

Preparing data integration and the common data spaces using OGC API's

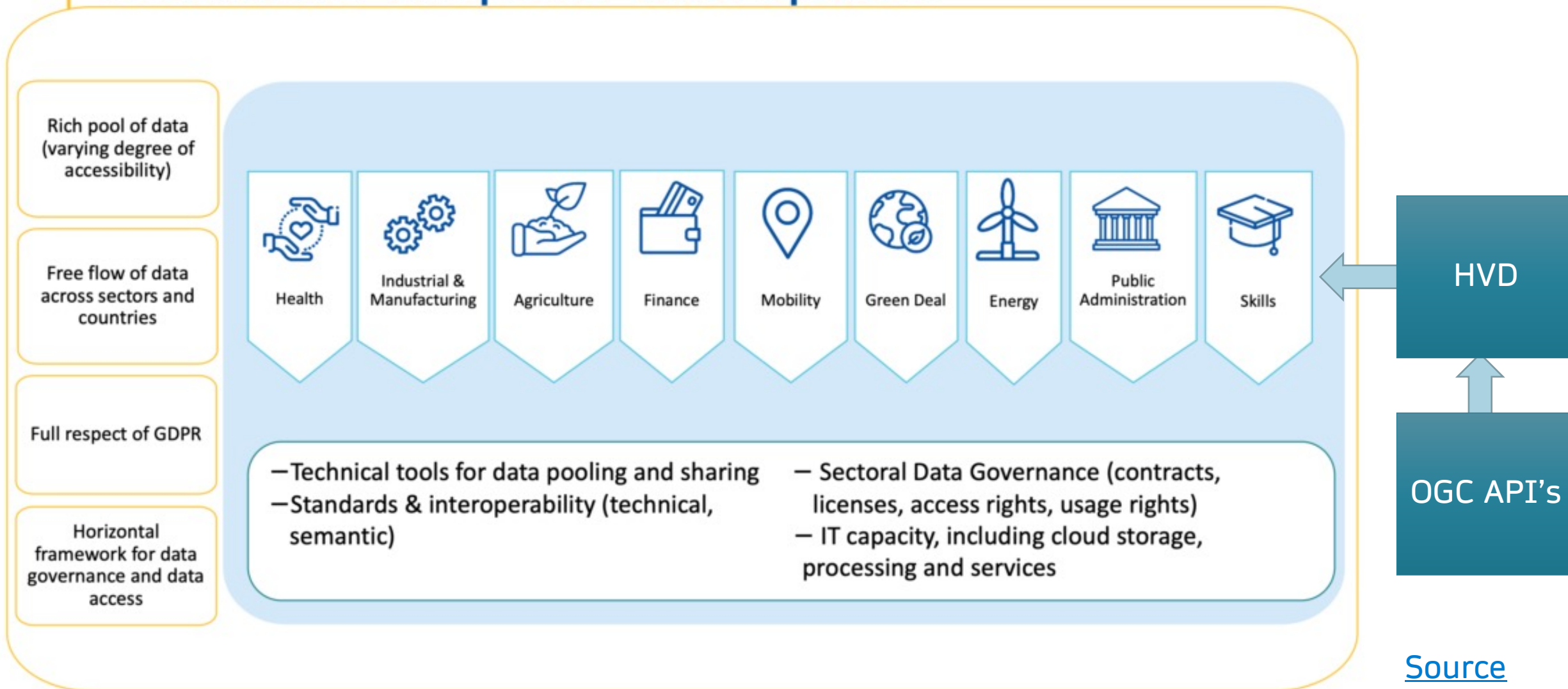
Linked Data in the European spatial data
infrastructure – an operational view

7 November 2023

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National Land Survey of Finland

Common European data spaces



ISO/TC211 ad-hoc group on "Input to EU Data Spaces"

- ISO/TC 211 resolves to create an Ad hoc group to prepare a document describing the use of standards to enable the publication of High-value datasets in accordance with the related [Implementing Act](#), as part of the legal provisions from the Open Data Directive, and their implementation in "data spaces" according to the [European Strategy for data](#)
- Report will be published in December 2024, including:
 - Introduction to Data Spaces
 - The role of standards in High Value Datasets and EU Data Spaces
 - Recommendations

