



Spatially modelling dependent infrastructure networks

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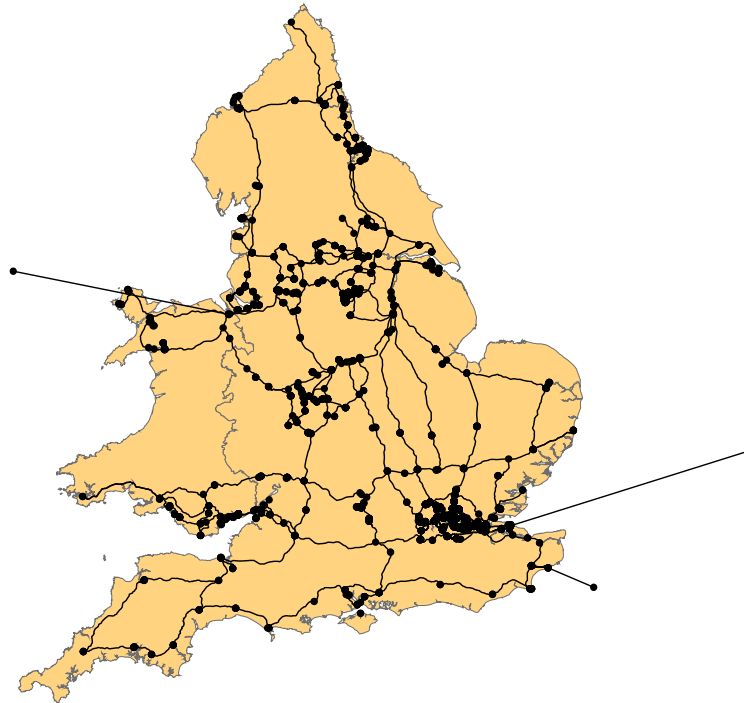
Critical infrastructures



