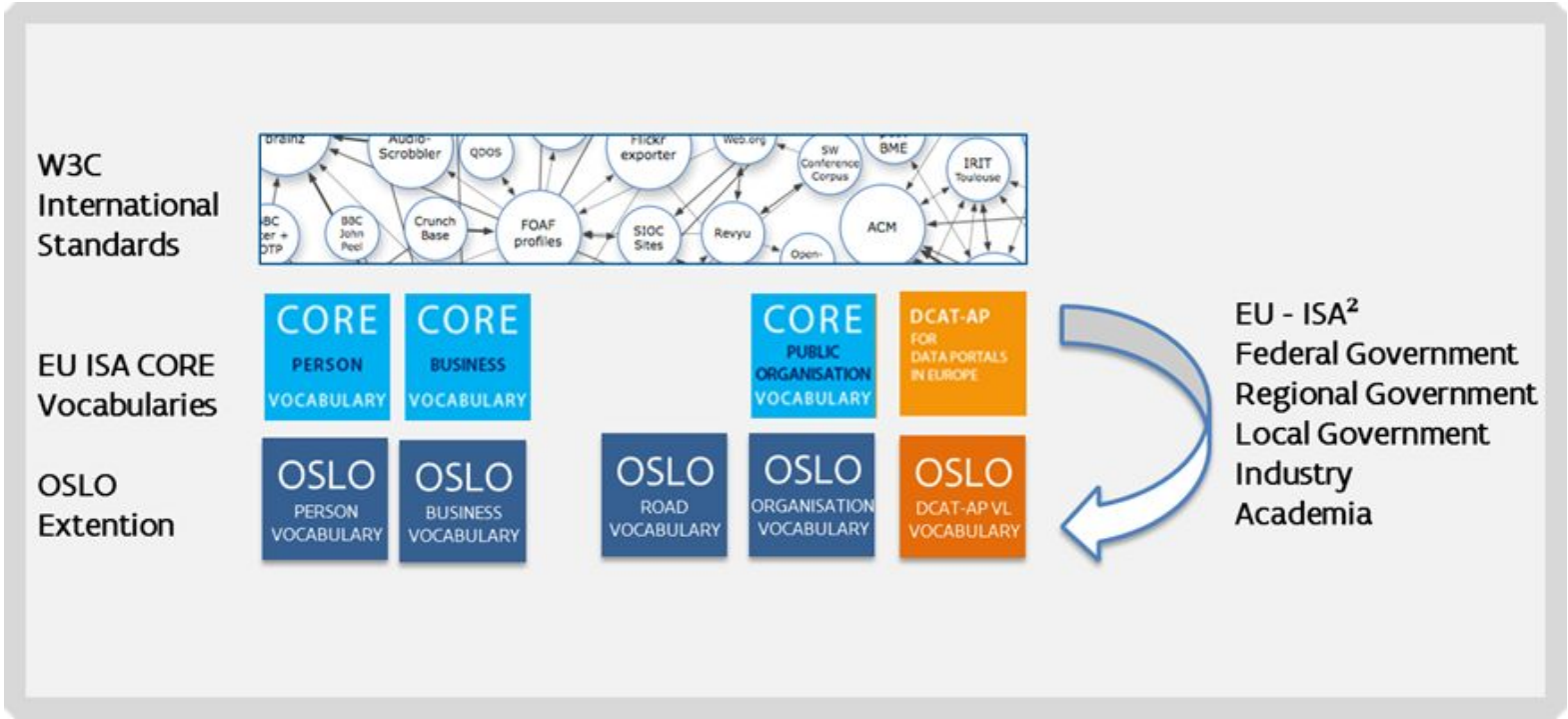
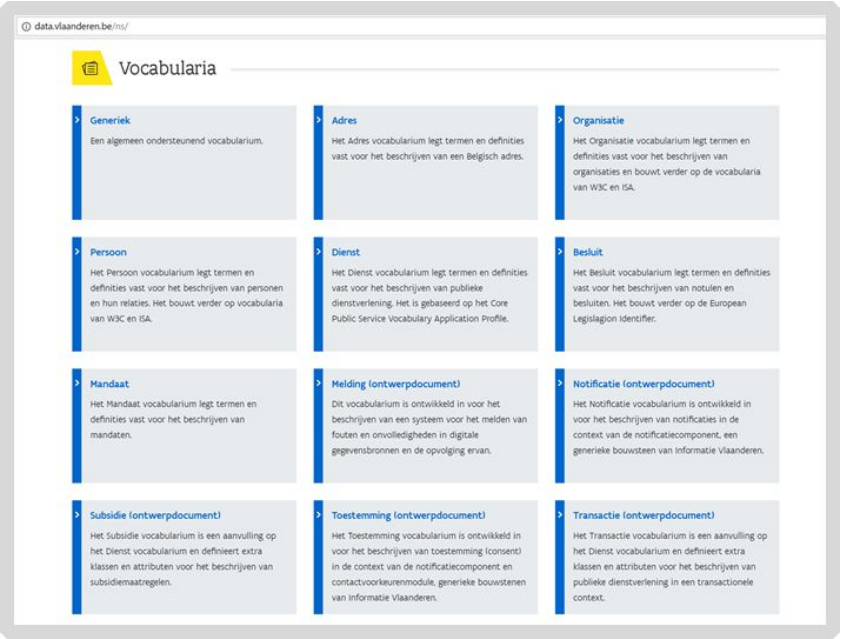
Flemish Knowledge Graph - reuse of vocabularies



data.vlaanderen.be

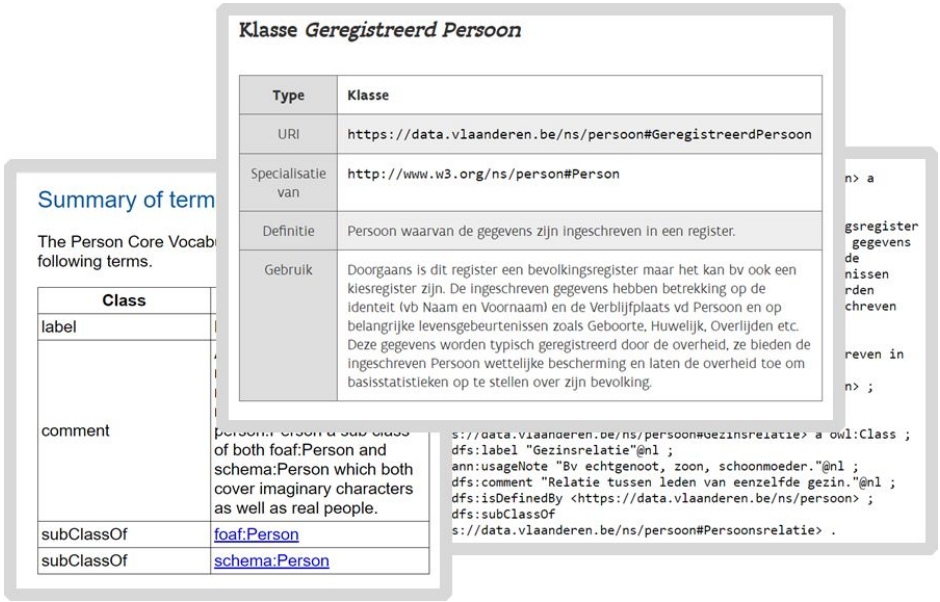
- *Publishing of normative semantic assets (vocabularies, application profiles, code lists)*
- *Publishing of non-normative guidelines (JSON-LD context, SHACL)*



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

data.vlaanderen.be

- *HUMAN- and machine readable*
- *Human and machine alignment*
- *Content negotiation*
- *Linked to international standards (reuse first)*



