



Follow your wastewater using the open source Graph Tracing Engine

Brussel, 24 oktober 2019



GEOSPARC

Oliver May

Project Manager & Business Analyst

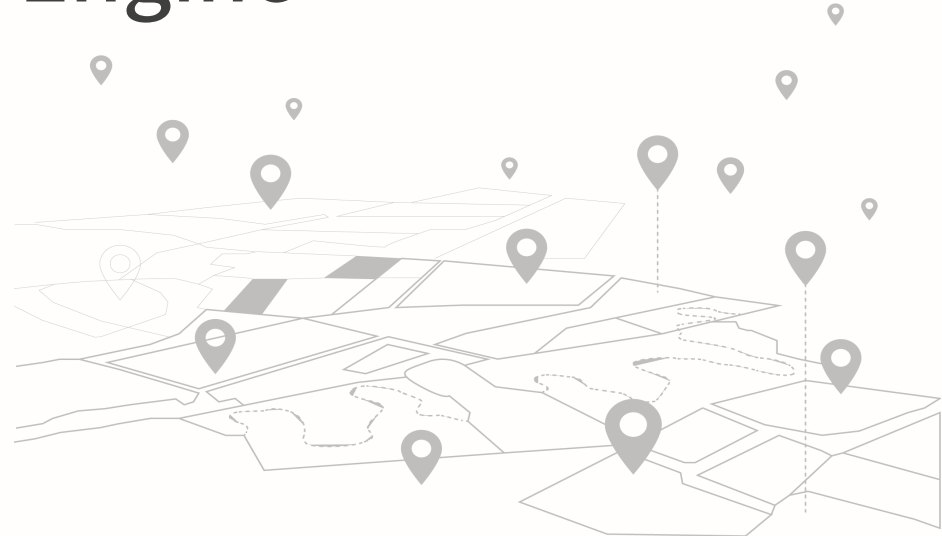
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Service Delivery Manager

VLAAMSE
MILIEUMAATSCHAPPIJ

Katleen Miserez

Dries Luts



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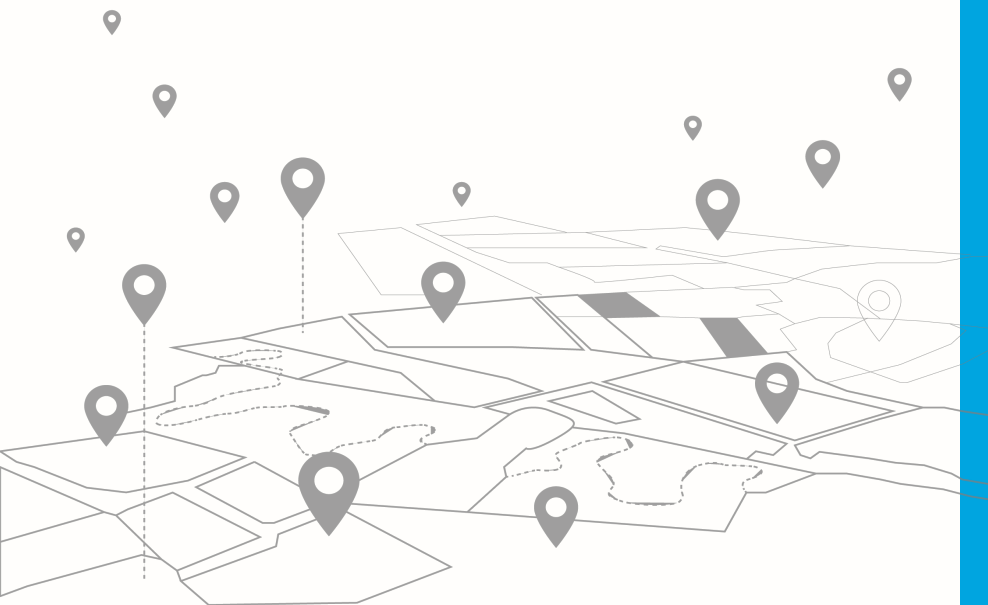
Geosparc

Mission & values
Team
Projects & applications

Project

Objectives
Under the hood
Future





Geosparc

An aerial photograph of a city street grid, overlaid with several white location pins. The image is semi-transparent, allowing the text to be clearly visible.

WE IMPROVE THE LIVES OF CITIZENS WITH
WELL THOUGHT-OUT, GEOLOCATION BASED
SOLUTIONS BASED ON OPEN SOFTWARE AND
OPEN DATA.

That's our mission. [Discover Our Solutions](#)

Professional Team

Executive office

Kris De Pril
CEO

20y experience in software business



Customer Relations

Jeroen Saegeman



Service Delivery

Berdien De Roo



Product Development

Peter De Mangelaere



Support

Pepijn Viaene



GIS Experts



IT & Data Specialists



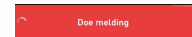
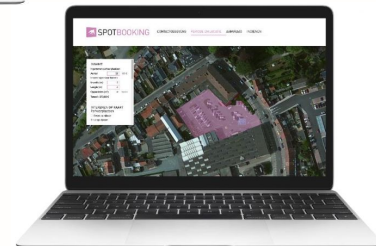
Main Solutions



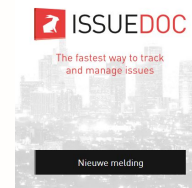
Smart insights in your parking policy



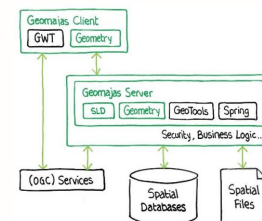
The smart way to manage and reserve the use of public domain



The quickest way to effectively manage enforcement.



