Real-time data

05 April 2022
10:00-11:30 CET

data.europa.eu academy

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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
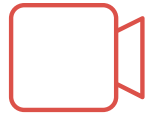- Next steps for writing the report
- Closing

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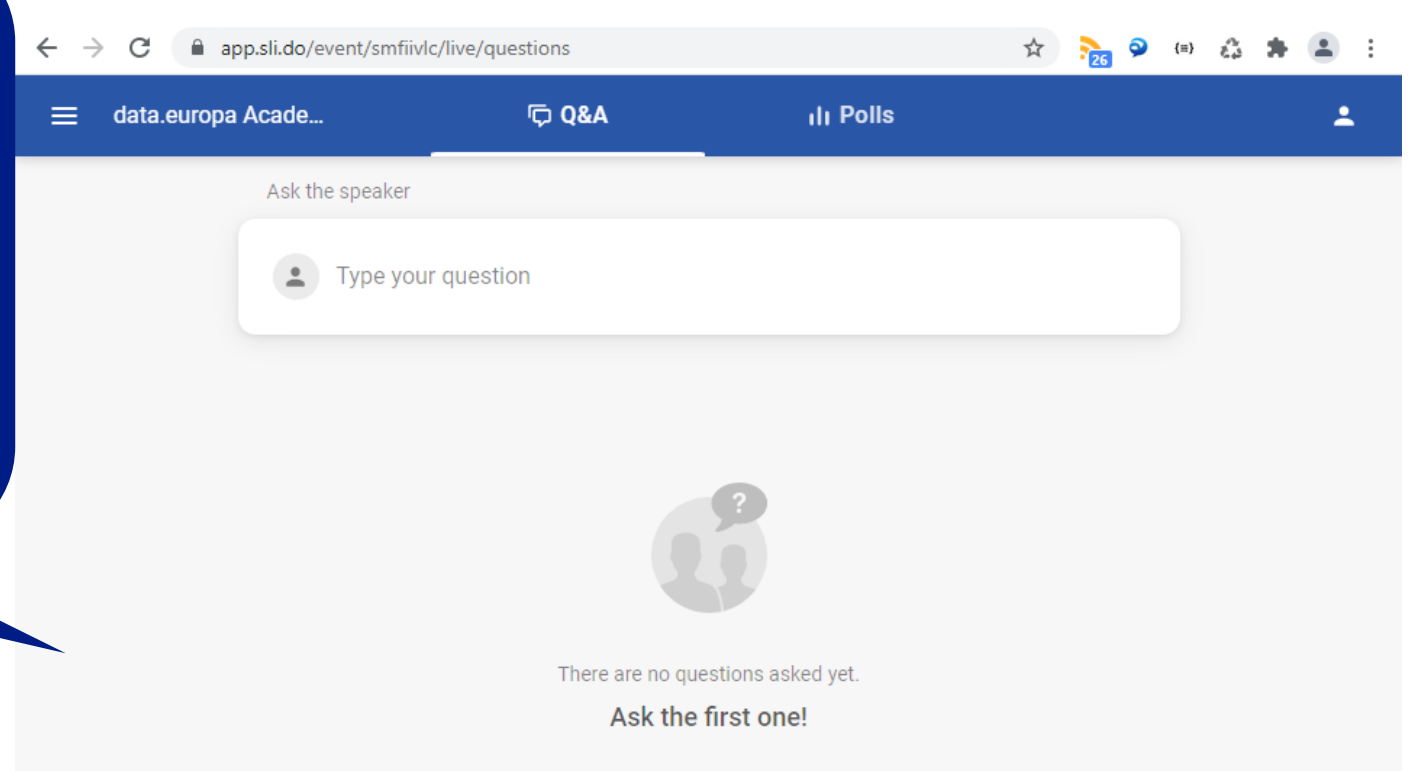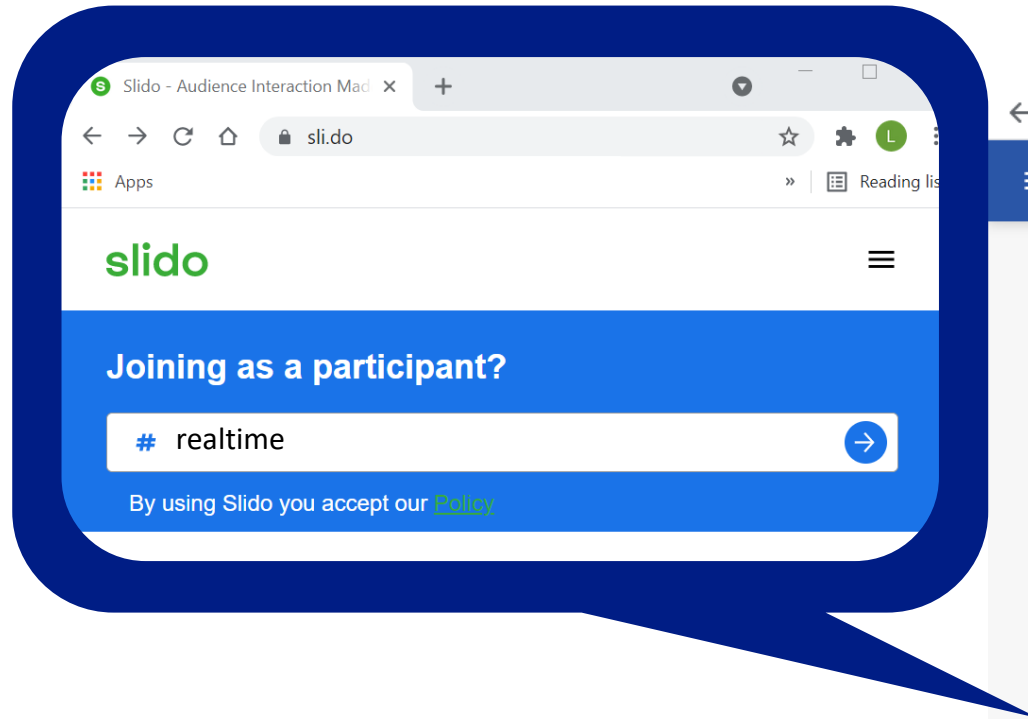
Please reserve 3 min after the training to help us improve by filling in our feedback form