http://data.vlaanderen.be/ns/persoon

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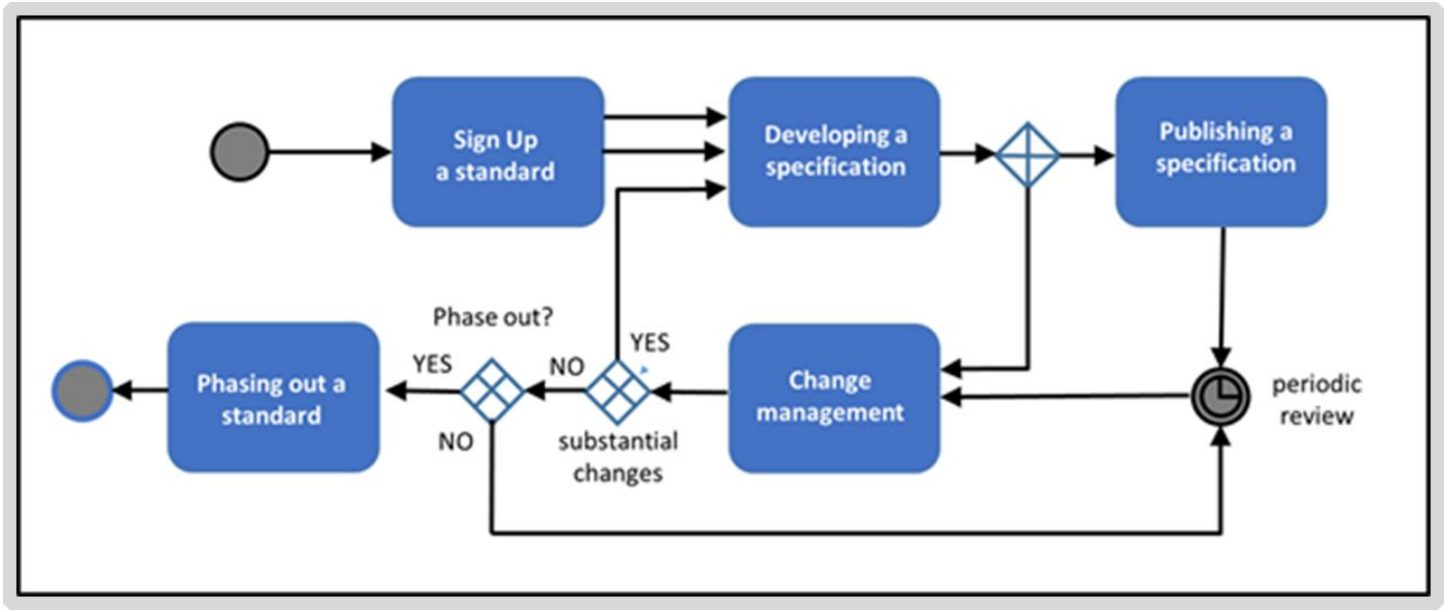
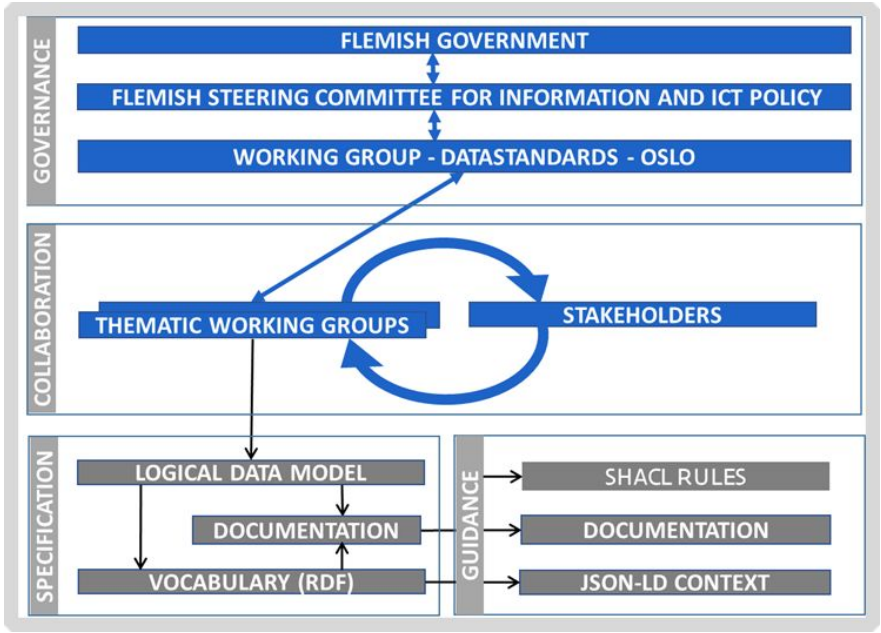
Formal process based on ISA, W3C and Open Stand)



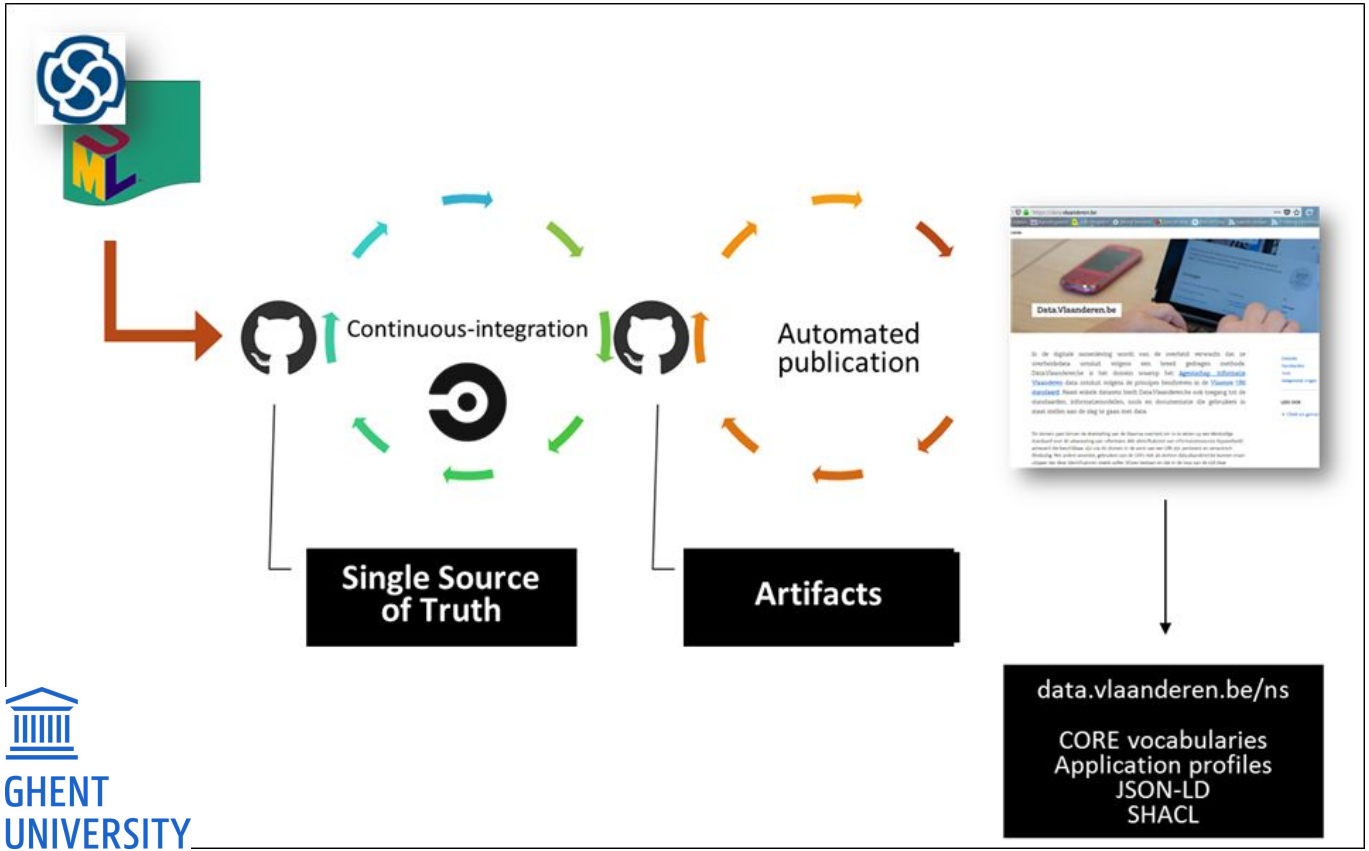
https://data.vlaanderen.be/cms/Proces_en_methode_voor_de_erkenning_van_datastandaarden_v1.0.pdf

Transparent end-2-end process

- *The data specification process follows a transparent process.*
- *semantic agreements are traceable and aligned to match the different stakeholders*



OSLO toolchain



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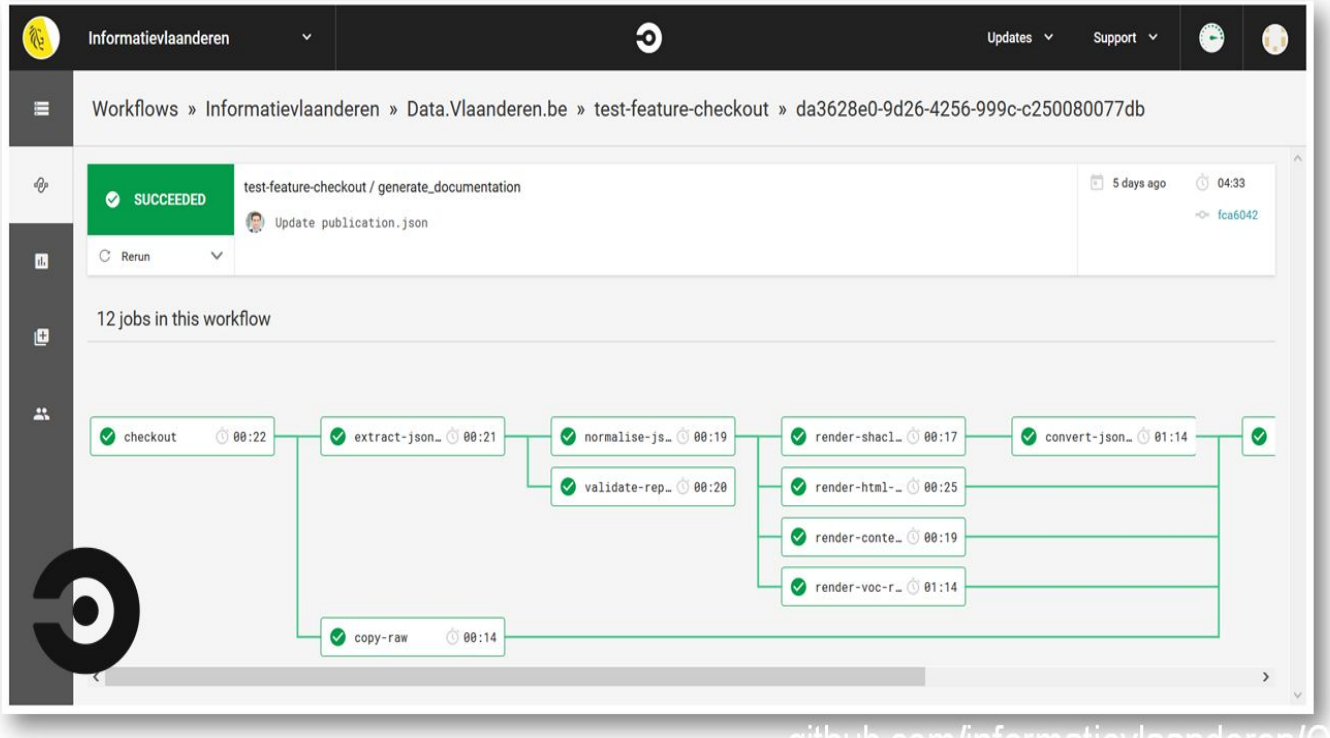
OSLO toolchain - document generation



