MATSIM WORKS IN PROGRESS – JAPAN & S. EAST ASIA

21 November 2024

Presented by
Pieter Fourie
Contributions from
collaborators

慶應義塾
Keio University

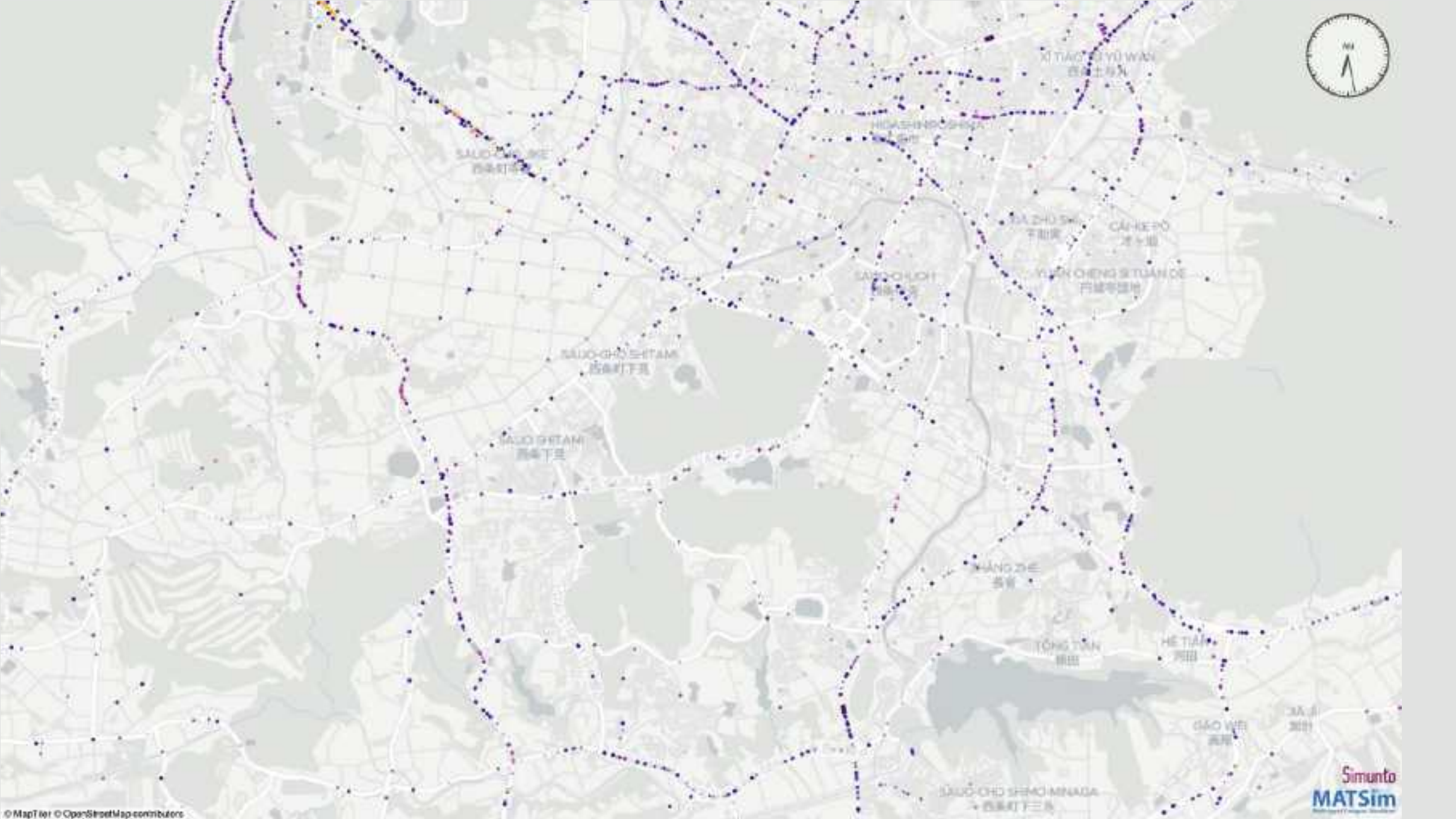
SDM
System Design and Management

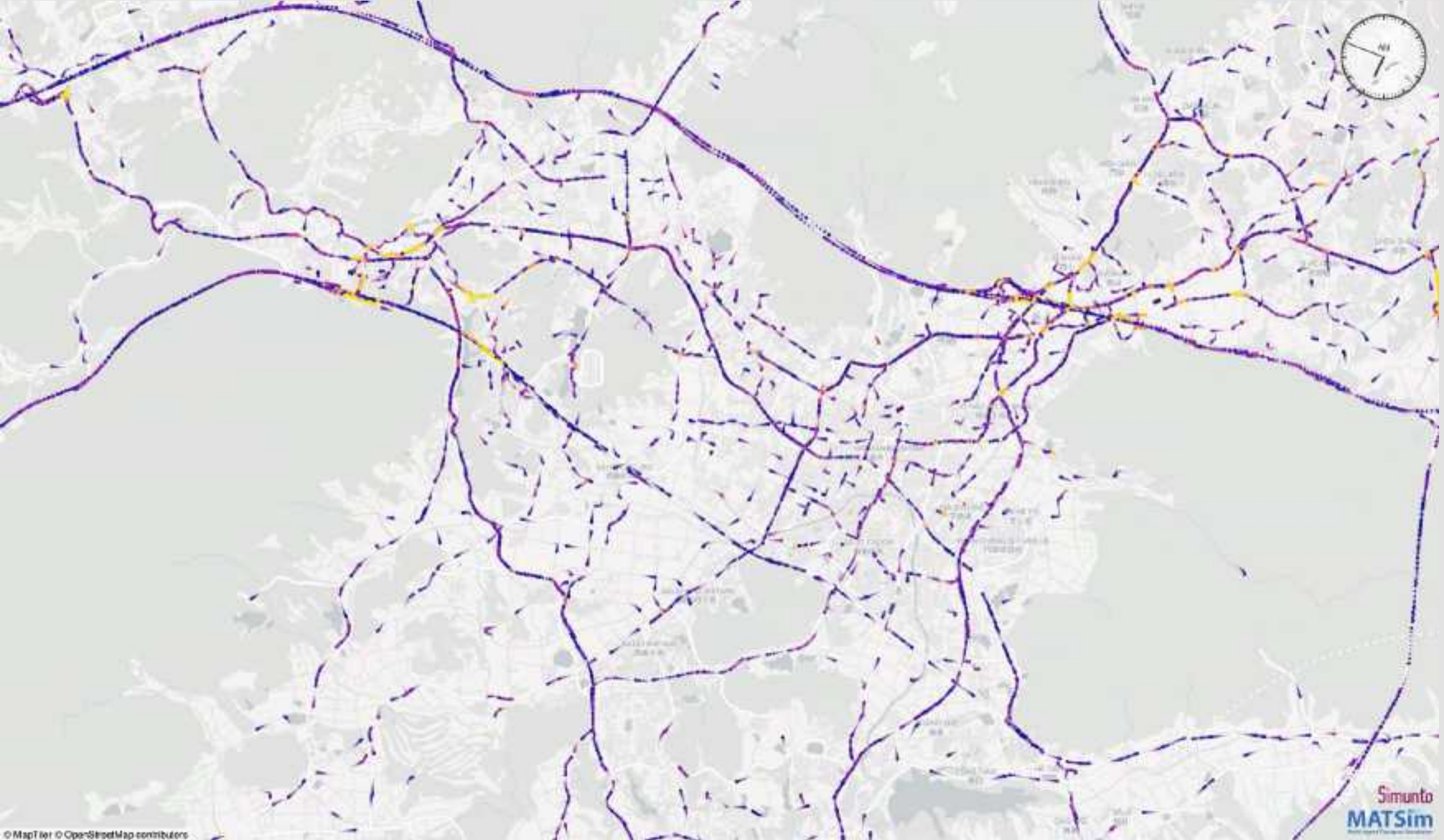
(FCL) FUTURE CITIES LABORATORY 未来城市实验室

(SEC) SINGAPORE-ETH CENTRE 新加坡－ETH研究中心

IVT Institut für Verkehrsplanung und Transportsysteme
Institute for Transport Planning and Systems

ETH zürich


Simunto
MATSim
© MapTiler © OpenStreetMap contributors


Simunto
MATSim
© MapTiler © OpenStreetMap contributors


Network
deltavol (crt - baseline) (abs.)
-400.0
-266.6666666666663
-133.3333333333331
0.0
133.3333333333331
266.6666666666674
400.0
Allowed Transport Mode
*
"rail"
Volumes (absolute) (crt
0.0
15.0
3000.0
Background
© MapTiler © OpenStreetMap contributors
Simunto
MATSim

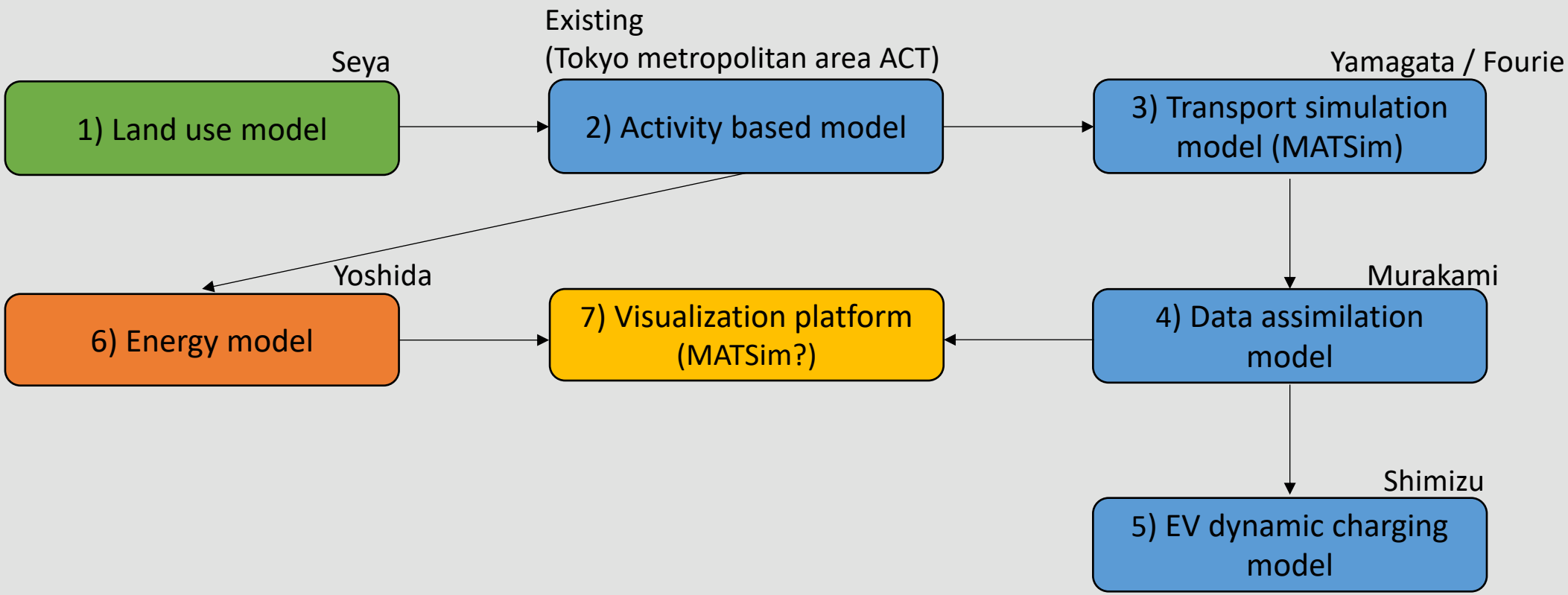
Aim

- Develop a new urban land use transportation model to project future CO_2 emission in Tokyo 23 wards
- We can use recently published data in Japan
  - Age of building at grid cell or building level
  - Smart meter data (Available preliminarily in SIP project) at grid cell level
- Scenario analyses
  - We consider residential, commercial, and transport sectors.
  - Guidelines for the installation of road equipments for dynamic charging for EVs

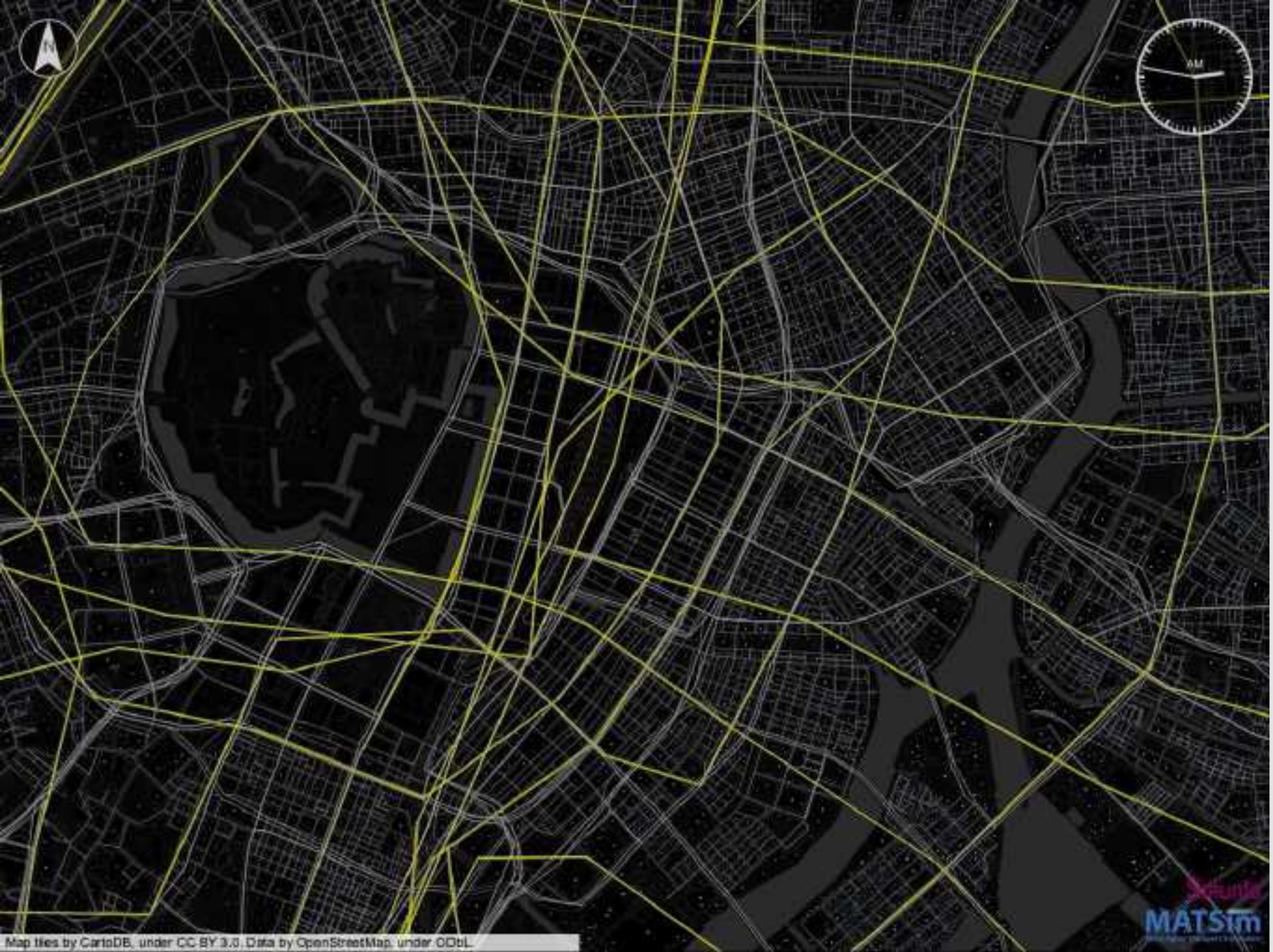
https://www.jst.go.jp/mirai/jp/uploads/230221-fujimoto.pdf

SOURCE: HAJIME SEYA, KOBE UNIV.

Model structure



SOURCE: HAJIME SEYA, KOBE UNIV.



Building an activity-based, agent-based simulation of Tokyo

We generated this demand from home, work census and travel survey data. It serves as a basis for further demand updates, e.g. GPS data.

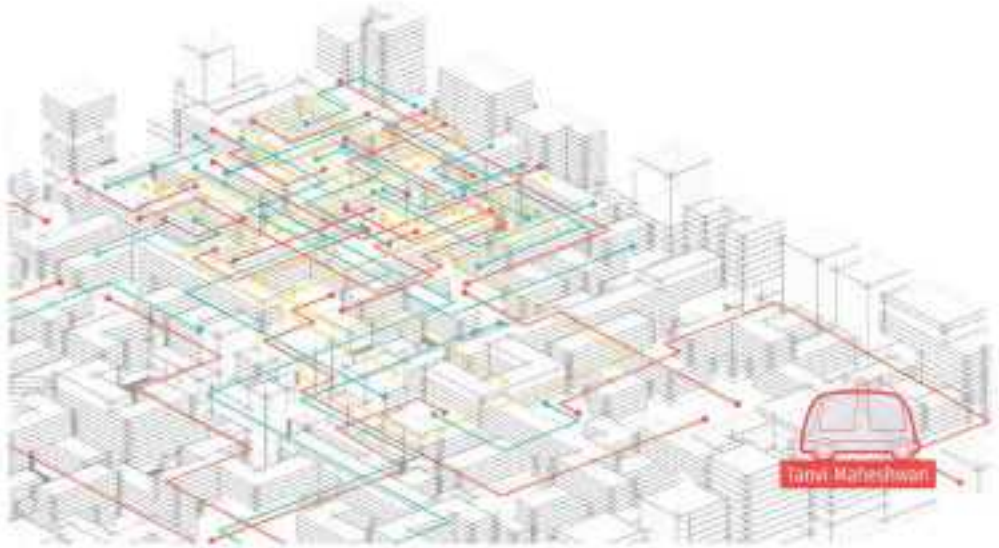
Colors denote activity types: home, work, school, and other

Source: Takahiro Yoshida, UTokyo

DESIGN EXPERIMENTS

AN URBAN DESIGN RESPONSE TO THE TECHNOLOGICAL SHIFT IN TRANSPORTATION

How to conduct urban design with vehicle automation, sharing and electrification



ISSN 1364-503X | Volume 382 | Issue 2285 | 16 December 2024

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A

MATHEMATICAL, PHYSICAL AND ENGINEERING SCIENCES

Co-creating the future: participatory cities and digital governance

Theme issue compiled and edited by Dirk Helbing, Sachit Mahajan, Dino Carpentras, Monica Menendez, Evangelos Pournaras, Stefan Thurner, Trivik Verma, Elsa Arcaute, Michael Batty and Luis M. A. Bettencourt

THE ROYAL SOCIETY PUBLISHING

PHILOSOPHICAL TRANSACTIONS A

royalsocietypublishing.org/journal/rsta

Research

Cite this article: Maheshwari T, Fourie P. 2024 Co-designing transport models as a heuristic planning tool. *Phil. Trans. R. Soc. A* **382**: 20240110.
https://doi.org/10.1098/rsta.2024.0110

Received: 12 April 2024
Accepted: 3 October 2024

One contribution of 17 to a theme issue 'Co-creating the future: participatory cities and digital governance'.

