Implementing OGC-API Features in the National Cartographic System of Spain

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INSTITUTO GEOGRÁFICO NACIONAL

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https://www.ign.es/

National Cartographic System of Spain (SCN) WFS

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- State Administration

  (Government)

- Autonomous Administrations

  17 Autonomous Communities

  2 Autonomous Cities

- Local Administrations

  50 Provinces

  >8,100 Municipalities

State Agency

Autonomous Communities

Local

Geographic Information in Spain

National Cartographic System

- State Administration

  (Government)

State Agency

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  17 Autonomous Communities

  2 Autonomous Cities

Autonomous Communities

- Local Administrations

  50 Provinces

  >8,100 Municipalities

Local

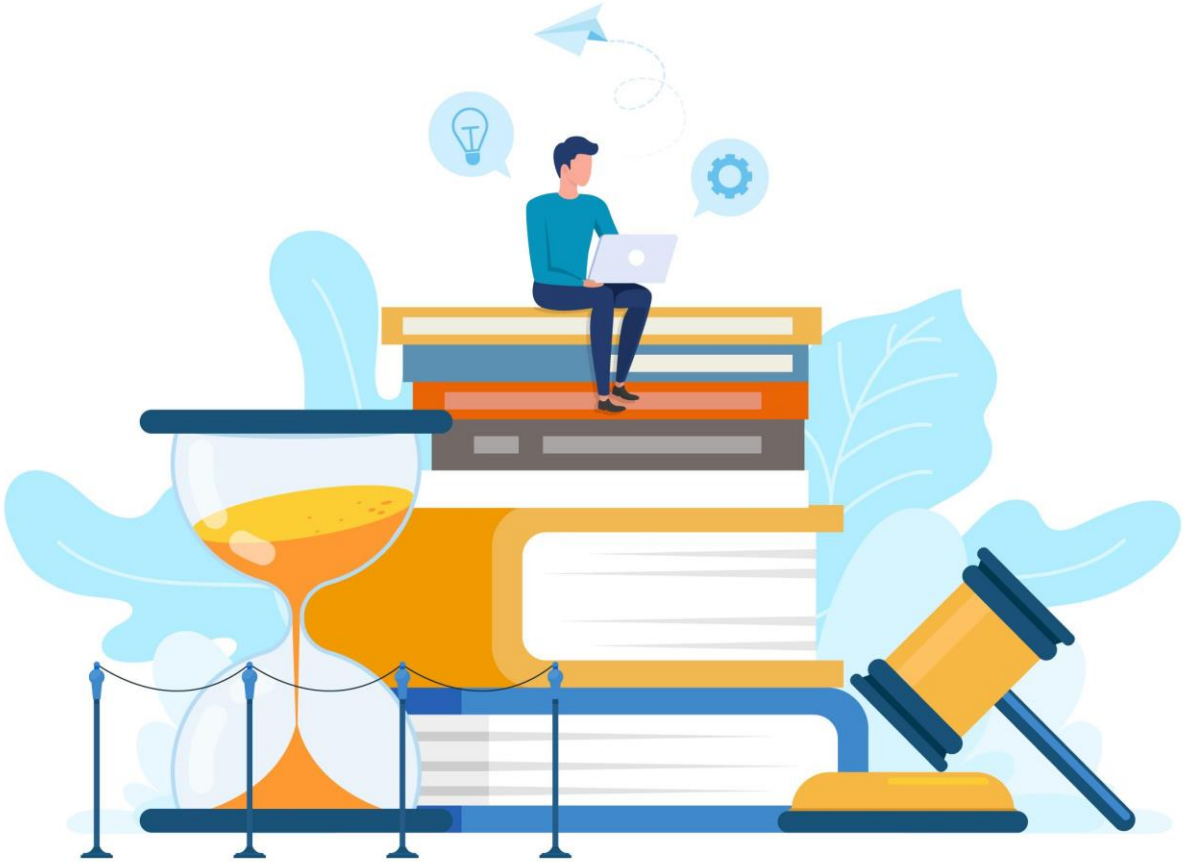


Image: Designed by Freepik

Geographic Information in Spain

- State Administration

  (Government)

