



data.
europa.
eu
academy 

Real-time data

*05 April 2022
10:00-11:30 CET*



data.europa.eu The official portal
for European data



Agenda of today

- Welcome, introduction, data.europa.eu, and the goal of the meeting
- What is real-time data?
- Application examples
- Introduction to relevant technologies:
 - OGC SensorThings API
 - MQTT
- Discussion and gathering feedback on relevant technologies
- Next steps for writing the report
- Closing

Introduction

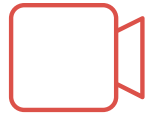


Antje Kügeler
con terra
Geospatial expert



Dr. Simon Jirka
52°North
Geospatial and real-time data expert

Rules of the game



The training will be recorded



Please mute yourselves during the training

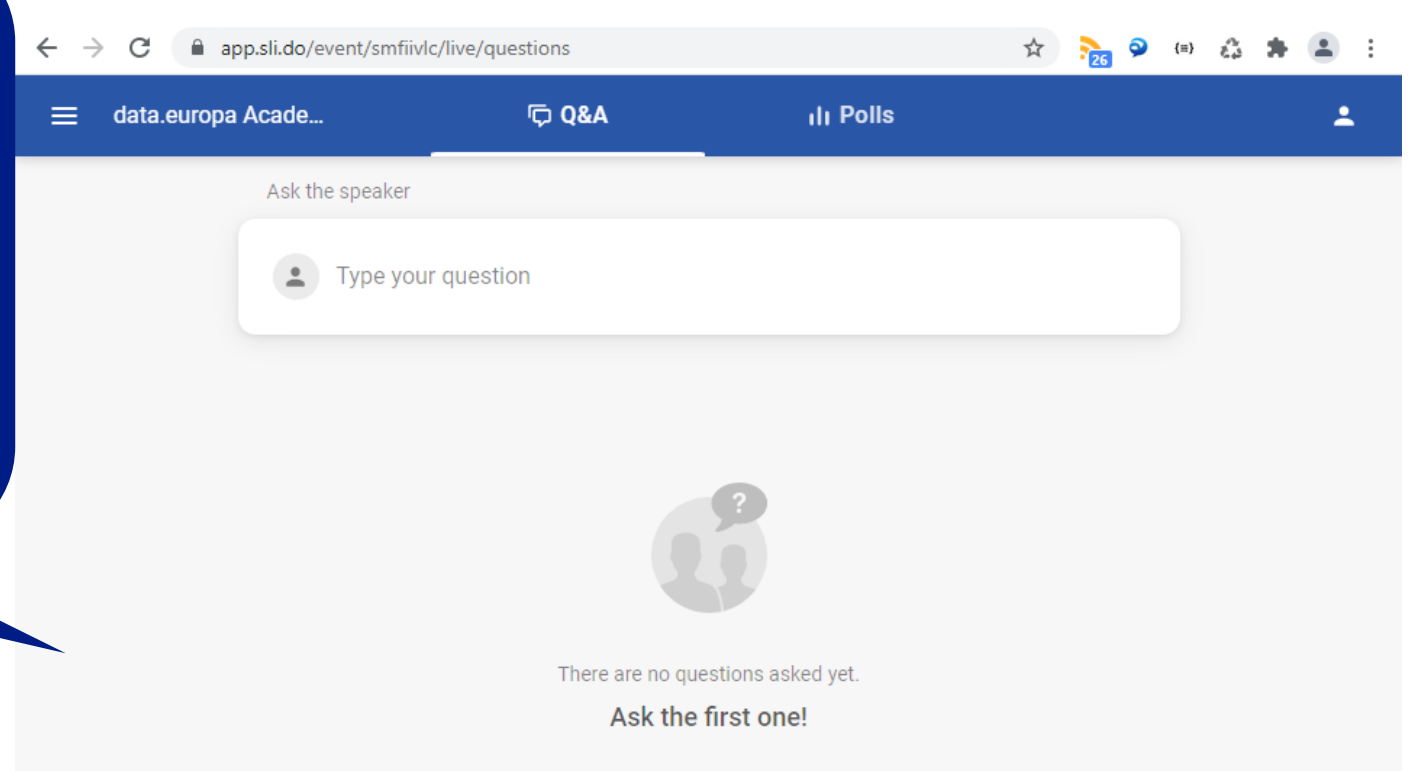
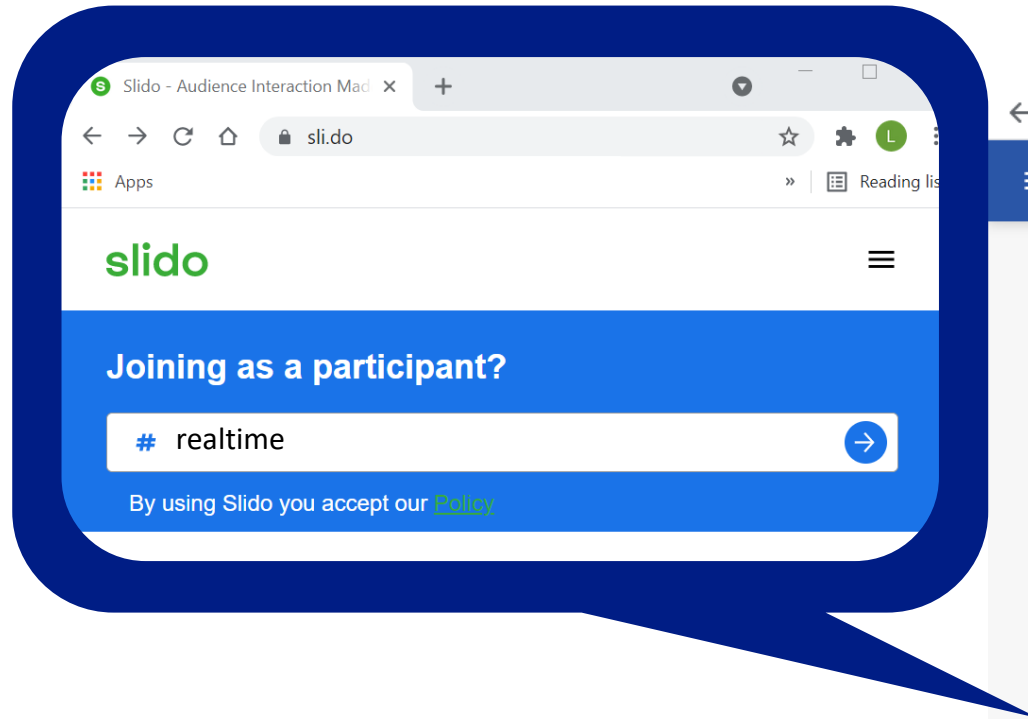


Please reserve 3 min after the training to help us improve by filling in our feedback form



For questions, please use [sli.do](#). Vote for the questions that are of most interest to you, those will be discussed later

