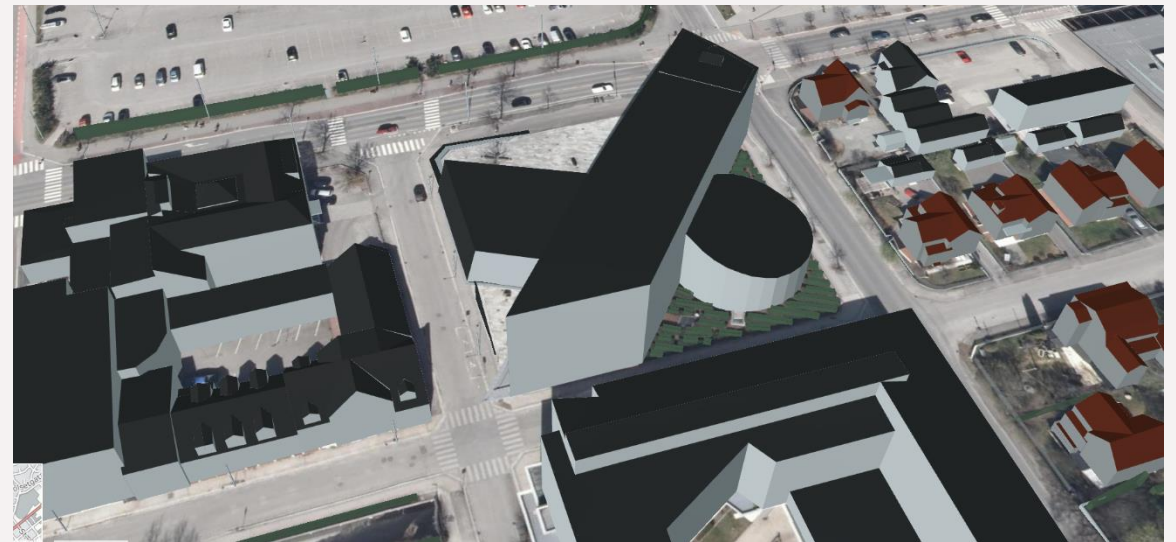
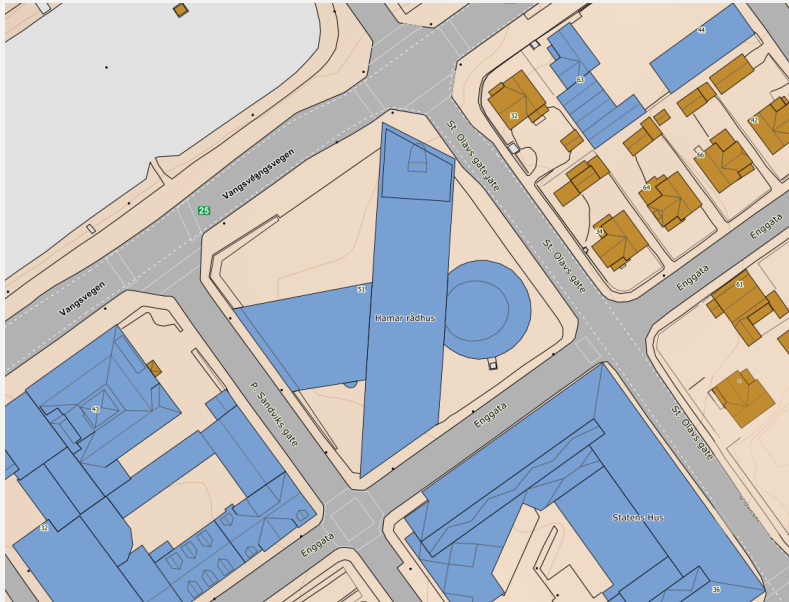