EU High Value Datasets (HVD)

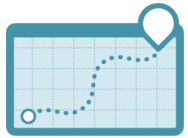
- Free Access: High-value datasets should be provided free of charge.
- Machine-Readable and Open Formats: The datasets should be made available in machine-readable formats and under open licenses (CC BY 4.0)
- Metadata and Documentation: Adequate metadata and documentation should be provided to help users understand and use the data effectively.
- Availability via APIs: High-value datasets should be made available via Application Programming Interfaces (APIs), ensuring easy access and integration with other systems.

Spatial Data on the Web Best Practices

- Use globally **unique persistent HTTP URIs** for Spatial Things
- Make your spatial data **indexable** by search engines
- Use spatial **data encodings** that match your target audience
- Expose spatial data through 'convenience **APIs**'
- Include spatial **metadata** in dataset metadata

[Complete list at w3.org](https://www.w3.org/2019/02/spatial-data-on-the-web/)

Being FAIR



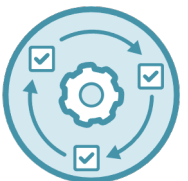
Findable – Catalogs and metadata



Accessible – Protocol is open and standardized



Interoperable – content encoding (GeoJSON, GML, HTML, JSON-FG)

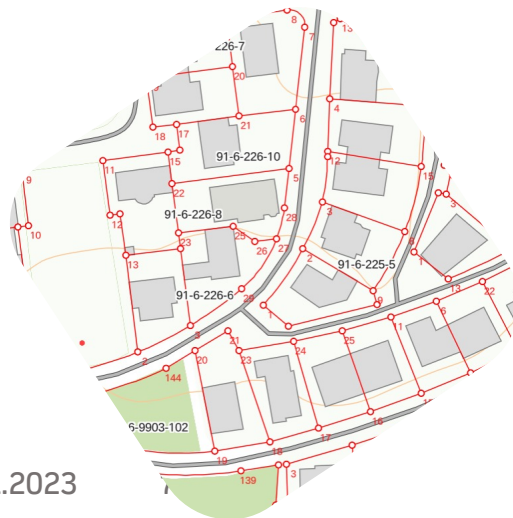


Reusable – license information, data product specifications

OGC API's



- These standards build upon the legacy of the OGC Web Service standards (WMS, WFS, WCS, WPS, etc.)
- These define resource-centric APIs that take advantage of modern web development practices
- Standards are being constructed as "building blocks"



```
-<wfs:FeatureCollection xsi:schemaLocation="http://www.schemas.opengis.net/wfs/1.1.0/wfs.xsd http://xml.nls
-<gml:featureMember>
  -<PlaceName gml:id="PN_42010286">
    <placeNameId>42010286</placeNameId>
    <placeNameVersionId>1</placeNameVersionId>
    <spelling>Ivalo flygplats</spelling>
    <language>swe</language>
```

Data, Maps and Metadata ...



"Download Service"

Features

Approved Standard 

OGC API - Features - Part 1: Core and Part 2: Coordinate Reference Systems by Reference are both publicly available.



"View Service"

Maps

OGC API - Maps offers a modern approach to the OGC Web Map Service (WMS) standard for provision map and raster content.



"Discovery Service"

Records

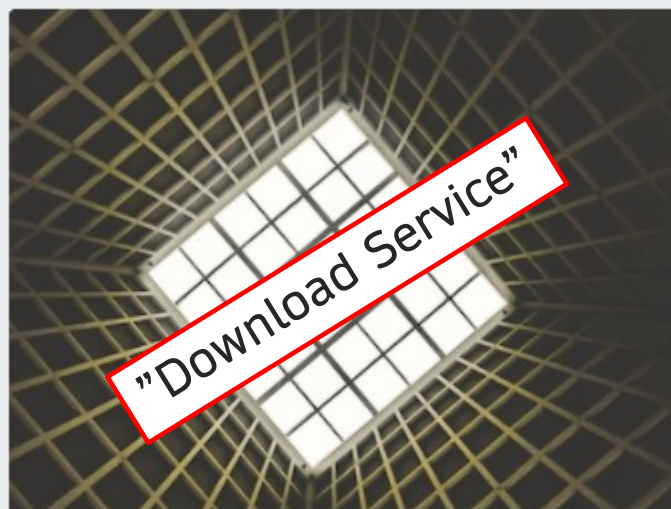
OGC API - Records updates OGC's Catalog Services for the Web by building on the simple access to content in OGC API - Features.