github.com/informatievlaanderen/Data.Vlaanderen.be

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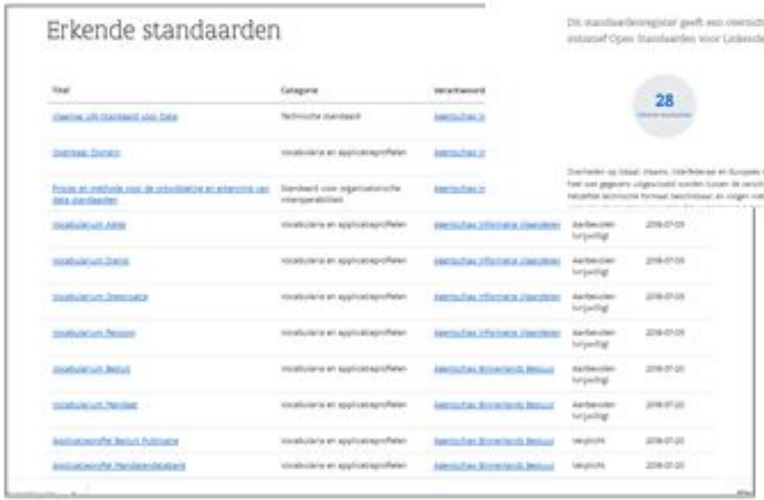
Registry

Tools: OSLO standaardenregister



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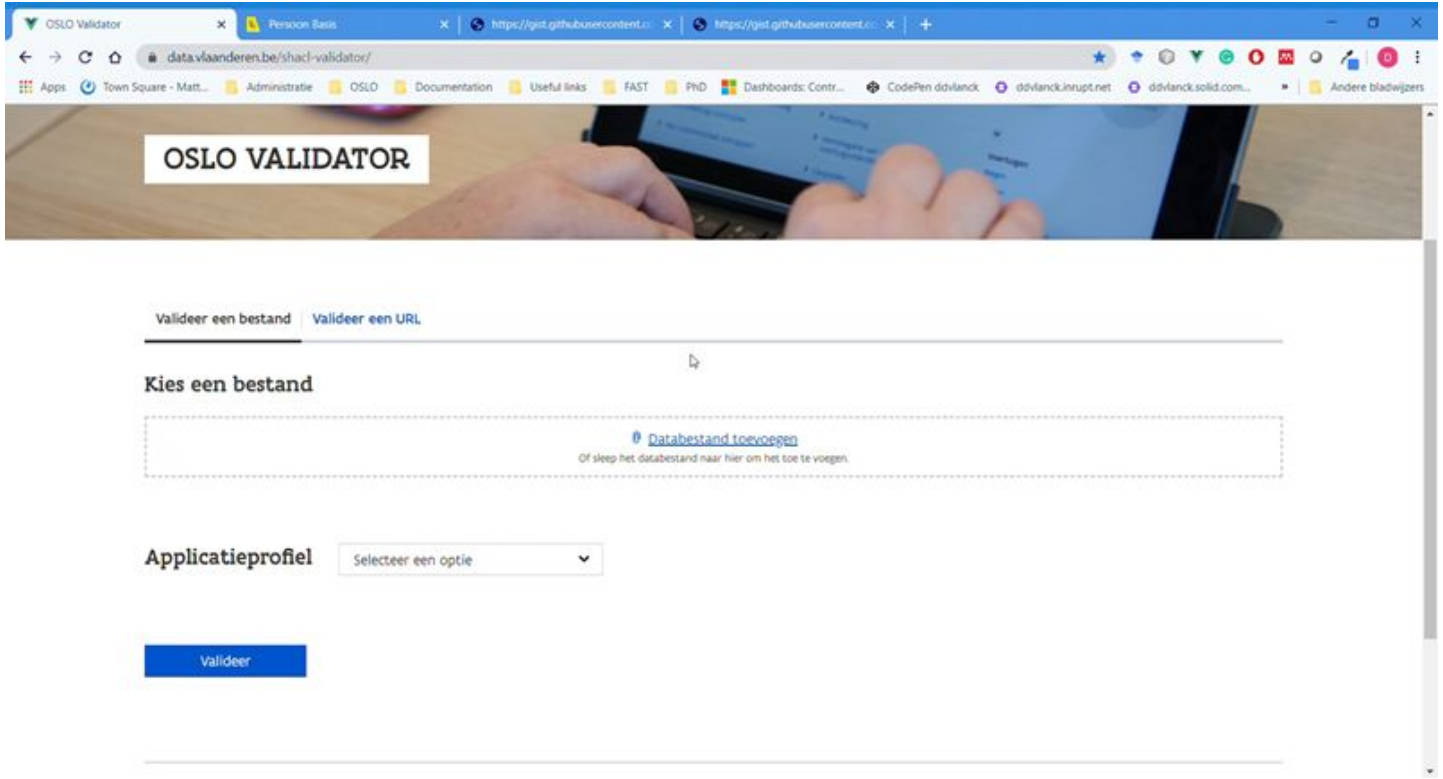
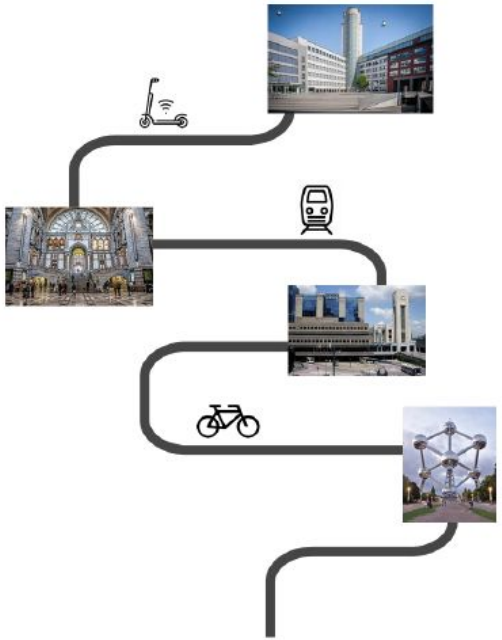
Compliance


OSLO Validator
Persoon Basis
data.vlaanderen.be/shacl-validator/
OSLO VALIDATOR
Valideer een bestand
Valideer een URL
Kies een bestand
Databestand toevoegen
Of sleep het databestand naar hier om het toe te voegen.
Applicatieprofiel
Selecteer een optie
Valideer

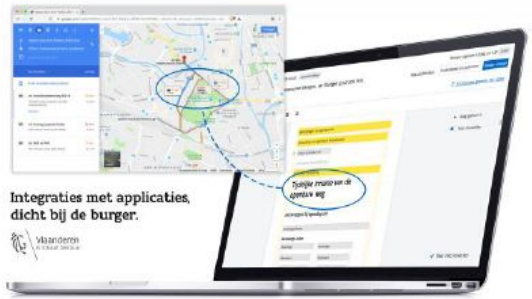
OSLO Reference Cases

Mobility as a Service (MaaS)



City & Road Infrastructure

Linked Legislation



Support and training

Profielgebaseerde handleidingen

Business verantwoordelijke
Integreren van de informatiestrategie in een projectplan.

Analist
Uitwerken van een informatiemodel op basis van de behoeften.

Ontwikkelaar
Implementeren van semantische afspraken in elektronische diensten.

Bestaande resources

Proces en methode voor standaarden
Document dat meer details verschaft rond het proces en de ontwikkeling van datastandaarden.

Vocabularia, applicatieprofielen en codelijsten
Lijst van de beschikbare Vocabularia, applicatieprofielen en codelijsten.

OSLO Checklist
Ga na of je implementatie conform OSLO is.

OSLO tooling en publicatie
Toolchain om een dataspecificatie te genereren.

Architecturale overwegingen
Tips rond architectuurkeuzes voor gegevensuitwisseling op het web.

Ondersteuning

Contacteer ons via email of via Github indien u vragen of opmerkingen hebt.

2 AWV

- AWV
- AIM program
- OTL
- Data journey
- Challenges

- AWV
- AIM program
- OTL
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- Challenges

Main activities

Flemish road administration

owner - operator

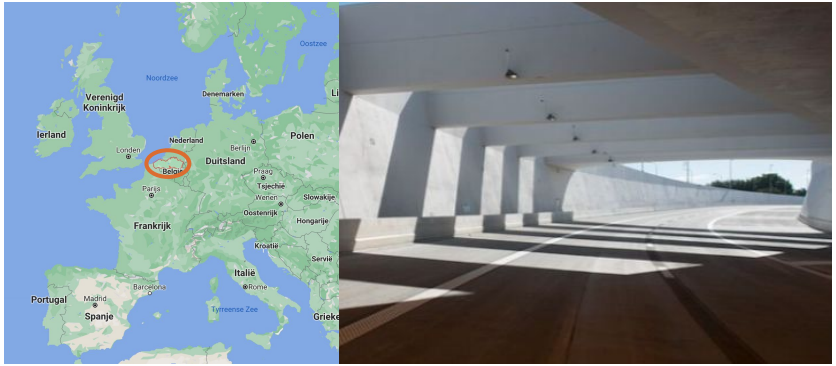
7000 km highways and main roads

7700 km cycle paths

+- 20 tunnels > 200 m

+- 1000 bridges

https://wegenenverkeer.be/



- AWV
- AIM program
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- Challenges

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Object Type Library (OTL)

