

Automated Generalization for Topographic Maps: Innovations with ArcGIS

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Background

- Research project for the course “Advanced applications” in MSc study
- Automated cartographic generalization (ACG)
- Research goal:
 - Generalize a 1:10k topographic basemap to a 1:50k map in an automated way

Background

Resources

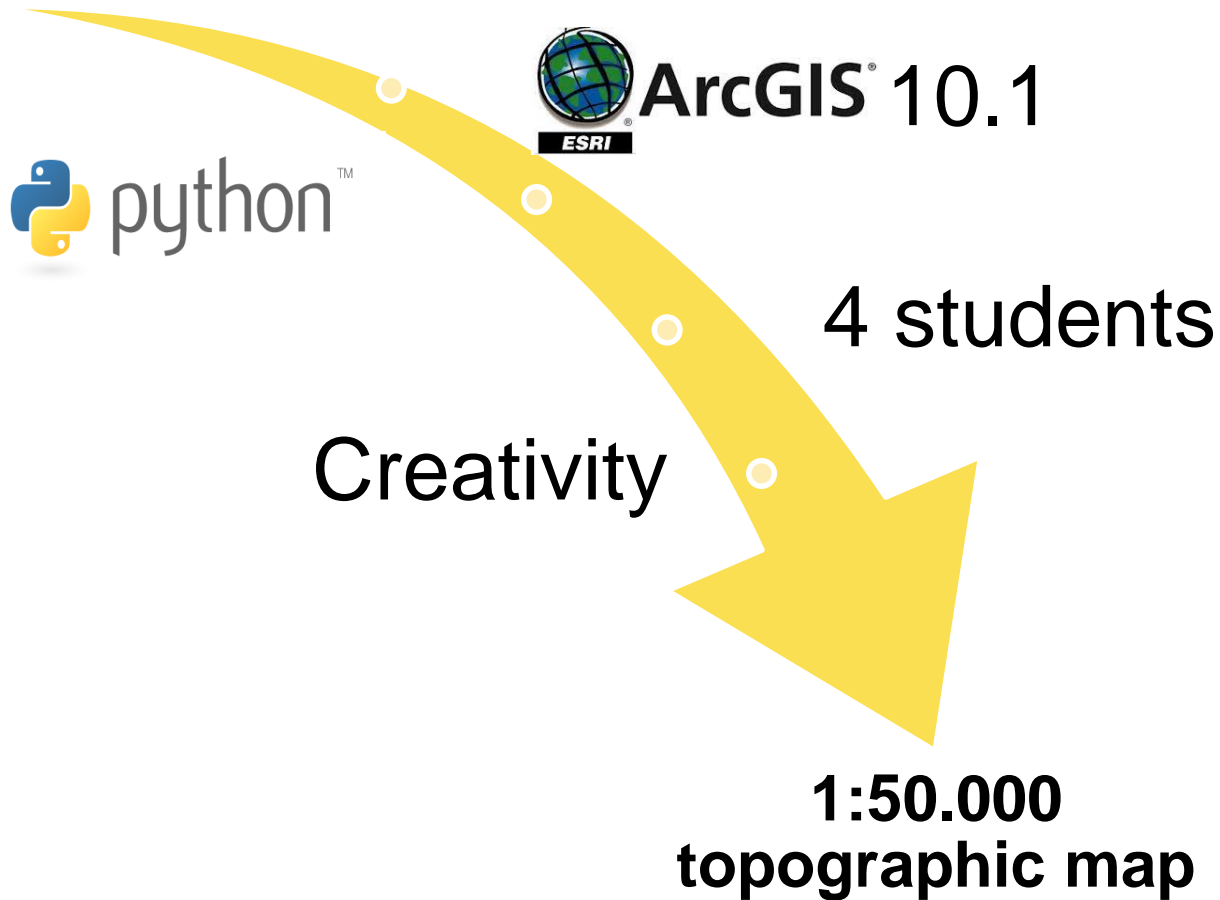
- ArcMap 10.1 - ArcInfo license
- ESRI Resource Centre
- Topographic dataset: TOP10NL from Dutch Kadaster
- Team with different backgrounds

