

# **GeoSmartCity Workshop**

## **Girona – October 7<sup>th</sup> 2015**

**The GeoSmartcity Data model  
and Data harmonization**

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# Summary

- Objectives
- Data models
  - Scenarios and pilots involved
  - Methodology for the production of the GSC data models
  - INSPIRE DS extension approach
  - An insight into the GSC data models
- Data harmonisation

# Objectives

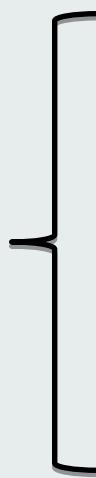
- To design the data model needed to harmonize the overall heterogeneous spatial datasets to be further managed by the hub.
- To harmonize the spatial datasets from the different heterogeneous sources to the common target schemas.

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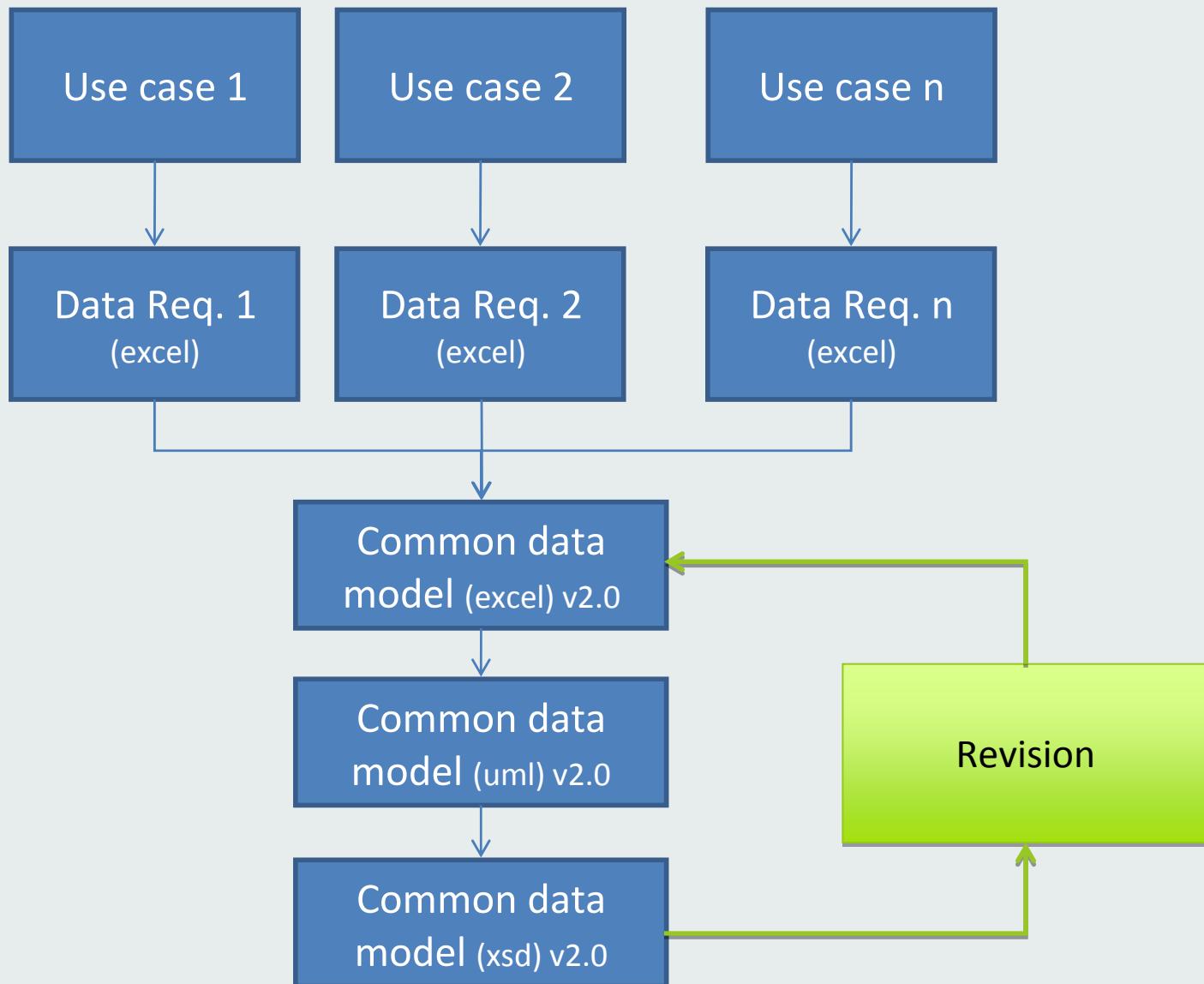
# Scenarios

- Green Energy
- Buildings (Reggio Emilia - IT, Marousi - GR, Oeiras – PT)
- Green routing (Girona – ES, Turku – FI)
- Underground (Pamplona – ES, Genova – IT, Oeiras – PT, Flanders – BE, South Moravia – CZ, Ruda Slaska – PL)



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1. Create a template file in order to collect the pilots' data modelling requirements in a structured way.
2. Request each pilot to provide the list of attributes / information, the code list / code list values needed to run its use cases.
3. Align pilots' data modelling requirements
4. Compare data requirements so collected with the relevant INSPIRE Data Specifications
5. Provide an extension of the INSPIRE data models to take into account those elements included in pilots' data modelling requirements not covered by the INSPIRE Data Specifications.
6. Detailed procedures and instructions for the revision loop

UC-GSCP07-01	UC-GSCP07-02	UC-GSCP07-03	UC-GSCP11-01	UC-GSCP09-01	UC-GSCP09-02	UC-GSCP08-01	DATA LOGIC NAME	DESCRIPTION LOGIC NAME	DATA TYPE	INSPIRE (<DataTheme>,<AttributeName>)
<b>P07</b>										
1	1	1					Underground.LinearClass.GEOMETRY_3D	Segment of the network described according its type in the whole network	Geometry	Utility and Government Services.Common Utility Network Elements.UtilityLink.centrelineGeometry
2	2	2					Underground.LinearClass.COD_CLASSE	Numeric code of the class according to the Content Specification for the Topographic DB rule	Text(6)	Utility and Government Services.Common Utility Network Elements.UtilityLink.inspireId.localId- Si crea il localId come formattato string Cod_classe-FileID ??
3	3	3					Underground.LinearClass.FILE_ID	Unique progressive identifier of the class objects	Integer(19)	Utility and Government Services.Common Utility Network Elements.UtilityLink.inspireId.localId. Si crea il localId come formattato string Cod_classe-FileID ??
4	4	4					Underground.LinearClass.L_CREATION	Input date of the object into the Municipality Geographic Information System	Date	Utility and Government Services.Common Utility Network Elements.UtilityLink.beginLifespanVersion
5	5	5					Underground.LinearClass.COM_ISTAT	ISTAT code of the Municipality in the format rrpppccc (rr=Region, pp=Province, cccc=Municipality)	Text(8)	
6	6	6					Underground.LinearClass.TP_STR_COD	Code of the road	Text(8)	
7	7	7					Underground.LinearClass.TP_STR_NOM	Name of the road	Text(254)	
8	8	8					Underground.LinearClass.ES_AMM_CF	Functional classification of the road	Code list	
9	9	9					Underground.LinearClass.L_EG_COD	Fiscal code/VAT number of the managing authority	Text(16)	
10	10	10					Underground.LinearClass.L_EG_NOM	Name of the managing authority	Text(50)	Common Utility Network Elements.UtilityNetwork.authority role
11	11	11					Underground.LinearClass.L_BORN	Date of the installation/setup/workability	Date	Utility and Government Services.Common Utility Network Elements.UtilityLink.validFrom
12	12	12					Underground.LinearClass.L_DIA	Nominal diameter in mm	Integer(8)	Utility and Government Services.Common Utility Network Elements.Pipe.pipeDiameter
13	13	13					Underground.LinearClass.L_LUNG	Length in m	Decimal	Utility and Government Services.Common Utility Network Elements.duct.length?
14	14	14					Underground.LinearClass.L_MAT	Type of material	Code list	Utility and Government Services.CommonExtendedCommon Utility Network Elements.Pipe.PipeMaterialType

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# The INSPIRE DS extension approach



**INSPIRE**  
Infrastructure for Spatial Information in Europe

## INSPIRE Generic Conceptual Model

<b>Title</b>	D2.5: Generic Conceptual Model, Version 3.4
<b>Status</b>	Version for Annex II/III data specifications v3.0
<b>Creator</b>	Drafting Team "Data Specifications"
<b>Date</b>	2014-04-08
<b>Subject</b>	Generic Conceptual Model of the INSPIRE data specifications
<b>Publisher</b>	Drafting Team "Data Specifications"
<b>Type</b>	Text
<b>Description</b>	Generic Conceptual Model of the INSPIRE data specifications
<b>Contributor</b>	Members of the INSPIRE Drafting Team "Data Specifications", INSPIRE Spatial Data Interest Communities & Legally Mandated Organisations, INSPIRE Consolidation Teams and other Drafting Teams
<b>Format</b>	Portable document format (pdf)
<b>Source</b>	Drafting Team "Data Specifications"
<b>Rights</b>	Public
<b>Identifier</b>	D2.5_v3.4
<b>Language</b>	En
<b>Relation</b>	n/a
<b>Coverage</b>	Project duration

## Annex F (informative)

### Example for an extension to an INSPIRE application schema

#### F.1 Introduction

The agreement on harmonised data specifications addresses the need of users, in particular pan-European users, to combine multiple spatial data sets without repetitive manual intervention and in such a way that the result is coherent. This requires an effort to transform the existing spatial data to the new harmonised data specifications. In the long-term, it is the hope that less and less effort will be required for such transformations and that data providers start to re-use the harmonised data specifications as the basis for their spatial data sets in case they are restructured. Since national spatial data sets will in almost all cases contain information not covered by the INSPIRE data specifications, national SDIs or community SDIs will typically have to extend the INSPIRE data specification for their own purpose.

The Generic Conceptual Model has been designed to support such extensions. This annex provides an example for a simple extension.

#### F.2 General rules

The INSPIRE data specifications have been developed through a process involving the European stakeholders. While the future maintenance of the specifications has not yet been fixed, it is reasonable to assume that this will be the case in the future, too. The INSPIRE

Extending an INSPIRE data specification would imply at a minimum that:

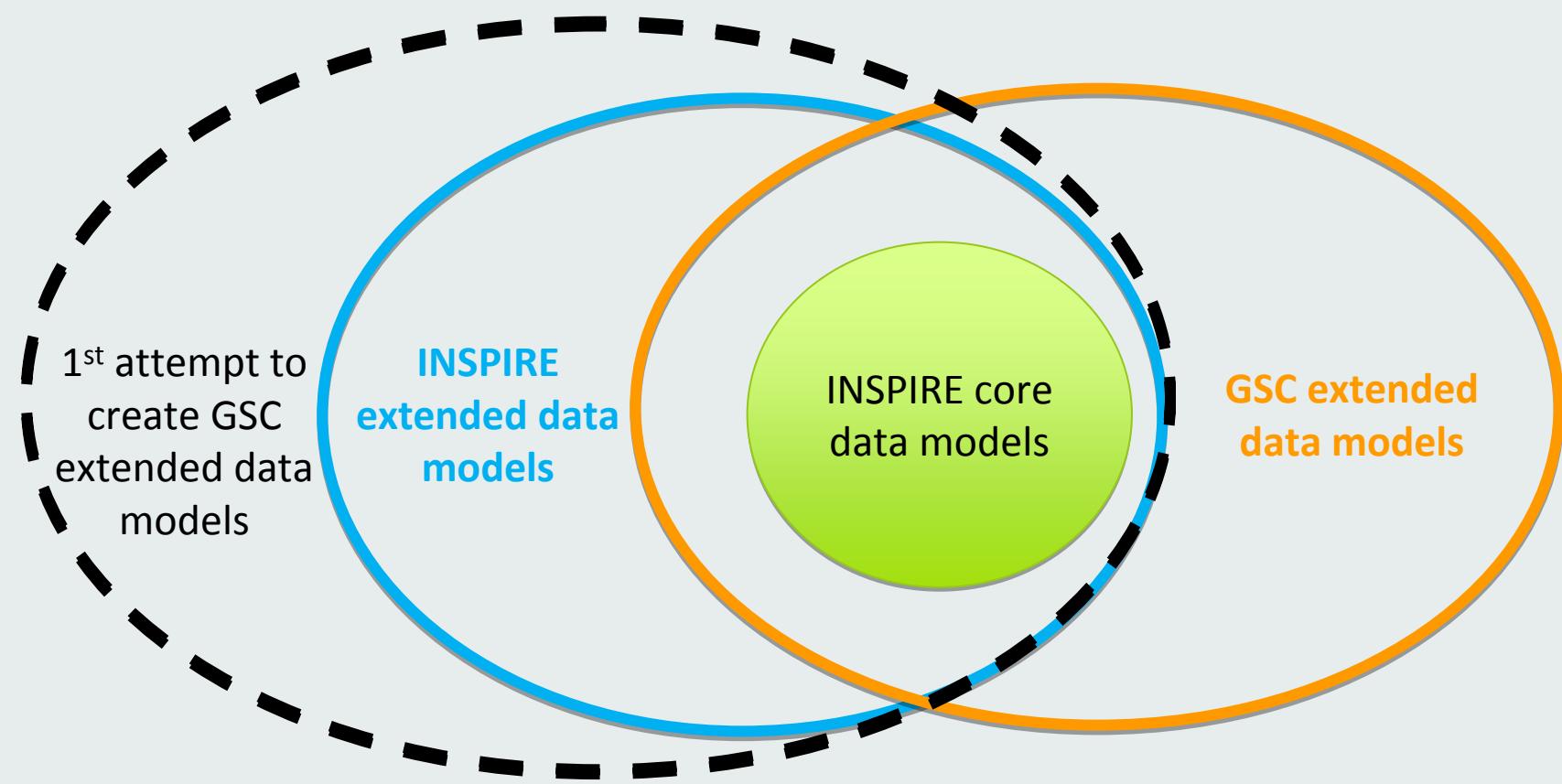
- the extension does not change anything in the INSPIRE data specification but normatively references it with all its requirements
- the extension does not add a requirement that breaks any requirement of the INSPIRE data specification

However, the extension may, for example, do any of the following:

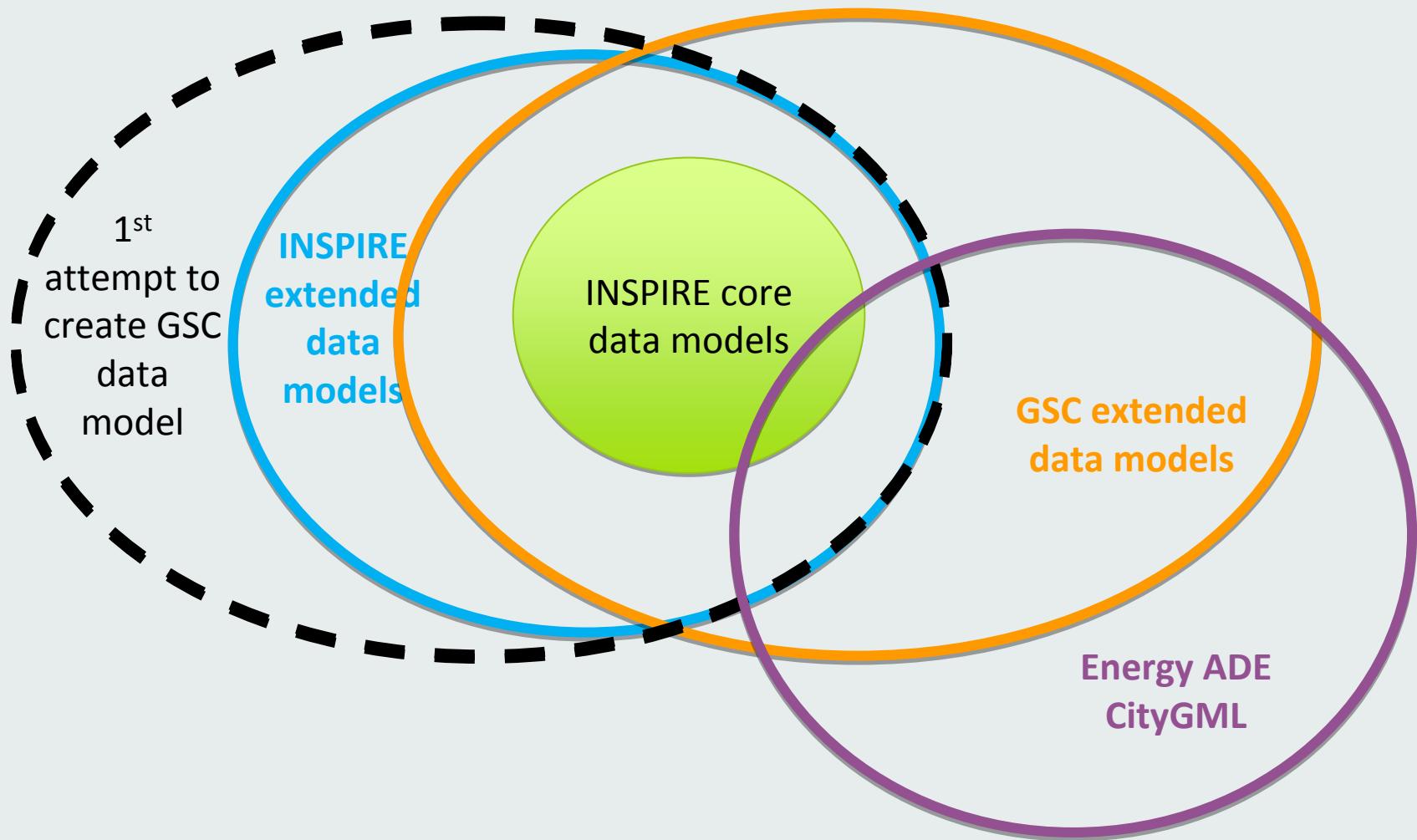
- add new application schemas importing INSPIRE or other schemas as needed
- add new types and new constraints in your own application schemas
- extend INSPIRE code lists as long as the INSPIRE data specification does not identify the code list as a centrally managed, non-extensible code list
- add additional portrayal rules

In addition to these general rules that are mainly implied by the rules of UML, further harmonisation will be achieved, if the extensions conform to all requirements of this document and the document "Guidelines for the encoding of spatial data", too.

