Digital Building Stock Model

DBSM

Ana Martinez

Technical sub-group of the INSPIRE Maintenance and Implementation Group
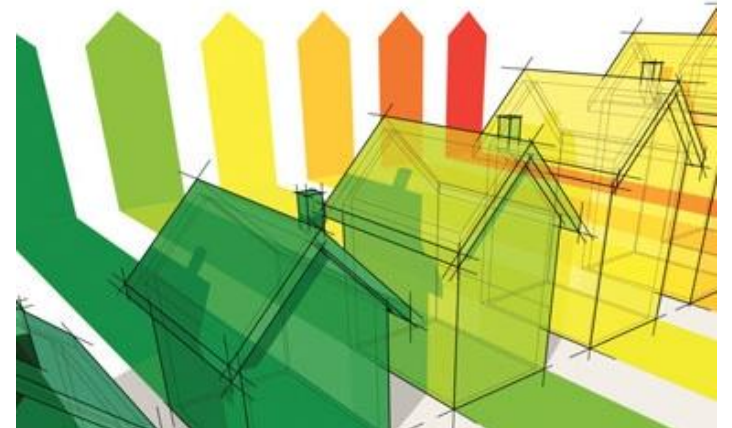
Digital Building Stock Model at EU scale

- **Pan-European map** of individual buildings with energy-related features

- Use of **Machine Learning** and data from **Earth Observation**

- **Open access** to all citizens

- Policy support

   Energy Renovation Wave

   Energy Performance of Buildings Directives

European Commission

Vision

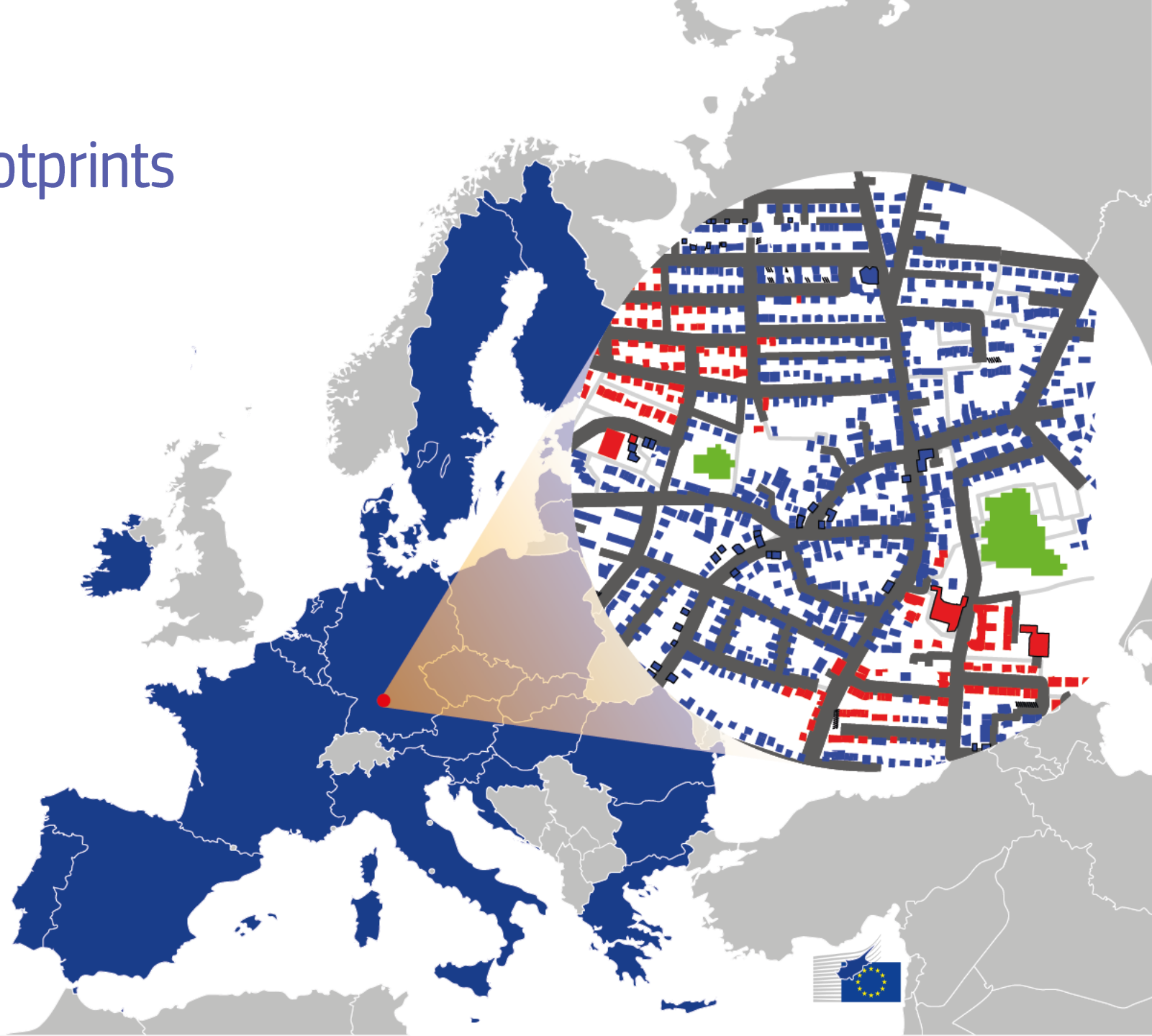| Attributes	Source / Reliability	
Footprint	Conflation of sources (OSM/Microsoft/ESM)	Available **DBSM v1**
Height	GHSL-based (LoD1)	Coming soon **DBSM v2**
Compactness	Compactness formula	
Function (res/non-res)	GHSL+	
PV potential	PVGIS+	
Age	Machine Learning	Under research
Rooftop type	Machine Learning	
Energy demand	Simplified physical Model	
RE suitability	JRC Model	

