OGC Member

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HEV-E

Hazards, Exposures and Vulnerabilities Explorer

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About Us

- Around since 2006
- Expertise
  - GeoSpatial Data Fusion, Web Mashups, Mobile Apps
  - OGC, ISO, INSPIRE Standards
- Supporting/Developing FOSS4G projects
  - MapStore, GeoServer, GeoNetwork, CKAN, GeoNode
- Offer
  - Enterprise Support Services
  - Deployment Warranty
  - Professional Training
  - End-To-End Projects (Integration)
- Clients
  - UN FAO (CIOK, FIGIS, NRL, FORESTRY, ESTG), UN WFP, World Bank, DLR, EUMETSAT, JRC, ARPAT, NATO CMRE, UNESCO, IGAD, UNEP, etc..
  - Private Companies all over the world like TOTAL, CGI, BAYER, BASF, DigitalGlobe, MDA, e-GEOS, Halliburton, etc..

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Made in Italy

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The Challenge Fund

- **Initiators**
  - **Global Facility for Disaster Reduction and Recovery** (GFDRR)
  - **UK's Department for International Development** (DFID)
- **Objectives**
  - innovation to local contexts
  - identify climate threats and disaster risk
  - support effective decision-making
  - **build resilience**

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The Challenge Fund

- **Problem**
  - Unavailable risk data in developing countries
  - Generates non-effective risk-reducing policies
- **Response**
  - **Challenge Fund** took action
  - (by launching an initiativeto) **develop a framework for multi-hazard view of risk**.

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The Challenge Fund

- 3 teams working on the data framework
  1. Data schema and data for multi-hazard database – **British Geological Survey (BGS)**
  2. Data schema and data for global exposure database – **Global Earthquake Model Foundation (GEM)**
  3. Data schema and data for a global database of vulnerability functions – **University College London Consultants (UCL)**

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The Challenge Fund

- **GeoSolutions** contribution
  - design and implement an **exploration platform**
  - provide a dedicated set of tools for
    - *Searching*
    - *Exploring*
    - *Extracting*

  data of interest

Hazards, **E**xposures and **V**ulnerabilities **E**xplorer → **HEV-E**

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HEV-E | Challenges

- **Unified exploration/exploitation** platform
- Data Types
  - **Hazards**
  - **Exposures**
  - **Vulnerabilities**
- **User friendly** web frontend
  - Broad range of stakeholders
  - Explore, inspect and download such diverse data
  - User friendly also for the uninitiated

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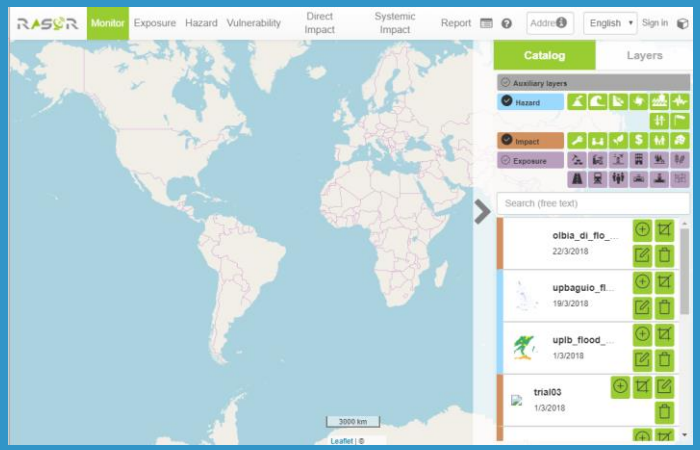
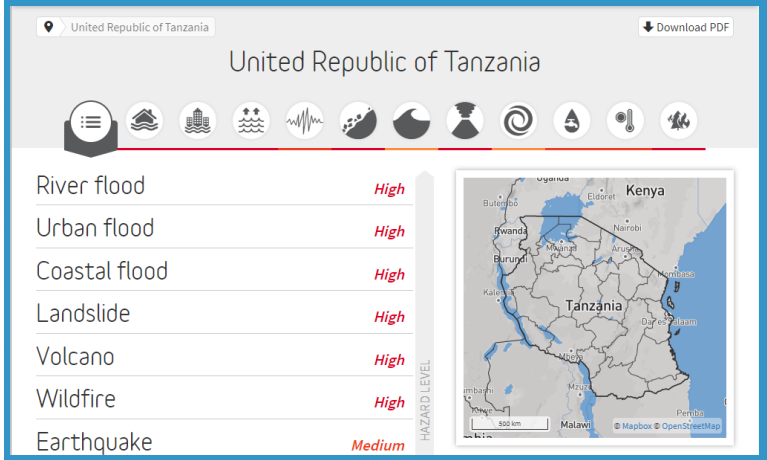
Previous work - Others

GeoSAFE



Rasor



ThinkHazard!

