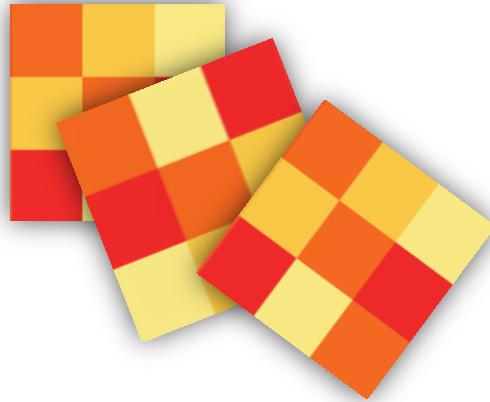




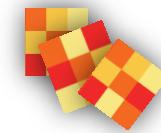
NATIONAL STATISTICAL INSTITUTE  
OF THE REPUBLIC OF BULGARIA



## *How to produce population gridded data following the hybrid approach*

7<sup>th</sup> of May 2014, ESTP Course, Oslo, Norway

Arslan Ahmedov, [aahmedov@nsi.bg](mailto:aahmedov@nsi.bg)



# Content



Sense of “Hybrid”



The Data



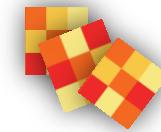
Geocoding Framework



Generation of Population Grid

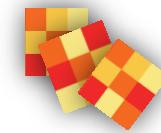


References



## Why Hybrid solution?





## Why Hybrid solution?



Statistical/Census dataset is not geocoded



Lack or incompleteness of national registers with addresses/buildings with coordinates



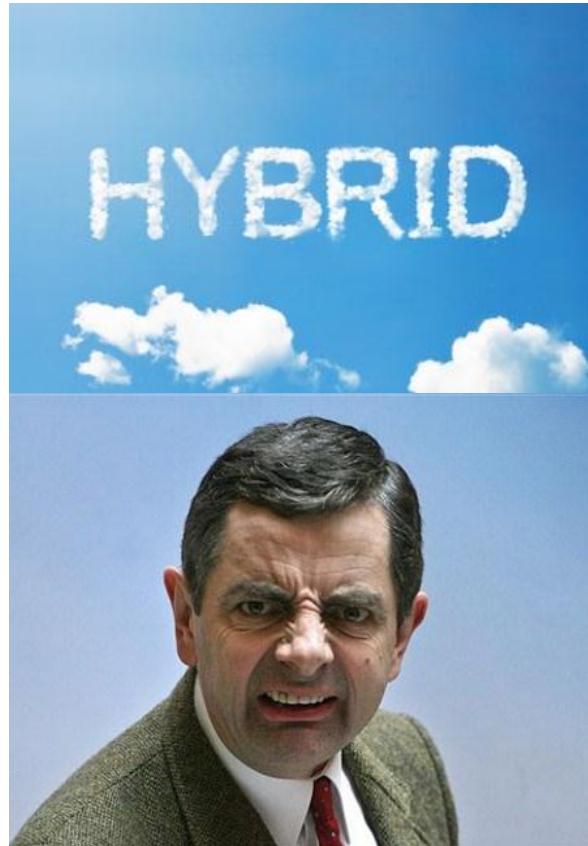
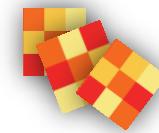
Aggregation cannot be applied to the whole territory



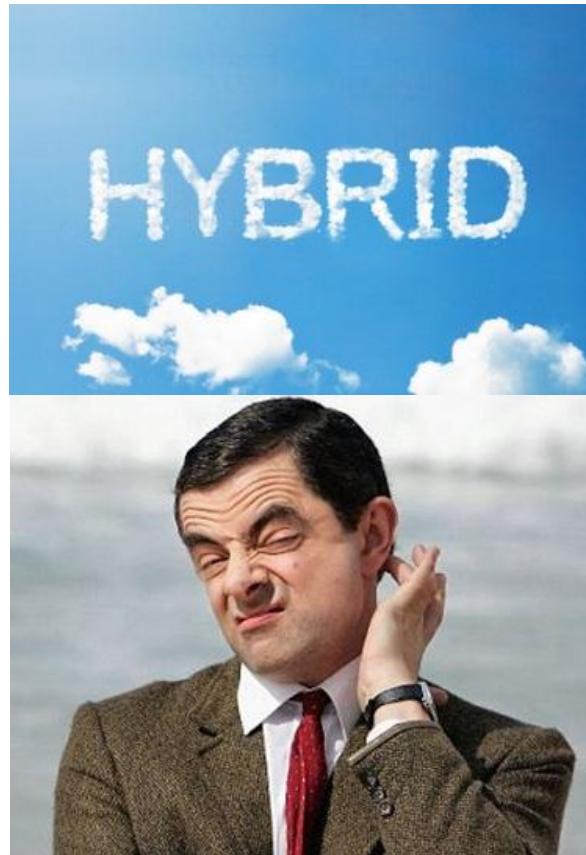
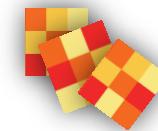
To improve the accuracy by getting a higher quality than just disaggregation

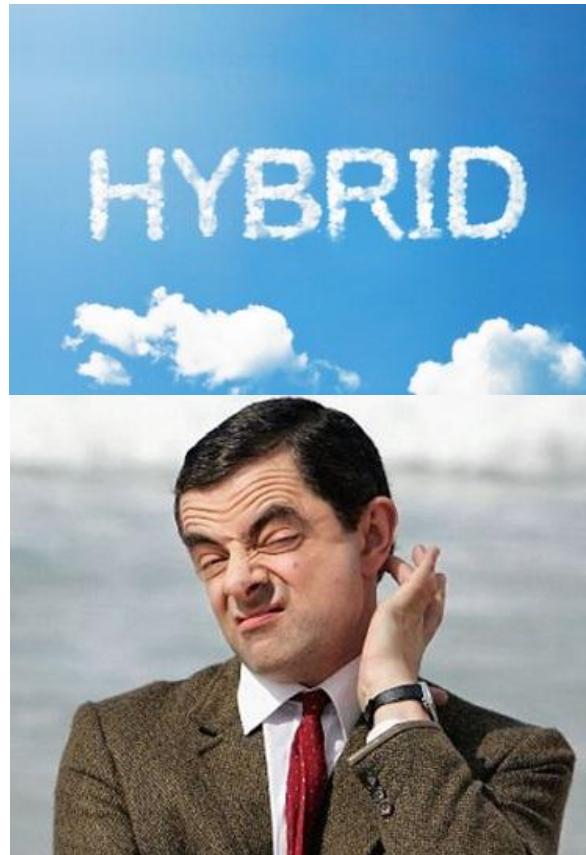
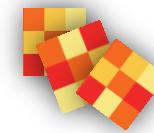


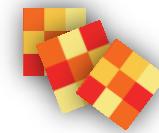
NATIONAL STATISTICAL INSTITUTE OF THE REPUBLIC OF BULGARIA

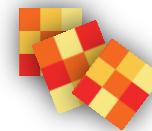


7<sup>th</sup> of May 2014, ESTP Course, Oslo, Norway

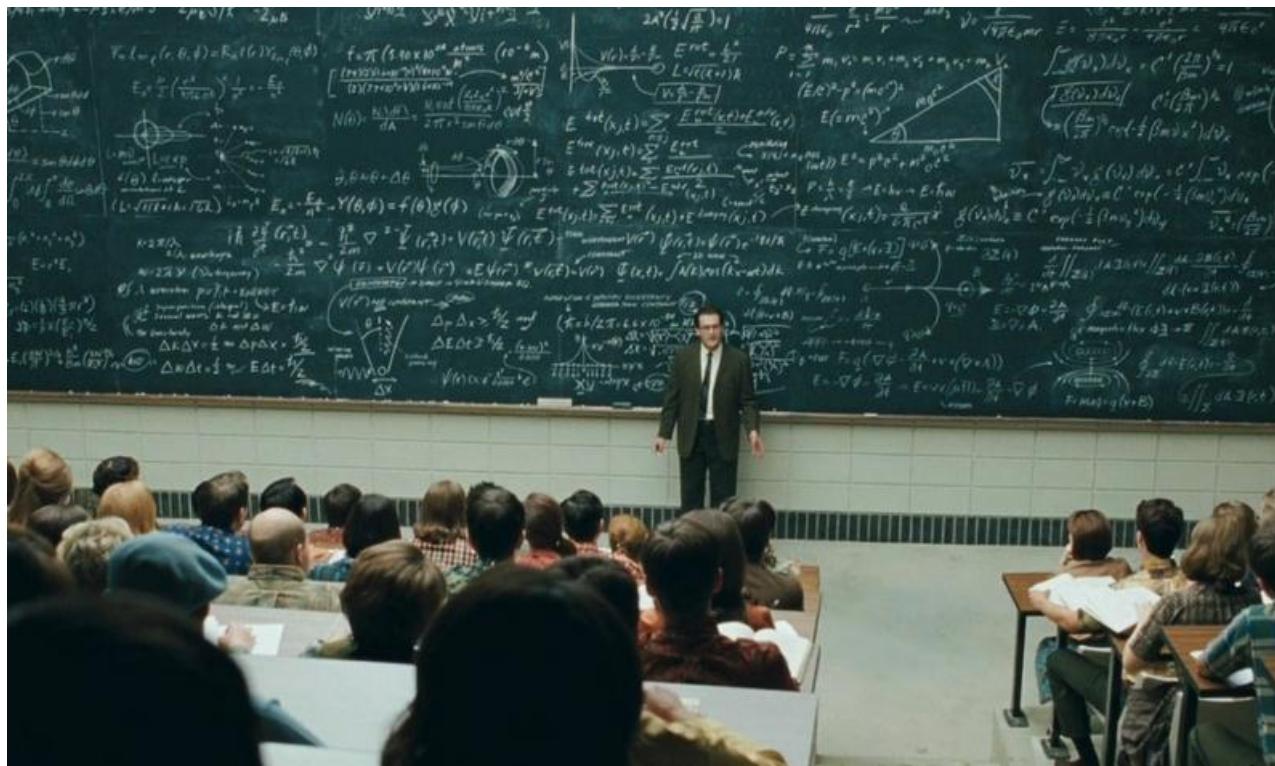


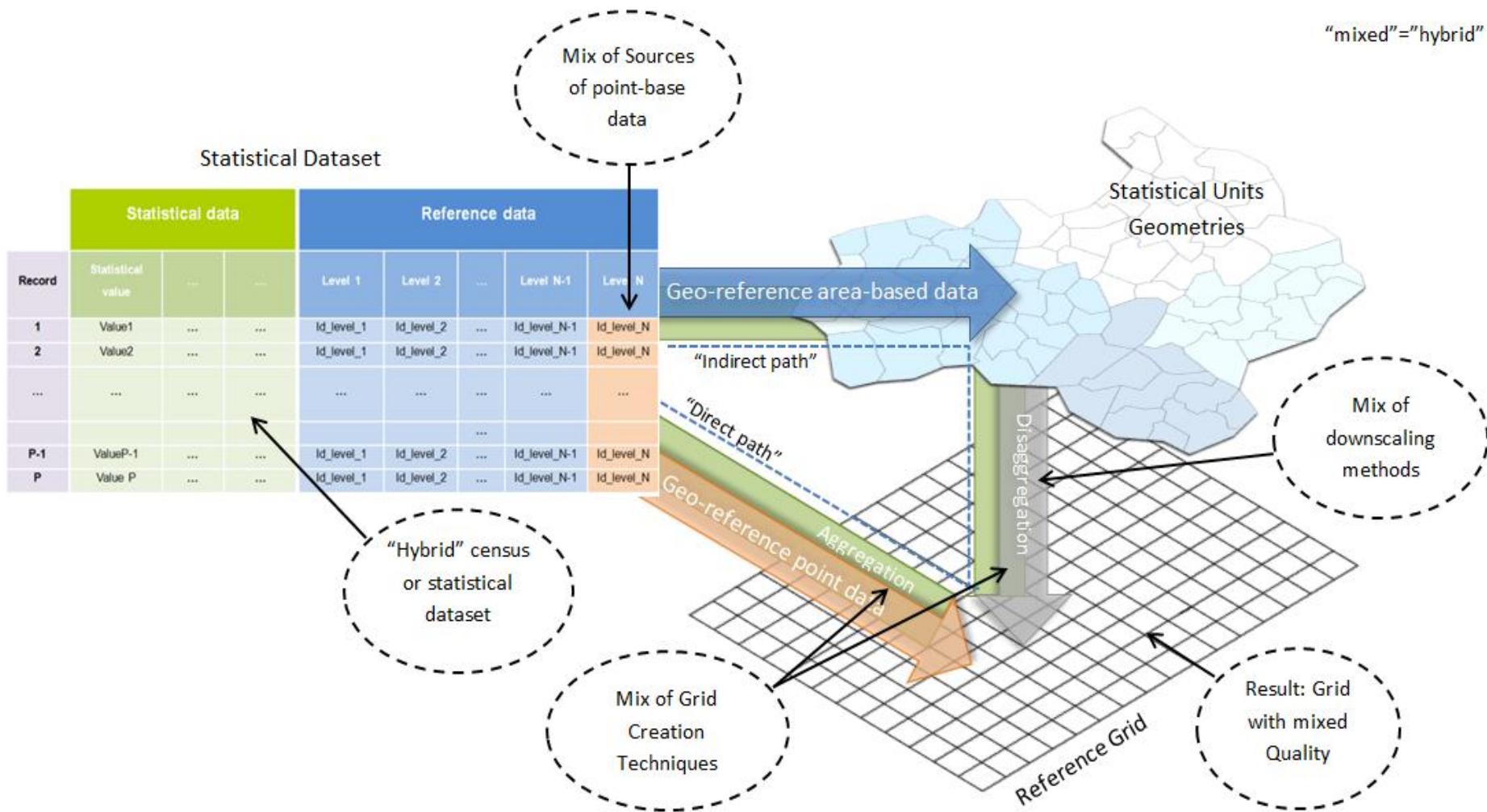
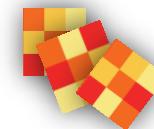