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

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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

data.europa.eu

- Includes metadata from 173 catalogues

- from 36 countries

- Descriptions of more than 1 Mio. 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?

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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

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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
  - …
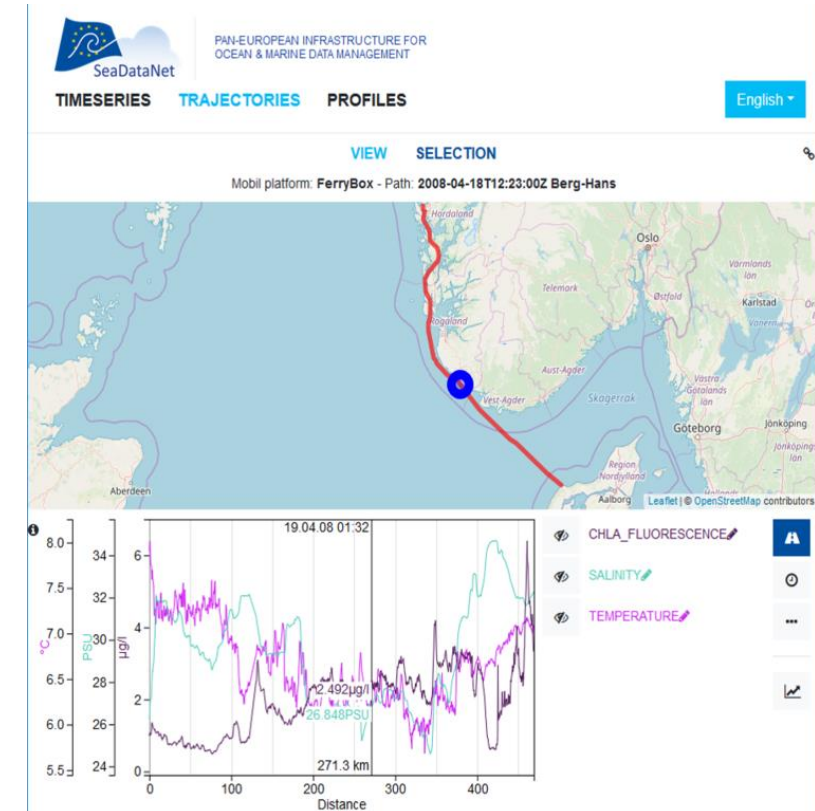
What is Real-Time Data?