Co-designing transport models as a heuristic planning tool

Tanvi Maheshwari[1] **and Pieter Fourie**[2,3]

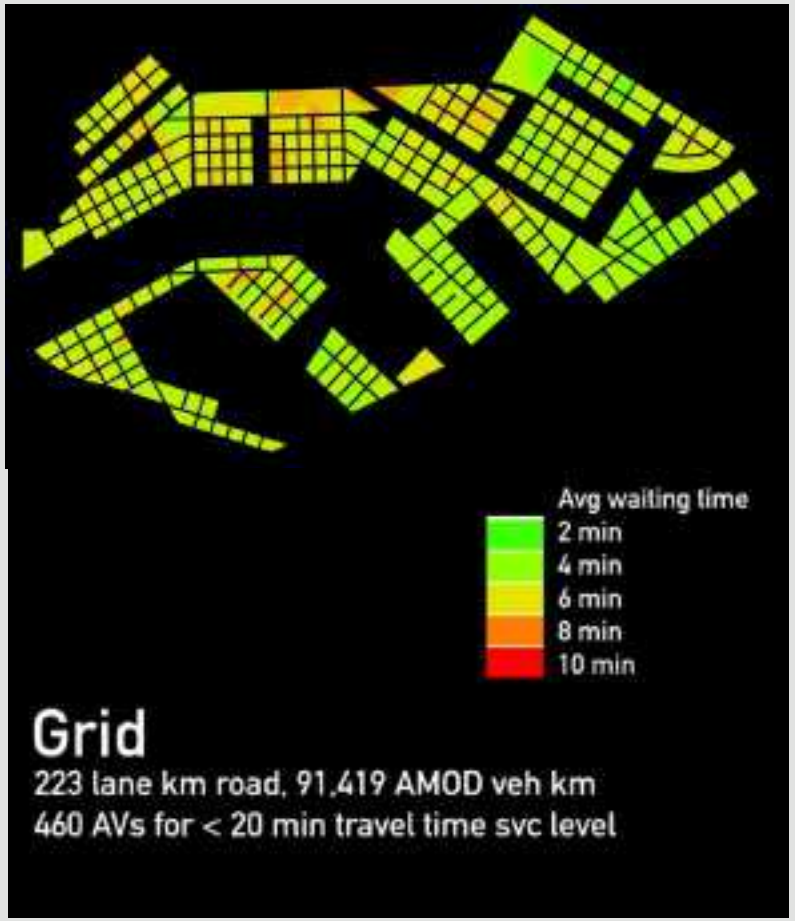
[1]Department of Architecture, Monash University, Melbourne, Victoria 3145, Australia
[2]Graduate School of System Design and Management, Keio University, Hiyoshi, Kohoku-ku, Yokohama, Kanagawa, Japan
[3]Graduate School of Advanced Science and Engineering, Hiroshima University, Kagamiyama, Higashi-Hiroshima, Hiroshima 739-8527, Japan

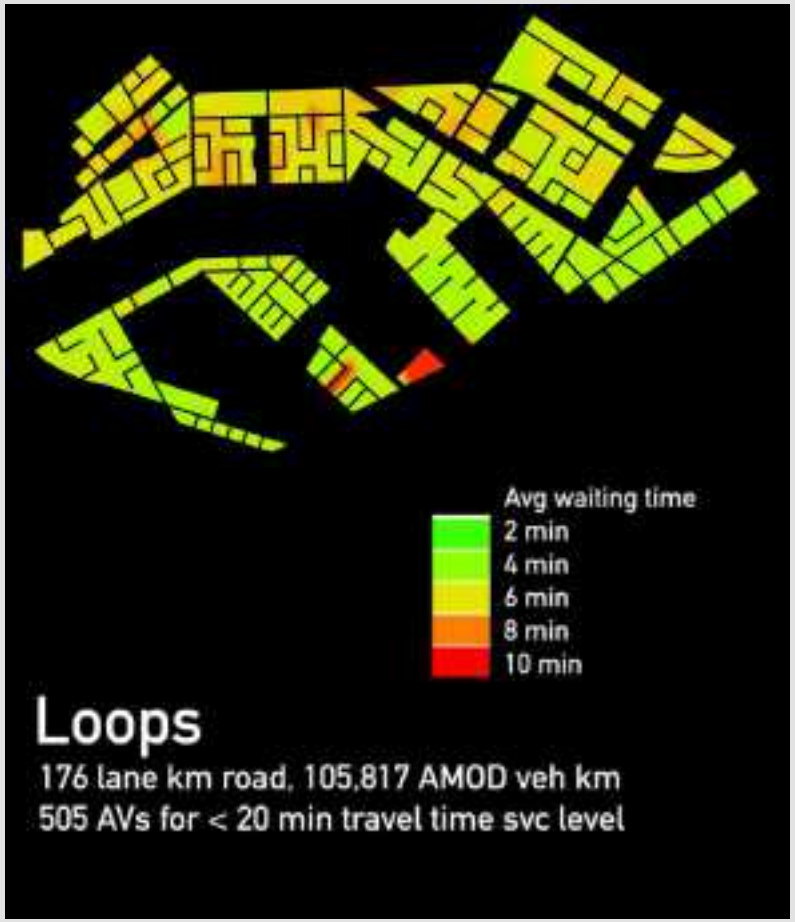
TM, 0000-0002-0805-2951; PF, 0000-0003-4694-3357

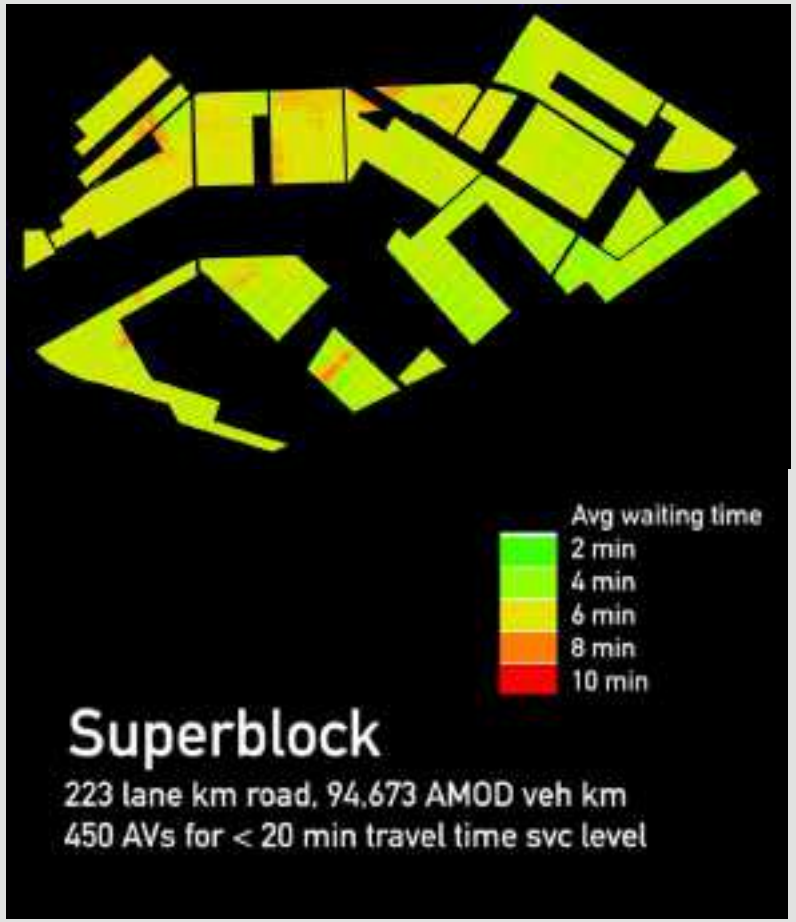
Recently the transportation sector has witnessed several new technologically driven disruptions that have amplified the complexity of city planning and policymaking. Traditional well-established processes of decision-making in urban planning and transportation are proving insufficient to deal with this degree of complexity and uncertainty. This paper proposes an alternative approach, combining qualitative and normative urban design, with quantitative and predictive transport modelling. This requires urban designers and transport modellers to


Superblock

Example:
Waiting times for AVs in different road network configurations







SketchMATSim: core idea

Aim

Test impact of new urban designs on future mobility in a future neighbourhood

Challenge

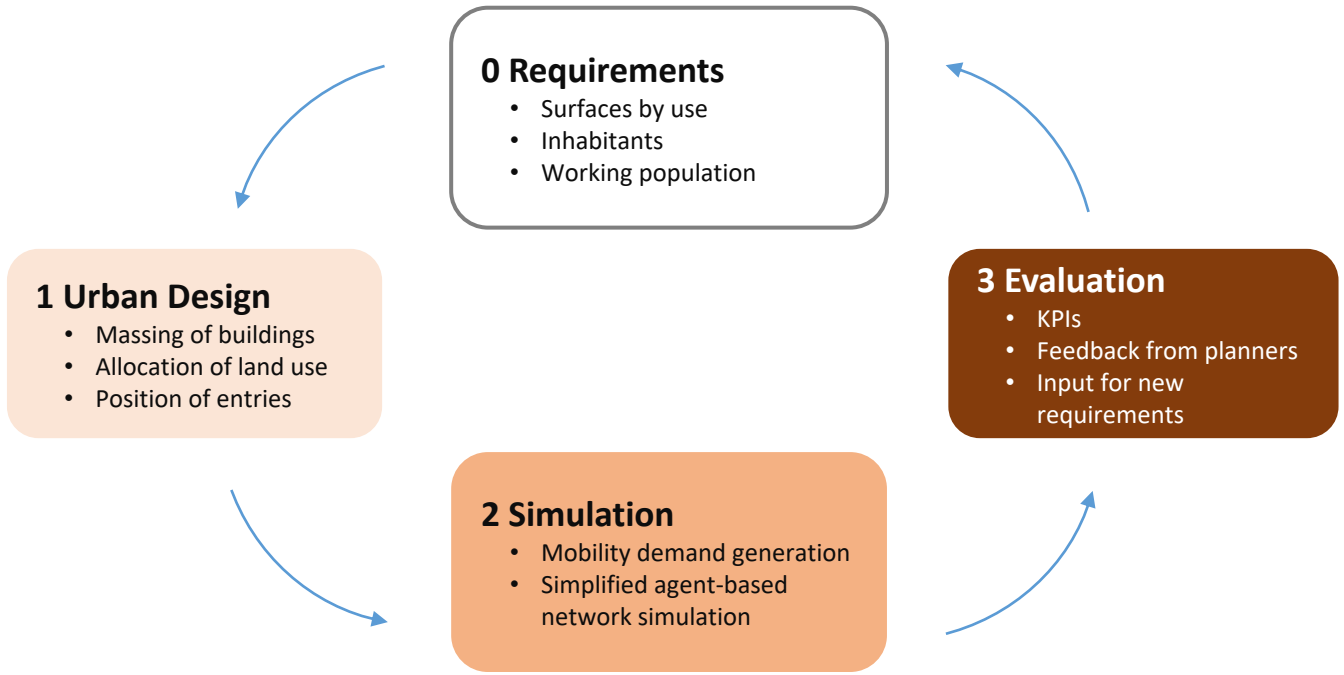
Need to be fast to support an iterative planning approach: Results in seconds (or minutes) rather than days.

Opportunity

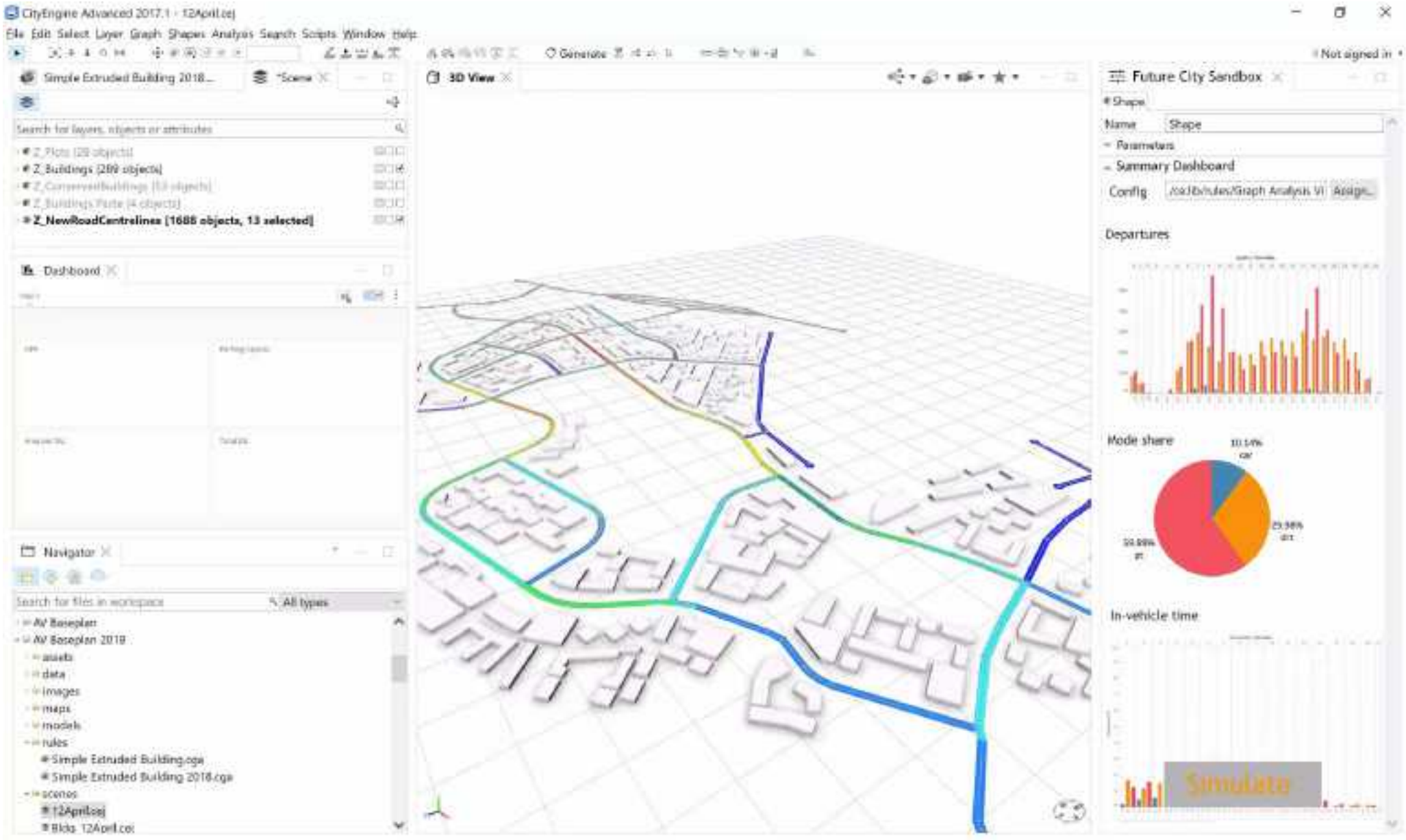
Smaller scale than what is used in activity-based demand generation.