Constraints

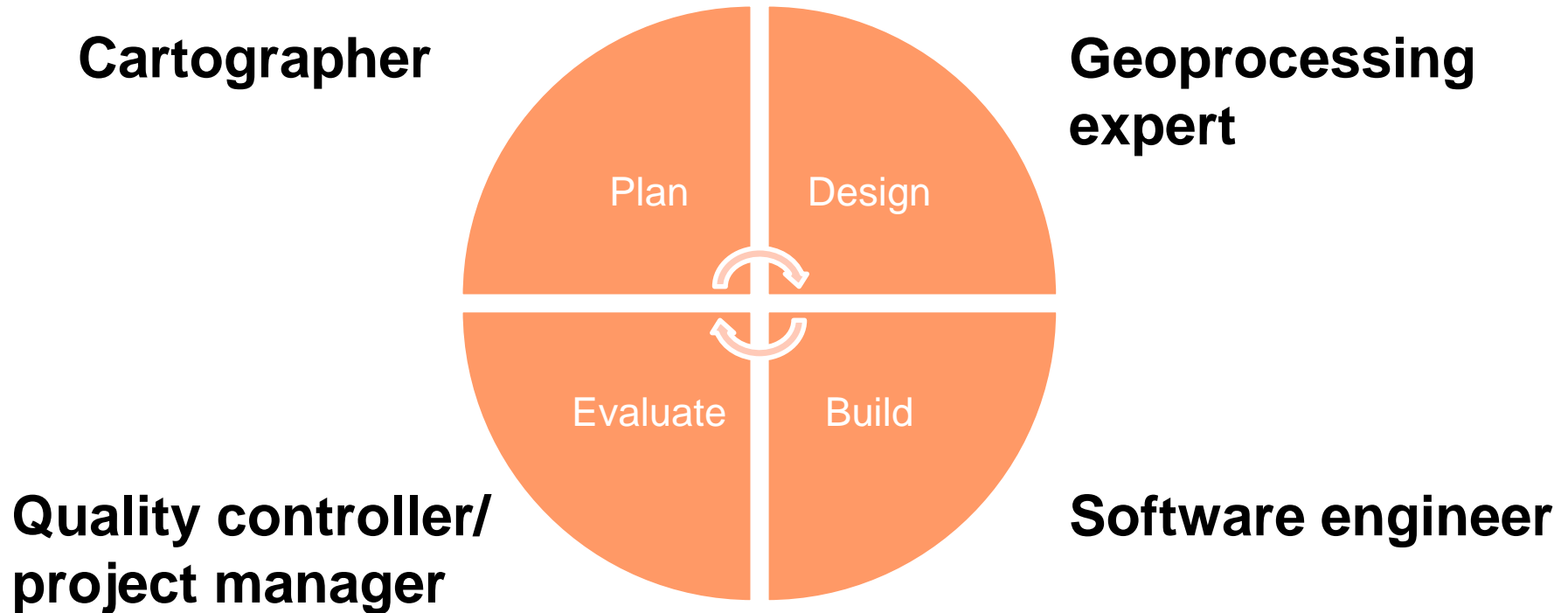
- Limited amount of time: 12 weeks
- Distance working – remote communication

Approach (1)

