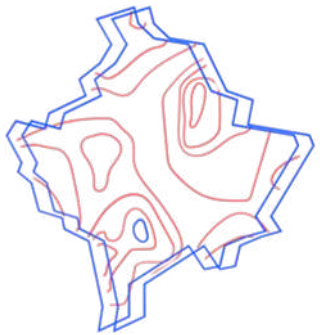
United Nations Development Programme

GeoHub - UNDP's one stop shop for cloud based geospatial data visualisation and analytical tool

Jin Igarashi, Joseph Thuha

SDG Integration, Bureau for Policy and Programme Support

@UBT C/ N109, 11:30 – 12:00, 29 June 2023



FOSS4G

Prizren, 2023

Speakers are…

Jin Igarashi

JinIgarashi

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linkedin.com/in/jinigarashi

- Full stack GIS developer in United Nations Development Programme
- GIS software developer with more than 12 years experience
- WaSH (Water, Sanitation and Hygiene) specialist in Eastern Africa region

Joseph Thuha

Thuhaa

linkedin.com/in/josephthuha

- Junior GIS consultant in United Nations Development Programme
- GIS Developer with 2 years experience developing GIS software and 5 years experience using open source GIS tools

What does UNDP do?

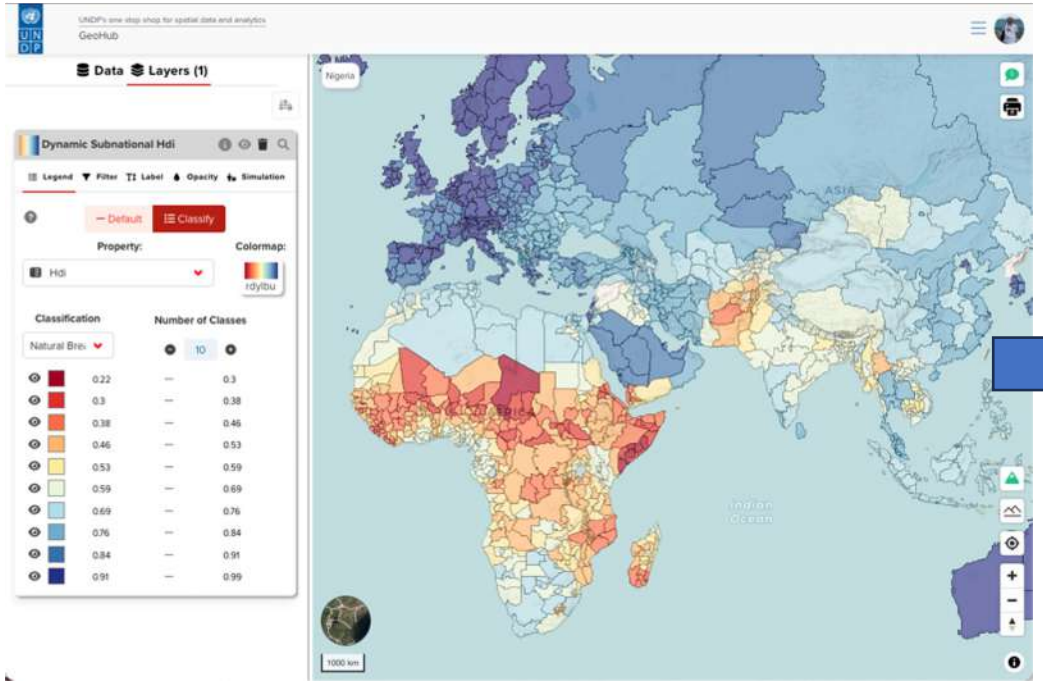
- UNDP works in about 170 countries and territories, helping to eradicate poverty, reduce inequalities and exclusion, and build resilience so countries can sustain progress.
- UNDP plays a critical role in helping countries achieve the Sustainable Development Goals as the UN agency.

Scan QR code to know more about UNDP

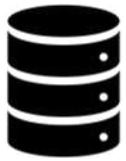
SUSTAINABLE DEVELOPMENT GOALS

What is GeoHub?

- A centralised ecosystem of geospatial services to support UNDP staff and development policy makers in the context of SDGs.



Previous challenges of using GIS data



No centralised geospatial repository

Specialized staff/skills required to work with geospatial

Geospatial analytics and work was carried out by consultants

Limited hardware/software capabilities, mainly commercial

We started developing GeoHub since 2021…

To address those issues of managing and utilising geospatial datasets to support policy makers and staffs.

GeoHub is…

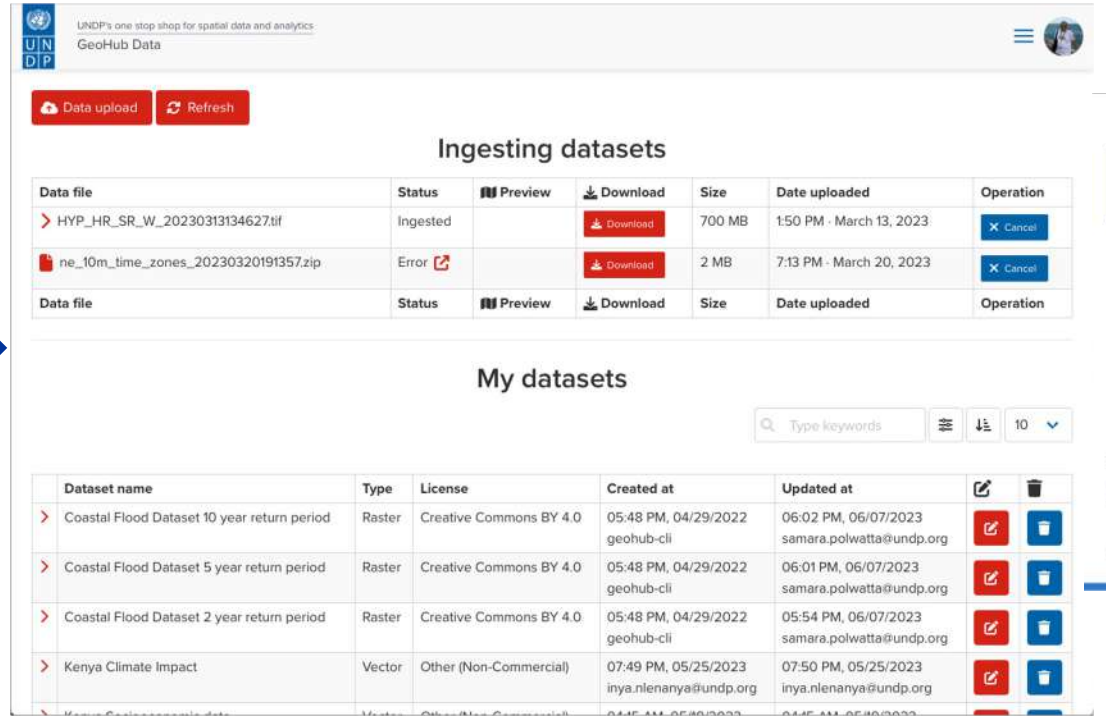
1. a centralised geospatial database
2. a data catalog
3. a visualisation/analytical tool
4. a map sharing tool
5. a dashboard for specific datasets and use cases

