



# API4INSPIRE

## Facilitating access to INSPIRE data through standard-based Application Programming Interfaces

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# What is INSPIRE?

- Directive 2007/2/EC establishing an **Infrastructure for Spatial Information** in the European Community
- Covers **34 Spatial Data Themes** grouped into 3 Annexes
- OGC based UML conceptual models created by TWGs, formalized in Implementing Rules (IR), XSD automatically generated
- Implementing Rules also govern metadata, view & download services
- Finalization date for data from Annex II & III fall 2020
- **Current status: >100 000 datasets; ~7,000 institutions** (and rising. Note: To date, most available datasets have not been harmonized)

# Why APIs in INSPIRE?

- State-of-play

- Most services in INSPIRE geoportal are based on W\*S/OWS services
- APIs still emerging within OGC
- Huge interest in APIs within the INSPIRE community
- Few documented implementations of APIs in INSPIRE

- European agenda

- European Strategy for Data
  - Sector-specific data spaces
  - Connecting different actors
- Open Data Directive
  - High-Value Datasets (harmonised, documented and available through APIs)
- INSPIRE MIWP 2020 - 2024
  - Standard-based APIs are one of the means for modernising INSPIRE's technological stack

# Why APIs in INSPIRE?

## APIs provide an excellent opportunity for INSPIRE

### 1) Increase the use of the infrastructure

- INSPIRE → mainstream ICT
- Improve the discoverability through search
  - DWBP and SDWBP
    - *DWBP Best Practice 23: Make data available through an API*
    - *SDWBP Best Practice 12: Expose spatial data through 'convenience APIs'*

### 2) Leverage on grassroots standardisation

- Novel approaches at the OGC (OGC API-Features and SensorThingsAPI)
  - Hackathons
  - Multiple early implementations
  - Co-creation of specifications

# API4INSPIRE

- Implemented under the ISA<sup>2</sup> ELISE Action
  - European Location Interoperability Solutions for e-Government
- Based on demand
  - Requested by MS at the ISA<sup>2</sup> working group on geospatial solutions
- Novel approach
  - Providers on board
  - Learning from hands-on experiences
- Tasks
  - Evaluation Methodology - Benefits & Efforts
  - Deployment Strategies for OGC API - Features & OGC SensorThings API
  - Deployment of API endpoints
  - Guidelines / technologies, lessons learned
  - Provide evidence for INSPIRE Good Practices with these APIs



# API4INSPIRE - Data Providers

- Austrian Meteorological Agency (ZAMG) [AT]
- Austro Control (ACG) [AT]
- Austrian Environment Agency (UBA) [AT]
- European Environment Agency (EEA) [EU]
- City of Hamburg (CH) [DE]
- French Geological Survey (BRGM) [FR]
- Office for Biodiversity (OFB) + "INSIDE" - environmental information systems research center (BRGM+OFB) [FR]
- Environment Agency Baden-Württemberg (LUBW) [DE]



# OGC APIs

- OGC is defining a new set of services to replace the currently used OWS (20 years old)
- These new services are collectively identified as OGC APIs.
- They are Web APIs, sometimes referred to as **RESTful services**.
- Each service is described by an **OpenAPI document**.
- Each of them is geared towards JSON based representations of resources:
  - Other encodings are supported, **e.g. HTML, XML**.
- Each service has a minimal core, and **numerous optional extensions to add functionality**.

Service Capabilities

FEATURES

1.0

IMAGES

1.0

STYLES

1.0

TILES

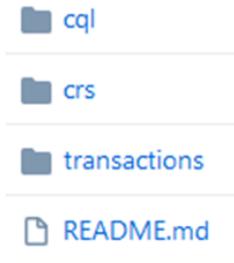
1.0

# OGC API - Features

- Can be found at:  
<https://github.com/opengeospatial/ogcapi-features>
- In addition to OGC API (OAPI) core:
  - **/collection/{collectionId}/items (features)**
  - **/collection/{collectionId}/items/{itemId}**
- Only supported CRS are:
  - CRS84 (WGS84 lon/lat)
  - CRS84h (WGS84 lon/lat/height)
- No mandated schema, features can be anything:
  - Simple (SF-0)
  - Complex (SF-1, SF-2e)