Ask your questions in sli.do using the code *realtime*



data.europa.eu

- data.europa.eu provides access to open data
- Metadata describes data sources
 - “data about data”
- strategic objective is to improve accessibility of open data



The official portal for European data

173 Catalogues 36 Countries 1 438 462 Datasets

Trending datasets ⓘ

- Consolidated list of persons, groups and entities subject to EU financial sanctions
- Taxpayer Identification Number (TIN)
- The European Commission's Oil Bulletin
- Number of COVID-19 people killed by age
- CORDIS - EU research projects under Horizon 2020 (2014-2020)

Search datasets

Search datasets

Agriculture, Fisheries, Forestry & Foods

Economy & Finance	Education, Culture & Sport	Energy	Environment	Government & Public Sector	Health
International Issues	Justice, Legal System & Public Safety	Population & Society	Regions & Cities	Science & Technology	Transport

> DATA CATALOGUES > ALL DATASETS > EU INSTITUTIONS DATASETS

data.europa.eu

- Includes metadata from 173 catalogues
- from 36 countries
- Descriptions of more than 1 Mio. datasets

The screenshot shows the top navigation bar of the data.europa.eu website. It features a dark blue header with a yellow home icon on the left, and menu items for 'Data', 'Studies', and 'data.europa academy'. Below the header is a timeline of events for the EUDatathon 2022, including 'Launch of competition' (7 February 2022), 'Deadline to submit ideas' (31 March 2022), 'Preselected teams announced' (25 April 2022), 'Deadline to submit full proposals' (26 June 2022), and 'Finalist team announce' (15 July 2022). A banner below the timeline includes the hashtag #eudatathon, the URL op.europa.eu/eudatathon, the date 20 OCTOBER 2022, and the EUD logo.

The official portal for European data

173 Catalogues **36** Countries **1 438 462** Datasets

Trending datasets

Consolidated list of persons, groups and

Search datasets

Search datasets

Objectives of this Webinar

- Illustrate the current status how real-time data sets are handled within data.europa.eu
- Provide an overview of relevant standards/APIs/technologies
- Gather feedback
 - Which real-time data sources should be further investigated for data.europa.eu?

What is Real-Time Data?

- Data that is delivered immediately after collection
- Real-time data allows live decision making
 - Dashboards
 - Real-time data analytics
- Openly accessible real-time data streams are still rare



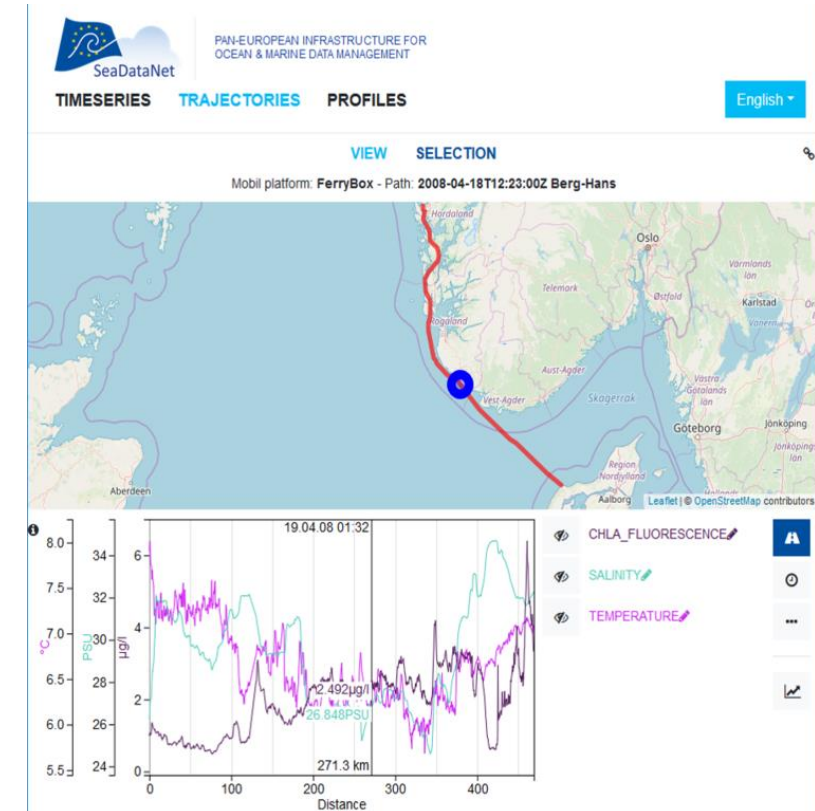
IAEA Imagebank, [CC BY 2.0](#), via
Wikimedia Commons

What is Real-Time Data?

- Examples:
 - Traffic information
 - Weather measurements
 - Rain radar
 - Water level measurements
 - People flow information in cities
 - Gasoline prices
 - ...

What is Real-Time Data?

- Types of real time data
 - Tracking data (geometries)
 - Data measured along trajectories
 - Stationary measurements (e.g. time series)
 - Images
 - ...



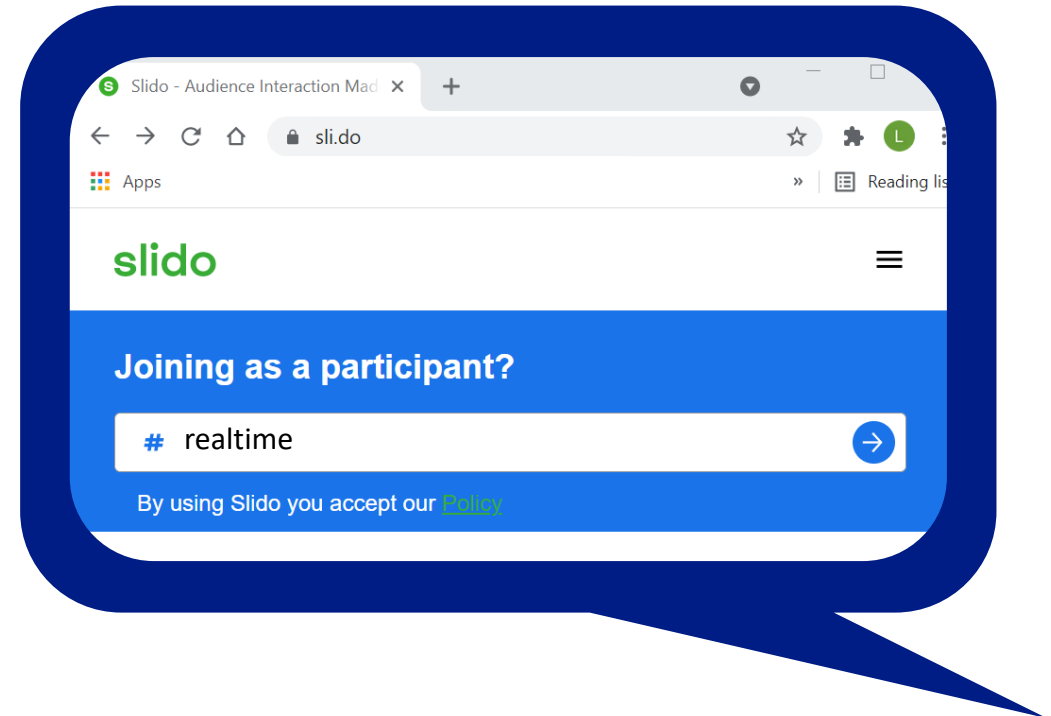
What is Real-Time Data?

