eurac research

Eo4multihazards Web Application

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VU VRIJE UNIVERSITEIT AMSTERDAM gmv INNOVATING SOLUTIONS UCL BGS British Geological Survey eurac research cmcc

Project Description

The **EO4MULTIHAZARDS** project is a **European Space Agency** funded project aiming to explore the EO technology potential to advance the scientific understanding of high impact multi-hazard events to better identify, characterise and assess their associated risk, vulnerability and impacts on society and ecosystems. This project will finish in September 2025.

The aim of the development of the web application is to create the multi-hazard event database and provide access to it through a web portal and API.

Our initial challenge in this project is the spread of data across different repositories and the harmonization of these datasets.

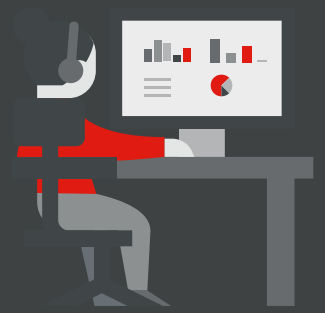
Project Roadmap

Input data

- Selection of the available and accessible hazard data sources
- Process automation

Database

- Architecture and technologies
- Relational Database
- Integrate the geometries

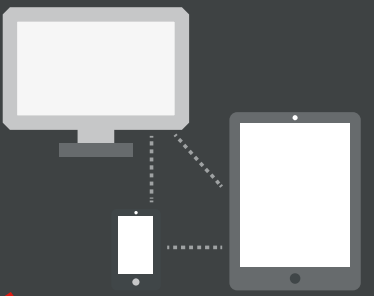


Development

- Packages and Technologies
- Feasibility to use map

Web Application

- Visualizing the data
- Feasibility to query the database



Input Data

Input Data – Dataset selection

- International Disaster Database(API accessibility) – All Hazard Types
- European Forest Fire Information System dataset (Openly available) – Forest Fire
- British Geological Survey (Available upon request)
- Data Harvesting/ Data FAIR principles (Findable, Accessible, Interoperable, Reusable)
- API, web services

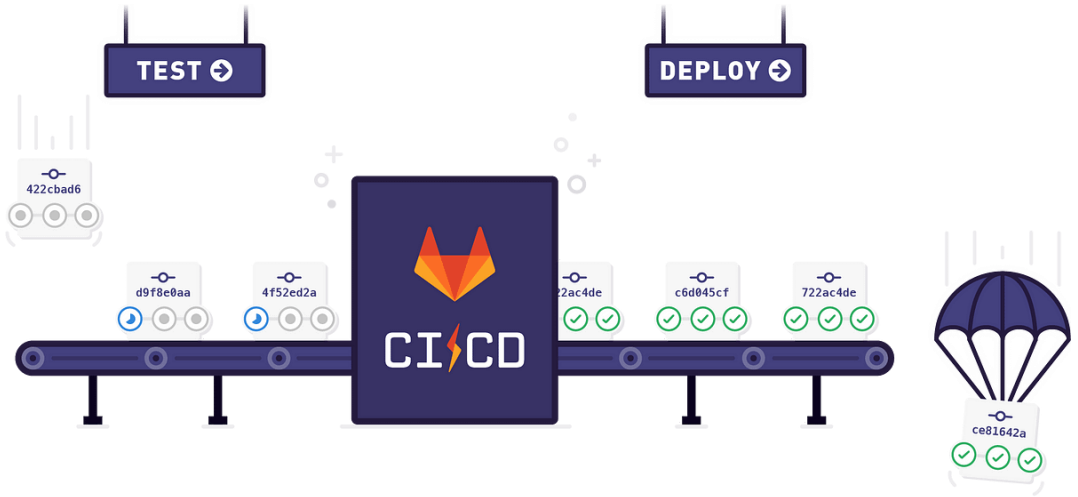
EM-DAT
The International Disaster Database
Centre for Research on the Epidemiology of Disasters

EFFIS

BGS British Geological Survey

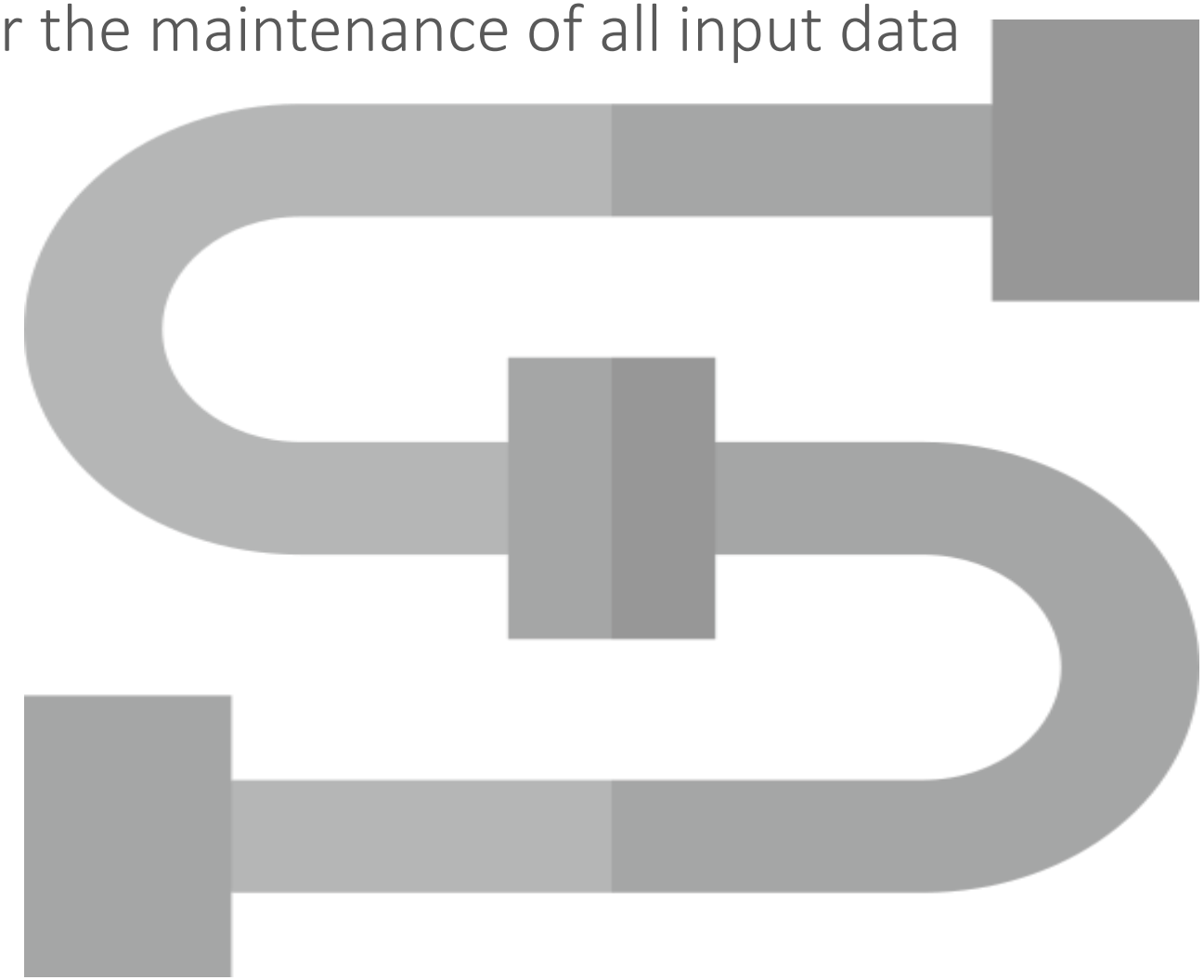
Input Data - Automation

- CI/CD pipeline for the maintenance of all input data
- Scheduled at a precise time of the day
- Download new data
- Harmonization of the database
- Uploading to the Database
- Separate Job for each Data sources