Extensions! Some are already in the making:



# OGC SensorThings API

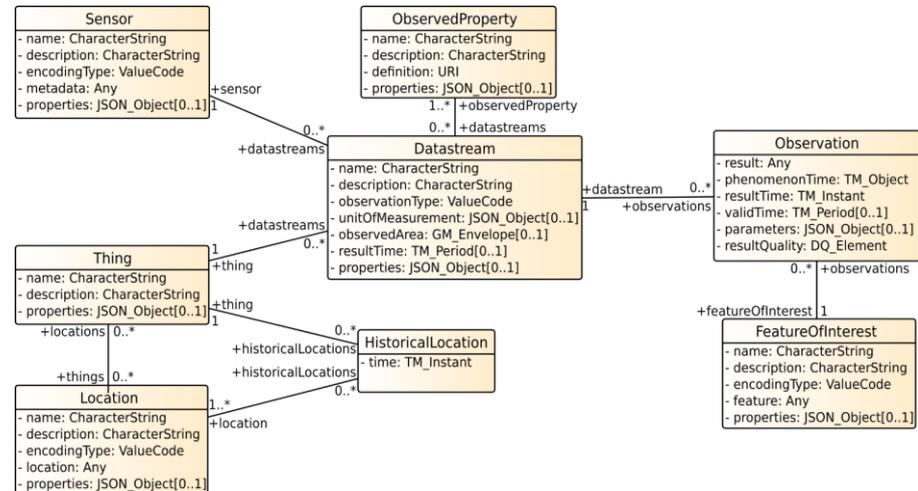


<https://github.com/FraunhoferIOSB/FROST-Server>

The successor to SOS

- REST + JSON + Full Editing
- O&M Based Data Model
  - Extendible properties
- Powerful OData Queries
  - Across the entire data model
  - Composable response data
- Scalable
  - Thousands of stations
  - Millions of observations
- Understandable
  - Follow the links to *all* data

Caveat: In contrast to OGC APIs, OGC SensorThings API is based on the **OData API Model**

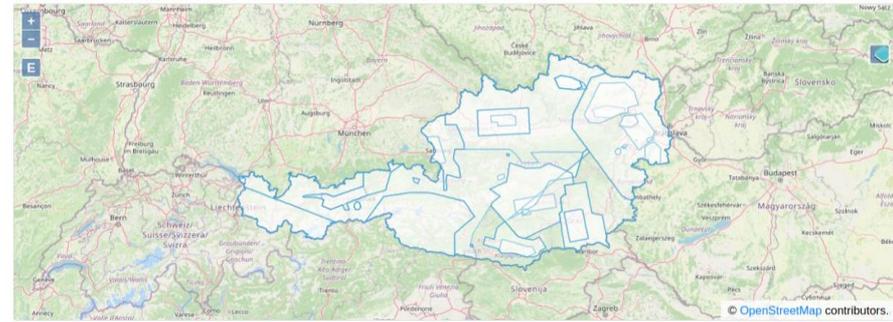


# Data Nests

Sets of colocated and complementary data sources exposed by the APIs under evaluation:

- **Airy Austria**  
Air Transport information complemented by meteorological data
- **Urban Data Platform Hamburg**  
Smart City Sensors together with road transport networks
- **Franco-Germanic Flow**  
Cross-border water: surface & ground, quality & quantity, flood zones
- **Covid ad-hoc**  
Realtime air quality, Covid-19 case data complemented by a background demography layer

# Airy Austria



Air Transport information & meteorological data.