Open source software framework for custom-made web-based geo applications

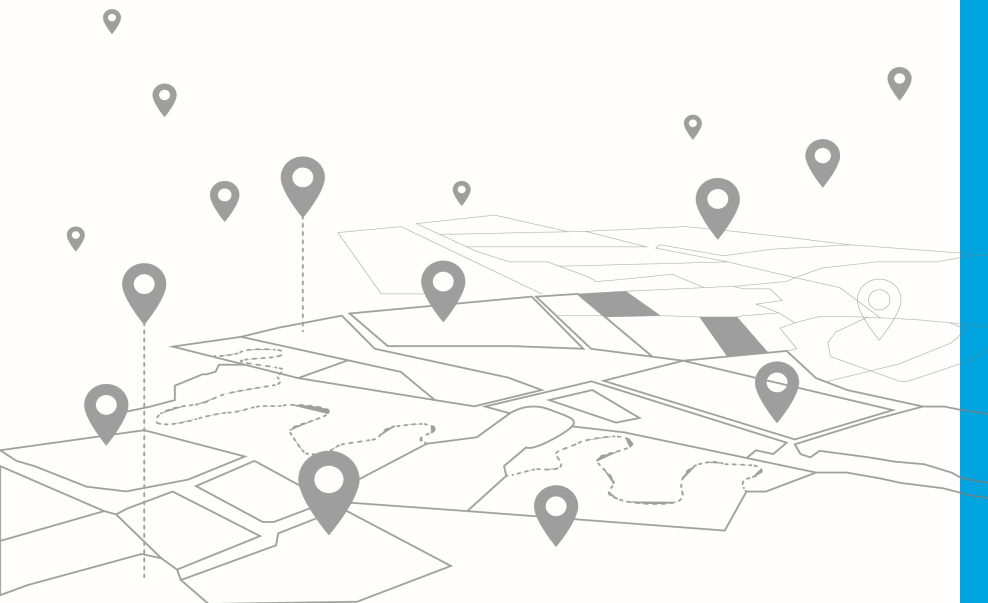




VLAAMSE
MILIEUMAATSCHAPPIJ



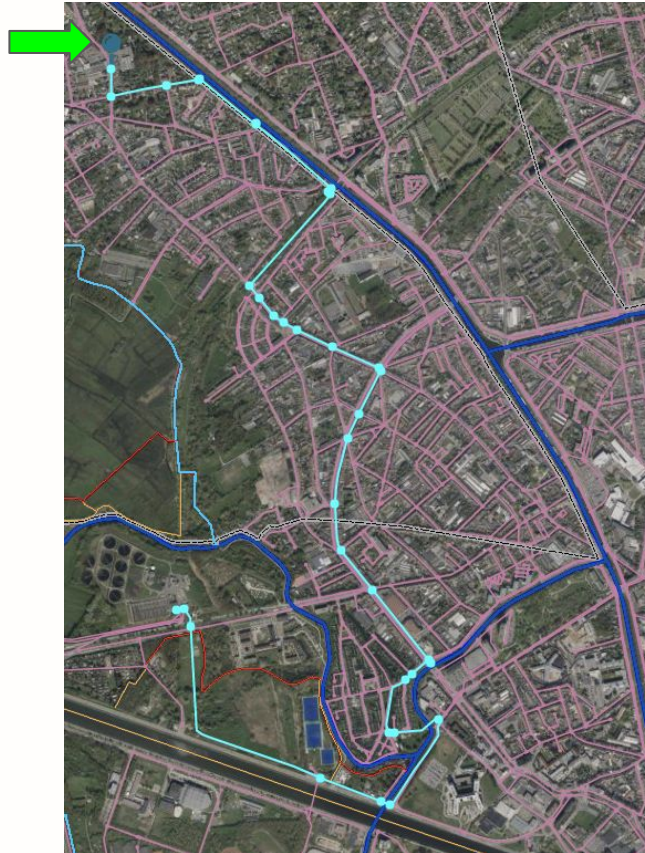
Waste water tracing algorithm



Trace what?

Downstream

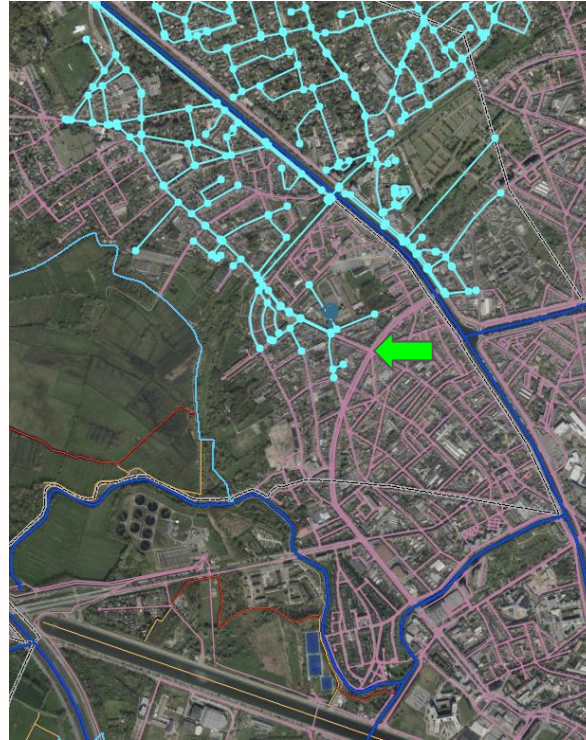
- Extinguishing water flow-off
- Invasive plant species
- Simulation, future planning
- ...

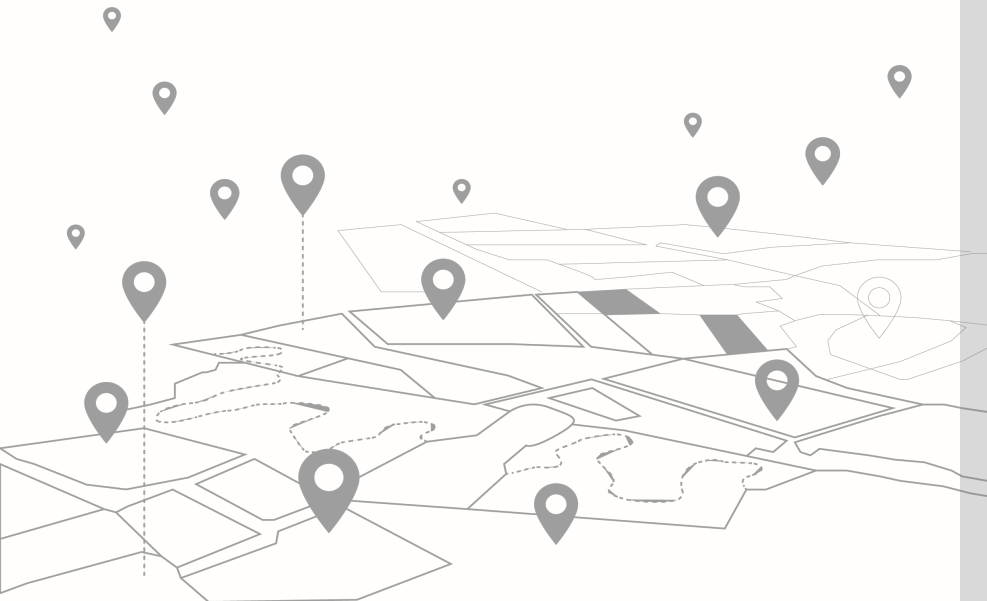


Trace what?

Upstream

- Trace source of contamination
- Calculate waste load
- Simulation, future planning
- ...





Waste water tracing algorithm

Objective

Pains

- Poor performance
- Limited flexibility in data
- No insight in risk areas
- Only available in sewer inventory application
- Tracing limited to single network

Main objective

Improve and extend VMM's tracing algorithm for sewers and surface water by creating an open, re-usable application that allows fast tracing and risk analysis over different interconnecting data sources.

