



NLS
FINNISH GEOSPATIAL
RESEARCH INSTITUTE
FGI

Data Integration

NMCA Workshop, Brussels

Apr 18, 2023

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Agenda

- GeoE3 Integration Platform
- Provision of 3D Buildings
- Cross-collection Queries for Data Integration
- Climate Data Integration
- Context Broker
- Conclusions

GeoE3 Integration Platform

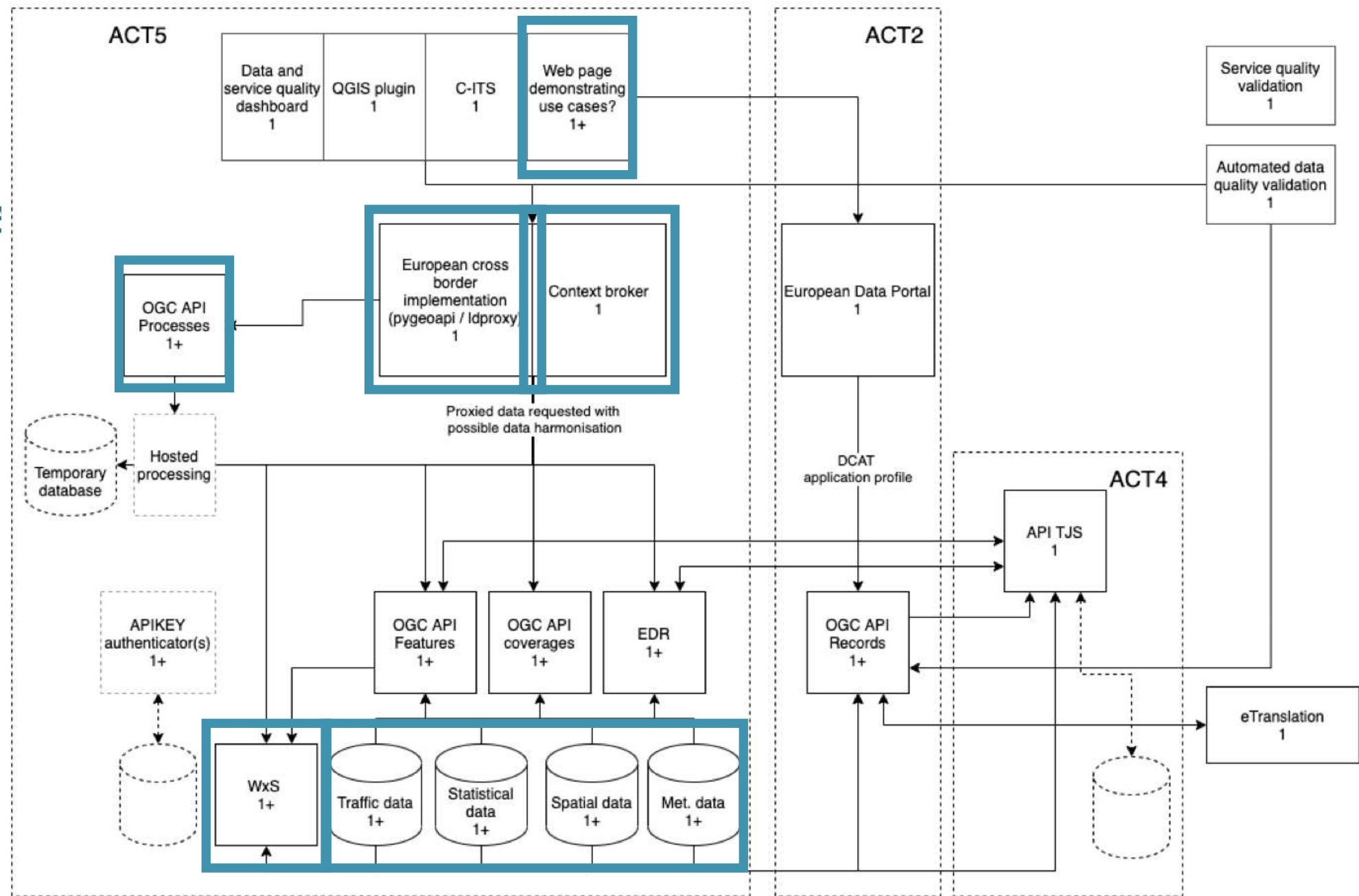
- Energy-related use cases (Energy Data Space)
 - Buildings, Roads
 - DTM, DSM
 - Climate
- All datasets available via OGC API Features, OGC API Coverages
 - Metadata via OGC API Records
 - 3D buildings (Norway) via OGC API Processes
- Runs on a cloud service platform

Cloud Platform

- CSC Cloud Computing Platform
 - In Kajaani, Finland
- Linux, Apache, WSGI
- Django
- pygeoapi
 - rasterio
 - GDAL
 - Numpy, SciPy
 - Pandas, Fiona
 - owslib



