Geonovum Handreiking - Werkversie

OGC API Features Guideline

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Abstract

This document is a guideline for Dutch INSPIRE data providers who want to use OGC-API-Features to fulfil their INSPIRE obligations for download services. The guideline has been written on the bases of the experience gained from 4 Dutch example implementations of OGC-API-Features of INSPIRE datasets on test beds. The aim of setting up these test beds and this guideline, has been to stimulate the Dutch INSPIRE data providers and hosting organizations to start publishing INSPIRE data as OGC API Features. By doing this, a greater goal is reached: A better use of Inspire data. Secondly it hopes to contribute to the Inspire community.

A general recommendation to all parties involved is to adjust as much as possible to the INSPIRE requirements as stated in this document. The most important recommendations for the hosting organizations is to stimulate data providers to start with OGC API features to increase the use of the INSPIRE data. Data providers are recommended to first orientate on the possible work of other data providers in this field. A roadmap is described with the steps needed to be taken by INSPIRE data providers. OGC API features use simple encodings as input and output. For the interoperability, it is important that all member states use the same encoding rules. The INSPIRE

community therefor needs a central organization for the mapping of the complex data models to the simple encodings.

An important conclusion is that none of the tools used in the examples fulfil all INSPIRE requirements and no tooling is known to do so at this moment (August 2022). The INSPIRE community is recommended to stimulate the market to solve this. The main barrier for implementing OAPIF services conform INSPIRE is the complexity of the INSPIRE data models. The data needs to be flattened and converted into simple encodings like the GeoJSON encoding which is the OAPIF standard encoding for output. Another barrier is the support for coordinate reference system (CRS): ETRS89 which is required by INSPIRE. Officially, only WGS84 is supported in GeoJSON. New standards like OGC-API-Features - part 2 and an extension to GeoJSON (JSON FG) will help to solve this CRS problem, once tooling has adjusted to them.

Status van dit document

Dit is een werkversie die op elk moment kan worden gewijzigd, verwijderd of vervangen door andere documenten. Het is geen stabiel document.

Inhoudsopgave

1. OGC API Features explained

OGC API Features (OAPIF) is a multi-part standard that offers the capability to create, modify, and query spatial data on the Web and specifies requirements and recommendations for APIs that want to follow a standard way of sharing feature data. The specification is a multi-part document. [PUB-1], [PUB-5], [PUB-6].

OAPIF is also the term used for a feature download service by means of an API (Application Program Interface) based on OGC standards. OAPIF has been considered as follow up for the OGC WFS standard, but that does not mean it will replace it in the near future, although it might happen in a later future. They are complementary to each other. Where WFS is mainly known and used in the GIS community, the OAPIF is aiming at the non GIS-community, like web developers. OAPIF easier to use and needs less knowledge in the spatial domain. Note as well that WFS adopts the Geography Markup Language (GML) as a default data format. In contrast, OAPIF includes recommendations to support HTML and GeoJSON as encodings. Implementations of OAPIF may also optionally support GML.

An OAPIF consist of resources that can be retrieved by typing the corresponding path after the landing page of the OAPIF in a web browser or web application.

Resource	Path	Purpose
Landing page	/	This is the top-level resource, which serves as an entry point.

Resource	Path	Purpose
Conformance declaration	/conformance	This resource presents information about the functionality that is implemented by the server.
API definition	/api	This resource provides metadata about the API itself. Note use of /api on the server is optional and the API definition may be hosted on completely separate server
Feature collections	/collections	This resource lists the feature collections that are offered through the API.
Feature collection	/collections/{collectionId}	This resource describes the feature collection identified in the path.
Features	/collections/{collectionId}/items	This resource presents the features that are contained in the collection.
Feature	/collections/{collectionId}/items/{featureId}	This resource presents the feature that is identified in the path.

In the API definition, one can find all the supported encodings (HTML, JSON) and parameters that can be given along with URL like a bounding box or a limit of the amount of features. By default, an OAPIF service will provide access to a single dataset. Rather than sharing the data as a complete dataset, the OGC API Features standards offer direct, fine-grained access to the data at the feature (object) level.

The best way of understanding the concept is looking at the examples that are discussed in the chapter of examples.

Since providing a download service is an INSPIRE requirement when responsible for an INSPIRE dataset, the use of OAPIF can be considered for this purpose. It is even seen as an endorsed Good Practice within the INSPIRE community.

