



SensorThings API in INSPIRE Good Practices

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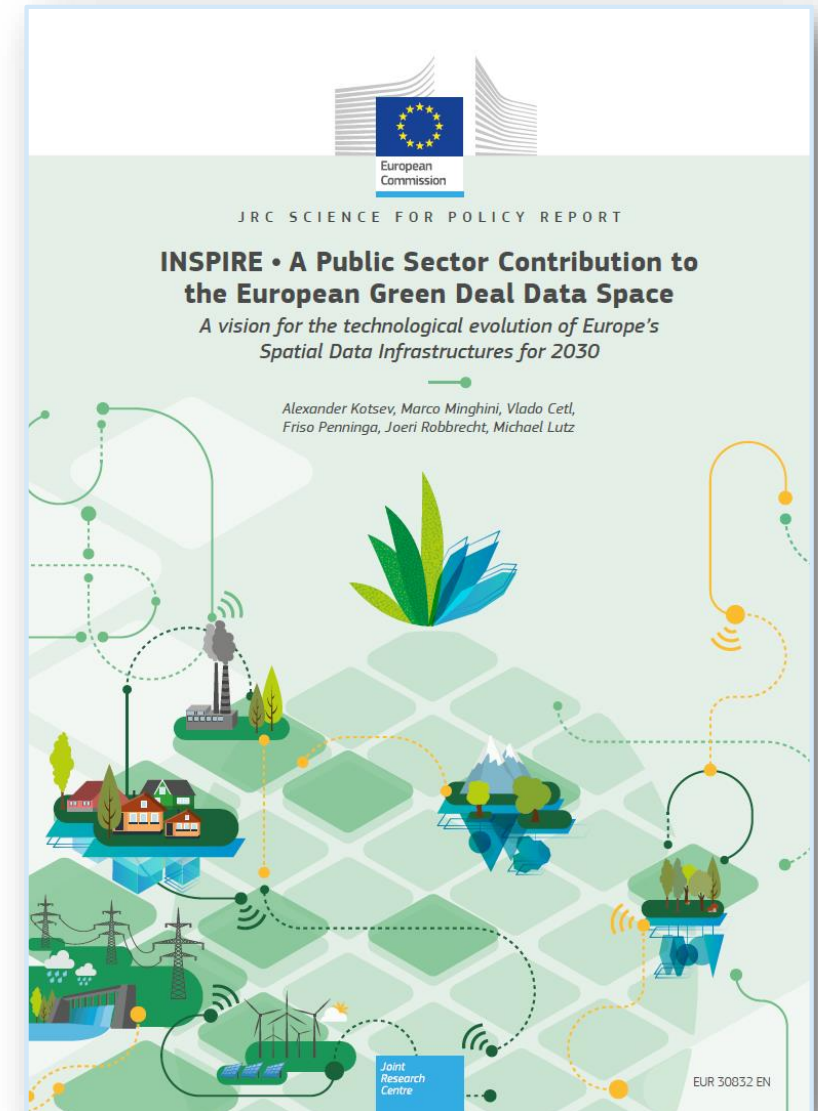
Workshop 3

FAIR solutions for dynamic sensor
data: OGC SensorThings API

Modernisation of INSPIRE

- 2021 JRC outlook on how to modernise **INSPIRE** from the organisational and technological perspectives, by:
 - reflecting on **lessons learnt** from the first 15 years of implementation
 - assessing the new **political and technological** context
 - **Green Deal & data spaces**
 - disruptive **technological trends** around (geo)data
 - developing a **vision** for the future and **actions** to achieve it

<https://publications.jrc.ec.europa.eu/repository/handle/JRC126319>



The possible future of INSPIRE

- Data sharing is **not a goal in itself**. To remain fit for purpose, INSPIRE should support data-driven decision-making and innovation.
- To be sustainable, INSPIRE should **'blend in' with the broader ecosystem** of spatial and non-spatial data, infrastructures, technologies and policies.
- This will mean **opening up to a broader community** of implementers and users and to a wider range of applications and use cases.
- Making the INSPIRE framework more **flexible and agile** will significantly lower the entry level to the sharing and utilisation of data.
- Technical **approaches need to be simplified** by reusing well-adopted standards and technologies.