- 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?
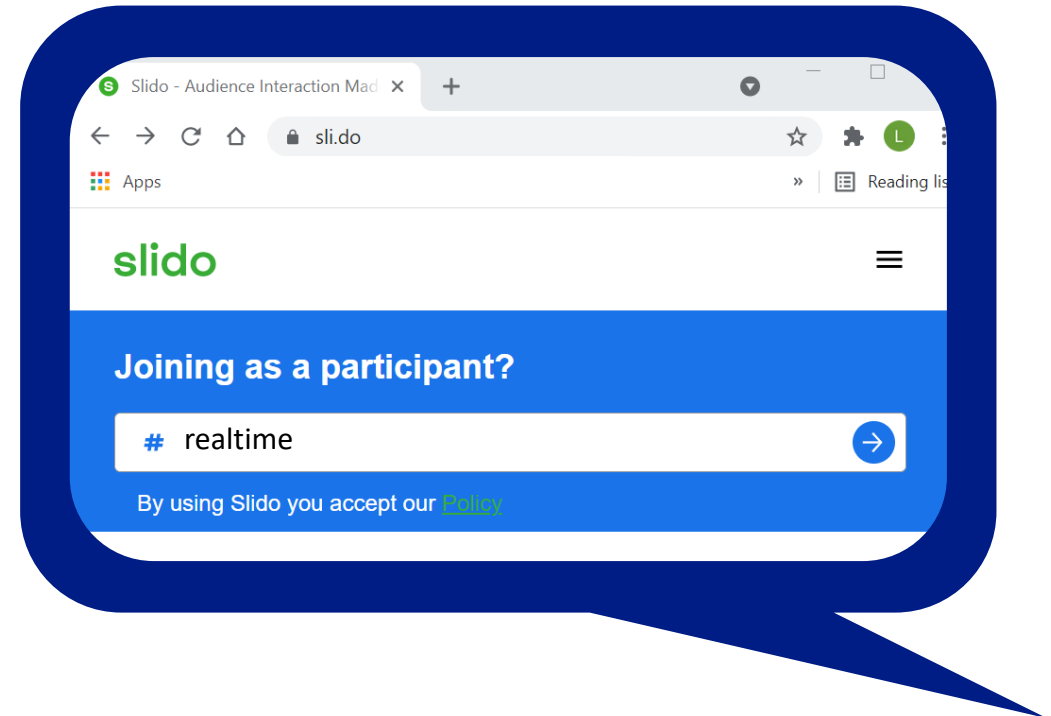
Application Examples

- 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
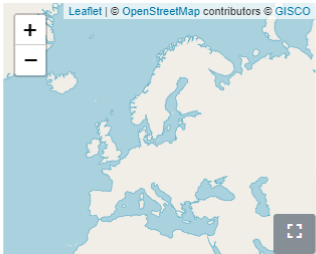