OTL as a standard for BIM and AIM

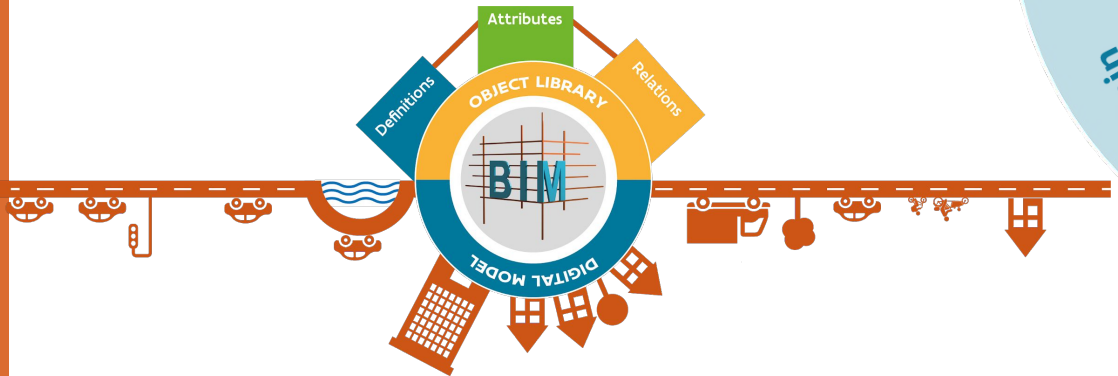
Contains the **information need** for our assets

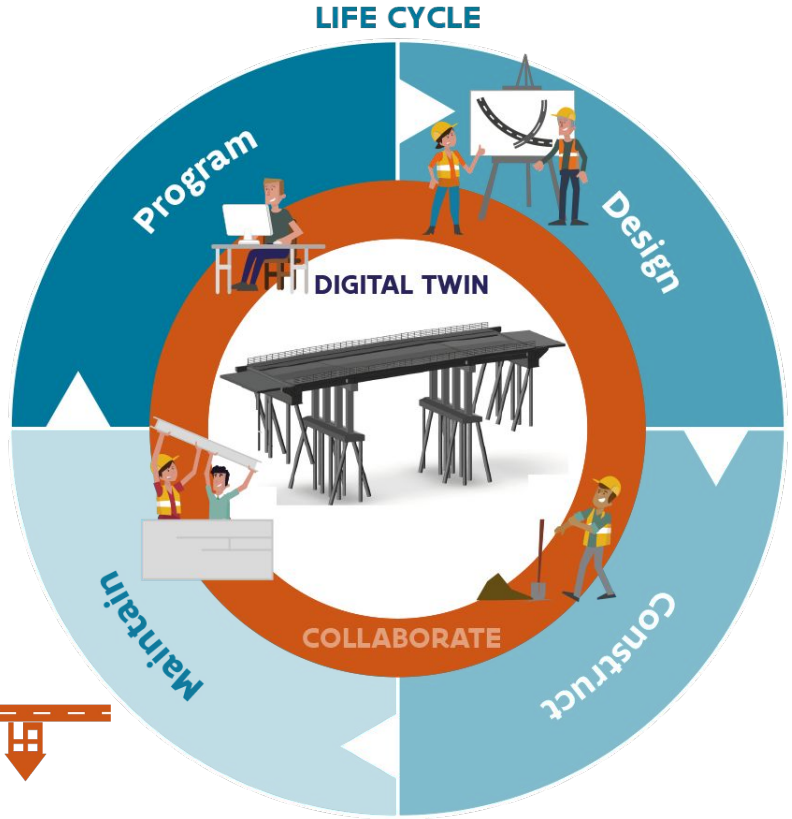
Centralised creation and management

Publication in human readable web pages

Technically published via machine readable technical artefacts

wegenenverkeer.data.vlaanderen.be





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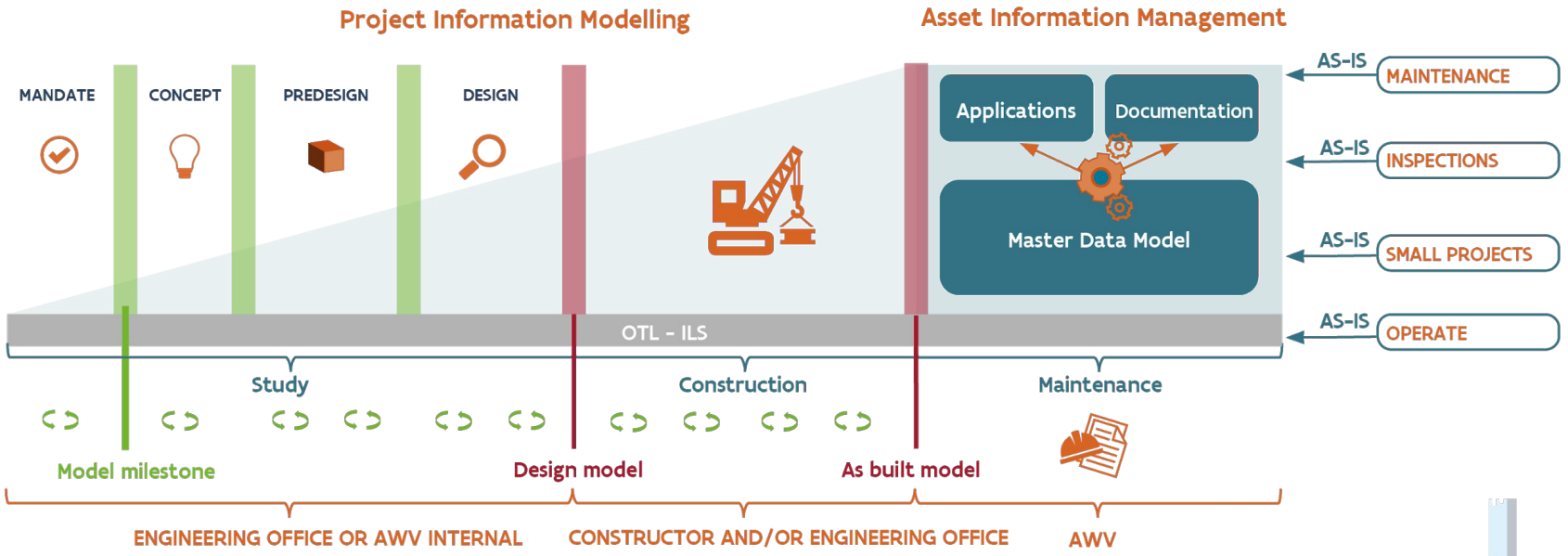
BIM data process



Based on PAS 1192-2:2013, UK

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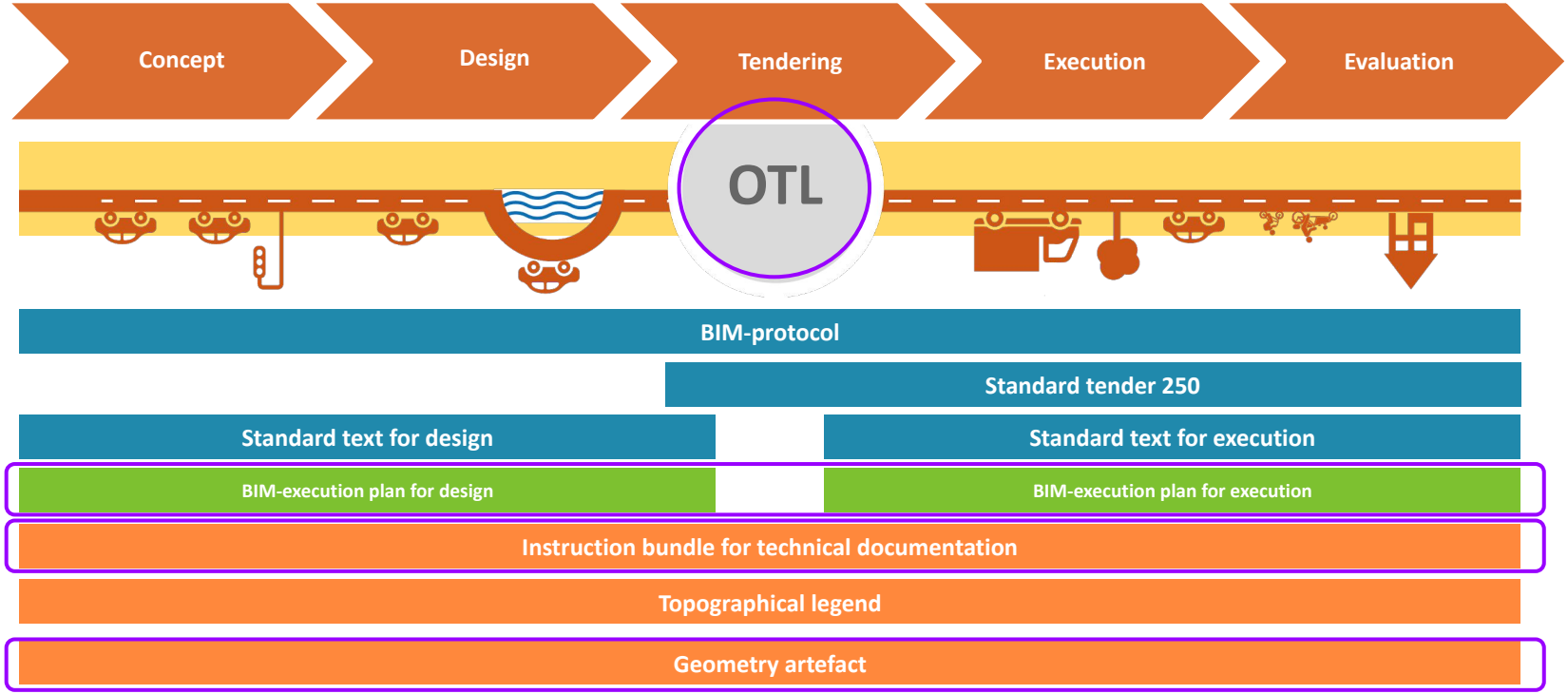
OTL throughout standardisation of documents



