Efficient data inventarisation for KLIP Digital Phase using QGIS

KLIP Digital Phase - Context

- KLIP: “Kabel en Leiding Informatie Portaal”
- Flemish legislation
- Goal: prevent damage through digging to underground cables and pipelines

- Major cause of accidents is the cumbersome process for obtaining maps of the subsoil infrastructure

KLIP Digital Phase - context

KLIP: Portal & Web Services

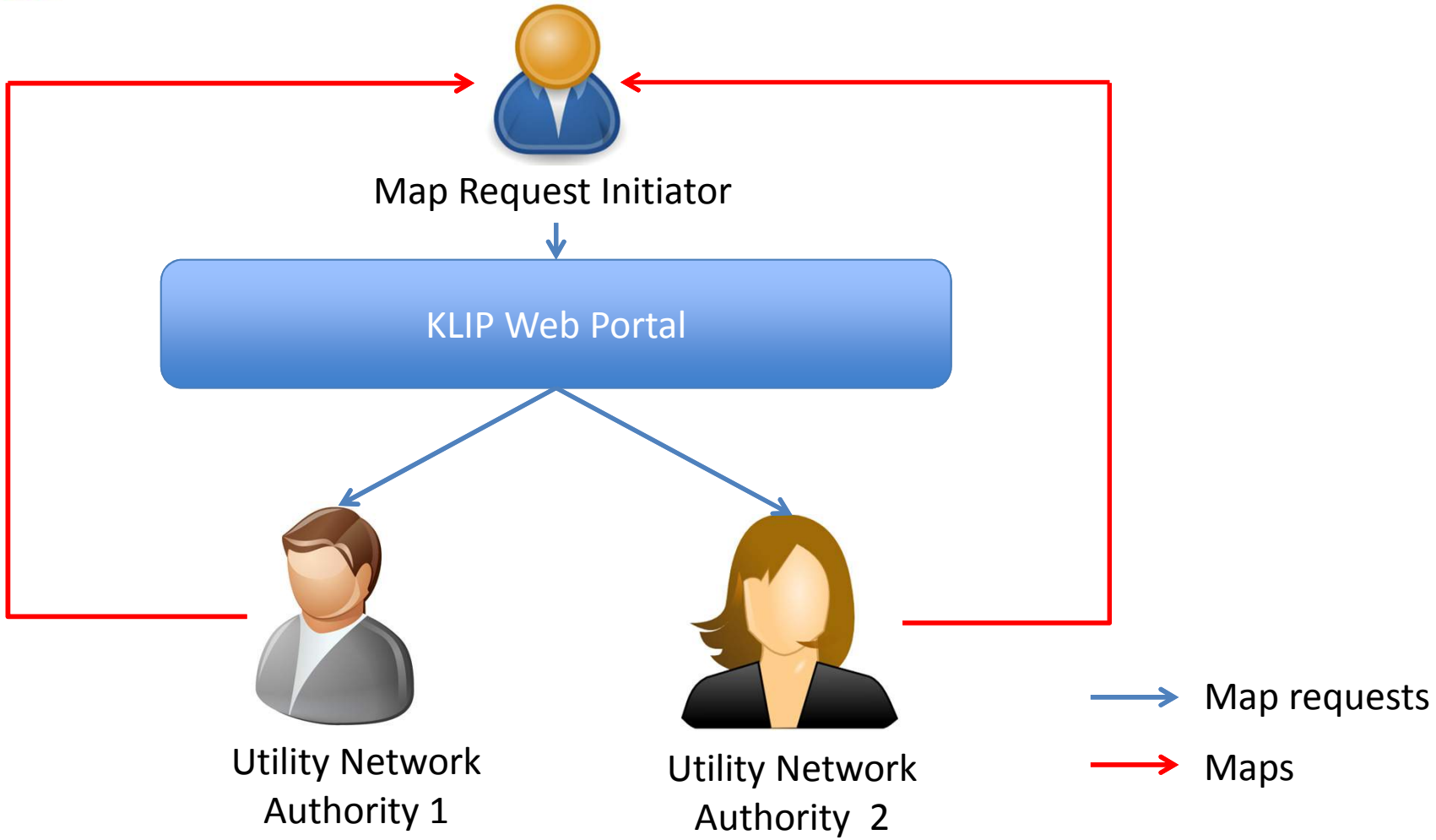
Objective: better information exchange between

- Diggers that create map requests: Map Request Initiators - MRI
- Cable and pipeline operators that need to reply to those map requests –Utility Network Authorities -UNA

KLIP "Analogue" phase

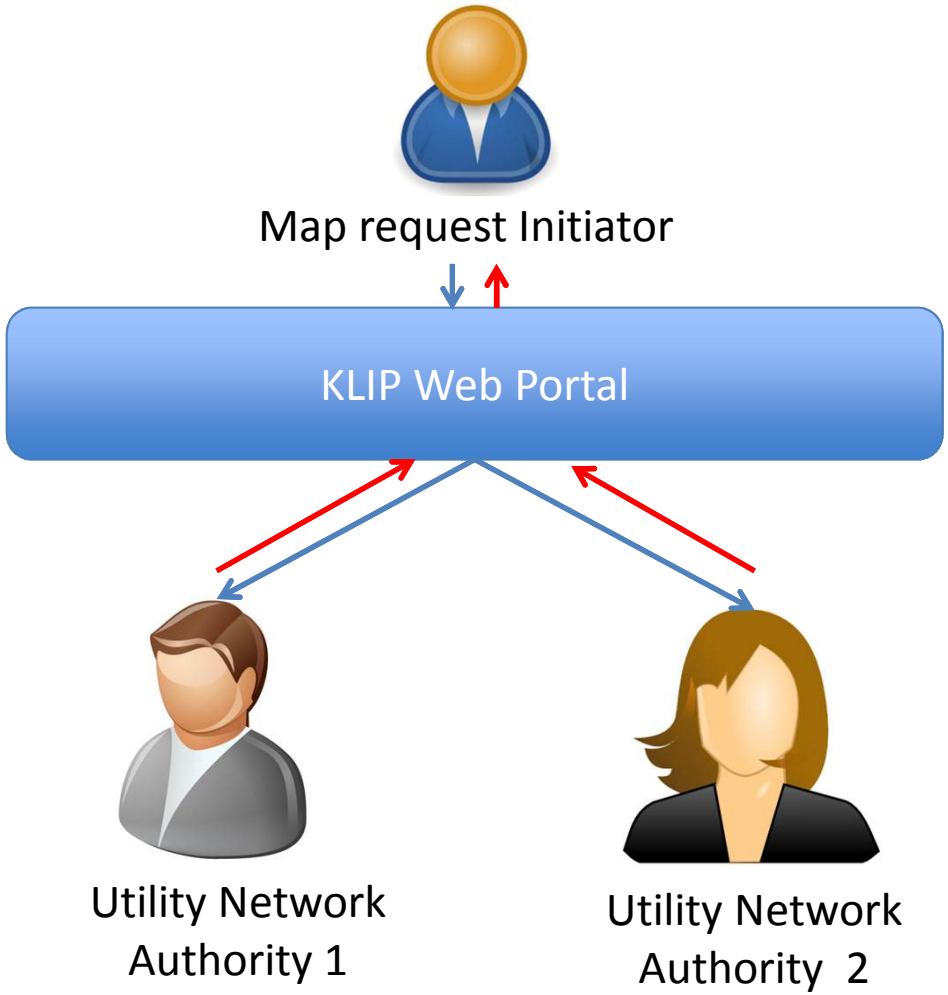
- Operational since 2007
- UNA mandated to register with KLIP
- MRI mandated to introduce map requests

Process KLIP “analogue” Fase



Process KLIP “analogue” Fase

Process KLIP Digital Phase



Possible since April 2015
Mandated for January 2016!