Core concept

Develop software and travel demand models that allow for an iterative urban design and mobility planning process



SketchMATSim: core idea

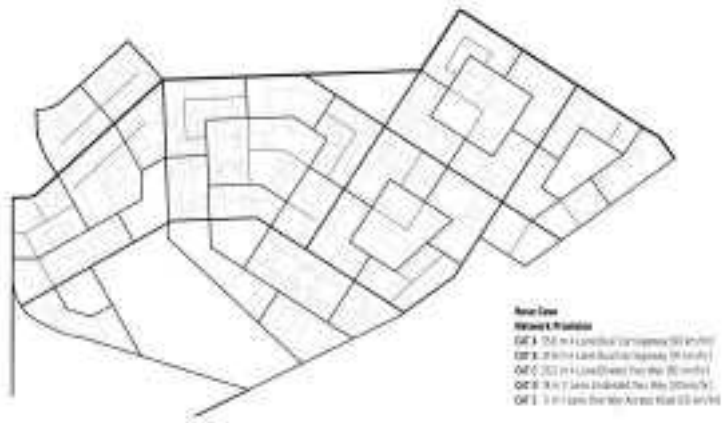


Urban design elements

Parcels and buildings

Land use distribution

Network Design



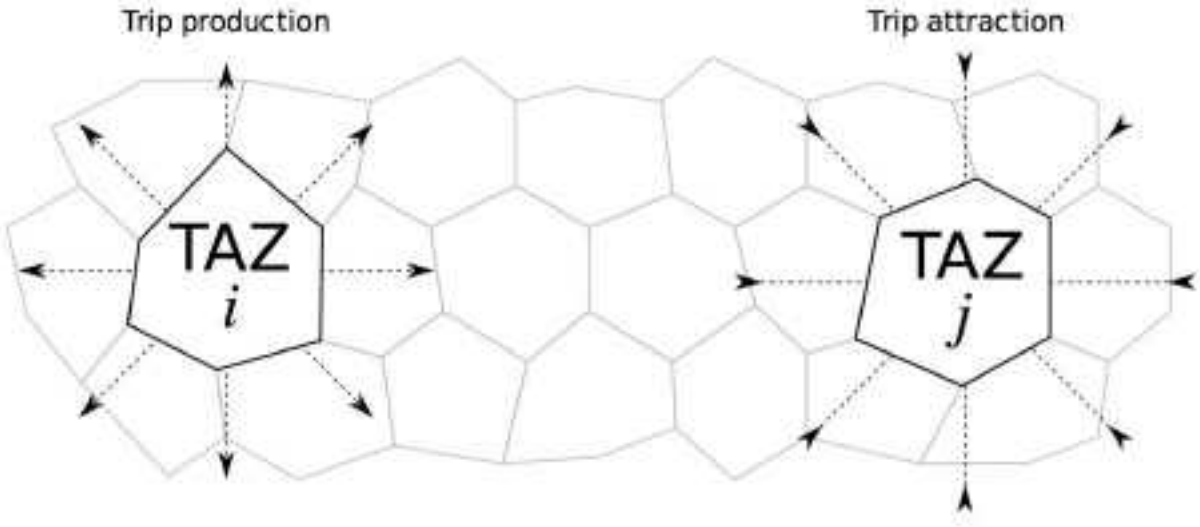
Parking as an example for urban design scenarios

Distributed Lots

Shared Parking Depots

On Street and Roaming

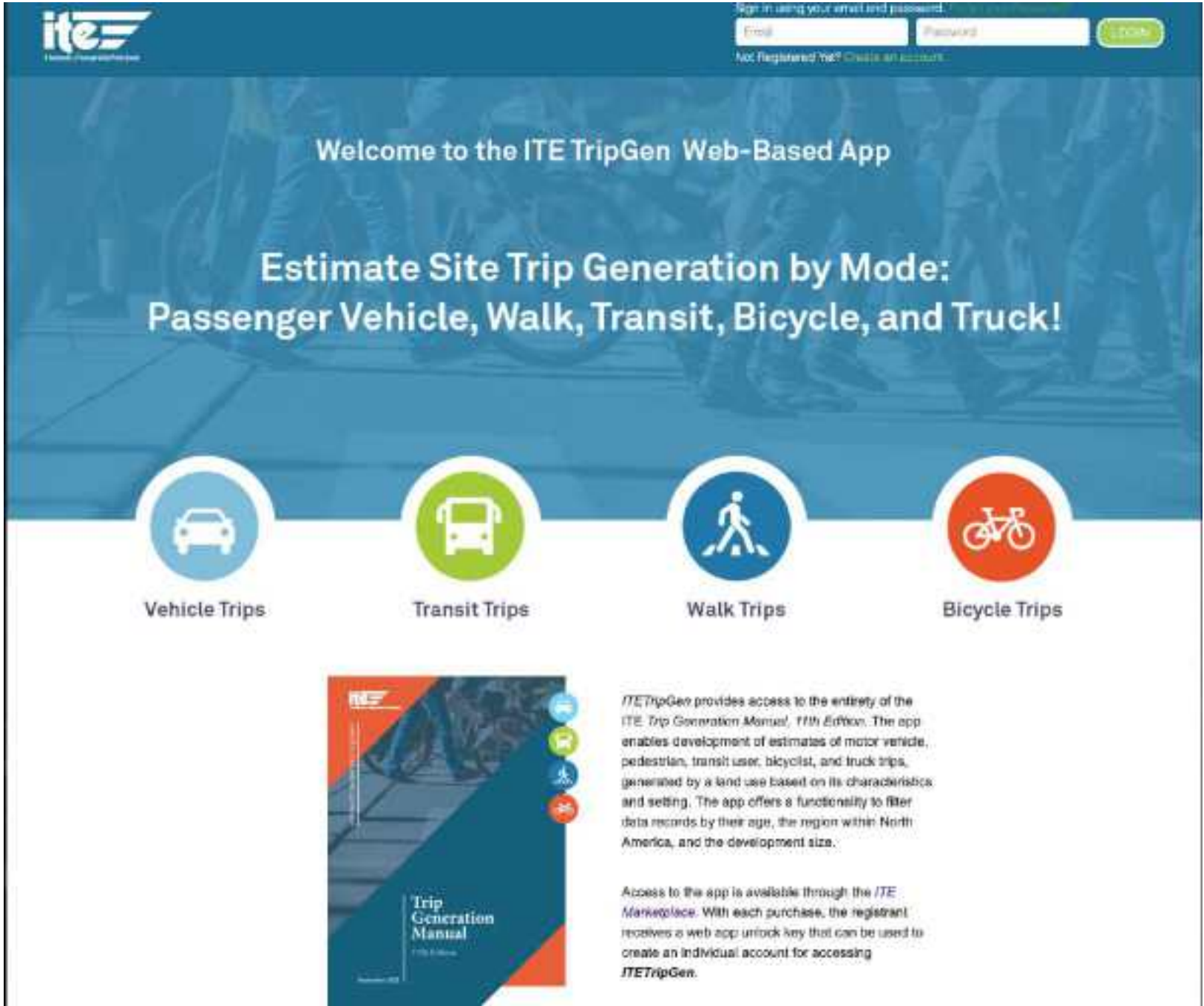
BACK TO BASICS:
FOUR STEP MODELING – STEP 1



1. Trip generation

Calculate the number of trips produced by and attracted to each TAZ from census data.
The total number of trips produced in the entire study area must match the total number of trips attracted.

FOUR STEP MODELING – STEP 1



FOUR STEP MODELING – STEP 1

EPA United States Environmental Protection Agency

Search EPA.gov

Environmental Topics | Laws & Regulations | Report a Violation | About EPA

Smart Growth

CONTACT US

- Smart Growth Home
- About Smart Growth
- Examples of Smart Growth
- Grants and Funding
- Partnerships
- Publications
- Technical Assistance
- Tools
- Topics
- Webinars, Videos, and Podcasts
- Smart Growth in Your Community

Mixed-Use Trip Generation Model

Santana Row in San Jose, California, generates fewer trips by mixing uses in a walkable neighborhood on the site of an old shopping mall.

Research consistently shows that neighborhoods that mix land uses, make walking safe and convenient, and are near other development allow residents and workers to drive significantly less if they choose. In fact, in the most centrally located, well-designed neighborhoods, residents drive as little as half as much as residents of outlying areas.[1]

Along with these benefits, mixed-use development can improve communities in other important ways, including supporting affordable housing by lowering transportation costs.[2] Studies have shown that mixed-use development, especially in concert with other smart growth strategies, provides significantly higher returns to local governments through property and sales taxes[3] while requiring lower per unit infrastructure and public-service costs.[4]

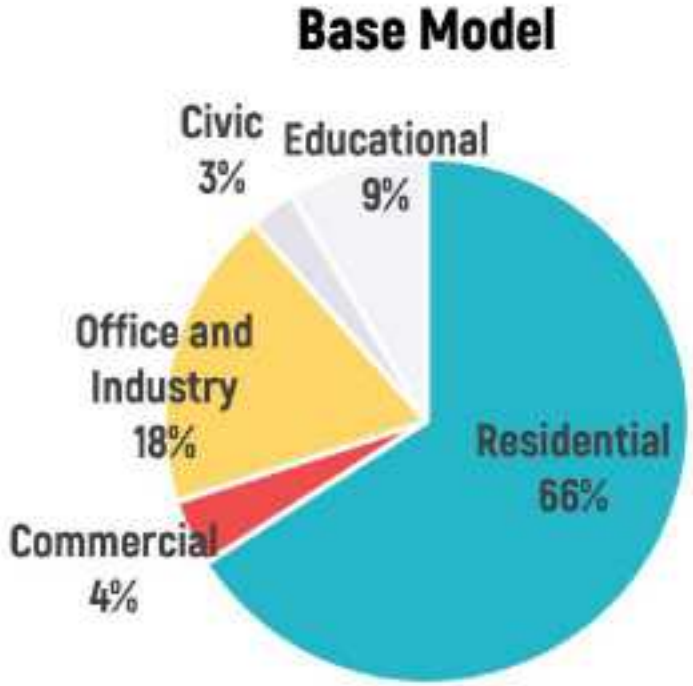
The typical development planning and approval process treats mixed-use developments as though the uses were separated and accessible only by car, leaving mixed-use developments at a disadvantage compared to conventional, single-use developments. Recognizing the lower traffic impacts of mixed-use development in central, well-connected neighborhoods in the planning and approvals process would help communities reduce traffic and realize other benefits.

The technical methods to estimate how much traffic a new development will create, known as trip generation

FOUR STEP MODELING – STEP 1

INSTITUTE OF TRANSPORTATION ENGINEERS
COMMON TRIP GENERATION RATES (PM Peak Hour)

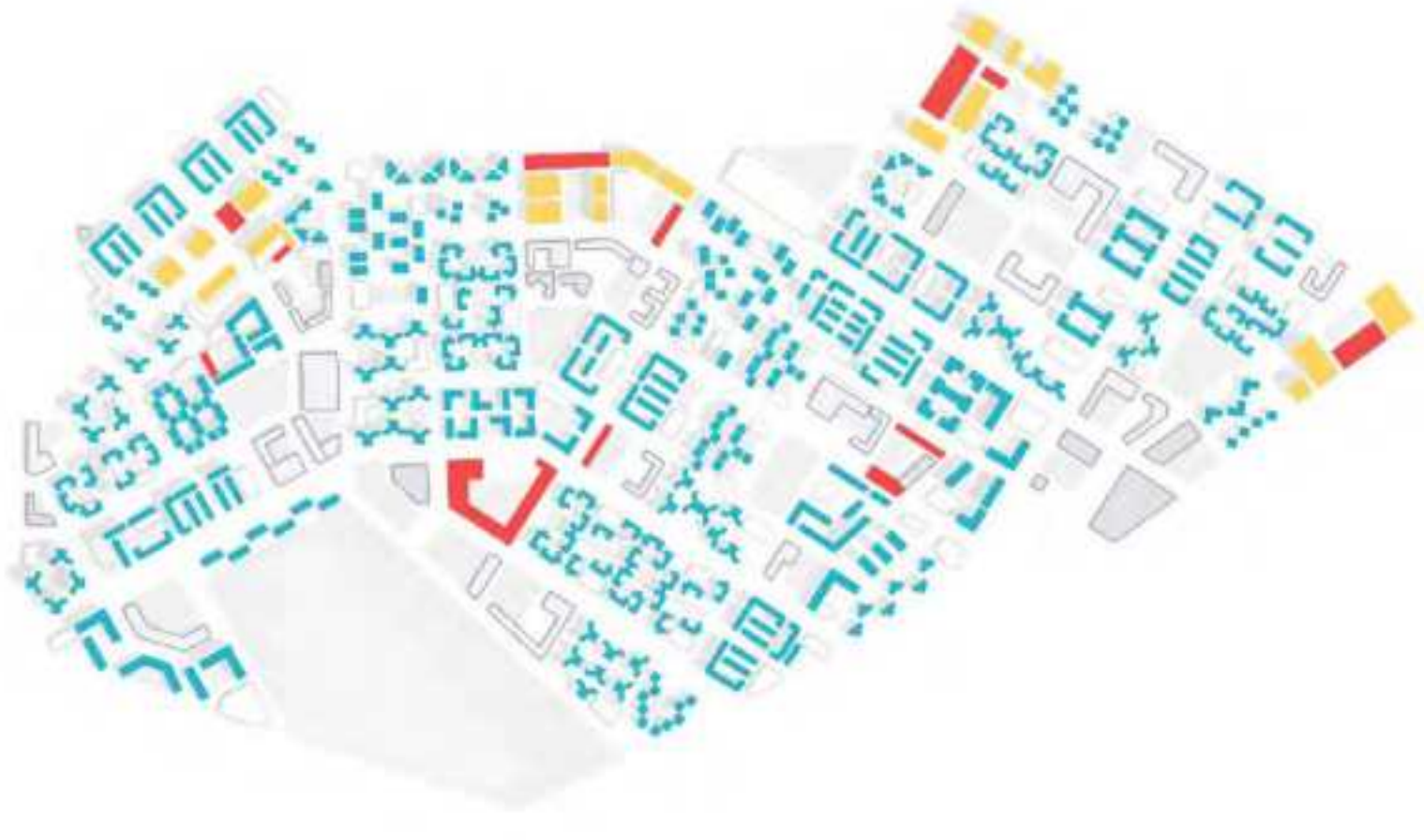
DESIGN EXPERIMENTS: TRIP GENERATION



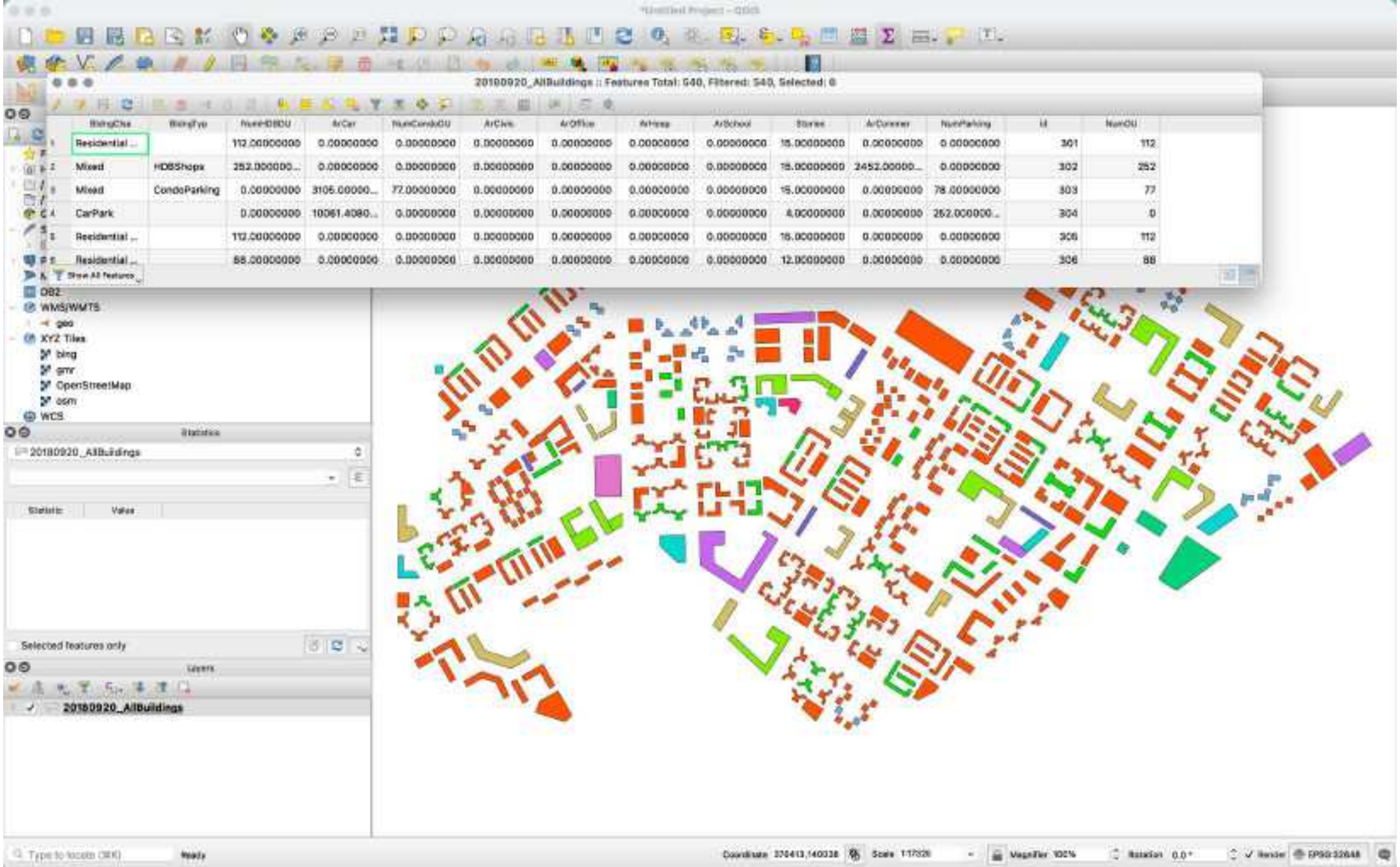
Use	Area in Ha
Residential	399
Commercial	25
Office and Industry	112
Civic	17
Educational	52