Input Data – CI/CD

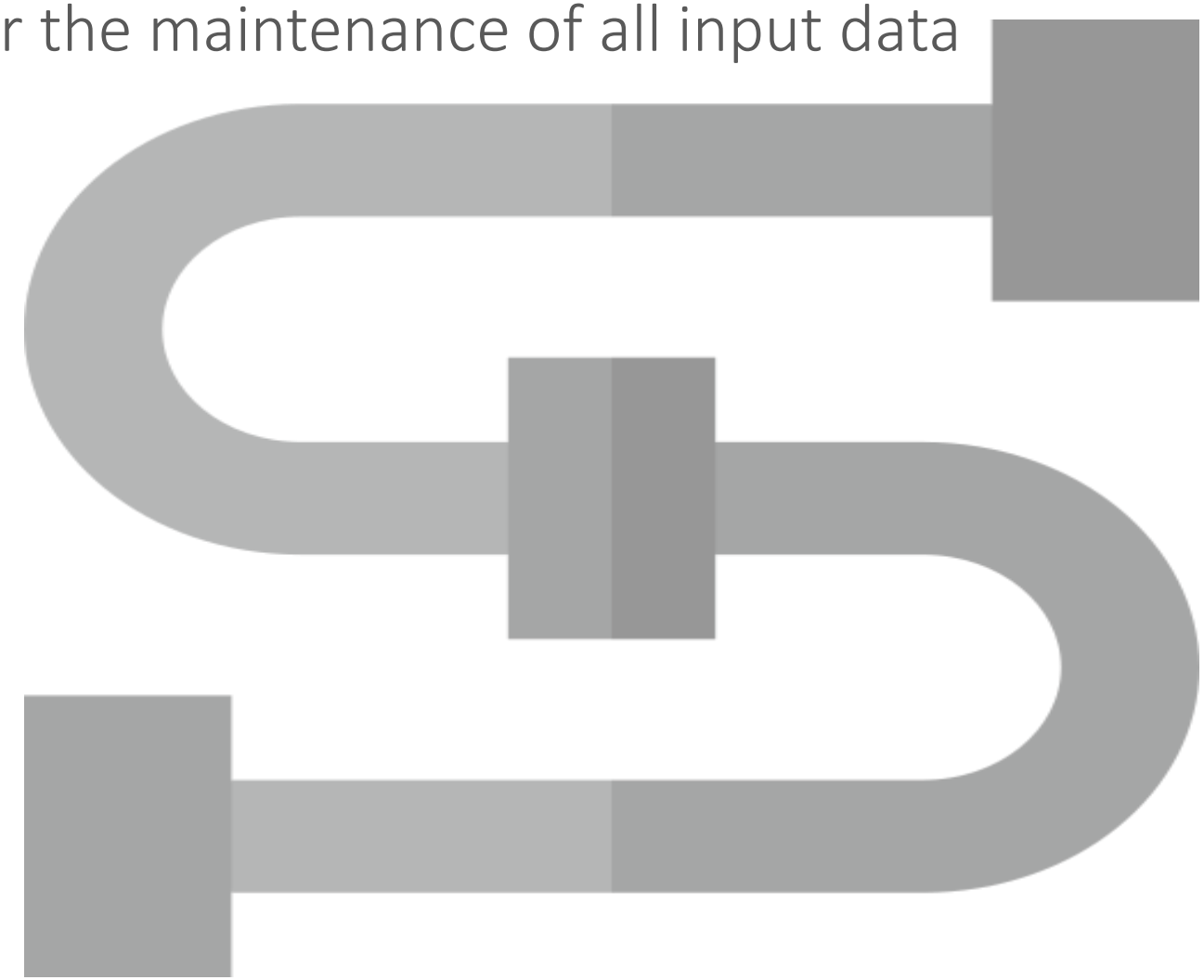
CI/CD pipeline for the maintenance of all input data



- EMDAT Data Retrieval via API
- EFFIS Data Retrieval from WFS (Web Feature Services)

Input Data – CI/CD

CI/CD pipeline for the maintenance of all input data



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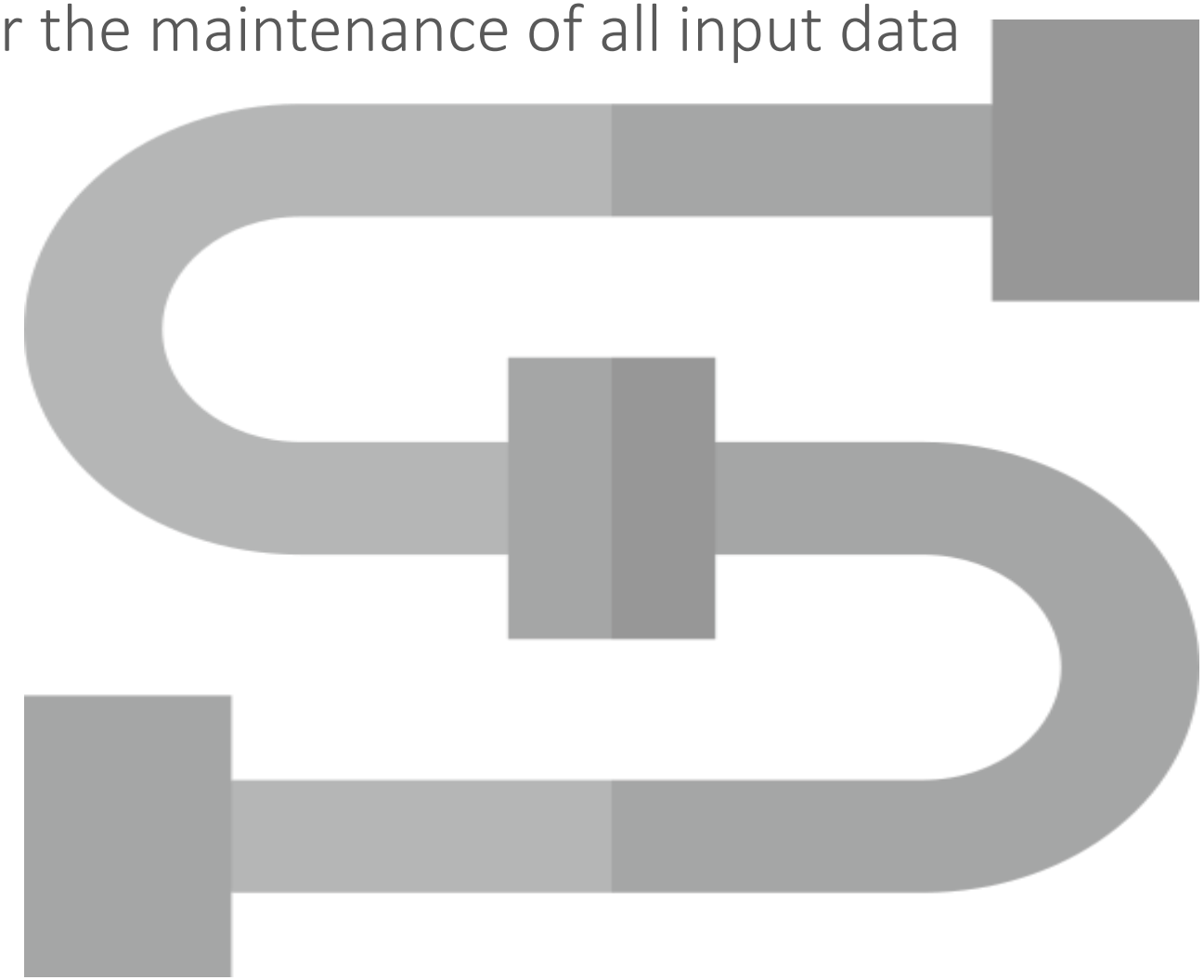
Data is downloaded and saved in the Eo4multihazard database in different tables
Following the specific conditions from each data source