https://github.com/smart-data-models

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

Traffic information

Traffic information

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/

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Hydrological monitoring/flooding
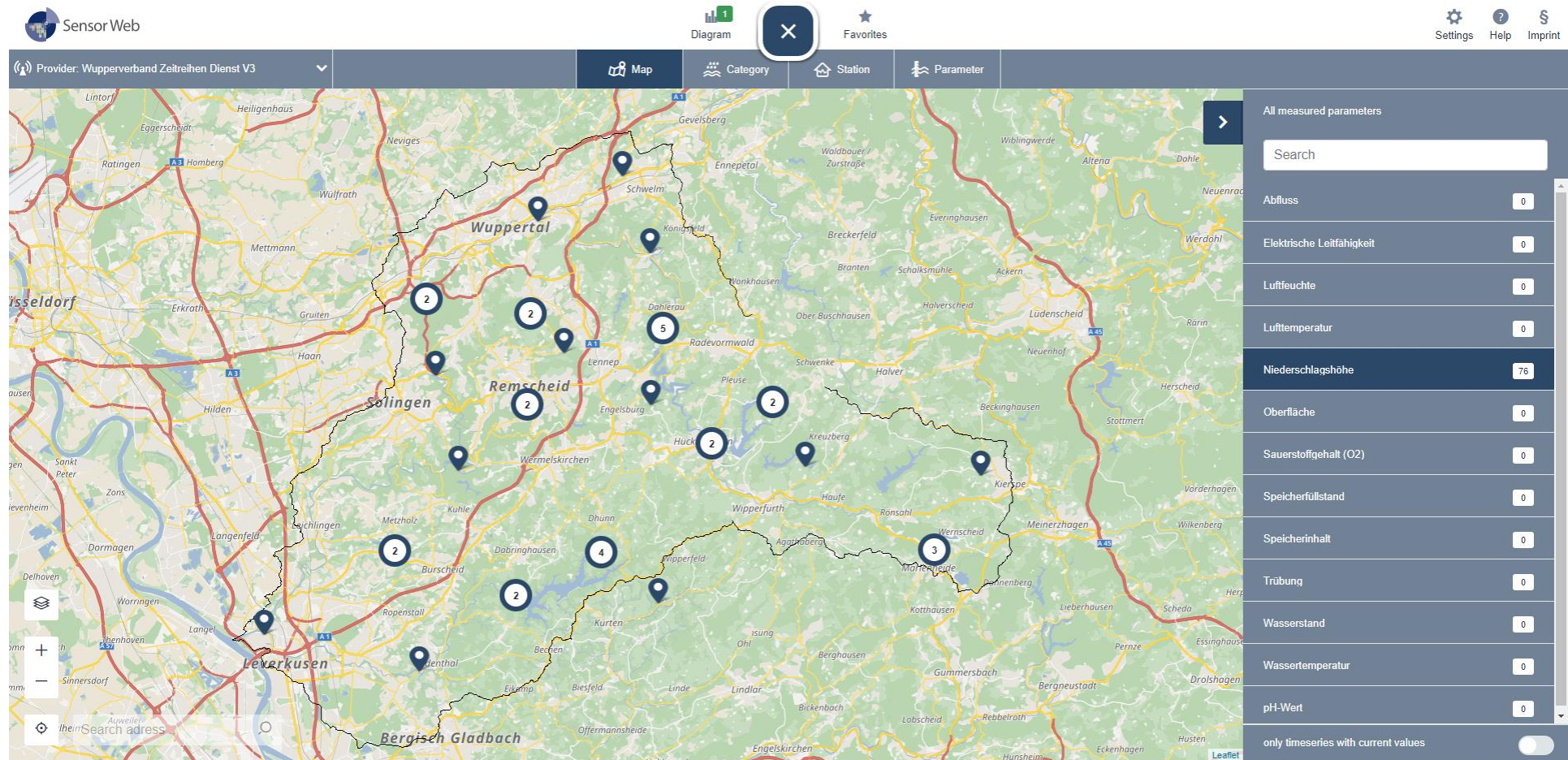
Hydrological monitoring/flooding
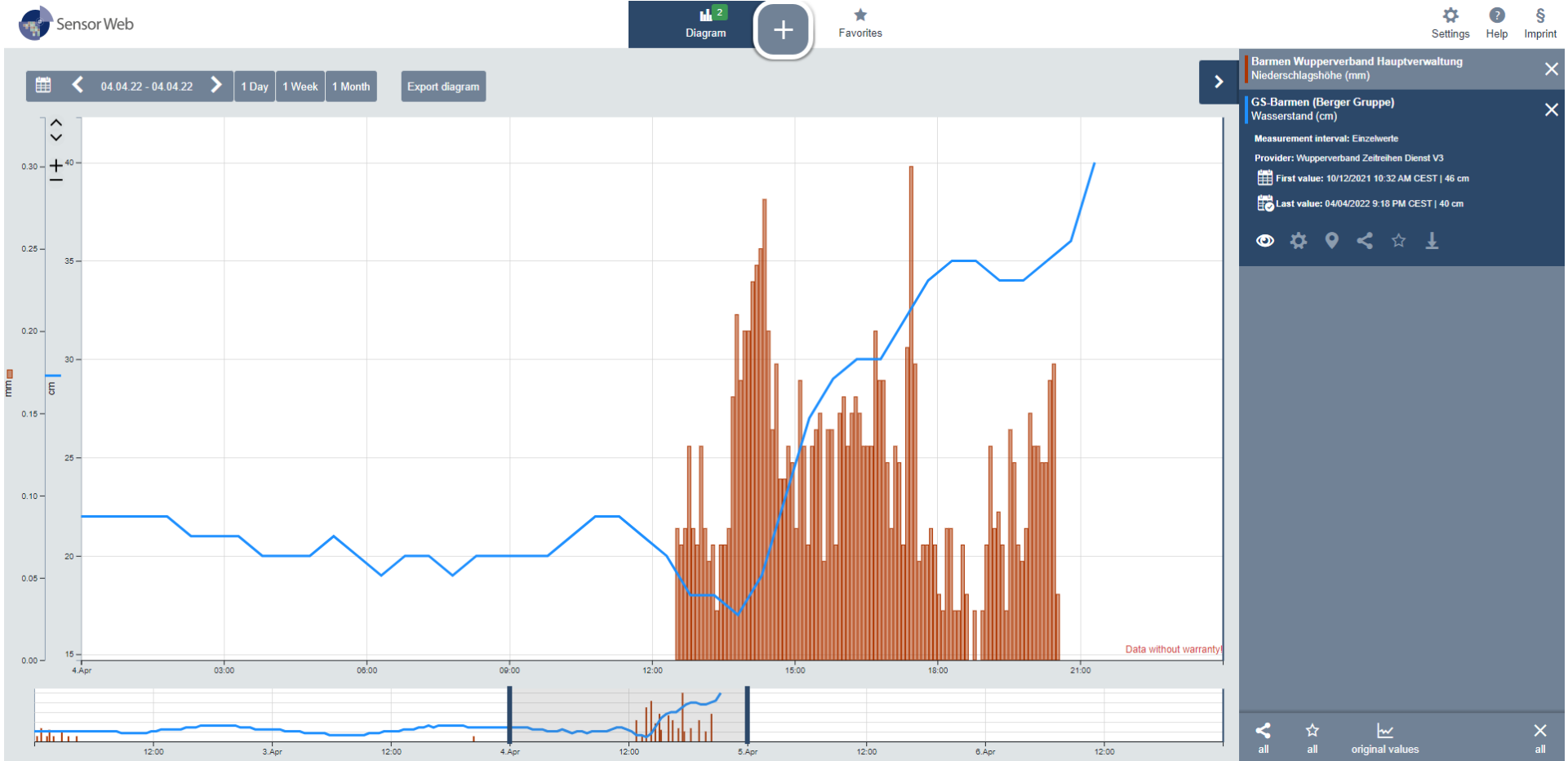
Air quality information