- Quality of life
- Economic worth



- Spatial systems
- Failures

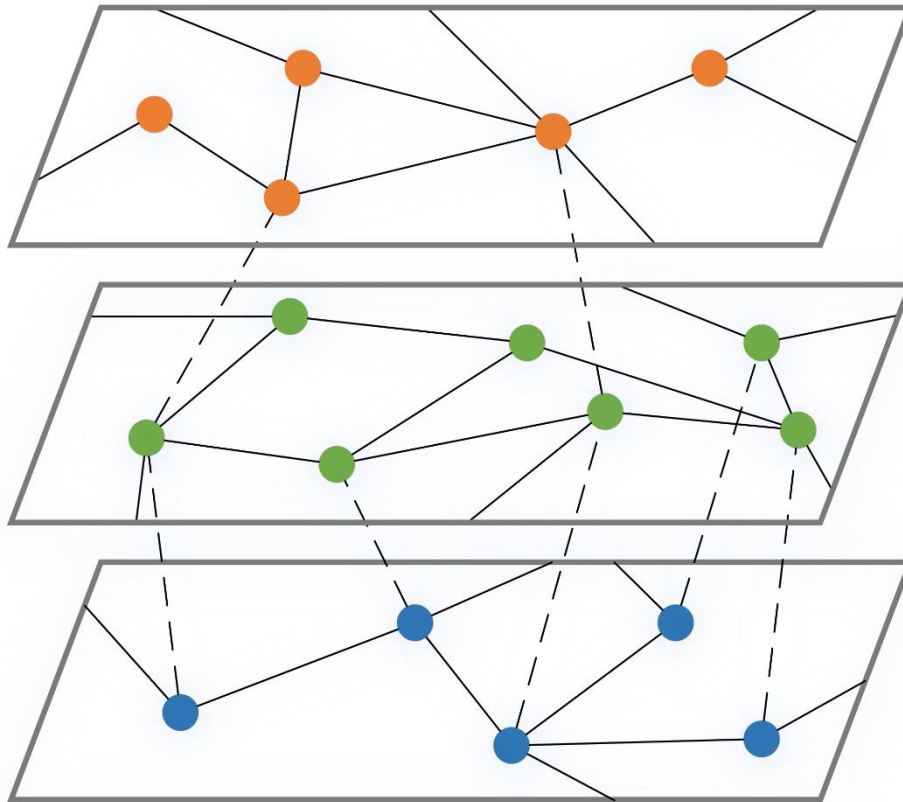


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Infrastructure networks

