

# Interoperability Building Blocks: The Flemish Smart Data Space approach

Julián Rojas

**OASC Summit**

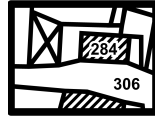
June 3rd 2024 - Rotterdam, The Netherlands



Addresses



transport  
infrastructure



Cadaster



Company  
Registry



Council Decisions



Taxes



Demographics



Environment



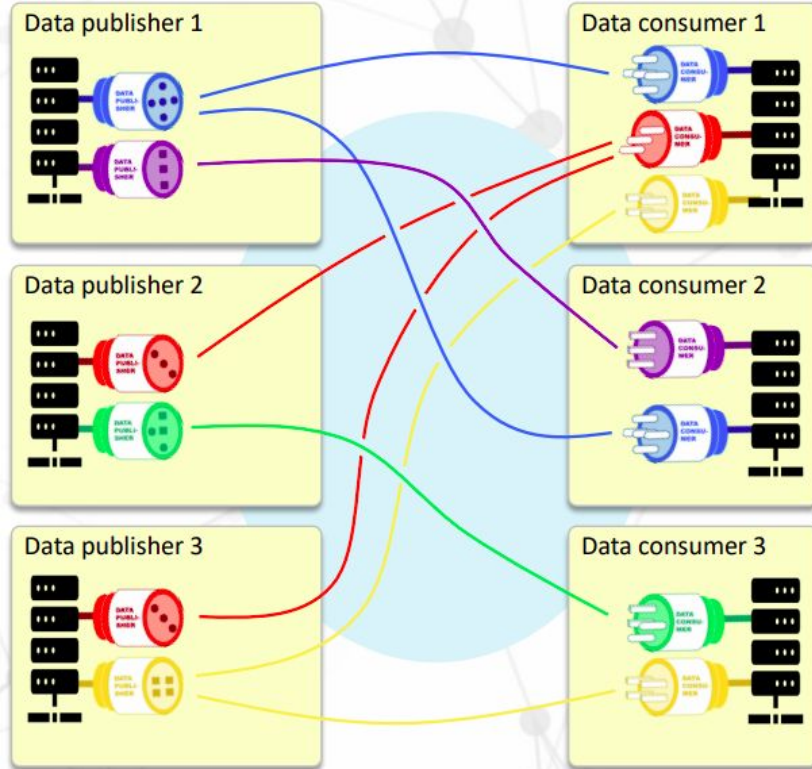
Public Authorities



Health

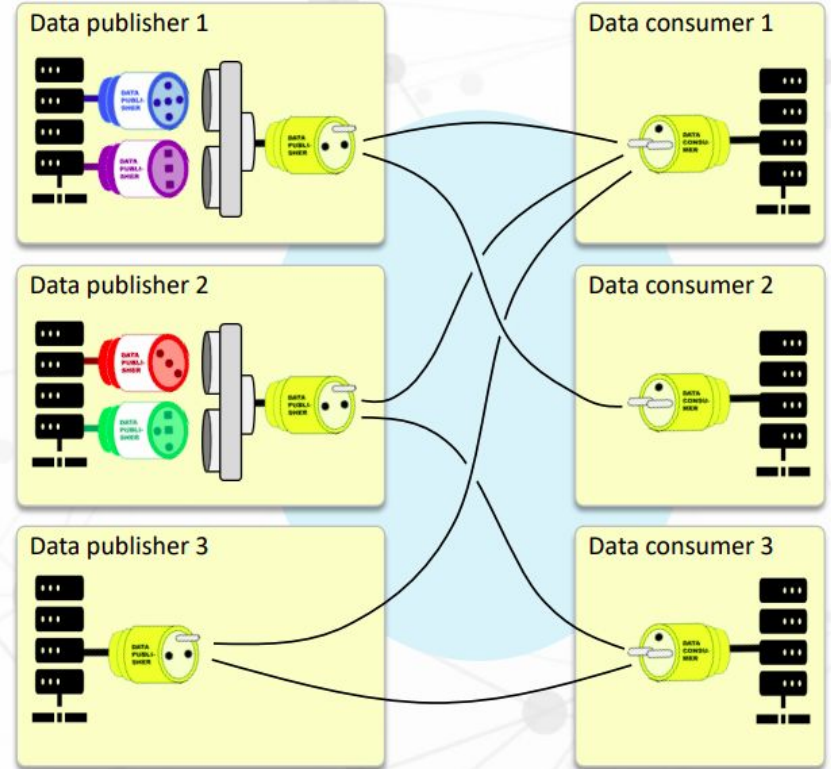
# AS-IS

Many different ways (and standards) to exchange data, both on the publisher side and on the consumer side