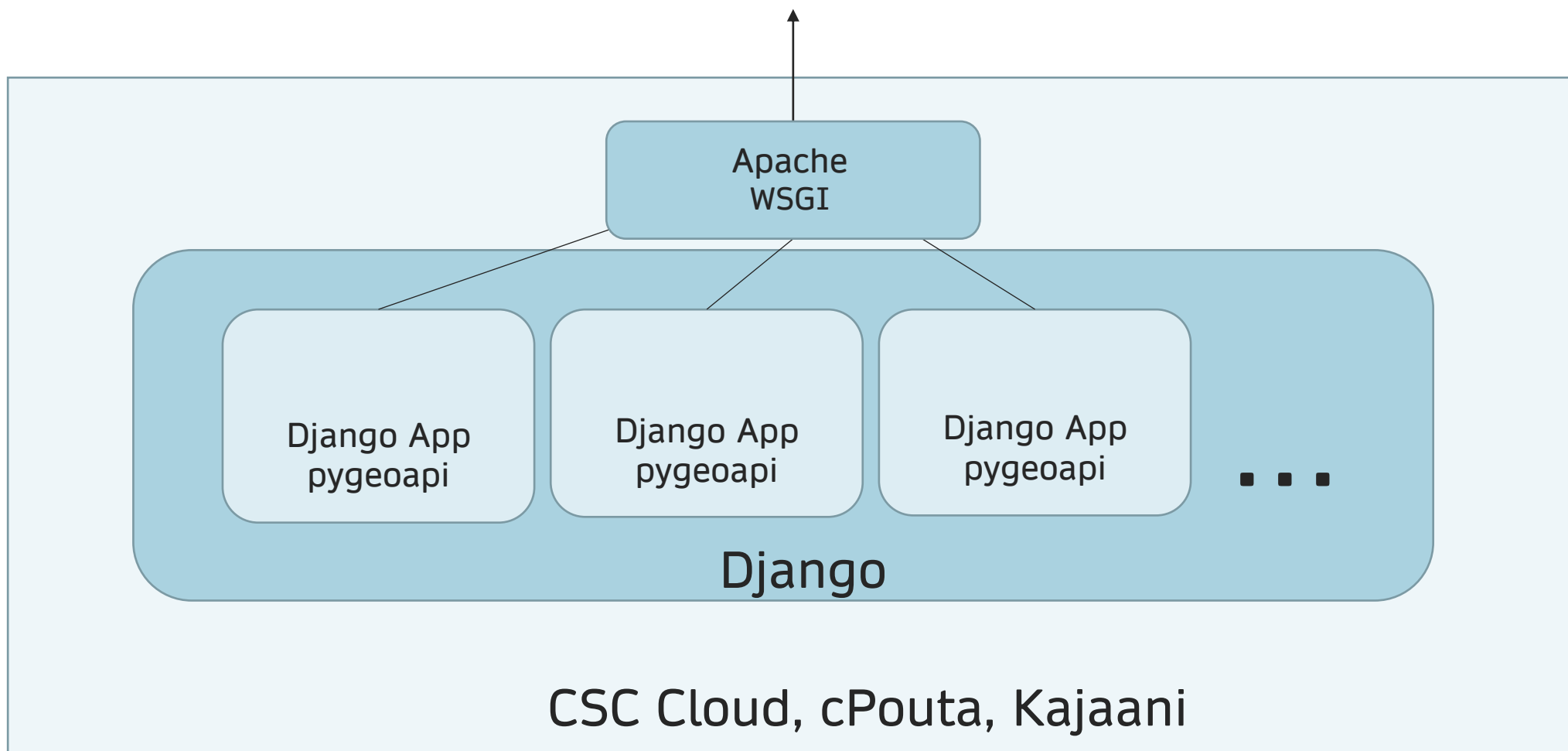
Geoe3 Service Architecture

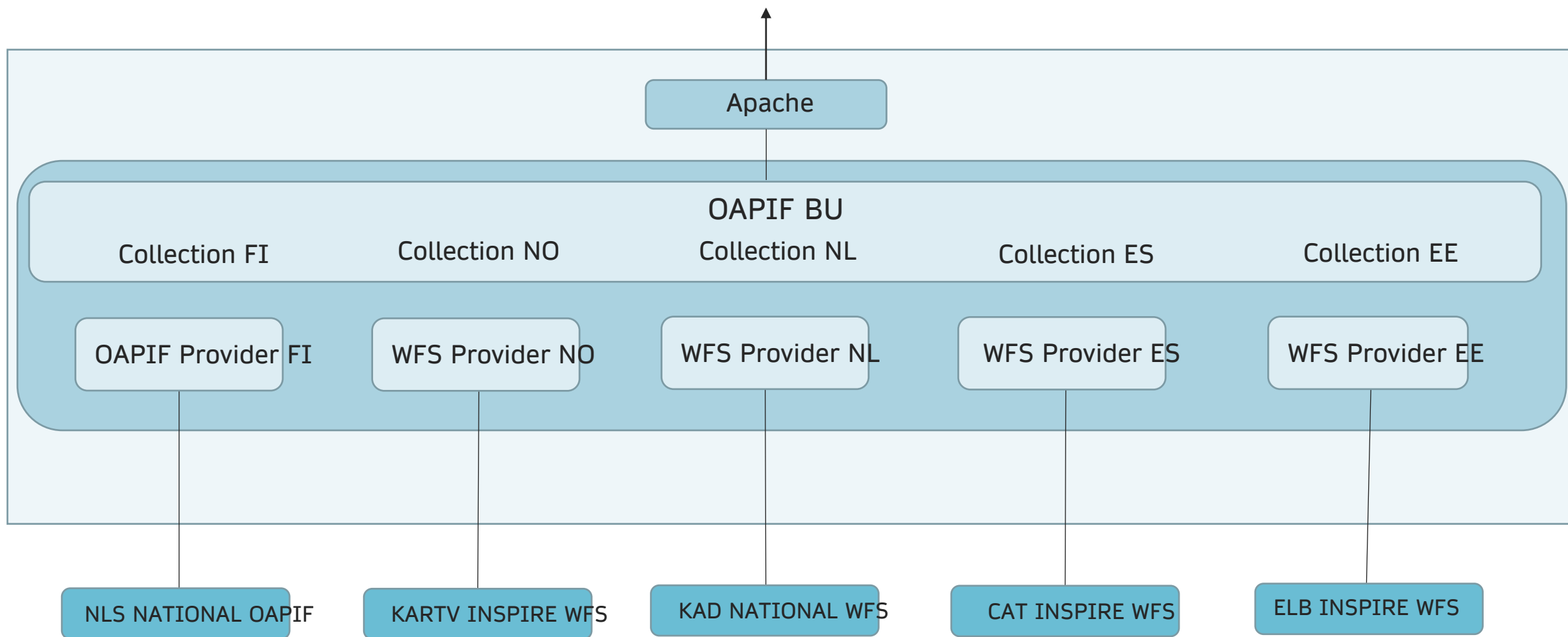


User Interface

- pygeoapi
 - Jinja2 template engine
- Django templates
- Leaflet -> OpenLayers
- ThreeJsViewer
 - Vue component
 - TU Delft
 - three.js







