

State of GeoNode

FOSS4G-NA

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About me

- GeoNode developer since 2012
- Contributed to the development and deployment of the GeoNode instances for UN WFP, Harvard University WorldMap
- Member of the GeoNode and pycsw PSC
- OSGeo member since 2013
- Twitter and github: capooti

GeoNode at a glance

- A web frameworks to build GeoCMS, open data geoportals and SDI
- Started by Global Facility for Disaster Reduction and Recovery (GFDRR) in 2009
- Adopted by a large number of organizations
- Built with open source software
- Official OSGeo project since August 2016

Capabilities

- Upload geospatial datasets (by default shapefiles and GeoTIFFs)
- User with appropriate permissions can edit layer metadata, which are exposed by OGC CSW and REST, to provide search/discovery capability
- Create thematic maps accessible to general public
- Users with appropriate permissions can edit layer styles and features (for vector layers)
- Granular permission systems: viewing, downloading, metadata editing, styles and feature editing for a layer can be restricted to users or groups
- GeoNode exposes a number of standards for each layer: OGC (WMS, WMS-C, WFS, WFS-T, WCS, CSW) and mass market search standards (OAI-PMH, SRU, OpenSearch)

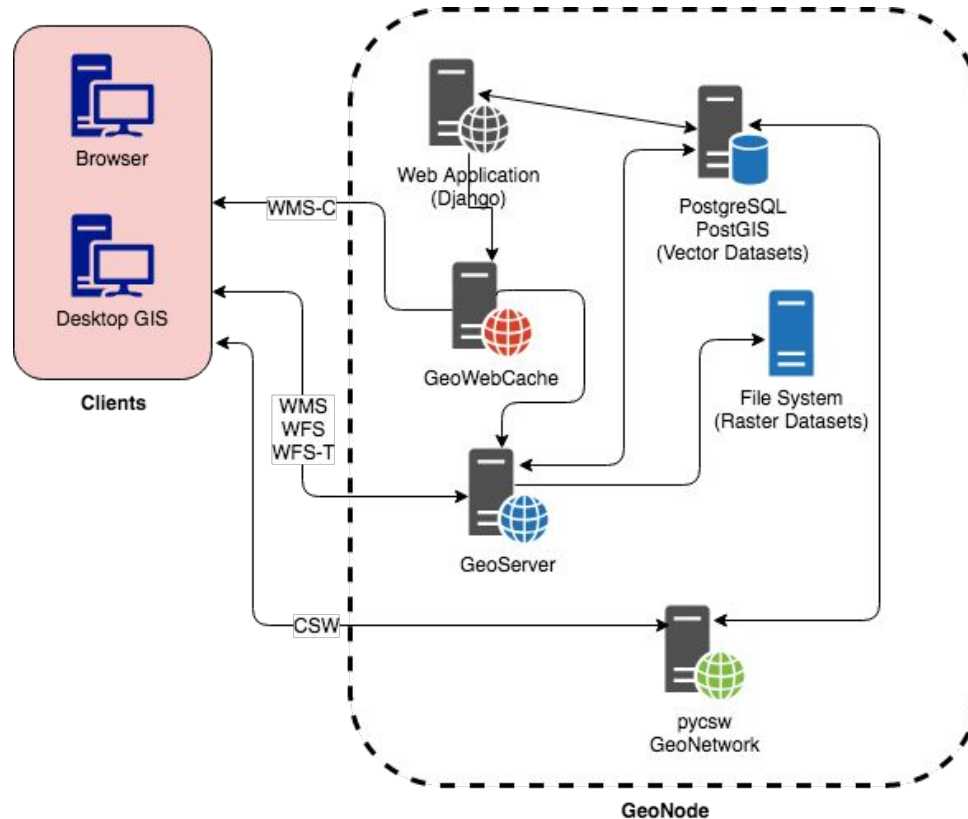
Architecture stack and technologies

- Web application: Python/Django
- Spatial data server: GeoServer or QGIS Server
- Spatial cache tile server: GeoWebCache
- User interface: jQuery, AngularJS, ExtJS, GeoExplorer, MapStore2, MapLoom
- Spatial database: PostgreSQL/PostGIS - but can use any data store supported by GeoServer
- Catalogue: pycsw or GeoNetwork OpenSource or deegree
- Search Engine (optional): Solr or ElasticSearch
- Task queue (optional): Celery/RabbitMQ or Redis

