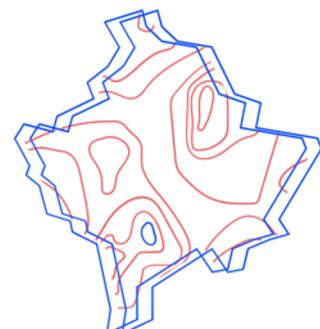


GeoHub - UNDP's one stop shop for cloud based geospatial data visualisation and analytical tool

Jin Igarashi, Joseph Thuha

SDG Integration, Bureau for Policy and Programme Support

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



Speakers are...

Jin Igarashi



[JinIgarashi](#)



[@j_igarashi](#)



[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.

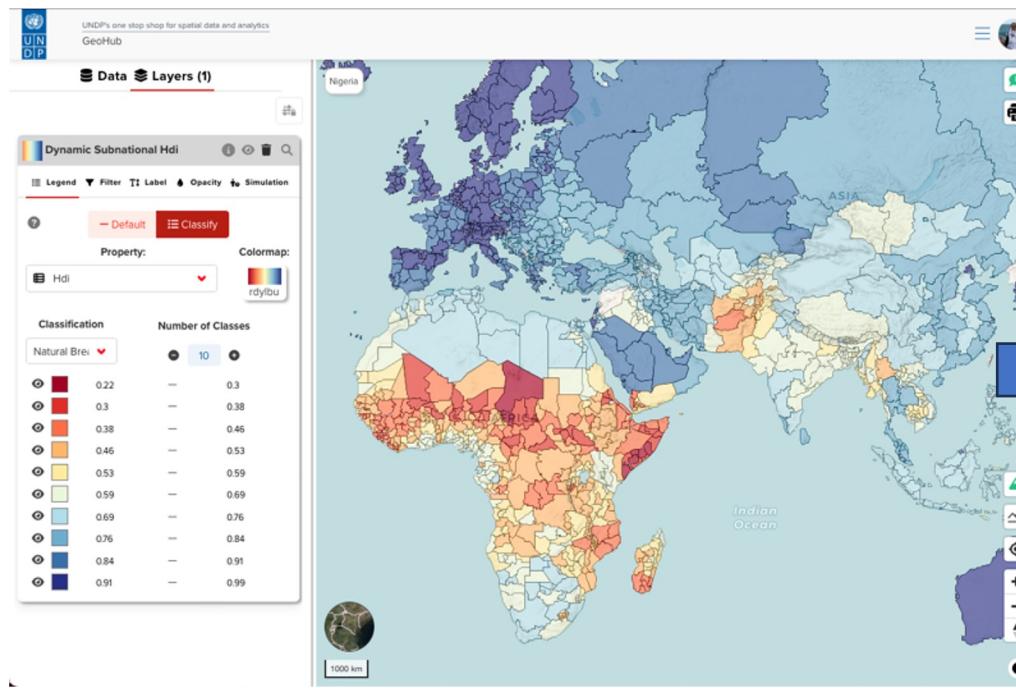


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What is GeoHub?

- 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



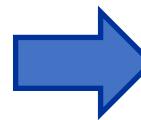
Country offices, HQ



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



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



GeoHub data upload portal

UNDP's one stop shop for spatial data and analytics
GeoHub Data

Data upload Refresh

Ingesting datasets

Data file	Status	Preview	Download	Size	Date uploaded	Operation
HYP_HR_SR_W_20230313134627.tif	Ingested		Download	700 MB	1:50 PM · March 13, 2023	<button>Cancel</button>
ne_10m_time_zones_20230320191357.zip	Error		Download	2 MB	7:13 PM · March 20, 2023	<button>Cancel</button>

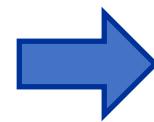
My datasets

Dataset name	Type	License	Created at	Updated at	Operations
Coastal Flood Dataset 10 year return period	Raster	Creative Commons BY 4.0	05:48 PM, 04/29/2022 geohub-cli	06:02 PM, 06/07/2023 samara.polwatta@undp.org	
Coastal Flood Dataset 5 year return period	Raster	Creative Commons BY 4.0	05:48 PM, 04/29/2022 geohub-cli	06:01 PM, 06/07/2023 samara.polwatta@undp.org	
Coastal Flood Dataset 2 year return period	Raster	Creative Commons BY 4.0	05:48 PM, 04/29/2022 geohub-cli	05:54 PM, 06/07/2023 samara.polwatta@undp.org	
Kenya Climate Impact	Vector	Other (Non-Commercial)	07:49 PM, 05/25/2023 inya.nlenanya@undp.org	07:50 PM, 05/25/2023 inya.nlenanya@undp.org	

Raster
(COG)



CLOUD OPTIMIZED
GEOTIFF



PostGIS



Spatial PostgreSQL



Cloud-optimized + compressed single-file tile
archives for vector and raster maps