1. Centralised geospatial database

Country offices, HQ

Third party data
STAC (Microsoft, etc)
Open Data…

Other UN agencies (UNICEF, UNEP, FAO, World Bank, etc)



GeoHub data upload portal

Raster (COG)

COG CLOUD OPTIMIZED GEOTIFF

protomaps/PMTiles

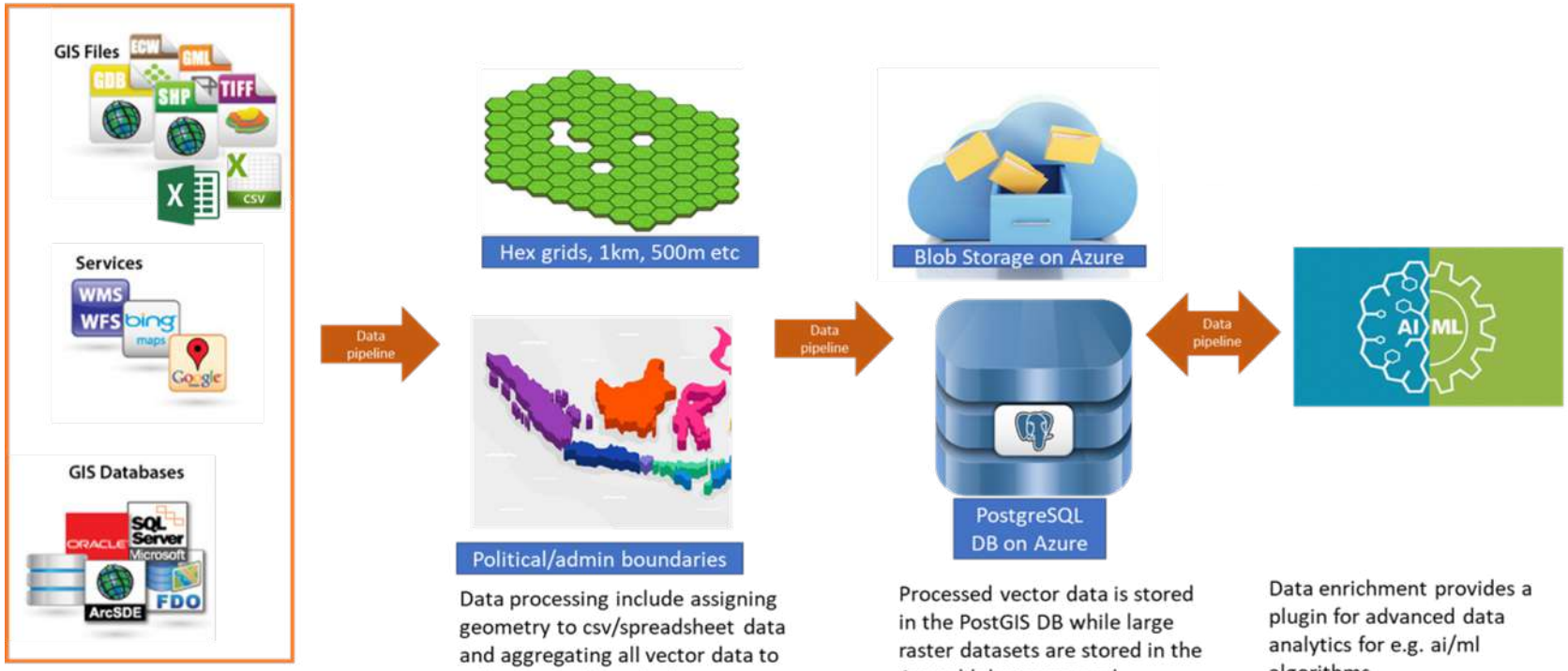
Vector (pmtiles)

