CROSS-BORDER AND CROSS-DOMAIN INTEGRATION OF CONTENT IN A EUROPEAN GEOSPATIALLY ENABLED ECOSYSTEM

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IARIA

LASSI LEHTO

Dr. (Tech) Lassi Lehto is the Research Manager at the Dept. of Geoinformatics and Cartography in the Finnish Geospatial Research Institute. Lehto's research interests include geospatial network services and their interoperability, SDI architectures, and modelling of geographic information. He has been a member of the drafting team "Network Services" preparing implementing rules for the INSPIRE Directive and has taken part in several collaborations aimed at developing a Pan-European SDI.

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GEOE3 ACTION

- Geospatially Enabled Ecosystem for Europe (GeoE3)
- Funded by Connecting Europe Facility (CEF)
- Duration: three years
- Budget: 2.6M€
- 12 partners
- Five national mapping or cadastral agencies
  - Finland, Norway, Estonia, The Netherlands, Spain
- Coordinated by National Land Survey of Finland

GEOE3 GOALS

- Use case –oriented approach for service development
- Cross-border content integration
  - Across five participating countries
- Cross-domain content integration
  - Geospatial with statistical, meteorological
- Implement modern service interfaces
  - OGC API Features, Coverages, Processes, Records
- Presenting 3D geodata in browser
- On-the-fly data enhancements

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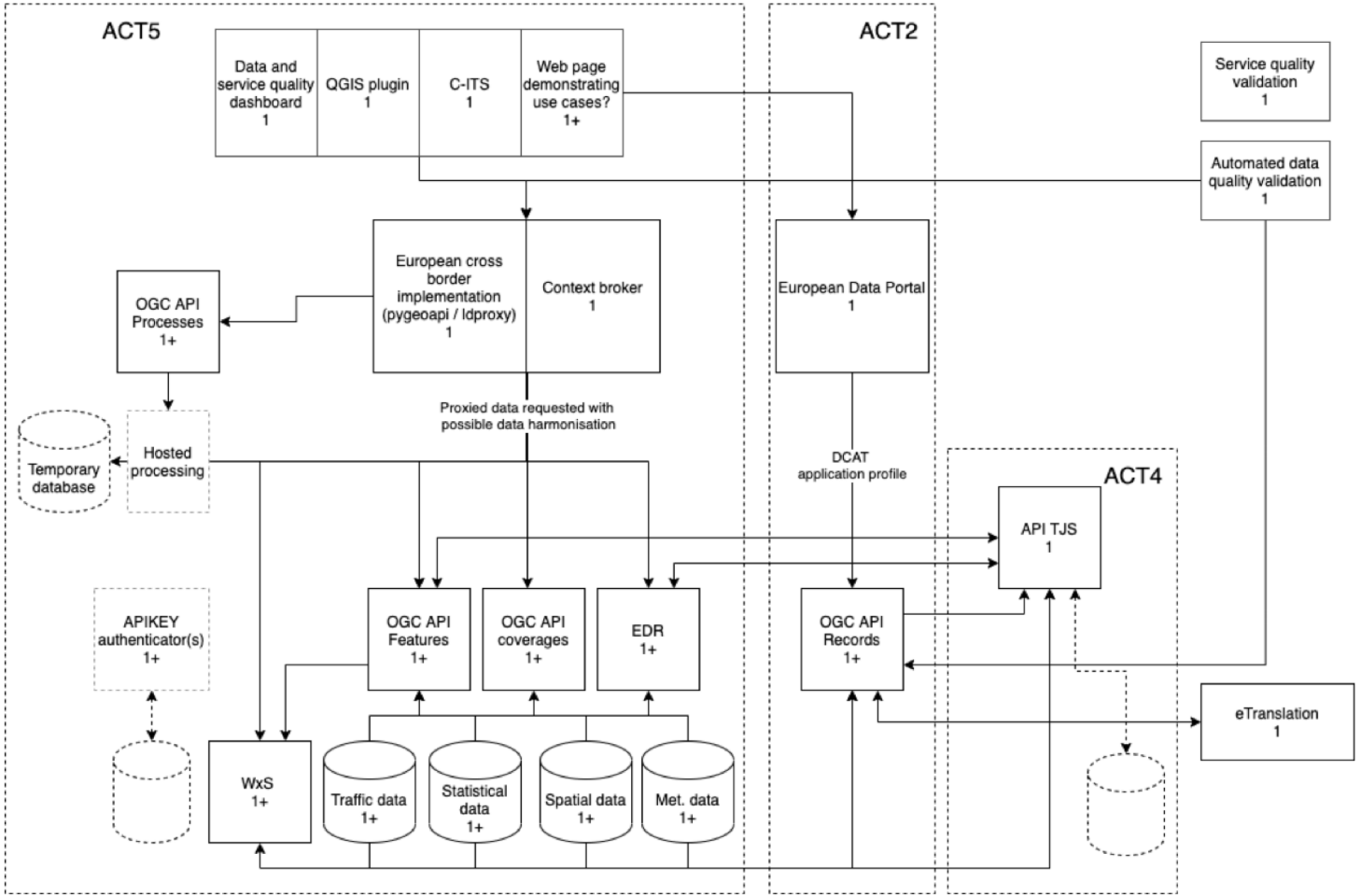
GEOE3 SERVICE ARCHI-TECTURE