- AWV
- AIM program
- **OTL**
- Data journey
- Challenges

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1 OTL for all domains

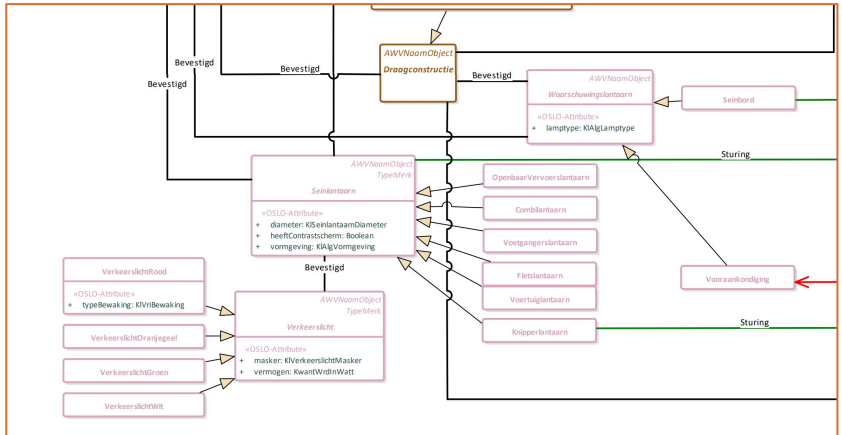
Classes - attributes - datatypes - relations

Standard tenders

SB250: road construction

SB260: bridges, tunnels

SB270: electro-mechanical



Standaardbestek

> Wanneer u een bestek moet opstellen voor een overheidsopdracht in het kader van wegenbouw of een wegherinrichting, dan kan u beroep doen op een standaardbestek (of typebestek) met standaardeisen.

Standaardbestek 250

Digitale versies downloaden:

- Standaardbestek 250 versie 4.1 (inclusief presentaties infosessies)
- Standaardbestek 250 versie 4.0 hoofdstuk 1
- Standaardbestek 250 versie 3.1, errata en aanvullingen
- Oudere versies

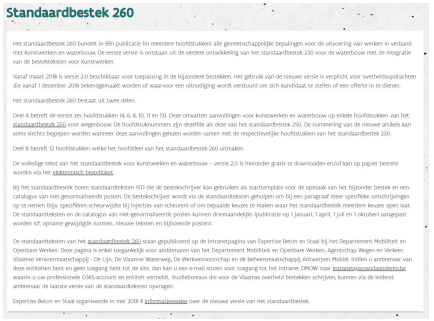
Gedrukte versie bestellen:

Het Standaardbestek 250 versie 4.1 kan je hier bestellen.

- Een gedrukte versie van het Standaardbestek 250 kost 100 euro.
- Gelieve rekening te houden met een verzendingstermijn van ongeveer drie weken na betaling.

Het standaardbestek 250 bevat **alle info** over:

- Wegenbouw
- Rioleringen
- Signalisatie
- Groenaanleg



Standaardbestek 270

Digitale versies downloaden:

- Standaardbestek 270 versie 4
- Oudere versies

Het standaardbestek 270 bevat **alle info** over:

- Elektromechanische uitrusting
- Verlichting, pompen, motoren en hoogspanningscabines

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BIM CEDR workgroups

European BIM standard

International standards

National standards

Company / NRA standards

BIM GIS ISO CEN/TC442 ...

European Road OTL

OKSTRA CB-NL BSA 2.0 OSLO ...

AWV-OTL RWS-OTL TRV-ANDA ...

Interlink: https://www.roadotl.eu/
CODEC: https://www.codec-project.eu/
AMSFree: http://www.amsfree.eu/

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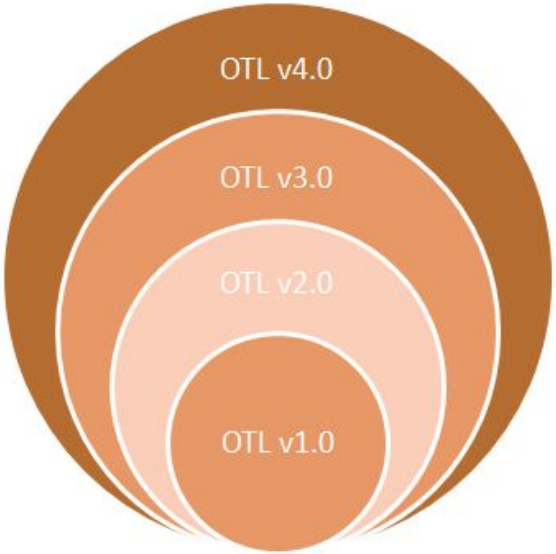
Backwards compatibility

Gradual evolution

- Running tenders
- Data migration
- Contractors

Deprecation - no hard deletes



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Information model

Level of Detail (LOI & LOG) for all object types

LOI: Level of Information = OTL

A selection of attributes as defined in the OTL Depends on the phase and scope of the project

LOG: Level of Geometry (LOG -1 to 4) **= geometry artefact**

Level of detail of geometries per object type

Specific geometrical requirements

Inheritance

Derivation

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LOI UML class diagram for a semantic graph of assets

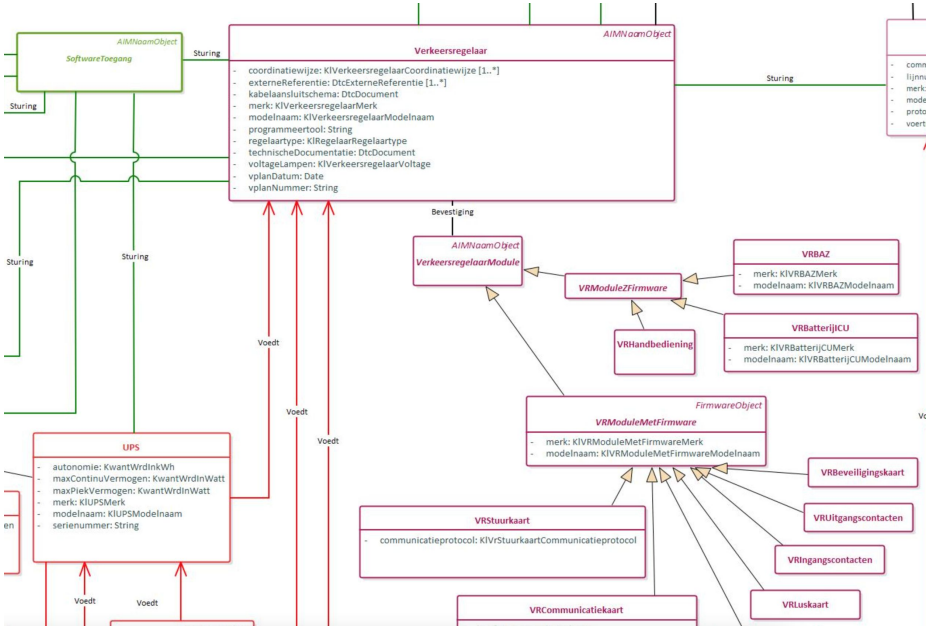
Objects, attributes, data types

Basic building blocks

No hierarchy

Semantic relations

UML associations



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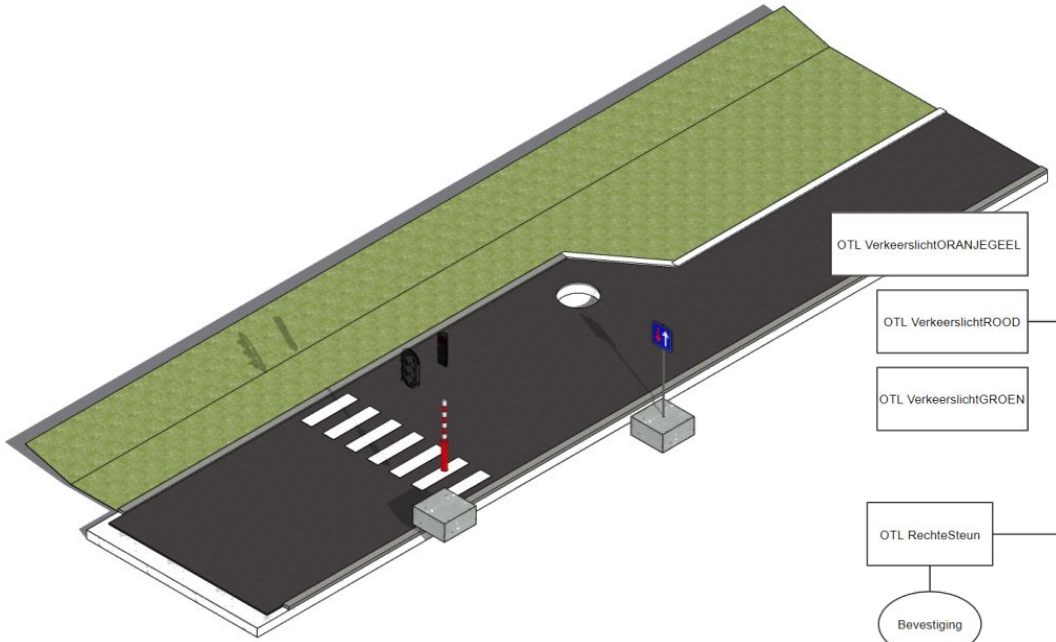
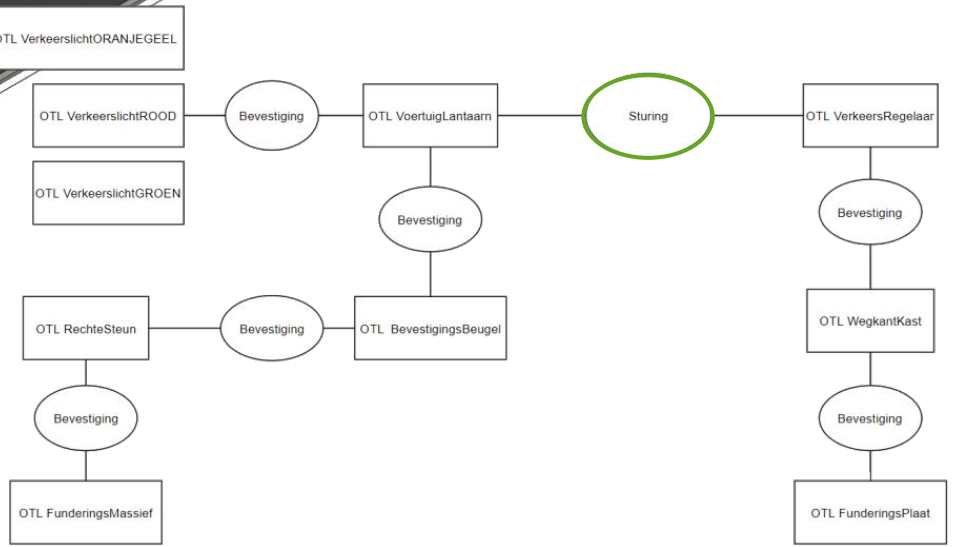
Cross theme semantic graph of assets