- From the Directive on open data and the re-use of public sector information:

For dynamic data, meaning frequently updated data, often in real time, public sector bodies and public undertakings should make this available for re-use immediately after collection by ways of suitable APIs and, where relevant, as a bulk download, save for cases where this would impose a disproportionate effort.

Question - Please answer on sli.do using the code *realtime*

For which purposes do you currently use real-time data?



Application Examples

- Traffic information
- Warning and monitoring of natural hazards (e.g. flooding)
- Air quality information

Traffic information

- Examples



- Bus tracking
- Parking space availability

- Provided via FIWARE Context Broker

- Interfacing with Internet of Things and for example sensor systems
- Publish context data

Smart Data Models
A program led by FIWARE, IUDX, TM Forum, OASC and others to support the adoption of common compatible data models in smart solutions
<https://smartdatamodels.org> @smartdatamodels

Overview Repositories 71 Packages People 1 Projects

Pinned

- SmartCities** (Public)
A repository for data models related to the Smart Cities Domain. Includes data models for Buildings, Parking, Urban Mobility & etc.
☆ 40 🍴 19
- SmartAgrifood** (Public)
A repository for data models related to the Smart Agrifood Domain. Includes data models for Crops, Farms, Animals, Land Use & etc.
☆ 7 🍴 4
- SmartEnergy** (Public)
A repository for data models related to the Energy Domain. Includes data models for Batteries, Energy Metering, Green Energy & etc.
☆ 11 🍴 5
- SmartWater** (Public)
A repository for data models related to the Water Management Domain. Includes data models for Waste Water, Water Quality, Water Distribution & etc.
☆ 12 🍴 4
- data-models** (Public)
A joint collaboration program to support the adoption of a reference architecture and compatible common data models underpinning a digital market of interoperable and replicable smart solutions.
Python ☆ 63 🍴 38
- incubated** (Public)
A holding repository for immature data models still under development. Once completed, these data models are moved across to the appropriate domain repository.
Python ☆ 9 🍴 35

Repositories

Find a repository... Type Language Sort

- incubated** (Public)
A holding repository for immature data models still under development. Once completed, these data models are moved across to the appropriate domain repository
Python ☆ 9 🍴 35 0 5 Updated 8 hours ago
- dataModel.OCF** (Public)
Data models adapted from the Oden Connectivity Foundation <https://github.com/OdenInterConnect/IoTDataModels>

<https://github.com/smart-data-models>

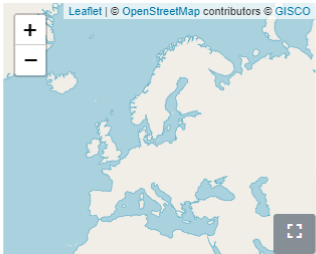
Traffic information

- Examples available on data.europa.eu
 - <https://data.europa.eu/data/datasets?query=fiware&locale=en&catalog=52north&page=1>
 - https://data.europa.eu/geo-viewer/?dataset=365781c1-73b1-403e-b3f4-53e13ae71a68&type=fiware_cb&lang=en
 - https://data.europa.eu/geo-viewer/?dataset=d3ab76b9-0eb2-4326-aa11-c0b4971d26d4&type=fiware_cb&lang=en

Traffic information

Datasets

Filter by location



Settings [ⓘ]

Operator AND OR

Catalogues [ⓘ]

52°North 2

Categories [ⓘ]

Transport 2

Publisher [ⓘ]

fiware

Datasets Catalogues Editorial Content

Last Modified Relevance More [⌵]

2 datasets found

Catalogues: 52°North [✕]

EMT bus locations in real time

EMT bus locations in real time, positions are updated every minute. The different bus lines are color-coded. For detailed information about each bus please click on the colored dots. A FIWARE CB GeoJSON resource is published. fiware_c

Created: 17.01.2020 11:39 🇩🇪 52°North

Ocupación de los aparcamientos públicos municipales.

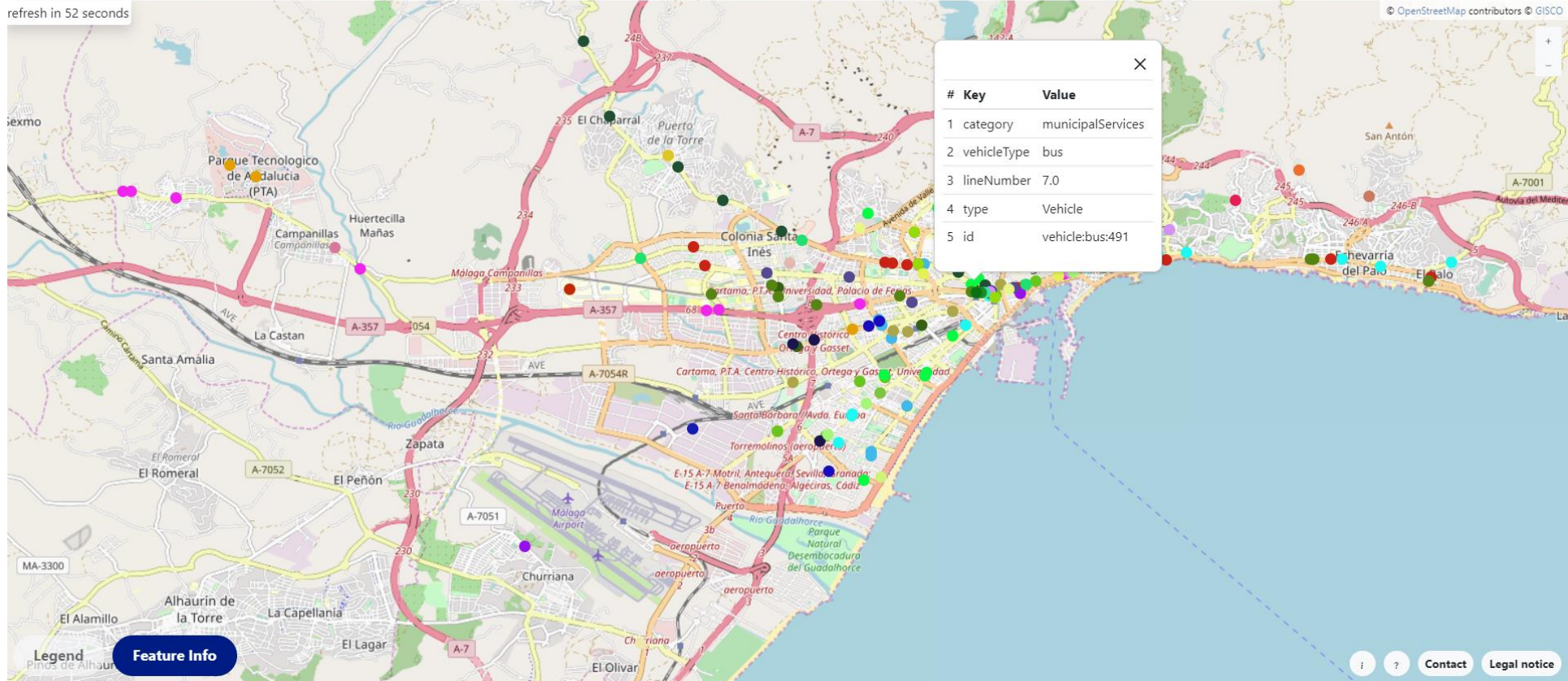
Ocupación de los aparcamientos públicos municipales. La información de actualiza cada 1 minuto. fiware_c