16 Contributors 5 Used by 26 Discussions 700 Stars 49 Forks

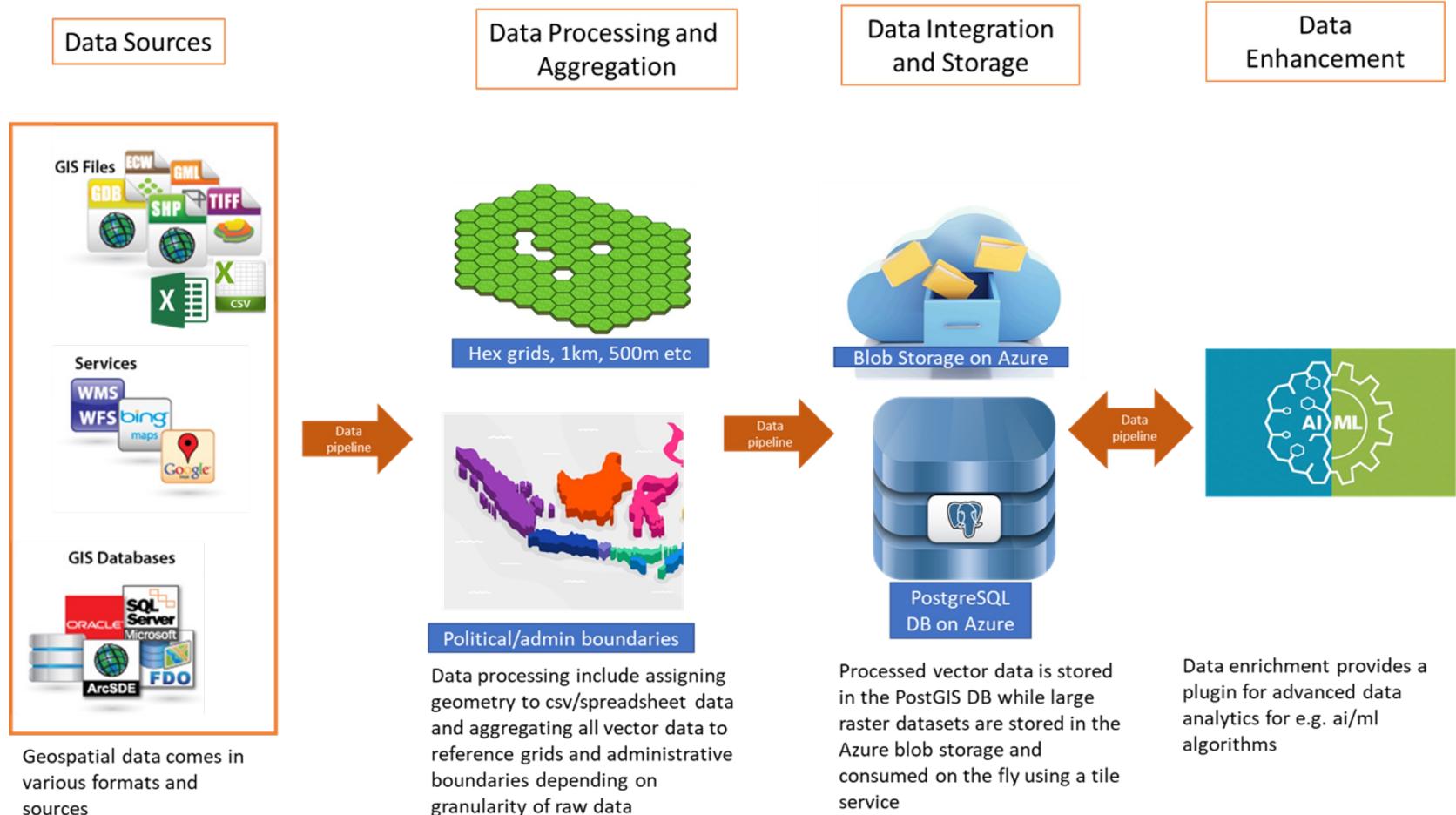
Vector
(pmtiles)