Source: Maheshwari, 2020

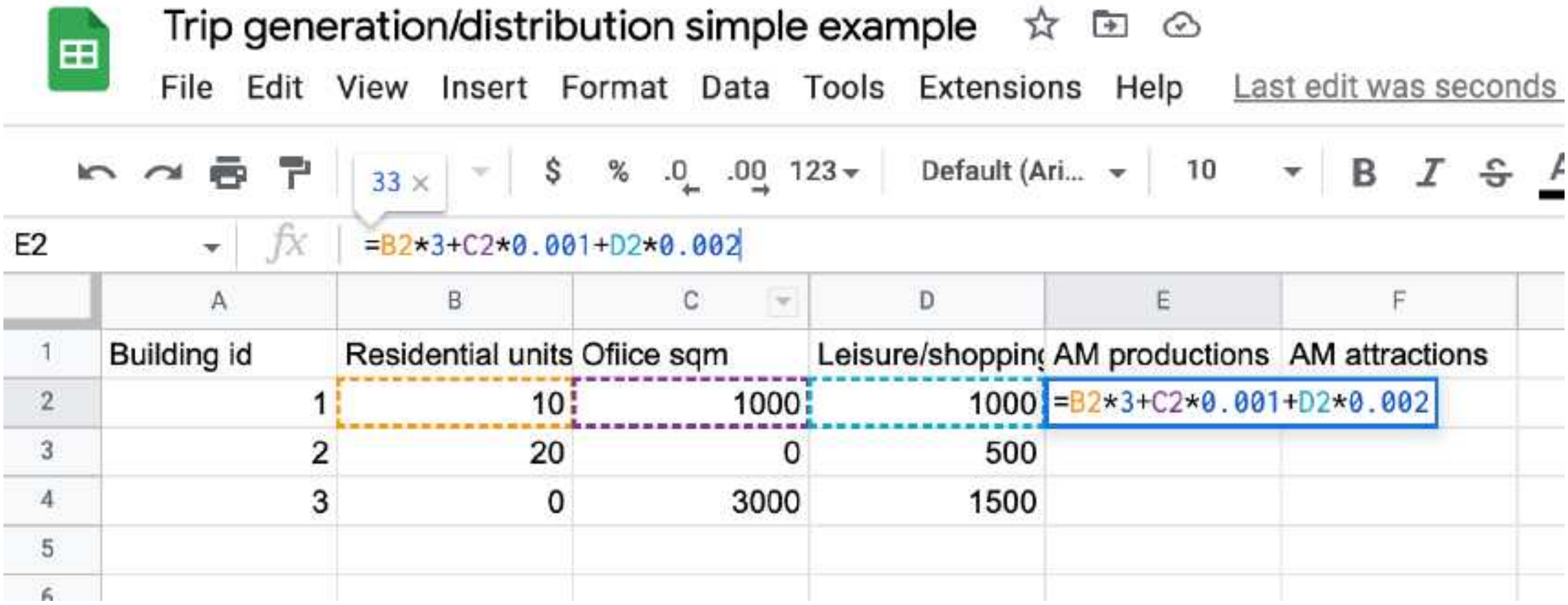
DESIGN EXPERIMENTS: TRIP GENERATION



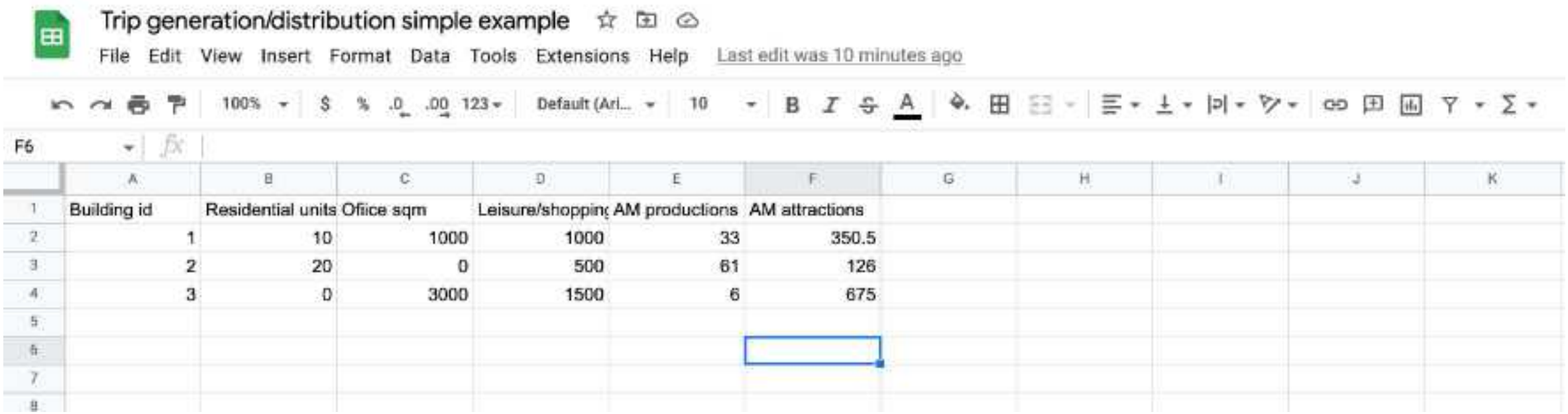
Source: Maheshwari, 2020


20180920_AllBuildings :: Features Total: 640, Filtered: 640, Selected: 0
BldgClss
BldgTyp
NumHDBDU
ArCar
NumCondoDU
ArClub
ArOffice
ArHosp
ArSchool
Storey
ArCommer
NumParking
Id
NumDU
Residential ...
Mixed
HDBShops
CondoParking
CarPark
Show All Features
OB2
WMS/WMTS
geo
XYZ Tiles
bing
gmr
OpenStreetMap
osm
WCS
Statistics
20180920_AllBuildings
Statistic
Value
Selected features only
Layers
20180920_AllBuildings
Type to locate (⌘K)
Ready
Coordinate 370413,140338
Scale 1:17026
Magnifier 100%
Rotation 0.0°
Render
EPSG:32648

SIMPLE TRIP GENERATION



SIMPLE TRIP GENERATION



Trip generation/distribution simple example

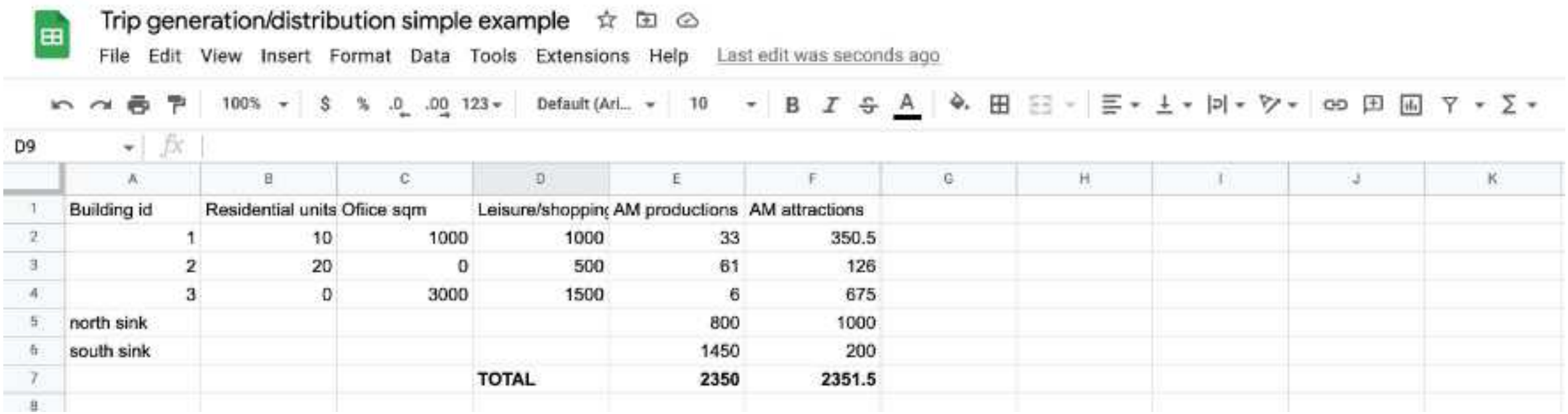
File Edit View Insert Format Data Tools Extensions Help Last edit was 10 minutes ago

100% $ % .0 .00 123 Default (Ari... 10

F6

	A	B	C	D	E	F	G	H	I	J	K
1	Building id	Residential units	Ofiice sqm	Leisure/shoppin	AM productions	AM attractions					
2	1	10	1000	1000	33	350.5					
3	2	20	0	500	61	126					
4	3	0	3000	1500	6	675					
5											
6											
7											
8											

SIMPLE TRIP GENERATION



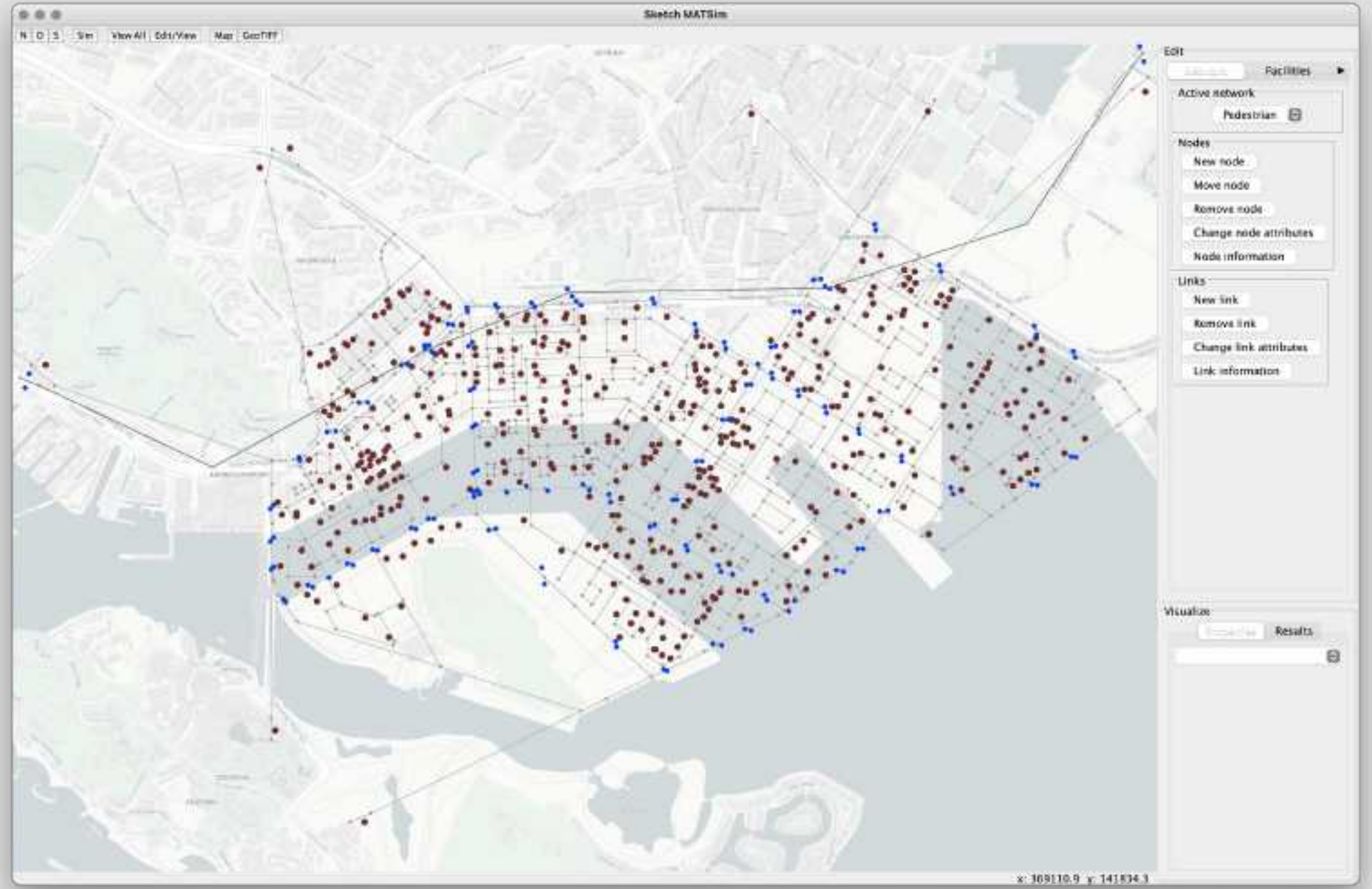
Trip generation/distribution simple example

File Edit View Insert Format Data Tools Extensions Help Last edit was seconds ago

100% $ % .0 .00 123 Default (Ari... 10

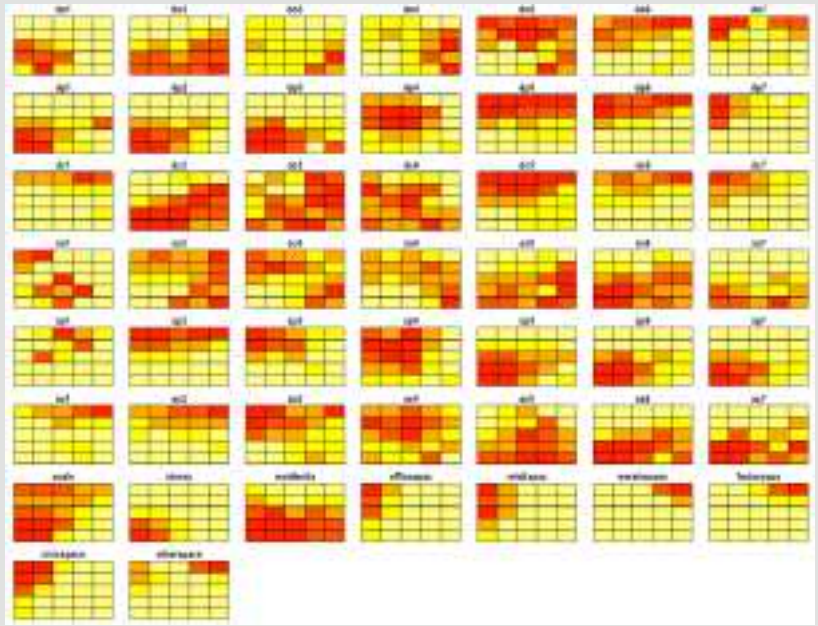
D9

	A	B	C	D	E	F	G	H	I	J	K
1	Building id	Residential units	Ofiice sqm	Leisure/shoppin	AM productions	AM attractions					
2	1	10	1000	1000	33	350.5					
3	2	20	0	500	61	126					
4	3	0	3000	1500	6	675					
5	north sink				800	1000					
6	south sink				1450	200					
7				**TOTAL**	**2350**	**2351.5**					
8											

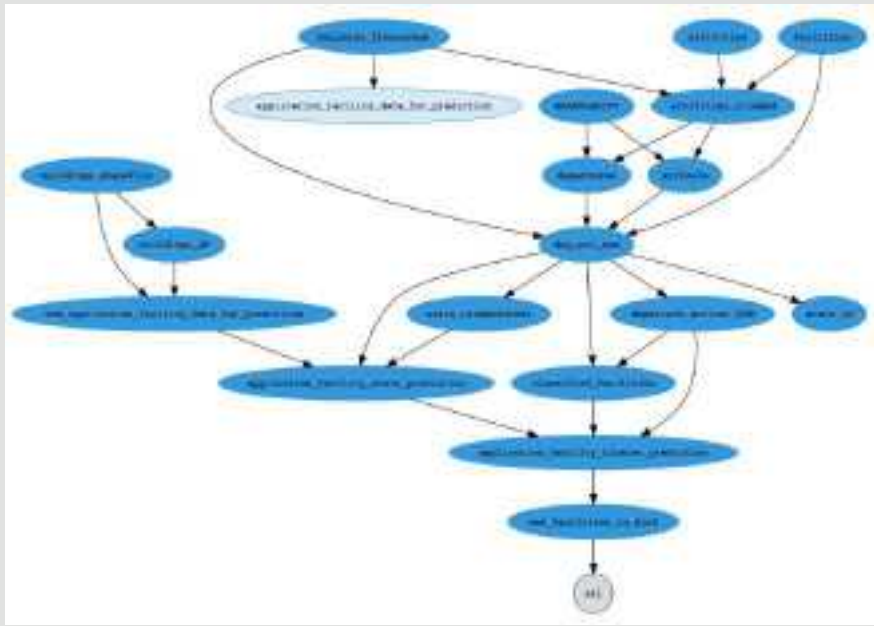

Sketch MATSim
N
O
S
Sim
View All
Edit/View
Map
GeoTIFF
Edit
Facilities
Active network
Pedestrian
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Visualize
Results
x: 369110.9 y: 141834.3

How to generate the trip production / attraction figures?
Approach 1: without Telco data

Self-organising maps



Regression and classification



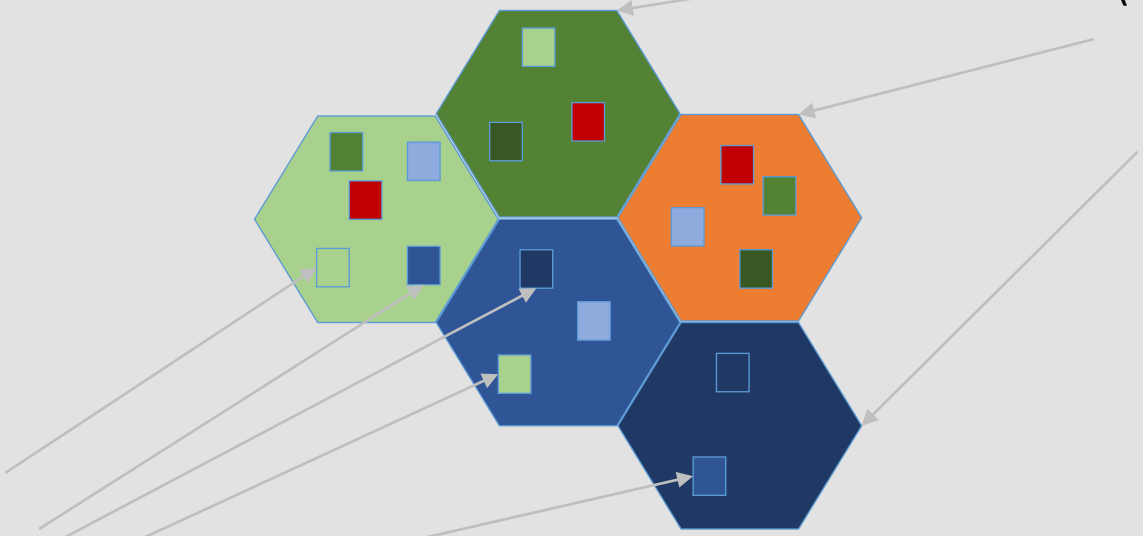
Simple SOM based on limited attributes.

Classify new buildings with SOM, predict scale of production + attraction.

Followed by probabilistic pairing of productions and attractions into trips.

Boundary flows from full model.