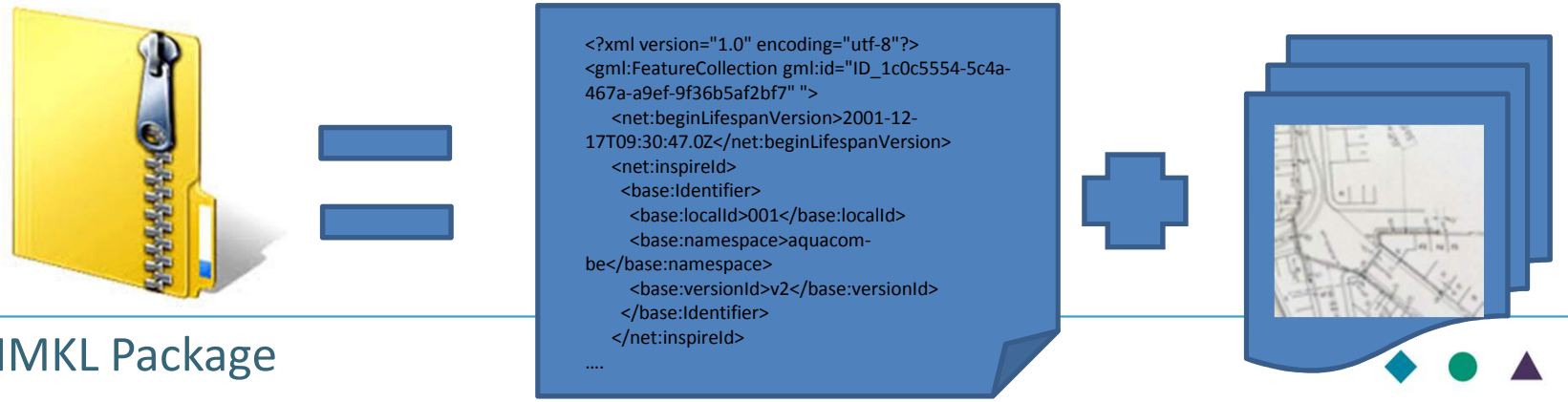
Map requests

Maps

KLIP Digital Phase – Data model & Format

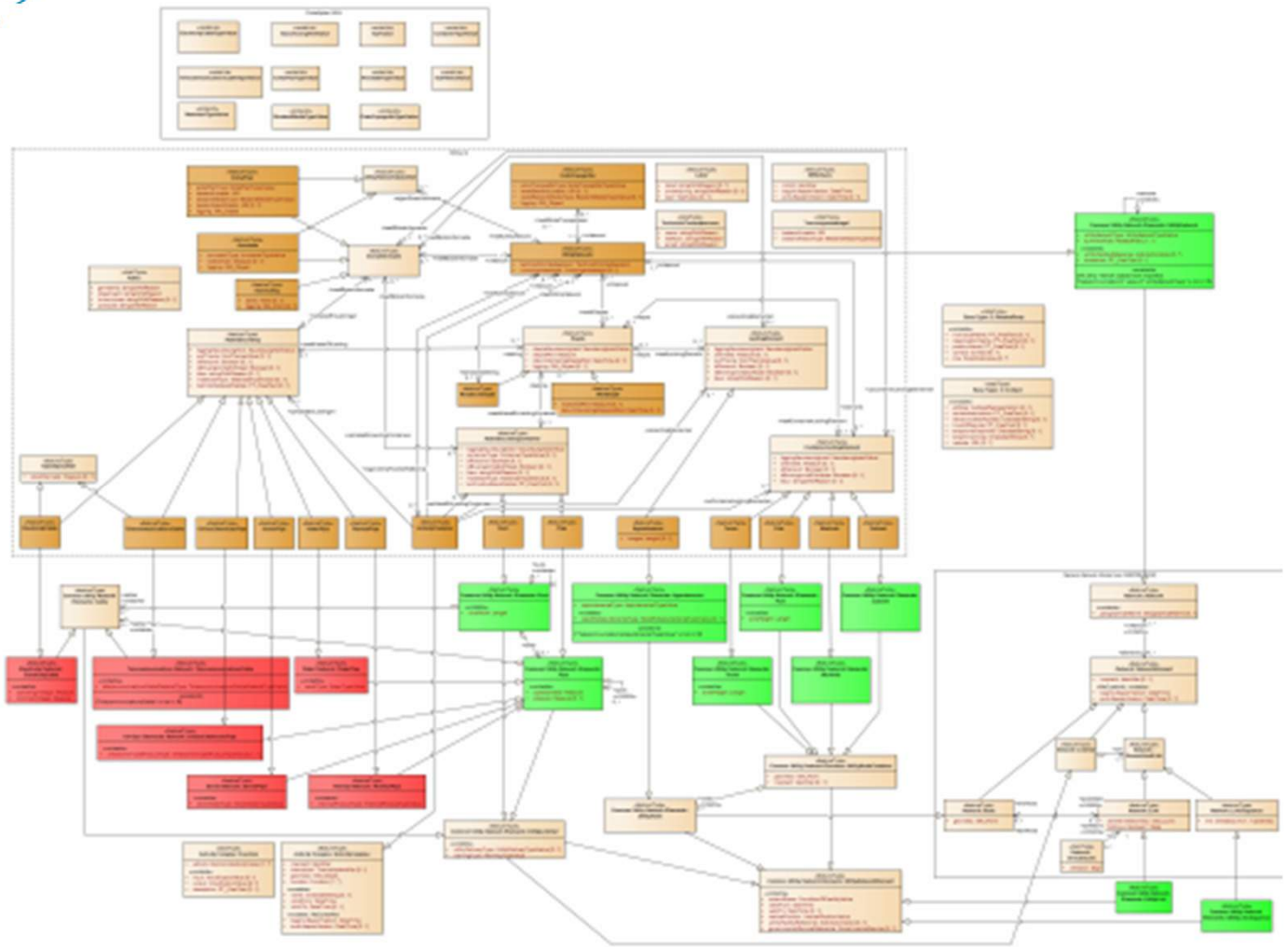
No more free choice concerning the format of the maps

- Geographic information must be delivered in accordance with the "Informatiemodel Kabels en Leidingen (IMKL)"
- IMKL package
  - IMKL encoded as GML
  - Extra files (response letters, detailed drawings, …) referred to from within the IMKL



IMKL Package

IMKL - Model



KLIP Digital Phase – Presentation Model

Symbology with which the IMKL is portrayed is defined within the "Presentatie Model Kabels en Leidingen (PMKL)"

```
<?xml version="1.0" encoding="utf-8"?>
<gml:FeatureCollection gml:id="ID_1c0c5554-5c4a-
467a-a9ef-9f36b5af2bf7" ">
    <net:beginLifespanVersion>2001-12-
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    <net:inspireId>
     <base:Identifier>
      <base:localId>001</base:localId>
      <base:namespace>aquacom-
be</base:namespace>
      <base:versionId>v2</base:versionId>
     </base:Identifier>
    </net:inspireId>
....
```
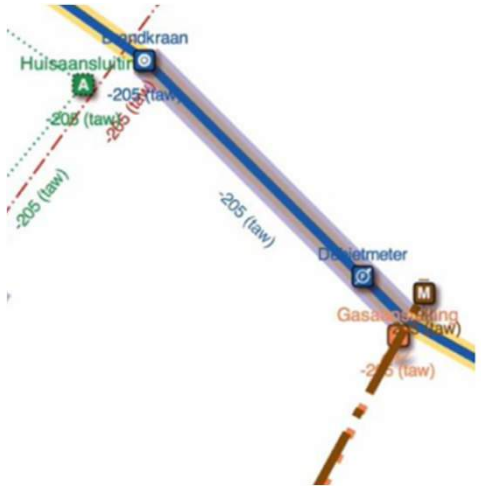
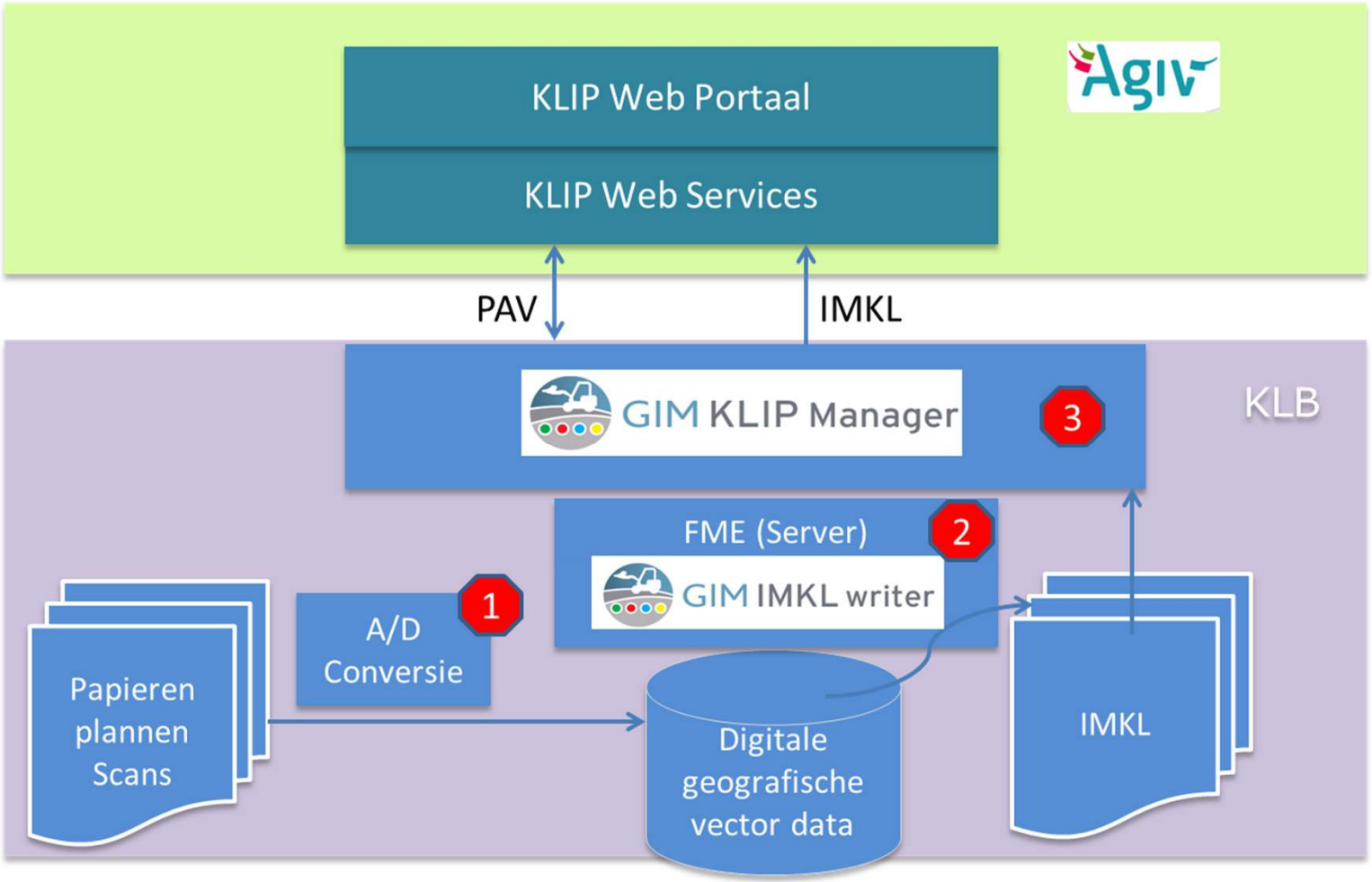