TOP10NL

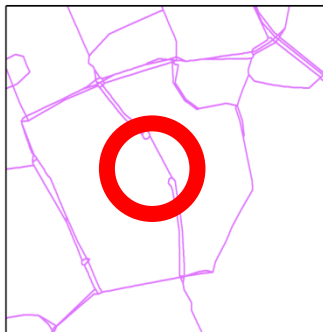
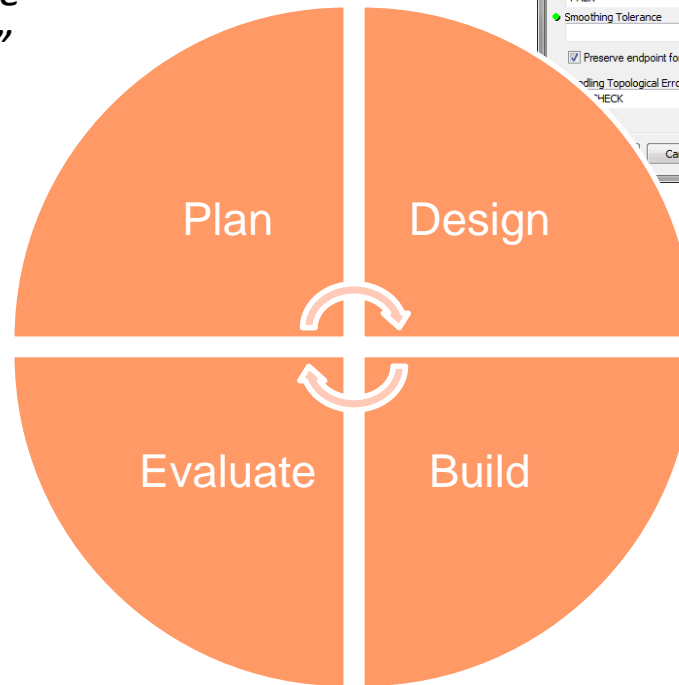
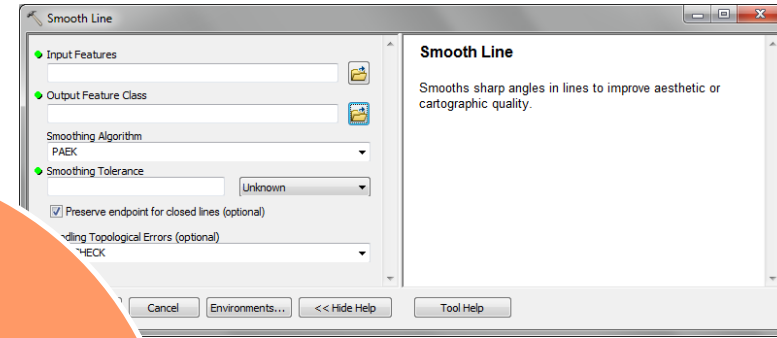


Approach (2)



Approach (3)

“In the output map there shall be no sharp edges”



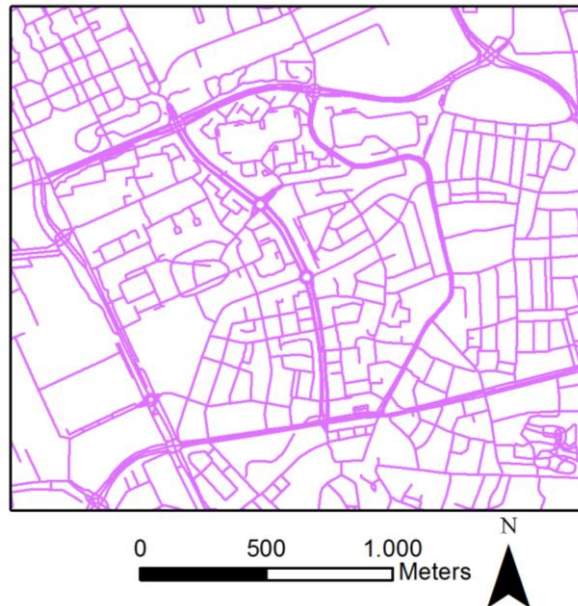
```
acg.Message("Smooth roads...")
arcpy.SmoothLine_cartography(acg.mfc("20_Simple"),
                             acg.mfc("30_Smoothed"), "PAEK", strSmoothTolerance,
                             "FIXED_CLOSED_ENDPOINT", "NO_CHECK")
```

Results

- Today's focus on:
 - Roads generalization
 - Automated polygon selection (water features)
 - Restoring the terrain partition (terrain features)