§ 2. Roadmap for data providers

The following steps could be considered to follow:

1. Read this document and all the documents in https://geonovum.github.io/OAPIF-PDOK-INSPIRE/#references
2. Make a choice between publishing by yourself or contact a hosting organization that can help you publish the OAPIF services.
3. Look what other data providers have done in this field for the concerning INSPIRE themes and have a look at these examples: https://github.com/INSPIRE-MIF/gp-ogc-api-features/tree/master/deployments.
4. If you diced to serve the OAPIF by yourself, make a choice for the best tooling, while regarding the CRS options (see next step).
5. Figure out the best way of supporting more than one CRS, and at least WGS84 and ETRS89 since the last is the most common in INSPIRE and mostly mandatory, but also provide the Dutch RD. If tooling is chosen that is not able to serve more than one CRS, a second INSPIRE download option should be provided that does give the required CRS.
6. Decide on the best input encoding for the OAPIF. It depends on the previous steps.
7. Decide on the best output encoding, which also depends on the previous steps. The tooling used in the examples did a simple 1 to 1 mapping between the input and output encoding.
8. If a previously published mapping to an encoding other than GML cannot be found for the concerned INSPIRE theme, research the mapping of your harmonized data to this other encodings together with other INSPIRE data providers in Europe and use the principles as stated in [PUB-4]. Consider leaving out the empty fields to reduce the output size or use an option not to show them.
9. Execute the transformation into the chosen input encoding. This can be done with software like HALE studio or FME
10. If not described before, describe the mapping from the INSPIRE data model to the output encoding of the OAPIF and publish it in order to be INSPIRE compliant.
11. Adjust your metadata of the dataset with the addition of extra OAPIF service. As long as there is no official protocol defined in https://inspire.ec.europa.eu/metadata-codelist/ProtocolValue:1, use the extended code list for the protocol in the Dutch metadata standard 2.1.0 (https://docs.geostandaarden.nl/md/mdprofiel-iso19119/#codelist-protocol) contains: "OGC:API features".
12. If you host your OAPIF by yourself, research how to make INSPIRE compliant metadata of the OAPIF service. It is probably similar to the metadata of a WFS, except for the protocol

element.

13. Add all the links as mentioned in the chapter on requirements (metadata of dataset, INSPIRE feature concept dictionary, Licence, mapping description, bulk download).
14. The steps for final actual publishing of the OAPIF service, depend on the chosen tool, so there the tooling guidelines need to be followed:

- Geonovum testbed: https://github.com/Geonovum/ogc-api-testbed/tree/main/docs/docs/howto
- GOAF: https://github.com/PDOK/goaf
- Pygeoapi: https://github.com/Geonovum/ogc-api-testbed/blob/main/docs/docs/howto/howto_pygeoapi.md or https://docs.pygeoapi.io/_/downloads/en/stable/pdf/
- Geoserver: https://github.com/Geonovum/ogc-api-testbed/blob/main/docs/docs/howto/howto_geoserver.md or https://docs.geoserver.org/latest/en/user/

15. Validate the OAPIF service with the INSPIRE validation tool and adjust where possible to be compliant.
16. When a working INSPIRE OAPIF is published with a well described mapping to the output encoding, it could be shared at https://github.com/INSPIRE-MIF/2017.2/issues or https://github.com/Geonovum/OAPIF-PDOK-INSPIRE/issues.

§ 3. Requirements

Below the most relevant requirements (or requirement classes) for setting up an INSPIRE OAPIF are listed:

nr	requirement	priority	reference
1	OGC API Features Core	1	[PUB-1]
2	INPSIRE-MIF document: Setting up an INSPIRE Download service based on the OGC API-Features standard	1	[PUB-2]
3	multilinguality	3	[PUB-2] #82-requirements-class-inspire-multilinguality-
4	predefined download	1	[PUB-2] #req-pre-defined
5	GeoJSON	1	[PUB-2] #req-oapif-json

nr	requirement	priority	reference
6	bulk download	1	[PUB-2] #req-bulk-download
7	CRS ETRS89 and WGS84	2	[PUB-5] and [PUB-2] #req-crs
8	INSPIRE validated GML as input and output	3	https://inspire.ec.europa.eu/validator/about/ and [PUB-1] #_requirements_classes_for_encodings
9	Dutch API design rules	1	[PUB-3]
10	describing encoding	1	[PUB-4]
11	filtering	2	[PUB-6]
12	metadata links	1	[PUB-1] #rec_core_fc-md-descriptions and [PUB-2] #metadata-elements-of-the-data-set

§ 3.1 OGC API Features Core

OGC API Features Core, [PUB-1] describes the basic requirements (50) and recommendations (17) according to OGC that one needs to follow, independent of INSPIRE. It describes which paths can be used and what responses one should receive. It does not make the use of OpenAPI Specification 3.0 mandatory, but if it is used, it gives an extra requirement class.

There is a INSPIRE validation on the OGC standards for OAPIF available. It test on OGC requirements, but it does not test the requirements as stated in [PUB-2].

Figuur 1 Validation on the OGC standards for OAPIF

§ 3.2 INPSIRE-MIF document: Setting up an INSPIRE Download service based on the OGC API-Features standard

INPSIRE-MIF document: Setting up an INSPIRE Download service based on the OGC API-Features standard, [PUB-2] describes the specific INSPIRE requirements. Most of them are explained in the next chapters. This document does propose in Note 2 to make it a mandatory requirement for INSPIRE to comply with OAPIF requirements class OpenAPI 3.0.