# The GSC underground DM approach



# The GSC building DM approach



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# Extension of INSPIRE Utilities and Governmental Services (US) - “*Utility networks*” sub-model

Pilots involved :

[P06] Comarca of Pamplona (ES), [P07] Genova (IT), [P08] Oeiras (PT), [P09] Flanders Region (BE), [P10] South Moravian Region (CZ), [P11] Ruda Śląska (PL)

Focus on the Italian use cases:

GSC data modelling helps process of alignment of the National Specification on Utility networks to INSPIRE Directive requirements.

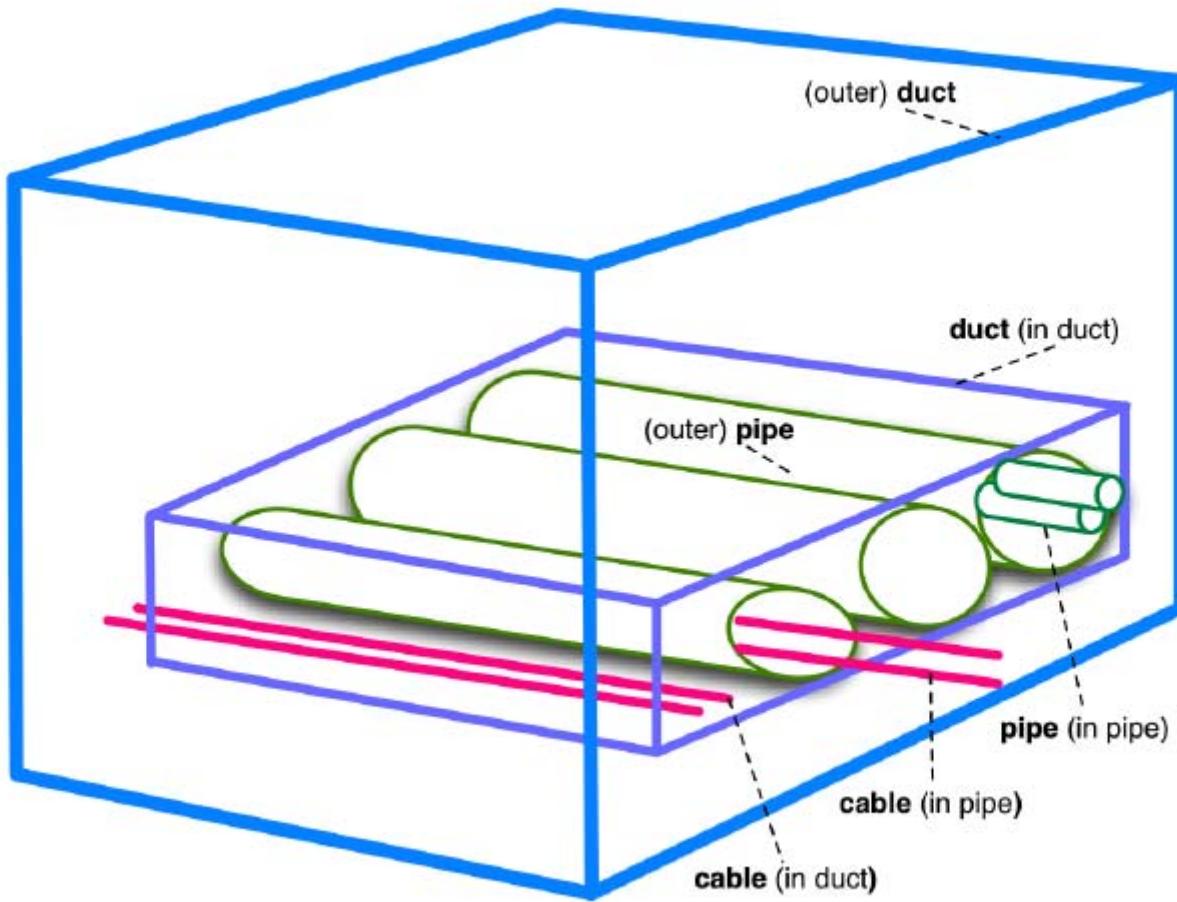
Focus on the Flanders Region use cases:

GSC data model extends INSPIRE US data model taking into account the information needed by Flanders sewer network management (Aquafin's AQS2.0 data model)

# GSC - Underground Scenario

## Utility Networks Profile:

- is based on a node-arc-node structure and network concept
  - information is detailed in :
  - one “Common Utility Networks Elements” application schema, that contains all the common elements shared among the different utility network type
  - six network - specific application schemas
    - Electricity network
    - Oil, Gas & Chemicals network
    - Sewer network
    - Telecommunications network (only proposed in the technical guidance, out of legislation)
    - Thermal network
    - Water network



**Figure 9 – Physical relations between cables, pipes and ducts**

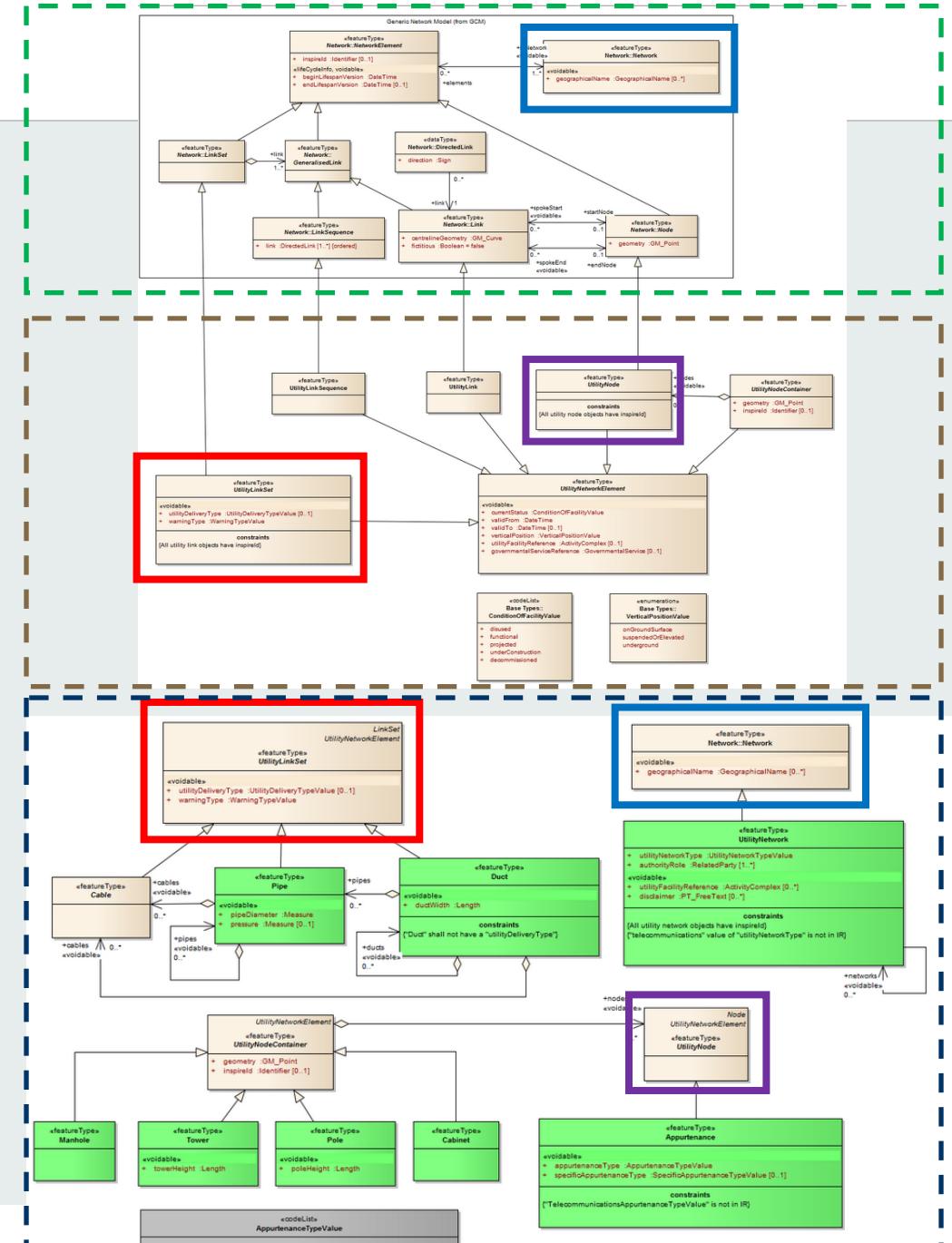


**GeoSmartCity**

## Generic Network Model (from GCM)

### Utility Network Profile – Abstract Types

### Utility Network Profile – CommonTypes



# Flanders Pilot National Specification Data Model

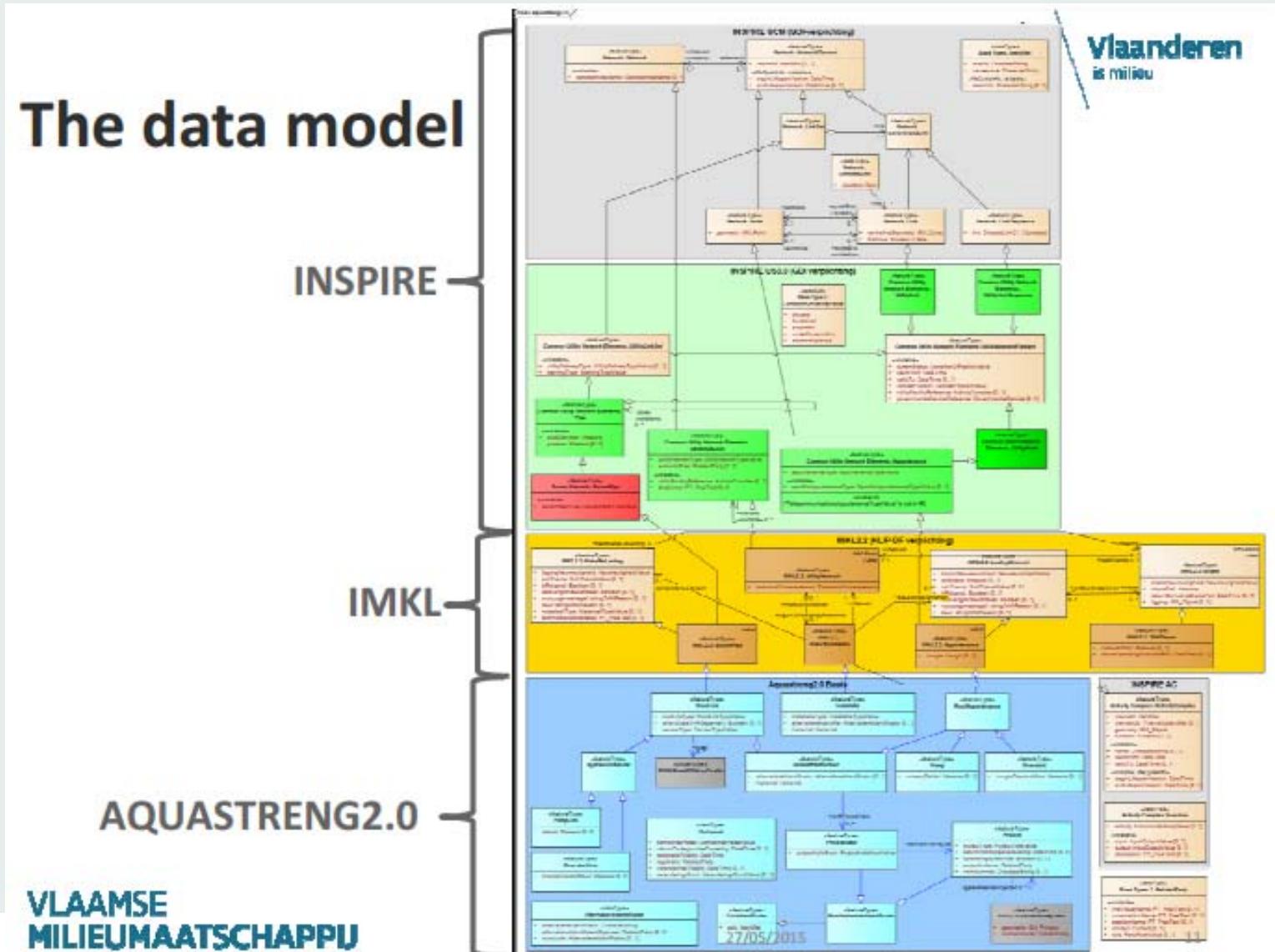
## The data model

INSPIRE

IMKL

AQUASTRENG2.0

VLAAMSE  
MILIEUMAATSCHAPPIJ



The GeoSmartCity Utilities and Governmental Services data model version 2.0 extends the core INSPIRE data model for Utilities and Governmental Services:

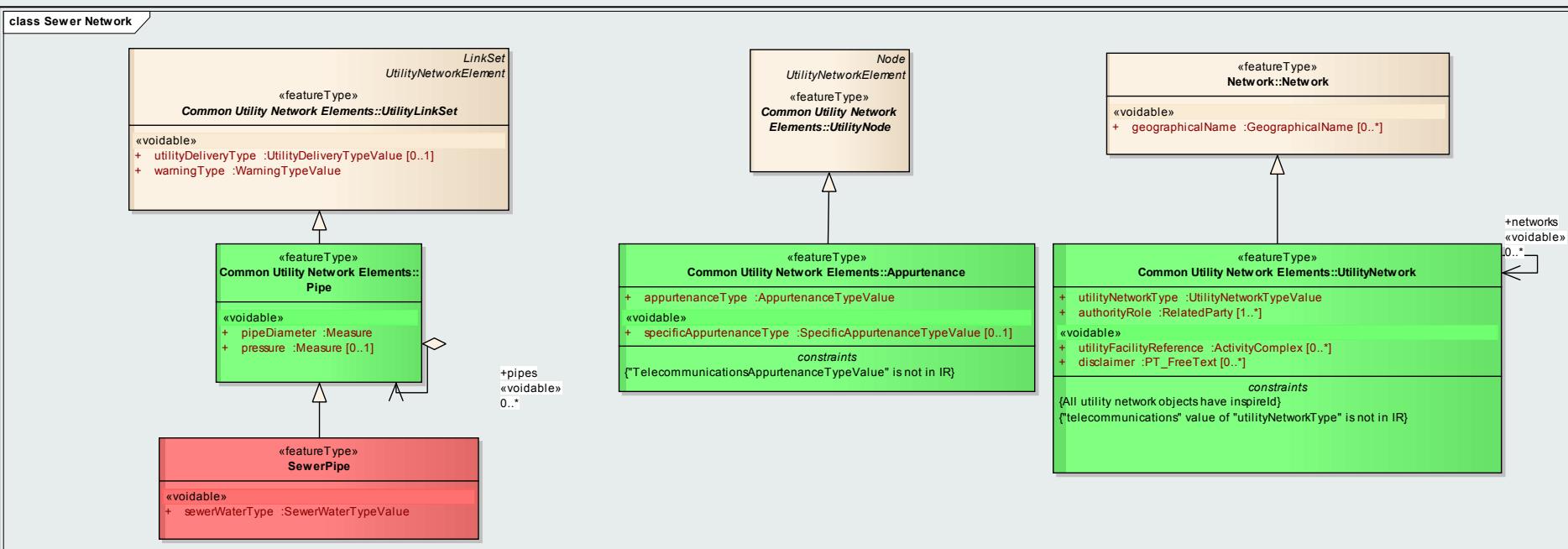
• **7 INSPIRE feature types extended** adding new attributes to the relevant INSPIRE US core feature types

- UtilityNetwork
- ActivityComplex
- SewerPipe
- WaterPipe
- OilGasChemicals Pipe
- TelecommunicationsCable
- ElectricityCable

• **9 feature types created from scratch** (no corresponding feature type in the INSPIRE US core model exists)

- SewerAppurtenance
- WaterAppurtenance
- OilGasChemicalsAppurtenance
- SoilDigs
- Intervention
- TransformationProjects
- InfrastructureOrigin
- MunicipalIntervention
- CrowdSourcing