# TO-BE

publishers use the same semantic and technical standards, consumers can retrieve data anywhere with the same interface



# FLEMISH SMART DATA SPACE

## INTEROPERABLE

*The ability of multiple systems to communicate and interact with each other*

## DECENTRALISED

*We facilitate. Accountability remains with data providers and consumers.*

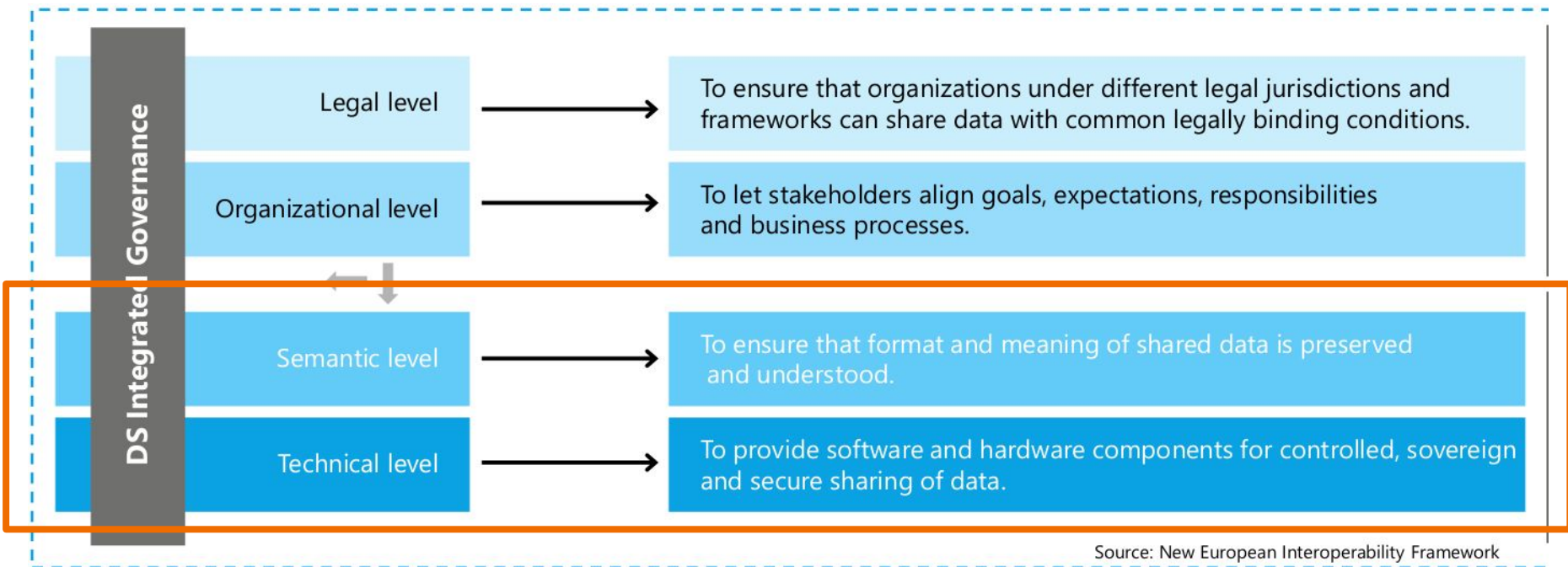
## NEW BUSINESS MODELS - PUBLIC AND PRIVATE PLAYERS



Semantic (OSLO)  
Technical (LDES)



# The European Interoperability Framework as a starting point



Source: New European Interoperability Framework

# Semantic interoperability: OSLO (Open Standards for Linked Organisations)

## Vocabularia

### > Generiek

Een algemeen ondersteunend vocabularium.

### > Adres

Het Adres vocabularium legt termen en definities vast voor het beschrijven van een Belgisch adres.