Input Data – CI/CD

CI/CD pipeline for the maintenance of all input data

Database Harmonization
- UK-BGS events dataset harmonization and upload
- EMDAT and EFFIS harmonization



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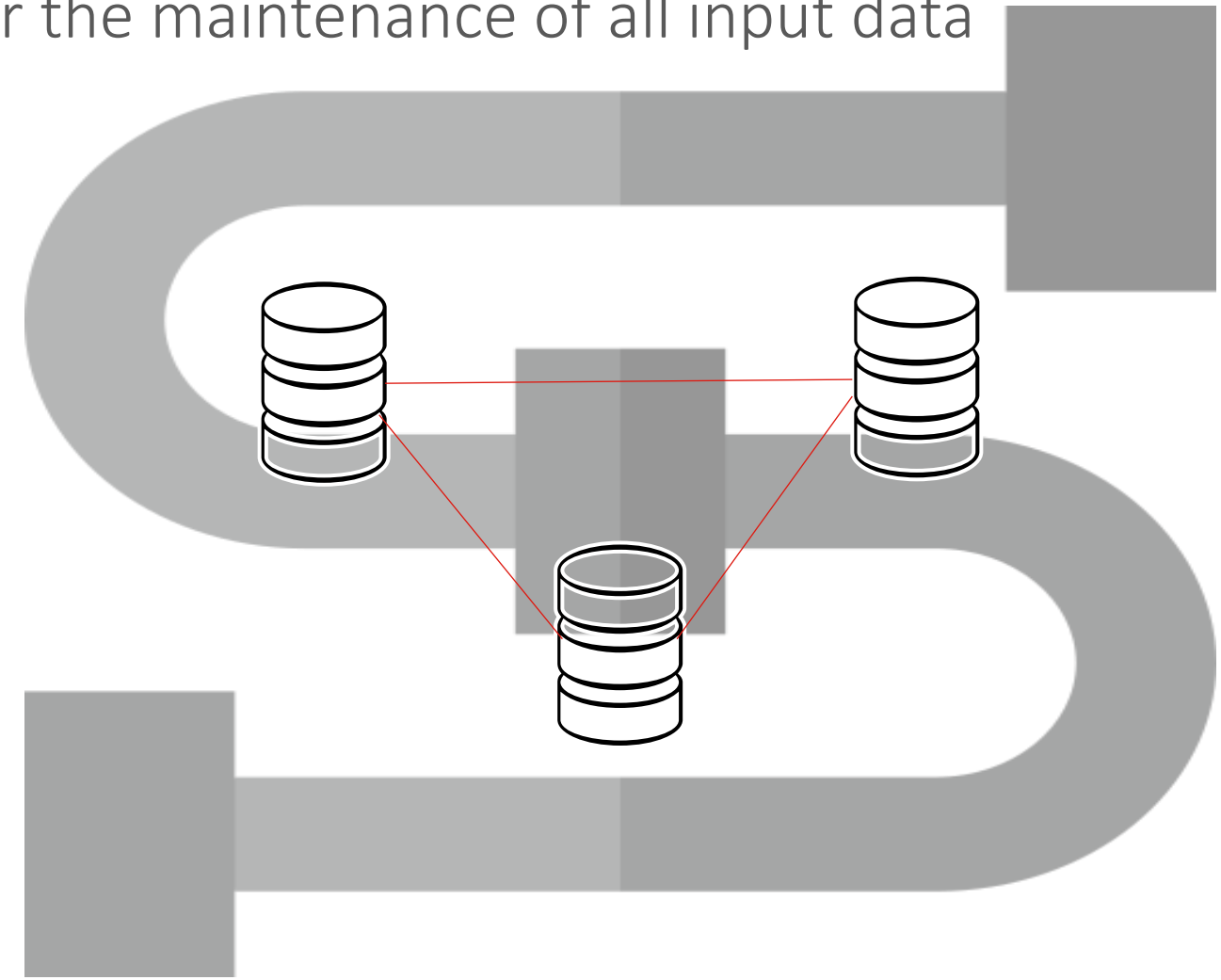

- EMDAT Data Retrieval via API
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Eo4multihazard Database – events table
- All the data sources are included
- final indices are accumulated based on the number of the record in the database

Data is downloaded and saved in the Eo4multihazard database in different tables
Following the specific conditions from each data source

