



Open
Geospatial
Consortium

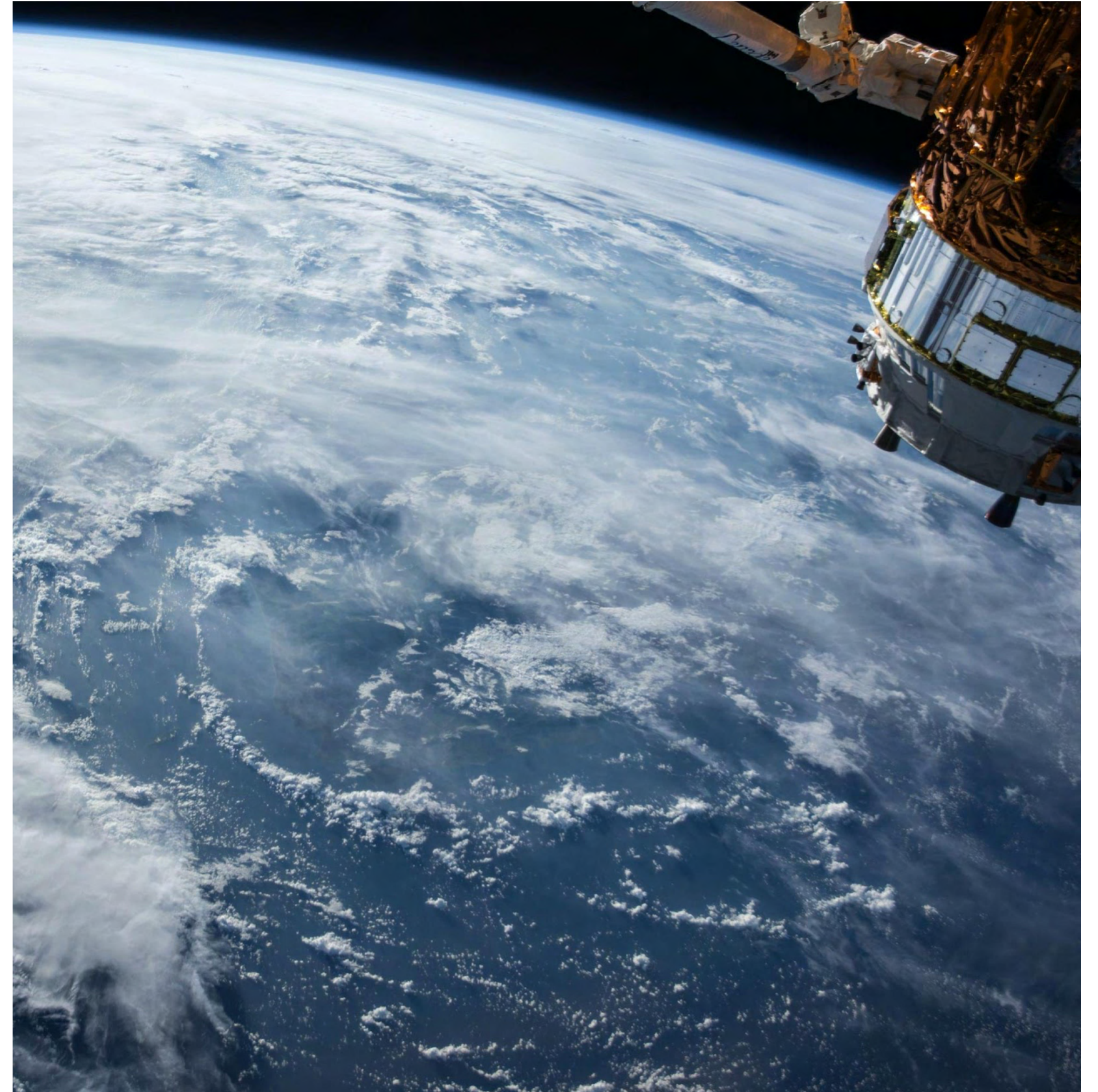
Getting Geospatial Data on the Web

Joana Simoes - Developer Relations @OGC



Agenda

- Introduction
- How can I share geospatial data?
- Why should I use a standard?
- OGC API Features
- How can I get involved with OGC?




Use Case

```
https://features.byteroad.net/collections/sawcer/items?format=jsonld  
{  
  "@context": {  
    "schema": "https://schema.org/",  
    "id": "@id",  
    "type": "@type",  
    "features": "schema:ItemListElement",  
    "FeatureCollection": "schema:ItemList"  
  },  
  "type": "FeatureCollection",  
  "features": [  
    {  
      "id": "https://features.byteroad.net/collections/sawcer/items/61afae9fc6bf8d516533620f",  
      "type": "schema:Place"  
    },  
    {  
      "id": "https://features.byteroad.net/collections/sawcer/items/61afae9fc6bf8d5165336210",  
      "type": "schema:Place"  
    },  
    {  
      "id": "https://features.byteroad.net/collections/sawcer/items/61afae9fc6bf8d5165336211",  
      "type": "schema:Place"  
    },  
    {  
      "id": "https://features.byteroad.net/collections/sawcer/items/61afae9fc6bf8d5165336212",  
      "type": "schema:Place"  
    },  
    {  
      "id": "https://features.byteroad.net/collections/sawcer/items/61afae9fc6bf8d5165336213",  
      "type": "schema:Place"  
    },  
    {  
      "id": "https://features.byteroad.net/collections/sawcer/items/61afae9fc6bf8d5165336214",  
      "type": "schema:Place"  
    }  
  ]  
}
```

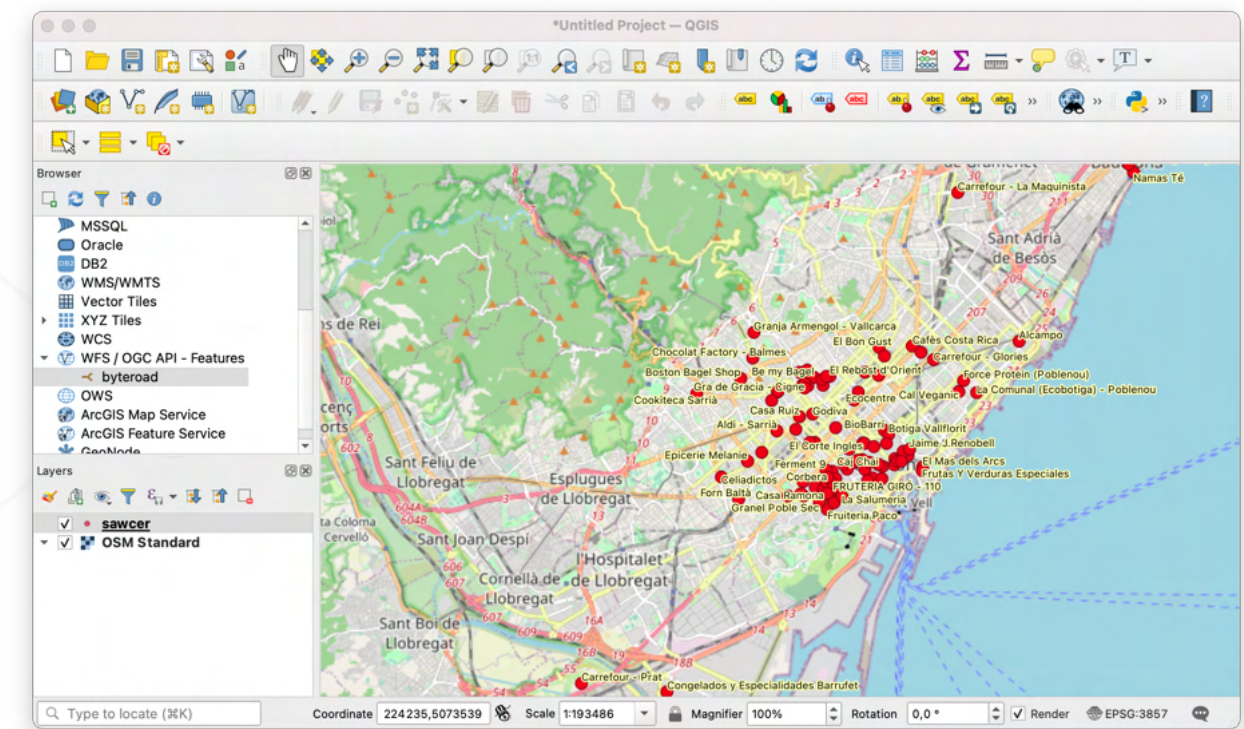
pygeoapi Contact
Home / Collections / Shops and Products / Items JSON JSON-LD

Shops and Products

Items in this collection.



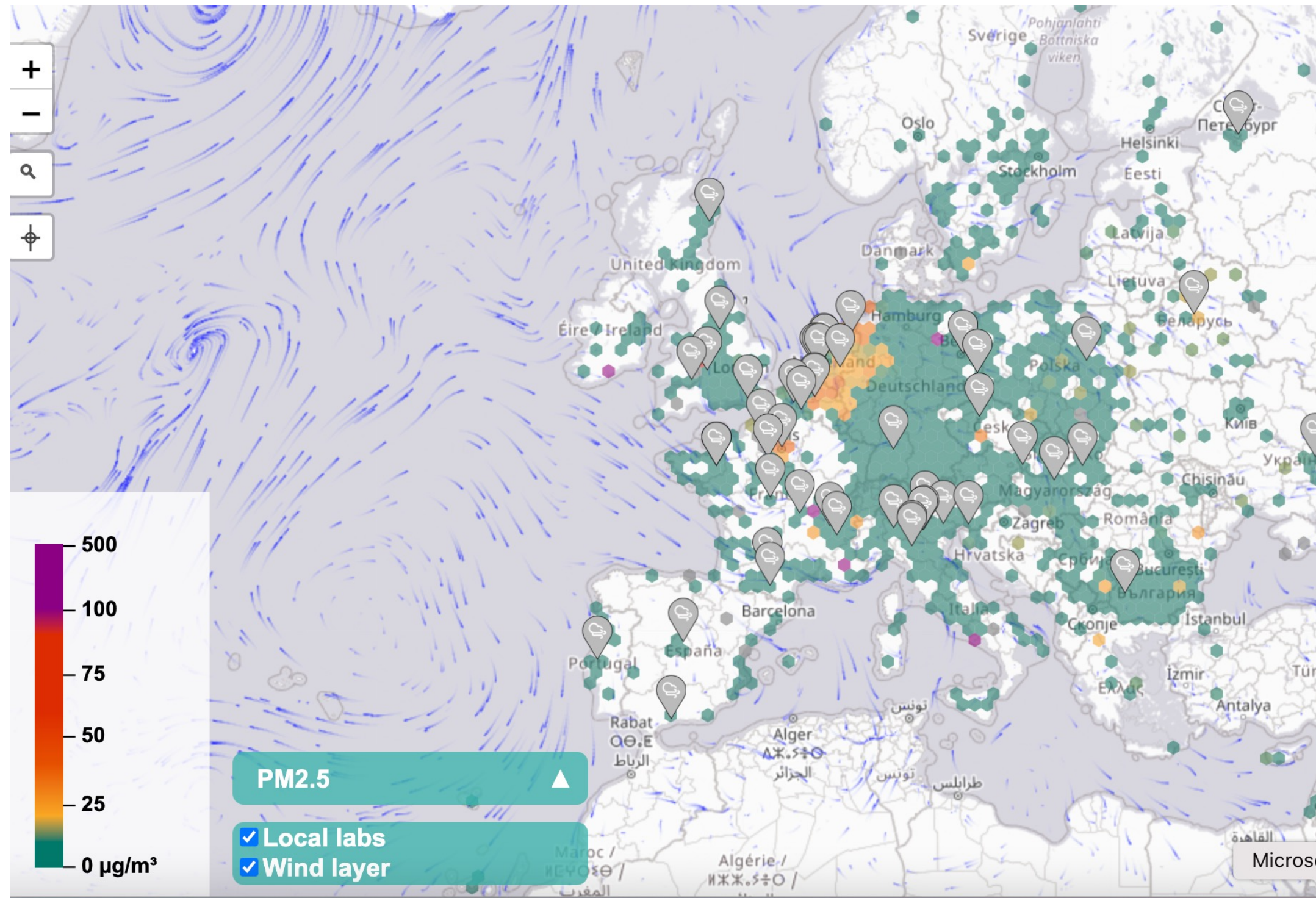
id	field_1	Shop name	Products	Shop GPS
616db0c...	3	Alcampo	Creme fraiche,...	41.4099...
616db0c...	8	Amiette Gluten Free Bakery	Bread rolls multigra...	41.3779...
616db0c...	1	Abarrotes Doña Cuca	Ancho Chillies,...	41.4024...



```
more shops.geojson  
[{"type": "Feature", "properties": {"field_1": 0, "Shop name": "A Taste of Home - The English Supermarket", "Products": "Apple Cider Vinegar, Baking Powder, Berbere, Celery seeds, Chocolate, Chocolate Chai Latte, Cotted cream, Cottage Cheese, Cranberry sauce, Cream of Tartar, Crumpets, Dark chocolate chips, Dark Muscovad o sugar, Distilled malt vinegar, Distilled malt vinegar, Free from Chai Latte, Garam masala, Ginger beer, G inger beer, Ground Allspice, Haggis, Halloumi, Harissa, Horseradish, Hot & Spicy Burgers - vegan, Lemon Curd , Light Muscovado sugar, Liquid Aminos, Liquid Smoke, Madagascar Vanilla, Malt extract, Maple syrup, Meat free burgers, Meat free Chicken and Leek Pies, Meat free Cottage Pie, Meat free Garlic and herb fillets, Me at free Lasagna, Milk chocolate chips, Mulled wine, Mustard Piccalilli, Mustard seed, N\u00e4kd bars, Natural Va nilla Extract, Peanut butter, Peanut butter, Peanut butter, Pearl barley, Pink peppercorns, Plain chocolate chips, Preserved lemon, Rhubarb, Ribena, Sausages, Seafood sauce, Shortening, Skinny blend chai latte, Smoke d paprika, Sour cream, Split peas, Sweet Piccalilli, Tahini, Tahini, Tahini, Tomato paste, Tomato paste, Vegem ite, Vegetarian Fillets, Vegetarian Mince, Vegetarian Sausages, White chocolate chips, Whole Allspice, York shire Tea Bags, Yorkshire Tea Bags for Hard Water, Za'atar", "Shop GPS": "41.378329, 2.158516", "Address": " Carrer de Floridablanca, 80, 08015 Barcelona ", "CP": "08015", "Country": "Spain", "Telephone": "938 94 50 73", "Website": "https://www.facebook.com/atasteofhomebarcelona/", "Shop description": "Over 2,000 products including English, American, German, Dutch and vegetarian brands including over 100 herbs and spices. Great offers, discounts and we deliver! we also have a good selection of English Books", "Shop descrip tion using hashtags #": "NorthernEurope, English", "Email address": "floridablanca@atasteofhome.eu.com", "Opening times": "L-V 10.00-14.30. 17.00-20.30, S 10.00-20.30, D cerrado", "Map block": " eyJpIjoInDEuM zc4MzI5LDIuMTU4NTE2IiwibyI6eyJzdgF0dXM0i0iJPSyIsImxhdCI6NDEuMzI5LDIuMTU4NTE2Iiwicm90Ij0iImJmGR01k4TD00TFhzYmJhZi9luc3 RhbGxhdGlvbk1kcyI6WyJibG1uWmRpdUVabENGR1cCjdlCjI0IiwidmVudGlvbkZpZmVkbW0iOiJmGR01k4TD00TFhzYmJhZi9luc3 LIjowfQ==", "Notes": null, "lat": 41.378329, "lon": 2.158516}, "geometry": {"type": "Point", "coordinates": [2.1 58516, 41.378329]}}, {"type": "Feature", "properties": {"field_1": 1, "Shop name": "Abarrotes Do\u00f1a Cuca", "Pro ducts": "Ancho Chillies, Tajin, Valentina chilli sauce", "Shop GPS": "41.4024193, 2.175658800000647", "Addr shops.geojson
```

shutterstock

Geospatial Data



Current values of sensors measuring air quality.
Source: <https://maps.sensor.community/#2/0.0/0.0>



Travel times across London. Source:
<https://movement.uber.com/>

Geospatial Data

- Any piece of information which has a **location** tag attached to it.

