



Open
Geospatial
Consortium

Datos Geoespaciales en la Web

En la era de REST, JSON y
OpenAPI

Joana Simoes - Developer Relations @OGC



Sobre mí



Dr. Joana Simoes
Developer Relations (OGC)

- Data Engineer & Data Scientist.
- PhD en SIG, University College of London.
- +15 años de experiencia en pymes, academia una start-up y una organización internacional (FAO).
- Contribuidora de proyectos FOSS.
- Charter member de OSGeo.



Open
Geospatial
Consortium



OSGeo



Open Geospatial Consortium (OGC)

- Consorcio industrial internacional.
- Agrupa a más de 560 compañías, agencias gubernamentales y universidades.
- Los miembros colaboran en el desarrollo y mantenimiento de estándares para datos y servicios geospaciales.



1ª - Generación de Servicios Web OGC (OWS)

- 1990s/00s
- Uso de SOAP/XML



Servicios W*s

	WMS	WFS	WCS	WPS	SOS	SPS	CSW	WMTS
Use HTTP methods explicitly.	Y	N	Y*	N	N	N	N	Y
Be stateless.	Y	Y	Y	Y	Y	Y	Y	Y
Expose directory structure-like URIs.	N	N	N	N	N	N	N	Y
Use HTTP Error codes	N	N	N	N	N	N	N	N
Transfer XML, JavaScript Object Notation (JSON), or image.	Image	XML	Any	Any	XML	XML	XML	Image

Source: OGC 15-052r1r1

OGC APIs

👉 <https://ogcapi.ogc.org/>

- Aseguran que los datos geoespaciales sean “web native”.
- Mejoran la experiencia del desarrollador.
- En última instancia, reemplazarán y mejorarán los estándares de servicio web de OGC (W*s).



{ REST }



Todo definido en OpenAPI

Modernización de la documentación

The image shows the Swagger Editor interface. On the left, the OpenAPI 3.0.2 specification is written in YAML. On the right, the rendered documentation is displayed, showing the title 'Building Blocks specified in OGC API - Features - Part 1: Core' with version '1.0.0' and 'OAS3' tags. The rendered content includes a description, contact information for Clemens Portele, and a 'Schemas' section with expandable items like 'collection' and 'collections'.

```
1 openapi: 3.0.2
2 info:
3   title: "Building Blocks specified in OGC API - Features - Part 1: Core"
4   description: |-
5     Common components used in the
6     [OGC standard "OGC API - Features - Part 1: Core"](http://docs
7     .opengeospatial.org/is/17-069r3/17-069r3.html).
8     OGC API - Features - Part 1: Core 1.0 is an OGC Standard.
9     Copyright (c) 2019 Open Geospatial Consortium.
10    To obtain additional rights of use, visit http://www.opengeospatial
11    .org/legal/ .
12    This document is also available on
13    [OGC](http://schemas.opengis.net/ogcapi/features/part1/1.0/openapi
14    /ogcapi-features-1.yaml).
15  version: '1.0.0'
16  contact:
17    name: Clemens Portele
18    email: portele@interactive-instruments.de
19  license:
20    name: OGC License
21    url: 'http://www.opengeospatial.org/legal/'
22  components:
23  parameters:
24    bbox:
25      name: bbox
26      in: query
27      description: |-
28        Only features that have a geometry that intersects the bounding
29        box are selected.
30        The bounding box is provided as four or six numbers, depending on
31        whether the
32        coordinate reference system includes a vertical axis (height or
```

Building Blocks specified in OGC API - Features - Part 1: Core 1.0.0 OAS3

Common components used in the [OGC standard "OGC API - Features - Part 1: Core"](#).

OGC API - Features - Part 1: Core 1.0 is an OGC Standard. Copyright (c) 2019 Open Geospatial Consortium. To obtain additional rights of use, visit <http://www.opengeospatial.org/legal/> .

This document is also available on [OGC](#).

[Contact Clemens Portele](#)

[OGC License](#)

No operations defined in spec!

Schemas

- collection >
- collections >

Publicadas en “Bloques de Construcción”

User: just want features in WGS 84, but want to query



Features: CQL

Features: CRS

Features: Core

Data
OGC API - Common

Tiles

Maps

Coverages

User: tile it up and make it work on my phone



User: need features supporting GDA2020 and other CRSs



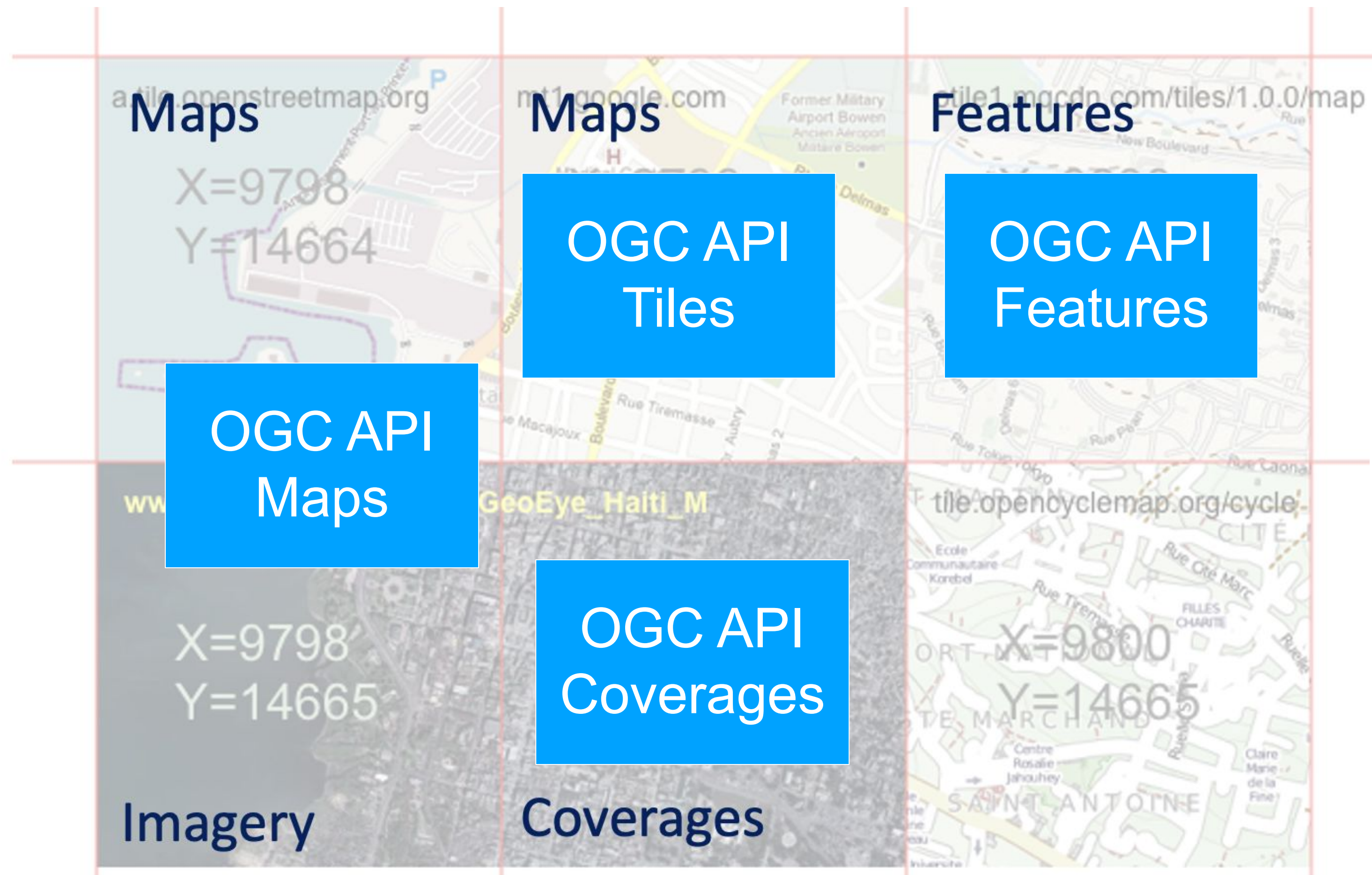
Features: Transactions

EDR



User: I am a fire incident commander: give me everything

OWS -> OGC APIs



Discover via
OGC API Records

Multiple Maps with common semantics - Interoperability (Source: Joan Maso)

OGC API - Estándares aprobados y candidatos a estándares

OGC API – Discrete Global Grid Systems

OGC API – Records

OGC API - Maps

OGC API - Styles

OGC API – Moving Features

OGC API - Tiles

OGC API - Common

OGC API - Routes

OGC API – Environmental Data Retrieval

OGC API - Features

OGC API - Processes

OGC API – Coverages

OGC API – Joins

Green border means approved

Points	Lines	Polygons
	2 segments	3 segments
	1 segment	2 segments

OGC API - Features

- Especifica el comportamiento de las Web APIs que dan acceso a features, de manera independiente de la “data store” subyacente.
- Define las operaciones de descubrimiento y consulta.
- Publicadas: P1 y P2.
- P1 del estándar está alineada con STAC API y ISO 19168-1:2020.

