Vario-scale Shenzhen and extension of tGAP creation with scale dependent actions

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Enabling new technology

Solutions of others - Swisstopo

Käuferle, D. New National Maps for Switzerland Presented at 2nd ICA/EuroSDR NMA Symposium 2015, Amsterdam, NL, 2015

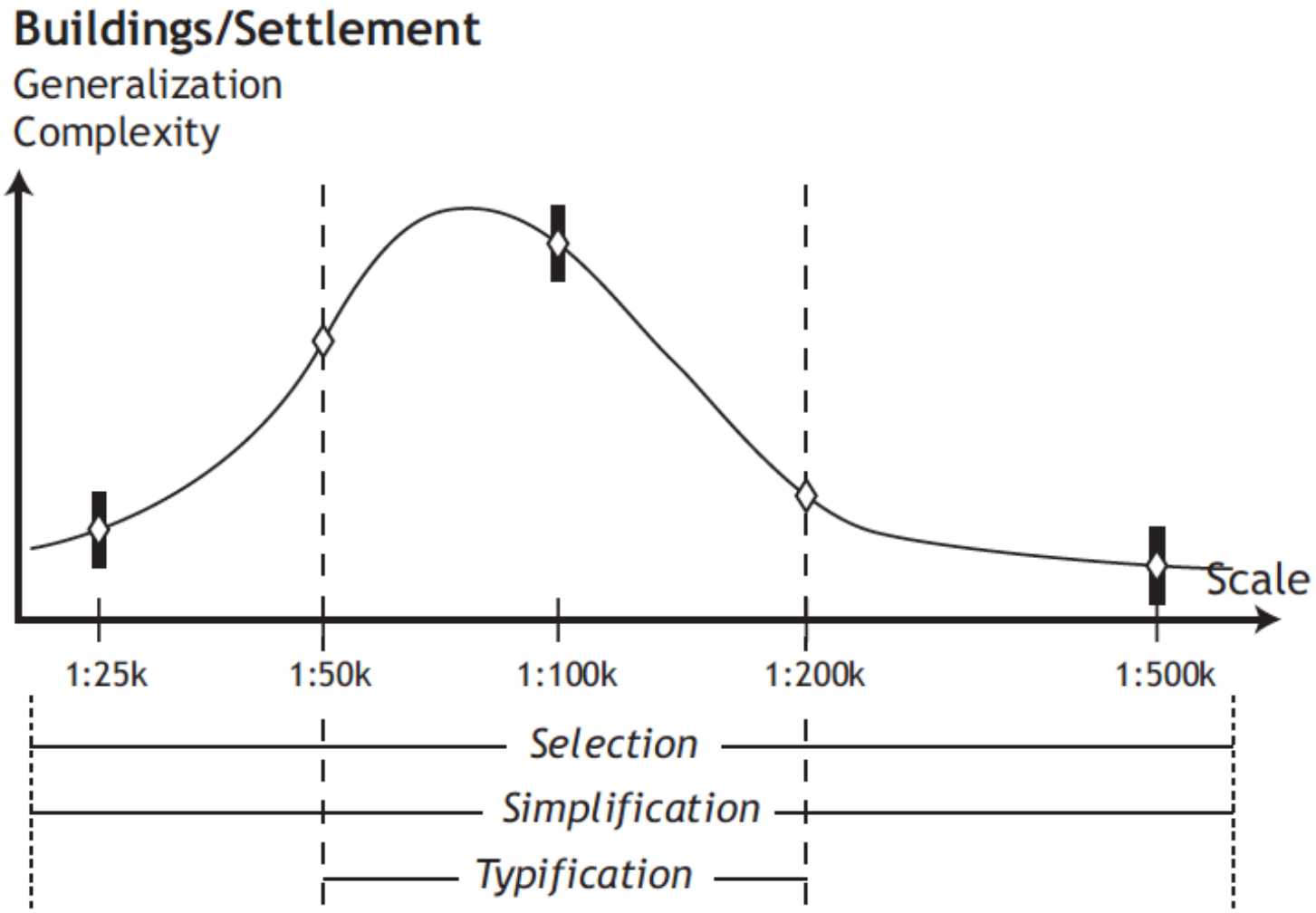
tGAP basic concept - merge with compatibility

From-class code	→	1001	2001	3001	4001	4002	4003	4004
Weight		13.0	1.20	1.30	9.00	1.00	0.93	0.90
Class name	To-c↓							
Building	1001	1.00	0.50	0.00	0.90	0.90	0.50	0.50
Road	2001	0.00	0.99	0.00	0.00	0.00	0.00	0.00
Water	3001	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Lot	4001	0.50	0.90	0.00	1.00	0.95	0.95	0.95
Fallow land	4002	0.90	0.90	0.00	0.50	1.00	0.90	0.90
Plants	4003	0.50	0.50	0.00	0.50	0.50	0.99	0.95
Terrain unk.	4004	0.90	0.50	0.00	0.50	0.90	0.00	1.00
Grass	4005	0.50	0.90	0.00	0.80	0.50	0.95	0.95