Results

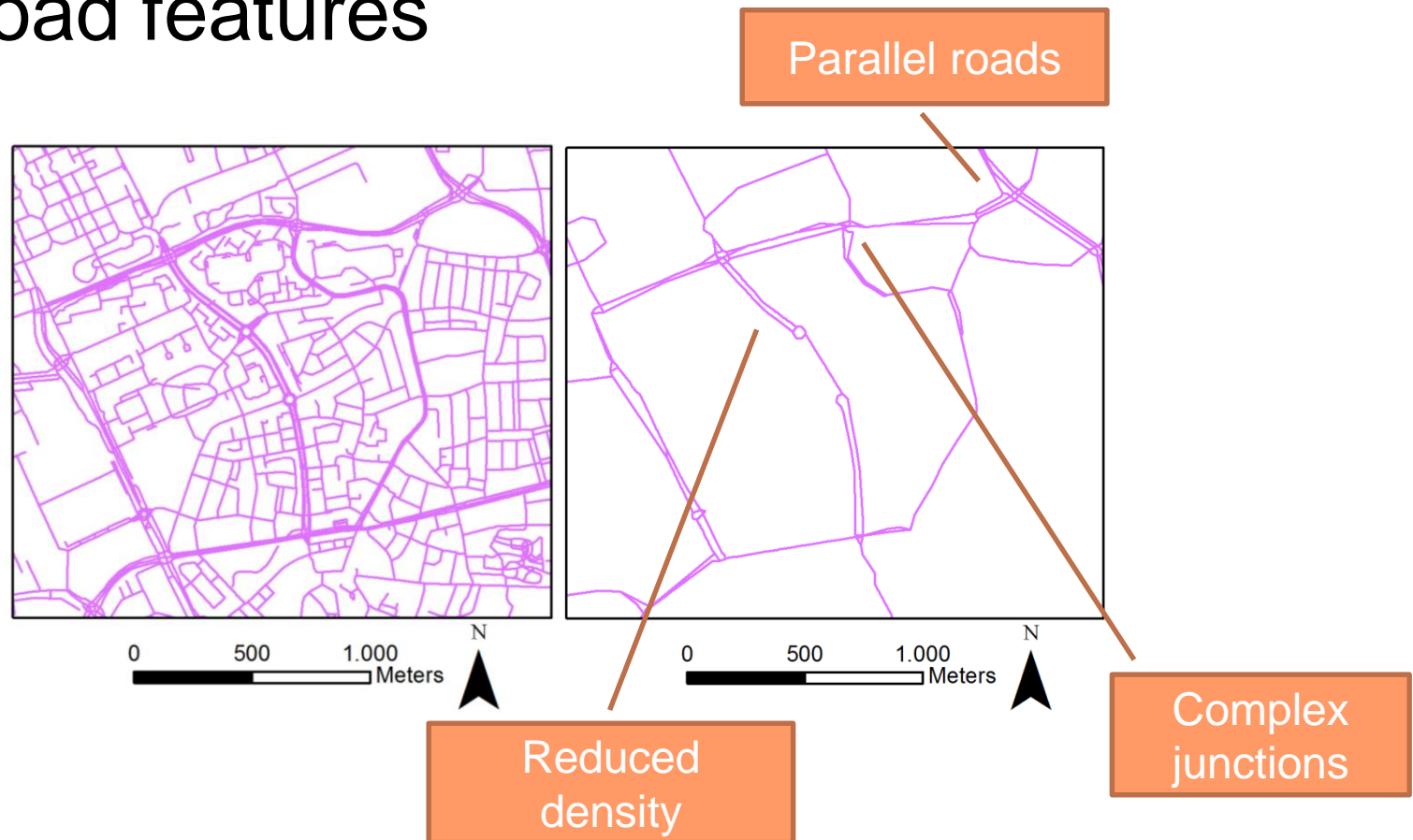
- Road features



- Roads exist as polygons and polylines
- Density
- Parallel roads
- Complex junctions