APPROVED

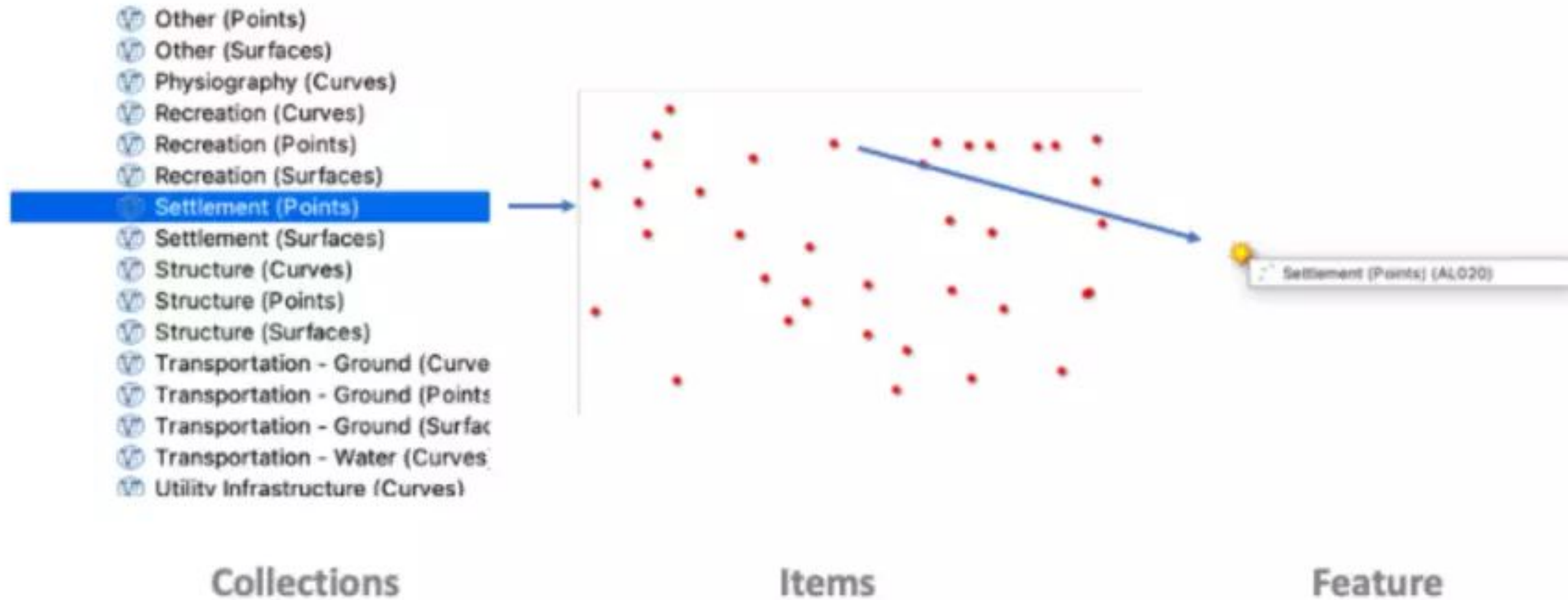


STAC
SpatioTemporal
Asset Catalog

Peticiones



<https://app.swaggerhub.com/apis/cportele/opf-features-api/1.0.0>



Implementaciones

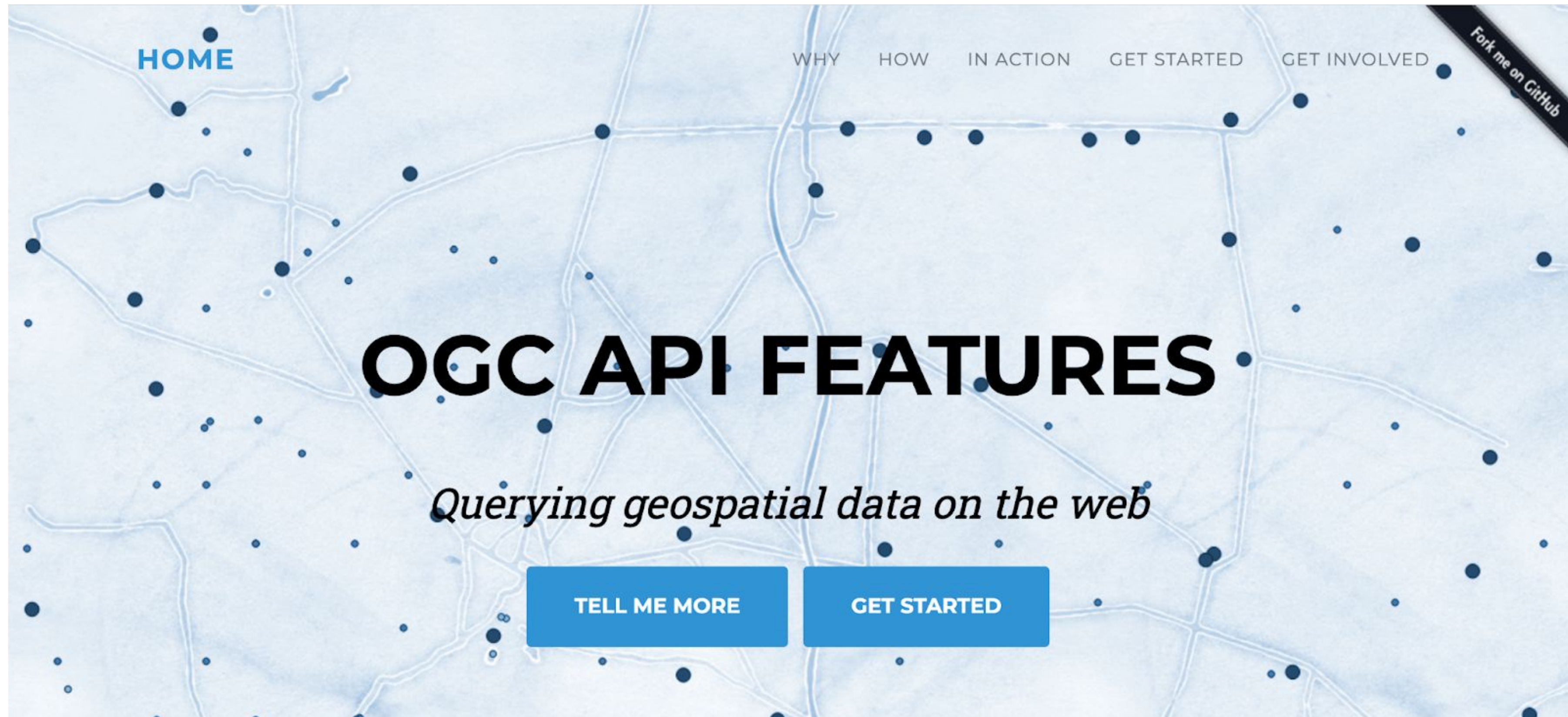
- 10 implementaciones del lado del servidor y 8 implementaciones del lado del cliente.
- Implementaciones adicionales (STAC, GeoJSON).