Architecture: GeoNode behind the scenes

- A new shapefile is uploaded from the client: the shapefile is imported in PostGIS and a GeoServer layer for a PostGIS data store is created
- A client access to the tiles of the layer: these are provided by GWC with WMS-C requests. If a tile doesn't still exist this is created using the GeoServer WMS endpoint
- When a client identify a feature, a WMS or WFS GetFeatureInfo request is sent to GeoServer
- A client modify the geometry of a feature from the client: a WFS/T request is sent to the PostGIS layer in GeoServer
- A client modify the style of a layer: a REST request is sent to the GeoServer REST API
- A client queries time series data: a WMS-T request is sent to GeoServer

GeoNode architecture



Architecture: Clients

- GeoExplorer (ExtJS, gxp, OpenLayers 2) - Boundless
- MapStore (OpenLayers 3/LeafletJS/Cesium, ReactJS) - GeoSolutions
- MapLoom (OpenLayers 3, GeoGig integration, AngularJS) - Boundless, ProminentEdge
- Geonode-client (OpenLayers 3, ReactJS) - Boundless
- WorldMap (GeoExplorer fork with improved features) - Harvard CGA
- Leaflet

And any Desktop GIS client supporting OGC standards (WMS/WFS/WCS...)

Security and authorizations

- A granular security system let object owners or administrators to specify different authorizations access for layers, maps and documents
- GeoNode implements security and authorization at two levels:
 - Django-guardian
 - GeoFence
- GeoNode interacts with GeoServer through a security mechanism based on OAuth2 Protocol and GeoFence

Set permissions for this resource

Who can view it?

☒ Anyone

The following users:

* cryang1018

* blewis

* pcrossing

* Brad343

* suzanneblier

The following groups:

Choose groups...

Who can download it?

Who can change metadata for it?

Who can edit data for this layer?

Who can edit styles for this layer?

Who can manage it? (update, delete, change permissions, publish/unpublish it)