PostGIS Spatial PostgreSQL

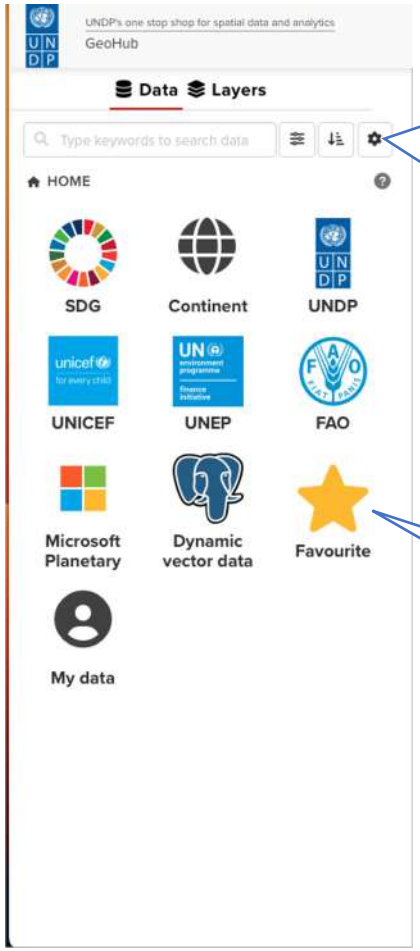
Azure Blob Storage

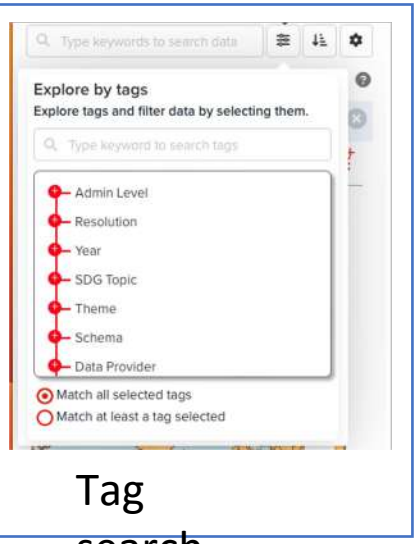
Azure

Data processing for uploaded data



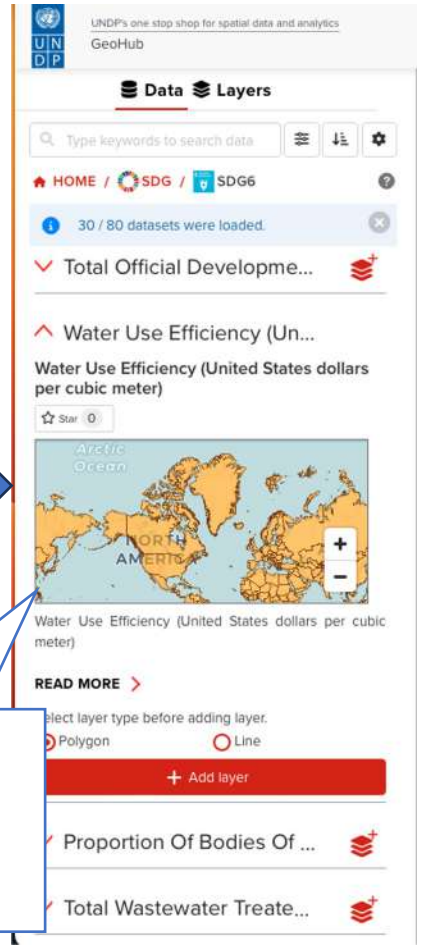
2. Data catalog





Tag search

Bookmark (favourite)