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

Más Información

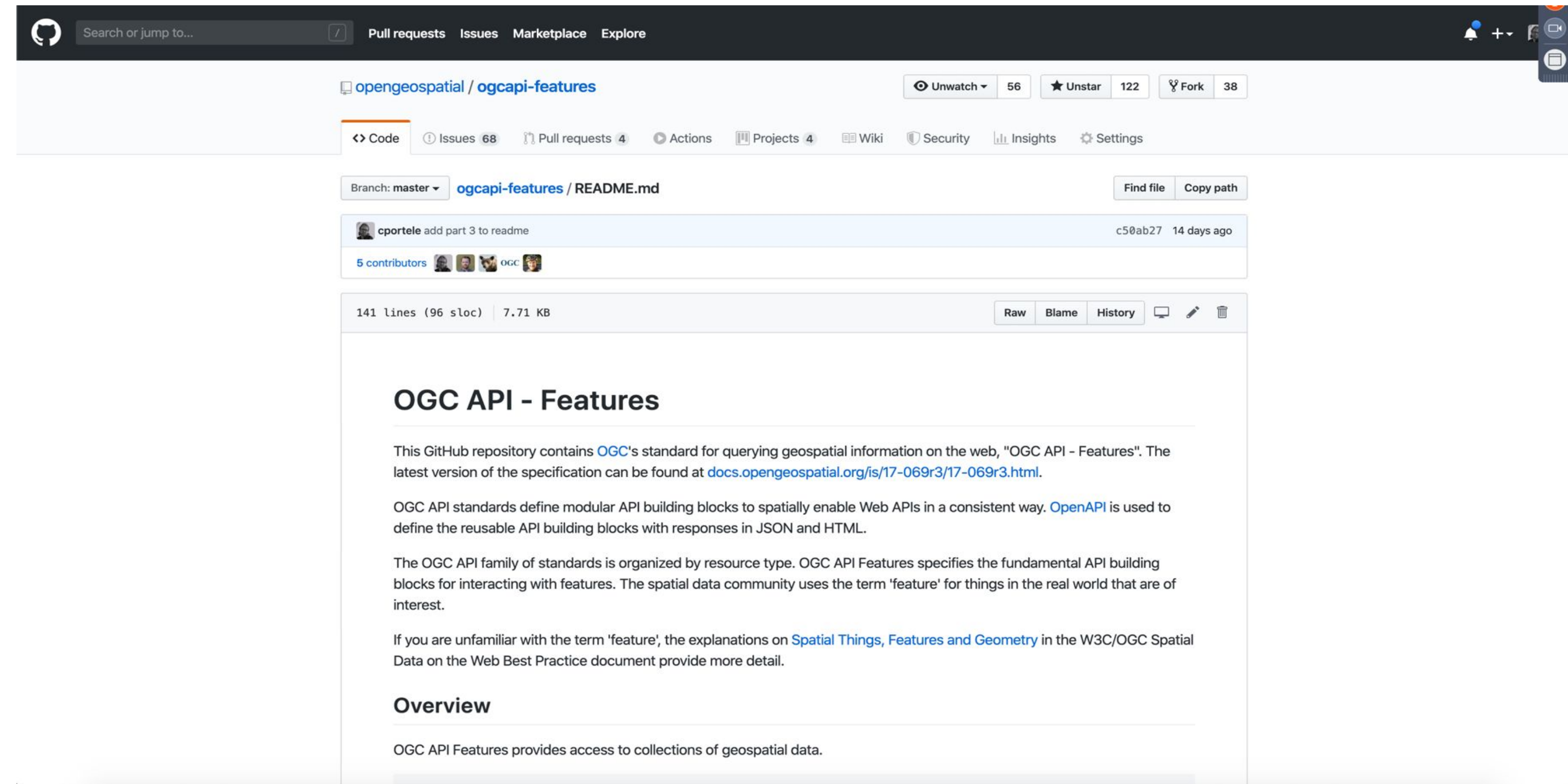
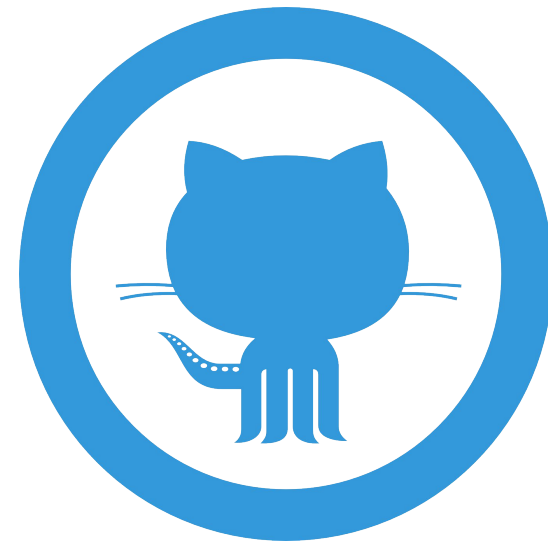
<http://ogcapi.org/dev/features>



¿Cómo involucrarse en OGC?

Contribuir a los repositorios de GitHub de las OGC APIs

- Juntarse a las discusiones.
- Crear issues.
- Submitir PR.



The screenshot shows the GitHub repository page for 'opengeospatial/ogcapi-features'. The repository has 56 watchers, 122 stars, and 38 forks. The current branch is 'master' and the file being viewed is 'ogcapi-features / README.md'. The commit history shows a recent commit by 'cportele' titled 'add part 3 to readme' with commit hash 'c50ab27' from 14 days ago. The README content includes the title 'OGC API - Features', a description of the repository's purpose, and an 'Overview' section.

OGC API - Features

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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.

<https://github.com/opengeospatial/ogcapi-features/>

<https://github.com/opengeospatial/ogcapi-tiles>

<https://github.com/opengeospatial/ogcapi-records>

Unirse a los grupos de trabajo de OGC

- Grupos de Trabajo de Estándares (SWG): grupos que trabajan en estándares (nuevos o revisados) a través del proceso OGC RFC.
- Grupos de Trabajo de Dominio (DWGs): grupos que trabajan en requisitos específicos de tecnología o dominio para la interoperabilidad.
- **Es necesario ser miembro OGC para unirse a los grupos de trabajo.**



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

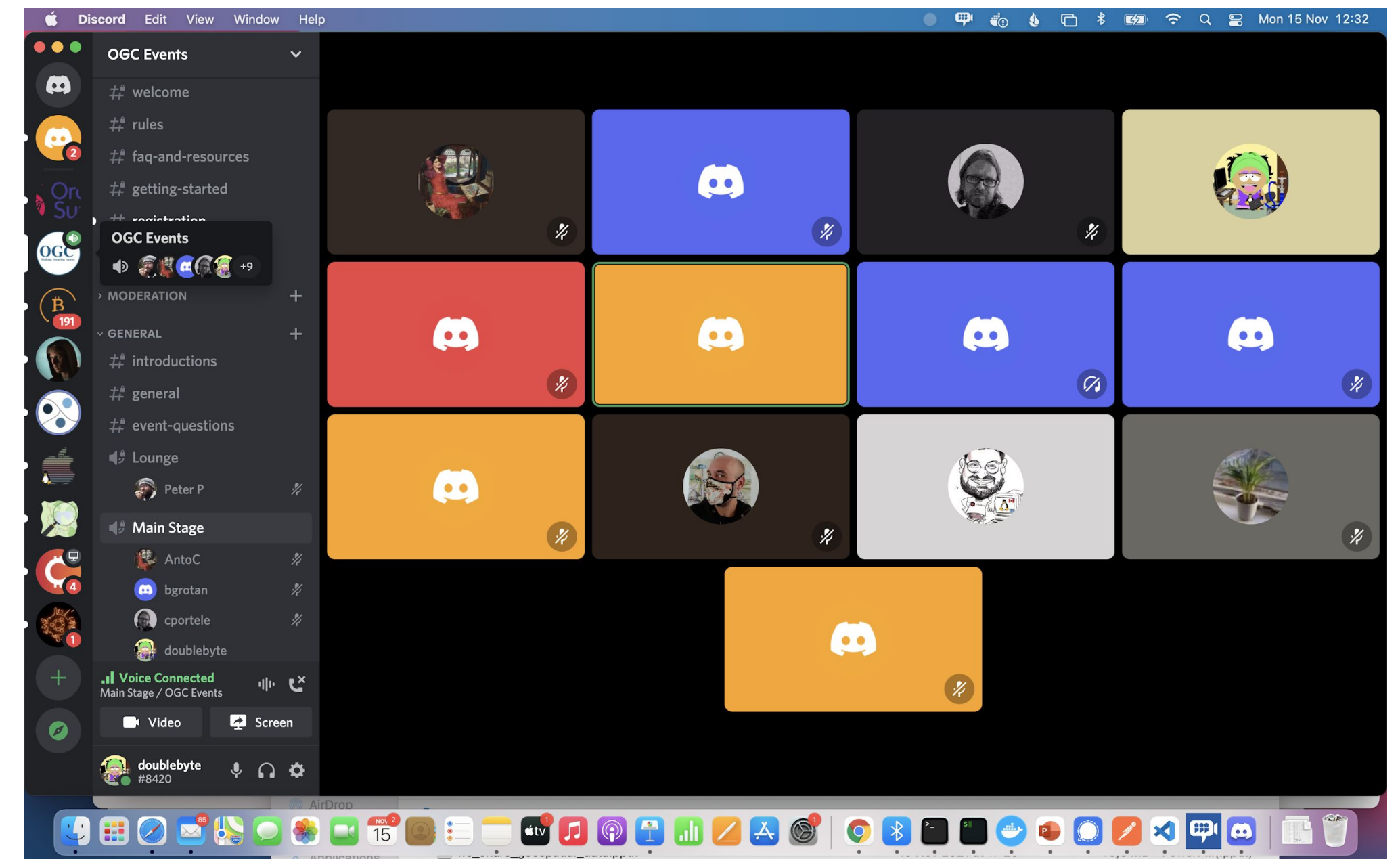
Unirse a los Code Sprints de OGC

- Eventos virtuales/híbridos de tres días.
- Enfoque en un grupo de estándares relacionados.
- La participación esta abierta a todas las personas.
- Habrá un mentor stream para nuevos participantes.