31 High St, Haverhill

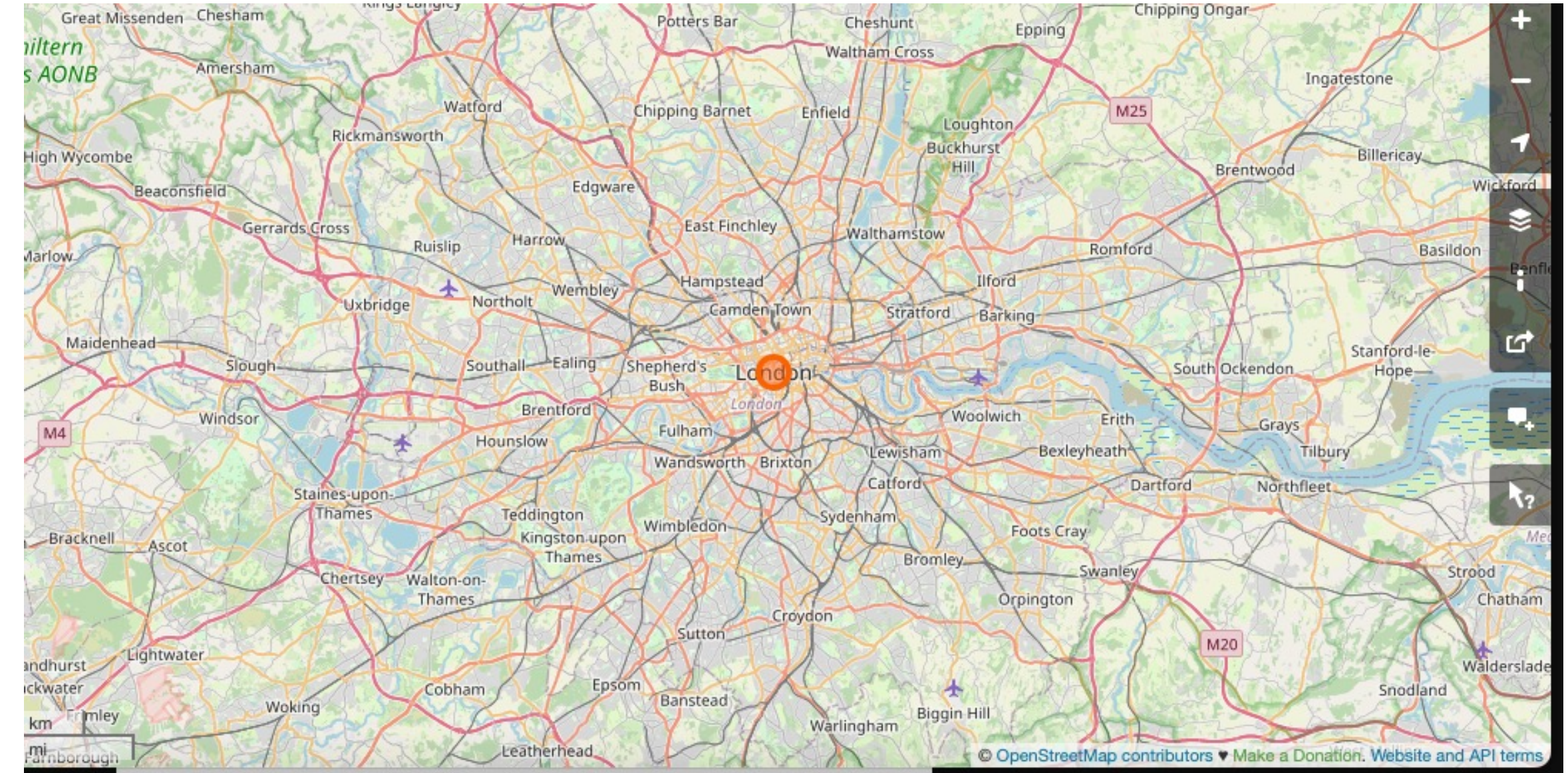
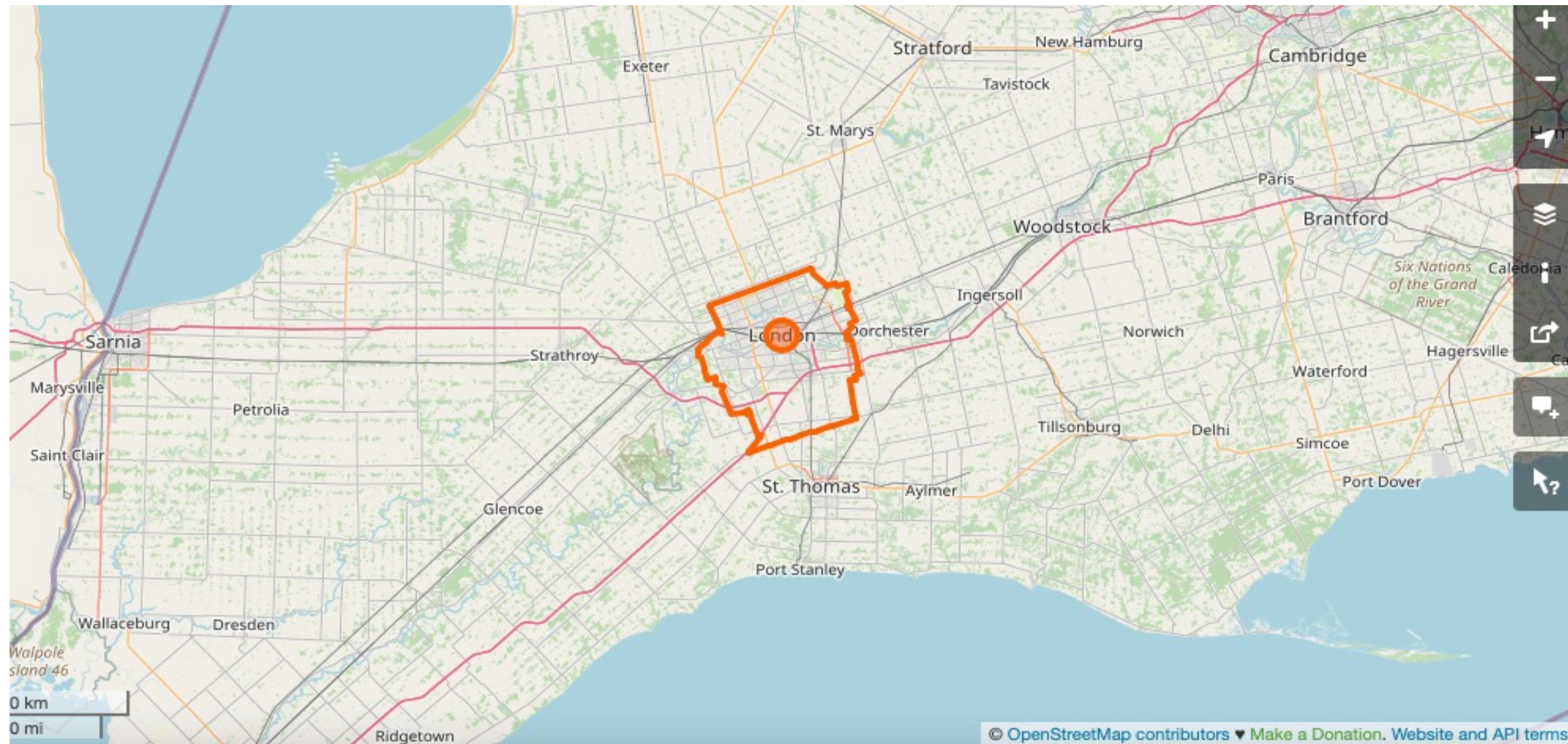
CB9 8AD, UK



London

Names can be ambiguous!

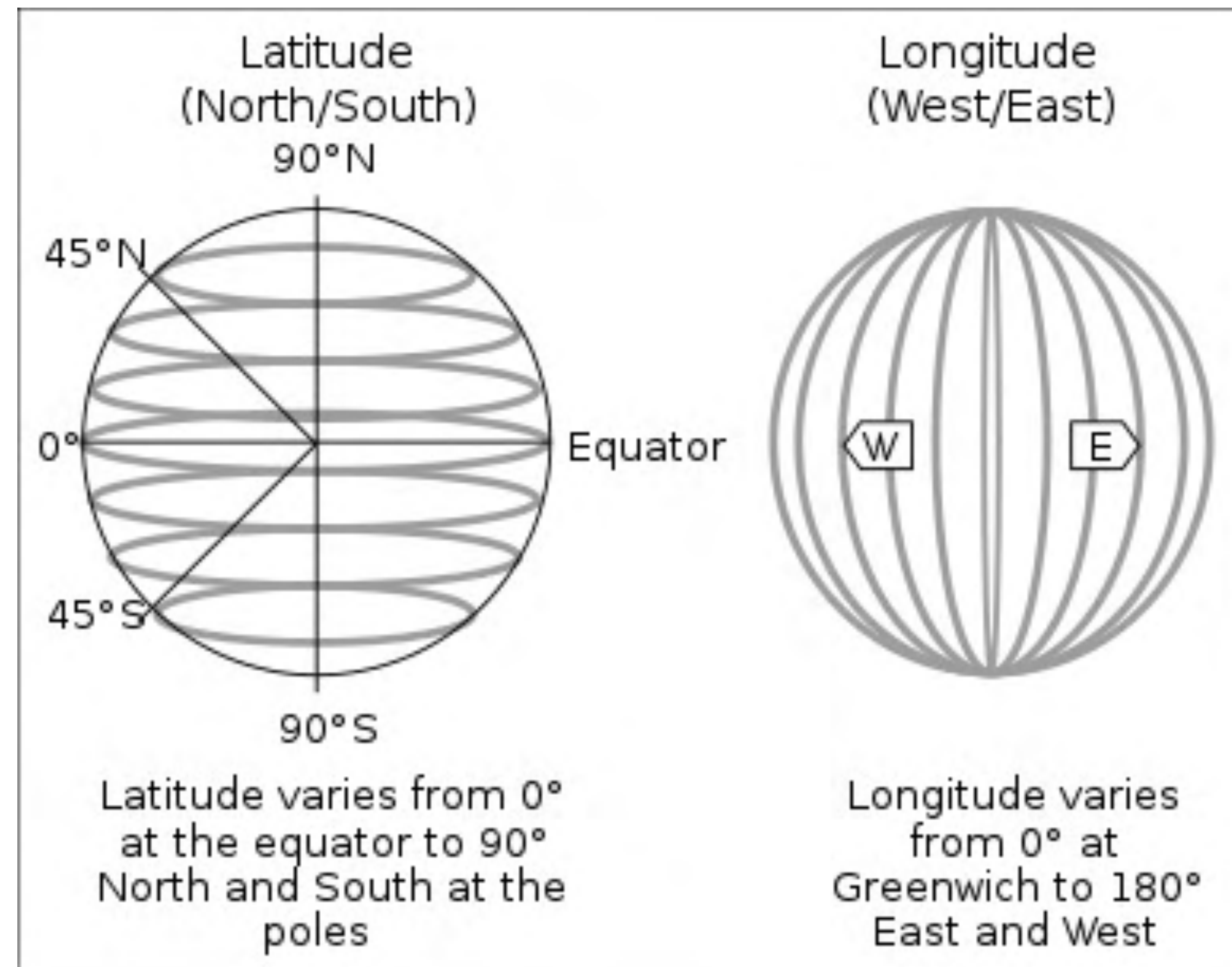
London



London, UK ?

London, Ontario ?

Geographic Coordinates



bbox=280375,5577680,531792,5820212&

bbox-crs=[http%3A%2F%2Fwww.opengis.net%2Fdef%2Fcrs%2FEPSSG%2F0%2F25832](http://www.opengis.net/def/crs/EPSG/0/25832)

How can I share geospatial data?

File

- Use a format that supports storing geometry and CRS information.

Advantages ✓

- Simple to use.

Drawbacks ✗

- Redundancy.
- Lack of consistency.



Database

- Databases are designed to share information in an efficient and secure manner.



Advantages ✓

- Integrity.
- Security.
- Concurrency.

Drawbacks ✗

- Complexity.