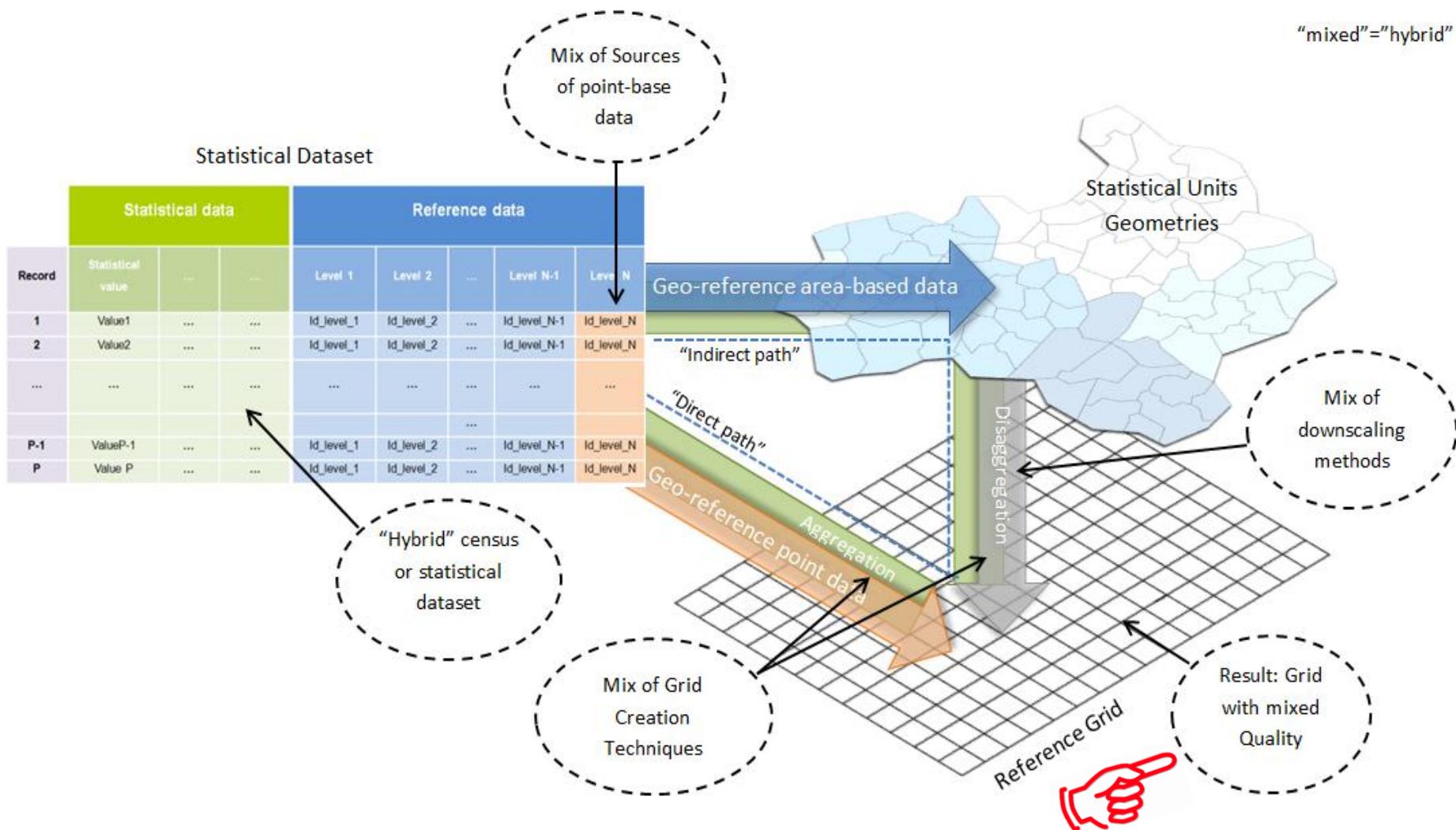
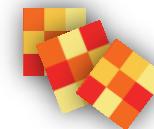


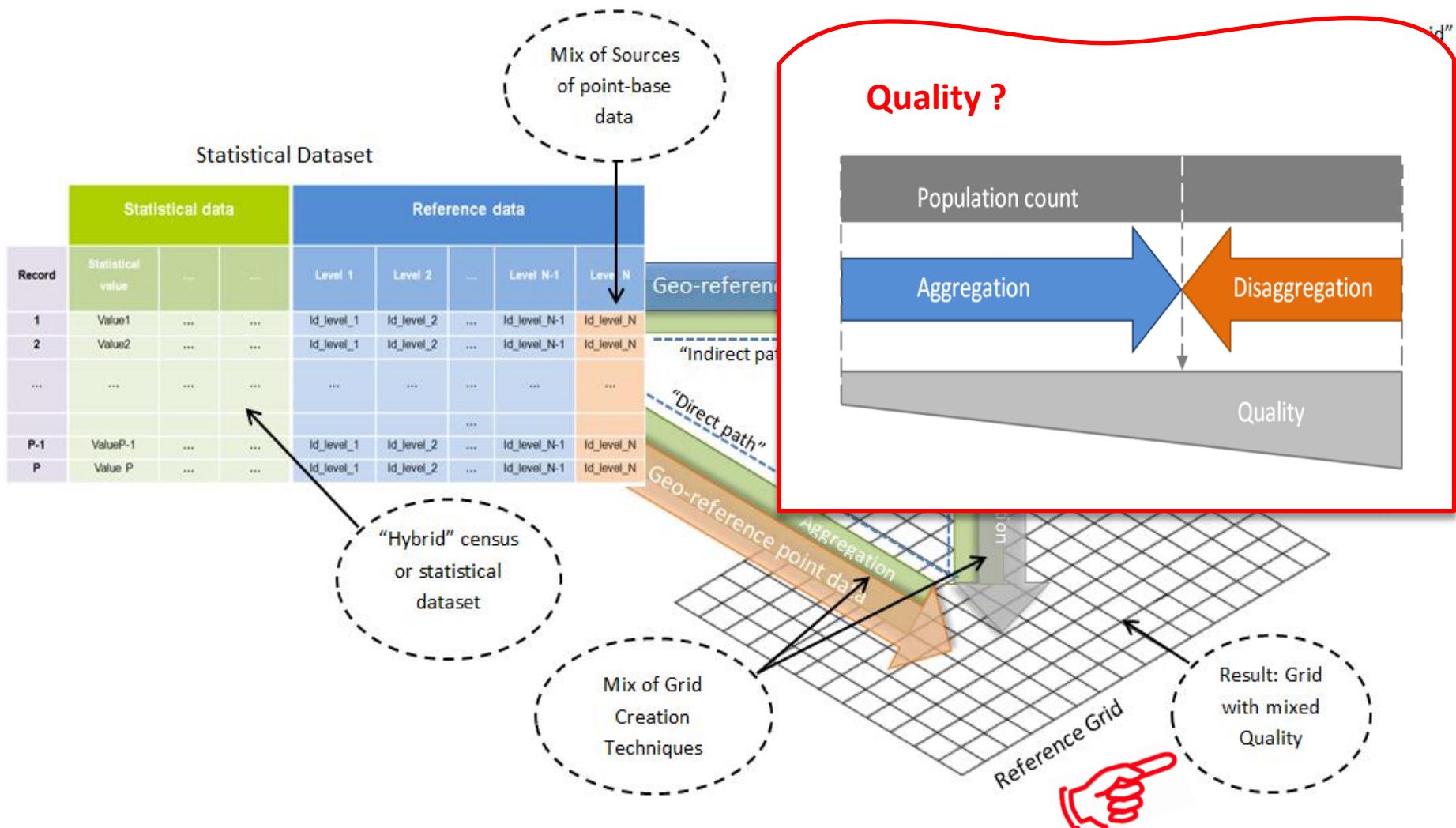
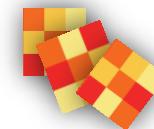


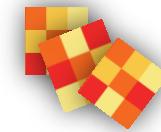
## Sense of “Hybrid”









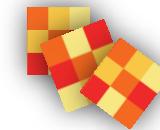


## The Data





# NATIONAL STATISTICAL INSTITUTE OF THE REPUBLIC OF BULGARIA



Source

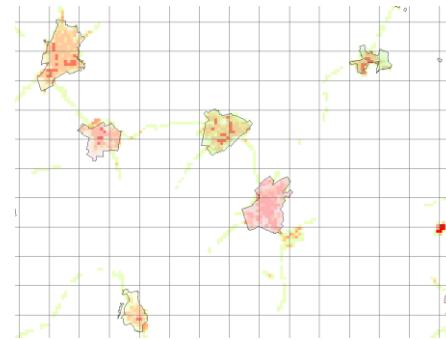
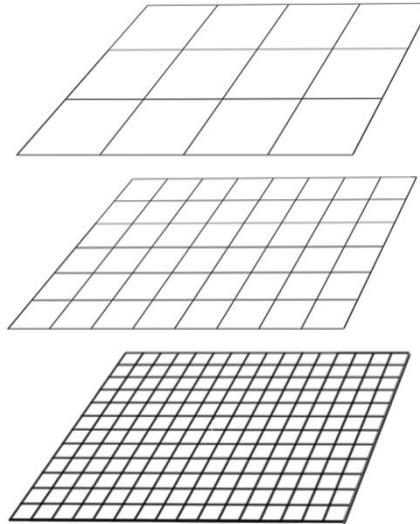
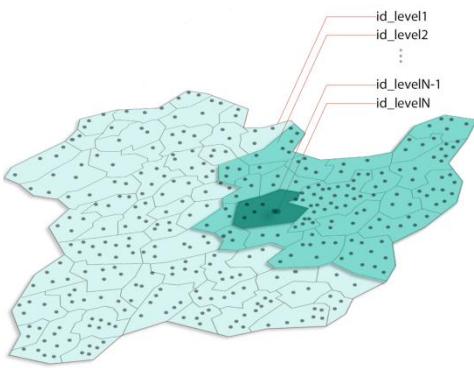


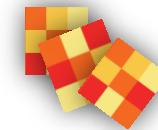
Target



Ancillary

Microdata Level 1 - STATISTICAL DATASET NAME													
A	B	C	D	E	F	G	H	I	J	K	L	M	N
Level 1	Level N-2	Level N-1	Level 0	Level 1	Level 2	StreetCode	Var1	Var2	Var3	Var4	Var5	Var6	Var7
1													
2													
3													
4	001												
5													
6	002												
7													
8	003												
9													
10	004												
11	005												
12	006												
13	007												
14	008												
15	009												
16	010												
17	011												
18	012												
19	013												
20	014												
21	015												
22	016												
23	0000006	1300006	43954487	02	01184		3	5	3				
24	0000007	1300007	43955595	02	00015		3	5	3				
25	0000008	1300008	43955597	02	01184		3	5	3				
26	0000009	1300009	43955603	02	00045		3	2	3				





Source

## Statistical (population) dataset

	A	B	C	D	E	F	G	H	I	J	K
	Level1	Level N-2	Level N-1	Level N	LevelD	StreetCode	Var1	Var2	Var3	Var4	Var5
2	BG	-	1294671	1294671	458915	02	01585	1	1	2	
3	BG	-	1294679	1294679	458926	02	01004	2	1	5	
4	BG	-	1294830	1294830	4590087	02	00120	2	1	4	
5	BG	-	1294938	1294938	4590224	02	00045	1	1	5	
6	BG	-	1294998	1294998	4590267	02	00597	1	1	2	
7	BG	-	1295102	1295102	4590375	02	00045	1	1	5	
8	BG	-	1295795	1295795	4591108	02	00597	1	1	1	
9	BG	-	1295934	1295934	4591235	02	00120	1	1	2	
10	BG	-	1295983	1295983	4591305	02	00248	1	1	1	
11	BG	-	1296029	1296029	4591379	02	01004	1	1	1	
12	BG	-	1296068	1296068	4591388	02	00024	1	1	1	
13	BG	-	1297127	1297127	4590960	02	01004	2	1	3	
14	BG	-	1297857	1297857	4590901	02	01004	2	1	4	
15	BG	-	1298039	1298039	4591384	02	01004	1	1	1	
16	BG	-	1298142	1298142	4591587	02	01004	1	1	1	
17	BG	-	1298429	1298429	4591769	02	00035	1	1	5	
18	BG	-	1298764	1298764	4594117	02	01004	1	1	1	
19	BG	-	1299171	1299171	4594100	02	01004	2	1	3	
20	BG	-	1299348	1299348	4594154	02	01004	1	1	1	
21	BG	-	1299674	1299674	4595012	02	01004	1	1	1	
22	BG	-	1299950	1299950	4595110	02	01004	1	1	2	
23	BG	-	1300098	1300098	4595447	02	01004	1	1	1	
24	BG	-	1300234	1300234	4595595	02	00015	1	1	1	
25	BG	-	1303262	1303262	4596421	02	01004	1	1	1	
26	BG	-	1303940	1303940	4597011	02	00045	1	1	1	

Record	Reference data					Statistical data		
	Level 1	Level 2	...	Level N-1	Level N	Statistical value	...	...
1	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value1	...	...
2	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value2	...	...
...	...	...	...	...	...	...	...	...
P-1	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	ValueP-1	...	...
P	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value P	...	...



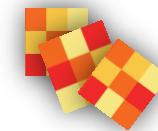
Source

## Statistical (population) dataset

	A	B	C	D	E	F	G	H	I	J	K
	Level 1	Level N-2	Level N-1	Level N	LevelD	StreetCode	Var1	Var2	Var3	Var4	Var5
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3	BG	-	1294679	1294679	458926	02	01104	2	1	5	
4	BG	-	1294830	1294830	4590087	02	00120	2	1	4	
5	BG	-	1294938	1294938	4590224	02	00645	1	1	5	
6	BG	-	1294998	1294998	4590267	02	00597	1	1	2	
7	BG	-	1295102	1295103	4590375	02	00645	1	1	5	
8	BG	-	1295795	1295795	4591108	02	00597	1	1	1	
9	BG	-	1295934	1295934	4591235	02	00120	1	1	2	
10	BG	-	1295983	1295983	4591305	02	02168	1	1	1	
11	BG	-	1296029	1296029	4591379	02	01104	1	1	1	
12	BG	-	1296068	1296068	4591388	02	00624	1	1	1	
13	BG	-	1297127	1297127	4590460	02	01104	2	1	3	
14	BG	-	1297857	1297857	4590501	02	01104	2	1	4	
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16	BG	-	1298142	1298142	4591587	02	01104	1	1	1	
17	BG	-	1298429	1298429	4591769	02	00635	1	1	5	
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19	BG	-	1299171	1299171	4594160	02	01104	2	1	3	
20	BG	-	1299348	1299348	4594194	02	01104	1	1	1	
21	BG	-	1299674	1299674	4595012	02	01104	1	1	1	
22	BG	-	1299950	1299950	4595310	02	01104	1	1	2	
23	BG	-	1300098	1300098	4595447	02	01104	1	1	1	
24	BG	-	1300234	1300234	4595595	02	00115	1	1	1	
25	BG	-	1303182	1303182	4596421	02	01104	1	1	1	
26	BG	-	1303940	1303940	4597031	02	00645	1	1	1	

address;  
building;  
dwelling;  
household;  
other

Record	Reference data					Statistical data		
	Level 1	Level 2	...	Level N-1	Level N	Statistical value	...	...
1	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value1	...	...
2	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value2	...	...
...	...	...	...	...	...	...	...	...
P-1	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	ValueP-1	...	...
P	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value P	...	...