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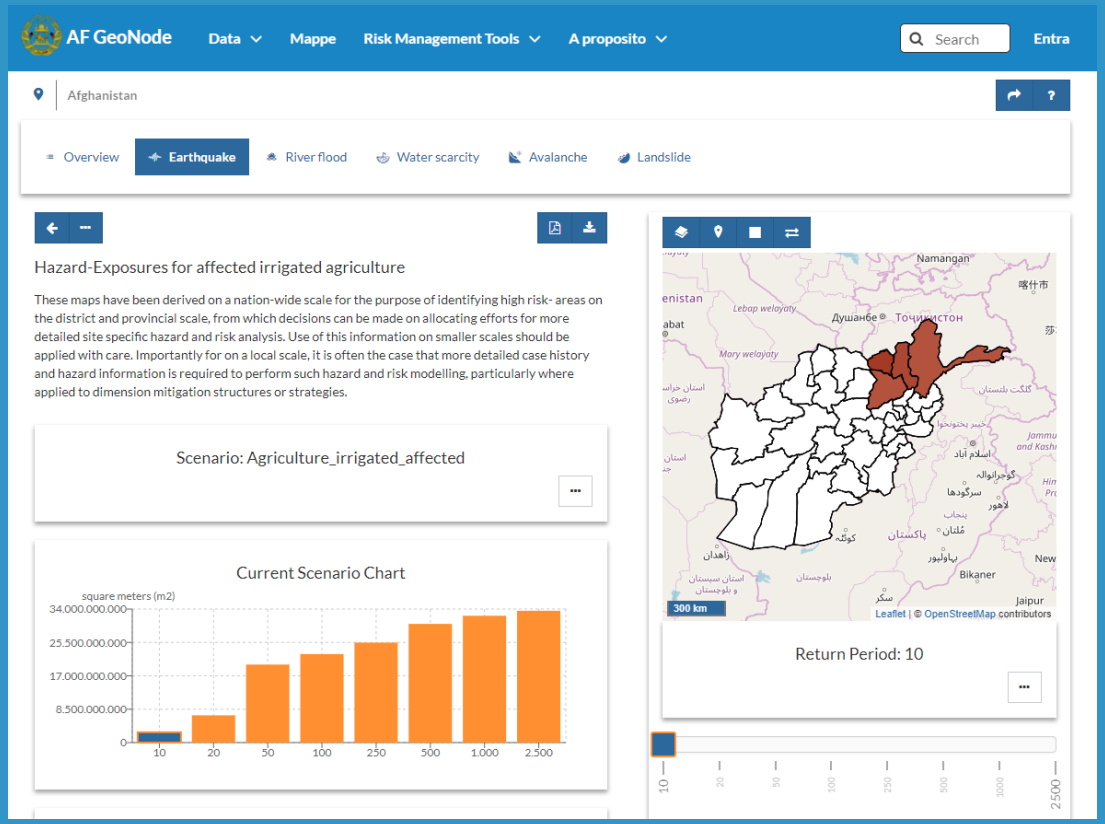
Previous work - GeoSolutions

Afghanistan Disaster Risk http://disasterrisk.af/



Risk Assessment and Cost/Benefit Analysis

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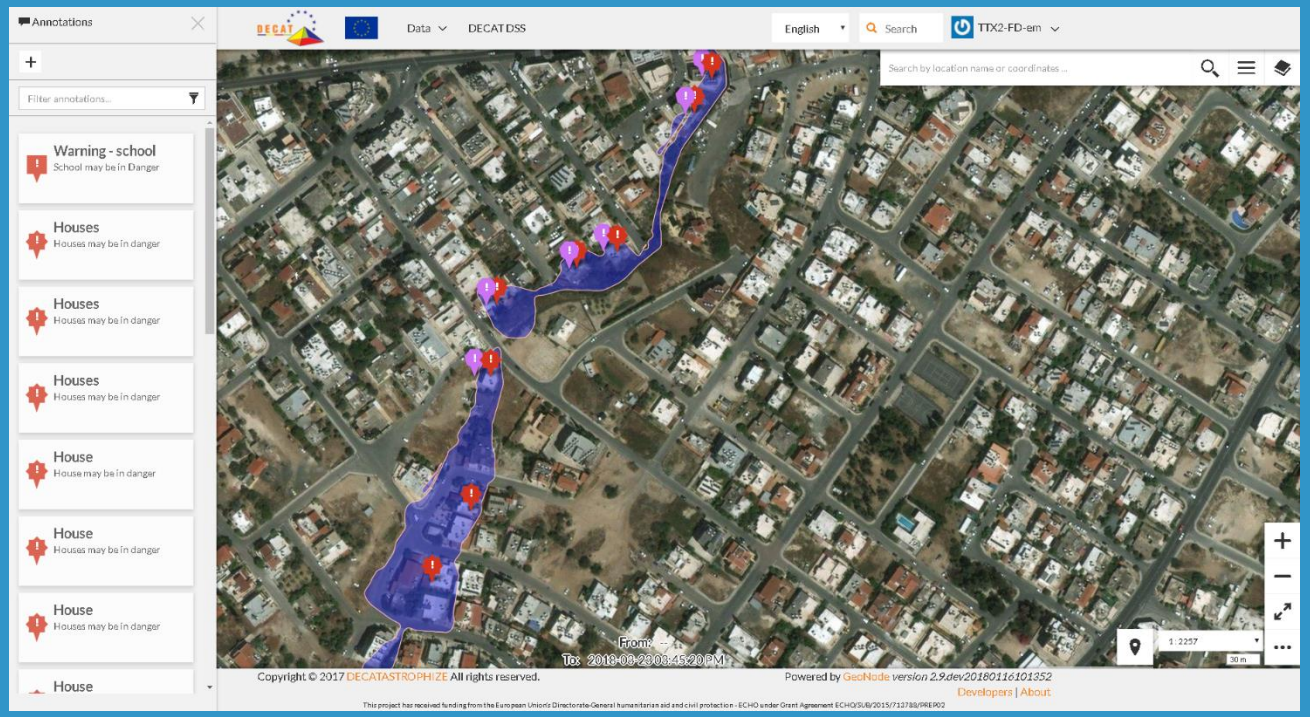
Previous work - GeoSolutions