Created: 17.01.2020 11:39 🇩🇪 52°North

Traffic information

data.europa.eu Locations of public buses.
The official portal for European data

English (en) ▾



Traffic information

data.europa.eu Occupation of parking spaces.
The official portal for European data

English (en) ▾

refresh in 34 seconds

#	Key	Value
1	status	open,full
2	category	publicPrivate,onlyReside
3	name	Cervantes
4	requiredPermit	residentPermit
5	allowedVehicleType	car
6	availableSpotNumber	284
7	source	https://datosabiertos.m...

Legend Feature Info

OpenStreetMap contributors © GISCO

Info ? Contact Legal notice

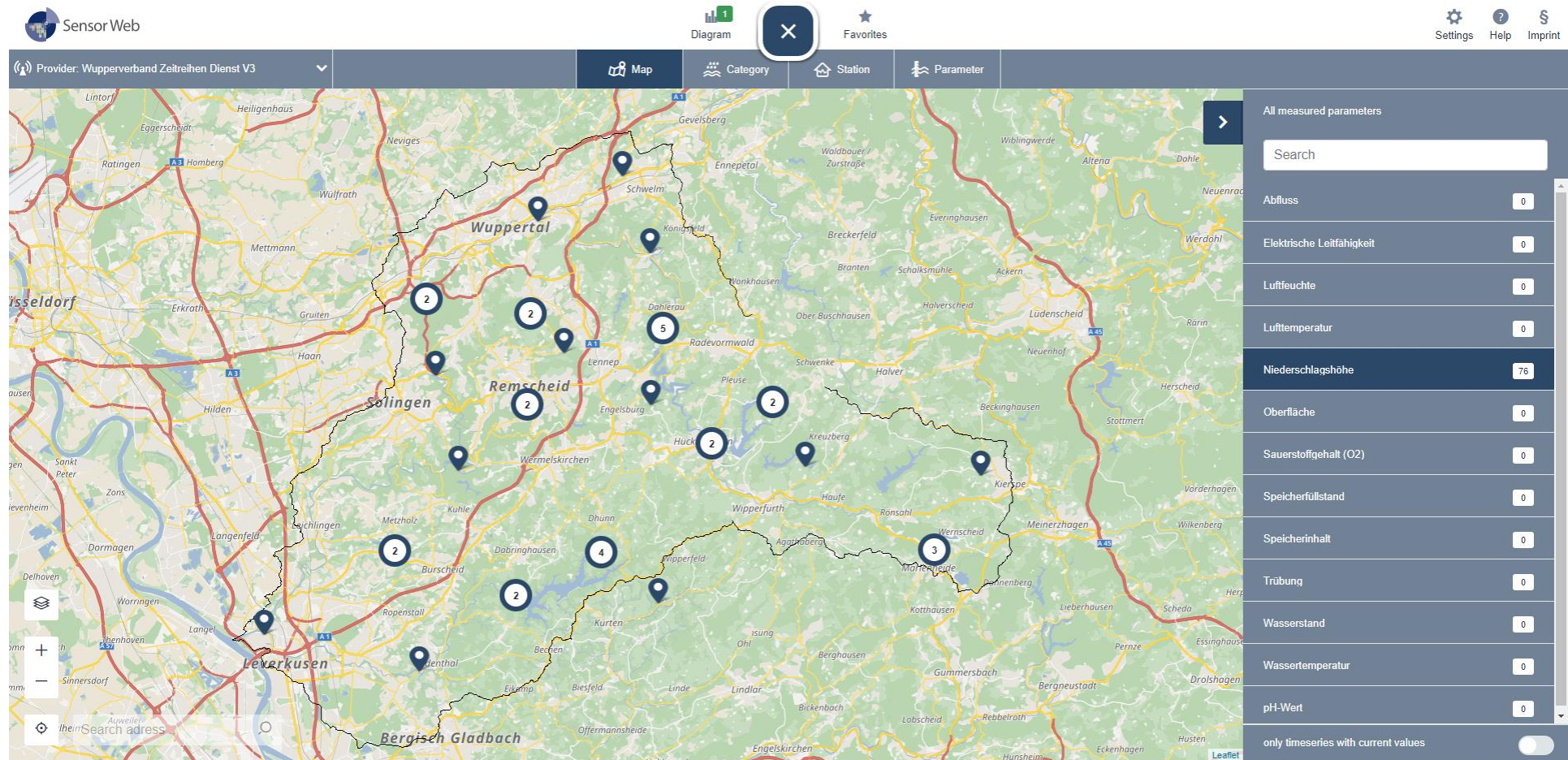
Hydrological monitoring/flooding

- Organisations in hydrology collect large amounts of real-time data
- Flood monitoring
- Water management
- Recreation
- Example: Wupperverband
 - <https://www.fluggs.de/swc/>