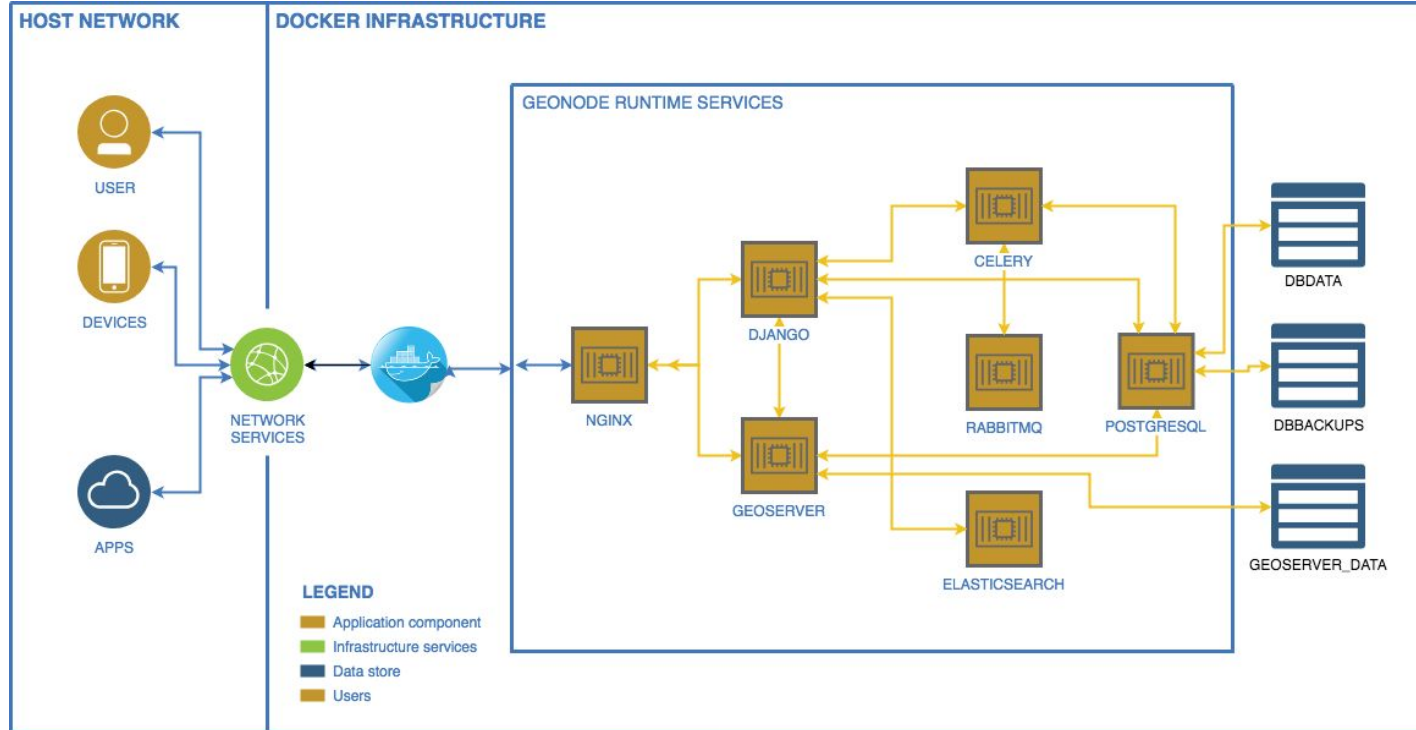
Cancel

Apply Changes

Containers

- GeoNode is developed with scalability in mind, therefore the recommended installation method used docker containers (with docker-compose)
- Different containers deployed by docker-compose: nginx, django, postgresql, geoserver, celery, rabbitmq, elasticsearch
- CI infrastructure builds the system at each submitted PR using the same approach
- Deployment: discussions for developing a possible production ready deployment procedures based on Docker, Rancher and Kubernetes

Containers



Summits and code sprints

- GeoNode Summit 2019: Viareggio, Italy (hosted by GeoSolutions)
- GeoNode Summit 2018: Turin, Italy (hosted by ITHACA)
- GeoNode Code Sprint 2016: Bonn, Germany and New Orleans, LA, USA
- GeoNode Summit 2016: Rome, Italy (hosted by UN WFP)
- GeoNode Code Sprint 2015: New Orleans, LA, USA and Turin, Italy
- GeoNode Summit 2012: Cambridge, MA, USA (hosted by Harvard University)
- GeoNode Summit 2011: Washington DC (hosted by World Bank)

Summits and code sprints



Community growth and adoption

The World Bank, OpenGeo, Australia Indonesia Facility for Disaster Reduction (AIFDR), MapStory, Global Earthquake Model (GEM) Foundation, Harvard WorldMap, ROGUE (US Army Corps of Engineers), South Pacific Applied Geoscience Commission (SOPAC), SERVIR (US National Aeronautics and Space Administration / NASA), Regional Centre for Mapping of Resources for Development (RCMRD, Kenya), Information Technology for Humanitarian Assistance Cooperation and Action (ITHACA, Italy), UN World Food Programme (WFP), Comision Permanente de Contingencias (COPECO, Honduras), Humanitarian Information Unit (HIU, US State Department), Marine Civil Information Management System (MARCIMS, US Marine Corps), National Geospatial-Intelligence Agency (US NGA), Office of Secretary of Defense (US), Pacific Disaster Center, Central Asian Institute for Applied Geosciences (CAIAG, Kyrgyzstan), National Research Council, Institute of Marine Sciences (Italy), European Commission Joint Research Centre (JRC), World Agroforestry Centre (ICRAF), Massachusetts Institute of Technology (MIT, US), National Oceanic and Atmospheric Administration Center for Weather and Climate Prediction (NOAA NCWCP, US Department of Commerce), Politecnico di Milano (Italy), Humanitarian Data Exchange (HDX, United Nations Office for the Coordination of Humanitarian Affairs), Agency for International Development (US AID), HABAKA Innovation Hub (Madagascar), GESP (Gestione Elaborazione Studio Pianificazione, Italy), Zhejiang University (China), Ritsumeika University (Japan)

Community and infrastructure

- ~20 active core committers across several organizations
- ~400 members on the users list
- ~100 members on the developers list
- Mailing list traffic growing steadily
- Successfully onboarding new developers and contributing organizations
- ~350 Pull Requests Merged in the last year
- Continuous Integration + Automated Builds
- Working toward a regular release cycle