# An example of GSC extension: the sewer network

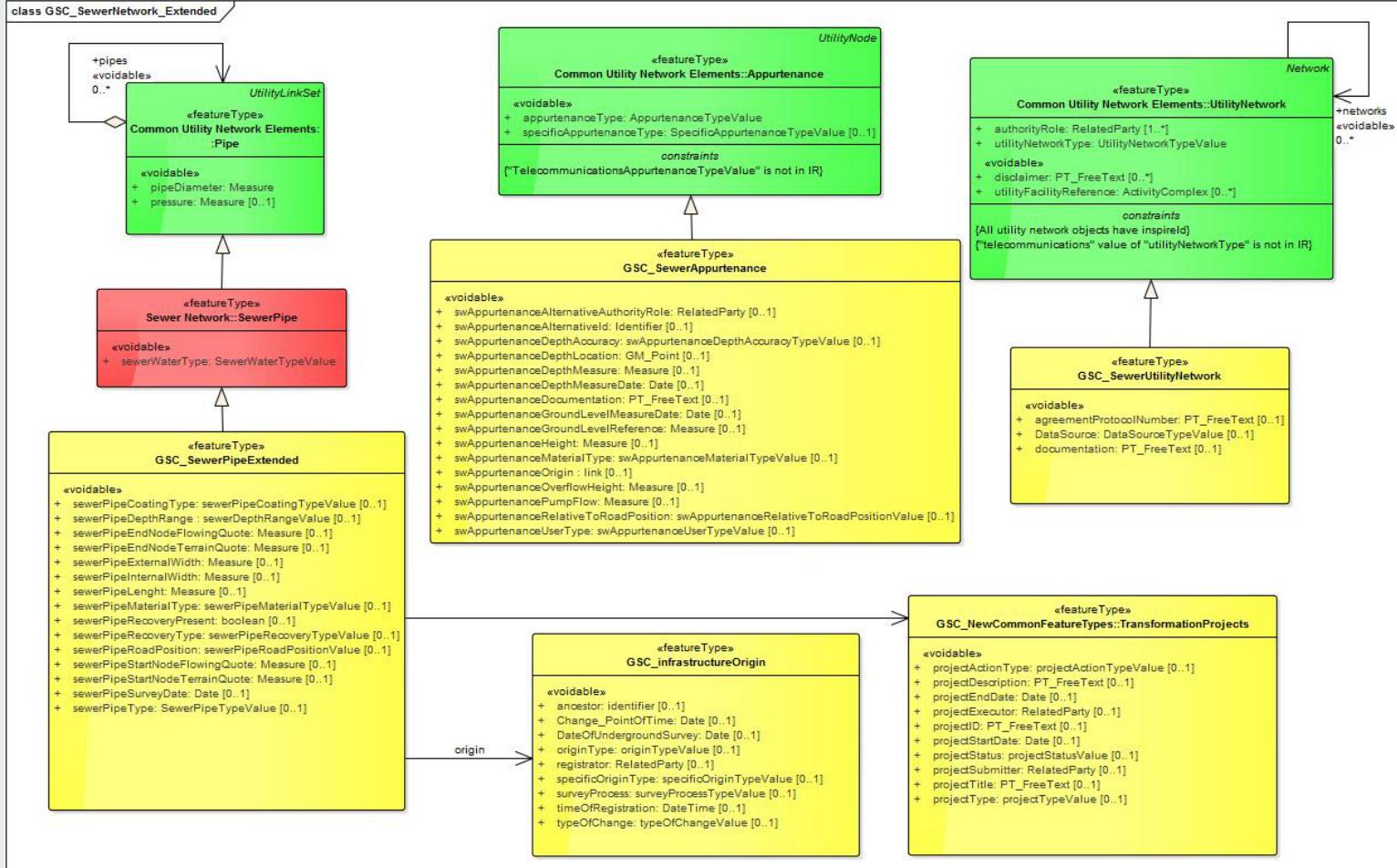


UML of the INSPIRE core SewerNetwork

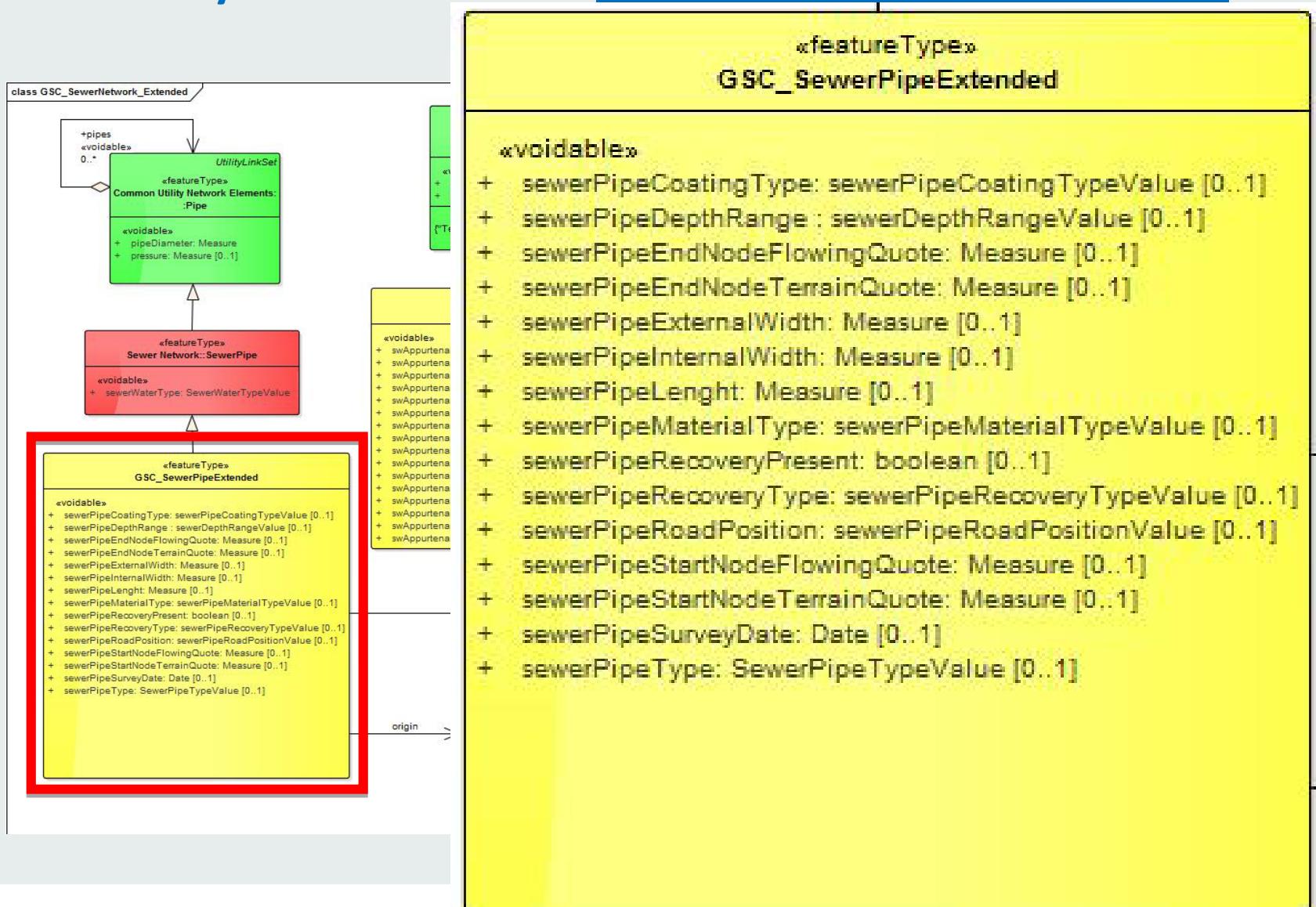
## GeoSmartCity extension of the “Sewer Network” - version 2.0

- The GeoSmartCity data model for sewer network
  - extends 2 INSPIRE-core feature types:
    - sewerPipe
    - sewerAppurtenance
  - introduces 2 new feature types:
    - InfrastructureOrigin - (Flanders region requirements)
    - TransformationProject (Flanders region + Italian requirements)

# GeoSmartCity extension of the “Sewer Network” - version 2.0



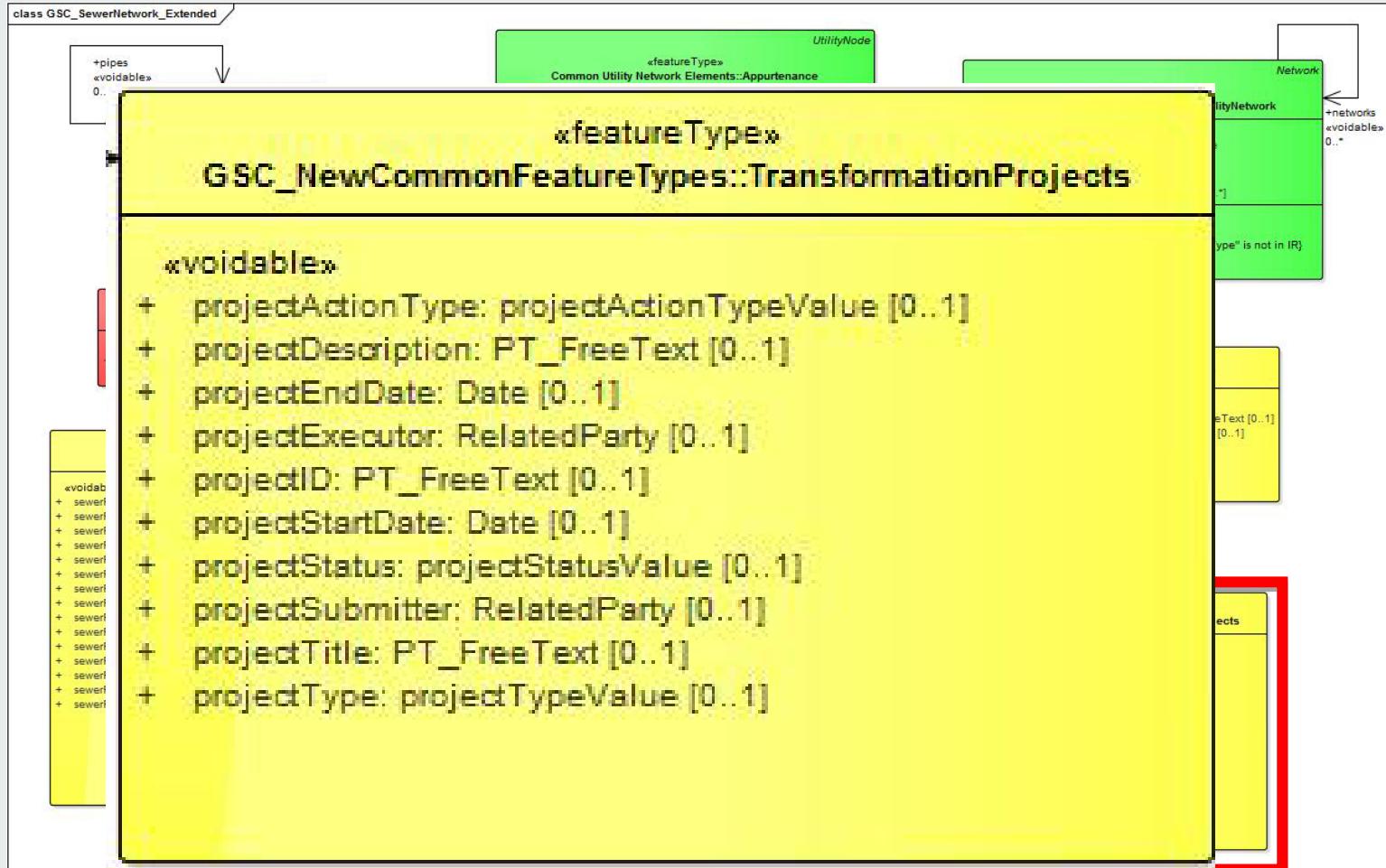
## GeoSmartCity extension of the “Sewer Network” - version 2.0



## GeoSmartCity extension of the “Sewer Network” - version 2.0

«featureType» GSC_SewerAppurtenance	
«voidable»	
+ swAppurtenanceAlternativeAuthorityRole: RelatedParty [0..1]	
+ swAppurtenanceAlternativeId: Identifier [0..1]	
+ swAppurtenanceDepthAccuracy: swAppurtenanceDepthAccuracyTypeValue [0..1]	
+ swAppurtenanceDepthLocation: GM_Point [0..1]	
+ swAppurtenanceDepthMeasure: Measure [0..1]	
+ swAppurtenanceDepthMeasureDate: Date [0..1]	
+ swAppurtenanceDocumentation: PT_FreeText [0..1]	
+ swAppurtenanceGroundLevelMeasureDate: Date [0..1]	
+ swAppurtenanceGroundLevelReference: Measure [0..1]	
+ swAppurtenanceHeight: measure [0..1]	
+ swAppurtenanceMaterialType: swAppurtenanceMaterialTypeValue [0..1]	
+ swAppurtenanceOrigin : link [0..1]	
+ swAppurtenanceOverflowHeight: Measure [0..1]	
+ swAppurtenancePumpFlow: Measure [0..1]	
+ swAppurtenanceRelativeToRoadPosition: swAppurtenanceRelativeToRoadPositionValue [0..1]	
+ swAppurtenanceUserType: swAppurtenanceUserTypeValue [0..1]	

## GeoSmartCity extension of the “Sewer Network” - version 2.0





## GeoSmartCity - Underground Data Model – v2.1

Il data model **GeoSmartCity Underground** estende il core **Utility Networks Profile** del data model INSPIRE per Utilities and Government Services (US).

Le informazioni sono contenute in:

- Un “**New Common Types**” application schema, che contiene tutti i nuovi (cioè inesistenti feature/data type in INSPIRE US core model) common elements condivisi tra i diversi utility network type
- Sei **network-specific extended** application schema:
  - Electricity network
  - Oil, Gas & Chemicals network
  - Sewer network
  - Telecommunications network
  - Thermal network
  - Water network
- Una **theme-specific extension** del Base Model “Activity Complex” application schema
  - Activity Complex