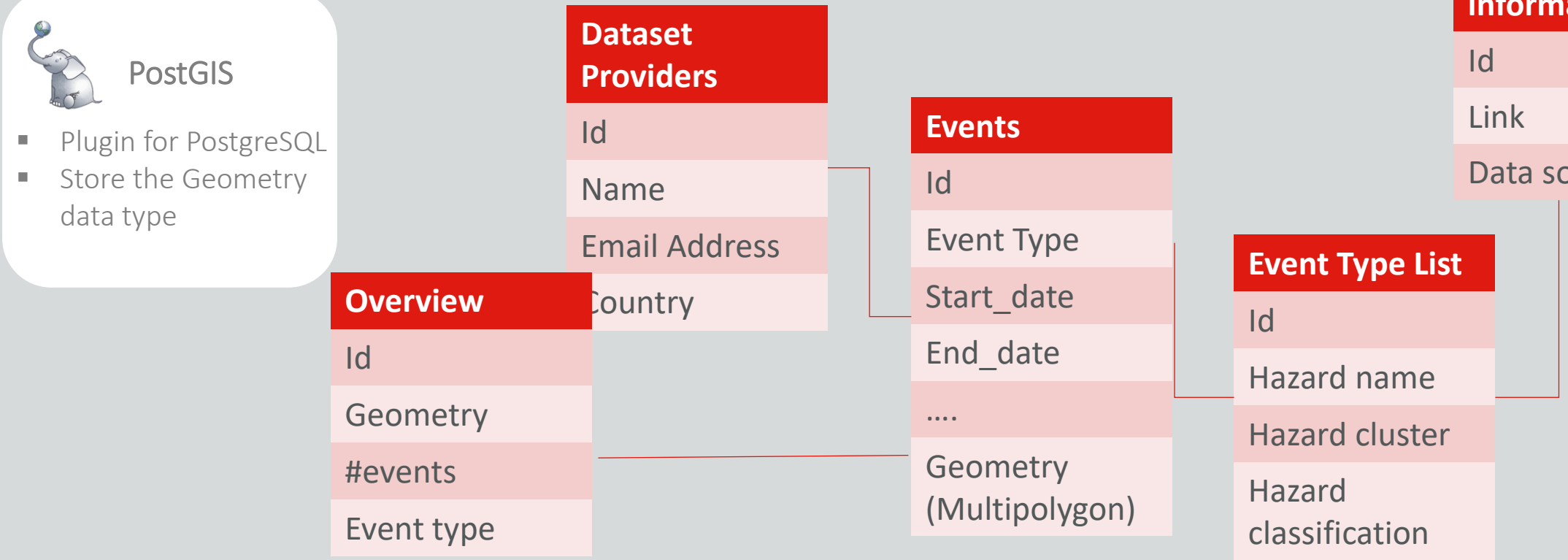
Database

Database

PostgreSQL: Relational Database to manage the storage of records
Collects and exposes events and datasets metadata for further analysis

PostGIS

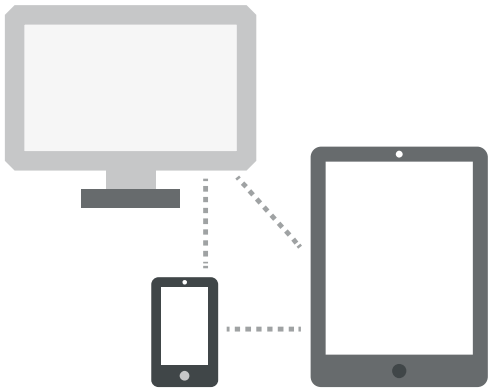
- Plugin for PostgreSQL
- Store the Geometry data type



Development

Development - Overview

Final Users (Researchers, Risk Managers,..)
Accessing the Eo4multihazard Application



Eo4multihazard Web Application

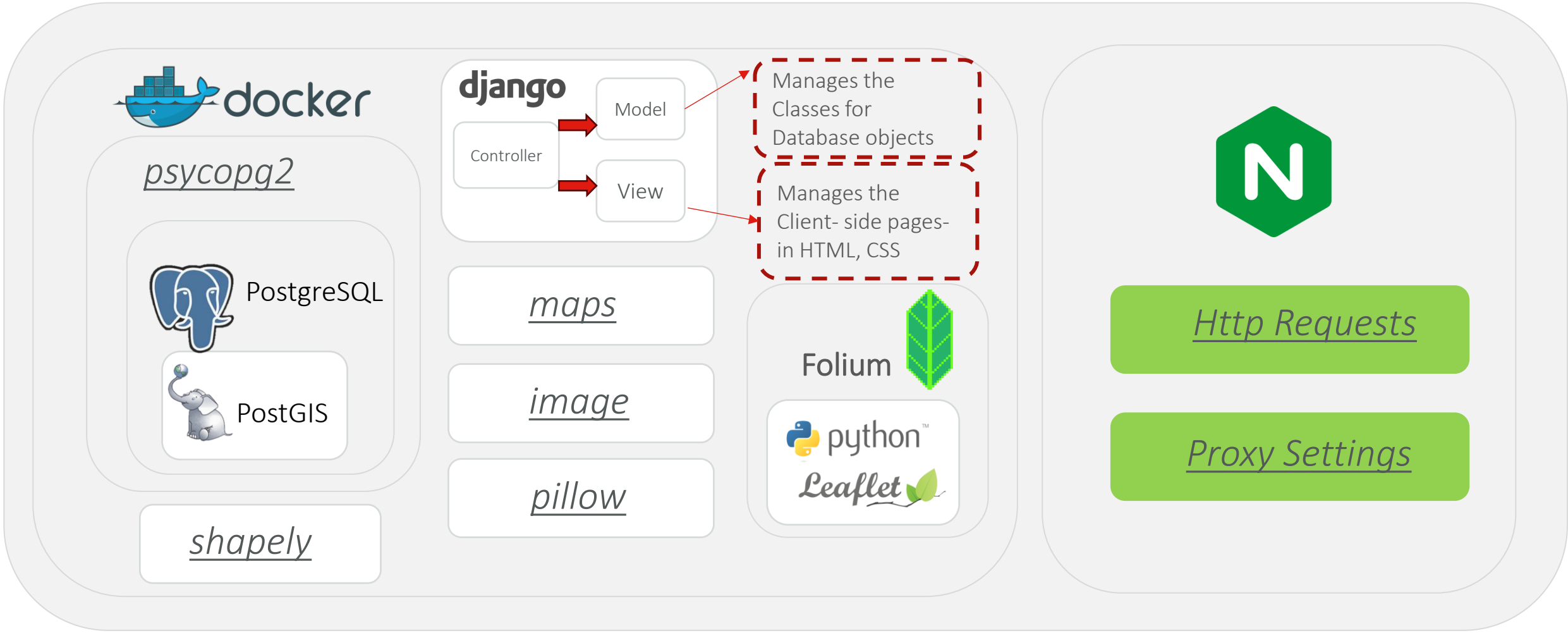
EFFIS Dataset
EMDAT Dataset
BGS-UK Dataset

Eo4multihazard Database

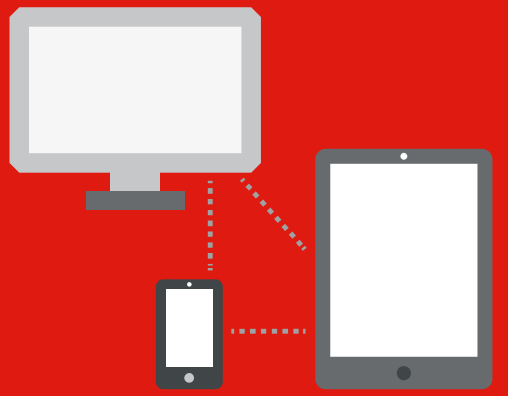
Development - Technologies

- Application development in **Django** framework
- Standard containerization of the application in **Docker**
- Showing the geometry of the event in **Folium** map
- Folium map is based on **Leaflet** map
- List of Countries with their ISO codes in **Py-country**
- Converting the geometry of the events with **Shapely**