DECATastrophize http://decat.geo-solutions.it/



Early warning + Impact Assessment + Emergency Management

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HEV-E | main functionalities

- **Discover** hazards, exposures and vulnerabilities
  - By Type
  - By Category
  - By Geographical area
- **Preview** and **Explore**
  - On a map
  - On a Sahboard (summaries and charts)
- **Download** content of interest (**Exploit**)

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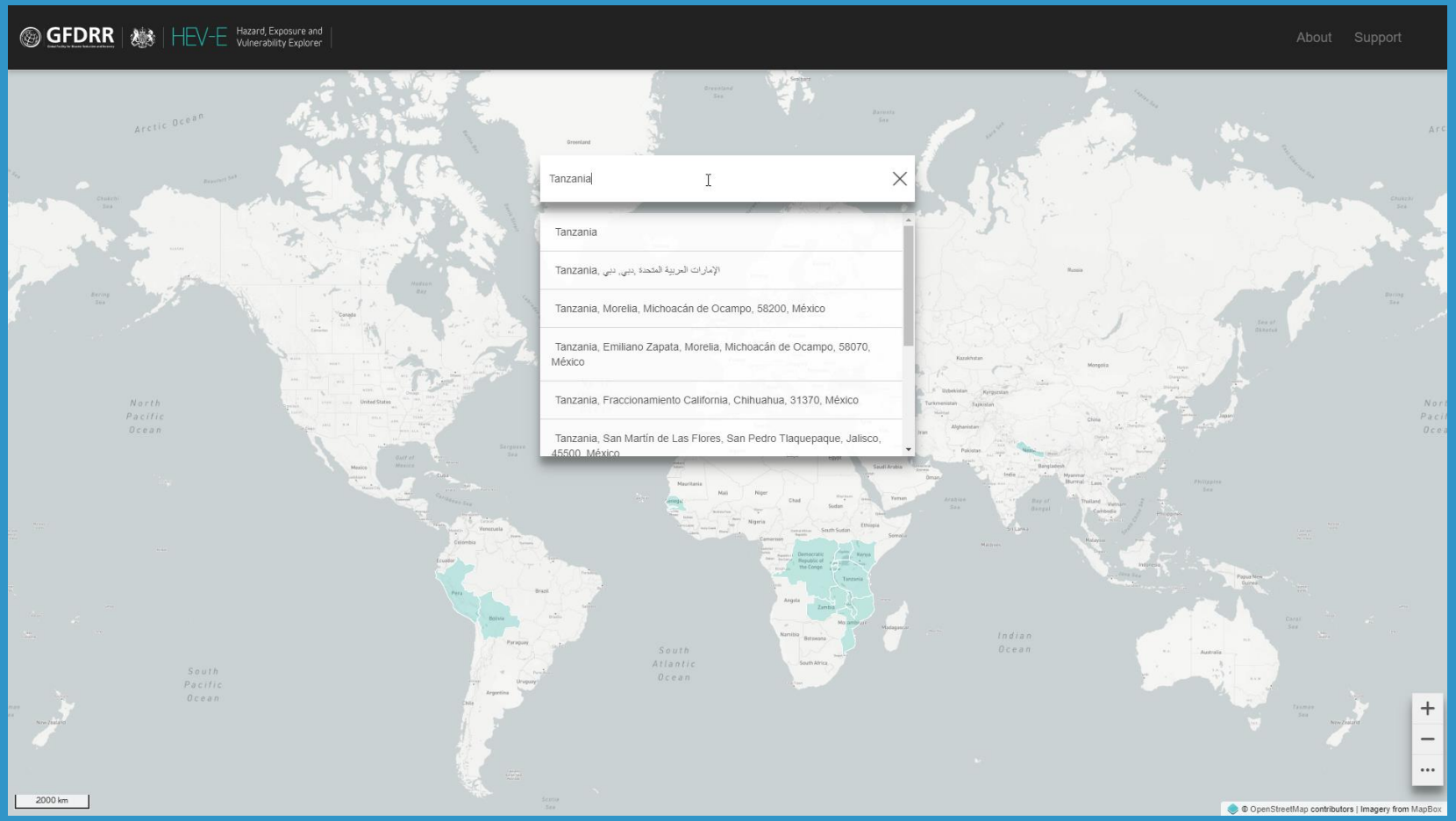
HEV-E | landing page