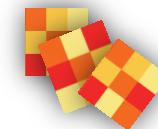
Source

## Statistical (population) dataset

A	B	C	D	E	F	G	H	I	J	K
Level1		Level N-2	Level N-1		Level D	StreetCode	Var1	Var2	Var3	
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9	BG	—	1295934	1295934	4591235	02	00120	1	1	2
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11	BG	—	1296629	1296629	4591379	02	01186	1	1	1
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24	BG	—	1300234	1300234	4595595	02	00115	1	1	1
25	BG	—	1303082	1303082	4596461	02	01184	1	1	1
26	BG	—	1303090	1303090	4597031	02	00645	1	1	1

address;  
building;  
dwelling;  
household;  
other

Reference data					Statistical data			
Record	Level 1	Level 2	...	Level N-1	Level N	Statistical value	...	...
1	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value1	...	...
2	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value2	...	...
...	...	...	...	...	...	...	...	...
P-1	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	ValueP-1	...	...
P	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value P	...	...
country boundary; NUTS; administrative/ geographical level <b>X,Y; grid_id</b>								



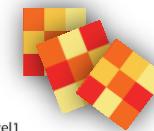
Source

## Statistical (population) dataset

	A	B	C	D	E	F	G	H	I	J	K
	Level 1	Level N-2	Level N-1	Level 0	Level D	StreetCode	Var1	Var2	Var3	Var4	Var5
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3	BG	-	1294679	1294679	458926	02	01604	2	1	5	
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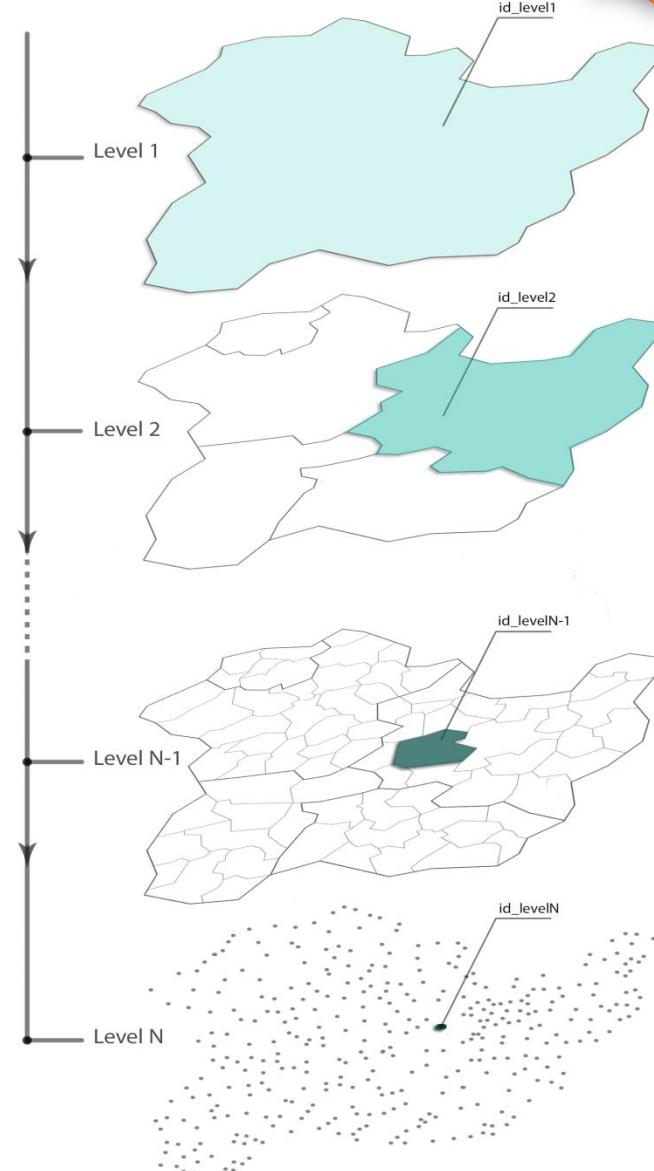
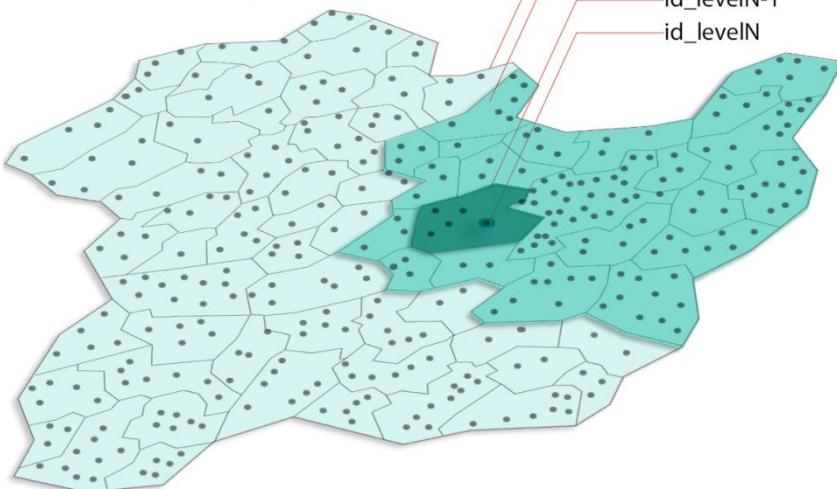
address;  
building;  
dwelling;  
household;  
other

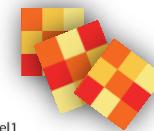
Record	Reference data					Statistical data		
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2	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value2	...	...
...	...	...	...	...	...	...	...	...
P-1	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	ValueP-1	...	...
P	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value P	...	...
						population variables		



Source

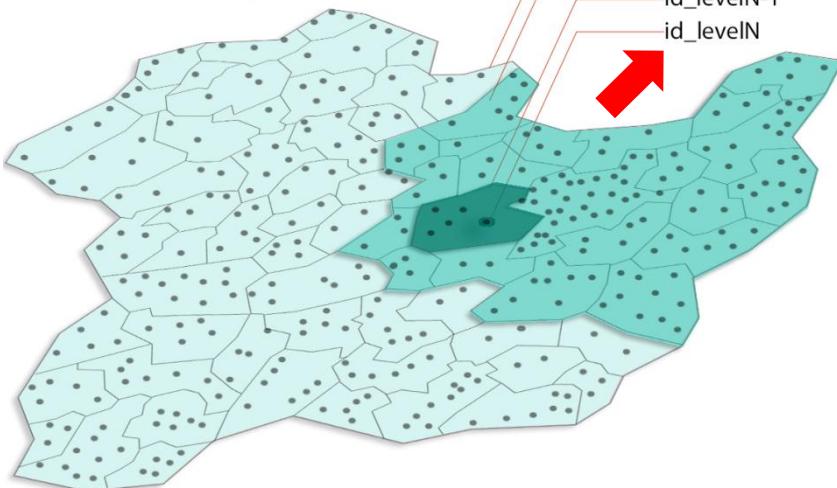
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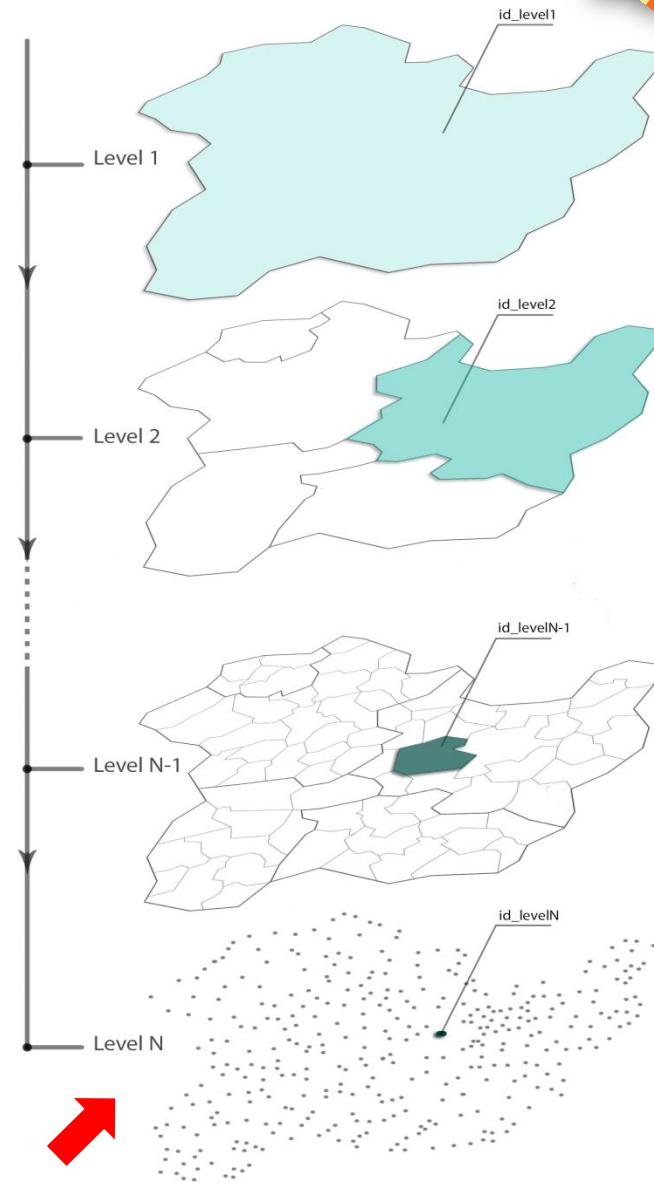


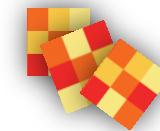
Source

## Spatial data

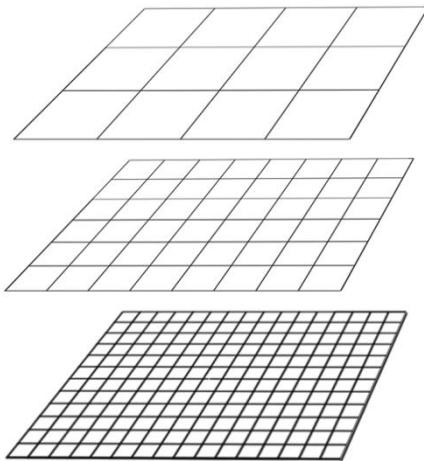


id\_level1  
id\_level2  
⋮  
id\_levelN-1  
id\_levelN

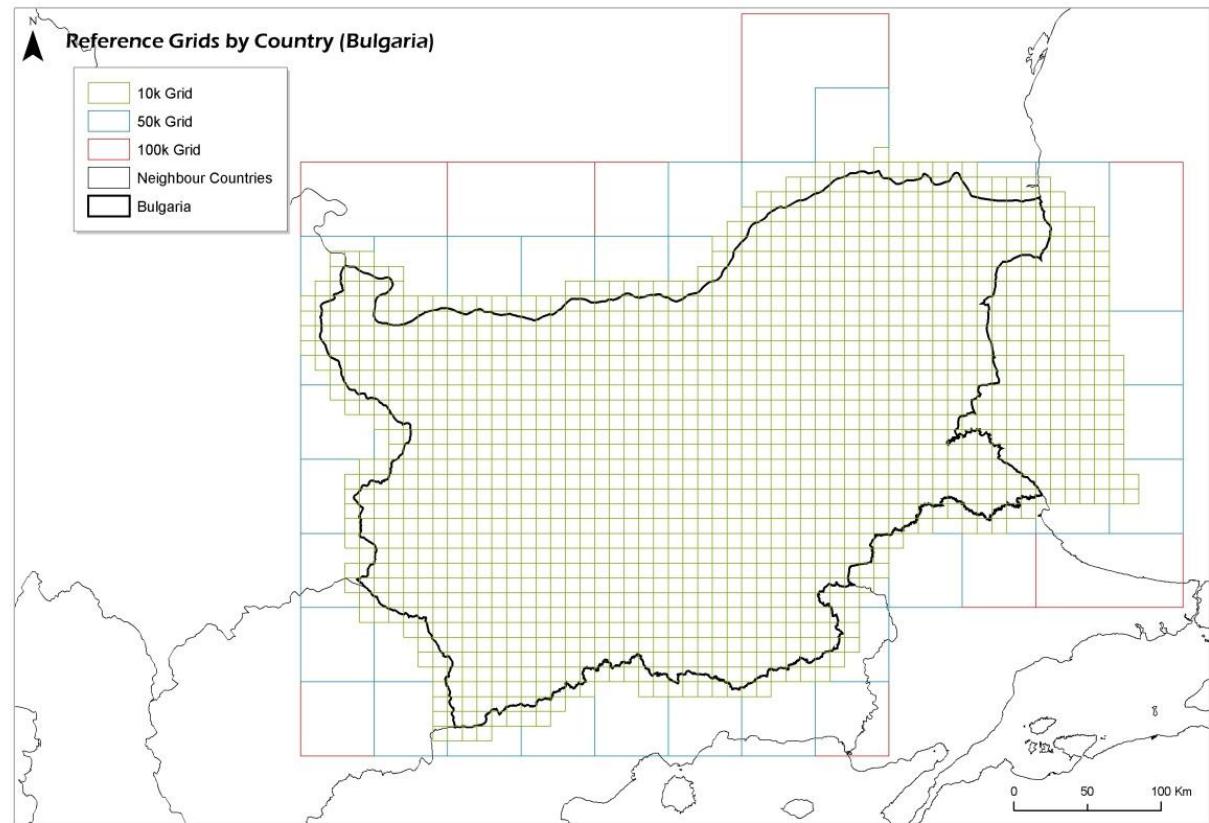


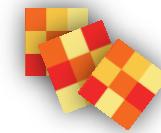


Target



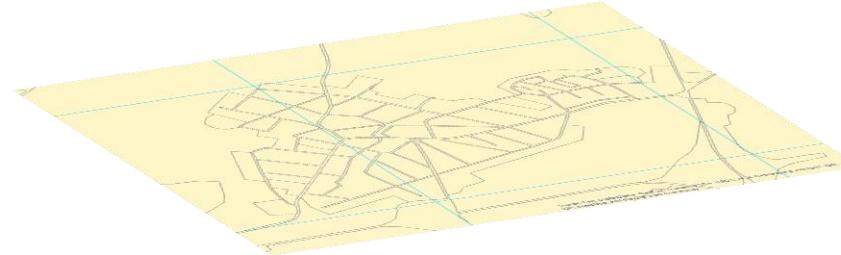
Grid(s)



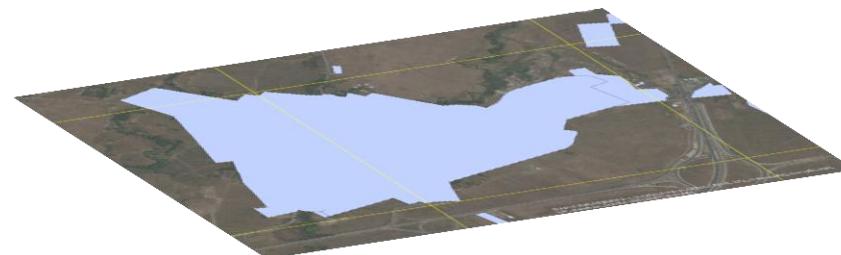


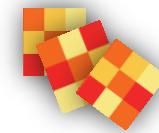
Ancillary

Ancillary data



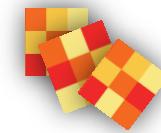
*High Resolution  
land cover/  
land use*