What does a UNA require for KLIP Digital Phase



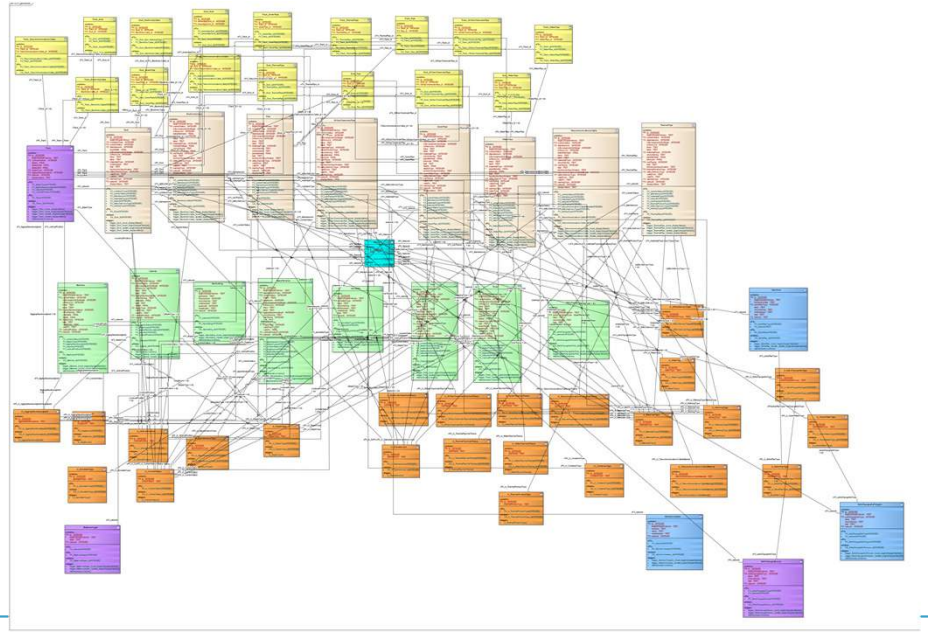
Data digitisation with QGIS

- Still a lot of (smaller) UNA's do not have digital vector data about their subsoil infrastructure
- Only data that is available are paper plans and scans
- Need for a cost-effective and simple data digitisation solution

- GIM selected QGIS as the GIS Tool of choice
  - Free
  - User friendly
  - Can handle complex data models
  - Easy to implement PMKL symbology
  - Support for portable database format as SpatiaLite

Implementation of Database in SpatiaLite

- Using Enterpise Architect to read in the IMKL UML model
- Slightly simplifying the model
- Generating the database creation statements