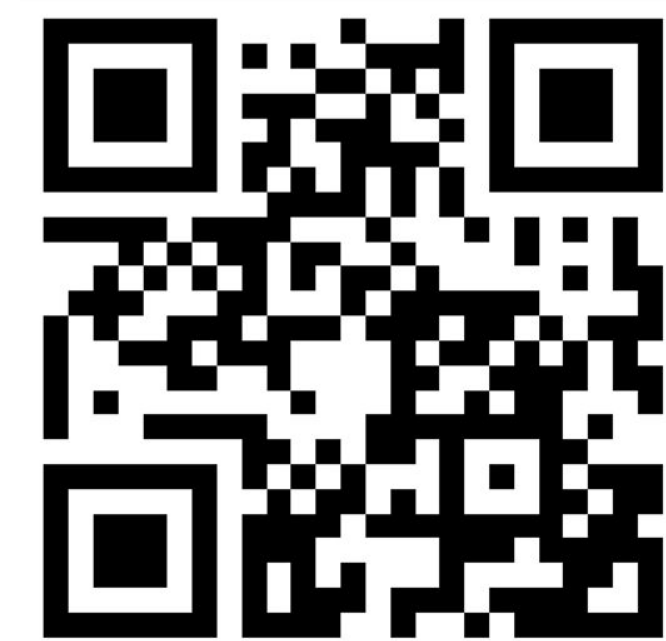


<https://github.com/opengeospatial/developer-events/wiki>

Servidor de Discord: OGC-events



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



Code Sprint - Datos Vectoriales

- Julio 2022
- Evento virtual
- Estándares: OGC API - Moving Features, OGC API - Routes, OGC API - GeoVolumes, OGC API - Features, y OGC API - Joins



Code Sprint de Septiembre ✓

- Code Sprint de OGC junto con ISO/TC211
- Enfoque en metadatos: OGC API - Records, ISO 19115, JSON-FG y STAC.
- Híbrido

Code Sprint de Diciembre ✓

- Enfoque en mapas web: OGC API - Tiles, OGC API Maps y OGC API - Styles.
- Híbrido

Seguir el Foro Ibérico y Latino-Americano de OGC

- Quiere abarcar la comunidad de habla hispana y portuguesa interesada en los desarrollos y objetivos de OGC.
- Engloba tanto a los miembros OGC como a los que, sin serlo, compartan intereses con los citados desarrollos y objetivos.
- 🖱️ 17/06: Día de la interoperabilidad en Madrid



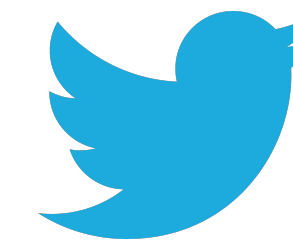
Suscribirse a la lista: ila.forum@lists.opengeospatial.org

https://external.ogc.org/twiki_public/ILAFpublic/WebHome

¡Gracias por vuestra atención! ❤️



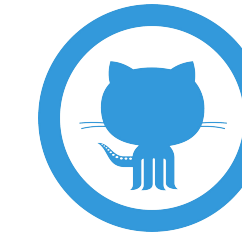
jsimoes@ogc.org



@doublebyte



joanasimoes



@doublebyte1



<https://dev.to/doublebyte>



<https://community.ops.io/doublebyte>

¿Por qué usar un estándar?



Cápsula de Café Estándar

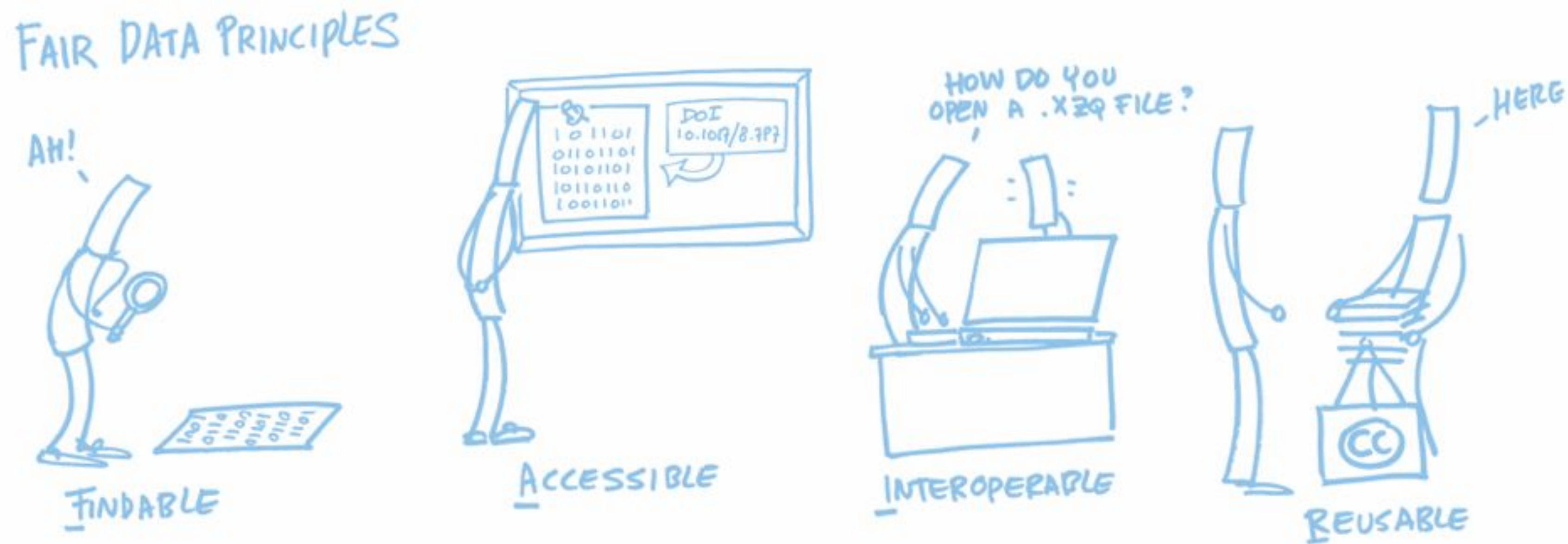


Easy Serving Espresso
pod (E.S.E. pod)
standard



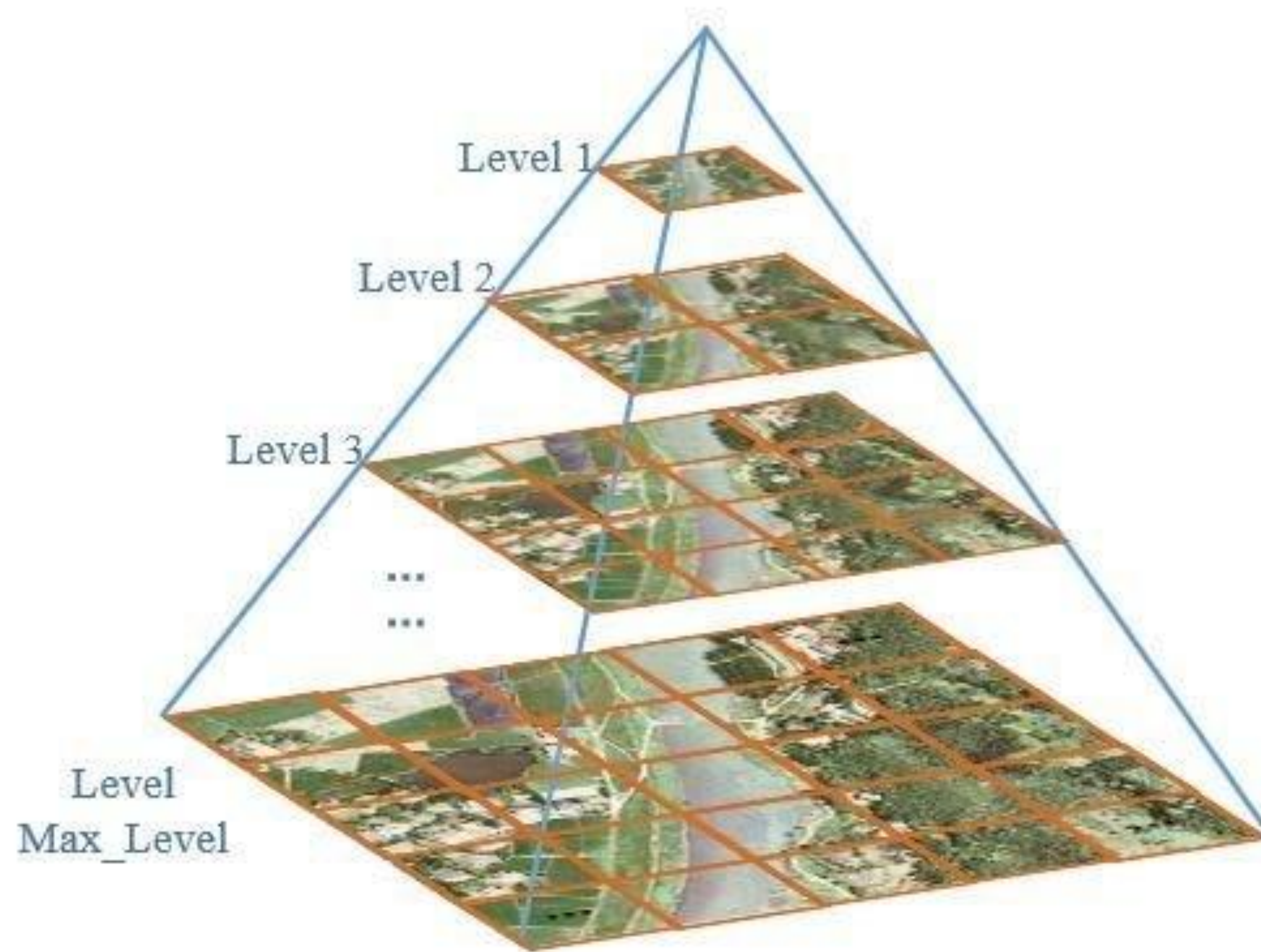
¿Por qué usar estándares para compartir información geoespacial?

