DAFNI
Data & Analytics Facility for National Infrastructure

QUANT

casa

Simulating the Resilience of Transport Infrastructures using QUANT (SCQUAIR)

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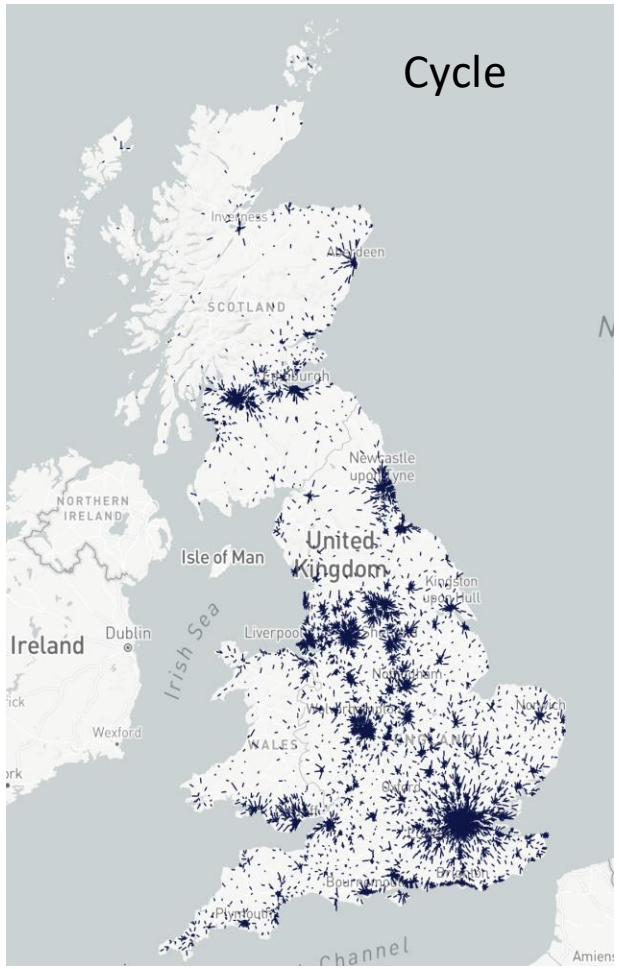
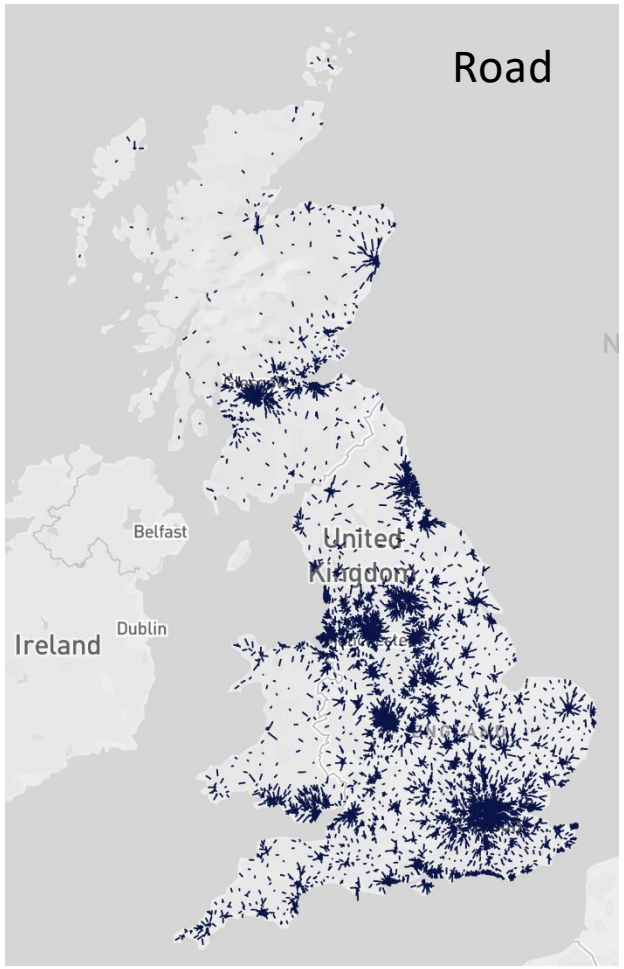
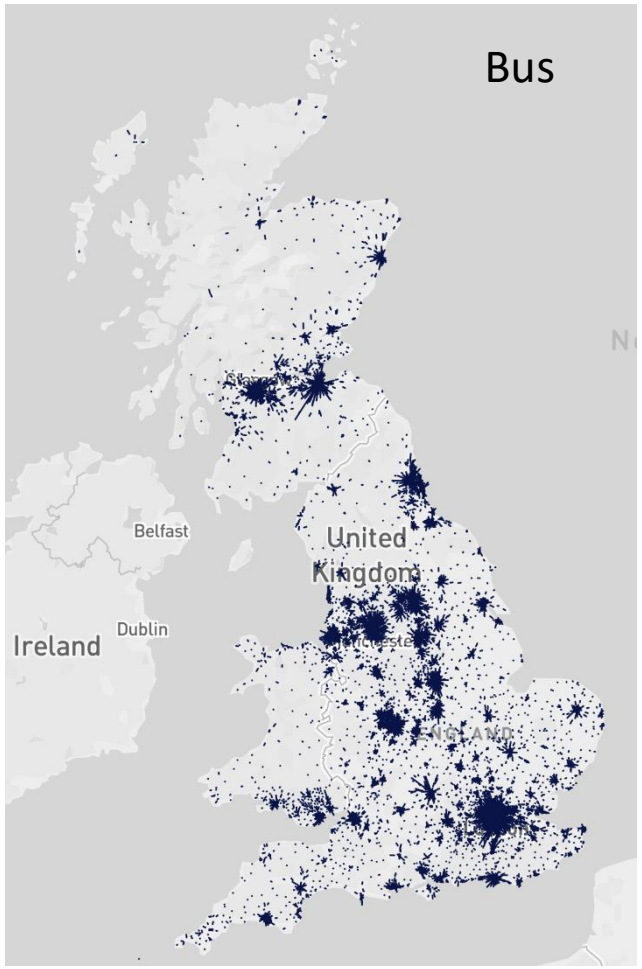
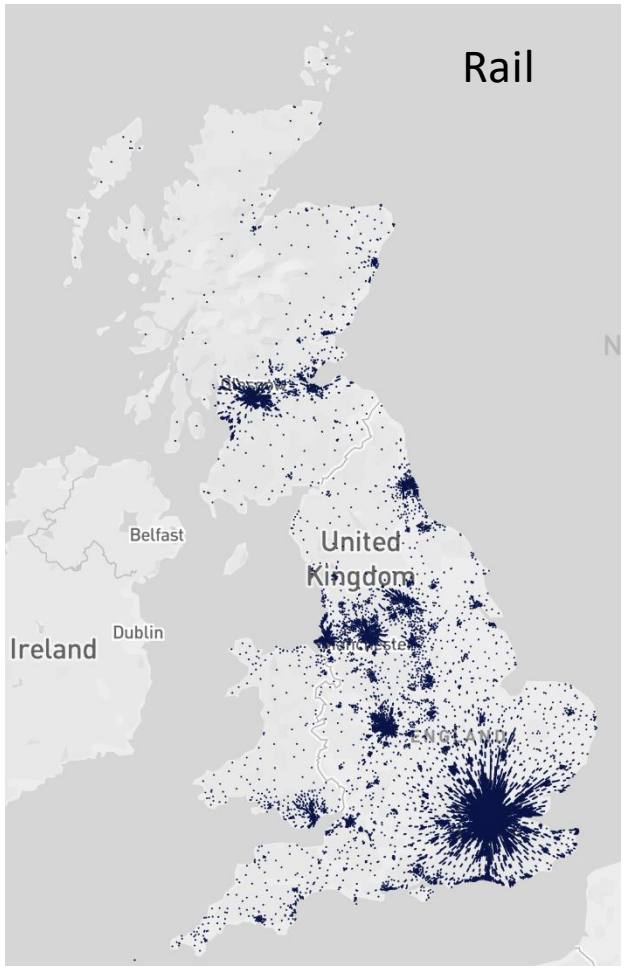
Travel to Work: Cycle, Road, Bus, Rail

