

INSPIRE Good Practice: OGC SensorThings API

Name of the GP

OGC SensorThings API

Description of the GP

To date, the Sensor Observation Service (SOS) has been utilized for direct access to measurement data in INSPIRE. In the quest for simpler access methods, we are proposing the use of the OGC SensorThings API (STA) as an alternative, pertaining both to the data and service specifications. We have shown how full compliance with the data requirements ensuing from both the INSPIRE EF Theme as well as the underlying Observational Model from the GCM can be met in our publication “Extending INSPIRE to the Internet of Things through SensorThings API” doi:10.3390/geosciences8060221.

In order to show the practical applicability of a STA based INSPIRE download service, several STA systems must be deployed by MS. At present, STA endpoints have been created for the following environmental and related domains:

- Water (France & Germany):
 - Ground Water
 - Surface Water Quantity
 - Surface Water Quality
- Air Quality - Near-real-time air quality across Europe, data from both national and Europe
- Smart Cities - Urban Data Platform Hamburg
- Demography - Based on European NUTS regions, data from Eurostat
- Covid-19 Case Data

This overview shows the degree of flexibility available when utilizing STA. While initially designed to bridge the gap between the spatial and IoT domains, the potential for reuse far beyond sensors becomes apparent.

INSPIRE component(s)

This Good Practice pertains to data encoding as well as to network (download) services, while greatly enabling data sharing.

Pertaining to data encoding, the underlying STA data model, while isomorph to the OGC O&M data model upon which the INSPIRE observational models, does have some subtle differences, requiring reconfiguration of the O&M based INSPIRE data specifications.

However, due to the isomorphism between these data models, the fact that the STA data model was derived from the O&M model, a lossless transposition of data can be assured.

Pertaining to network (download) service requirements, STA utilizes a REST based API approach modelled on the OData standard. In addition to fulfilling the core requirements laid down by INSPIRE pertaining to download services, the OData approach allows for the formulation of complex queries tailored to the complexity of the underlying data model, thus allowing users more direct access to the data they require than previously possible.

References

Normative reference

- [SensorThings API Part 1: Sensing](#)
- [OGC SensorThings API Part 1: Sensing Version 1.1](#)
- [OGC 10-004r3 and ISO 19156:2011\(E\), OGC Abstract Specification Topic 20: Geographic information — Observations and Measurements](#)
- [OASIS OData Version 4.0 Part 1: Protocol Plus Errata 02](#)
- [OASIS OData Version 4.0 Part 2: URL Conventions Plus Errata 02](#)
- [OASIS OData JSON Format Version 4.0 Plus Errata 02](#)
- [OASIS OData ABNF Construction Rules Errata 02](#)

Other references

- ["Extending INSPIRE to the Internet of Things through SensorThings API" doi:10.3390/geosciences8060221](#)
- [STA as a INSPIRE Download Service](#)
- [API4INSPIRE](#)

Relevance & expected benefits

The adoption of the OGC SensorThings API standard as an INSPIRE Download service would provide a modern approach for the exposure of dynamic geospatial data that adheres to the recommendations of the [W3C Data on the Web Best Practices](#). Both implementers of INSPIRE and users of the data would benefit from the powerful, yet simple approach for data sharing.

In contrast to the previously utilized OWS, deployment of STA is far easier and less resource intensive than SOS, while use of the JSON encoded data is far more in line with modern development paradigms.

Intended Outcome

- Technical guideline for setting up INSPIRE Download services based on the OGC SensorThings API standard
- Implementation evidences

Evidence of implementation & support

- Water:
 - Ground Water (FR):
<https://sensorthings.brqm-rec.fr/SensorThingsGroundWater/v1.0>
 - Surface Water Quantity (FR):
<https://iddata.eaufrance.fr/api/stapiHydrometry/v1.1>
 - Surface Water Quality (FR):
<https://sensorthings-wq.brqm-rec.fr/FROST-Server/v1.0>
 - Water (DE):
<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>
- Smart Cities - Urban Data Platform Hamburg:
<https://iot.hamburg.de/v1.0>
- Demography - Based on European NUTS regions, data from Eurostat:
<https://demography.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1>
- Covid Case Data, harvested from various sources including Johns Hopkins and RKI:
<http://covidsta.hft-stuttgart.de/server/v1.1>

Limitations

Seamless integration with OGC API – Feature instances still work-in-progress, with issues arising due to the underlying service models, OData vs. Open API. This pertains to potential overlaps between the resources provided by the different API types, as in many use cases the same data resource must be exposed by both APIs. The OGC Interoperability Experiments [ELFIE and SELFIE](#) have provided a way forward, now being prototyped through [API4INSPIRE](#).

Executable tests and validation of OGC API – Feature instances are also not covered in this good practice as they will be dealt with within the context of the work on the INSPIRE Reference validator.