NLS
FINNISH GEOSPATIAL
RESEARCH INSTITUTE
FGI

GeoE3 Platform and Use Cases

Metadata Matters, Hilversum, The Netherlands

Sep 6, 2023

Lassi Lehto

Agenda

- GeoE3 Integraton Platform
  - OGC API Features, Coverages, Processes
- Provision of 3D Buildings
  - OGC API Features, CityJSON
- Cross-collection Queries for Data Integration
- Climate Data Integration
- Application Example
- Conclusions

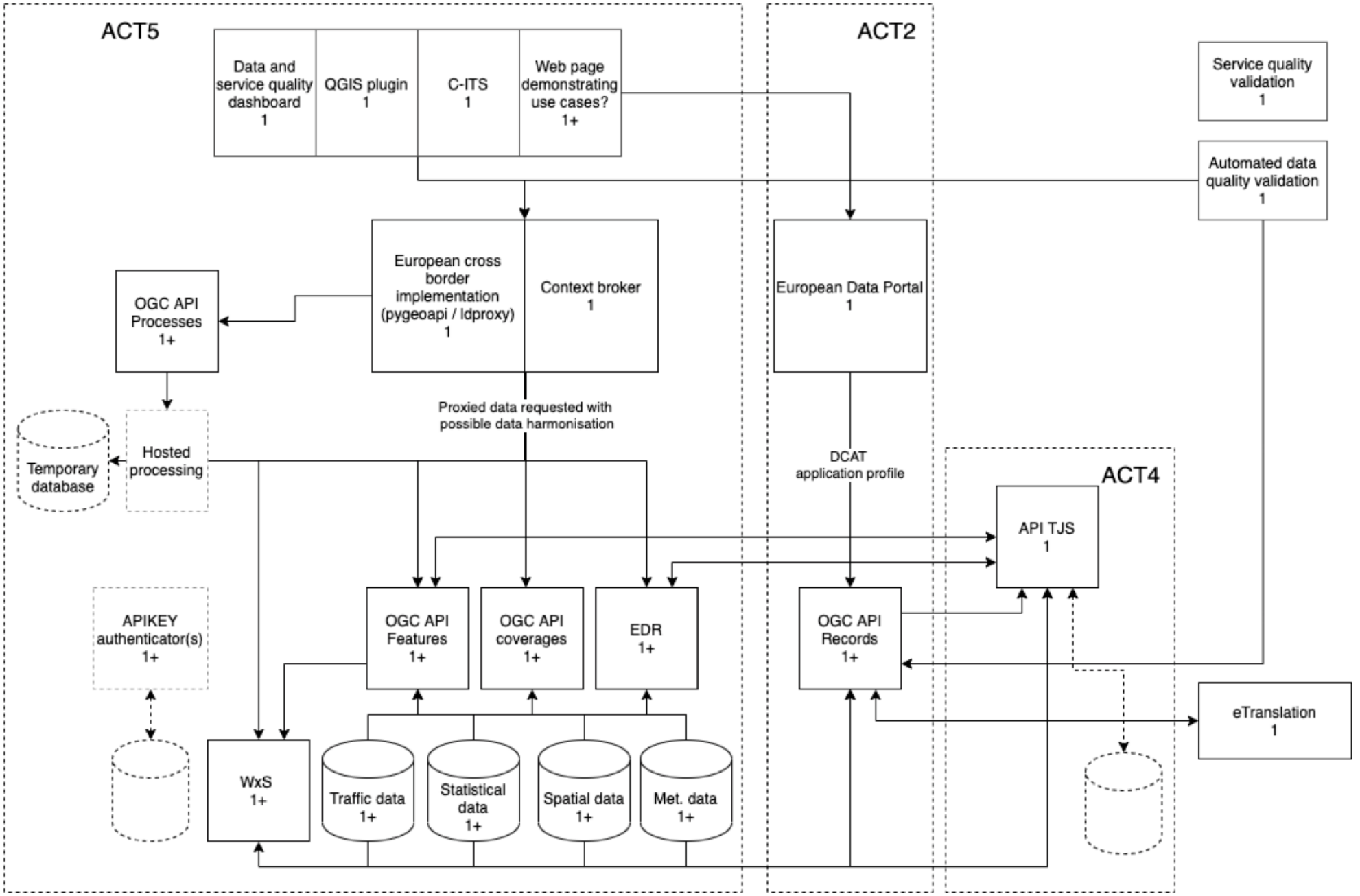
Geospatially Enabled Ecosystem for Europe GeoE3

- Cross-border and cross-domain integration of geospatial data
- Use case –driven
  - Renewable energy, Smart city
- Finland, Estonia, Norway, The Netherlands, Spain

Data Contents on the Integration Platform

- Focus so far mostly on
  - 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
- Running on cloud service platform
  - Django, pygeoapi (provider plugins, web user interface)