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HEV-E | the 'e-store' approach

Data Discovery

- Narrow the matches using data specific contextual filters
- Sort according to various criteria
- Preview location and contents on map
- Suggest related content (*prototype*)

→ *Guided and simplified data discovery*

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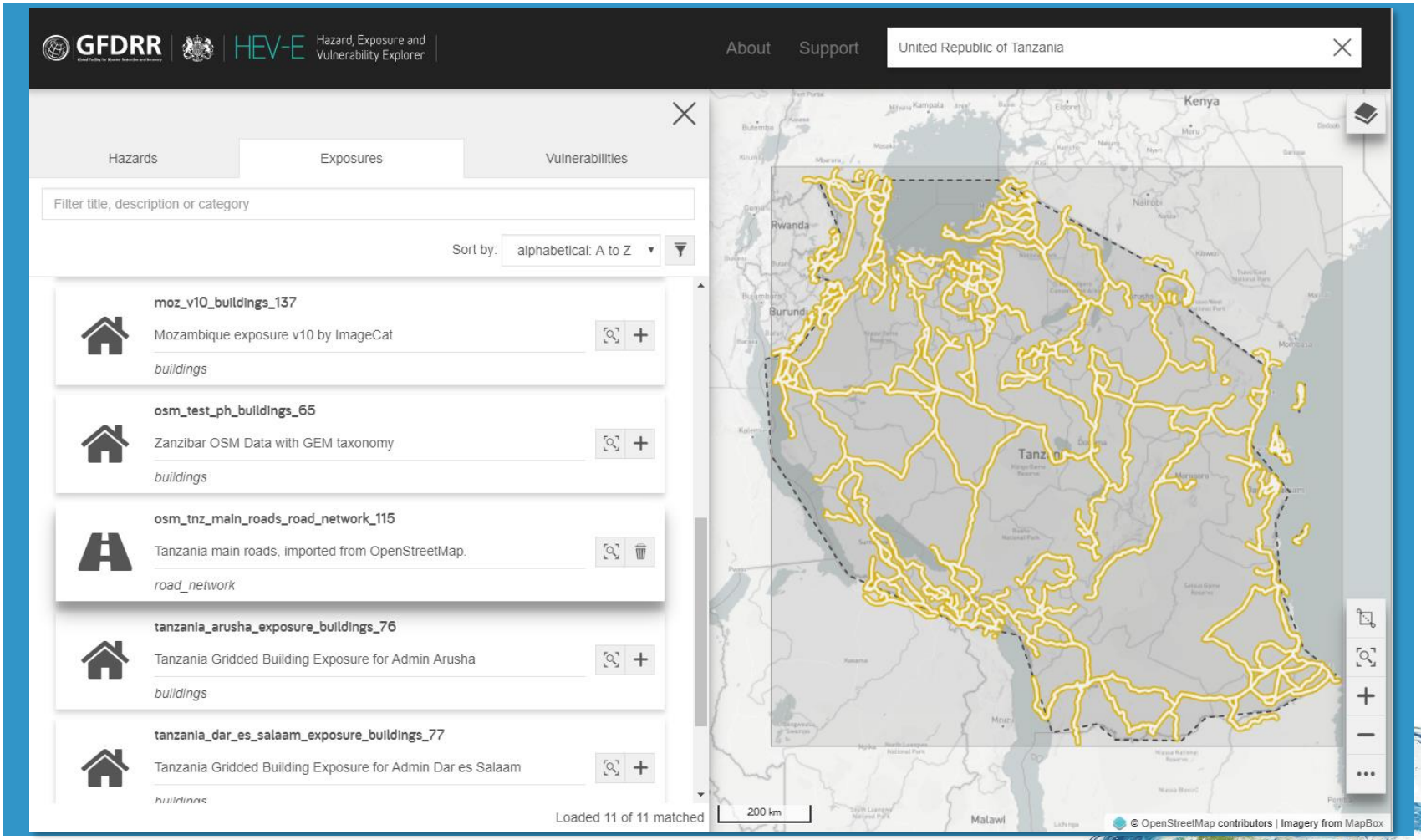
HEV-E in action