How to generate the trip production / attraction figures?
Approach 2: with Telco data



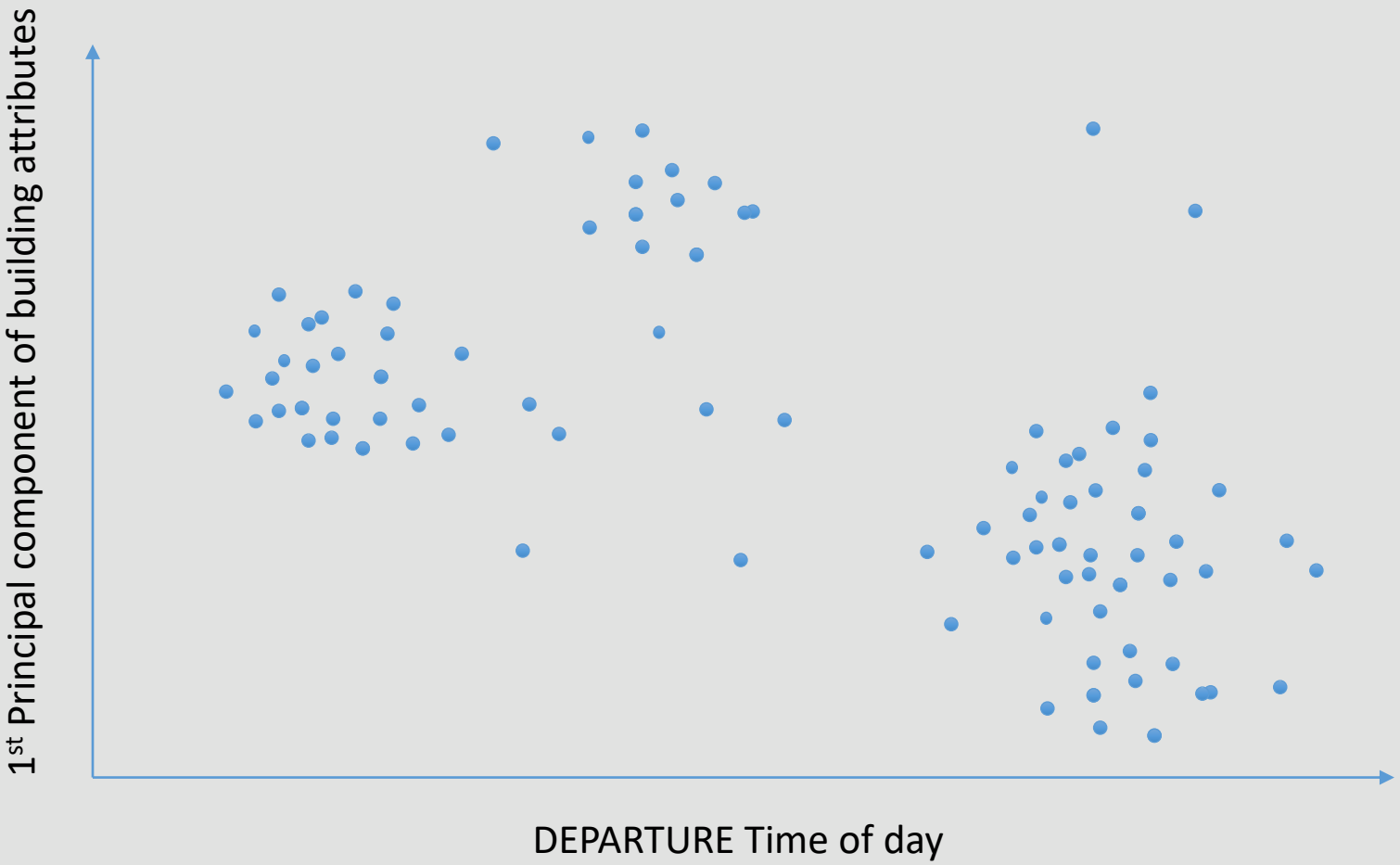
Zonal Controls
(CDR OD matrix productions/ Attractions, same hour)

Predictions
(Building level, for a given hour)

For a genome of Gaussian kernel parameters, predict hourly patterns of production and attractions for each building in a zone, and aggregate to hourly zonal productions and attractions, compare against control from cellphone data.

Use genetic algorithm to find a genome that will minimize the difference

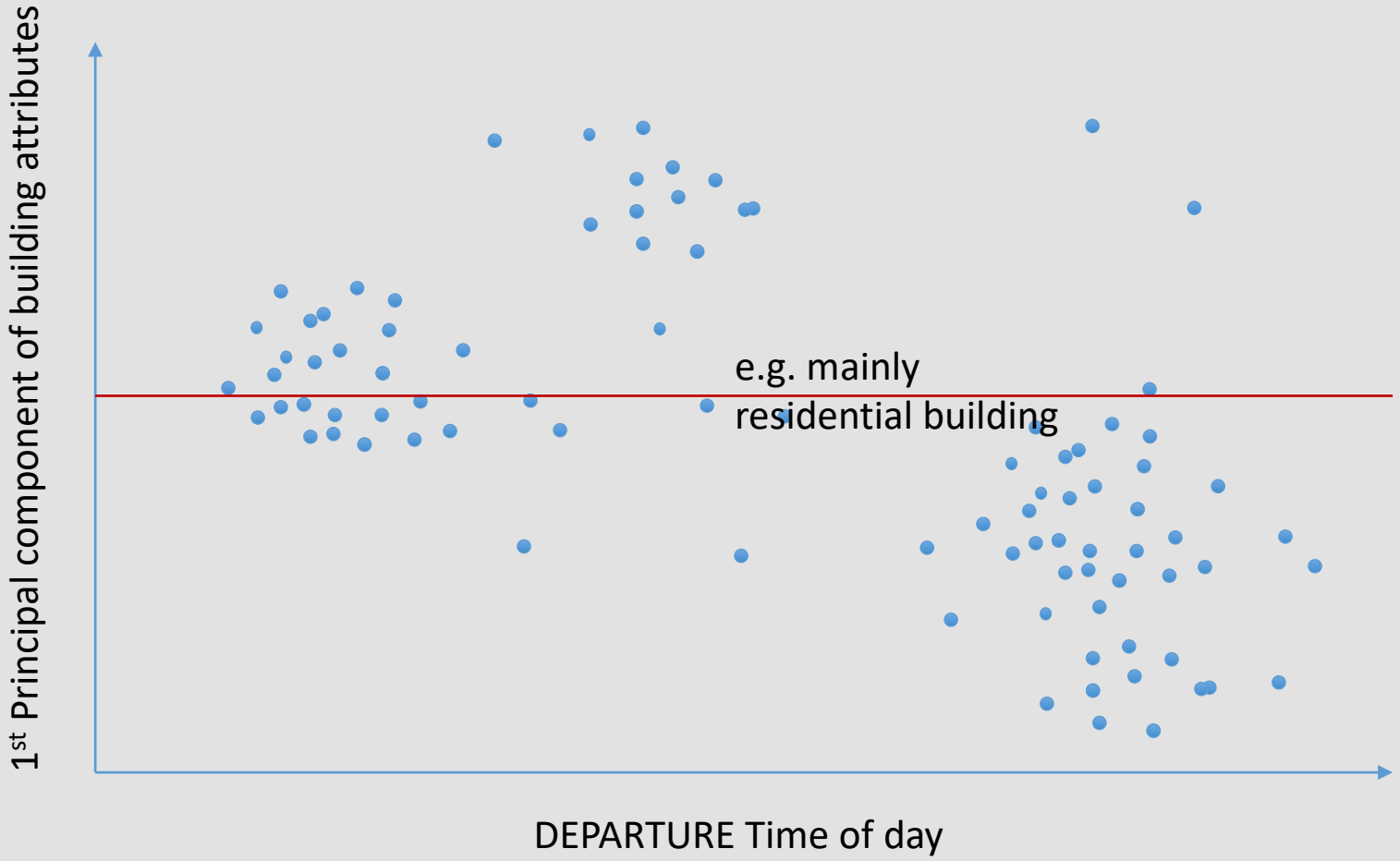
How to generate the trip production / attraction figures?
Approach 2: with Telco data



Uses travel survey (or other sources of limited observation of individuals) + hourly OD-matrices by zone + buildings with attributes

How to generate the trip production / attraction figures?

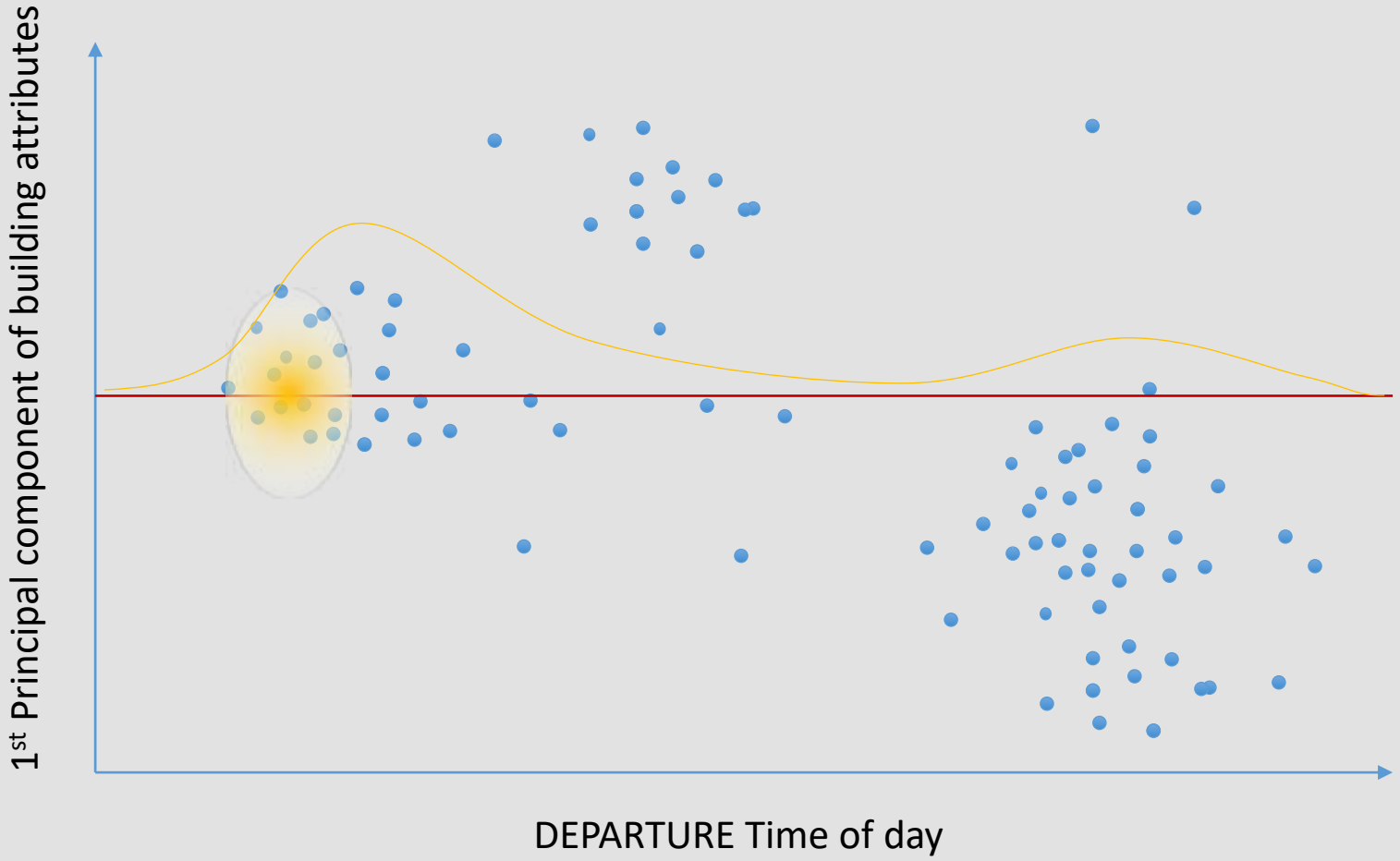
Approach 2: with Telco data



Observations of e.g. departures are in n-dimensional space of building attributes, here we collapse it to a single principal component for ease of explanations.

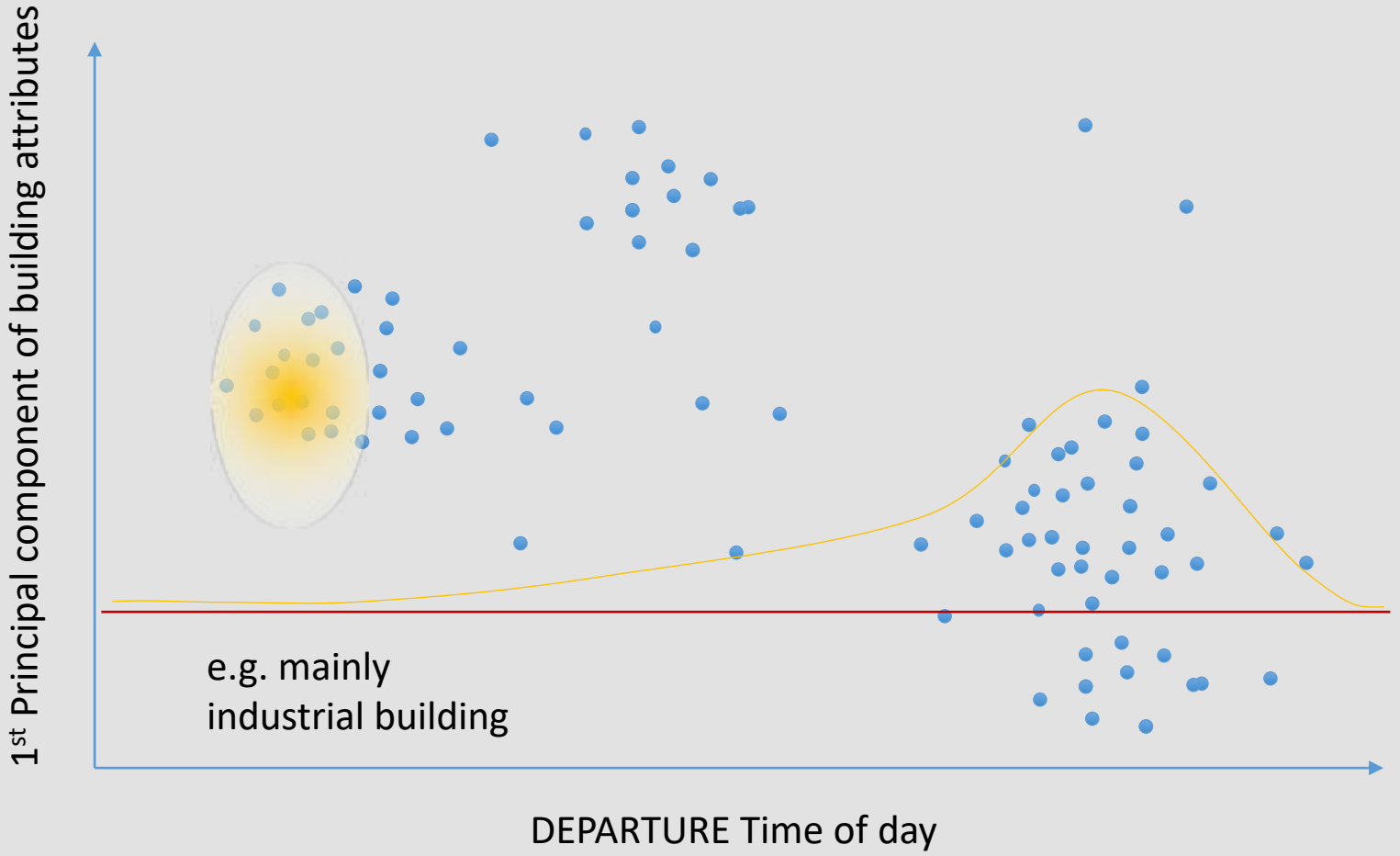
A building (new/existing) with any given set of attributes (res. sqm, commercial, network centrality, agglomeration of other uses around it, etc) can be located on the y-axis.

How to generate the trip production / attraction figures?
Approach 2: with Telco data



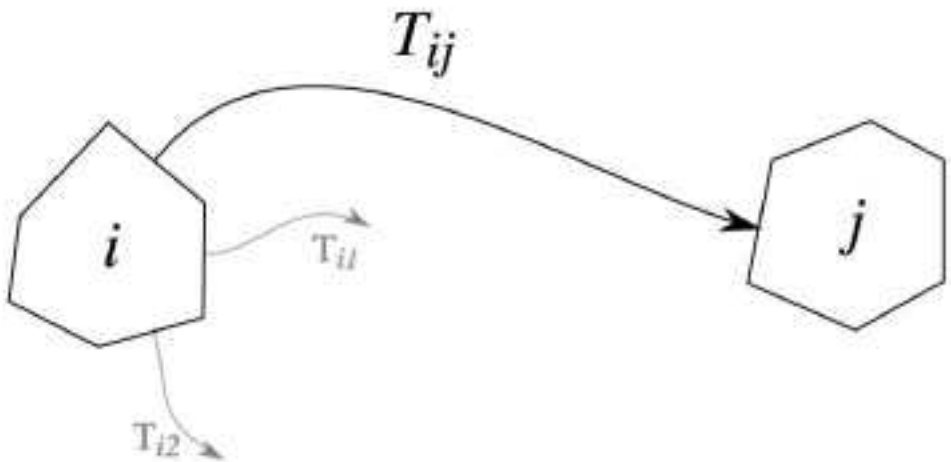
For the correct set of Gaussian kernel parameters, determining the weight of observations, we can produce a continuous prediction of trip productions, moving along the red line

How to generate the trip production / attraction figures?
Approach 2: with Telco data



Finding the right set of parameters can be a challenge, and the parameters can vary along both axes.

FOUR STEP MODELING – STEP 2



2. Flow distribution

A fraction of trips are assigned to the traffic flow T_{ij} from origin TAZ i to destination TAZ j.
The trip volume is usually determined by a so-called gravity model: the closer the origin-destination (O-D) pair, the greater the traffic flow between them.