Pulling data from a database

```
# Connection String
conn = psycopg2.connect("host=%s port=%s dbname=%s
password=%s user=%s" % (host,
port,dbname, db_password, db_user))

# SQL Query
sqlSelect = "SELECT city.name, state.name, city.geom
FROM city JOIN state ON ST_Intersects(city.geom,
state.geom)

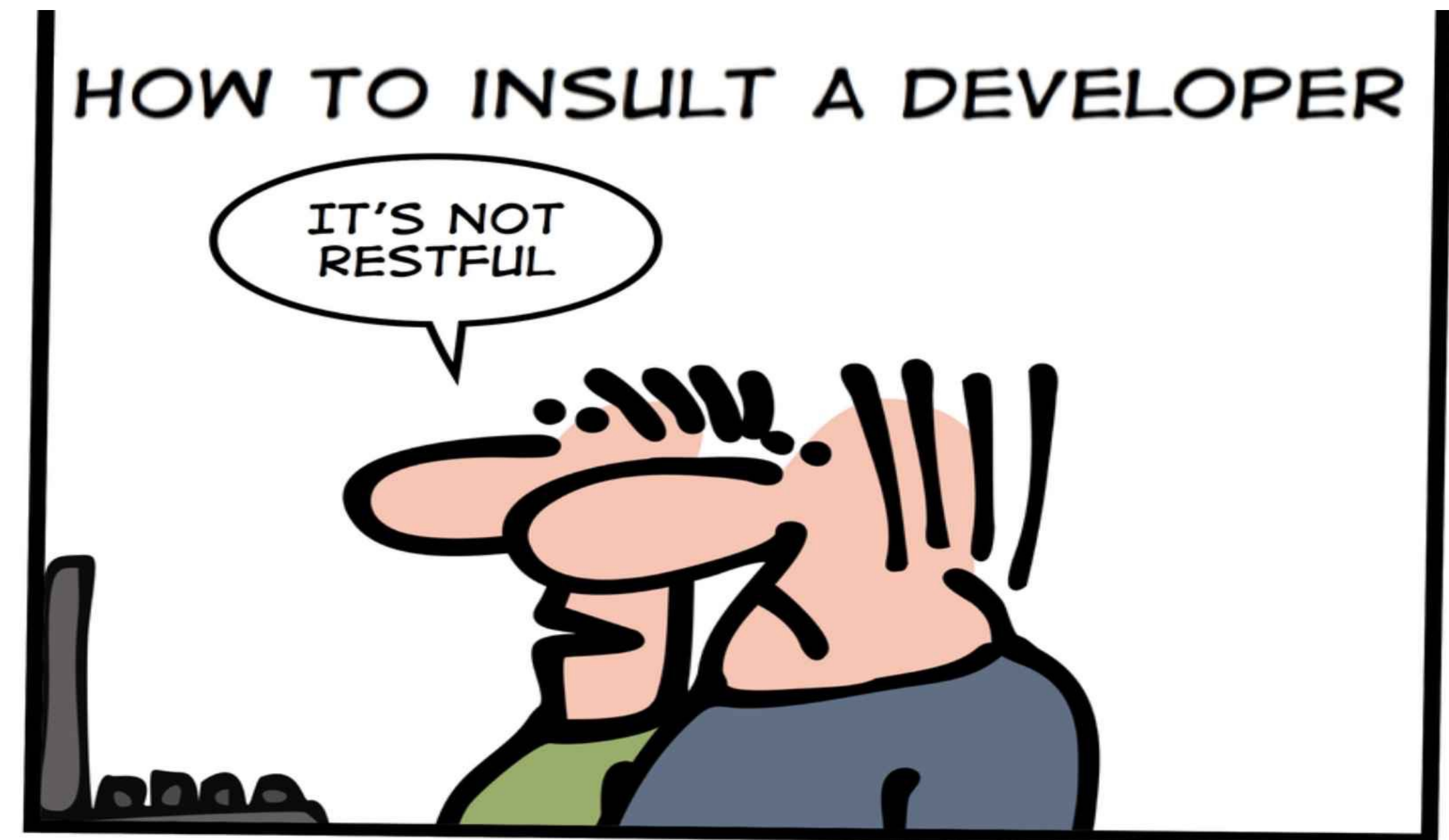
cur.execute(sqlSelect)
```


Web API

- Used to communicate with the browser using the HTTP protocol.

Advantages ✓

- Simplicity.
- Scalability.
- Flexibility.
- Independence.



Source: <https://res.infoq.com/presentations/spring-security-rest-api/en/slides/sl29.jpg>

Example

pygeoapi Contact

Home / Collections / Shops and Products / Items JSON JSON-LD

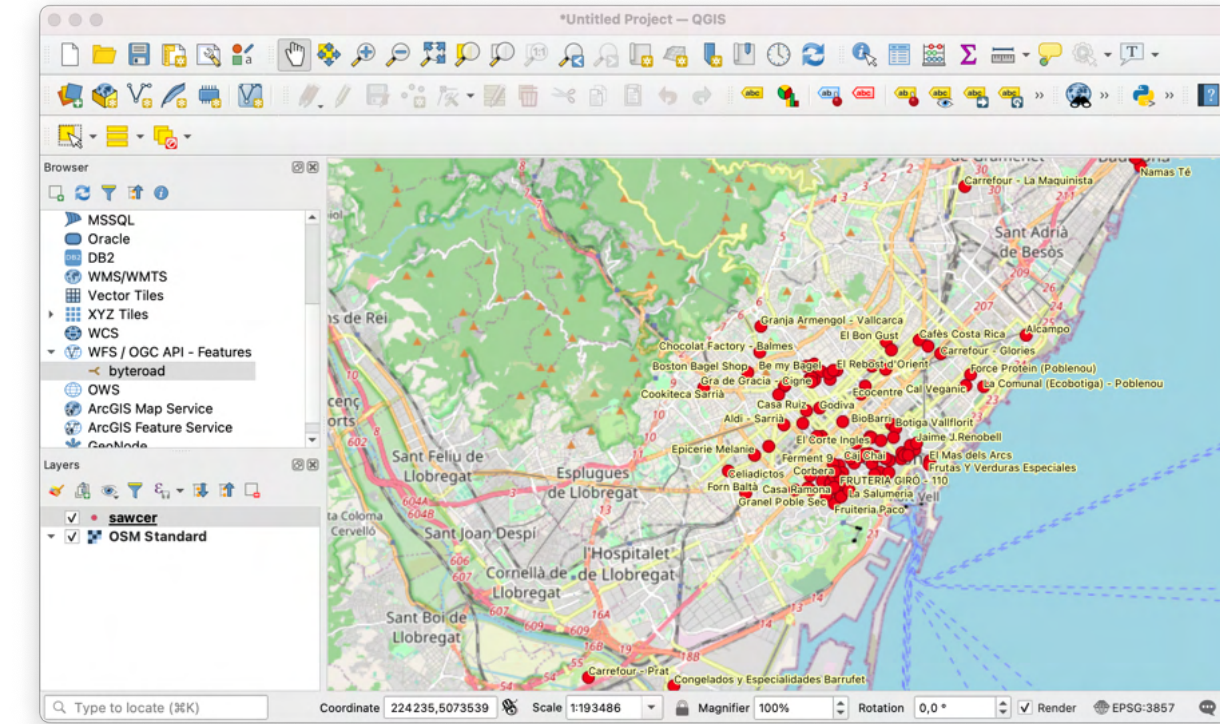
Shops and Products

Items in this collection.

Id	field_1	Shop name	Products	Shop GPS
616db0c...	3	Alcampo	Creme fraiche...	41.4099...
616db0c...	8	Amiette Gluten Free Bakery	Bread rolls multigr...	41.3779...
616db0c...	1	Abarrotes Doña Cica	Ancho Chillies...	41.4024...

```
https://features.byteroad.net/...
features.byteroad.net/collections/sawcer/items?f=jsonld

{
  "@context": {
    "@schema": "https://schema.org/",
    "id": "@id",
    "type": "@type",
    "features": "schema:itemListElement",
    "featureCollection": "schema:itemList"
  },
  "type": "FeatureCollection",
  "features": [
    {
      "id": "https://features.byteroad.net/collections/sawcer/items/61fae9fc6bf8d516533620f",
      "type": "schema:Place"
    },
    {
      "id": "https://features.byteroad.net/collections/sawcer/items/61fae9fc6bf8d5165336210",
      "type": "schema:Place"
    },
    {
      "id": "https://features.byteroad.net/collections/sawcer/items/61fae9fc6bf8d5165336211",
      "type": "schema:Place"
    },
    {
      "id": "https://features.byteroad.net/collections/sawcer/items/61fae9fc6bf8d5165336212",
      "type": "schema:Place"
    },
    {
      "id": "https://features.byteroad.net/collections/sawcer/items/61fae9fc6bf8d5165336213",
      "type": "schema:Place"
    },
    {
      "id": "https://features.byteroad.net/collections/sawcer/items/61fae9fc6bf8d5165336214",
      "type": "schema:Place"
    }
  ]
}
```



Standard

API

Database

Why using a Standard?



Standard Coffee Pod

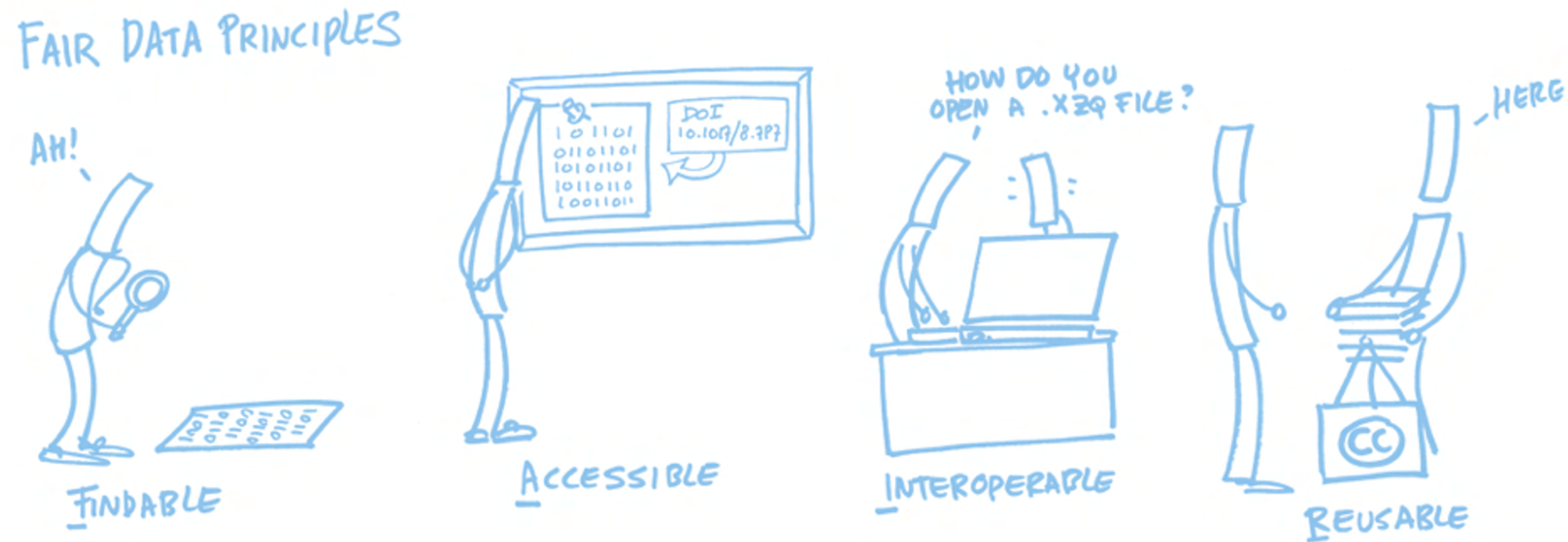


Easy Serving Espresso
pod (E.S.E. pod)
standard



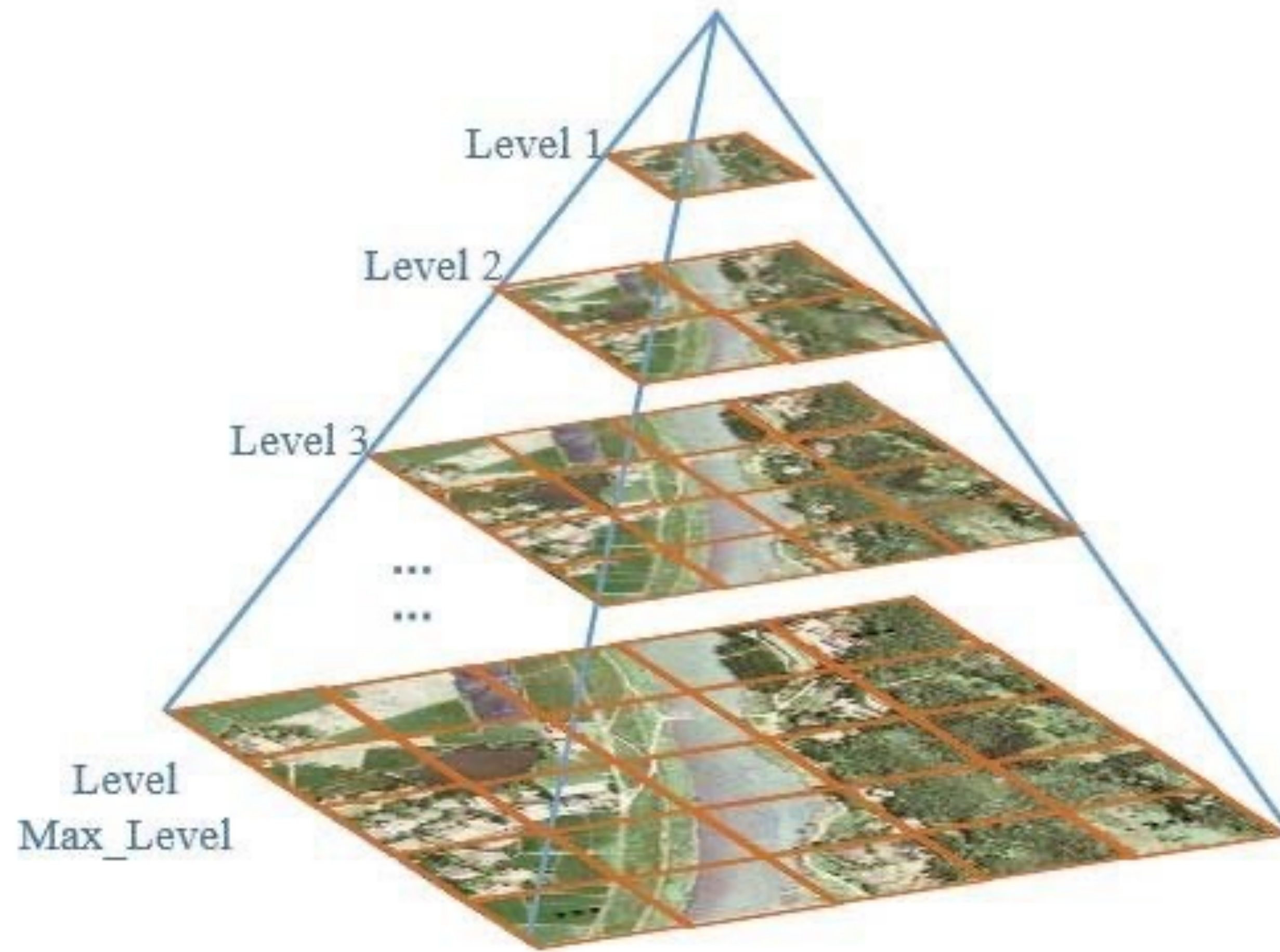
Why using standards for sharing geospatial information?

- To optimise data sharing and reuse by humans and machines.