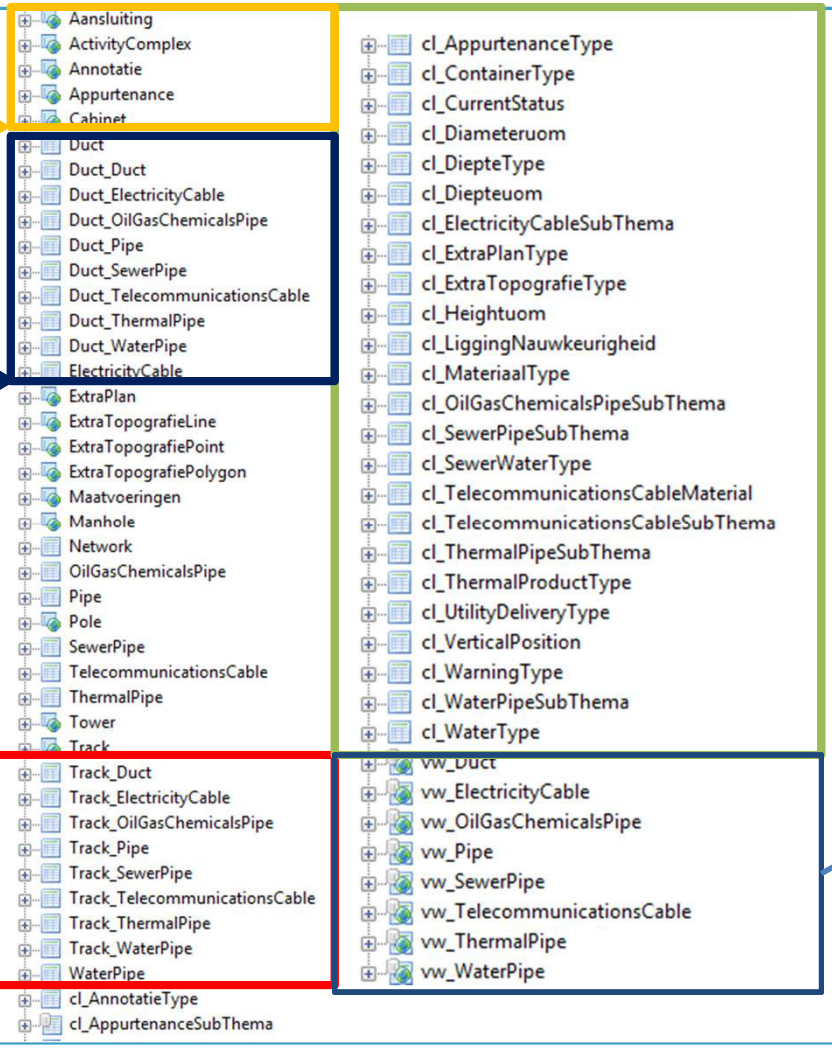


SpatiaLite

Layers with geometry

Tables without geometry

Many to many relationships – coupling tables



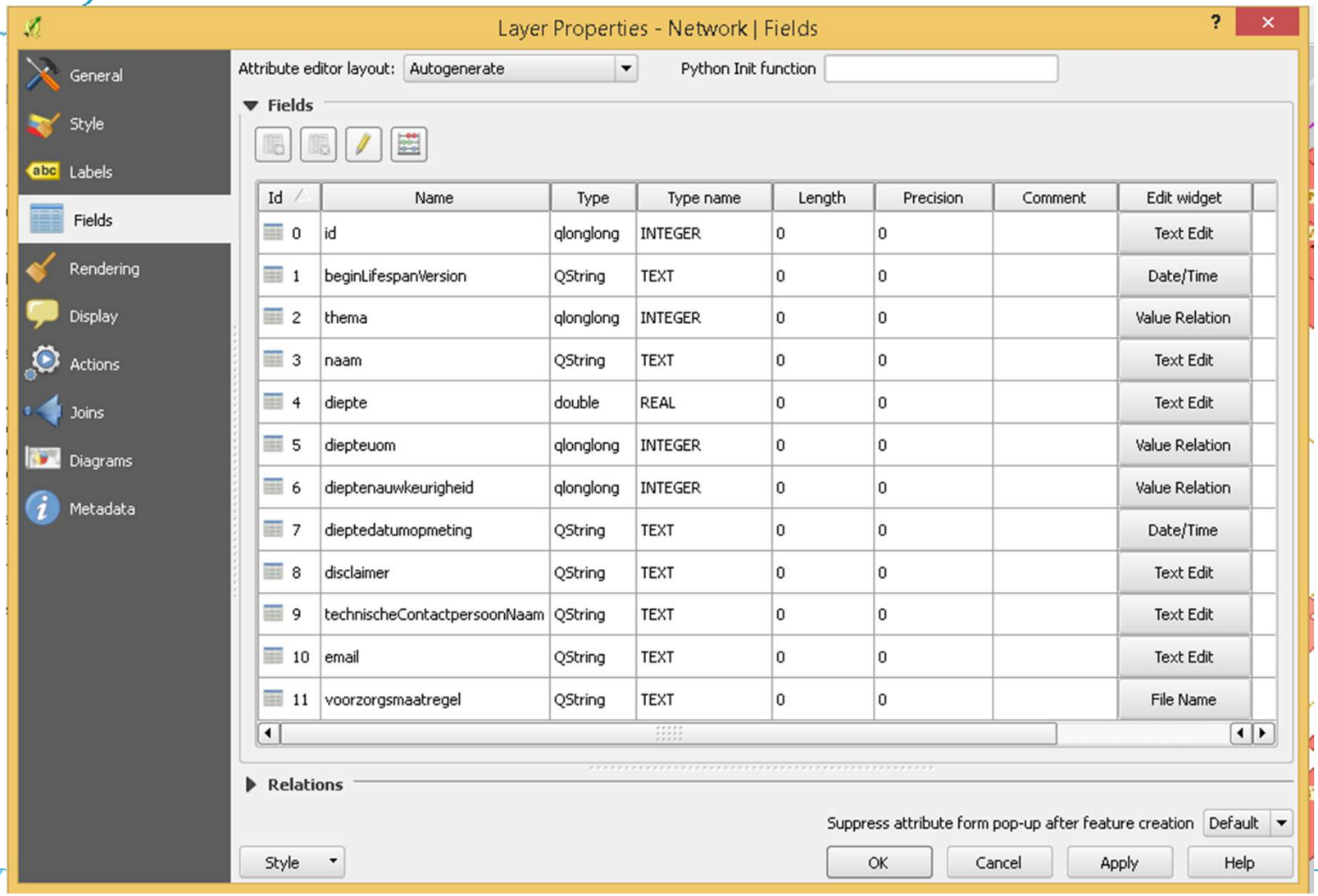
Codelist tables for picklists

Views for display

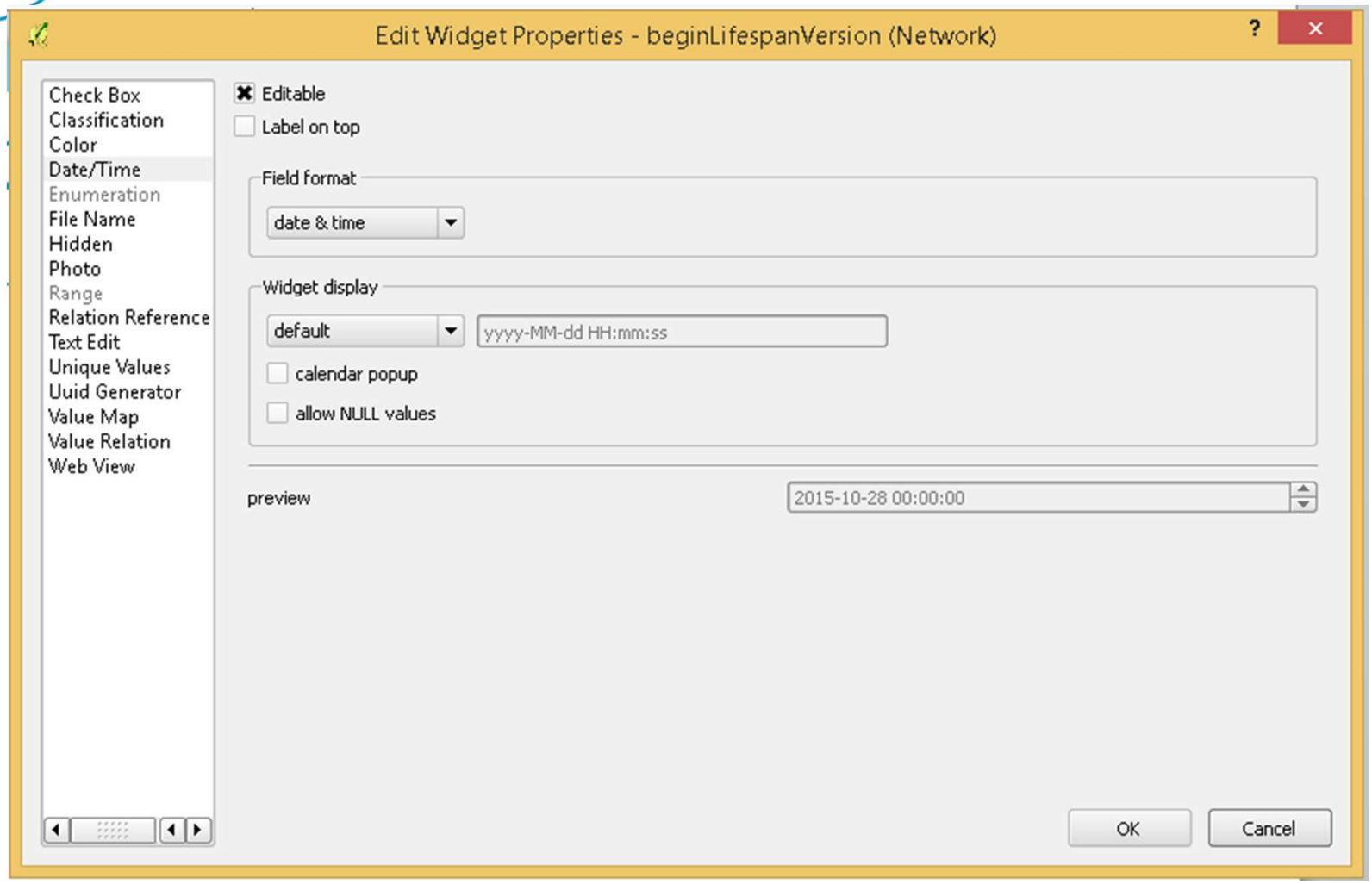
QGIS Configuration

- Creation of a QGIS Project that contains
  - Background layers offered as WMTS layers
  - Layers and Tables from the SpatiaLite database
  - Specific attribute editing forms for each of the different objects
  - Implemented the one-to many and many-to-many relationships between the different objects
  - Implemented the symbology