Flow lines show mean magnitude and direction of people commuting



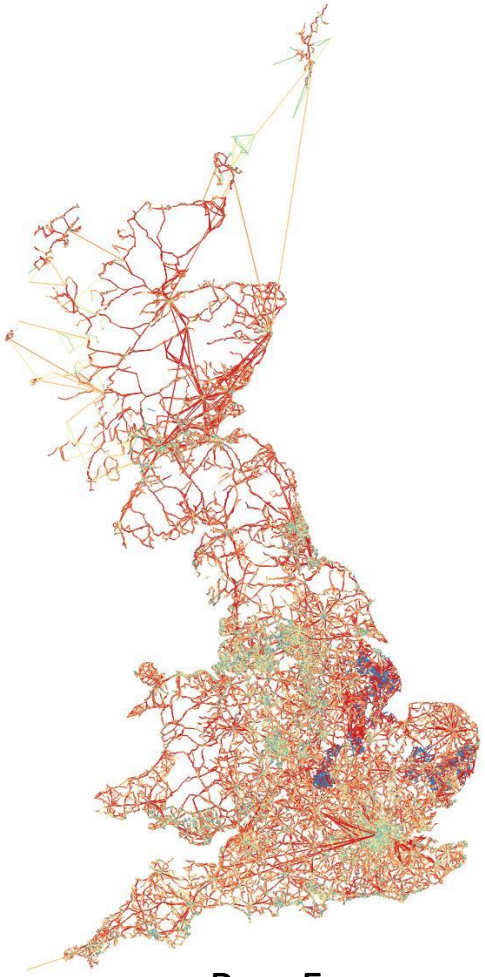




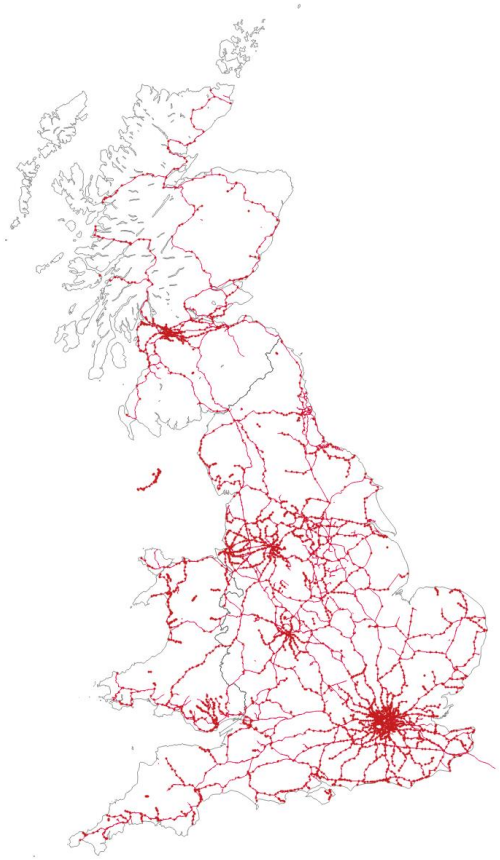


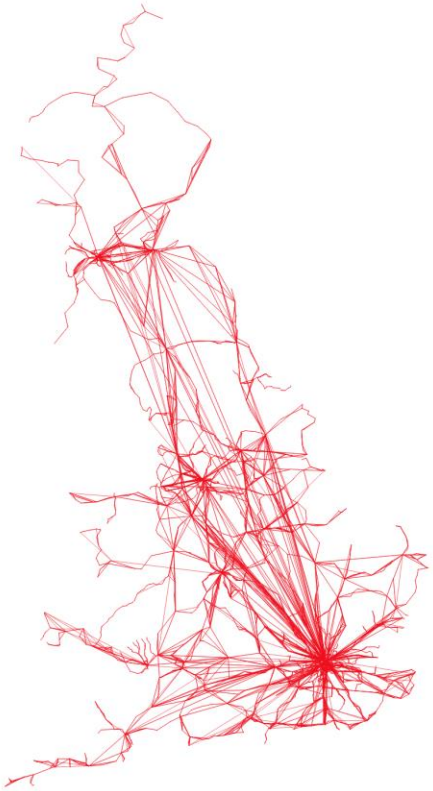
Transport Networks

Road,
v=3.5M, e=8.4M



Bus, Ferry,
v=0.29M,
e=0.42M





Rail, v=3165, e=10,269

SCQUAIR: Small Changes, QUant and AI Resilience - The Plan

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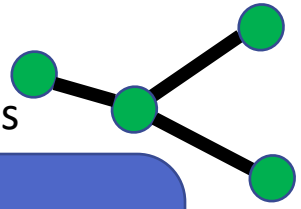
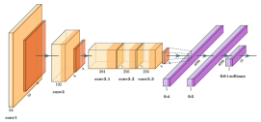
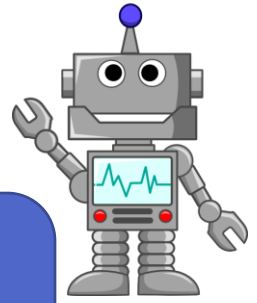
docker