FOUR STEP MODELING – STEP 2

$$T_{ij} = K_i K_j T_i T_j f(C_{ij})$$

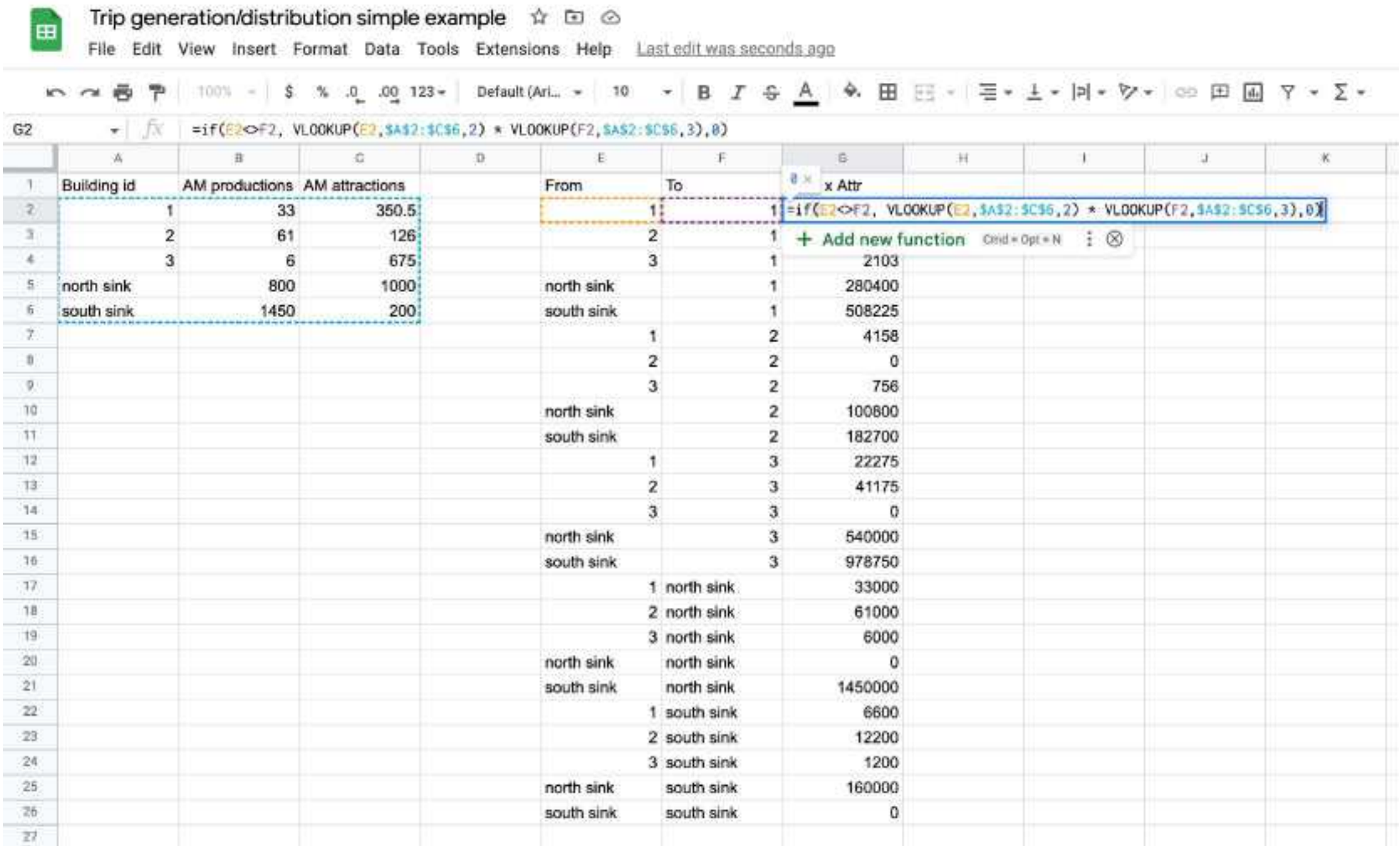
$$\sum_j T_{ij} = T_i, \sum_i T_{ij} = T_j$$

$$K_i = \frac{1}{\sum_j K_j T_j f(C_{ij})}, K_j = \frac{1}{\sum_i K_i T_i f(C_{ij})}$$

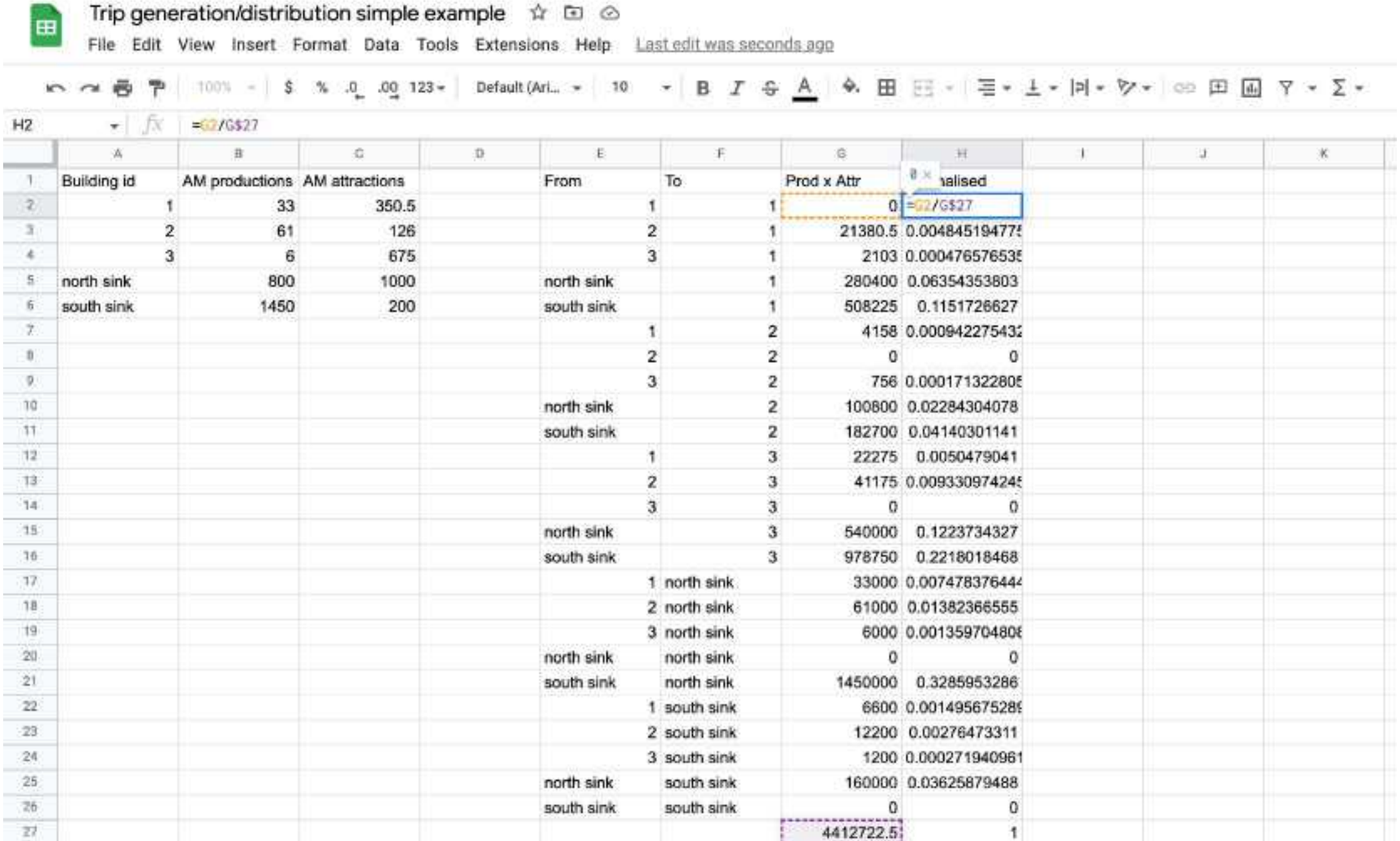
where

- T_{ij} = Trips between origin *i* and destination *j*
- T_i = Trips originating at *i*
- T_j = Trips destined for *j*
- C_{ij} = travel cost between *i* and *j*
- K_i, K_j = balancing factors solved iteratively. See Iterative proportional fitting.
- f = distance decay factor, as in the accessibility model

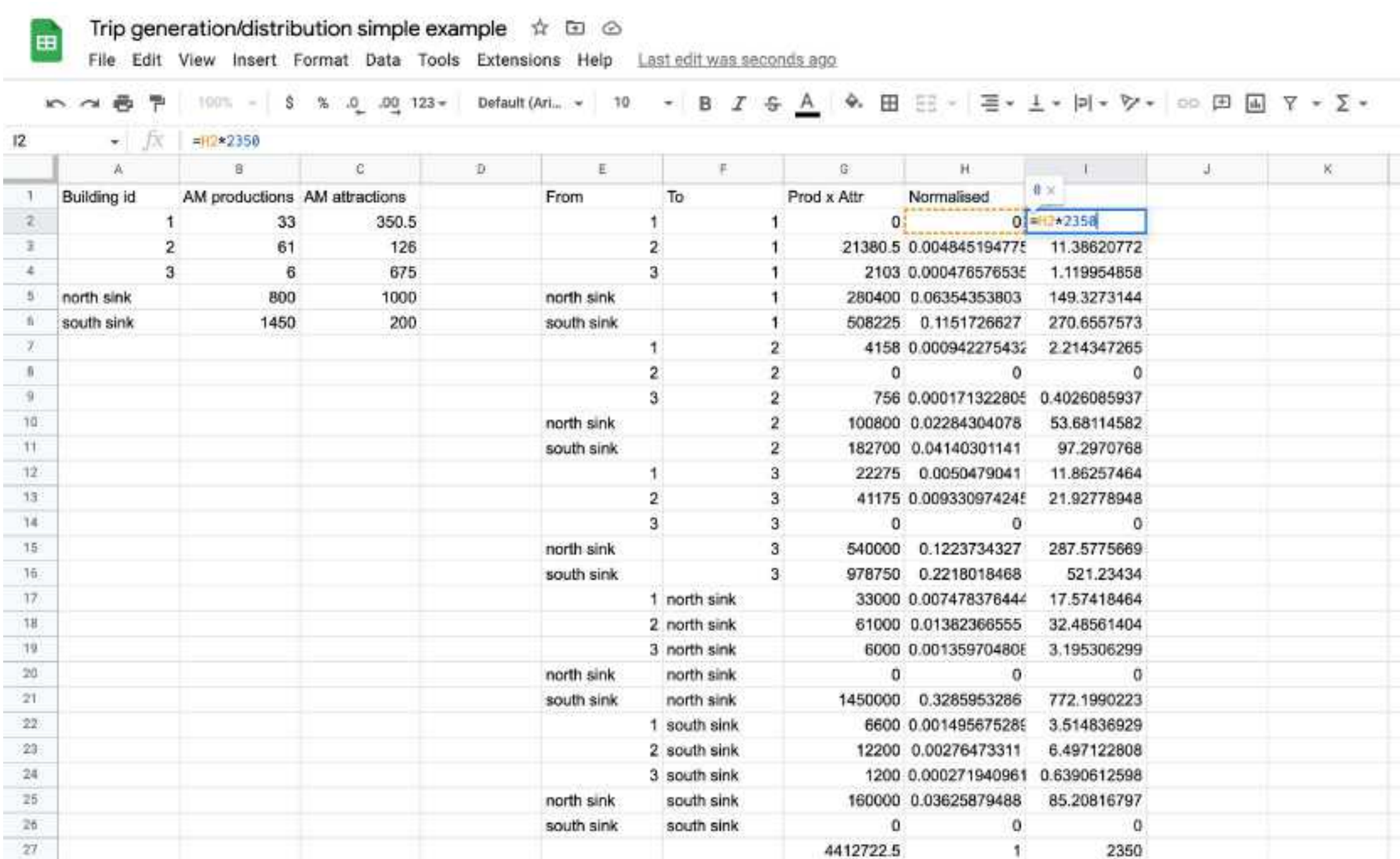
Source: Wikipedia – Trip distribution



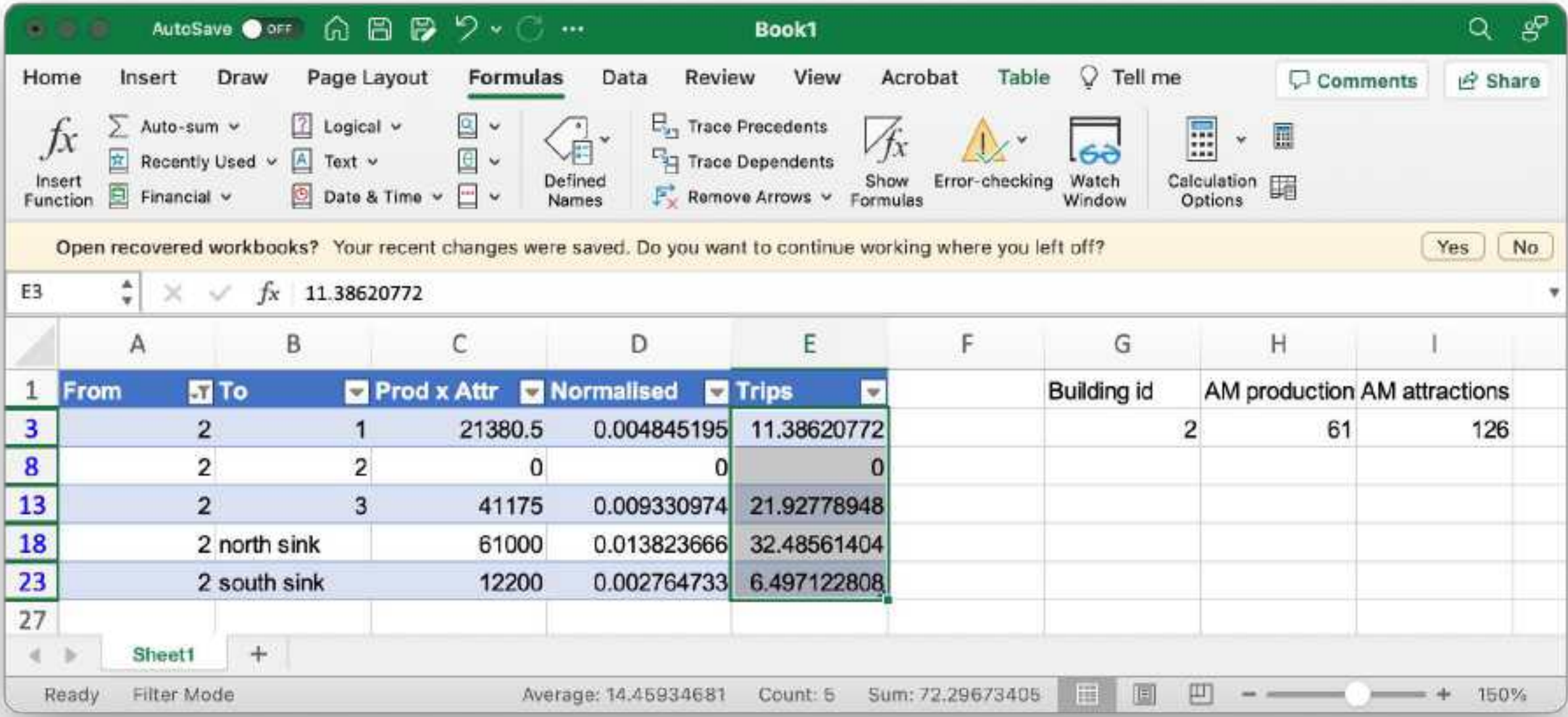
	A	B	C	D	E	F	G	H	I	J	K
1	Building id	AM productions	AM attractions		From	To	x Attr				
2	1	33	350.5		1	1	=if(E2<>F2, VLOOKUP(E2,$A$2:$C$6,2) * VLOOKUP(F2,$A$2:$C$6,3),0)				
3	2	61	126		2	1					
4	3	6	675		3	1	2103				
5	north sink	800	1000		north sink	1	280400				
6	south sink	1450	200		south sink	1	508225				
7					1	2	4158				
8					2	2	0				
9					3	2	756				
10					north sink	2	100800				
11					south sink	2	182700				
12					1	3	22275				
13					2	3	41175				
14					3	3	0				
15					north sink	3	540000				
16					south sink	3	978750				
17					1	north sink	33000				
18					2	north sink	61000				
19					3	north sink	6000				
20					north sink	north sink	0				
21					south sink	north sink	1450000				
22					1	south sink	6600				
23					2	south sink	12200				
24					3	south sink	1200				
25					north sink	south sink	160000				
26					south sink	south sink	0				
27											



	A	B	C	D	E	F	G	H	I	J	K
1	Building id	AM productions	AM attractions		From	To	Prod x Attr	alised			
2	1	33	350.5		1	1	0	=G2/G$27			
3	2	61	126		2	1	21380.5	0.00484519477			
4	3	6	675		3	1	2103	0.00047657653			
5	north sink	800	1000		north sink	1	280400	0.06354353803			
6	south sink	1450	200		south sink	1	508225	0.1151726627			
7					1	2	4158	0.000942275432			
8					2	2	0	0			
9					3	2	756	0.000171322805			
10					north sink	2	100800	0.02284304078			
11					south sink	2	182700	0.04140301141			
12					1	3	22275	0.0050479041			
13					2	3	41175	0.009330974245			
14					3	3	0	0			
15					north sink	3	540000	0.1223734327			
16					south sink	3	978750	0.2218018468			
17					1	north sink	33000	0.007478376444			
18					2	north sink	61000	0.01382366555			
19					3	north sink	6000	0.001359704808			
20					north sink	north sink	0	0			
21					south sink	north sink	1450000	0.3285953286			
22					1	south sink	6600	0.001495675285			
23					2	south sink	12200	0.00276473311			
24					3	south sink	1200	0.000271940961			
25					north sink	south sink	160000	0.03625879488			
26					south sink	south sink	0	0			
27							4412722.5	1			



	A	B	C	D	E	F	G	H	I	J	K
1	Building id	AM productions	AM attractions		From	To	Prod x Attr	Normalised			
2	1	33	350.5		1	1	0	0	=H2*2350		
3	2	61	126		2	1	21380.5	0.004845194775	11.38620772		
4	3	6	675		3	1	2103	0.000476576535	1.119954858		
5	north sink	800	1000		north sink	1	280400	0.06354353803	149.3273144		
6	south sink	1450	200		south sink	1	508225	0.1151726627	270.6557573		
7					1	2	4158	0.000942275432	2.214347265		
8					2	2	0	0	0		
9					3	2	756	0.000171322805	0.4026085937		
10					north sink	2	100800	0.02284304078	53.68114582		
11					south sink	2	182700	0.04140301141	97.2970768		
12					1	3	22275	0.0050479041	11.86257464		
13					2	3	41175	0.009330974245	21.92778948		
14					3	3	0	0	0		
15					north sink	3	540000	0.1223734327	287.5775669		
16					south sink	3	978750	0.2218018468	521.23434		
17					1	north sink	33000	0.007478376444	17.57418464		
18					2	north sink	61000	0.01382366555	32.48561404		
19					3	north sink	6000	0.001359704808	3.195306299		
20					north sink	north sink	0	0	0		
21					south sink	north sink	1450000	0.3285953286	772.1990223		
22					1	south sink	6600	0.001495675285	3.514836929		
23					2	south sink	12200	0.00276473311	6.497122808		
24					3	south sink	1200	0.000271940961	0.6390612598		
25					north sink	south sink	160000	0.03625879488	85.20816797		
26					south sink	south sink	0	0	0		
27							4412722.5	1	2350		



	A	B	C	D	E	F	G	H	I
1	From	To	Prod x Attr	Normalised	Trips		Building id	AM production	AM attractions
3	2	1	21380.5	0.004845195	11.38620772		2	61	126
8	2	2	0	0	0				
13	2	3	41175	0.009330974	21.92778948				
18	2	north sink	61000	0.013823666	32.48561404				
23	2	south sink	12200	0.002764733	6.497122808				
27									