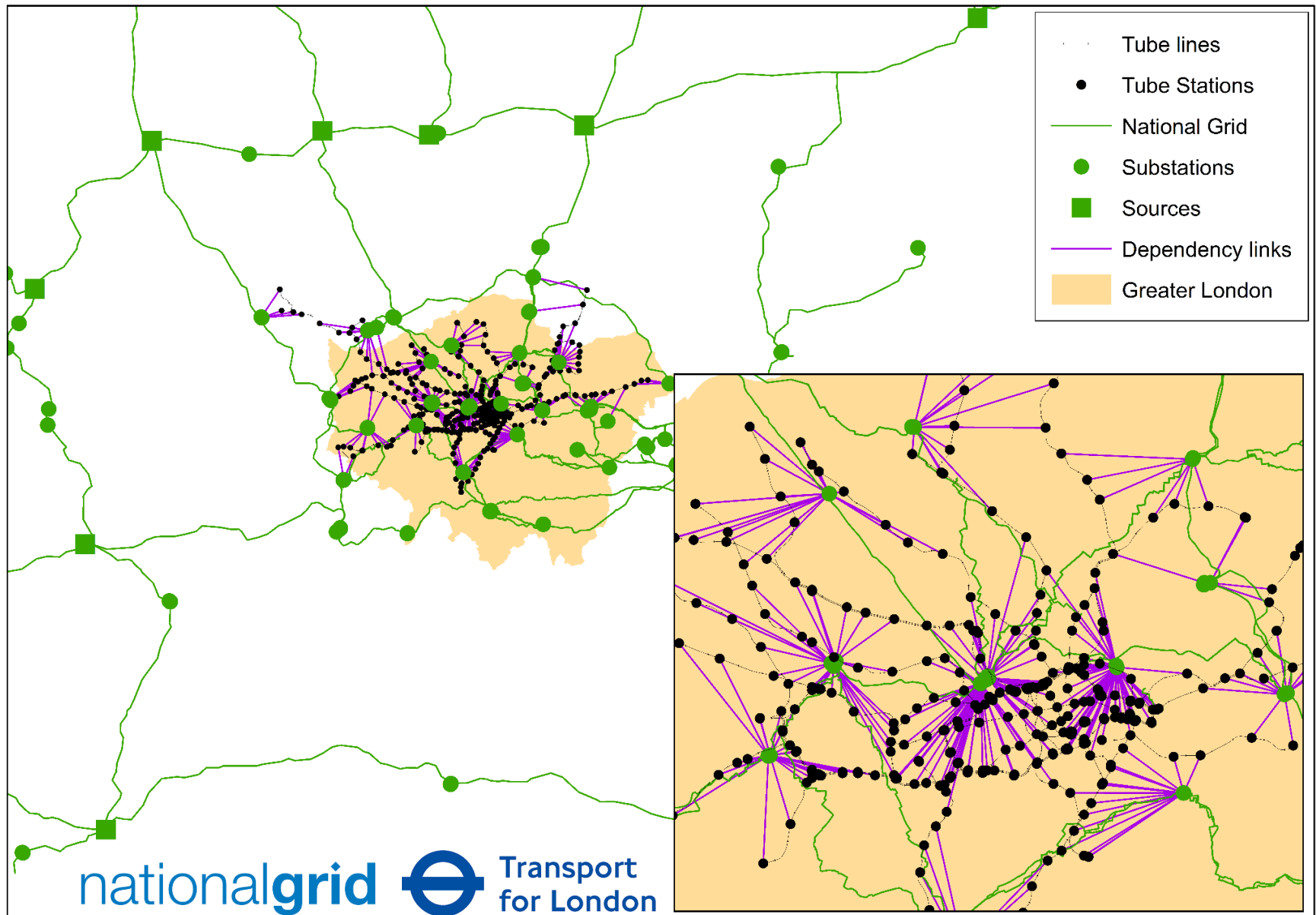
- Complex systems
 - Dependencies



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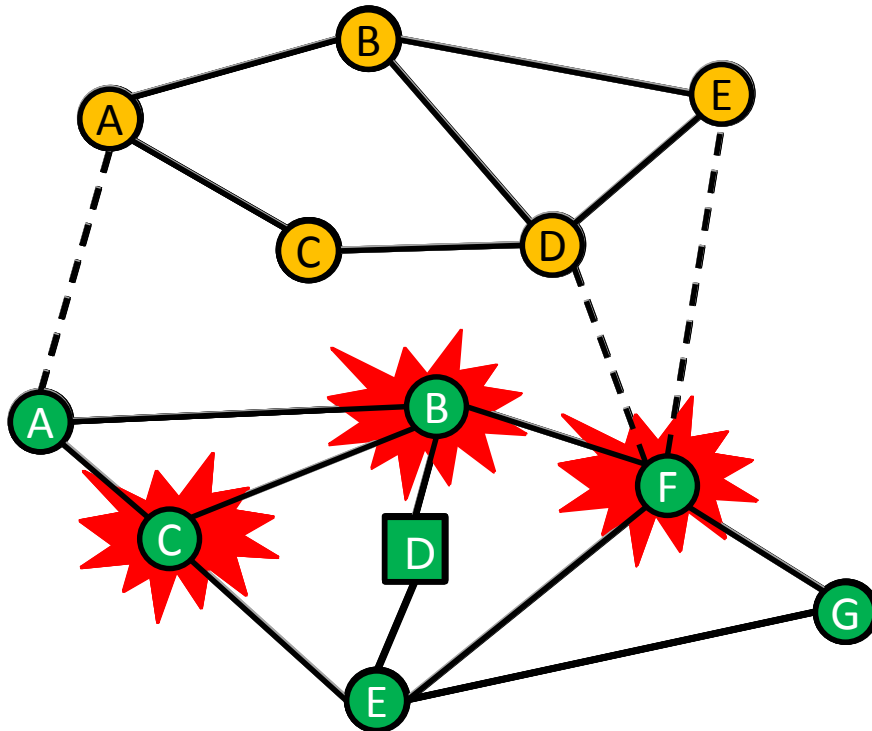