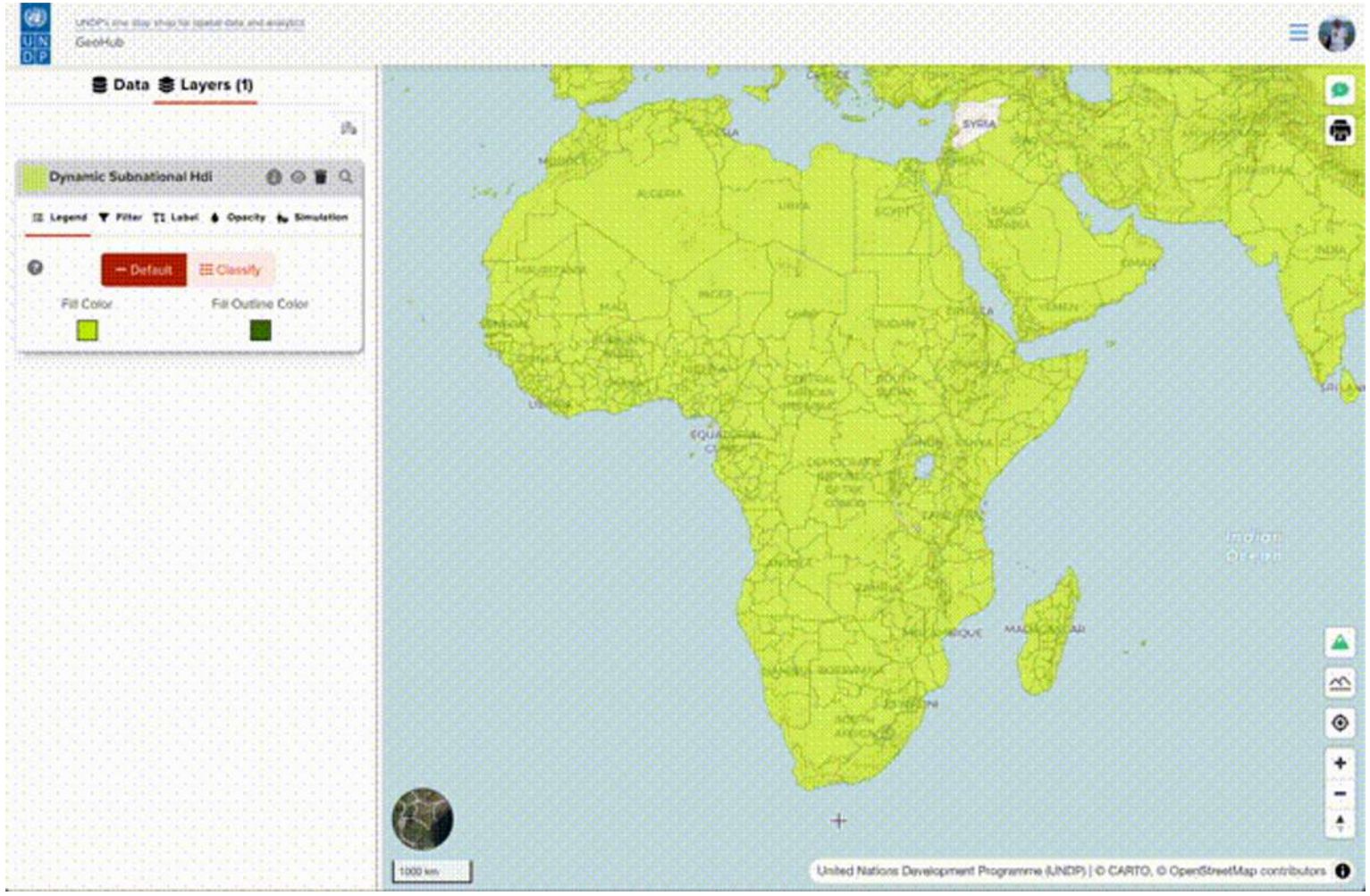
Browse metadata and Preview data

Easy to search all datasets

GeoHub

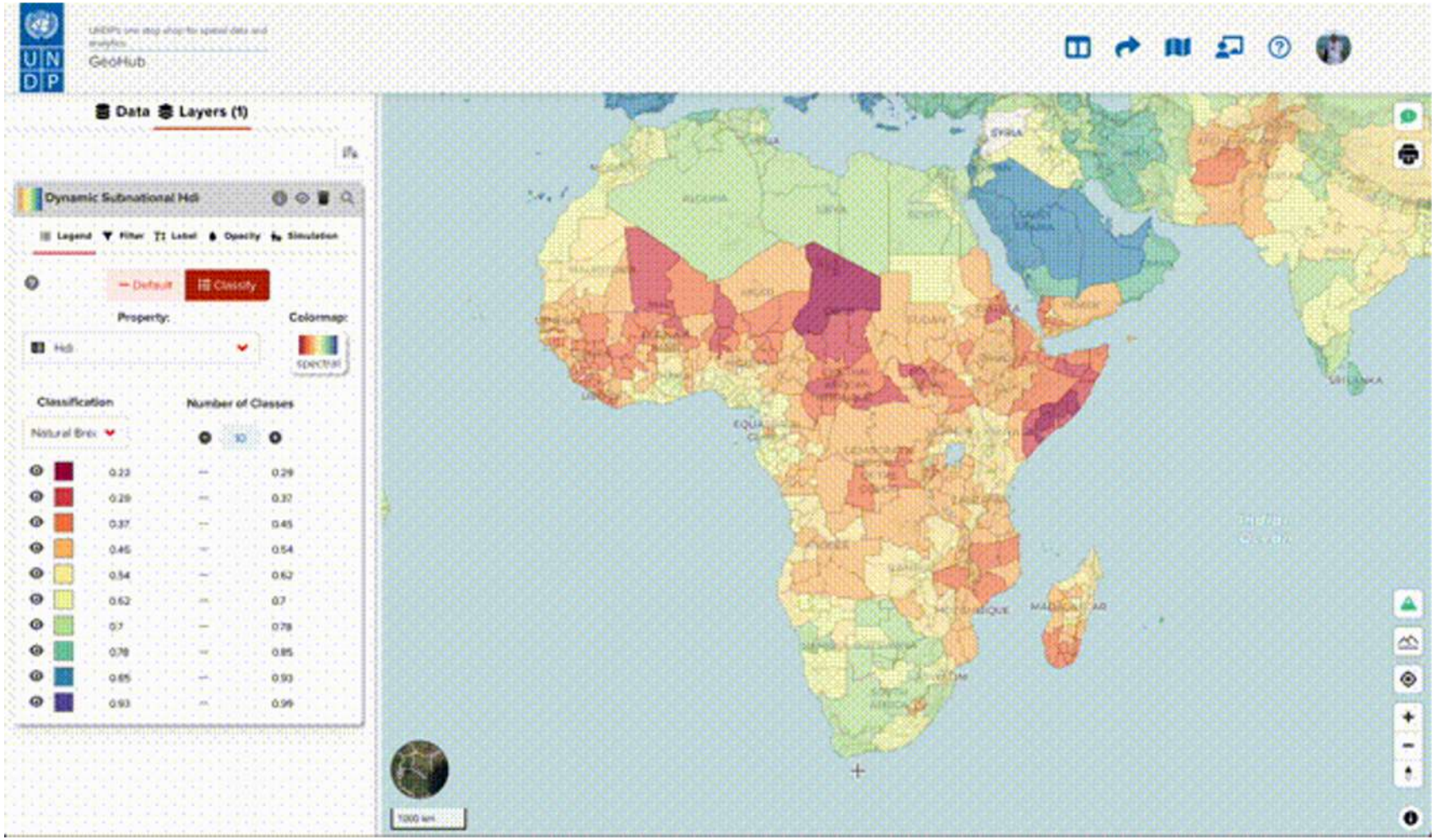
3. Visualisation/analytical tool

- Support two Legend type (simple or classify)
- Switch color map
- Filter data
- Add data label
- Simulation (available for dynamic vector data)

