

Simulating Active Modes With Hermes

(tweaking Hermes vehicle speed representation)



Kasia Kozłowska

Senior Data Scientist

kasia.kozlowska@arup.com

 github.com/KasiaKoz

Arup (London) City Modelling Lab

citymodelling@arup.com

 medium.com/arupcitymodelling



Fred Shone

Technical Lead

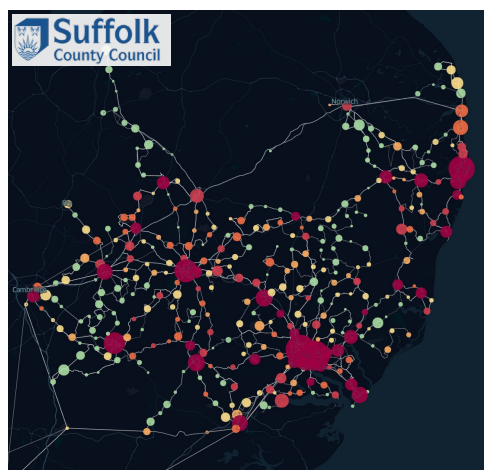
fred.shone@arup.com

 github.com/fredshone

ARUP



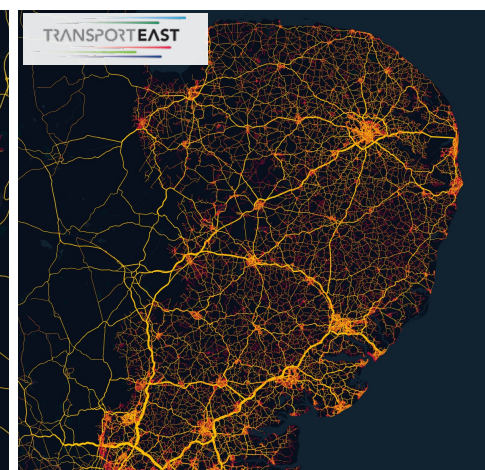
Suffolk County Council UK



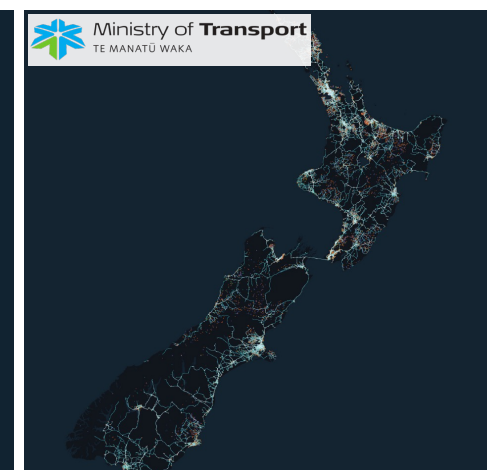
Sheffield



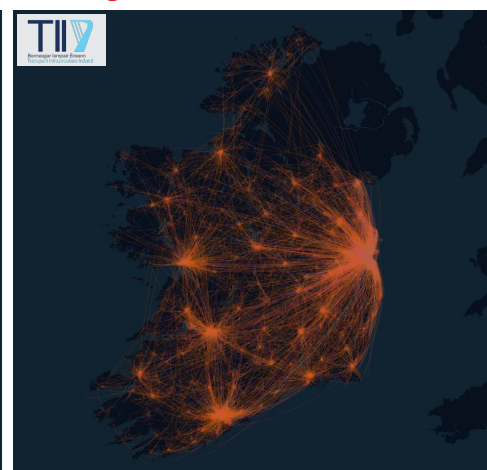
Transport East, UK



New Zealand MoT



Transport Infrastructure Ireland



Contents

1. Context
2. Issues, approach and status of using Hermes
3. Things we would still like to add
4. Sneak-peak at an external bike interaction tool

Context

Our clients are increasingly interested in active mode interventions and behaviour, e.g.

- Effect of new cycling lanes
- Different pricing and ownership models for bicycles
- Electric bicycles

Context

We are a consultancy so we like to rely on other people's work if we can. This means we use MATSim contribs in the first instance!

- Multimodal
 - Age + Gender dependent speeds
- Bicycle
 - Motorised Interactions

Context

We like Hermes!