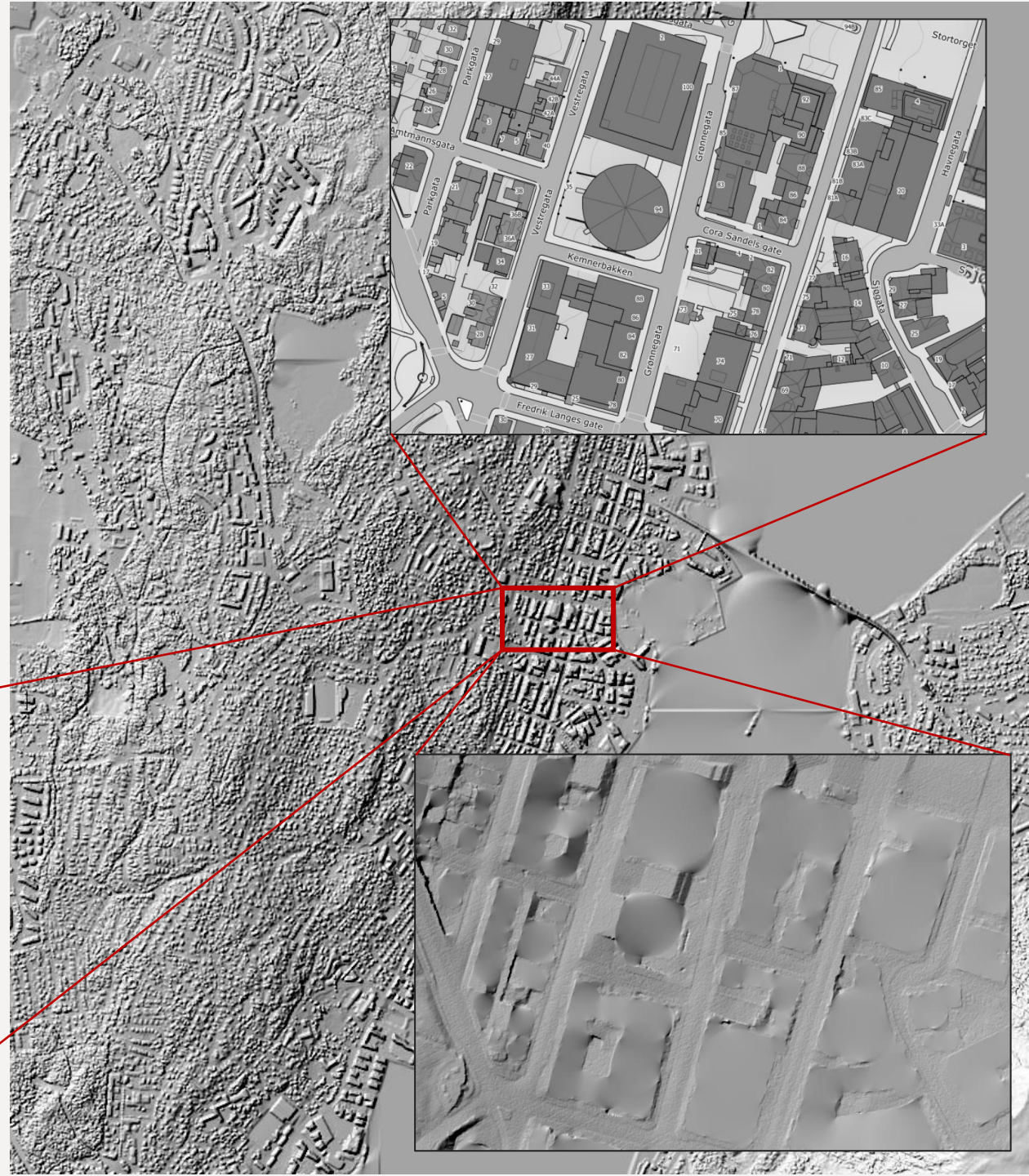
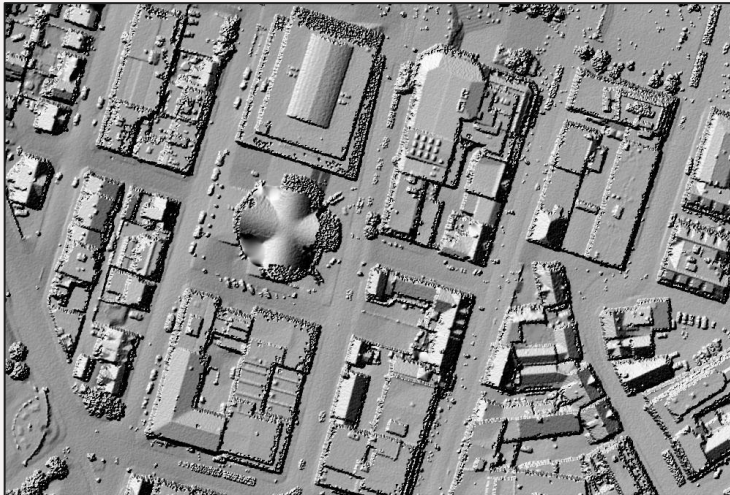
Volume geometries in Norwegian geodatabases