## GeoSmartCity extension of the “Sewer Network” – 2.1

Based upon Flanders Region pilot's feedback

### New Feature type:

*TransformationAction*

### Associations:

*sewerPipeHasProjectAction*

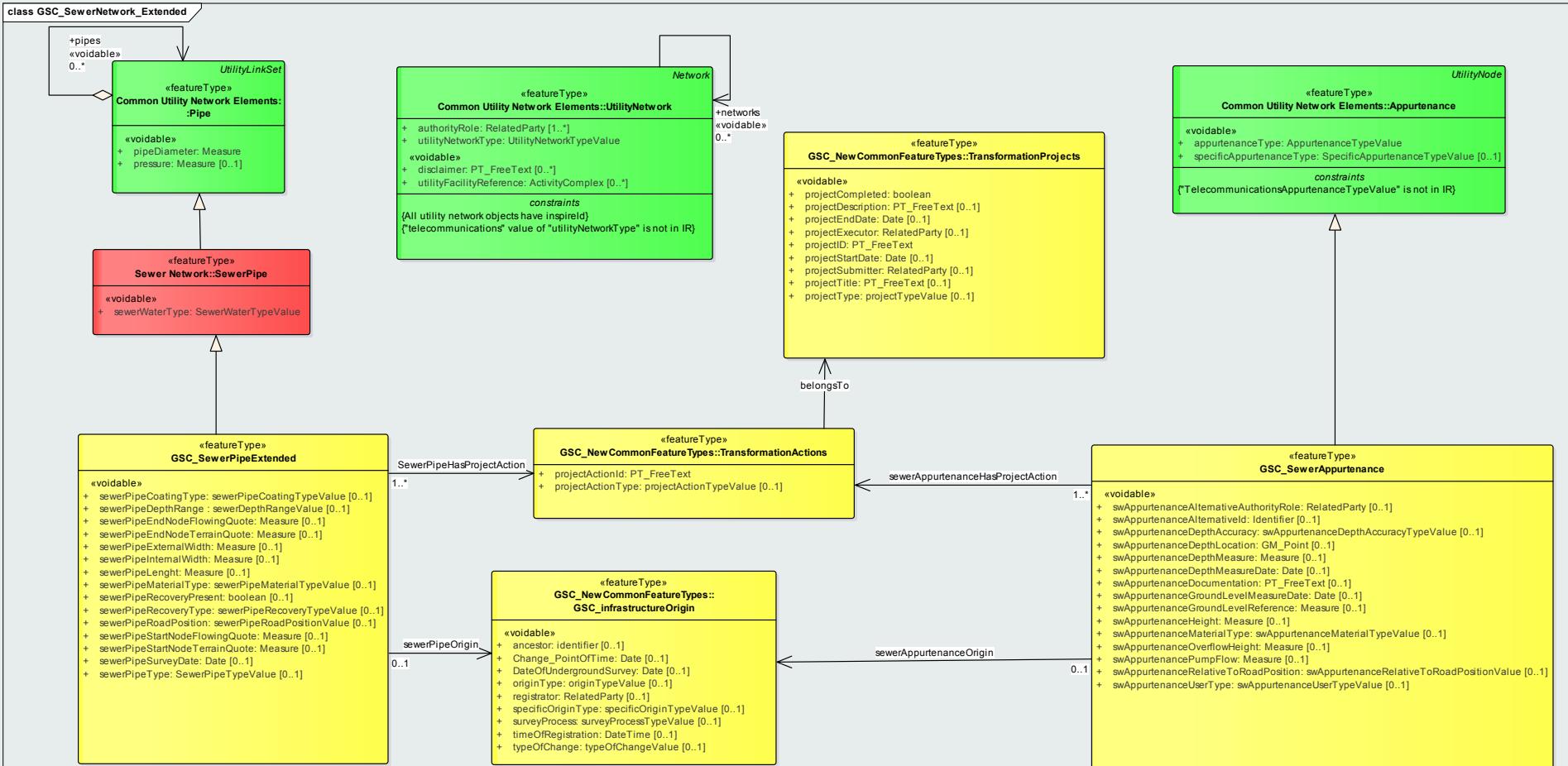
*sewerAppurtenanceHasProjectAction*

*actionBelongsToProject*

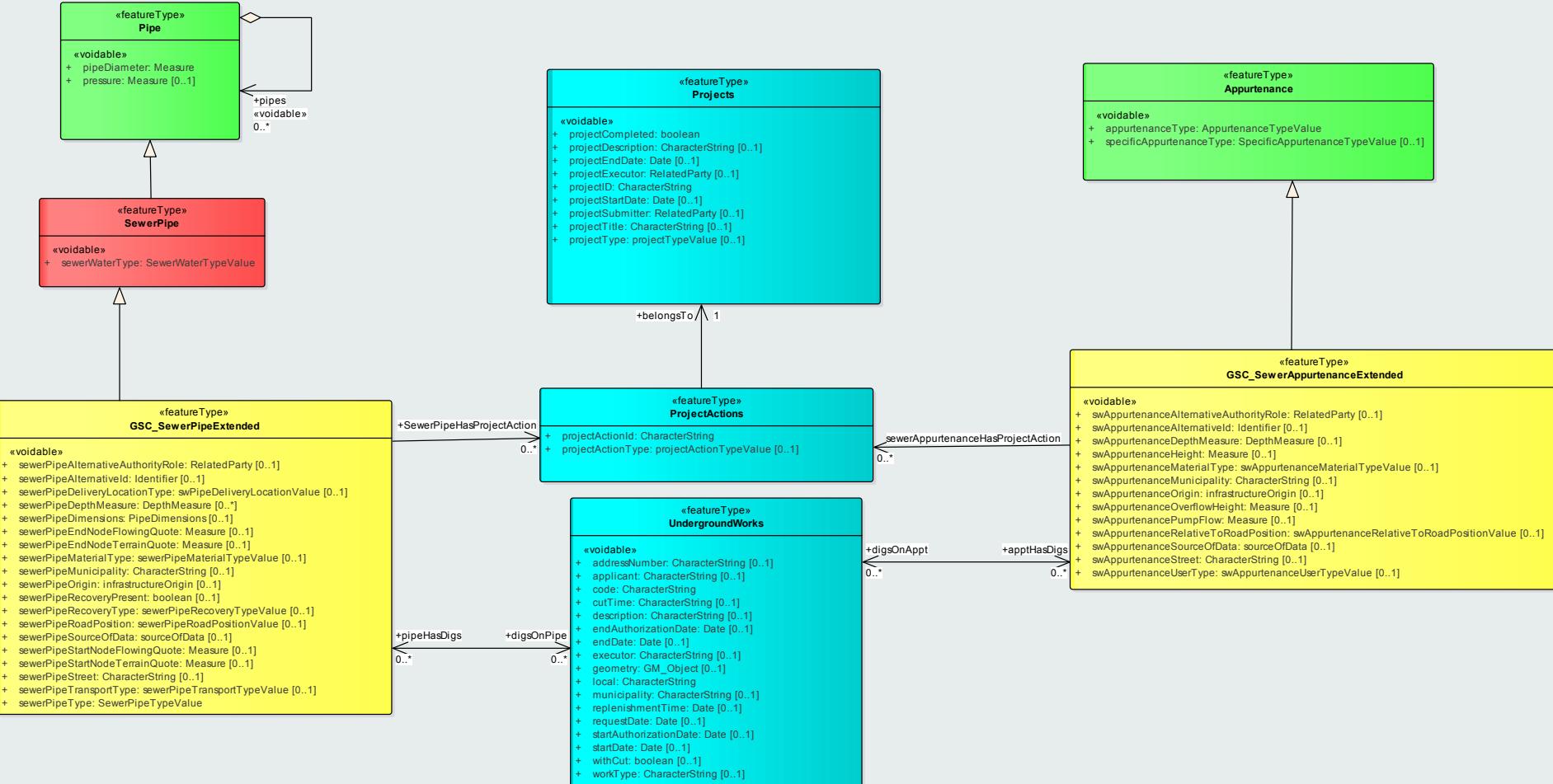
*sewerPipeHasOrigin*

*sewerAppurtenanceHasOrigin*

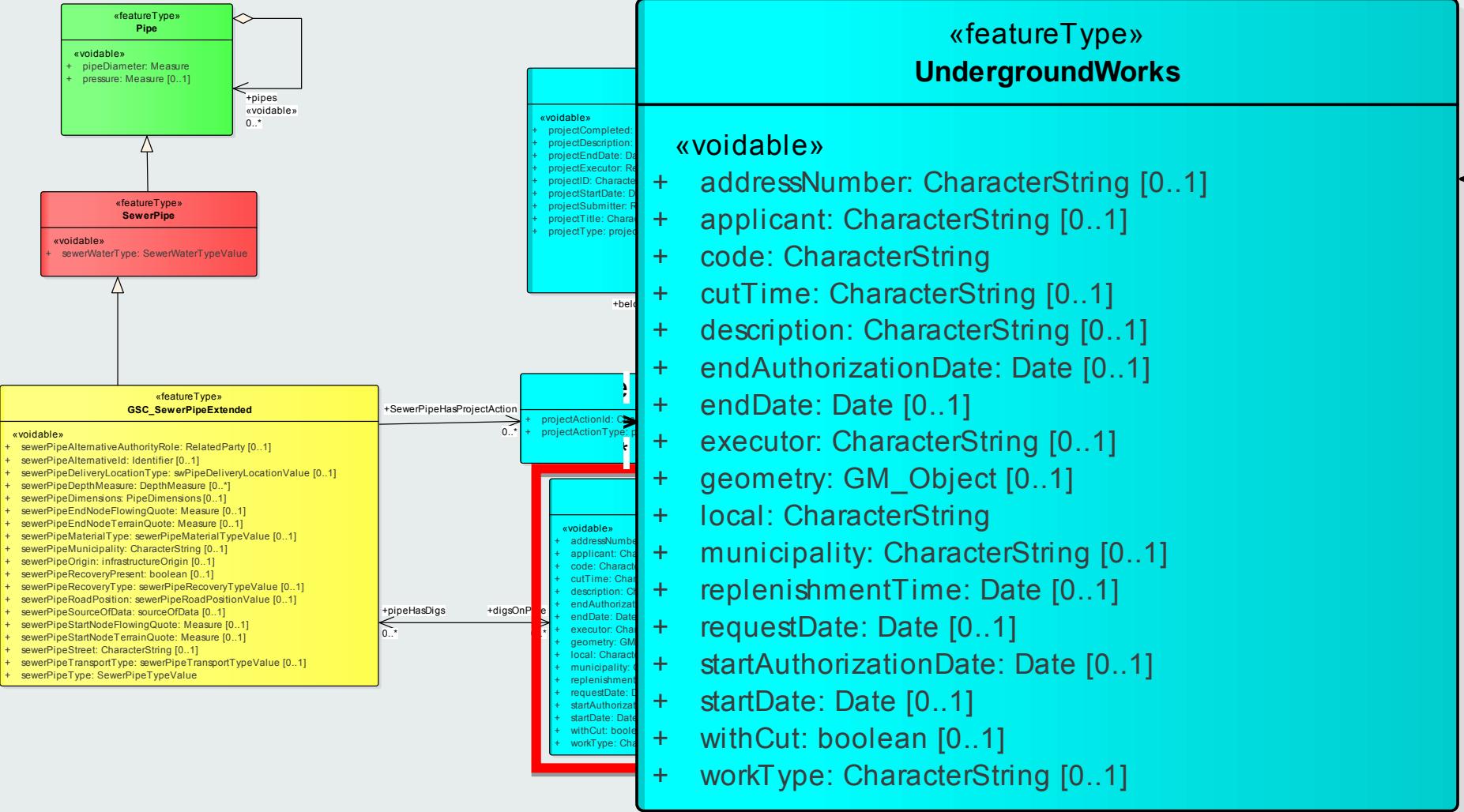
# GeoSmartCity extension of the “Sewer Network” version 2.1



# Target data model: GeoSmartCity – Sewer Network Extended

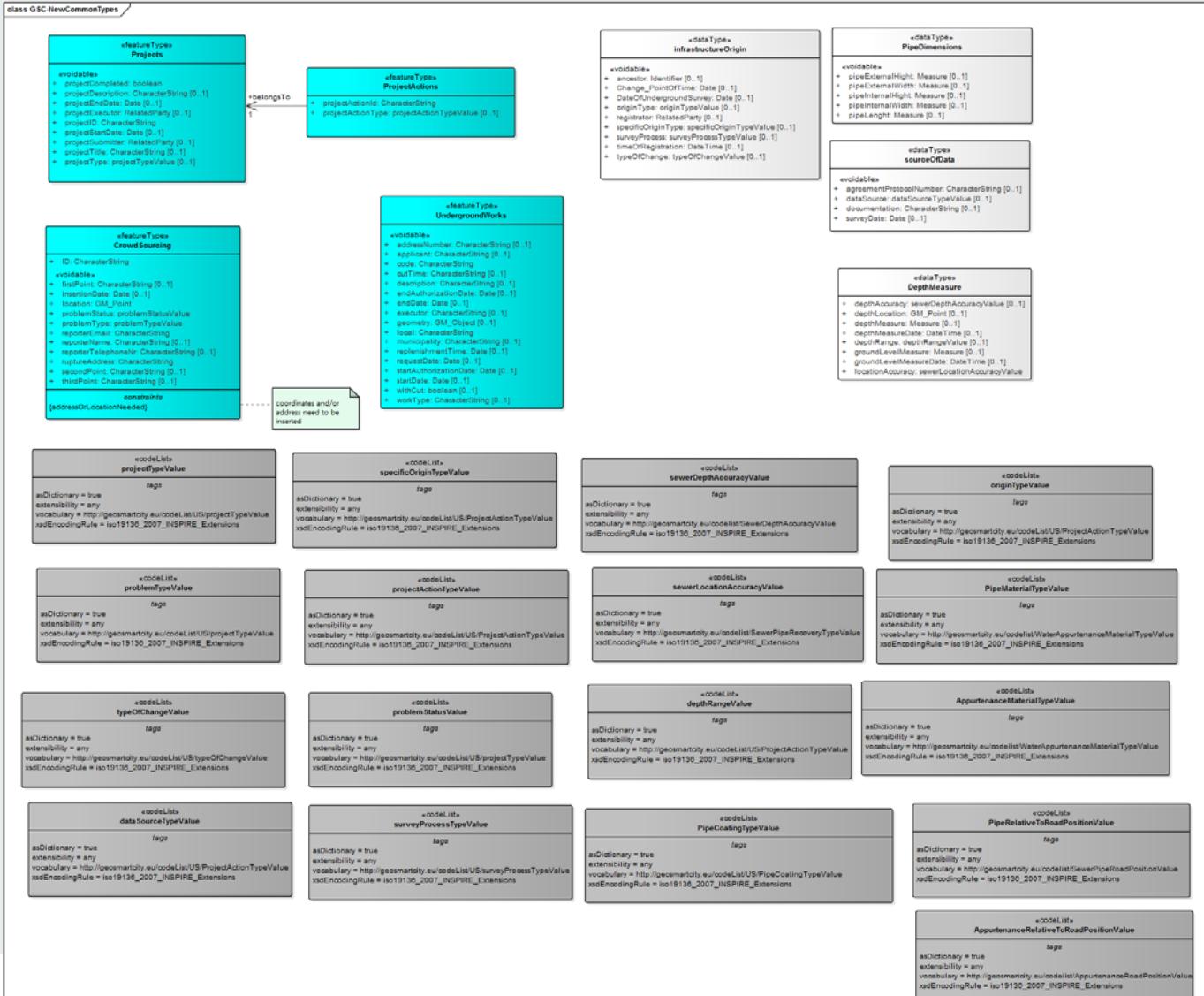


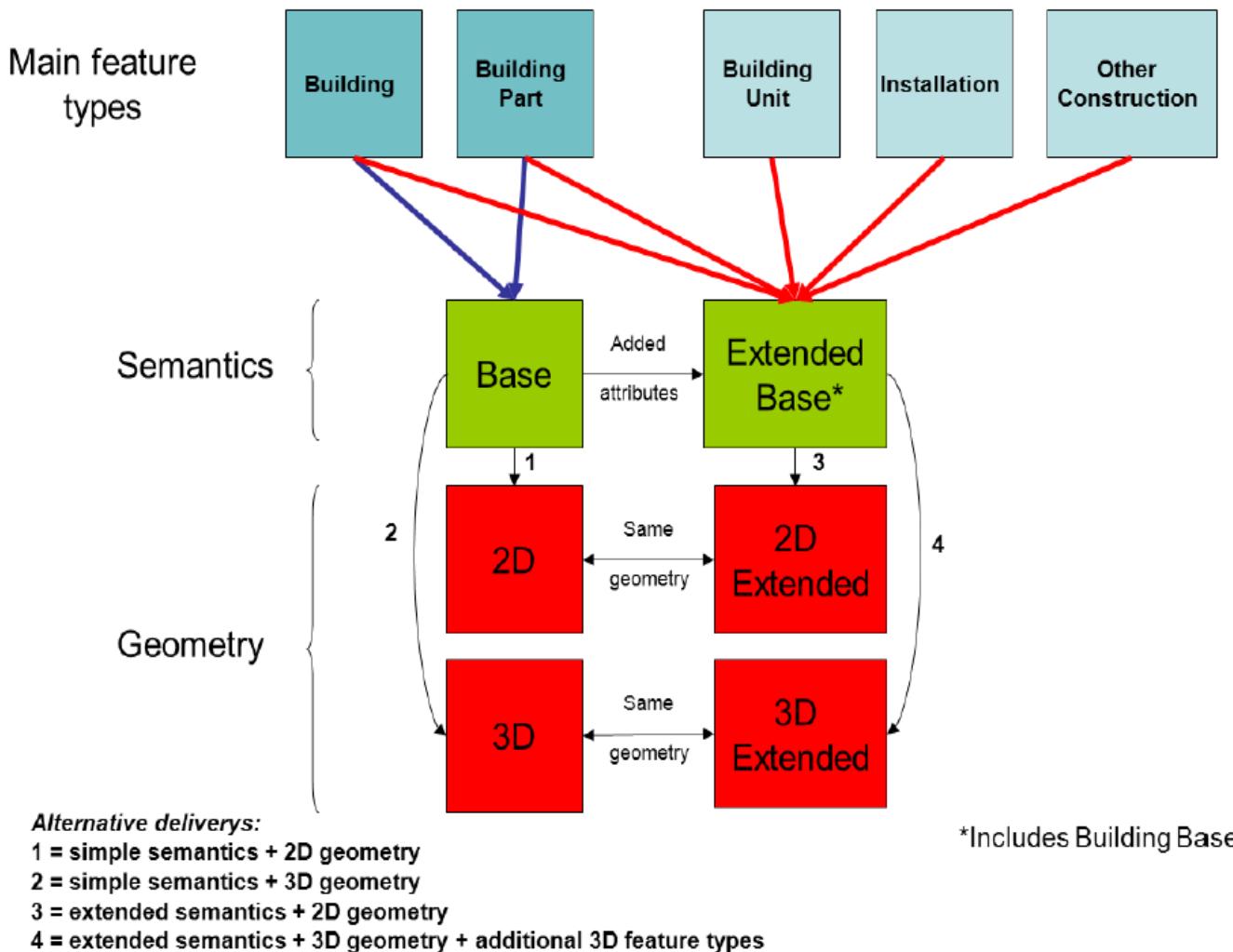
# Target data model: GeoSmartCity – Sewer Network Extended



# Target data model: GSC–NewCommonTypes

## 2.1



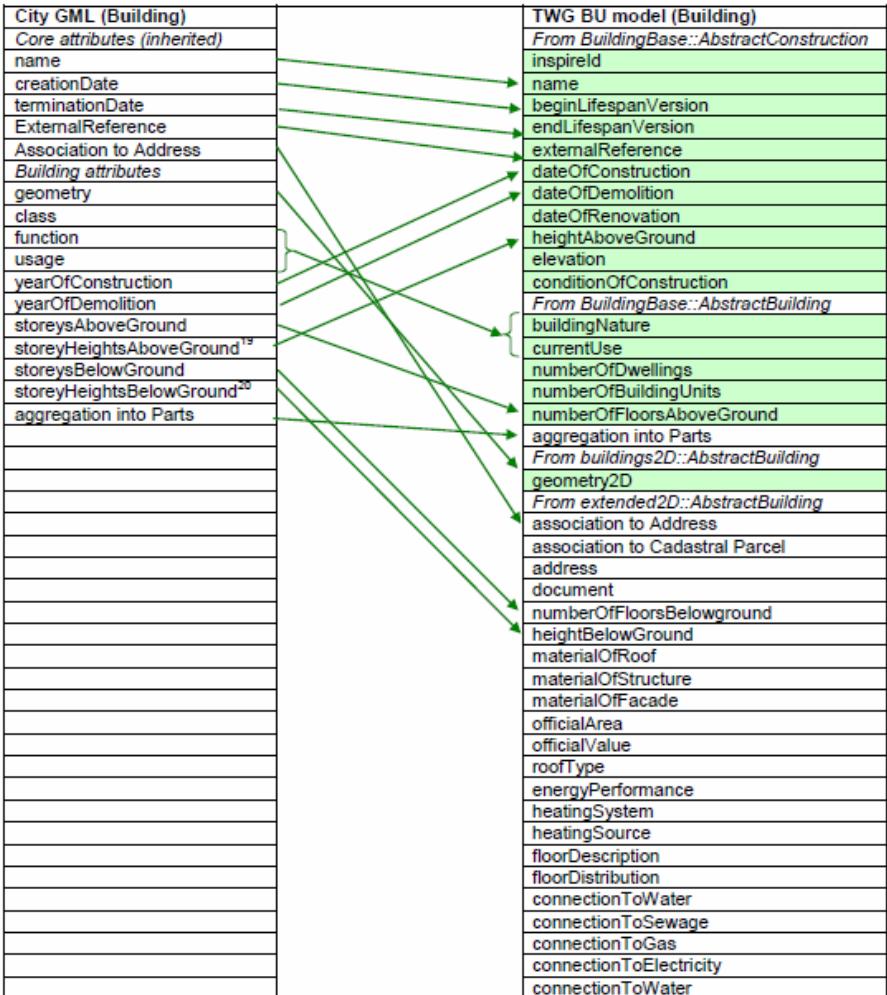


**Figure 3: Content and structure of application schemas for theme Buildings**

Feature types are represented in blue. Abstract application schemas are represented in green. Instanciable application schemas are represented in red.