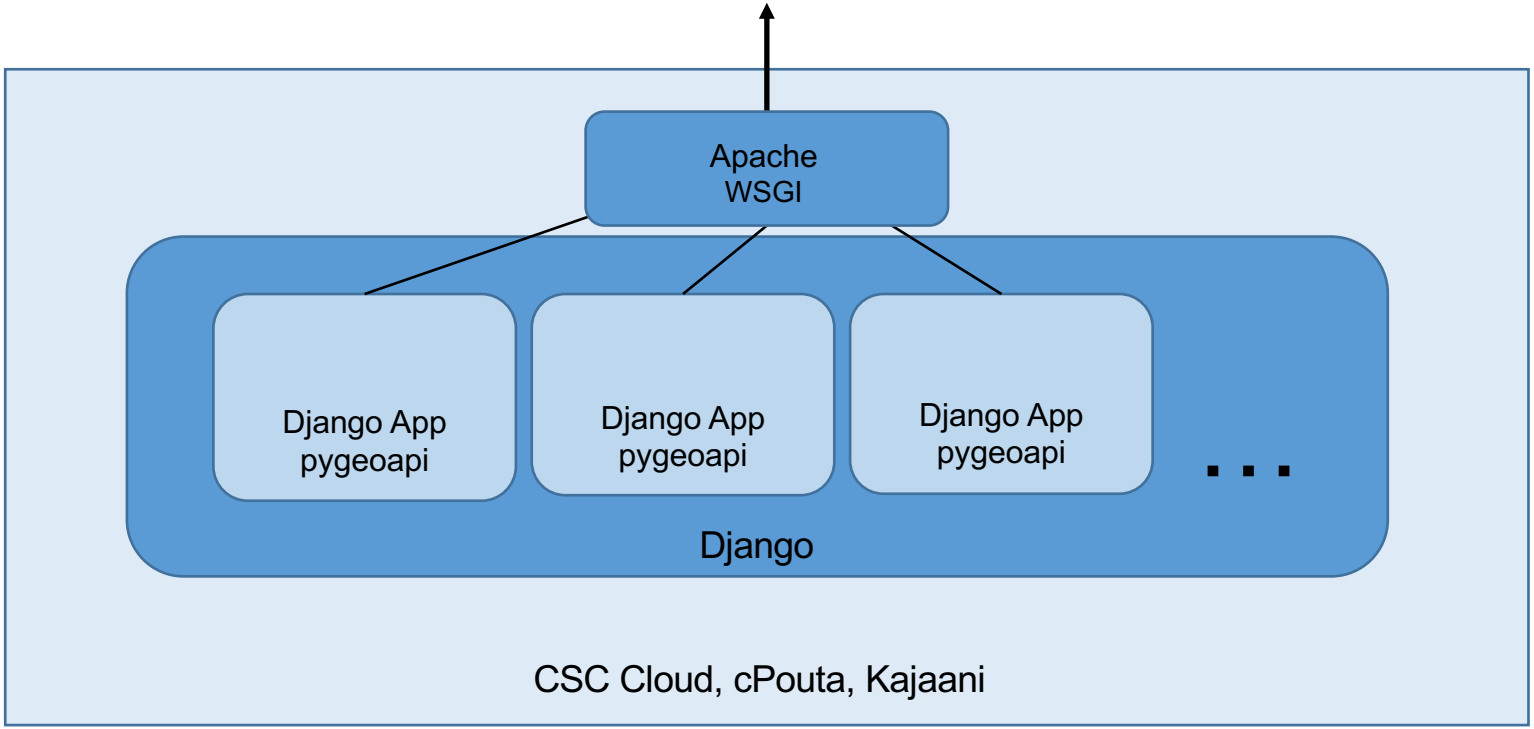


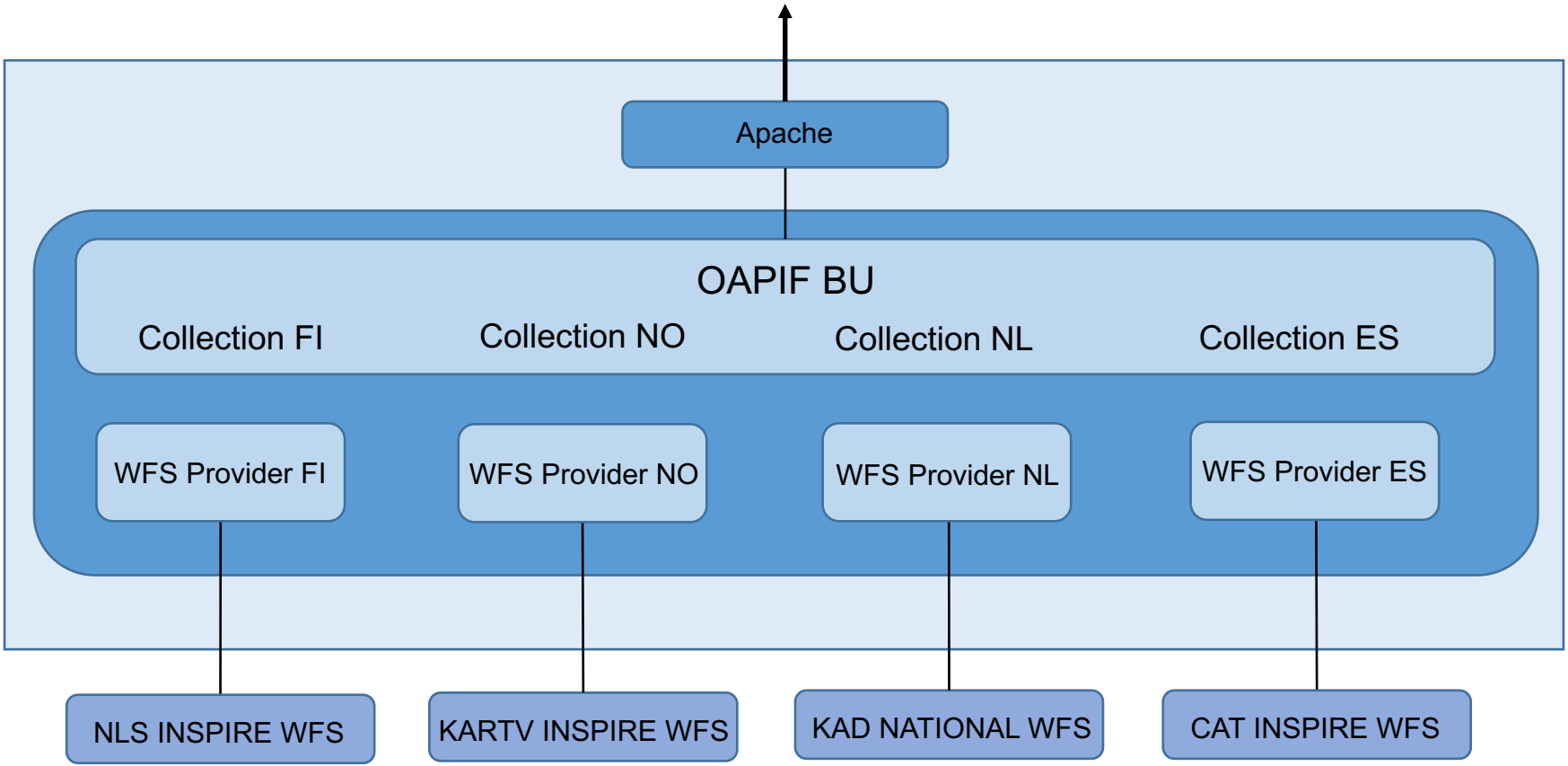
July, 2021

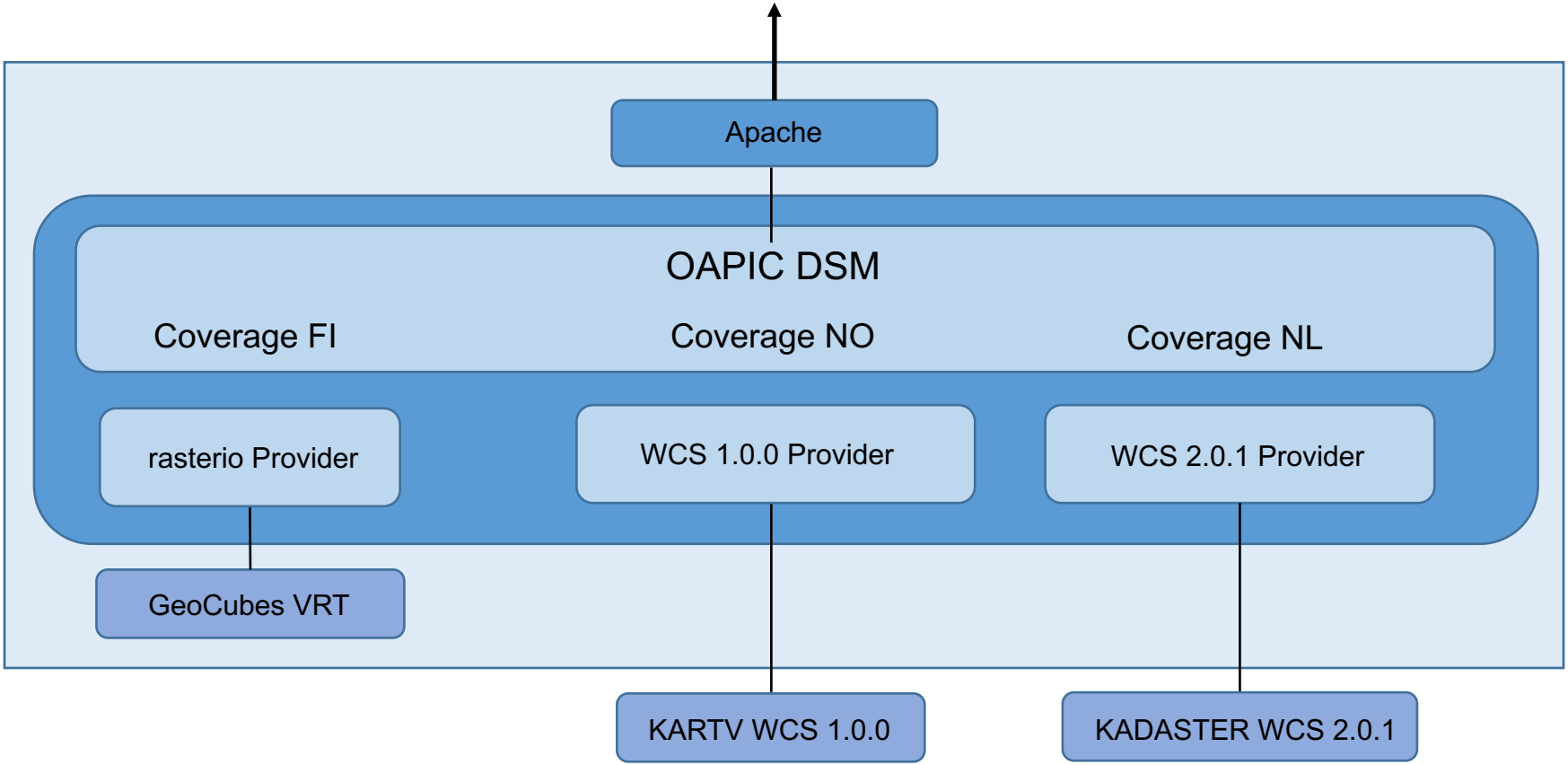
CLOUD PLATFORM

- Linux, Apache2, WSGI
- Django
- pygeoapi
- rasterio
- GDAL/OGR
- owslib

- CSC Cloud Platform cPouta
  - In Kajaani, Finland

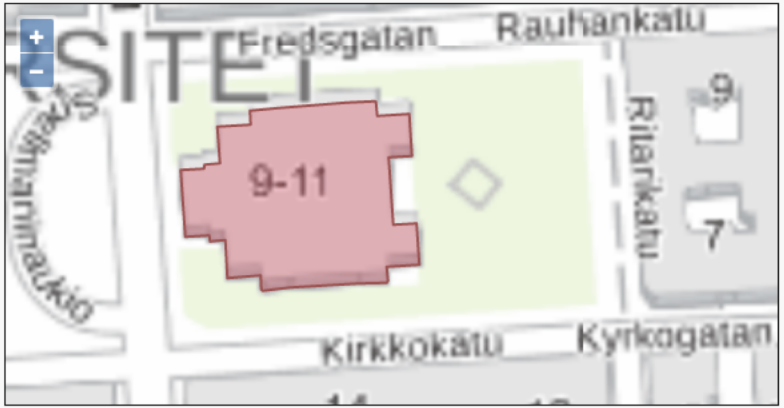

Apache
WSGI
Django App
pygeoapi
Django App
pygeoapi
Django App
pygeoapi
. . .
Django
CSC Cloud, cPouta, Kajaani


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


Apache
OAPIC DSM
Coverage FI
Coverage NO
Coverage NL
rasterio Provider
WCS 1.0.0 Provider
WCS 2.0.1 Provider
GeoCubes VRT
KARTV WCS 1.0.0
KADASTER WCS 2.0.1

FEATURE DASHBOARD

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



currentUse_currentUse_href	http://inspire.ec.europa.eu/codel...
currentUse_percentage	100
geometry2D_referenceGeometry	true
geometry2D_horizontalGeometr...	foot print
geometry2D_horizontalGeometryRe...	http://inspire.ec.europa.eu/codelis

APPLICATION-SPECIFIC FEATURE DASHBOARD

- For instance analysis of sun energy potential on rooftop
- Building footprint and Digital Surface Model
  - OGC API Features, Coverages
- Application-specific formatting
  - f=html-se: html –formatted representation of content destined for sun energy -related applications)
  - f=json-se (the same, but json –formatted)
- Example
  - WhiteboxTools: TimeInDaylight