3.3 Multilinguality

The multilinguality requirement class, [PUB-2] is mandatory for all data sets that contain information in more than one natural language. This is mostly not the case in the Netherlands, so it is of less importance.

3.4 Predefined download

The predefined download requirement class,[PUB-2] consists of 3 requirements for each collection to link to:

1. the metadata of the corresponding dataset
2. the corresponding entry in the INSPIRE feature concept dictionary
3. the license

3.5 GeoJSON

The GeoJSON requirement class in [PUB-1] recommends to support GeoJSON for features with geometry, but as stated in https://docs.opengeospatial.org/is/17-069r4/17-069r4.html#_encodings, no encoding is mandatory. The GeoJSON requirement class in [PUB-2] also recommends to document how the GeoJSON encoding is retrieved from the INSPIRE data models.

3.6 Bulk download

The bulk download requirement class, [PUB-2] requires links for enclosure of the total data set and/or of each seperate collection.

3.7 CRS ETRS89 and WGS84

The CRS requirement in [PUB-1] requires WGS84 for 2D-data and WGS84h for 3D-data as default. The INSPIRE-CRS requirement class in [PUB-2] requires also one of the INSPIRE CRS's based on ETRS89 to be supported The OGC API - Features - Part 2 standard, [PUB-5] prescribes how to support different coordinate systems with OAPIF.

For the Dutch data providers, it is recommended to also support RD for 2D data or RD +NAP for 3D data. See also: https://docs.geostandaarden.nl/crs/crs.

3.8 GML

The use of GML as encoding for INSPIRE data can be considered in two ways. As input and as output.

When we consider the input, one would like to be able to use a source dataset of harmonized data. In most cases, this will be a GML encoded dataset. The GML encoding is at least needed to validate the data set with the EU INSPIRE validator Unfortunately, not many tooling for creating a OAPIF service is able to use GML as input. Especially when it concerns a complex GML dataset. So, a transformation to another encoding like GeoJSON is needed.

Output of GML from the OAPIF service can only be in simple features level 0 and level 2. So no complex features will be supported.

3.9 Dutch API design rules

Dutch data providers are recommended to follow the Dutch API design rules, [PUB-3]. This is not an INSPIRE requirement.

3.10 Describing encoding

The standards considered in this guideline do not set a specific encoding as mandatory. https://docs.opengeospatial.org/is/17-069r4/17-069r4.html#_encodings [PUB-1] Once another encoding than GML is used, data providers need to document how the encoding relates to the concerned INSPIRE data model. The good practice on the use of geopackages as encoding, describes how this describing could be done.

3.11 Filtering

The specification for filtering, [PUB-6] is still a draft version and has therefore not yet been taken into account. Some basic filtering requirements are described in OGC API - Features - Part 1: Core [PUB-1]. This only concerns filtering on a bounding box and on properties.

§ 3.12 Metadata links

The requirement for metadata links to the data in [PUB-2] have also been described in predefined download requirement class. The requirement for metadata of the API in [PUB-1] describes the metadata of the API via the API definition.

§ 3.13 Relevant documentation

Relevant documentation is shown in appendix A.

§ 4. test hoofdstuk

test test

§ 5. Conformiteit

Naast onderdelen die als niet normatief gemarkeerd zijn, zijn ook alle diagrammen, voorbeelden, en noten in dit document niet normatief. Verder is alles in dit document normatief.

§ 6. Lijst met figuren

§ A. Index

§ A.1 Begrippen gedefinieerd door deze specificatie

§ A.2 Begrippen gedefinieerd door verwijzing

§ B. Referenties

§ B.1 Normatieve referenties

[PUB-1]
OGC API Features Part1:Core. OGC. V1.0. URL: https://docs.opengeospatial.org/is/17-069r4/17-069r4.html

[PUB-2]
Setting up an INSPIRE Download service based on the OGC API-Features standard. INSPIRE-MIF. V1.0. URL: https://github.com/INSPIRE-MIF/gp-ogc-api-features/blob/master/spec/oapif-inspire-download.md

[PUB-3]
Dutch API design rules. https://www.geonovum.nl. 19 JULI 2020. URL: https://www.geonovum.nl/over-geonovum/actueel/rest-api-design-rules-op-pas-toe-leg-uit-lijst

[PUB-4]
INSPIRE UML-to-GeoJSON encoding rule. Working group on Inspire Action 2017.2. V0.1. URL: https://github.com/INSPIRE-MIF/2017.2/blob/master/GeoJSON/geojson-encoding-rule.md#inspire-requirements-for-encoding-rules

[PUB-5]
OGC API - Features - Part 2: Coordinate Reference Systems by Reference. OGC. V1.0. URL: http://docs.opengeospatial.org/is/18-058r1/18-058r1.html

[PUB-6]
OGC API - Features - Part 3: Filtering and the Common Query Language (CQL). OGC. V1.0.0, draft. URL: https://docs.ogc.org/DRAFTS/19-079r1.html

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