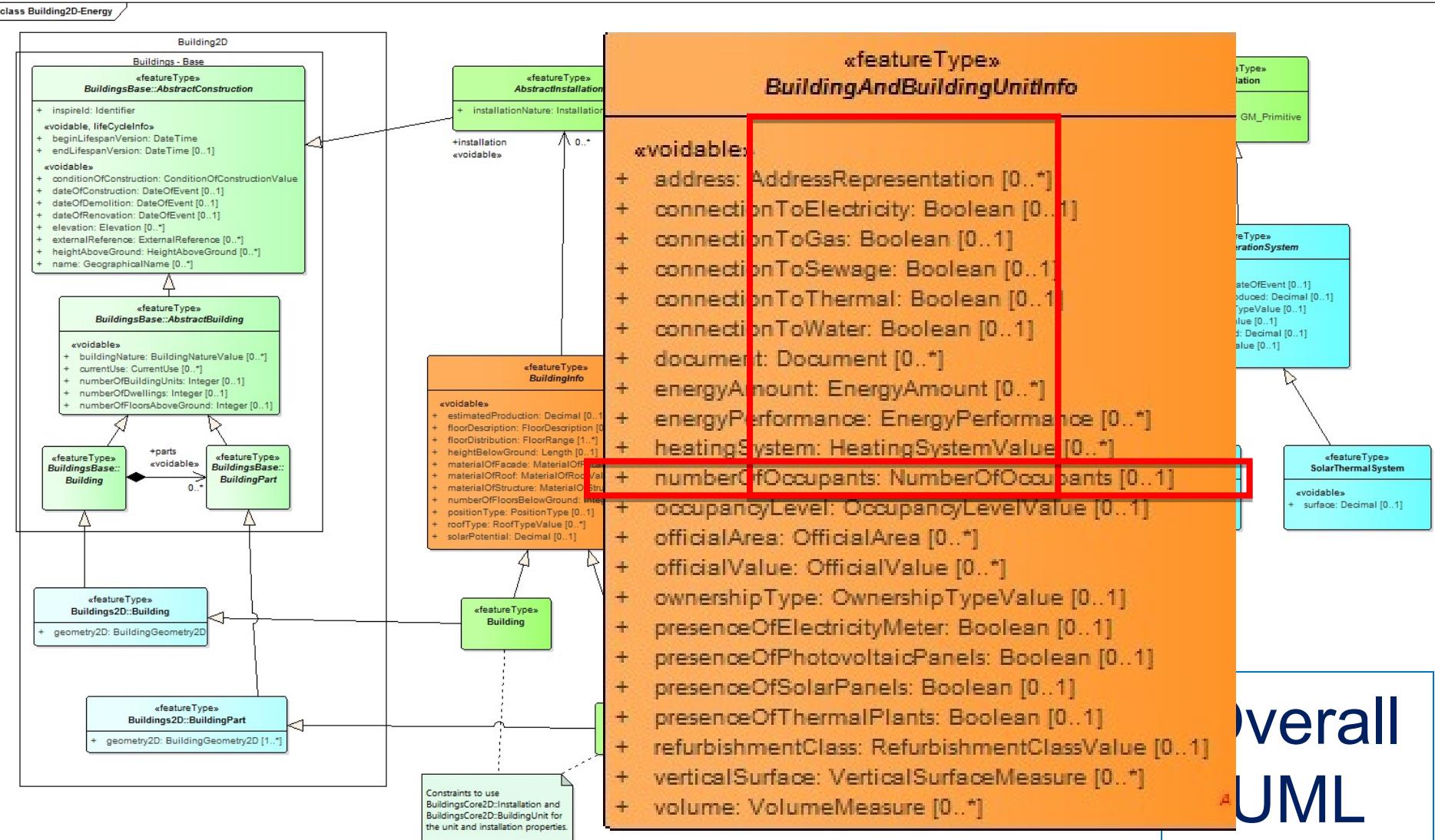
# Mapping between CityGML and INSPIRE BU model

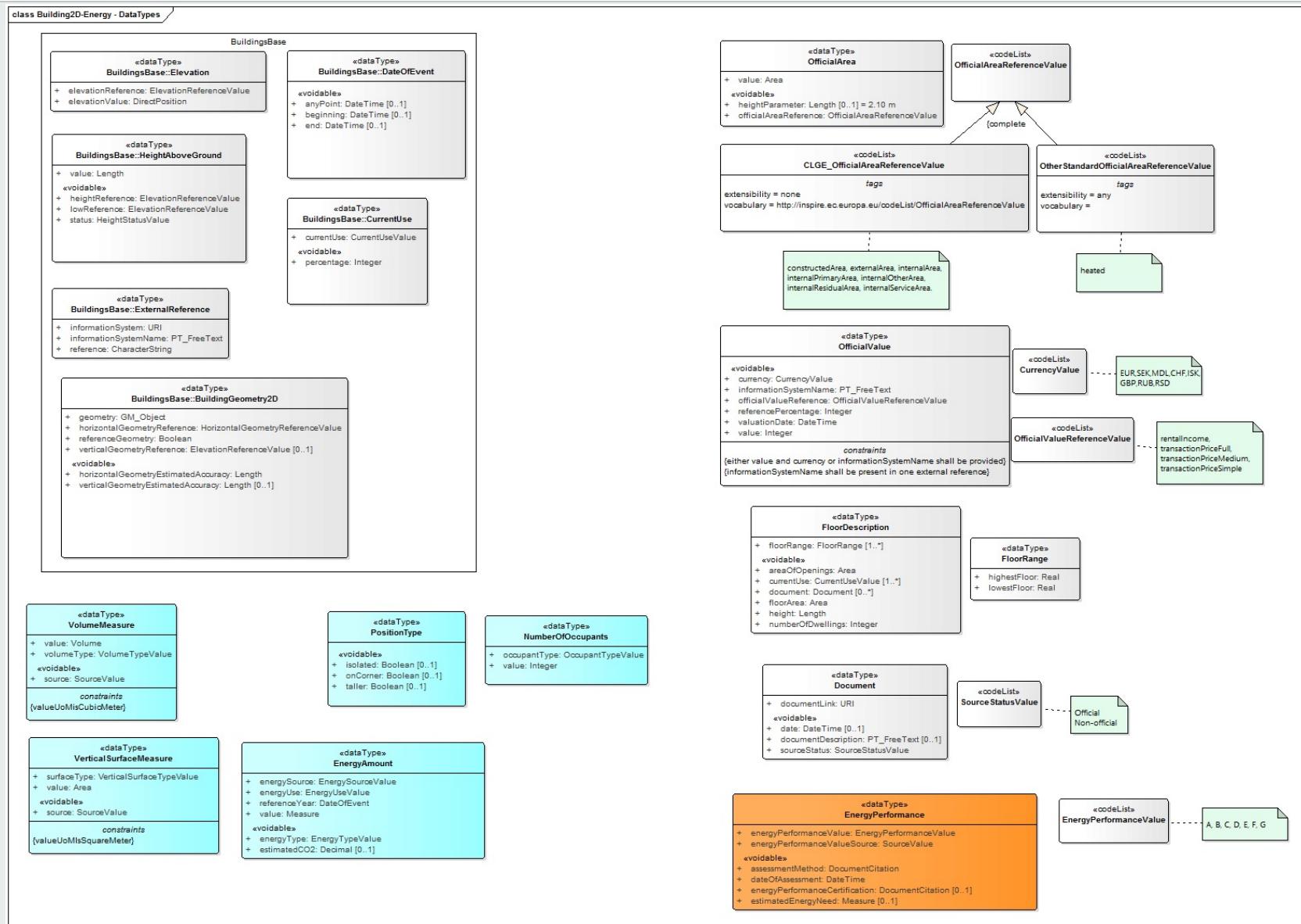
INSPIRE	Reference: D2.8.III.2_v3.0		
TWG-BU	Data Specification on Buildings	2013-12-10	Page 295

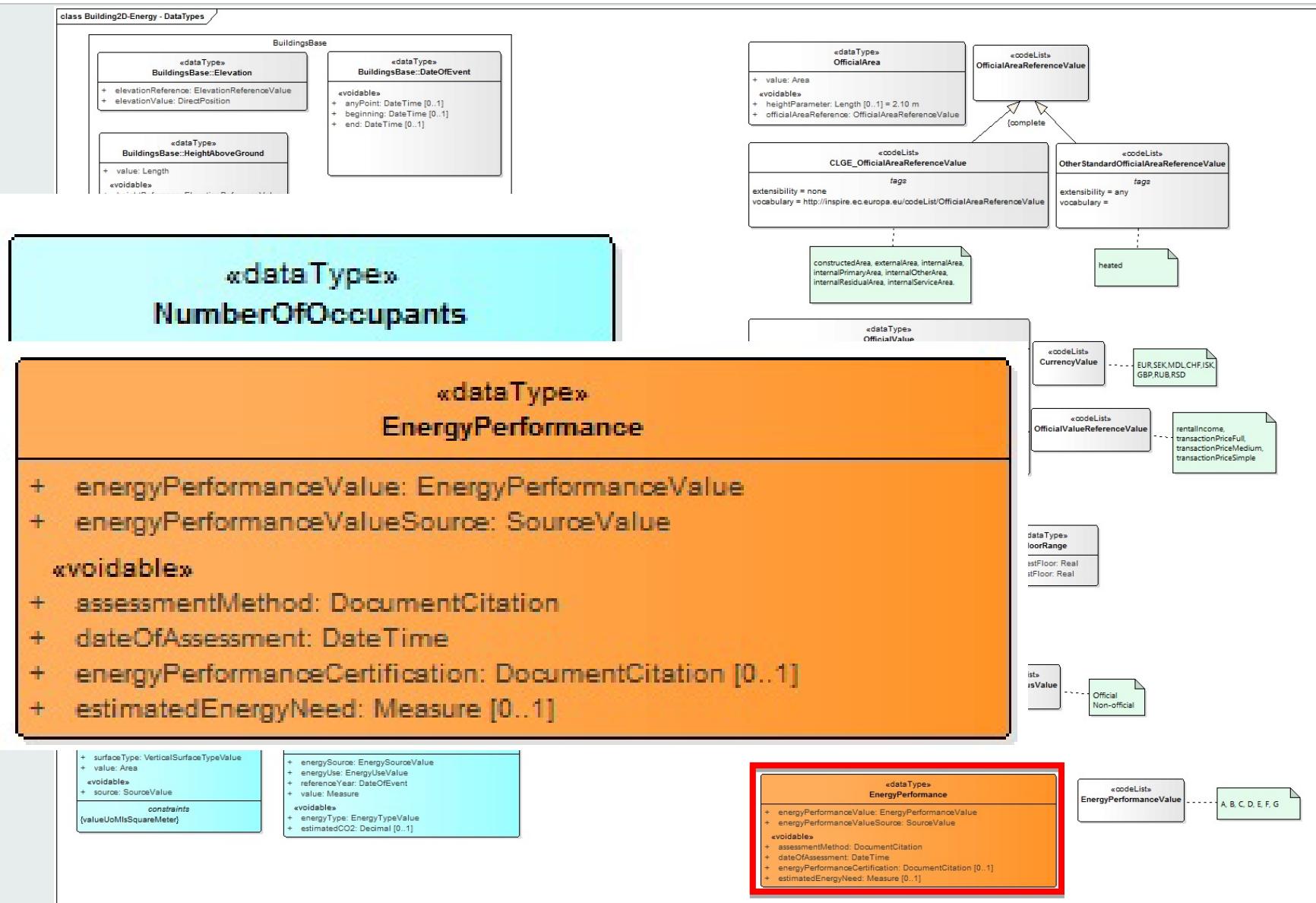


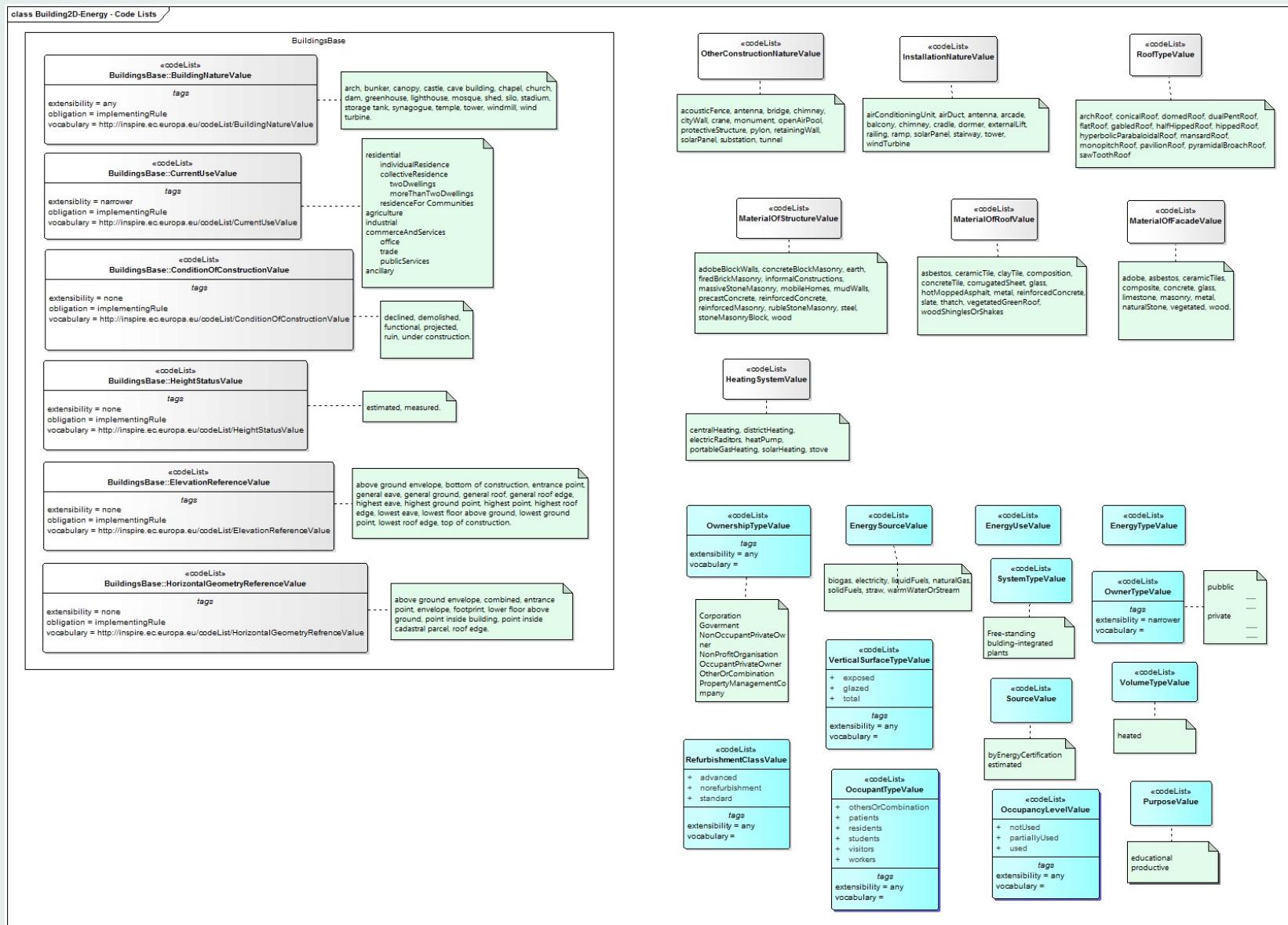
NOTE: attributes coloured in green are those coming from Core profiles

