

Managing the Flemish Functional Cycle Network: A FOSS4G solution

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FOSS4G-Europe
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Introduction

- Karel Dieussaert
 - GIS consultant
 - **GEO Solutions NV (Belgium):**
Geo-ICT integrator
- Customer:
Department Mobility and Public Works
(Flemish Government)
- Project:
GeoMOB



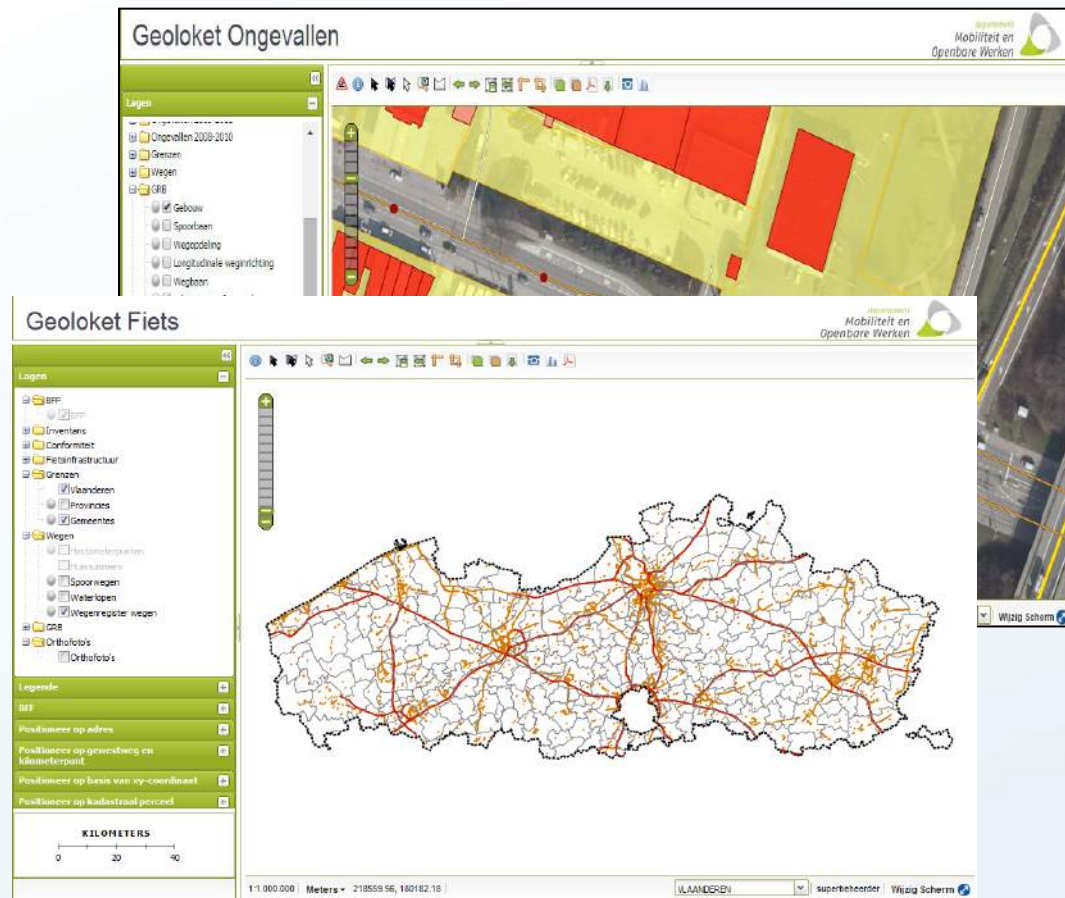
Agenda

- Introduction
 - Project “GeoMOB”
 - Functional Cycle Network
- Functional demands
- Technical demands
 - Architecture
 - Data model (Linear referencing)
- Integration: functional & technical demands
- Current state of the project
- Data migration - OpenLR

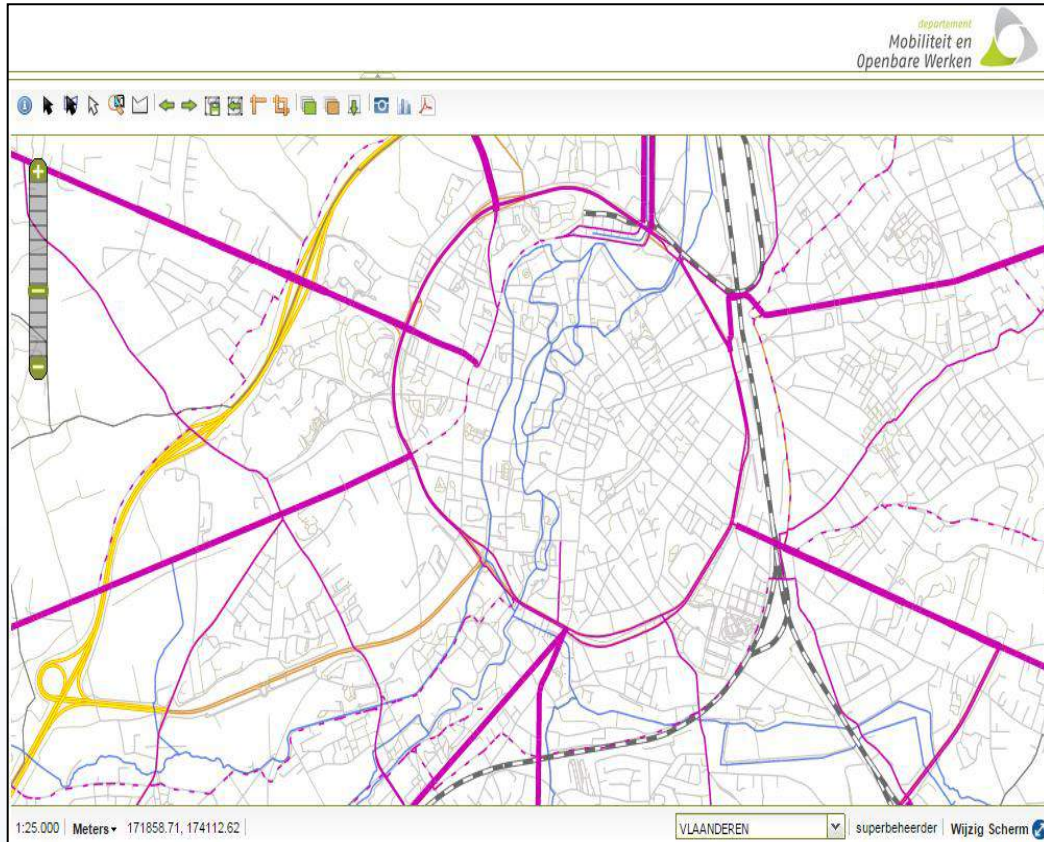


GeoMOB

- Geoportal for MOBility
- Thematic geo-applications:
 - Accidents
 - Functional Cycle Network
- Goals:
 - Manage (geo)data
 - Visualisation
 - Analysis
 - Reporting & monitoring



