

Next Generation Digital Twins

Stijn Vranckx



Topics

Use of environmental models

- Use of environmental models by experts
- User-friendly web-based applications
 - What is the current situation?
 - What will the future bring?
 - What if we implement new (mobility) policies?
 - Which air quality policies can be implemented?
- Integration in cross-disciplinary digital twin environment
 - Movie clip x-Cite
- Integrating real-time information
- Integrating AI
 - AI surrogate models
 - Agentic AI



Land use

Monitoring data



Background concentrations



Meteo

Meteo

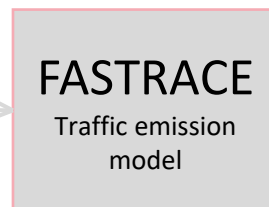
Traffic intensities

Fleet

Emission factors

Shipping emissions

Industrial emissions



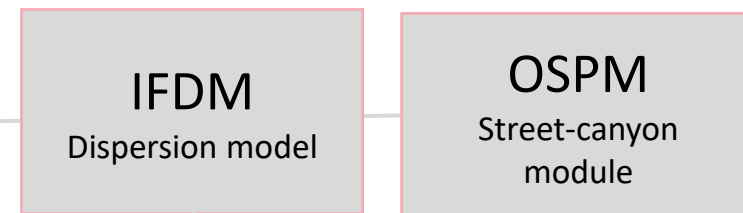
Line sources

Line sources

Point sources

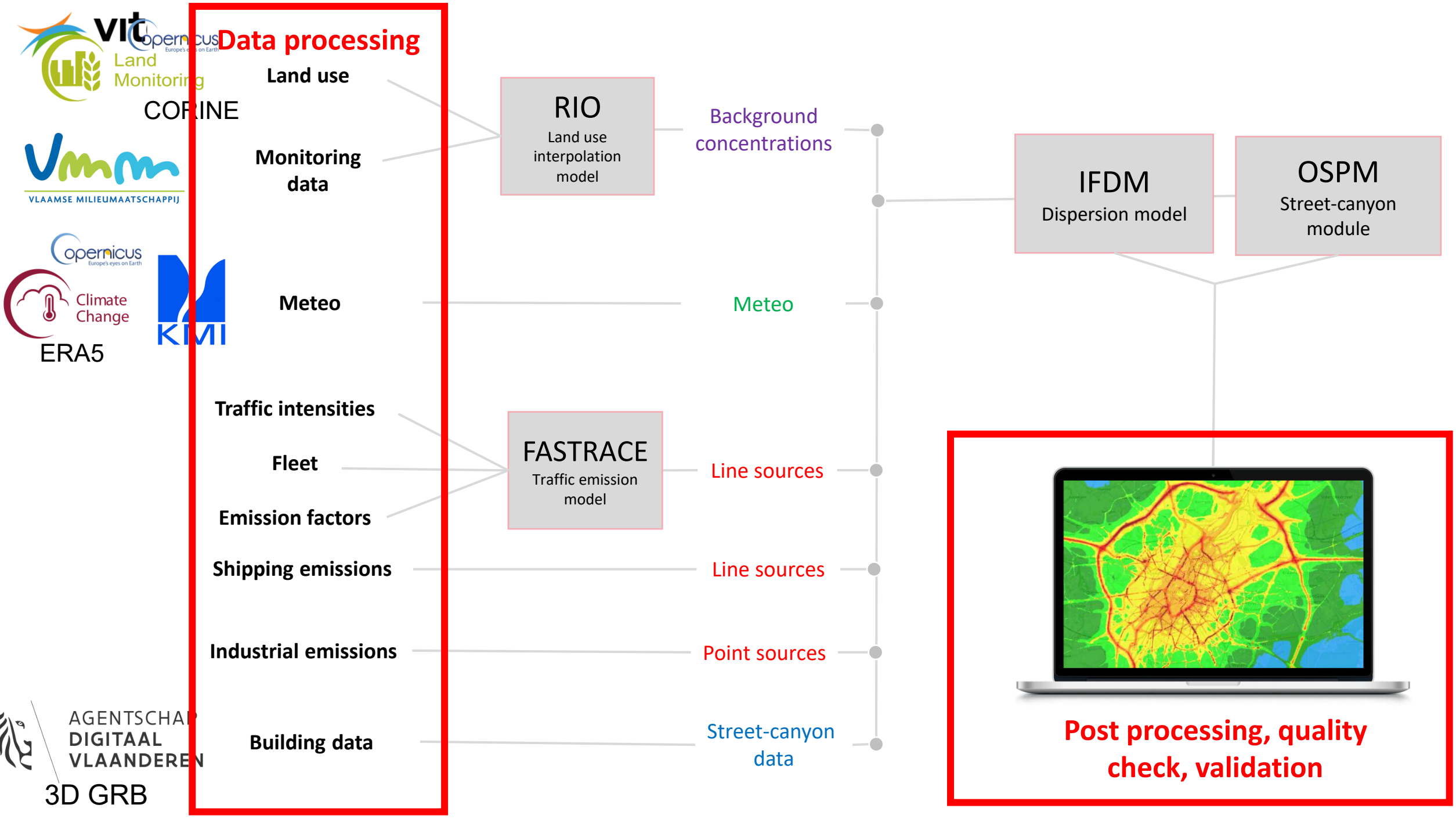
Building data

Street-canyon data



Concentration maps





Land use

Monitoring data

Meteo

Traffic intensities

Fleet

Emission factors

Shipping emissions

Industrial emissions

Building data

RIO

Land use interpolation model

FASTRACE

Traffic emission model

Background concentrations

Meteo

Line sources

Line sources

Point sources

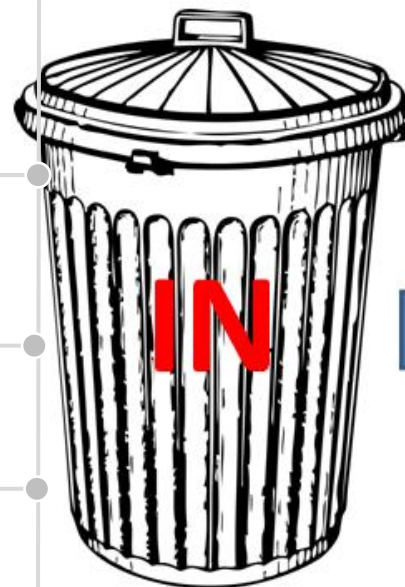
Street-canyon data

IFDM

Dispersion model

OSPM

Street-canyon module





Welcome

Please sign in to continue

Email

stijn.vranckx@vito.be

Password

LOGIN

[FORGOT PASSWORD?](#)