Building attributes

European Commission
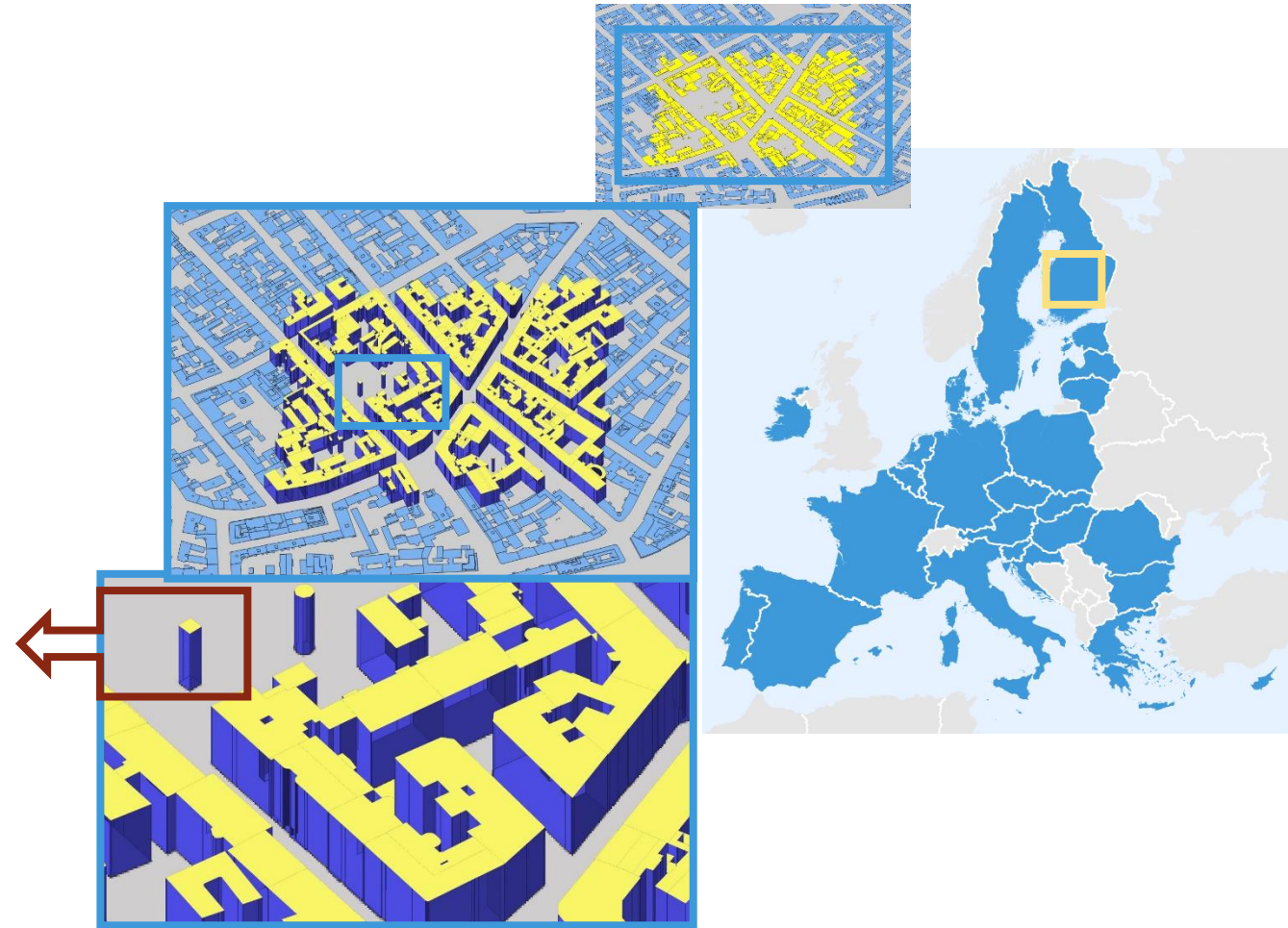
DBSM v1: Building footprints