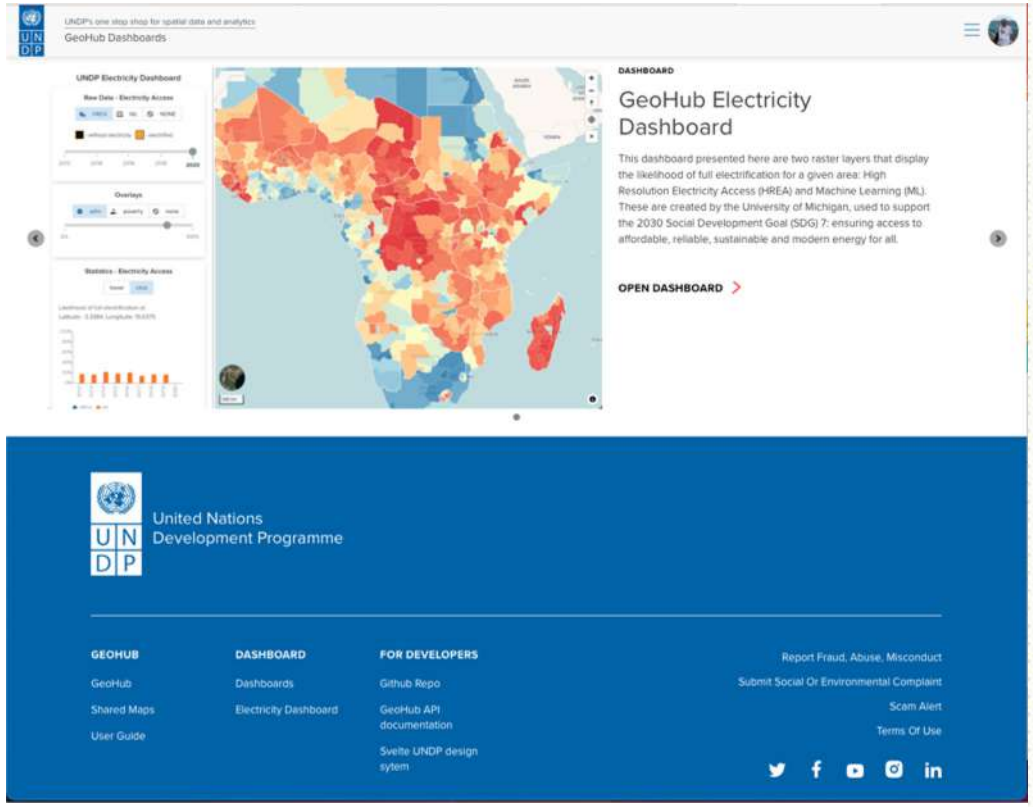


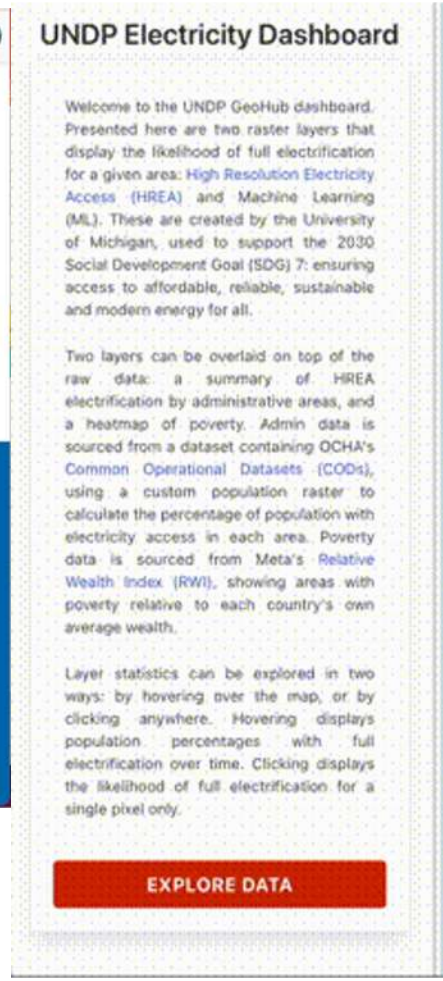
4. Map sharing tool

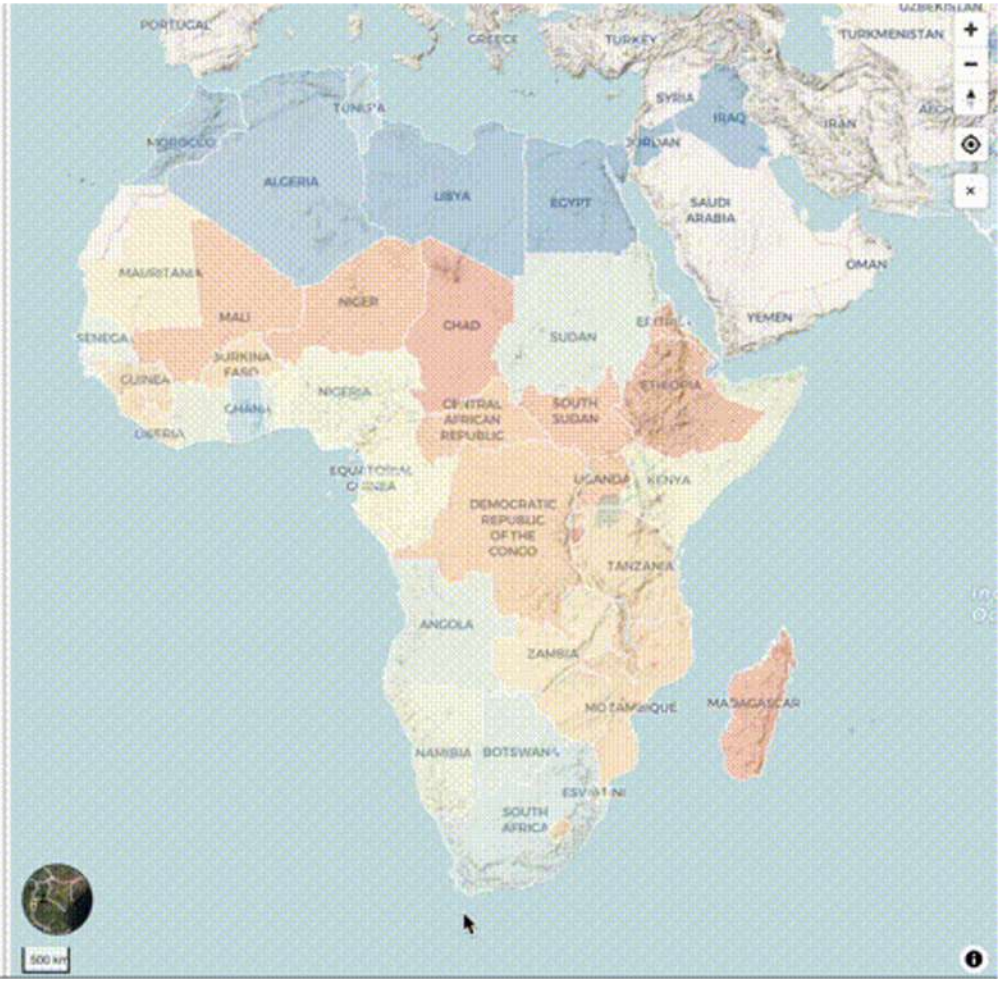
- Save current map as a private map
- Share in UNDP or Public
- Explore other users' maps
- Can edit other users' maps