Waste water tracing algorithm

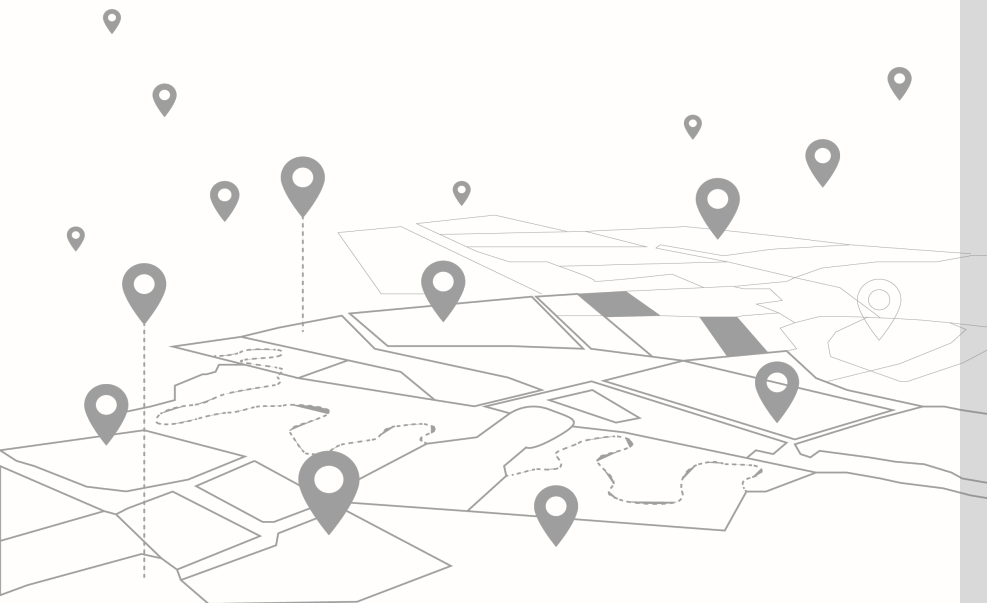
Performance

Data flexibility

Risk analysis

Re-usability

Multiple networks



Performance

Performance issues

- Long response times, over 10 seconds
- Limited & incomplete results
- Web browser freeze
- → Frustrated users

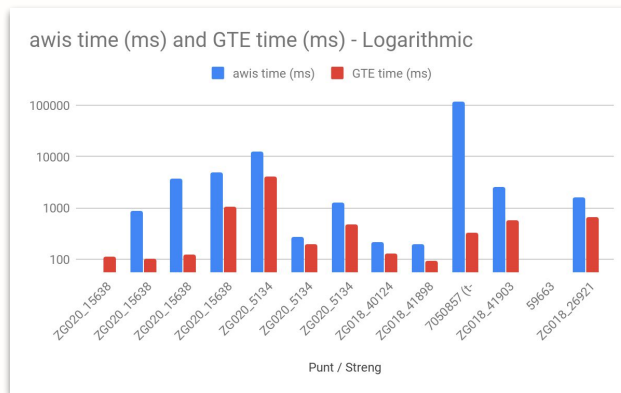
Performance

New Tracing Core

- Store network in memory (= faster)
- Use existing graph library JGraphT
- Implement efficient tracing algorithm
- Limit and preprocess data sent to browser

Improvements

- Up to 10 times faster
- Better browser response times
- Bigger trace results possible



Waste water tracing algorithm

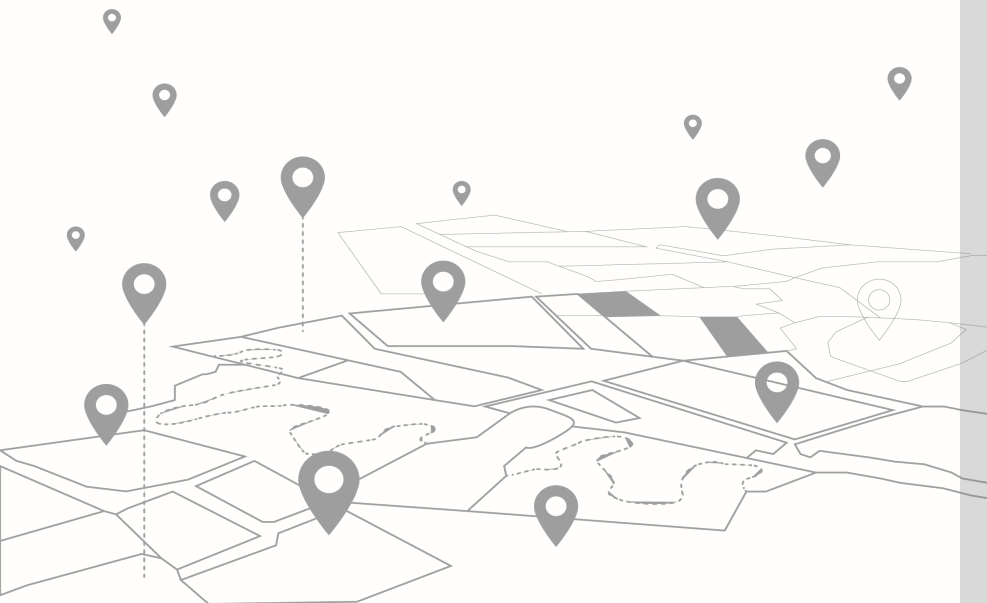
Performance

Data flexibility

Risk analysis

Re-usability

Multiple networks



Data flexibility

Limited flexibility in source data

- Tracing algorithm hard-coded against existing dataset
- Very database oriented
- High (development) cost to update data model
- Difficult to add new datasets

Data flexibility

Graph preprocessor

- Configuration mechanism for data sources
- Uses geotools software library (compatible with multiple data sources)
- Configure different types of networks (i.e. Geographical, Logical, ...)

Improvements

- Configuration by non-developer
- Easy to add new datasets from various sources
- No longer limited to specific data structure

Mysql
WFSOGCOracle
INSPIRE
GML
Shapefile
PostGIS

Data flexibility

Successful proof-of-concept with Delfland water authority data



Waste water tracing algorithm

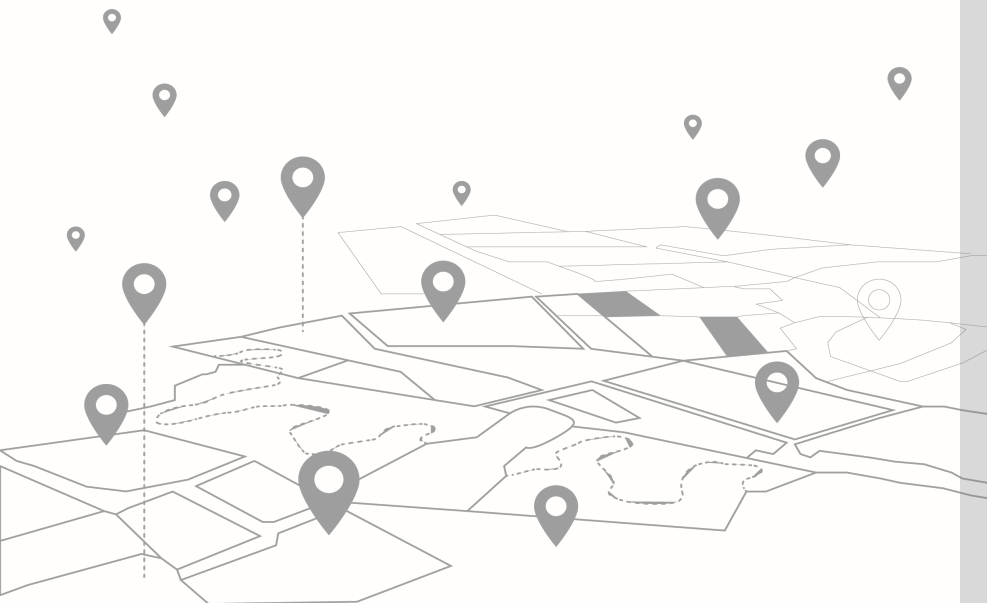
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Re-usability