12,000 scenarios







WP1: QUANT running on DAFNI (2m)

WP2: Run Batches of Scenarios (4m)

WP3: Teach ANN to Run Scenarios (6m)

WP4: Visualise, Analyse, Write Papers (2m)

OUTPUTS:

- QUANT on DAFNI… linking models
- Research on making scenarios
- Portfolio of Plans
- Workshops
- Papers

HEATHROW 3rd RUNWAY

UCL

QUANT Alpha version

The Alan Turing Institute

casa

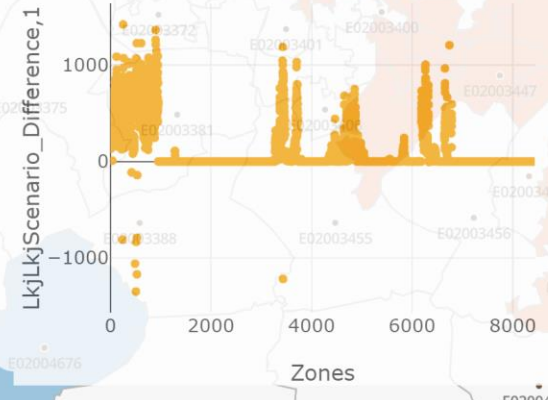
Lj Scenario Absolute Difference KM Travelled

663.57 to 1419.47
384.02 to 663.57
128.39 to 384.02
-789.84 to 128.39
-1346.73 to -789.84

This is the absolute difference in KM travelled after the scenario has been run. Change

Colours | Ranked | Mode: road

Map Opacity



Road: 727,071KM

Rail: 824,555KM

mapbox
© Mapbox © OpenStreetMap Improve this map

HEATHROW 3rd RUNWAY

UCL

QUANT Alpha version

The Alan Turing Institute

casa

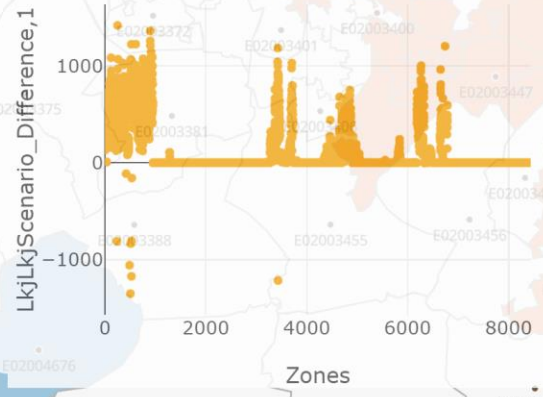
Lj Scenario Absolute Difference KM Travelled

662.54 to 1417.07
383.42 to 662.54
128.08 to 383.42
-807.21 to 128.08
-1350.45 to -807.21

This is the absolute difference in KM travelled after the scenario has been run. Change

Colours | Ranked | Mode: road

Map Opacity



926 secs

Road: 725,936KM

Rail: 826,317KM (35KM)

mapbox
© Mapbox © OpenStreetMap Improve this map

HEATHROW 3rd RUNWAY

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QUANT Alpha version

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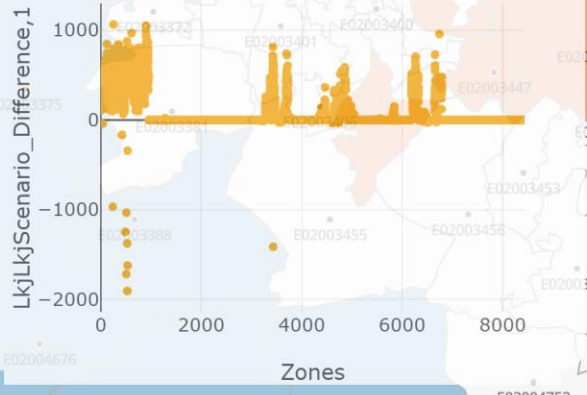
Lj Scenario Absolute Difference KM Travelled

512.01 to 1064.27
298.36 to 512.01
99.65 to 298.36
-967.96 to 99.65
-1905.62 to -967.96