Processing, Coverages and Environmental data



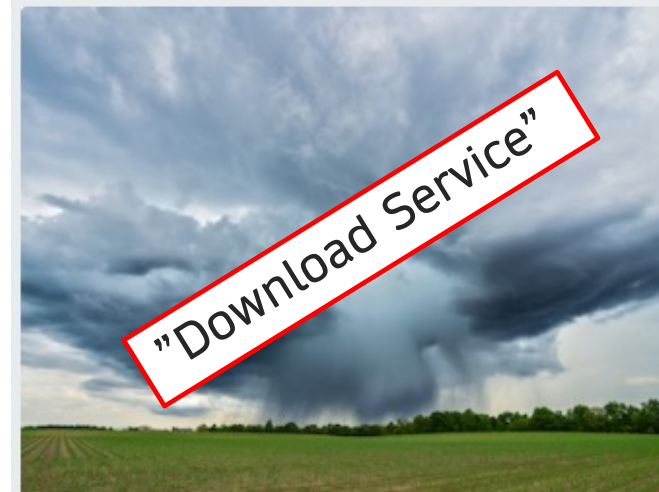
Processes

OGC API - Processes allows for processing tools to be called and combined from many sources and applied to data in other OGC API resources through a simple API.



Coverages

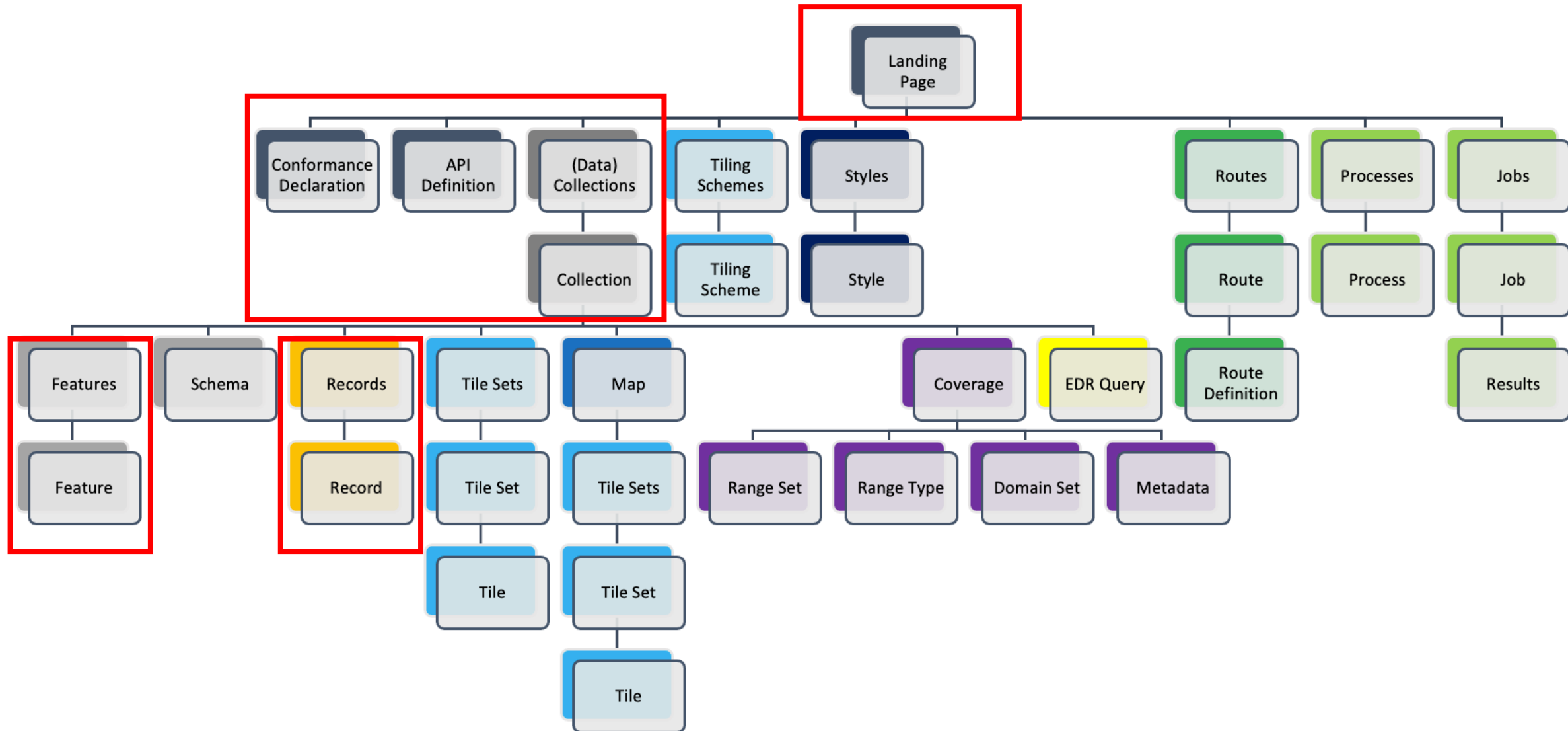
OGC API - Coverages allows discovery, visualization and query of complex raster stacks and data cubes.