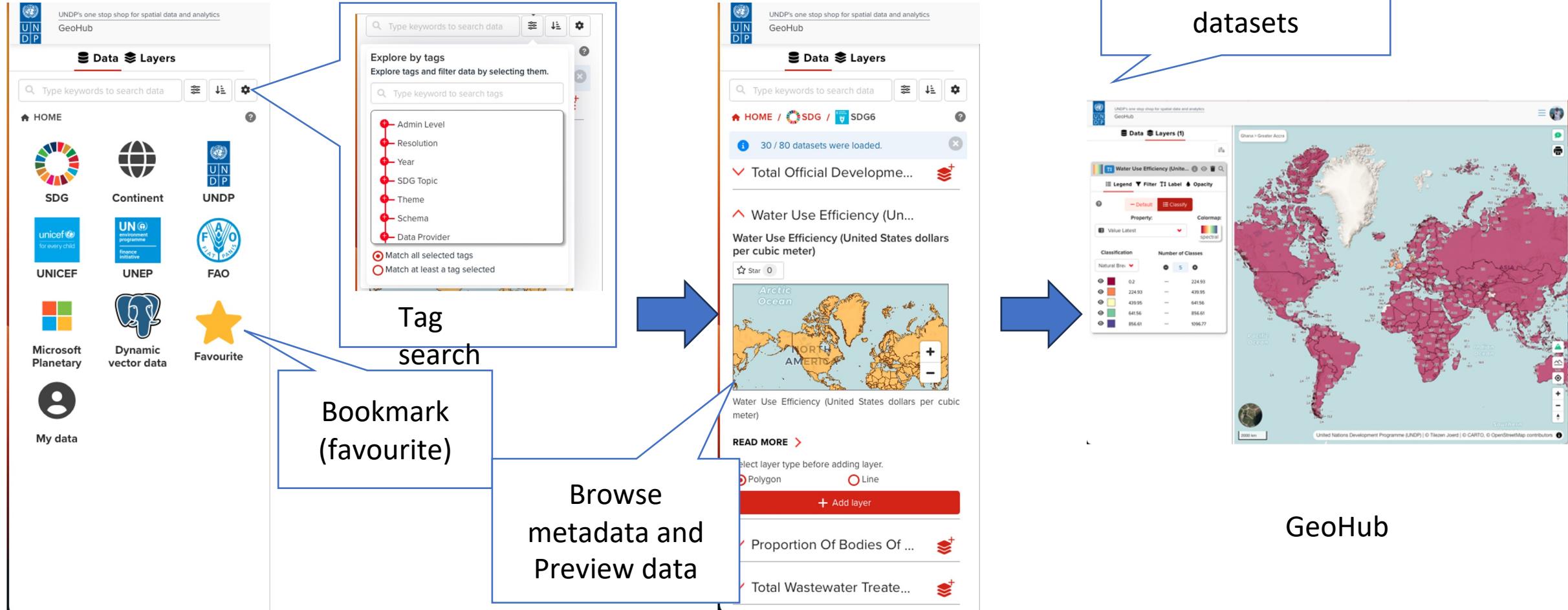
Azure Blob Storage



Data processing for uploaded data



2. Data catalog

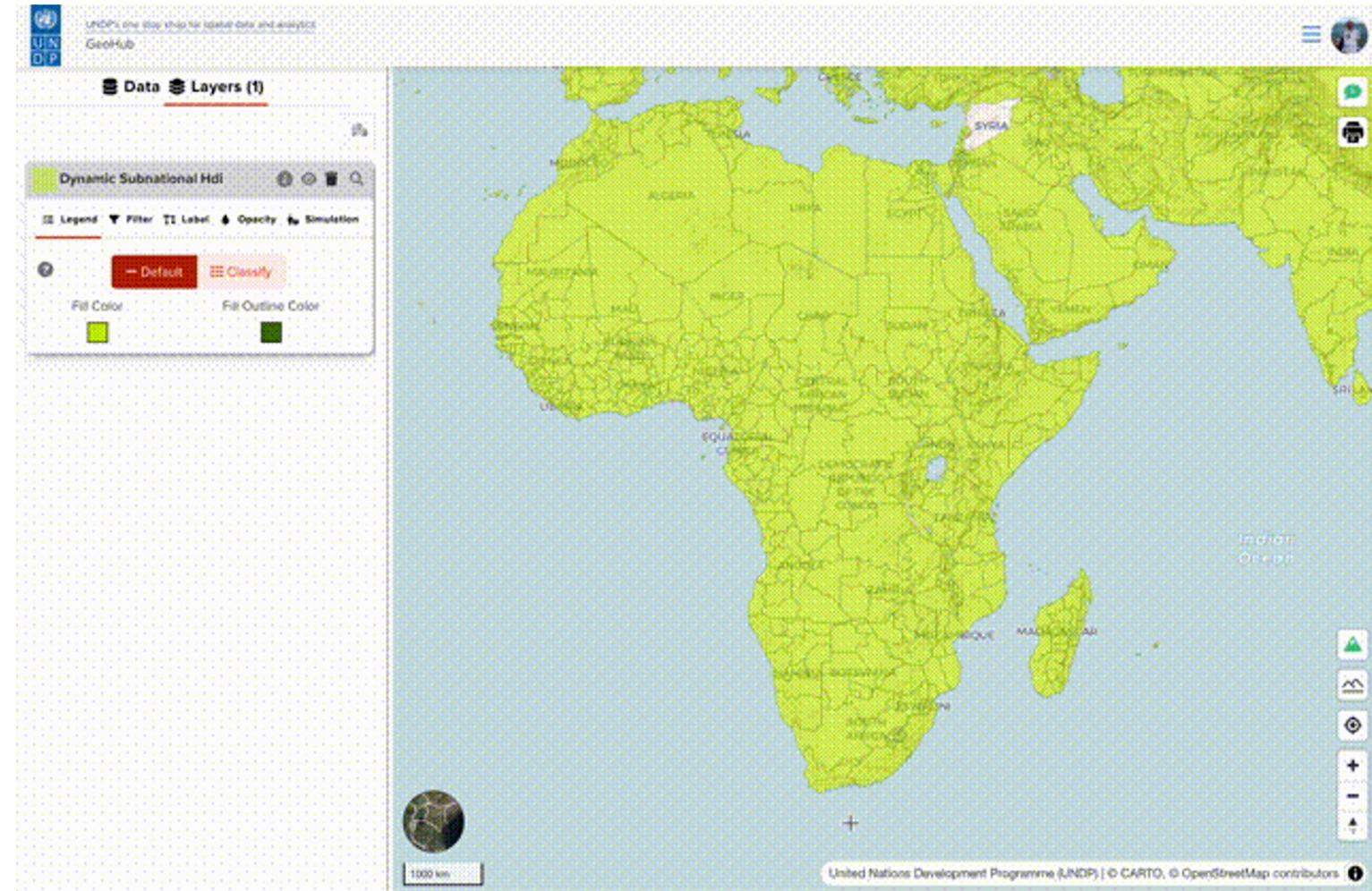




UN
DP