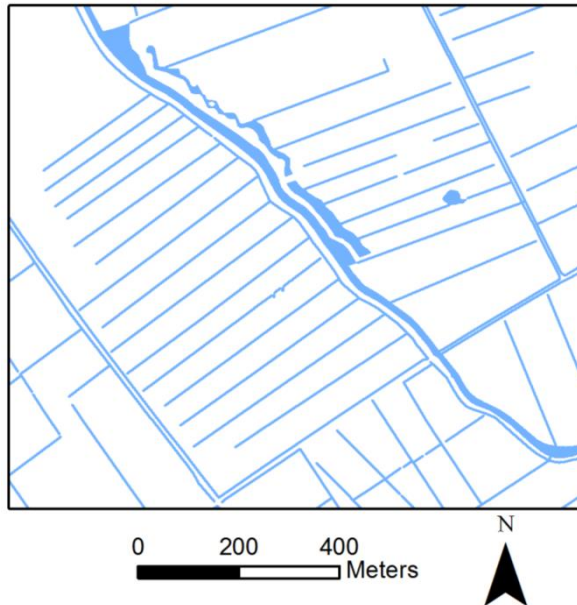
Results

- Road features



Results

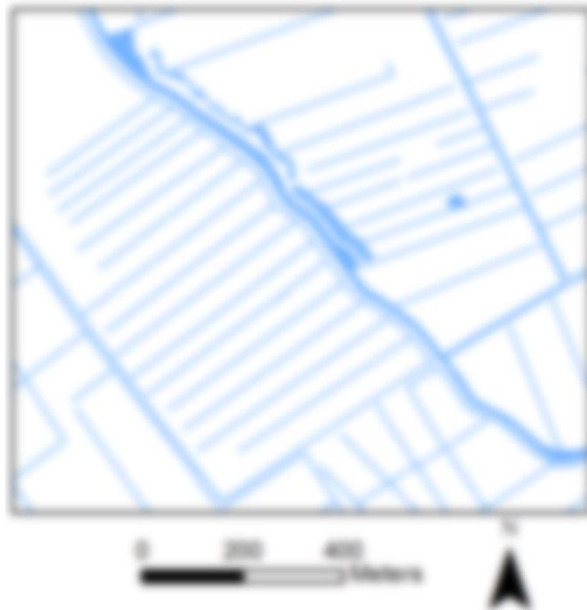
- Water features



- Density
- Polygon to polyline

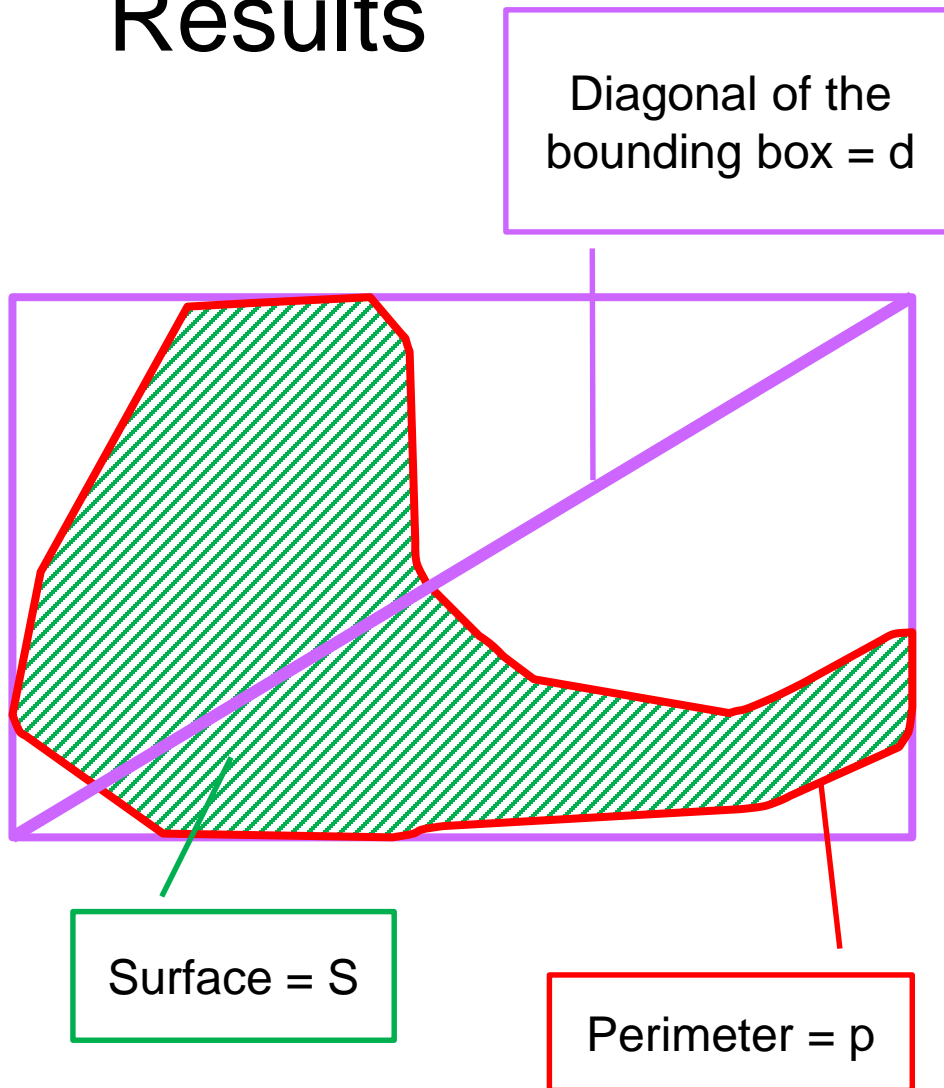
Results

- Water features



- Automated selection of polygons
- Which polygons are to be converted?
- “Shape factor”
→ oblong polygons
- Polygon to centreline