## Geocoding Framework





## Hybrid source data

Combination of different data sources  
for establishing geocoded framework



## Possible sources of longitude, latitude data



Registers



Geocoders



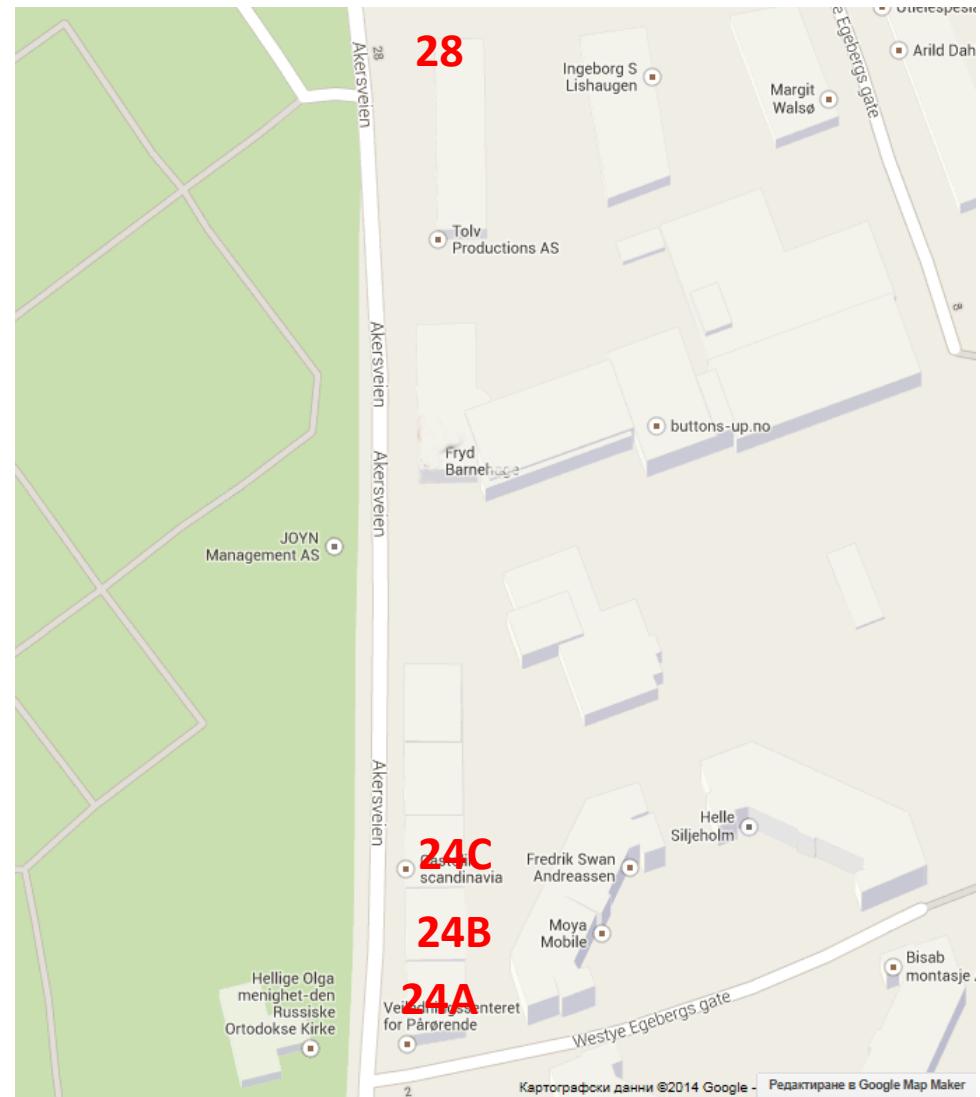
Pinpoint

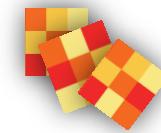


## Interpolate

between known  
neighbor locations

**OSLO, AKERSVEIEN, 26**

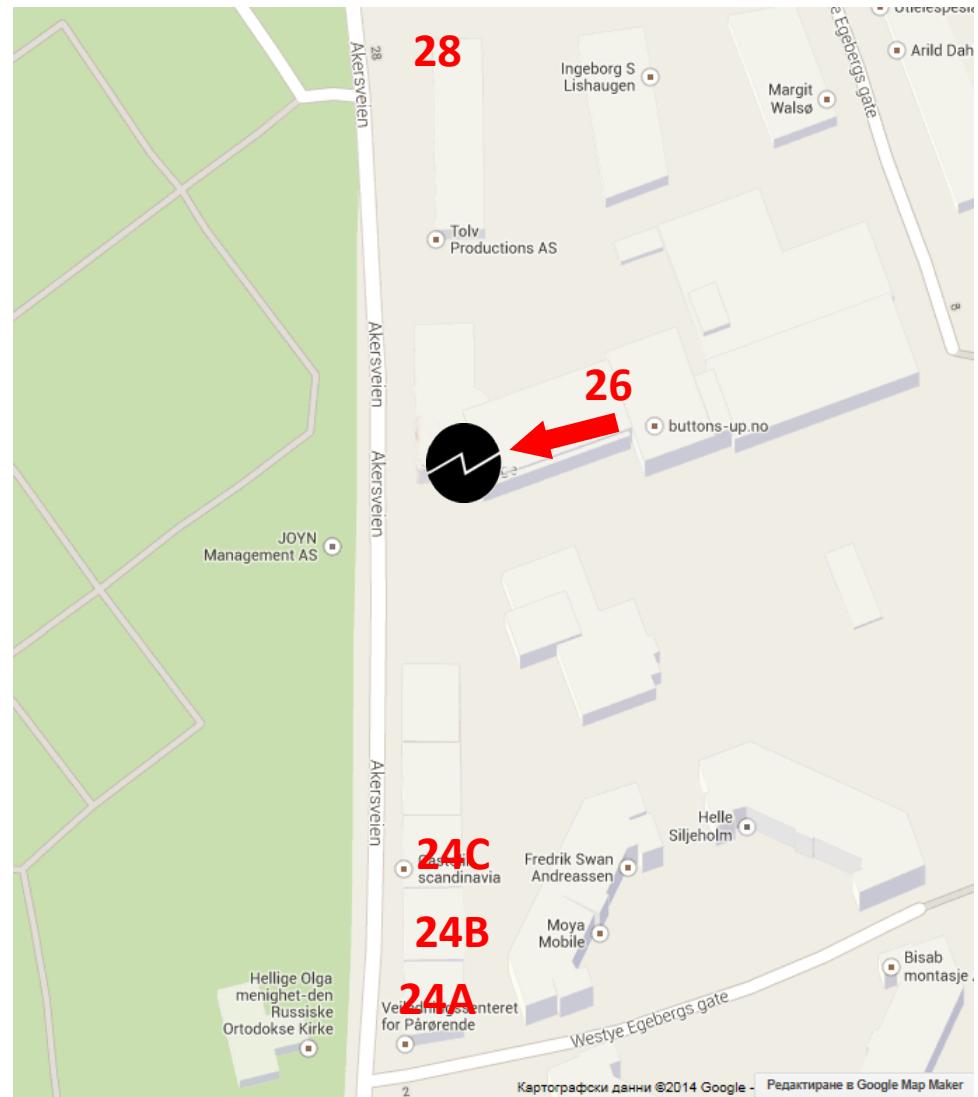




## Interpolate

between known  
neighbor locations

**OSLO, AKERSVEIEN, 26**





## Interpolate

between known  
neighbor locations

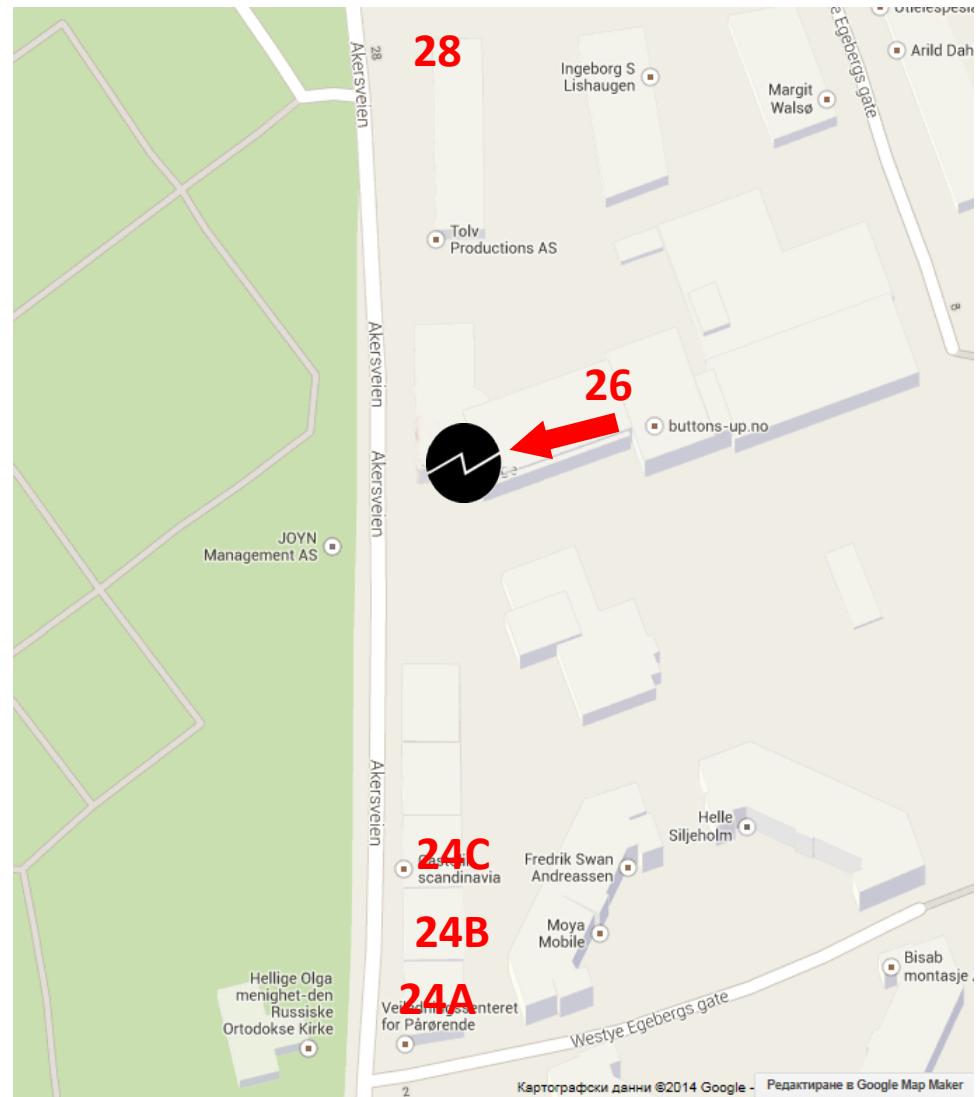
**OSLO, AKERSVEIEN, 26**



## Approximate

to the nearest  
neighbor locations

**OSLO, AKERSVEIEN, 24F**





## Interpolate

between known  
neighbor locations

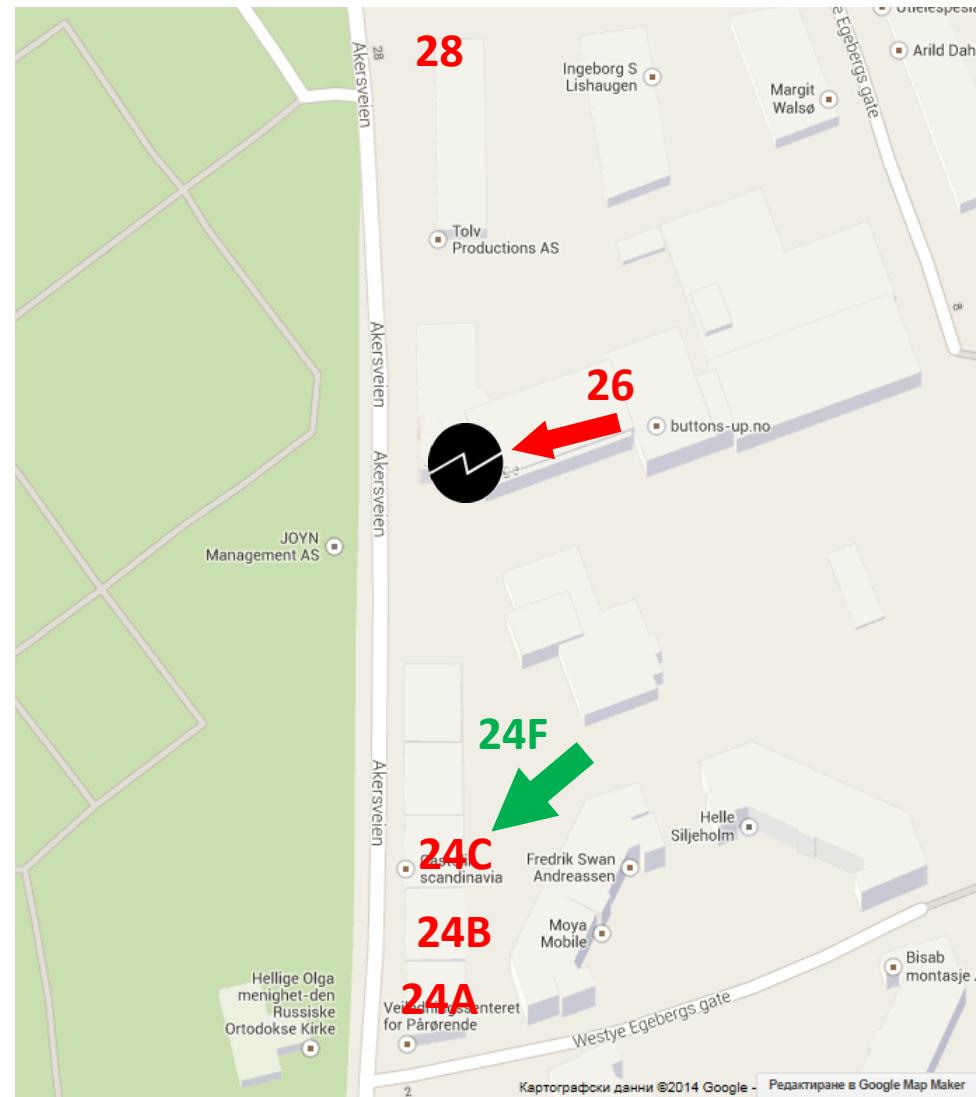
**OSLO, AKERSVEIEN, 26**

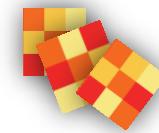


## Approximate

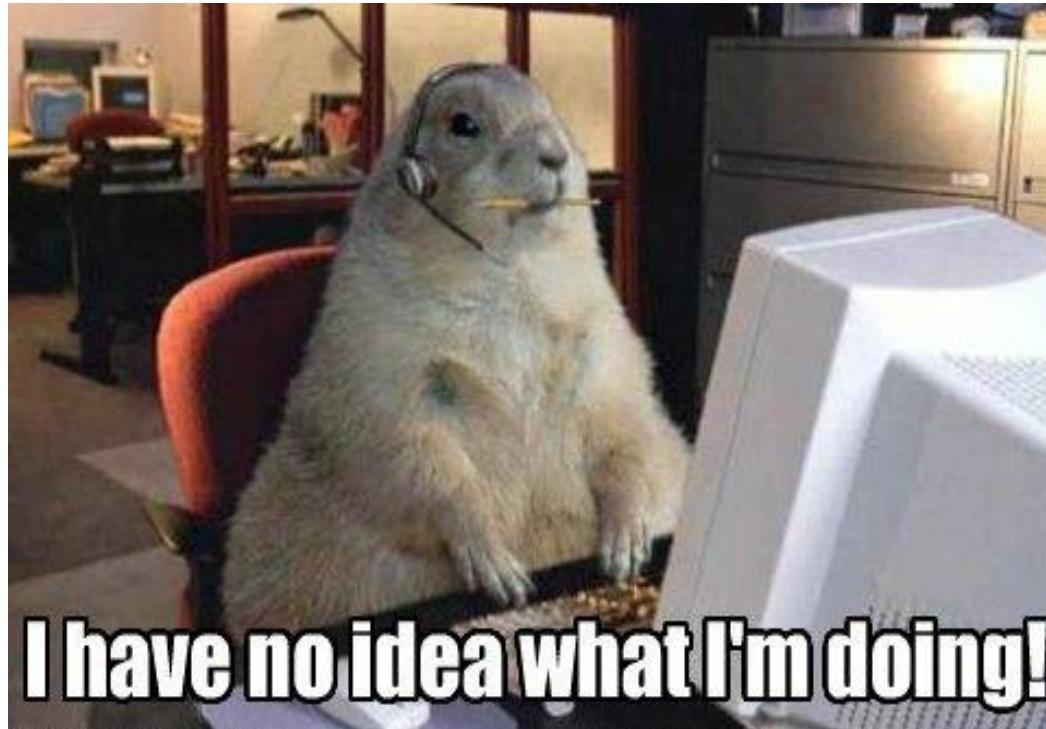
to the nearest  
neighbor locations

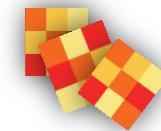
**OSLO, AKERSVEIEN, 24F**





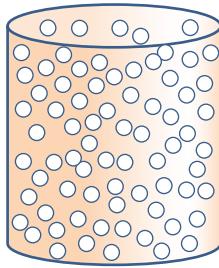
## Generation of population grid



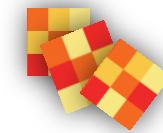


## Source

Population dataset  
aggregated by “object”



Record	Reference data					Statistical data		
	Level 1	Level 2	...	Level N-1	Level N	Statistical value	...	...
1	Id_level1	Id_level2	...	?	Id_level N	Value1	...	...
2	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value2	...	...
...	...	...	...	...	...	...	...	...
P-1	Id_level1	Id_level2	...	Id_levelN-1	?	ValueP-1	...	...
P	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value P	...	...

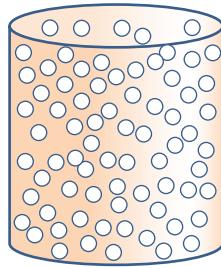


## STEP 1: AGGREGATION PHASE



### Matching

Population dataset  
aggregated by “object”



Geocoded address  
collection

Record	Reference data					Statistical data		
	Level 1	Level 2	...	Level N-1	Level N	Statistical value	...	...
1	Id_level1	Id_level2	...	?	Id_level N	Value1	...	...
2	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value2	...	...
...	...	...	...	...	...	...	...	...
P-1	Id_level1	Id_level2	...	Id_levelN-1	?	ValueP-1	...	...
P	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value P	...	...

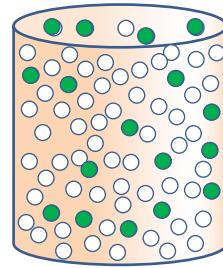


## STEP 1: AGGREGATION PHASE



### Matching

Population dataset aggregated by “object”

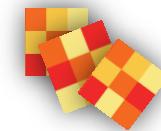


Match  
Address



Geocoded address  
collection

Record	Reference data					Statistical data		
	Level 1	Level 2	...	Level N-1	Level N	Statistical value	...	...
1	Id_level1	Id_level2	...	?	Id_level N	Value1	...	...
2	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value2	...	...