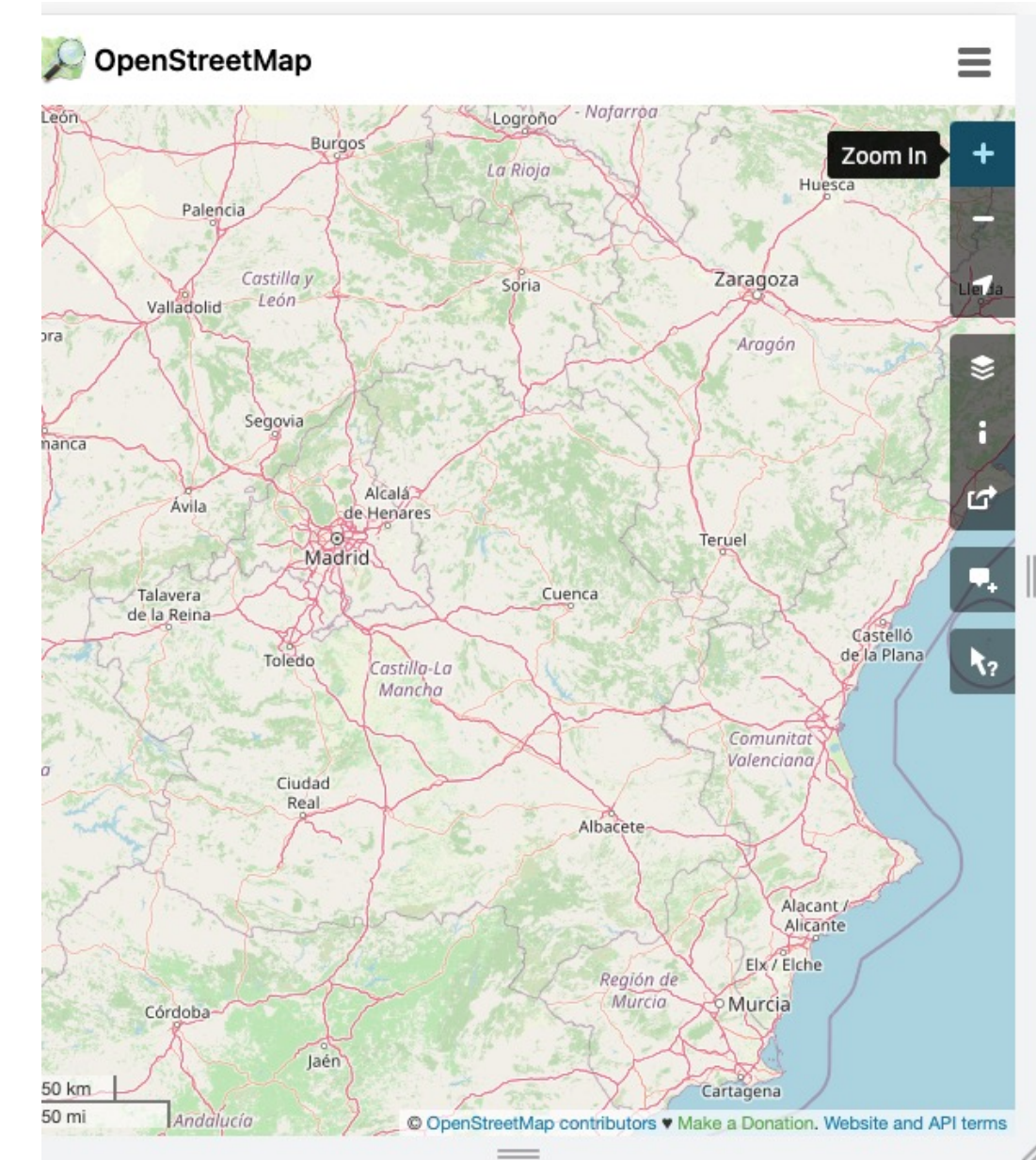
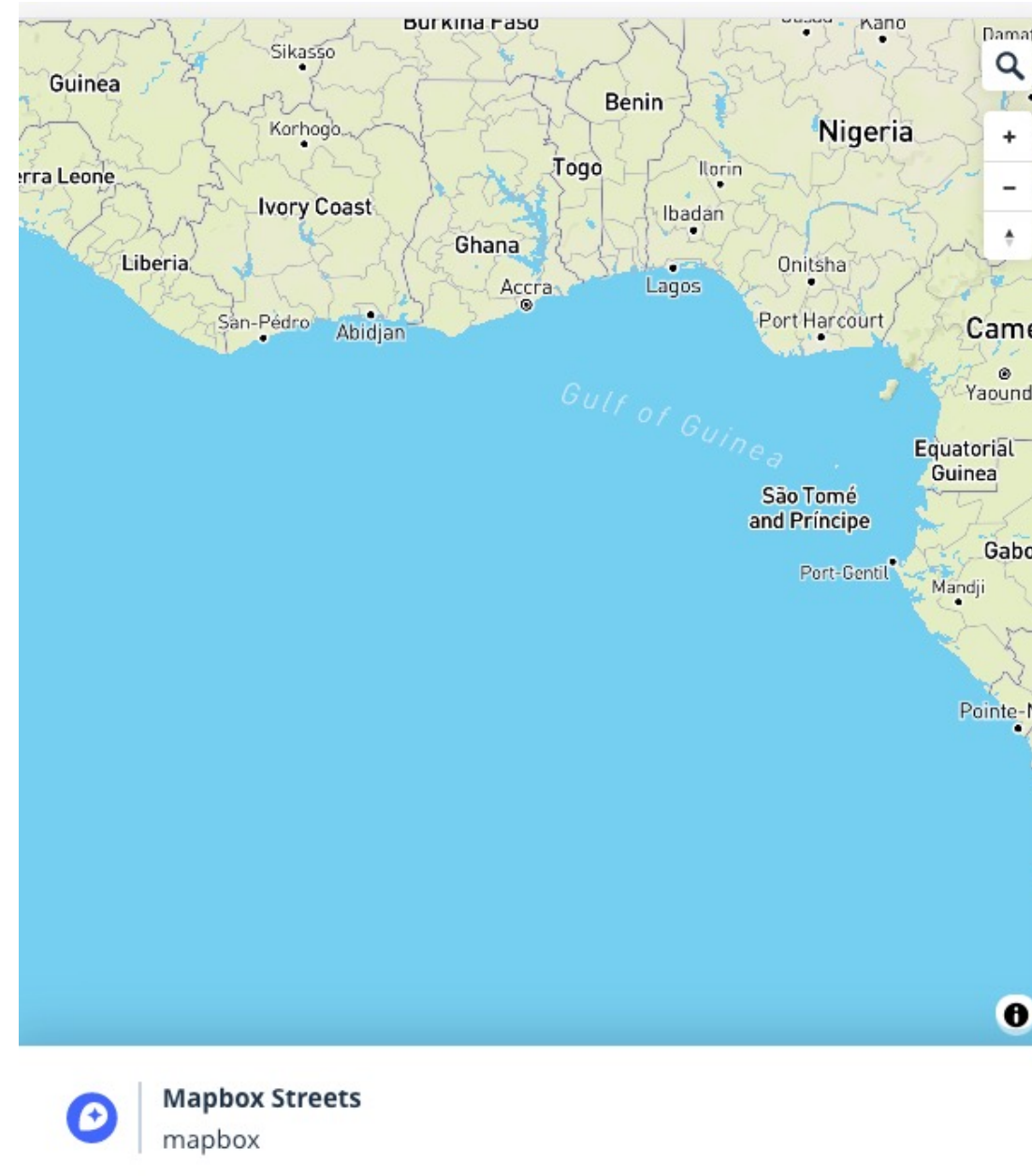
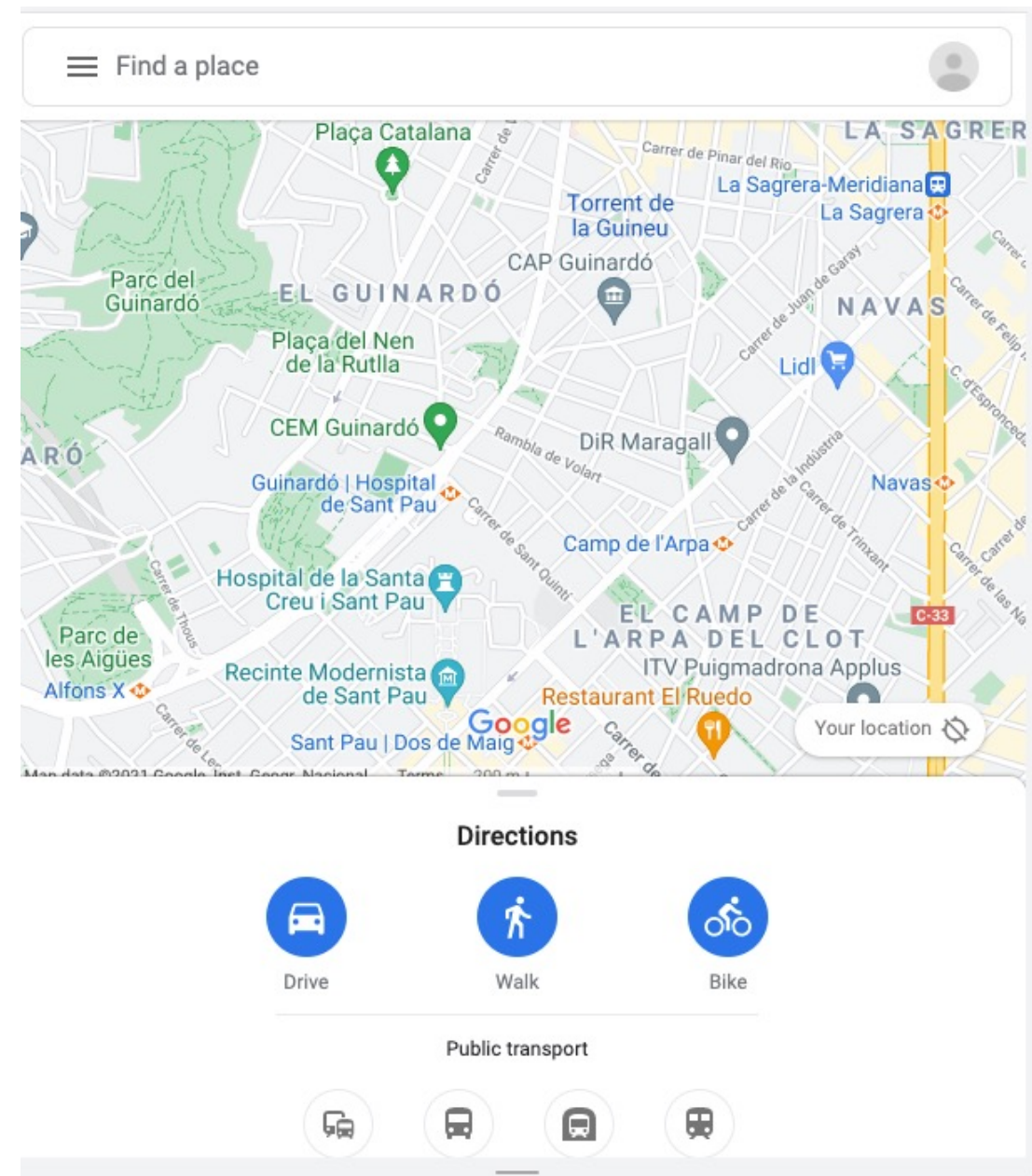


Source: <https://www.openaire.eu/how-to-make-your-data-fair>

Web Maps



Web Maps



<https://www.google.com/maps/vt?pb=!1m5!1m4!1i15!2i16583!3i12236!4i256&pb=!2m3!1e0!2sm!3i574299180&pb=!3m10!2sen!3ses!5e1249!12m1!1e18!12m4!1e68!2m2!1sset!2sRoadmap!4e0!5m4!1e3!5f2!7m1!1b1!23i1381033!23i1368782!23i1368785!23i1385853!23i46990830!23i1375050!23i4536287>

https://api.mapbox.com/v4/mapbox.mapbox-streets-v8,mapbox.mapbox-terrain-v2/4/8/7.vector.pbf?sku=101m93BNZYKAm&access_token=pk.eyJ1IjoibWFwYm94IiwiYSI6ImNpejY4M29iazA2Z2gycXA4N2pmbDZmangifQ.-g_vE53SD2WrJ6tFX7QHmA

<https://tile.openstreetmap.org/7/63/49.png>



What is OGC?

A hub for thought leadership, innovation, and standards for all things related to location

Our Vision

Building the future of location with community and technology for the good of society

Our Mission

Make location information Findable, Accessible, Interoperable, and Reusable (FAIR)

Our Approach

A proven collaborative and agile process combining consensus-based standards, innovation project, and partnership building

What is an OGC Standard?

- A document, established by consensus and approved by the OGC Membership, that provides rules and guidelines, aimed at the optimum degree of interoperability in a given context.



Photo taken March 2018

What's in an OGC Standard?

Specification Elements

- Requirements Classes
- Requirements
- Conformance Classes
- Conformance Tests

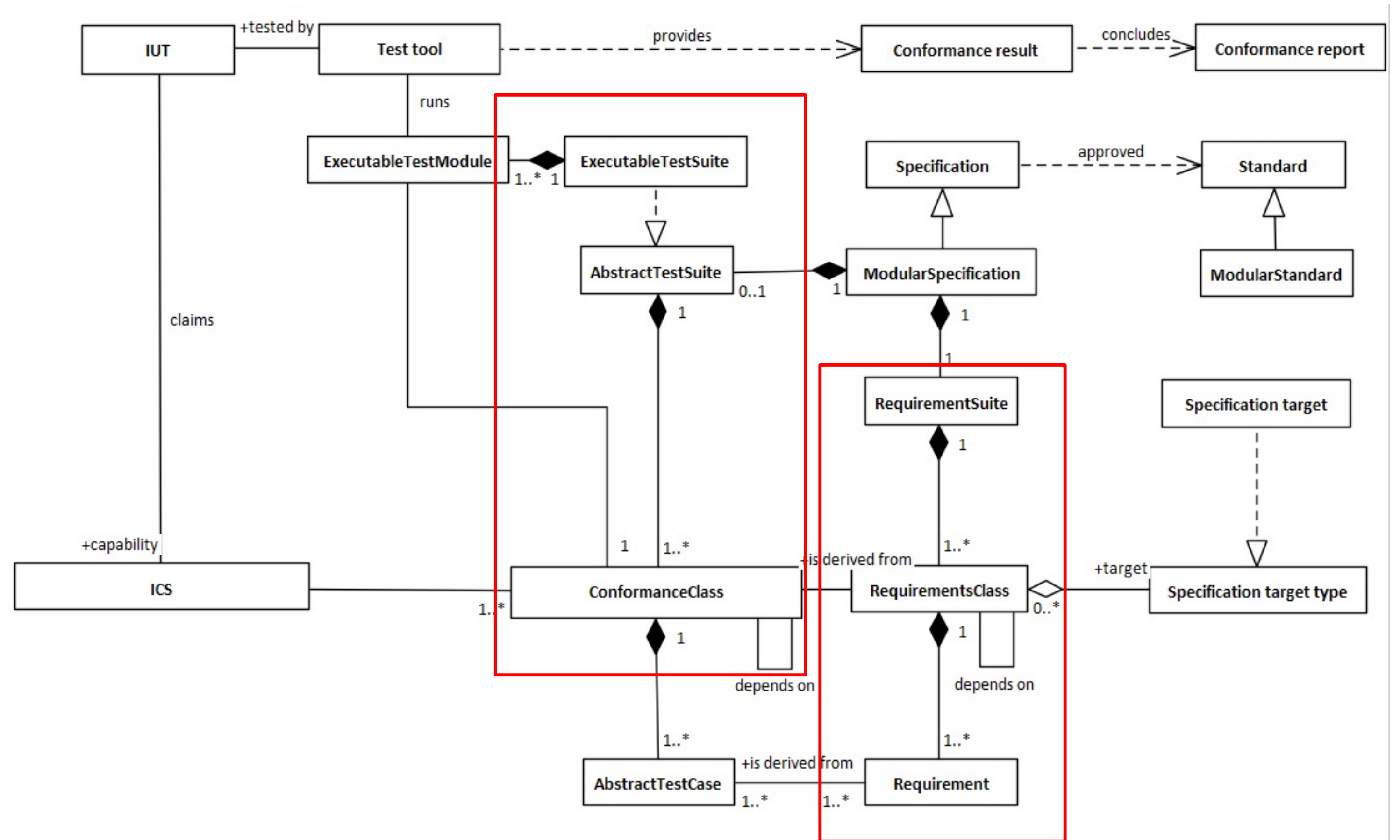


Image source: ISO 19105

Example Specification Elements

Taken from OGC API – Features – Part 1: Core

Requirement 10	/req/core/crs84
A	Unless the client explicitly requests a different coordinate reference system, all spatial geometries SHALL be in the coordinate reference system http://www.opengis.net/def/crs/OGC/1.3/CRS84 (WGS 84 longitude/latitude) for geometries without height information and http://www.opengis.net/def/crs/OGC/0/CRS84h (WGS 84 longitude/latitude plus ellipsoidal height) for geometries with height information.