Results



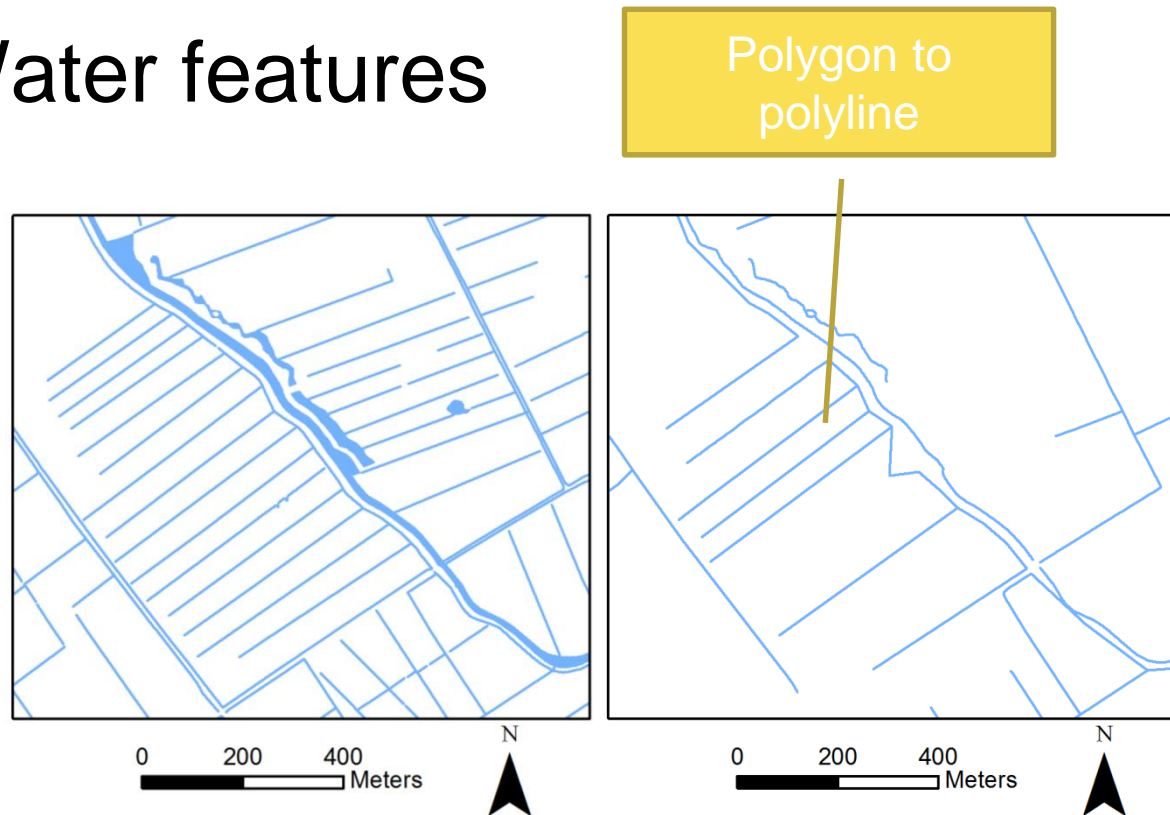
- Automated selection of polygons based on “**Semishape factor**”
- Dimensionless coefficient
- Higher factor \rightarrow more oblong polygon

$$\frac{\left(\frac{p + d}{2}\right)^2}{S}$$

- Shapefactor above threshold? Converted to polyline!