Development - Packages



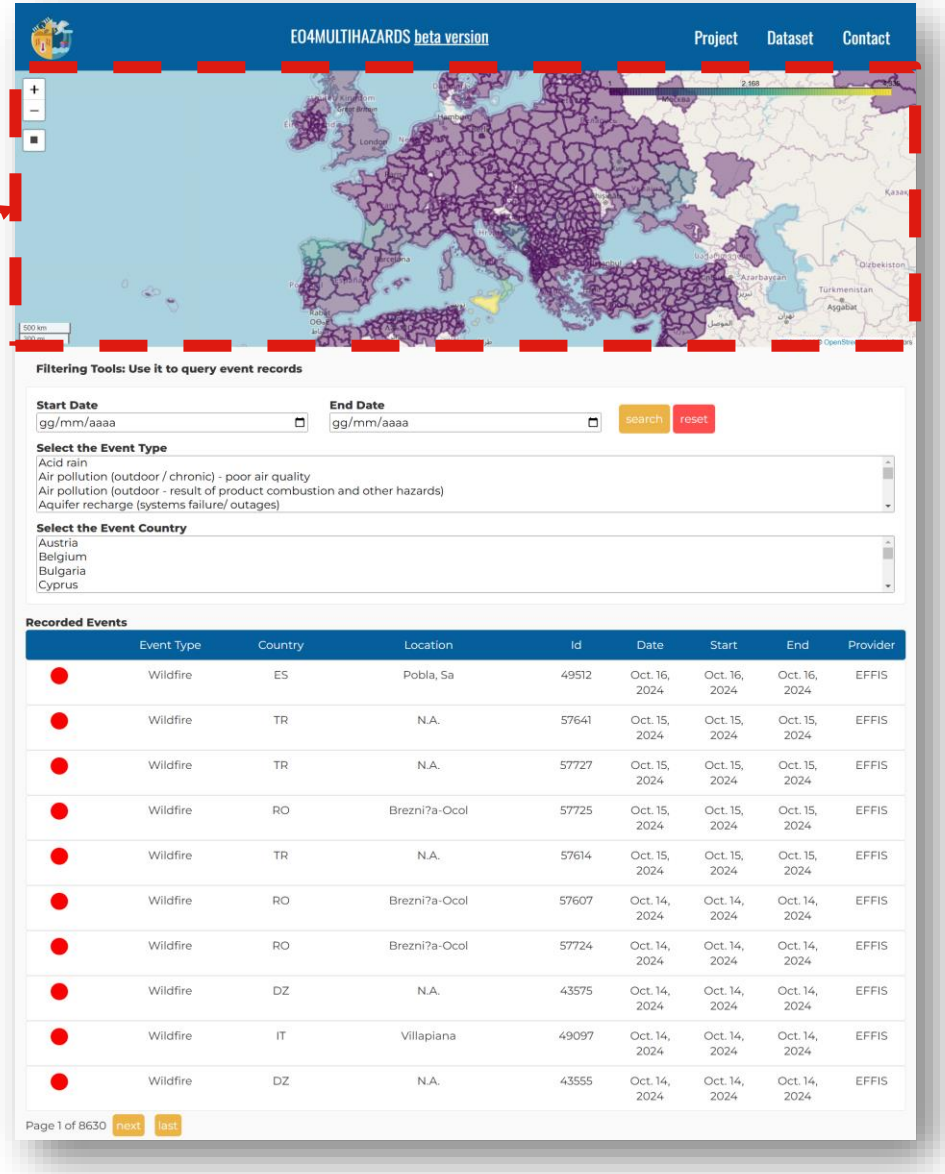
Web Application



Web Application

Functionalities are to support researcher and first responders to identify relation between events

- Event overview - GAUL Admin-0 level, implemented by the Food and Agriculture Organization (FAO)



Web Application

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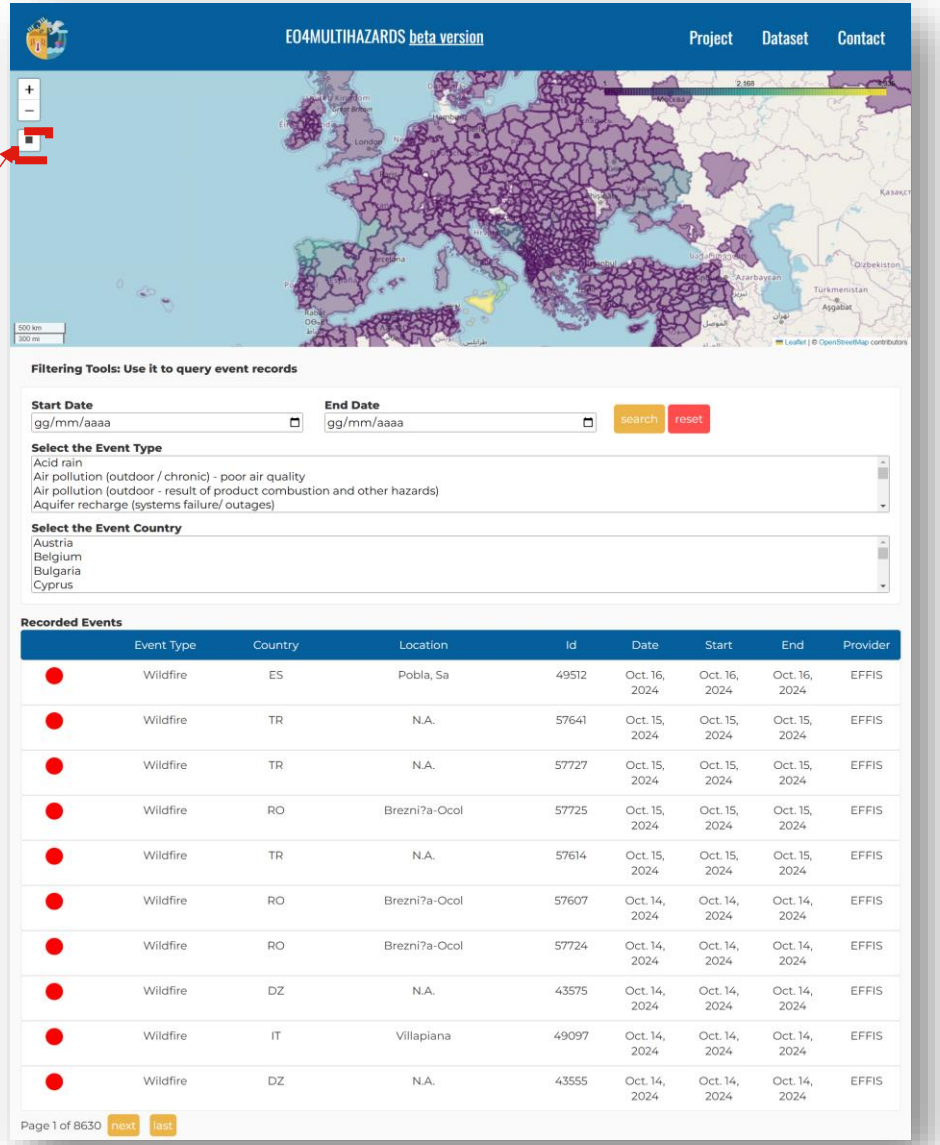
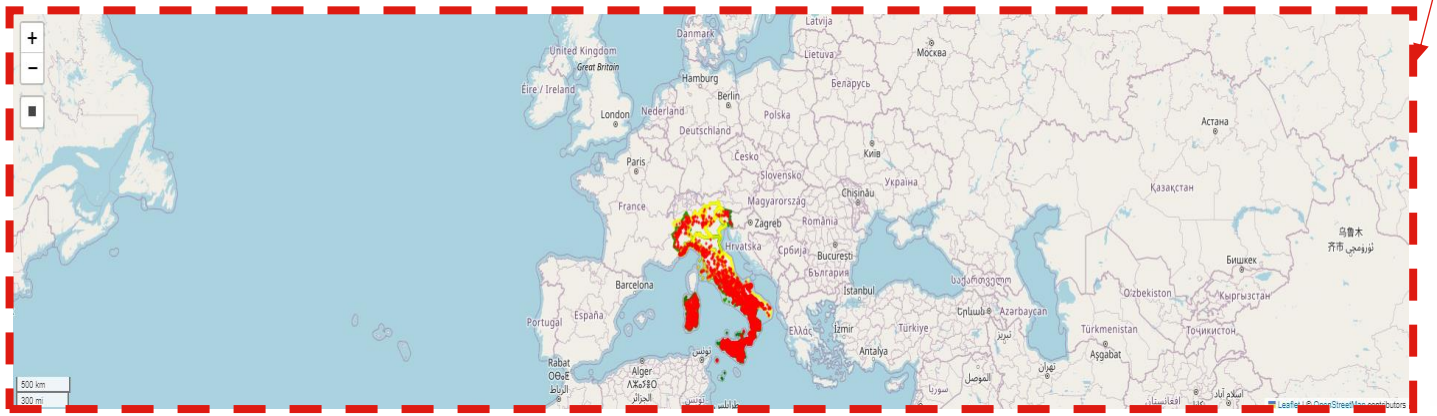
- Event overview - GAUL Admin-0 level, implemented by the Food and Agriculture Organization (FAO)
- Features filtering by polygon on the map