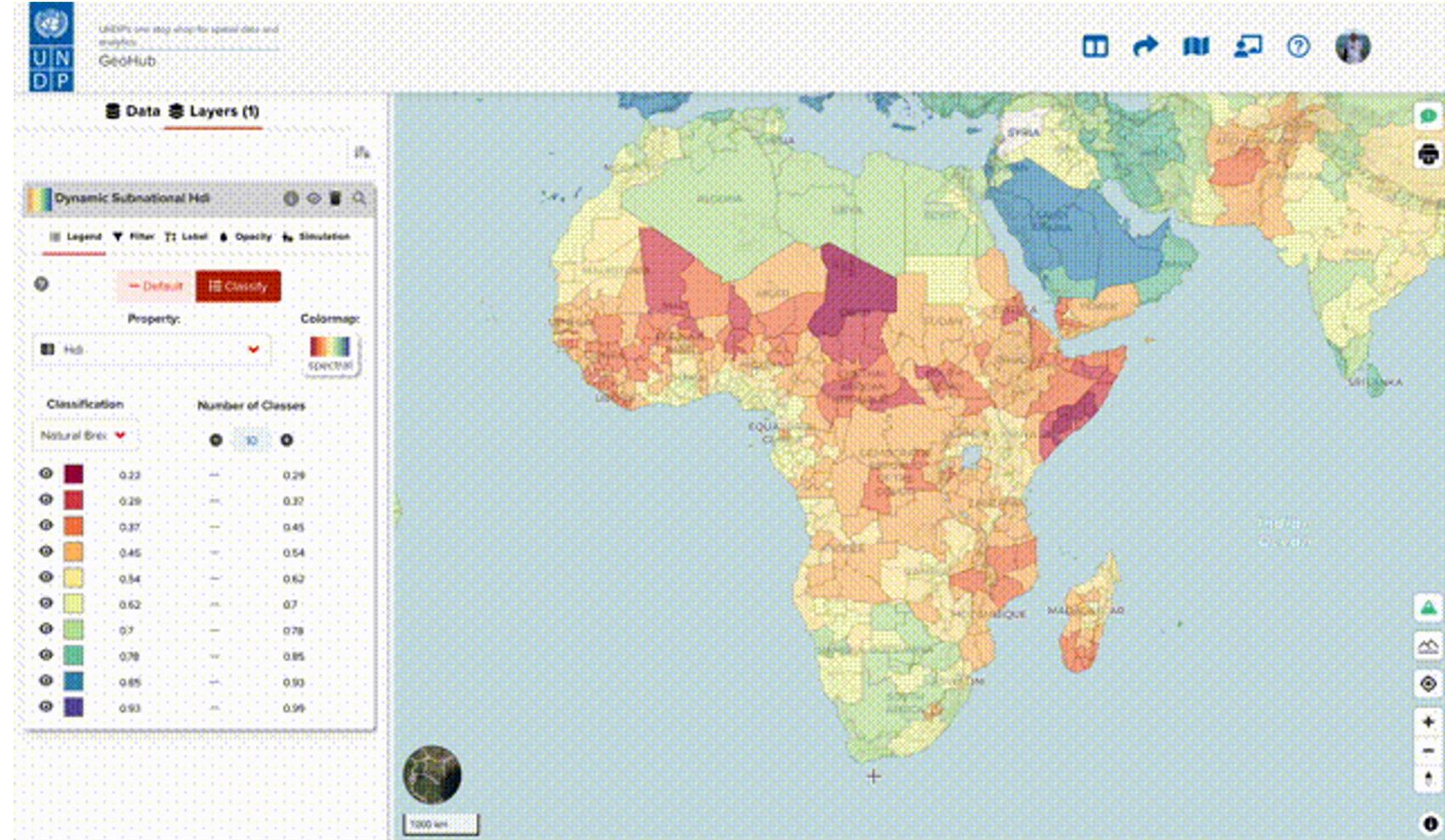
3. Visualisation/analytical tool

- 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

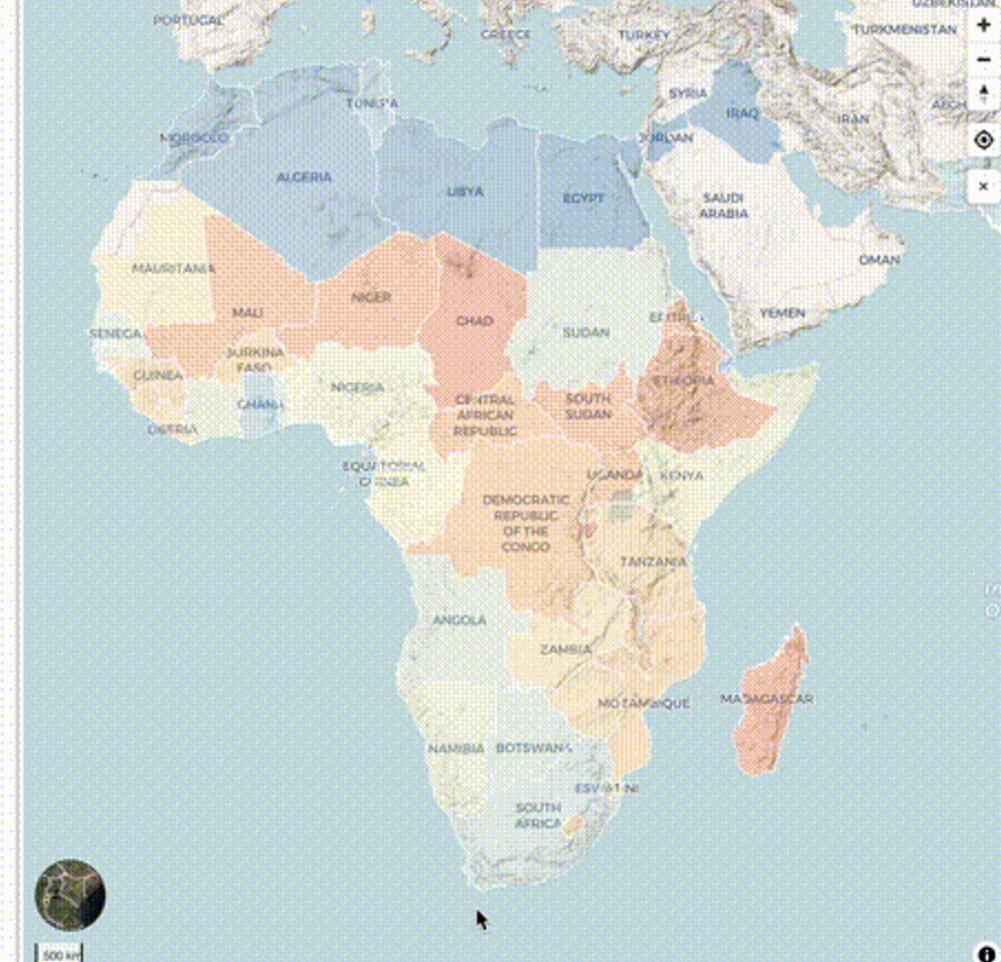
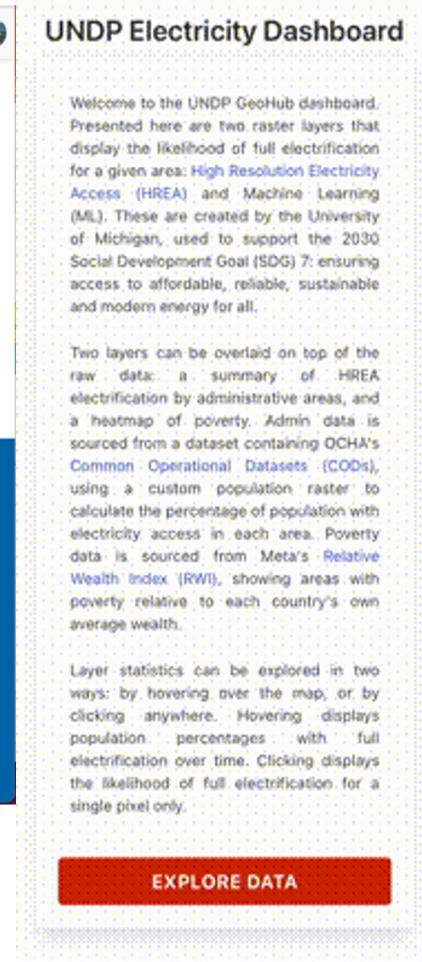