Open Street Map

MS global ML buildings

Vectorised ESM

Download from:
JRC Data Catalogue

How was the dataset curated?

Conflation of Open Datasets on QGIS

(Cadastral Data)
Where available from official providers

Open Street Map
Latest extract from OSM (buildings=yes)

Microsoft Buildings
Requires topology and geometry cleaning

European Settlement Map
Converted to vector, corrected, filtered

Digital Building Stock Model
final seamless product in vector format

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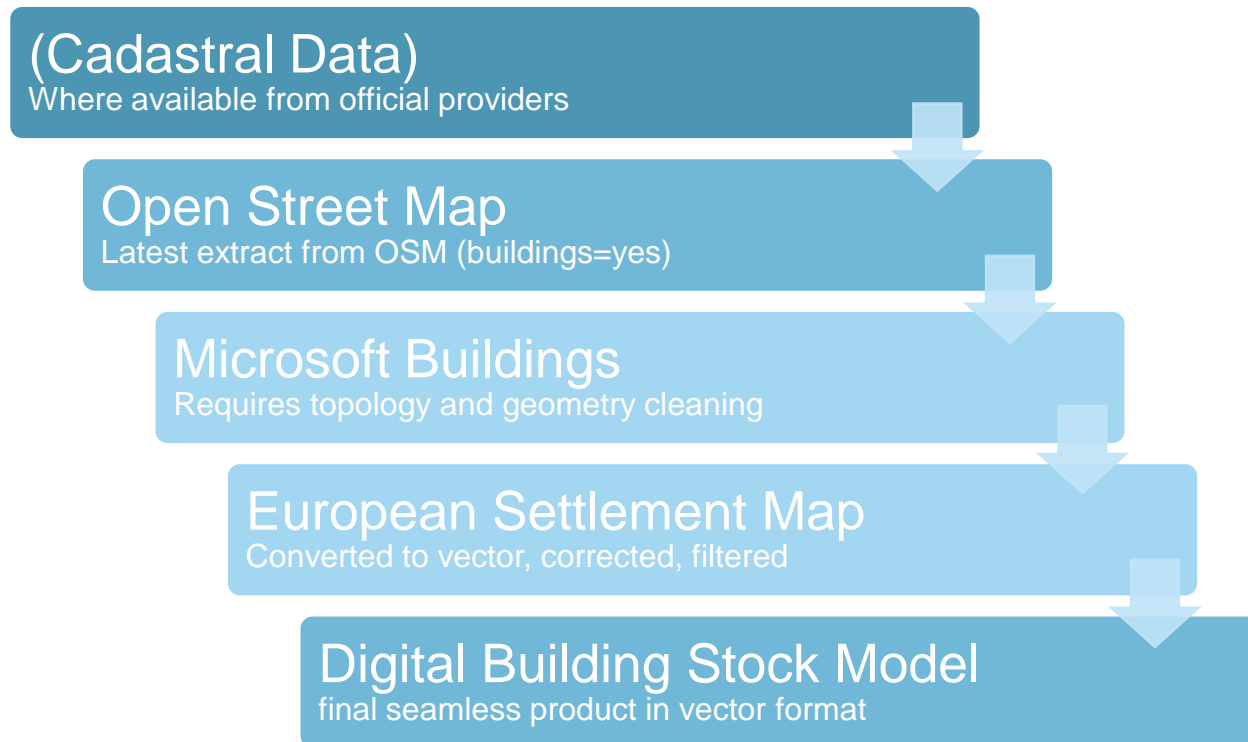
Comparison with GHSL