Network data



Failure modelling

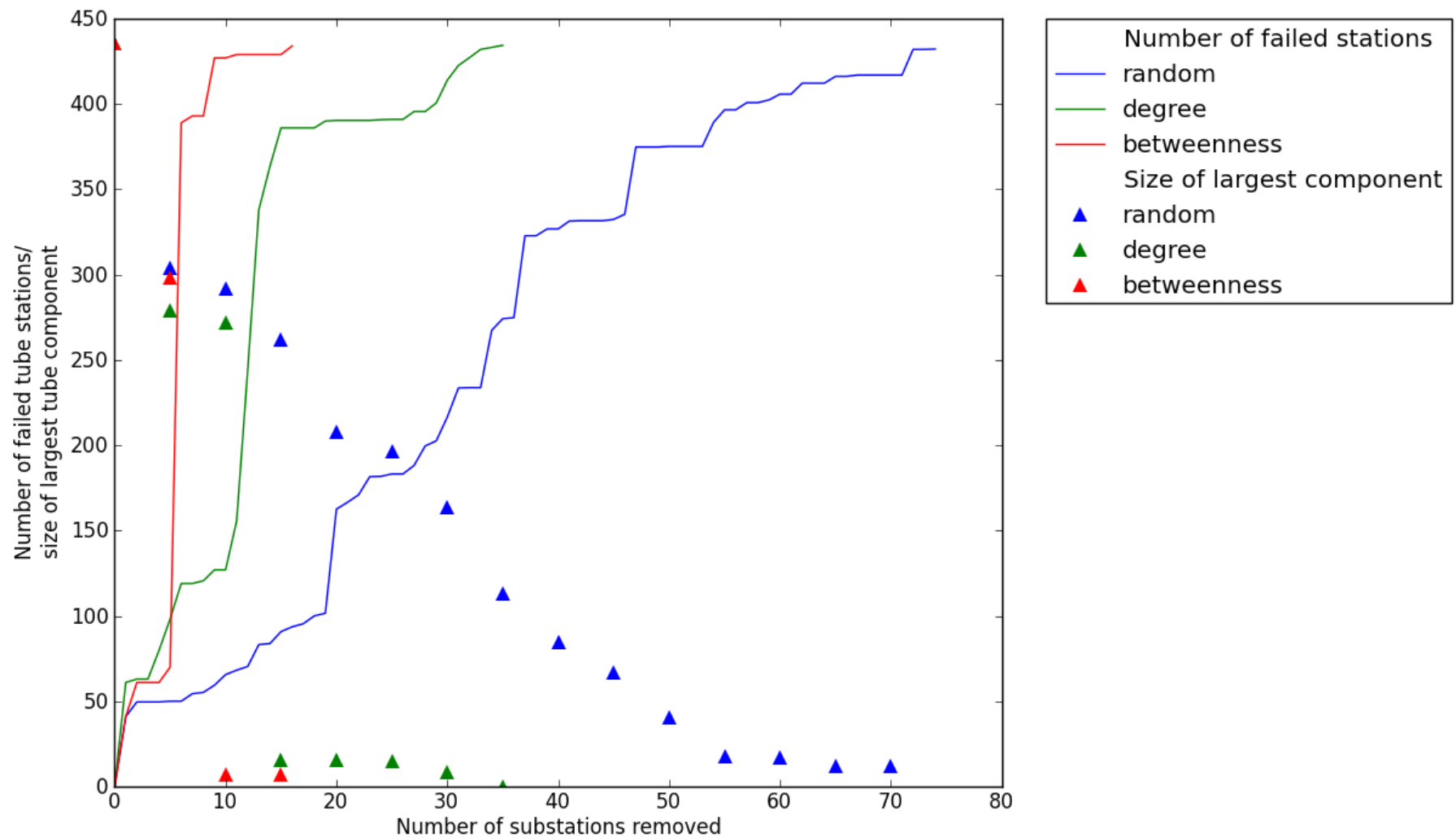
- Implemented failure model
 - Random