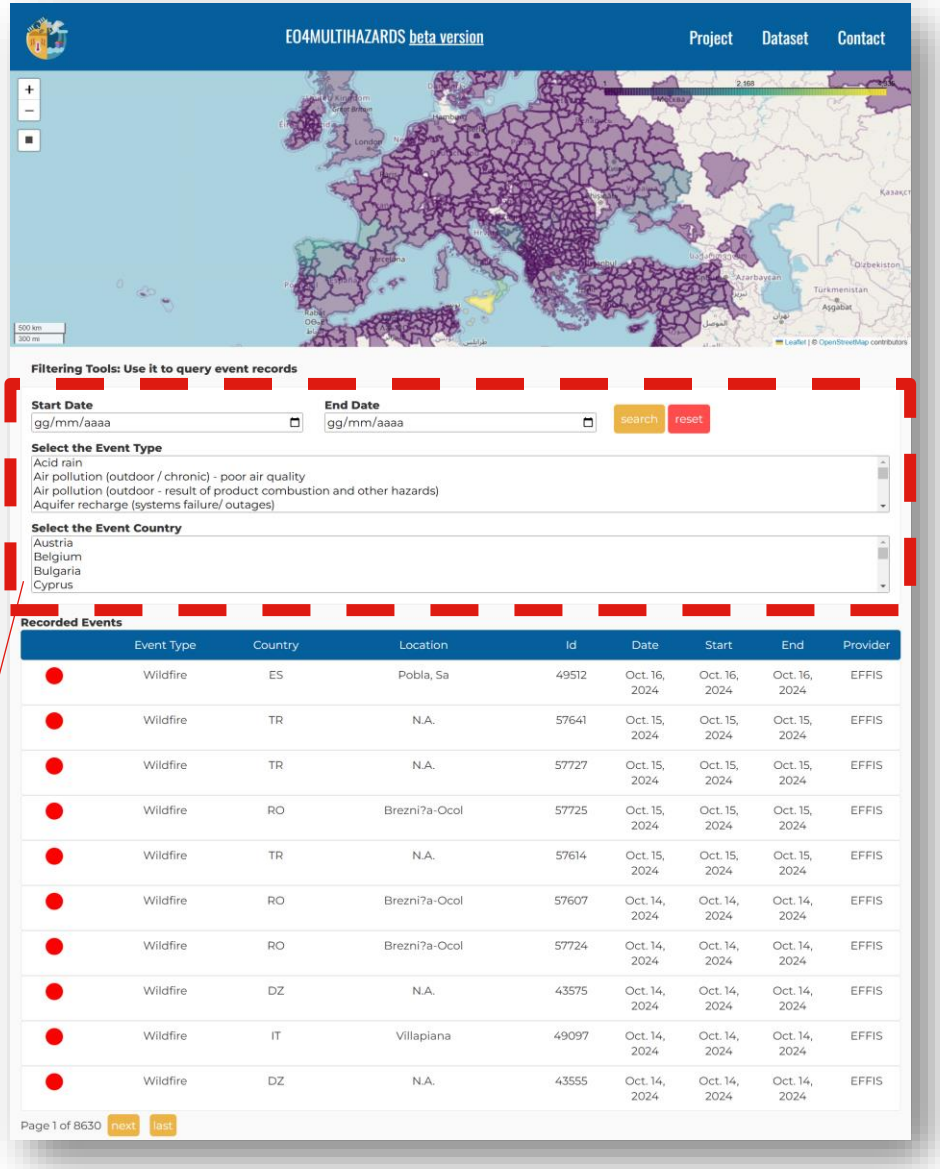


Web Application

Functionalities are to support researcher and first responders to identify relation between events

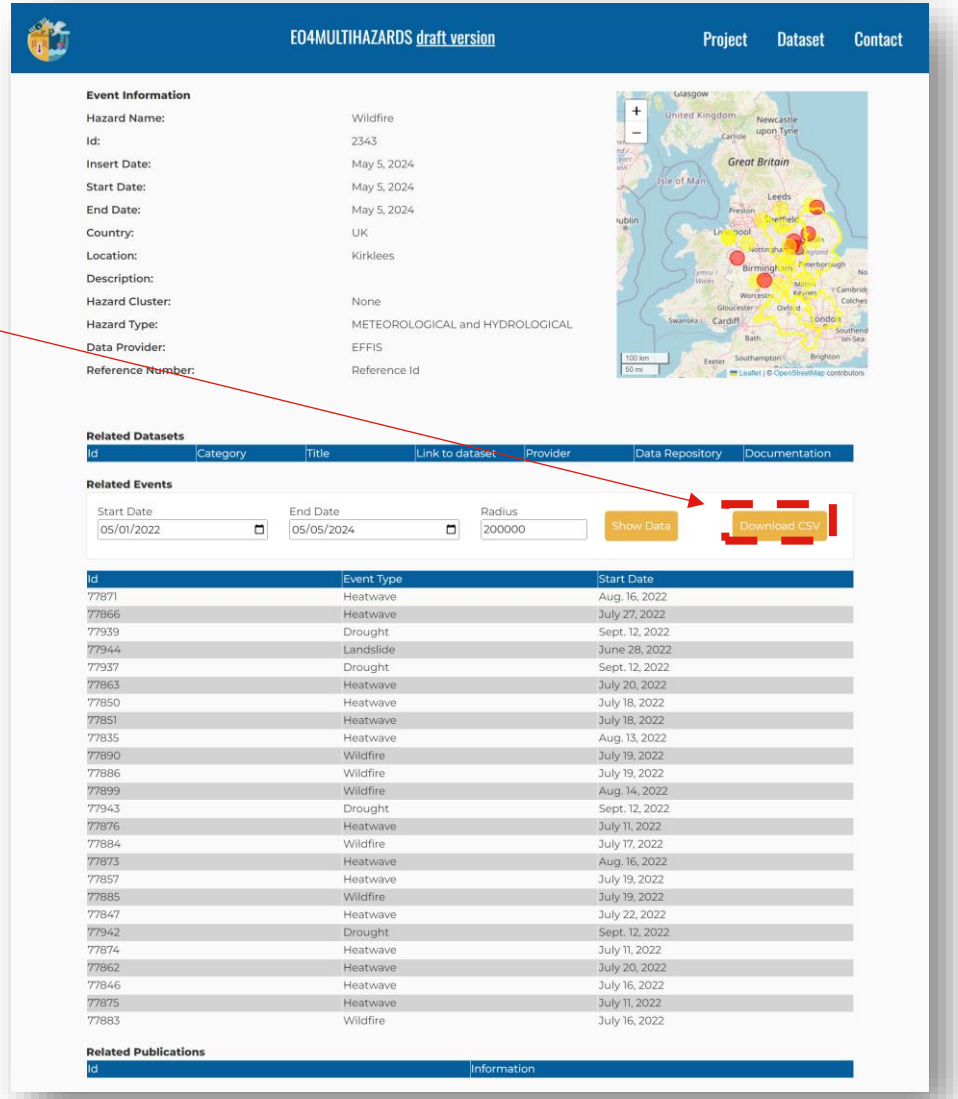
- Event overview - GAUL Admin-0 level, implemented by the Food and Agriculture Organization (FAO)
- Features filtering by polygon on the map
- Features filtering by country, event type, start/end date