- 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

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Air quality information

Air quality information

Introduction to relevant Technologies

- Interoperability

- OGC SensorThings API

- MQTT

Interoperability
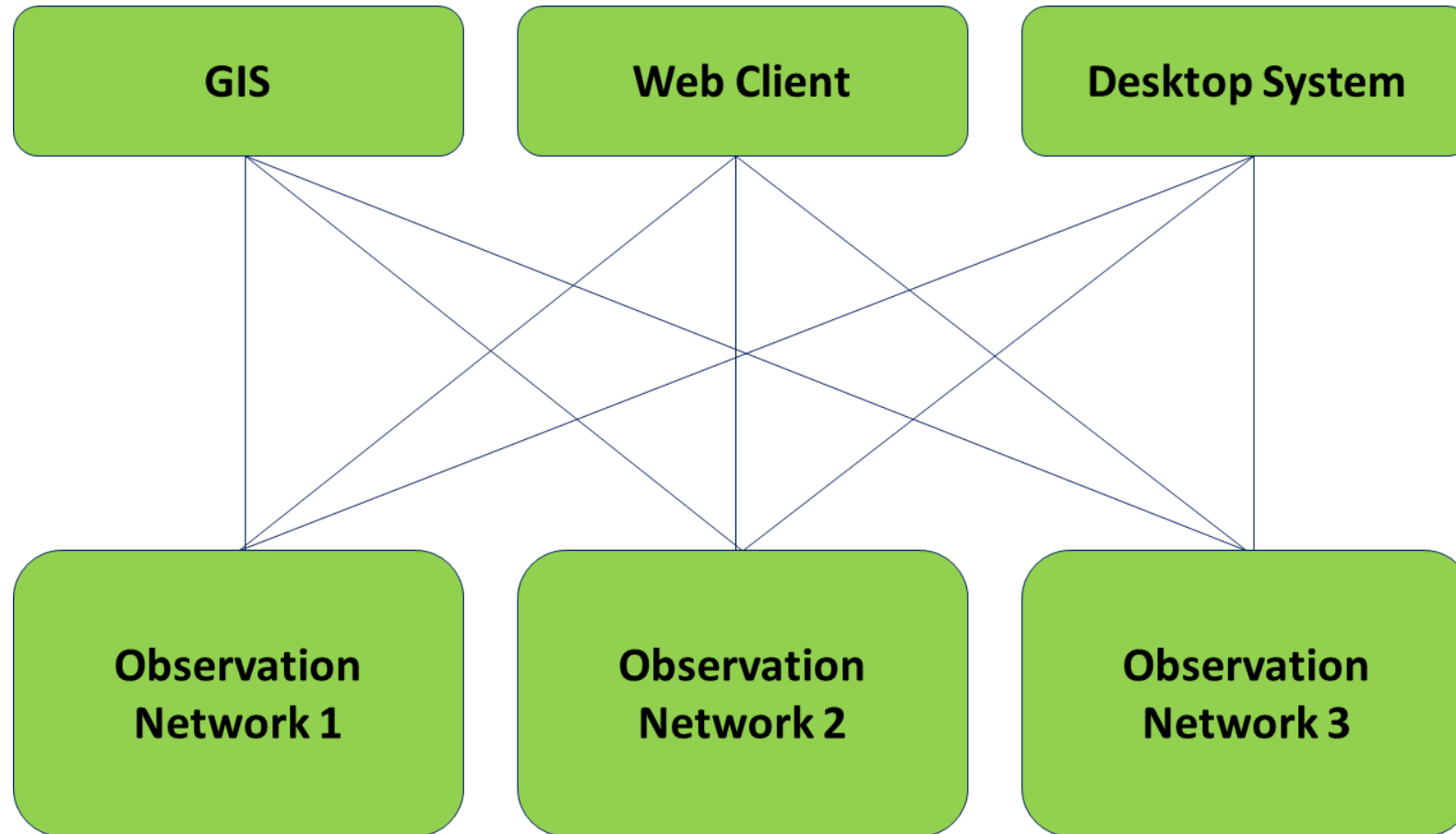
Interoperability
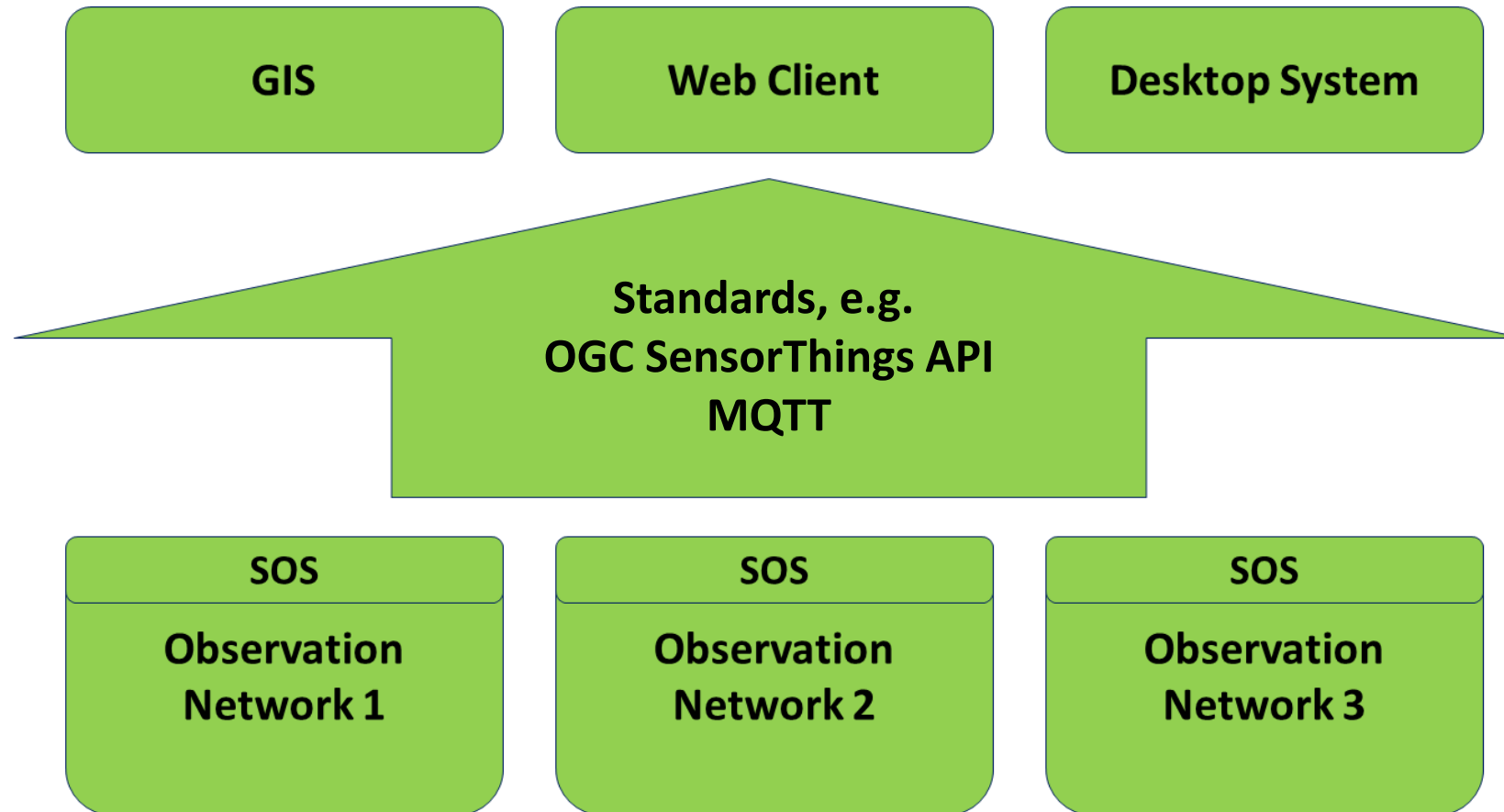
OGC SensorThings API