FOUR STEP MODELING – STEP 3

3. Modal split

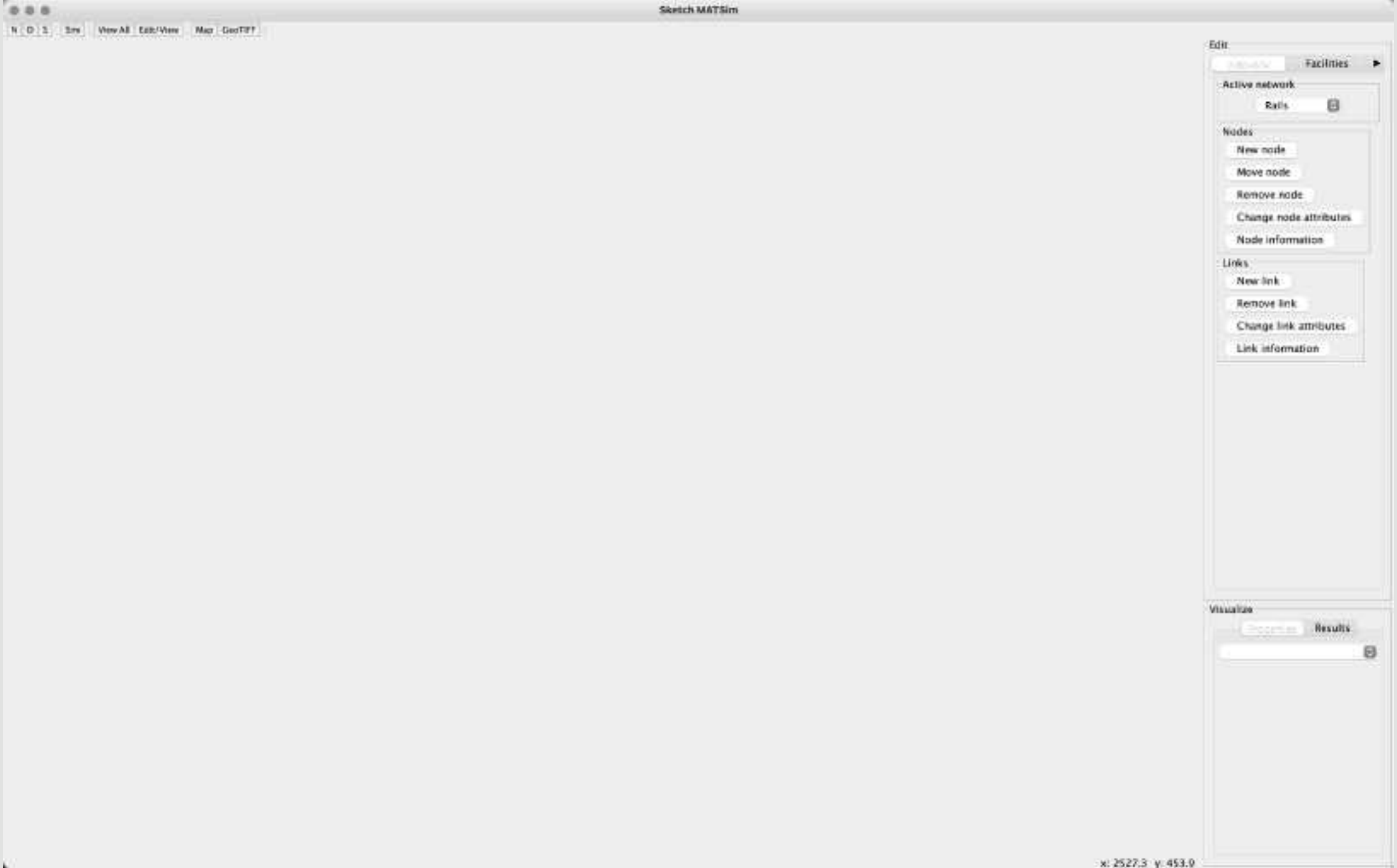
The traffic flow is split into separate flows for each mode in operation between the O-D pair. The fraction assigned to each mode depends on census information such as income and car ownership. In this case, traffic flow T_{ij} is split into flow T_{ijCAR} for private vehicle traffic and $T_{ijTRAIN}$ for rail traffic.

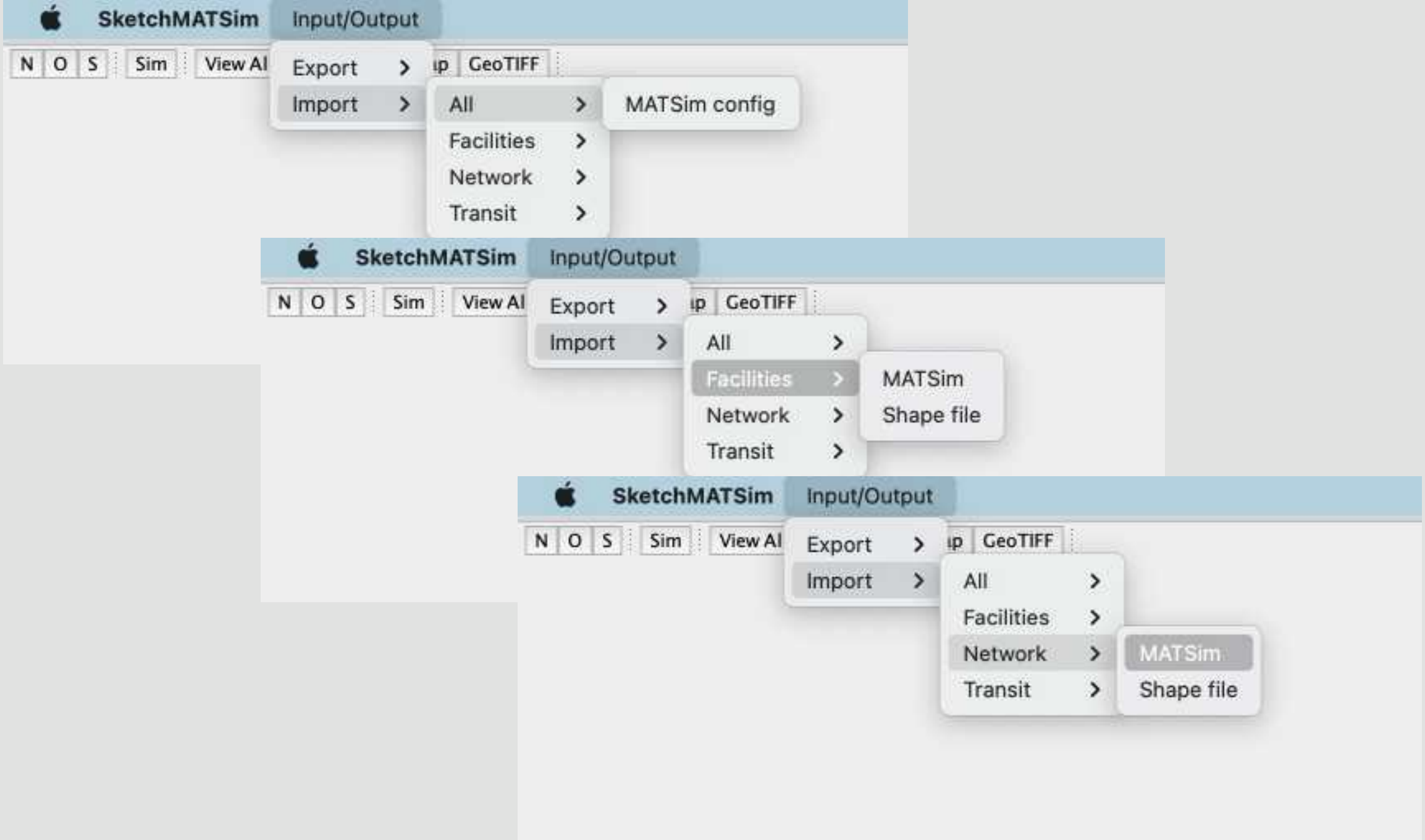
FOUR STEP MODELING – STEP 4

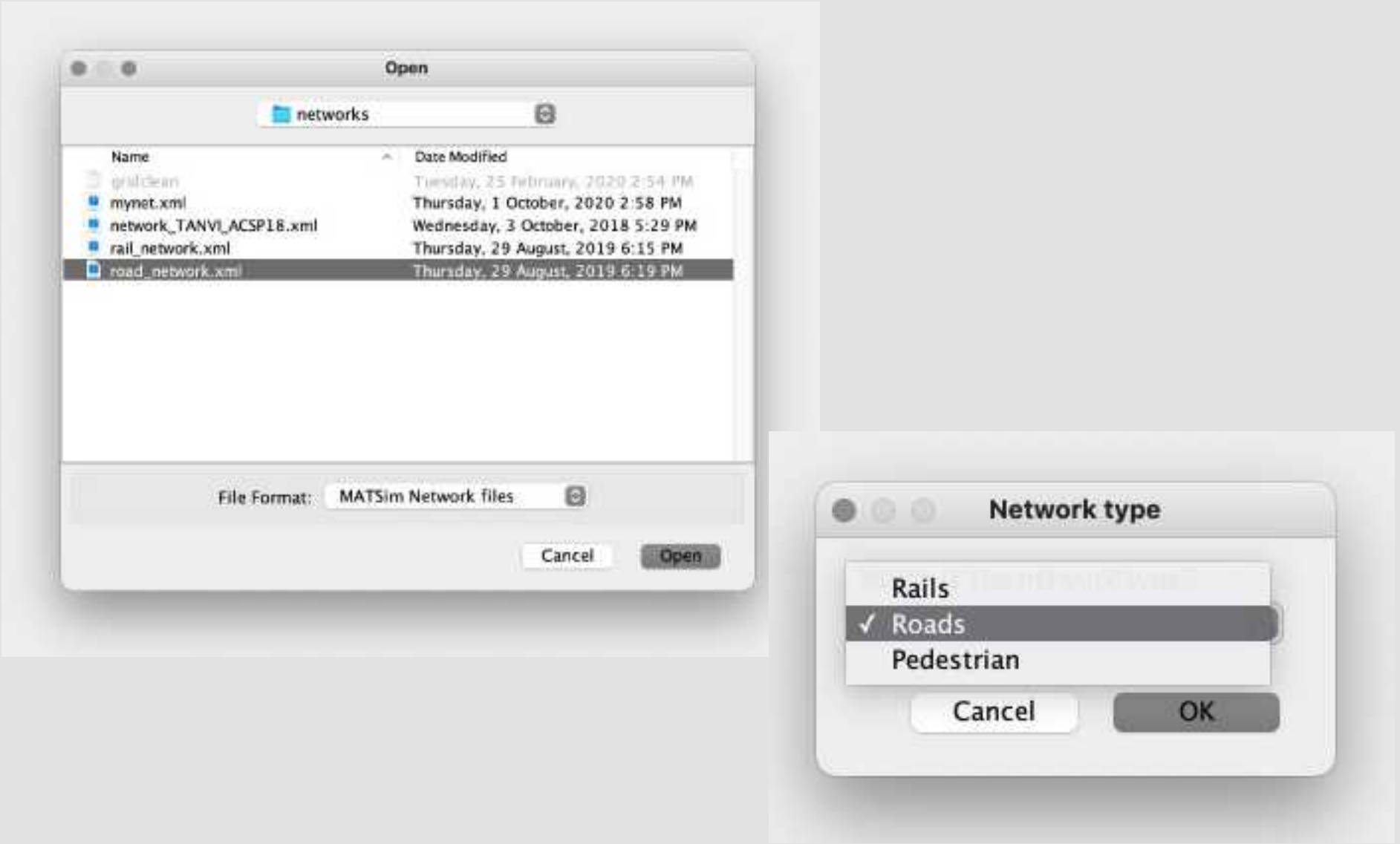
SOLVED by MATSim

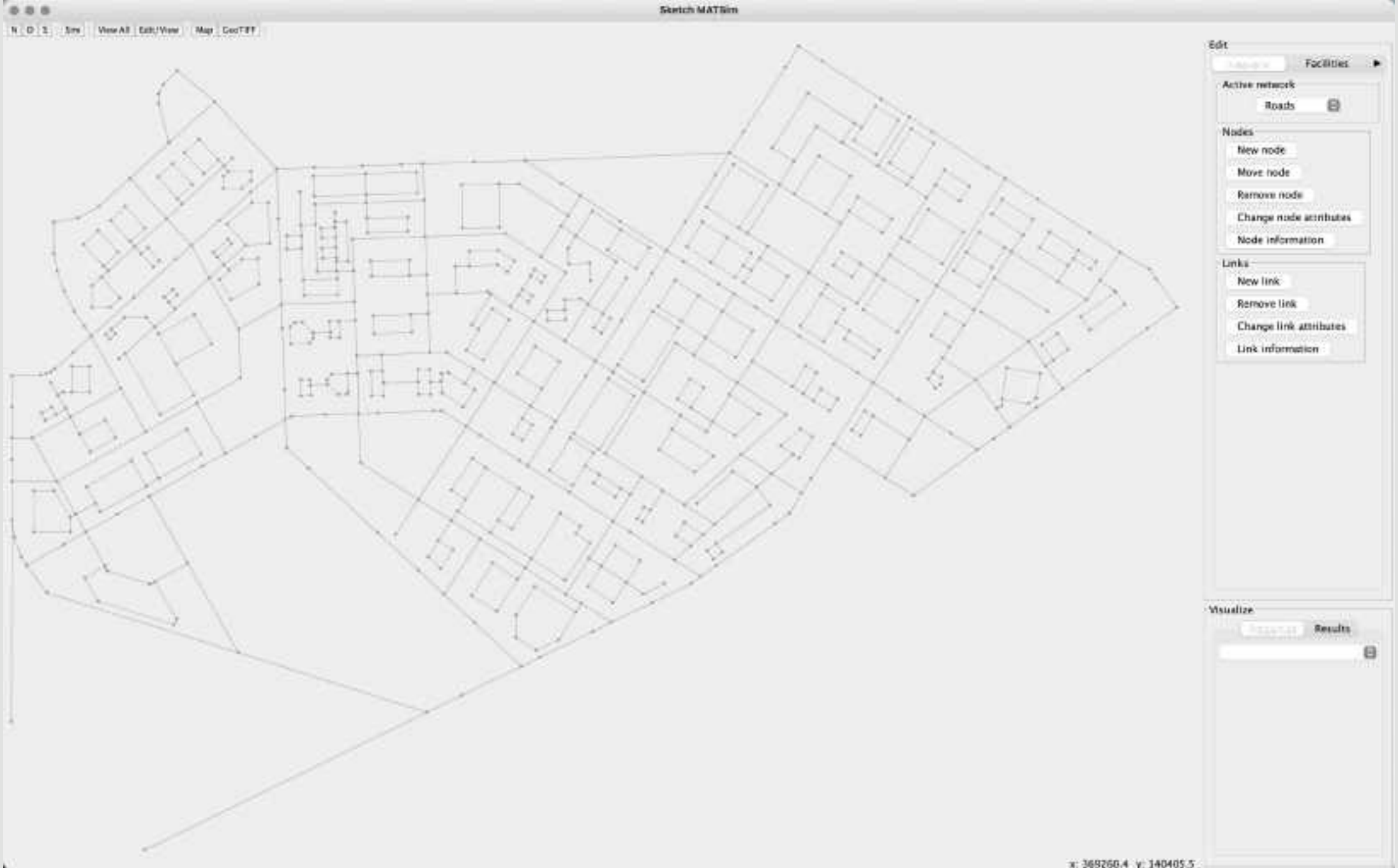
4. Network assignment

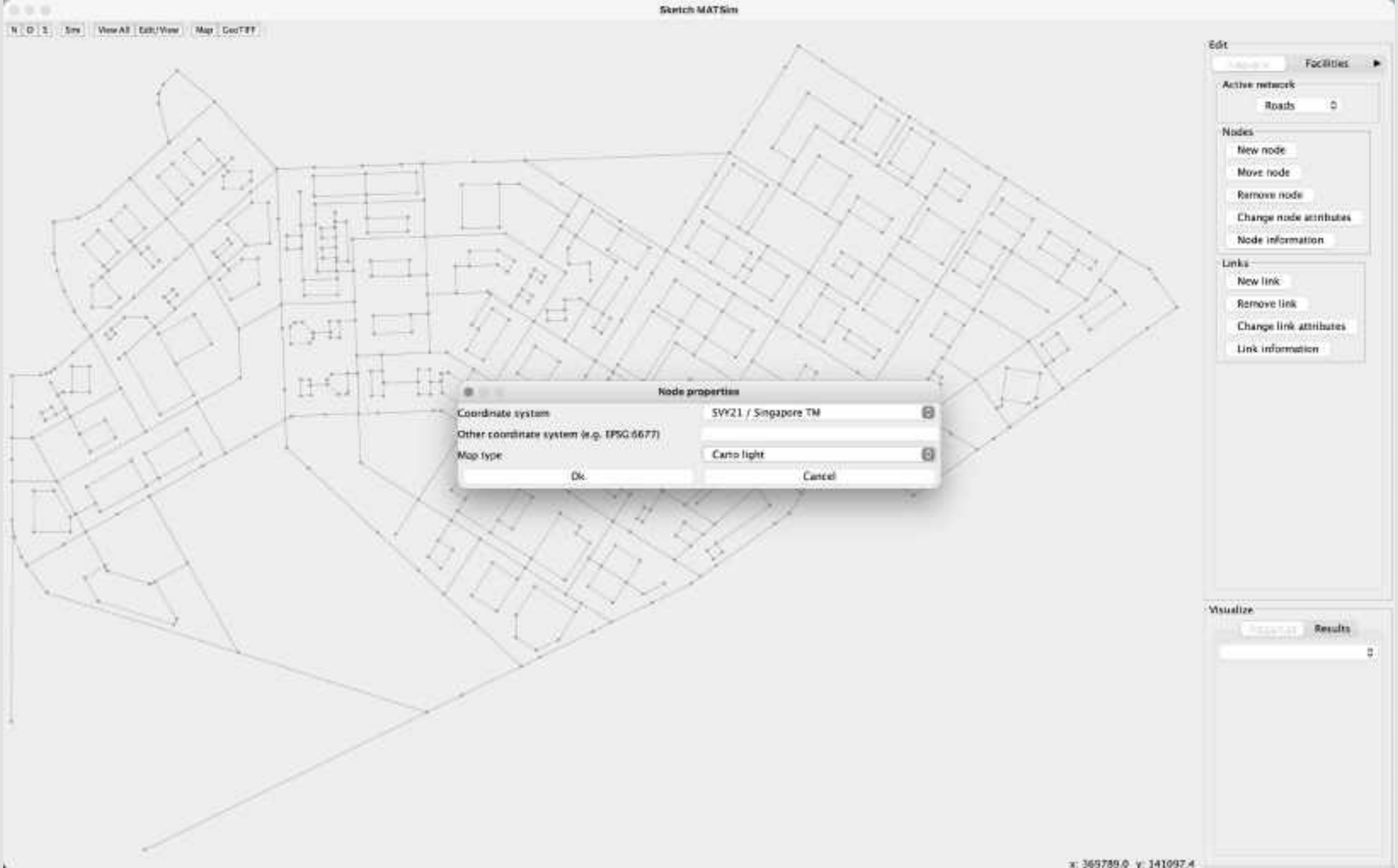
Each modal traffic flow is assigned to a route through the network. This frame illustrates the route for flow T_{ijCAR} through the network for private vehicle traffic. In an iterative process, the flows are re-routed to satisfy capacity constraints and to 'balance' the network, until further re-routing can no longer improve the expected travel time of any trip.