- Para optimizar el intercambio y la reutilización de datos por parte de humanos y máquinas.

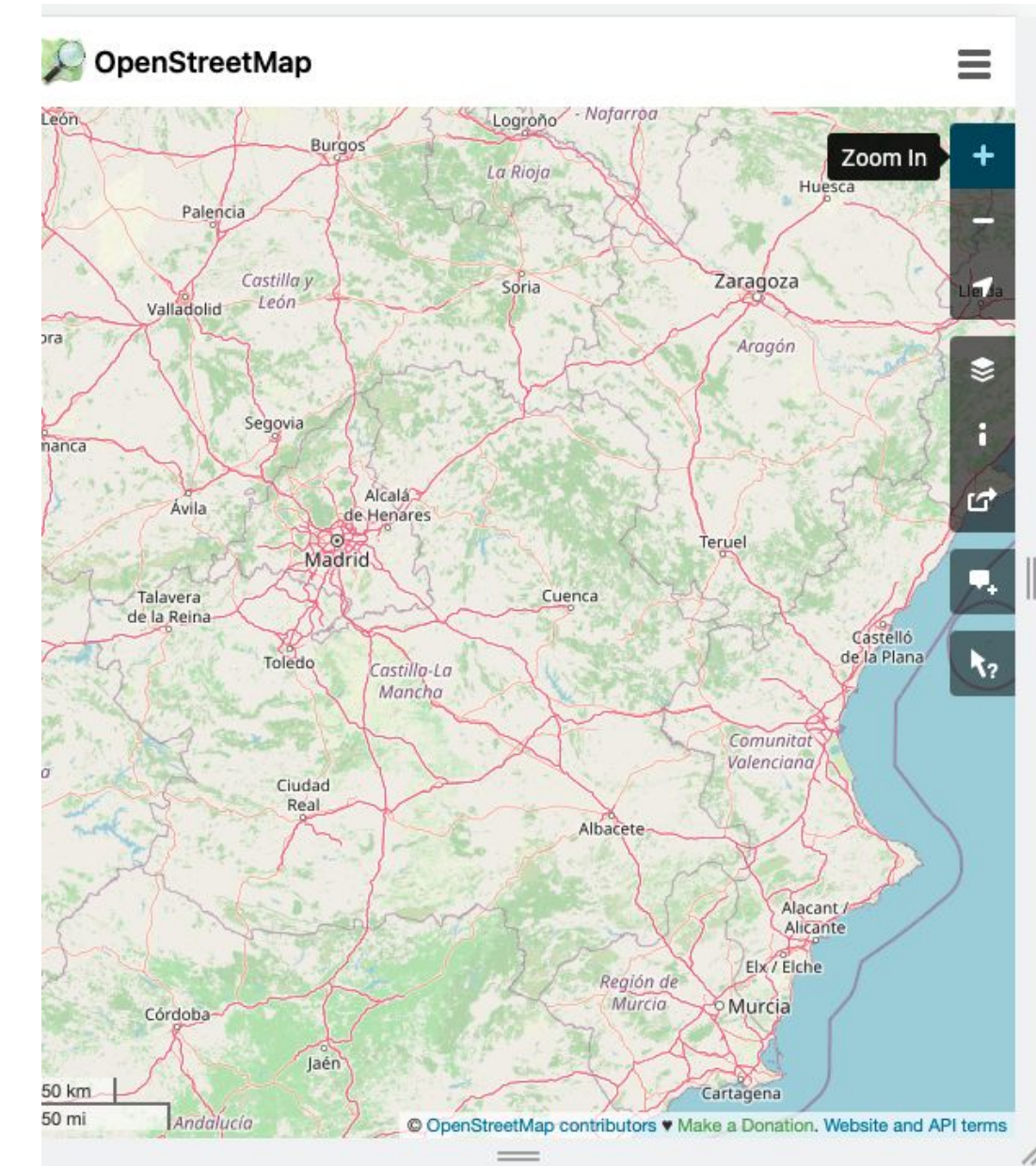
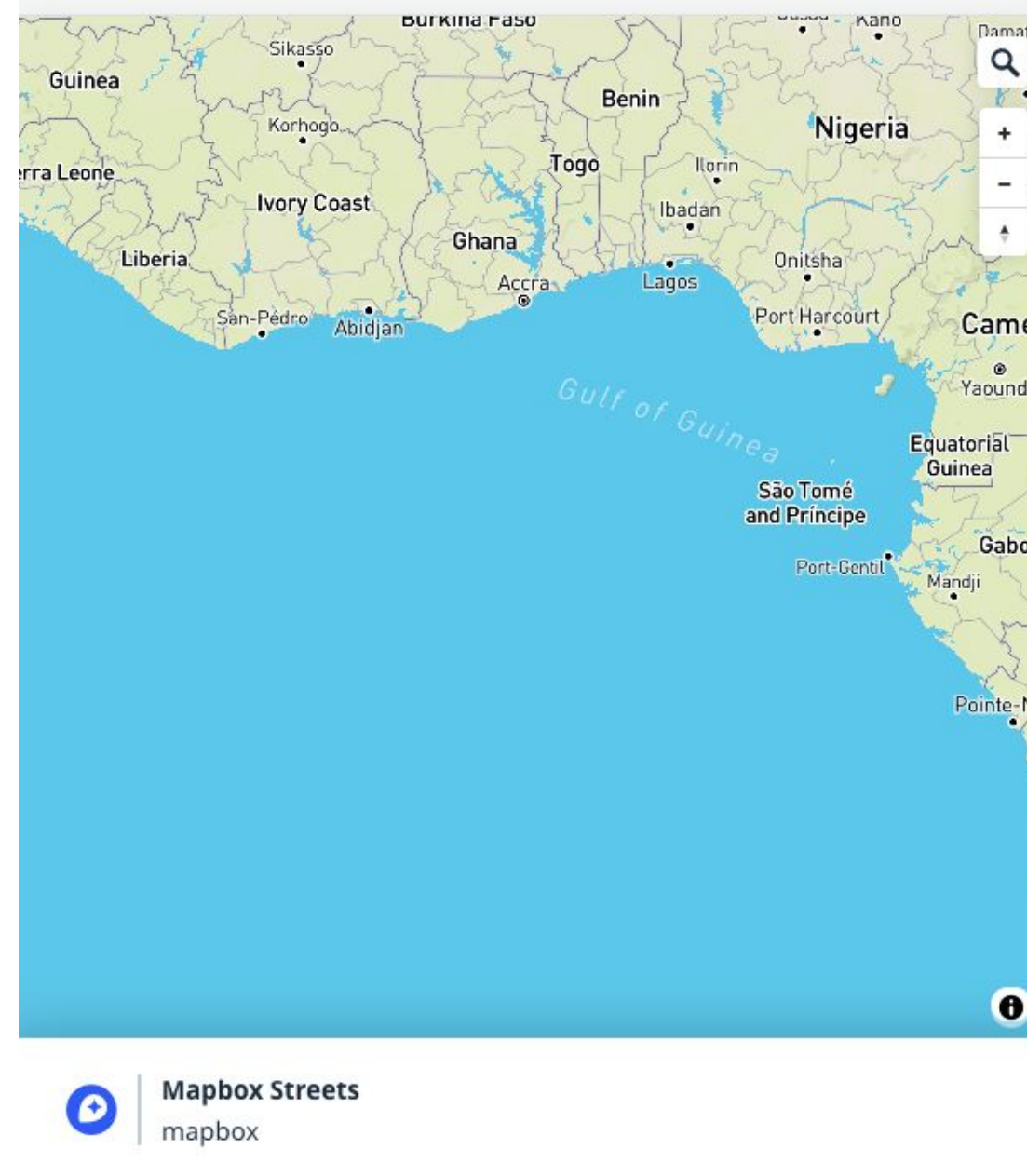
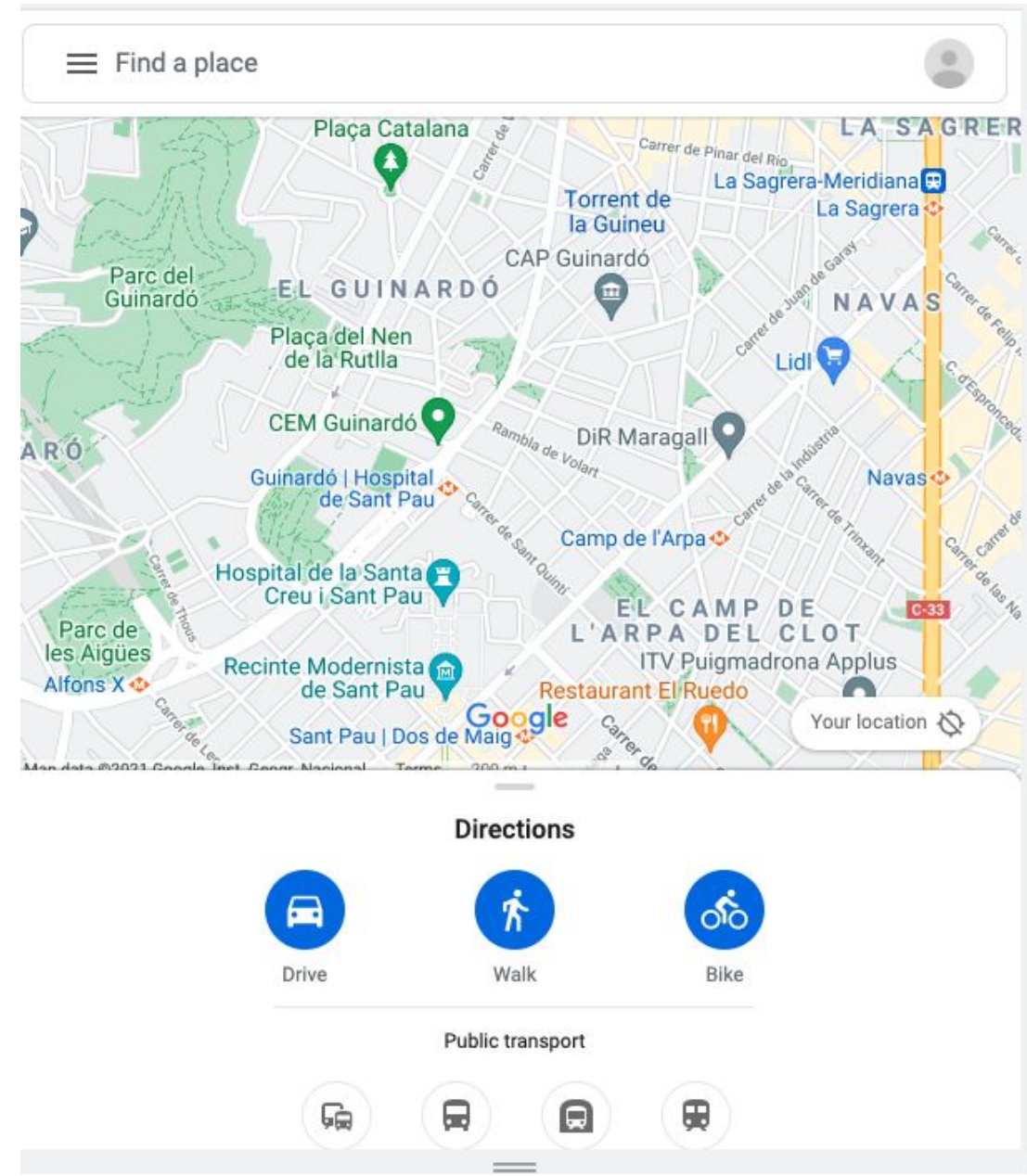