EU-27: Built-up surface

OSM / MSB / ESM

$0.68 \times GHS = 3.59\text{e}+04$

DBSM: 2.59e+03, 5.02e+03, 2.74e+04

GHS: 5.28e+04

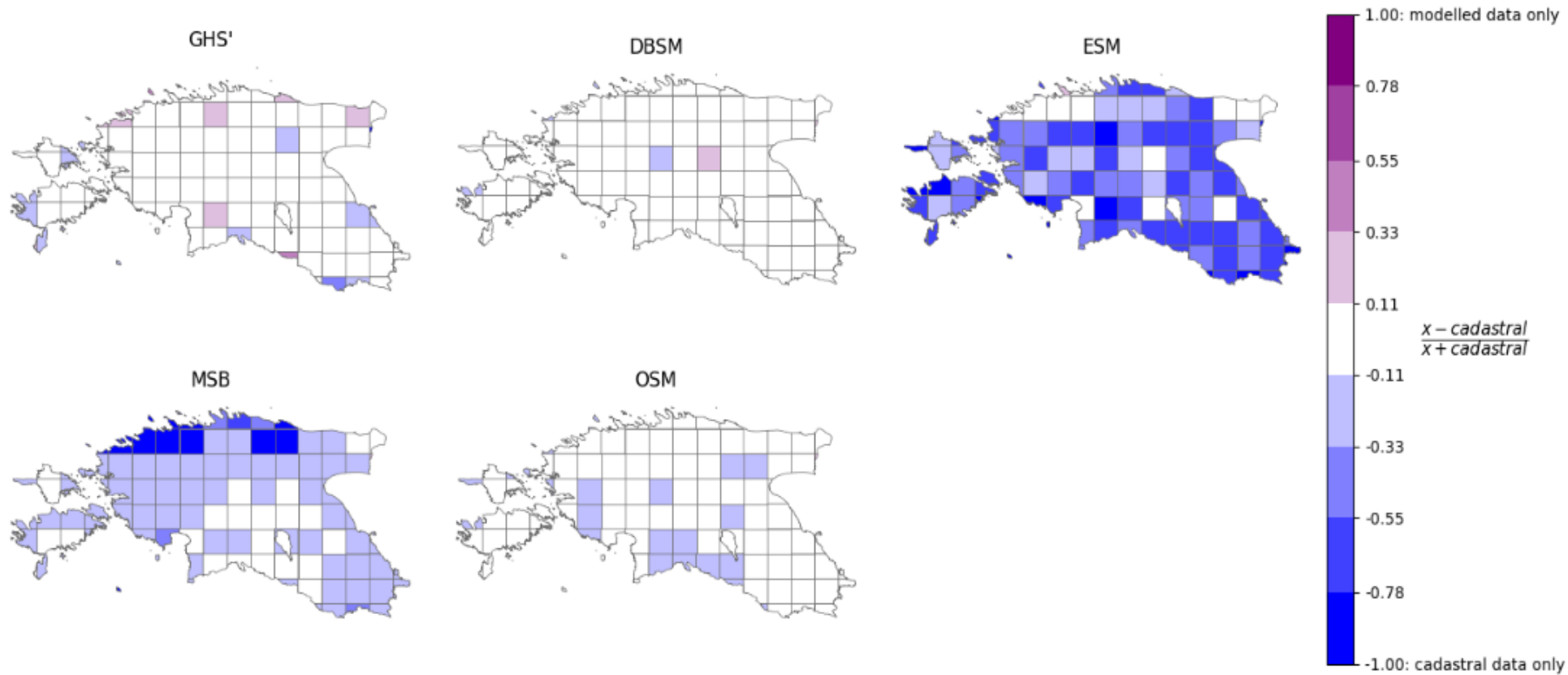$\frac{DBSM - GHS'}{DBSM + GHS'}$