Actions

- Legal:

1. Avoid **overspecification** in legislation
2. Use a **simple licensing framework**

- Organisational:

1. Embrace **co-design** by default
2. Rethink the existing **governance** structures
3. Adopt an **ecosystem** approach

- Technological:

1. Continue to improve the **discoverability** and **accessibility** of data
2. Ensure **neutrality** and embrace well-adopted standards and technologies
3. Avoid **custom extensions**
4. Embrace well-documented, **standard-based APIs**
5. Optimise data for **search engines**
6. Leverage on the developments of **federated European cloud infrastructure**

INSPIRE Good Practices

WHY • Introduced to **modernise** and add value to the infrastructure

WHAT • Leverage


- new **technologies**, **standards** & **approaches** for data encoding/sharing
- **experiences** gained from implementations

Good Practice Library	
Good Practice documents	
Candidate	Endorsed
GeoPackage encoding of INSPIRE datasets	GeoDCAT-AP
Data-Service Linking Simplification	SDMX for Human Health and Population Distribution
	OGC API – Features as an INSPIRE download service
	OGC SensorThings API as an INSPIRE download service
	Building one access point to dispersed data sources
	Making spatial data downloadable via WMS services
	OGC compliant INSPIRE Coverage data and service implementation

<https://inspire.ec.europa.eu/portfolio/good-practice-library>

INSPIRE Good Practices

WHO

- Based on an **agile** process:
 - **community-initiated/driven**
 - using **online collaborative platforms** 

HOW

- According to a step-wise procedure:
 1. **initiation**
 2. **submission as good practice candidate** to the MIG-T
 3. **outreach**
 4. **submission as a good practice** to the MIG
 5. **legal scrutiny**
 6. **feedback**

Good Practice on OGC SensorThings API

- OGC SensorThings API (STA) as an **INSPIRE** download service:
 - modern **alternative** to OGC SOS to serve measurement data
 - aligned to the recommendations of the **W3C Data on the Web Best Practices**
- Specifications for **data** & **services**:
 - **encoding**: STA data model compliant with requirements from the EF data theme and the observation model from the INSPIRE Generic Conceptual Model
 - **sharing**: STA uses a REST-based API approach modelled on the **Open Data Protocol** standard that fulfills INSPIRE core requirements for download services

Good Practice on OGC SensorThings API

OGC SensorThings API as an INSPIRE download service

To date, the OGC Sensor Observation Service (SOS) has been utilised for direct access to measurement data in INSPIRE. In the quest for simpler access methods, use of the OGC SensorThings API (STA) is proposed as an alternative, pertaining both to the data and service specifications. It is shown to be in full compliance with the data requirements ensuing from both the INSPIRE EF Theme as well as the underlying Observational Model from the GCM as described in a dedicated publication .

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

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 is built, 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 loss

Pertaining to network (download) service requirements, STA utilises a the [OData standard](#). In addition to fulfilling the core requirements laid services, the OData approach allows for the formulation of complex qu underlying data model, thus allowing users more direct access to the d

<https://inspire.ec.europa.eu/good-practice/ogc-sensorthings-api-inspire-download-service>

Extending INSPIRE to the Internet of Things through SensorThings API

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§ The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

Geosciences **2018**, *8*(6), 221; <https://doi.org/10.3390/geosciences8060221>

<https://github.com/INSPIRE-MIF/gp-ogc-sensorthings-api>

gp-ogc-sensorthings-api

Good Practice document for INSPIRE download services based on OGC SensorThings API

Overview of work pertaining to INSPIRE

For compliance with INSPIRE, data providers must demonstrate compliance with the INSPIRE Implementing Rules. Pertaining to the data requirements towards download services, we have shown alignment between STA V1.1 and both INSPIRE Environmental Monitoring Facilities and the Observational model in our publication on "[Extending INSPIRE to the Internet of Things through SensorThings API](#)" doi:10.3390/geosciences8060221

Data Alignment - Matching tables

The Excel Sheet [INSPIRE SensorThings Matching](#) provides a good basis for the alignment of an existing data source with the requirements from STA and INSPIRE

EC INSPIRE Documents

[Specification Implementing Rules](#)

[Specification Technical Guidelines](#)

Services Alignment

alify STA as an INSPIRE Download Service, the requirements laid down in the Implementing Rules for ces (IR NS) must be fulfilled. To simplify this task, a Google Sheet has been created detailing the IR together with STA implementation options. Should IR requirements be identified that cannot be STA 1.0, proposals for extension in STA 1.1 should be provided.

uirements as pertains to STA are available at [INSPIRE IR NS - STA](#), please request edit rights