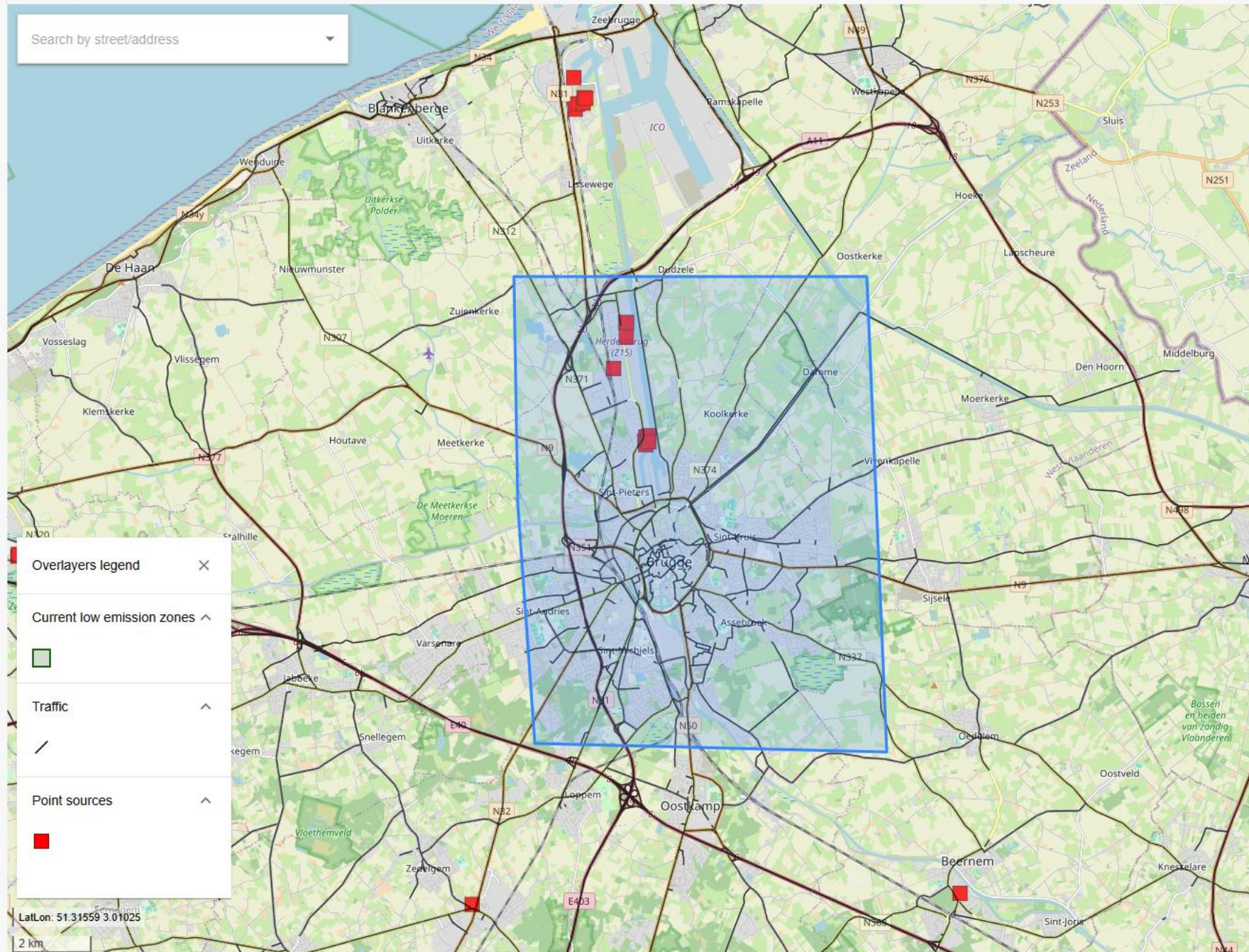
Create a new case

Click **Finish** to create your case or
Redraw/Edit to edit the polygon first.