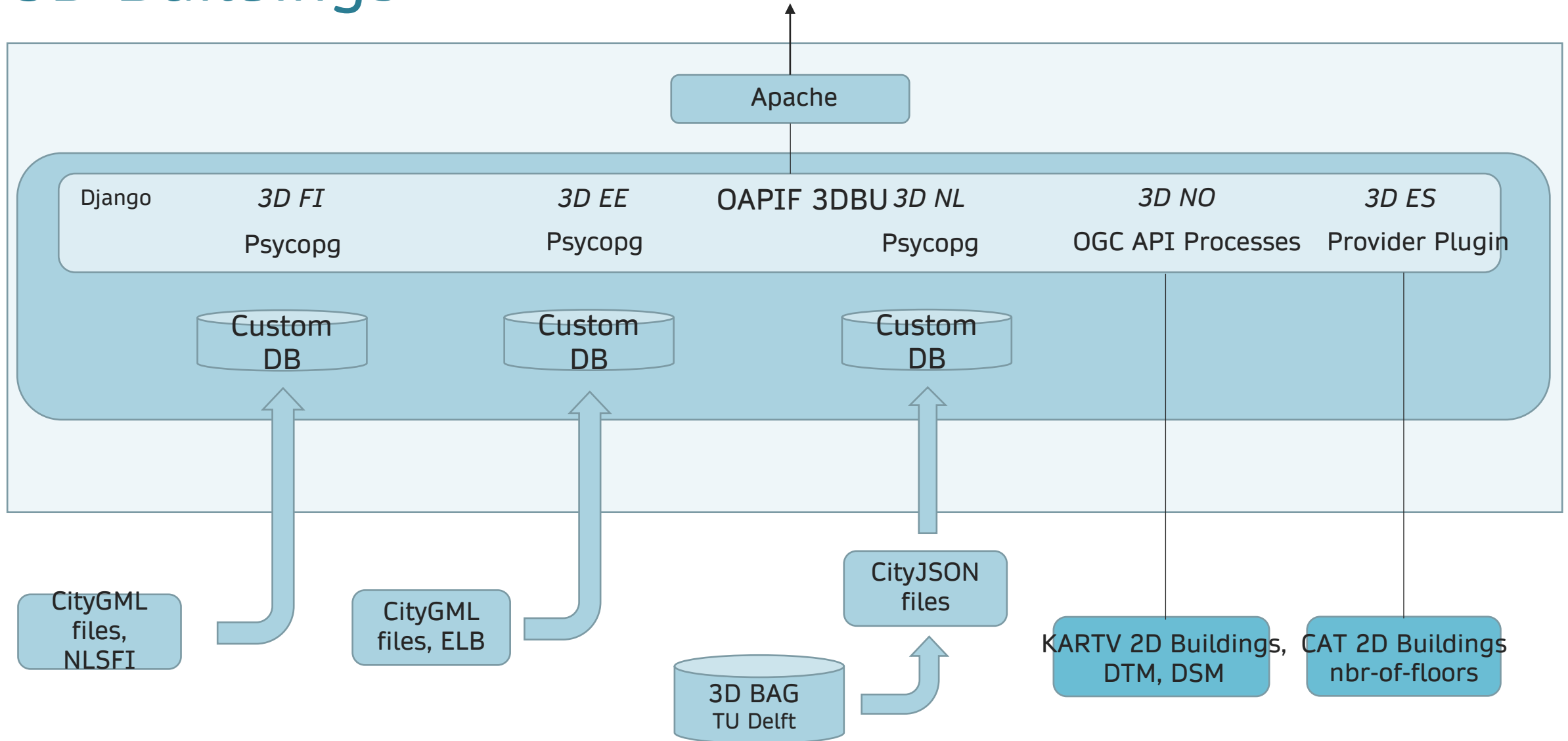
Collections in this service

Name	Type	Description
Finland	feature	Buildings from NLSFI
Norway	feature	Buildings from Kartverket
The Netherlands	feature	Buildings from Kadaster
Spain	feature	Buildings from Spanish Cadastre
Estonia	feature	Buildings from Maa-Amet
Slovakia	feature	Buildings from UGKK
France	feature	Buildings from IGN
Buildings metadata	record	Buildings metadata for GeoE3 countries (FI, NO, ES, NL, EE)

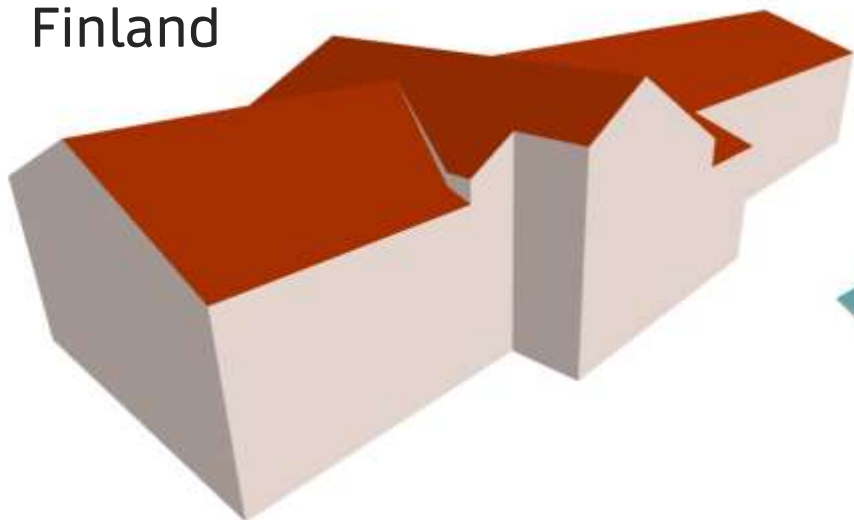
3D Buildings

- Downloaded to Integration Platform (LoD 2)
 - Finland, Estonia, The Netherlands
- Accessed from national-level service, processed on-the-fly (LoD 1)
 - Spain, Norway