 - Targeted: Degree, betweenness



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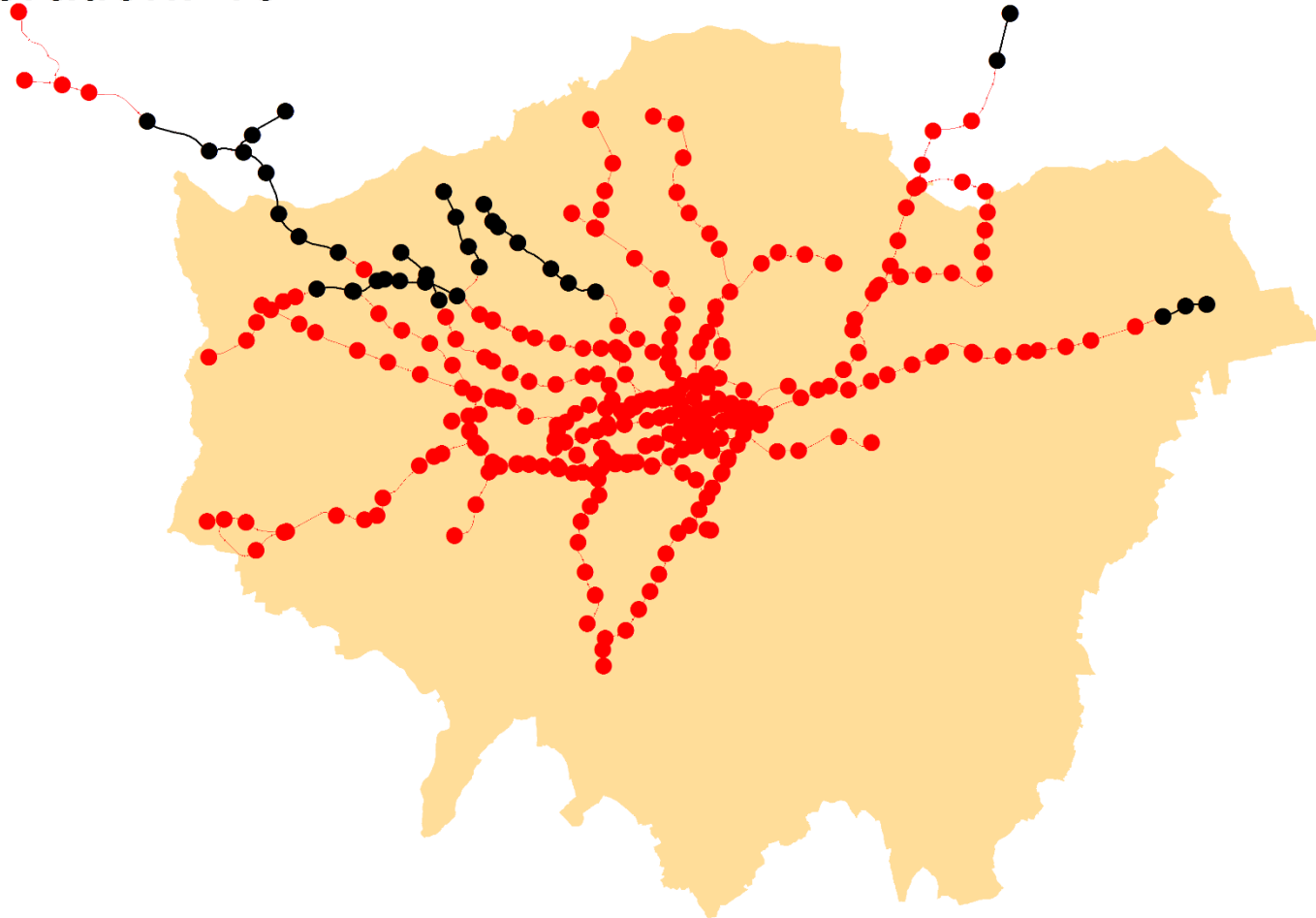