A study of how we can extend public data sets from 2.5D to 3D



Norwegian public 3D geodata - NDH National Detailed Elevation Model

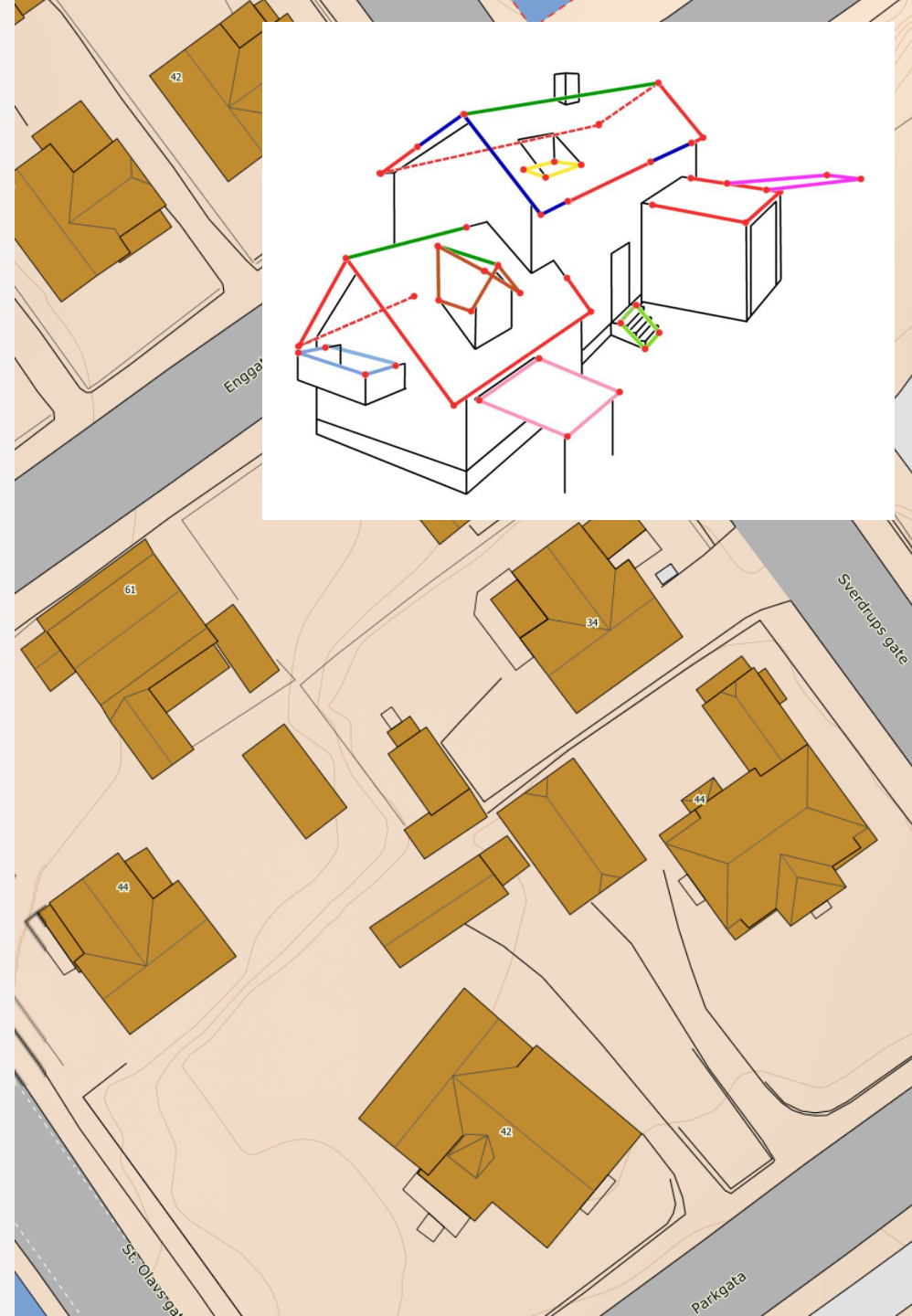
- Detailed elevation data (laser scan) covering the entire country
 - Point Cloud 2-5 points per m²
 - Digital Terrain Model
 - Digital Surface Model
 - Open data - Hoydedata.no



Norwegian public 3D geodata - FKB

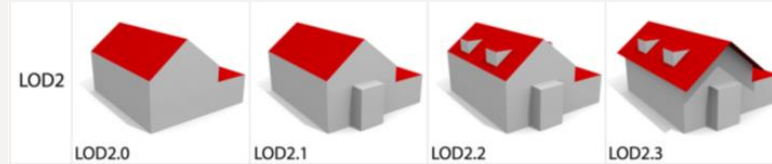
Base maps - Common Geodatabase

- Detailed base maps – 16 themes
 - SOSI Standards and Data Product Specifications
 - Based on ISO/TC 211 standards
 - Covering all of Norway
- **Point, line and polygon geometry in 2.5D**
 - **Spatial absolute accuracy at decimeter level or better**
- Data collected, maintained and owned by partners in the GEOVEKST collaboration
 - NMA
 - Municipalities
 - Counties
 - National authorities – road, rail, air etc
 - Electricity and telecommunication
 - Other public and private partners
- Restricted data – economically and security



Commercial derived products

- Volume representation of **buildings**
 - 3 private companies produce similar data sets
- Derived from
 - The 2.5D Common Geodatabase (FKB)
 - The National Detailed Elevation Model (NDH)
- Derived to CityGML
 - LOD 2.2
- Sold to
 - Municipalities (owners of the FKB data!)
 - Other public and private users



How do municipalities use 3D data?



