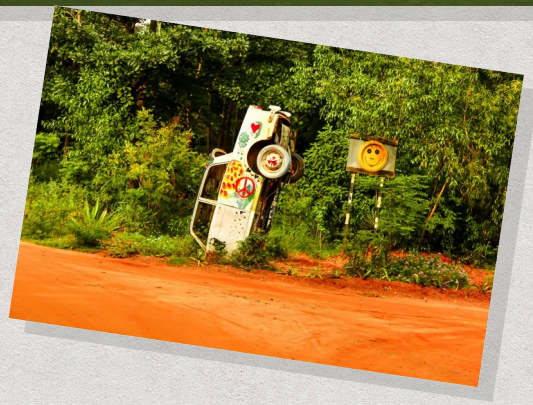
Auroville Geomatics Studio: building a FOSS GIS platform

C S R

Auroville Centre for Scientific Research Trust

Auroville

- International, intentional, spiritual **community**
- Founded in 1968, located near Pondicherry
- About 3000 residents, 50 nationalities, 10km^2
- One of the goals: build an “ideal” city
- A big challenge for such a small village



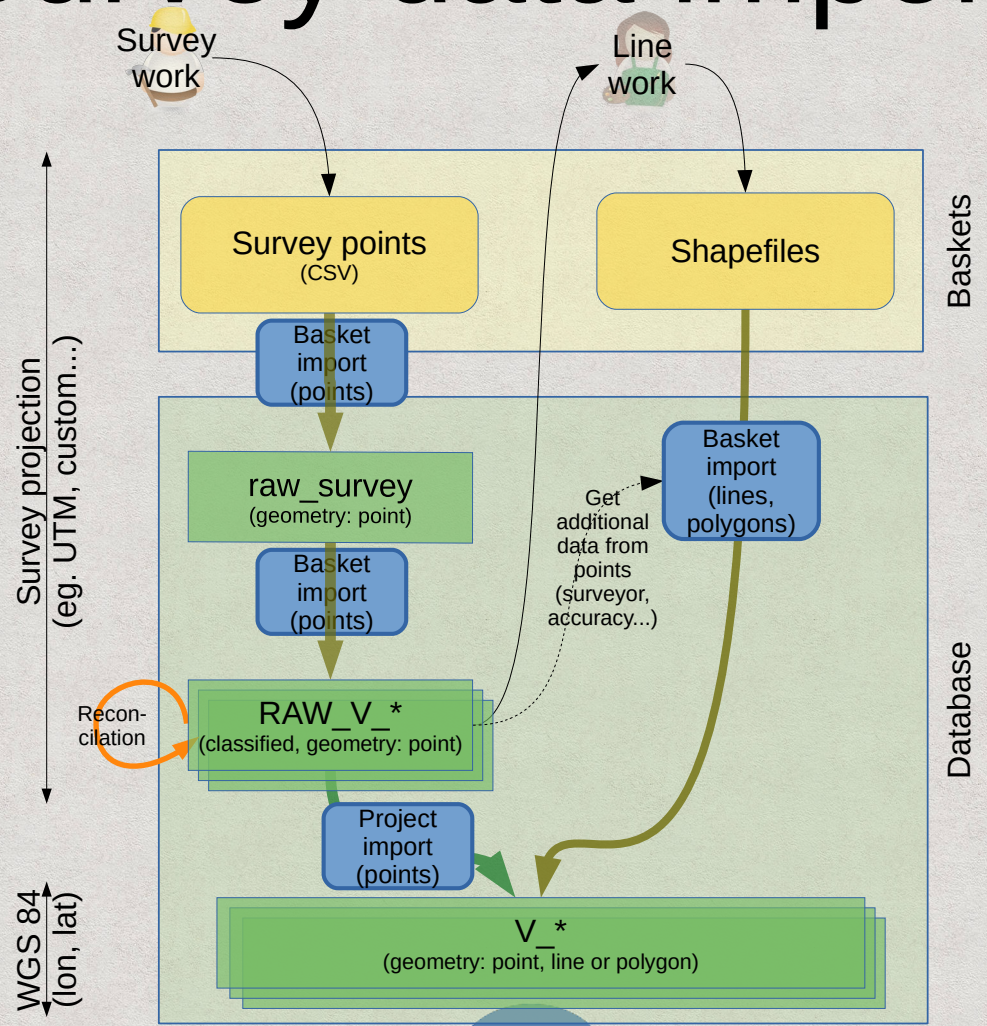
Need maps for (almost) everything

- Topography, geography, geology
- Town planning, architecture, infrastructures, administrations, decision support systems
- Cadastral, land ownership, asset management
- Natural and human made features
  - Professionals & domain specialists: water, architects, botanists…
- => 300+ layers

Sources

- Surveys: high accuracy DGNNS, Total Station and more (drones, ?)
- Other sources
  - Legacy in all kind of formats (Shapefiles, DXF…), coordinate systems
  - Online (OSM, aerial raster files, etc)
  - Volunteers with hand held GPS, other Geo-aware tools...
- Related data: beyond GIS
  - Chronological: wells, rain gauges, weather stations readings…
  - Infrastructures, administrations… in all kind of relations

Survey data import



Use case: water management

- Initial funding: Department of Science and Technology of MST, GOI
- Weather data collection (rain…)
- Ground water (well monitoring…)
- Waste water plants
- Pipes network, flow analysis*
- => Goal: *Water resource management (budget, plan)*