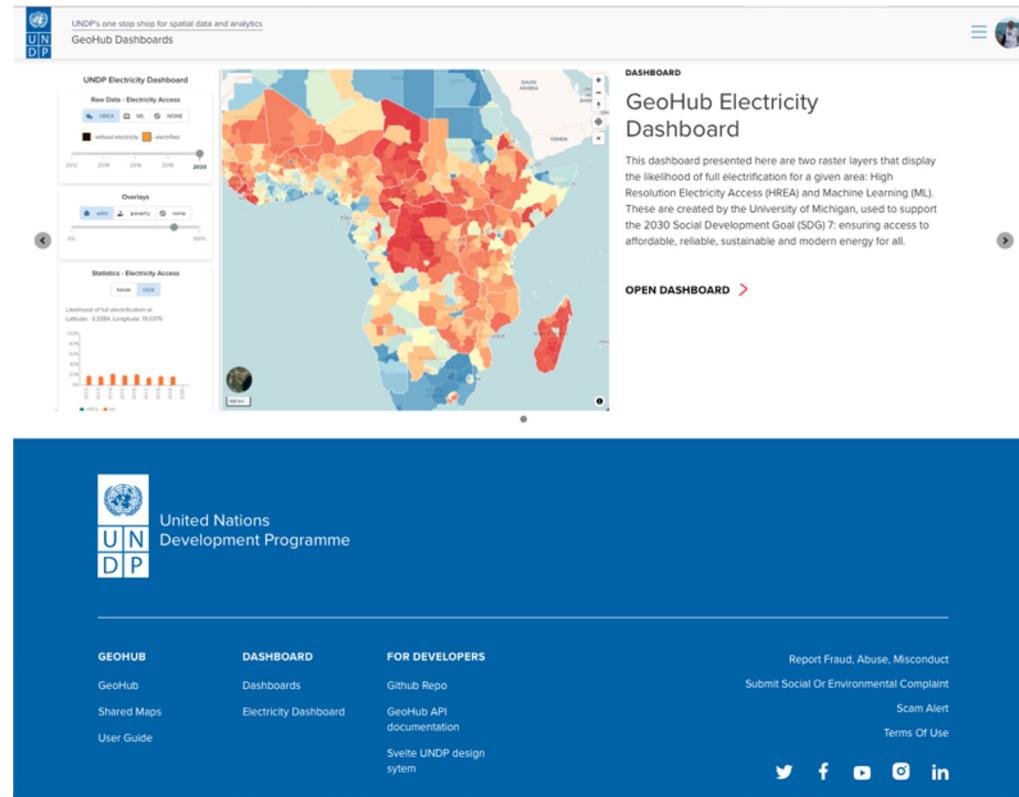
-  Save current map as a private map
-  Share in UNDP or Public
-  Explore other users' maps
-  Can edit other users' maps