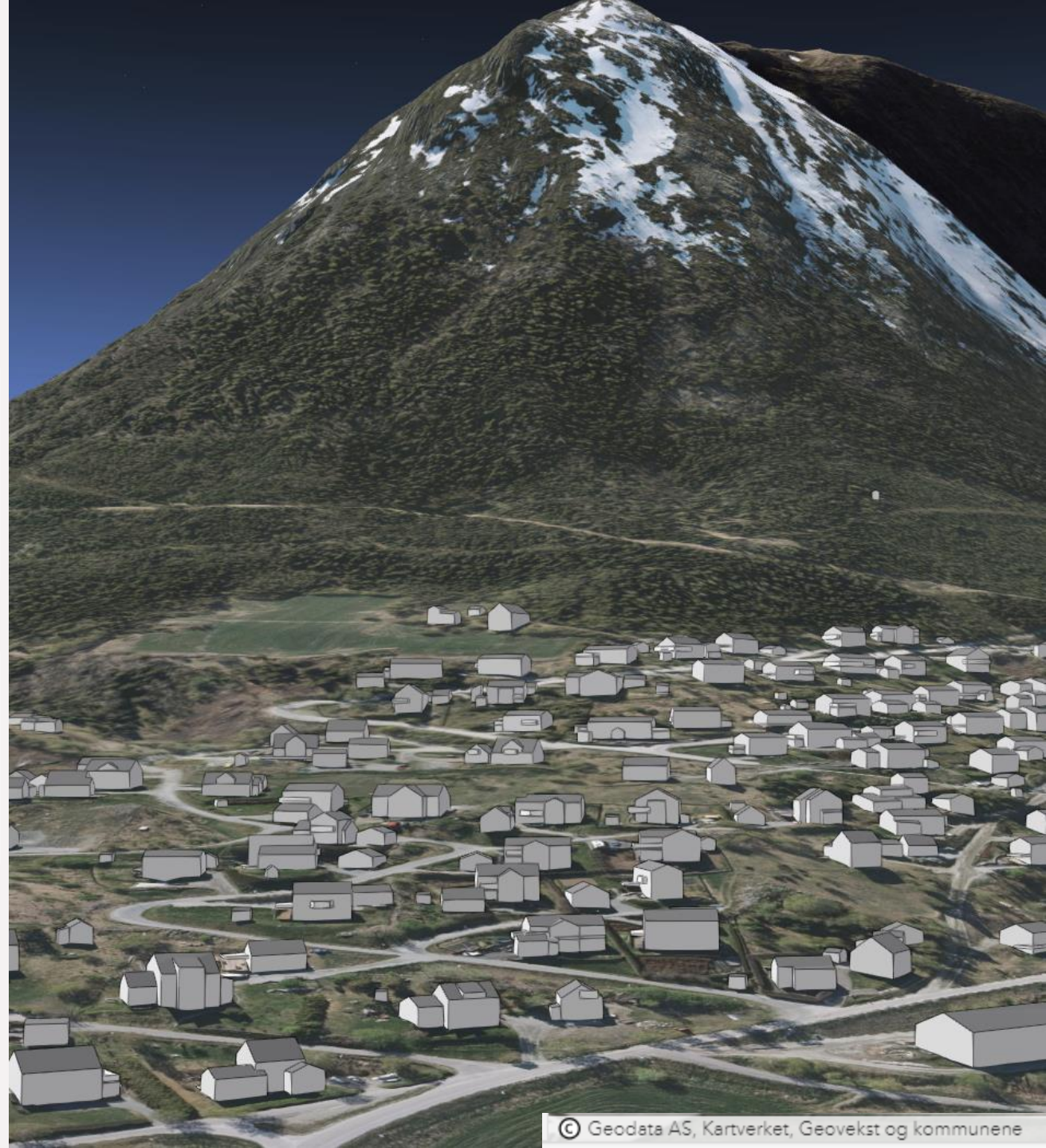
Spatial planning and building permits

- Sun and shadows
- Line of sight, viewshed
- Wind analysis
- Noise calculations



Risk analysis

- Landslides and avalanches
- Flooding, surface water, drainage



The Volume Geometry Project



A study of how we can extend public data sets from 2.5D to 3D



Focus on buildings, principles to be reused in other data sets



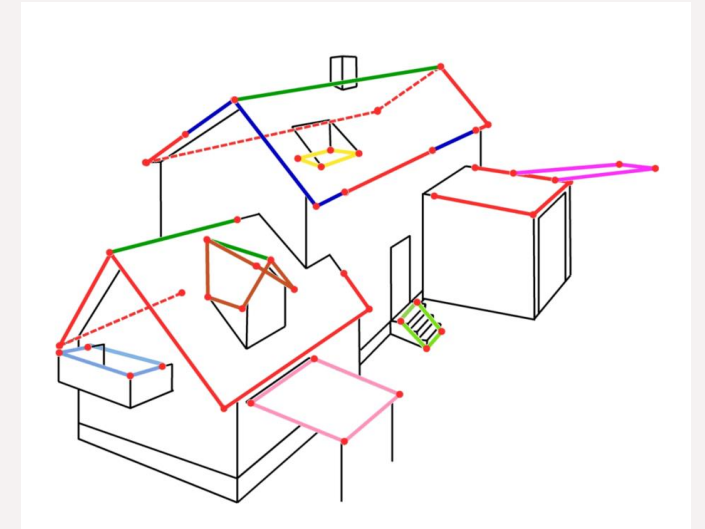
Funded by GEOVEKST and the Norwegian Research Council