More options available

We dont want to end up like this

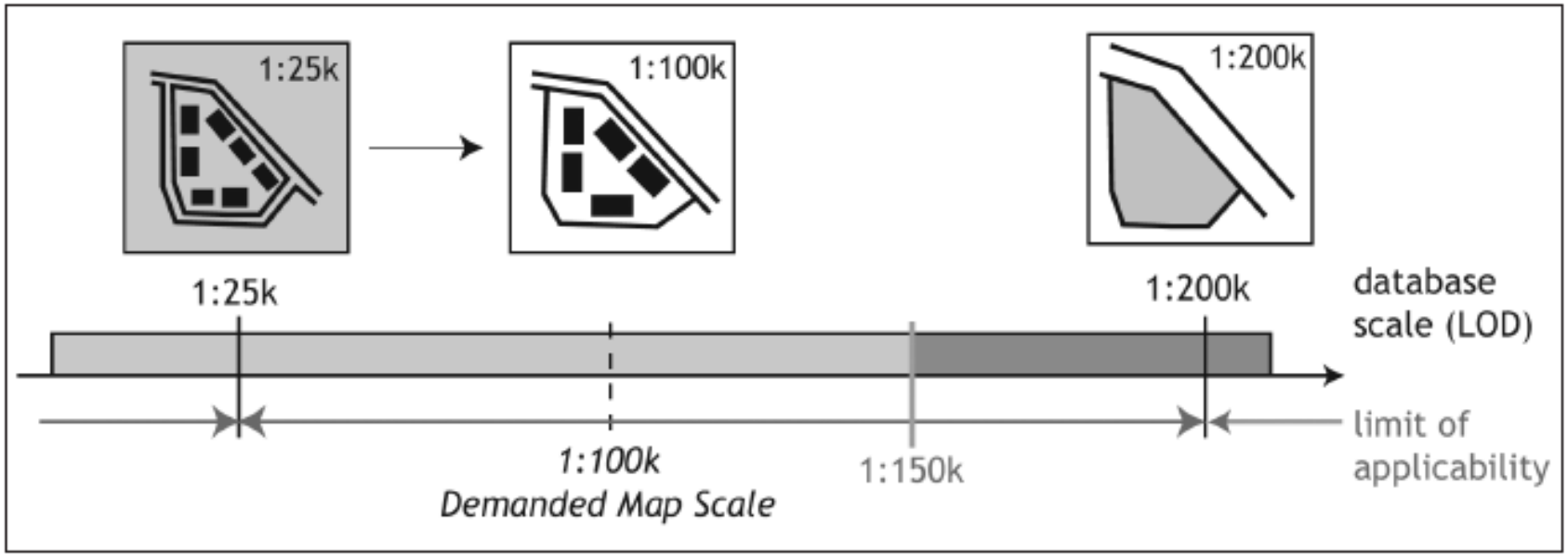
Proposed by others



Example guidance on representation decisions through scales.

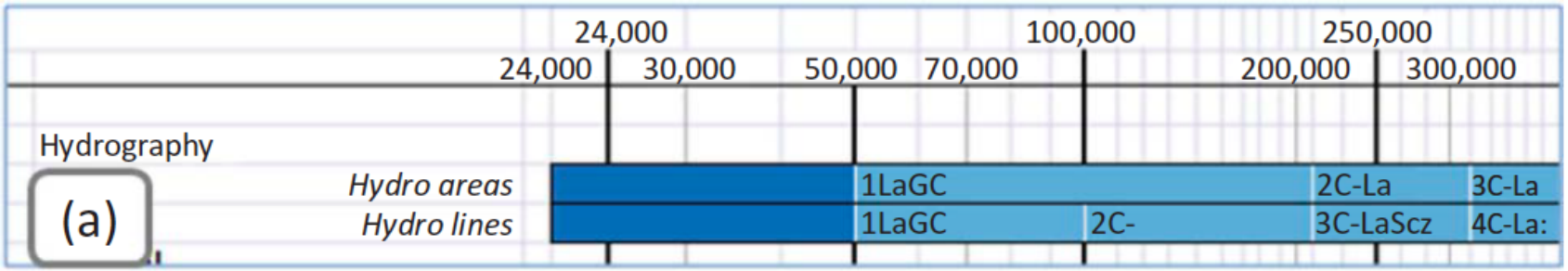
Cecconi, A.; Weibel, R. & Barrault, M. Improving automated generalisation for on-demand web mapping by multiscale databases Advances in Spatial Data Handling, 2002, 515-531

Proposed by others



Brewer, C. A. & Buttenfield, B. P. Framing Guidelines for Multi-Scale Map Design Using Databases at Multiple Resolutions Cartography and Geographic Information Science, 2007, 34, 3-15