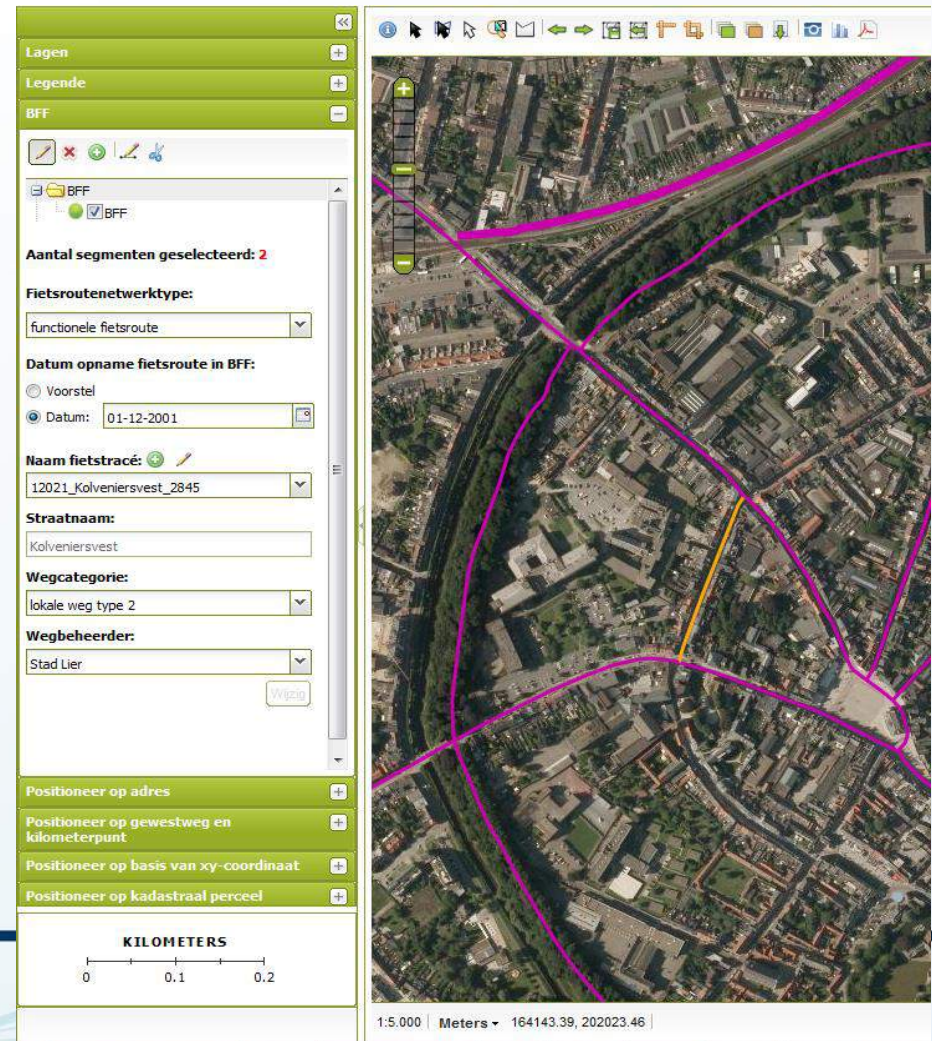
Functional Cycle Network (FCN)



- Connects
 - residential area
 - attraction poles
- Home - School
- Home - Work
- Home - Stores
- ...
- Comfort & safety
- Instrument for policy making
 - A functional network,
not a touristic network

FCN - functional demands

- Editing the FCN:
 - add, split, delete, update attributes



FCN - functional demands

- Inventory of the cycle road infrastructure:
 - Type, width, material, border, ... of bicycle path

The screenshot shows the 'Inventaris' software interface. At the top, a map displays a cycle path (highlighted in purple) on a yellow background, with a red '1' marking a specific location. Below the map is a data entry form with the following fields:

Geef inventaris in		Geen weginfrastructuur		Geen inventaris	
<input type="checkbox"/> Gemengd verkeer		Type voorziening:		D9	
Van (m):	0	Datum inventarisatie:	27-05-2015		
Tot (m):	79	Datum aanleg:			
Lengte (m):	79	Rijrichting:	tweerichting (2R)		
Breedte (cm):	230	Materiaal:	betonplaat		
Breedte tussenstrook (cm):	20	Kleur:	grijs/zwart		
Type tussenstrook:	grasstrook	Schoolomgeving:	geen		
Breedte markering (cm):	20	Soort verlichting:	fietspadverlichting		
Hoogte verhoging (cm):	20	Maximum snelheid:	>30 - ≤50		
Breedte goot (cm):		Aanliggend (verhoogd)/vrijliggend:	aanliggend verhoogd		
Conformiteit: <input checked="" type="radio"/> fietsinfrastructuur aanwezig, maar niet conform					
Reden forcering:		Maak uw keuze		Datum forcering:	
Opmerking:					
Bereken conformiteit Kopieer Plak Bewaar					

FCN - functional demands

- Data - analysis:
 - Checking compliancy of cycle infrastructure vs. policy rules