Map tiles by Stamen Design, CC BY 3.0 -- Map data (C) OpenStreetMap contributors

European Commission
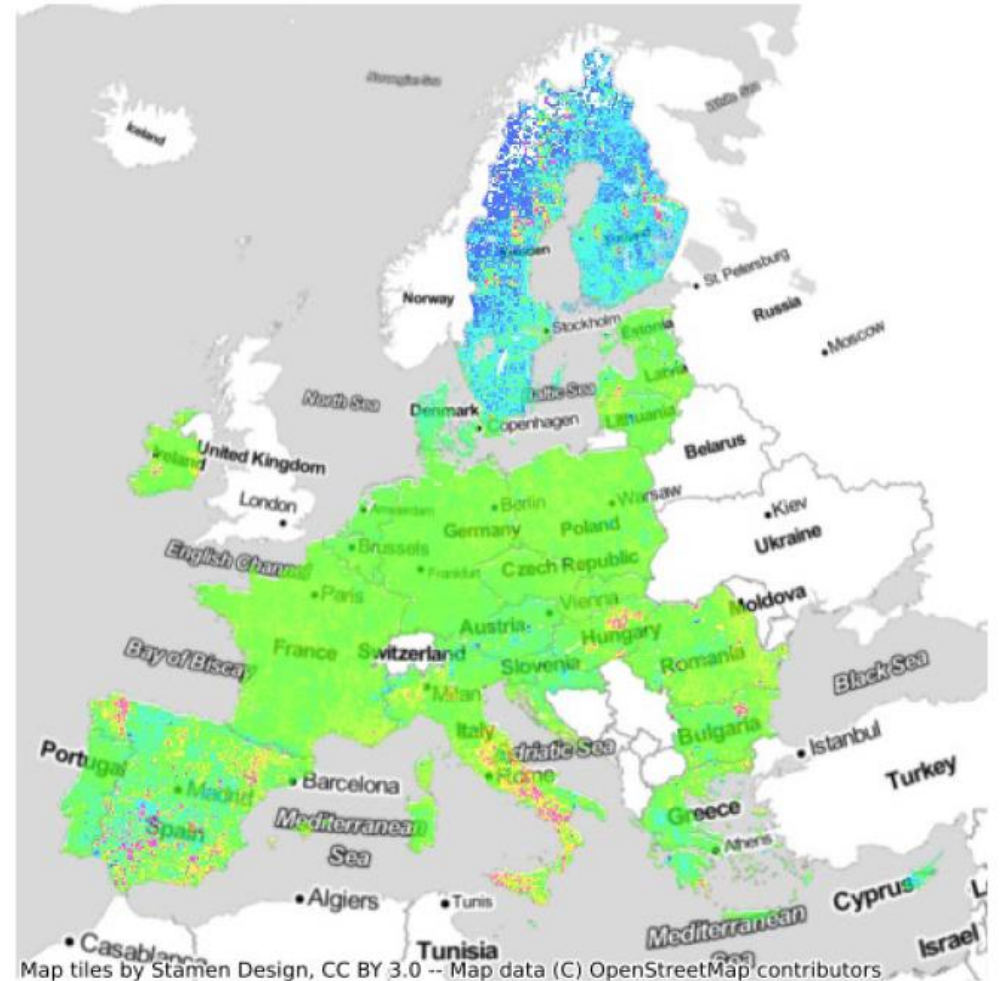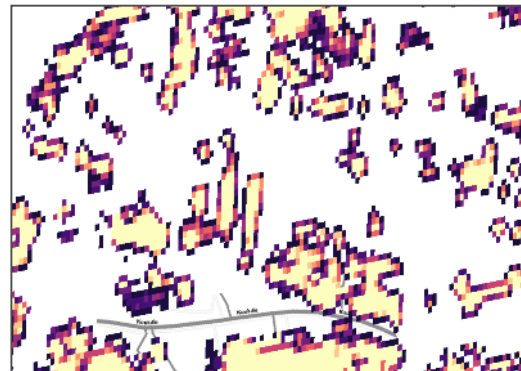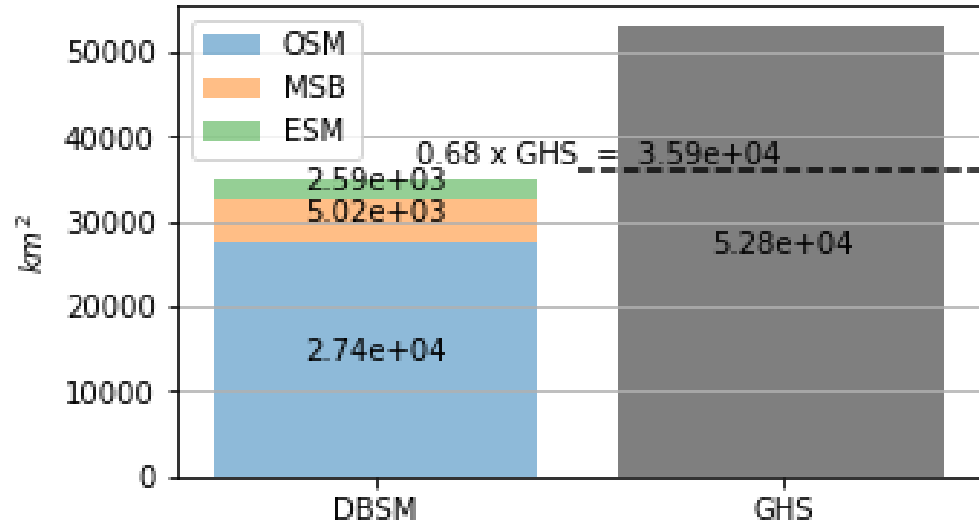
Comparison with cadastral data in Estonia