3D Buildings



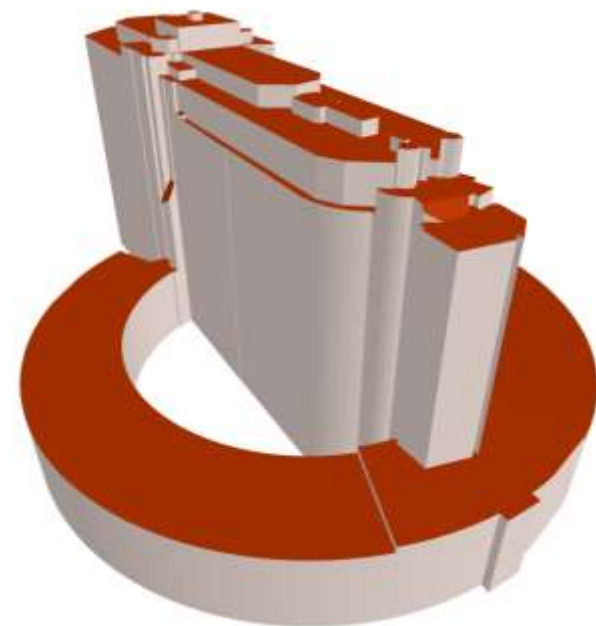
Finland



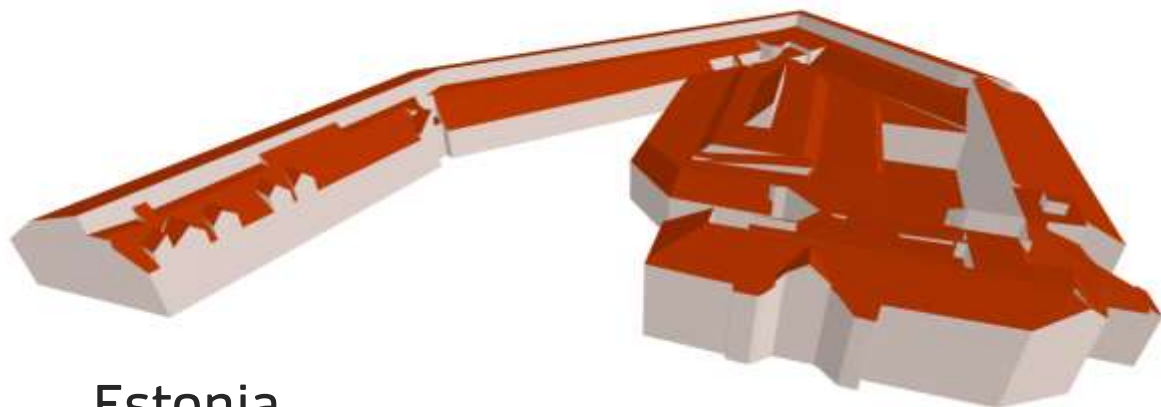
Norway



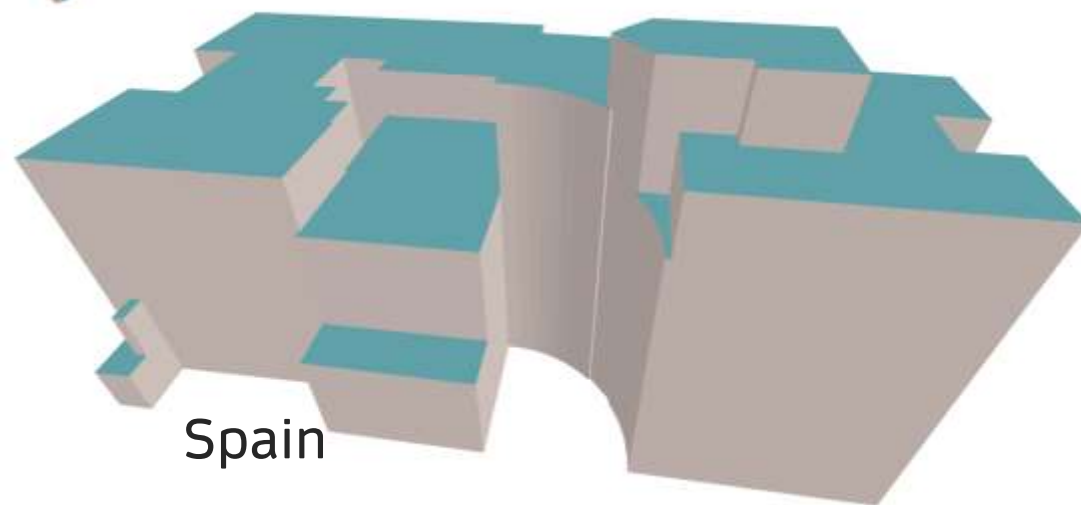
The Netherlands



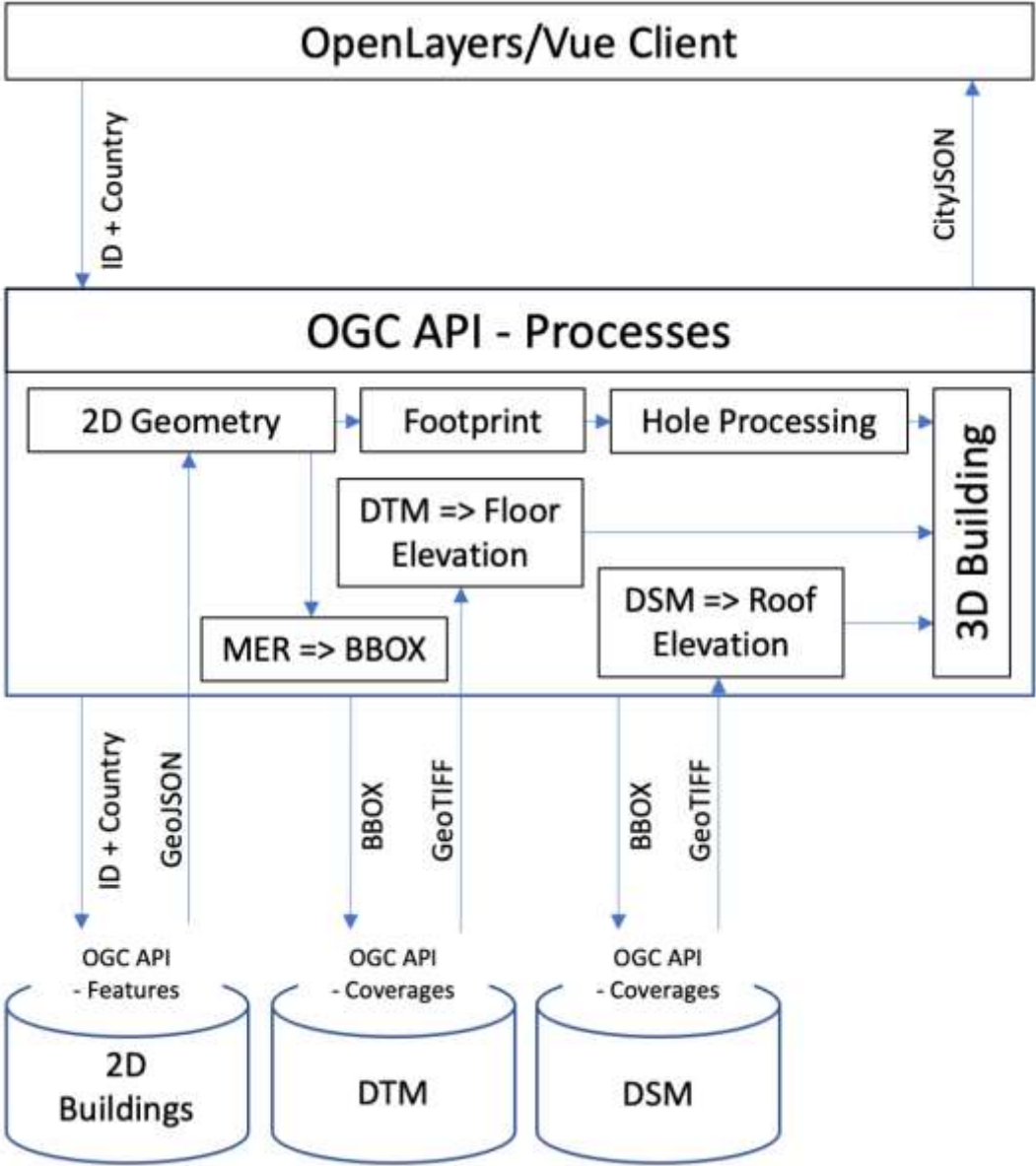
Estonia



Spain

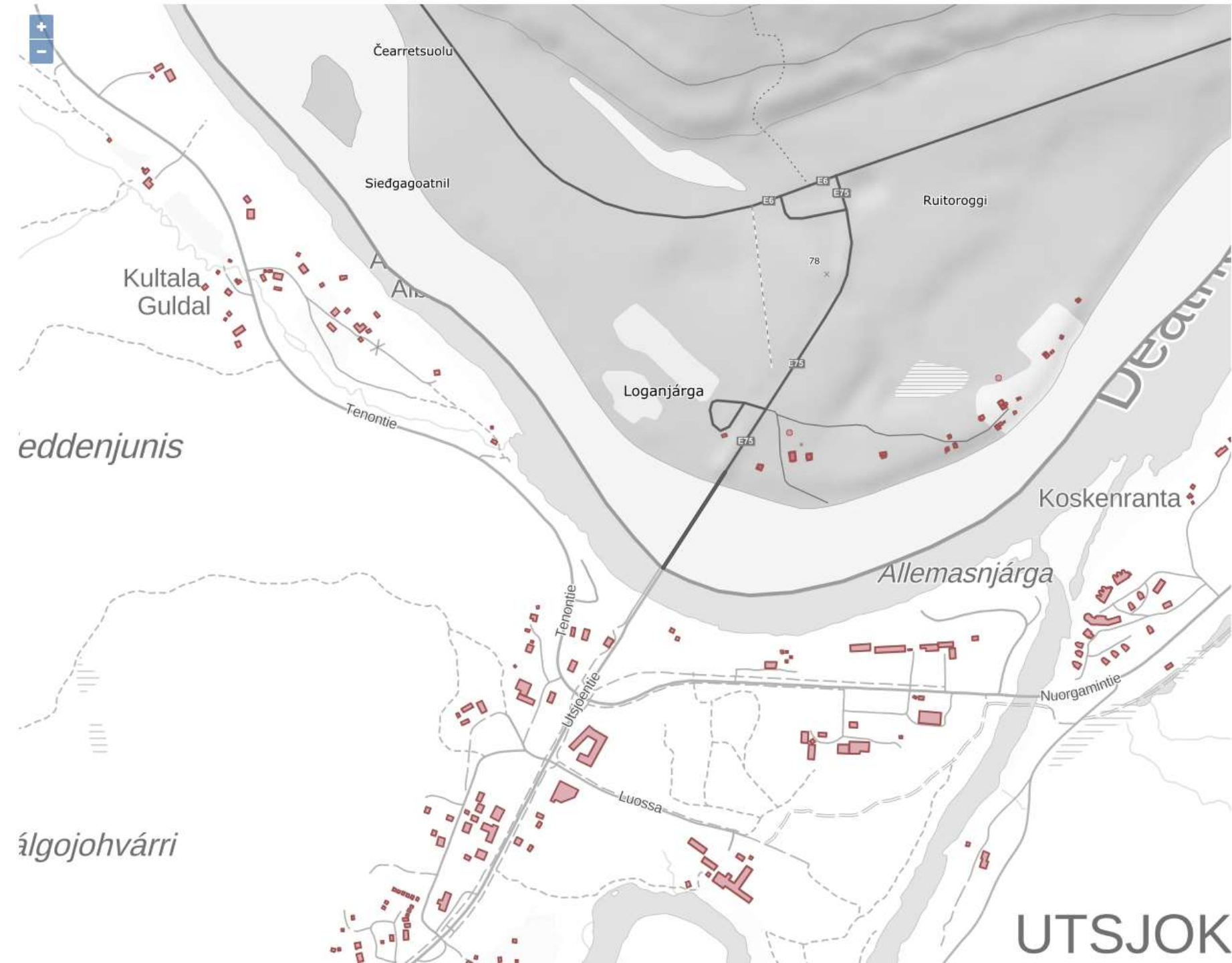


On-the-fly Generation of 3D Buildings



Cross-collection queries

- Important for the cross-border provision of datasets
- Officially supported in the OGC API Features spec (Part 3)
- [https://.../geoe3/buildings/search?
collections=buildings_FI,buildings_NO
&bbox=26.998585,69.903087,27.061414,69.920908
&f=json
&limit=1000](https://.../geoe3/buildings/search?collections=buildings_FI,buildings_NO&bbox=26.998585,69.903087,27.061414,69.920908&f=json&limit=1000)



Elements Console Network >> 30 30

search Hide data URLs

All XHR JS CSS Img Media Font Doc WS Manifest Other

Has blocked cookies Blocked Requests

1000 ms 2000 ms 3000 ms 4000 ms

Name	St...	Ty...	Initiator	Size	T..	Waterfall
search?collecti...	200	xhr	featur...	2...	4...	