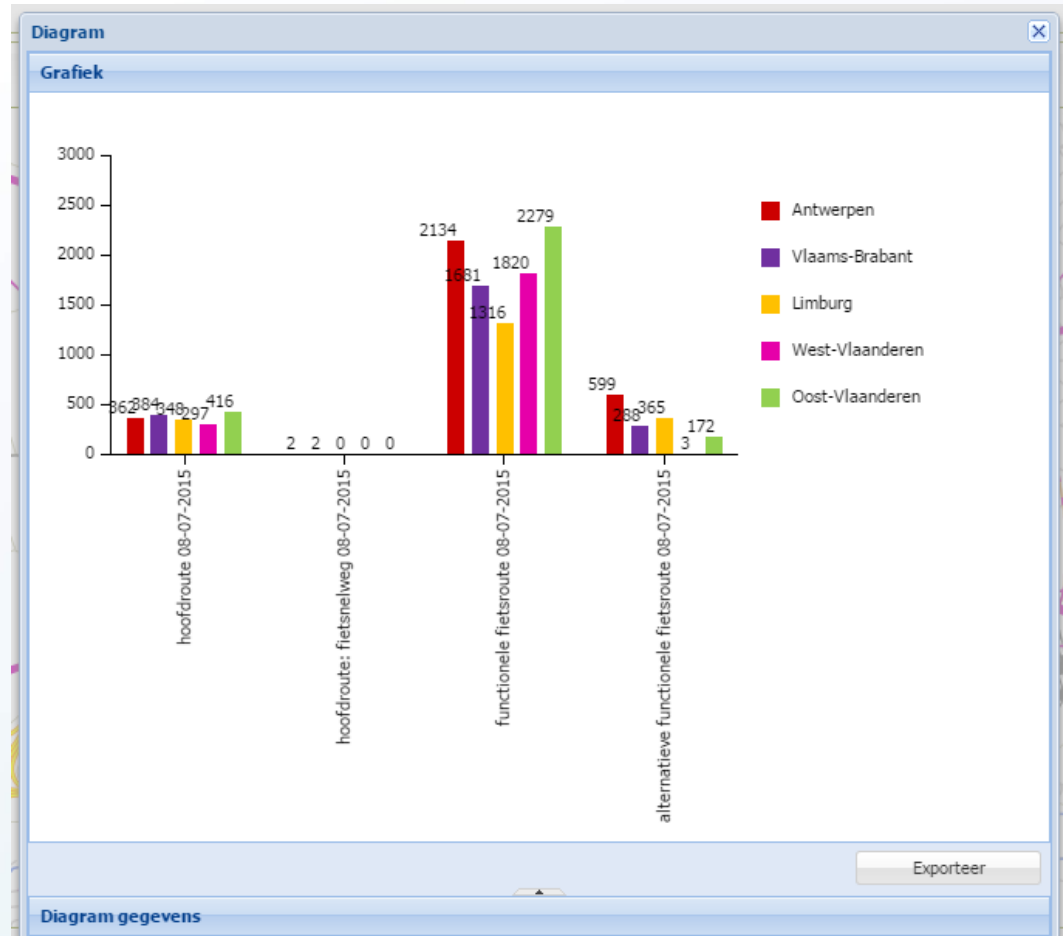
The screenshot shows the 'Inventaris' software interface. At the top, there is a map view with a yellow background and a blue line representing a path. A red '1' is marked on the path. Below the map, there is a form with various input fields and buttons. The form is titled 'Inventaris' and has three radio buttons: 'Geef inventaris in' (selected), 'Geen weginfrastructuur', and 'Geen inventaris'. The form contains several sections for data entry, including 'Type voorziening', 'Datum inventarisatie', 'Datum aanleg', 'Rijrichting', 'Materiaal', 'Kleur', 'Schooloromgeving', 'Soort verlichting', 'Maximum snelheid', and 'Aanliggend (verhoogd)/vrijliggend'. A red box highlights the 'Conformiteit' section, which shows a yellow dot icon and the text 'fietsinfrastructuur aanwezig, maar niet conform'. Below this, there are fields for 'Reden forcering' and 'Datum forcering'. At the bottom of the form, there is a 'Opmerking' field and several buttons: 'Bereken conformiteit', 'Kopieer', 'Plak', and 'Bewaar'.

Type voorziening: D9	
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Type tussenstrook:	grasstrook
Breedte markering (cm):	20
Hoogte verhoging (cm):	20
Breedte goot (cm):	
Datum inventarisatie: 27-05-2015	
Datum aanleg:	
Rijrichting: tweerichting (2R)	
Materiaal: betonplaat	
Kleur: grijs/zwart	
Schooloromgeving: geen	
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Conformiteit: ● fietsinfrastructuur aanwezig, maar niet conform	
Reden forcering:	Mak uw keuze
Datum forcering:	
Opmerking:	