Results – ensemble analysis

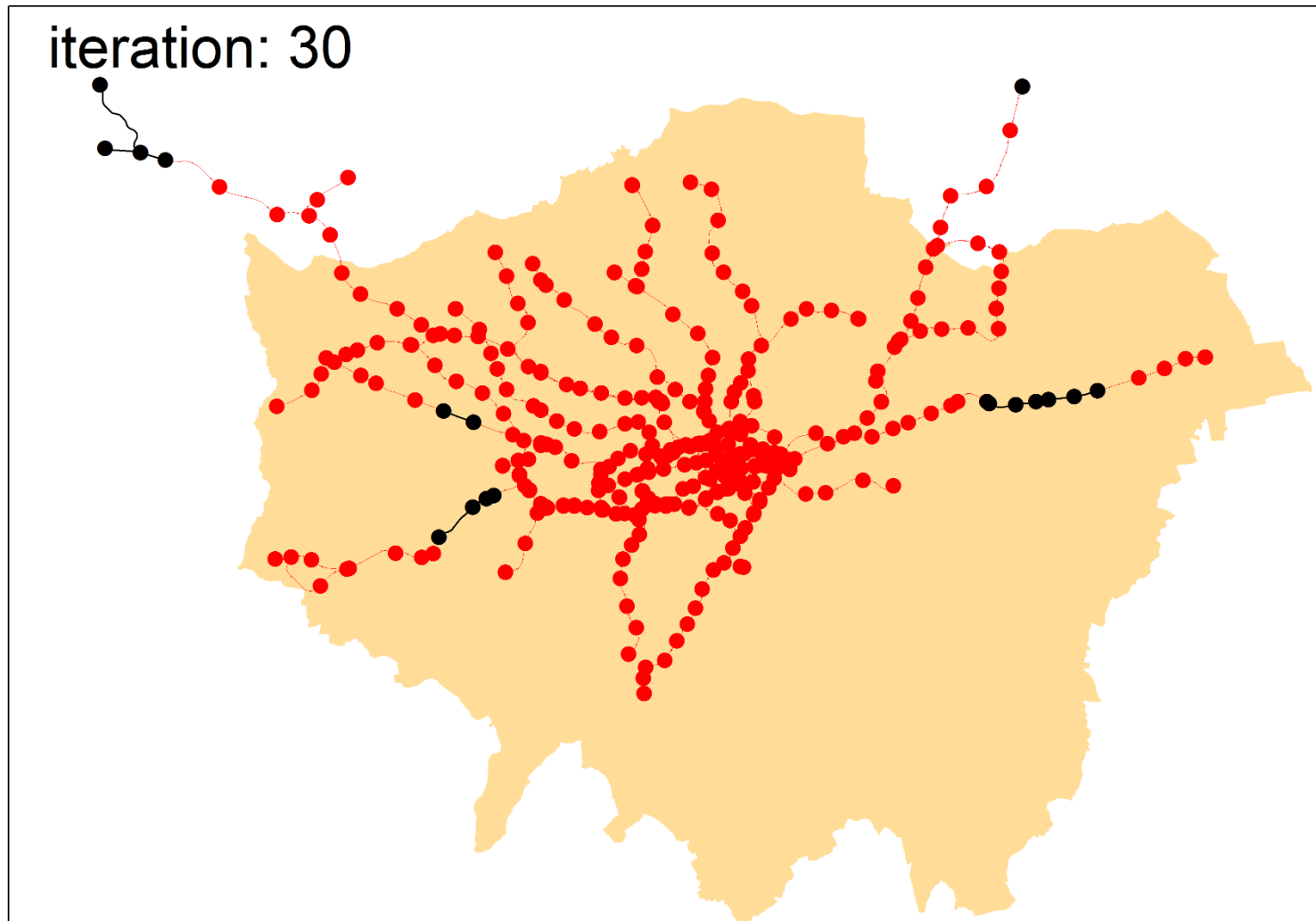


Results – spatial failure pattern (1)