Pilot 01			Pilot 02				Pilot 03							
UC-GSCP01-01	UC-GSCP01-02	DATA LOGIC NAME (PILOT 1)	UC-GSCP02-01	UC-GSCP02-02	UC-GSCP02-03	DATA LOGIC NAME (PILOT 2)	DATA LOGIC NAME (PILOT 3)	DATA LOGIC NAME *	DESCRIPTION LOGIC NAME *	INPUT_OUTPUT DATA *	DATA TYPE *	INSPIRE Buildings	CityGML + Energy ADE	
X (1, 2, 3, 4, 5, 6, 6bis, 7, 8)	X (1,2,3,4,7)	BuildingTerritory.Geo metry 2D; BuildingUE.Geometry 2D	X	X	X	Building.Geometry 2D;	Building.Geometry 2D; EconomicActivity.the geom	geometry2D	footprint of the territorial building	INPUT	Geometry	geometry2D	bldg:lod0FootPrint [data type]	
X (1, 2, 3, 4, 5, 6, 6bis, 7, 8)		BuildingUE.Name	X	X	X	Building.Name		name	Name of the building	INPUT	Text	name (0..*)	gml:name [string]	
X (1, 2, 3, 4, 5, 6, 6bis, 7, 8)	X (1,2,3,4,7)	BuildingUE.Nature	X	X	X	Building.Nature	Building.Nature (__TEDIF)	buildingNature	Typology of the building	INPUT	Code list	buildingNature (0..*)	bldg:function (0..*) [codelist] OR bldg:usage (0..*) [codelist]	
							Building.gid; UserBuilding.gid;	inspireId		INPUT	Number			
X (1, 2, 3, 4, 5, 6, 6bis, 7, 8)		BuildingUE.Ownership						ownership	Ownership of the building	INPUT	Code list			
X (1, 2, 3, 4, 5, 6, 6bis, 7, 8)	X (1,2,3,4,7)	BuildingUE.Use(s)	X	X	X	Building.Use(s)	Building.currentUse (__TUTIL); EconomicActivity.tser	currentUse	Type of uses of the building (use classification based on the energy certification)	INPUT	Code list	currentUse (0..*)	bldg:class (0..1) [codelist]	
X (1, 2, 3, 4, 5, 6, 6bis, 7, 8)	X (1,2,3,4,7)	BuildingUE.Address	X	X	X	Building.Postcode; Building.Neighborhood		address	Address building (Street, Civic, Civic sub)	INPUT	Text	address (0..*)	bldg:address [data type]	
X (1, 2, 3, 4, 5, 6, 6bis, 7, 8)		BuildingUE.Costuctio nYear	X	X	X	Building.Construction period - begin; Building.Construction period - end	Building.__EPOCA; Building.UserYear	dateOfConstruction	Costruction Year of the building (if available or estimated)	INPUT	Number	dateOfConstruction (0..1)	bldg:yearOfConstructio n (0..1) [YYYY]	
			X	X	X	Building.height; Building.height_statu		heightAboveGround	Total height of the building, in meters	INPUT		heightAboveGround		
X (1, 2, 3, 4, 5, 6, 6bis, 7, 8)	X (7)	BuildingUE.Volumes	X	X	X	Building.Total volumes		volumes	Volume of the building (by energy certification or estimated)	INPUT	Number		ade:grossVolume (0..1) [double]	
X (1, 2, 3, 4, 5, 6, 6bis, 7, 8)	X (7)	BuildingUE.Surfaces						surfaces	Surface of the building (by energy certification or estimated)	INPUT	Number		ade:ThermalBoundaryS urface [data type]	
			X	X	X	Building.Elevation_val ue		elevation	Elevation of the ground compared to sea level at the point of the building	INPUT	Number	elevation		
			X	X	X	Building.Number of floors		numberOfFloorsAboveGr ound	Number of floors (attic excluded)	INPUT	Number	numberOfFloorsAboveG round		









# GeoSmartCity data model for green routing

## Data model for green routing scenario

Regarding data requirements for Green Routing scenario, the reference target data model are INSPIRE Transport Networks

([http://inspire.jrc.ec.europa.eu/documents/Data\\_Specifications/INSPIRE\\_DataSpecification\\_TN\\_v3.2.pdf](http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_TN_v3.2.pdf)) for the road data and the data model GTFS (<https://developers.google.com/transit/gtfs/>) for the transportation schedules.

The adoption of a separate data model for transportation schedules was due by the fact that the INSPIRE Data Specifications for TN explicitly state that the data model is not conceived for such kind of information.

The selection of GTFS data model was based on the fact that it is globally used and after a first cross-check with the pilots concerned (P04 and P05) it seems well fitting for purpose with their use cases. However, according to the outcomes of the Task 3.2, further refinement of the data model could occur.

## GeoSmartCity data model for green routing

- Initial selection of the INSPIRE TN theme as target data model for the Turku (FI) and Girona (ES) pilots.
- Evaluated the possibility of using existing routing algorithms and provide the data to a wider community
- Use of OSM as data model for geometry/topology and part of the attributes
- Use of GTFS as data model for public transport schedules
- Under finalization selection of data model for pollution data

# GeoSmartCity data model for green routing

- Pilot04-Turku
  - Transformation of road dataset according to INSPIRE TN  
→in progress
  - The final INSPIRE dataset will be converted into OSM
- Pilot05-Girona
  - The source road dataset will be transformed directly in OSM, as requested in the use cases.

*OSM data will used for routing calculation*



# Initial mapping exercise between P05 datasets to OSM

Use Case ID or User services N	DATA LOGIC NAME (*)	DESCRIPTION LOGIC NAME (*)	INPUT_OUTPUT DATA	DATA TYPE (*)	OSM (tags)	EXISTING TABLE.ATTRIBUTE (OR OUTPUT METHOD CALCULATION)
1 (Girona streets)	Street.id	Unique identifier of each street	INPUT	Number	id	OBJECTID
	Street.town hall id	Unique identifier of each street (town hall codification)	INPUT	Number		CODIAJUNT
	Street.street name	Short name of the street	INPUT	Text	name	NOM_CARRER
	Street.street type	Type of street/road/path	INPUT	Code list	highway	TIPUS_VIA
	Street.preposition article	Preposition (if exists) of the street names	INPUT	Text		PREP_ARTIC
	Street.full name	Street's full name	INPUT	Text		NOM_COMPLE
	Street.urban	Boolean field. Urban=yes/no	INPUT	Code list		URBA
	Street.full street type	Type of street/road/path (full name)	INPUT	Code list		TIP_VIA_CO
	Street.full street name	Full name of the street	INPUT	Text	name	NOM_TIP_CO
2 (Bike lanes)	Street.length	Length of each street	INPUT	Number	"to be verified"	SHAPE_LEN
	Bike.id	Unique identifier of each bike lane	INPUT	Number	id	OBJECTID
	Bike.length	Length of each bike lane	INPUT	Number	"to be verified"	LENGTH
3	Bike.status	Status of the bike lane	INPUT	Code list		ESTAT
	Bike_parking.id	Unique identifier of each bike parking	INPUT	Number	id	OBJECTID
	Bike_parking.type	Type of bike parking	INPUT	Code list		TIPUS
	Bike_parking.id2	Parking identifier	INPUT	Number	id	IDENTIFICA
	Bike_parking.street code	Street code of parking's location	INPUT	Text		CODI_CARRE
	Bike_parking.street name	Street name of parking's location	INPUT	Text		CARRER
4	Bike_parking.number	Address number	INPUT	Number		NUMERO
	Bike_parking.places	Number of parking spaces	INPUT	Number		PLACES
	Bike_parking.location	information about the parking location	INPUT	Text		LOCALITZAC
	Bike_sharing.id	Unique identifier of each bike sharing point	INPUT	Number		OBJECTID
	Bike_sharing.type	Bike sharing point type	INPUT	Code list		TIPUS
	Bike_sharing.identifier	Bike sharing point identifier	INPUT	Number		IDENTIFICA
5	Bike_sharing.street code	Street code of bike sharing point	INPUT	Number		CODI_CARRE
	Bike_sharing.street	Street name of the bike sharing point	INPUT	Text		CARRER
	Bike_sharing.number	Address number	INPUT	Number		NUMERO
	Bike_sharing.places	Number of bikes to share	INPUT	Number		PLACES
	Bike_sharing.location	information about the bike sharing point location	INPUT	Text		LOCALITZAC
5	Bike_rental.	Layer to be created soon*	INPUT			
6	Bike_repair.	Layer to be created soon*	INPUT			
7 (OSM Data, road)	osm.id	Unique identifier of each road/street	INPUT	Number	id	OSM_ID
	osm.name	Road/Street name	INPUT	Text	name	NAME
	osm.reference	Road/Street reference code	INPUT	Code list		REF
	osm:type of road	Type of road	INPUT	Code list	highway	TYPE
	osm:onerway?	Is a oneway road? Yes/No	INPUT	Code list	oneway	ONEWAY
	osm:bridge?	Is a bridge? Yes/No	INPUT	Code list	bridge	BRIDGE
	osm:tunnel?	Is a tunnel? Yes/No	INPUT	Code list	tunnel	TUNNEL
	osm:maximum speed	maximum speed allowed	INPUT	Number	maxspeed	MAXSPEED

Legend:

Attribute to be present in the data model

Attribute not mandatory/necessary

No attributes yet defined

# OSM □ Data Model □ key concepts

- OpenStreetMap represents physical features on the ground (e.g., roads or buildings) using tags attached to its basic data structures (its nodes, ways, and relations).
- A **Tag** consists of 'Key' and a 'Value'. Both the key and value are free format text fields.
- Each tag describes a geographic attribute of the feature being shown by that specific node, way or relation.
- OpenStreetMap's [free tagging system](#) allows the map to include an unlimited number of attributes describing each feature.
- The community agrees on certain key and value combinations for the most commonly used tags, which act as informal standards.
- However, users can create new tags to improve the style of the map or to support analyses that rely on previously unmapped attributes of the features.
- For details of more tags and proposed changes to existing tags see [Proposed features](#) and [Deprecated features](#). If you do not find a suitable tag in this list then feel free to make something suitable up as long as the tag values will be [verifiable](#).

# Summary

- Objectives
- Data models
  - Scenarios and pilots involved
  - Methodology for the production of the GSC data models
  - INSPIRE DS extension approach
  - An insight into the GSC data model
- **Data harmonisation**

Generic workflow to transform datasets according to selected target schema requirements

Import target/source schemas

Import data

Set mapping rules

Export transformed data

Validate transformed dataset

# Mapping Table example: GSC Sewer pipe extended

Type	Documentation	Attribute / Association role	Attribute documentation	Values / Enumerations	Multiplicity	Nullable / Non	P07	P08	P09	P10	P06	P11
SewerPipeExtended  Supertypes: Pipe UtilityLinkSet UtilityNetworkElement LinkSet NetworkElement	A utility link or link sequence for the conveyance of sewage.	beginLifecycleVersion	Date and time at which this version of the spatial object was created.	DateTime	1	voidable	UndergroundLinearClass.L_CREATION					POCZĄTEK WERSJI OBIEKTU
		inspireId	External object identifier of the spatial object.NOTE An external identifier.	Identifier	0..1		UndergroundLinearClass.COD_CLASSE + UndergroundLinearClass.FILE_ID					PRZESTRZENNA ZW + LOKALNY ID
		endLifecycleVersion	Date and time at which this version of the spatial object was deleted.	DateTime	0..1	voidable						KONIEC WERSJI OBIEKTU
		inNetwork	The networks in which a network element is a member.	Network	1..*	voidable						
		link	The set of links and link sequences that constitute the link.	Generalised	1..*			link to Utility link feature type - See types spreadsheet for Utility link feature type				
		currentStatus	The status of an utility object with regards to its completion and use.	ConditionOfFacilityValue	1	voidable	UndergroundLinearClass.L_STA					ISTNIEŃ + EKSPLOATACJA
		validFrom	The time when the utility network element started to exist in the real world.	DateTime	1	voidable	UndergroundLinearClass.L_BORN					STARTOBIEKT
		validTo	The time from which the utility network element no longer exists.	DateTime	0..1	voidable						KONIEC OBIEKTU
		verticalPosition	Vertical position of the utility object relative to ground.	VerticalPositionValue	1	voidable	UndergroundLinearClass.L_POS_SUP					PRZEBIEG
		utilityFacilityReference	Reference to a facility activity complex that is linked (related) to this object.	ActivityComplex	0..1							
		governmentalServiceReference	Reference to a governmental service object that is linked to this object.	GovernmentalService	0..1							
		utilityDeliveryType	Kind of utility delivery network e.g. transport, distribution.	UtilityDeliveryTypeValue	0..1							FUNKCJA
		warningType	Kind of underground visible warning mechanism used to indicate problems.	WarningTypeValue	1	voidable						
		pipeDiameter	Pipe outer diameter. For convex shaped objects (e.g. a circle) the diameter is the major axis.	Measure	1	voidable	UndergroundLinearClass.L_DIA					SREDNICA +
		pressure	The maximum allowable operating pressure at which a product is delivered.	Measure	0..1	voidable						
		cables	A pipe may contain one or more cables.	Cable	0..*	voidable						
		pipes	A pipe may contain one or more pipes.	Pipe	0..*	voidable						
		sewerWaterType	Type of sewer water.	codelistSewerWater	1	voidable	SewerNetwork.L_F_TIPFOG					TYP KANAŁU
		sewerPipeType	Type of the segment	codelistSewerPipeT	1	voidable	SewerNetwork.L_F_TY					
		sewerPipeDepthMeasure	Measure of the Depth of the pipe	DepthMeasure	1..*	voidable		See DepthMeasure data type in the types spreadsheet				RODZAJ PRZEWODU
		sewerPipeRoadPosition	position relative to the road	CodeListRoadPosition	0..1		UndergroundLinearClass.L_POS					
		sewerPipeStartNodeTerrainQuote	Terrain quote of initial node	Measure	0..1		SewerNetwork.QUO_INI					
		sewerPipeStartNodeFlowingQuote	Flowing quote of the initial node	Measure	0..1		SewerNetwork.SCO_INI					
		sewerPipeEndNodeTerrainQuote	Terrain quote of final node	Measure	0..1		SewerNetwork.QUO_FIN					
		sewerPipeEndNodeFlowingQuote	Flowing quote of the final node	Measure	0..1		SewerNetwork.SCO_FIN					
		sewerPipeDimensions	length, height, width of the pipe	PipeDimensions	0..1			see pipeDimension type - in the types spreadsheet				
		sewerPipeSourceOfData	info about how data was obtained	sourceOfData	0..1			see sourceOfData type - in the types spreadsheet				
		sewerPipeMaterialType		CodeListPipeMaterial	0..1		UndergroundLinearClass.L_MAT					
		sewerPipeOrigin	info about pipe origin	infrastructureOrigin	0..1	voidable		see InfrastructureOrigin data type - in the types spreadsheet				
		sewerPipeAlternativeId		Identifier	0..*							
		sewerPipeAlternativeAuthorityRole		RelatedParty	0..*							
		sewerPipeMunicipality	The municipality where the sewer pipe is located	CharacterString	0..1							
		sewerPipeStreet	the street where the sewer pipe is located	CharacterString	0..1							
		sewerPipeTransportType	The way the transport is carried out (pressure, gravitational,...)	CodeList	0..1							
		sewerPipeProjectAction		ProjectAction	1..*	voidable		link to ProjectAction feature type - See GSC-New feature spreadsheet				
		sewerPipeRecoveryPresent	Presence of recovery of the pipe	boolean	0..1	true/false	SewerNetwork.L_F_RISAN					
		sewerPipeRecoveryType	Type of recovery of the pipe	recoveryType	0..1		SewerNetwork.L_F_T_RIS					
		sewerPipeDeliveryLocationType	* sewerage treatment plant * soil * surface water body * other	CodeListSewerNetw	0..1		SewerNetwork.L_F_REC					
		sewerPipeDigsCode		UndergroundWorks	0..1			link to UndergroundWorks feature type - See GSC-New feature spreadsheet				



GeoSmartCity



# Source data model

QGIS 2.8.2-Wien

Progetto Modifica Visualizza Layer Impostazioni Plugins Vettore Raster Database Web Processing Guida

Browser

- Home
- Prefetti
- C:/
- D:/
- F:/
- MSSQL
- Oracle
- PostGIS
- Spatialite
- OWS
- WCS
- WPS
- WMS

Legenda

- 27AALST\_K
- 27AALST\_S
- 27AALST\_H
- Bing Aerial

Informazioni risultati

Geometria	Valore
27AALST_S	605737
STR_ID	605737
STR_NR	20051306
STATUS	Actief
START_PRJ	BT
START_DAT	1970-01-01
START_PRG	1970
STOP_PRJ	ONBEPAA LD
STOP_DAT	9999-01-01
STOP_PRG	9999
RRSTR_C	93081045
RRSTR	Steenweg op Aalst(HOF)
BEGIN_KPT	112862473849_1
EIND_KPT	112862246991_1
INW	265
EIG_ID	2
EIG	Gemeente
LEIDING_ID	1
LEIDING	Gravitaire leiding
WATER_ID	1
WATER	GEM
BRON_ID	6
BRON	VMM uit leidraad
KLEUR	116
UITL_NR	25868
UITL_PERC	1
REN_PRJ	ONBEPAA LD
REN_DAT	9999-01-01
REN_PRG	9999
GUP_PRJ	NULL
GUP_DAT	NULL
GUP_PRG	NULL
GUP_T_C	NULL
GUP_T	NULL
LPACT_T_C	NULL
LPACT_T	1CG
ZON_C	0
SPLITFACT	341
LENTE	27
ZIG_ID	Aalst
WISSEN	NEE

Modalità Layer in uso

Vista Albero

Apri modulo automaticamente

Guida

Non ci sono geometrie in questa posizione.