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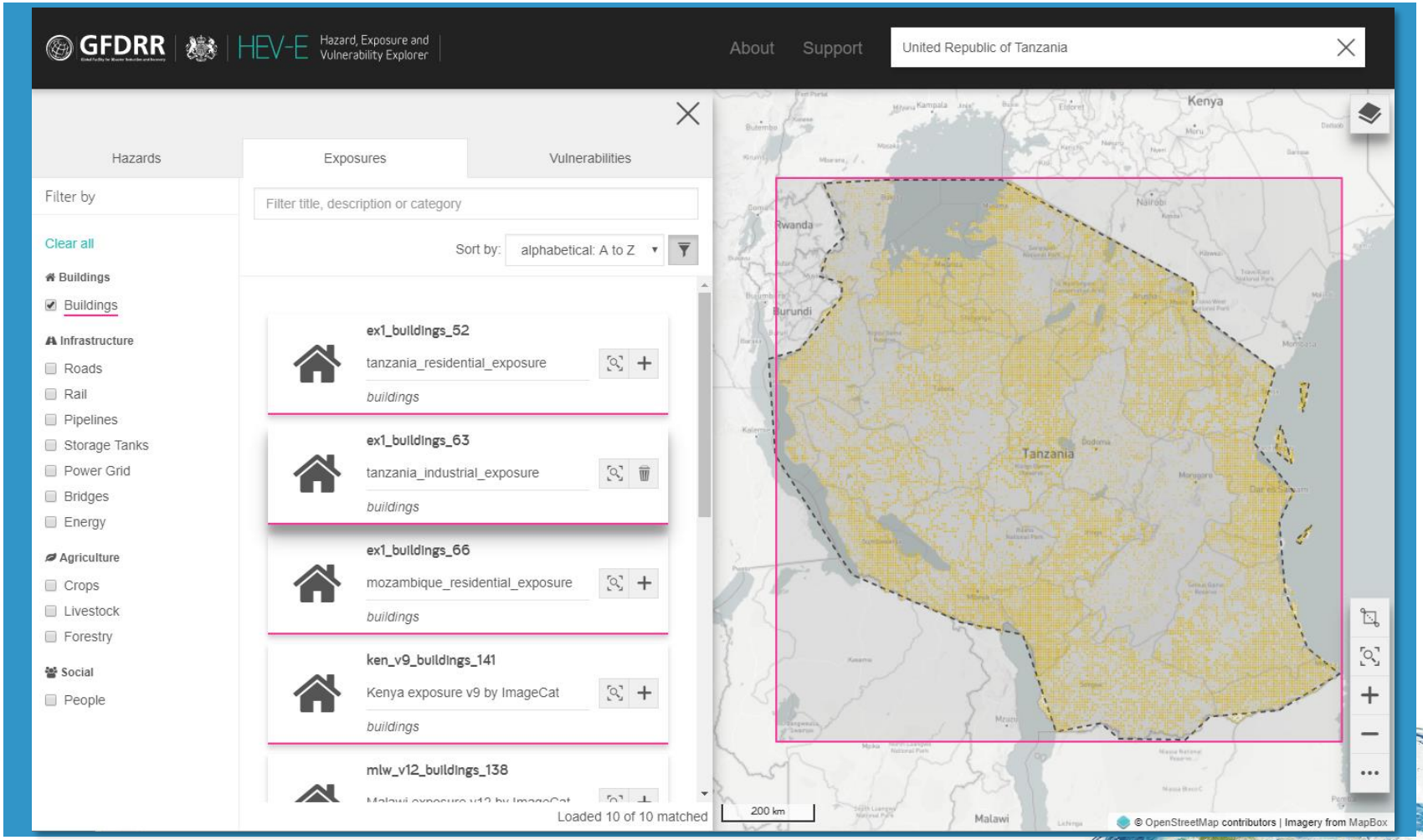
HEV-E in action



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HEV-E | the 'e-store' approach

- **Data Exploitation**
- Dashboard view for data contents
  - Charts
  - Metadata
  - Textual Summaries
- Additional Filter on contents
- Multiple detailed stylings on map