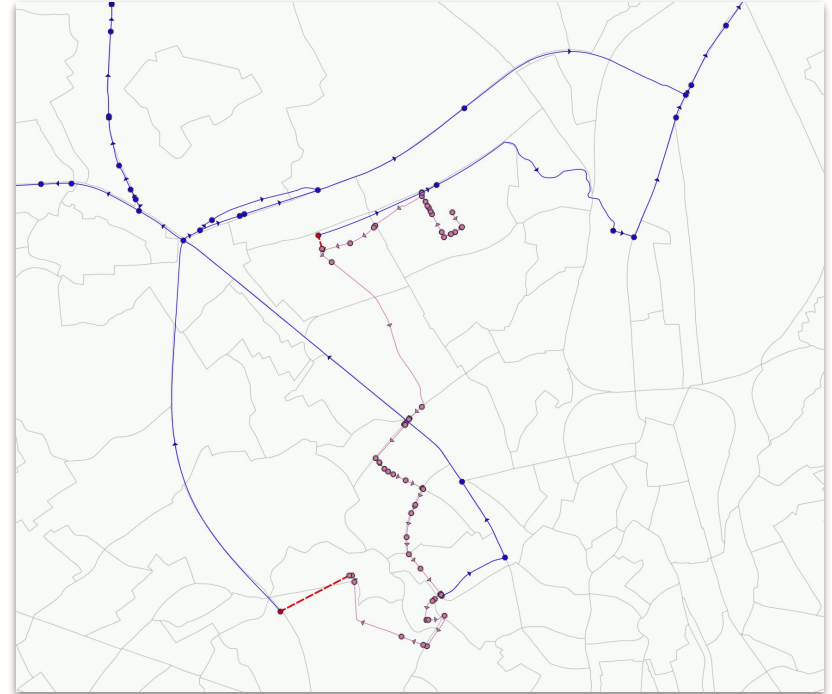
Multiple networks



Risk areas

Risk analysis feature

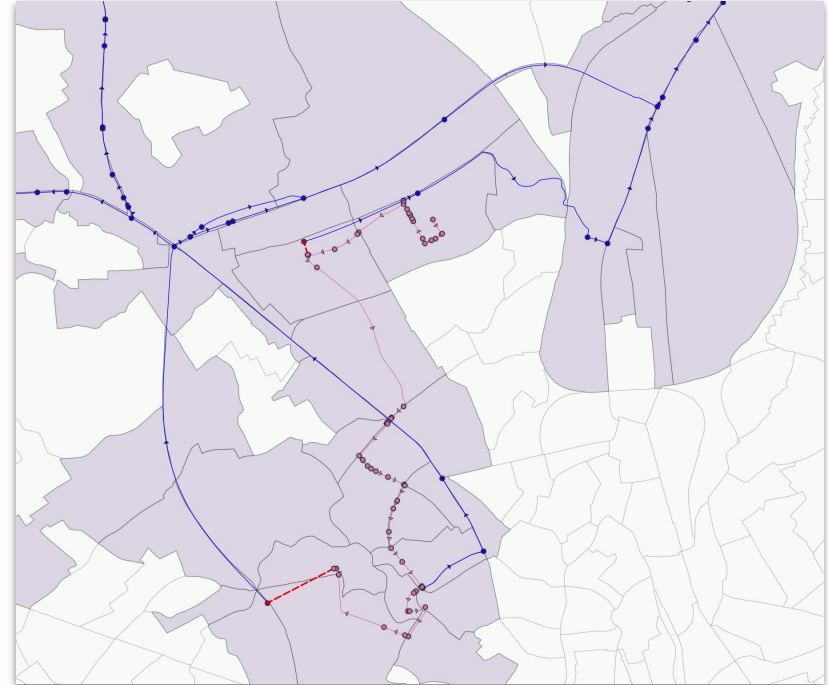
- No easy way to calculate which areas a tracing passes



Risk areas

Result

- Configuration mechanism for areas of interest
- Returns all areas where trace passes
- Not limited to areas, can be lines or points