Proposed by others



Data Themes	Operation order for content, Generalization, and S1		
Hydrography	1	2	3
Hydro areas	La, reduce label font size; GC, High Res. hydro replaced by 50,000 LoD	C-, filter small waterbodies; La, reduce label font size	C-, filter small waterbodies; La, reduce label font size
Hydro lines	La, reduce label font size; GC, High Res. hydro replaced by 50,000 LoD	C-, eliminate diffs	C-, filter small waterbodies; La, reduce label font size; Sc, loghten line color; Sz, reduce line weight

(b)

Brewer, C. A. & Buttenfield, B. P. Framing Guidelines for Multi-Scale Map Design Using Databases at Multiple Resolutions Cartography and Geographic Information Science, 2007, 34, 3-15

Scale ranges definition

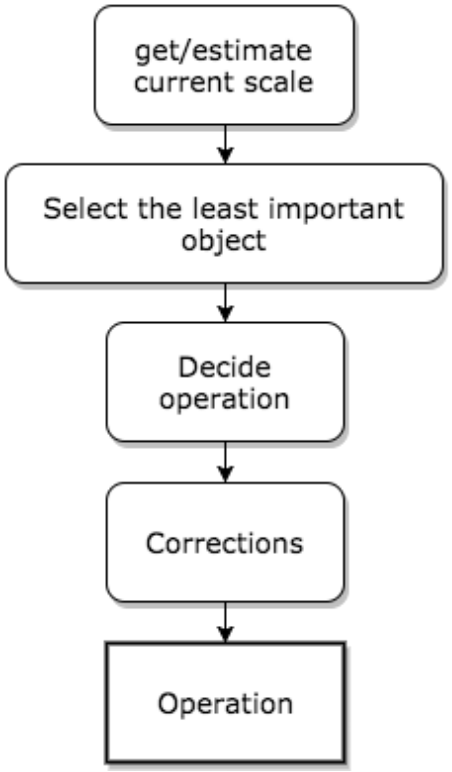
top10nl_margraten_03_02.xml — map_attrs

```xml
-1 = infinite
-->
<collection classes="Vario-scale mapping">
<cls title="Important road">
    <code>5</code>
    <rgb>230,0,0</rgb>
    <description>Very important road (e.g. highway)</description>
    <scaleranges>(0,30000,merge);(30000,-1,split)</scaleranges>
</cls>
<cls title="Regional road">
    <code>4</code>
    <rgb>255,170,0</rgb>
    <description>2nd most important road, e.g. regional roads of 1st class</description>
    <scaleranges>(0,20000,merge);(20000,-1,split)</scaleranges>
</cls>
<cls title="Local road">
    <code>3</code>
    <rgb>255,255,0</rgb>
    <description>local road</description>
    <scaleranges>(0,20000,merge);(20000,-1,split)</scaleranges>
</cls>
<cls title="Street">
    <code>2</code>
    <rgb>255,255,255</rgb>
    <description>Street</description>
    <scaleranges>(0,15000,merge);(15000,-1,split)</scaleranges>
</cls>
<cls title="Cycling line">
    <code>1</code>
    <rgb>255,211,127</rgb>
    <description>Other small types of roads e.g: cycling line</description>
```