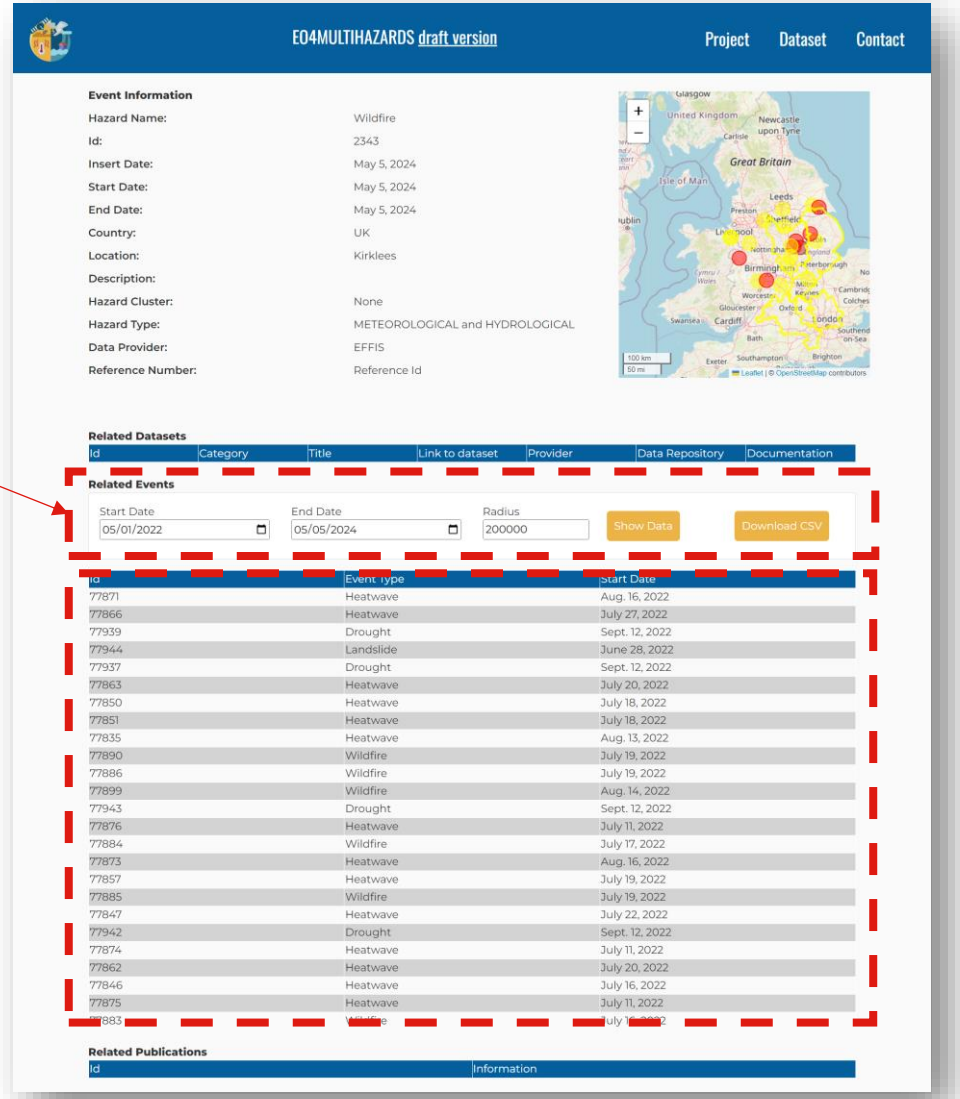
Web Application

- Download result of related events list



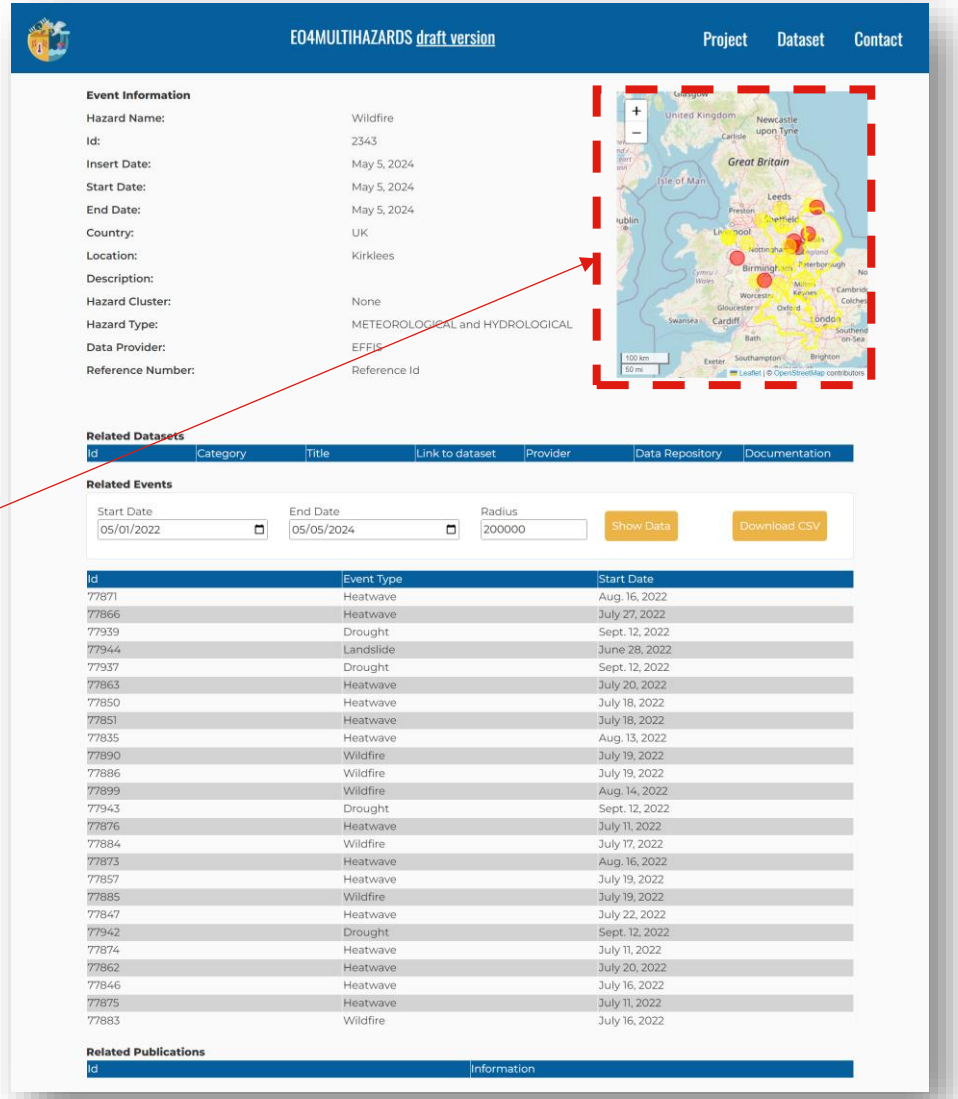
Web Application

- Download result of related events list
- Query to display related events: filter by time and radius