Abstract Test 2	/ats/core/crs84
Test Purpose	Validate that all spatial geometries provided through the API are in the CRS84 spatial reference system unless otherwise requested by the client.
Requirement	/req/core/crs84
Test Method	<ol style="list-style-type: none">1. Do not specify a coordinate reference system in any request. All spatial data should be in the CRS84 reference system.2. Validate retrieved spatial data using the CRS84 reference system.

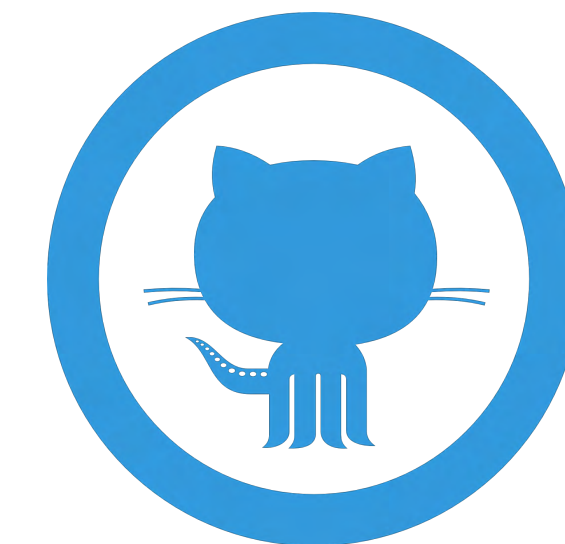
OGC API Key Characteristics

Spatially enable Web APIs in a consistent way

- Flexibility
- Leverages existing web practices
- Improves discoverability of geospatial data
- Self-documented
- Open development
- Multi-part



{ REST }



Improved Developer Experience

Quicker onboarding for non OGC/GIS experts.



OGC API - Features

- Specifies the behavior of Web APIs that provide access to features in a dataset in a manner independent of the underlying data store.
- Defines discovery and query operations.
- Published: P1 and P2.
- P1 of the standard is aligned with the STAC API and ISO 19168-1:2020.

APPROVED



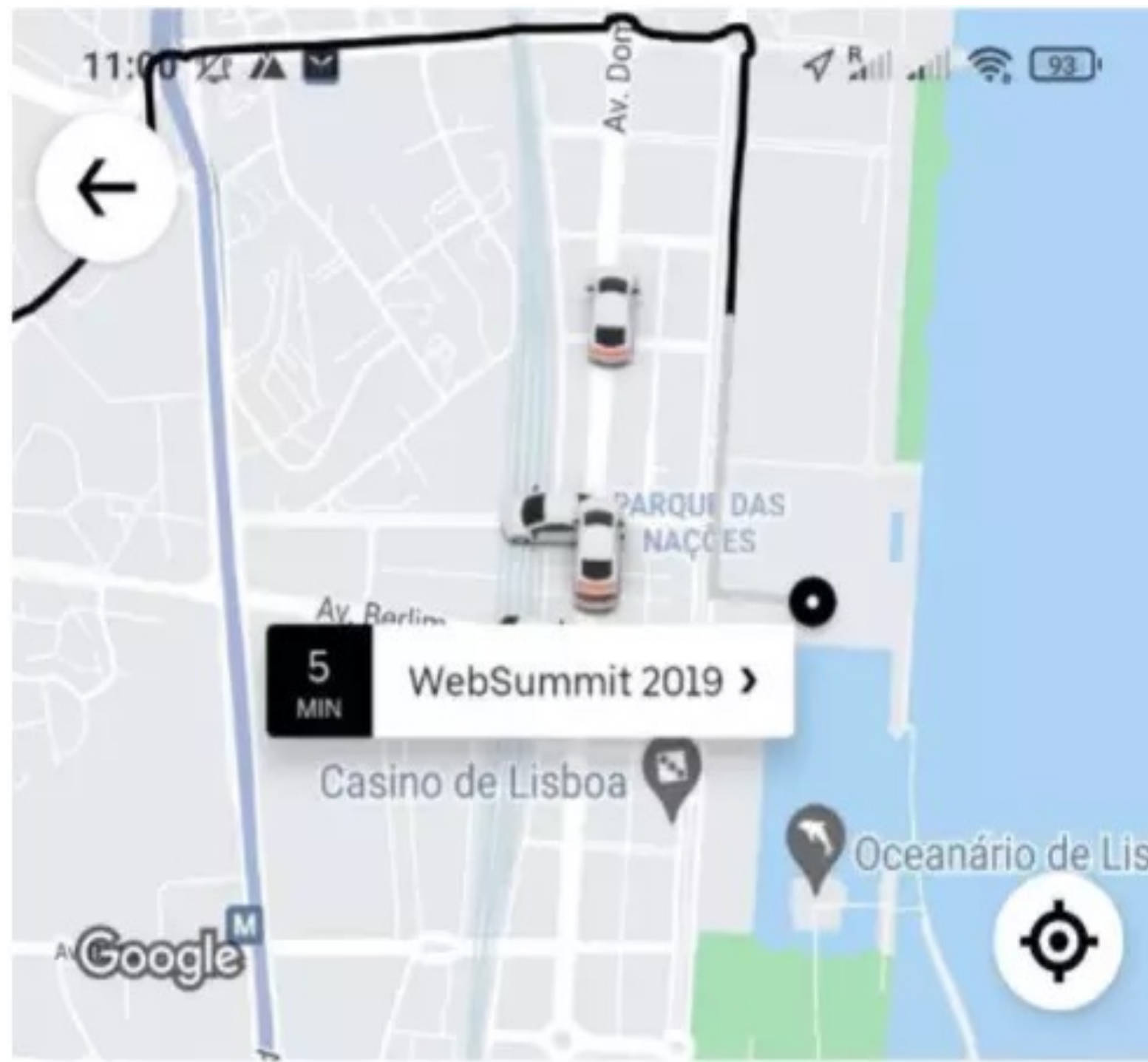
STAC
SpatioTemporal
Asset Catalog

Feature

Something of interest in the surface of the earth.

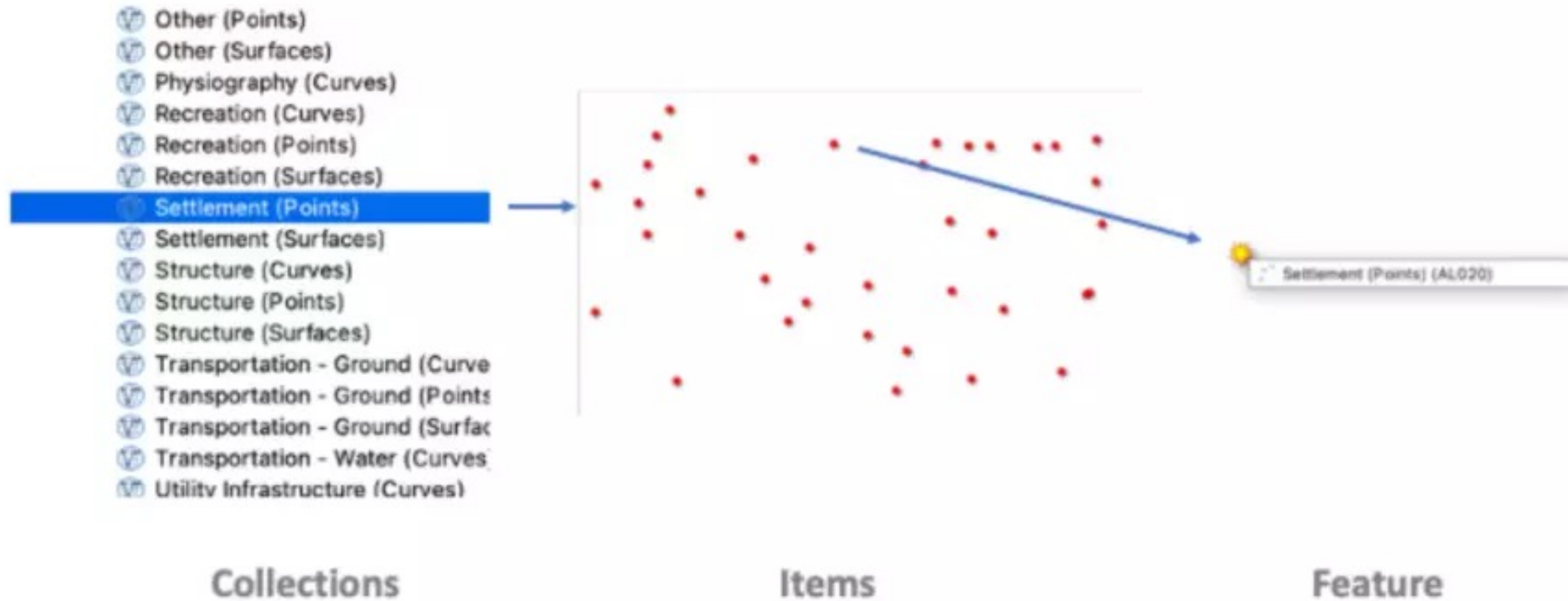


Source: <https://www.express.co.uk/news/world/868419/La-Palma-volcano-latest-updates-Canary-Islands-Cumbre-Vieja-earthquake-megatsunami>



Source: <https://9gag.com/gag/aKgywLb>

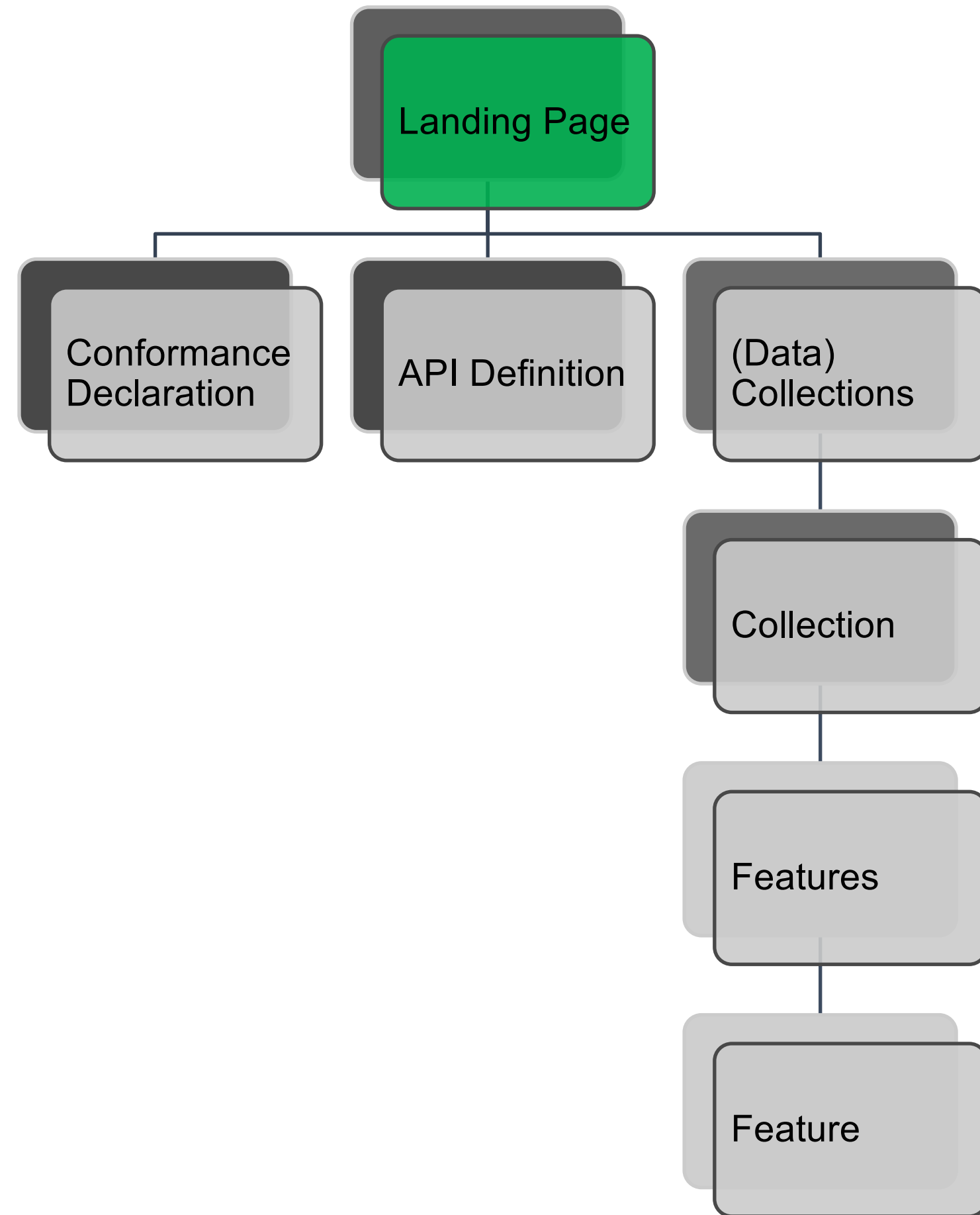
Requests



Paths in OGC API - Features

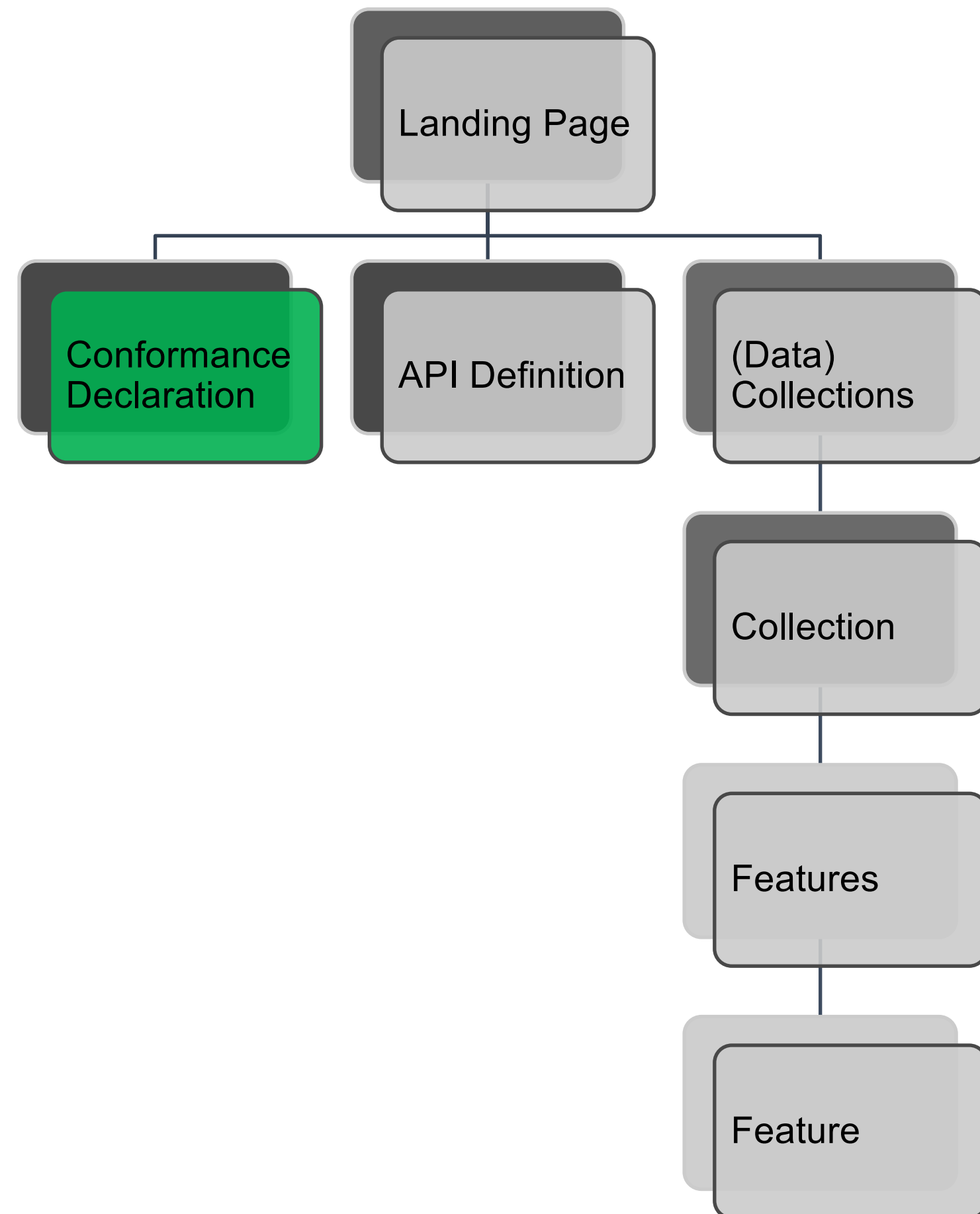
Resource	Path	HTTP method
Landing page	/	GET
Conformance declaration	/conformance	GET
API definition		GET
Feature collections	/collections	GET
Feature collection	/collections/{collectionId}	GET
Features	/collections/{collectionId}/items	GET
Feature	/collections/{collectionId}/items/{featureId}	GET