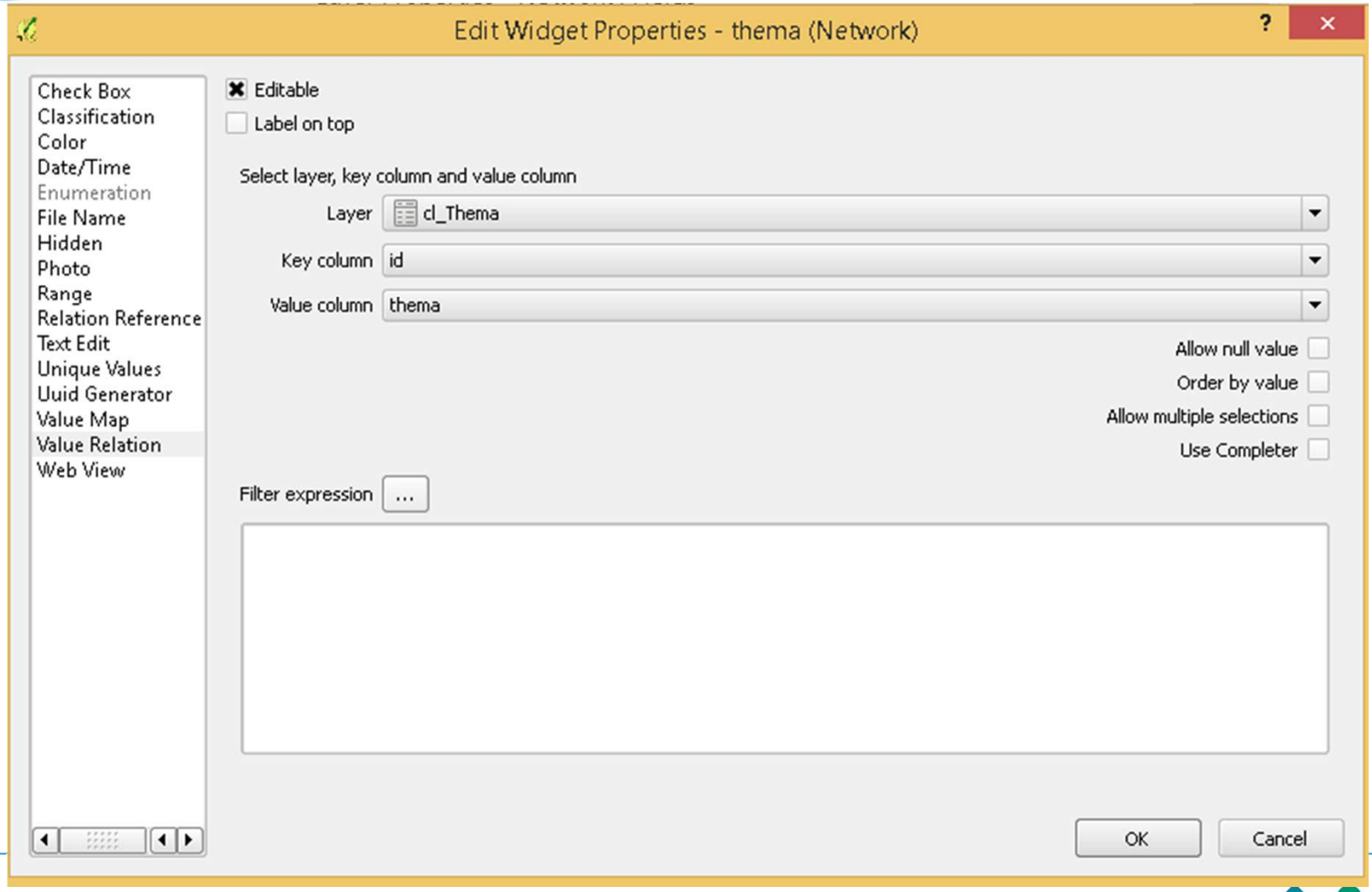
QGIS Configuration – editing forms



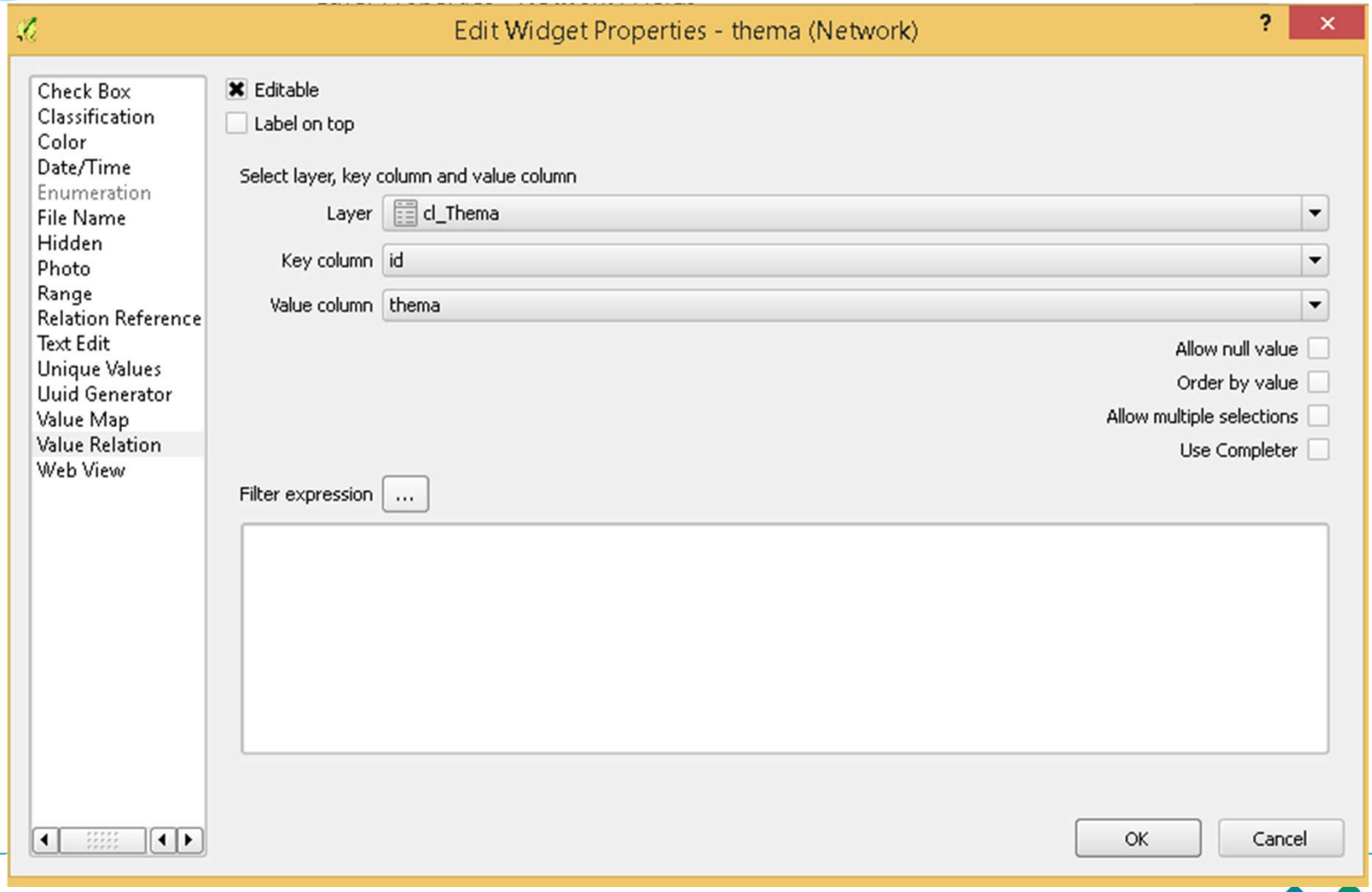
QGIS Configuration – editing forms – date/time