This is the absolute difference in KM travelled after the scenario has been run. Change

Colours | Ranked | Mode: road

Map Opacity



367 secs
926 secs
537 secs
583 secs
516 secs
537 secs
598 secs
315 secs
301 secs

Road: 529,797KM

Rail: 1,296,217KM

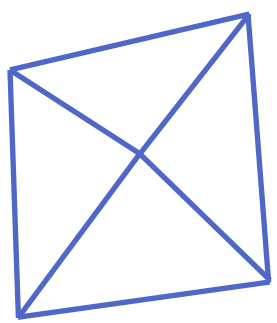
(193KM)

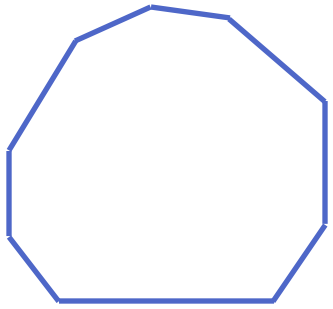
mapbox

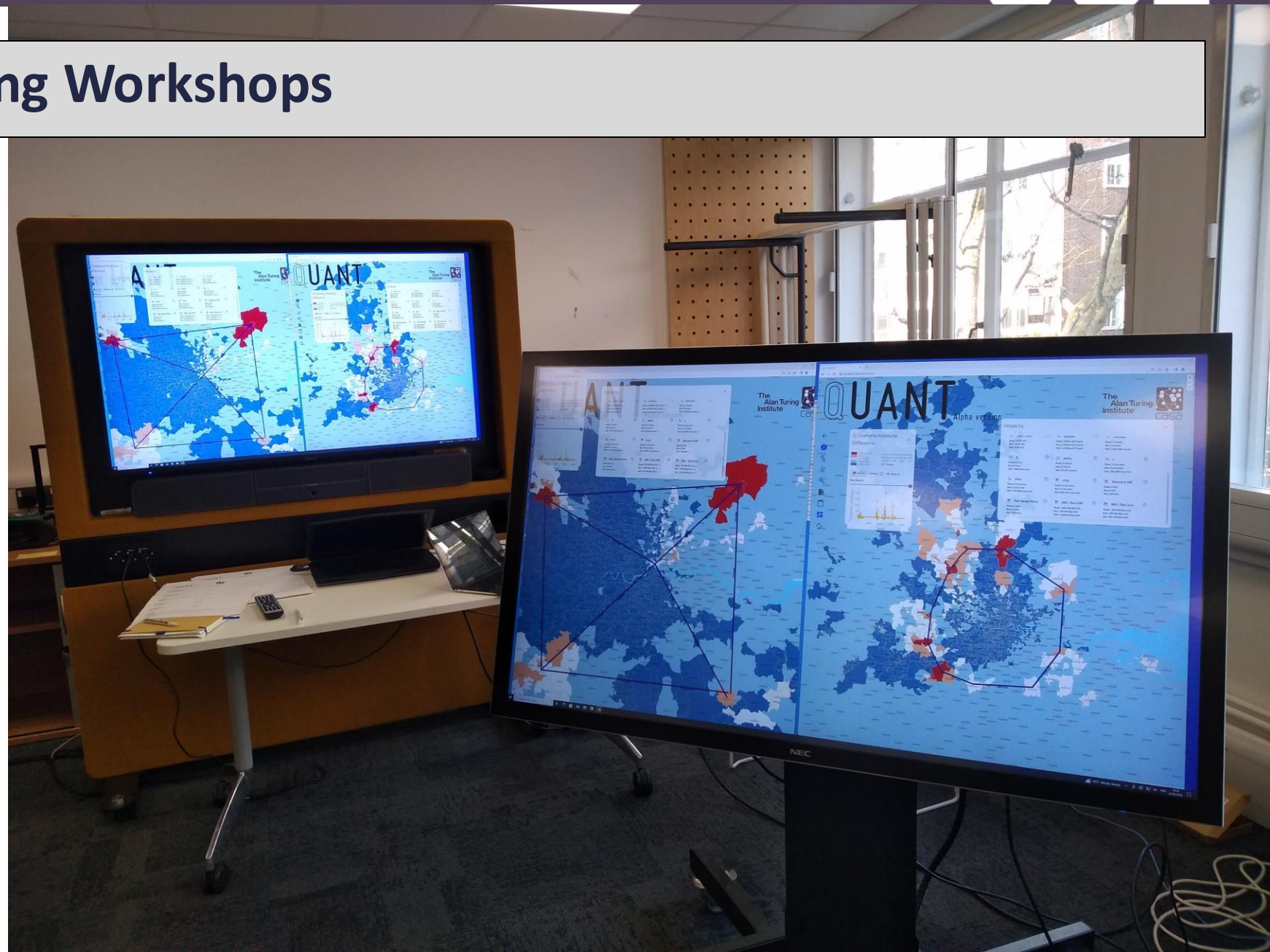
© Mapbox © OpenStreetMap Improve this map