Our sims are big and complicated – running QSim is not feasible for us already – active modes only add to complexity and already big run times!

Issue #1 - Simplified speeds

Hermes is fast because it simplifies and encodes different things to integers.

Speed was rounded to integers and covered speeds between 0-255 m/s.

We changed this to cover speeds 0.0-9.9 at 1 decimal point precision and 10-165 m/s

This has been merged to MATSim

<https://github.com/matsim-org/matsim-lib/pull/2320>

Issue #1 - Simplified speeds

Hermes is fast because it simplifies and encodes different things to integers.

Speed was rounded to integers and covered speeds between 0-255 m/s.

We changed this to cover speeds 0.0-9.9 at 1 decimal point precision and 10-165 m/s

This has been merged to MATSim



<https://github.com/matsim-org/matsim-lib/pull/2320>

Issue #2 - Different Speed API

MATSim contris use TravelTime binding which not used by Hermes.

Hermes takes the maximum speed of the vehicle. We implemented a TravelTime component for Hermes, so these bindings make their way downstream.

This is in a fork

<https://github.com/KasiaKoz/matsim-lib/pull/1>

Issue #3 - FIFO link dynamics

Cyclists and cars can't share the network with Hermes. Cars get blocked behind much slower bicycles.

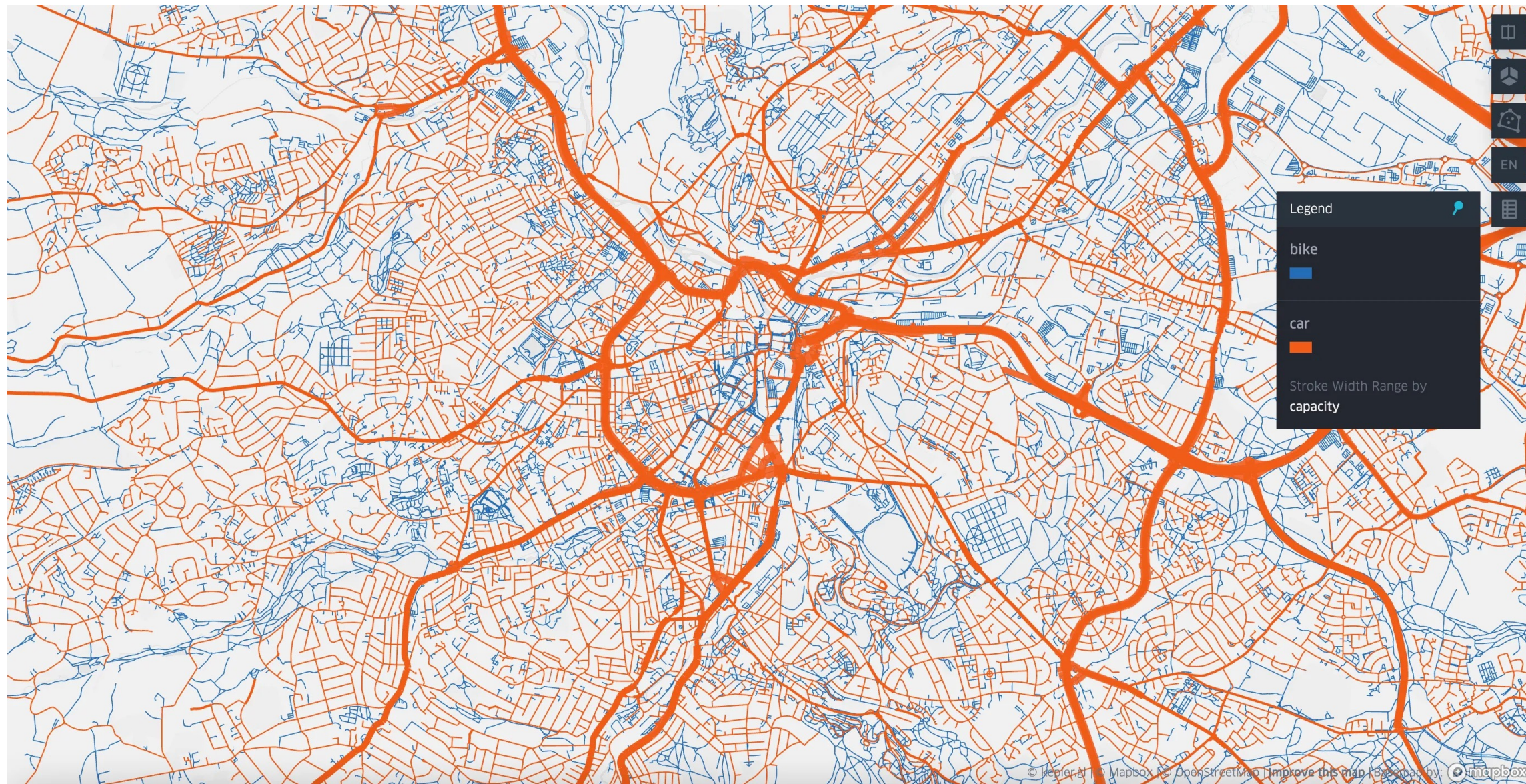
We would like to add Passing Queue link dynamics to Hermes, But this is not implemented yet!