...	...	...	...	...	...	...	...	...
P-1	Id_level1	Id_level2	...	Id_levelN-1	?	ValueP-1	...	...
P	Id_level1	Id_level2	...	Id_levelN-1	Id_level N	Value P	...	...

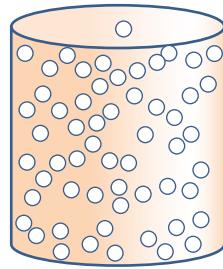


## STEP 1: AGGREGATION PHASE

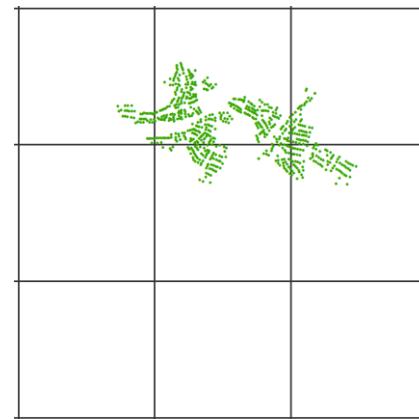


### Matching

Population dataset aggregated by “object”



Geocoded “objects” to points

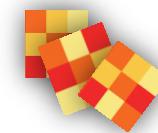


Statistics aggregated by grids

186	1198	292
	371	289



Geocoded address collection

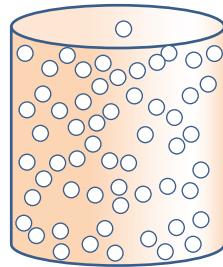


## STEP 1: AGGREGATION PHASE

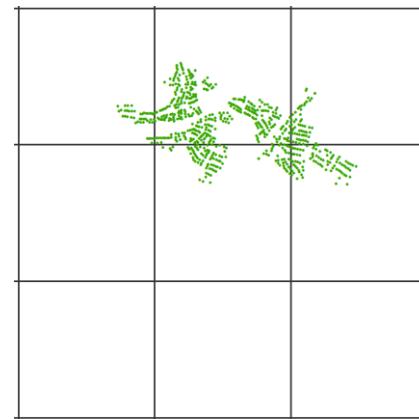


### Matching

Population dataset aggregated by “object”



Geocoded “objects” to points

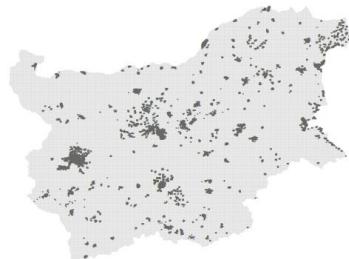


Statistics aggregated by grids

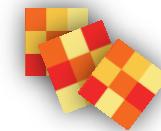
186	1198	292
	371	289



### Additional steps (1A,1B...)



Geocoded address collection

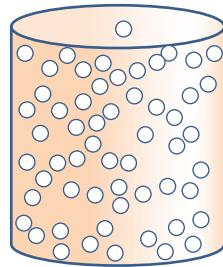


## STEP 1: AGGREGATION PHASE

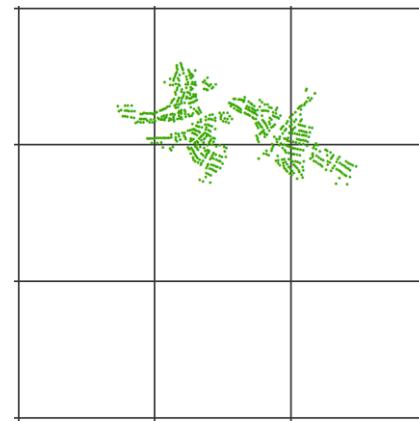


### Matching

Population dataset aggregated by “object”



Geocoded “objects” to points



Statistics aggregated by grids

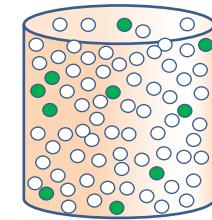
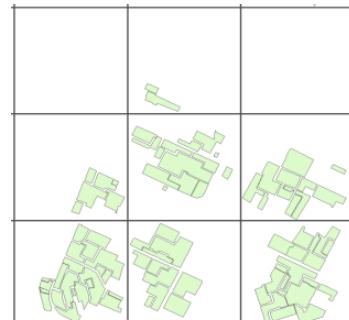
186	1198	292
	371	289



Geocoded address collection



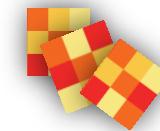
### Additional steps (1A,1B...)



Geometries of census tracts

	9	
25	155	110
220	202	250

Statistics aggregated by grids

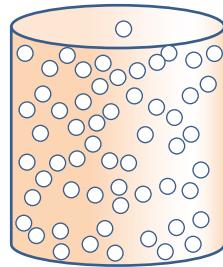


## STEP 1: AGGREGATION PHASE

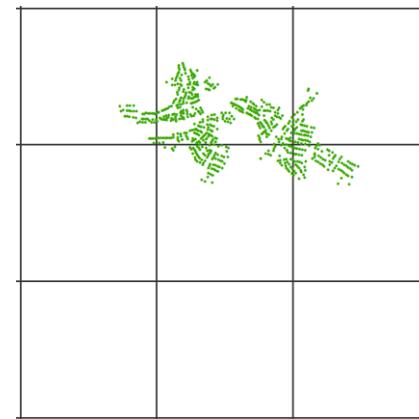


### Matching

Population dataset aggregated by “object”



Geocoded “objects” to points



Statistics aggregated by grids

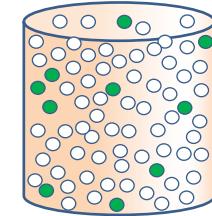
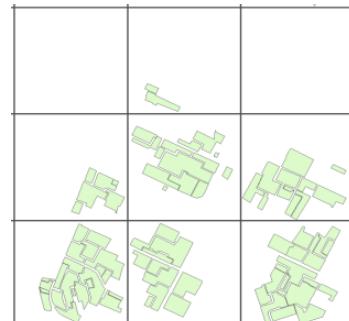
186	1198	292
	371	289



Geocoded address collection

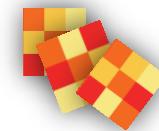


### Additional steps (1A,1B...)



Statistics aggregated by grids

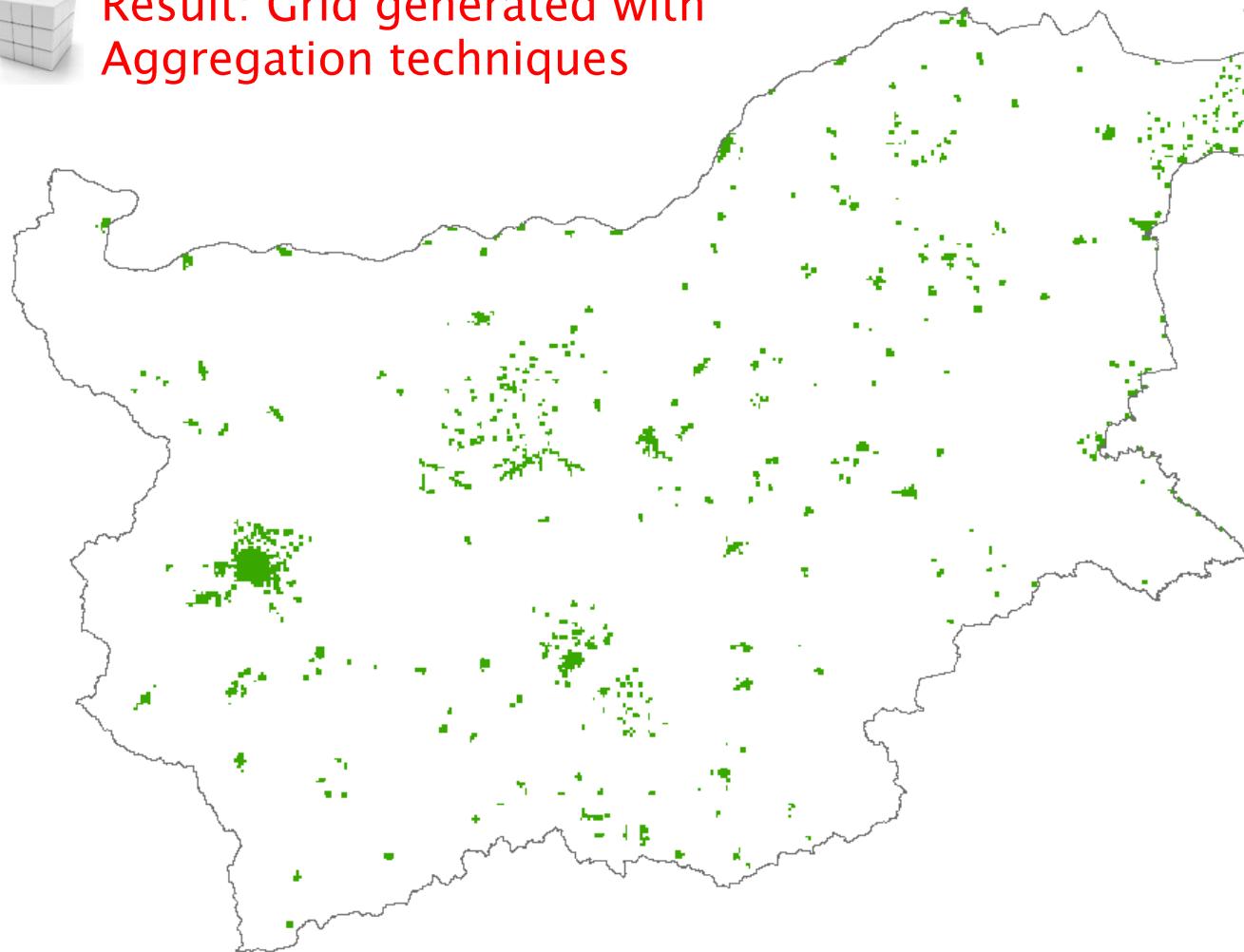
	9	
25	155	110
220	202	250



## STEP 1: AGGREGATION PHASE



**Result: Grid generated with  
Aggregation techniques**



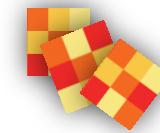
Statistics aggregated by grids

186	1198	292
	371	289



25	9	110
220	202	250

Statistics aggregated by grids



## STEP 2 & 3: DISAGGREGATION PHASE

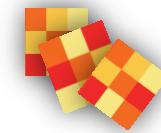


### Areal interpolation

- with ancillary information
  - *dasymetric mapping (binary, three class, regression...)*
  - *smoothing method*
  - .....
- with ancillary information
  - *point-based*
  - *area-based*
  - *pycnophylactic interpolation*
  - *kernel-based interpolation*
  - .....