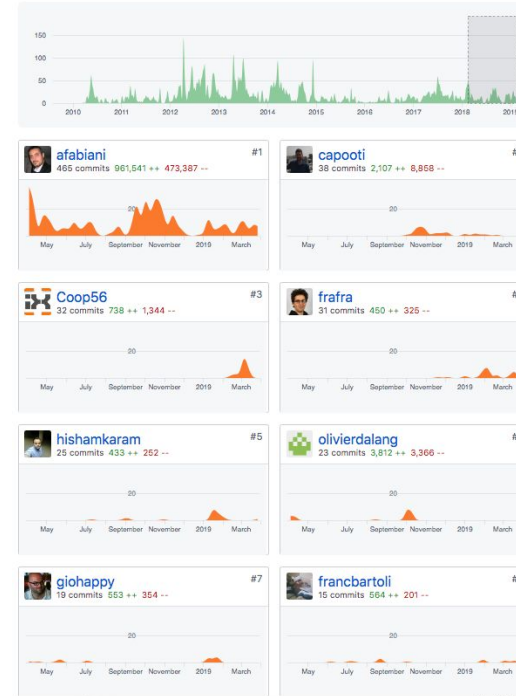
Active contributors

- World Bank
- GeoSolutions
- Terranodo
- Boundless
- GeoBeyond
- Joint Research Centre
- Harvard University
- UN WFP
- ITHACA
- MapStory
- The Pacific Community
- CSGIS
- NINA - Norsk institutt for naturforskning
- CartoLogic

Apr 10, 2018 – Apr 10, 2019

Contributions: Commits

Contributions to master, excluding merge commits

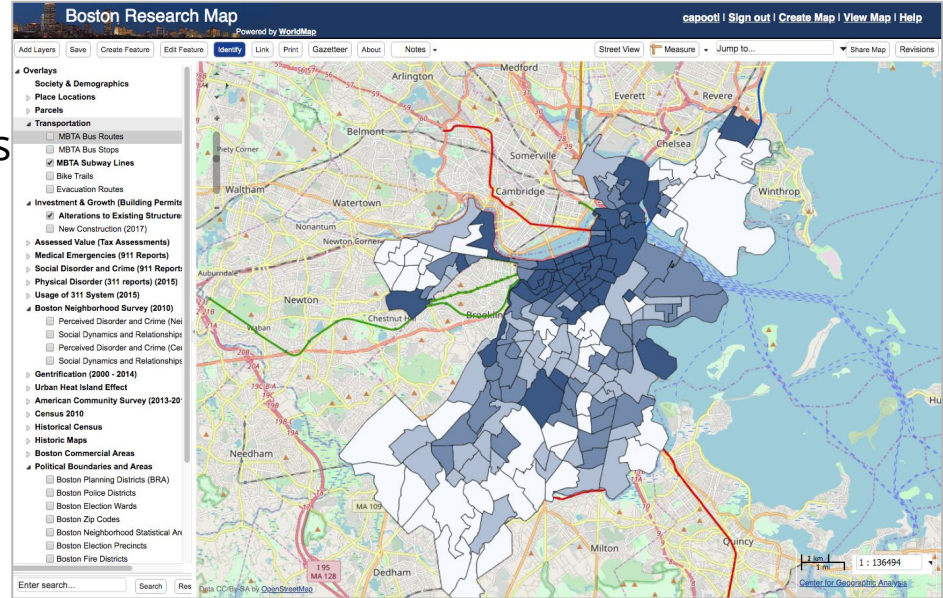


Success stories

- Harvard WorldMap
- Global Facility for Disaster Reduction and Recovery (GFDRR)
- MapStory
- World Food Programme (UN WFP)
- Global Earthquake Model Foundation (GEM)
- Joint Research Centre (JRC)
- UNESCO IHP-WINS

Success stories: Harvard WorldMap

- Developed by Harvard Center for Geographic Analysis since 2009
- It is a large GeoNode instance which is used by students, professors and general public
- More than 20K users, 25K layers and 5K maps
- Notable maps include Boston Research Map, ChinaMap, AfricaMap, JapanMap, ChicagoMap, ParisMap