6 months: 1.Nov 2024 – 1.May 2025



Participants: NMA, 5 municipalities, 4 private companies



Background: The national geodata strategy towards 2025 (2018)

Action plan - Measure 22: Facilitate 3D geodata

- Facilitate the use of 3D geodata
- Above and below ground
- Develop the geospatial infrastructure for the use of 3D

Actions:

- Investigate requirements for 3D in the national infrastructure
- Connect stakeholders that are active on 3D
- Study experiences and good practices from other countries.
- Bring BIM into the geospatial infrastructure



Everything happens somewhere

National geospatial strategy towards 2025



Bringing stakeholders together

- Investigate requirements and options



Municipalities

Municipality use
Data maintenance



Mapping
companies

Data collection



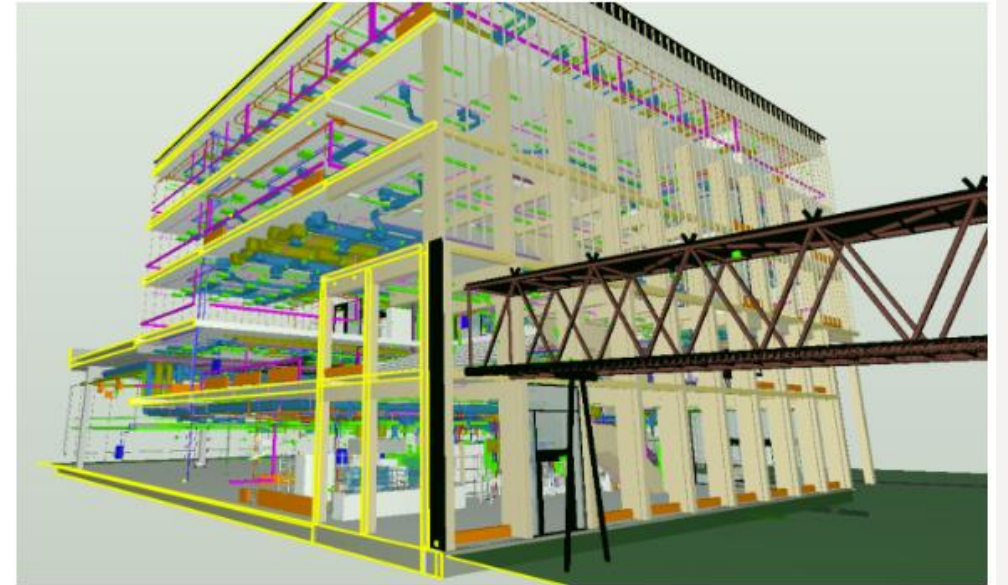
Software
vendors

Implementation in
databases and applications
Other users and usages

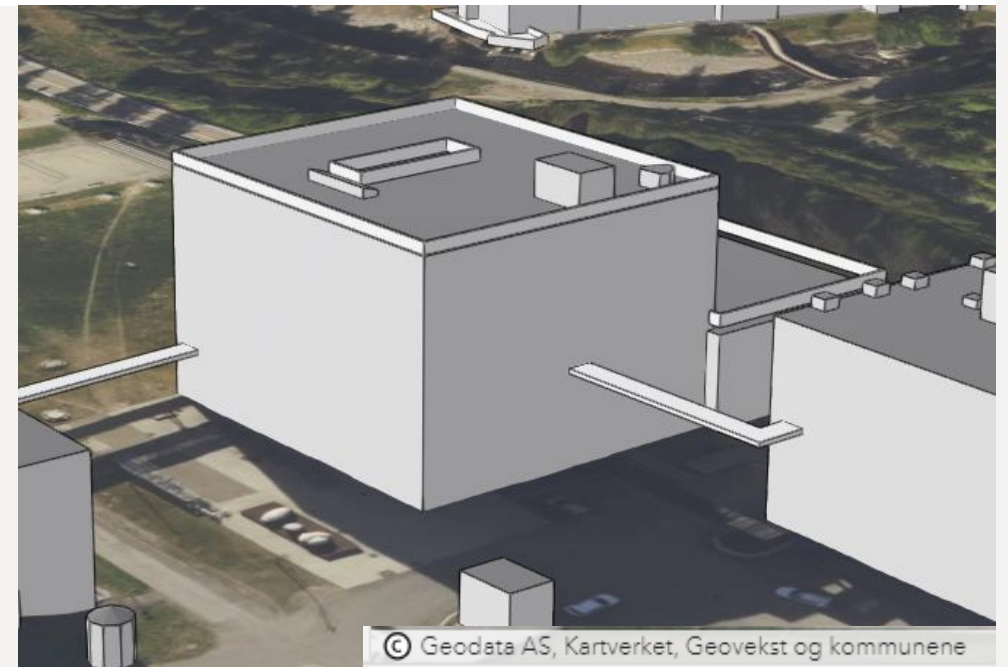


The relation to BIM

- **Building Information Models from building permit applications should be the main source for new and changed buildings**
- Data from BIM can be transformed to a higher LOD than derived volume geometries
- BIM is a big user of geospatial data
- Standardisation
 - ISO/TC 59/SC 13 and ISO/TC 211 Joint Working Group 14 GIS-BIM
 - Norwegian national guidelines for BIM and GIS
 - Norwegian national requirements for BIM in building permit applications