UN
DP

5. Dashboard for specific datasets

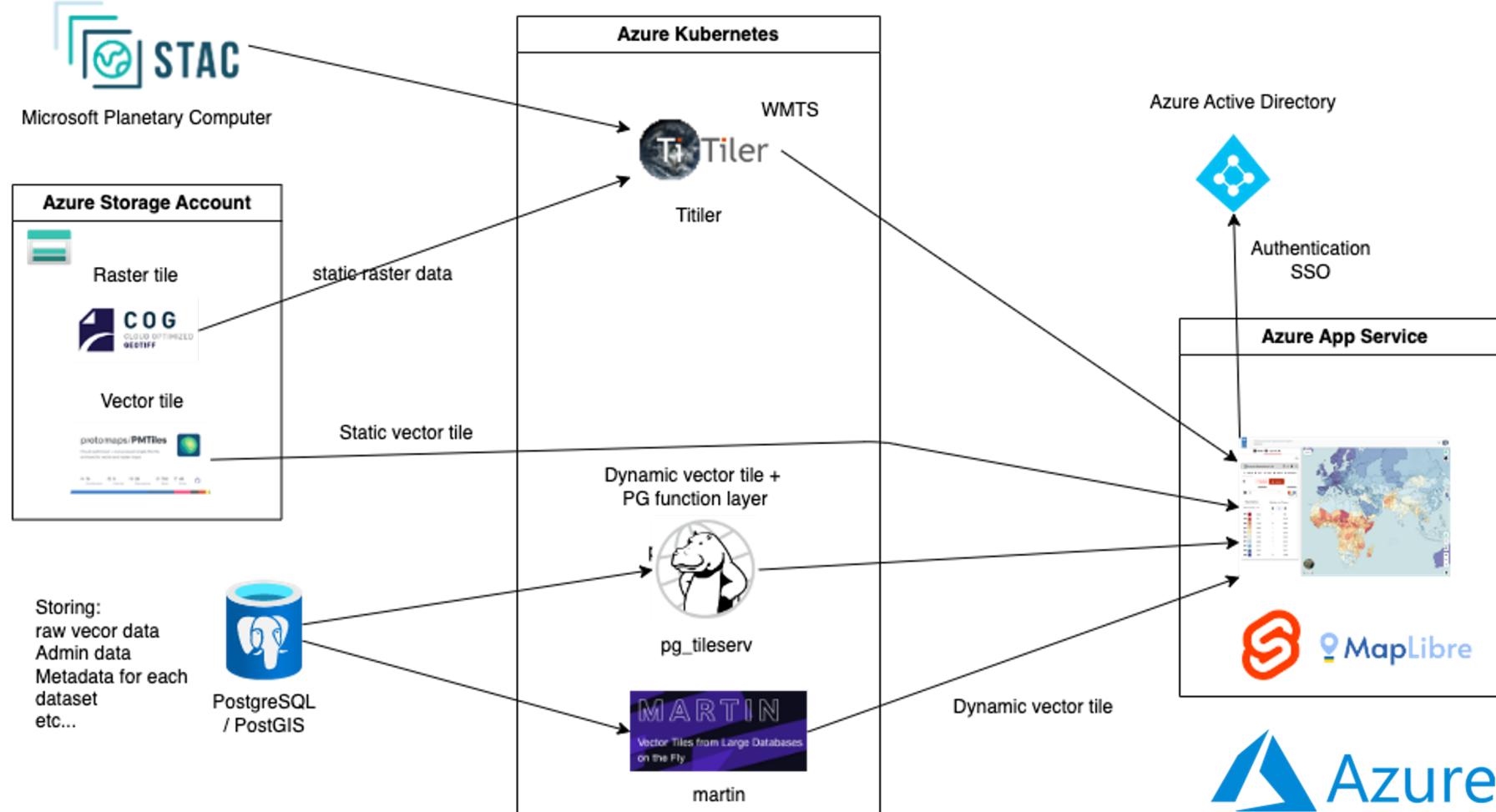


Dashboard for High Resolution Electricity Access data

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

Technologies and software libraries/components

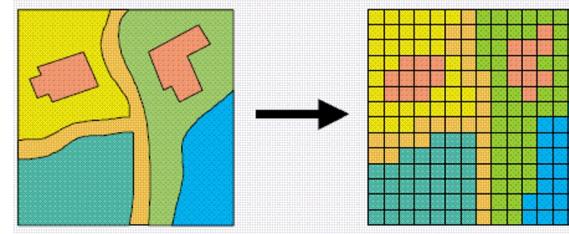
GeoHub ecosystem




Backbone services

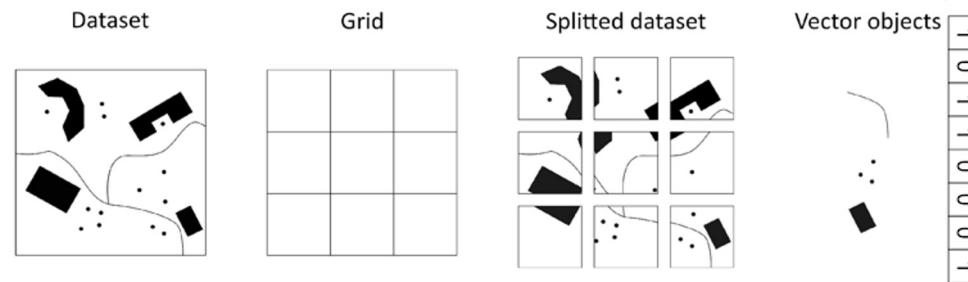
1. Dynamic Vector Tile Service

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



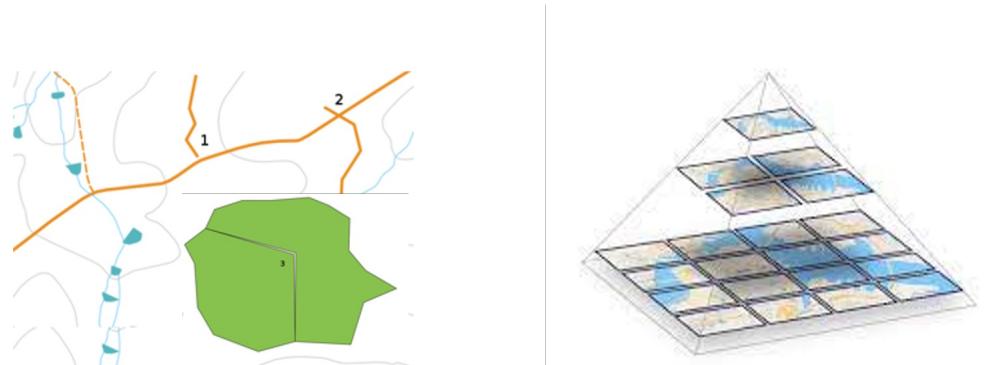
2. Static Vector Tile Service

- serve tiles containing binary geometries with their attributes through pmtiles

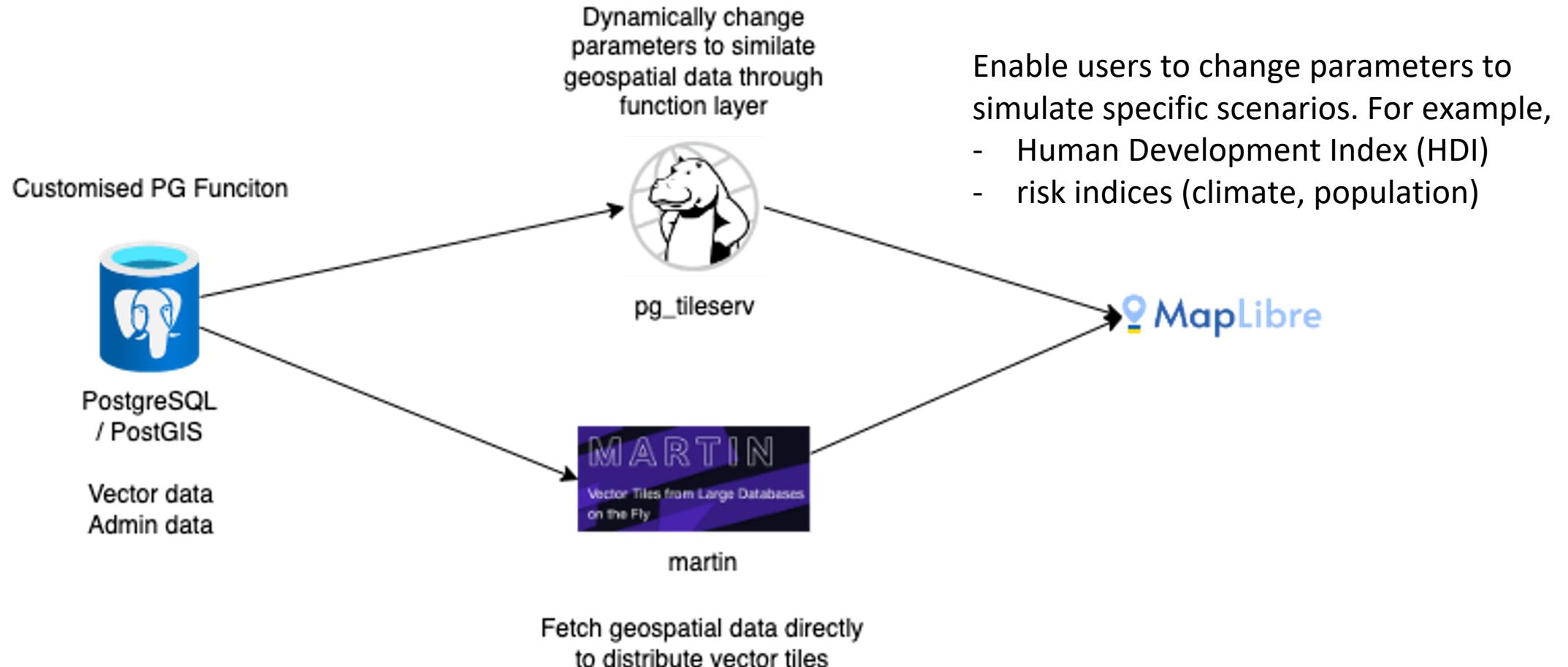