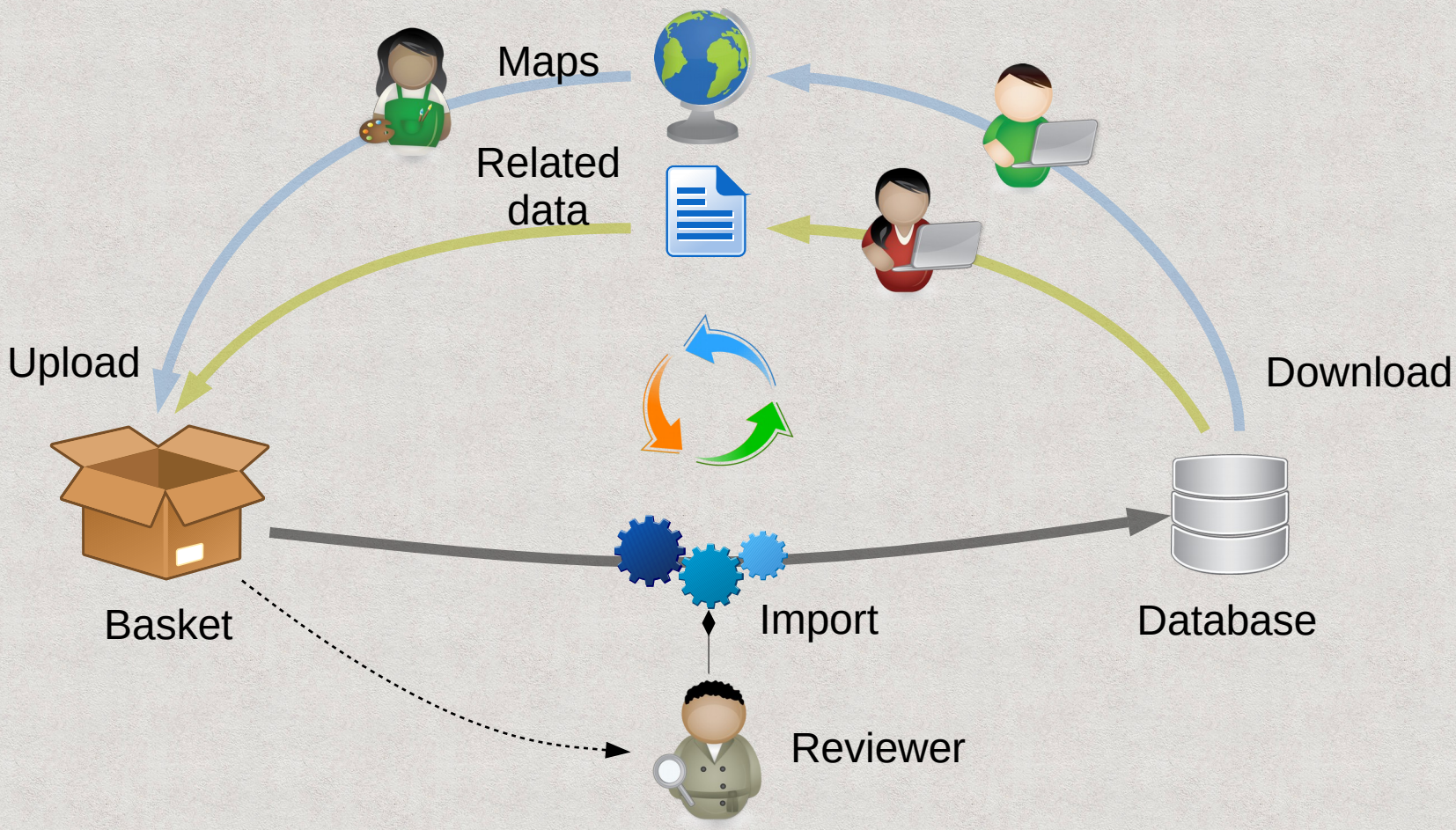
* Planned

Geomatics Studio Portal

- **Geomatics**: "*the discipline of gathering, storing, processing, and delivering geographic information or spatially referenced information*" (*Wikipedia*)
- Online, freely accessible*: collaborative tool
- Data organized and consistent format
- Data quality continuous improvement
- Implement a workflow for the team (6-10 people: surveyors, architects, environment engineers, monitors…)
- Promote open source, open data, accessibility

* Except sensitive information

Functional workflow



Gisaf

- Code under FOSS license (GPLv3)
- > 5000 LOC (mostly Python and Typescript)
- Try to keep it as generic as possible
  - Python plugin architecture
- => Goal:
  - Make Gisaf a solution for organizations with similar needs
  - Share our experience

Software stack

- Server
  - Python, Aiohttp, Gino, Shapely, Graphene...
- Database
  - Postgis
- Browser
  - Angular, Mapbox GL
- Data analytics
  - Jupyter and Pandas

Integration

- Pandas
  - Generation of dashboards for Gisaf
- Import/export Gisaf <=> OSM*
  - Mapping between Gisaf database schema and OSM tags?
- Python power
  - A Swiss Army Knife that can glue heterogeneous pieces

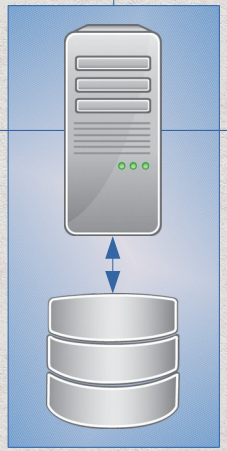
* Planned

IO

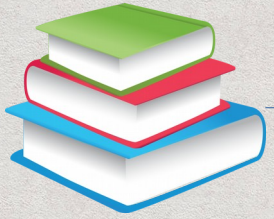
Web browser

Reference maps
(shapefiles, etc)

Other services
(APIs)