5. Dashboard for specific datasets





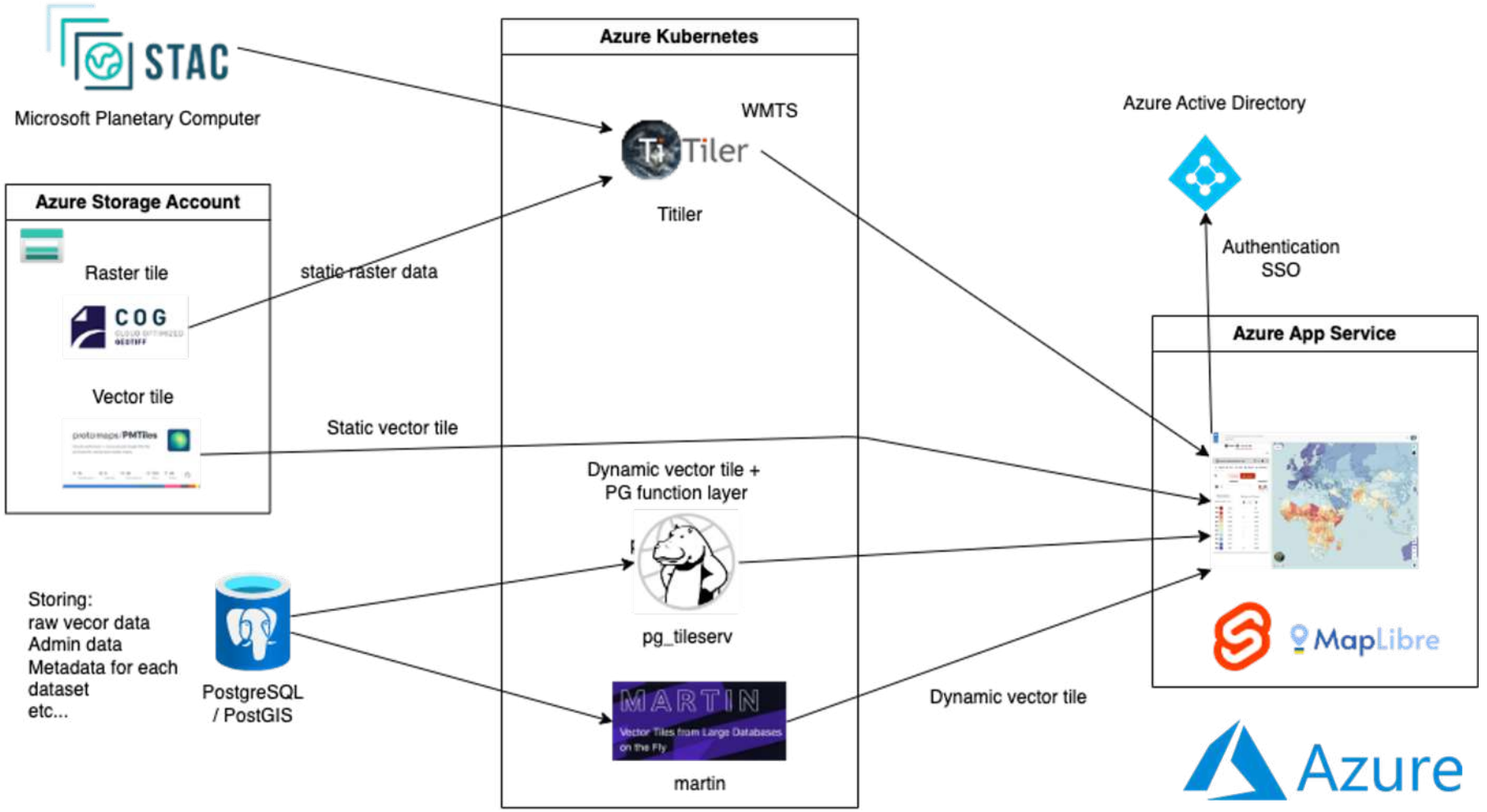


Dashboard for High Resolution Electricity Access data

http://www-personal.umich.edu/~brianmin/HREA/

Technologies and software libraries/components

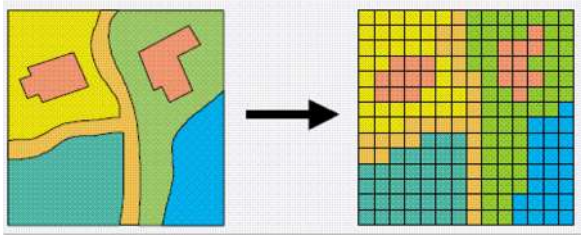
GeoHub ecosystem



Backbone services

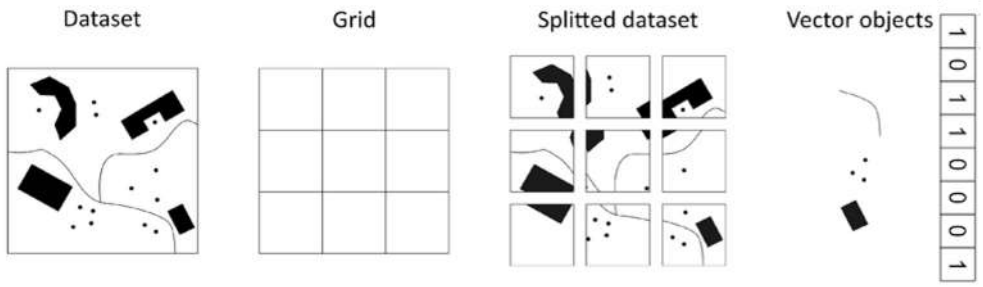
1. Dynamic Vector Tile Service

- store data in PostGIS
- leverage PostgreSQL (function layers)