State Agency

- Autonomous Administrations

  17 Autonomous Communities

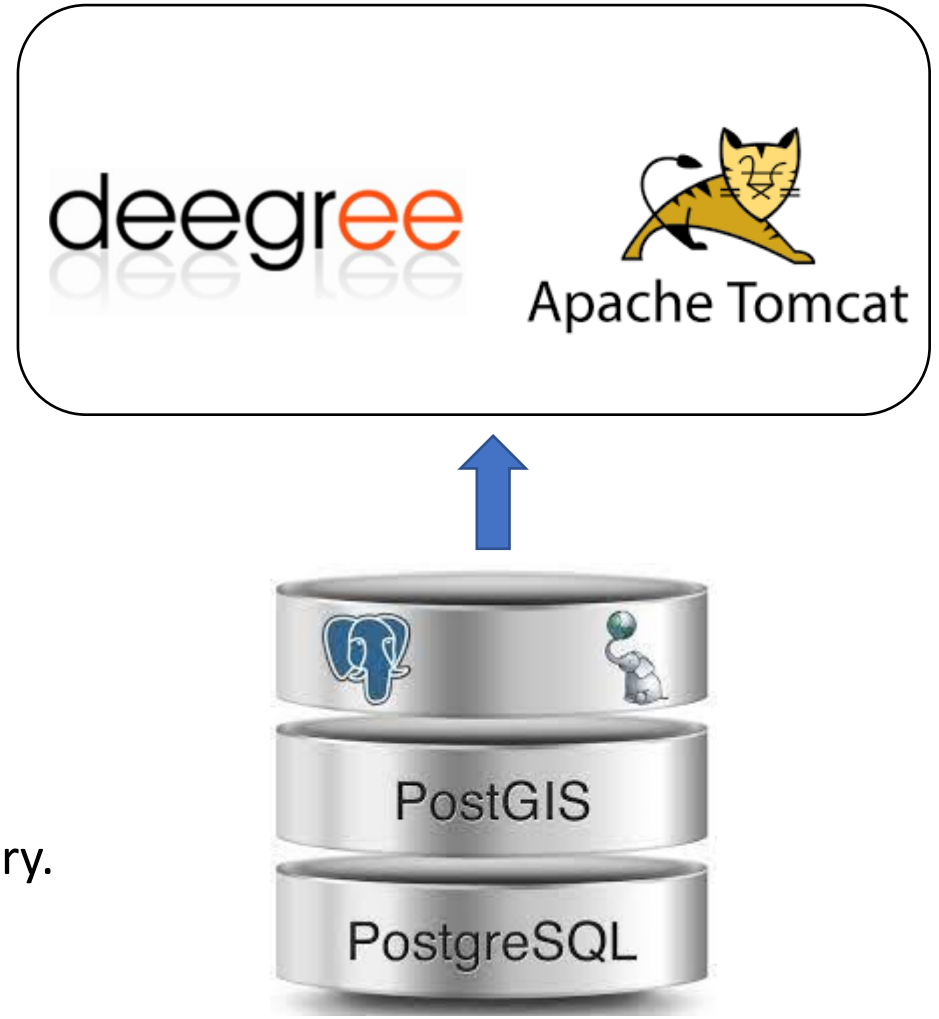
  2 Autonomous Cities

Autonomous Communities

Image: Designed by Freepik

WFS

- Published in 2014
- PostgreSQL DB+ PostGIS
  - DB Clúster with 3 replicated DB
  - WFS and OGC API Features
- Deegree 3.4.3 (virtual machines)
- INSPIRE Validation:
  - Dataset GML : identifiers, attribute values and geometry.
  - WFS: 90% pass validation.



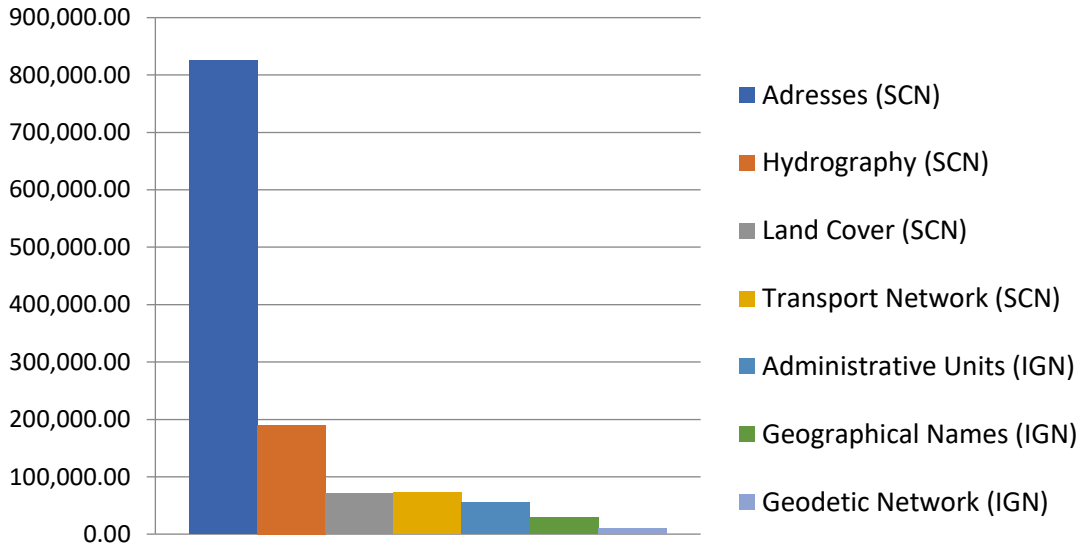
SCN WFS & IGN WFS

Adresses (SCN)	https://www.cartociudad.es/wfs-inspire/direcciones
Hydrography (SCN)	https://servicios.idee.es/wfs-inspire/hidrografia
Land Cover (SCN)	https://servicios.idee.es/wfs-inspire/ocupacion-suelo
Transport Network (SCN)	https://servicios.idee.es/wfs-inspire/transportes
Administrative Units (IGN)	https://www.ign.es/wfs-inspire/unidades-administrativas
Geographical Names (IGN)	https://www.ign.es/wfs-inspire/ngbe
Geodetic Network (IGN)	https://www.ign.es/wfs/redes-geodesicas

SCN WFS & IGN WFS

Number of request
(January to April 2024)
https://goaccess.io/

Adresses (SCN)	825.650,13
Hydrography (SCN)	190.438,29
Land Cover (SCN)	71.470,90
Transport Network (SCN)	72.927,50
Administrative Units (IGN)	55.359,16
Geographical Names (IGN)	28.993,01
Geodetic Network (IGN)	10.279,50