Scale ranges definition

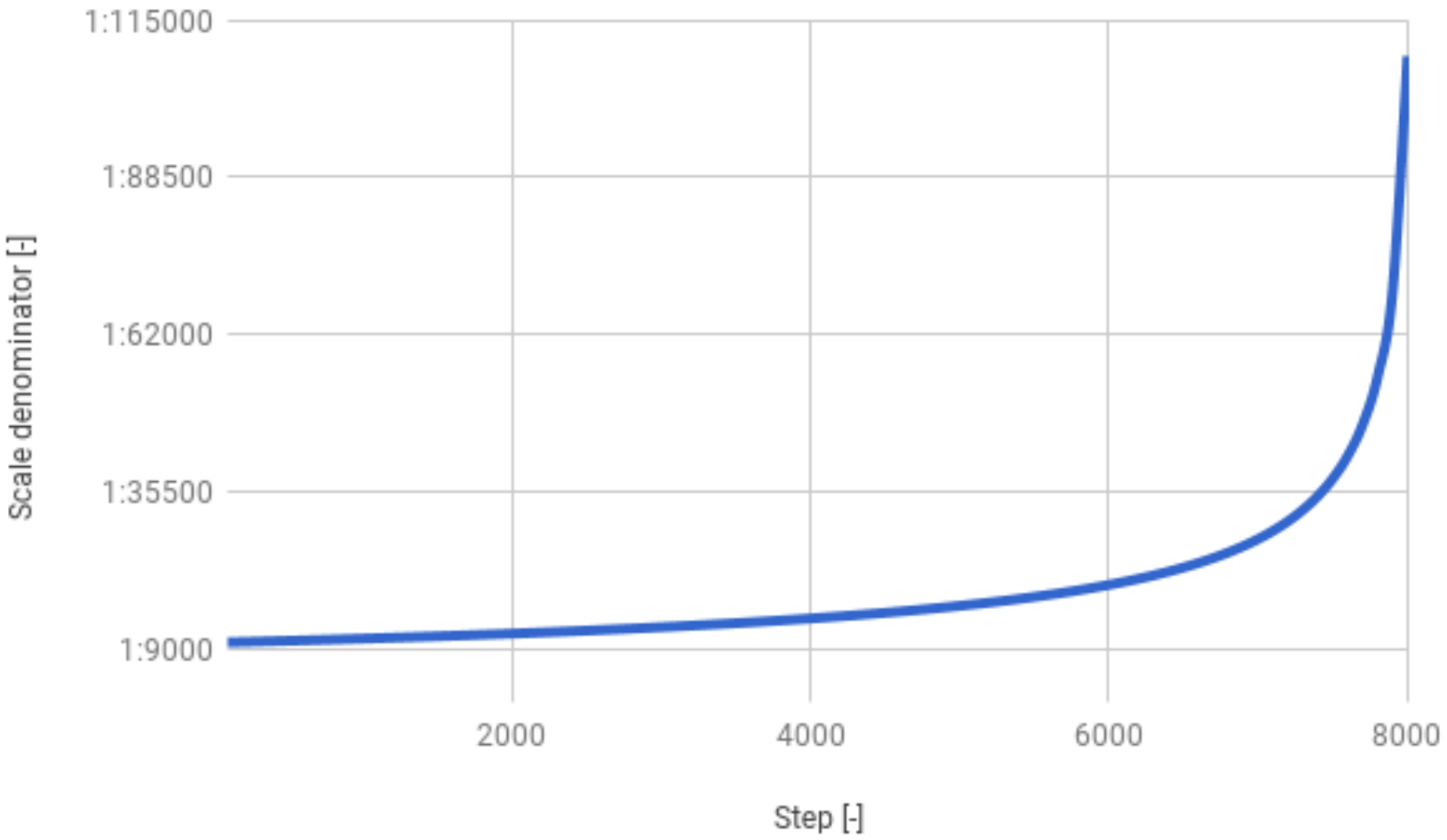
	feature_class integer	vario_code integer	name character varying	rgb character varying	description character varying	ranges character varying
1	10510	3	Local road	255,255,0	local road	(0,20000,merge);(20000,-1,split)
2	14160	0	Other	156,156,156	all other features	(0,-1,merge)
3	10780	0	Other	156,156,156	all other features	(0,-1,merge)
4	14040	3000	Terrain	201,235,112	terrain, green areas	(0,-1,merge)
5	14010	3000	Terrain	201,235,112	terrain, green areas	(0,-1,merge)
6	10730	1	Cycling line	255,211,127	Other small types of roads e.g: cycling line	(0,20000,merge);(20000,-1,split)
7	12500	1000	Water	160,220,255	all water features	(0,-1,split)
8	13000	4000	Building	0,0,0	buildings	(0,-1,merge)
9	14050	3000	Terrain	201,235,112	terrain, green areas	(0,-1,merge)
10	10310	5	Important road	230,0,0	Very important road (e.g. highway)	(0,30000,merge);(30000,-1,split)
11	14162	0	Other	156,156,156	all other features	(0,-1,merge)
12	10600	2	Street	255,255,255	Street	(0,15000,merge);(15000,-1,split)
13	14090	3000	Terrain	201,235,112	terrain, green areas	(0,-1,merge)
14	14080	3000	Terrain	201,235,112	terrain, green areas	(0,-1,merge)
15	14120	3000	Terrain	201,235,112	terrain, green areas	(0,-1,merge)
16	12400	1000	Water	160,220,255	all water features	(0,-1,split)
17	14060	3000	Terrain	201,235,112	terrain, green areas	(0,-1,merge)
18	10410	4	Regional road	255,170,0	2nd most important road, e.g. regional roads of 1st class	(0,20000,merge);(20000,-1,split)
19	10740	1	Cycling line	255,211,127	Other small types of roads e.g: cycling line	(0,20000,merge);(20000,-1,split)
20	10710	4	Regional road	255,170,0	2nd most important road, e.g. regional roads of 1st class	(0,20000,merge);(20000,-1,split)
21	14130	3000	Terrain	201,235,112	terrain, green areas	(0,-1,merge)
22	14100	0	Other	156,156,156	all other features	(0,-1,merge)
23	10720	4	Regional road	255,170,0	2nd most important road, e.g. regional roads of 1st class	(0,20000,merge);(20000,-1,split)