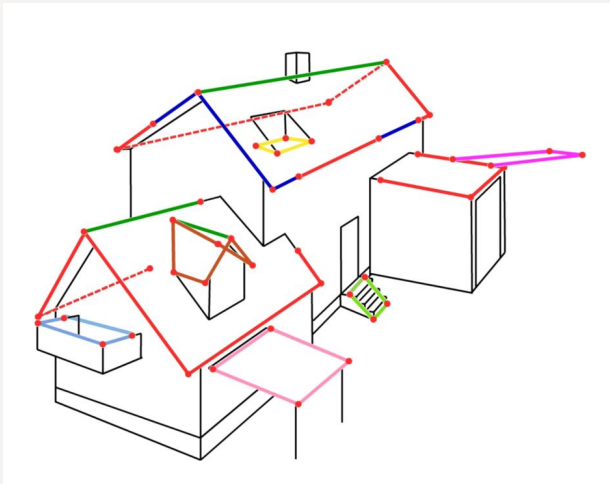
 Samsom Asmerom Habtemichael



Experiences from other countries

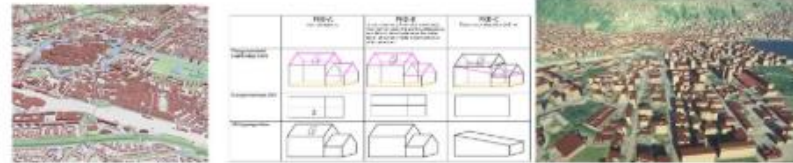
Many have derived volume geometries from point clouds and footprints

We believe that our detailed national 2.5D data is an especially good starting point for a high-quality volume representation



EUROSDR WORKSHOP STATE-OF-THE-ART 3D MAPPING AT NATIONAL AND REGIONAL MAPPING AGENCIES

22 - 23 January 2025 (IGN, Saint Mandé, Paris)



IGN

NMCAs who will present their 3D mapping activities (other NMCAs interested in giving a presentation can contact Jantien.Stoter@Kadaster.nl):

- Swisstopo
- IGN France
- IGN Belgium
- Lantmateriet Sweden
- Ordnance Survey, Great Britain
- Kadaster, NL
- Danish Digital Twin-project, Denmark
- Kartverket, Norway
- Estonian Land Board

There will also be presentations on related work from research institutes and companies:

- Comparisons between data- and model-driven model methods by FBK (Fondazione Bruno Kessler), Trento
- 3D mapping solutions by Hexagon

**EuroSDR**

Findings so far - and needs for clarification



Most realistic with a derived product for buildings

Not cost-effective to change the current data collection to include volumes
Public or commercial product?



Derived volume geometries are mostly good, but some challenges exist

Some challenges related to content: Missing details
 Some challenges related to quality: gaps, accuracy of surfaces
 The main workload (>95%) is related to special buildings
May need some additional lines and information
May need even stricter quality requirements to improve the result



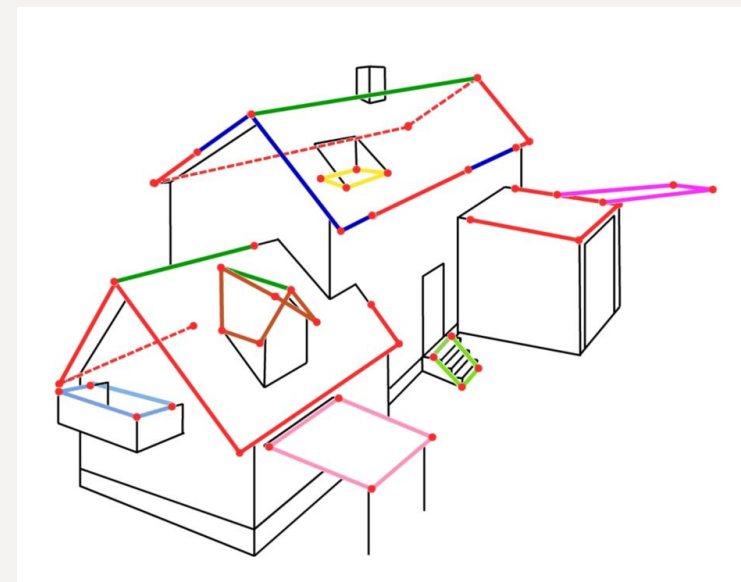
CityGML appears to be the most appropriate structure

A lot of ready-made functionality - "Everyone" uses CityGML
Which LOD sub-level should be the general level?



Should have a national strategy for 3D/Volume geometries

Other object types besides buildings - e.g., bridges, culverts
 One structure - independent of the provider
National profile of CityGML - and/or ADE?