REDRAW EDIT

PREVIOUS FINISH

Search by street/address



Overlayers legend

Current low emission zones



Traffic



Point sources



Layer manager

Search by name

Emissions

☒ Traffic

☒ Point sources

Case configuration

☒ Current low emission zones

Stations

☐ Stations NO₂

☐ Stations PM₁₀

☐ Stations PM_{2.5}

ATMO-Street

☒ None

☐ ATMO-Street NO₂

Active layers

Current low emission zones

Traffic

Point sources

LatLon: 51.31559 3.01025

2 km



Case

General settings

Grid settings

Points of interest

Scenario

Baseline scenario

LEZ

Puntbron

Traffic reduction Brugge

General

Emissions

Background concentrations

Meteo

Low emission zones

Emissions

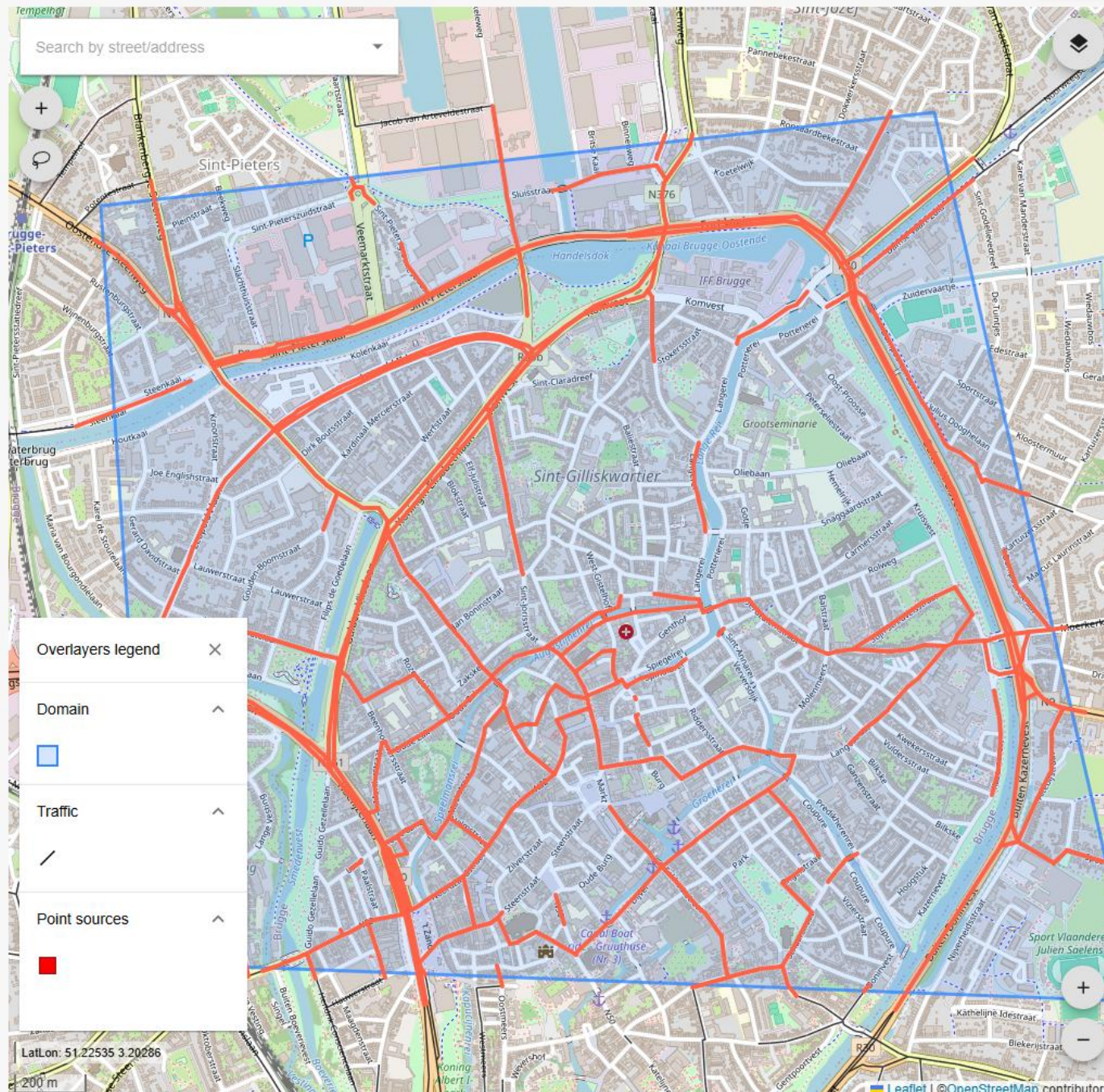
Traffic

Point source

Search by street/address

Overlayers legend

- Domain
- Traffic
- Point sources



Bulk edit (798 segments)