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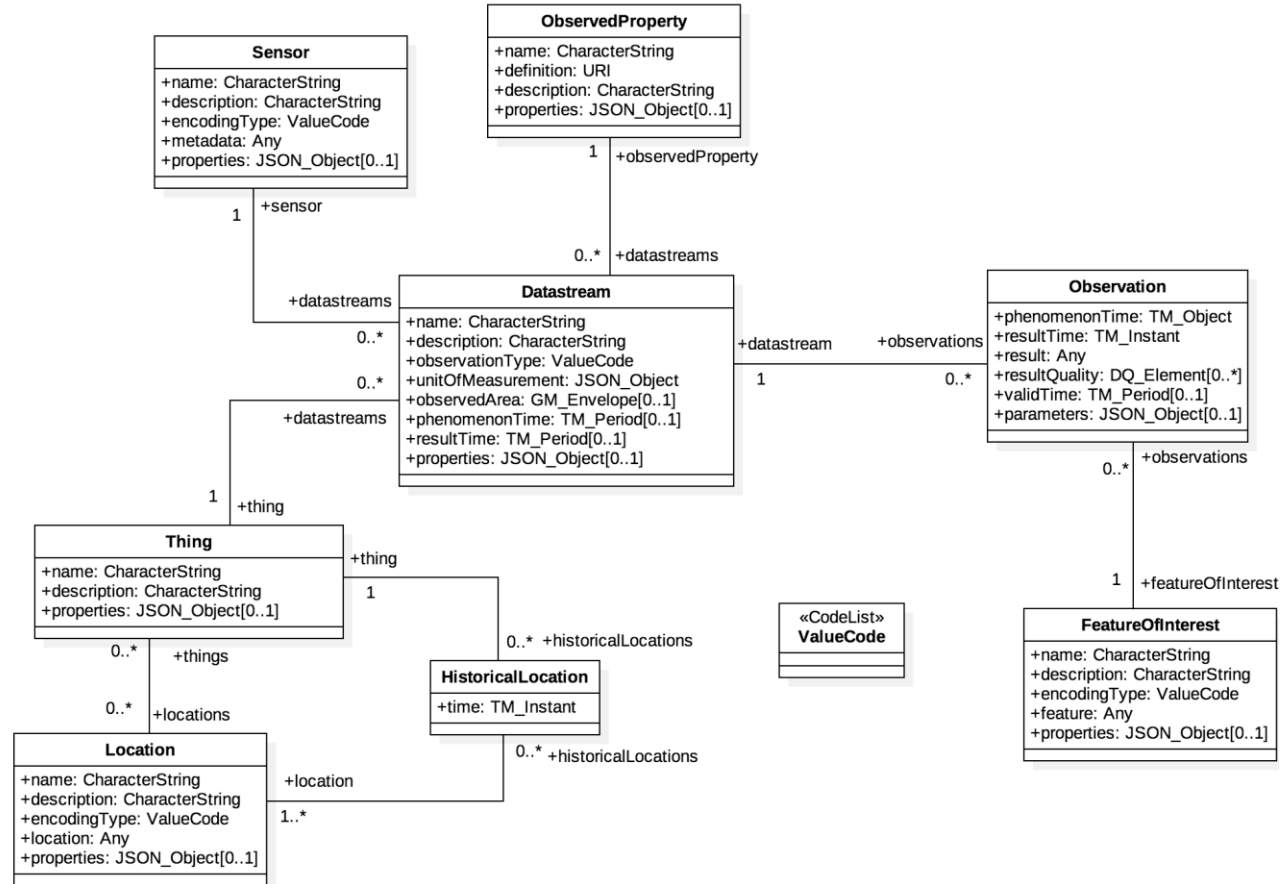
Source: OGC, SensorThings API 1.1
https://docs.ogc.org/is/18-088/18-088.html