Source: <https://www.openaire.eu/how-to-make-your-data-fair>

Web Maps



Web Maps



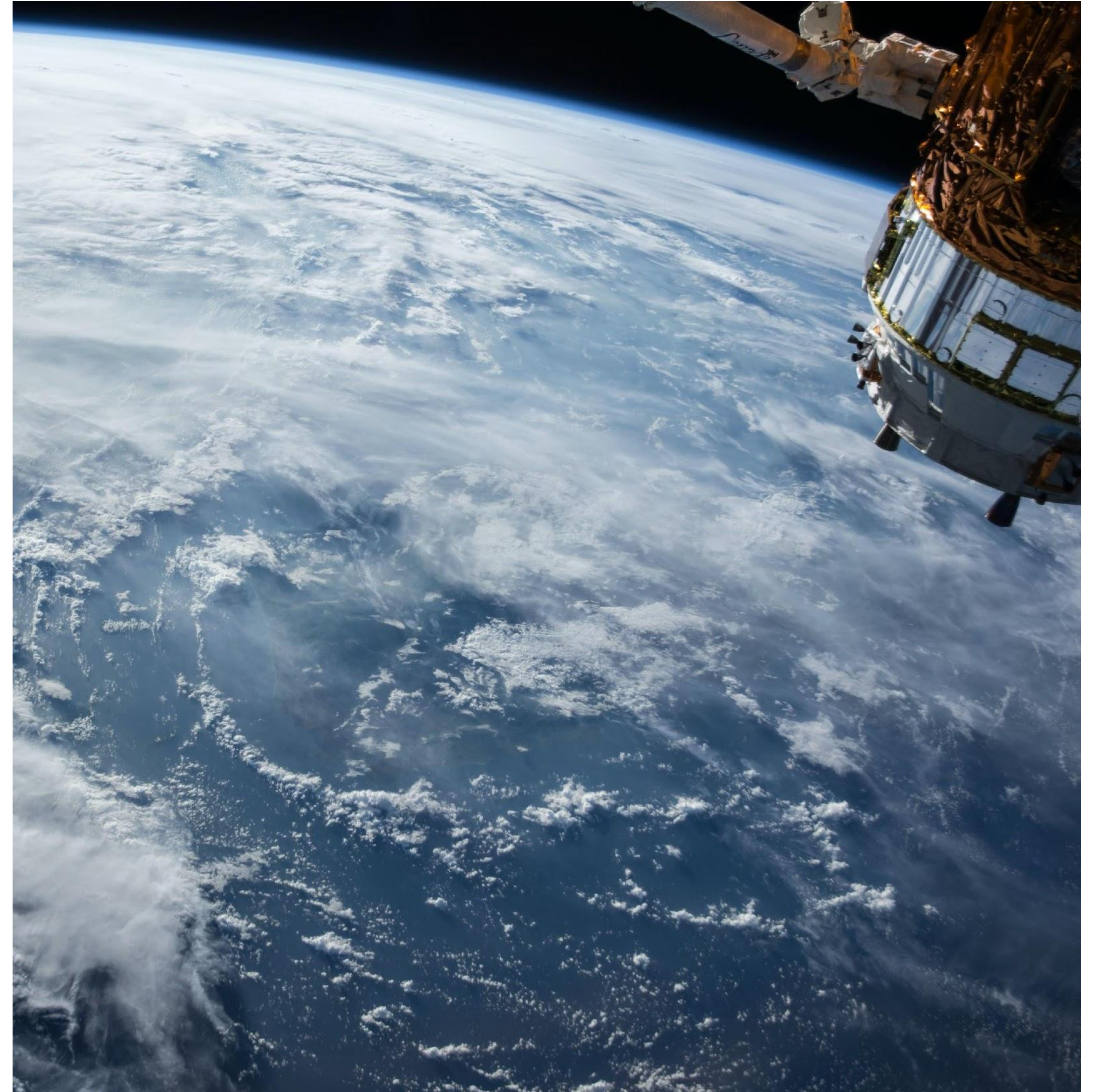
<https://www.google.com/maps/vt?pb=!1m5!1m4!1i15!2i16583!3i12236!4i256&pb=!2m3!1e0!2sm!3i574299180&pb=!3m10!2sen!3ses!5e1249!12m1!1e18!12m4!1e68!2m2!1sset!2sRoadmap!4e0!5m4!1e3!5f2!7m1!1b1!23i1381033!23i1368782!23i1368785!23i1385853!23i46990830!23i1375050!23i4536287>

https://api.mapbox.com/v4/mapbox.mapbox-streets-v8,mapbox.mapbox-terrain-v2/4/8/7.vector.pbf?sku=101m93BNZYKAm&access_token=pk.eyJ1IjoibWFwYm94IiwiYSI6ImNpejY4M29iazA2Z2gycXA4N2pmbDZmanngifQ.-g_vE53SD2WrJ6tFX7QHmA

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

Agenda

- **Introducción**
- **Estándares & OGC**
- **OGC APIs**
- **OGC API - Features**
- **Cómo involucrarse con OGC**



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!



License: [CC0 Public Domain](#)

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



How can I share geospatial data?

File

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

Advantages

- Simple to use.

Drawbacks X

- Redundancy.
- Lack of consistency.



Database

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



Advantages

- Integrity.
- Security.
- Concurrency.