3. Raster Tile Service

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



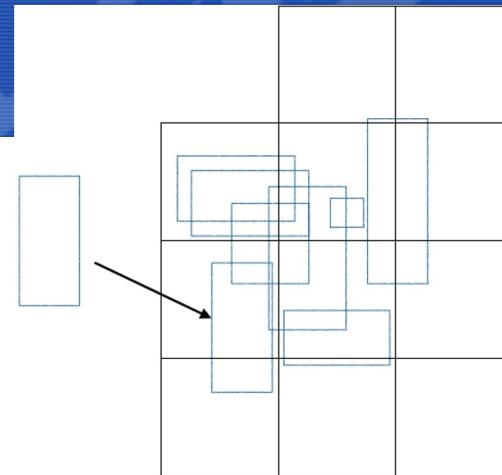
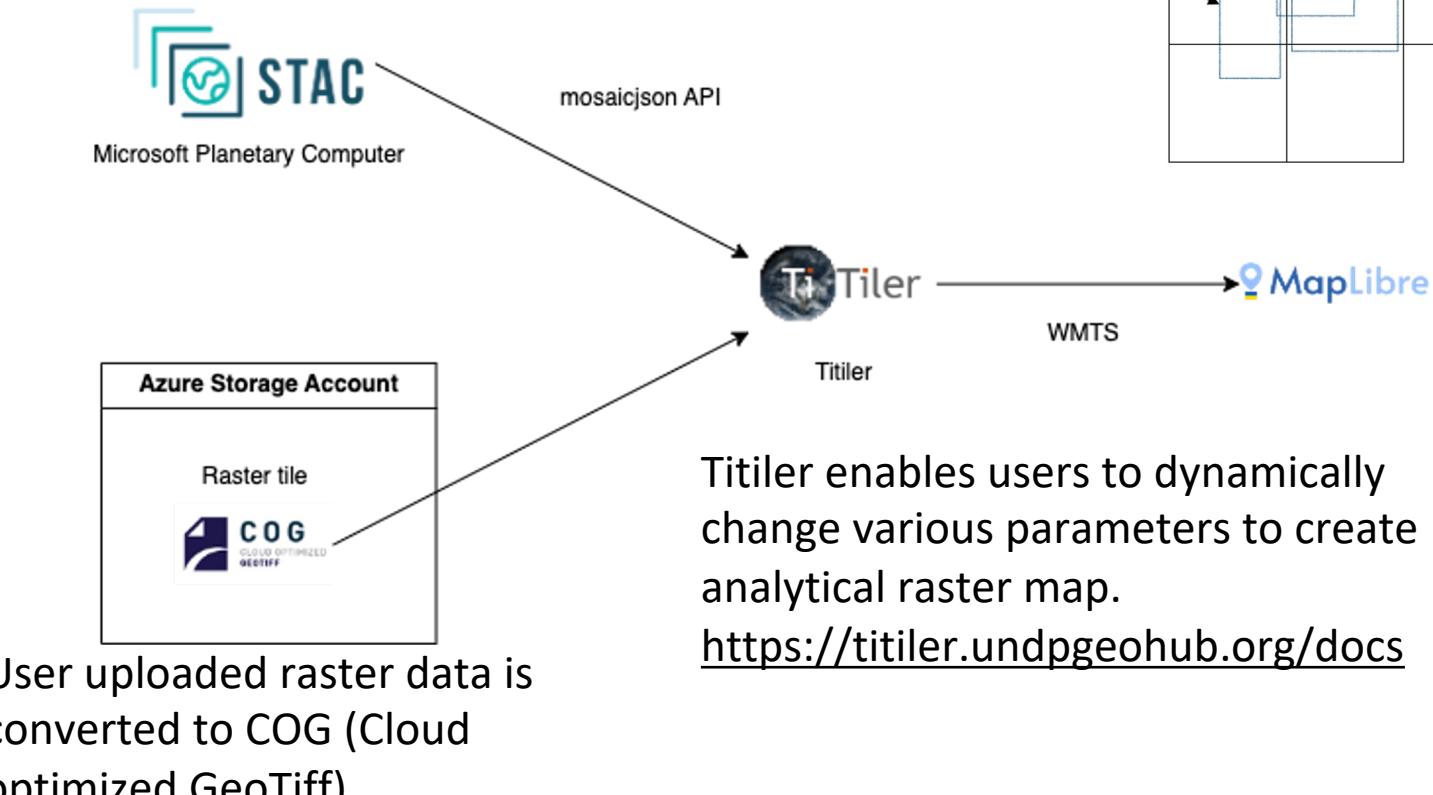
1. Dynamic Vector Tile Service



2. Static Vector Tile Service



3. Raster tile service



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

titiler 0.7.1 OAS3
[/openapi.json](#)

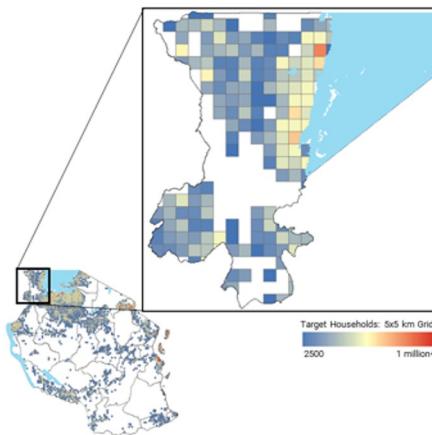
A lightweight Cloud Optimized GeoTIFF tile server

Cloud Optimized GeoTIFF

GET	/cog/bounds	Bounds
GET	/cog/info	Info
GET	/cog/info.geojson	Info Geojson

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

 MapLibre

 SVELTE KIT

 BULMA

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!!

GeoHub API specification 1.0 OAS3

</api/swagger/spec.json>

This documentation describes GeoHub's endpoints specification

Some endpoints (for POST, PUT, DELETE apis) are required to sign in prior to using them. GeoHub sign out. Please sign in first before trying swagger.

</auth/signin>
</auth/signout>

[the developer - Website](#)
[Send email to the developer](#)
[BSD-3-Clause license](#)

Servers

[/api - GeoHub APIs](#) ▾

datasets

GET </datasets> Datasets search API

GET </datasets/{id}> Get dataset feature by ID

<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