Results

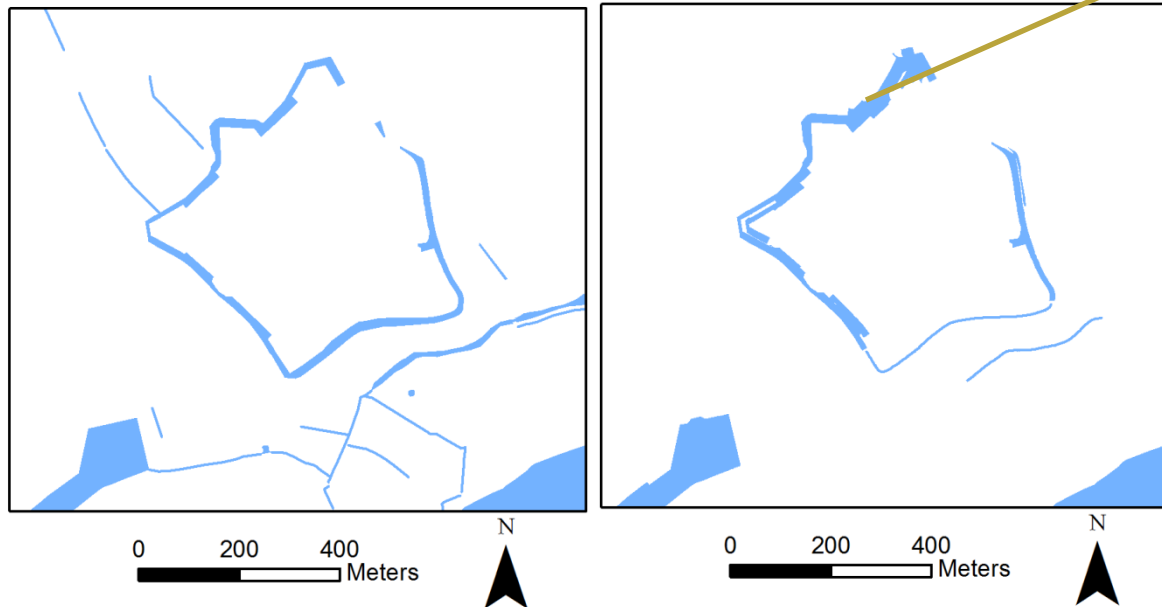
- Water features



Results

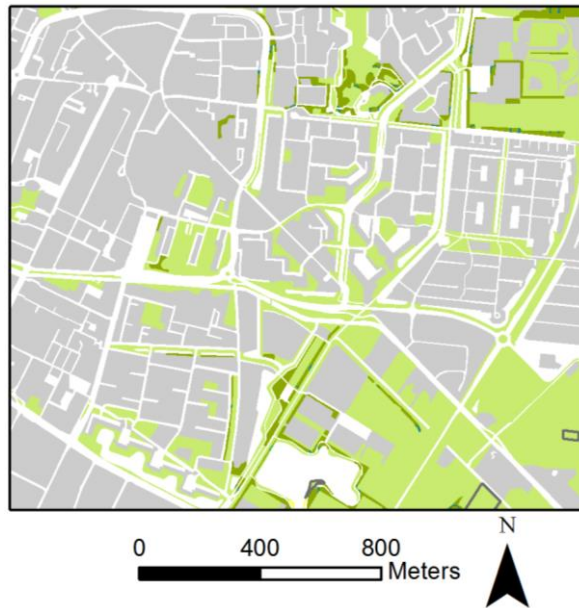
- Water features

Complex polygons
remain difficult



Results

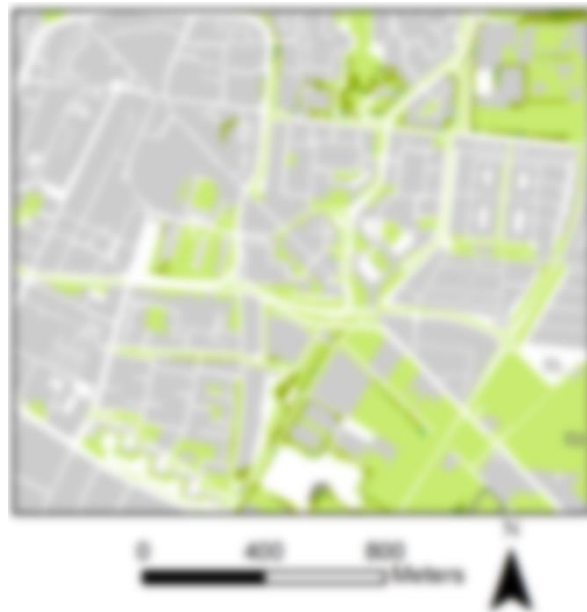
- Terrain features



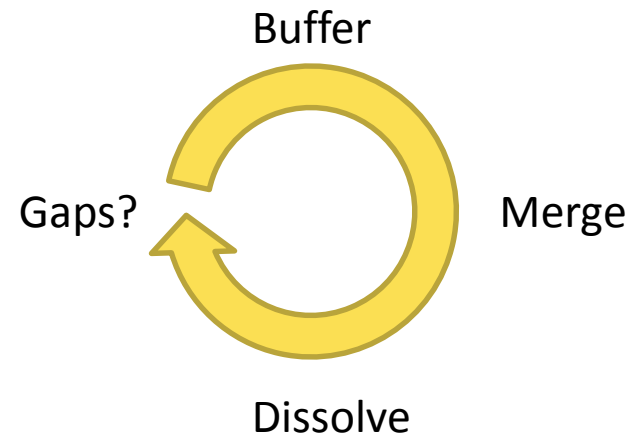
- Small polygons
- Partition gaps

Results

- Terrain features

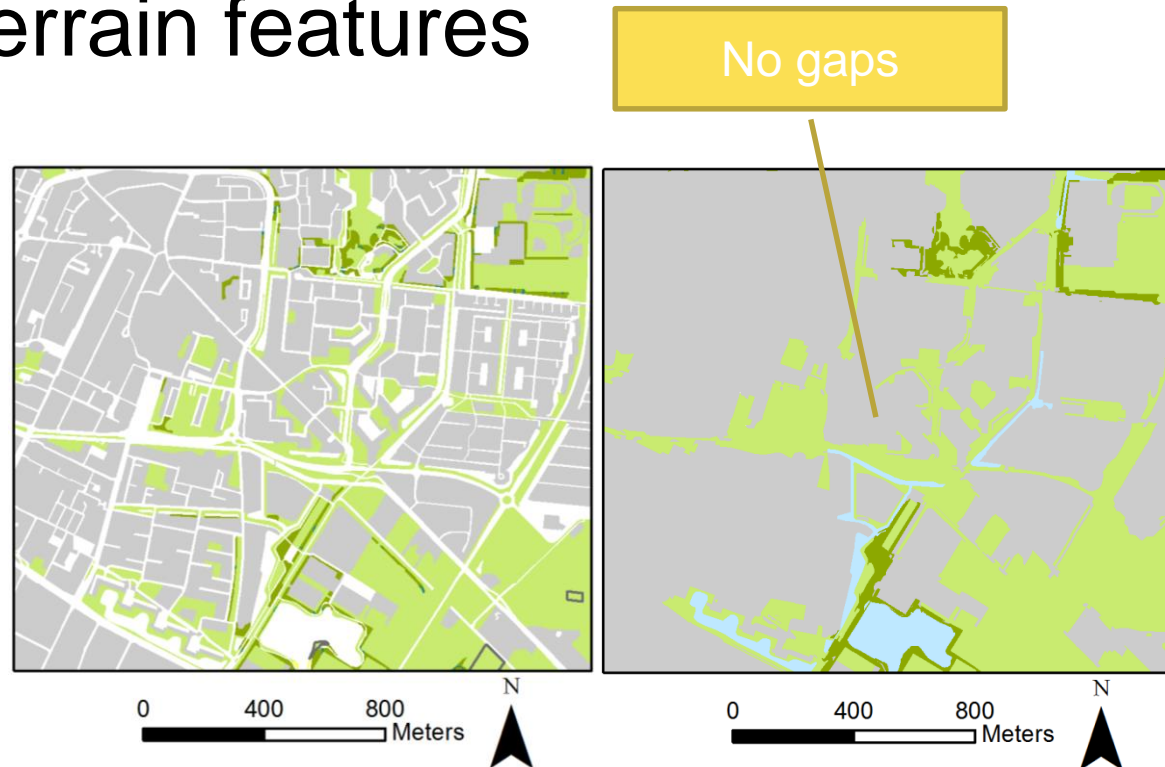


- Gaps need to be filled!
- No gap filling tool in ArcGIS



Results

- Terrain features



Conclusions

- Synergy between team members important to get creative results
- Complex generalization problems can be solved with basic ArcGIS functions
 - No need for developing new tools
 - Make more effective use of ArcGIS!

Thanks you for your attention

Questions?