For now, we separate active modes from the network during our network generation pipeline with a python tool called GeNet – [here](#) is the script we use

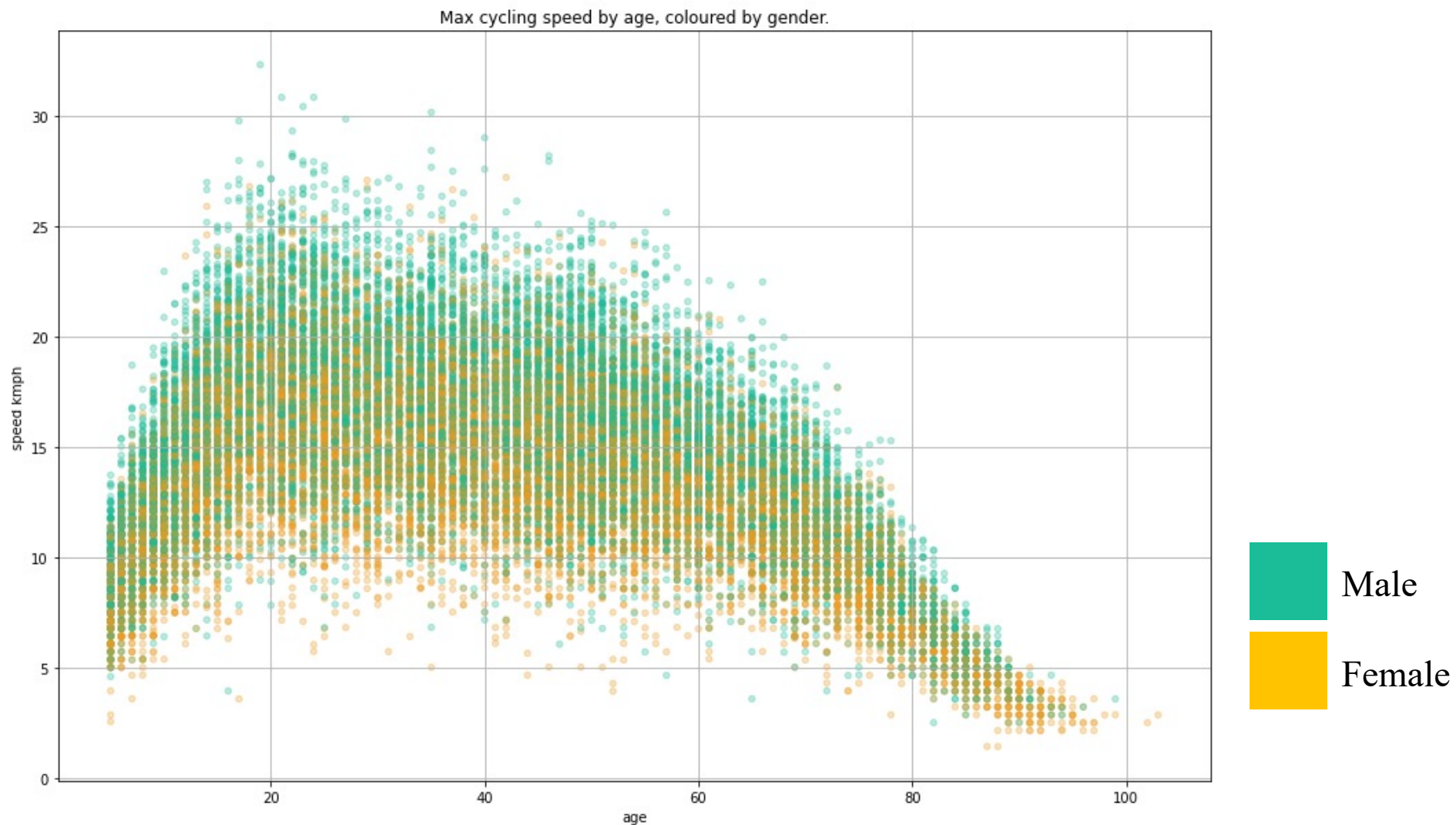
Future Work Aspirations