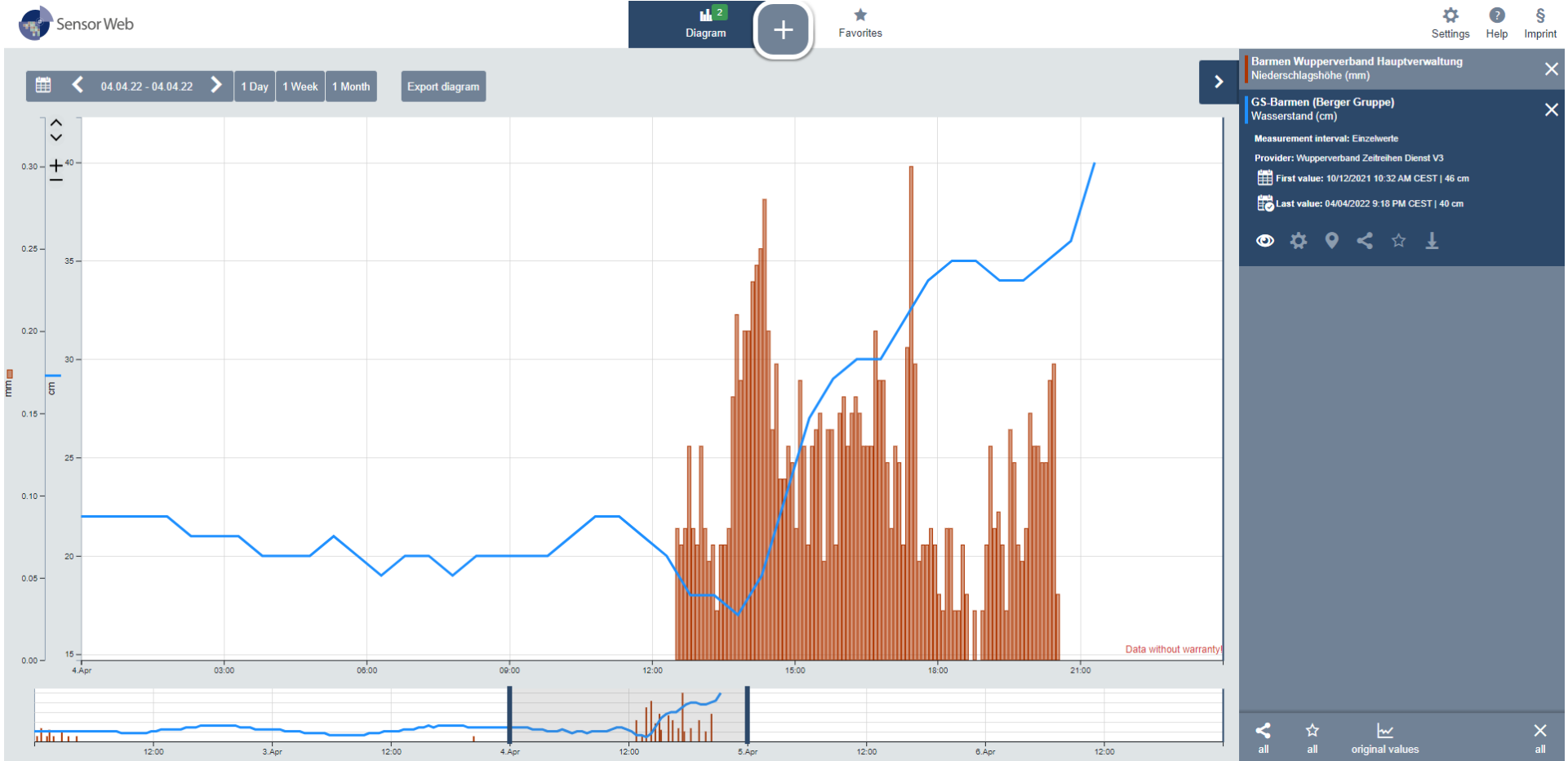


Buttons0603, [CC BY-SA 4.0](https://commons.wikimedia.org/licenses/by-sa/4.0/), via Wikimedia Commons

Hydrological monitoring/flooding



Hydrological monitoring/flooding



Air quality information

- Air quality data is collected by many agencies
- Also: citizen science projects
- Reporting of air quality to the EEA
 - AQ e-Reporting (flow E2a)
- Example:
 - <https://aqsens.52north.org/helgoland/diagram>

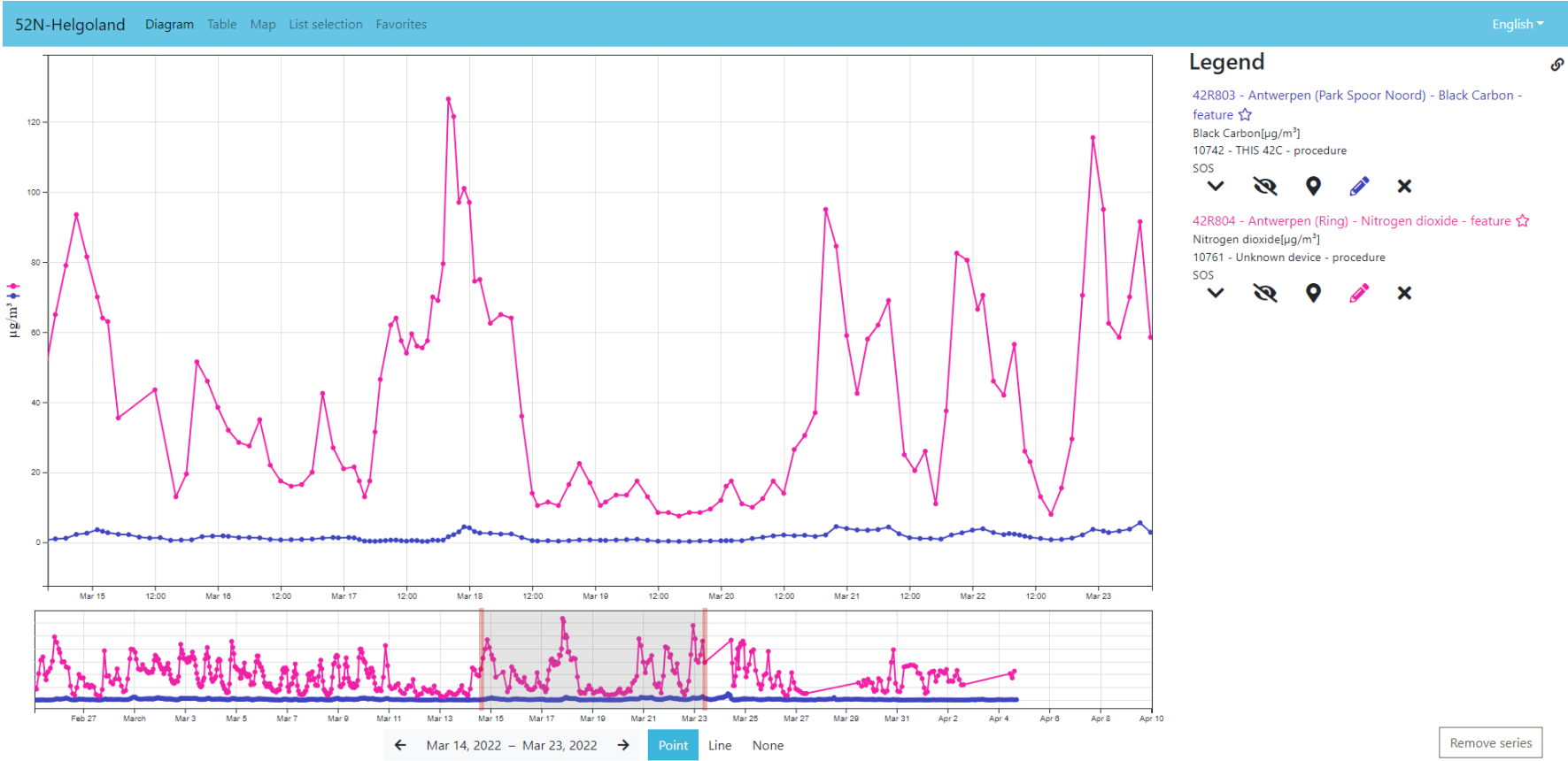


Welp.sk, [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/), via
Wikimedia Commons