Implementing OGC-API Features

Implementing OGC-API Features

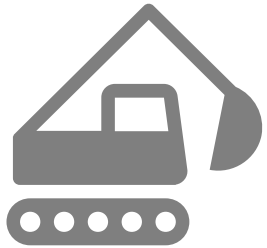
OGC API Features

OGC API Maps

OGC API Processes

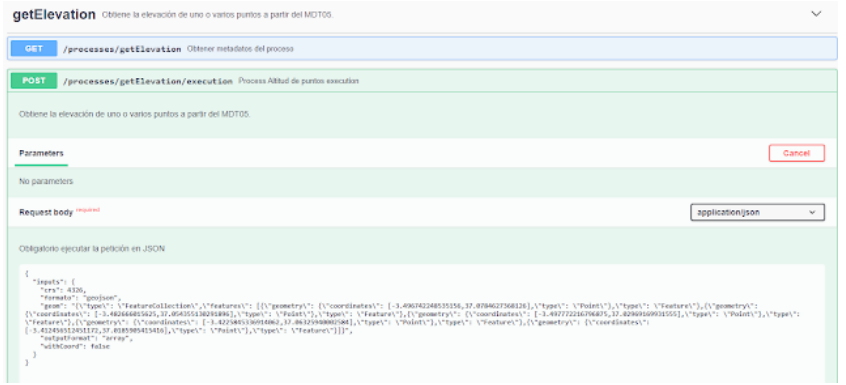
OGC API Coverages

OGC API Tiles



OGC API Processes

- https://api-processes.idee.es/?lang=en
  - 8 processes



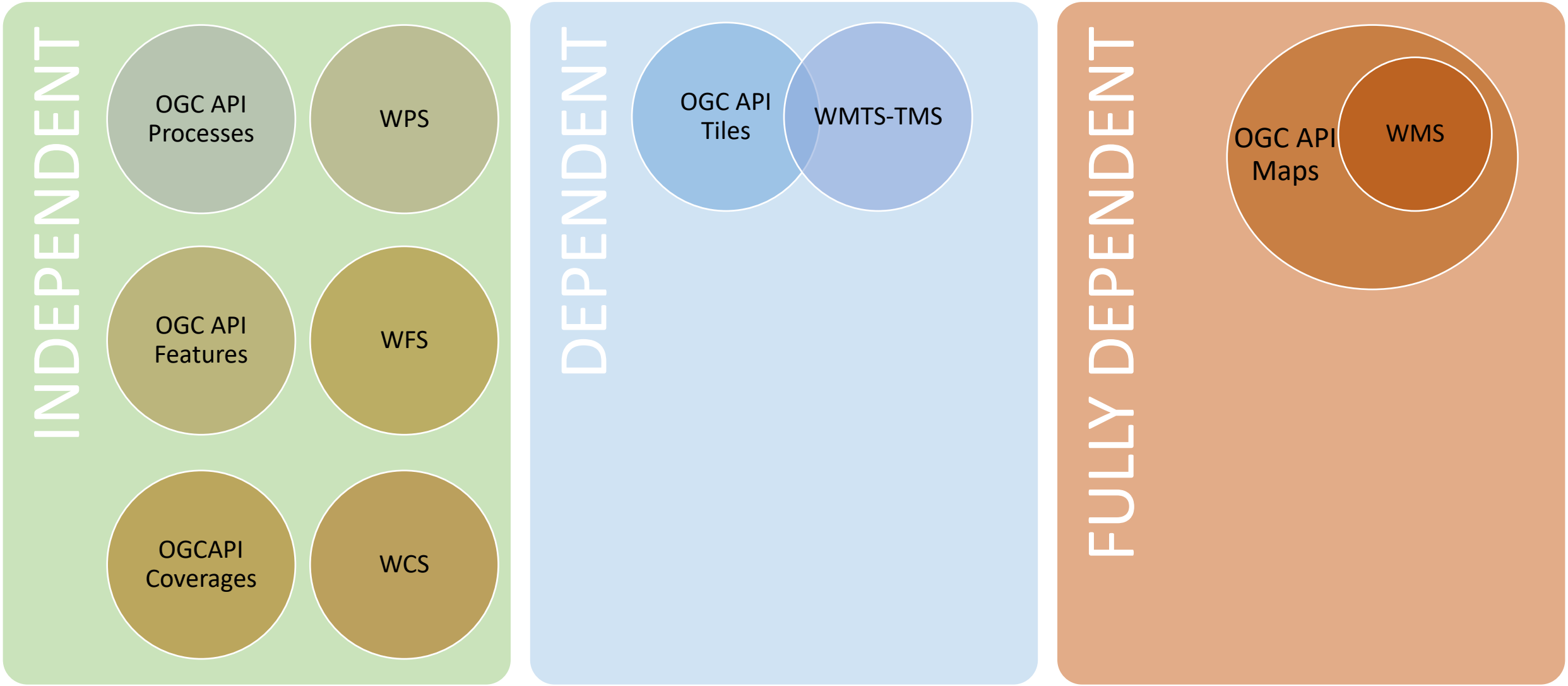
OGC API Features

- https://api-features.idee.es/?lang=en
  - 36 collections (Feature Types)
  - 36 INSPIRE Scheme
- https://api-features.ign.es/?lang=en
  - 7 collections (Feature Types)
  - 3 INSPIRE Scheme

OGC API Maps

- https://api-maps.idee.es/?lang=en
  - 10 collections (Maps)
  - 5 INSPIRE
- https://api-maps.ign.es/?lang=en
  - 2 collections (Maps)

Implementing OGC-API Features



OGC-API Features

OGC API Features. Server software

pygeoapi

deegree

GeoServer

pg_featureserv

OGC API Features. Server software

pygeoapi

Python server implementation of the OGC API suite of standards. The project emerged as part of the next generation OGC API efforts in 2018 and provides the capability for organizations to deploy a RESTful OGC API endpoint using OpenAPI, GeoJSON, and HTML.

Open source and released under an MIT license.