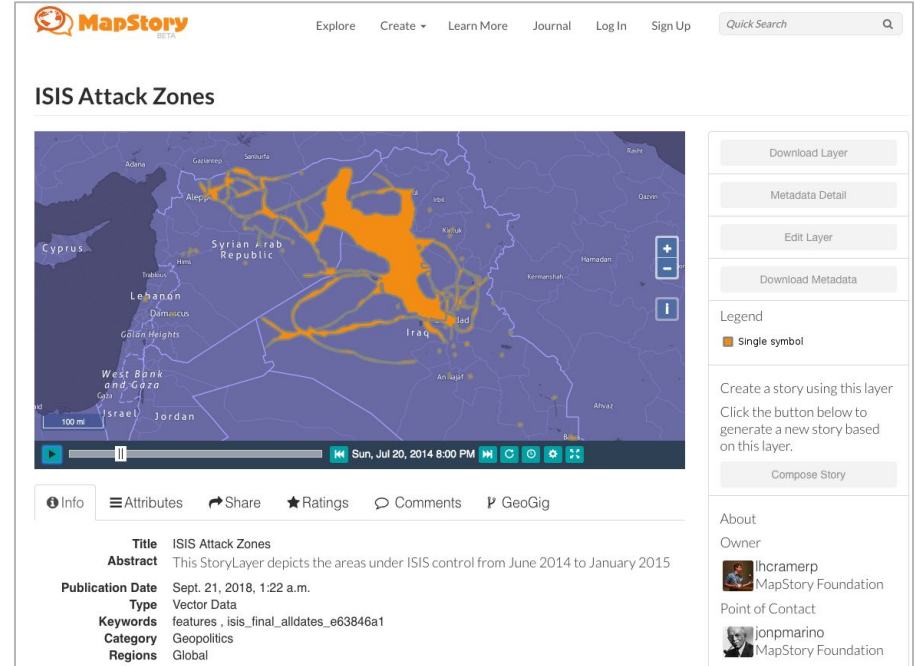
Success stories: GFDRR

- The Global Facility for Disaster Reduction and Recovery (GFDRR) uses GeoNode for its OpenDRI Initiative which aims to use open data to the challenges of reducing vulnerability and building resilience to natural hazards and the impact of climate changes across the globe
- GFDRR maintains a number of GeoNode instances, including MASDAP, a geoportal used by the Government of Malawi to disseminate open data to support development

The screenshot displays the MASDAP GeoNode portal interface. At the top, there is a navigation bar with the MASDAP logo, links for Data, Maps, and About, and a search bar with 'Search', 'Register', and 'Sign in' options. Below this is a red banner with the text 'Explore Layers'. The main content area is divided into a left sidebar and a main panel. The sidebar contains a 'Cart' section with instructions to add resources, a 'Create a map' button, and a 'Filters' section. The filters are categorized by TEXT, TYPE, and CATEGORIES. Under TYPE, 'Raster' has 58 items and 'Vector' has 194 items. Under CATEGORIES, 'Biota' has 7 items, 'Boundaries' has 30 items, 'Climatology Meteorology A...' has 19 items, 'Economy' has 4 items, 'Elevation' has 5 items, and 'Environment' has 22 items. The main panel shows a list of layers. The first layer is 'Q50 Flood Outline Main [Atkins 2012]' with a description: 'Flood envelope polygon showing the extent of flooding with respect to a 50 years return period.' It has 1205 views and 0 shares. The second layer is 'Q75 Flood Outline Main [Atkins 2012]' with a description: 'Flood envelope polygon showing the extent of flooding with respect to a 75 years return period.' It has 642 views and 0 shares. The third layer is 'Q100 Flood Outline Main [Atkins 2012]' with a description: 'Flood envelope polygon showing the extent of flooding with respect to a 100 years return period.' It has 1555 views and 0 shares. Each layer entry includes a thumbnail map showing a red outline on a white background.