Drawbacks X

- 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)
```

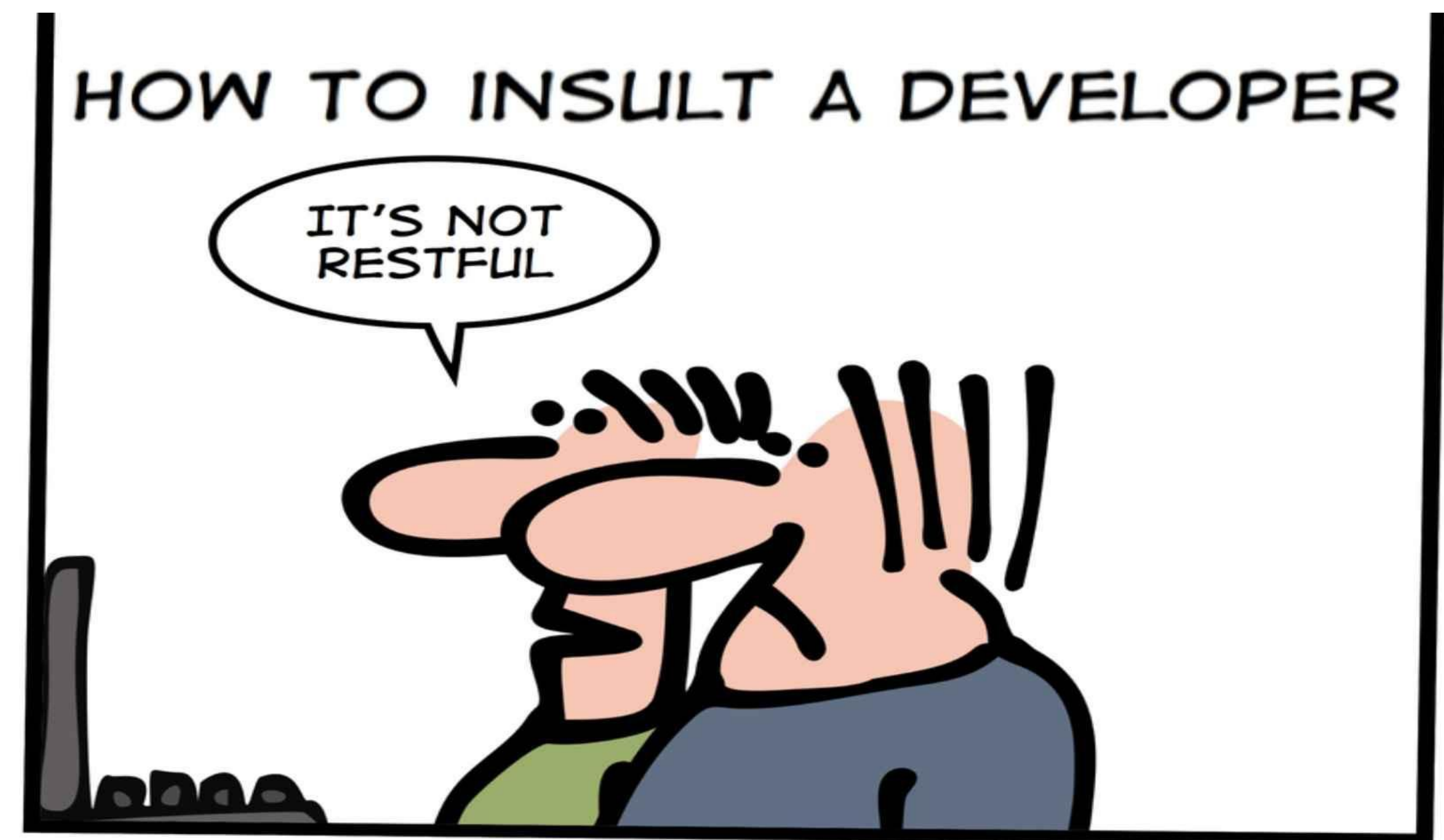
```
cur.execute(sqlSelect)
```


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
Home / Collections / Shops and Products / Items

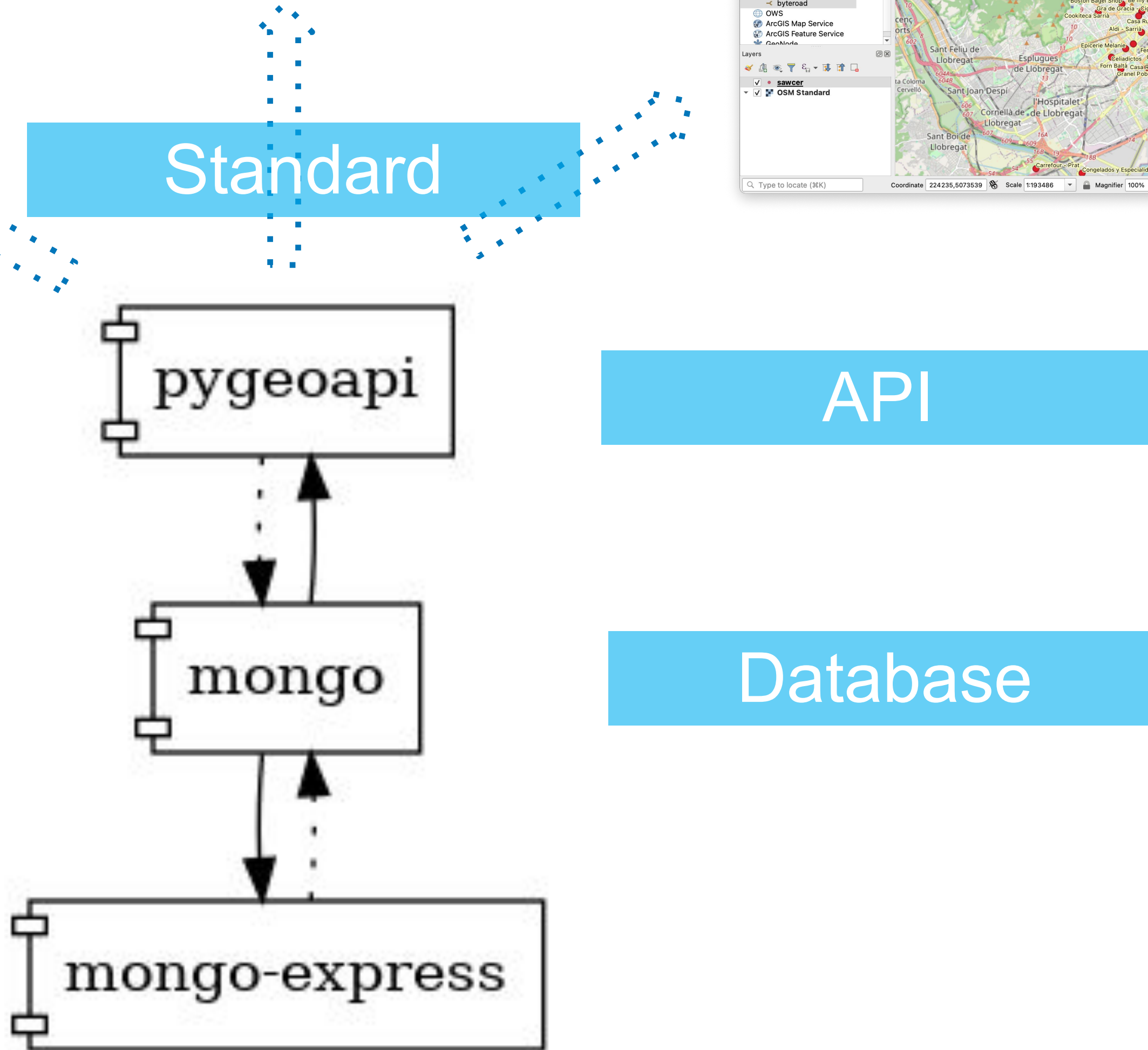
Shops and Products
Items in this collection.

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 Cuca	Ancho Chillies...	41.4024...

Untitled Project - QGIS

Layers: sawcer, OSM Standard