MORE INFO ABOUT BULK
EDIT

Traffic count

Time factor type: yearly total

Bus
X

Baseline value: x

Car
x/2

Baseline value: x

Heavy duty vehicle
X

Baseline value: x

Light duty vehicle
X

Baseline value: x

Segment properties

Speed limit
X km/h

Baseline value: x

Height
0 m

Baseline value: 0

Road type
X

Baseline value: x



Case

General settings

Grid settings

Points of interest

Scenario

Baseline scenario

LEZ

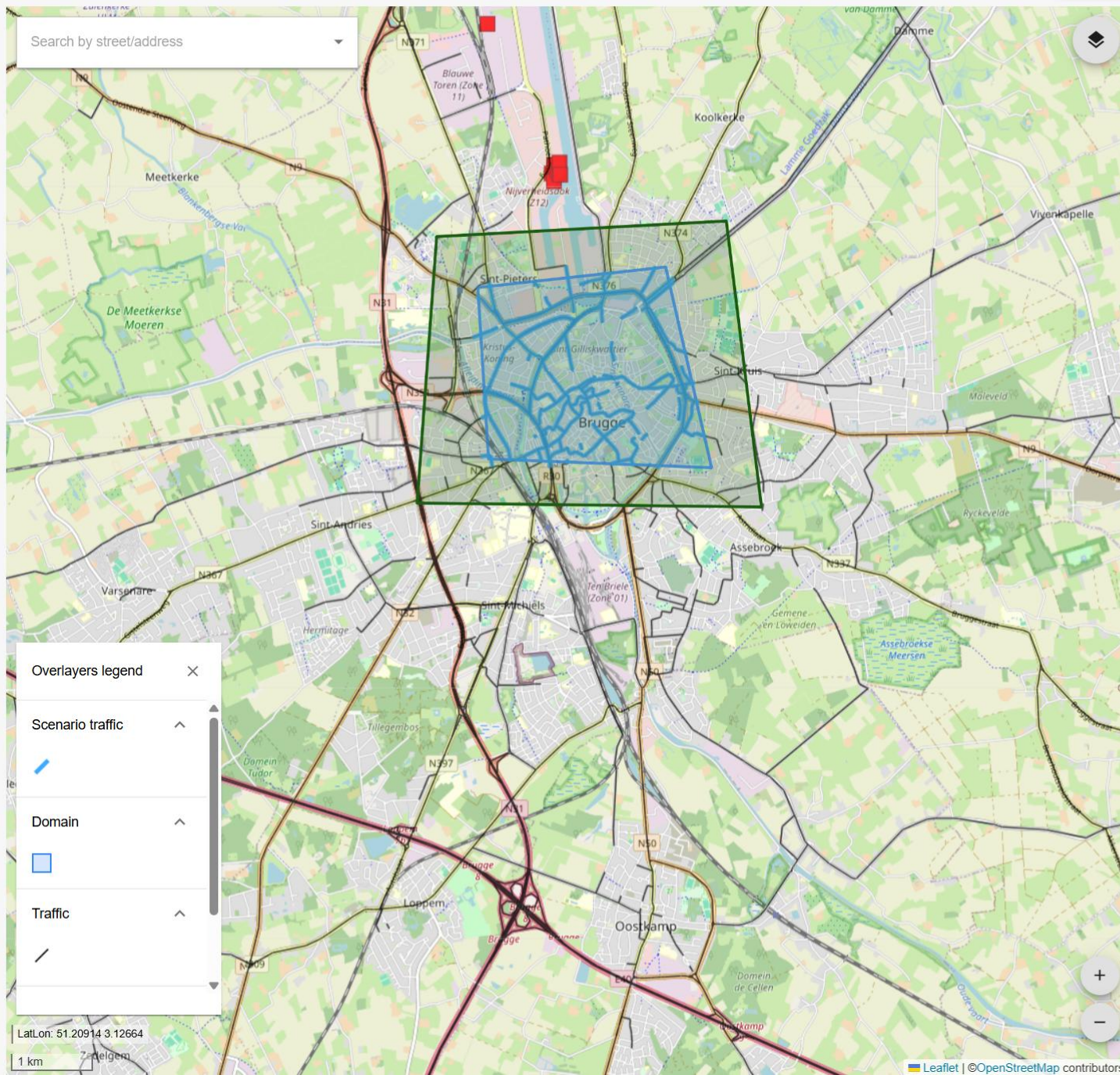
Puntbron

Traffic reduction Brugge

Low emission zones

LEZ

+ ADD LOW EMISSION ZONE



LEZ details

Name
LEZ

Location

The LEZ is shown on the map.

[REDRAW](#) [EDIT](#)

[CANCEL](#) [SAVE](#)

Restrictions

[MANAGE VEHICLE RESTRICTIONS](#)



Case

General settings

Grid settings

Points of interest

Scenario

Baseline scenario

LEZ

Puntbron

Traffic reduction Brugge

Search by street/address

Overlayers legend

Domain



Traffic



Point sources



LatLon: 51.2271 3.31409

1 km

Vehicle restrictions

Use this screen to allow or disallow vehicles of specific types from your defined LEZ. By defining a LEZ, it's important to note that the total number of vehicles will not change. The introduction of a LEZ will distribute the banned vehicle types to another class. E.g: By banning buses of the Euro 5 category, the total number buses of that category will be distributed over all other vehicle types.

☒ Define custom restrictions

☐ Use predefined fleet

Vehicle	Emission	Fuel	Allowed in LEZ
CAR	4	Diesel	☐
CAR	4	Diesel Conventional Hybrid	☐
CAR	4	Diesel Plugin Hybrid	☐
CAR	5	Diesel	☒
CAR	5	Diesel Conventional Hybrid	☒
CAR	5	Diesel Plugin Hybrid	☒
CAR	6	Diesel	☒
CAR	6	Diesel Conventional Hybrid	☒
CAR	6	Diesel Plugin Hybrid	☒