GeoServer

OGC API Community module. Version 2.16

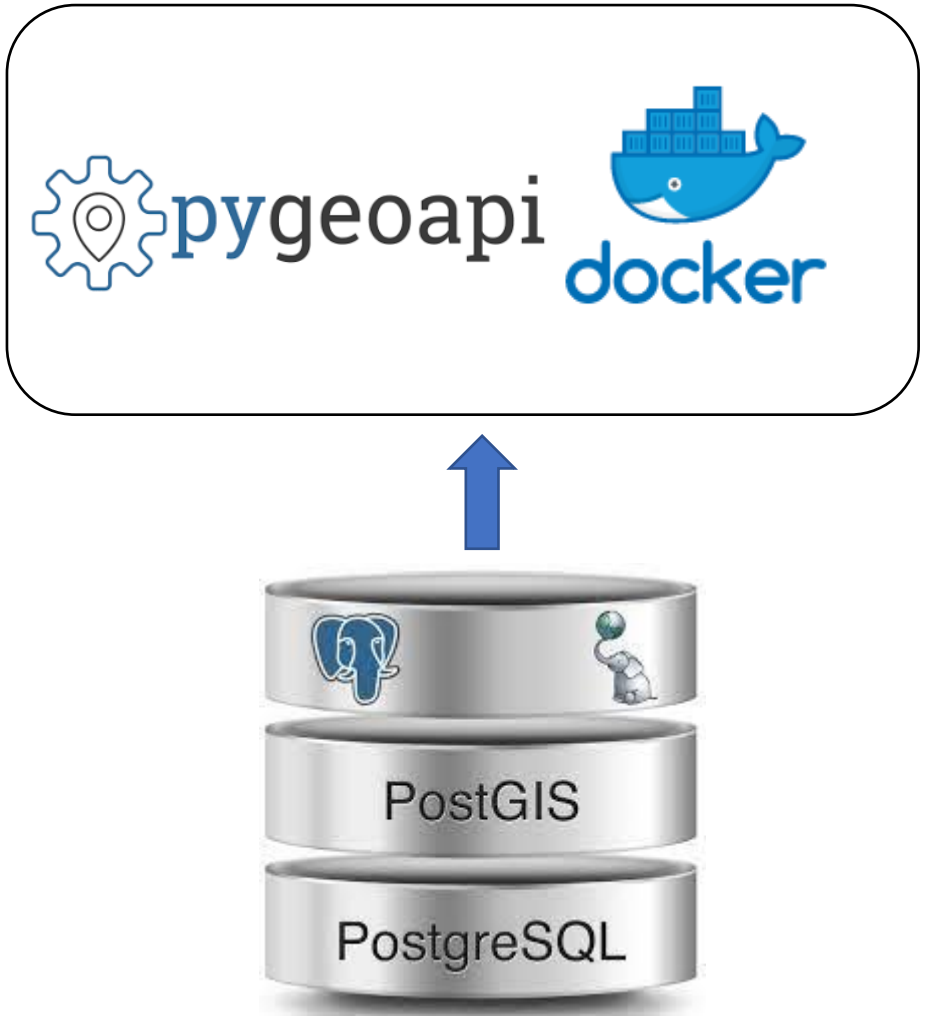
Easy to integrate in current deployments.

OGC API Features

- Published in April 2023

- PostgreSQL DB+ PostGIS
  - DB Clúster with 3 replicated DB
  - WFS, Atom and OGC API Features

- Pygeoapi 0.16 in a Docker (three virtual machines)

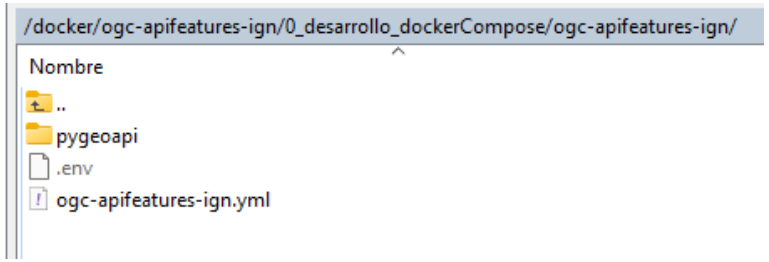


pygeoapi

+

docker

OGC API Features



Implementing OGC-API Features

ogc-apifeatures-ign.yml Docker file

ogc-apifeatures-ign.yml

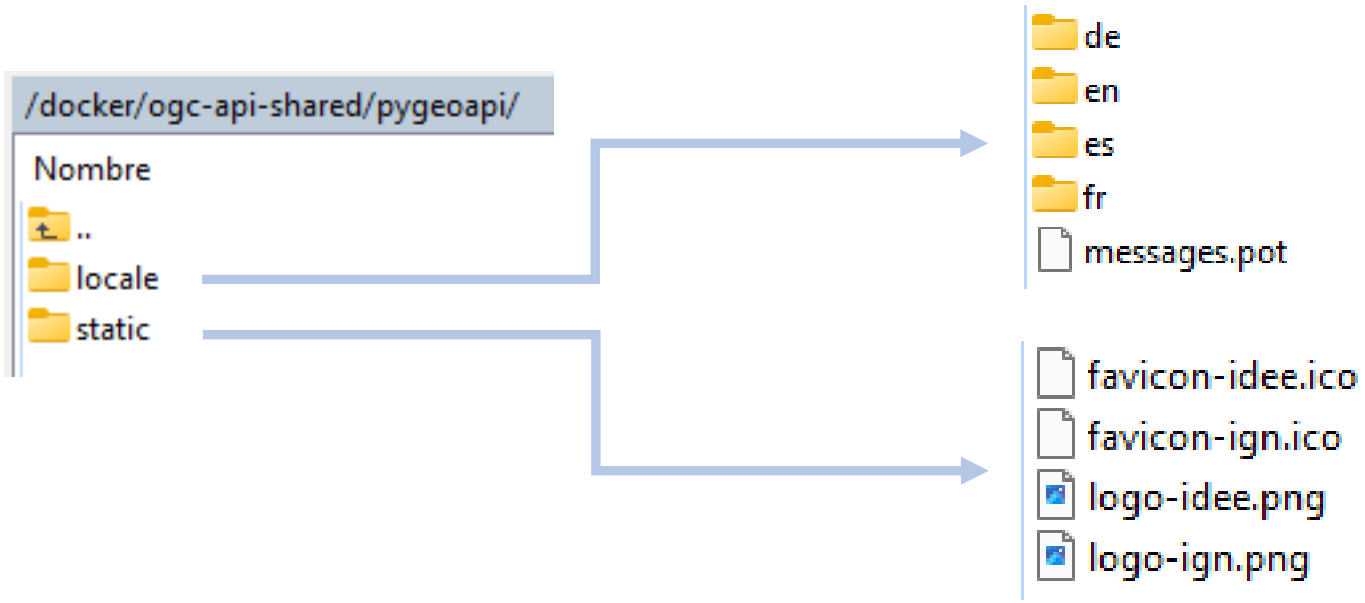
```yaml
version: '3.5'
services:
  # Nombre del servicio
  pygeoapy:
    # Ruta donde se encuentra el archivo Dockerfile
    # build:
      # dockerfile: Dockerfile
      # context: .
    # Nombre de la imagen que será generada
    image: geopython/pygeoapi:latest
    # Ruta al archivo con las variables de entorno
    env_file: .env
    # Reiniciar el contenedor en caso de ocurrir algún error
    restart: always
    # puerto destino (suite) - puerto origen (docker)
    ports:
      - 9071:80
    security_opt:
      - seccomp:unconfined

    # carpeta (suite) - carpeta (docker)
    volumes:
      - ./pygeoapi/my.config.yml:/pygeoapi/local.config.yml
      - ./pygeoapi/logs:/pygeoapi/logs
      - /docker/ogc-api-shared/pygeoapi/static/img/favicon-ign.ico:/pygeoapi/pygeoapi/static/img/favicon.ico
      - /docker/ogc-api-shared/pygeoapi/static/img/logo-ign.png:/pygeoapi/pygeoapi/static/img/logo.png
      - /docker/ogc-api-shared/pygeoapi/locale:/pygeoapi/locale
```