Landing Page



- Starting point to navigate the OGC API resources in this API.
- Path: /
- Members: title, description, (attribution).
- Links: service-desc, service-doc, conformance, data, (service-meta).

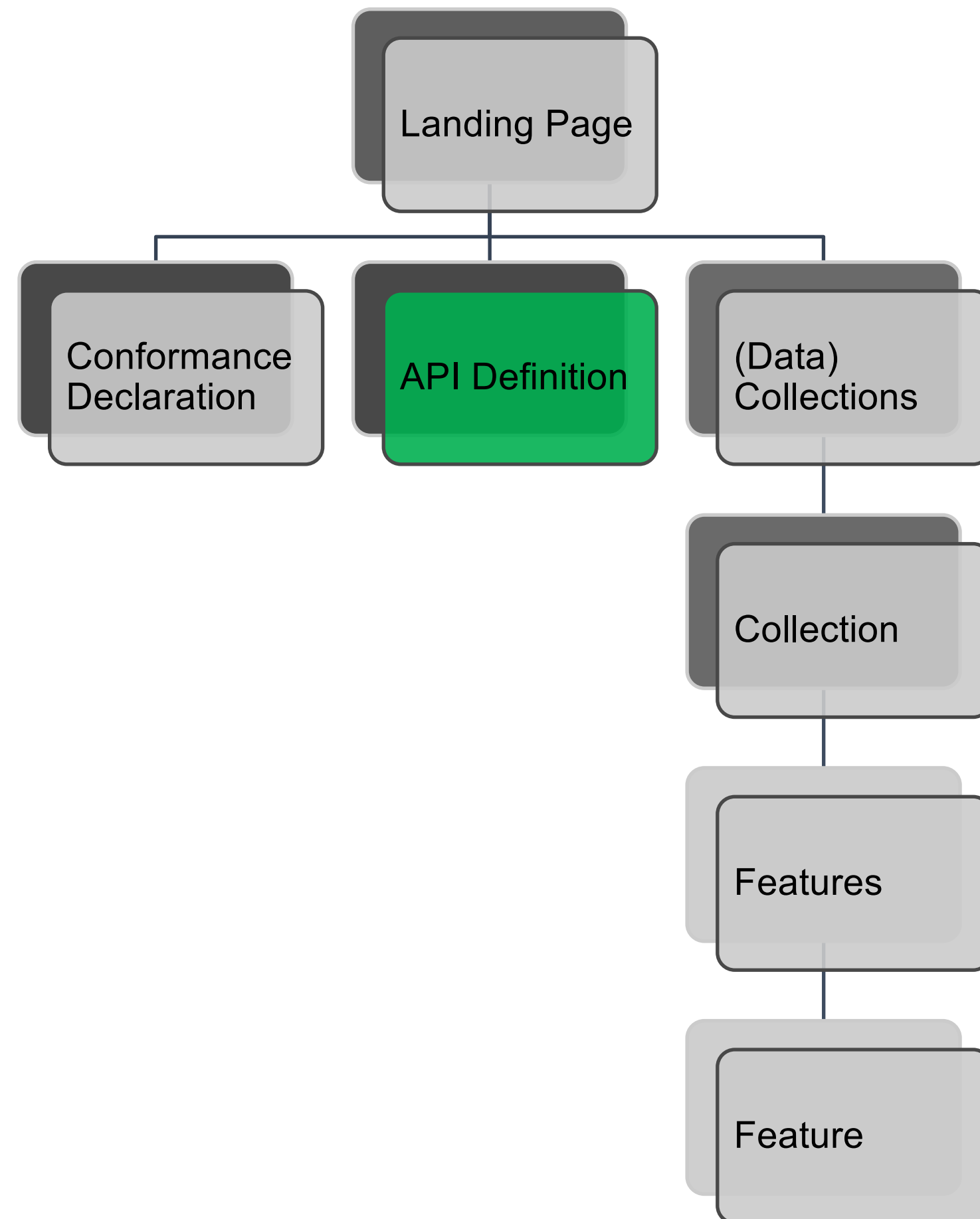
Conformance Declaration



- Lists the conformance classes from standards or community specifications, identified by a URI, that the API conforms to.
- Path: `/conformance`
- Members: `conformsTo`

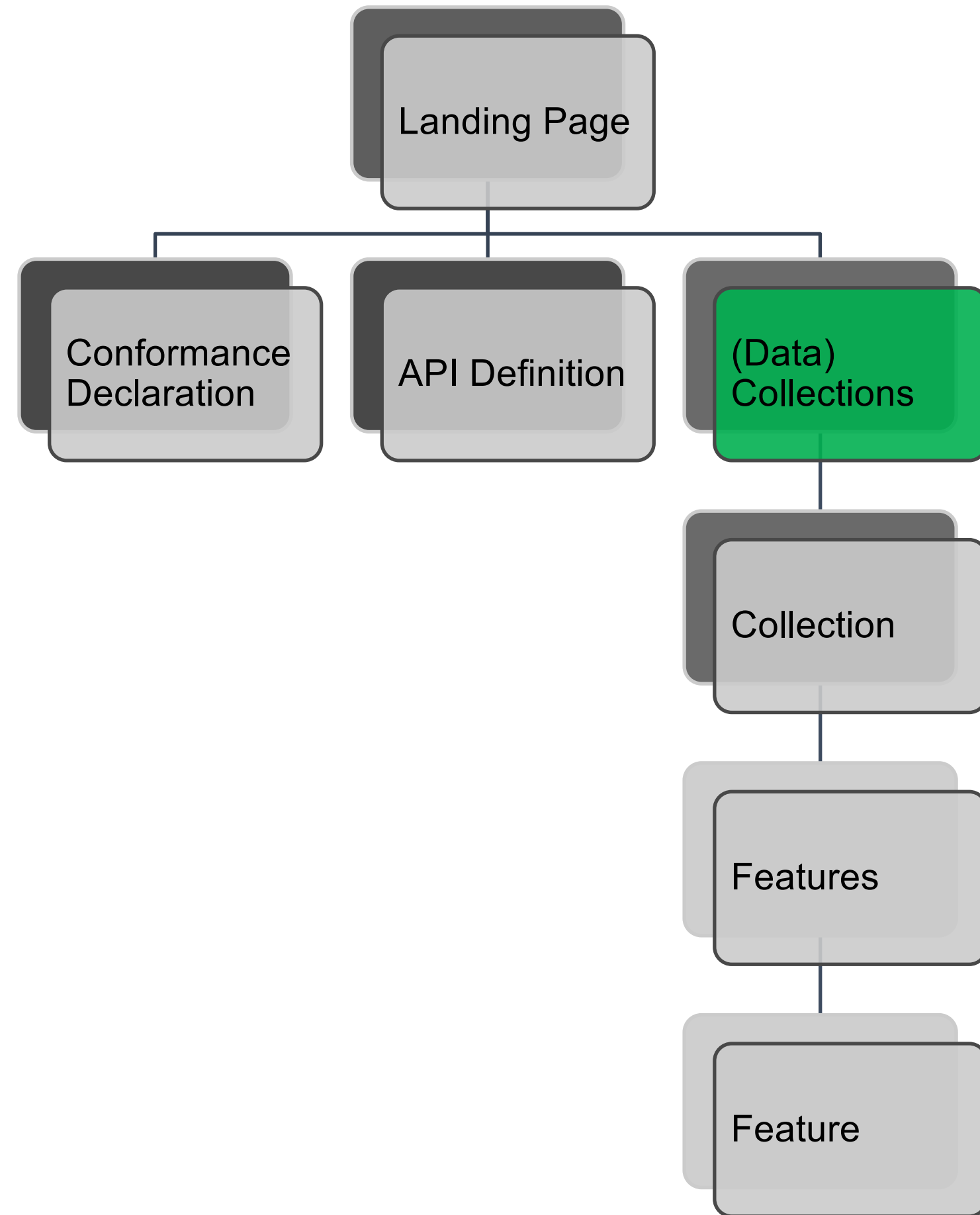
```
{
  "conformsTo": [
    "http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/core",
    "http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/oas30",
    "http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/html",
    "http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/geojson"
  ]
}
```


API Definition



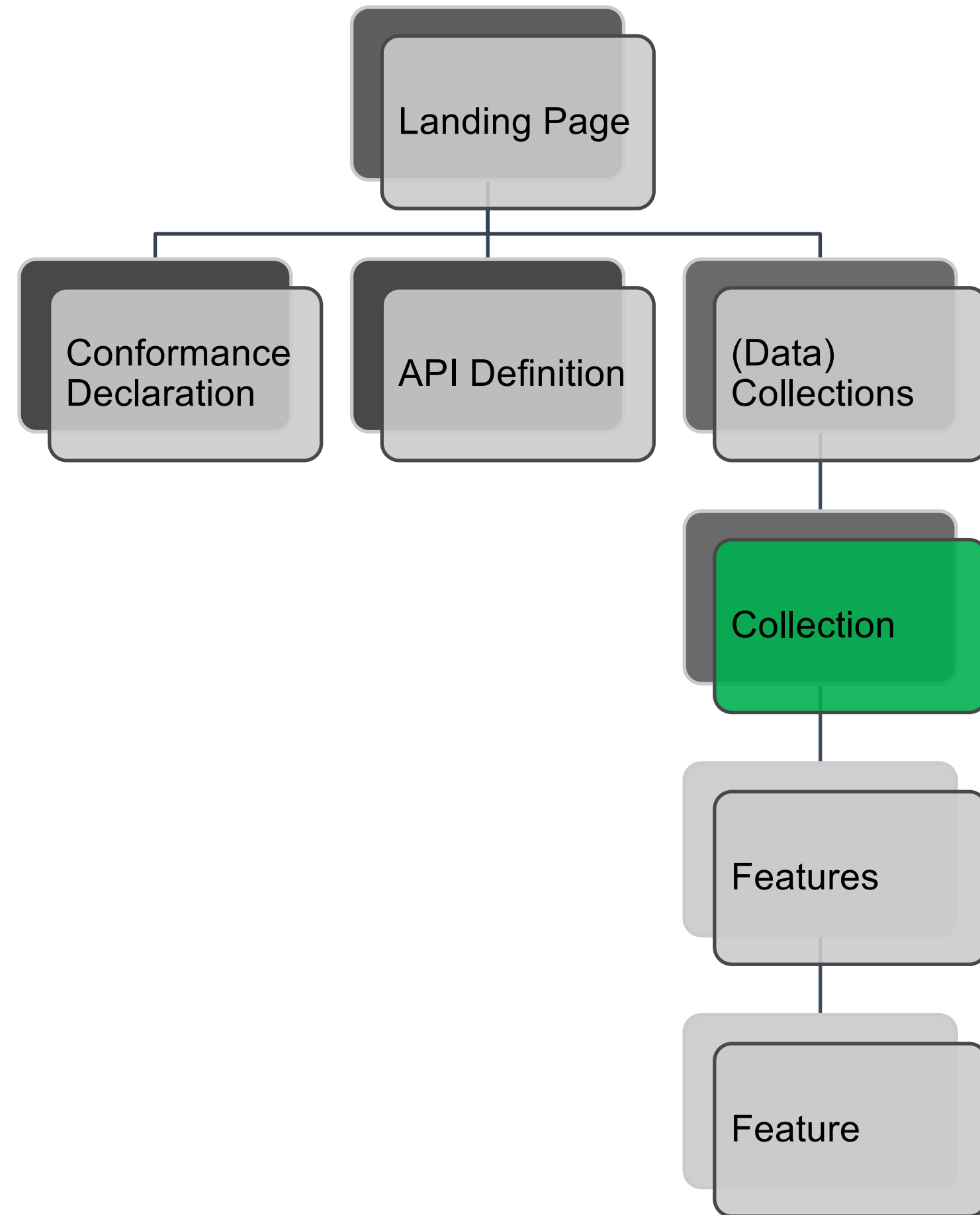
- Description/documentation of the API including the Landing Page and its sub-resources.
- No fixed path
 - often `/api`
 - may also be external, e.g. on SwaggerHub.
- OpenAPI document or an alternative service description.