Coordinate: 448900,6613130 Scala 1:40.844 Rotazione: 0,0 Visualizza



# Source data

QGIS 2.8.2-Wien - VMM\_sewernet

Progetto Modifica Visualizza Layer Impostazioni Plugins Vettore Raster Database Web Processing Guida

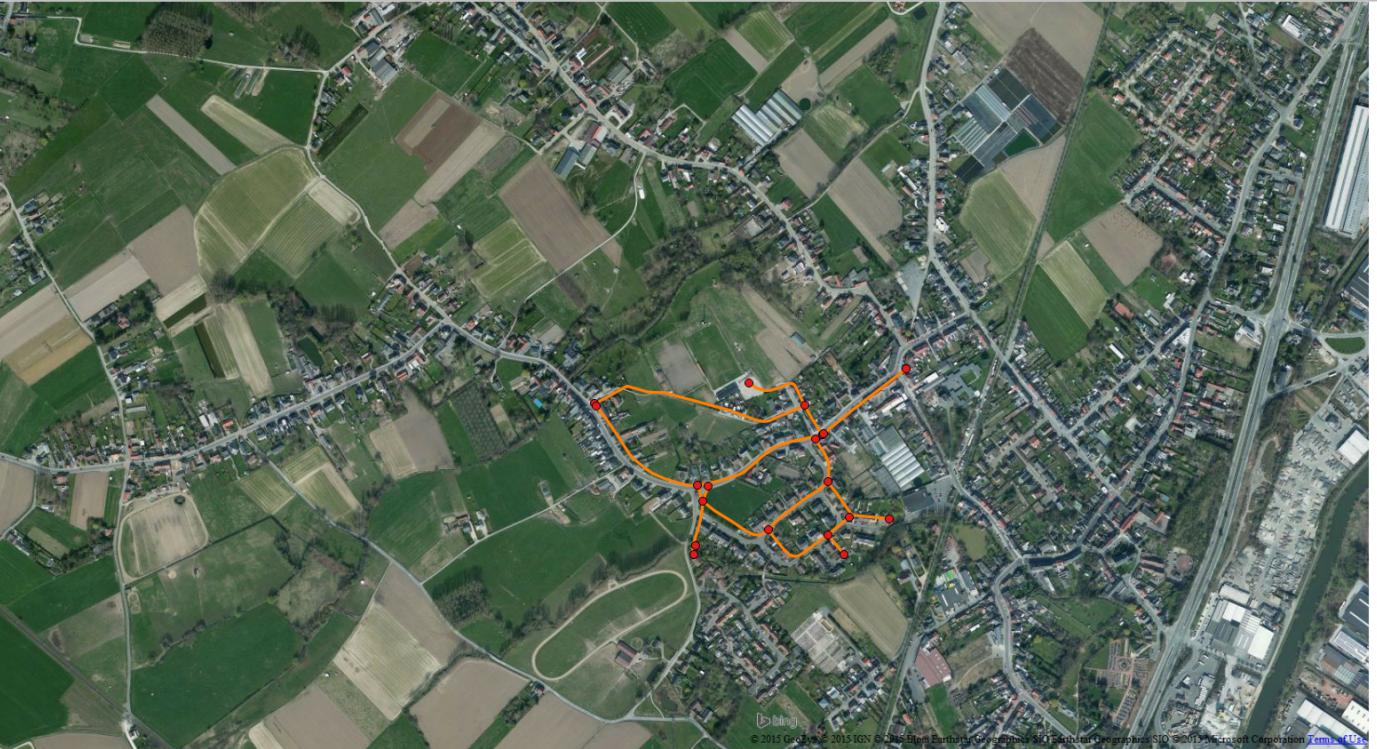
File Geotiff Shapefile Vector Layer Style Catalogo CSV Python

Browser

- Home del progetto
- Home
- Preferriti
- C:/
- D:/
- F:/
- MSSQL
- Oracle
- PostGIS
- Spatialite
- OWS
- WCS
- WFS
- WMS

Legenda

- 27AALST\_K\_sample
- 27AALST\_S\_sample
- 27AALST\_S
- 27AALST\_K
- 27AALST\_H
- Bing Aerial



0 elementi selezionati dal layer 27AALST\_S.

Coordinate: 126269,183385 Scala: 1:6.011 Rotazione: 0,0 Visualizza EPSG:31370 (OTF)

11:32 29/06/2015



# HALE transformation of source data

File Transformation Edit Window Help

Alignment Source Data Transformed Data

Default Data Map

27AALST\_S ×16 GSC\_SewerPipeExtended ×16

Source Data

27AALST_S	1	2
BEGIN_KPT	112853956999_1	6014993_1
BRON	VMM uit leidraad	VMM uit leidraad
BRON_ID	6	6
EIG	Gemeente	Gemeente
EIG_ID	2	2
EIND_KPT	112853856133_1	112853956994_1
filename	27AALST_S_sample	27AALST_S_sample
GUP_DAT	no value	no value
GUP_PRG	no value	no value
GUP_PRJ		
GUP_T		
GUP_T_C		
INW	37	4
KLEUR	116	116
LEIDING	Gravitaire leiding	Gravitaire leiding
LEIDING_ID	1	1
LENTE	138	51
LPACT_T		
LPACT_T_C		
REN_DAT	Fri Jan 01 00:00:00 CET 9999	Fri Jan 01 00:00:00 CET 9999
REN_PRG	9999	9999

Properties

link.href

General Namespace: <http://www.w3.org/1999/xlink>

Constraints Local name: href

ParentType Location: [Open Location](#)

PropertyType <http://www.w3.org/1999/xlink.xsd#0:0>

Transformed Data

GSC_SewerPipeExtended	1	2
GSC_SewerPipeExtended	Actief	Actief
currentStatus	Actief	Actief
href	<a href="http://inspire.ec.europa.eu/codelist/ConditionOfFacilityV">http://inspire.ec.europa.eu/codelist/ConditionOfFacilityV</a>	<a href="http://inspire.ec.europa.eu/codelist/ConditionOfFacilityV">http://inspire.ec.europa.eu/codelist/ConditionOfFacilityV</a>
id	SP_20050011	SP_20050012
inspireId		
Identifier		
localId	SP_20050011	SP_20050012
namespace	BE.VMM.SewerNetwork	BE.VMM.SewerNetwork
versionId	1.0	1.0
link	#UL_20050011	#UL_20050012
pipeDiameter		
sewerDimensions		
PipeDimensions		
sewerPipeStreet	Doriksveld	Doriksveld
sewerPipeType		
href	<a href="http://www.geosmartcity.eu/codelist/SewerPipeTypeValue">http://www.geosmartcity.eu/codelist/SewerPipeTypeValue</a>	<a href="http://www.geosmartcity.eu/codelist/SewerPipeTypeValue">http://www.geosmartcity.eu/codelist/SewerPipeTypeValue</a>
sewerWaterType		
href	<a href="http://inspire.ec.europa.eu/codelist/SewerWaterTypeValue">http://inspire.ec.europa.eu/codelist/SewerWaterTypeValue</a>	<a href="http://inspire.ec.europa.eu/codelist/SewerWaterTypeValue">http://inspire.ec.europa.eu/codelist/SewerWaterTypeValue</a>



# HALE transformation of source data

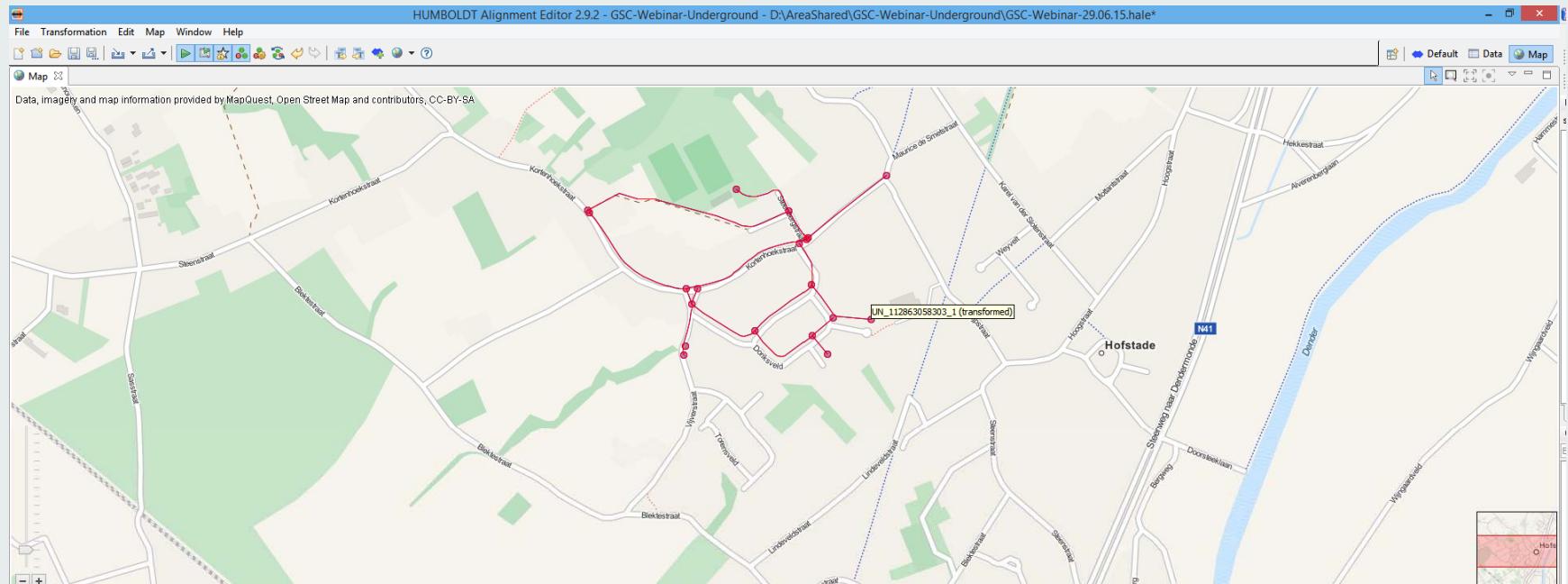
The screenshot shows the HALE transformation environment with the following components:

- Workspace (Top Left):** Displays a flow diagram for transforming '27AALST\_S' into 'UtilityLink'. The flow involves several steps: 'Retype' (from '27AALST\_S'), 'Rename' (from 'BEGIN\_KPT' to 'startNode.href'), 'Rename' (from 'EIND\_KPT' to 'endNode.href'), 'Rename' (from 'STR\_NR' to 'id'), and an 'Assign' step that links 'the\_geom' to 'fictitious'. A 'Formatted string' node is also present.
- Source Data (Top Right):** A table showing the original data for '27AALST\_S'. It includes columns for object ID, BEGIN\_KPT, BRON, EIG, EIND\_KPT, filename, GUP\_DAT, GUP\_PRG, GUP\_PRJ, GUP\_T, GUP\_T\_C, INW, KLEUR, LEIDING, LEIDING\_ID, LENGTE, LPACT\_T, LPACT\_T\_C, REN\_DAT, and REN\_PRG.
- Transformed Data (Bottom Right):** A table showing the resulting 'UtilityLink' data. It includes columns for object ID, centrallineGeometry, endNode, href, fictitious, id, startNode, and Metadata.
- Properties (Bottom Left):** A detailed view of the 'Formatted string: BEGIN\_KPT to href' rule. It explains that it populates the 'href' property with a string formatted according to the pattern '#UN\_(BEGIN\_KPT)'. It also shows a 'Replacement table' where '{BEGIN\_KPT}' is mapped to 'BEGIN\_KPT'.
- Taskbar (Bottom):** Standard Windows taskbar icons for various applications like File Explorer, Internet Explorer, and Office.

# HALE Map view of transformed data

HUMBOLDT Alignment Editor 2.9.2 - GSC-Webinar-Underground - D:\AreaShared\GSC-Webinar-Underground\GSC-Webinar-29.06.15.hale\*

Data, imagery and map information provided by MapQuest, Open Street Map and contributors, CC-BY-SA



**Source Data**

27AALST_S	1	2
BEGIN_KPT	112853956999_1	6014993_1
BRON	VMM uit leidraad	VMM uit leidraad
EIG	6	6
EIG_ID	Gemeente	Gemeente
EIND_KPT	2	2
filename	112853956133_1	112853956094_1
GUP_DAT	27AALST_S_sample	27AALST_S_sample
GUP_PRG	no value	no value

**Transformed Data**

GSC_SewerPipeExtended	1	2
location	no value	no value
beginLifetimeVersion	no value	no value
boundedBy	no value	no value
cables	no value	no value
currentStatus	+	+
description	no value	no value
descriptionReference	no value	no value
digsOnPipe	no value	no value
endLifetimeVersion	no value	no value

Condivisione screenshot  
È stato copiato nei tuoi appunti un link al tuo screenshot.  
478M of 491M visited (tariffo).

CST

EPSG:4326 - 4.0283 / 50.9616

# Transformed data

The screenshot shows the Oxygen XML Editor interface with the following details:

- Title Bar:** US\_test\_nodes.gml [D:\AreaShared\GSC-Webinar-Underground\US\_test\_nodes.gml] - <oxygen/> XML Editor
- Toolbar:** Includes standard file operations (File, Edit, Find, Project, Options, Tools, Document, Window, Help) and XML-specific tools.
- Project Explorer:** Shows the project structure with files like sample.xpr, .css, .debuger, .fo, .import, .json, .jar, .nrd, .relaxing, .schemaeditor, .org, .xsd, .query, .data, .doctbook, .form-controls, and .excel.
- Central Editor:** Displays the XML code for GSC-Net-Ext nodes. A green arrow points to the element `<gml:featureMember>`. A red box highlights the status bar message "Document is valid." at the bottom center.
- Right Panels:**
  - Attributes:** Shows attributes for the selected element, such as `gml:id="UN_11285386133_1"`.
  - Transformation Scenarios:** Lists scenarios for transformation.
- Status Bar:** Shows the path D:\AreaShared\GSC-Webinar-Underground\US\_test\_nodes.gml and the status "U+000A 66 : 30 Modified".



# Transformed data

US\_test\_nodes.gml [D:\AreaShared\GSC-Webinar-Underground\US\_test\_nodes.gml] - <oXygen/> XML Editor

XPath 2.0 Execute XPath on 'Current File' Project GSC-NewCommonTypes.xsd US\_test\_nodes.gml\*

sample.xpr

```

<us-net-common:verticalPosition xsi:nil="true"/>
</us-net-common:UtilityLink>
<gml:featureMember>
<us-net-common:UtilityLink gml:id="UL_2005001">
<net:beginLifespanVersion xsi:nil="true"/>
<net:inNetwork xsi:nil="true"/>
<net:centrelineGeometry>
<gml:LineString gml:id="_42bc529-8be3-4e2e-b7e3-1e9783acd6a5" srsName="EPSG:3035">
<gml:posList>3901876.036783958 3111660.684359382 3901868.4677875773
3111652.989941523 3901856.92613308 3111645.7319800407 3901834.050102738
3111633.916698539 3901812.9727297584 3111620.280581456 3901793.50612178
3111607.4255461176 3901777.073097746 3111595.37104614 3901763.555619249
3111582.5736422995</gml:posList>
</gml:LineString>
</net:centrelineGeometry>
<net:fictitious>false</net:fictitious>
<net:endNode xlink:href="#UN_112853856133_1"/>
<net:startNode xlink:href="#UN112853956999_1"/>
<us-net-common:currentStatus xsi:nil="true"/>
<us-net-common:validFrom xsi:nil="true"/>
<us-net-common:verticalPosition xsi:nil="true"/>
</us-net-common:UtilityLink>
</gml:featureMember>
<gml:featureMember>
<us-net-common:UtilityLink gml:id="UL_20050017">
<net:beginLifespanVersion xsi:nil="true"/>
<net:inNetwork xsi:nil="true"/>
<net:centrelineGeometry>
<gml:LineString gml:id="_2d493ee6-18df-4c39-be08-811f836df523" srsName="EPSG:3035">
<gml:posList>3901895.6453988096 3111528.900652323 3901869.1577788033
3111566.004800643</gml:posList>
</gml:LineString>
</net:centrelineGeometry>
<net:fictitious>false</net:fictitious>
<net:endNode xlink:href="#UN_112853956094_1"/>
<net:startNode xlink:href="#UN112853949699_1"/>
<us-net-common:currentStatus xsi:nil="true"/>
<us-net-common:validFrom xsi:nil="true"/>
<us-net-common:verticalPosition xsi:nil="true"/>
</us-net-common:UtilityLink>
</gml:featureMember>
<gml:featureMember>
<us-net-common:UtilityLink gml:id="UL_20050016">
<net:beginLifespanVersion xsi:nil="true"/>
<net:inNetwork xsi:nil="true"/>
<net:centrelineGeometry>
<gml:LineString gml:id="_719c14cf-86f3-415e-a155-16e81db374d0" srsName="EPSG:3035">
<gml:posList>3901981.83224404 3111586.0165476585 3901914.7511718394
3111597.668279988 3901982.2557142153 3111636.274996849 3901876.036783958
</gml:posList>
</gml:LineString>
</net:centrelineGeometry>
</us-net-common:UtilityLink>
</gml:featureMember>

```

Attributes us-net-common:UtilityLink [http://inspire.ec.europa.eu/gml/feature/UtilityLink]

Attribute	Value
gml:id	UL_20050011

Transformation Scenarios - US\_te... Transformation Scenarios - US\_te...