Bereken conformiteit Kopieer Plak Bewaar

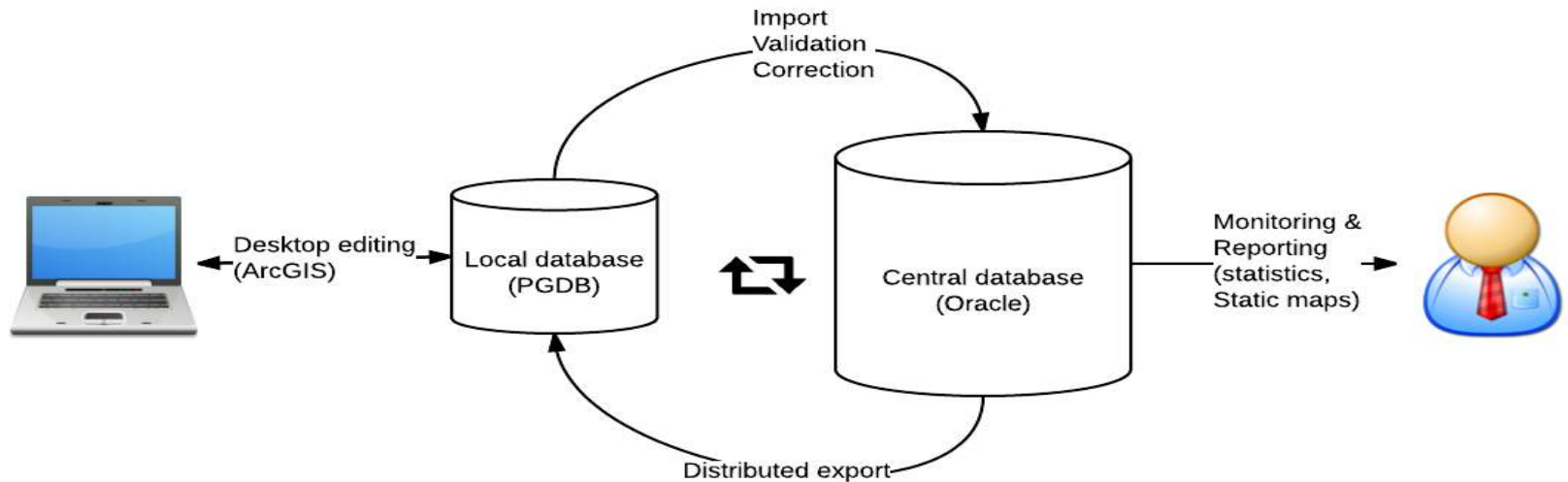
FCN - functional demands

- Monitoring & reporting:
 - Statistics
 - Graphs
 - Static maps

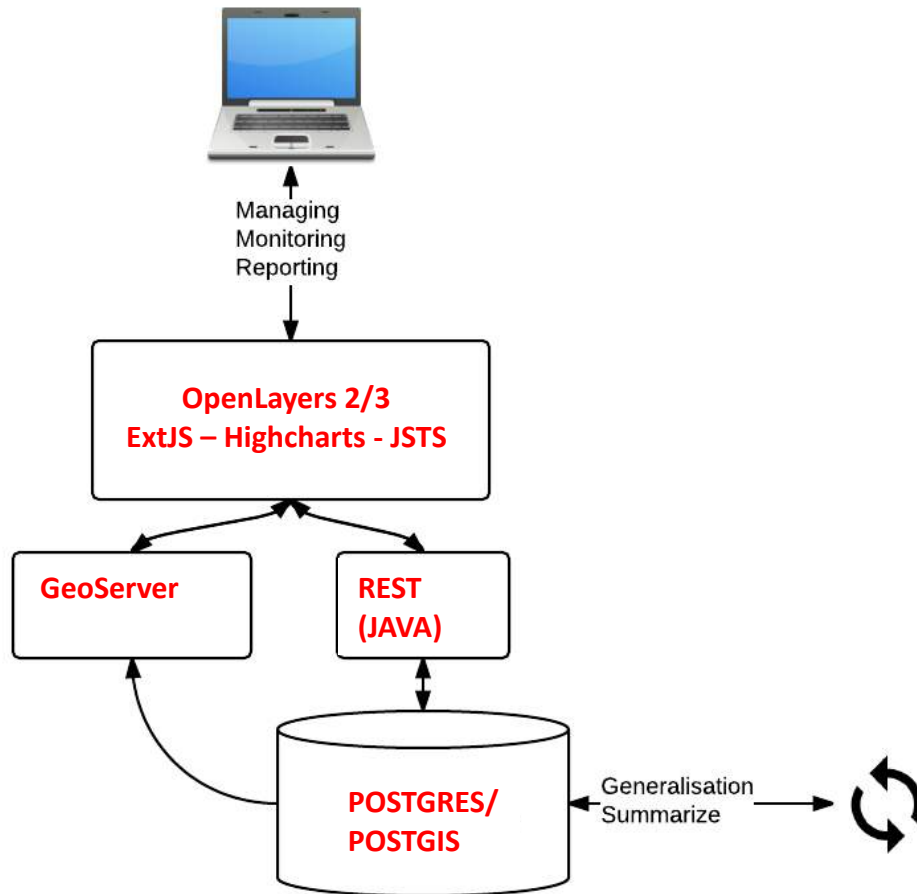


FCN - Technical demands

- Old architecture:
 - Distributed datasets
 - desktop editing
 - Commercial GIS components



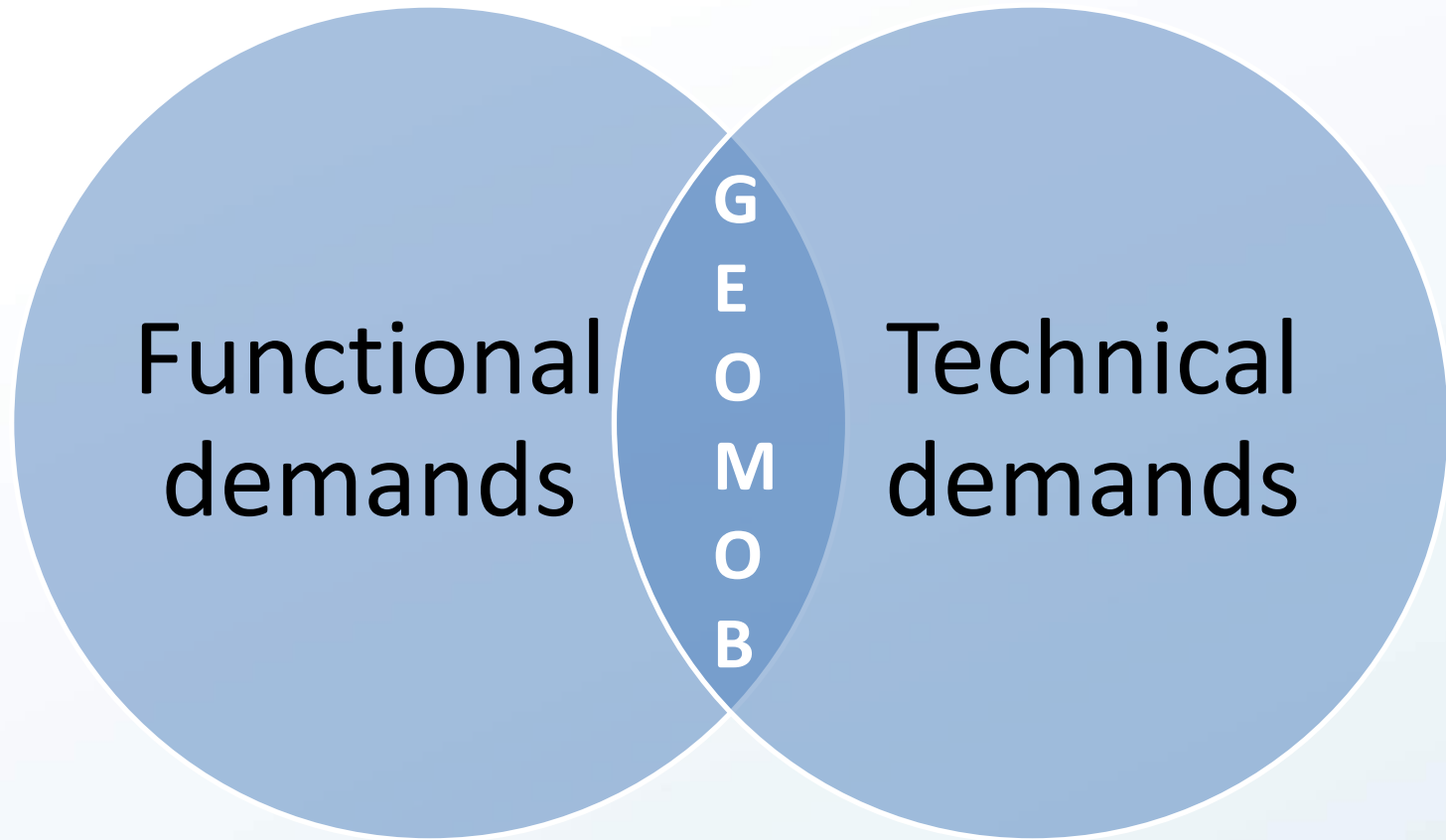
FCN - Technical demands



- Old architecture:
 - Distributed datasets
 - desktop editing
 - Commercial GIS components



- New architecture :
 - Service Oriented Architecture
 - » Central database
 - » Rest
 - » OGC standards
 - » Webapplication
 - Integrated validation
 - FOSS4G & OS components

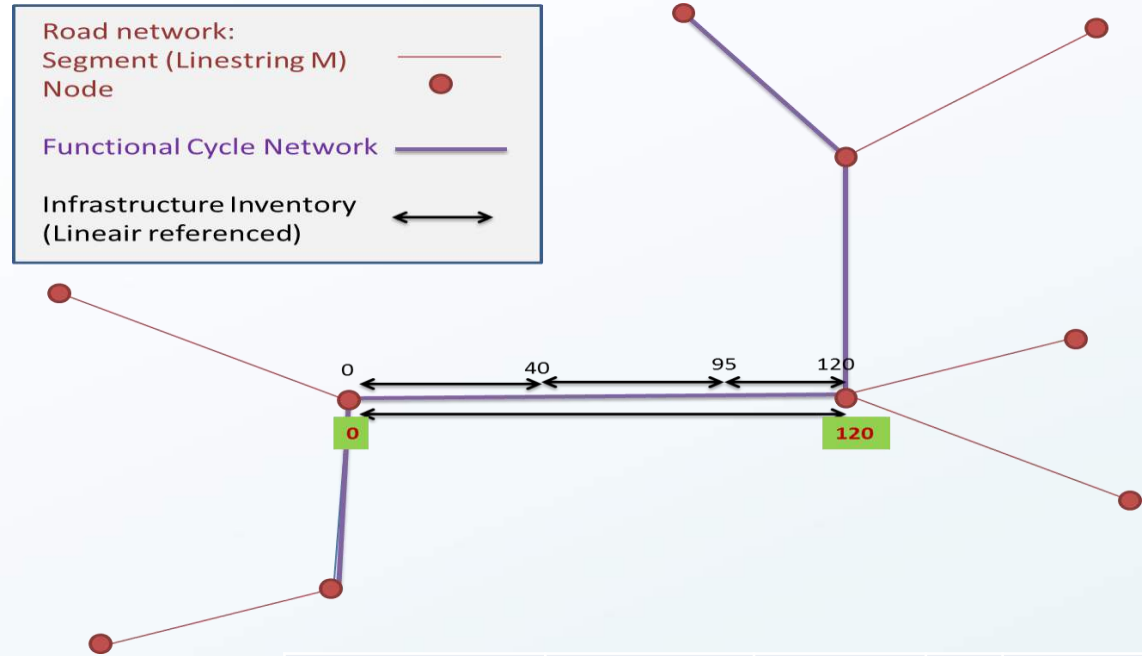


FCN - Event based datamodel

- **PostGIS**

Linear referencing capabilities:

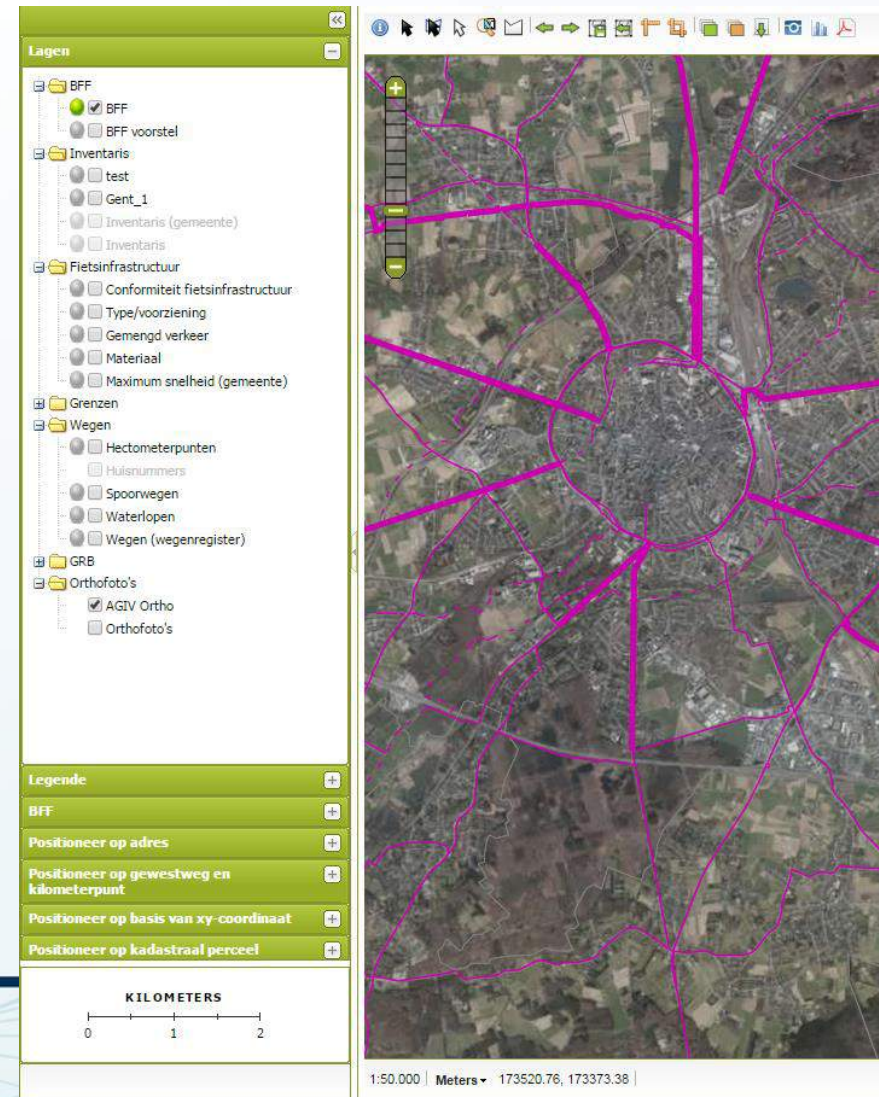
- ST_LineInterpolatePoint
- ST_LineLocatePoint
- ST_LineSubstring
- ST_LocateAlong
- ST_LocateBetween
- ST_interpolatePoint
- ST_AddMeasure



id_road_segment	FromMeasure	ToMeasure	Side	Material
192584	0	40	Left	soil
192584	40	95	Left	concrete
192584	95	120	Left	soil
192584	0	120	Right	Unknown

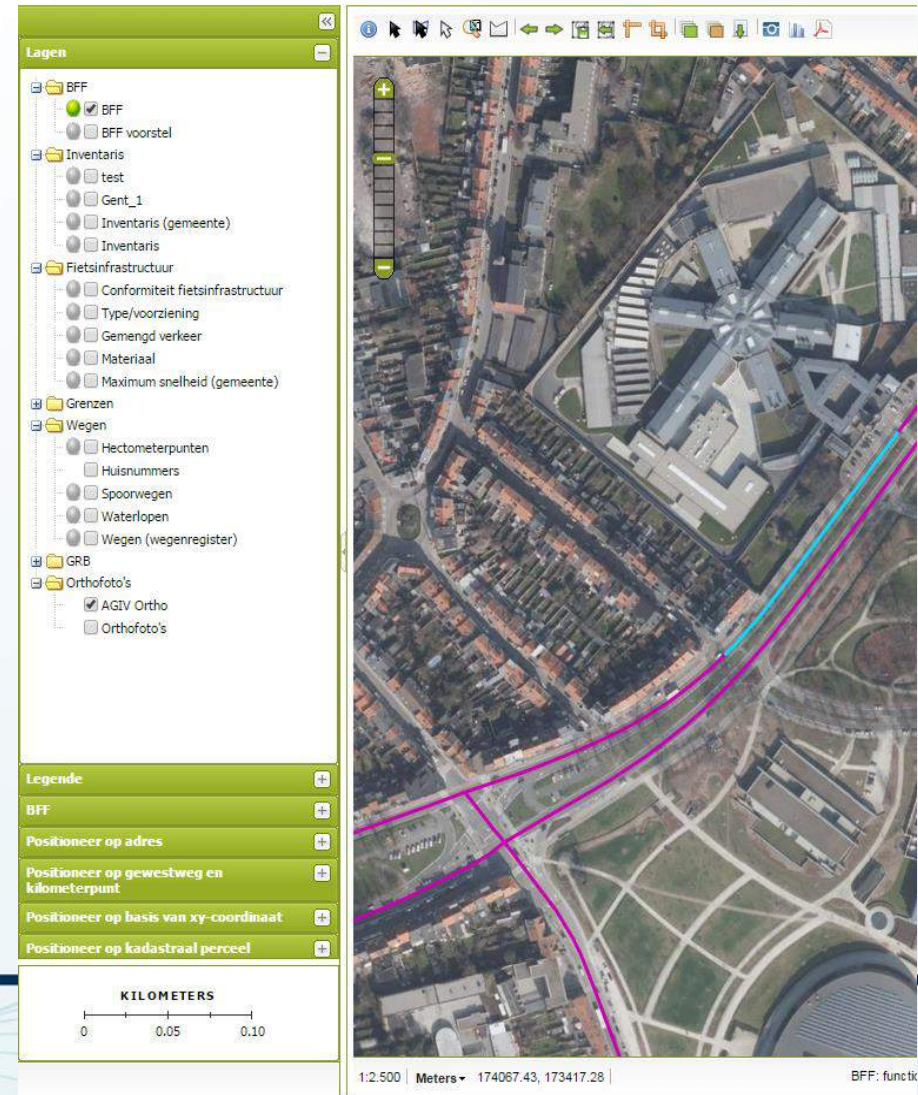
FCN - OGC services

- Web Map Service (WMS)
 - Background layers
 - Business layers (zoomed out)
~performance