Geoe3 Service Architecture

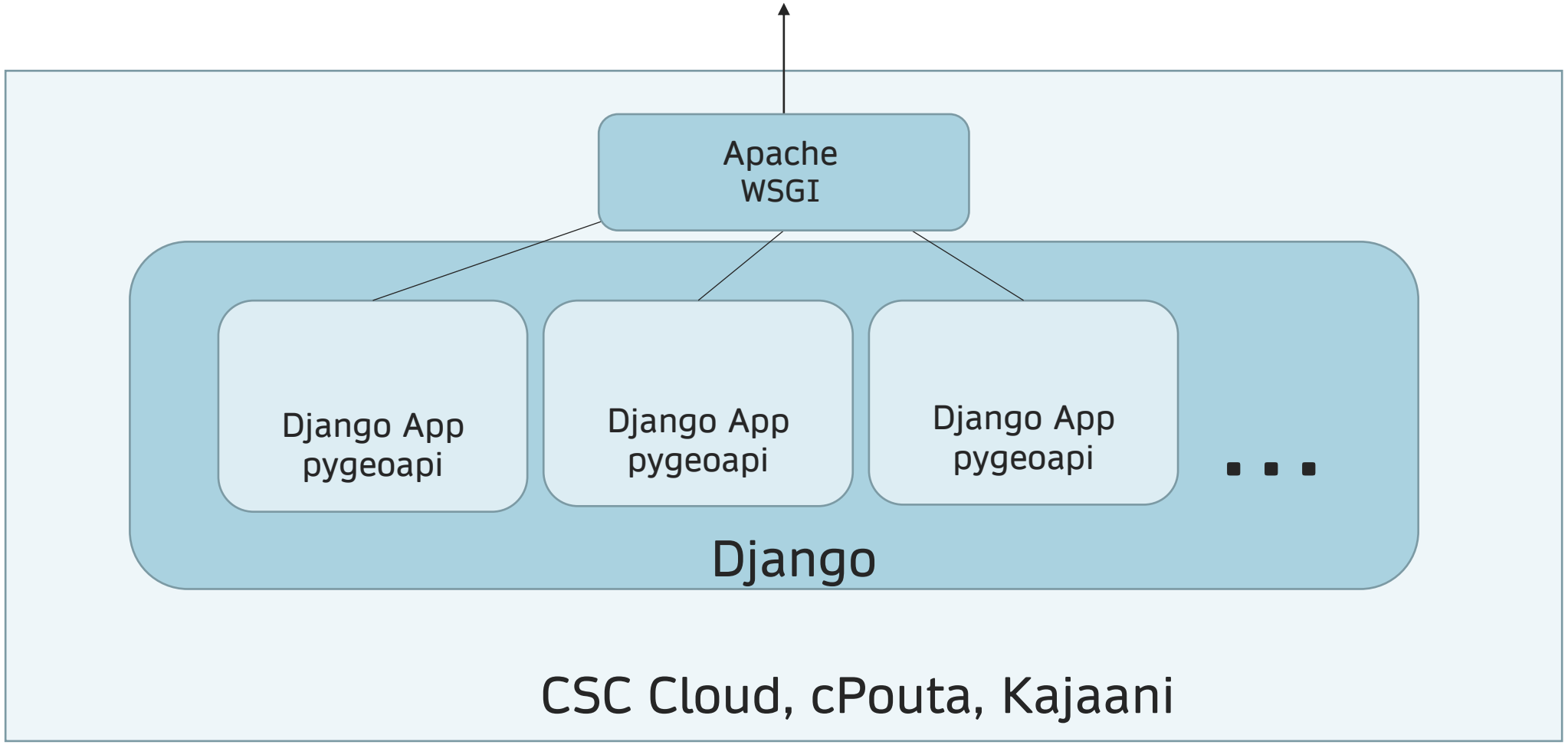


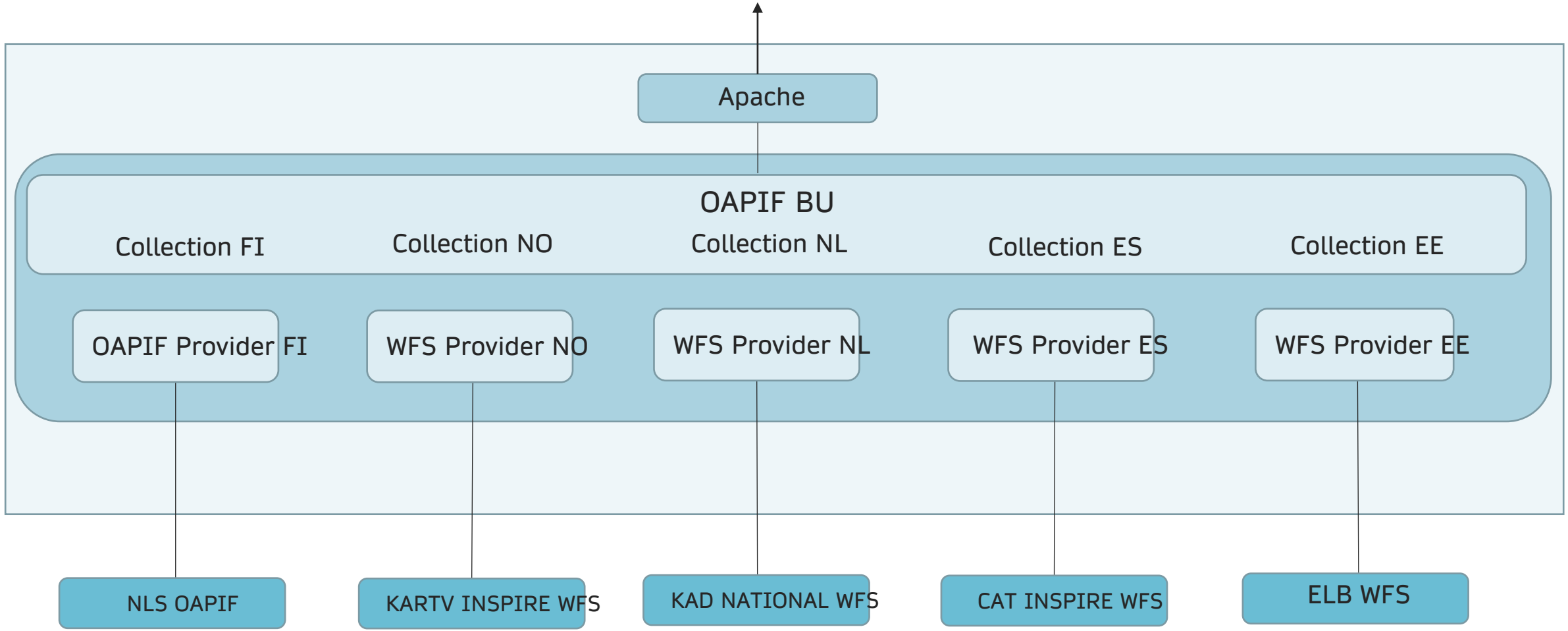
Cloud Platform

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

User Interface

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


Apache
WSGI
Django App
pygeoapi
Django App
pygeoapi
Django App
pygeoapi
Django
CSC Cloud, cPouta, Kajaani


Apache
OAPIF BU
Collection FI
Collection NO
Collection NL
Collection ES
Collection EE
OAPIF Provider FI
WFS Provider NO
WFS Provider NL
WFS Provider ES
WFS Provider EE
NLS OAPIF
KARTV INSPIRE WFS
KAD NATIONAL WFS
CAT INSPIRE WFS
ELB WFS

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)

User Interface

- HTML -formatted OGC API Features response
  - f=html
- Collection of visual components describing the feature
  - 2D map, 3D model, attributes
- OGC API Features html browsing rethought
  - Maintaining map-browsing metaphor

Finland

Buildings from NLSFI

buildings

View

Queryables

- Display Queryables of "Finland"

Links

- information (text/html)

Finland

Buildings from NLSFI

buildings

View

Queryables

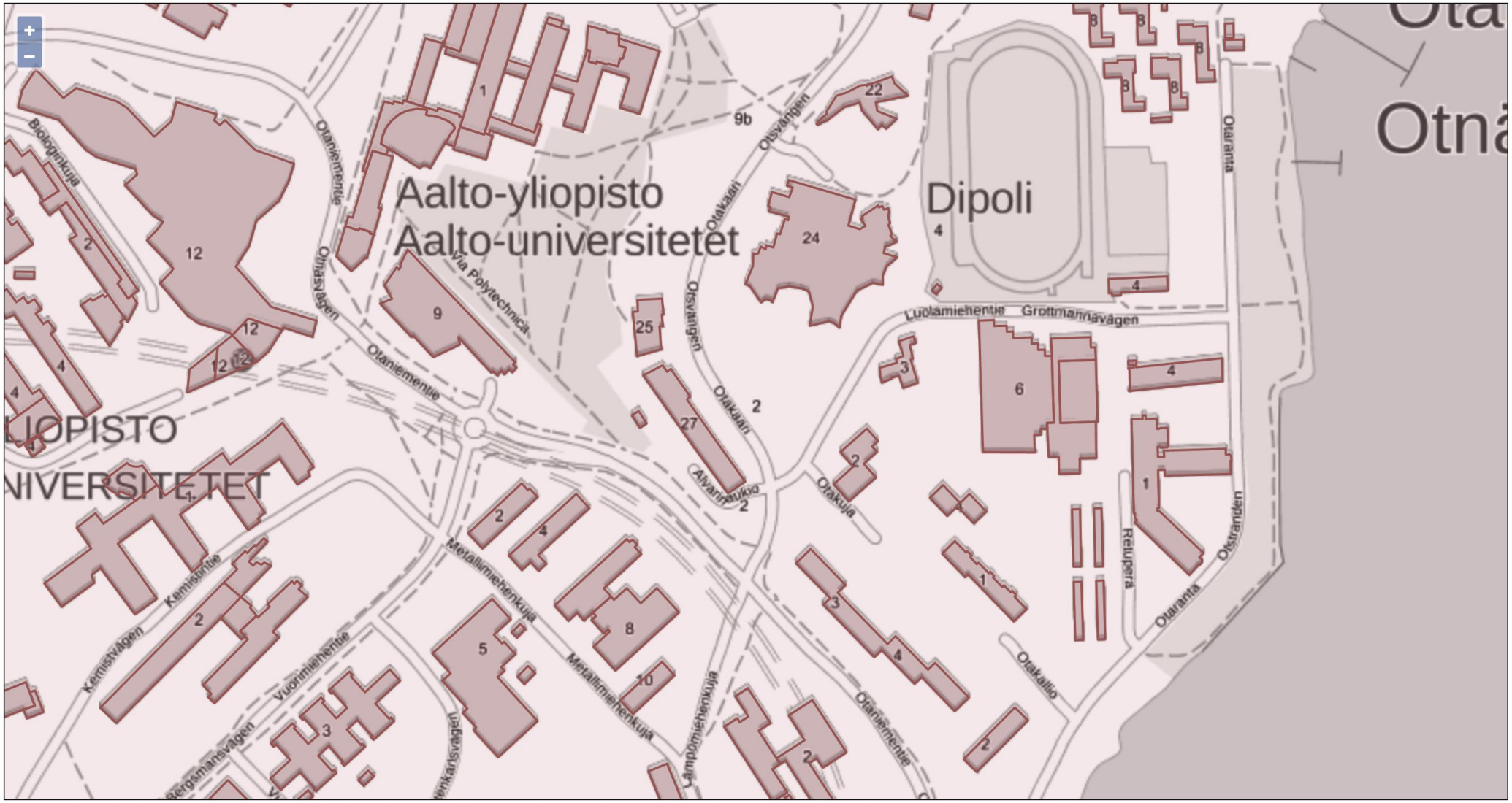
- Display Queryables of "Finland"

Links

- information (text/html)