Decision algorithm

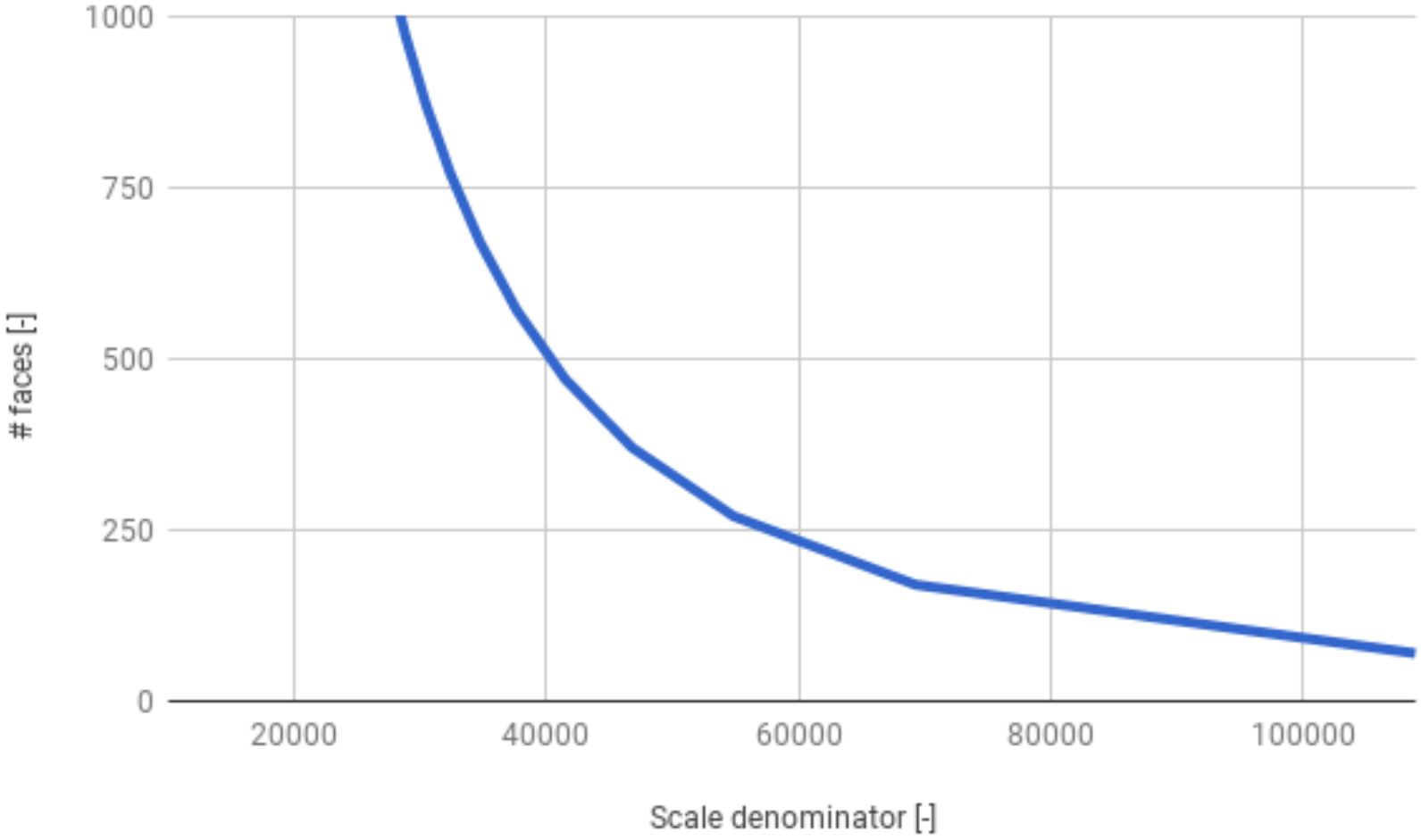


	Process	Current implementation	Future
1)	get/estimate current scale	Step to scale formula from (Huang2016)	-
2)	Select the least important object	Queue of faces is used	Any feature class can be picked
3)	Decide operation	Operation picked from scale ranges, inspired by Scale Master (Touya&Girres2013)	-
4)	Corrections	Back to queue	More complex penalty system, list of special cases / contra examples
5)	Operation	Merge, split, operations for road network, groups, compatibility matrix	Displacement, others