Waste water tracing algorithm

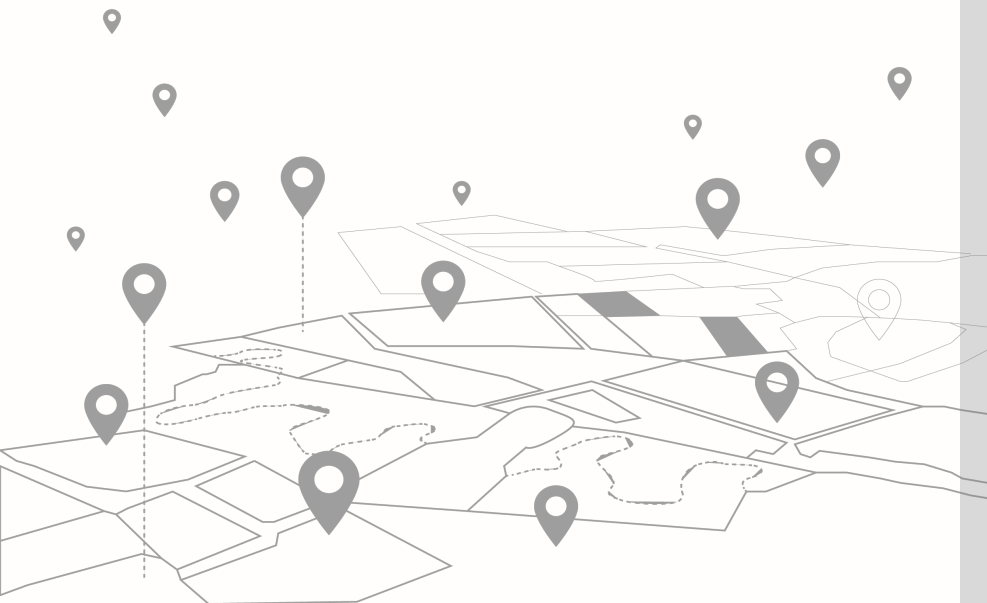
Performance

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Reuse

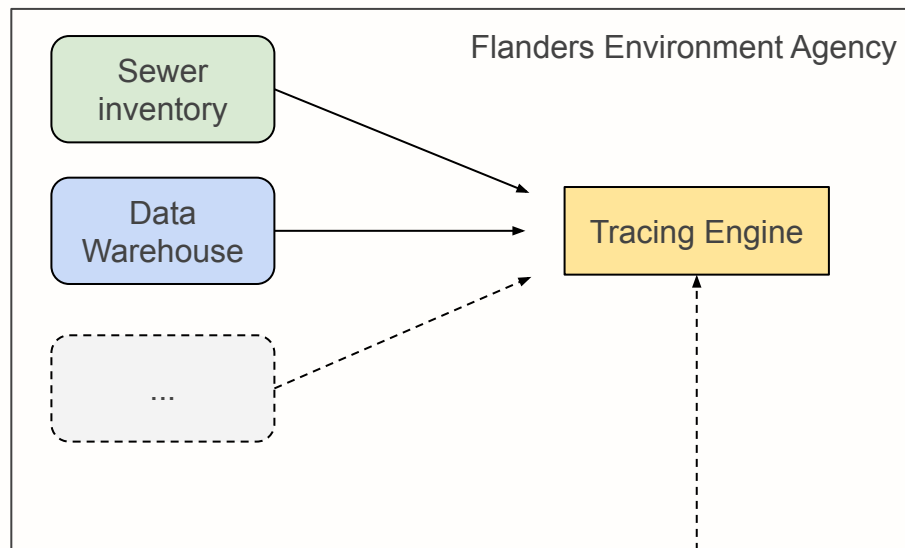
Reusability

- Tracing is only available in sewer inventory application
- Other services cannot access tracing
- Difficult to expose tracing to outside world

Reuse

Tracing Engine as (micro)service

- The tracing engine is a stand-alone application
- Accessible by other applications via REST api
- Not limited to inside organisation



Waste water tracing algorithm

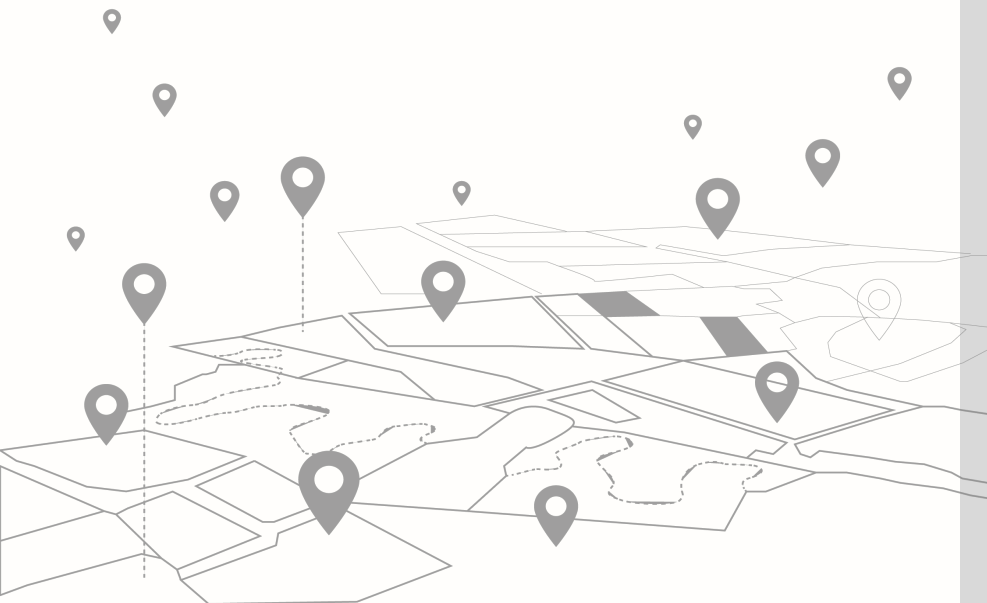
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Multiple networks

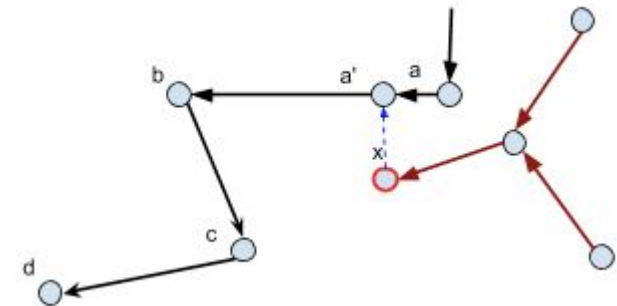
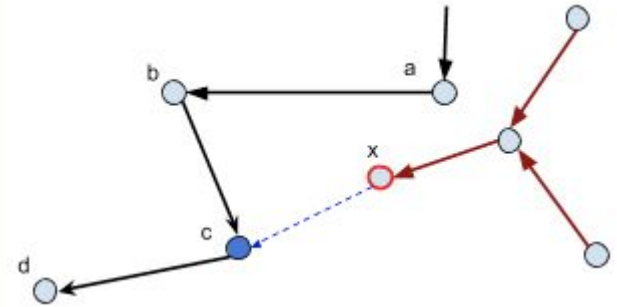
No interconnections

- The sewer inventory application tracing does not support tracing between different networks (waterways, sewer system)
- Does not support transnational tracings

Multiple networks

Configurable interconnections

- Support for different network interconnections
 - Logical
 - Geographical
 - Projected
- User can combine data sources for tracing
- Cross-border tracing possible



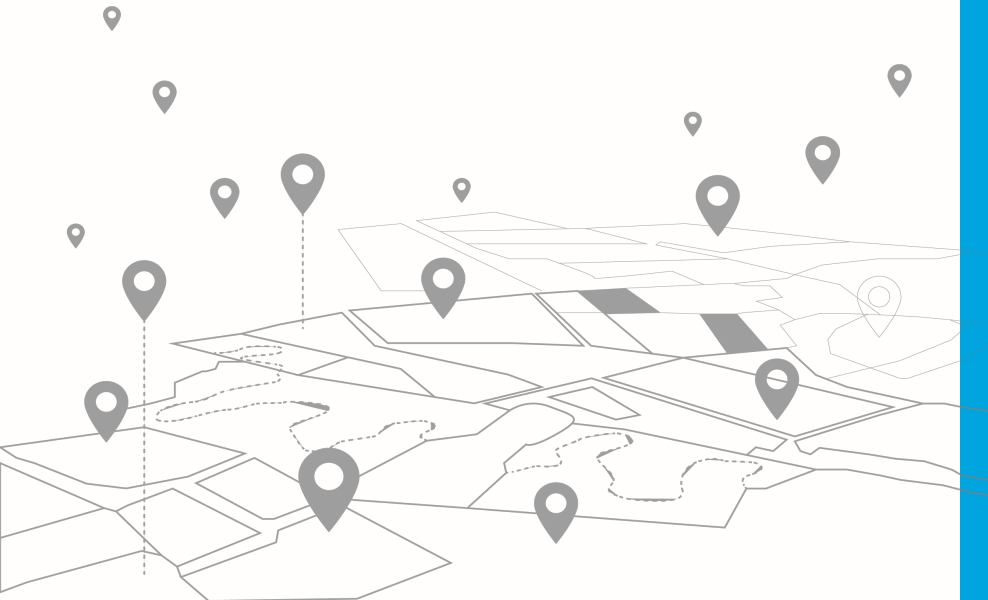
Results

- Improved performance
- Easily configurable data sources
- Insight in risk areas
- Available for the whole organisation (and possibly outside)
- Interconnection between multiple networks

