OGC SensorThings API

INSPIRE Good Practice
OGC SensorThings API

• OGC Standard since 2015, V1.1 update 2019
• Based on O&M Data model (ISO 19156)
• RESTful API following Oasis Odata V4.0
  • Utilizes a slightly different URL pattern than Open API
    but
  • Allows for far more powerful queries
• Adheres to recommendations of W3C Data on the Web Best Practices
• Far easier to deploy and use than SOS
• Explicit queries allow access to required data
• Extended response formats allow for GeoJSON and CSV responses
Relevant Domains (on beyond Sensors)

No data loss in comparison to Excel: https://www.theguardian.com/politics/2020/oct/05/how-excel-may-have-caused-loss-of-16000-covid-tests-in-england
OGC SensorThings API

Sensor

Thermometer

ObservedProperty

Temperature

DataStream

Temp in Room26

Observation

21°

FeatureOfInterest

[18.22998, 49.73265]

Thing

Room26

Location

[18.23, 49.73]
OGC SensorThings API - French Water Depth API

- Sensor: Electronic probe
- ObservedProperty: Water Depth
- DataStream: Water Depth Loire
- Thing: La Loire à Orléans – Quai du Roi
- Location: [1.904788014, 47.897324928]
- Observation: 1.2 m
- HistoricalLocation
- FeatureOfInterest: [1.904788014, 47.897324928]
OGC SensorThings API - French Water Depth API

https://iddata.eaufrance.fr/api/stapiHydrometry/Datastreams(4239)?$top=1000&$select=id,name,unitOfMeasurement,properties,phenomenonTime&orderby=name&$expand=ObservedProperty,Sensor,Thing,Thing/Locations
Realtime Air Quality

https://airquality-frost.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1/Datastreams(75)?$top=1000&$select=id,name,unitOfMeasurement,properties,phenomenonTime&$orderby=name&$expand=ObservedProperty,Sensor,Thing,%20Thing/Locations
Some Demos

Demos

• [https://datacoveeeu.github.io/API4INSPIRE/maps/AirQuality.html](https://datacoveeeu.github.io/API4INSPIRE/maps/AirQuality.html)
• [https://datacoveeeu.github.io/API4INSPIRE/maps/RiversInBw.html](https://datacoveeeu.github.io/API4INSPIRE/maps/RiversInBw.html)
European Demography
Some Queries - Population European Countries

http://service.datacove.eu/DemographyThings/v1.1/Things
  ?$top=10
  &$filter=length(name) eq 2
  &$select=name
  &$expand=Locations($select=location),
    Datastreams(
      $filter=ObservedProperty/name eq 'demo_r_pjanaggr3';
        $select=name;
      $expand=ObservedProperty($select=name, definition),
        Sensor($select=metadata),
        Observations(
          $select=result, phenomenonTime;
          $orderby=phenomenonTime_desc;
          $top=1
        )
    )
  &$resultFormat=geojson
Some Queries - All stations at a river that flows into the Rhine

https://lubw.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1/Things

?$filter=properties/type eq 'station'

and

properties/gewaesser.Location/properties/sink.Location/name eq 'Rhein'

&$resultFormat=geojson
SensorThings API Endpoints

• **Water:**
  - Surface Water Quantity (FR): [https://iddata.eaufrance.fr/api/stapiHydrometry/v1.1](https://iddata.eaufrance.fr/api/stapiHydrometry/v1.1)
  - Surface Water Quality (FR): [https://sensorthings-wq.brgm-rec.fr/FROST-Server/v1.0](https://sensorthings-wq.brgm-rec.fr/FROST-Server/v1.0)
  - Water (DE): [https://lubw.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1](https://lubw.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1)

• **Air Quality** - Near-real-time air quality across Europe, data from both national sources (harvested from AT SOS and WFS) and Europe (EEA): [https://airquality-frost.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1](https://airquality-frost.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1)
  - Reuse by Windy: [https://www.windy.com/fr/NO2?camsEu,no2,47.905,1.908,5](https://www.windy.com/fr/NO2?camsEu,no2,47.905,1.908,5)

• **Smart Cities** - Urban Data Platform Hamburg: [https://iot.hamburg.de/v1.1](https://iot.hamburg.de/v1.1)

• **Demography** - Based on European NUTS regions, data from Eurostat: [https://demography.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1](https://demography.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1)

• **Covid Case Data** - harvested from various sources including Johns Hopkins and RKI: [http://covidstat.stuttgart.de/server/v1.1](http://covidstat.stuttgart.de/server/v1.1)

**User base expanding**, example France:
- BRGM (French Geological Institute)
- French Office for Biodiversity
- INRAe: Soil
- IFREMER: marine
- Highly interested: MNHN and IGN France (mapping agency)
Conclusions

• SensorThings API is being increasingly deployed
• Far easier to deploy and use than SOS
• Data model isomorph to O&M, thus compatible to INSPIRE data specifications
  • "Extending INSPIRE to the Internet of Things through SensorThings API"
    doi:10.3390/geosciences8060221
• Map based visualization still in development
  • STAM provides simple mapping support
    https://github.com/DataCoveEU/STAM
  • Grafana support:
    https://grafana.com/grafana/plugins/linksmart-sensorthings-datasource

More examples and demos at:
https://datacoveeu.github.io/API4INSPIRE/

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Thanks for your Attention!

Kathi Schleidt
Kathi@DataCove.eu

Hylke van den Schaaf
hylke.vanderschaaf@iosb.fraunhofer.de