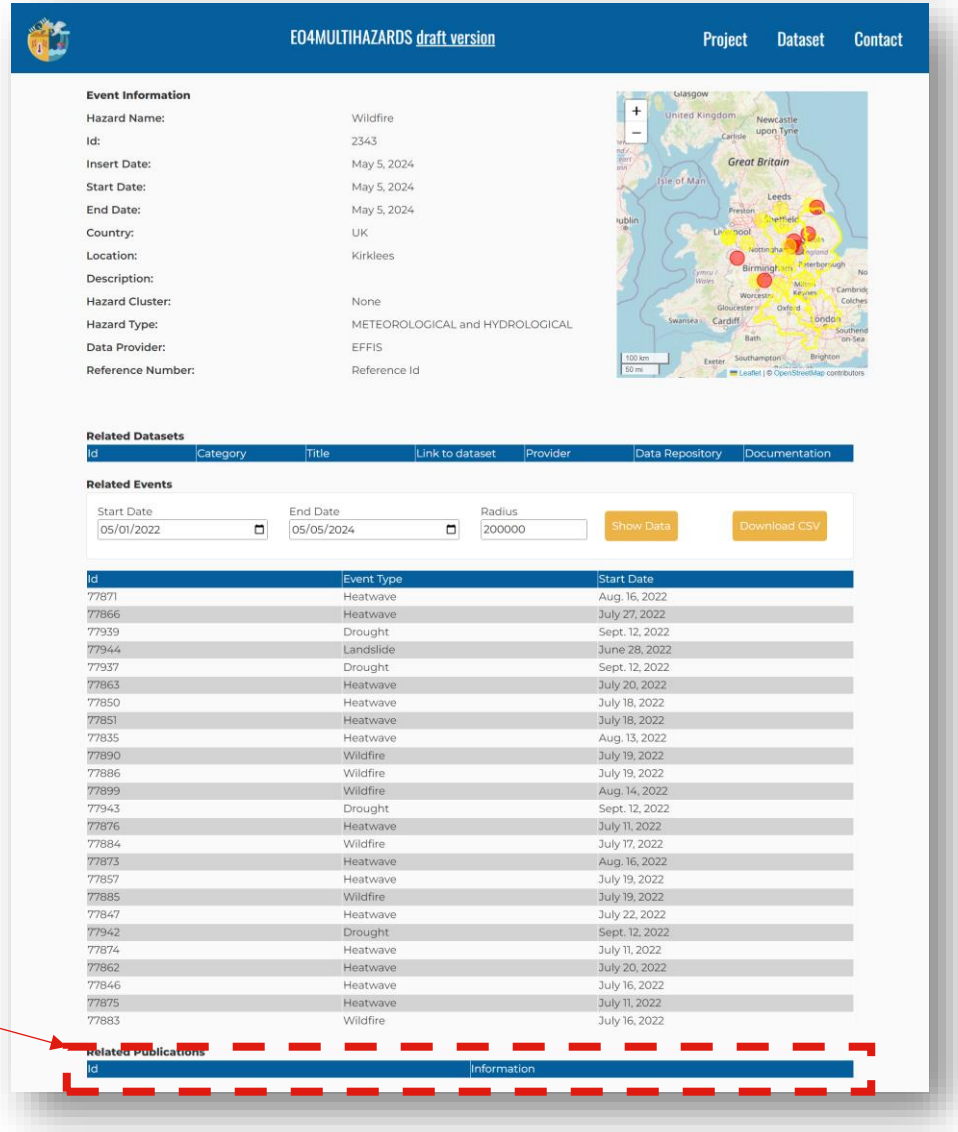
Web Application

- Download result of related events list
- Query to display related events: filter by time and radius
- Map overview of selected event and related ones



Web Application

- Download result of related events list
- Query to display related events: filter by time and radius
- Map overview of selected event and related ones
- View the Related Publication



Web Application

- List of Available Datasets

Web Application

- List of Available Datasets
- List of Available Data Providers

Id	Category	Title	Link to dataset	Provider	Data Repository	Documentation
10	None	None	None		None	
5	METEOROLOGICAL and HYDROLOGICAL, Wildfire	Copernicus Surface Soil Moisture - 1km	https://edp-portal.eurac.edu/discovery/5101aaf8-7964-11ee-9a8e-47abc4958022	EURAC RESEARCH	REST API (2.0)	
7	Cold wave, Heatwave, Wildfire	ERA5-Land Temperature	https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels?tab=overview	EURAC RESEARCH	GRIB/NetCDF	
8	METEOROLOGICAL and HYDROLOGICAL, Wildfire	ERA5-Land precipitation	https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels?tab=overview	EURAC RESEARCH	GRIB/NetCDF	
9	Cold wave, Heatwave, Wildfire	Temperature from ADO	https://ado.eurac.edu/	EURAC RESEARCH	API	
6	METEOROLOGICAL and HYDROLOGICAL, Wildfire	Meteo stations information	https://edp-portal.eurac.edu/discovery/c80d970c-adbf-4381-bfae-98d87ba59f9b	EURAC RESEARCH	WMS/WFS	
4	Cold wave, Heatwave, Wildfire	Daily temperature and precipitation values - Climate Data Base	https://edp-portal.eurac.edu/discovery/de6e883c-b9b9-4787-94a7-66517f9f06b8	EURAC RESEARCH	REST API (2.0)	

Id	Name	Country	Email	Website
1	EMDAT	Belgium	contact@cred.be	https://www.emdat.be
3	EURAC RESEARCH	Italy	info@eurac.edu	https://www.eurac.edu/
4	Euro-Mediterranean Centre on Climate Change (CMCC)	Italy	info@cmcc.it	https://www.cmcc.it/
5	Open Data Provincia di Bolzano	Italy	opendata@retecivica.bz.it	https://data.civis.bz.it/info
6	EFFIS	None	jrc-effis@ec.europa.eu	https://forest-fire.emergency.copernicus.eu/
7	BGS	United Kingdom	emills@bgs.ac.uk	None

Future Work

Improvement

Improve dataset page of the web application, webapp usability, and fill table of useful datasets

Creation

new pipelines to update datasets, Geostories to describe case studies, testing, and bug fixing

Finalizing

final URL and Host of web application

Thanks For Your Time!

Contact us

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