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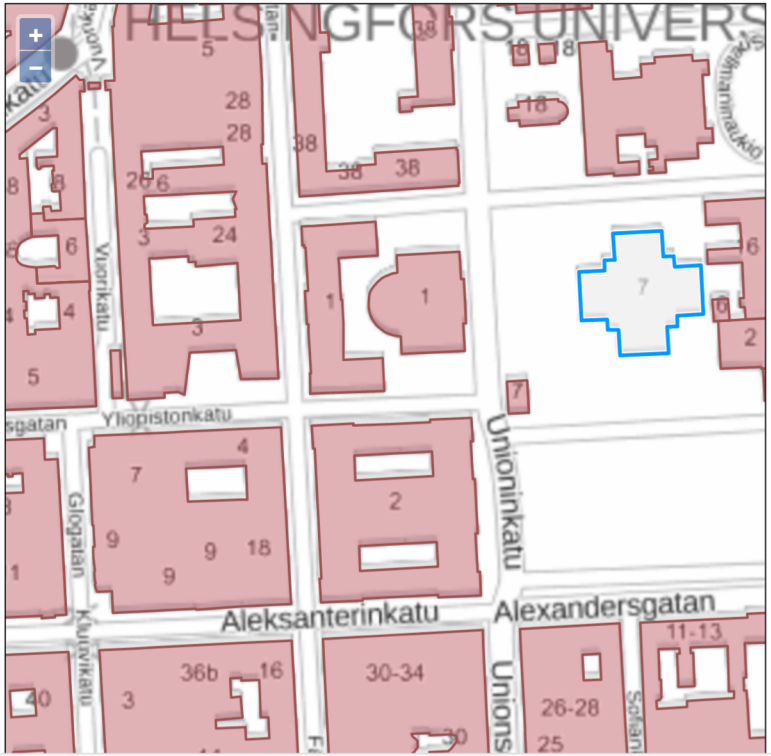
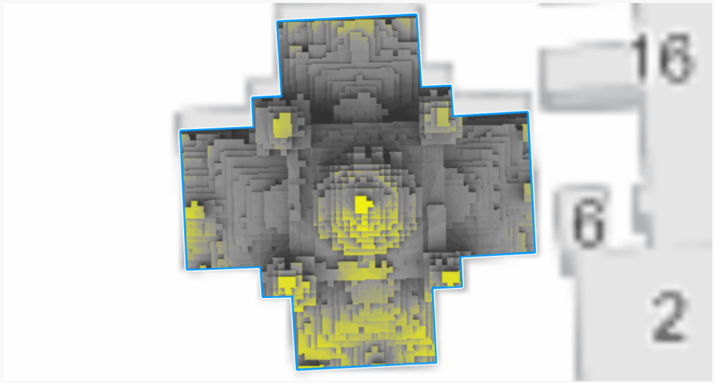
Finland

Zoom in to see the items in this collection.