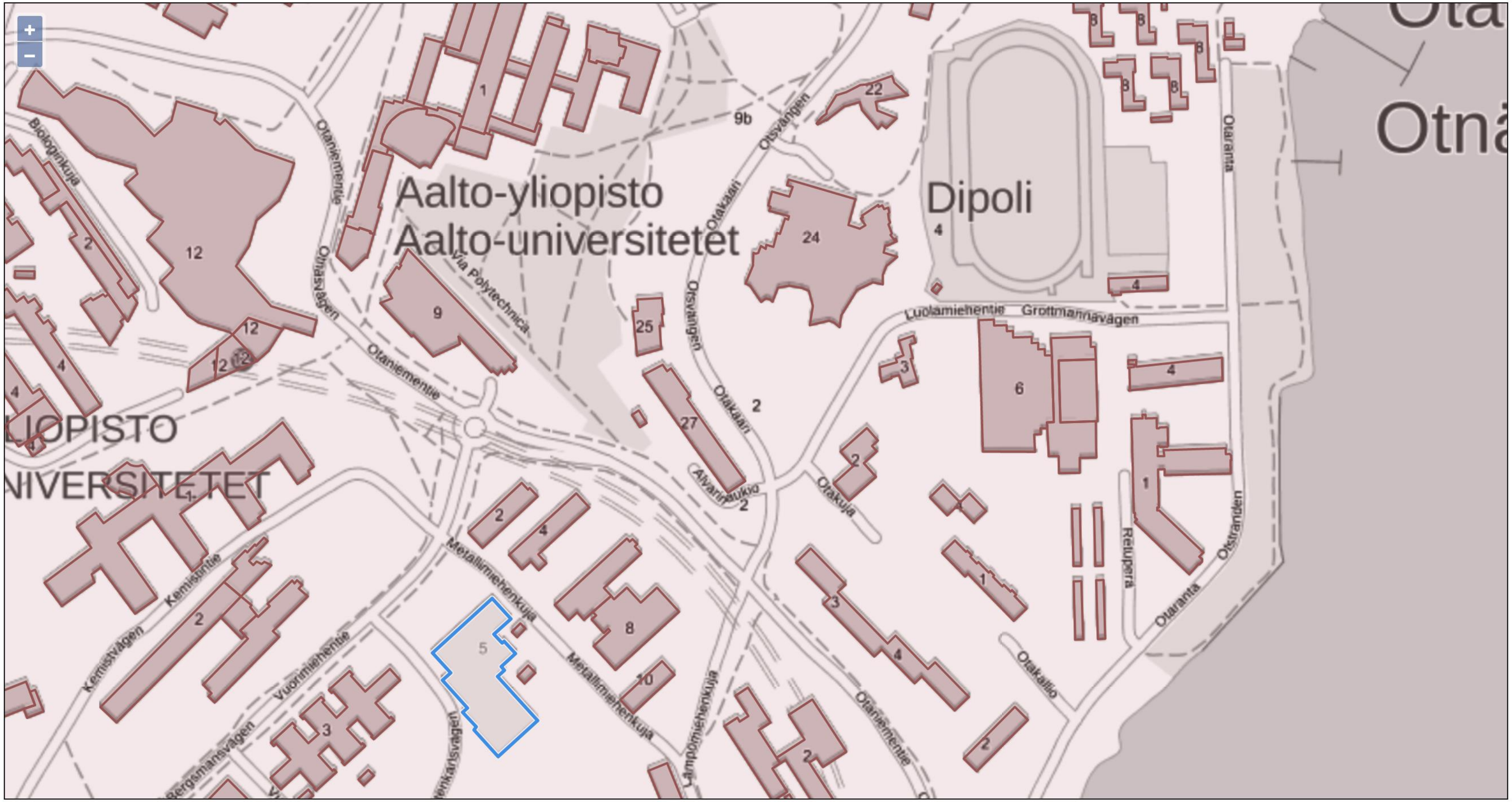
Finland

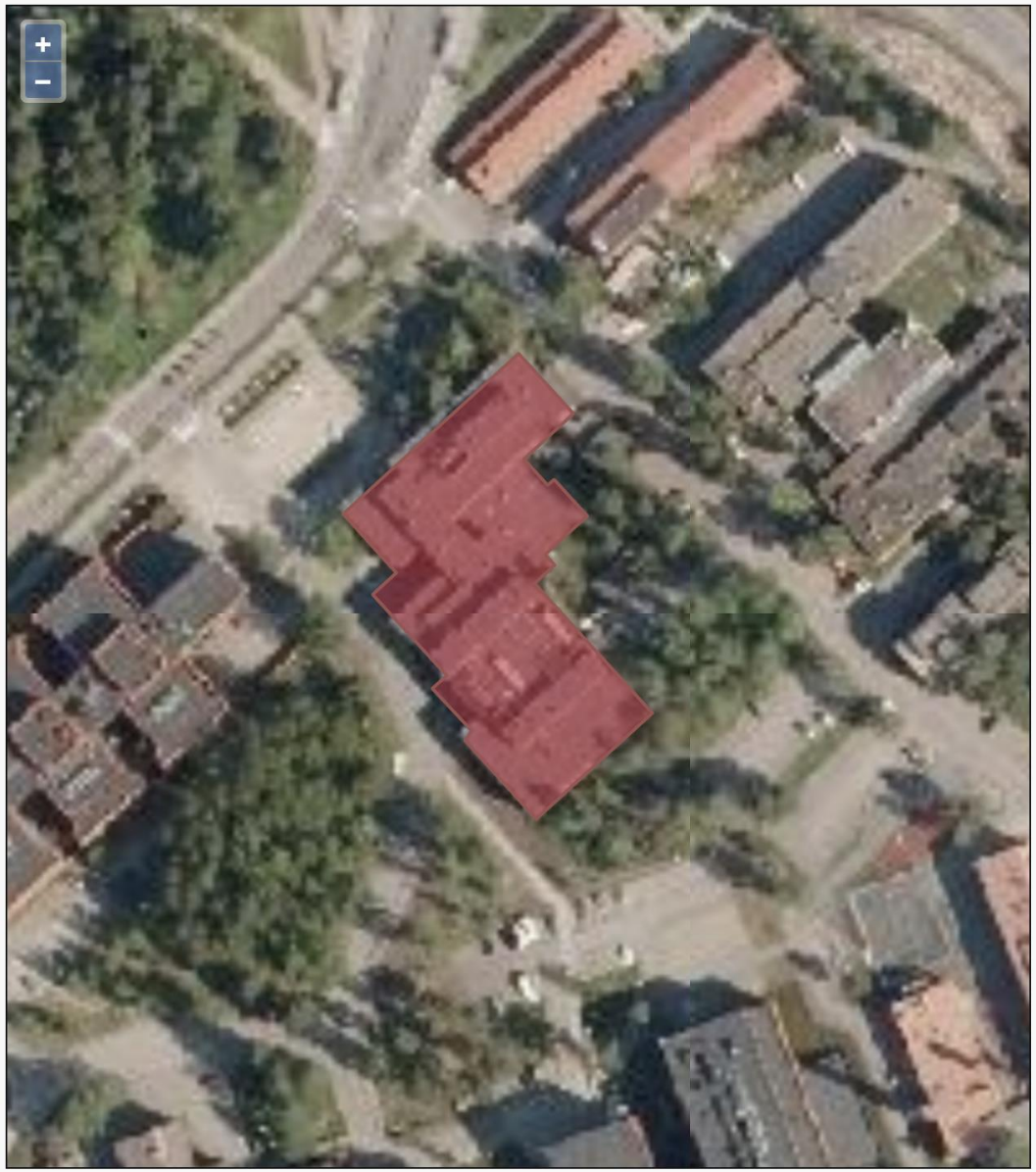
Zoom in to see the items in this collection.



Finland

Zoom in to see the items in this collection.