https://docs.pygeoapi.io/en/latest/running-with-docker.html#overriding-the-default-configuration

Implementing OGC-API Features

Language and images folders



https://docs.pygeoapi.io/en/latest/language.html
https://github.com/geopython/pygeoapi/tree/master/locale

Implementing OGC-API Features

my.config.yml Server configuration

my.config.yml

```
31  server:
32      bind:
33          host: ${HOST}
34          port: 80
35      url: ${URL}
36      mimetype: application/json; charset=UTF-8
37      encoding: utf-8
38      gzip: false
39      languages:
40          # First language is the default language
41          - es
42          - en
43          - fr
44          - de
45      cors: true
46      pretty_print: true
47      limit: 10
48      # templates:
49         # path: /pygeoapi/pygeoapi/templates
50         # static: /path/to/static/folder # css/js/img
51      map:
52          url: https://tms-ign-base.idee.es/1.0.0/IGNBaseTodo/{z}/{x}/{-y}.jpeg
53          attribution: '&copy; <a href="https://www.scne.es/" target="_blank">CC BY 4.0 scne.es</a>'
54      # manager:
55         # name: TinyDB
56         # connection: /tmp/pygeoapi-process-manager.db
57         # output_dir: /tmp/
58      # ogc_schemas_location: /opt/schemas.opengis.net
```

pygeoapi configuration contains the following core sections:

- `server`: server-wide settings
- `logging`: logging configuration
- `metadata`: server-wide metadata (contact, licensing, etc.)
- `resources`: dataset collections, processes and stac-collections offered by the server

Implementing OGC-API Features

my.config.yml

Server configuration

```yaml
logging:
    level: ERROR
    logfile: /pygeoapi/logs/pygeoapi.log

metadata:
    identification:
        title:
            es: API de descarga de objetos geográficos (API-Features) del Instituto Geográfico Nacional
            en: API for downloading geographic objects (API-Features) of the National Geographic Institute
            fr: API de téléchargement d'objets géographiques (API-Features) de l'Institut Géographique National
            de: API zum Herunterladen von geografischen Objekten (API-Features) des National Geographic Institute
        description:
            es: API de descarga de objetos geográficos del Instituto Geográfico Nacional procedentes de Líneas límite, Nomenclátor Geográfico Básico de España (NGBE) y vértices de
            las Redes Geodésicas ERGNSS, REDNAP, REGENTE y ROI. El servicio está basado en el estándar OGC API-Features.
            en: API for downloading geographic objects from the National Geographic Institute from Boundary Lines, the Basic Geographic Gazetteer of Spain (NGBE) and vertices of
            the ERGNSS, REDNAP, REGENTE and ROI Geodetic Networks. The service is based on the OGC API-Features standard.
            fr: API pour le téléchargement d'objets géographiques de l'Institut géographique national à partir de Boundary Lines, de l'Index géographique de base de l'Espagne
            (NGBE) et des sommets des réseaux géodésiques ERGNSS, REDNAP, REGENTE et ROI. Le service est basé sur la norme OGC API-Features.
            de: API zum Herunterladen von geografischen Objekten des National Geographic Institute aus Boundary Lines, dem Basic Geographic Gazetteer of Spain (NGBE) und
            Scheitelpunkten der geodätischen Netzwerke ERGNSS, REDNAP, REGENTE und ROI. Der Dienst basiert auf dem OGC API-Features-Standar
        keywords:
            es:
                - geoespacial
                - datos
                - api
            en:
                - geospatial
                - data
                - api
            fr:
                - géospatiale
                - données
                - api
            de:
                - georäumlich
                - daten
                - api
        keywords_type: theme
        terms_of_service: https://creativecommons.org/licenses/by/4.0/
        url: https://example.org
```

Implementing OGC-API Features

my.config.yml

Server configuration

```yaml
license:
    name: CC BY 4.0 ign.es
    url: https://creativecommons.org/licenses/by/4.0/
provider:
    name: Instituto Geográfico Nacional de España
    url: https://www.ign.es/
contact:
    name:
    position:
    address: C/ General Ibáñez de Ibero, 3
    city: Madrid
    stateorprovince: Madrid
    postalcode: 28003
    country: España
    phone: +34 91 597 96 46
    fax: +34 91 597 97 64
    email: ign@mitma.es
    url:
    hours:
    instructions:
    role: pointOfContact
```

Implementing OGC-API Features

my.config.yml

Server configuration

```yaml
resources:

    administrativeboundary:
        type: collection
        title:
            es: AU Límites administrativos
            en: AU Administrative boundary
        description:
            es: Línea de demarcación entre unidades administrativas.
            en: A line of demarcation between administrative units.
        keywords:
            - límite
            - administrativo
        # context:
        links:
            - type: text/html
              rel: describedby
              title: Metadato del conjunto de datos en HTML
              href: https://www.idee.es/csw-codsi-idee/srv/spa/catalog.search#/metadata/spaignLLM
              hreflang: es
            - type: application/xml
              rel: describedby
              title: Metadato del conjunto de datos en XML
              href:
              https://www.idee.es/csw-inspire-idee/srv/spa/csw?SERVICE=CSW&VERSION=2.0.2&REQUEST=GetRecordById&outputSchema=http://www.isotc211.org/2005/gmd&Eleme
              paignLLM
              hreflang: es
            - type: tag
              rel: describedby
              title: Definición en el registro INSPIRE de límite administrativo
              href: https://inspire.ec.europa.eu/featureconcept/AdministrativeBoundary
              hreflang: en
```