- Hermes - PassingQ link dynamics
- Bicycle contrib - MotorizedInteraction
- BikeAvail(ibility) (dis)utility in scoring
- E-bikes
- Validation/Calibration (Cycling)

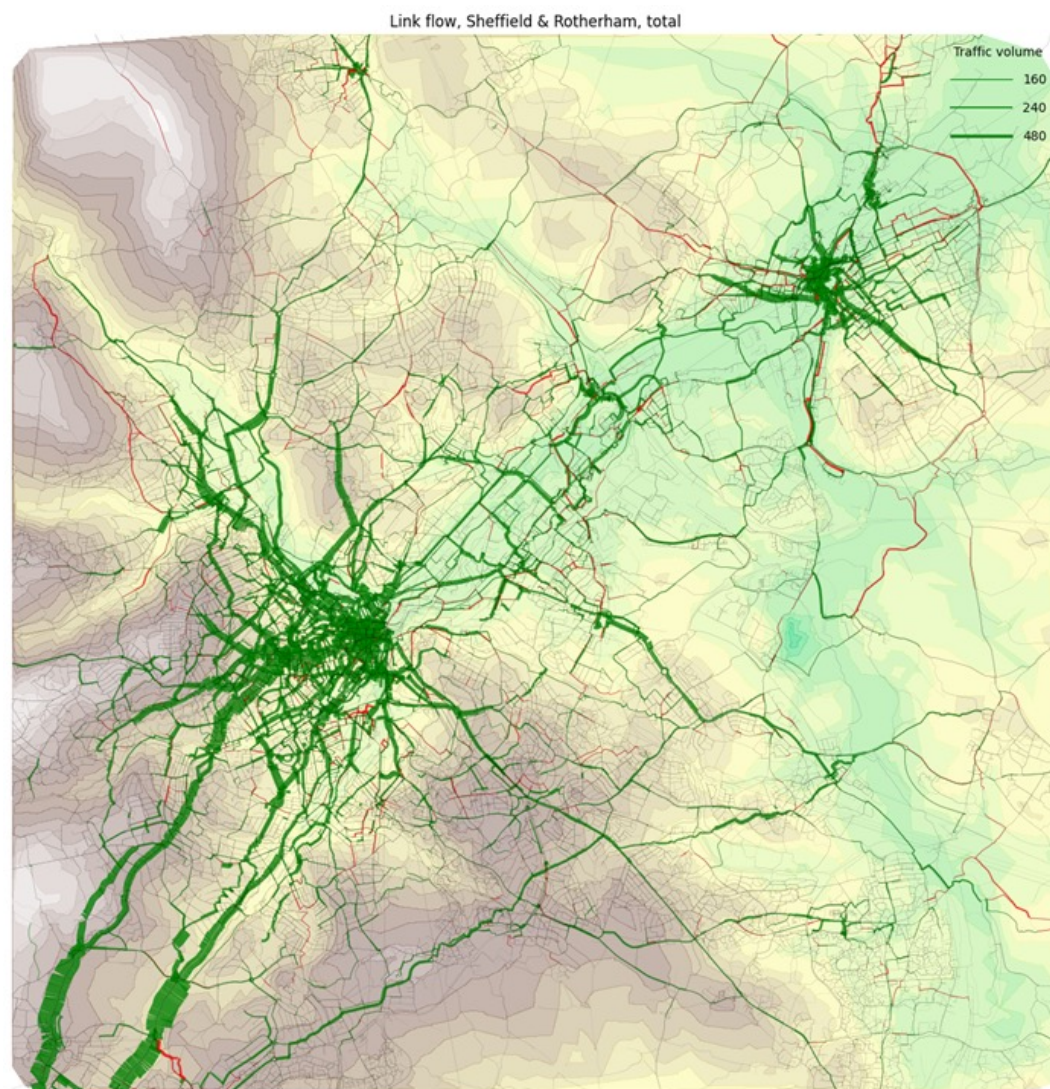
Cycling network representation with OSM data