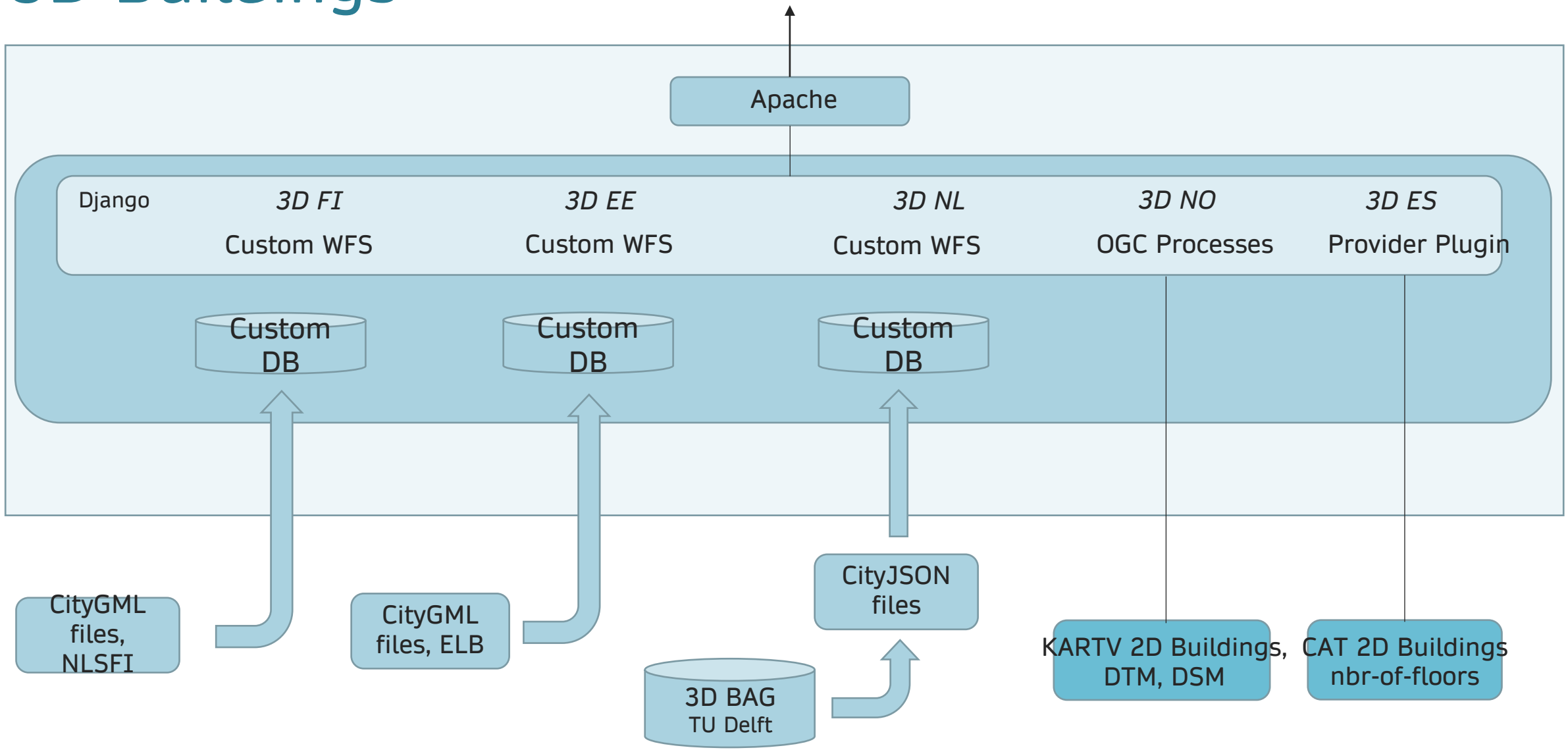


inspireId_localId	a6b6f0f9-05ea-4f19-9869-53c9a2689e37
inspireId_namespace	http://paikkatiedot.fi/1001075/bu/Building/
inspireId_versionId	4
beginLifespanVersion	2021-09-19T09:54:55.597Z
endLifespanVersion	null
externalReference_informationSystem	VTJ
externalReference_informationSystemName	RAHU
externalReference_reference	null
conditionOfConstruction	functional
geometry2D_referenceGeometry	true
geometry2D_horizontalGeometryReference	footPrint
geometry2D_horizontalGeometryReference_href	http://inspire.ec.europa.eu/codelist/HorizontalGeometryReferenceValue/footPrint
sourceId	417738341
temperature	6.0