The `resource.type` property is required. Allowed types are:

- `collection`
- `process`
- `stac-collection`

Implementing OGC-API Features

my.config.yml

Resource configuration

```yaml
extents:
    spatial:
        bbox: [-19,27,5,44]
        crs: http://www.opengis.net/def/crs/OGC/1.3/CRS84
    # temporal:
      # begin: 2000-10-30T18:24:39Z
      # end: 2007-10-30T08:57:29Z
providers:
    - type: feature
      name: PostgreSQL
      data:
          host: ${IP_CLUSTER}
          port: 5434
          dbname: wfs
          user: u_wfs
          password: ${PASS_WFS}
          search_path: [geoschema, public]
      id_field: gid
      table: adminunit
      geom_field: the_geom
```

requires a `type` property. Allowed types are:

- `feature`
- `coverage`
- `tile`
- `map`
- `record`
- `edr`
- `stac`

Provider
CSV
Elasticsearch
ERDDAP Tabledap Service
ESRI Feature Service
GeoJSON
MongoDB
OGR
PostgreSQL
SQLiteGPKG
SensorThings API
Socrata

Implementing OGC-API Features

my.config.yml

Resources configuration

```
118  resources:
119
120      administrativeboundary:
193      administrativeunit:
266      namedplace:
339      red_ergnss:
407      red_nap:
478      red_regente:
548      red_roi:
```

https://api-features.ign.es/collections?f=html

Instituto Geográfico Nacional

Contact

Home / Collections

json json-ld

Collections in this service

Name	Type	Description
AU Administrative boundary	feature	A line of demarcation between administrative units.
AU Administrative unit	feature	Unit of administration where a Member State has and/or exercises jurisdictional rights, for local, regional and national governance.
GN Named place	feature	Any real world entity referred to by one or several proper nouns.
GNSS Reference Stations Network (ERGNSS)	feature	It contains the information about the GNSS Reference Stations Network (code, name of station and geodetic data sheets).
High Precision Leveling Network (REDNAP)	feature	It contains the information about the High Precision Leveling Network (number, name, geodetic data sheets, node, type, group and line).
National Geodetic Network by Space Techniques (REGENTE)	feature	It contains the information about the National Geodetic Network by Space Techniques (number, name, geodetic data sheets, municipality and province).
Lower Order Network (ROI)	feature	It contains the information about the Lower Order Network (number, name, geodetic data sheets, municipality and province).

Compliance

OGC API Features

- OGC API Features - Overview page
- OGC API Features - GitHub repository
- OCG API Features – Developer
- OGC API Features - OGC Validator

Implementing OGC-API Features

OGC API Features as an INSPIRE download service

Technical guidelines for setting up an INSPIRE Download service based on the OGC API-Features standard

- 8.1. Requirements class “INSPIRE-pre-defined-data-set-download-OAPIF”
- 8.2. Requirements class “INSPIRE-multilinguality”
- 8.3. Requirements class “INSPIRE-OAPIF-GeoJSON”
- 8.4. Requirements class "INSPIRE-bulk-download"
- 8.5. Requirements class "INSPIRE-CRS“

INSPIRE VALIDATOR

Implementing OGC-API Features

- Requirements and Recommendations:

  add links to License, Metadata (HTML & XML), INSPIRE registry

Enlaces

- Metadato del conjunto de datos en HTML (text/html)
- Metadato del conjunto de datos en XML (application/xml)
- Definición en el registro INSPIRE de curso de agua (tag)
- Licencia de uso (application/pdf)

https://api-features.idee.es/collections/watercourse?f=json


```
links:
  0:
    type:      "text/html"
    rel:       "describedby"
    title:     "Metadato del conjunto de datos en HTML"
    href:      "https://www.idee.es/csw-codsi-idee/srv/spa/catalog.search#/metadata/spaign
    hreflang:  "es"
  1:
    type:      "application/xml"
    rel:       "describedby"
    title:     "Metadato del conjunto de datos en XML"
    href:      "https://www.idee.es/csw-inspire-idee/srv/spa/csw?SERVICE=CSW&VERSION=2.0.2
    hreflang:  "es"
  2:
    type:      "tag"
    rel:       "describedby"
    title:     "Definición en el registro INSPIRE de curso de agua"
    href:      "https://inspire.ec.europa.eu/featureconcept/Watercourse"
    hreflang:  "en"
  3:
    type:      "application/pdf"
    rel:       "license"
    title:     "Licencia de uso"
    href:      "https://www.ign.es/resources/licencia/Condiciones_licenciaUso_IGN.pdf"
    hreflang:  "es"
```

- Recomendation

Collection names

Recommendation	/rec/pre-defined/collection-naming
A	For each `collection` that provides data that is harmonised according to the [IRs for ISDSS], the id of the collection SHOULD be the lowercase version of the language-neutral name of the feature type as specified in the [IRs for ISDSS].

Implementing OGC-API Features

- Recommendation. Supported CRS,

Recommendation	/rec/inspire-crs/recognised-crs
A	For each feature collection in the API at least one of the coordinate reference systems (CRS) listed below SHOULD be included in the list of supported coordinate reference systems.