This nest consists of the following data providers and end points:

- **Austro Control** is the air navigation services provider that controls Austrian airspace

WFS2: <https://sdigeo-free.austrocontrol.at/geoserver/tn-a/wfs?service=WFS&version=2.0.0&request=GetCapabilities>

OGC API: <https://inspire.austrocontrol.at/ogcapi/ogc/features>

- **Austrian Meteorological Agency (ZAMG)** has a wide range of expertise at its disposal pertaining to all aspects of meteorological data management and provision



# Urban Data Platform Hamburg



The **City of Hamburg** has long seen the potential of Smart City technology, and been involved in diverse Smart City initiatives, successively extending their smart sensor infrastructure to an ever widening usage area.

Endpoint: <https://iot.hamburg.de/v1.0>

- Charging stations for electric cars
- Bike sharing stations from StadtRad
- Data from the Energy Campus of the Hamburg University of Applied Sciences

Future plans: A Lot!

- Traffic lights, traffic density, etc...

# Franco-Germanic Flow

- The French Geological Survey (**BRGM**) has long been involved in pushing the envelope pertaining to the possibilities of environmental data provision.
- Along with the French Office for Biodiversity (**OFB**) and their joint research center on information system (**INSIDE**), they provide access to (linked) datasets from various French Information Systems on Water, Underground Risk using



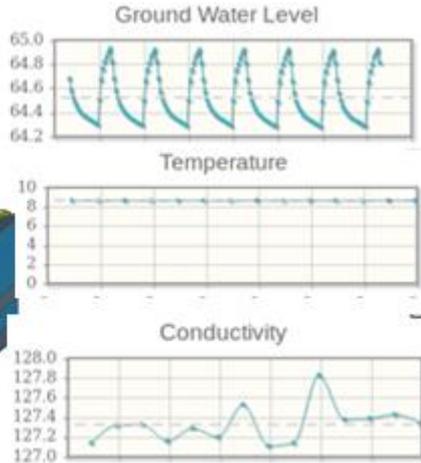
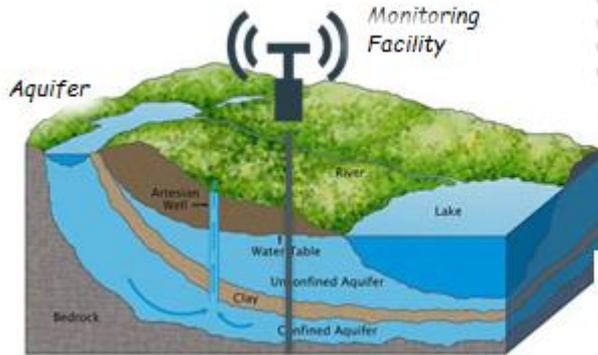
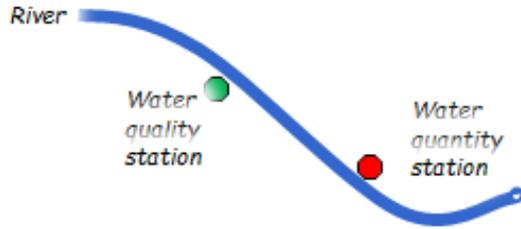
- The Environment Agency Baden-Württemberg – **LUBW** provides diverse water resources within Germany.

STA: <https://lubw-frost.docker01.ilt-dmz.iosb.fraunhofer.de/v1.1>

Viewer: <https://api4inspire.docker01.ilt-dmz.iosb.fraunhofer.de/servlet/is/102/>