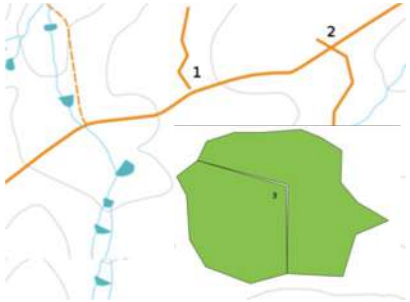
2. Static Vector Tile Service

- serve tiles containing binary geometries with
their attributes through pmtiles

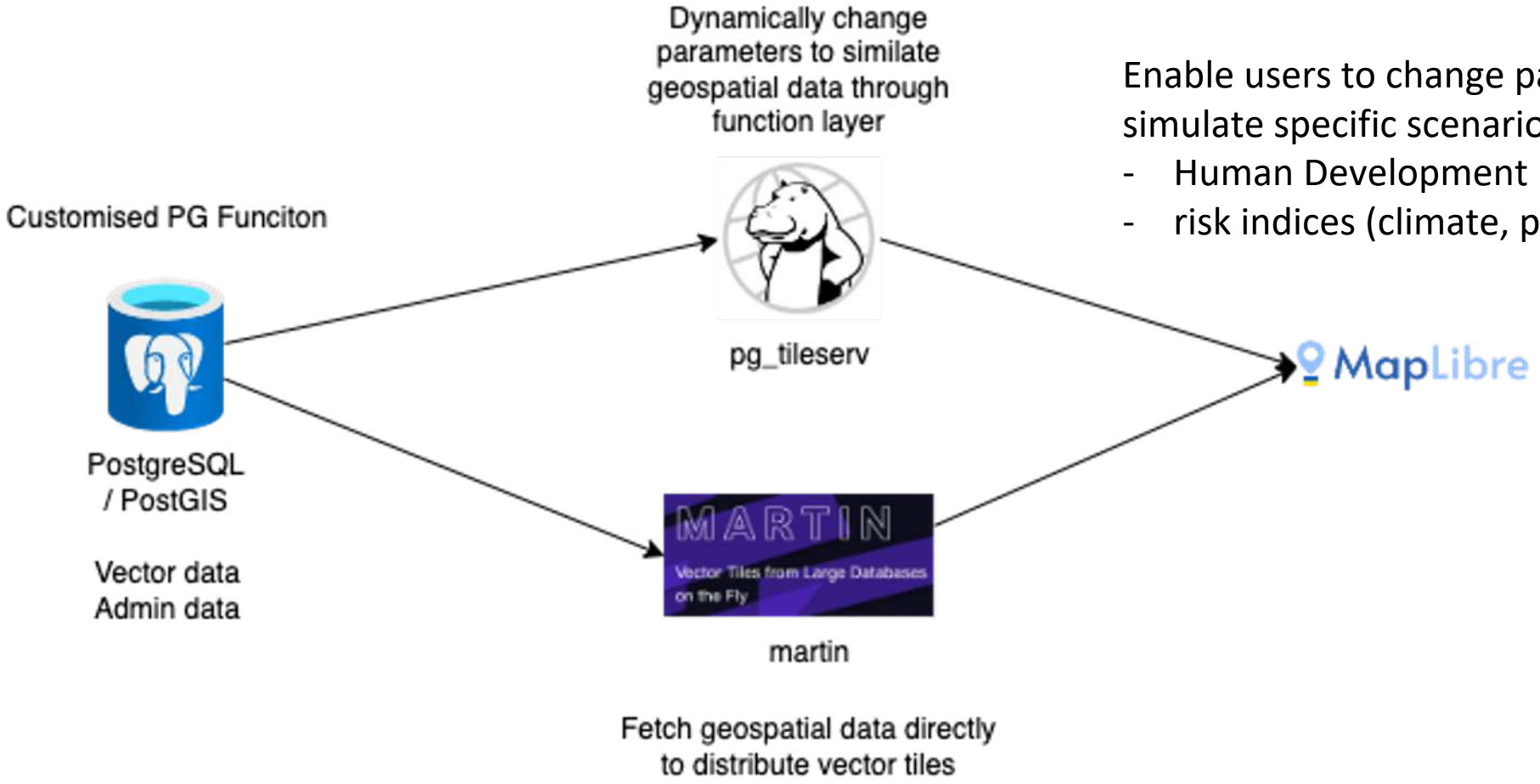


3. Raster Tile Service

- vector and raster data as
a cartographic map (picture)



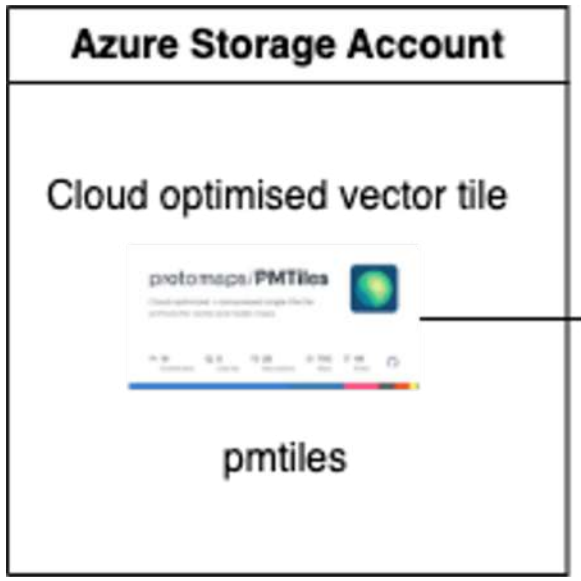
1. Dynamic Vector Tile Service



Enable users to change parameters to simulate specific scenarios. For example,

- Human Development Index (HDI)
- risk indices (climate, population)

2. Static Vector Tile Service



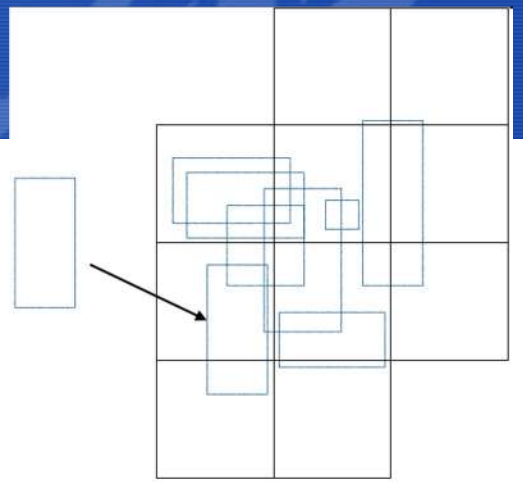
User uploaded vector data is converted to PMtiles format

Enable users to add their own datasets or third party vector datasets easily

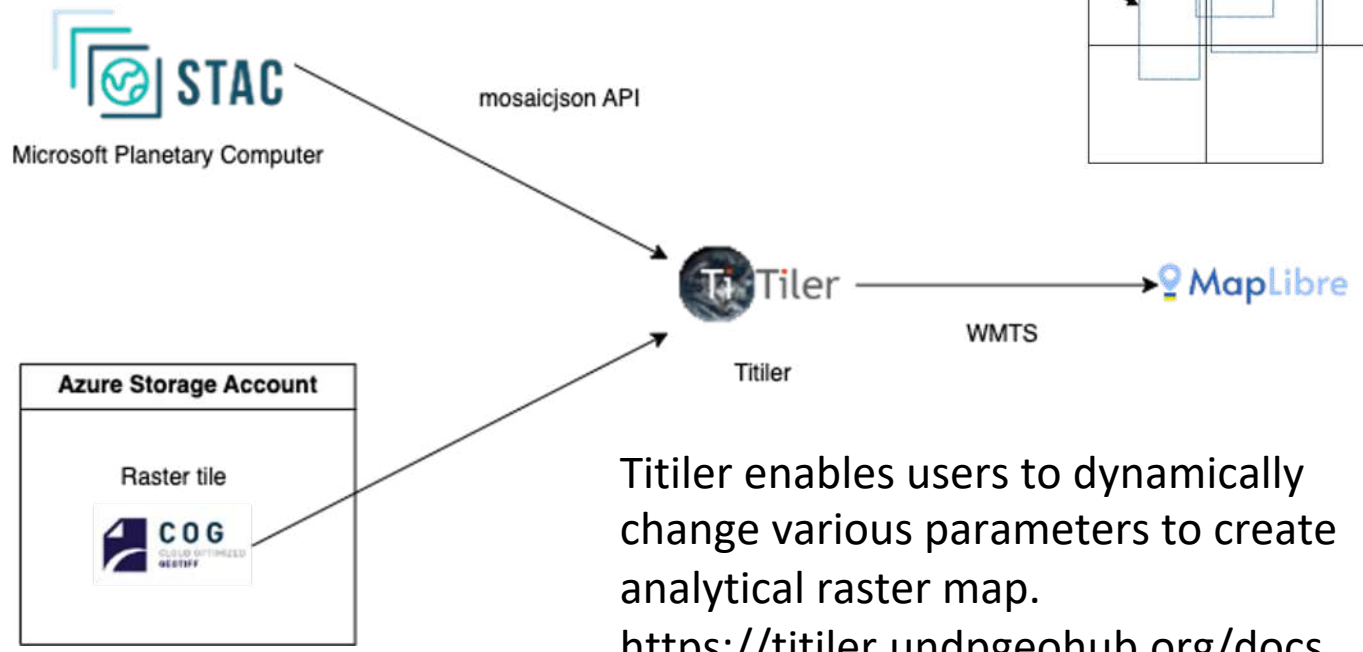
MapLibre

Faster to render the data in serverless.