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Machine readable LOI artefacts

AWV XMI -> modeling single source

RDF, Shacl, JSON-LD context -> translation by OSLO toolchain and OSLO rules

Unique URI's

SQLite -> additional translation by AWV toolchain and AWV rules

https://wegenenverkeer.data.vlaanderen.be/doc/implementatiemodel/master/#sqlite

Inheritance is resolved and limited for both attributes and relations

All constraints are resolved

SKOS lists -> translation by OSLO toolchain and OSLO rules

Unique URI's

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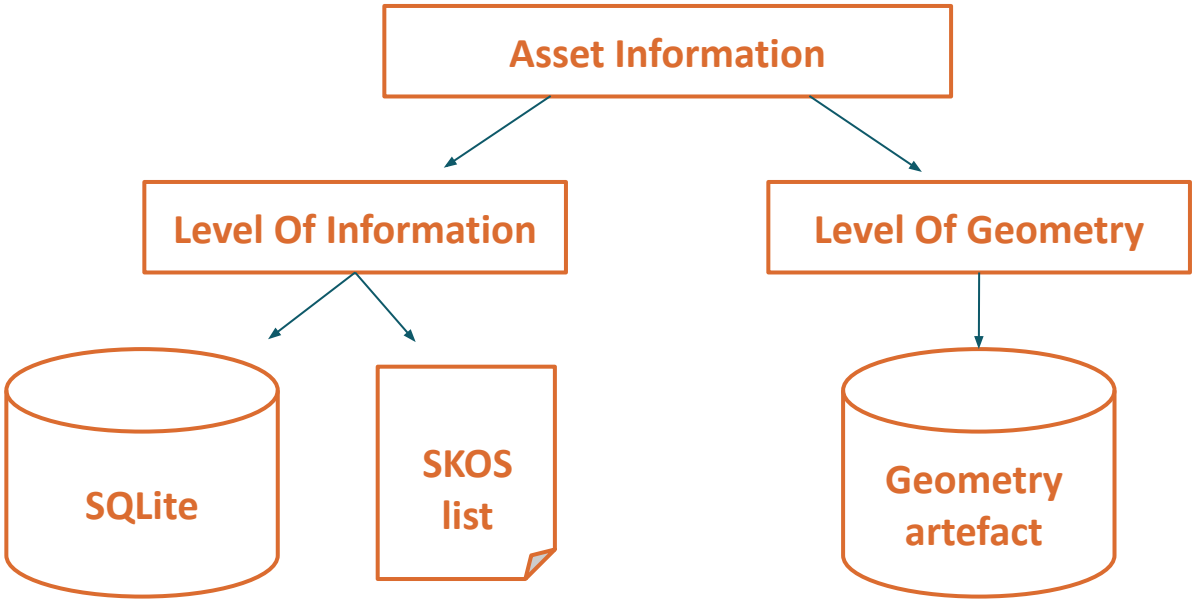
Machine readable artefacts



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AWV SQLite information model vs OSLO RDF application profile

AWV Information model

- Relations as first class objects
- Directional and non-directional relations
- Data types with units
- Constraints on lists
- Cardinality: everything required when it exists
- Limited inheritance

- AWV
- AIM program
- OTL
- **Data journey**
- Challenges

Data journey

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Data requests → Data updates → Data delivery → Technical validation → Data verification → View and modify Master Data Model