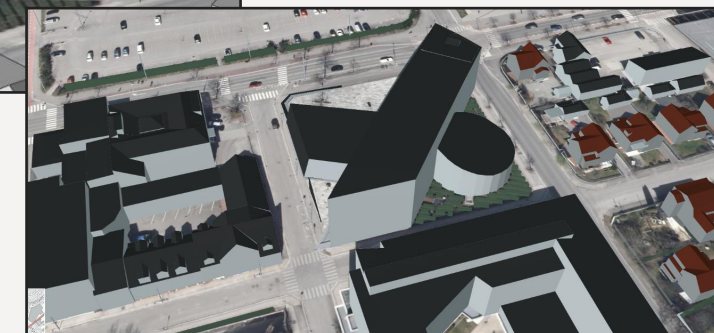
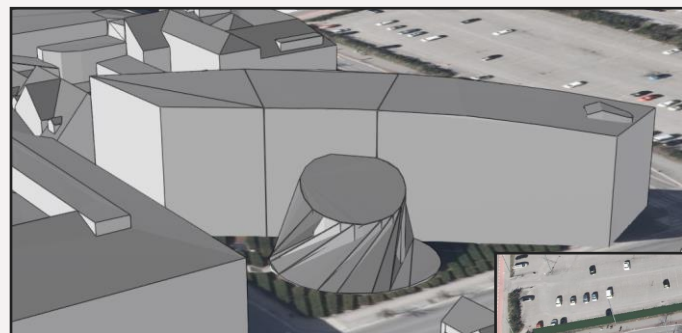
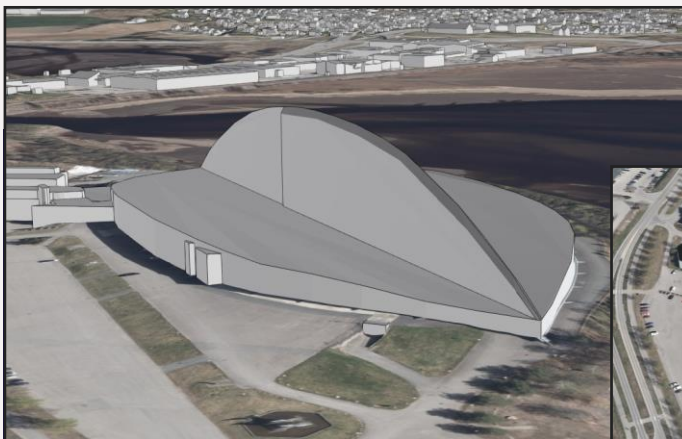
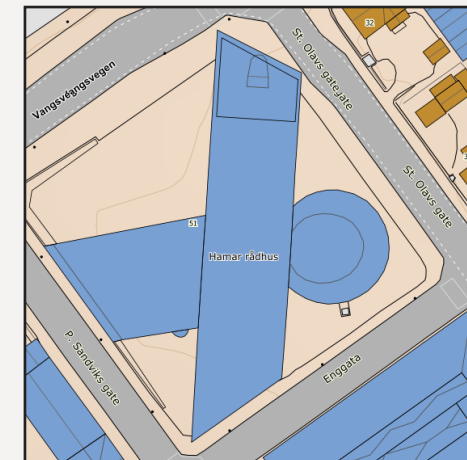