### > Organisatie

Het Organisatie vocabularium legt termen en definities vast voor het beschrijven van organisaties en bouwt verder op de vocabularia van W3C en ISA.

### > Persoon

Het Persoon vocabularium legt termen en definities vast voor het beschrijven van personen en hun relaties. Het bouwt verder op vocabularia van W3C en ISA.

### > Dienst

Het Dienst vocabularium legt termen en definities vast voor het beschrijven van publieke dienstverlening. Het is gebaseerd op het Core Public Service Vocabulary Application Profile.

### > Besluit

Het Besluit vocabularium legt termen en definities vast voor het beschrijven van besluiten. Het bouwt verder op de vocabularia van W3C en ISA.

## Applicatieprofielen

### > Applicatieprofiel Generiek Basis

Dit applicatieprofiel definieert een specificatie voor de uitwisseling van algemene concepten als contactinformatie, geometrieën en herkomstinformatie.

### > Applicatieprofiel Adresregister

Dit applicatieprofiel definieert een specificatie voor de uitwisseling van adresgegevens in de context van een adresregister (CRAB).

### > Applicatieprofiel Organisatie Basis

Dit applicatieprofiel definieert een specificatie voor de uitwisseling van adresgegevens in de context van een organisatie register.

### > Applicatieprofiel Persoon Basis

Dit applicatieprofiel definieert een specificatie voor de uitwisseling van persoonsgegevens in de context van een personenregister of bij het uitvoeren van publieke dienstverlening.

### > Applicatieprofiel Diensten catalogoog

Dit applicatieprofiel definieert een specificatie voor de uitwisseling van gegevens met betrekking tot publieke dienstverlening in de context van een diensten catalogoog.

### > Applicatieprofiel Besluit Publicatie

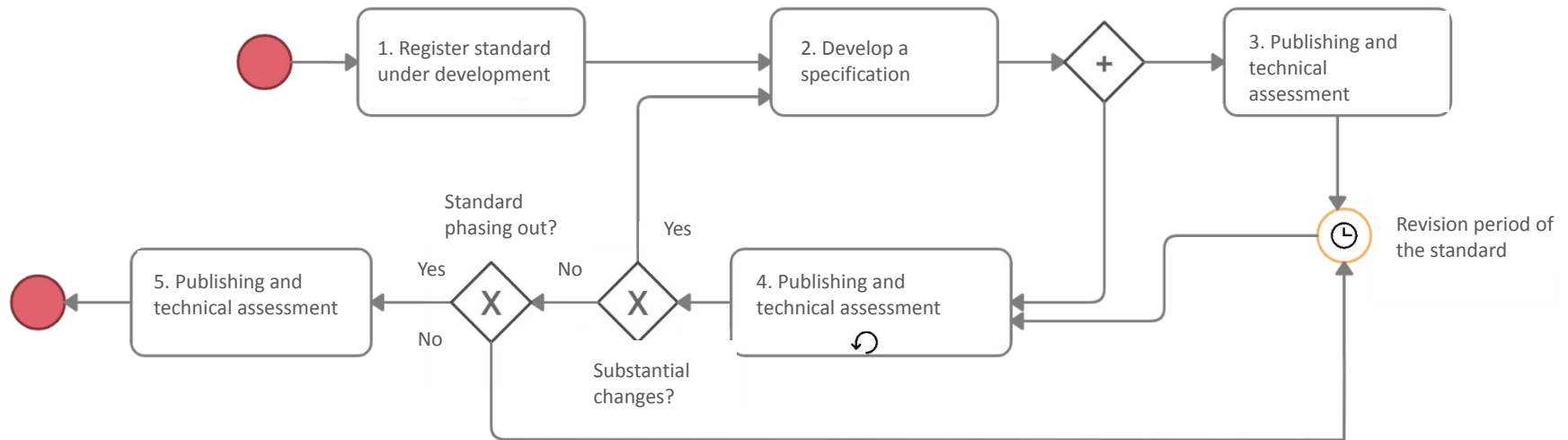
Dit applicatieprofiel definieert een specificatie voor de publicatie van notulen en besluiten van bestuursorganen.