EDR

Environmental Data Retrieval (EDR) API provides a family of lightweight interfaces to access Environmental Data resources. Each resource addressed by an EDR API maps to a defined query pattern.

OGC API's - A big picture (image by OGC)



OGC API Records

- OGC API - Records is a multi-part specification that offers the capability to create, modify, and query metadata on the Web
- Part 1 Core (**draft**) covers read-only access to records and simple query capabilities
- Capabilities for richer queries or to create, update or delete records will be specified in additional parts.

Item aa3b5e6e-7baa-40c0-8972-3353e927ec2f



Property	Value
id	aa3b5e6e-7baa-40c0-8972-3353e927ec2f
recordCreated	2022-06-09
recordUpdated	2022-09-02T14:02:36Z
type	dataset
title	BAG
description	De gegevens bestaan uit BAG-panden en een deelselectie van BAG-gegevens van deze panden en de zich daarin bevindende verblijfsobjecten. Ook de ligplaatsen en standplaatsen zijn hierin opgenomen met een deelselectie van BAG-gegevens. De gegevens van de nummeraanduiding zijn in deze services onderdeel van de adresseerbare

id:	"aa3b5e6e-7baa-40c0-8972-3353e927ec2f"
type:	"Feature"
▼ geometry:	
type:	"Polygon"
▶ coordinates:	[...]
▼ properties:	
recordCreated:	"2022-06-09"
recordUpdated:	"2022-09-02T14:02:36Z"
type:	"dataset"
title:	"BAG"
▼ description:	"De gegevens bestaan uit BAG-panden en een deelselectie van BAG-gegevens van deze panden en de zich daarin bevindende verblijfsobjecten. Ook de ligplaatsen en standplaatsen zijn hierin opgenomen met een deelselectie van BAG-gegevens.\n\nDe gegevens van de nummeraanduiding zijn in deze services onderdeel van de adresseerbare objecten, hierbij wordt slechts 1 adres opgenomen, dus objecten met meerdere adressen (hoofd- en nevenadressen) zijn niet compleet. In deze services zitten dus niet alle BAG adressen. \n\nAangezien niet alle BAG gegevens worden geleverd, adviseren wij u om de actuele gegevens in één van de BAG producten te controleren.\nRaadpleeg de BAG Viewer voor enkele bevestigingen van BAG gegevens.\nEen overzicht van alle beschikbare producten kunt u vinden op de website\nhttps://www.kadaster.nl/zakelijk/registraties/basisregistraties/bag .\n\nDeze dataset wordt ook gebruikt voor het ontsluiten van het INSPIRE thema Gebouwen. Het betreft gebouwcontouren, constructieve onderdelen van gebouwen en ruimtelijke barrières. Dit betreft niet-geharmoniseerde data uit de basisregistratie Adressen en Gebouwen (BAG).\n\nDe service wordt dagelijks geactualiseerd."
▼ contactPoint:	"Directie Operatie, Dienstverlening en Registratie, afdeling Data-, Proces- en Informatiemanagement, PPB-GVA@kadaster.nl, Kadaster"
▼ associations:	
▼ 0:	
▼ href:	"https://service.pdok.nl/lv/bag/wms/v2_0?request=getCapabilities&service=WMS"
rel:	"item"
title:	"BAG (WMS)"
▼ 1:	
▼ href:	"https://service.pdok.nl/lv/bag/wfs/v2_0?request=getCapabilities&service=WFS"
rel:	"item"
title:	"BAG (WFS)"
▼ 2:	
▼ href:	"https://api.bag.kadaster.nl/lvbag/individuelebevestigingen/v2/"