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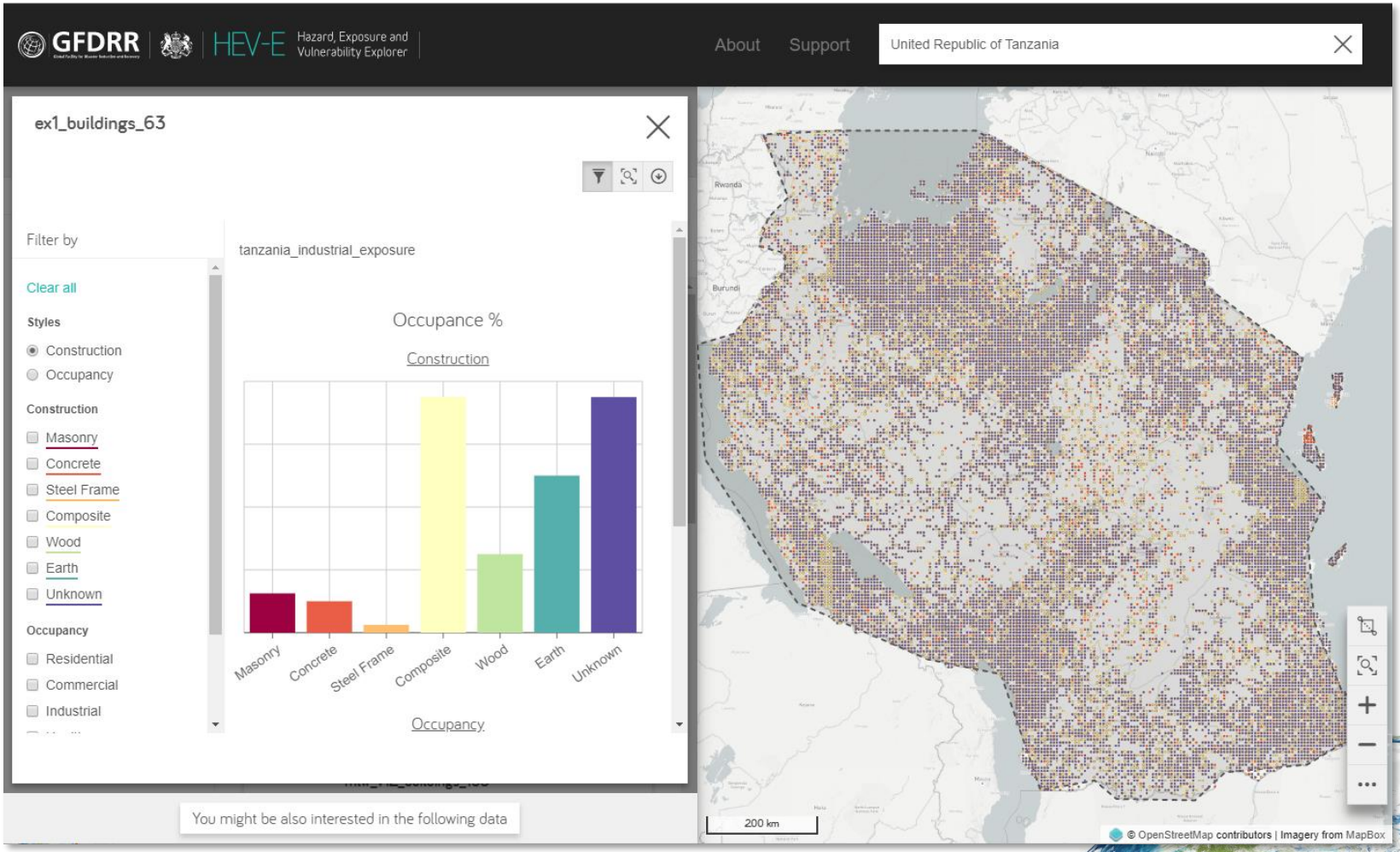
HEV-E in action



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HEV-E

- **Data Download**
- Spatial filters to fix the area of interest
  - exploration
  - download
- Download subsets of data
  - ESRI Shapefile
  - GeoPackage dumps (according to the original schema structure)