CLOSE

SAVE



Scenario

Baseline scenario

50% less traffic

Pollutant

NO₂

WILDCARD

PM₁₀

PM_{2.5}

Calculations

Annual mean

Difference

Relative difference

Show points of interest

DOWNLOAD OUTPUT

Search by street/address

Calculation details

Calculation method: OSPM

Overlayers legend

Result layer

µg/m³ - OSPM

< 5.00

5.00 - 10.00

10.00 - 15.00

15.00 - 20.00

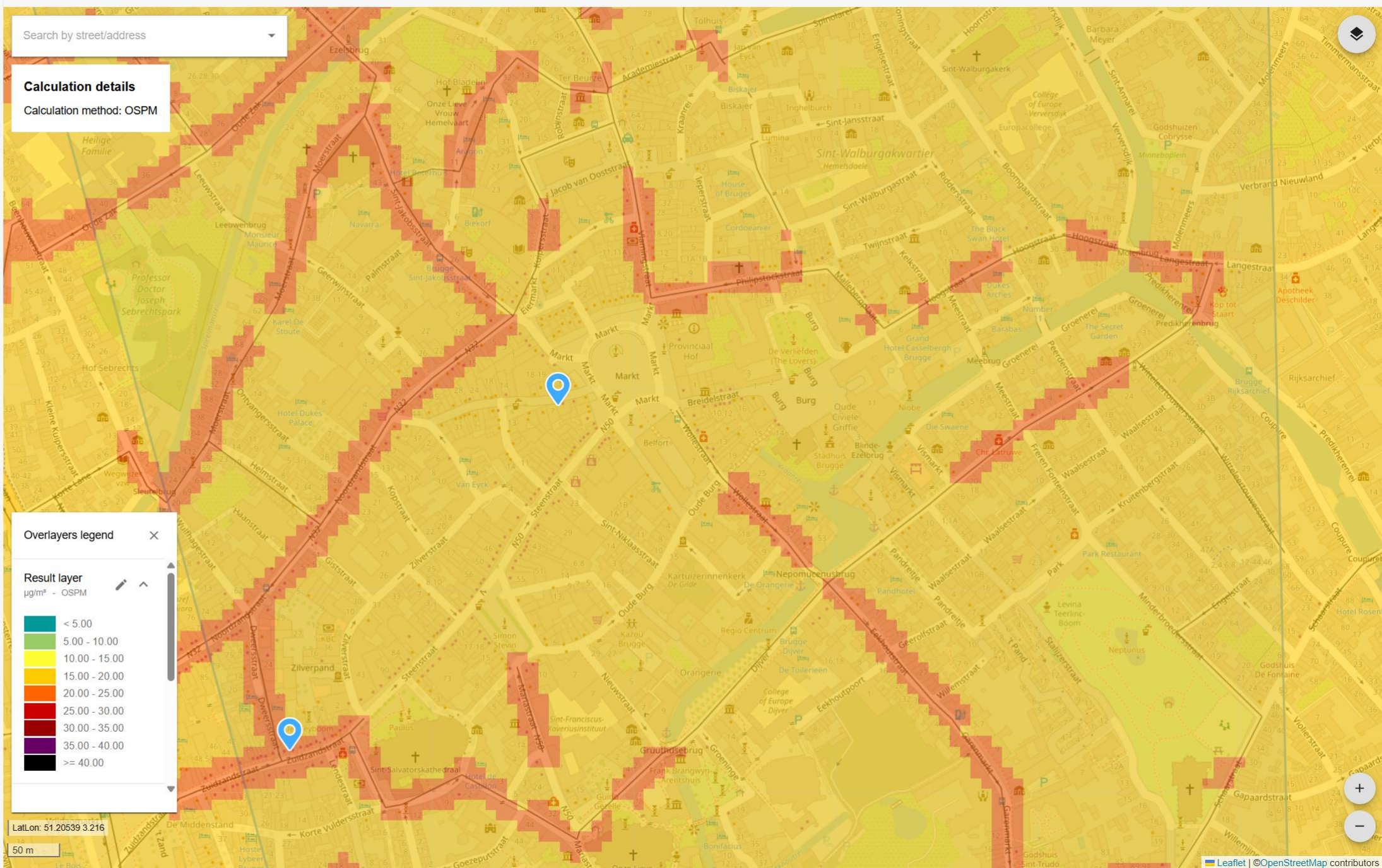
20.00 - 25.00

25.00 - 30.00

30.00 - 35.00

35.00 - 40.00

>= 40.00





Scenario

☐ Baseline scenario

☒ 50% less traffic

Pollutant

☒ NO₂

☐ WILDCARD

☐ PM₁₀

☐ PM_{2.5}

Calculations

☐ Annual mean

☒ Difference

☐ Relative difference

☒ Show points of interest

[📄 DOWNLOAD OUTPUT](#)