FCN - OGC services

- Web Map Service (WMS)
 - Background layers
 - Business layers (zoomed out)
~performance
- Web Feature Service (WFS)
 - Business layers (zoomed in)



FCN - OGC services

- Web Map Service (WMS)
 - Background layers
 - Business layers (zoomed out) *~performance*
 - Web Feature Service (WFS)
 - Business layers (zoomed in)
 - Web Processing Service (WPS)
 - Asynch processes
 - Calculations on big datasets
(F.e. accidents around school areas in Flanders)
- ➔GEO Server & OpenLayers
- covered our needs!
 - Good experiences in previous projects
 - WMS, WFS, WPS (extension), SLD styling
 - GeoWebCache integration *~performance*



FCN - Analysis

Filter

Geselecteerde dataaag:

Gekozen condities

Operator	(Conditie)

Identificatie

Naam filter: Publiek: ☐

Omschrijving:

Filter

Fietsinfrastructuur **Locatie**

Conformiteit:

Reden van forceren:

Van datum forcering: Tot datum forcering:

Type voorziening:

Gemengd verkeer:

Materiaal:

Kleur:

Rijrichting:

Van lengte (m): Tot lengte:

Van breedte (cm): Tot breedte:

Tussenstrooktype:

Oriëntatie:

Van tussenstrookbreedte (cm): Tot tussenstrookbreedte:

Markering:

Van breedte markering (cm): Tot breedte markering:

Verhoogd:

Van hoogte (cm): Tot hoogte:

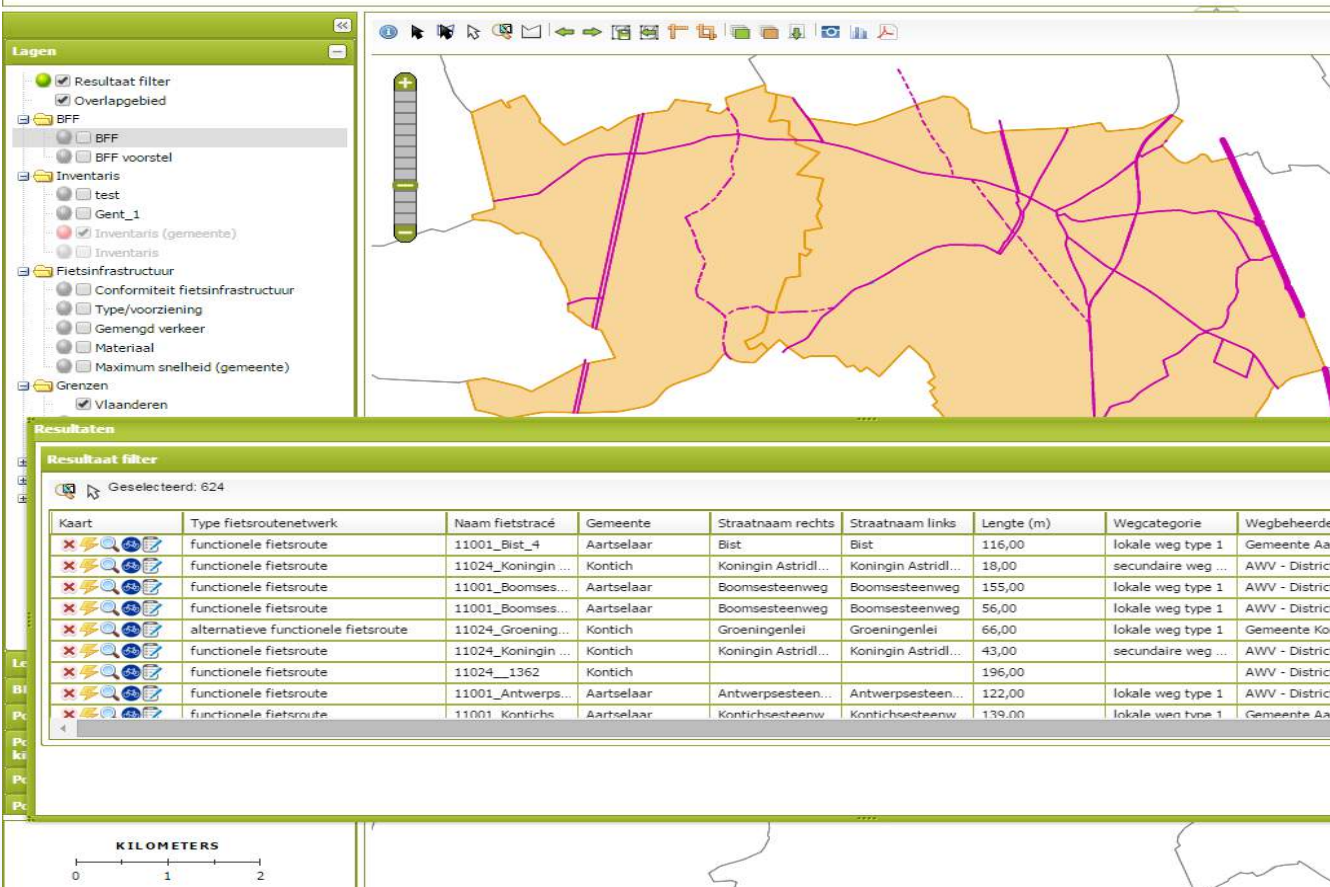
Goot:

Van breedte goot (cm): Tot breedte goot:

- Filter data
 - Attribute
 - Spatial
- Resulting filter added to TOC
- REST & WPS service