QGIS Configuration – editing forms – Value – relations

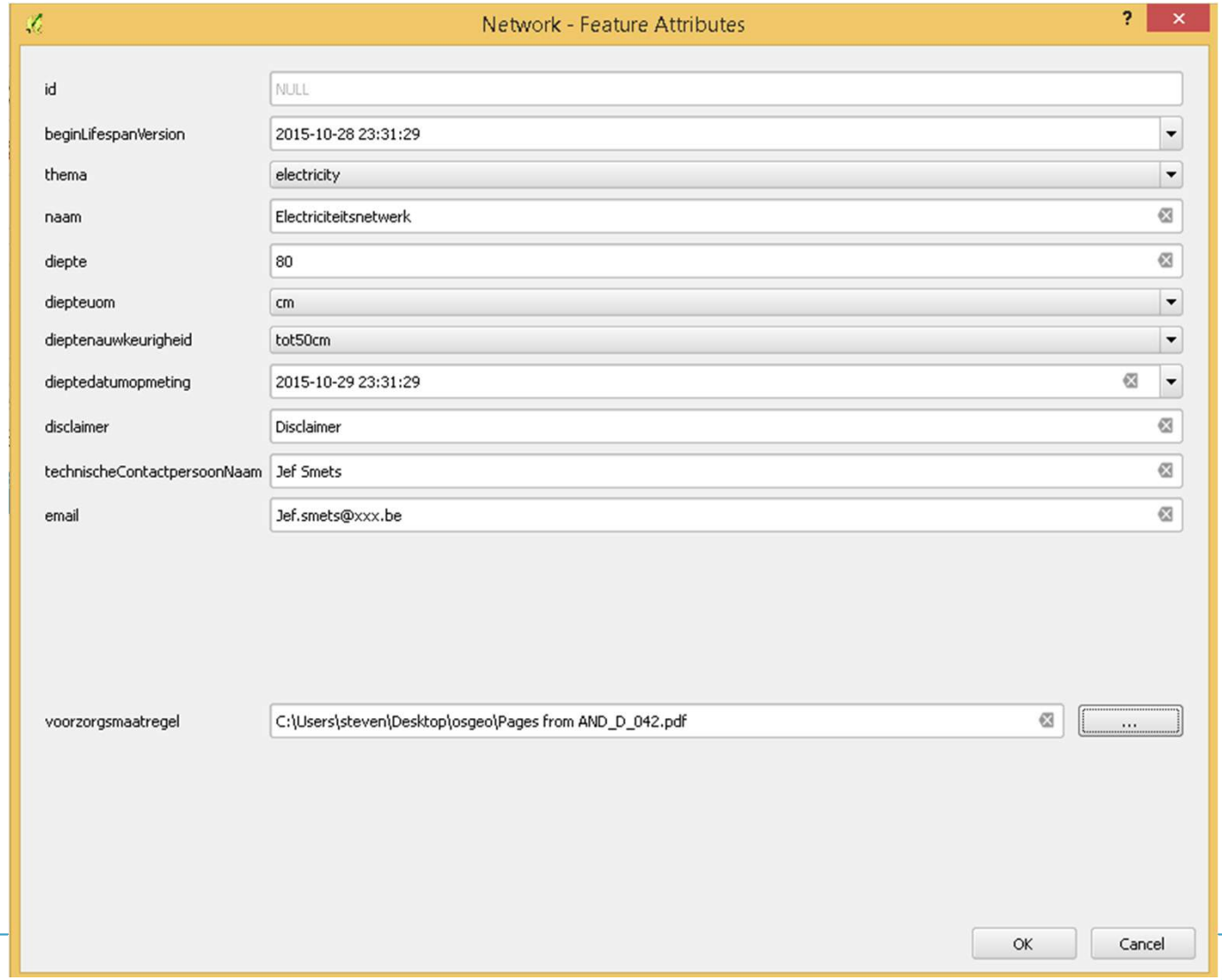


QGIS Configuration – editing forms – Value – relations

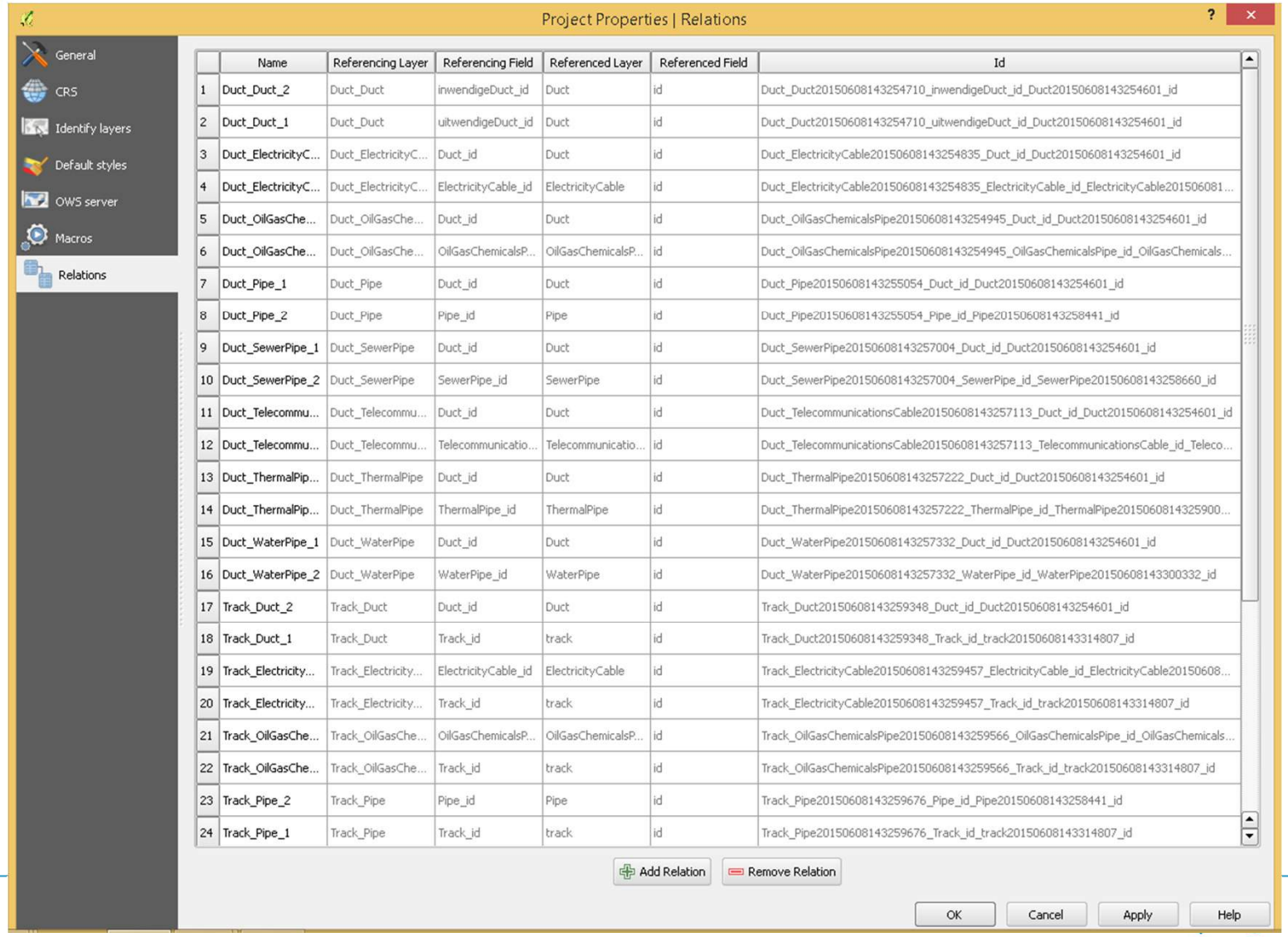


QGIS Configuration – editing forms – File browse Box

QGIS Configuration – editing forms – Result



QGIS Configuration - relationships



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2	Duct_Duct_1	Duct_Duct	uitwendigeDuct_id	Duct	id	Duct_Duct20150608143254710_uitwendigeDuct_id_Duct20150608143254601_id
3	Duct_ElectricityC...	Duct_ElectricityC...	Duct_id	Duct	id	Duct_ElectricityCable20150608143254835_Duct_id_Duct20150608143254601_id
4	Duct_ElectricityC...	Duct_ElectricityC...	ElectricityCable_id	ElectricityCable	id	Duct_ElectricityCable20150608143254835_ElectricityCable_id_ElectricityCable201506081...
5	Duct_OilGasChe...	Duct_OilGasChe...	Duct_id	Duct	id	Duct_OilGasChemicalsPipe20150608143254945_Duct_id_Duct20150608143254601_id
6	Duct_OilGasChe...	Duct_OilGasChe...	OilGasChemicalsP...	OilGasChemicalsP...	id	Duct_OilGasChemicalsPipe20150608143254945_OilGasChemicalsPipe_id_OilGasChemicals...
7	Duct_Pipe_1	Duct_Pipe	Duct_id	Duct	id	Duct_Pipe20150608143255054_Duct_id_Duct20150608143254601_id
8	Duct_Pipe_2	Duct_Pipe	Pipe_id	Pipe	id	Duct_Pipe20150608143255054_Pipe_id_Pipe20150608143258441_id
9	Duct_SewerPipe_1	Duct_SewerPipe	Duct_id	Duct	id	Duct_SewerPipe20150608143257004_Duct_id_Duct20150608143254601_id
10	Duct_SewerPipe_2	Duct_SewerPipe	SewerPipe_id	SewerPipe	id	Duct_SewerPipe20150608143257004_SewerPipe_id_SewerPipe20150608143258660_id
11	Duct_Telecommu...	Duct_Telecommu...	Duct_id	Duct	id	Duct_TelecommunicationsCable20150608143257113_Duct_id_Duct20150608143254601_id
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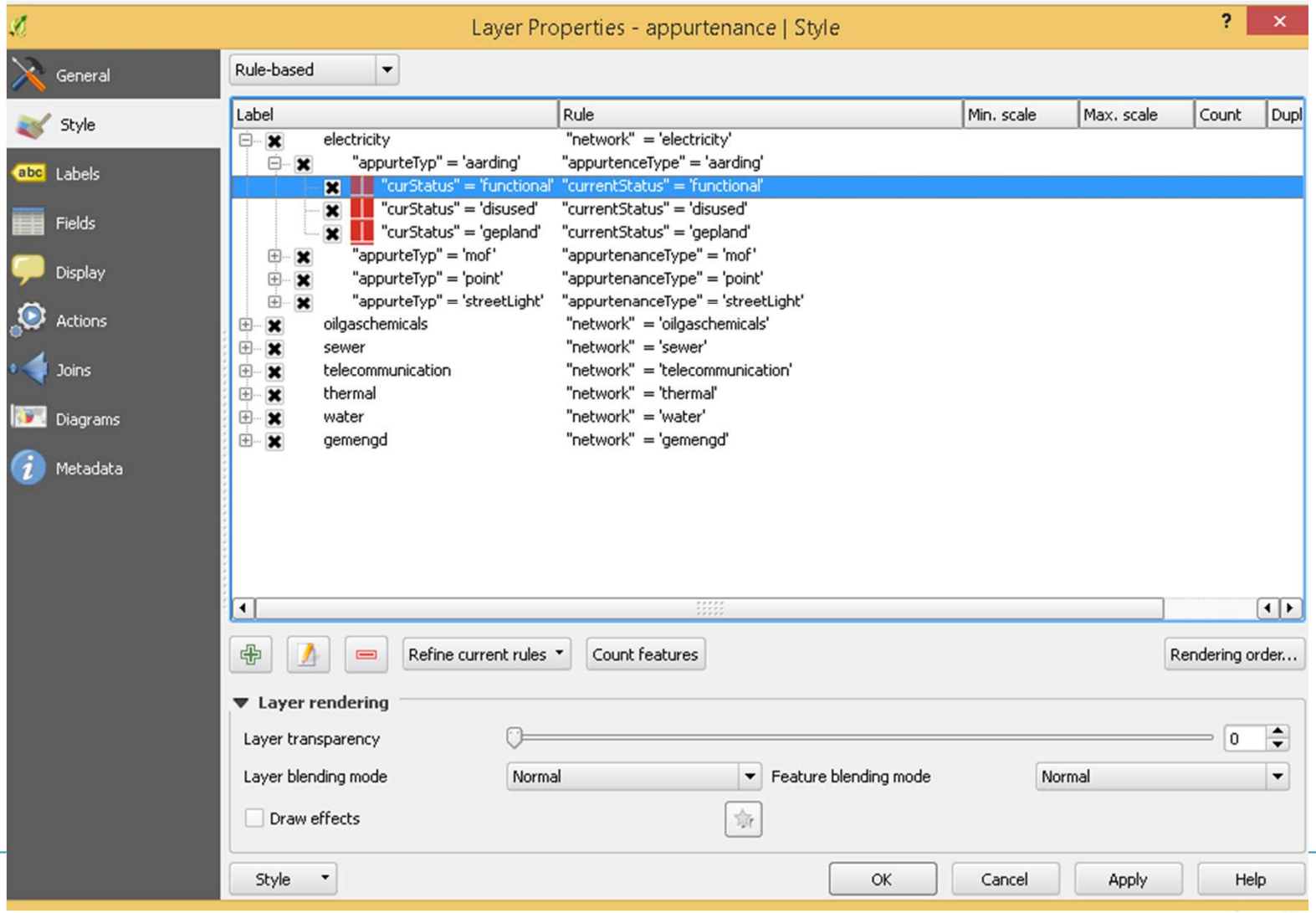
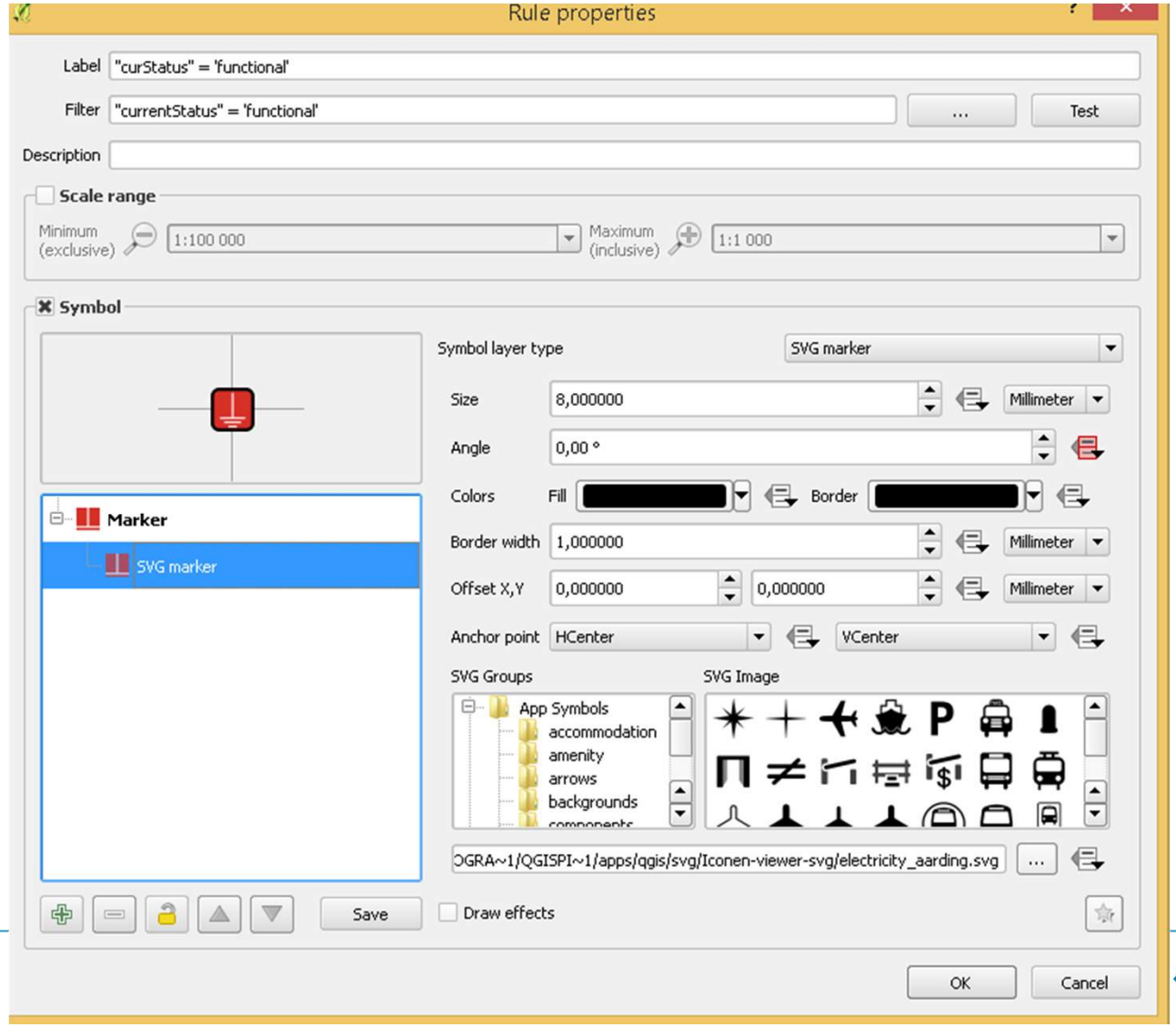
13	Duct_ThermalPip...	Duct_ThermalPipe	Duct_id	Duct	id	Duct_ThermalPipe20150608143257222_Duct_id_Duct20150608143254601_id
14	Duct_ThermalPip...	Duct_ThermalPipe	ThermalPipe_id	ThermalPipe	id	Duct_ThermalPipe20150608143257222_ThermalPipe_id_ThermalPipe2015060814325900...
15	Duct_WaterPipe_1	Duct_WaterPipe	Duct_id	Duct	id	Duct_WaterPipe20150608143257332_Duct_id_Duct20150608143254601_id
16	Duct_WaterPipe_2	Duct_WaterPipe	WaterPipe_id	WaterPipe	id	Duct_WaterPipe20150608143257332_WaterPipe_id_WaterPipe20150608143300332_id
17	Track_Duct_2	Track_Duct	Duct_id	Duct	id	Track_Duct20150608143259348_Duct_id_Duct20150608143254601_id
18	Track_Duct_1	Track_Duct	Track_id	track	id	Track_Duct20150608143259348_Track_id_track20150608143314807_id
19	Track_Electricity...	Track_Electricity...	ElectricityCable_id	ElectricityCable	id	Track_ElectricityCable20150608143259457_ElectricityCable_id_ElectricityCable20150608...
20	Track_Electricity...	Track_Electricity...	Track_id	track	id	Track_ElectricityCable20150608143259457_Track_id_track20150608143314807_id
21	Track_OilGasChe...	Track_OilGasChe...	OilGasChemicalsP...	OilGasChemicalsP...	id	Track_OilGasChemicalsPipe20150608143259566_OilGasChemicalsPipe_id_OilGasChemicals...
22	Track_OilGasChe...	Track_OilGasChe...	Track_id	track	id	Track_OilGasChemicalsPipe20150608143259566_Track_id_track20150608143314807_id
23	Track_Pipe_2	Track_Pipe	Pipe_id	Pipe	id	Track_Pipe20150608143259676_Pipe_id_Pipe20150608143258441_id
24	Track_Pipe_1	Track_Pipe	Track_id	track	id	Track_Pipe20150608143259676_Track_id_track20150608143314807_id