### Statistical modeling



## STEP 2 & 3: DISAGGREGATION PHASE



Matching “objects” with  
map feature of the “object”



Localization Units

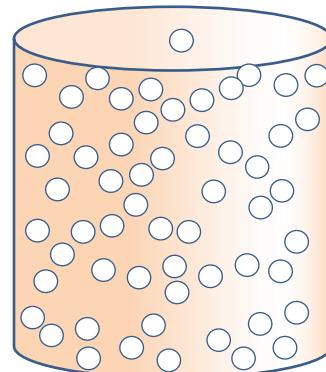


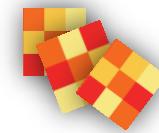
Urban Atlas



Populated Areas

Population dataset  
aggregated by “object”





## STEP 2 & 3: DISAGGREGATION PHASE



Matching “objects” with  
map feature of the “object”



Localization Units



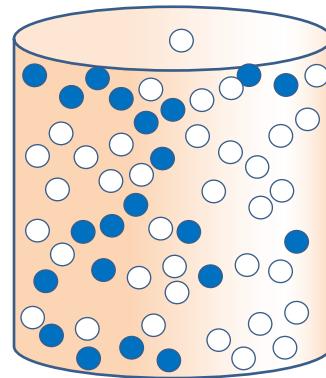
Urban Atlas

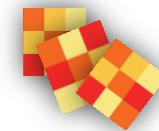


Populated Areas

*Match  
objects*

Population dataset  
aggregated by “object”





## STEP 2 & 3: DISAGGREGATION PHASE



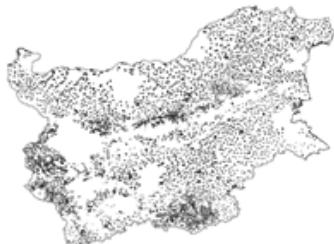
Matching “objects” with  
map feature of the “object”



Localization Units

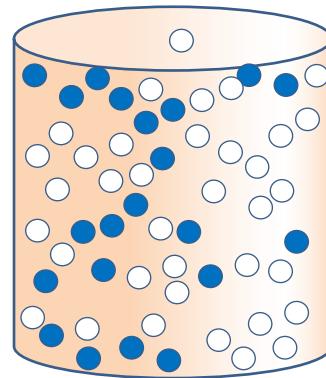


Urban Atlas

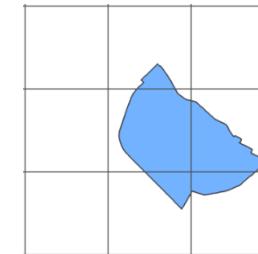


Populated Areas

Population dataset  
aggregated by “object”

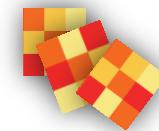


Map features  
of “the objects”



Disaggregation  
by grids

	21	
	210	124
	38	44



## STEP 2 & 3: DISAGGREGATION PHASE



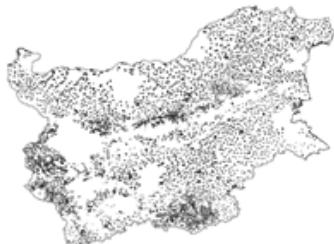
Matching “objects” with  
map feature of the “object”



Localization Units

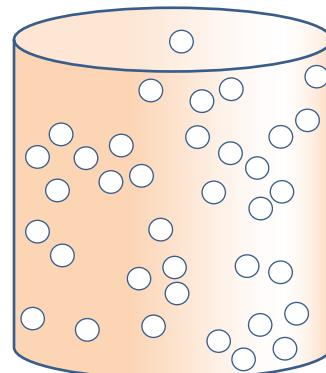


Urban Atlas

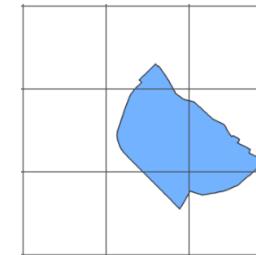


Populated Areas

Population dataset  
aggregated by “object”

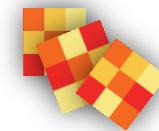


Map features  
of “the objects”



Disaggregation  
by grids

	21	
	210	124
	38	44



## STEP 2 & 3: DISAGGREGATION PHASE



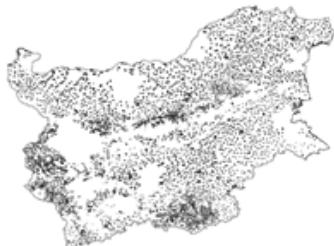
Matching “objects” with  
map feature of the “object”



Localization Units



Urban Atlas

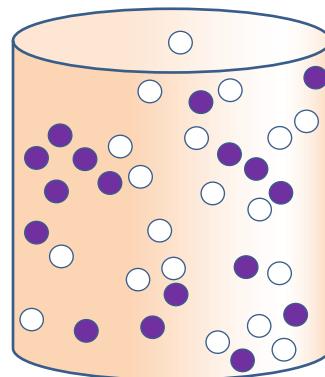


Populated Areas

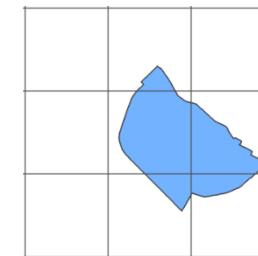
Match  
objects



Population dataset  
aggregated by “object”

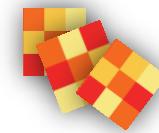


Map features  
of “the objects”



Disaggregation  
by grids

	21	
	210	124
	38	44



## STEP 2 & 3: DISAGGREGATION PHASE



Matching “objects” with  
map feature of the “object”



Localization Units

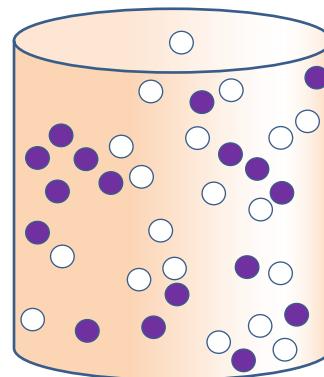


Urban Atlas

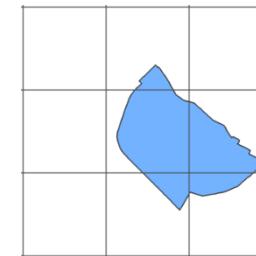


Populated Areas

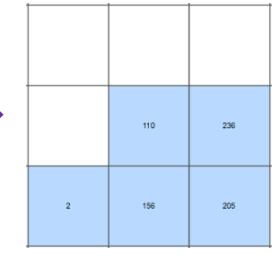
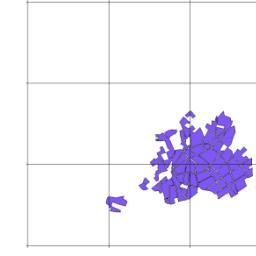
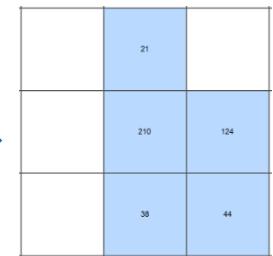
Population dataset  
aggregated by “object”

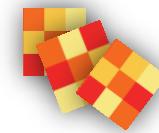


Map features  
of “the objects”



Disaggregation  
by grids





## STEP 2 & 3: DISAGGREGATION PHASE



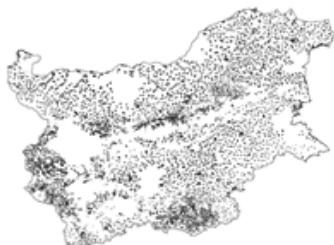
Matching “objects” with  
map feature of the “object”



Localization Units

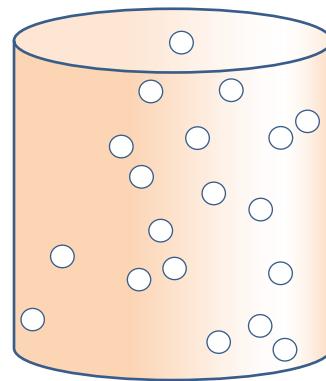


Urban Atlas

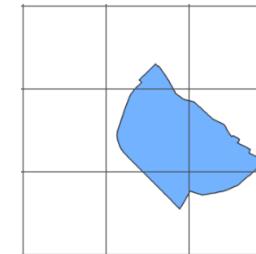


Populated Areas

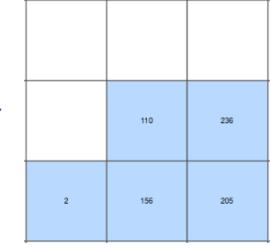
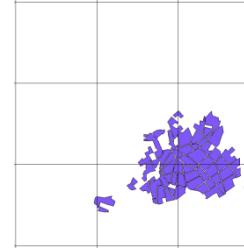
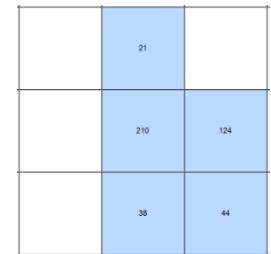
Population dataset  
aggregated by “object”

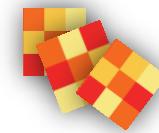


Map features  
of “the objects”



Disaggregation  
by grids





## STEP 2 & 3: DISAGGREGATION PHASE



Matching “objects” with  
map feature of the “object”



Localization Units

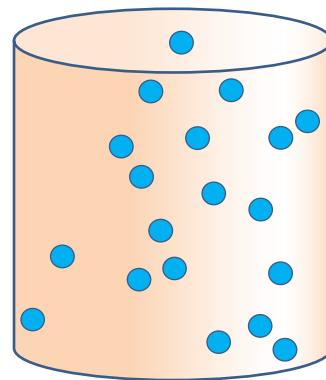


Urban Atlas



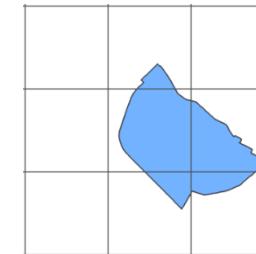
Populated Areas

Population dataset  
aggregated by “object”

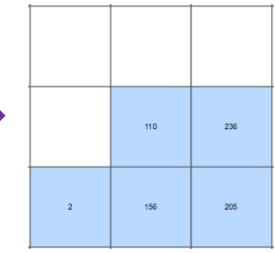
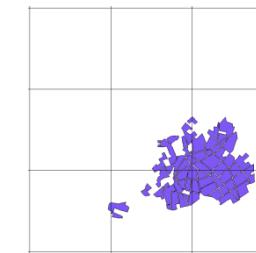
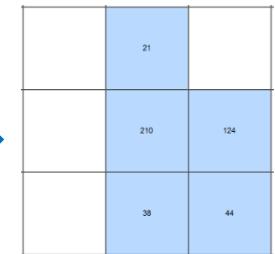


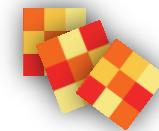
Match  
objects

Map features  
of “the objects”



Disaggregation  
by grids





## STEP 2 & 3: DISAGGREGATION PHASE



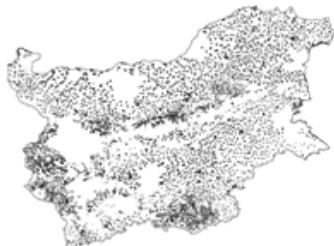
Matching “objects” with  
map feature of the “object”



Localization Units

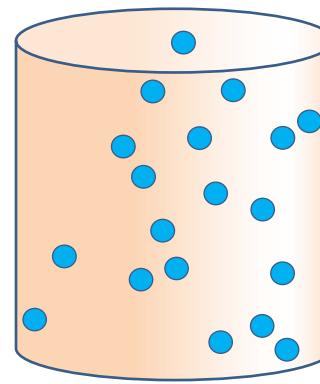


Urban Atlas

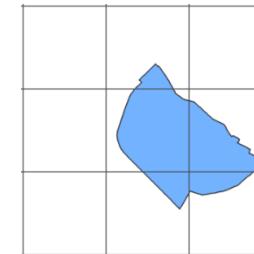


Populated Areas

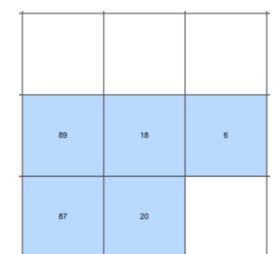
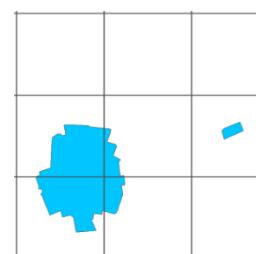
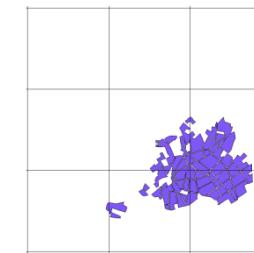
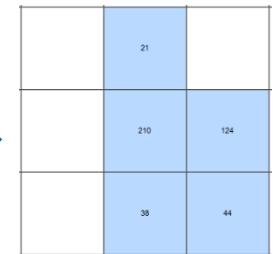
Population dataset  
aggregated by “object”

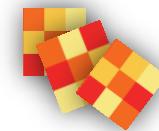


Map features  
of “the objects”



Disaggregation  
by grids





## STEP 2 & 3: DISAGGREGATION PHASE



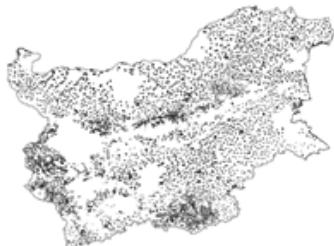
Matching “objects” with  
map feature of the “object”