QUANT Urban Planning Workshops

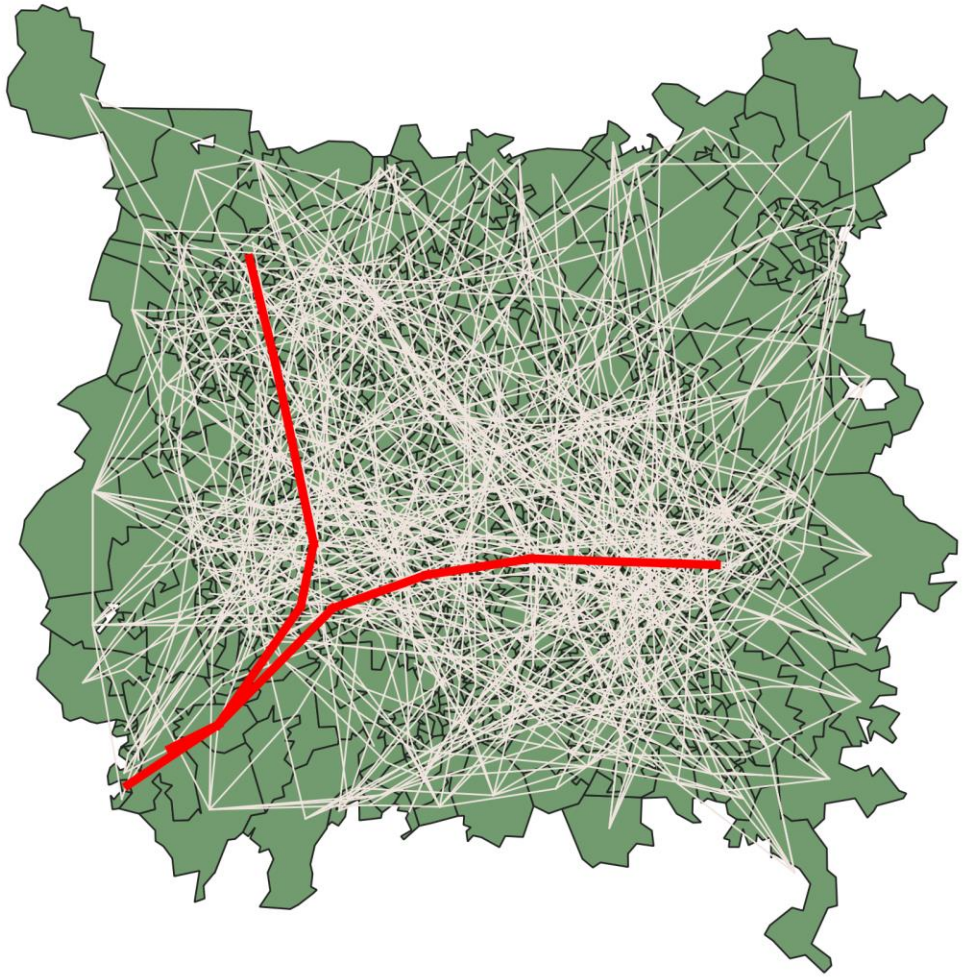
SQUARE and round plans to develop the green belt. The Circular ring around London had the better cost/benefit.