<https://data.vlaanderen.be/ns>

# OSLO methodology



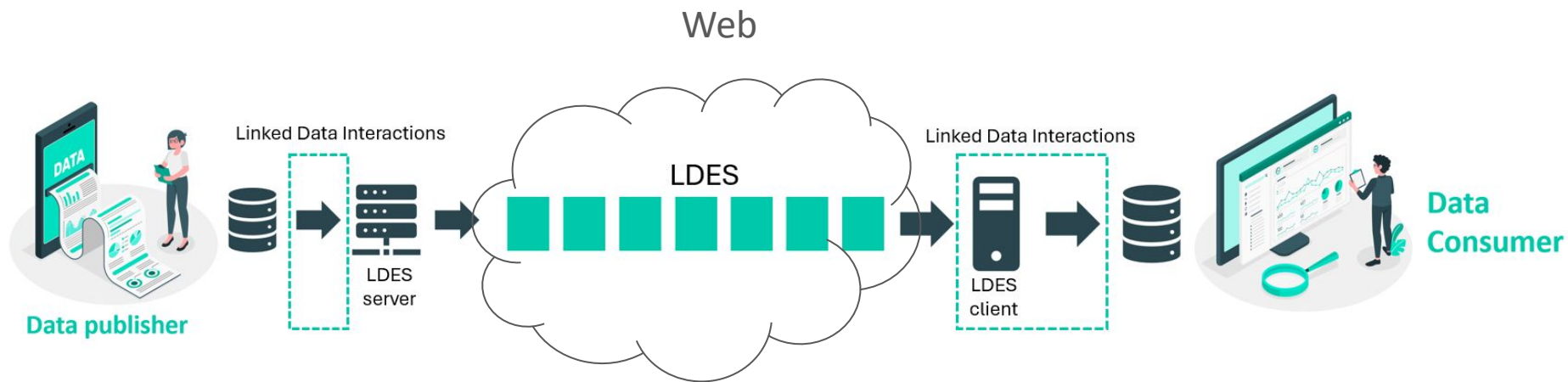
- Goal: consensus around data standard supported by various stake
- **OSLO Process and method** for registering, developing, changing, phasing out and changing data standards



# Technical Interoperability:

## LDES (Linked Data Event Streams) an API for all APIs

The Flemish Smart Data Space provides [technical building blocks](#) to create uniform data exchange interfaces based on LDES.





LDES is maintained and developed within the [SEMIC initiative](#)



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## Linked Data Event Streams (LDES)

 [Translate](#)

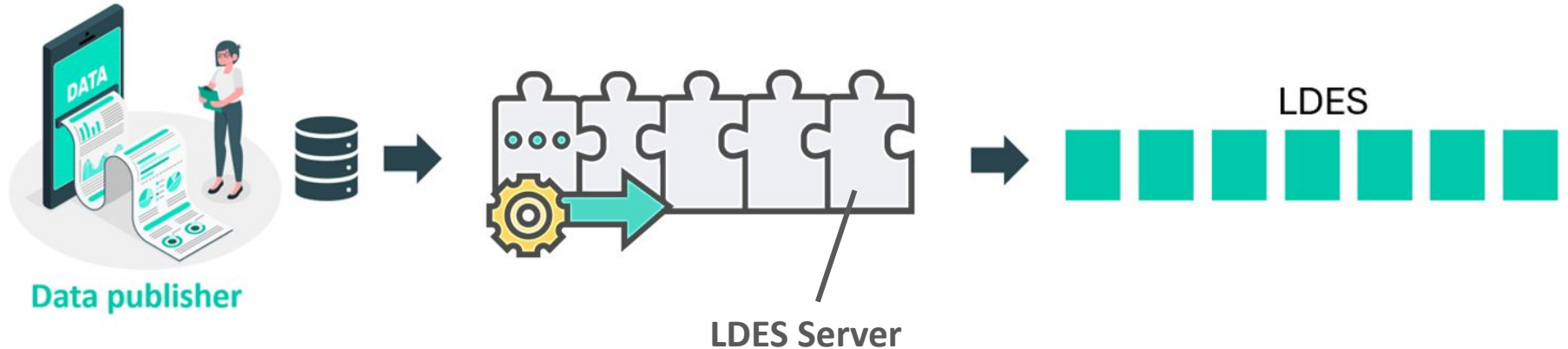
### What is LDES?

A Linked Data Event Stream (LDES) is a new data publishing approach which allows you to publish any dataset as a collection of immutable objects. The focus of an LDES is to allow clients to replicate the history of a dataset and efficiently synchronise with its latest changes.