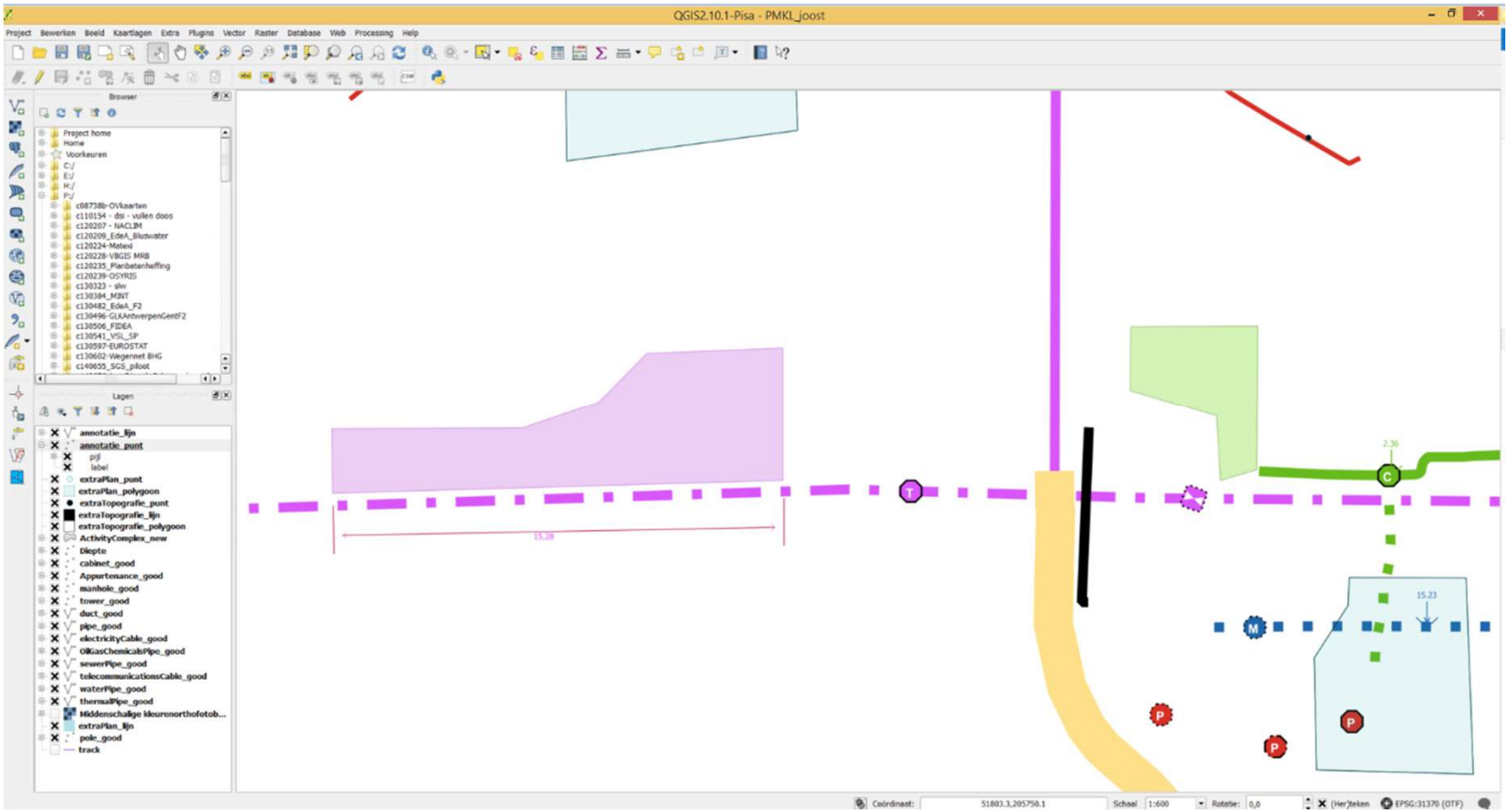
QGIS Configuration – Symbology



QGIS Configuration – Symbology Implementation



QGIS Configuration – Symbology - Result



Duct – Cable Relationships modelling

Track
(line geometry)