Collections



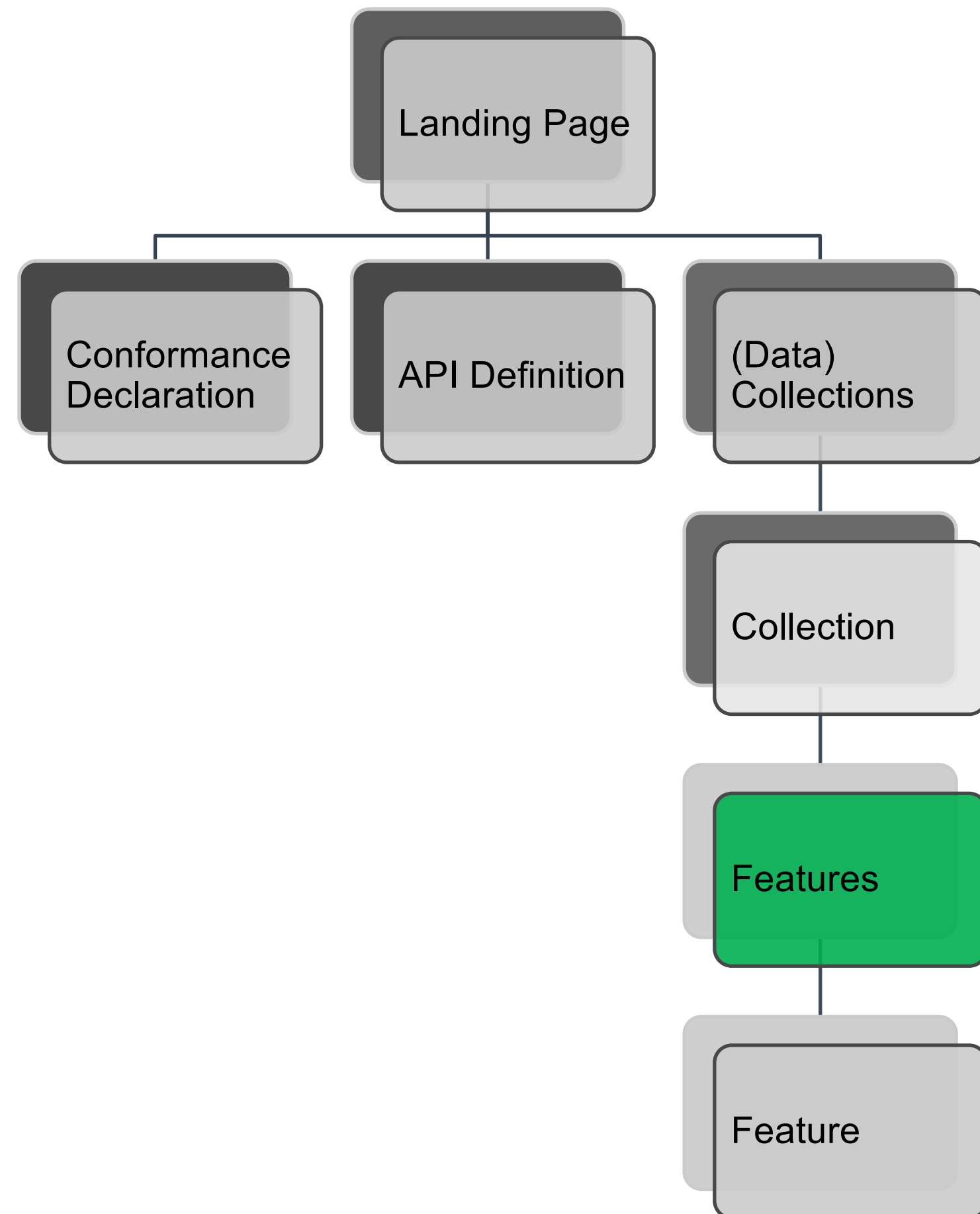
- The data in a dataset is organized into one or more collections.
- Path: `/collections`
- Members: title, description, `collections[]`, `(crs)`
- Links: `(license)`, `(enclosure)`, `(data-meta)`

Collection



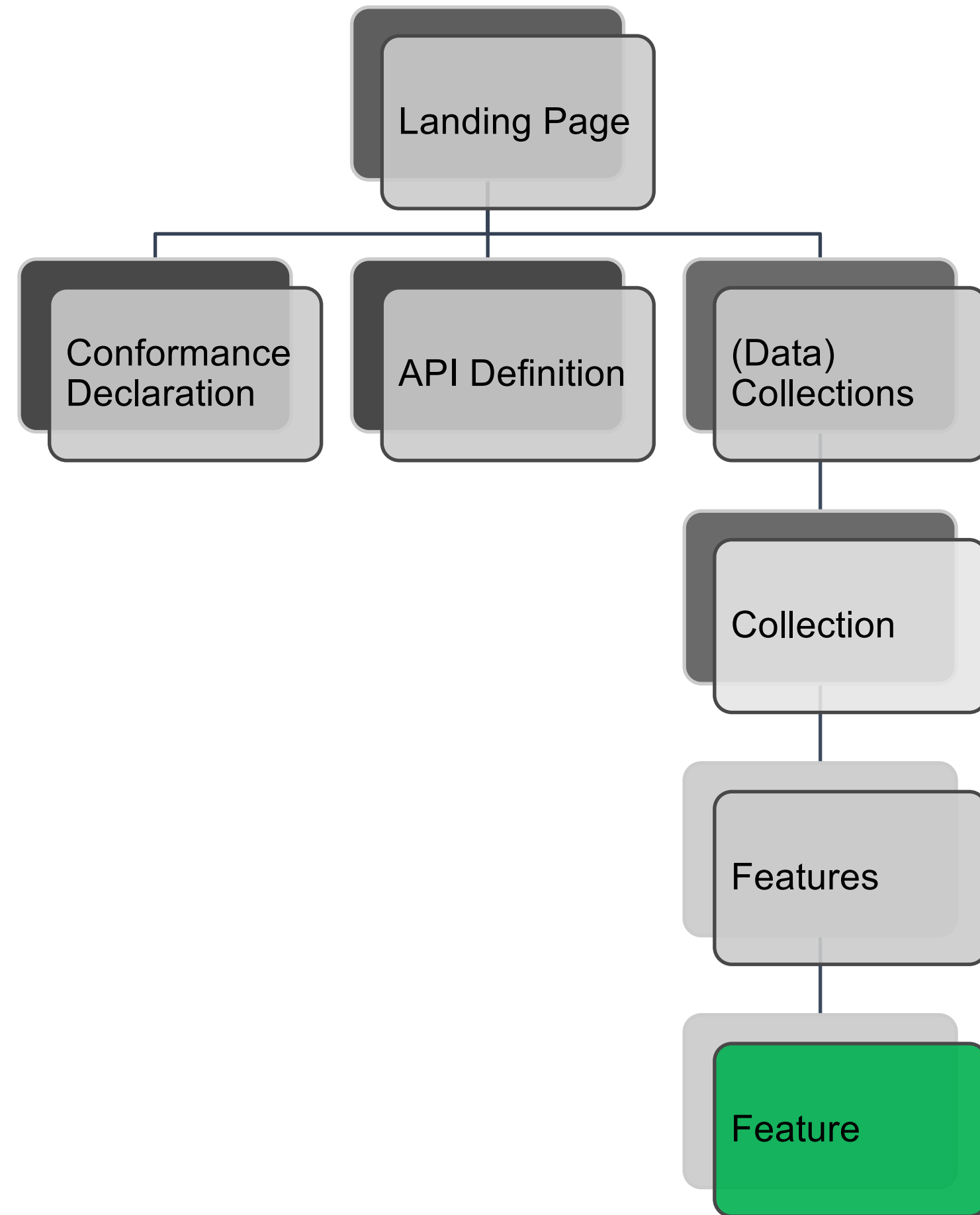
- A collection
 - OGC API Features specifies requirements for collections with itemType "feature".
- Path:
`/collections/{collectionId}`
- Members: id, title, description, extent, itemType, (crs), (storageCrs)
- Links: items, (license), (describedby), (queryables)

Features



- Paged access to features in the collection.
- Path:
`/collections/{collectionId}/items`
- Parameters: `bbox`, `datetime`, `limit`, (collection-specific parameters)
- Members: `numberMatched`, `numberReturned`, `timestamp`, `features[]`
- Links: `next`

Feature



- A single feature.
- **Path:** `/collections/{collectionId}/items/{featureId}`
- **links:** collection

Current Implementations

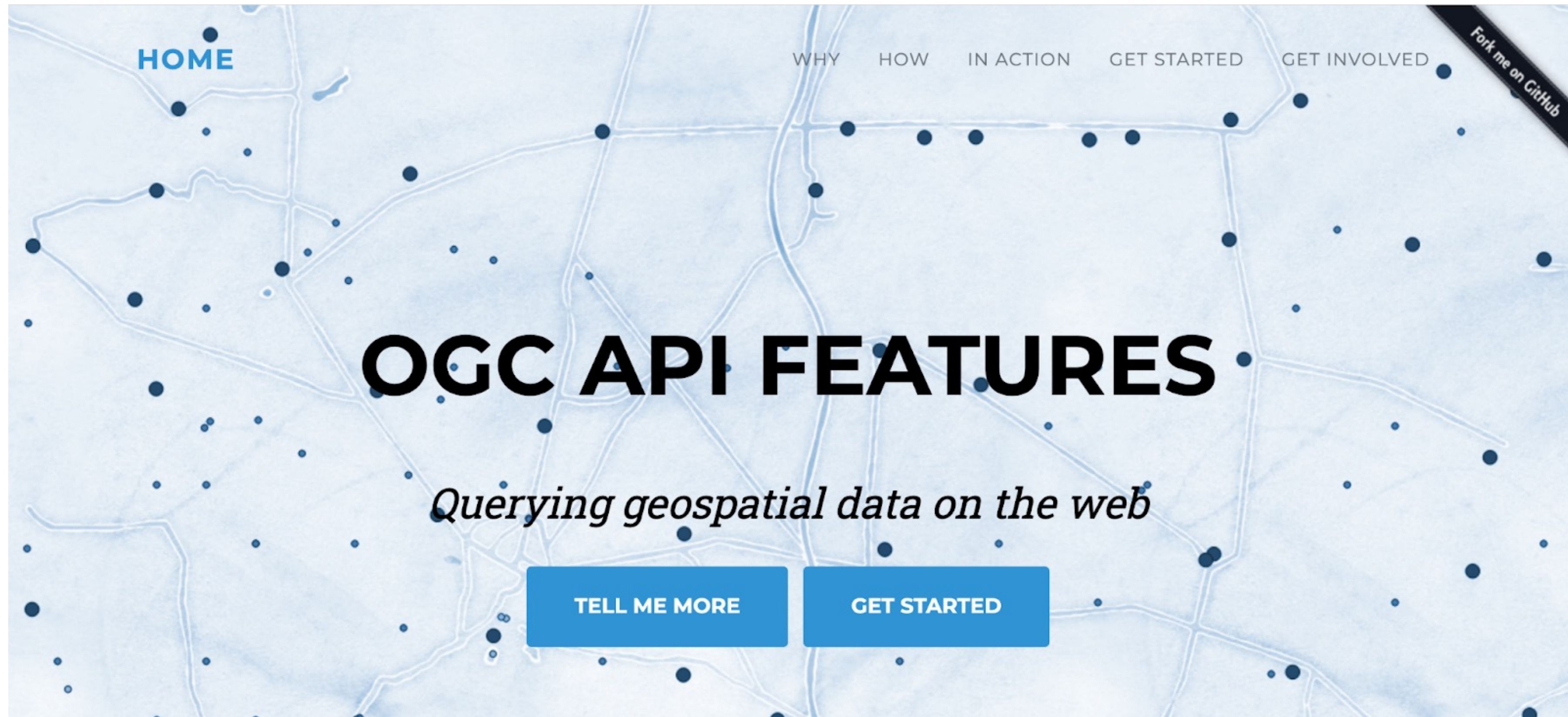
- 10 server-side implementations and 8 client-side implementations.
- Additional implementations (STAC, GeoJSON).



Source: <https://github.com/opengeospatial/ogcapi-features/tree/master/implementations>

More Information

<http://ogcapi.org/dev/features>



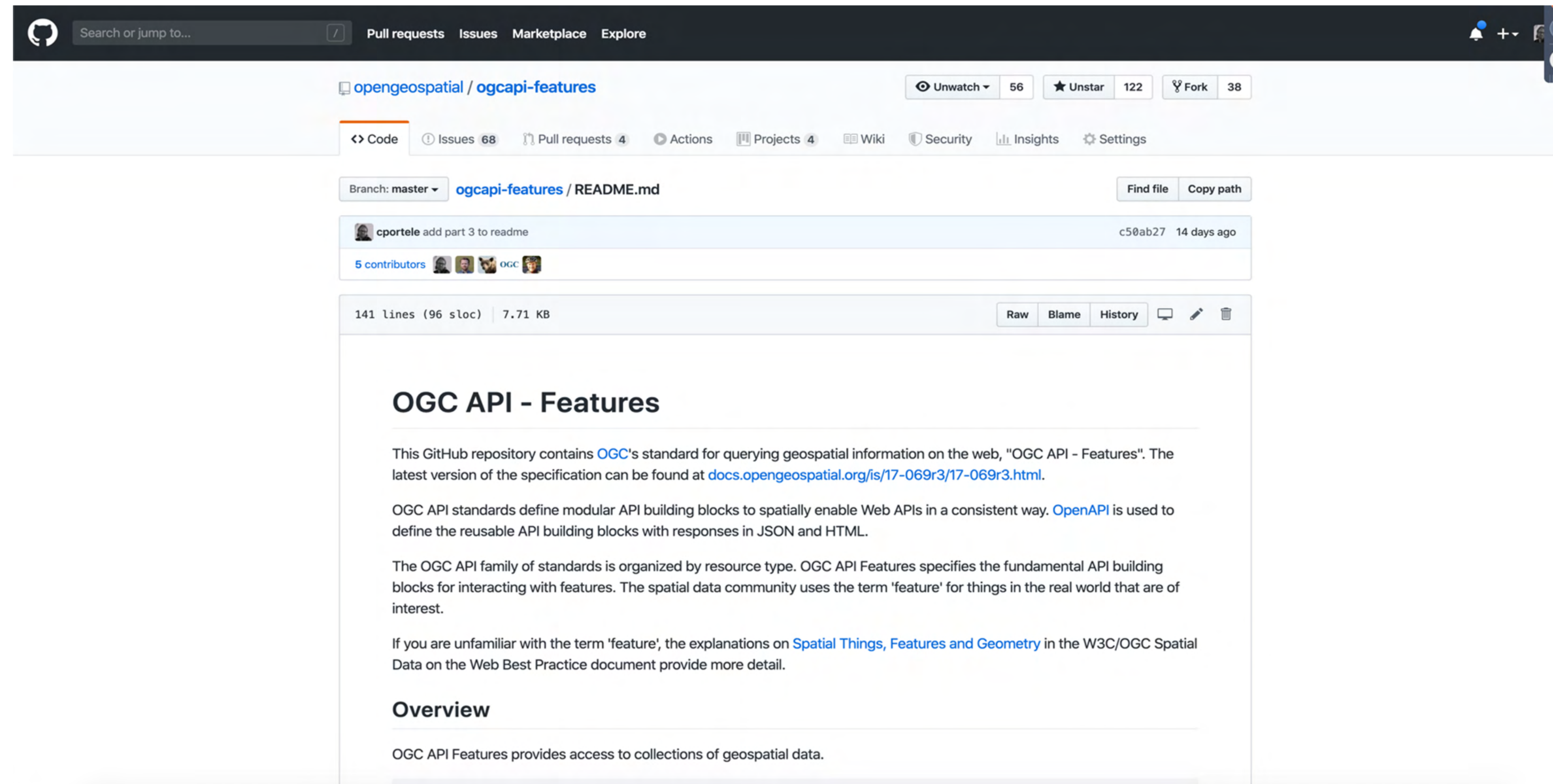


Open
Geospatial
Consortium

How can I get involved?

Contribute to the OGC API GitHub Repos

- Join the discussions.
- File issues.
- Submit PR.