Contractors

AWV

Davie

Data Portal - DAVIE

Data Acceptance, Validation and Information Extraction

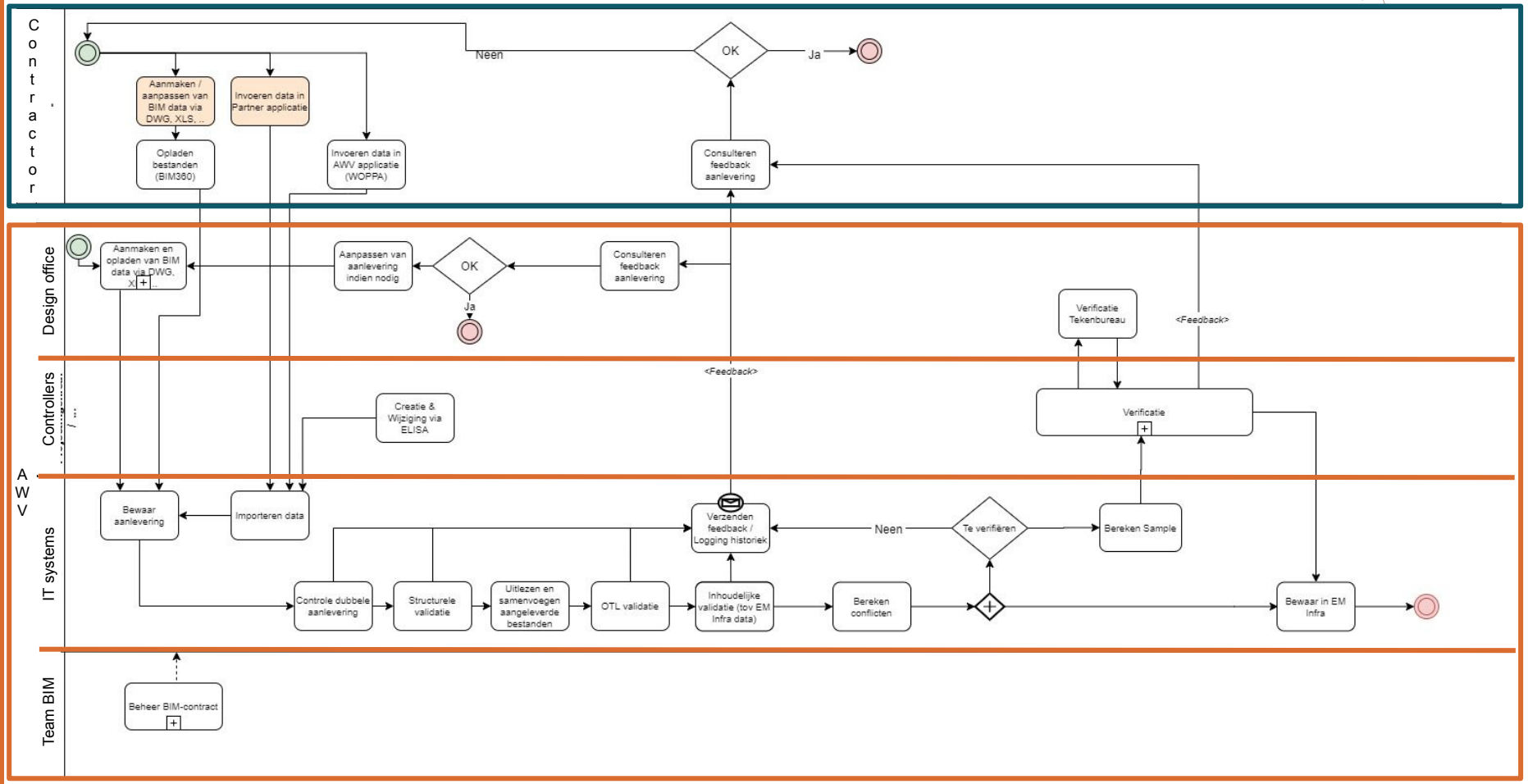
AWV Infra

AIMS

Structured data

AIM graph DB

Data platform flow



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Data exchange partners

Engineering offices

Contractors

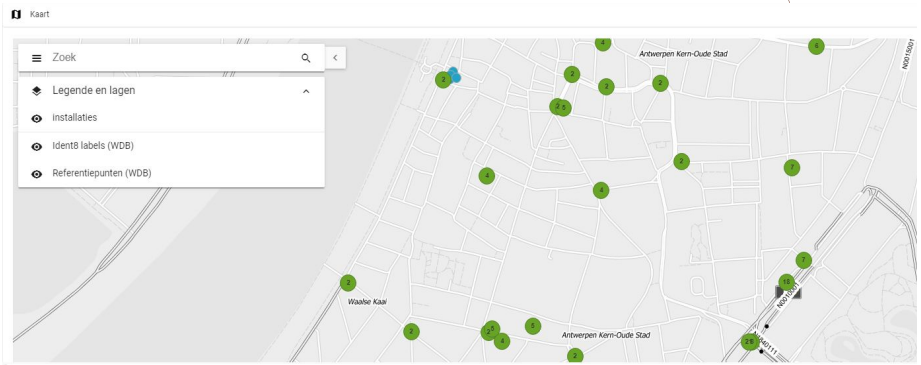
Very different Maturity levels

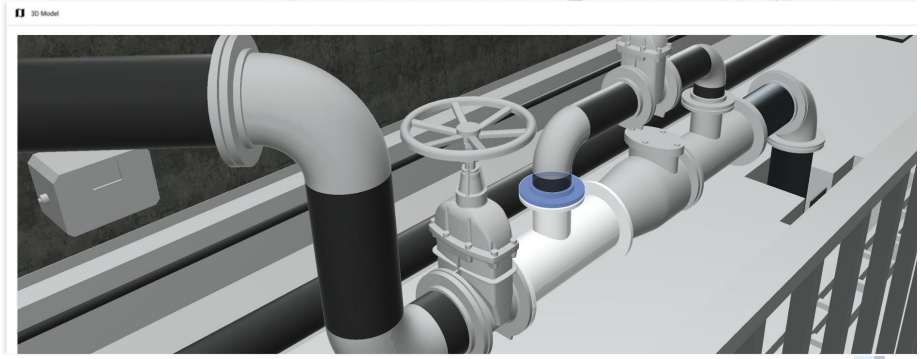
BIM

ICT

Data

Different domain needs





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ICT partners

Construction sector ICT-companies

Big gap towards linked data technology

Slow development of tooling ecosystem

PIO tender for semantic relations

https://www.innovatieveoverheidsopdrachten.be/projecten/aanmaak-en-beheer-van-semantische-otl-relaties

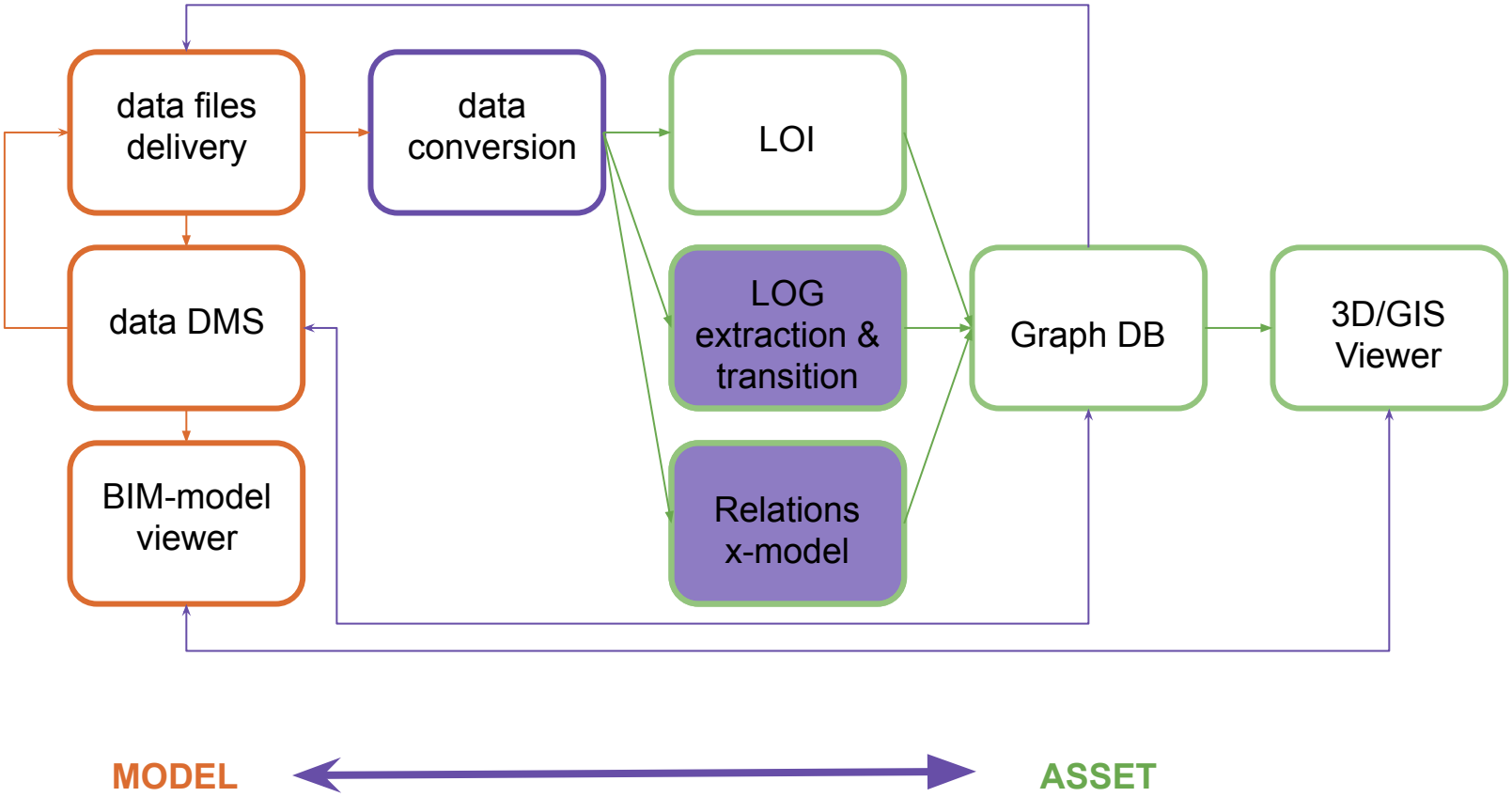
AWV Internal ICT

Closed world asset management environment

Classic API technology

=> We decided not to take the challenge because of the relative added value vs costs

model vs asset



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Supported formats - instruction bundle

OTL as definition layer -> translated in file schemas

- typeURI attributed to have close linkage to OTL
- Information model vs pragmatic data deliveries
- “Dot notation” for simplification of triple based data types
- BIM-model vs Asset data

OTL-compliant standardised data schemes

- REST API, JSON, GEOJSON, CSV, XLS, DWG, RVT

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Supported formats

GEOJSON


```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {
        "aardVerharding": "ongewapend-beton",
        "laagtype": "eenlaagse-betonverharding",
        "breedte": 0.945,
        "laagRol": "verharding",
        "lengte": 4.44,
        "oppervlakte": 4.2,
        "assetId.identificator": "f96a0cae-d78a-460c-8a05-63c424b9a0c9",
        "typeURI": "https://wegenenverkeer.data.vlaanderen.be/ns/onderdeel#Cementbetonverharding",
        "dikte": 10
      },
      "geometry": {
        "type": "Polygon",
        "coordinates": [
          [
            [14637.376678466796875, 15637.211602375119969, 0],
            [14637.3773651123046875, 15637.211591599143704, 0],
            [14637.387321472167969, 15637.211171316466534, 0],
            [14637.401226043701172, 15637.211785562871367, 0],
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            [14637.385261535644531, 15637.212259662149147, 0],
            [14637.376678466796875, 15637.211602375119969, 0]
          ]
        ]
      }
    },
    {
      "type": "Feature",
      "properties": {
        "aardVerharding": "ongewapend-beton",
```
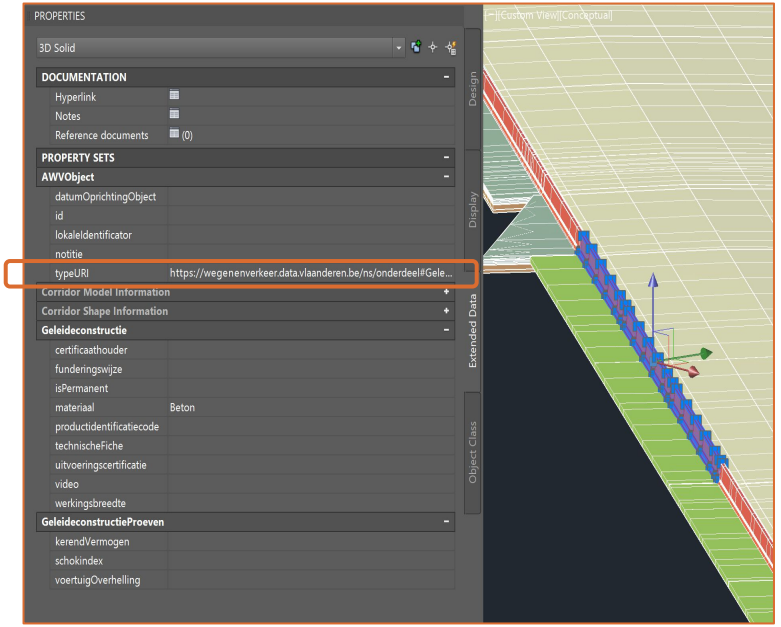


Civil 3D dwg



Excel

AE	AF	AG	AH	AI	AJ	AK
oprichtingObject	assetId.identificator	notitie	typeURI	dikte	productidentificatiecode	geometry
	BA-4DBB275A-DAEF-7B49-968B-FDEF4B055		https://wegenenverkeer.data.vlaanderen.be/ns/onderdeel#Cementbetonverharding	10		POINT Z (153327.708265584 206892.606476734 0)
	C2-4DBB275A-DAEF-7B49-968B-FDEF4B055		https://wegenenverkeer.data.vlaanderen.be/ns/onderdeel#Cementbetonverharding	10		LINESTRING Z (153327.708265584 206892.606476734 0, 150659.733110133 203204.571856091 0, 135967.52525712 1752
	D3-4DBB275A-DAEF-7B49-968B-FDEF4B055		https://wegenenverkeer.data.vlaanderen.be/ns/onderdeel#Cementbetonverharding	10		POLYGON Z ((153327.708265584 206892.606476734 0, 150659.733110133 203204.571856091 0, 135967.52525712 175263