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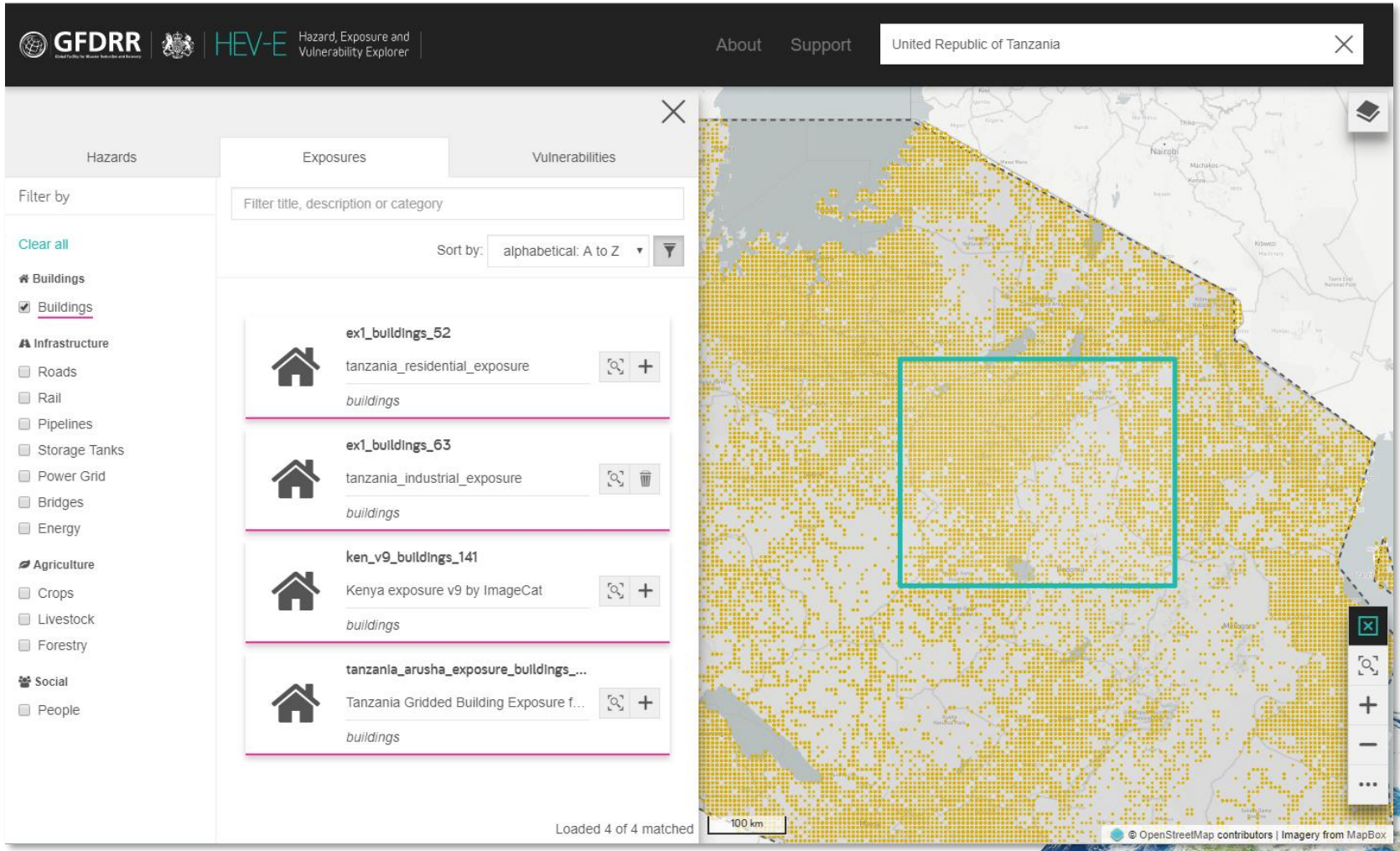
HEV-E in action



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HEV-E | Who made it possible

- PostgreSQL / PostGIS
- Django
- GeoNode
- Geoserver
- MapStore

GeoNode

django

GeoServer

MapStore

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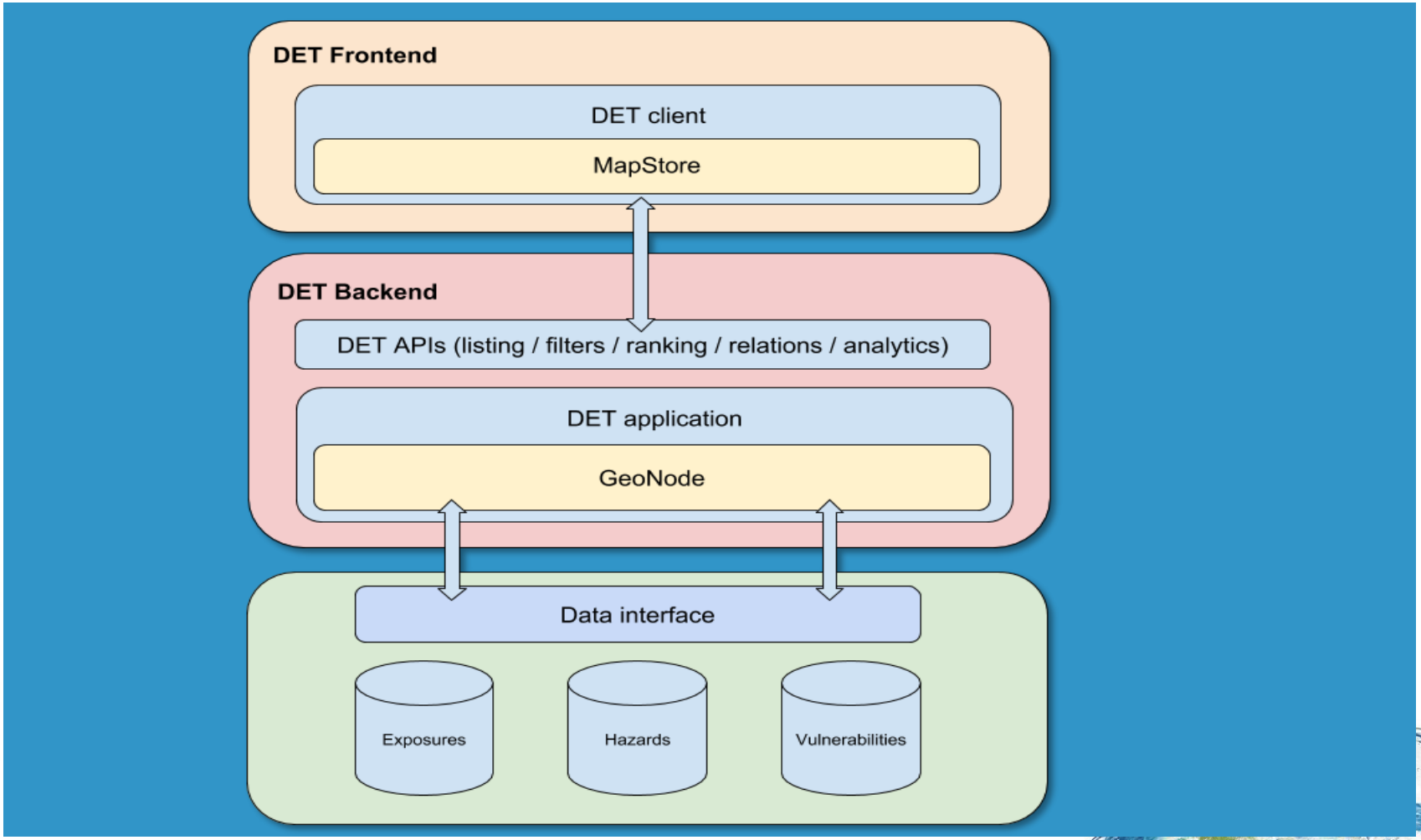
HEV-E | High level architecture