# Franco-Germanic Flow



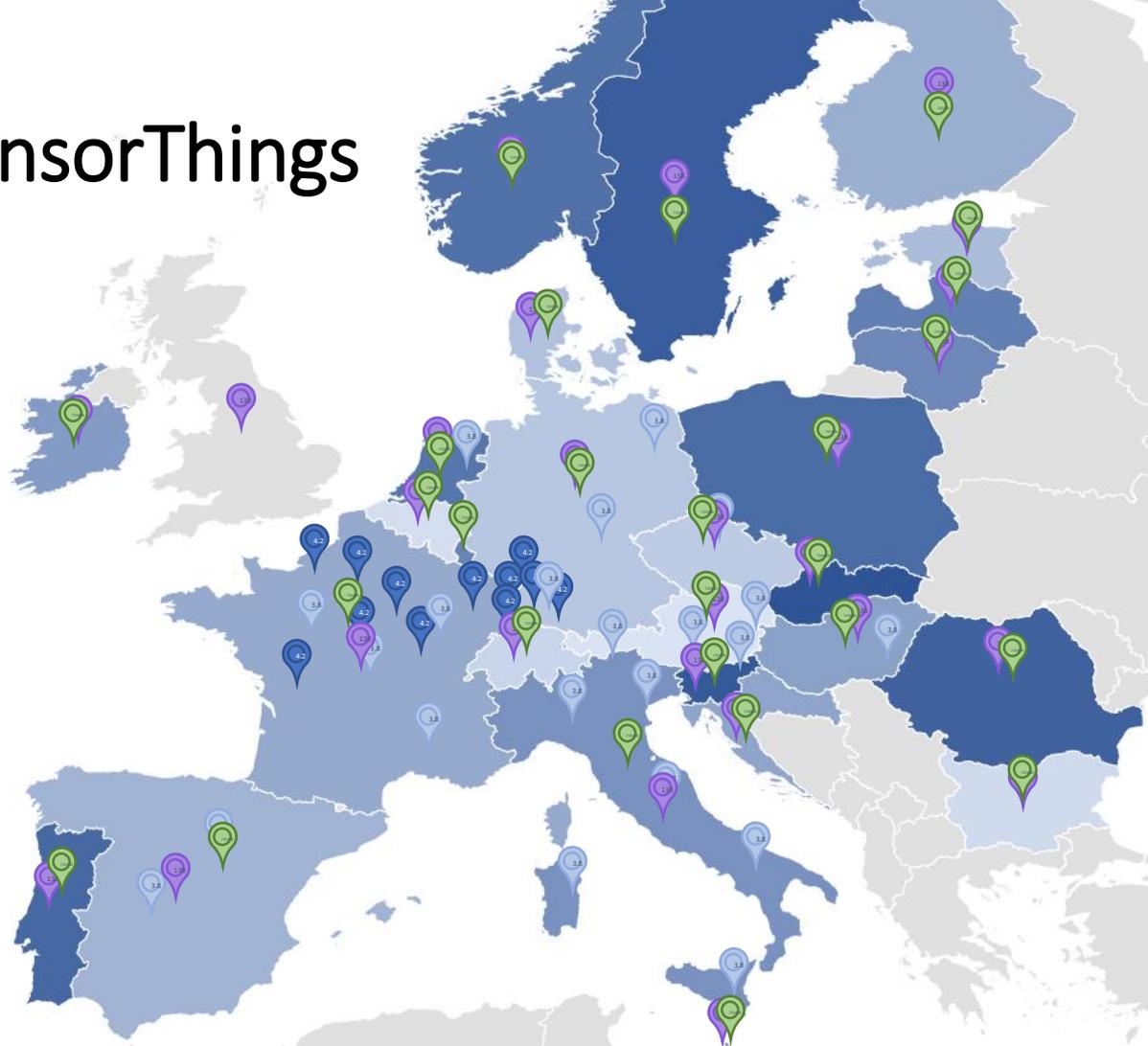
# API4INSPIRE - SensorThings

 HydroThings

 AirThings

 CovidThings

 DemographyThings



# Ad-Hoc Flows

## AirThings

- Data from Umweltbundesamt (AT) and EEA (EU)
- <https://airquality-frost.docker01.ilt-dmz.iosb.fraunhofer.de/v1.1>
- <https://api4inspire.docker01.ilt-dmz.iosb.fraunhofer.de/servlet/is/113/>

## CovidThings

- <http://covidsta.hft-stuttgart.de/server/>

## DemographyThings

- Data from Eurostat DB
- <http://service.datacove.eu/DemographyThings/v1.1>

# Conclusions?

No conclusions yet!

We need guinea pigs!

Further Info: <https://datacoveeu.github.io/API4INSPIRE/>