Air quality information

The screenshot displays the '52N-Helgoland' air quality monitoring interface. At the top, navigation options include 'Diagram', 'Table', 'Map', 'List selection', and 'Favorites'. The current view is 'Map', showing a detailed map of Antwerpen, Belgium, with several monitoring stations marked by blue pins. A popup window for station '42R804 - Antwerpen (Ring) - Nitrogen dioxide - feature' is open, displaying a message: 'Please select one or more timeseries to display in diagram: Nitrogen dioxide 10761 - Unknown device - procedure(SOS) 45µg/m³ (04/04/2022 3:00 PM CEST)'. To the right, a sidebar titled 'All phenomena' lists various air quality indicators: Benzene, Black Carbon, CO, Carbon monoxide, NO2, Nitrogen dioxide, Nitrogen monoxide, O3, Ozone, PM10, PM2.5, Relative Humidity, SO2, Sulphur dioxide, and Temperature.

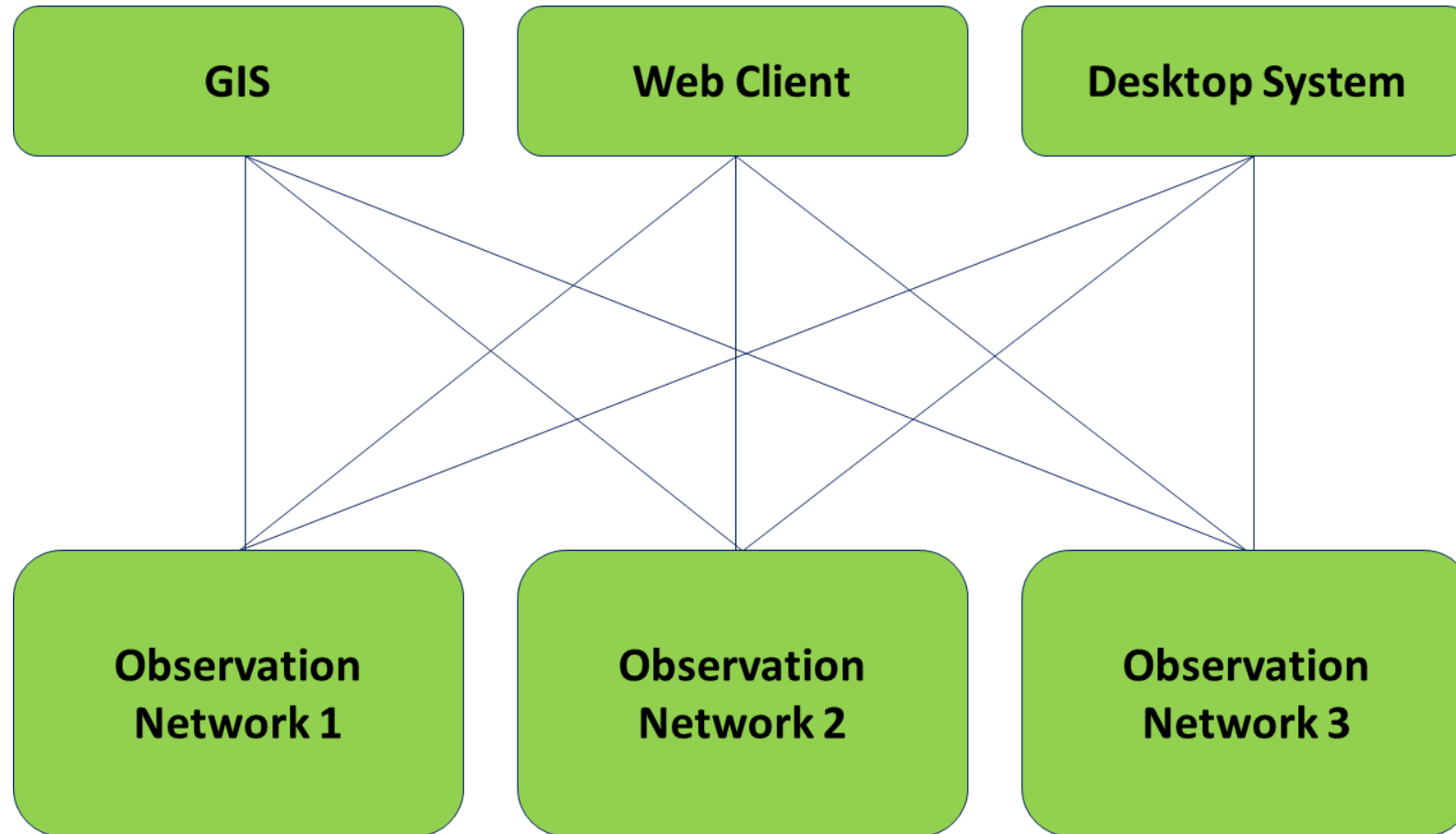
Air quality information



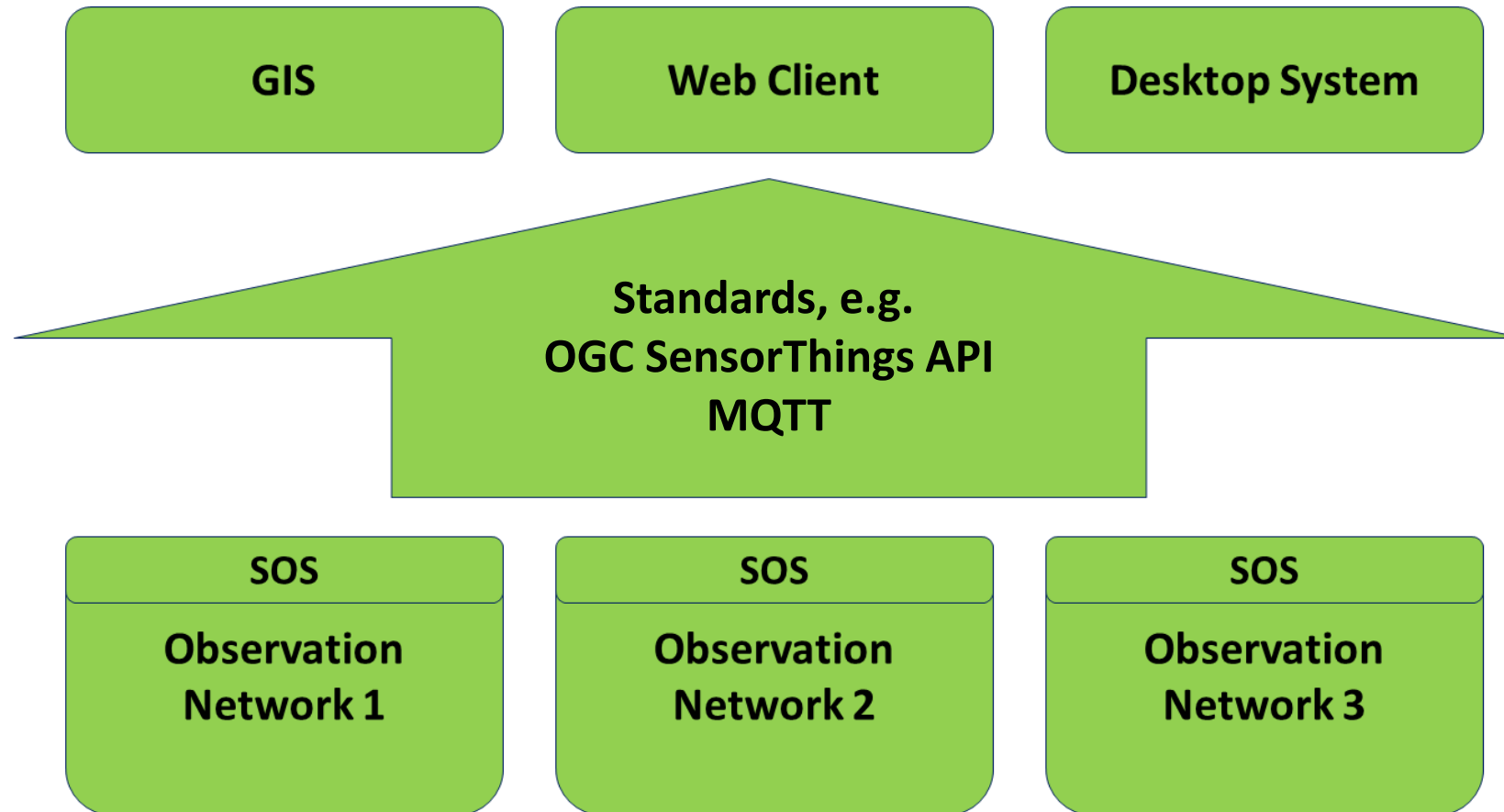
Introduction to relevant Technologies

- Interoperability
- OGC SensorThings API
- MQTT

Interoperability



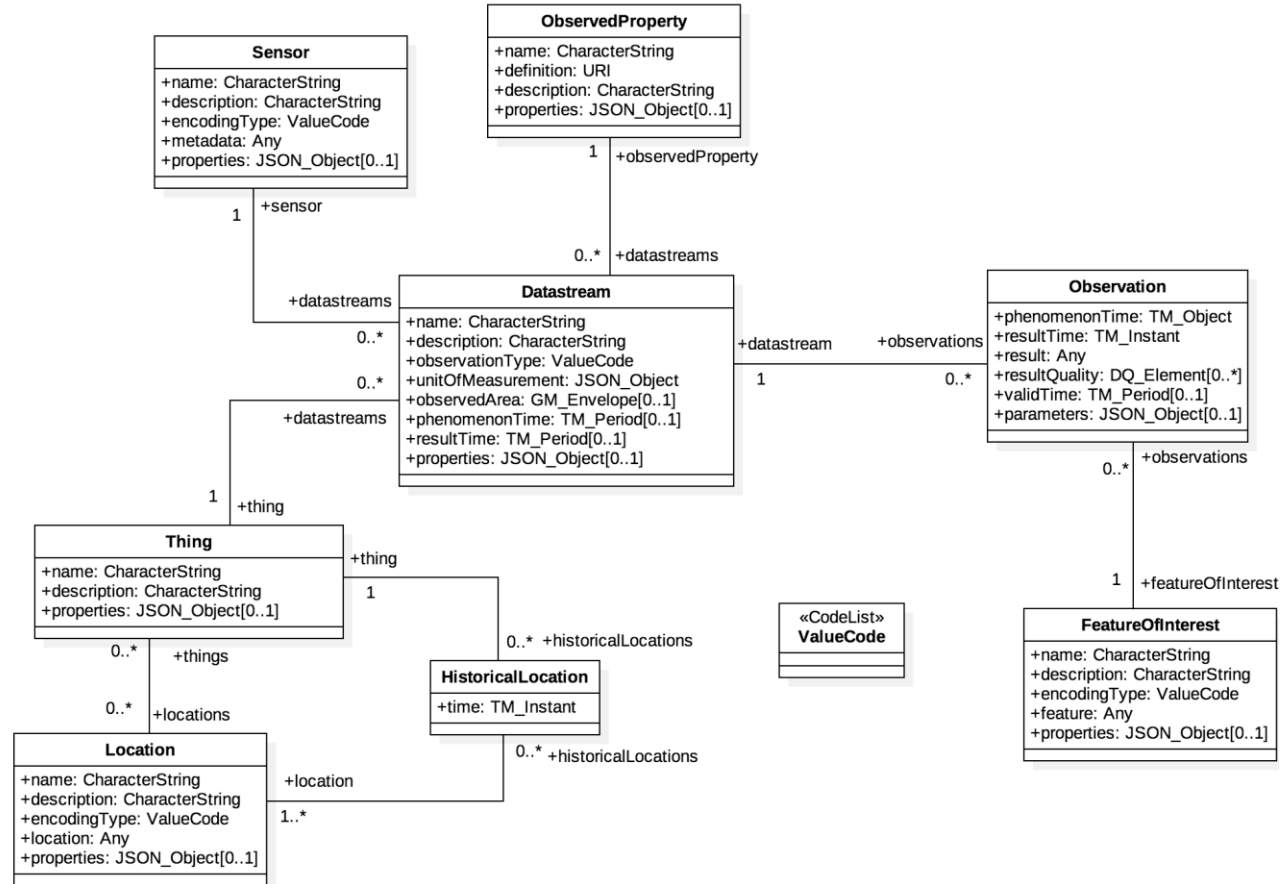
Interoperability



OGC SensorThings API

- Specification of the Open Geospatial Consortium (OGC)
- Lightweight and efficient approach to access (real-time) sensor observations
- Based on REST and JSON
- Important elements
 - Data model for observation data and data streams
 - REST interface for creating, reading, updating and deleting observation data