OGC API Features

User friendly – developer friendly

OpenAPI

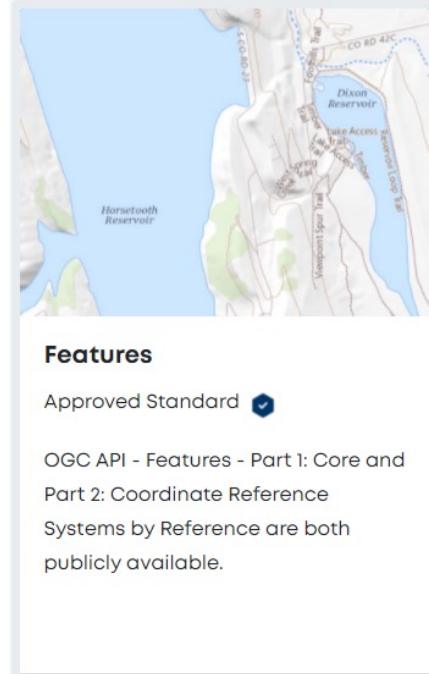
Modular (core + extensions)

Findable (indexable)

An example

WFS: `/ows?request=GetFeature&typename=buildings&featureid=5`

Features: `/api/collections/buildings/items/5`





Examples - spatial information

Find cemeteries from Finland

<.../terrain/features/v1/collections/cemetery>

Cultivated land from this region

[.../terrain/features/v1/collections/cultivated_land/items?limit=10000
&bbox=336981,6971749,339757,6976463](.../terrain/features/v1/collections/cultivated_land/items?limit=10000&bbox=336981,6971749,339757,6976463)

One building

<.../features/v1/collections/buildings/items?limit=1>

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "id": "459985d8-eb5e-488c-9f38-42ae8f1f778d:1",
      "geometry": {
        "type": "MultiPolygon",
        "coordinates": [
          [
            [
              [27.9506429, 63.0952404],
              [27.9505738, 63.0952764],
              [27.9506372, 63.0953013],
              [27.9507062, 63.0952653],
              [27.9506429, 63.0952404]
            ]
          ]
        ]
      },
      "properties": {
        "featureClass": "Building",
        "kmtkId": "459985d8-eb5e-488c-9f38-42ae8f1f778d",
        "version": 1,
        "VTJprt": null,
        "sourceId": "2101647874",
        "PNRplaceId": null,
        "startTime": "2022-02-20T10:40:13.822Z",
        "versionStartTime": "2022-02-20T10:40:13.822Z",
        "versionEndTime": null,
        "endTime": null,
        "dataSource": 1000,
        "sourceModification": null
      }
    }
  ]
}
```

Recommendations for Linked Data

- Use Open Standards
- Support standard data formats
- Clearly document your API, including endpoints, request-response examples, error codes, and usage limits.
- Follow RESTful Principles:
- Use standard HTTP methods (GET, POST, PUT, DELETE) consistently.
- Use Semantic Web Technologies for Linked Data: RDF - SPARQL
- Use URIs: Ensure that resources are identified using URIs, making them uniquely identifiable and linkable.
- Ensure that your API can be easily discovered by potential users.

Thank you!

 @JariReini

 <https://www.linkedin.com/in/reini/>



Advancing together