3. Raster tile service

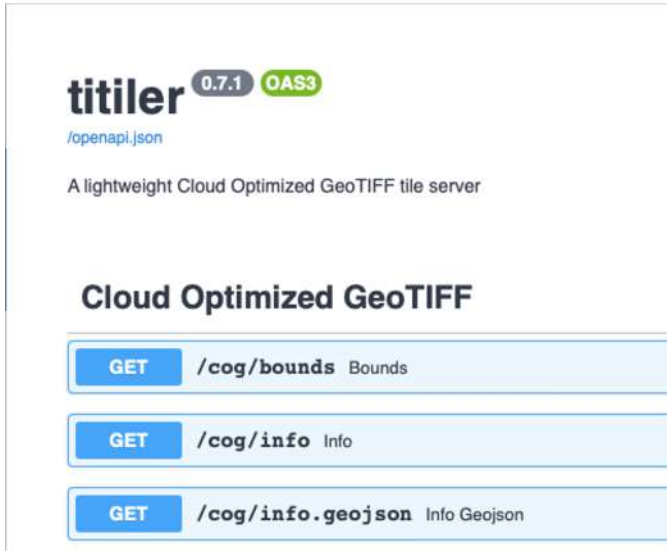


Mosaic JSON to distribute seamless raster tile from STAC https://github.com/developmentseed/titiler/discussions/287



User uploaded raster data is converted to COG (Cloud optimized GeoTiff)

Titiler enables users to dynamically change various parameters to create analytical raster map. https://titiler.undpgeohub.org/docs

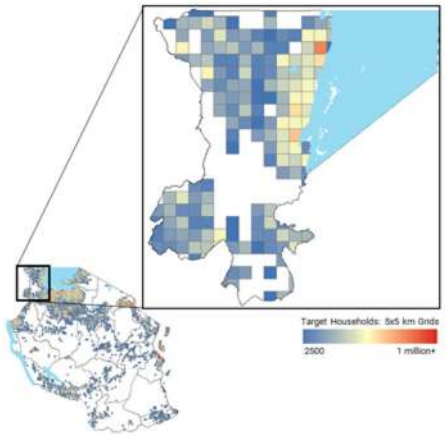


Front end – web application

- cartographic visualization through JavaScript libraries (maplibre)

- visual and spatial analytics through appealing UI

- build on solid and proven libraries (Svelte + SvelteKit + Bulma CSS + UNDP design system)

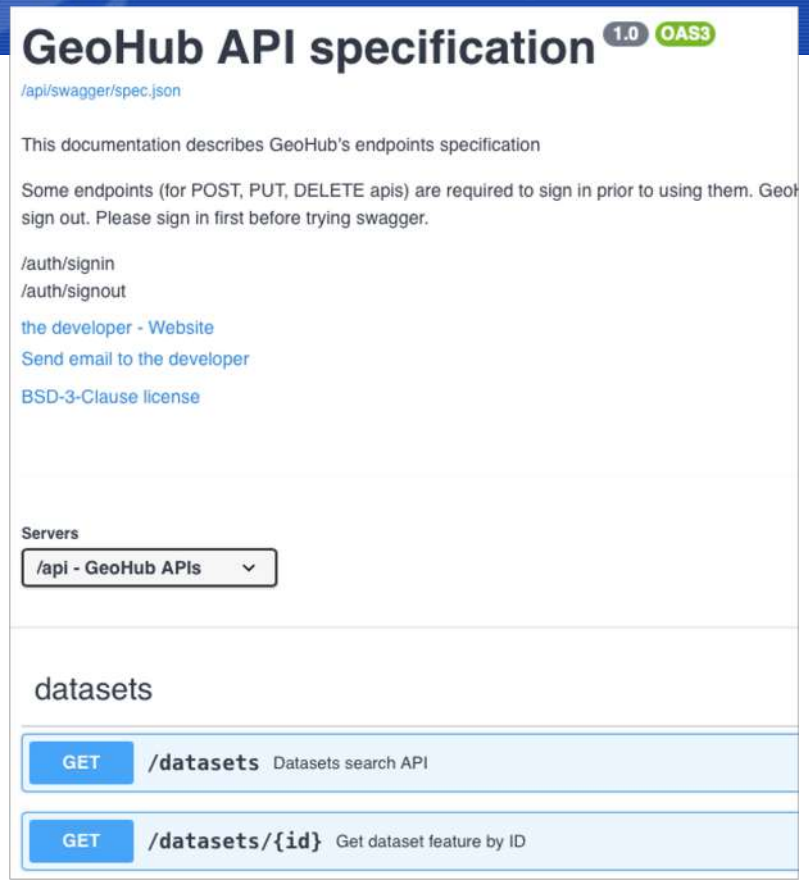


- interconnect users with advanced geospatial models and allow them to run these models and visualize the results in a spatial context

REST API to collaborate partners

- UNDP GeoHub has its own STAC like API to fetch datasets
- Documentation is available

We are welcoming any partners to collaborate with UNDP!!



https://geohub.data.undp.org/api

What's next?

- Improved UI/UX
- Develop scale adaptive hybrid geospatial layers (raster-vector) to represent risk indicators layers for the Disaster risk and resilience community
- Continue improving data pipeline to process more analytical and useful data (AI, machine learning, etc).
- Collaborate with other UN agencies
  - UNICEF, UNEP, WFP, FAO, etc.
  - Add their own data into GeoHub through their API (if applicable).
  - Implement Azure authentication for them who can partner with UNDP
- Provide social logins to gather more geospatial data from third parties.
  - Facebook, Google, etc.
- Rollout GeoHub in UNDP.

GeoHub

geohub.data.undp.org

Github repo

UNDP-Data/geohub

A centralized ecosystem of services to support development policy makers

GeoHub

FOSS4G Prizren, 2023