OGC SensorThings API



Source: OGC, SensorThings API 1.1
<https://docs.ogc.org/is/18-088/18-088.html>

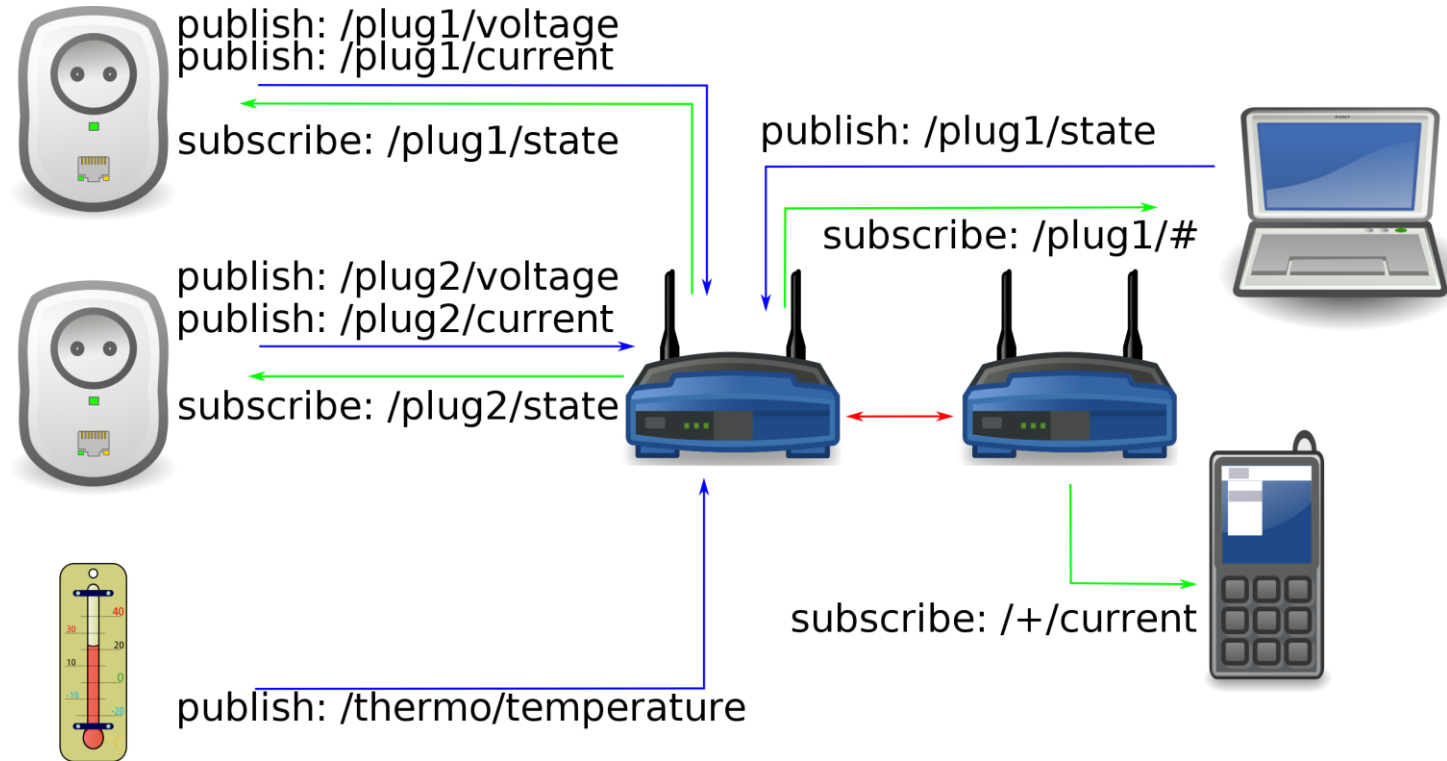
OGC SensorThings API

- Endorsed as an INSPIRE Good Practice
 - <https://inspire.ec.europa.eu/good-practice/ogc-sensorthings-api-inspire-download-service>
- Example:
 - <https://aqsens.52north.org/data/reference/sta/>

MQTT

- MQTT: Message Queuing Telemetry Transport
- Open protocol for the exchange of messages according to the publish/subscribe principle
 - Sender publishes message to broker
 - Recipient subscribes to messages
 - Subscriptions of Topics
 - Sender and receiver are decoupled
- Simple protocol and small header
- Suitable for environments with limited network availability

MQTT




Ademant, [CC BY-SA 4.0](https://commons.wikimedia.org/wiki/File:MQTT_network_topology.png), via Wikimedia Commons

MQTT

- Demo: MQTT Explorer
 - <https://mqtt-explorer.com/>
- <https://data.europa.eu/data/datasets/785d987c-aaff-471d-ae3a-ebcd4c9e23f1?locale=en>

MQTT


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STA MQTT-Broker

GDI-DE

Publisher: Landesbetrieb Geoinformation und Vermessung (LGV) Hamburg

Updated:

i This dataset is not available in your language yet. Translations are ongoing. x

MQTT ist ein Internetprotokoll für die zeitnahe Bereitstellung von Echtzeit- und Sensordaten. MQTT ist Teil der Implementierung der SensorThings API. Mit der Erweiterung SensorThings MQTT können Beobachtungswerte erstellt und an den SensorThings-Dienst übermittelt werden.

MQTT-Broker: iot.hamburg.de

Das Abonnement auf ein Topic erfolgt unter:

- v1.0/Observations ODER
- v1.0/Datastreams({id})/Observations

Ein Beispiel zur Visualisierung der Echtzeitdaten mit MQTT besteht im Masterportal des LGV: <https://www.masterportal.org/>

Distributions (1)

MQTT

The screenshot shows the MQTT Explorer application window. The title bar reads "MQTT Explorer" and the menu bar includes "Application", "Edit", and "View". The main interface is divided into two main sections:

- Left Panel (Tree View):** Displays a hierarchical view of MQTT topics. The root is "iot.hamburg.de", which is expanded to show "v1.1". Under "v1.1", there is a long list of "Datastreams" topics, each followed by its topic name and the number of messages (e.g., "Datastreams(12356) (1 topic, 1 message)"). The first topic in the list is expanded to show a JSON message:


```
Observations = { "@iot.id": "583184958", "phenomenonTime": "2022-04-05T05:12:55.000Z", "result": "1", "resultTime": "2022-..." }
```
- Right Panel (Publish Panel):** Contains controls for publishing messages. At the top, it shows the selected topic "v1.1" and a notification badge with the number "39". Below this, there is a "Value" field and a "History" button. The "Publish" section shows the current topic "v1.1/Datastreams(15400)/Observations" and three radio buttons for message format: "raw", "xml", and "json" (which is selected). A "PUBLISH" button is located at the bottom right of this panel.

Questions for Discussion

- Which types of real-time data, that you do not yet have access to, would be most interesting for you?
- Which difficulties do you encounter when searching for real-time data sets?
- Are you aware of specific technologies that you consider important to deliver real-time data?
- If you discover a real-time data set via data.europa.eu, which kinds of data preview would be most interesting to you (e.g., map-based display, overview of the latest values, diagram to see temporal changes)?

Next steps

- Development of a summary report
- Derive recommendations how data.europa.eu could be enhanced to present real-time data in a most useful way
- Recommendations what should be the plan for data.europa.eu for the future in terms of availability, re-usability and presentation of real-time

Please
provide us
your
feedback!



Please take a minute to help us move forward with the data.europa academy



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Thank you very much!

info@data.europa.eu



data.europa.eu The official portal
for European data