Search by street/address

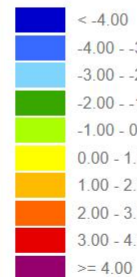
Calculation details

Calculation method: OSPM

Overlayers legend

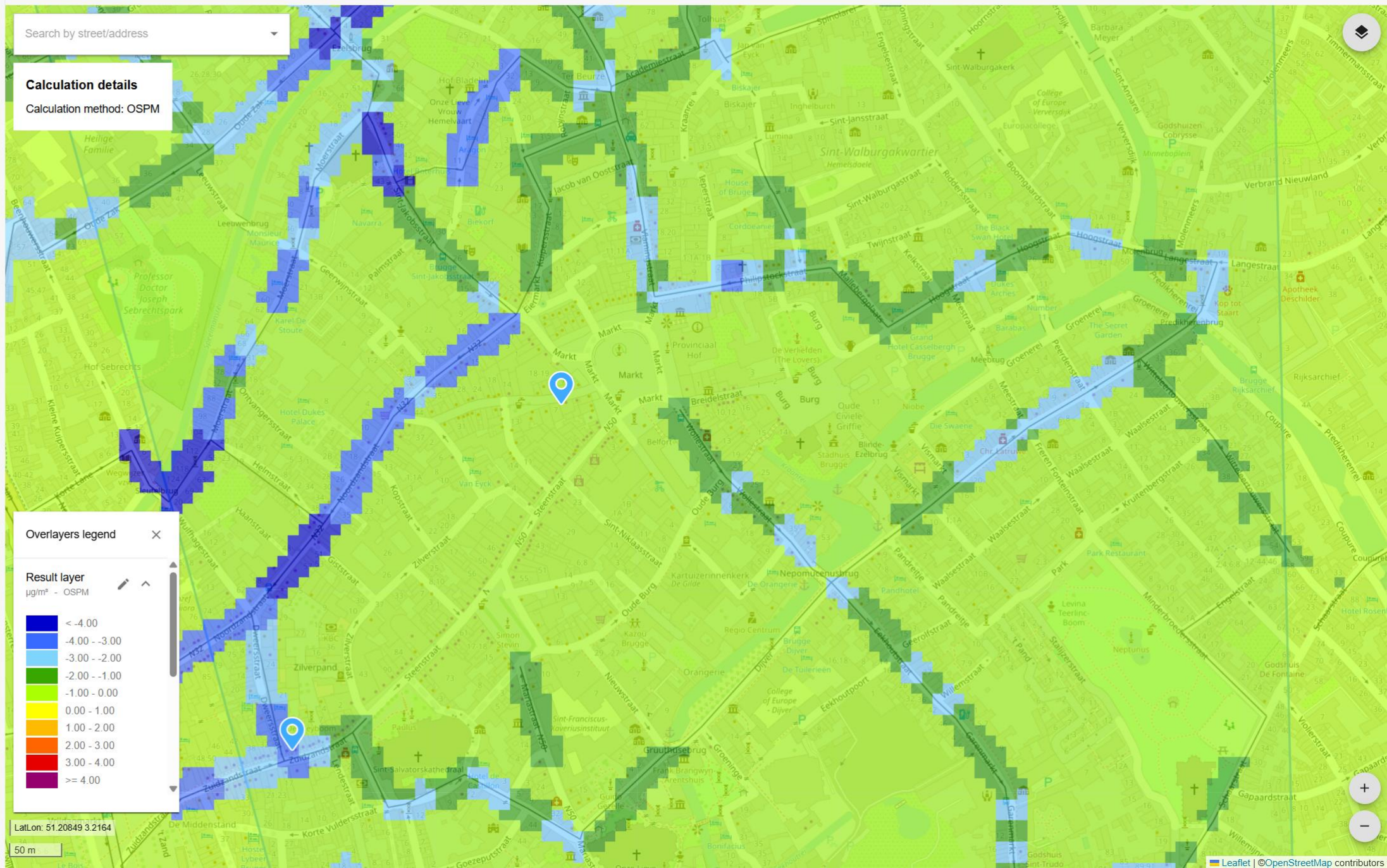
Result layer

µg/m³ - OSPM



LatLon: 51.20849 3.2164

50 m



 **cite** Welcome to
the Citiverse

 **mobilize**
Digital Twin for Smart Cities

 **cegeka**

 **ENGINEERING
STUDIO**





Simulation

Predicting future behaviour and situations



Analysis

Meaningful insight



Visualisation

Easy to understand for everyone



Centralisation

All data accessible in 1 data platform



Input

From sensors to data providers & more...





Simulation

Predicting future behaviour and situations



Analyse

Meaningful insight



Visualisation

Easy to understand for everyone



Centralisation

All data accessible in 1 data platform



Input

From sensors to data providers & more...



Welcome to
the Citiverse

“Tool B”