Probes



Spacial and temporal data

Jupyter Notebooks

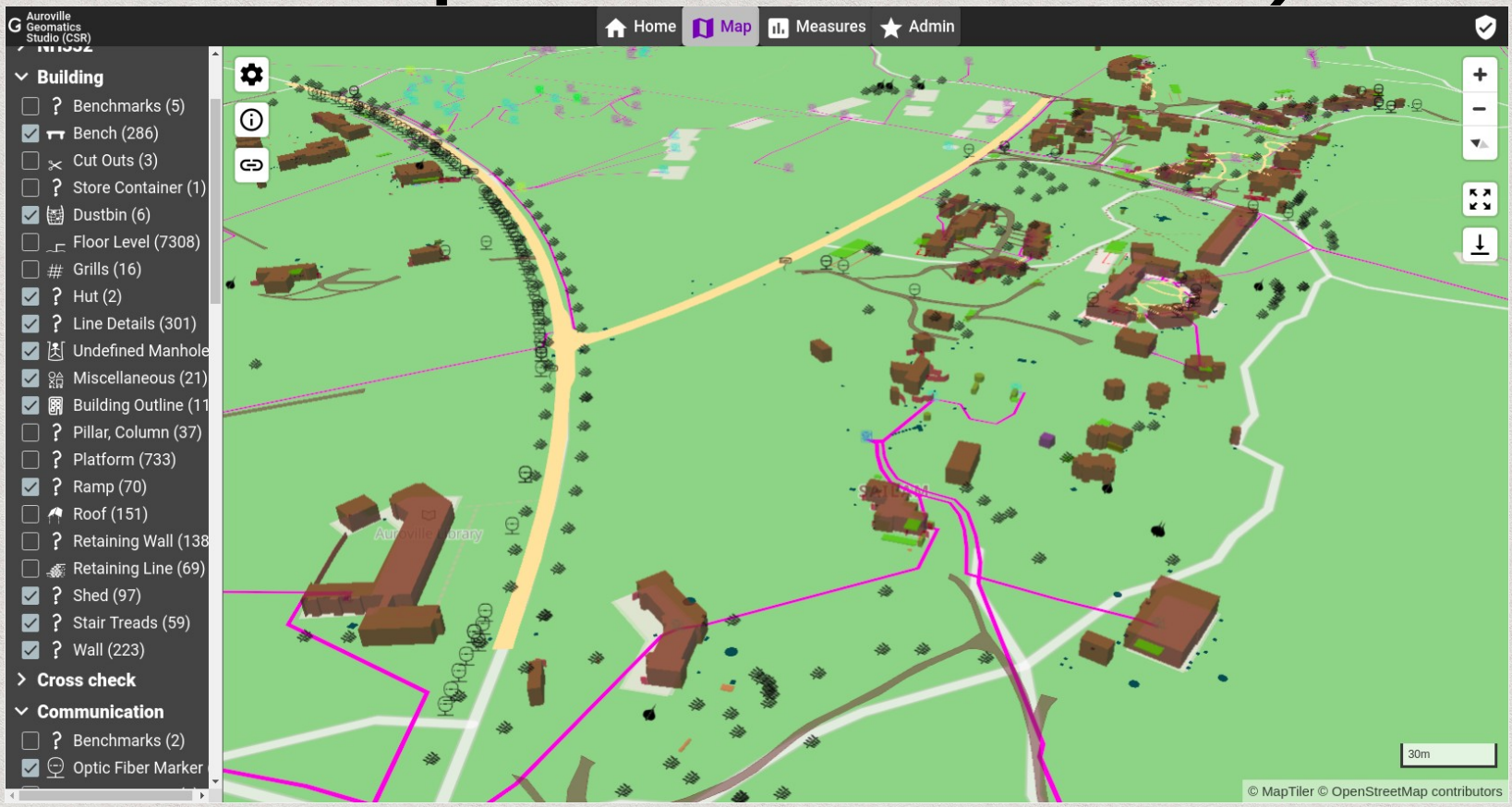
Data analysis

- Jupyter notebooks
- Pandas and GeoPandas
  - Pandas: easy data analysis
    - Input and output from database, files, URLs…
    - Statistical and scientific analysis
  - GeoPandas is also remarkable for generating maps