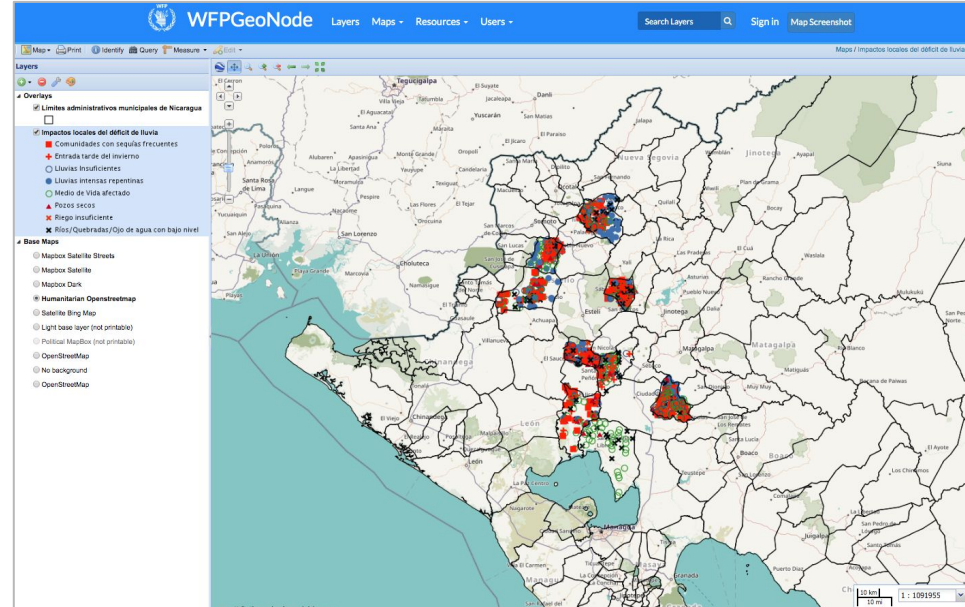
Success stories: MapStory

- GeoNode is used by the MapStory foundation for its platform which aims to be a free atlas of change that everyone can edit
- Users can import data and create story layers and map stories which aim to explain how and why geographic change occurs in the world



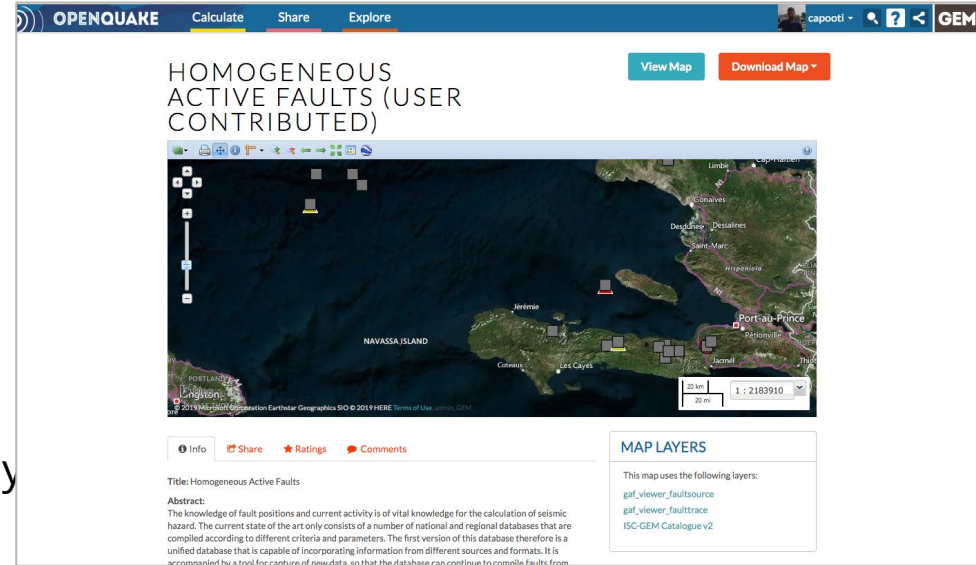
Success stories: UN WFP

- The United Nations World Food Programme (WFP) has started building its public SDI using GeoNode in 2012
- More than 1k public and private layers, contributed by more than 300 users which created more than 100 maps
- The platform has been adopted as the institutional public web mapping platform, and it contains datasets related to environment, food security, natural disasters, logistics