Localization Units

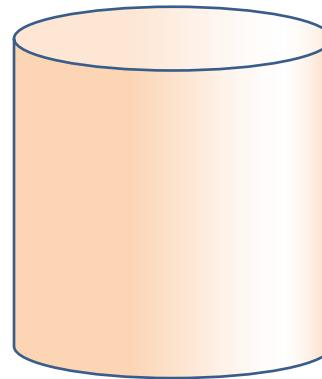


Urban Atlas

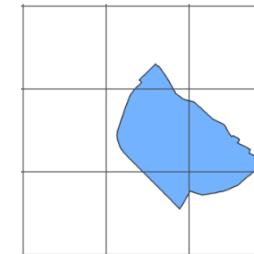


Populated Areas

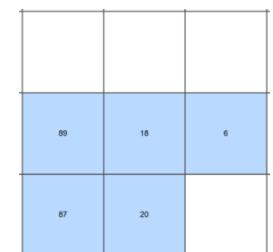
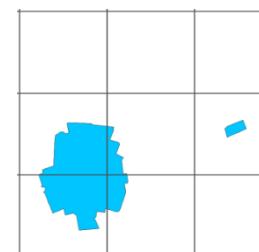
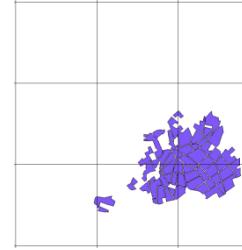
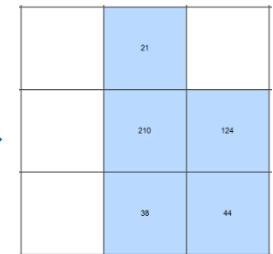
Population dataset  
aggregated by “object”

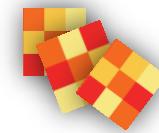


Map features  
of “the objects”



Disaggregation  
by grids





## STEP 2 & 3: DISAGGREGATION PHASE



Matching “objects” with  
map feature of the “object”



Localization Units

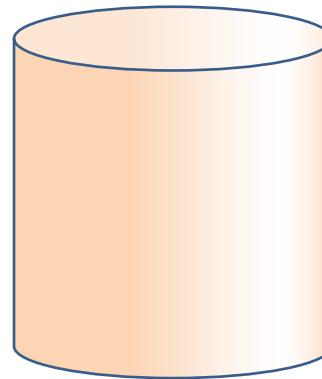


Urban Atlas

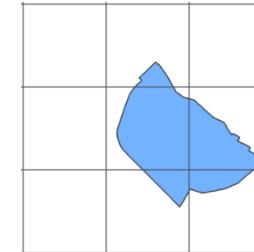


Populated Areas

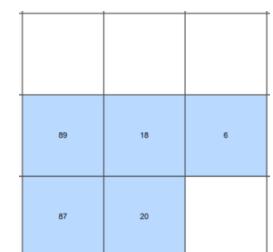
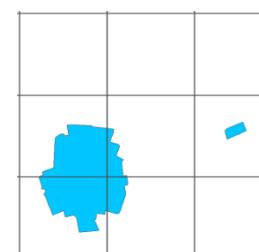
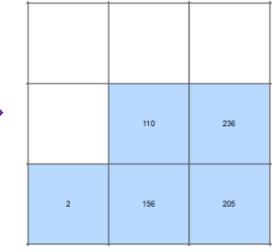
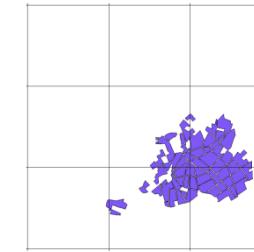
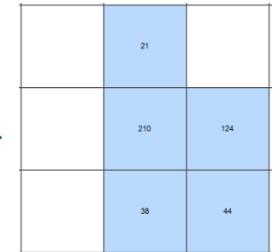
Population dataset  
aggregated by “object”

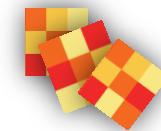


Map features  
of “the objects”