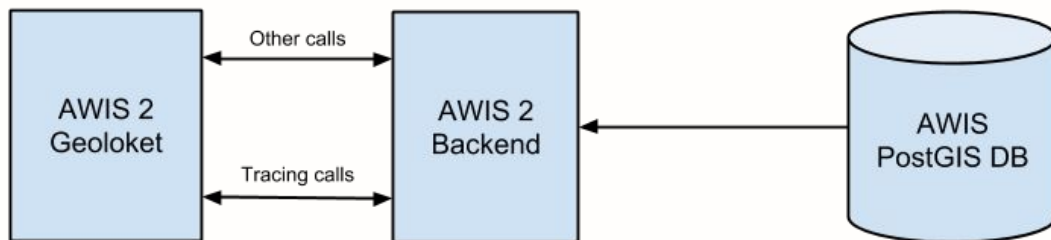
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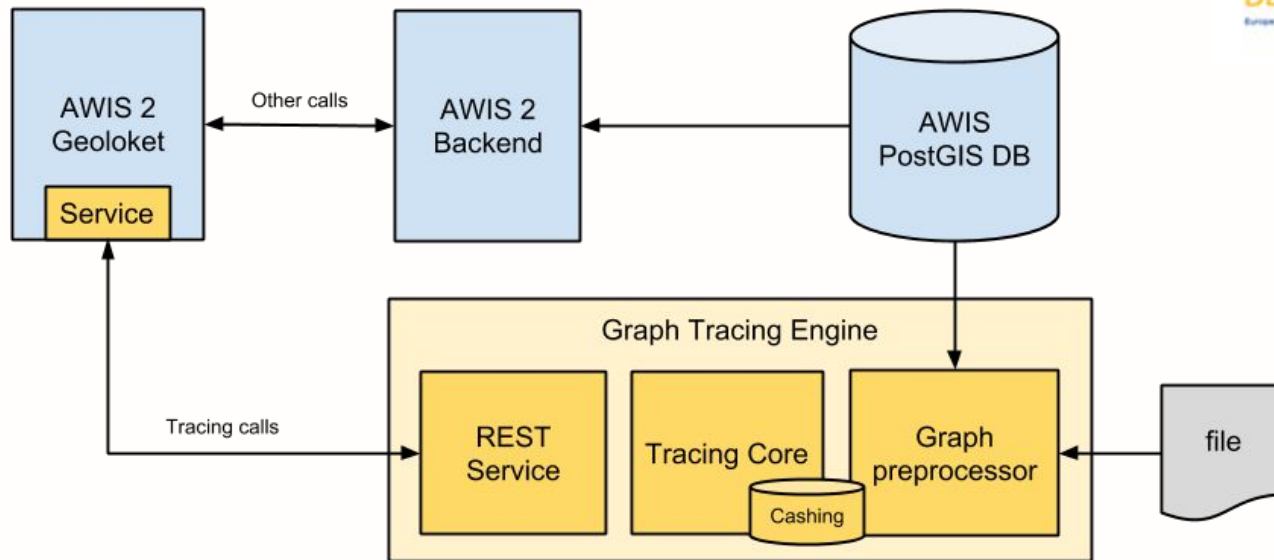
Under the hood