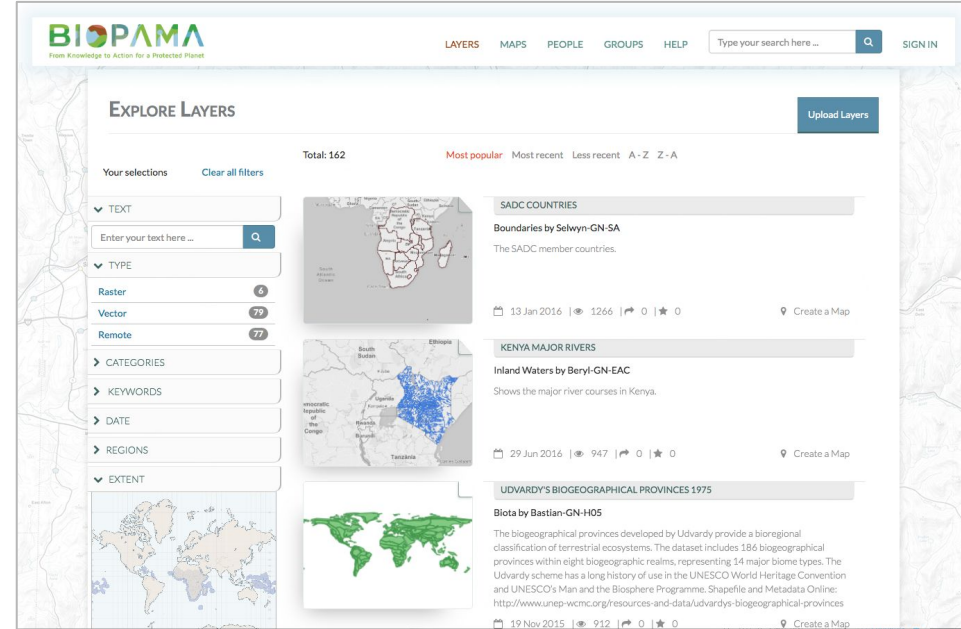
Success stories: GEM

- The Global Earthquake Model Foundation (GEM) uses GeoNode for building the OpenQuake Platform, its open geospatial data framework
- The platform contains a number of layers and models which can be run to analyze the earthquake risk for a specific region. The output of the analysis can be shared by the users by publishing in OpenQuake new layers and maps



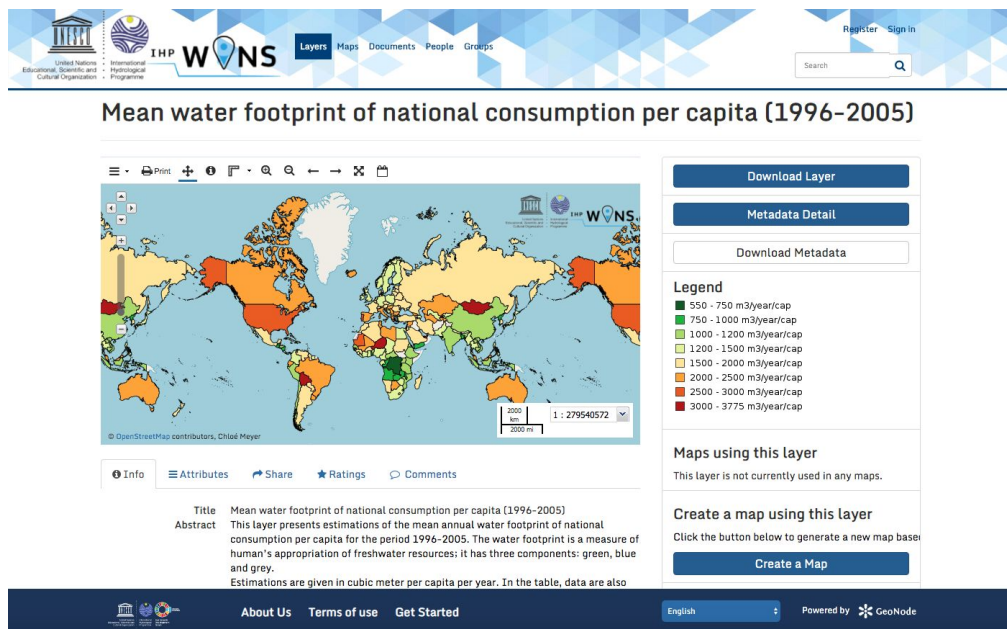
Success stories: JRC

- The European Commission Joint Research Centre uses GeoNode in several projects
- The Risk Data Hub improves the access and sharing of curated European-wide risk data, tools and methodologies for fostering Disaster Risk Management (DRM) related actions
- The BIOPAMA project aims to build a solid information base for decision making on protected areas in the Africa, Caribbean, Pacific (ACP) region



Success stories: UNESCO IHP-WINS

- Water Information Network System by the International Hydrological Programme of UNESCO
- Added a publishing workflow for spatial layers: an editor must approve a dataset before publication
- KMZ and temporal series upload