Get/estimate current scale



Get/estimate current scale



Test region

TOP10NL, near Maastricht, A rural region Area of 7×7 km

8,068 features at the beginning

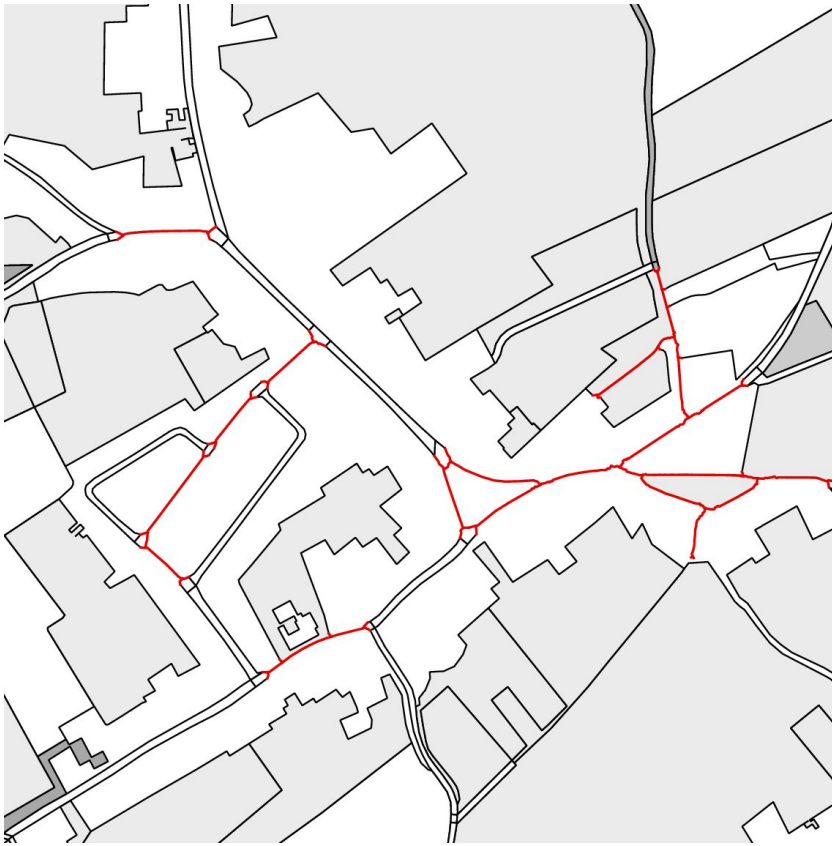
OLD: road network - detailed situation

structure

styled

OLD: road network - detailed situation

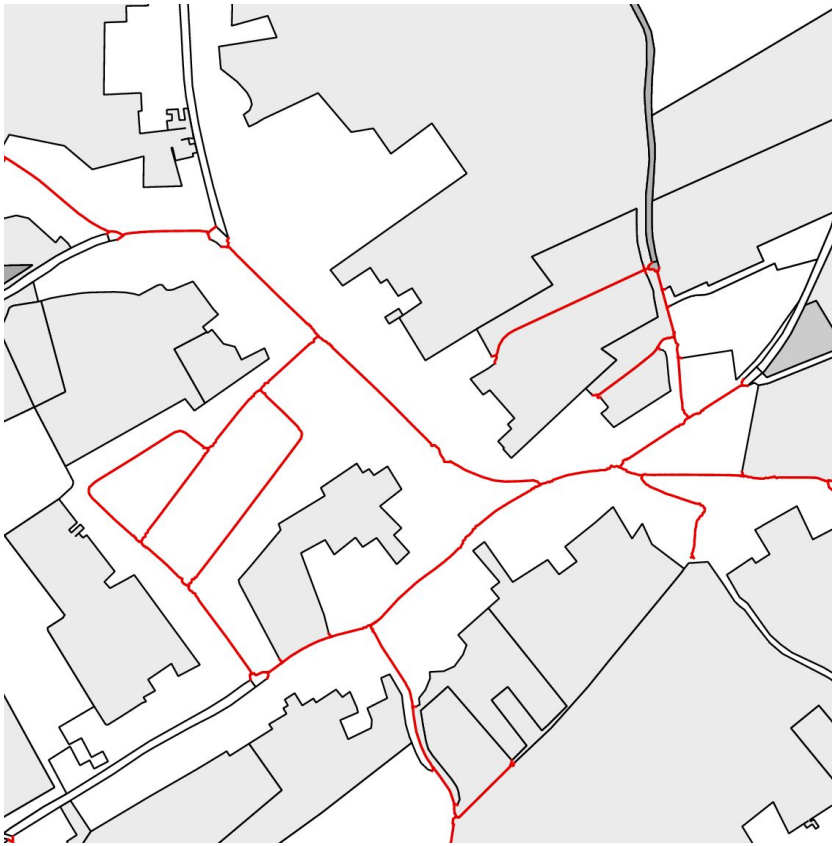
structure



styled

OLD: road network - detailed situation

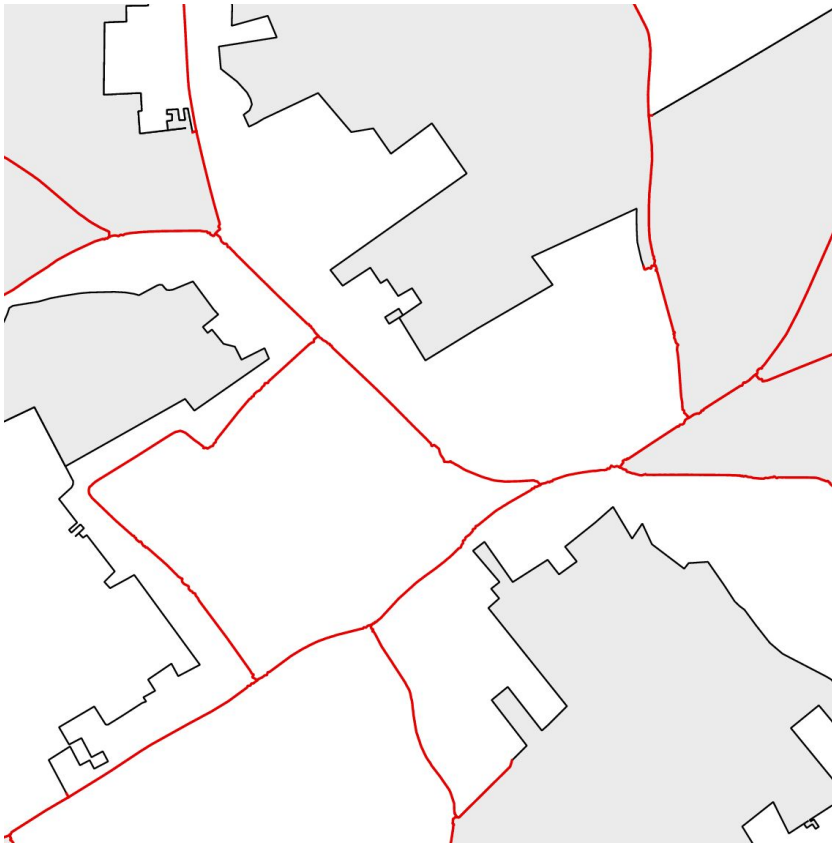
structure



styled

OLD: road network - detailed situation