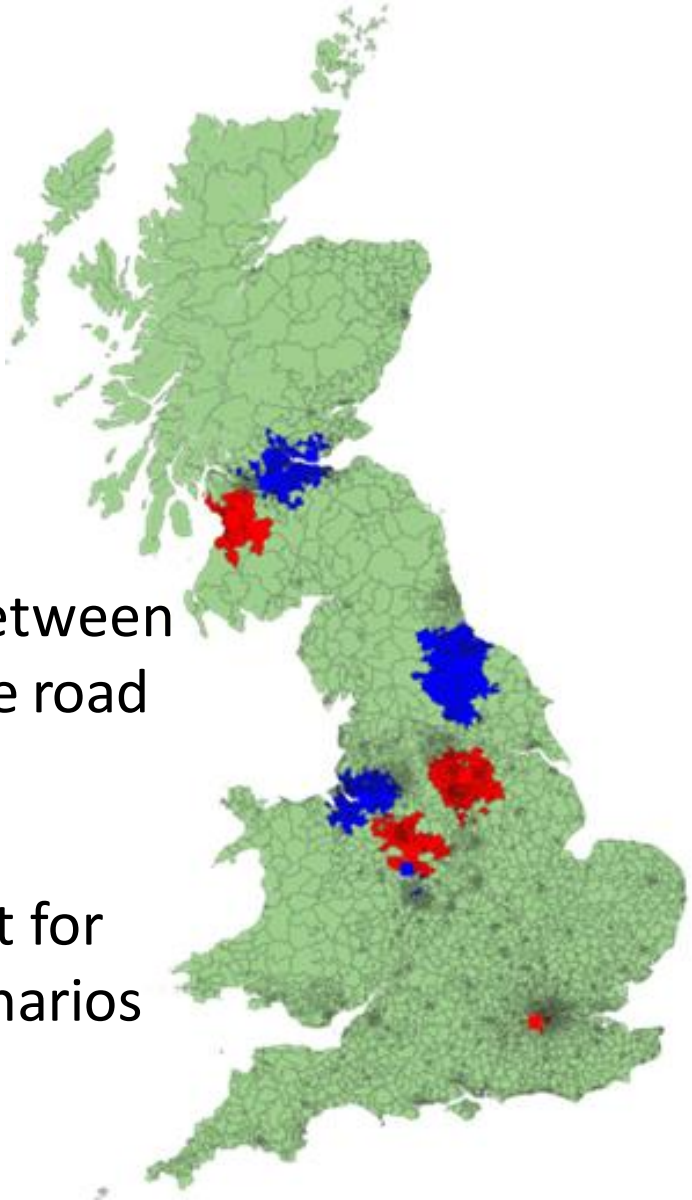




QUANT Gravity Model: Network and Job Changes

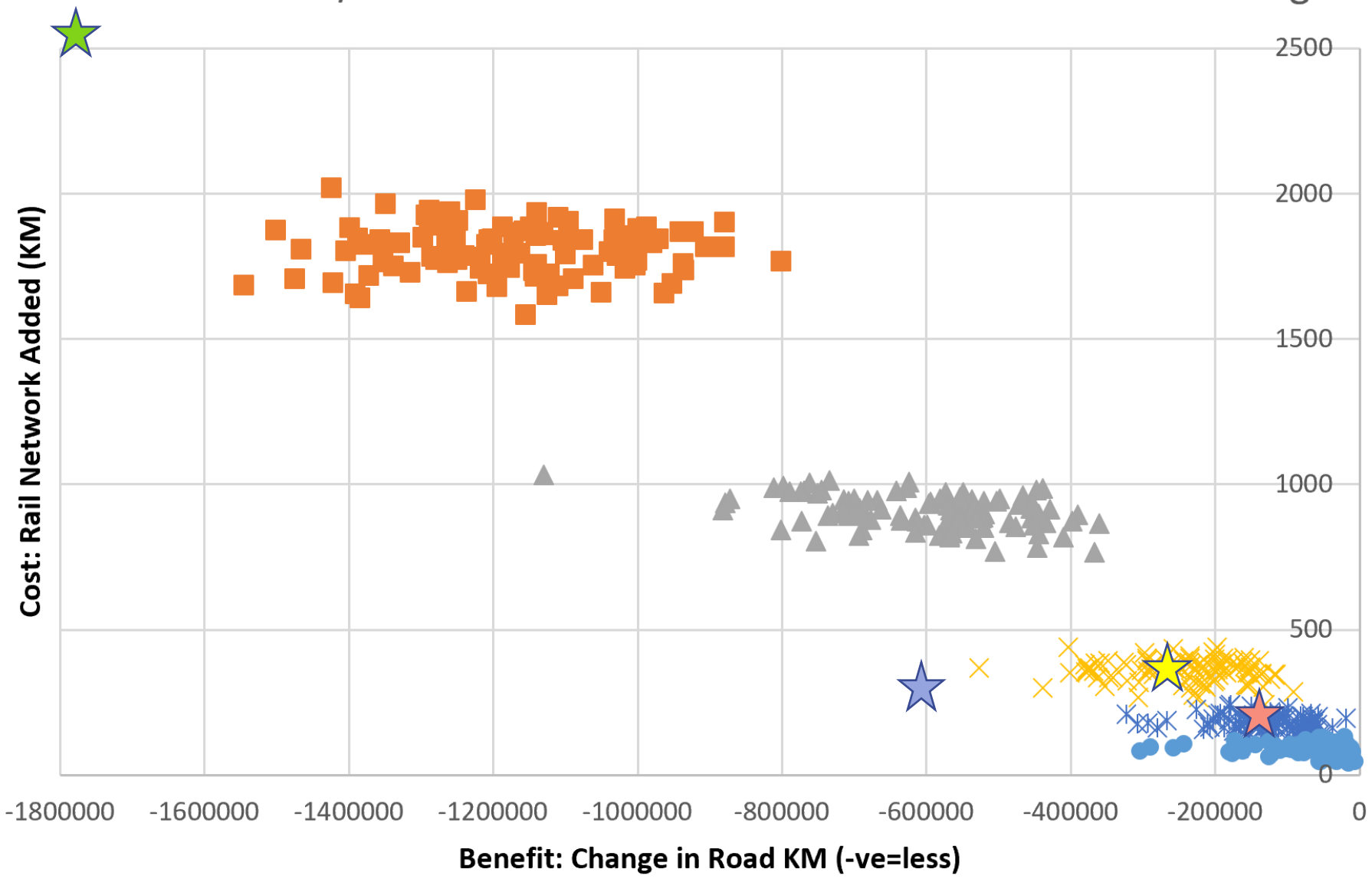


Birmingham: 300 random bus routes



UK: Job swaps between regions to reduce road KM driven.
Also, change the North/South split for Levelling Up Scenarios

Cost/Benefit: Rail Scenario Size and Road Commute Changes



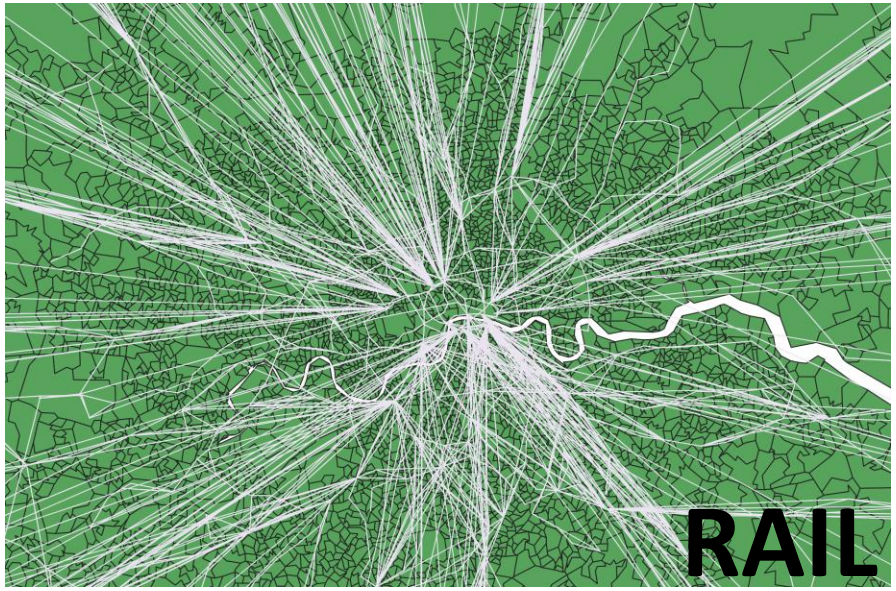
Scenario	Road KM	Rail KM
HS2 IRP	-1.8M	3,000
CAMKOX	-610,188	284
HS2 Phase 1	-248,026	329
Crossrail	-179,924	229

- Random 200
- Random 100
- Random 40
- Random 20
- Random 10

LIMIT TO 30 KM RADIUS LINKS

Network Resilience: Reachable Locations and Recovery Time?

Network measures of resilience and recovery? Community, centrality, hierarchy and accessibility



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Simulating the Impacts of Large Scale Change in UK

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