Lessons learned and best practices

- *License (ODbL)*

- *Large processing in QGIS: ideally move to python in the future.*

- *No building IDs in this version.*

- *Only providing one file per country, which might be heavy for some countries for some users.*
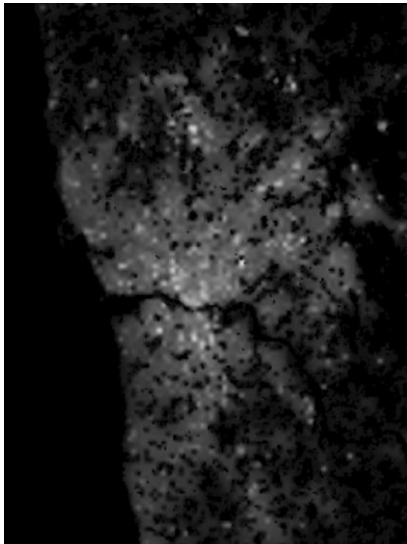
- *No API developed yet.*

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WIP: sneak peek

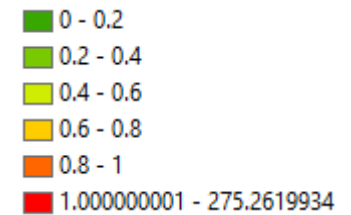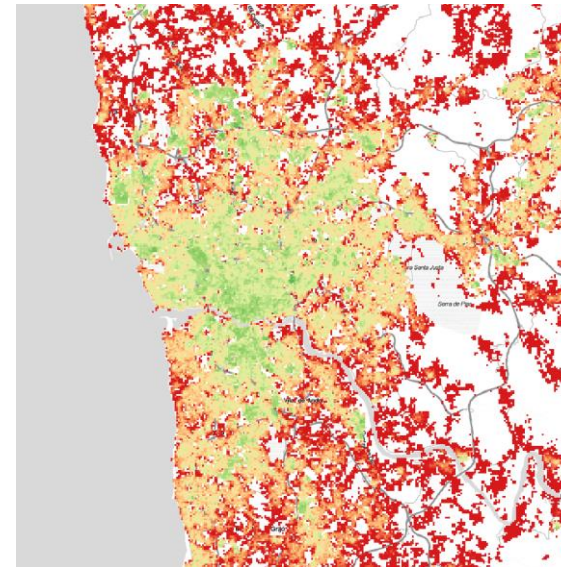Porto, Portugal