iteration: 45

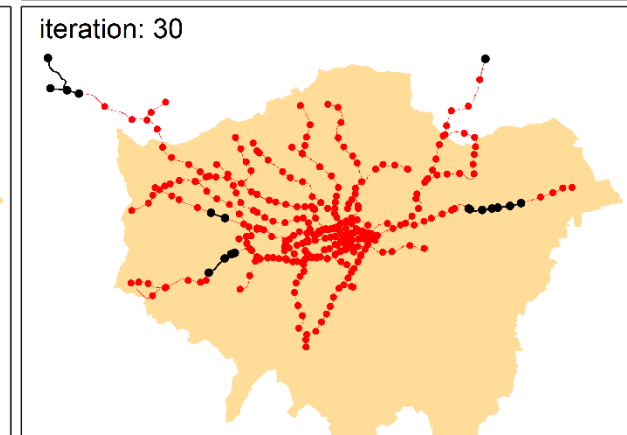
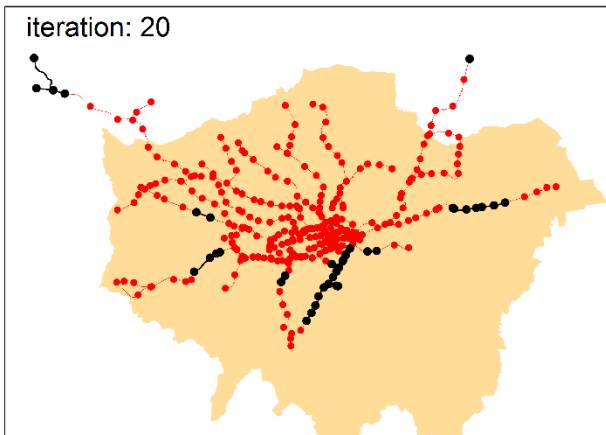
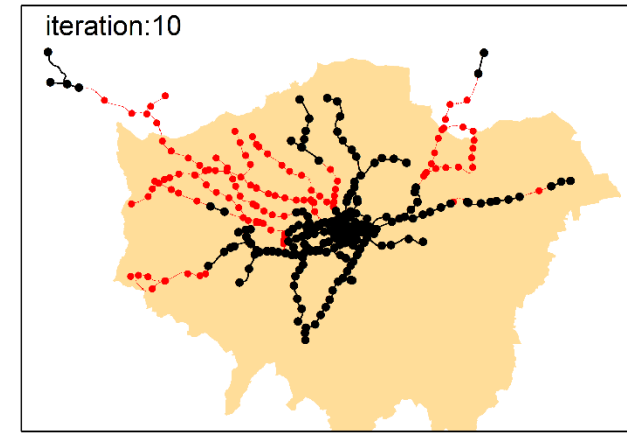
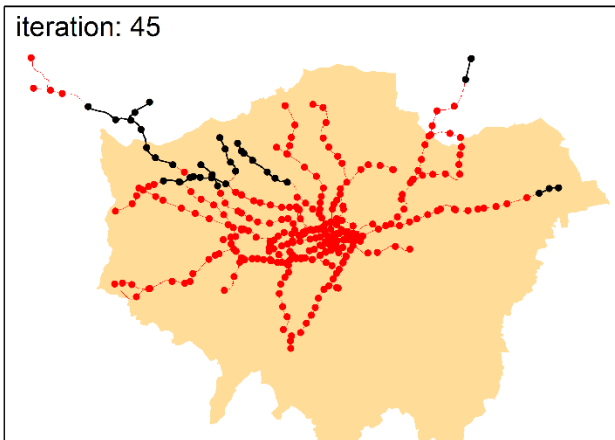
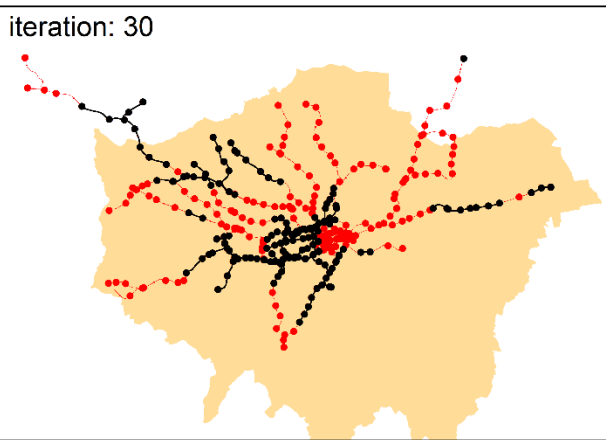
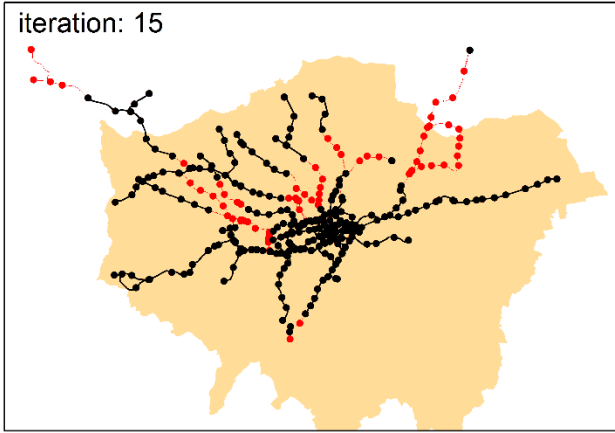
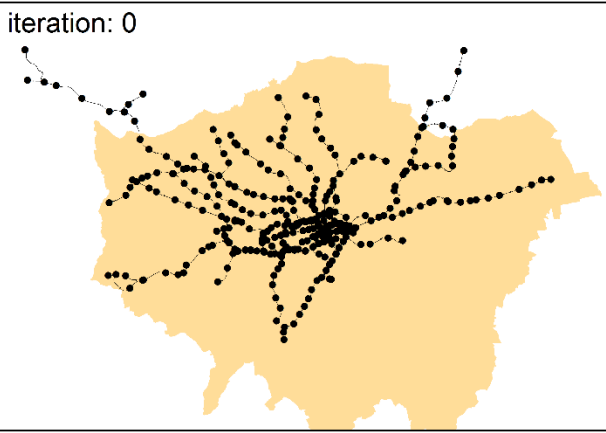


Results – spatial failure pattern (2)



Results

- Random



- Degree

Conclusions and future work

- Clear spatial pattern of failures
- Demonstrated the vulnerability of networks though dependencies
- Network flows
- Affect on users journeys
- Improve dependency modelling



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Thank you for listening. Questions?

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<http://research.ncl.ac.uk/geospatial/>

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