Reference Systems

- http://www.opengis.net/def/crs/EPSG/0/4258
- http://www.opengis.net/def/crs/EPSG/0/4326
- http://www.opengis.net/def/crs/EPSG/0/3857
- http://www.opengis.net/def/crs/EPSG/0/3035
- http://www.opengis.net/def/crs/EPSG/0/25828
- http://www.opengis.net/def/crs/EPSG/0/25829
- http://www.opengis.net/def/crs/EPSG/0/25830
- http://www.opengis.net/def/crs/EPSG/0/25831
- http://www.opengis.net/def/crs/EPSG/0/32628
- http://www.opengis.net/def/crs/EPSG/0/32629
- http://www.opengis.net/def/crs/EPSG/0/32630
- http://www.opengis.net/def/crs/EPSG/0/32631
- http://www.opengis.net/def/crs/OGC/1.3/CRS84

Storage CRS

- CRS: http://www.opengis.net/def/crs/OGC/1.3/CRS84

Implementing OGC-API Features

OGC API Features as an INSPIRE download service

Technical guidelines for setting up an INSPIRE Download service based on the OGC API-Features standard

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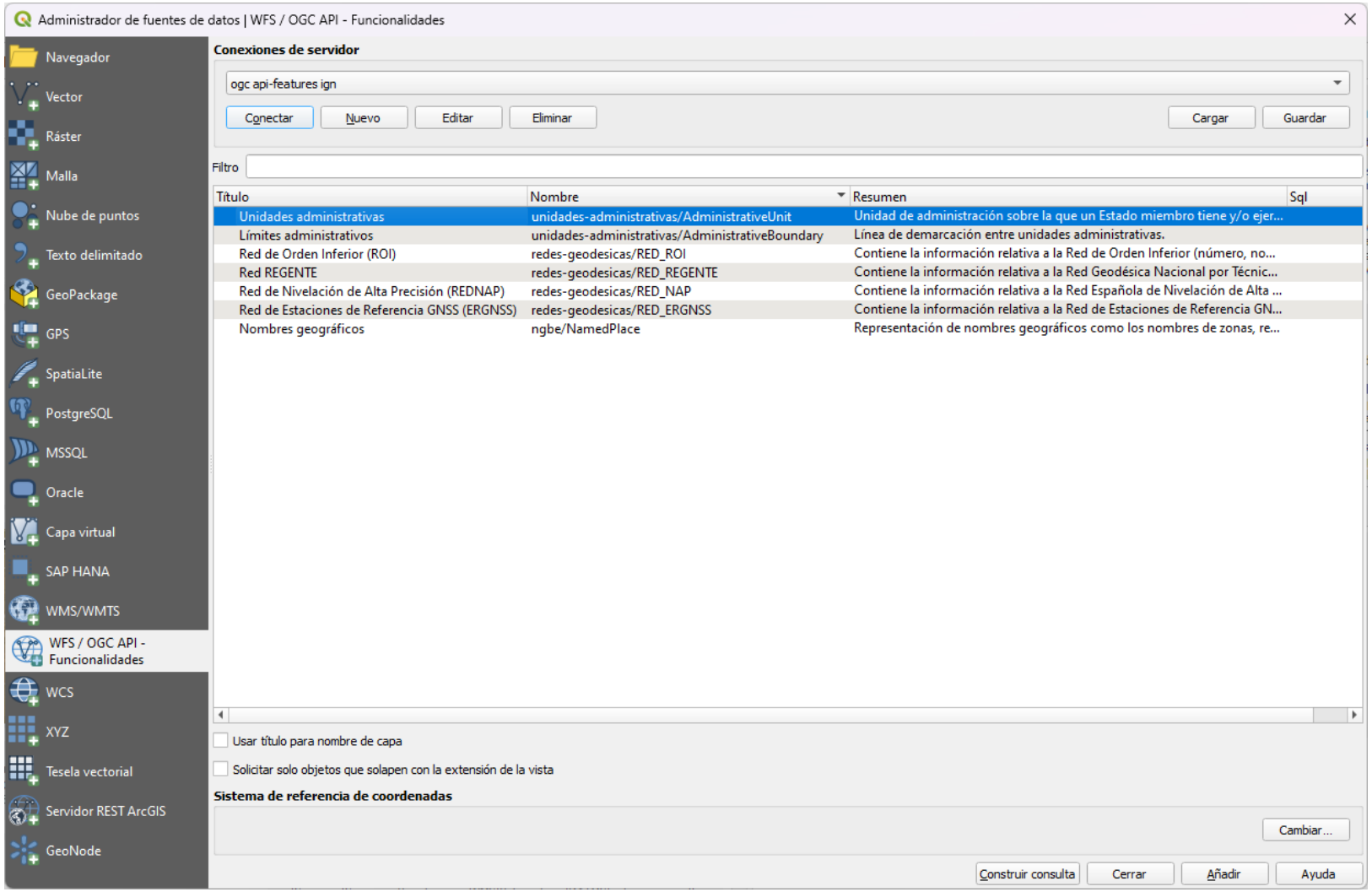
- 8.2. Requirements class “INSPIRE-multilinguality”
- 8.3. Requirements class “INSPIRE-OAPIF-GeoJSON”
- 8.4. Requirements class "INSPIRE-bulk-download"
- 8.5. Requirements class "INSPIRE-CRS"