AQ model



AI models



Traffic Scout



Mobilize



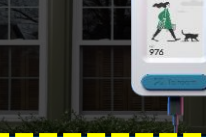
Urban Sense



Own data



Telraam



Krycer



FCD



Cyclomedia





My Projects

Project overview

Search by title



Weggevoerdenlaan



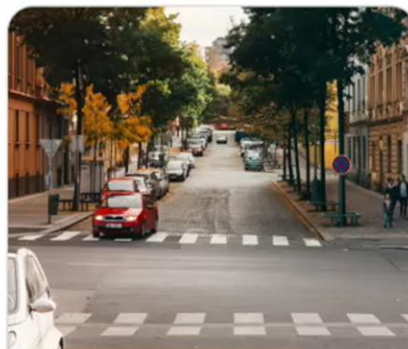
04/12/2025



Cegeka test project



04/12/2025



HoWest Participatie



+3 04/12/2025

Test1



Add New Project



1

2

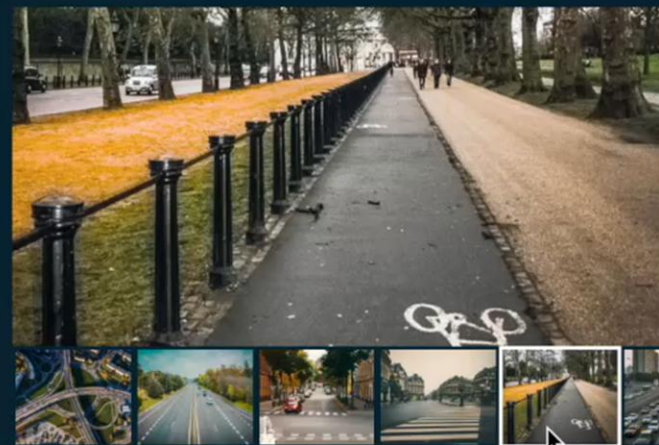
3

Project Info

Study Area

Project Team

Project thumbnail



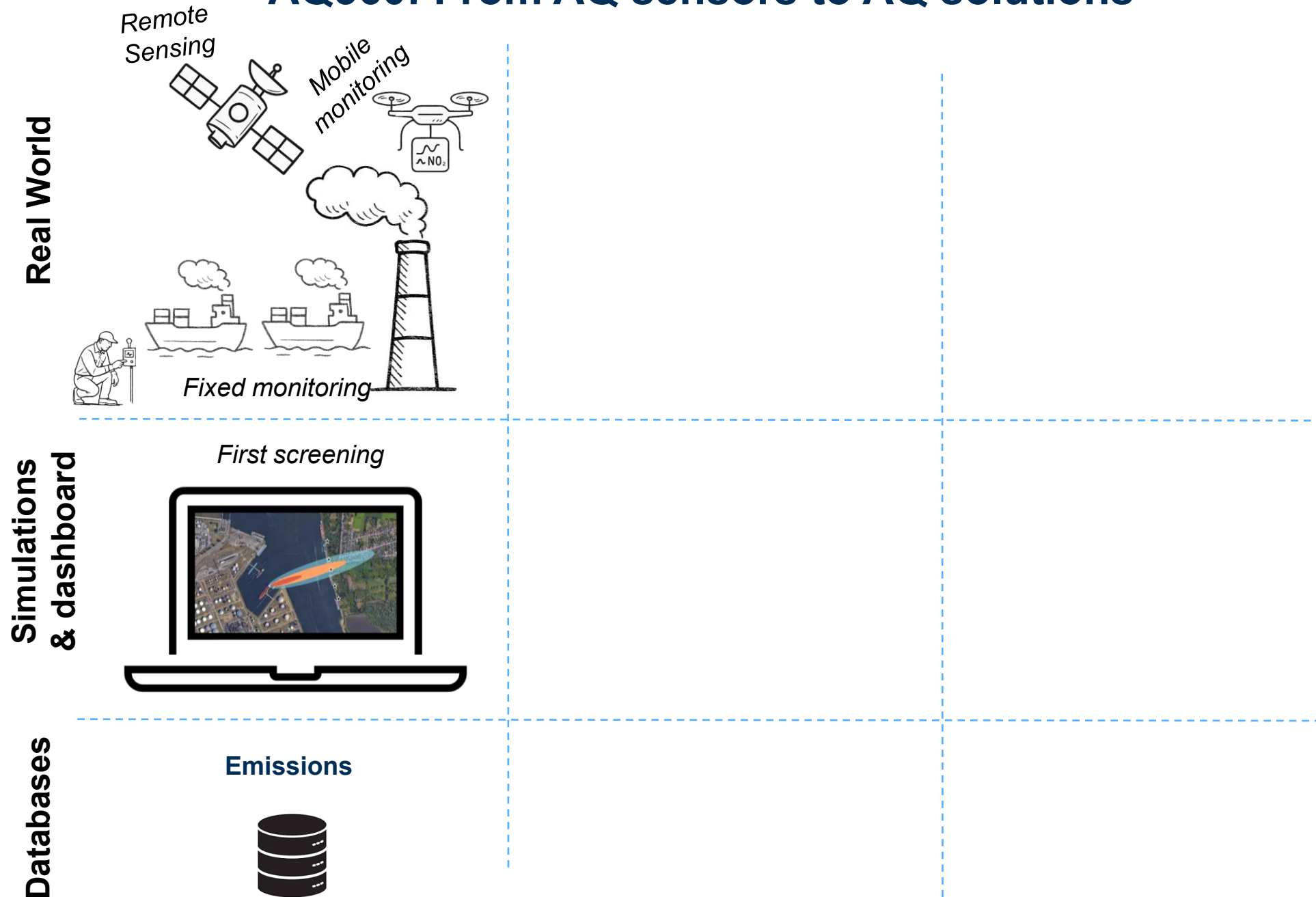
Project name *