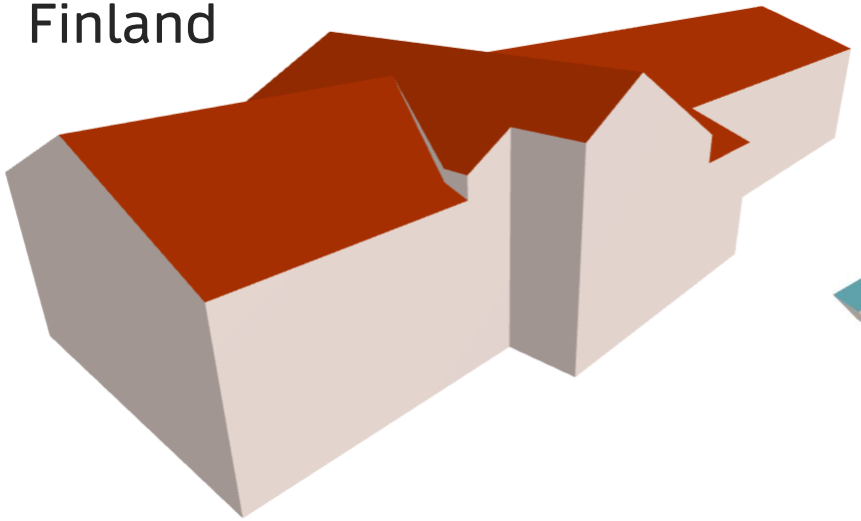
3D Buildings

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

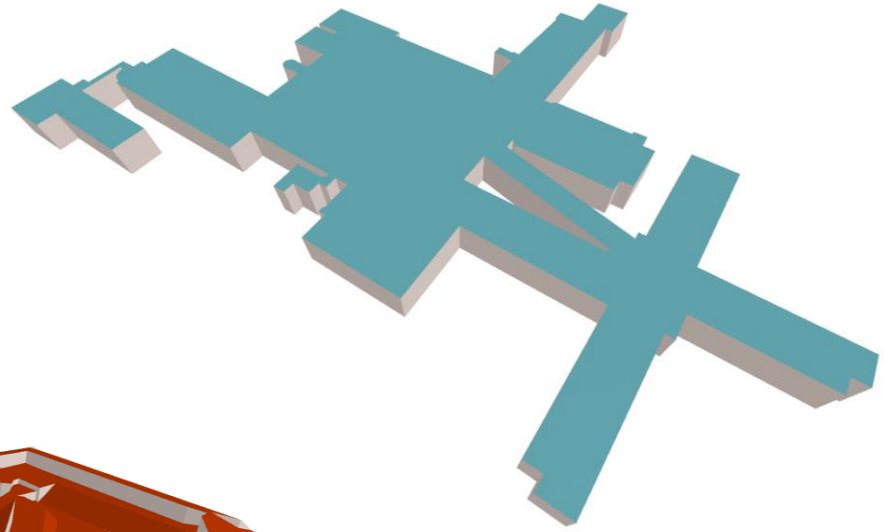
3D Buildings



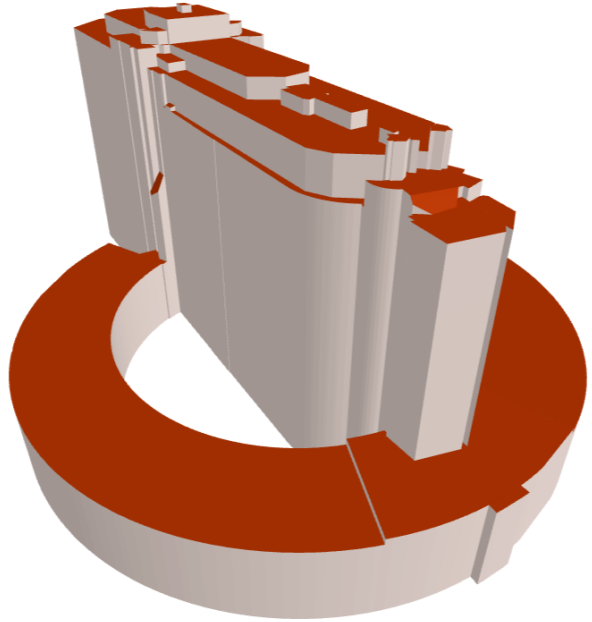
Finland

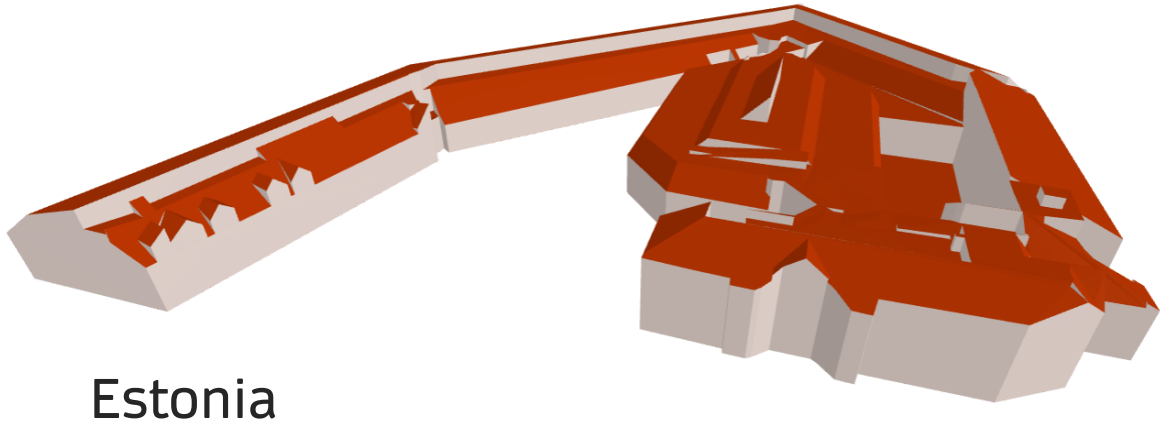


Norway

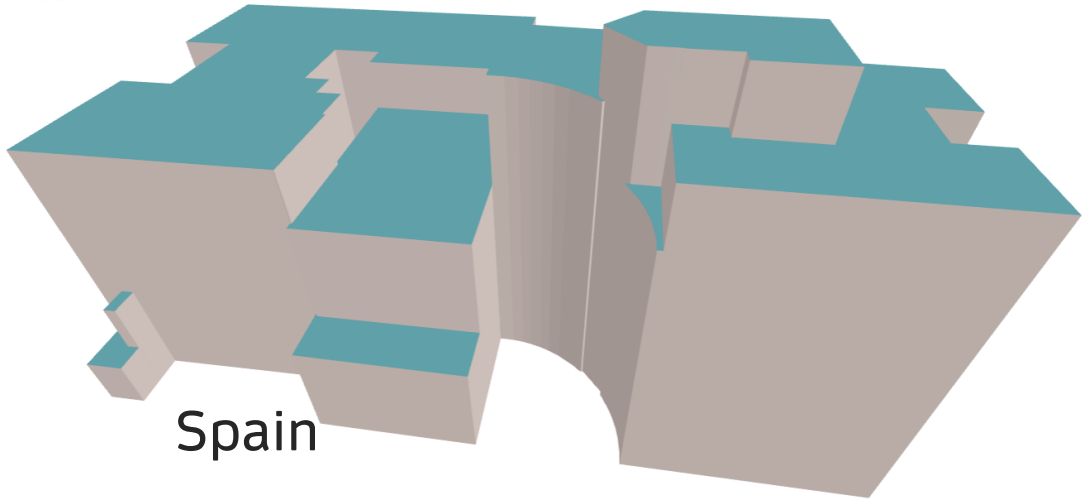


The Netherlands



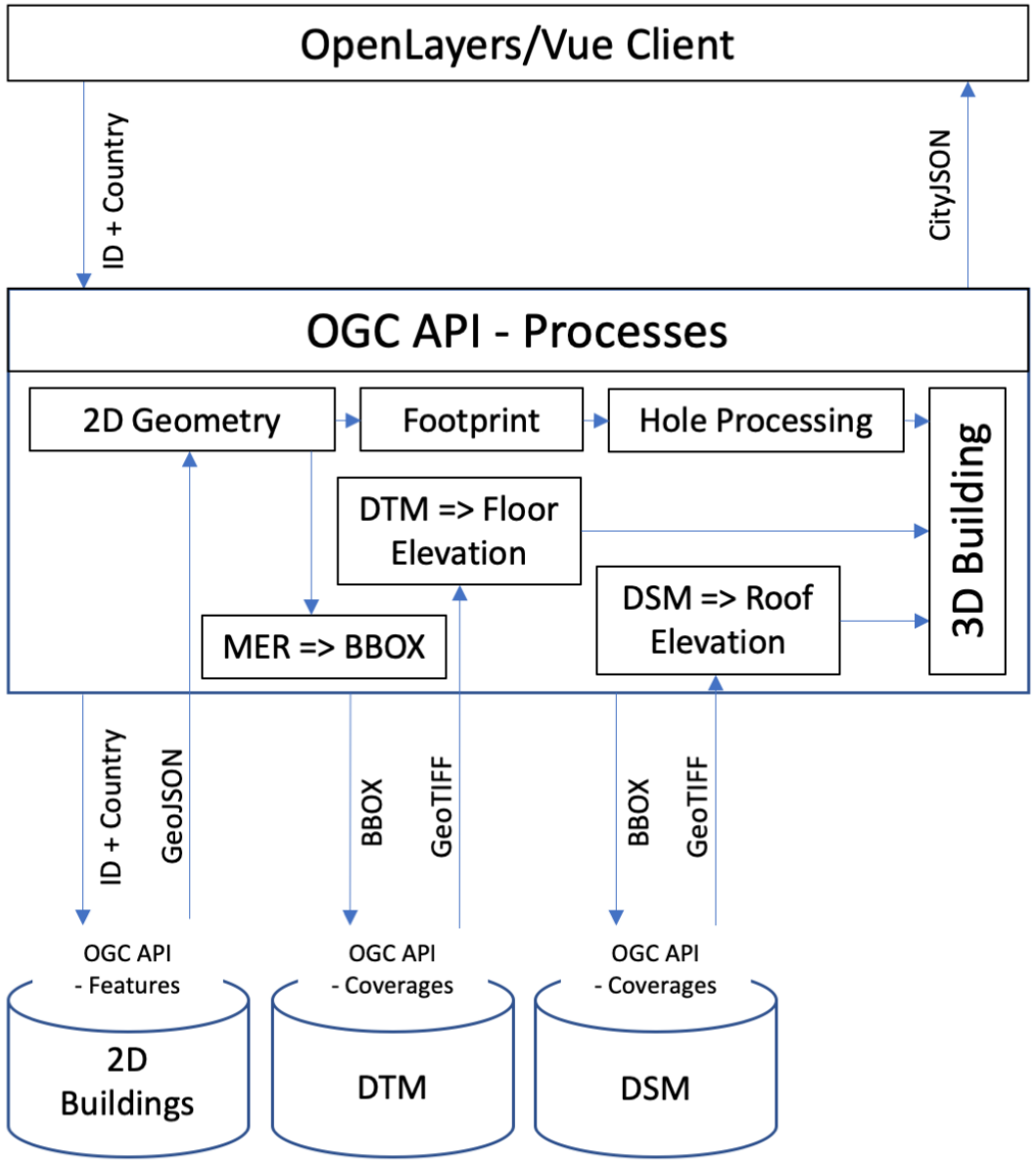


Estonia



Spain

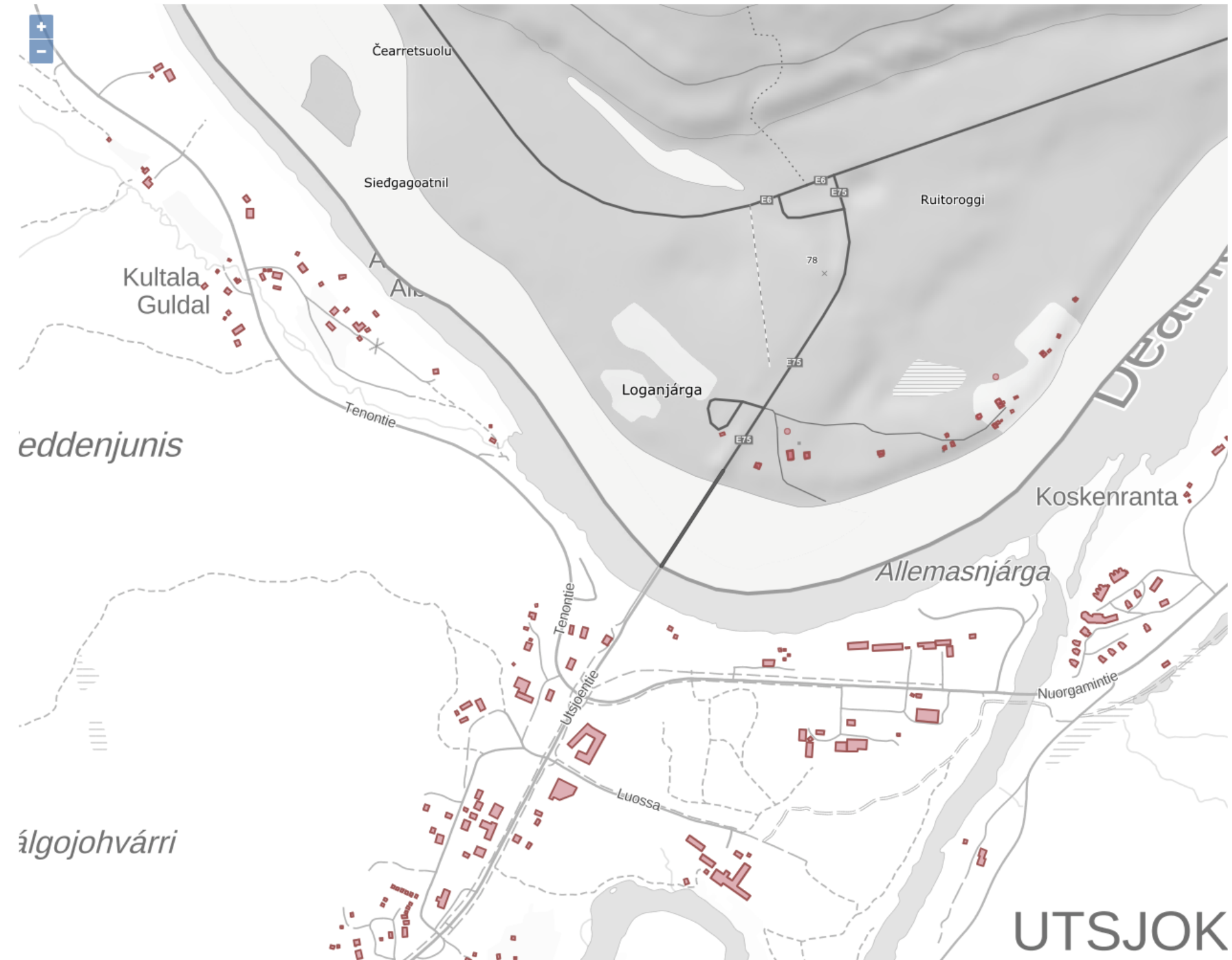
On-the-fly Generation of 3D Buildings

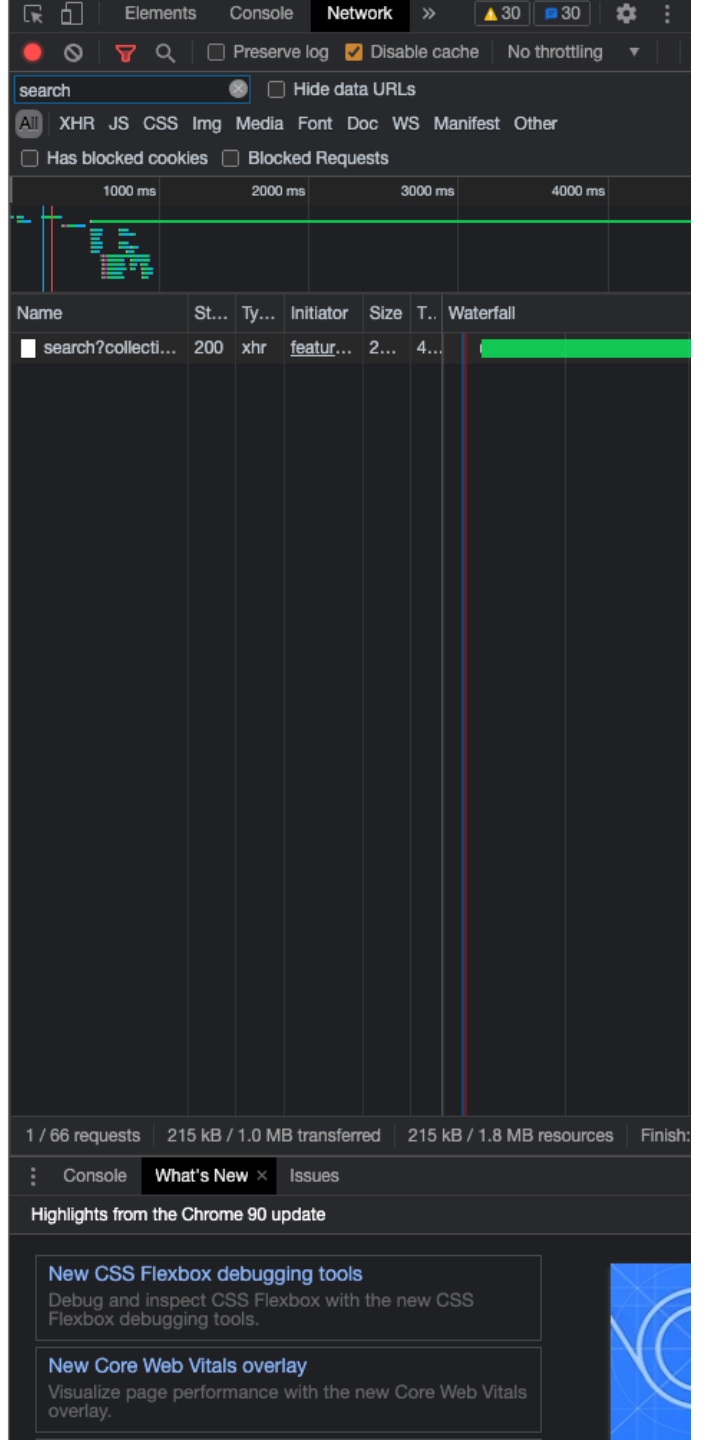


Cross-collection queries

- Important for the cross-border provision of datasets
- Idea from 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


Čearretsuolu
Sieđgagoatnil
Ruitoroggi
Kultala
Guldal
Loganjárga
Tenontie
eddenjunis
Koskenranta
Allemasnjárga
Tenontie