```
https://features.byteroad.net/collections/sawcer/items?format=jsonld
{
  "@context": {
    "schema": "https://schema.org/",
    "id": "@id",
    "type": "@type",
    "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"
    }
  ]
}
```





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

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.

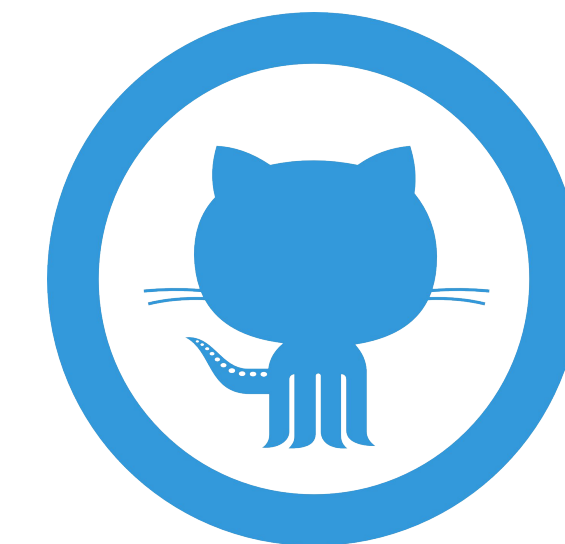
OGC API Key Characteristics

Spatially enable Web APIs in a consistent way

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

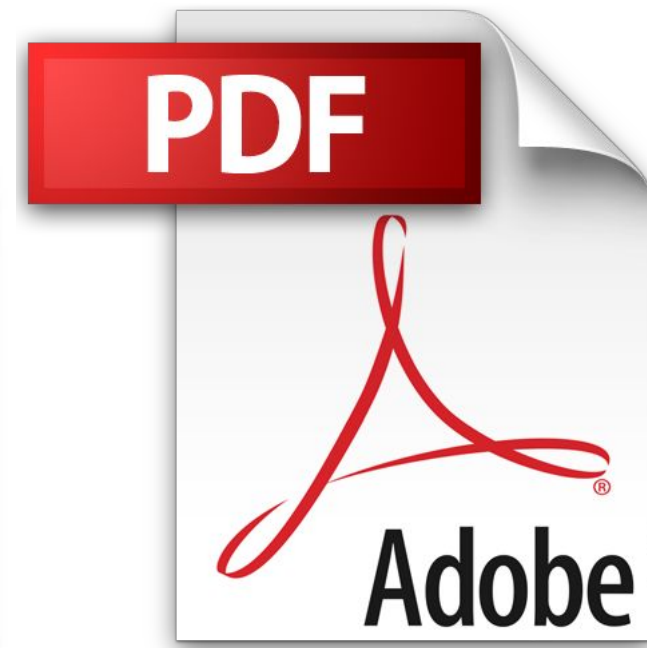


{ REST }



Formatos Abiertos vs Estándares

- Los formatos abiertos no tienen restricciones y están definidos por una especificación publicada.
- Los estándares son publicados y mantenidos por una organización de expertos, **no comercial**.



Everything is on GitHub, including the discussions

The screenshot shows the GitHub interface for the repository 'opengeospatial / ogcapi-features'. The top navigation bar includes the GitHub logo, a search bar, and links for 'Pull requests', 'Issues', 'Marketplace', and 'Explore'. The repository name and path are displayed, along with statistics for 'Unwatch' (56), 'Unstar' (122), and 'Fork' (38). Below the repository name, there are tabs for 'Code', 'Issues (68)', 'Pull requests (4)', 'Actions', 'Projects (4)', 'Wiki', 'Security', 'Insights', and 'Settings'. The current file being viewed is 'ogcapi-features / README.md' on the 'master' branch. A commit by 'cportele' is shown, titled 'add part 3 to readme', with a commit hash of 'c50ab27' and a date of '14 days ago'. Below the commit information, there are 5 contributors listed. The file statistics show '141 lines (96 sloc)' and '7.71 KB'. The README content includes a title 'OGC API - Features', a paragraph describing the repository's purpose, a paragraph about OGC API standards, a paragraph about the organization of standards, and a paragraph about unfamiliar terms. The 'Overview' section begins with the sentence 'OGC API Features provides access to collections of geospatial data.'

Search or jump to... / Pull requests Issues Marketplace Explore

opengeospatial / ogcapi-features Unwatch 56 Unstar 122 Fork 38

<> Code Issues 68 Pull requests 4 Actions Projects 4 Wiki Security Insights Settings

Branch: master ogcapi-features / README.md Find file Copy path

cportele add part 3 to readme c50ab27 14 days ago

5 contributors

141 lines (96 sloc) | 7.71 KB Raw Blame History

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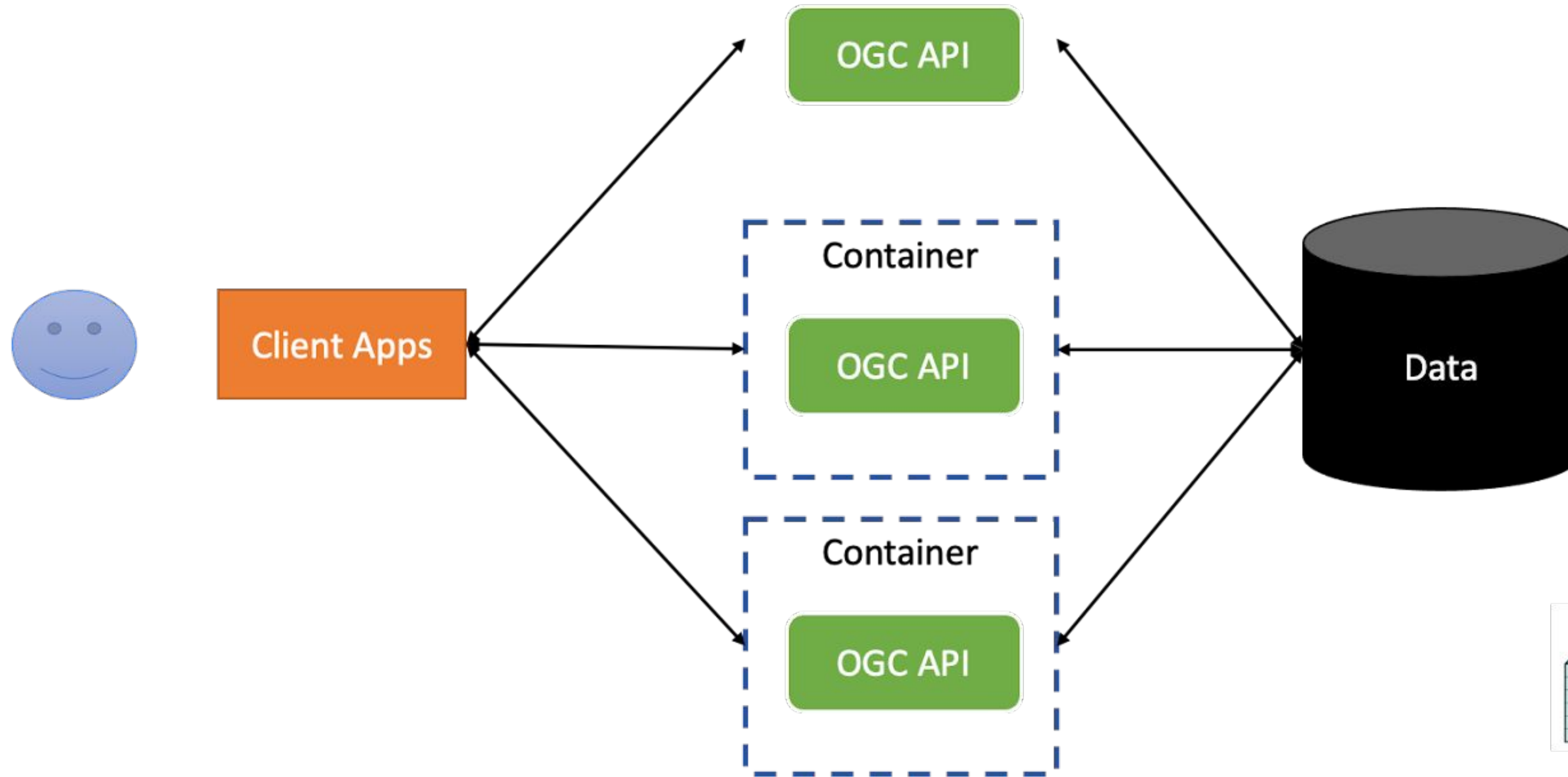
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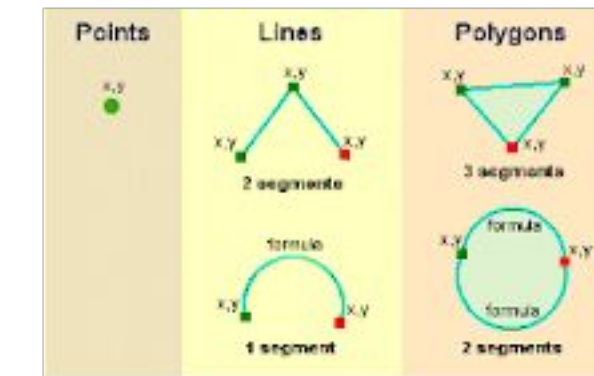
Deployment of OGC APIs as Microservices



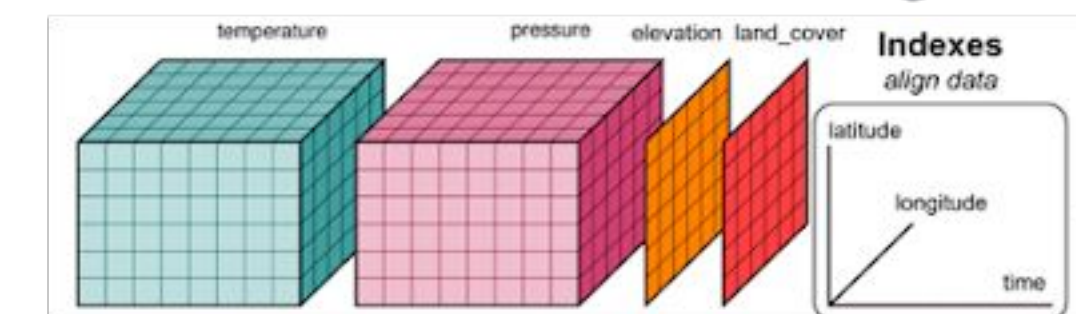
Map and Map Tile



Feature Geometry



Tiled Data and Coverage



Improved Developer Experience

Quicker onboarding for non OGC experts.