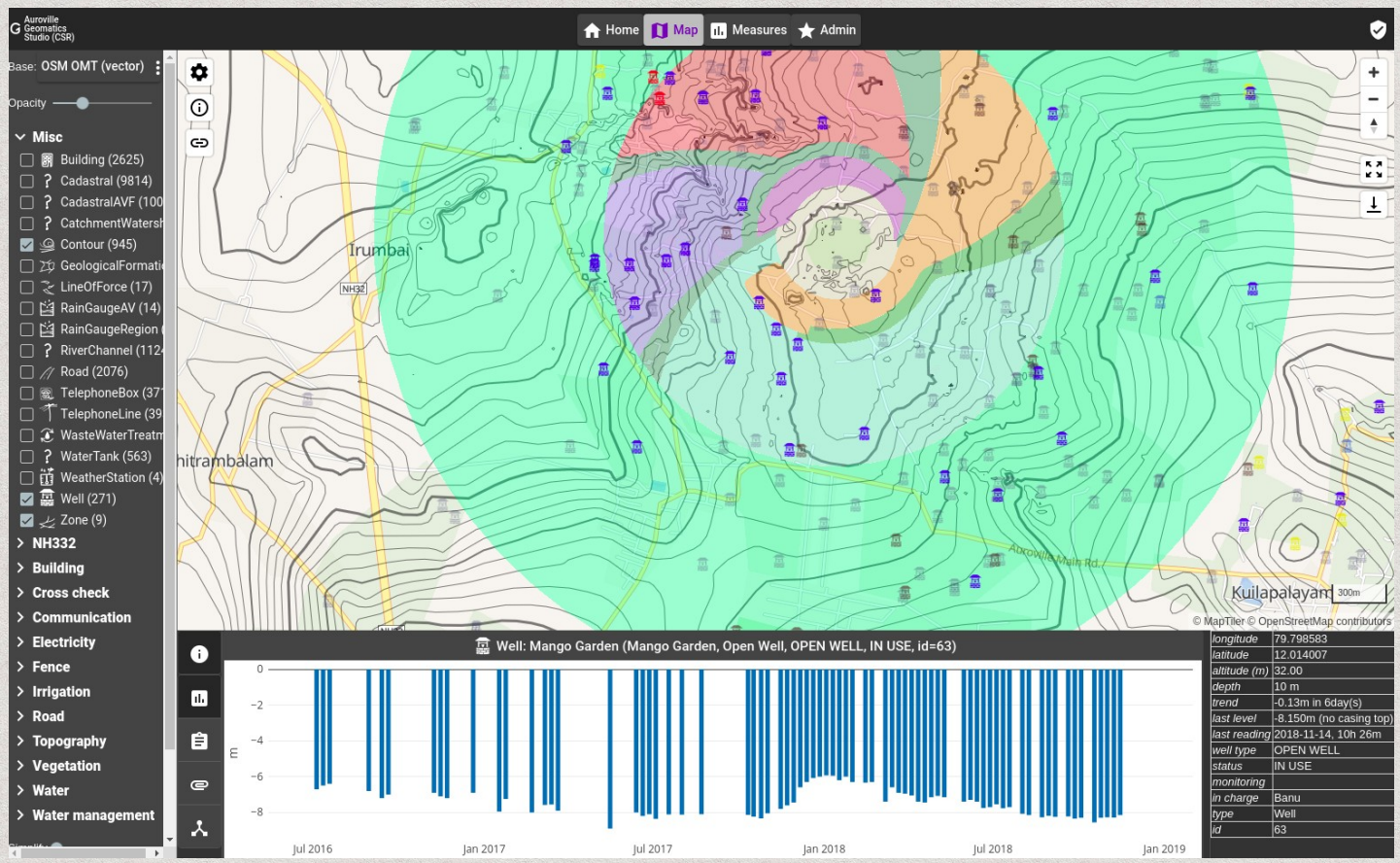
Links

- Site: http://gis.auroville.org.in
- Gisaf home: http://redmine.auroville.org.in/projects/gisaf