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

publish: /plug1/voltage
publish: /plug1/current

subscribe: /plug1/state

publish: /plug1/state

subscribe: /plug1/#

publish: /plug2/voltage
publish: /plug2/current

subscribe: /plug2/state

subscribe: /+/current

publish: /thermo/temperature
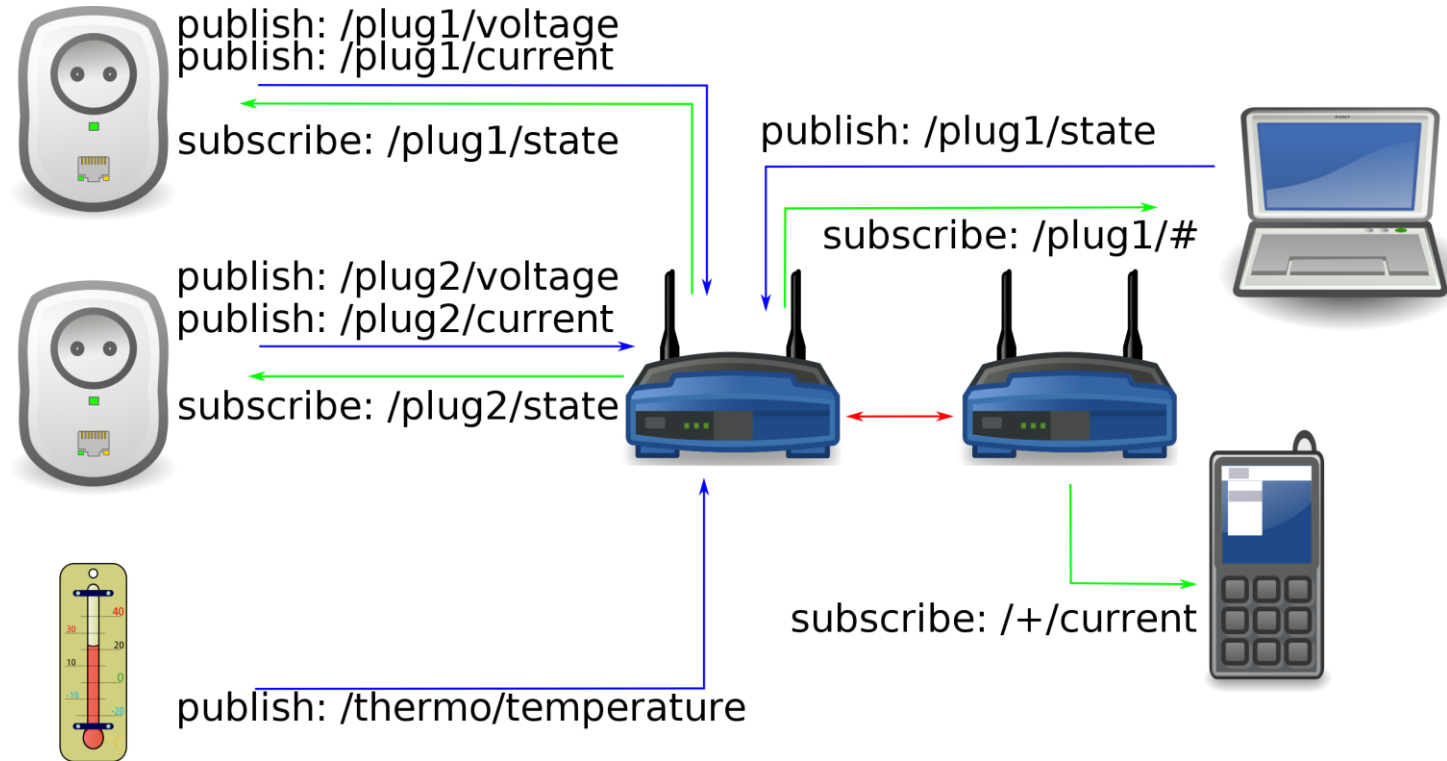
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MQTT

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

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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.   ✕

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 Visualierung der Echtzeitdaten mit MQTT besteht im Masterportal des LGV: https://www.masterportal.org/

Distributions (1)

MQTT

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