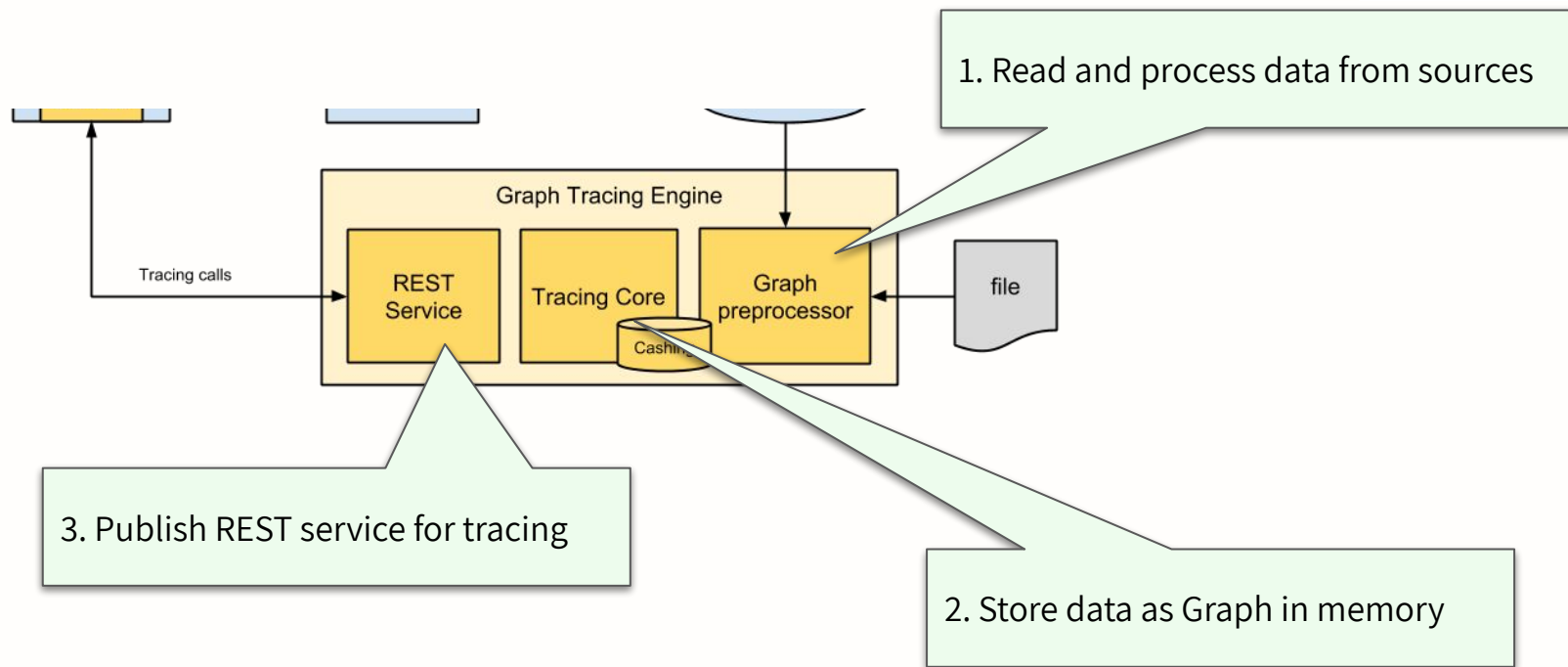
Architecture as-is



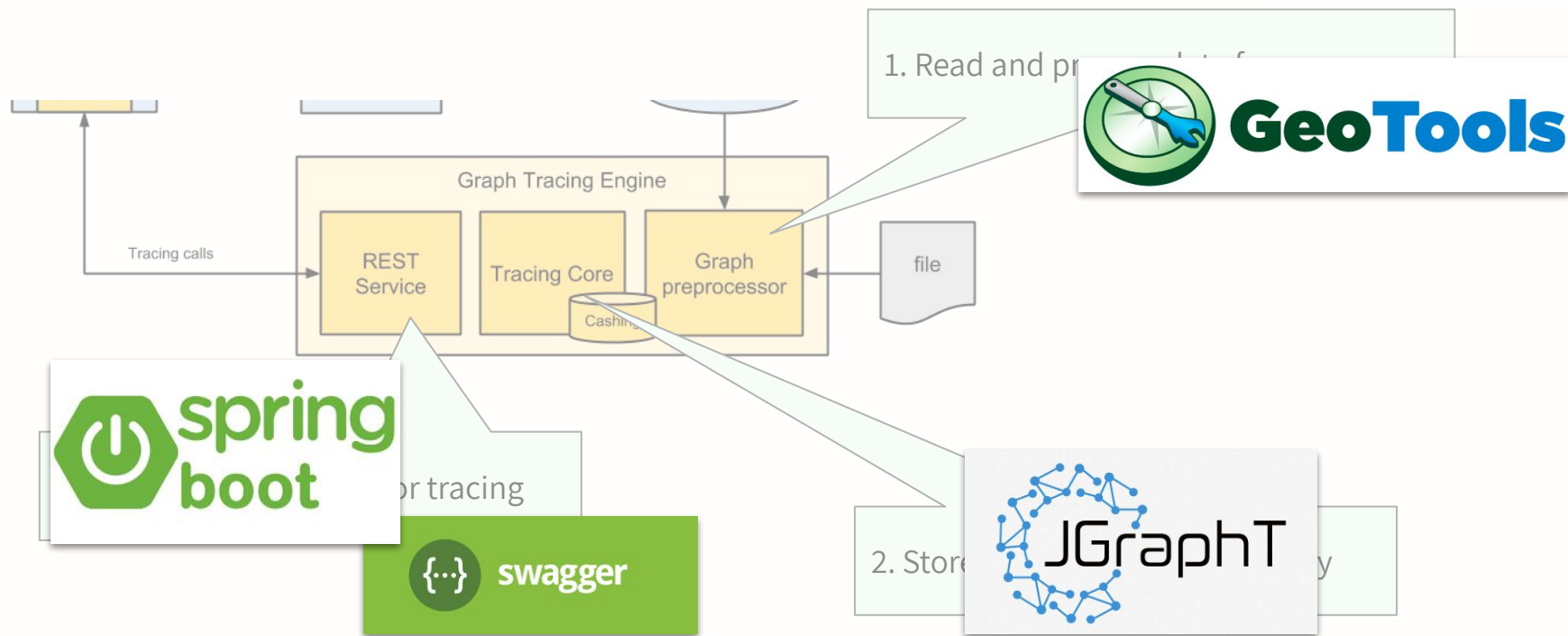
Architecture to-be



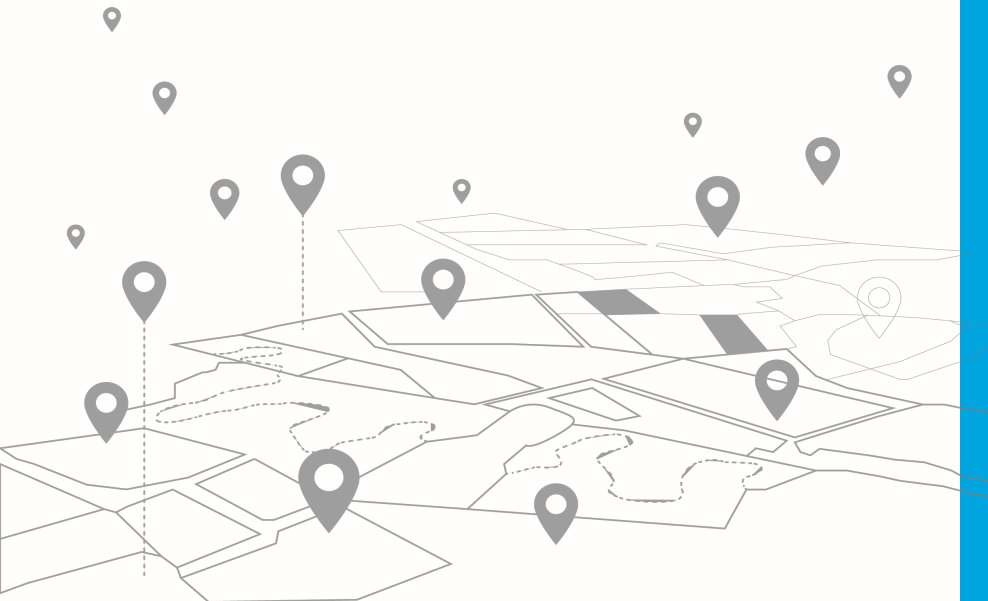
Graph Tracing Engine



Libraries



Future



Business opportunities study

Report delivered :

- USPs
- Technology choice
- Open source license options
- Immediate and potential future (by extending) use cases/applications
- Business opportunities

Other applications:

- Database Subsoil Flanders: Sediment tracing
- Think outside of the box

Open Source



"It takes a village to raise a child"

