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 ISA² ELISE Action
  - European Location Interoperability Solutions for e-Government
- Based on demand
  - Requested by MS at the ISA² 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**.
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

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

https://github.com/FraunhoferIOSB/FROST-Server
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/tna/wfs?service=WFS&version=2.0.0&request=GetCapabilities](https://sdigeo-free.austrocontrol.at/geoserver/tna/wfs?service=WFS&version=2.0.0&request=GetCapabilities)
  OGC API: [https://inspire.austrocontrol.at/ogcapi/ogc/features](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:

![BRGM logo](https://example.com)

Pôle INSIDE
INTEROPÉRABILITÉ DES SYSTÈMES D'INFORMATION SUR L'ENVIRONNEMENT

- The Environment Agency Baden-Württemberg – LUBW provides diverse water resources within Germany.
  STA: [https://lubw-frost.docker01.ilt-dmz.iosb.fraunhofer.de/v1.1](https://lubw-frost.docker01.ilt-dmz.iosb.fraunhofer.de/v1.1)
  Viewer: [https://api4inspire.docker01.ilt-dmz.iosb.fraunhofer.de/servlet/is/102/](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/