Utsjoentie
Nuorgamintie
Luossa
álgojohvárri
UTSJOK
E6
E75
78


Elements
Console
Network
30
30
Preserve log
Disable cache
No throttling
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
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

- Important for the cross-border provision of datasets
- Experimental for OGC API Coverages

- 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

- Available 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

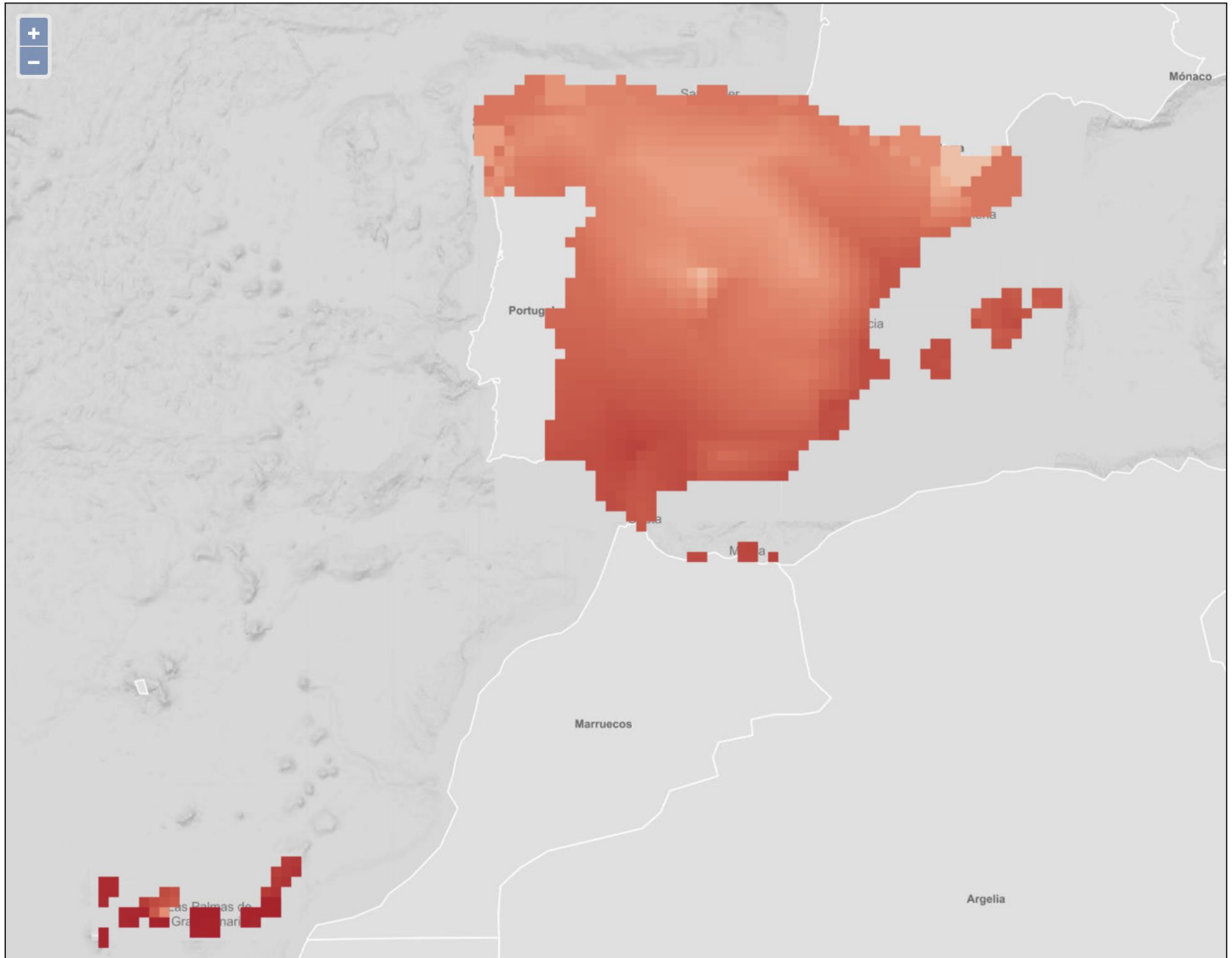
Climate Data Integration

- Data accessed from the national Met agencies portals
- From point observations to interpolated grid
- Served via OGC API Coverages
- Integrated with individual building features
  - Value accessed using buildings centroid

Zoom in to explore the coverage.