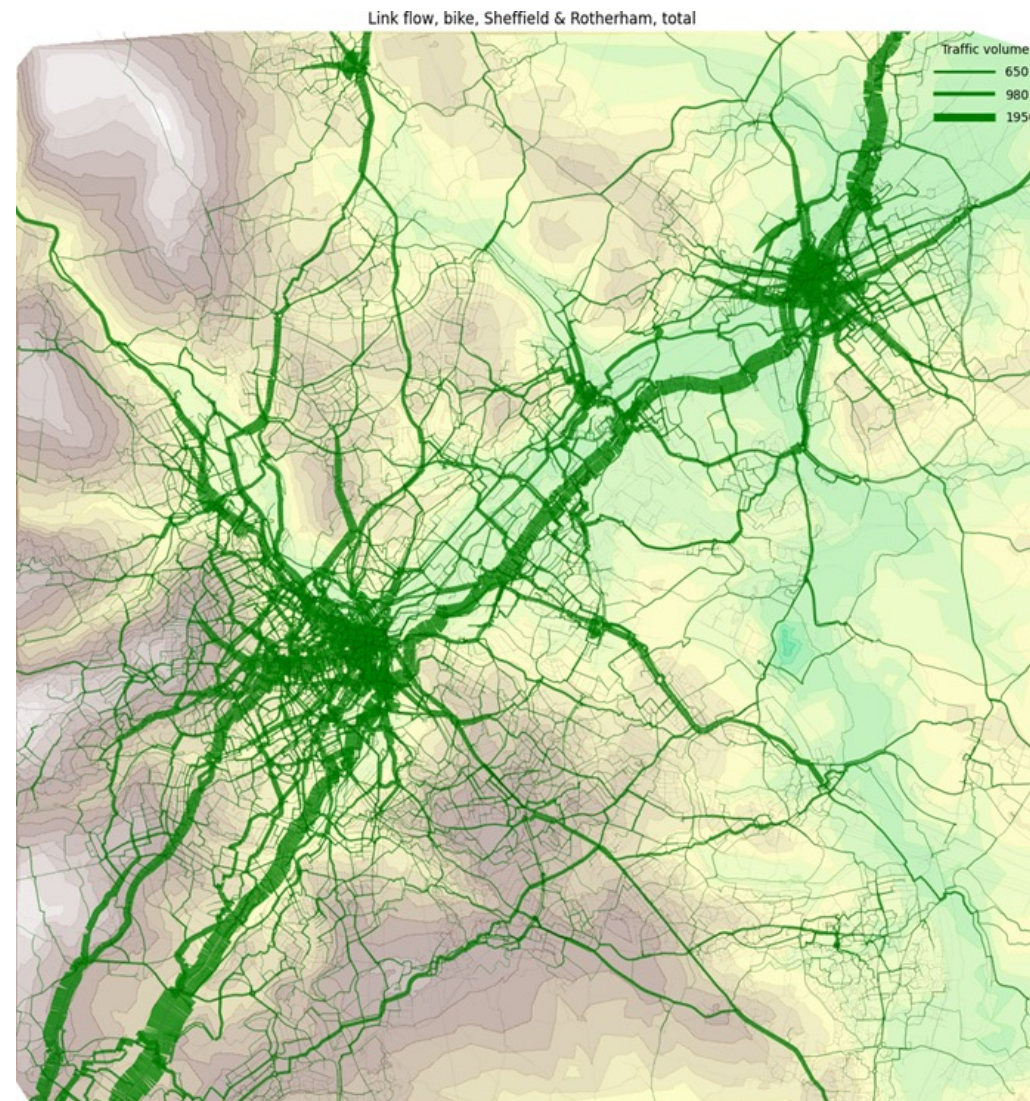
Age- and Gender-based Speeds



Slope impacting route choice



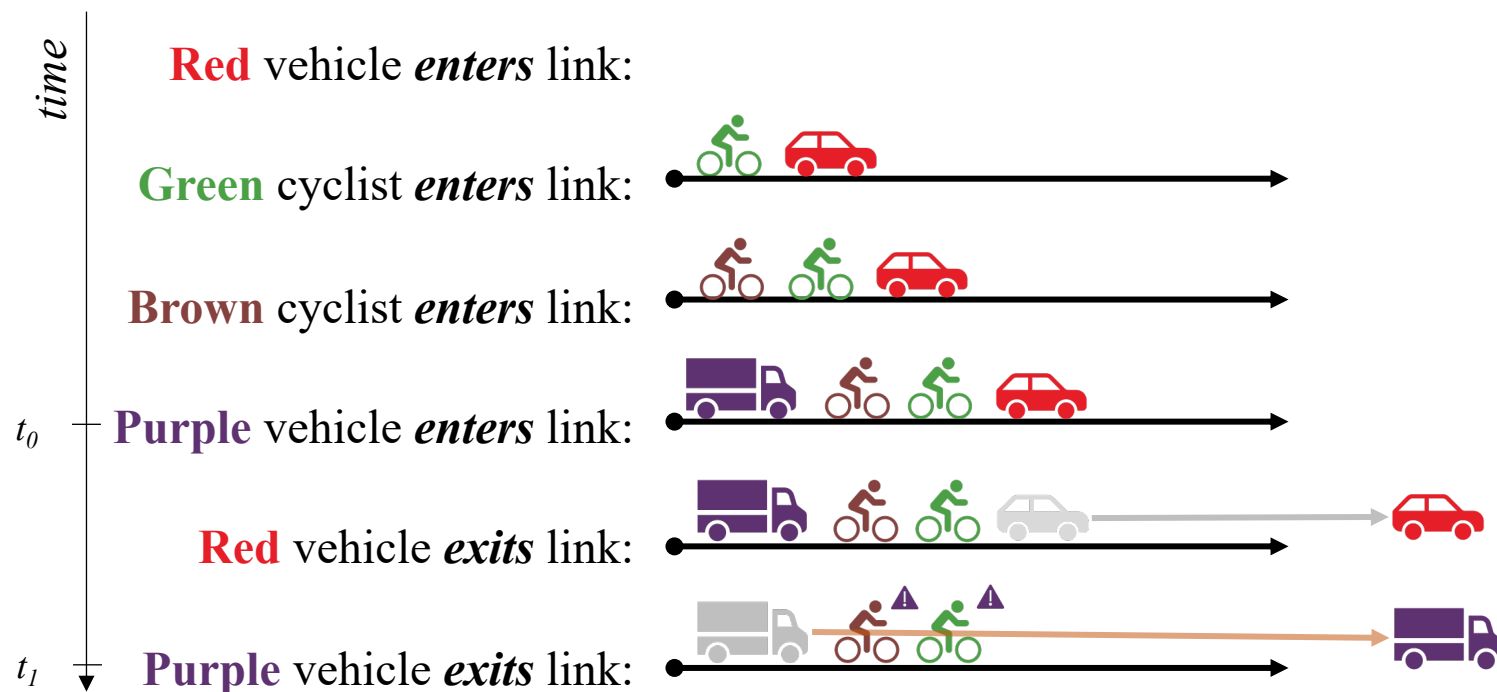
Difference in bike flows between sims with and without slope



Bike flows before including slope impact

Bicycle Interaction Tool

- External to MATSim-we analyse link enter and leave events
- We track
 - Who gets overtaken and by what vehicle
 - Agent's trip purpose and route
- In this example, we see two overtakes occur in the network



Bicycle Interaction Tool

- We gain insight for hotspots where cyclists and cars come into contact
- This already gives the client:
 - Indication where they could focus their infrastructure interventions
 - Who the agents most affected by car traffic are



Thanks for listening!

ARUP