At the heart, a Linked Data Event Stream can be interpreted as a publishing strategy by which a data provider allows multiple third parties to stay in sync with the latest version of the data source in a resource and cost-effective manner. In that sense, LDES is a way out from the so-called "API maintenance hell", as described by Pieter Colpaert from UGent.

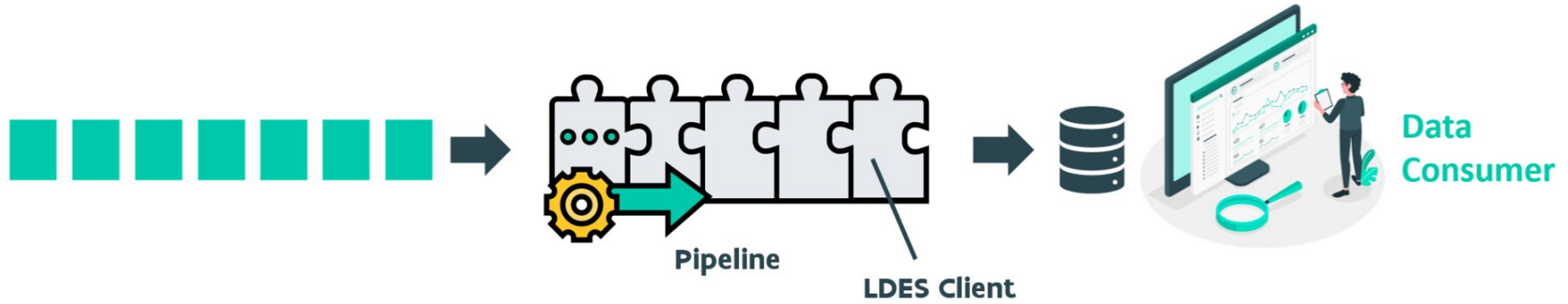
# LDES Building blocks: **Publishing**

A data publisher publishes its data in the Flanders Smart Data Space as an LDES via data processing pipelines.



## LDES Building blocks: **Consuming**

Data consumers tap into LDES data in the Flemish Smart Data Space and can create consumption pipelines according to their needs.



# Use case: traffic measurements data space

## Telraam

What : Pedestrians, bikes, cars, bus/freight

How fast: Every hour

Where: 80% Flanders - 20% abroad

Amount: 2.000

Onboarding: end of november



## Vlaams Verkeerscentrum

What : Cars, bus/freight

How fast: After completion of interval

Where: Whole Flanders

Amount: 2.500

Onboarding: 2024



## AWV – Agentschap Wegen & Verkeer

What : Bikes

How fast: Every 24 hours

Where: Whole Flanders

Amount: 100

Onboarding: december



## Stad Genk:

100 smart cameras



## Krycer

What : Cars, bus/freight (smiley signs: speed)