1 / 66 requests 215 kB / 1.0 MB transferred 215 kB / 1.8 MB resources Finish:

Console What's New x Issues

Highlights from the Chrome 90 update

New CSS Flexbox debugging tools
Debug and inspect CSS Flexbox with the new CSS Flexbox debugging tools.

New Core Web Vitals overlay
Visualize page performance with the new Core Web Vitals overlay.

Cross-collection queries

- Experimental for OGC API Coverages (not yet in the spec)
- [https://.../geoe3/dsm/search?
collections=DSM_NO,DSM_FI
&subset=x\(1756108.1:3748915.4\),y\(10110879.3:11705125.2\)
&scaleSize=x\(1000\),y\(800\)
&f=png](https://.../geoe3/dsm/search?collections=DSM_NO,DSM_FI&subset=x(1756108.1:3748915.4),y(10110879.3:11705125.2)&scaleSize=x(1000),y(800)&f=png)



Norway

Finland

Cross-border 3D viewing

- Demonstration on the Dutch-German border
- https://vm4062.kaj.pouta.csc.fi/geoe3/integrated3d/collections/buildings3d_NL,buildings3d_DE/items?bbox=6.488606234528742,51.85824881485968,6.506722950226878,51.86328864488121&f=html-3D
- https://vm4062.kaj.pouta.csc.fi/geoe3/integrated3d/search?collections=buildings3d_NL,buildings3d_DE&bbox=6.488606234528742,51.85824881485968,6.506722950226878,51.86328864488121&f=cityjson