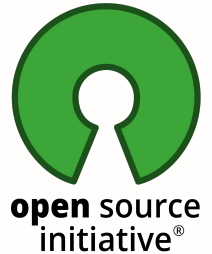
Open Source

Advantages

- Lower total cost of ownership
- Value for the society

Challenges

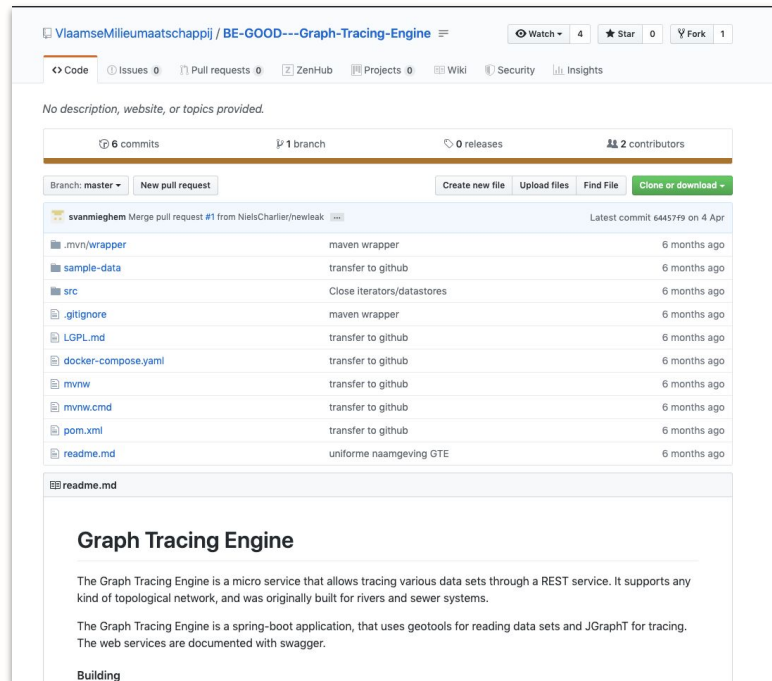
- Ownership
- User base - Community



Getting started

- Visit the github page

<https://github.com/VlaamseMilieumaatschappij/BE-GOOD---Graph-Tracing-Engine>



The screenshot shows the GitHub repository page for 'VlaamseMilieumaatschappij / BE-GOOD---Graph-Tracing-Engine'. The repository has 4 watches, 0 stars, and 1 fork. It contains 6 commits, 1 branch, 0 releases, and 2 contributors. The repository is currently on the 'master' branch. A merge pull request #1 from NilsCharlier/hewleak is shown, with the latest commit 64457f9 on 4 Apr. The repository contains several files and folders, including .mvn/wrapper, sample-data, src, .gitignore, LGPL.md, docker-compose.yaml, mvnw, mvnw.cmd, pom.xml, and readme.md. The 'readme.md' file is selected, showing the title 'Graph Tracing Engine' and a description: 'The Graph Tracing Engine is a micro service that allows tracing various data sets through a REST service. It supports any kind of topological network, and was originally built for rivers and sewer systems. The Graph Tracing Engine is a spring-boot application, that uses geotools for reading data sets and JGraphT for tracing. The web services are documented with swagger. Building'.

VlaamseMilieumaatschappij / BE-GOOD---Graph-Tracing-Engine

Watch 4 Star 0 Fork 1

Code Issues 0 Pull requests 0 ZenHub Projects 0 Wiki Security Insights

No description, website, or topics provided.

6 commits 1 branch 0 releases 2 contributors

Branch: master New pull request Create new file Upload files Find File Clone or download

svannieghe Merge pull request #1 from NilsCharlier/hewleak Latest commit 64457f9 on 4 Apr

.mvn/wrapper	maven wrapper	6 months ago
sample-data	transfer to github	6 months ago
src	Close iterators/datastores	6 months ago
.gitignore	maven wrapper	6 months ago
LGPL.md	transfer to github	6 months ago
docker-compose.yaml	transfer to github	6 months ago
mvnw	transfer to github	6 months ago
mvnw.cmd	transfer to github	6 months ago
pom.xml	transfer to github	6 months ago
readme.md	uniforme naamgeving GTE	6 months ago

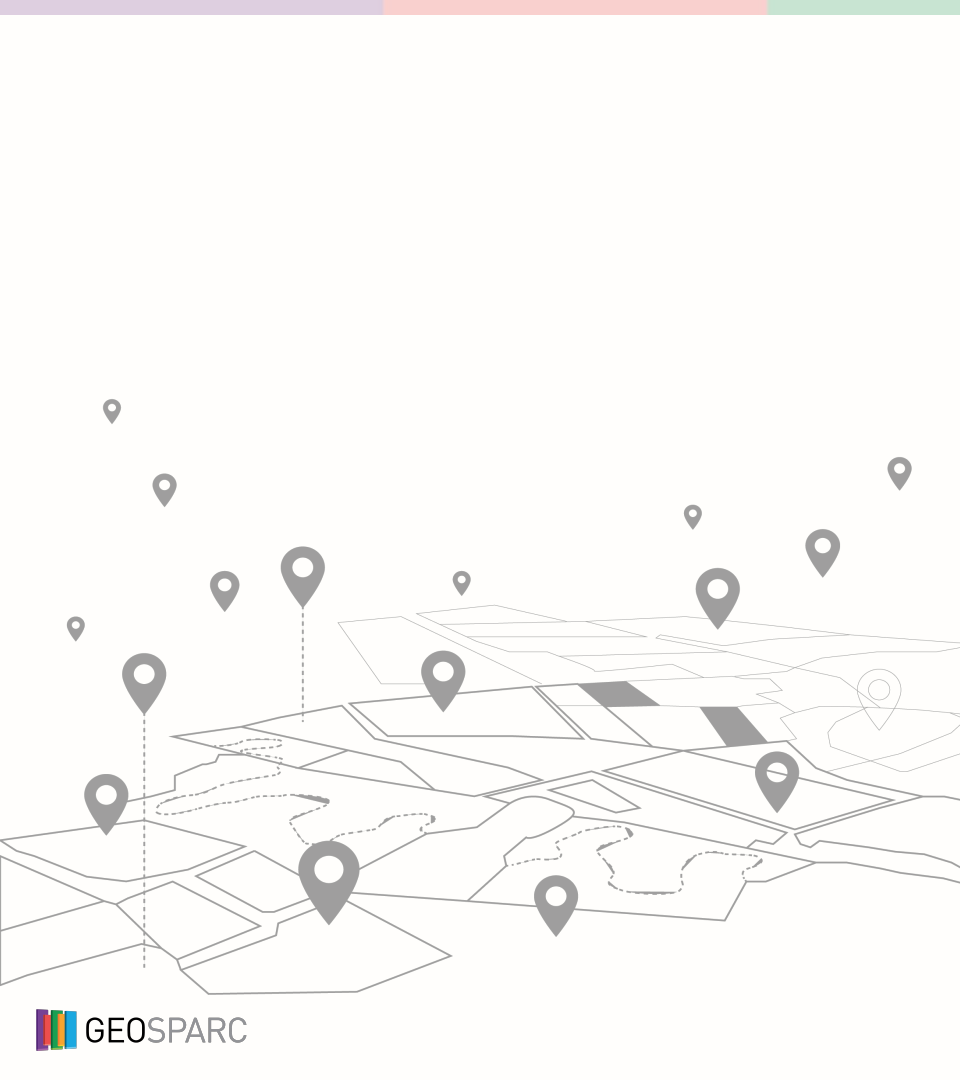
readme.md

Graph Tracing Engine

The Graph Tracing Engine is a micro service that allows tracing various data sets through a REST service. It supports any kind of topological network, and was originally built for rivers and sewer systems.

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Building



Questions?

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