structure



styled

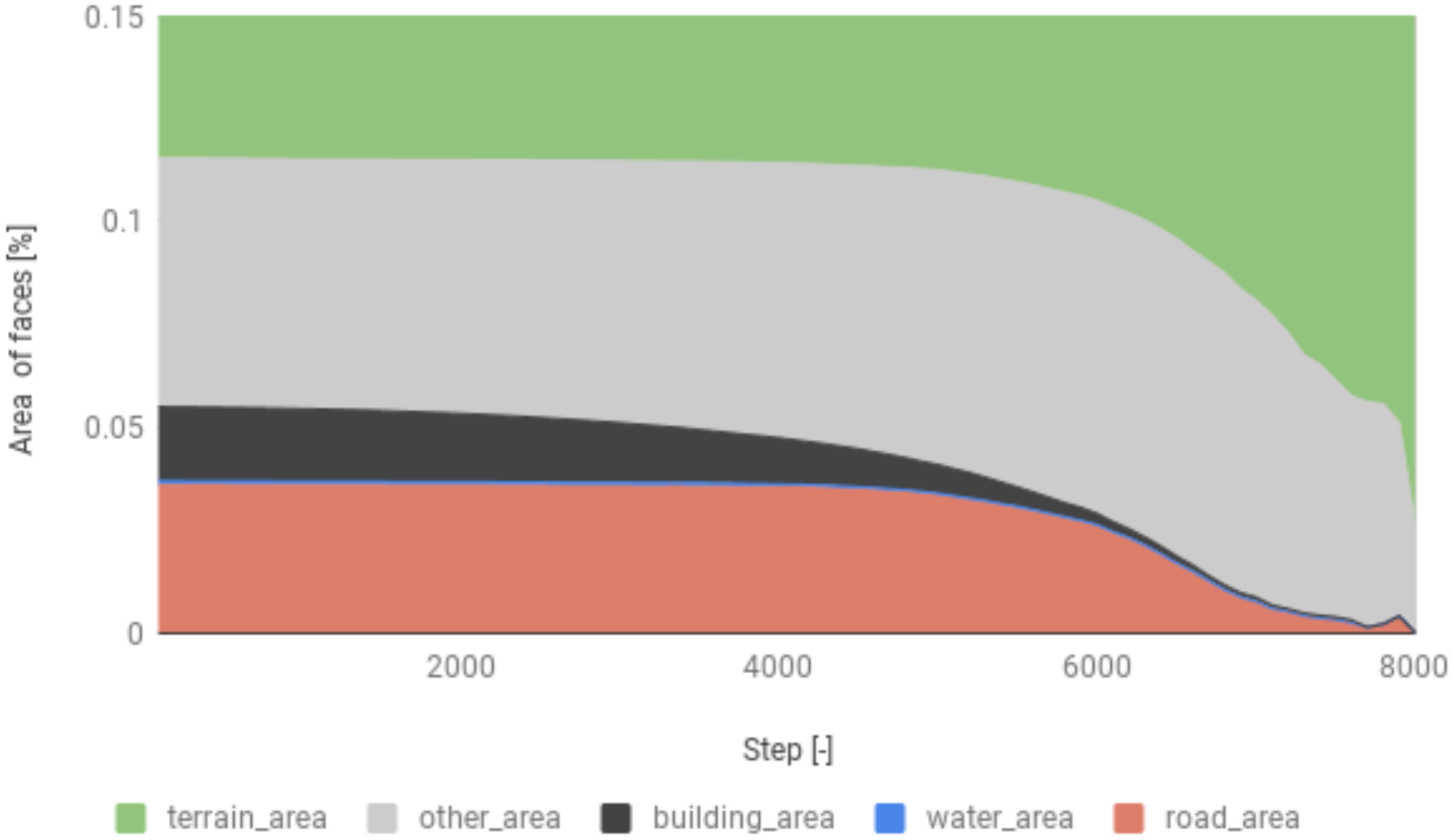
NEW: Scale ranges - detailed situation

NEW: Scale ranges - detailed situation

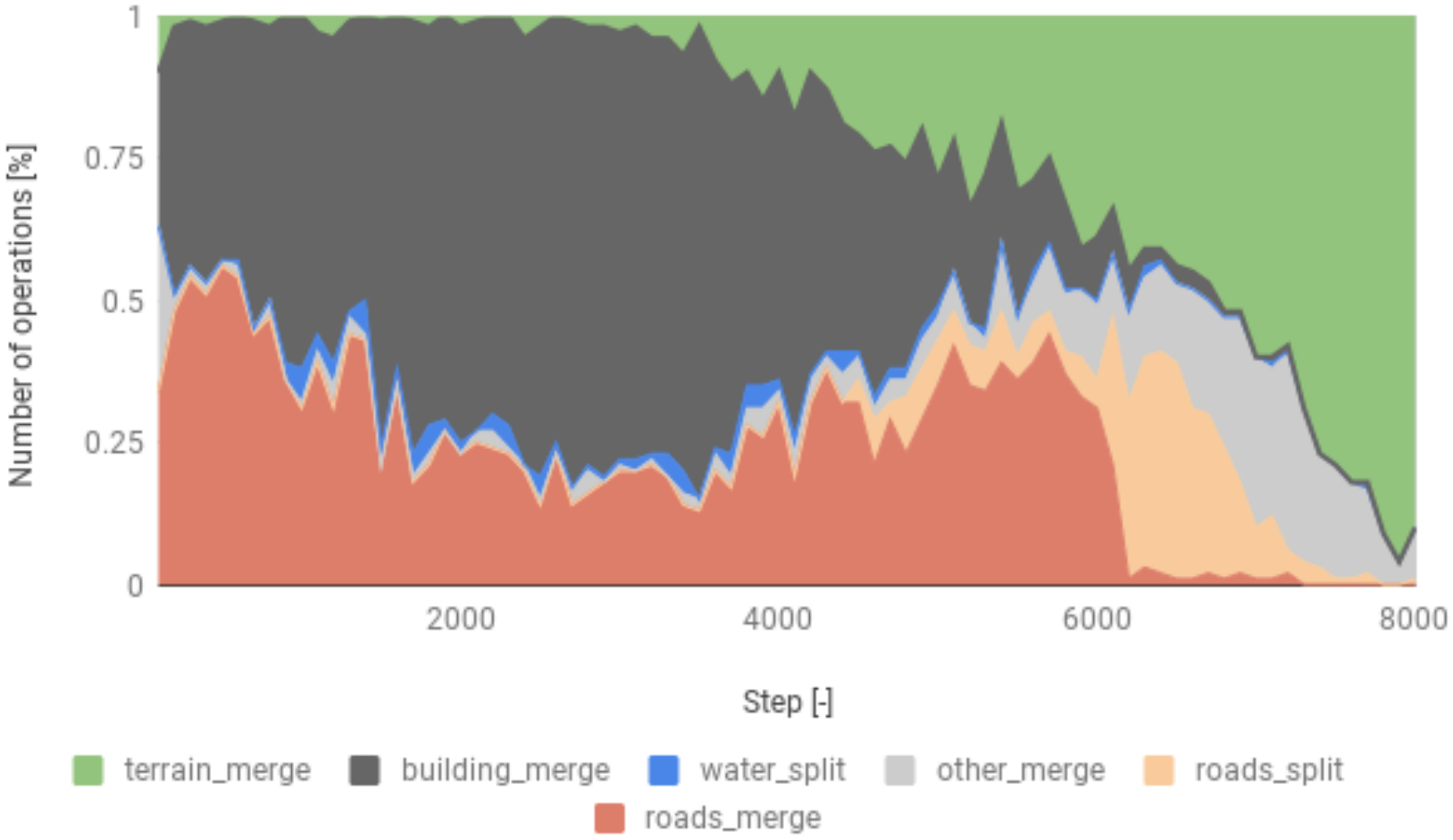
NEW: Scale ranges - detailed situation

NEW: Scale ranges - detailed situation

Statistics


0.15
0.1
0.05
0
Area of faces [%]
2000
4000
6000
8000
Step [-]
terrain_area
other_area
building_area
water_area
road_area

Statistics


1
0.75
0.5
0.25
0
Number of operations [%]
2000
4000
6000
8000
Step [-]
terrain_merge
building_merge
water_split
other_merge
roads_split
roads_merge

Conclusion

- ‘Cook book’ – overview what is happening in the process
- More unification
- Easier parametrization
- Are we lucky enough?

Future

- Compatibility matrix changes over the scales?
- Include scale ranges for not wanted result?
- No discrete number of scale-ranges,
  perhaps 'functions' on whole range

Thanks for your attention

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