How fast: Realtime data

Where: data owner municipality of Ternat

Amount: 5 to 10

Onboarding: 2024



## Geomobility

What: Bikes, cars, bus/freight

How fast: Telecampigns historic data

Where: data owner Brugge

Amount: 48

Onboarding: november



## Signco

What: Bikes, Cars, bus/freight

How fast: Telecampigns historic data

Where: data owner Antwerp

Amount: 100

Onboarding: 2024

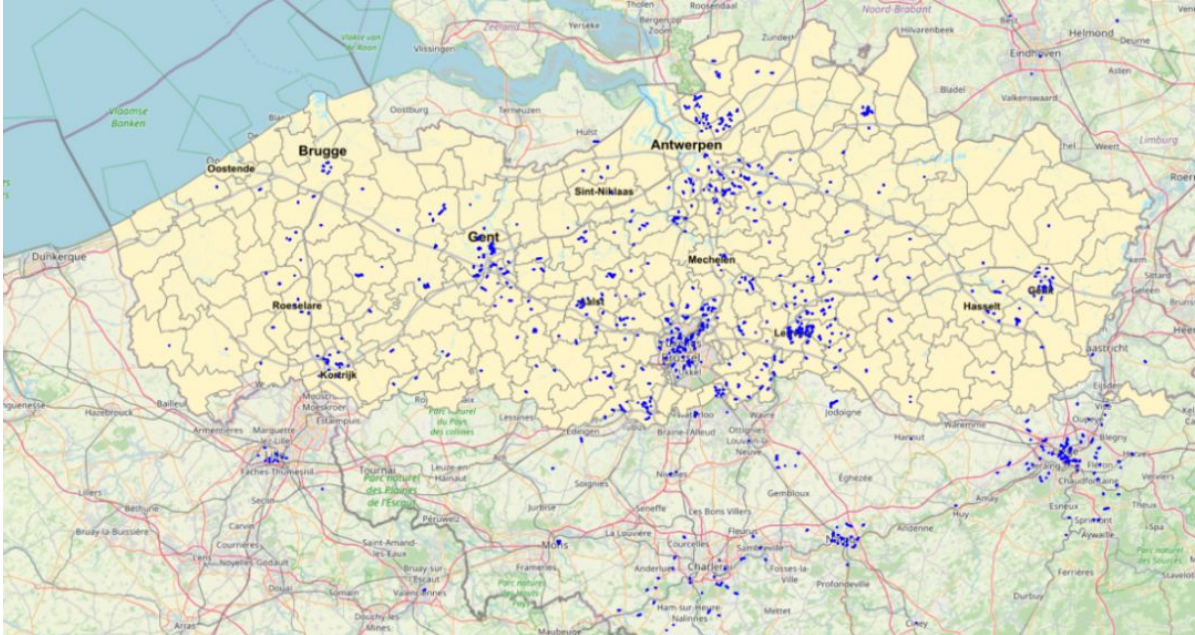


## Geosparc

Leuven traffic measurements



# Use case: traffic measurements data space



AI-based user application,  
answering to the question:

*“Show me all measurements for  
cars between 15h and 16h for  
which the count is higher than 70”*

# Use case: water data space



## Setup Water Data Space

Identification of stakeholders and use cases (e.g., CIW)



## IoW – Sensors for water quality

“Virtual” aggregation of the water sensor network



## Smarter water metering

Efficient publishing and consumption of water sensor data in the VSDS

# Use case: water data space

[Preliminary work](#) using the VSDS building blocks. By using LDES, water quality can be analyzed and aggregated in real-time. This allows emerging trends, deviations from the norm and even alarming situations to be detected

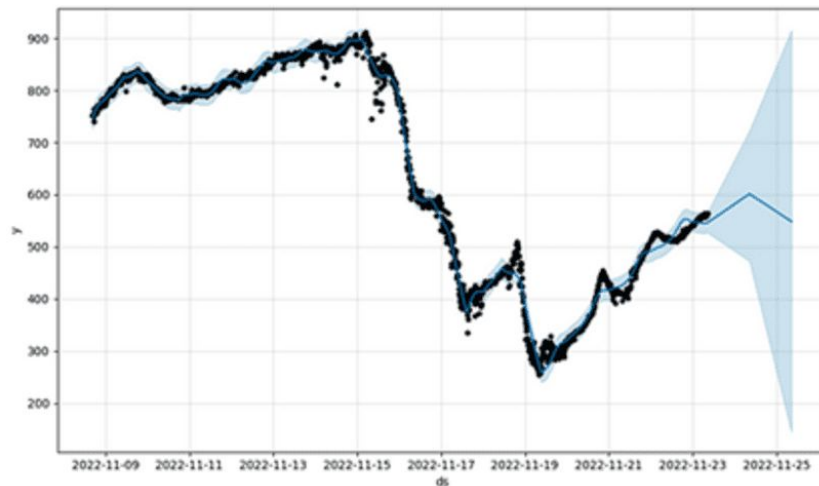
## Incremental Machine Learning for Linked Data Event Streams

Unlocking the Power of Real-time Predictions: An Introduction to Incremental Machine Learning for Linked Data Event Streams



Samuel Van Ackere · [Follow](#)

Published in Towards AI · 7 min read · Feb 9, 2023



# Next steps

Further align with the international initiatives for Data Spaces





# Takeaways

- Semantic and technical **interoperability is possible** in collaborative and standard-based ecosystems.
- The value of interoperability becomes tangible in terms of **productivity** and operational costs reductions.
- Legacy **organisational mindsets** remains to be the biggest obstacle for achieving data interoperability.

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