The Netherlands

Dinxperlo



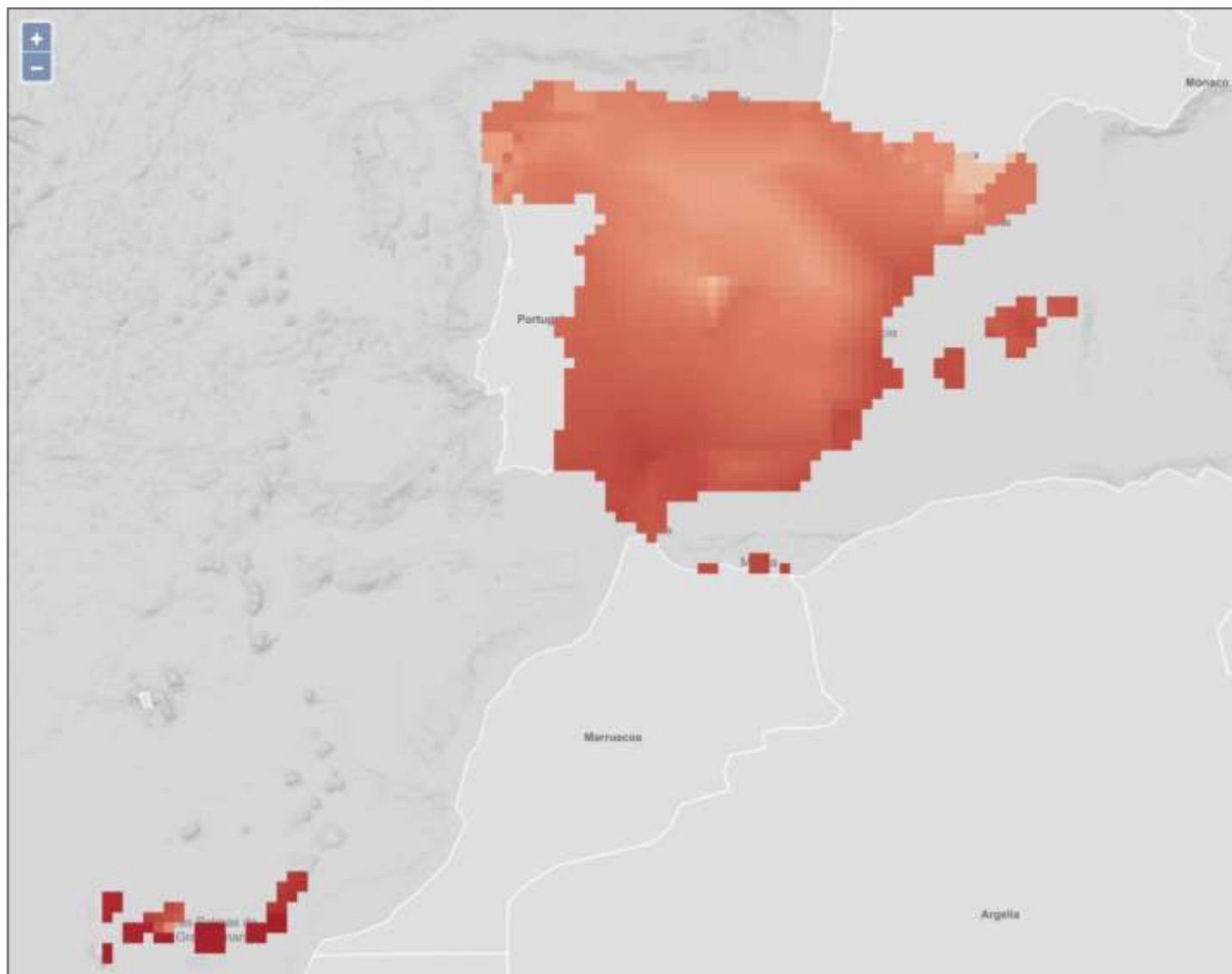
Germany

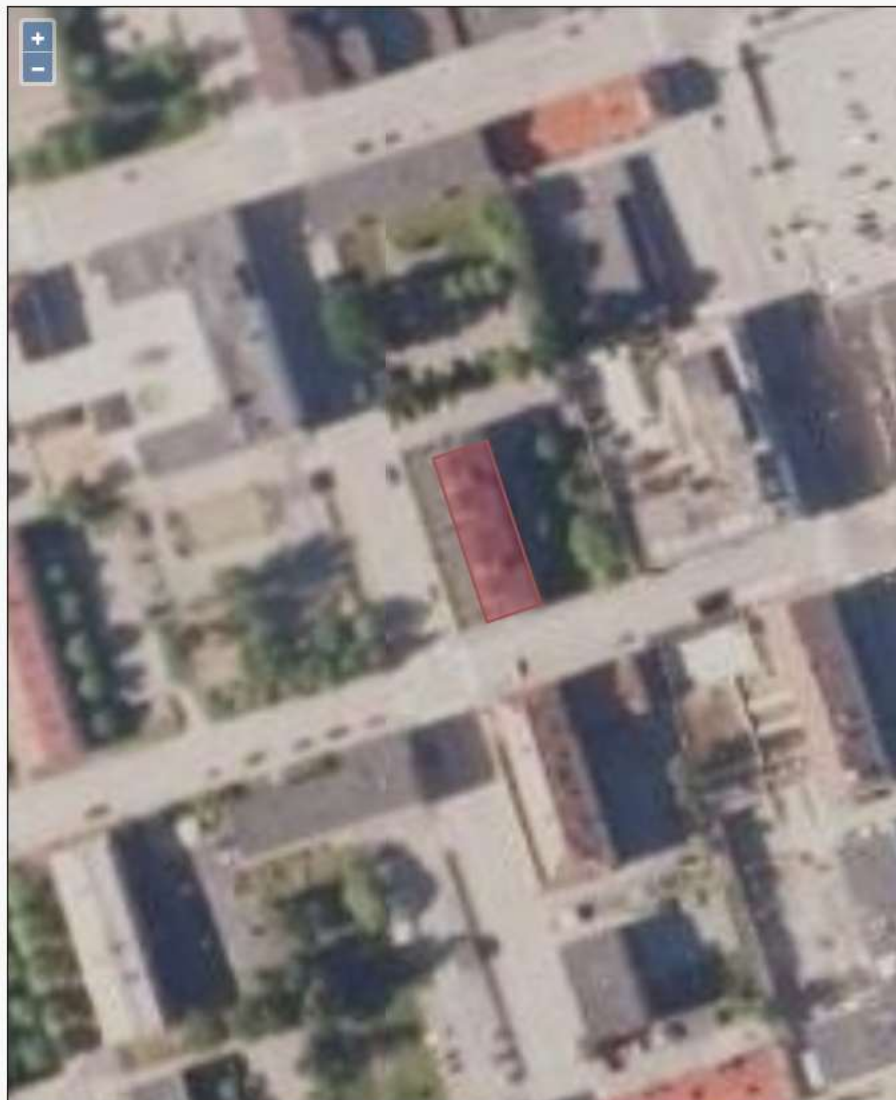
Suderwick

Climate Data Integration

- Data accessed from the national Met agencies portals
 - FMI OAPIF, Frost, KNMI Data Platform, AEMET OpenData, EEA files
- From point observations to interpolated grid
- Served via OGC API Coverages
- Integrated with individual building features
 - Value accessed using buildings centroid
- Detailed description available in the Location Innovation Academy

Zoom in to explore the coverage.





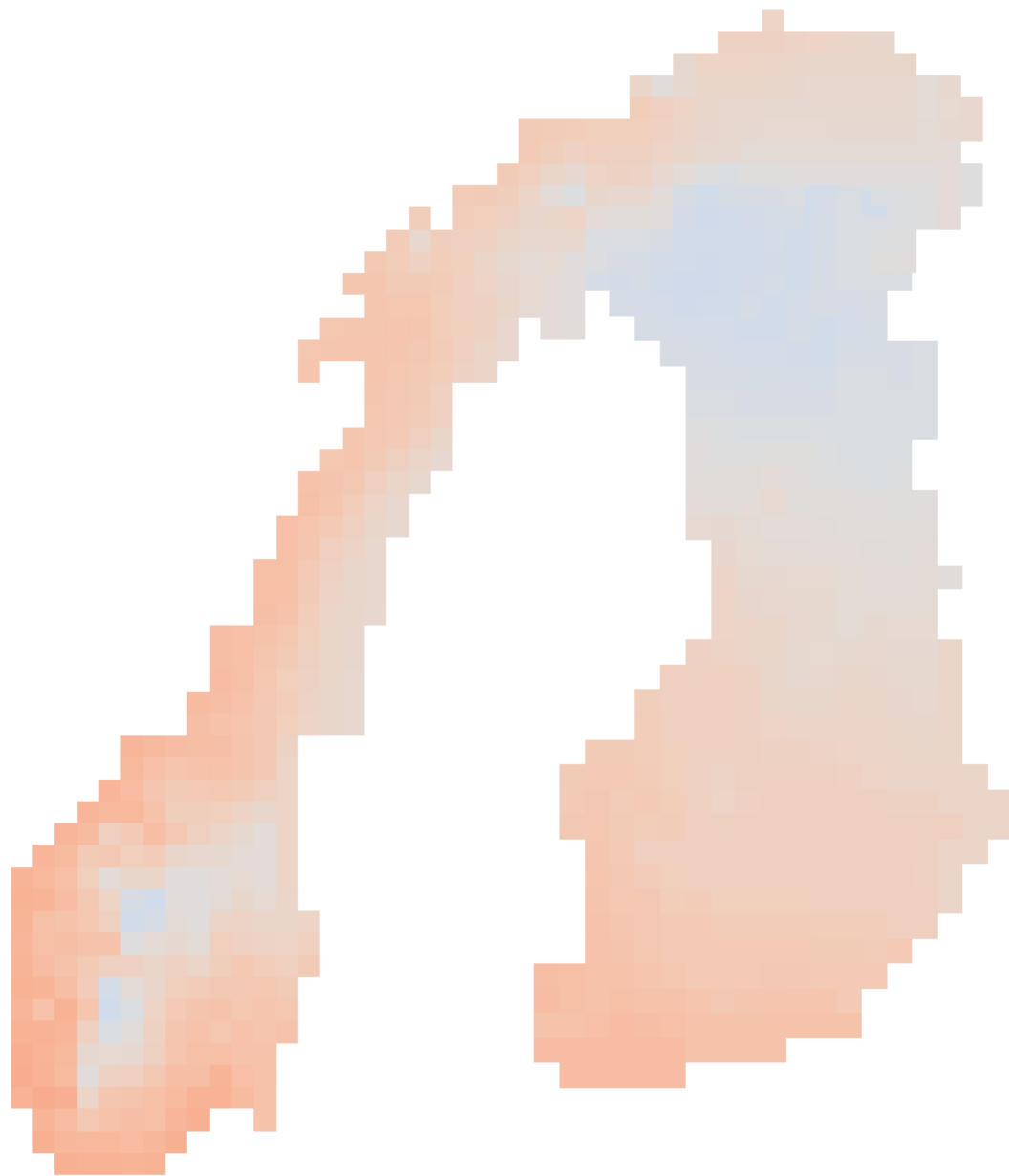
currentUse_currentUse	1
materialOfFacade	2
floorDescription_floorArea	1560
numberOfFloorsAboveGround	3
roofType	1580