Clients

Implementing OGC-API Features

QGIS

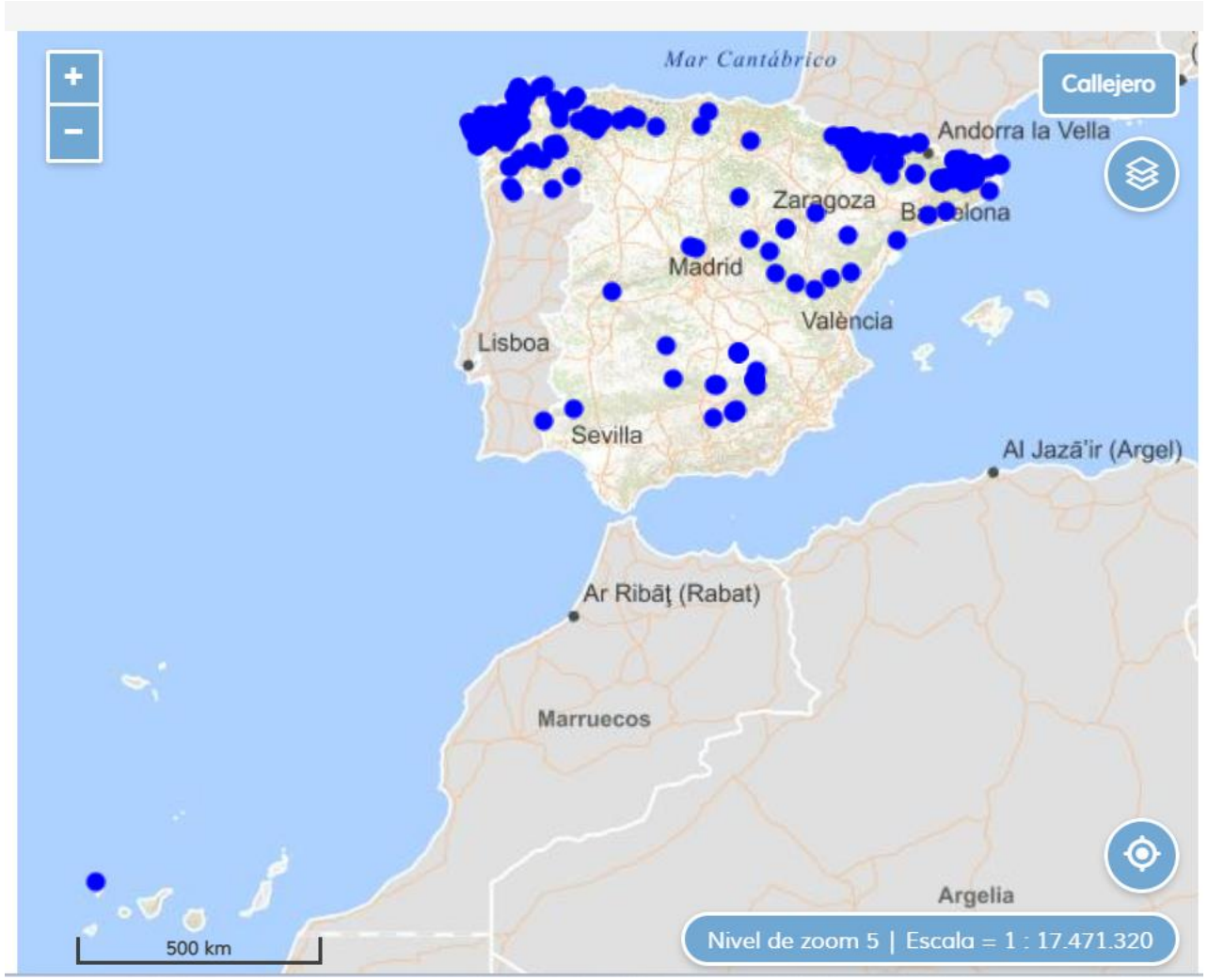


Implementing OGC-API Features

API cnig

```
// define la capa
const layer = new M.layer.OGCAPIFeatures({
  url: 'https://api-features.idee.es/collections/',
  name: 'falls',
  legend: 'Falls - OGCAPIFeatures',
  limit: 20000

}, {
```



https://componentes.cnig.es/GaleriaEjemplos_APICNIG/ejemplos/ogcapiFeatures01.html

Conclusions and some questions

Data Provider

Easy to implement.

Work in progress.

Software updates to adapt to standard changes.

Working over previous work and INSPIRE Experience.

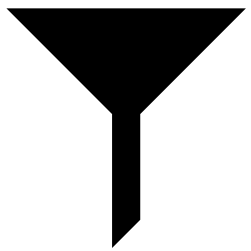
We need to adapt our databases to direct INSPIRE data publishing.

Data User

Versatile.

Performance.

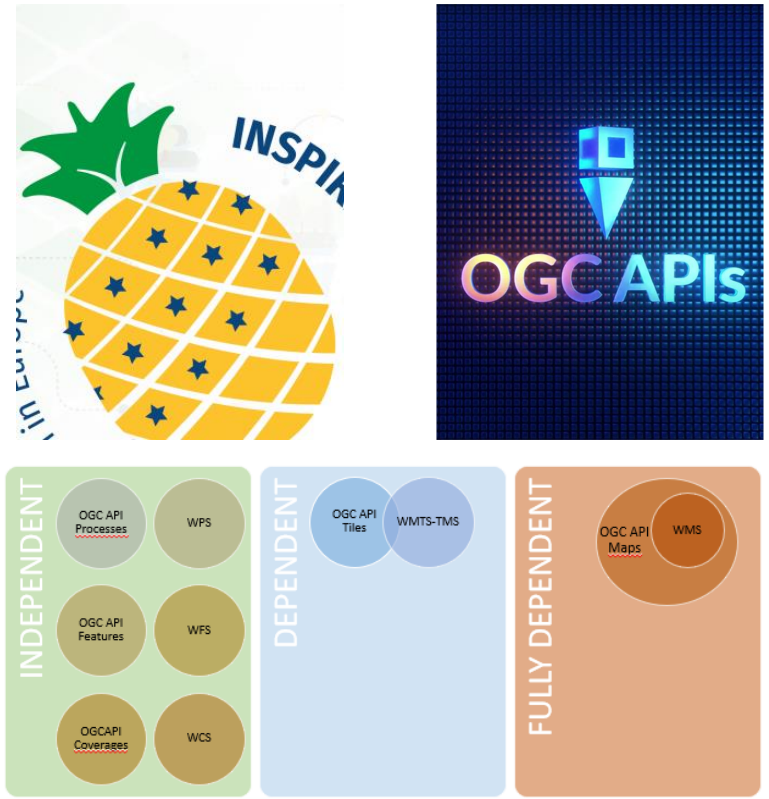
Developers oriented.



Part 3: Filtering is in draft status.

Data advanced filtering differs from server to server.

Implementing OGC-API Features



How will all these new collections coexist in the INSPIRE and High Value Dataset ecosystem?

How long will it take to our users to adapt to the new standards?

How long will we be able to maintain doubled services efficiently?

Will new implementations be able to substitute the massive use of services?

Instituto Geográfico Nacional
CENTRO NACIONAL DE INFORMACIÓN GEOGRÁFICA

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