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AWV - internal JSON-LD support


```
{
  "@graph": [
    {
      "@id": "https://data.awvvlaanderen.be/id/asset/45190b14-a39c-4532-b7ad-e5bb088b69b1",
      "@type": "https://wegenenverkeer.data.vlaanderen.be/ns/onderdeel#Cementbetonverharding",
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      "Laag.breedte": 1,
      "Laag.laagRol": "https://wegenenverkeer.data.vlaanderen.be/id/concept/KlLaagRol/verharding",
      "LaagDikte.dikte": 4,
      "Laag.oppervlakte": 10,
      "AIMObject.assetId": {
        "DtcIdentificator.identificator": "45190b14-a39c-4532-b7ad-e5bb088b69b1",
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    },
    {
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        "DtcIdentificator.identificator": "851dc680-46f5-4bd3-8ab4-995b54e90cf8",
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      },
      "AIMObject.typeURI": "https://wegenenverkeer.data.vlaanderen.be/ns/onderdeel#Cementbetonverharding",
      "Cementbetonverharding.laagtype": "https://wegenenverkeer.data.vlaanderen.be/id/concept/KlCBVLaagtype/eenlaagse-betonverharding",
      "Cementbetonverharding.aardVerharding": "https://wegenenverkeer.data.vlaanderen.be/id/concept/KlCBVAardVerharding/ongewapend-beton"
    }
  ],
  "@context": {
    "context.maakt.niet.uit": {
      "@id": "https://wegenenverkeer.data.vlaanderen.be/ns/implementatieelement#DtcRechtspersoon.afdeling",
      "@type": "http://www.w3.org/2001/XMLSchema#String"
    }
  }
}
```

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Data exchange specifications

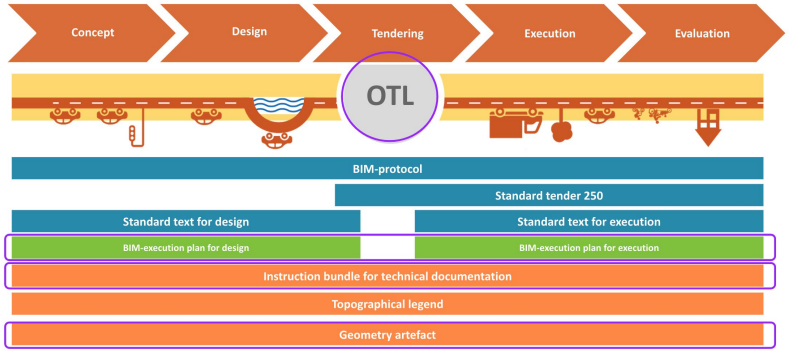
BIM execution plan

OTL subsets = ad hoc LOI specification

https://opendata.apps.mow.vlaanderen.be/otltool

Instruction bundle = data format specifications

Geometry artefact = geometrical LOD



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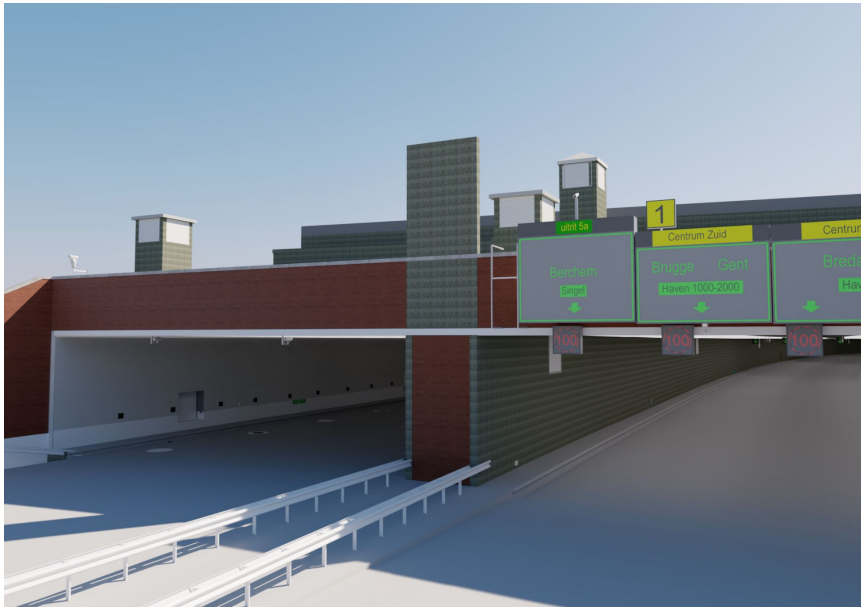
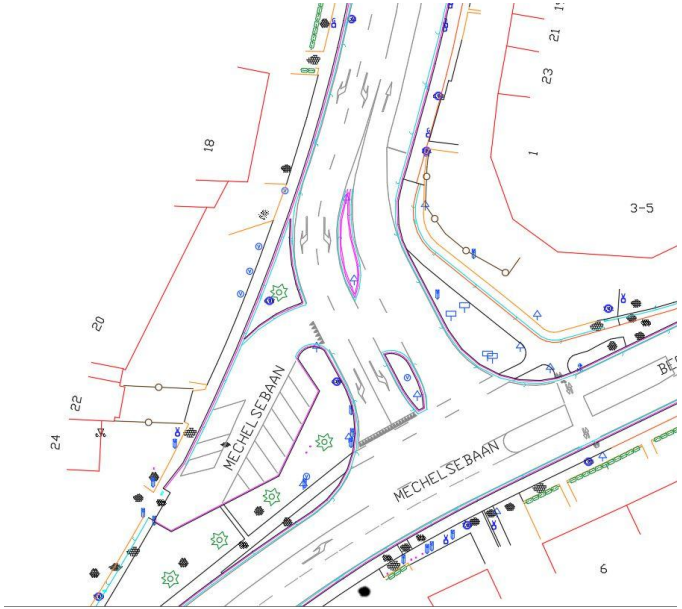
Examples





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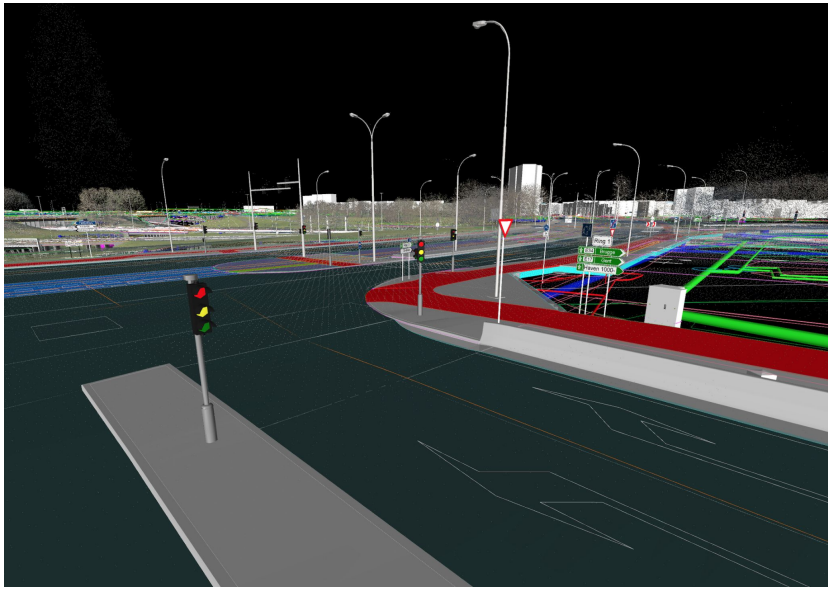
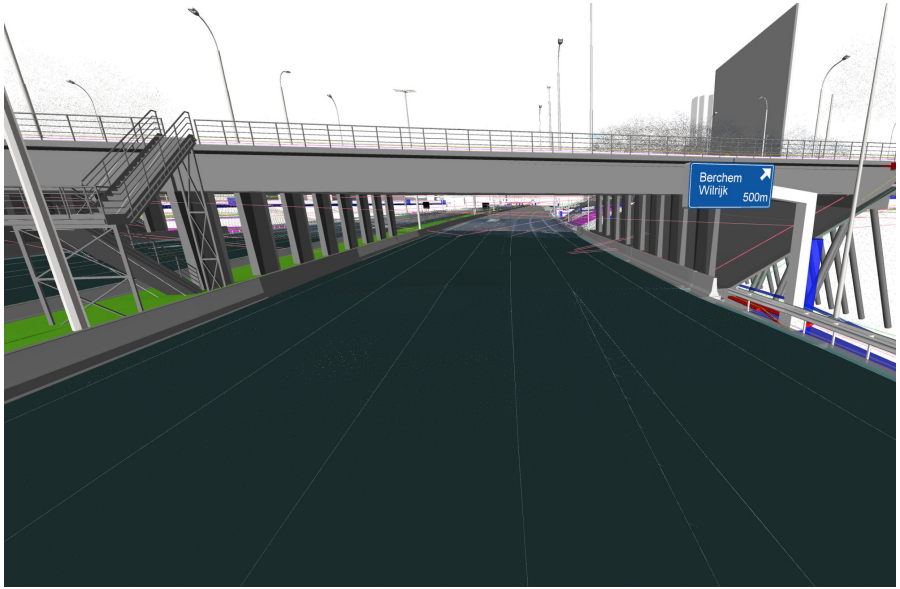
Examples





- AWV
- AIM program
- OTL
- Data journey
- Challenges

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Linked data future proofness

OSLO compliant

Linked data advantages for sharing and coupling datasets

EU standardisation

Long term initiatives vs pragmatic approach with OTL

Not yet implemented because

Limitations of RDF/SHACL implementation at OSLO -> to be re-evaluated

Other priorities as a closed world asset manager -> linked data is not a goal on its own

Upcoming implementation with linked data for road signs (LBLOD)

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