Disaggregation  
by grids

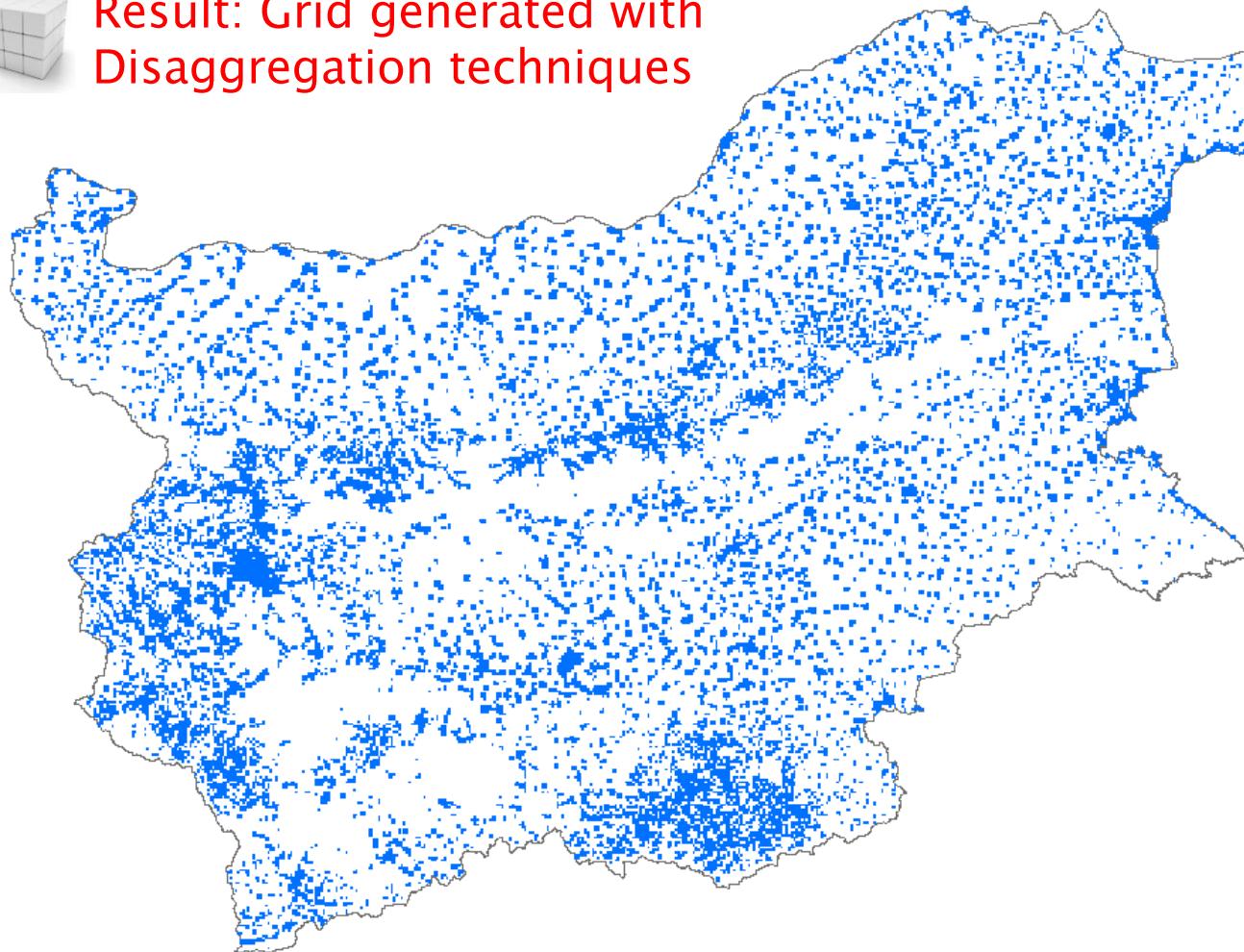




## STEP 2 & 3: DISAGGREGATION PHASE



Result: Grid generated with  
Disaggregation techniques



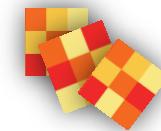
	21	
	210	124
	38	44



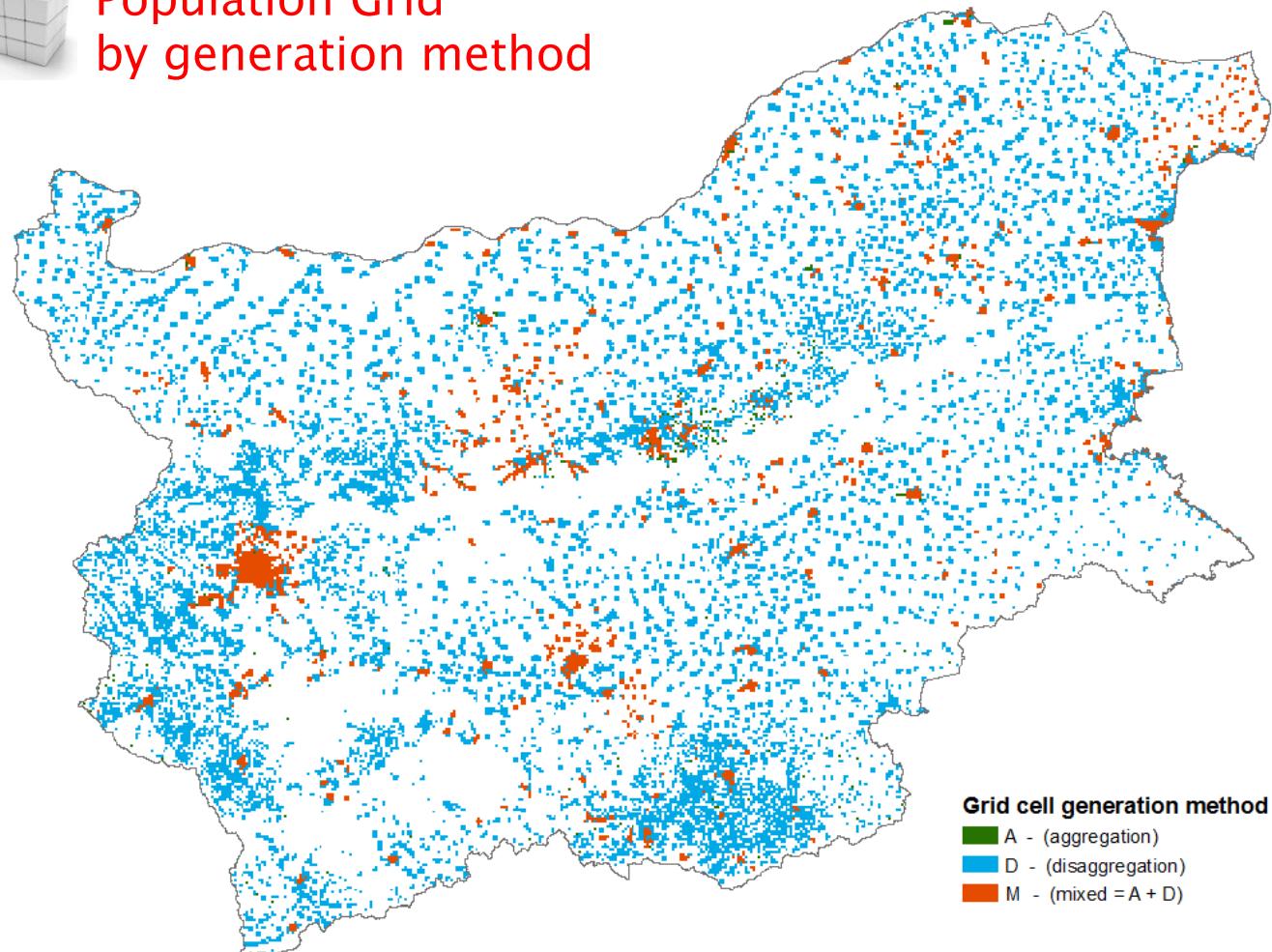
	110	236
2	156	205

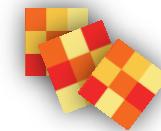


89	18	6
87	20	

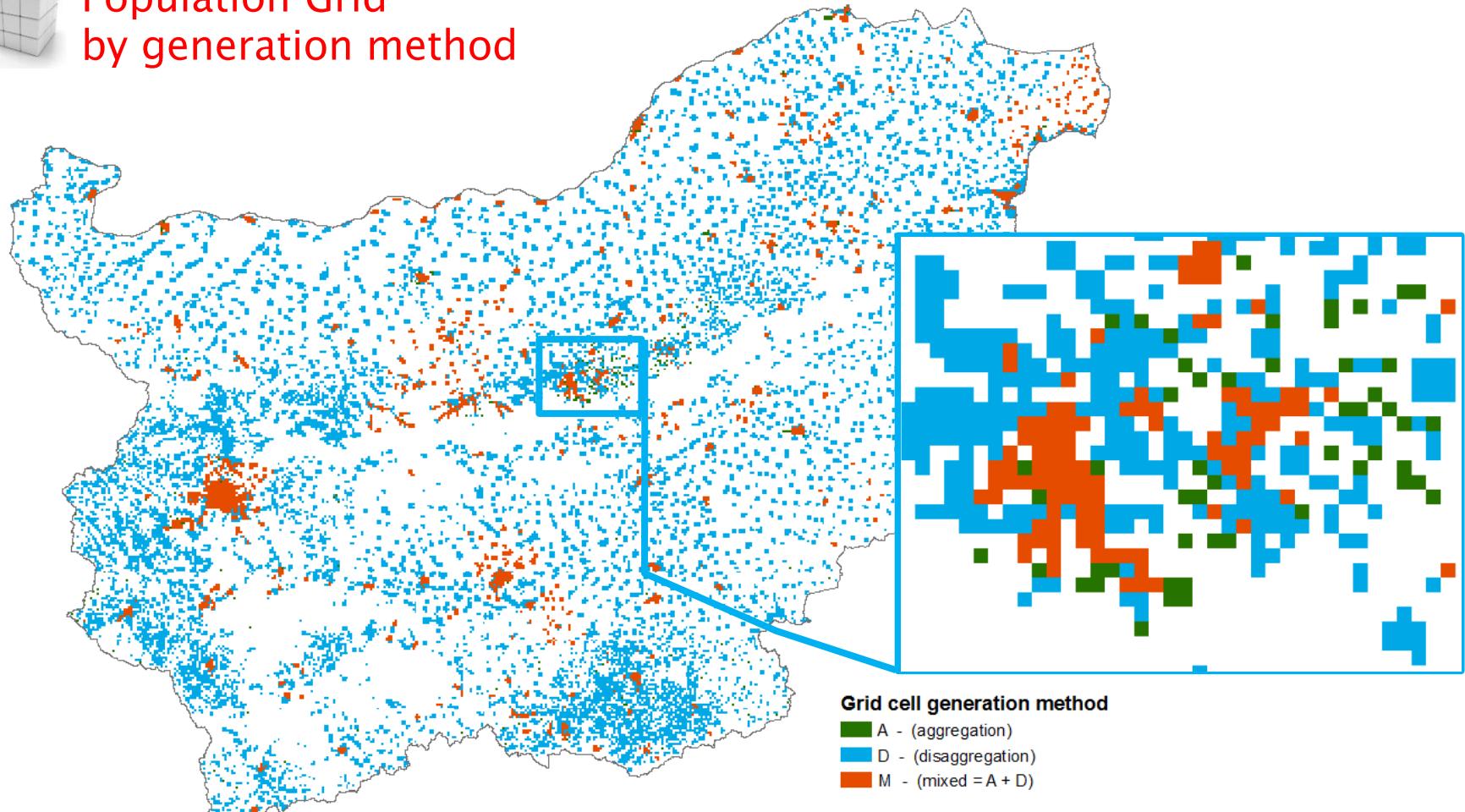


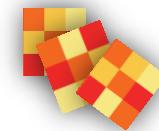
## Population Grid by generation method



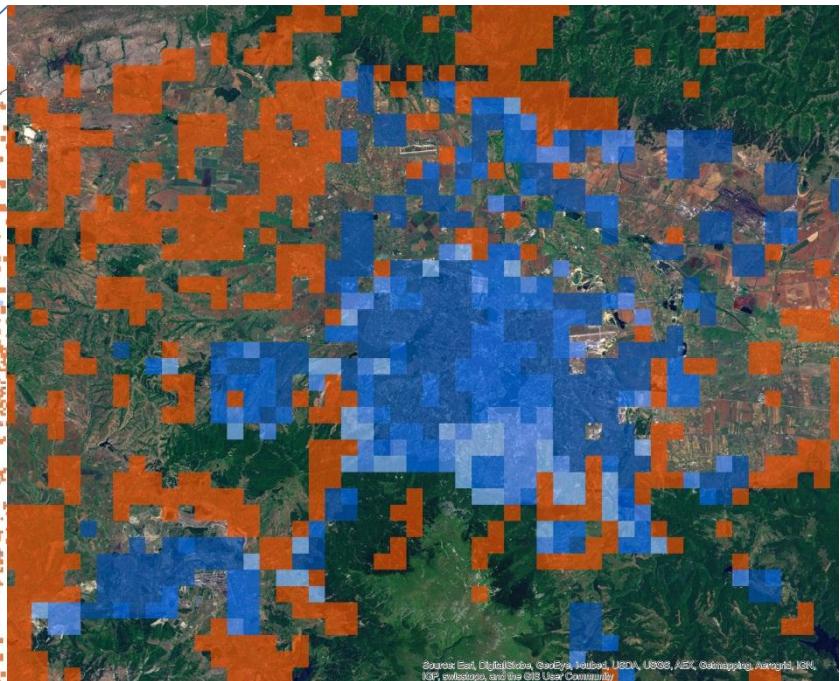
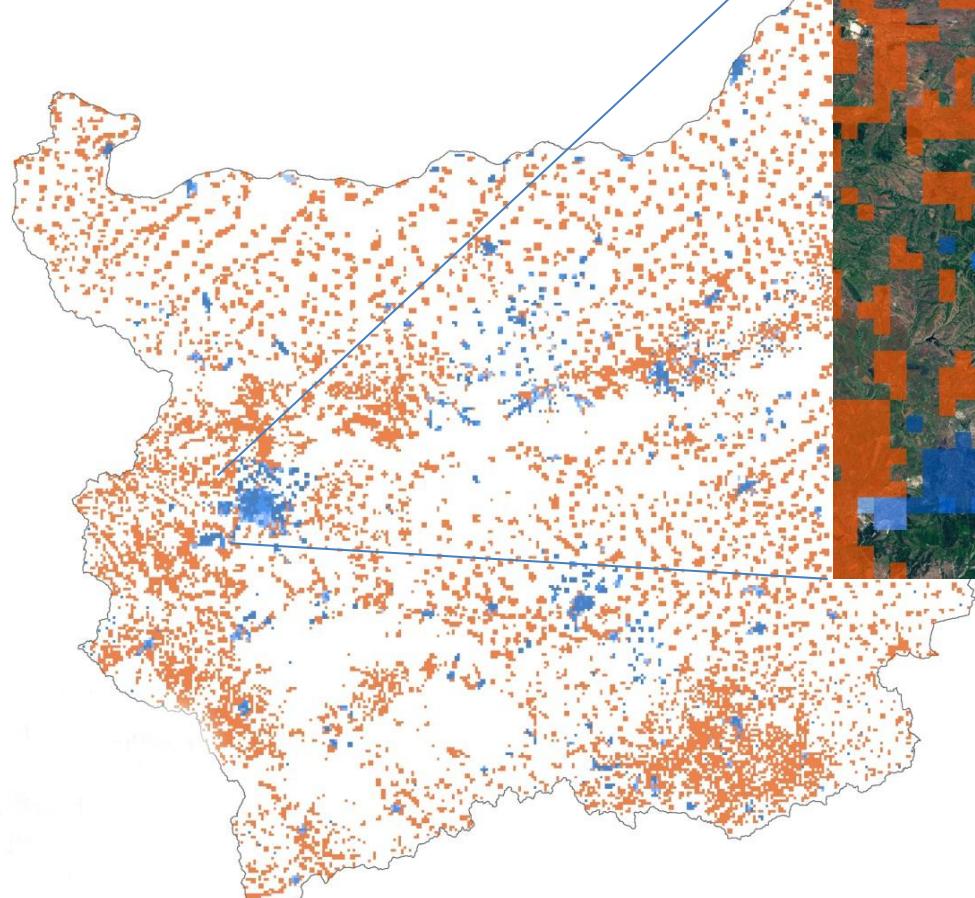


## Population Grid by generation method



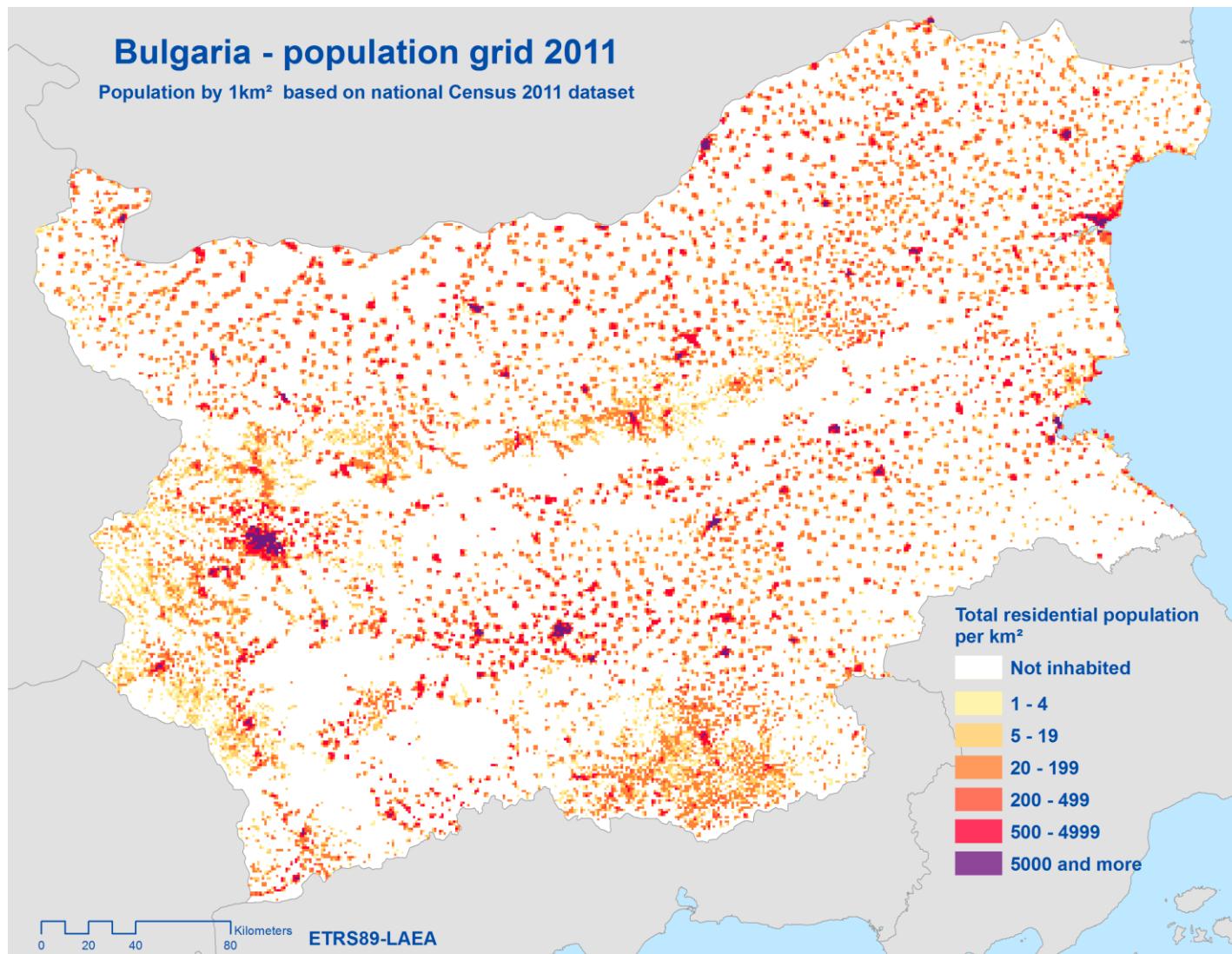
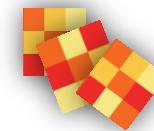


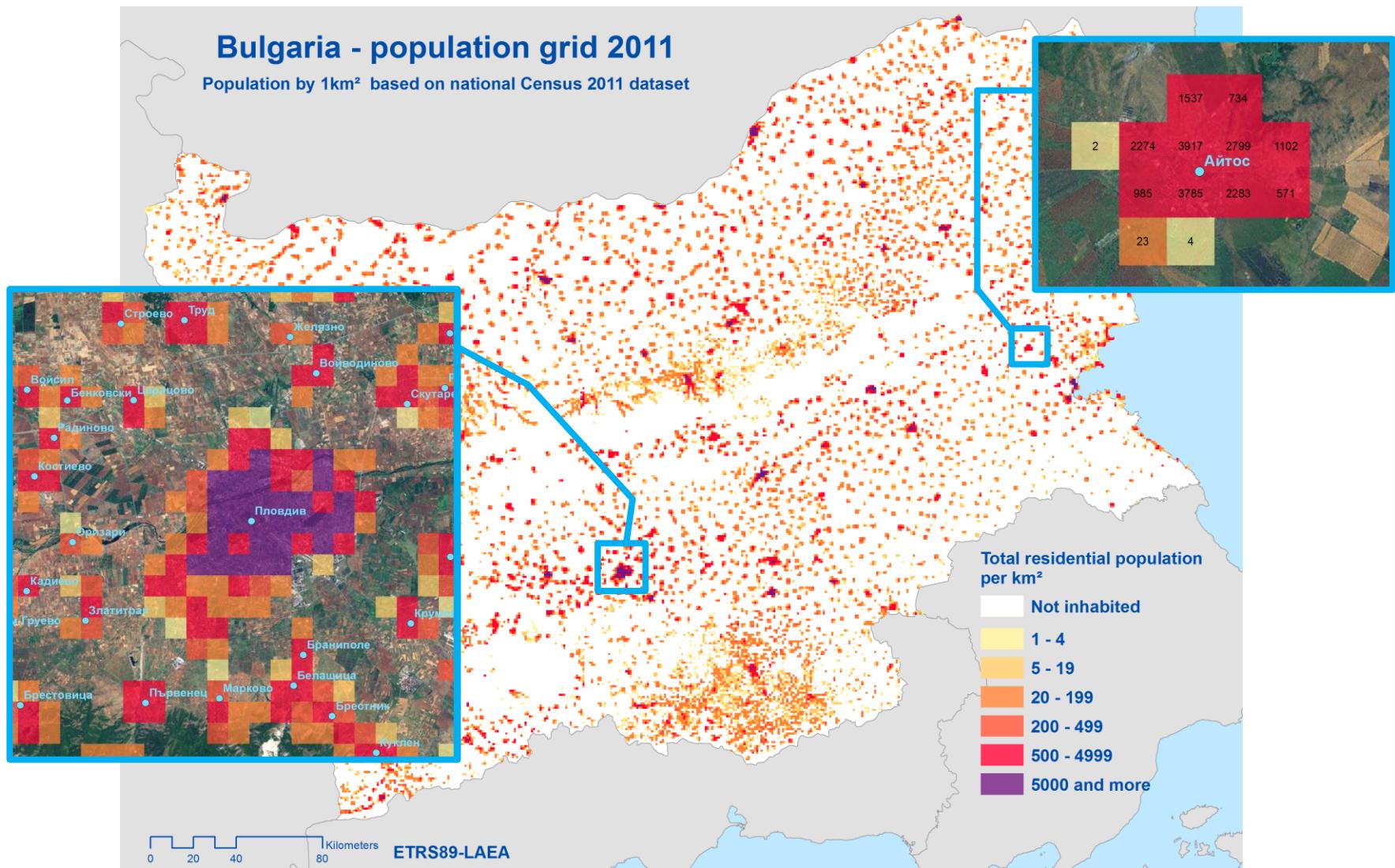
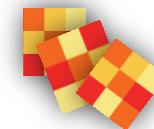
## Population Grid by generation method

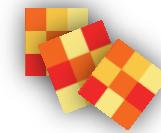


**Rate of aggregated population  
per grid cell**

- only disaggregated
- up to 50%
- from 51% to 75%
- from 76% to 90%
- from 91% to 100%

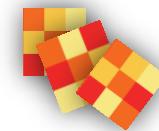






## References





**EFGS**, (2011). "GEOSTAT 1A – Representing Census data in a European population grid, Final Report".



**EFGS**, (2012). Guidelines from Geostat 1B "Production procedures for harmonized European population grid.



**Corcoran, D.** (2011). "A population grid for the Republic of Ireland: Making use of national databases and local geography".



**Goerlich, F. and Cantarino, I.** (2011). "Downscaling Population with a High Resolution Land Cover Data Set for Spain".



**Goerlich, F. and Cantarino, I.** (2013). "A population density grid for Spain."



**Qui, F., Zhang, C and Zhou, Y.** (2012). "The development of an Areal Interpolation ArcGIS Extension and a Comparative Study"



**Lipatz, JL.** (2010). "Gridded population data by INSEE."



**Lipatz, JL.** (2010). "Gridded data from the French census 2007. Aggregation without coordinates, coordinates but disaggregation. JL. Lipatz 23/11/2011."



**Jablonski, R. and Wardzinska-Sharif, A.** (2010). "WP2 Geostatistics, Guidelines for producing statistics by grids - Poland"



**Steinnocher, K., Kaminger, I., Kostl, M. and Weichselbaum, J.** (2012). "Gridded Population – new data sets for an improved disaggregation approach"



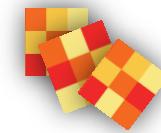
**INSPIRE.** (2011). "Data specification on Statistical Units – Draft Guidelines" D2.8.III.1"

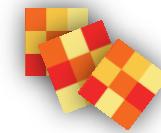


**INSPIRE.** (2011). "Data specification on Population Distribution - Demography – Draft Guidelines" D2.8.III.10"



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Thank you for your attention!