Heights

K. Goch, M. Fernandez

From GHSL   **From Urban Atlas**

Compactness

P. Florio

🟩	0 - 0.2
🟢	0.2 - 0.4
🟨	0.4 - 0.6
🟧	0.6 - 0.8
🟠	0.8 - 1
🟥	1.000000001 - 275.2619934

100 m resolution

European Commission

WIP: sneak peek

Rooftop type

L. Selmi

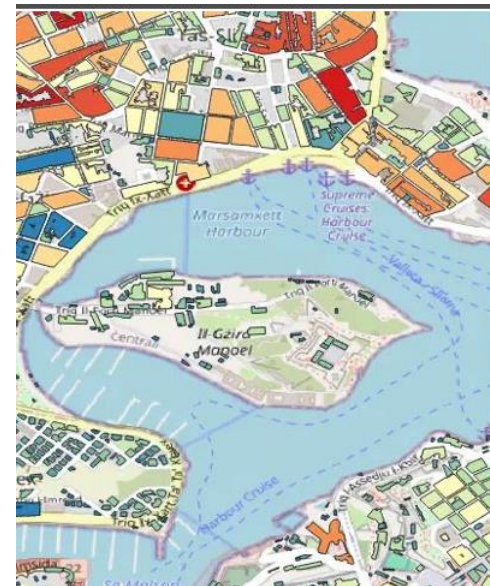- **Deep Learning models** for image classification / segmentation

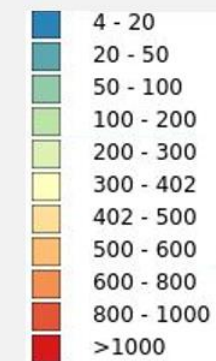- **Copernicus VHR 2015** at ~0.5m resolution

- Challenges with image displayment

Rooftop solar potential

G. Kakoulaki

Potential of PV generation (MWh/yr)

- 4 - 20
- 20 - 50
- 50 - 100
- 100 - 200
- 200 - 300
- 300 - 402
- 402 - 500
- 500 - 600
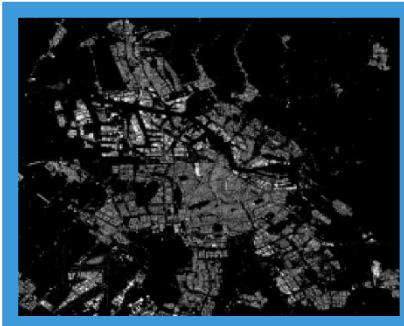- 600 - 800
- 800 - 1000
- >1000

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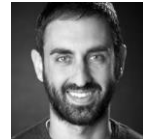# WIP: sneak peek

Age of construction

J. Wenzel

Time series of Bilt-up
satellite data (GSHL)

Morphological features
from OpenStreetMap

Function and Energy demand

C. Franco, C. Maduta, D.
D'Agostino, D. Paci

	DBSM v2.0 (beta)		Building Stock Observatory	
	Res	Non-Res	Res	Non-Res
Austria	93%	7%		
Belgium	91%	9%	93%	7%
Estonia	96%	4%	96%	4%
Czechia	85%	15%	94%	6%

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DBSM: stay tuned!

- *Paradigm shift: from standard aggregated statistics to detailed information*

- *Socio-economic and demographic information*

- *Philosophy to release fast and improve often*

- *Join forces with other institutions to work on faster solutions*

European Commission

Thank you

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EU Science Hub
joint-research-centre.ec.europa.eu

European Commission