Description

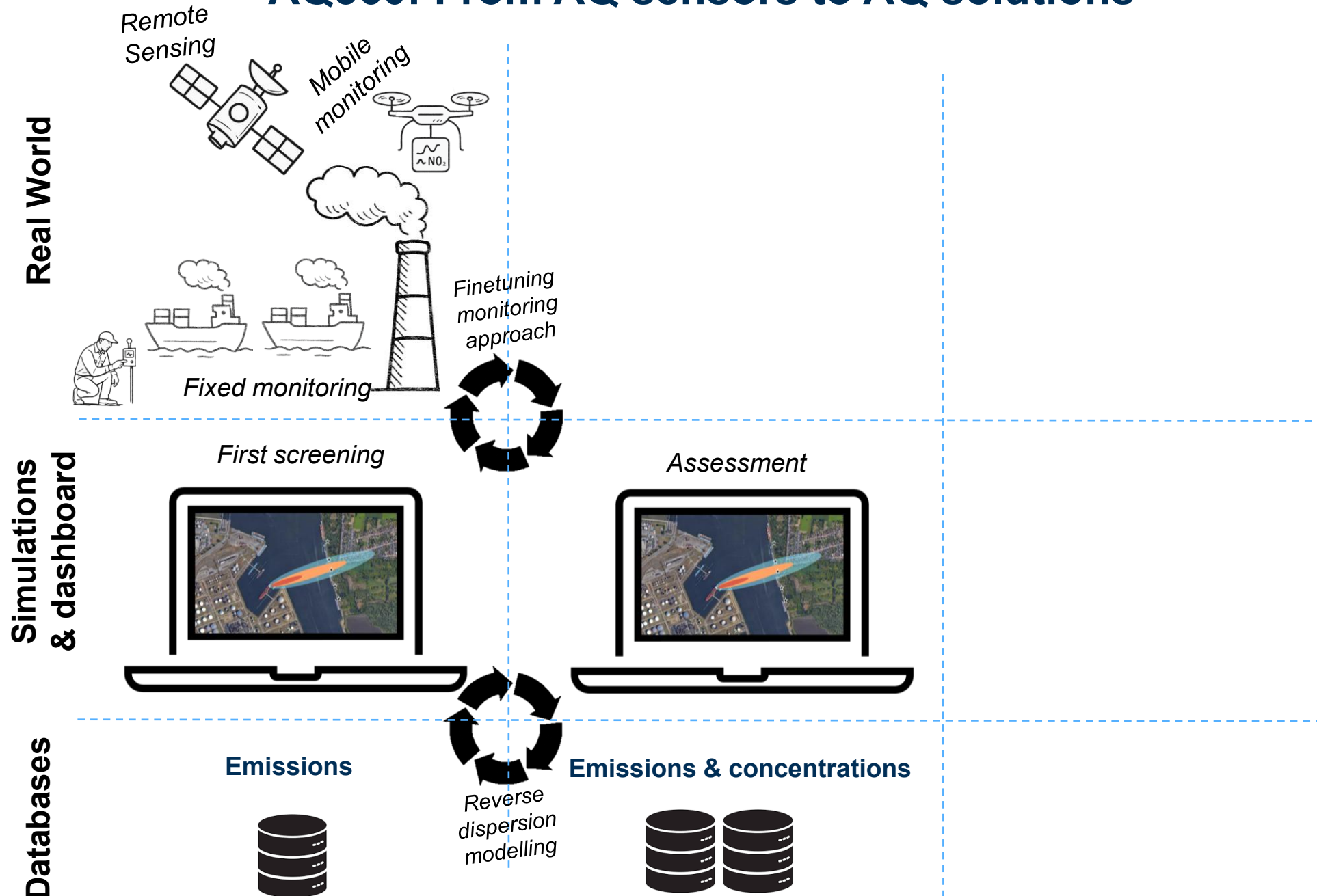
Project tags

Press <Enter> key to insert new tag

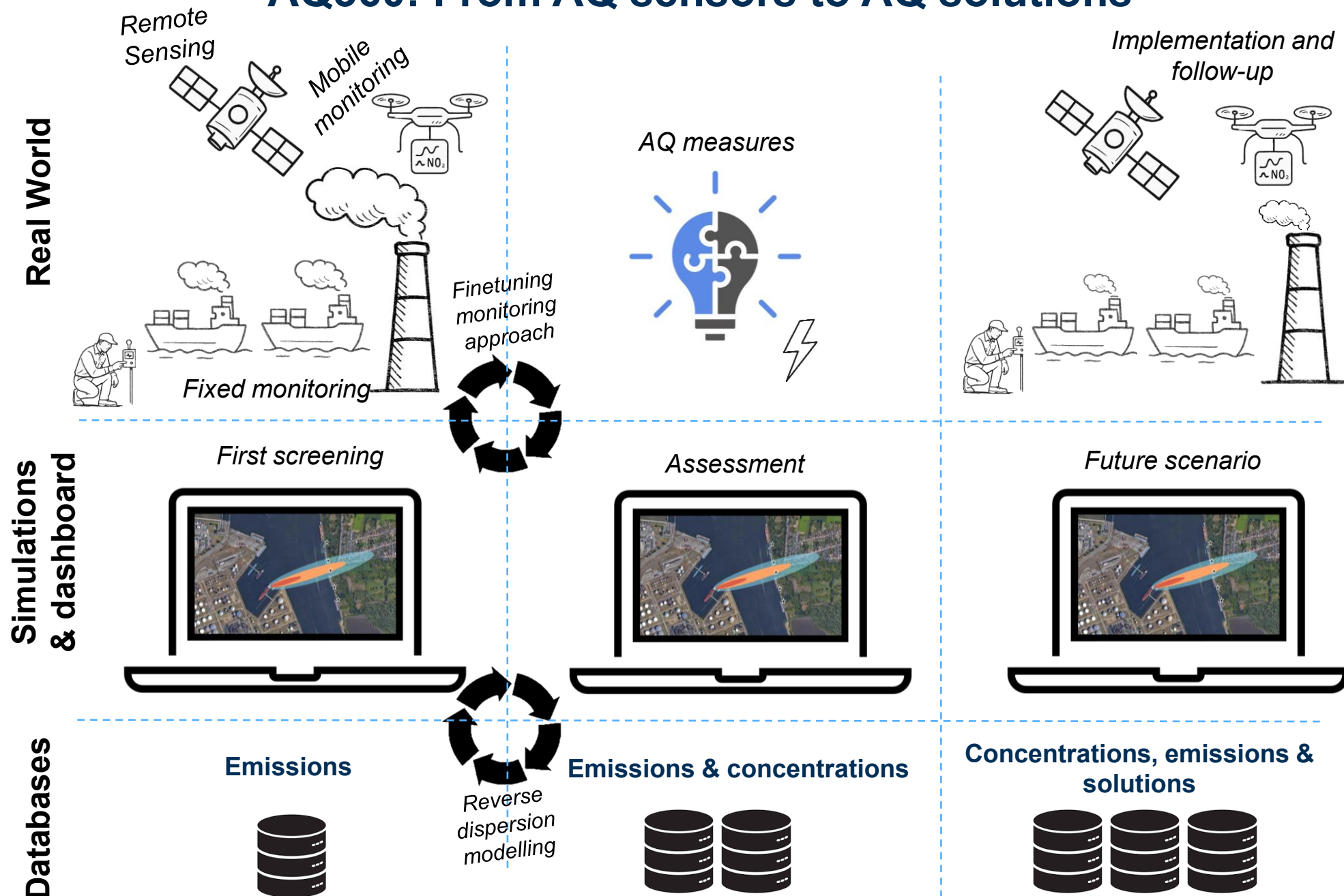
AQ360: From AQ sensors to AQ solutions



AQ360: From AQ sensors to AQ solutions

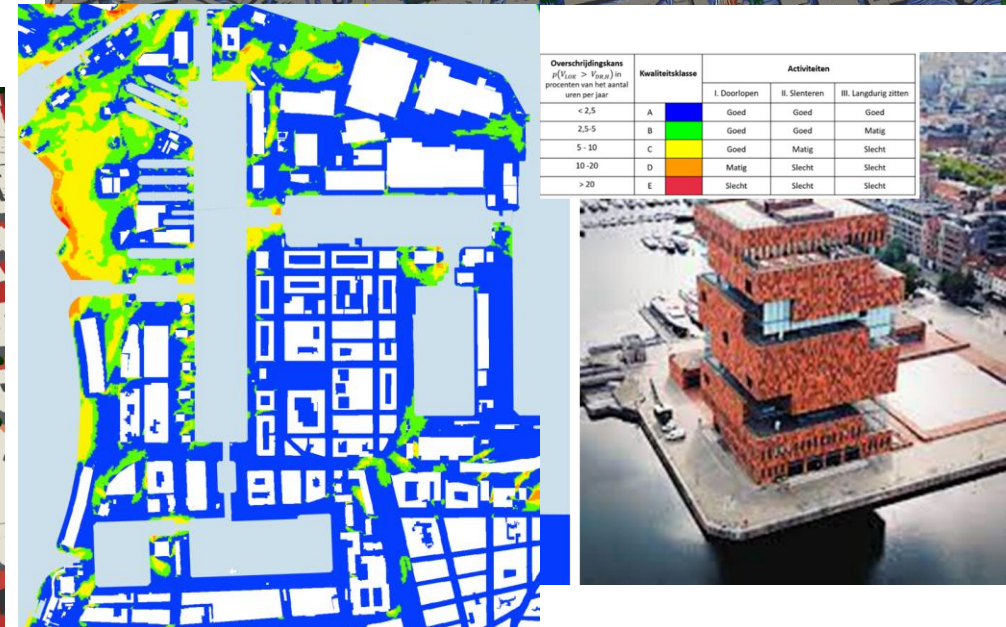


AQ360: From AQ sensors to AQ solutions



Links to other topics

- Air quality
- Climate Adaptation & Heat stress¹
- Wind risks & wind comfort
- Energy & building renovations²
- Ecosystem services & nature based solutions³
- AI
- ...



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