FCN - Analysis

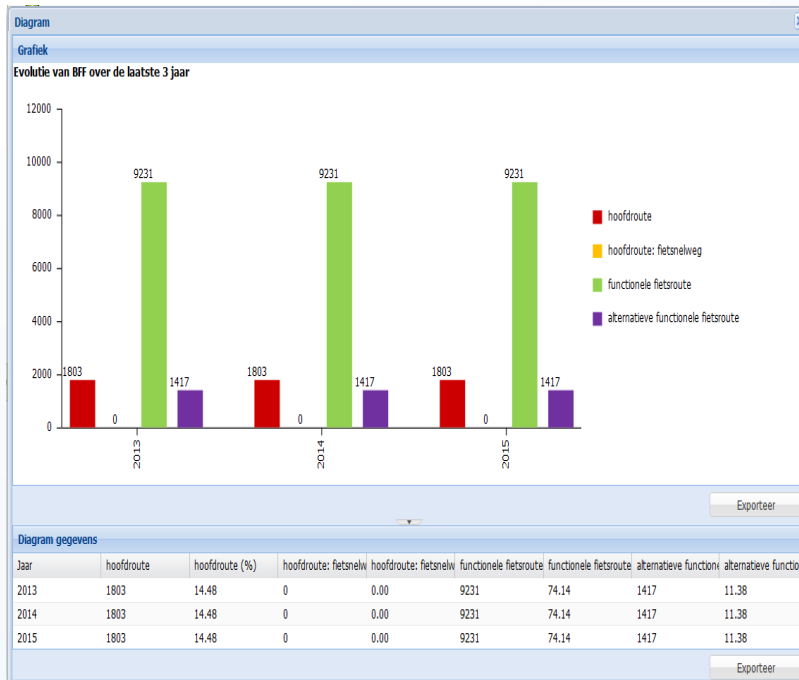
Geoloket Fiets



- Filter data
 - Attribute
 - Spatial
- Resulting filter added to TOC
- REST & WPS service

FCN - Reporting

- Evolution in time
- ExtJS - HighCharts



Definieer diagram

Thema

Thema: BFF naar type (in km)

Subthema: ☒ Geen ☐ Provincies

Gegevens

Periode: Van 01-01-2013 Tot 19-03-2015 Interval 1

Gebied: Vlaanderen

Opmaak

Grafiek:

Titel grafiek: Evolutie van BFF over de laatste 3 jaar

Titel X-as:

Titel Y-as:

Legende: ☒ Rechts ☐ Onderaan ☐ Geen

Labels: ☒ Aantallen ☐ Percentages ☐ Geen

X-waarden: ☒ Thema ☐ Jaar

Identificatie

Naam diagram: Publiek: ☐

Omschrijving:

FCN - Infrastructure inventory

- Map turned for best fit (OpenLayers 3)
- Edit inventory
 - Add, split, delete part of geometry
 - Edit attributes
- Copy inventory to other side
- Check compliancy

The screenshot shows the 'Inventaris' application window. The top part is a map view with a yellow background and a winding path. A red circle highlights a section of the path labeled '1'. Another red circle highlights a zoom control in the bottom right corner of the map. Below the map is a form with various input fields and buttons. A red circle highlights a message in the 'Conformiteit' section: 'fietsinfrastructuur aanwezig, maar niet conform'.

Inventaris

Geef inventaris in ☒ Geen weginfrastructuur ☐ Geen inventaris ☐

☐ Gemengd verkeer

Type voorziening: D9

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Reden forcering: Maak uw keuze

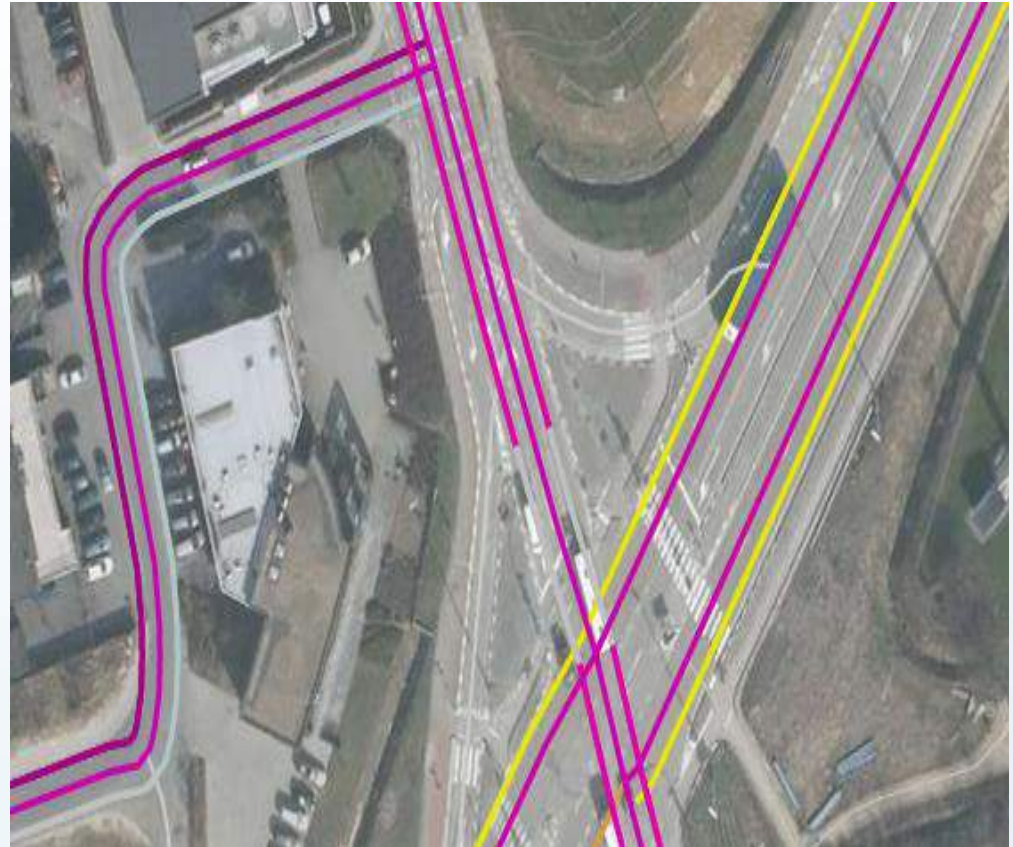
Datum forcering:

Opmerking:

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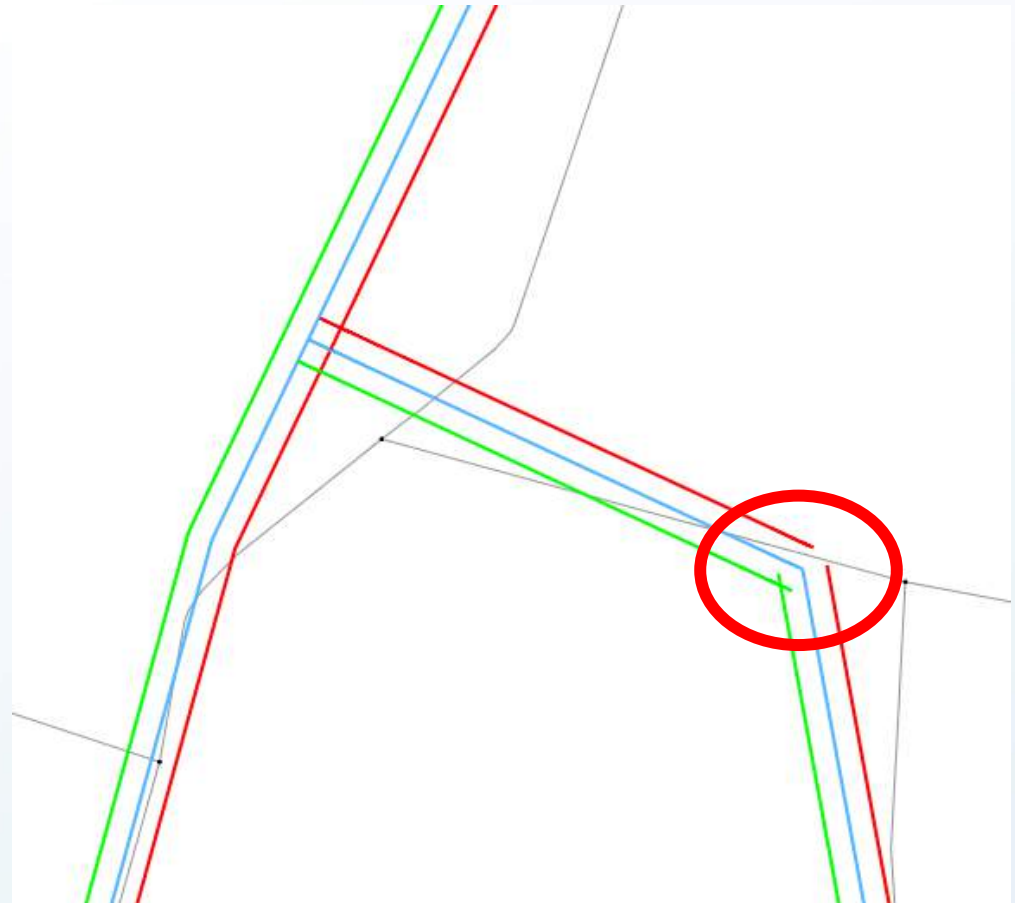
FCN - Offset rendering with JSTS

- Dynamic offset
 - Left & Right
 - Based on measures (Linestring M)
 - Not on digitising direction
 - SLD offset didn't solve problem
- ➔ Client-side offset rendering with Javascript Topology Suite (JSTS)
- Small artefacts at end of line



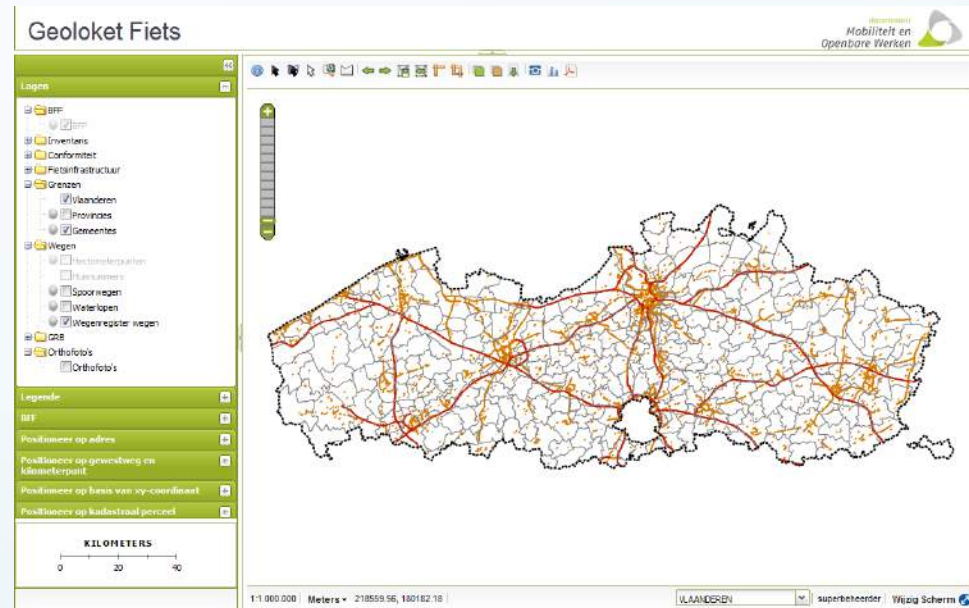
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FCN - Project status

- Version 1.0: In production



FCN - Project status

- Ideas for future versions:
 - Follow-up investments on cycle path infrastructure
 - Mobile app for inventory on the field
 - Integration dataset MeasureBike:
 - measurement of vibrations (=comfort of a cycling path)



FCN - Data migration

FCN on old road network



FCN on new road network:
Geometrically different!



FCN - Data migration

FCN on old road network



FCN on new road network:
Geometrically different!



FCN - Data Migration (OpenLR)

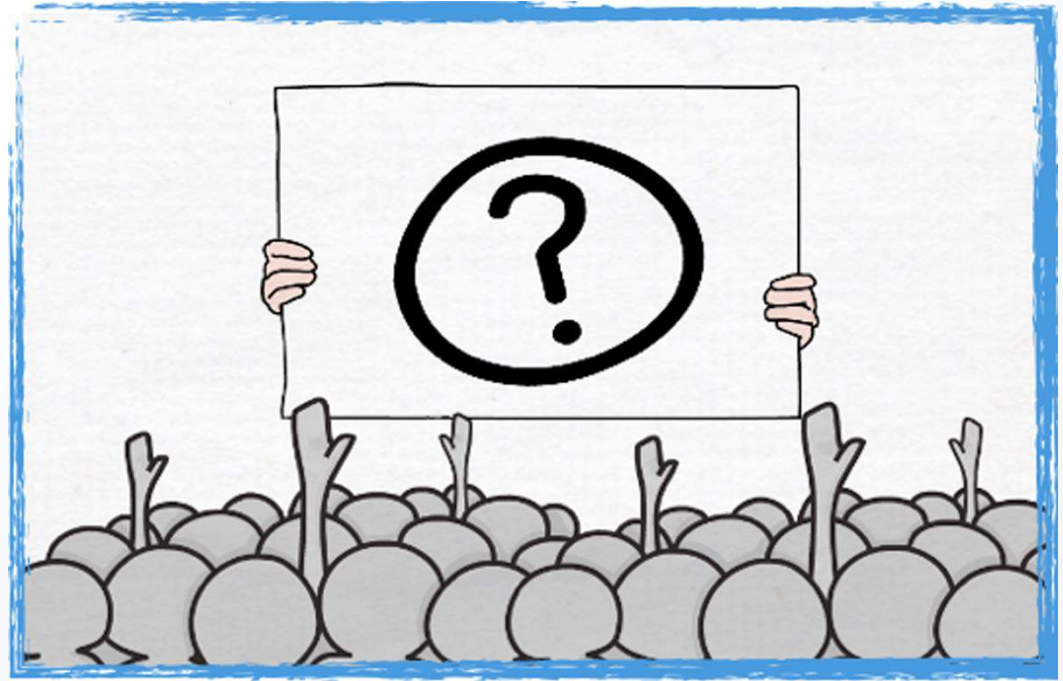
- **OpenLR:**

- OS project from TomTom
 - Methodology based on Location Reference Points (LRP)
 - **Encode** FCN in a network-independent format
 - **Decoding** network-independent format on new network
- ➔ Manual validation and correction!



Thanks!

Any questions?



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