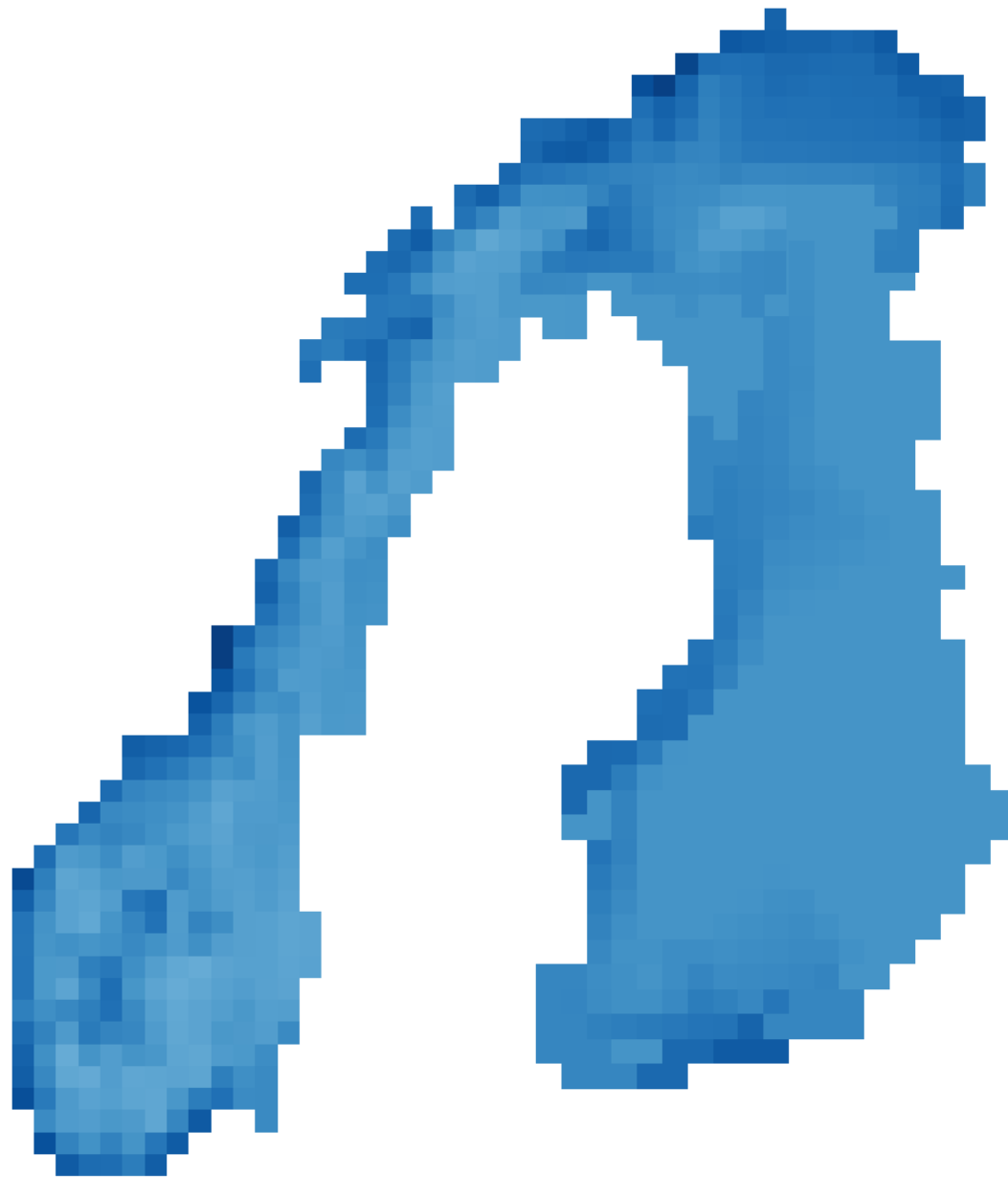
sunshine_hours	1580
windspeed	3.0
temperature	3.3
energyClass	D

sunshine_hours	1580
windspeed	3.0
temperature	3.3
energyClass	D

Cross-collection Climate Visualisations

- [https://.../geoe3/temperature/search?
collections=temperature_FI,temperature_NO
&subset=x\(396919:3888202\),y\(7701052:11580281\)
&scale-size=x\(900\),y\(1000\)
&f=png&](https://.../geoe3/temperature/search?collections=temperature_FI,temperature_NO&subset=x(396919:3888202),y(7701052:11580281)&scale-size=x(900),y(1000)&f=png&)





Context Broker

- Implementation based on Orion Context Broker
- All Finnish LoD2 level 3D buildings
 - Over 800 000
- ID of the building in MongoDB (/entities)
- Registration for forecast temperature in MongoDB (/registrations)
 - Points to Context Provider at <https://vm4062.kaj.pouta.csc.fi/geoe3/context/v2>

Context Broker

- For example:
https://vm4062.kaj.pouta.csc.fi/contextbroker/v2/entities/urn:ngsi-ld:Building:417738341/attrs/forecast_temperature?options=keyValues
- Context Provider will
 - request the buildings footprint from NLS-FI OGC API Features
 - compute building's centroid
 - request forecast temperature from FMI's OGC API EDR with point location
- Result returned like:
 - {"forecast_temperature":-4}

GeoE3 Integration Platform URLs

- Stable version
 - <https://geoe3platform.eu>
- Development version
 - <https://vm4062.kaj.pouta.csc.fi/geoe3/>
- All feedback welcome!
 - lassi.lehto@nls.fi

Conclusions

- Dynamic geodata integration platform for energy-related applications
- OGC API Features, OGC API Coverages
 - Data sets of countries as data collections inside a single service instance
- 3D Buildings available from all five participating countries (+2)
 - All provided in CityJSON, via OGC API Features
- Climate data integration
 - From point observations to grid coverages
 - Values dynamically integrated as building attributes

Thank you!