Type filter text

Association Scenario

Text Grid Author

D:\AreaShared\GSC-Webinar-Underground\US\_test\_nodes.gml

Format and Indent successful

U+0055 597 : 44 Modified 09:43 01/07/2015



# Transformed data

# Transformed data

Gaia 3.4.2 - www.TheCarbonProject.com

File View Tools Help

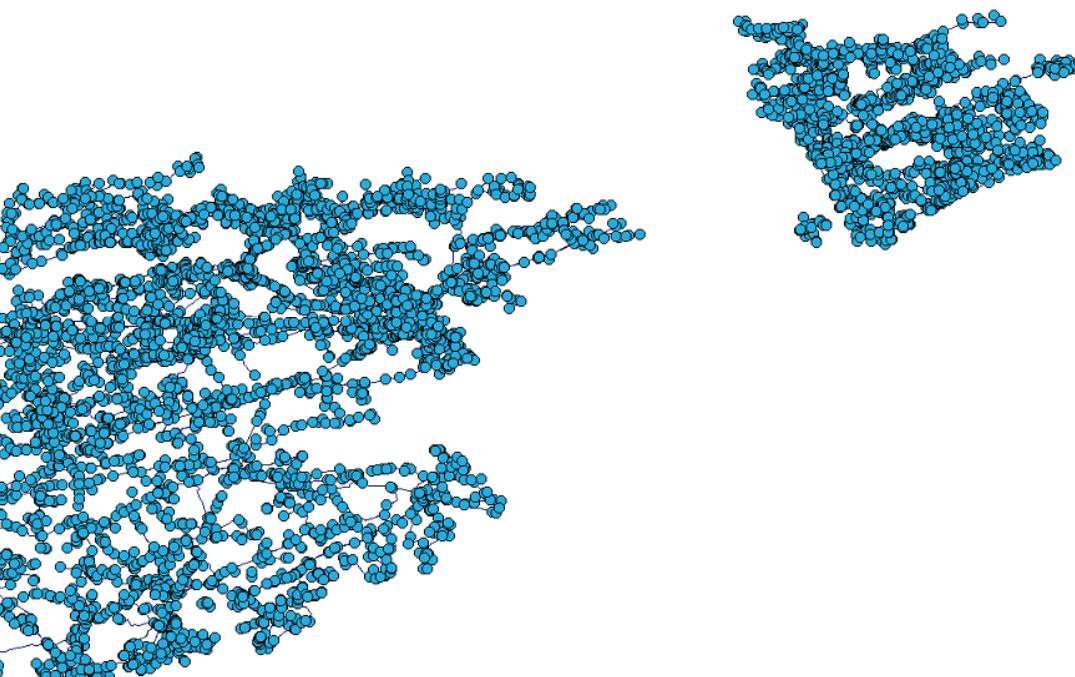
Map Layers Layers Info

VMM\_GSC\_Sewer\_BenedenDemer\_v1.1.gml

```

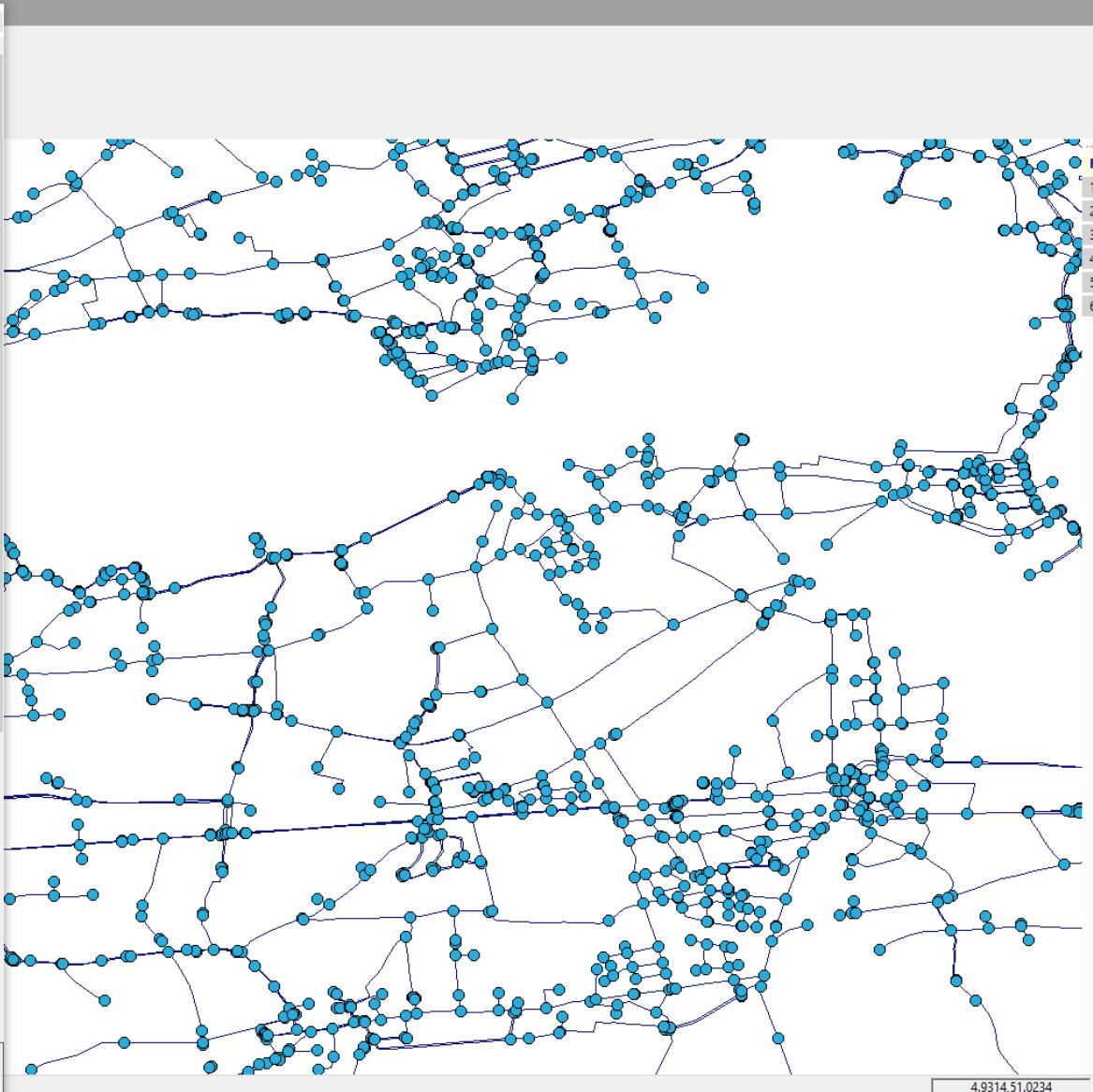
UtilityLink (id=UL_6592614)
  beginLifeSpanVersion (nil=true)
  insp:isRid
    Identifier
      localId = UL_6592614
      namespace = BE_VMM
    inf:network = (http://#UtilityNetwork_sewer_BE_VMM_ZVG_161)
    centrelneGeometry
      LineString (id=b59cac87-969c-4b19-ba89-639f1b603d17 srsName=EPSG:4258)
        fictitious = true
        endNode = (http://#UN_7128661_1)
        startNode = (http://#UN_709377_1)
        currentStatus = (http://inspire.ec.europa.eu/codelist/ConditionOfFacilityValue/projected)
        validFrom = 2045-01-01T00:00:00+01:00
        validTo = 9999-01-01T00:00:00+01:00
        verticalPosition = underground
    UtilityLink (id=UL_6592615)
      beginLifeSpanVersion (nil=true)
      insp:isRid
        Identifier
          localId = UL_6592615
          namespace = BE_VMM
        inf:network = (http://#UtilityNetwork_sewer_BE_VMM_ZVG_161)
        centrelneGeometry
          LineString (id=e17a3e2-527e-45e8-a42e-cf7ed5c2651 srsName=EPSG:4258)
            fictitious = true
            endNode = (http://#UN_7128662_1)
            startNode = (http://#UN_7128651_1)
            currentStatus = (http://inspire.ec.europa.eu/codelist/ConditionOfFacilityValue/projected)
            validFrom = 2045-01-01T00:00:00+01:00
            validTo = 9999-01-01T00:00:00+01:00
            verticalPosition = underground
      GSC_SewerApputenanceExtended (id=UN_7128661_1)
        beginLifeSpanVersion (nil=true)
        insp:isRid
          Identifier
            localId = UN_7128661_1
            namespace = BE_VMM
          inf:network = (http://#UtilityNetwork_sewer_BE_VMM_ZVG_161)
        geometry
          Point (x=5.04973138576187 y=50.9571701523477) (id=f0742a9c29-435e-a650-8a40bd38842 srsName=EPSG:4258)
            spokeEnd = (http://#UL_6592614)
            spokeStart = (http://#UL_6592615)
            currentStatus (nil=true)
            validFrom (nil=true)
            verticalPosition = underground
            utilityFacilityReference = (http://inspire.ec.europa.eu/codelist/UtilityNetworkTypeValue/sewer)
            apputenanceType = (http://inspire.ec.europa.eu/codelist/SewerApputenanceTypeValue/sewerNode)
            swApputenanceMaterialType = (nilReason=unknown)
        swApputenanceAlternative
          Identifier
            localId = KPTid_527910
            namespace = BE_VMM

```





- UtilityLink (id=UL\_20253230)  
  beginLifespanVersion (nil=true )  
  inspireId  
    Identifier  
      localId = UL\_20253230  
      namespace = BE.VMM  
  inNetwork = ([href="#UtilityNetwork\\_sewer\\_BE.VMM\\_ZVG\\_221](#))  
  centrelineGeometry  
    LineString (id=\_63b24b26-8655-4074-98de-418f8716f5d srsName=EPSG 4258)  
    fictitious = true  
  endNode = ([href="#UN\\_118897854811\\_1](#))  
  startNode = ([href="#UN\\_118897942332\\_1](#))  
  currentStatus = ([href="http://inspire.ec.europa.eu/codelist/ConditionOfFacilityValue/functional](#))  
  validFrom = 1970-01-01T00:00:00+01:00  
  validTo = 9999-01-01T00:00:00+01:00  
  verticalPosition = underground  
- GSC\_SewerAppurtenanceExtended (id=HP\_21291)  
  beginLifespanVersion (nil=true )  
  inspireId  
    Identifier  
      localId = HP\_21291  
      namespace = BE.VMM  
  inNetwork (nil=true )  
  geometry  
    Point [x=4.93640662622335 y=50.9971246110992] (id=\_f94c70c3-c336-4079-9b02-938705f907a srsName  
    currentStatus = ([href="http://inspire.ec.europa.eu/codelist/ConditionOfFacilityValue/functional](#))  
    validFrom = 1970-01-01T00:00:00+01:00  
    validTo = 9999-01-01T00:00:00+01:00  
    verticalPosition = underground  
    utilityFacilityReference = ([href="http://inspire.ec.europa.eu/codelist/UtilityNetworkTypeValue/sewer](#))  
    appurtenanceType = ([href="http://inspire.ec.europa.eu/codelist/WaterAppurtenanceTypeValue/waterDischarge](#))  
    SewerApptHasProject.Action = ([href="#STOP\\_ONBEPALD](#))  
    SewerApptHasProject.Action = ([href="#START\\_BT](#))  
    SewerApptHasProject.Action = ([href="#SEN\\_ONBEPALD](#))  
    swAppurtenanceMunicipality = Scherpenheuvel-Zichem  
    swAppurtenanceMaterialType = (nilReason=unknown )  
  swAppurtenanceAlternative  
    Identifier  
      localId = HPTid\_13380  
      namespace = BE.VMM  
- GSC\_SewerAppurtenanceExtended (id=UN\_6001127\_1)  
  beginLifespanVersion (nil=true )  
  inspireId  
    Identifier  
      localId = UN\_6001127\_1  
      namespace = BE.VMM  
  inNetwork = ([href="#UtilityNetwork\\_sewer\\_BE.VMM\\_ZVG\\_221](#))  
  geometry  
    Point [x=4.93652744982047 y=50.99967003363879] (id=\_5661456b-b914-47d4-b988-74888054fc2a srsName  
    spokeStart = ([href="#UL\\_20252972](#))  
    currentStatus (nil=true )  
    validFrom (nil=true )  
    verticalPosition = underground  
    utilityFacilityReference = ([href="http://inspire.ec.europa.eu/codelist/UtilityNetworkTypeValue/sewer](#))  
    appurtenanceType = ([href="http://inspire.ec.europa.eu/codelist/SewerAppurtenanceTypeValue/sewerNode](#))  
    swAppurtenanceMaterialType = (nilReason=unknown )  
  swAppurtenanceAlternative



Close



Type New Type	Docume ntation	Attribute □ Association role □ New attribute	Attribute / Association role Documentation	Values / Enumera tions	Multipli city	Voidab le / Non- Voidab	Pilot 01	Pilot 02	Pilot 03	NOTE by EP01+SGIS	Review by EPSIT
Building □ Super types: <i>Building BuildingAbstractBuildingAbstractConstructionBuildingInfo</i> □ <i>BuildingAndBuildingUnitInfo</i>	-- Name -- □ Building A Building is an enclosed <b>construction</b> above and/or underground, used or intended for the shelter of humans, animals or things or for the production of economic goods. A building refers to any structure permanently constructed or erected on its site.										
		<b>beginLifespanVersion</b>	-- Name -- Begin lifespan version □ Date and time at	DateTime□	1	voidable					
		<b>conditionOfConstruction</b>	-- Name -- Condition of construction □ Status of the construction □ Value	ConditionOfConstructionValue□	1	voidable					
		<b>dateOfConstruction</b>	-- Name -- Date of construction □ Date of	DateOfEvent□	0..1	voidable					
		<b>dateOfDemolition</b>	-- Name -- Date of demolition □ Date of demolition	DateOfEvent□	0..1	voidable					
		<b>dateOfRenovation</b>	-- Name -- Date of last major renovation □ Date of last	DateOfEvent□	0..1	voidable					
		<b>RefurbishmentClass</b>									OK, it is a property of a "Building"/"BuildingPart" or
		<b>elevation</b>	-- Name -- Elevation □ Vertically constrained	Elevation□	0..*	voidable		Building.Elevation			
		<b>endLifespanVersion</b>	-- Name -- End lifespan version □ Date and time at	DateTime□	0..1	voidable					
		<b>externalReference</b>	-- Name -- External reference □ Reference to an external reference	ExternalReference□	0..*	voidable					
		<b>heightAboveGround</b>	-- Name -- Height above ground □ Height above	HeightAboveGround□	0..*	voidable		Building.height;		Multiplicity [1]	This attribute is defined in the INSPIRE "Building2D"
		<b>inspireId</b>	-- Name -- inspire id □ External object identifier of the	Identifier□	1			Building.gid;			
		<b>name</b>	-- Name -- Name of the construction EXAMPLES:	GeographicalName□	0..*	voidable		UserBuilding.name			
		<b>buildingNature</b>	-- Name -- Building nature □ Characteristic of the building that	BuildingNatureValue□	0..*	voidable		Building.Nature			
		<b>currentUse</b>	-- Name -- Current use □ Activity hosted within the building	CurrentUse□	0..*	voidable		Building.currentUse			
		<b>numberOfDwellings</b>	-- Name -- Number of dwellings □ Number of	Integer□	0..1	voidable					
		<b>numberOfBuildingUnits</b>	-- Name -- Number of building units □ Number of building	Integer□	0..1	voidable		Building.Units			
		<b>numberOfFloorsAboveGround</b>	-- Name -- Number of floors above ground □ Number of	Integer□	0..1	voidable		Building.Number			
		<b>parts</b>	The building parts composing the building & building may be a	BuildingPart□	0..*	voidable					
		<b>geometry2D</b>	-- Name -- Geometry 2D □ 2D or 2.5D geometric	BuildingGeometry2D□	1			Building.Territory.Geometry			
		<b>connectionToElectricity</b>	-- Name -- Connection to electricity □ An indication if	Boolean□	0..1	voidable					
		<b>connectionToGas</b>	-- Name -- Connection to gas □ An indication if the building or	Boolean□	0..1	voidable					
		<b>connectionToSewage</b>	-- Name -- Connection to sewage □ An indication if the	Boolean□	0..1	voidable					
		<b>connectionToWater</b>	-- Name -- Connection to water □ An indication if the	Boolean□	0..1	voidable					
		<b>connectionToThermal</b>		Boolean□	0..1	voidable			NEW	OK - Could you please provide the	
		<b>document</b>	-- Name -- Document □ Any document providing information	Document□	0..*	voidable					
		<b>energyPerformance</b>	-- Name -- Energy performance □ The energy	EnergyPerformance□	0..1	voidable				Multiplicity 0..*	OK



## Layers Info

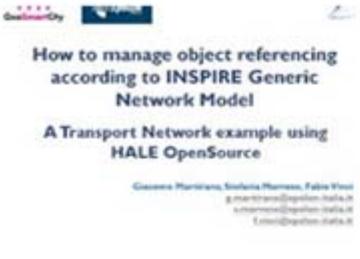
GSC\_Oeiras\_BU.gml

featureMember

- Building (id=CMO\_15557)
  - beginLifespanVersion (nil=true)
  - conditionOfConstruction (nil=true)
- dateOfConstruction
  - DateOfEvent
    - beginning = 1971-01-01T00:00:00+01:00
    - end = 1980-12-31T00:00:00+00:00
- elevation
  - Elevation
    - elevationReference = (<http://inspire.ec.europa.eu/codelist/ElevationReferenceValue/generalGround>)
    - elevationValue = 19.11712
- heightAboveGround
  - HeightAboveGround
    - heightReference (nil=true)
    - lowReference (nil=true)
    - status = (<http://inspire.ec.europa.eu/codelist/HeightStatusValue/estimated>)
    - value = 18.28 (uom=meter)
- inspireId
  - Identifier
    - localId = 15557
    - namespace = PT.CMOPT.BU
- currentUse
  - CurrentUse
    - currentUse = (<http://inspire.ec.europa.eu/codelist/CurrentUseValue/residential>)
    - percentage (nil=true)
- numberOfDwellings = 1
- numberOfFloorsAboveGround = 4
- geometry2D
  - BuildingGeometry2D
    - geometry
      - Polygon (id=\_2705c7ae-4e97-43c5-9a80-ec7bcd9d08e srsName=EPSG:3763)
    - referenceGeometry = true
    - horizontalGeometryReference = (<http://inspire.ec.europa.eu/codelist/HorizontalGeometryReferenceValue/footPrint>)
    - horizontalGeometryEstimatedAccuracy = (uom=unknown nilReason=unknown nil=true)

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-101556.1977,-107440.7067

Close



**How to manage object referencing according to INSPIRE Generic Network Model**

A Transport Network example using HALE OpenSource

Giovanni Martorana, Stefania Maruccia, Fulvio Vinci  
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f.vinci@epsilon-italia.it

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**THANK YOU!**  
**QUESTIONS?**