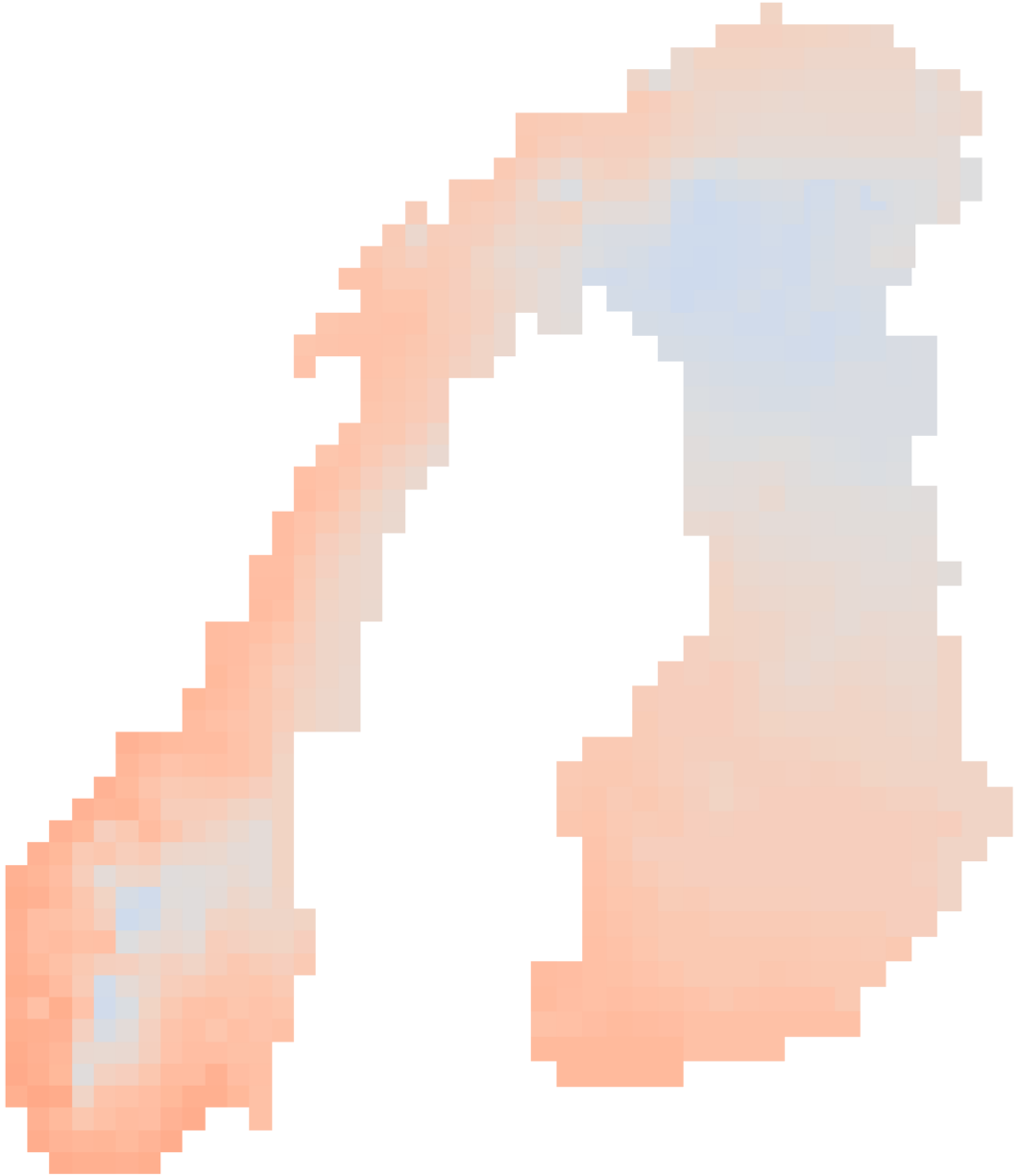
GTiff

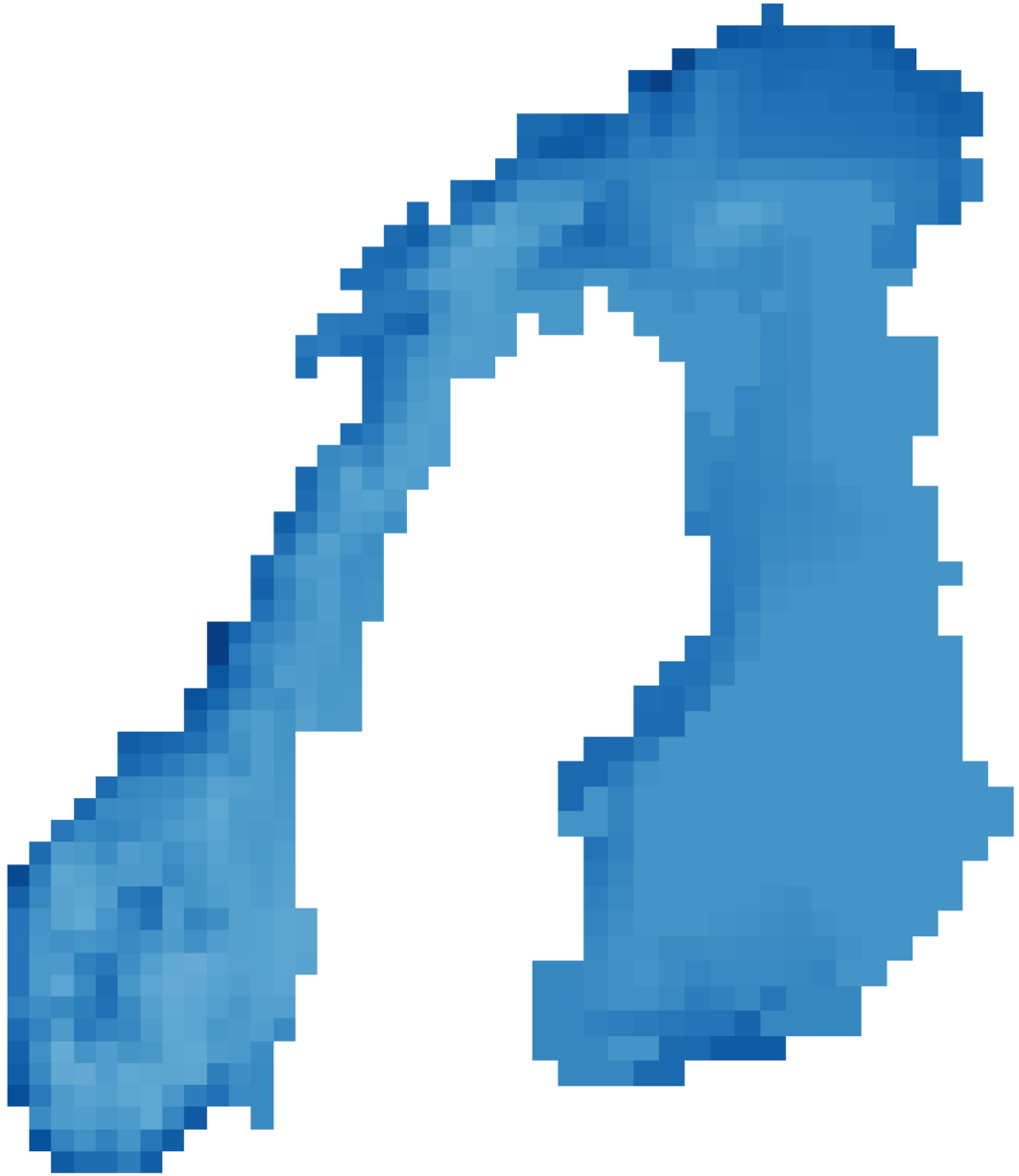
Download



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&





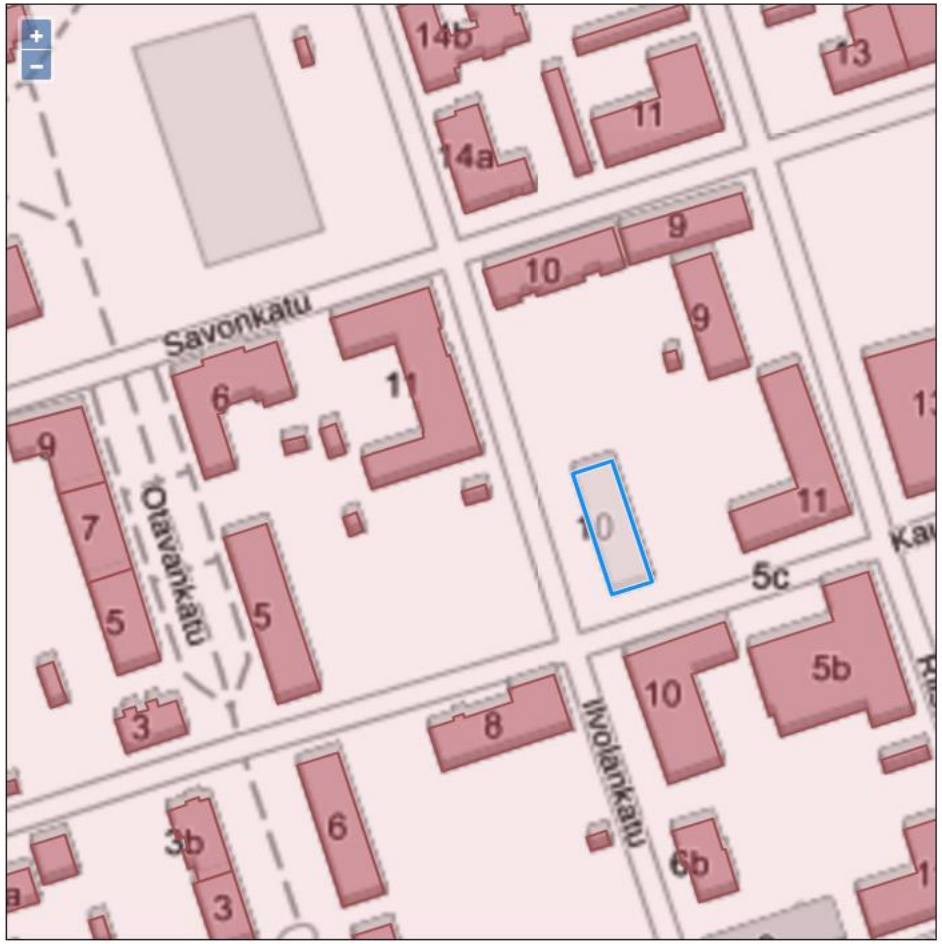
Application Example

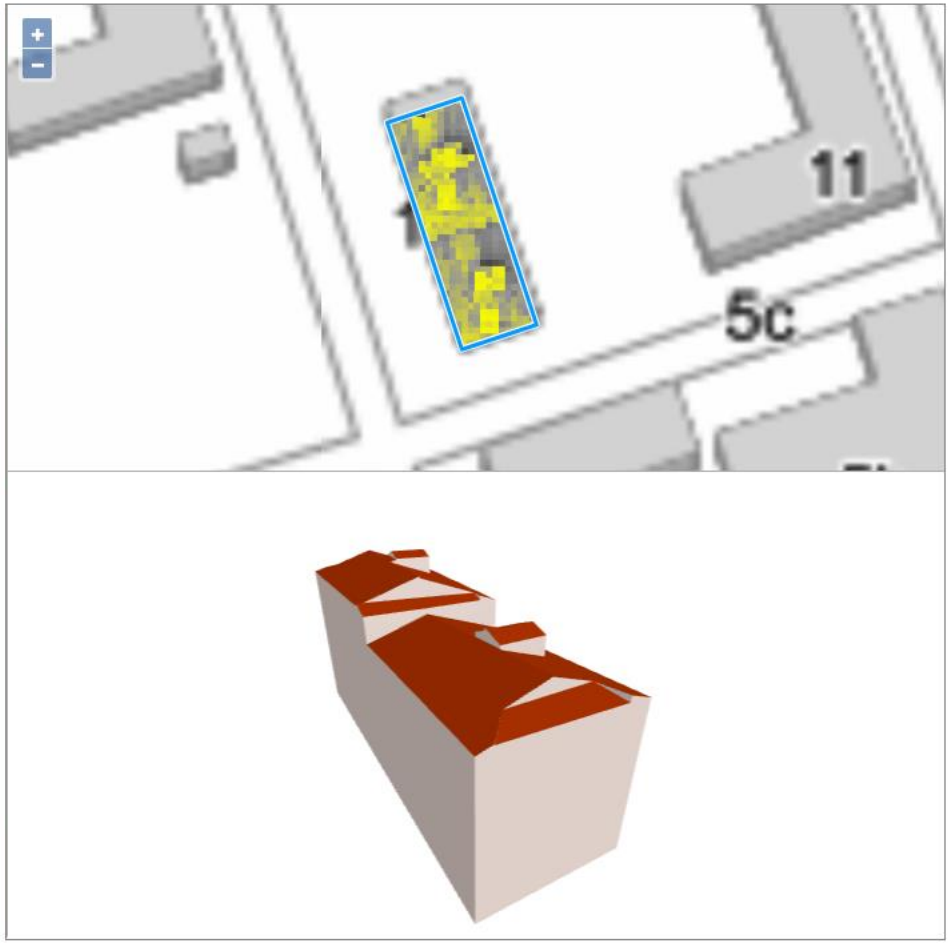
- Building’s 2D and 3D viewing
- Solar exposure analysis
  - WhiteboxTools: TimeInDaylight
- Integration of climate attributes
  - Temperature, windspeed, sunshine hours
- Integration of energy register
  - Energy class attribute

Buildings / Collections / Finland / Items / 74d72002-d920-4828-8241-b9969a96bb12:4

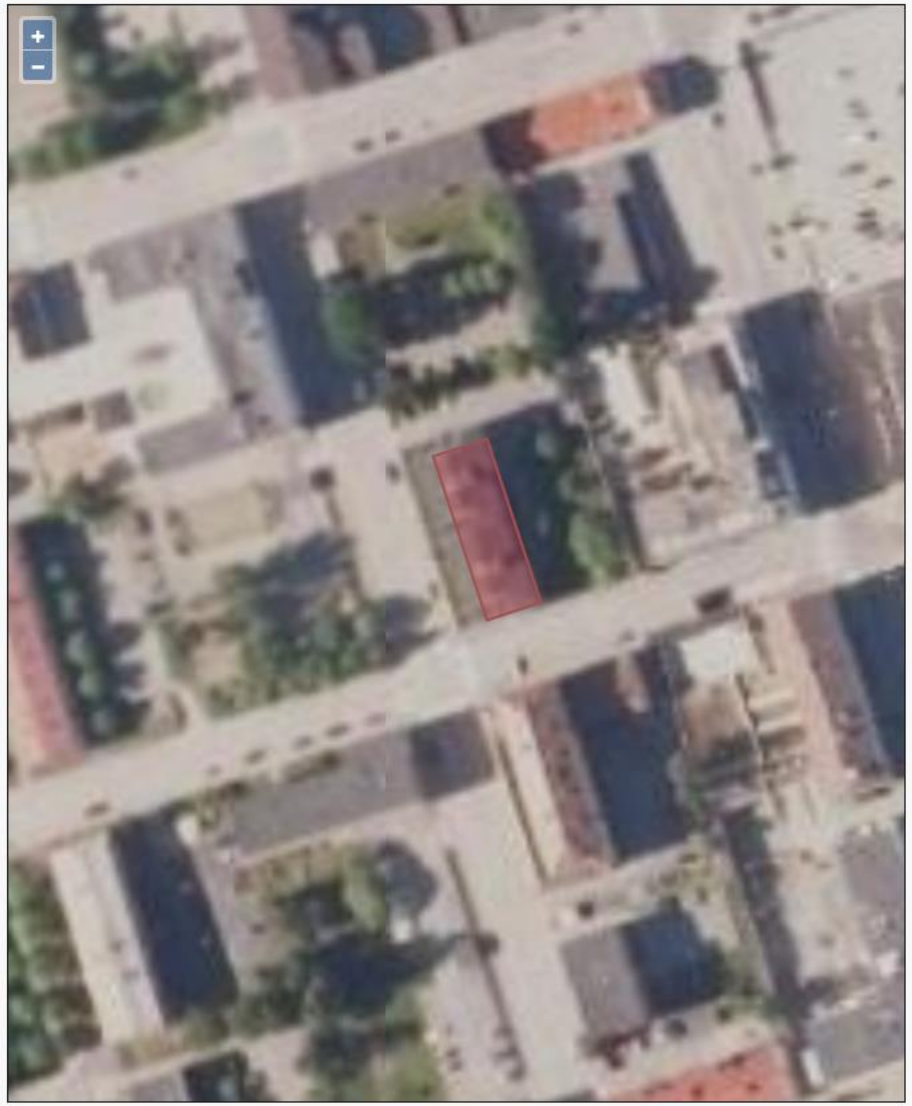
Finland

Zoom in to see the items in this collection.





Buildings / Collections / Finland / Items / 74d72002-d920-4828-8241-b9969a96bb12:4 [3D]



currentUse_currentUse	1
materialOfFacade	2
floorDescription_floorArea	1560
numberOfFloorsAboveGround	3
officialArea_value	1560
volume_	5770
heatingSystem	1
heatingSource	01
materialOfStructure	1
constructionMethod_	2
address_thoroughfare_name_fin	Ilvolankatu
address_locator_designator_addressNumber	10
sunshine_hours	1580
windspeed	3.0
temperature	3.3
energyClass	D

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, use case-driven geodata integration platform
- 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
  - All provided in CityJSON, via OGC API Features
  - Web-based visualization by ThreeJsViewer.vue
- Climate data integration
  - From point observations to grid coverages
  - Values dynamically integrated as building attributes

Thank you!