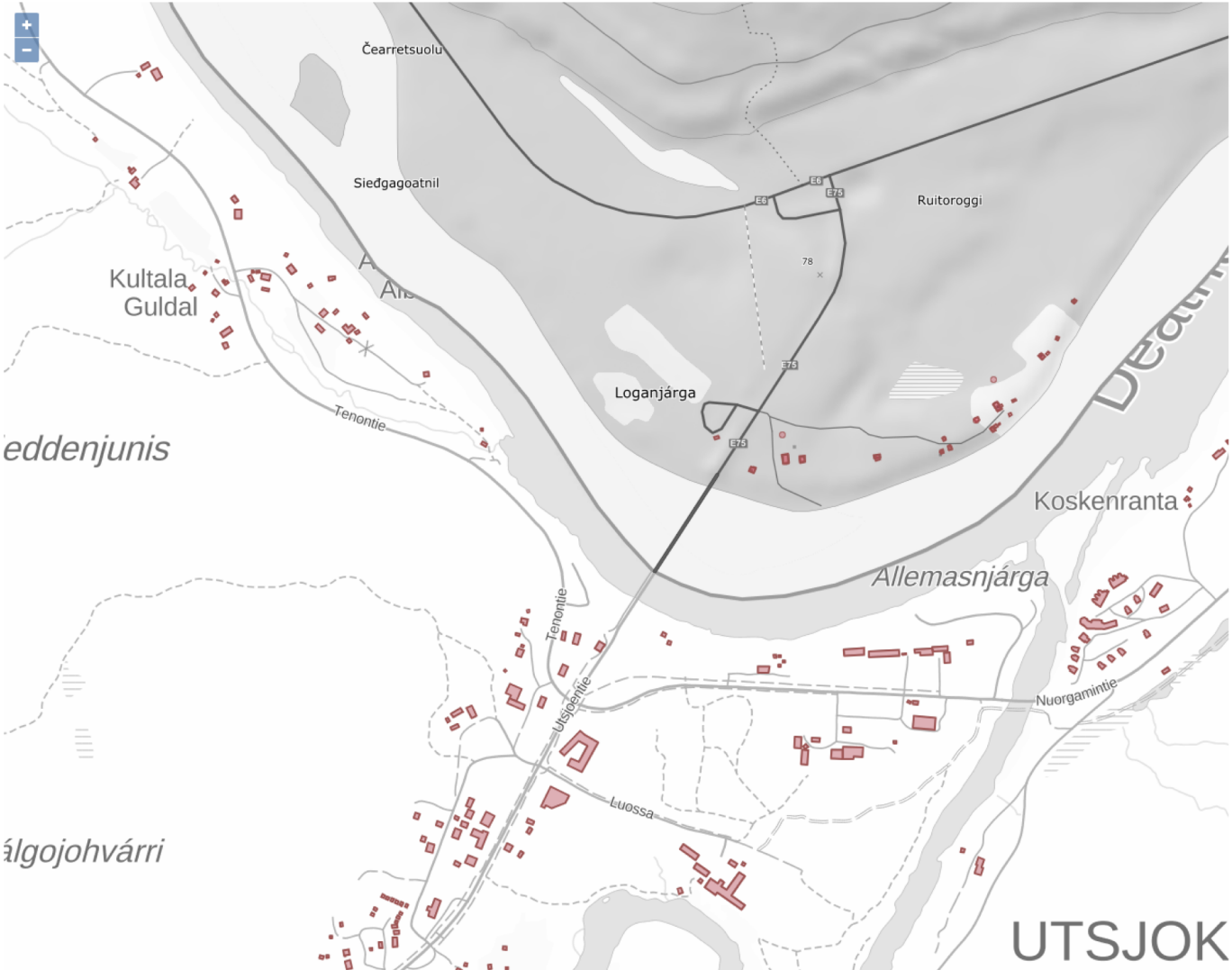


Wind Speed[50m]: 6.1m/s

OAPIF CROSS-COLLECTION QUERY

- Essential from the cross-border interoperability point of view
- OAPIF – Part 3, Chapter 6.4

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
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.

OAPIC CROSS-COVERAGE QUERY

- Essential from the cross-border interoperability point of view
- Experimental, not standardized

- 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

OAPIC CROSS-COVERAGE QUERY

- Server runs two background queries for DSM (Finland, Norway)
  - Finland in ETRS-TM35FIN (EPSG:3067)
  - Norway in UTM Zone 33 (EPSG:25833)
- Transformation to Pseudo Mercator (EPSG:3857)
  - Harmonization of resolution
  - Nodata areas
- Merging arrays together
- Masking of the nodata areas
- Rendering to PNG image

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Norway
Finland

Hide Border | DTM | DSM | FI | NO

CONCLUSION

- GeoE3 action commenced in CEF programme
  - Use case -oriented
- Aims at cross-border and cross-domain data integration
  - Five countries, integration of statistical and meteorological data
- Applies modern service interface standards
  - OGC API Features, Coverages, Processes, Records
- Focus on 3D presentation of geodata in browser
- Rethinking of OGC API Features html output

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THANK YOU!

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