The screenshot displays the GitHub interface for the repository `opengeospatial/ogcapi-features`. The repository has 56 Unwatch, 122 Unstar, and 38 Fork actions. The current view is the `ogcapi-features / README.md` file, which is 141 lines long (96 sloc) and 7.71 KB in size. The commit history shows a recent commit by `cpotele` titled "add part 3 to readme" from 14 days ago. The README content includes the following text:

OGC API - Features

This GitHub repository contains OGC's standard for querying geospatial information on the web, "OGC API - Features". The latest version of the specification can be found at docs.opengeospatial.org/is/17-069r3/17-069r3.html.

OGC API standards define modular API building blocks to spatially enable Web APIs in a consistent way. OpenAPI is used to define the reusable API building blocks with responses in JSON and HTML.

The OGC API family of standards is organized by resource type. OGC API Features specifies the fundamental API building blocks for interacting with features. The spatial data community uses the term 'feature' for things in the real world that are of interest.

If you are unfamiliar with the term 'feature', the explanations on [Spatial Things, Features and Geometry](#) in the W3C/OGC Spatial Data on the Web Best Practice document provide more detail.

Overview

OGC API Features provides access to collections of geospatial data.

Join the Working Groups at OGC

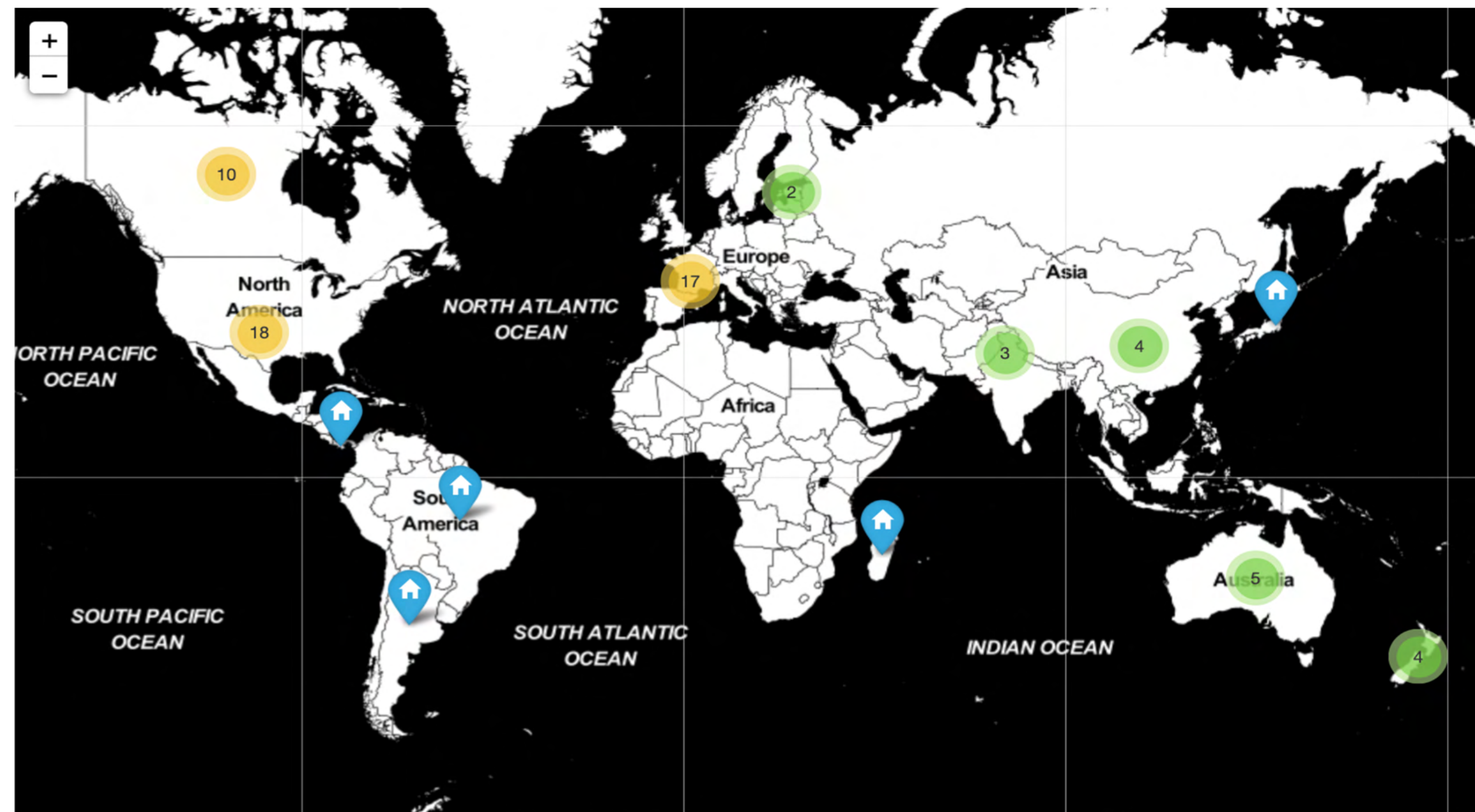
- Standards Working Groups - Groups that work on standards (new or revisions) through the OGC RFC process.
- Domain Working Groups - Groups that work on technology- or domain-specific requirements for interoperability.
- **You need to be a member in order to join the WGs.**



<https://www.ogc.org/join>

Join the OGC Code Sprints

- Three-day virtual event.
- Focus in one or more OGC standards.
- Anyone is free to attend.
- Provide a mentor stream to welcome newcomers.



<https://github.com/opengeospatial/developer-events/wiki>

2nd Open Source Software and Open Standards Code Sprint

- 8-10 March, 2022
- Will cover all OGC API approved and candidate standards.



<https://developer.ogc.org/sprints/15/>



Open
Geospatial
Consortium



OSGeo



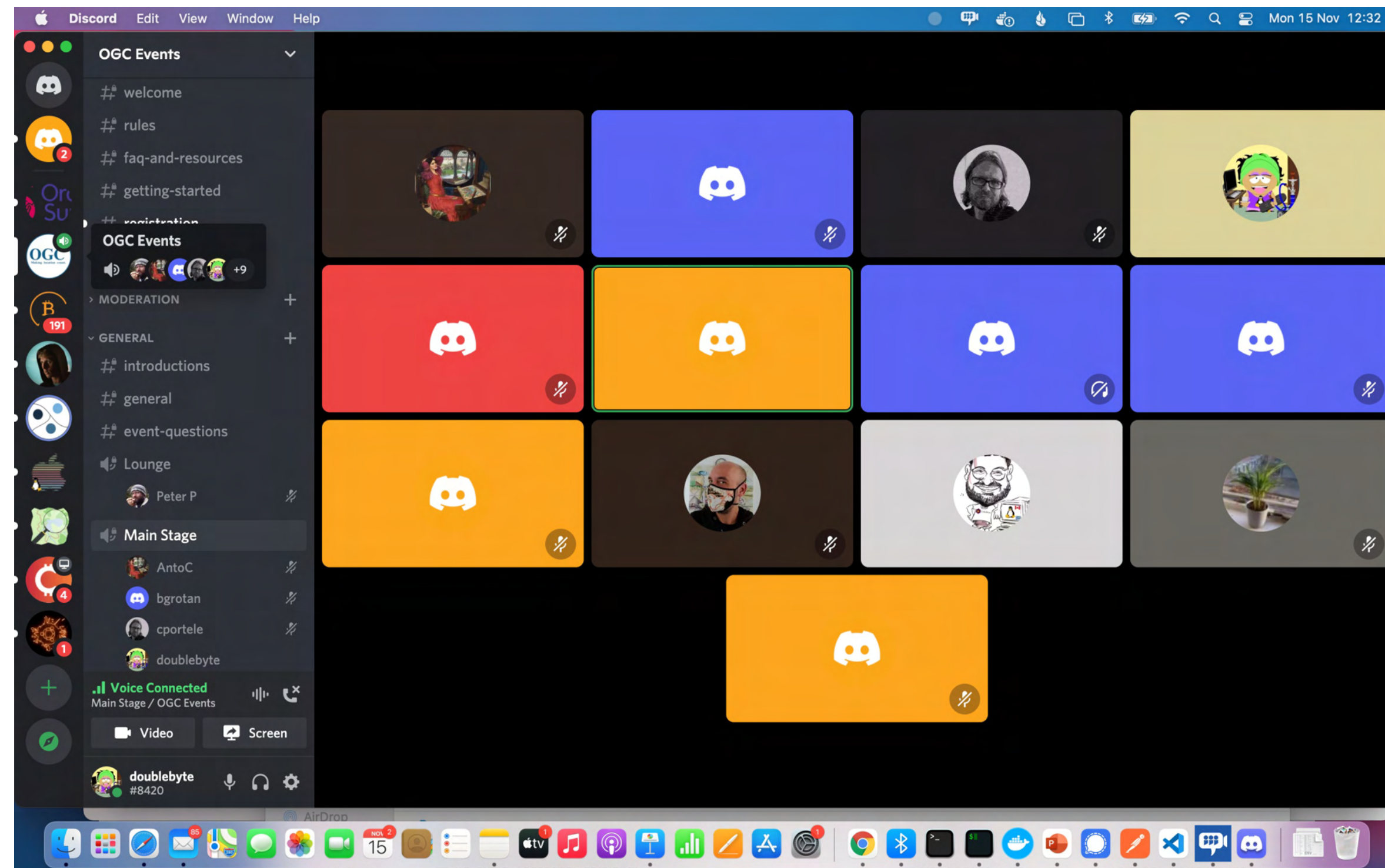
THE
APACHE
SOFTWARE FOUNDATION
20TH ANNIVERSARY

Join the OGC-Events Discord Channel



- Keep updated with future events.
- Participate in the discussions.

<https://discord.gg/3uyaZZuXr3>



Key Takeaways

- APIs are a very effective and popular enabler of rapid software development.
- API variations without standardized elements can degrade interoperability.
- Open Standards improve interoperability between independent implementations.
- OGC API Standards enhance geospatial interoperability between Web APIs.
- OGC welcomes developers to use contribute to these standards.

Don't reinvent the wheel!



Just perfect it.

Thank You

Community

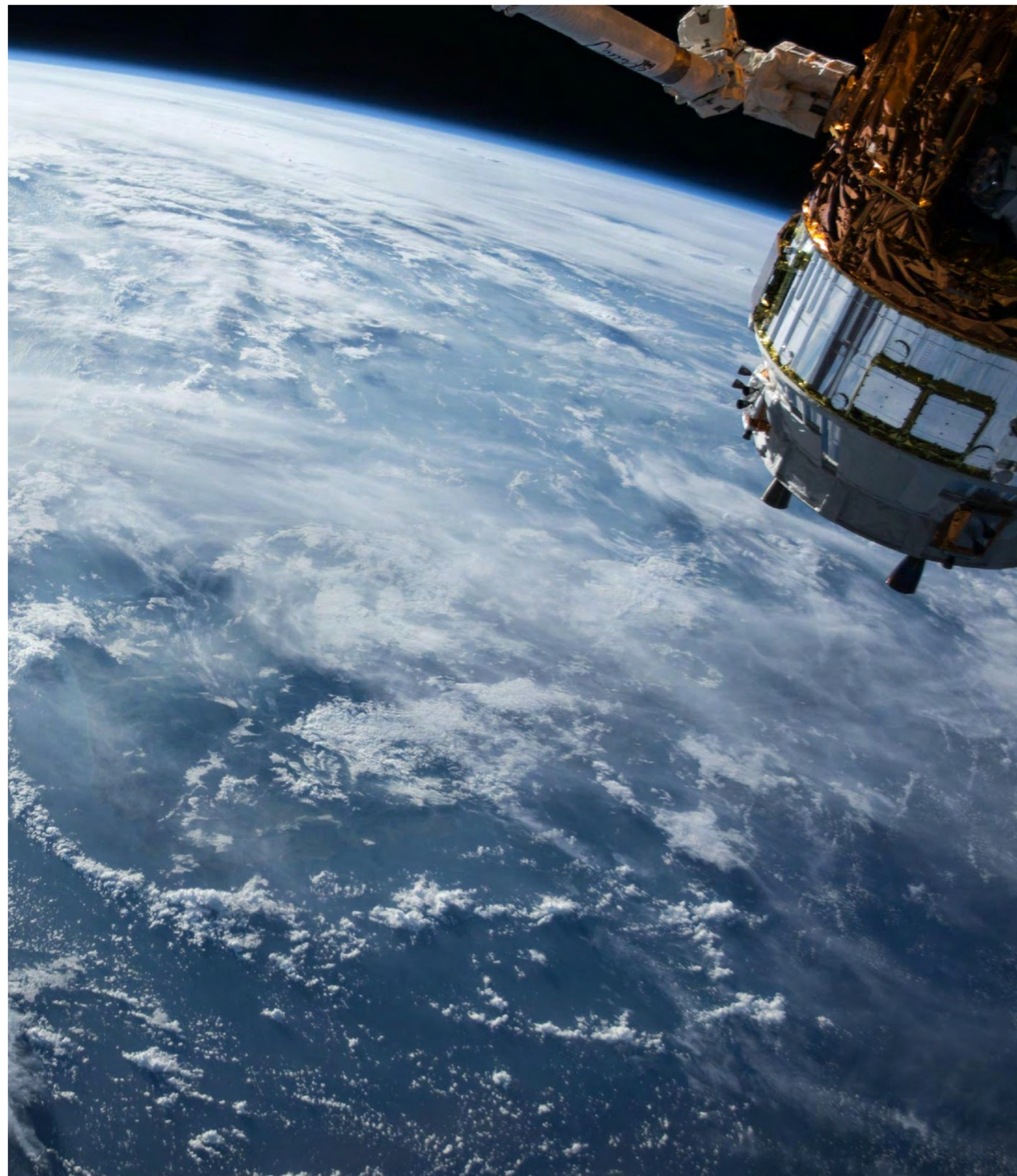
- 500+ International Members
- 110+ Member Meetings
- 60+ Alliance and Liaison partners
- 50+ Standards Working Groups
- 45+ Domain Working Groups
- 25+ Years of Not for Profit Work
- 10+ Regional and Country Forums

Innovation

- 120+ Innovation Initiatives
- 380+ Technical reports
- Quarterly Tech Trends monitoring

Standards

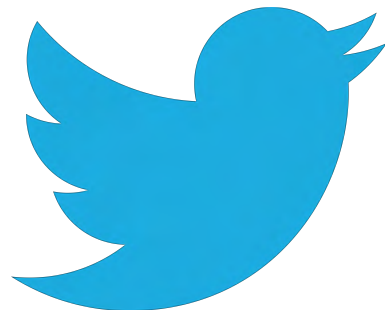
- 65+ Adopted Standards
- 300+ products with 1000+ certified implementations
- 1,700,000+ Operational Data Sets
- Using OGC Standards

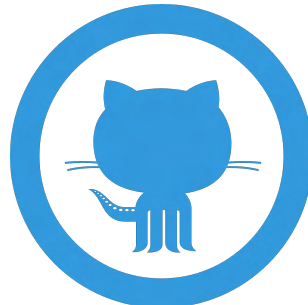


I would ❤️ to hear from you!

 jsimoes@ogc.org

 joanasimoes

 @doublebyte

 @doublebyte1

 <https://dev.to/doublebyte>