KLIP_Track

Link: KLIP_Track_Duct
(containsID_track and ID_duct)

KLIP_Track_Duct

Link: KLIP_Track_Telecom
(contains ID_track and ID_telecom)

KLIP_Track_Telecom

Duct –'mantelbuis' or 'goot'
(no geometry)

KLIP_Duct

Link: KLIP_Duct_Telecom
(contains ID_duct and ID_telec)

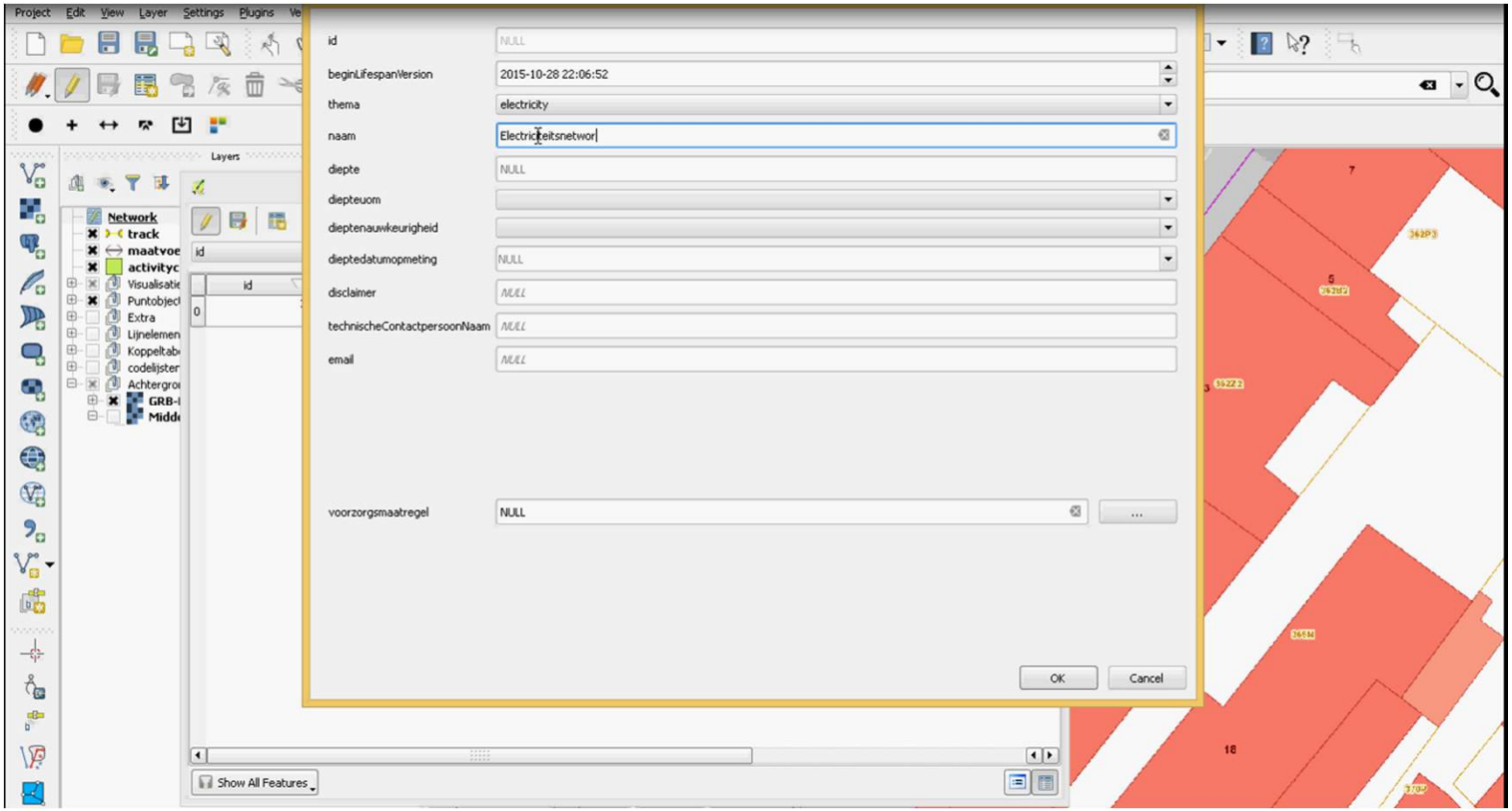
- Link to geometry by linking duct to track

KLIP_Duct_Telecom

TelecommunicationsCable
(no geometry)

KLIP_TelecomCable

Demo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beginLifespanVersion
2015-10-28 22:06:52
thema
electricity
naam
Electriciteitsnetwor
diepte
NULL
diepteuom
dieptenauwkeurigheid
dieptedatumopmeting
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disclaimer
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technischeContactpersoonNaam
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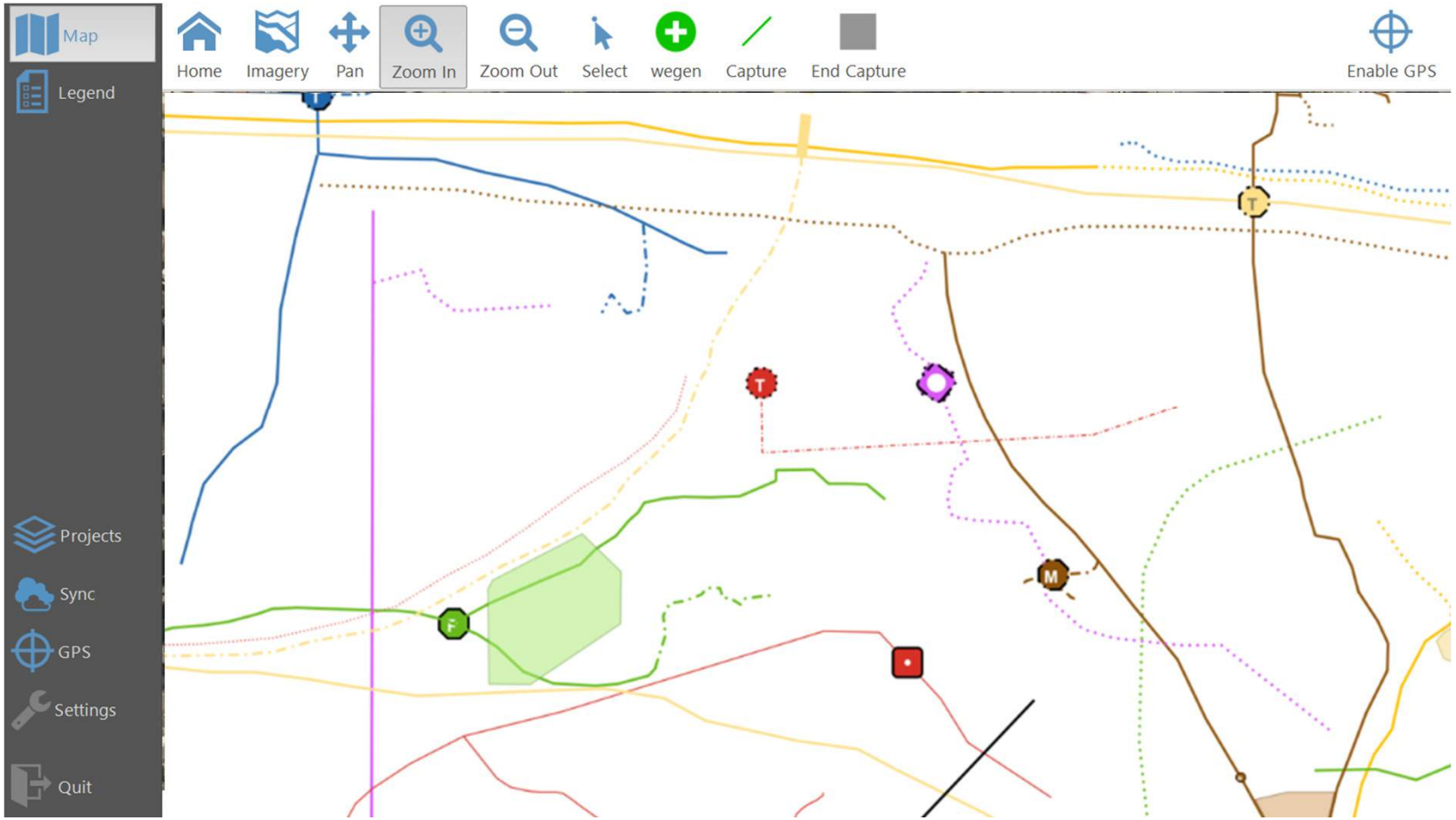
email
NULL
voorzorgsmaatregel
NULL
OK
Cancel
Show All Features

Mobile Offline Viewer using QGIS



Conclusion

- QGIS proved to be a convenient data inventarisation solution with nice configuration possibilities for
  - designing custom editing forms
  - implementing complex relationships between objects
  - applying complex symbologies
  - SpatiaLite support

- Is in use by
  - >10 Communes
  - Flemish regional agencies (SpatiaLite and SQLServer)

To come

QGIS Plugin for Orbit Mobile Mapping API