Release History

- June 2019, **GeoNode 2.10** (Django 1.11.20, GeoServer 2.14, pyows 2.2.0)
- April 2018, **GeoNode 2.8** (Django 1.8.19, GeoServer 2.12.2, pyows 2.0.2, group moderation and resources publication workflow, SLD upload, metadata wizard)
- May 2017, **GeoNode 2.6** (Django 1.8.7, GeoServer 2.9, pyows 2.0.2, React client, QGIS server backend, ansible and docker setup, Ubuntu 16.04 support)
- November 2015, **GeoNode 2.4** (Django 1.6.11, GeoServer 2.7, pyows 1.10.5, django-guardian, groups, remote services, responsive template, Ubuntu 14.04 support)
- April 2014, **GeoNode 2.0** (Django 1.5.5, GeoServer 2.5, pyows 1.8.6, django-polymorphic, bootstrap, Ubuntu 12.04 support)
- October 2012, **GeoNode 1.2** (Django 1.4, GeoServer 2.3, South migrations, django-taggit, social features, comments and ratings, find/add layers widget)
- May 2012, **GeoNode 1.1.1** (Ubuntu 10.04 and 11.04 installer)
- December 2010, **GeoNode 1.0**, with major contributions from OpenGeo, the World Bank, GFDRR, UNISDR, and GEM
- August 2010, **GeoNode 1.0-beta**

What's new in GeoNode 2.10

GeoNode 2.10 will be released at the next GeoNode summit (Viareggio, Italy, June). Here is what is new:

- GeoServer 2.14
- many performance improvements
- SPC - a docker deployment setup based on docker-compose
- New client: WorldMap (GNIP
<https://github.com/GeoNode/geonode/issues/3718>)
- Improvements for GeoNode theming and customisations (GNIP
<https://github.com/GeoNode/geonode/issues/3743>)
- Optimizations to GeoFence for instances with very large number of layers
(GNIP <https://github.com/GeoNode/geonode/pull/4326>)

Open GeoNode Improvement Proposals (GNIP)

- GNIP 4276: Python 3 and Django 2 upgrade
- GNIP 4129: Migrate GeoNode frontend from AngularJS to React
- GNIP 4311: Contrib applications cleanup
- GNIP 4091: Edit data in tabular format
- GNIP 3924: Add Kubernetes deployment
- GNIP 3707: Support production-grade deployment using Docker
- GNIP 3228: GeoNode 4

GeoNode 3.0

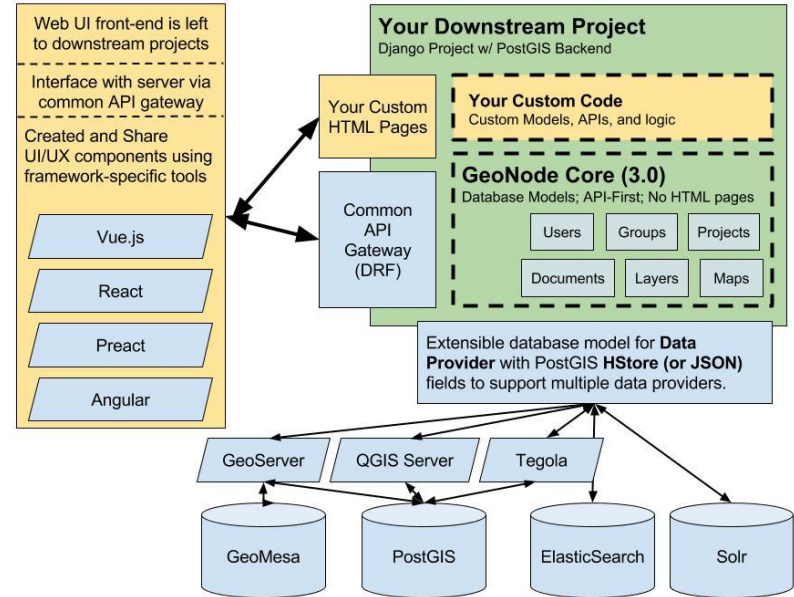
The plan is to release it within the end of the year, when Python 2 will be at the End Of Life

- Python 3 and Django 2 upgrade (GNIP <https://github.com/GeoNode/geonode/issues/4276>)
- Migrate Geonode Frontend from AngularJS to React (GNIP <https://github.com/GeoNode/geonode/issues/4129>)



GeoNode 4

- Still based on Django, but it will possibly be a rewrite
- API-centric, based on Django Rest Framework and SwaggerUI
- Web UI Frameworks Agnostic: instance developers can use their favourite javascript framework and mapping client using a REST API
- Support for multiple data providers (GeoServer, QGIS Server, Tegola, Solr, Elasticsearch/ElasticGeo, GeoMesa)



Thank you!

Any questions?

Thanks to all the core developers that contributed to this presentation