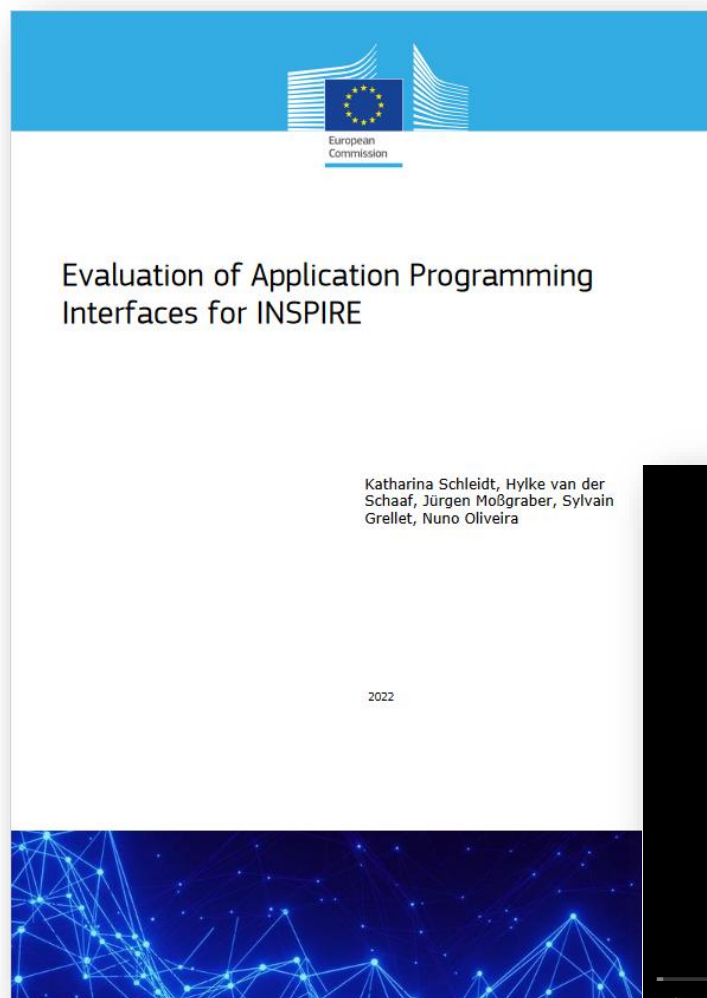
Documents

[ork Services Implementing Rules](#)

[ork Services Technical Guidelines](#)

<https://www.mdpi.com/2076-3263/8/6/221>

The API4INSPIRE project



<https://publications.jrc.ec.europa.eu/repository/handle/JRC128885>

API4INSPIRE

The EC has a long history of promoting open access to public data across Europe, breaking down electronic barriers at national borders through the creation of common data and service models, as well as through the provision of accompanying legislation facilitating such endeavours. The [INSPIRE Directive](#) has been a core building block in this work, which has been further elaborated within the “[European Union Location Framework \(EULF\)](#)” and “[A Reusable INSPIRE Reference Platform \(AR3NA\)](#)”

API4INSPIRE serves to investigate new developments in geospatial standards and technologies, foremost the new [OGC API – Features](#) and [SensorThings API](#) standards, together with the outcomes of the [INSPIRE MIG Action 2017.2 on alternative encodings for INSPIRE data](#). For this purpose, an evaluation strategy has been developed suited to determine how these new and emerging standards can best be utilized to leverage existing investments by EU Member States in the INSPIRE implementation.

For the provision of data via OGC API – Features, our most common deployment option is [GeoServer](#) with the OGC API extension. For cases where GeoServer is not used or where we do not have access to provider infrastructure, [LD-Proxy](#) is utilized to transform data available via WFS2. In addition, the OGC API – Simple server has been developed within the API4INSPIRE project; this simple implementation allows for provision of simple features in accordance with SF-O. For the provision of SensorThings API, we utilize the [Fraunhofer Open Source SensorThings \(FROST\) Server](#).

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



ELISE Workshop: SensorThings API brings Dynamic Data to INSPIRE (Part 1/3)

<https://joinup.ec.europa.eu/collection/elise-european-location-interoperability-solutions-e-government/event/elise-workshop-sensorthings-api-brings-dynamic-data-inspire>



Next steps

- From the INSPIRE side:
 - support for STA-based download services in the [INSPIRE Geoportal](#)
 - addition of test suites to check compliance of STA implementations in the [INSPIRE Reference Validator](#)
 - endorsement of [JSON/GeoJSON](#) as an INSPIRE Good Practice
<https://github.com/INSPIRE-MIF/gp-geojson-encodings>
- For the USAGE Consortium:
 - showcase [implementation](#)
 - provide [feedback](#) on the Good Practice

Thank you!



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