	LOD x.0	LOD x.1	LOD x.2	LOD x.3
LOD0				
LOD1				
LOD2				
LOD3				

Some challenges: Special buildings

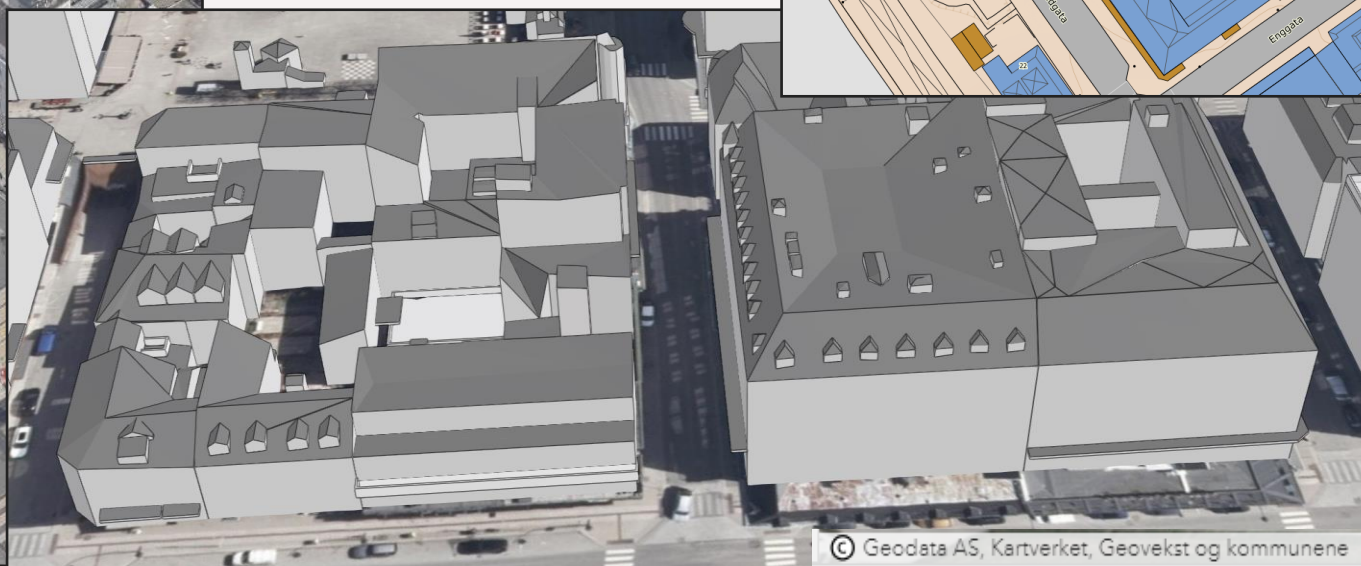
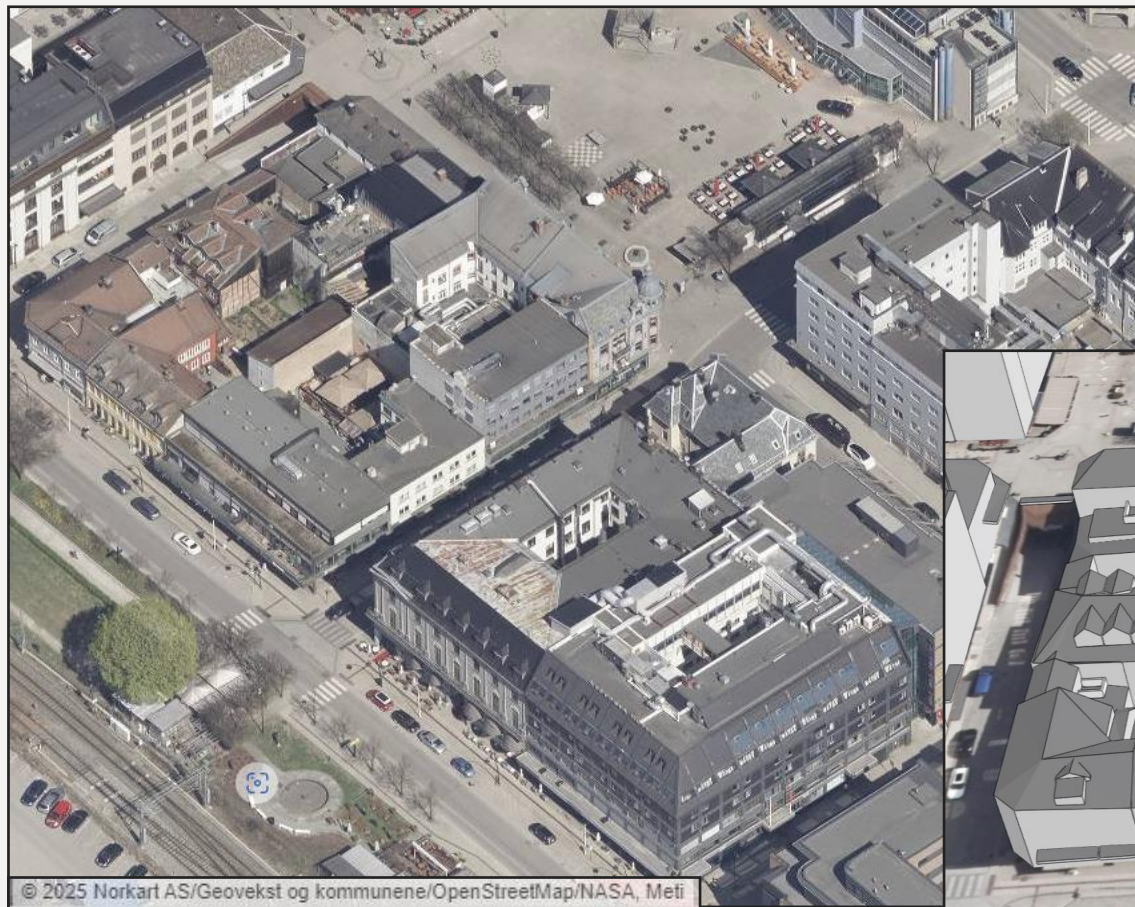


FOTO: NRK



Some challenges: Connected buildings

Which lines belong to which building?



© 2025 Norkart AS/Geovekst og kommunene/OpenStreetMap/NASA, Meti

© Geodata AS, Kartverket, Geovekst og kommunene

Public or Commercial data set?

- Authorities own the detailed map data through GEOVEKST
 - Should not need to buy a product derived from their own data
- Commercial products contribute to vendor-locking
- Lack of harmonisation between commercial products
 - Structure, coverage and LOD
- Should have a basic national product for all at LOD2.x
 - Can be upgraded to LOD3 by private companies commissioned by municipalities or others
 - **Lack of funding for national production and maintenance**





Questions?

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→ knut.jetlund@kartverket.no



Kartverket