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HEV-E | Data Ingestion

Original DBs
(PG dumps)

- Hazards
- Exposures
- Vulnerabilities

Pre-processing

Custom Django management commands

1. DBs health check
2. Grouping of data into multiple layers
3. Create MATERIALIZED VIEWS for each group of data
4. Precalculate relevant statistics, normalize taxonomies, check and cast geometry fields

HEV-E DB

HEV-E

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HEV-E | Data Ingestion

HEV-E DB

HEV-E

Ingestion

Custom Django management commands

5. Create Geoserver's store and workspace
6. Publish each MATERIALIZED VIEW as a single layer
7. Create styles for the different type of layers and geometries

Geoserver

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HEV-E | Data Ingestion

GeoServer

Ingestion

Custom Django management commands

8. Import Geoserver layers in GeoNode
9. Popupate keywords and categories from DB views attributes
10. Populate title and description fields
11. Define Geofence rules

GeoNode

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HEV-E | PostGIS

- Data pre-processing (pg/plsql + Python code)
- **MATERIALIZED VIEWS**
  - avoid data duplication
  - lowest runtime overhead
- Spatial queries to extract spatial relations between datasets
- Extract countries boundaries with available data

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HEV-E | GeoServer

- **OGC / WMS** service to view contents on map
- **(E)CQL** to filter layers and contents on map
- **SLD** for styling multiple geometries and geometry types
- **SLD** filters for styling content
- **Geofence** rules to restrict access to layers and services
- **GeoWebCache** for tile caching

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HEV-E | GeoNode

- **Enrich original data** with metadata and additional informations (keywords and categories)
- Support frontend functionalities
- Publish a CSW catalog of the (simplified) layers
- **Geoserver APIs** for management commands
- **Proxy WMS** requests under ACLs
- Implement some of the HEV-E REST APIs

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HEV-E | MapStore

- HEV-E frontend → Downtream **MapStore** project
  - Reuse **MapStore** standard building blocks
  - Add specific new building blocks
  - Super Fast development (sort of ☺)
- **Single Page Application**
  - It's 2018 right?
- **Responsive***
- **Mobile Friendly***

** Work in progress ☺*

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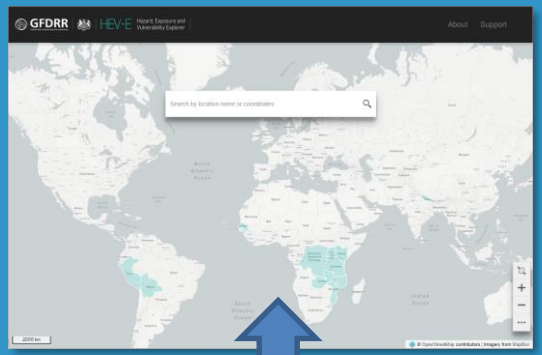
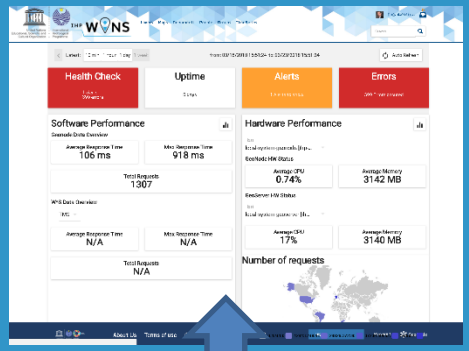
HEV-E | MapStore

Time for a new approach for GeoNode based projects?

End User UI



Contrib Modules Admin UI



REST APIs

GeoNode Core + modules

Admin UI

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That's all!

http://www.geo-solutions/contacts

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