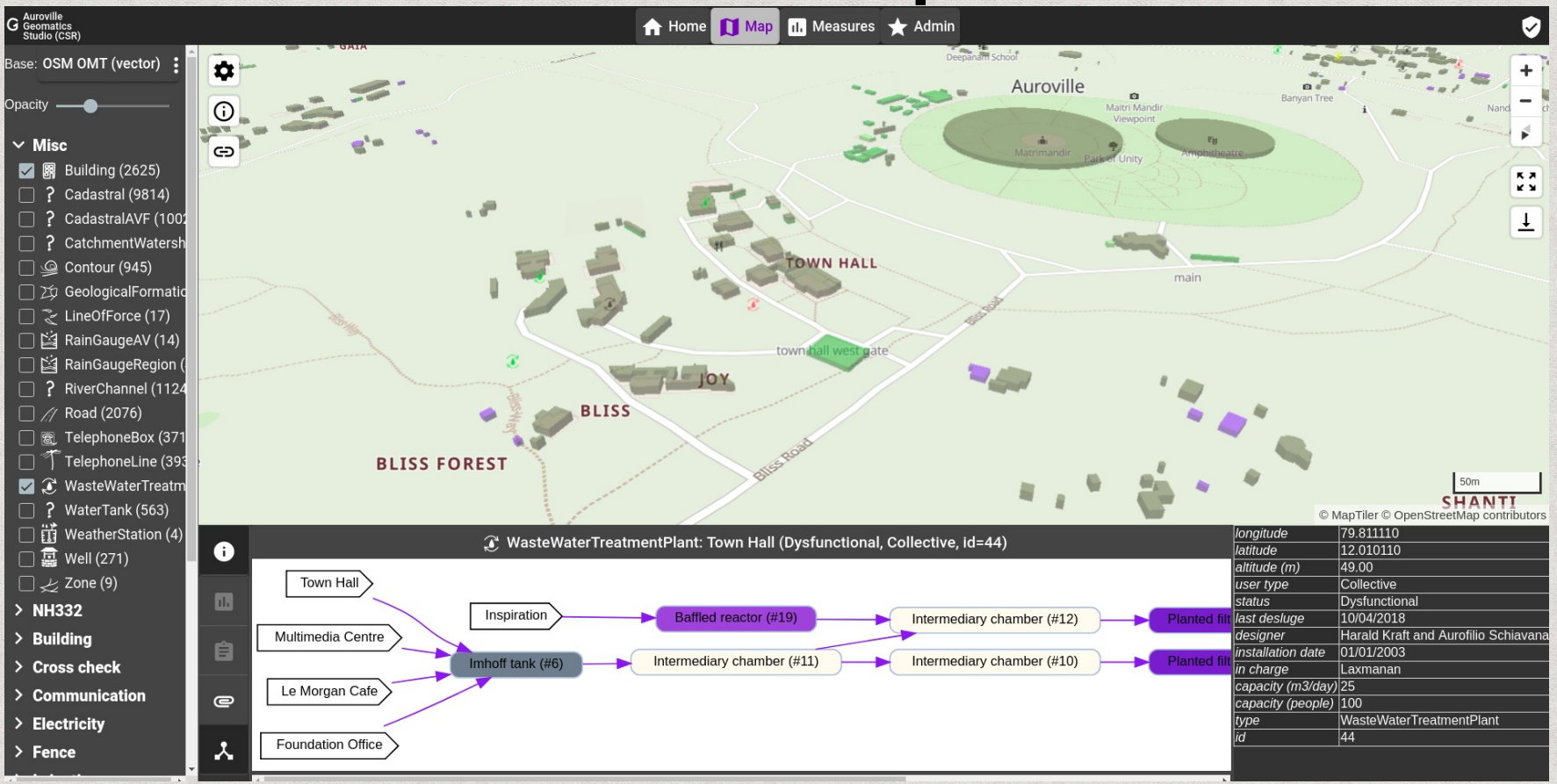
Screenshot: map (buildings, telephone lines, etc)



Screenshot: wells, with water levels



Screenshot: waste water treatment plant



Screenshot: dashboard (from Jupyter notebook)