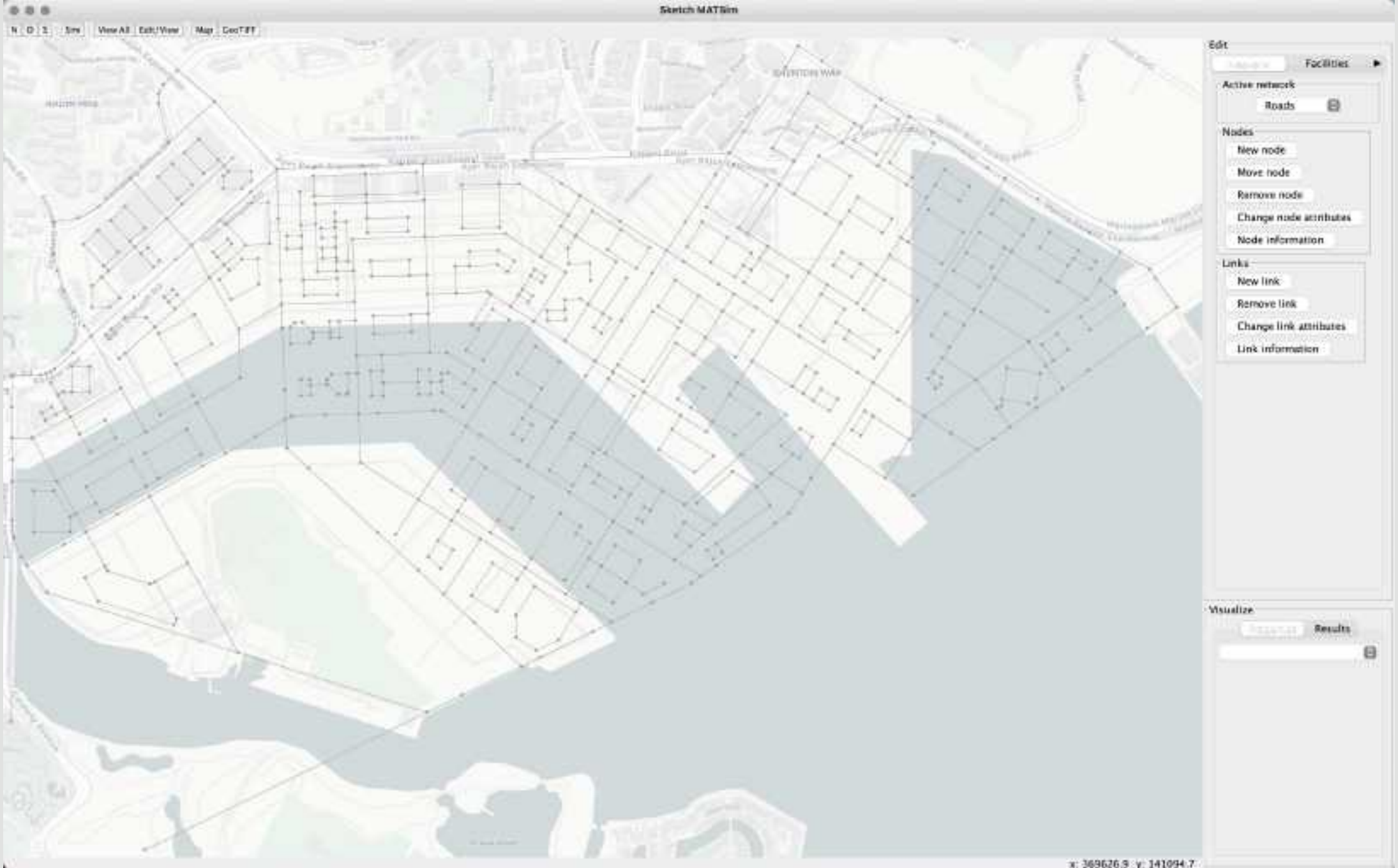

Sketch MATSim
N
O
S
Sim
View All
Edit/View
Map
GeoTIFF
Edit
Facilities
Active network
Rails
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Visualize
Results
x: 2527.3 y: 453.9


SketchMATSim
Input/Output
N
O
S
Sim
View Al
Export
Import
ip
GeoTIFF
All
Facilities
Network
Transit
MATSim config
SketchMATSim
Input/Output
N
O
S
Sim
View Al
Export
Import
ip
GeoTIFF
All
Facilities
Network
Transit
MATSim
Shape file
SketchMATSim
Input/Output
N
O
S
Sim
View Al
Export
Import
ip
GeoTIFF
All
Facilities
Network
Transit
MATSim
Shape file

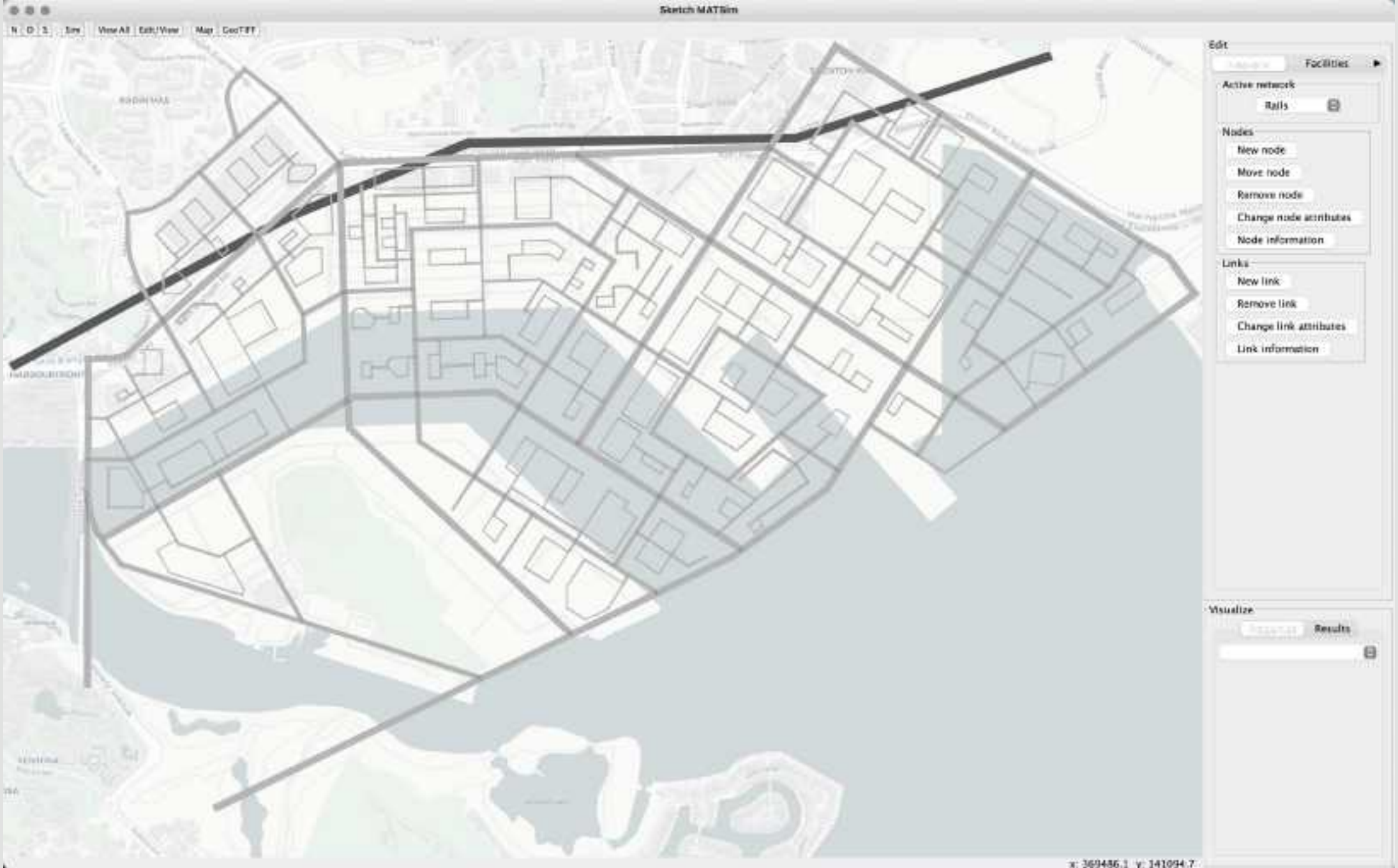

Open
networks
Name
Date Modified
gridClean
Tuesday, 25 February, 2020 2:54 PM
mynet.xml
Thursday, 1 October, 2020 2:58 PM
network_TANVI_ACSP18.xml
Wednesday, 3 October, 2018 5:29 PM
rail_network.xml
Thursday, 29 August, 2019 6:15 PM
road_network.xml
Thursday, 29 August, 2019 6:19 PM
File Format:
MATSim Network files
Cancel
Open
Network type
Rails
✓ Roads
Pedestrian
Cancel
OK


Sketch MATSim
N
D
S
Sim
View All
Edit/View
Map
GeoTIFF
Edit
Facilities
Active network
Roads
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Visualize
Results
x: 369260.4 y: 140405.5

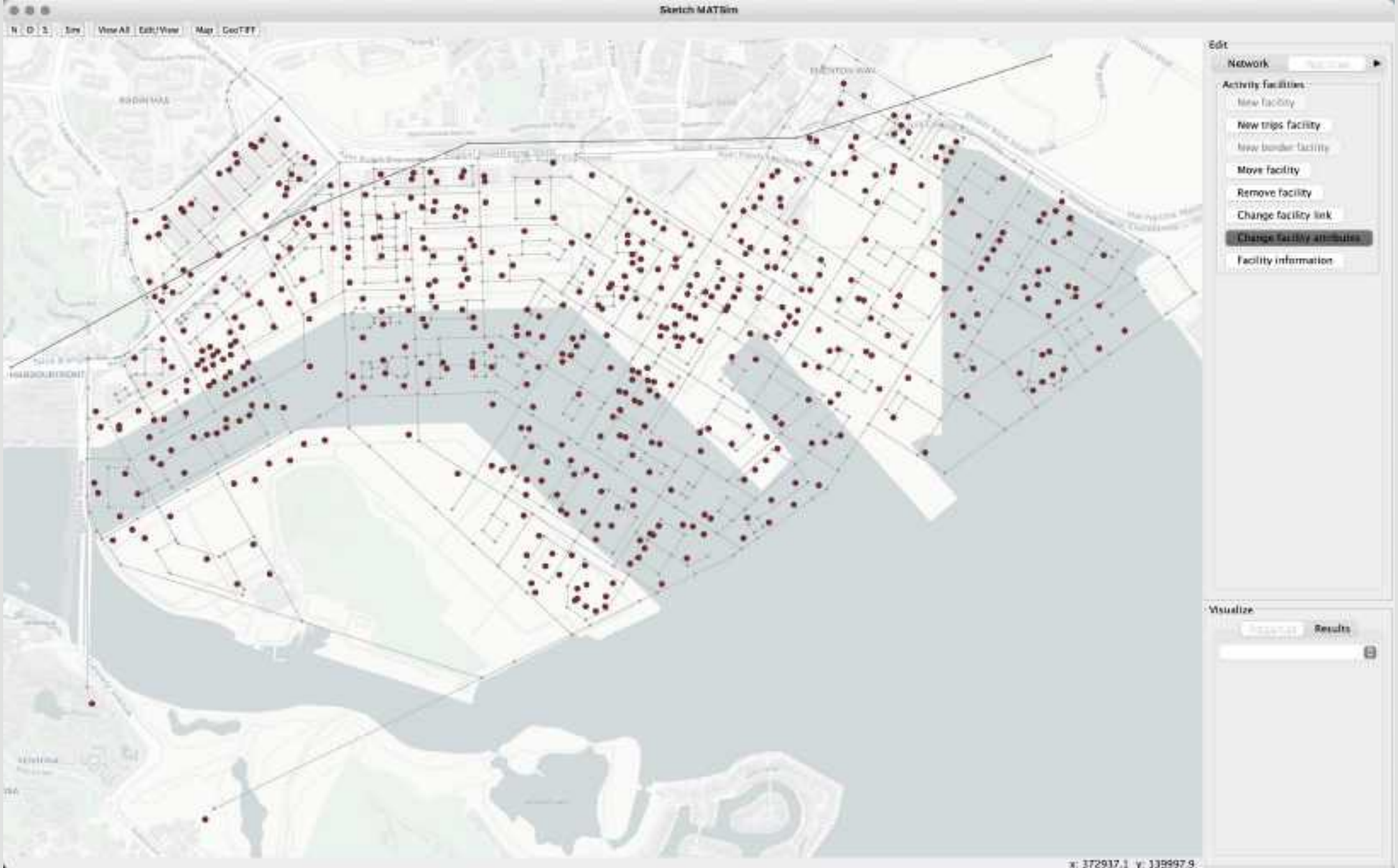

Sketch MATSim
N
D
S
Sim
View All
Edit/View
Map
GeoTIFF
Edit
Facilities
Active network
Roads
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Node properties
Coordinate system
SVY21 / Singapore TM
Other coordinate system (e.g. EPSG:6677)
Map type
Carto light
Ok
Cancel
Visualize
Results
x: 369789.0 y: 141097.4

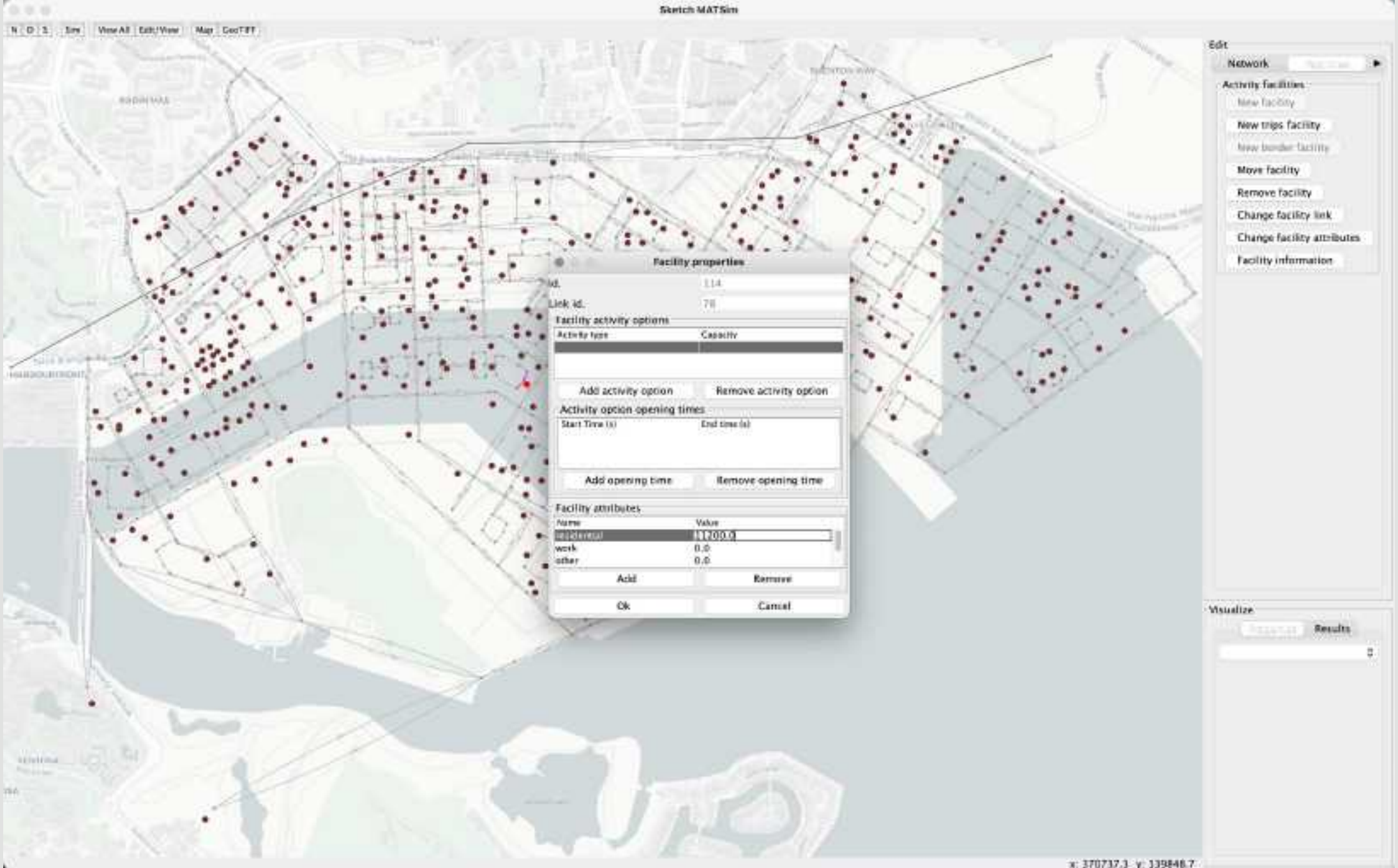

Sketch MATSim
N
O
S
Sim
View All
Edit/View
Map
GeoTIFF
Edit
Facilities
Active network
Roads
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Visualize
Results
x: 369626.9 y: 141094.7


Sketch MATSim
Edit
Facilities
Active network
Roads
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Visualize
Results

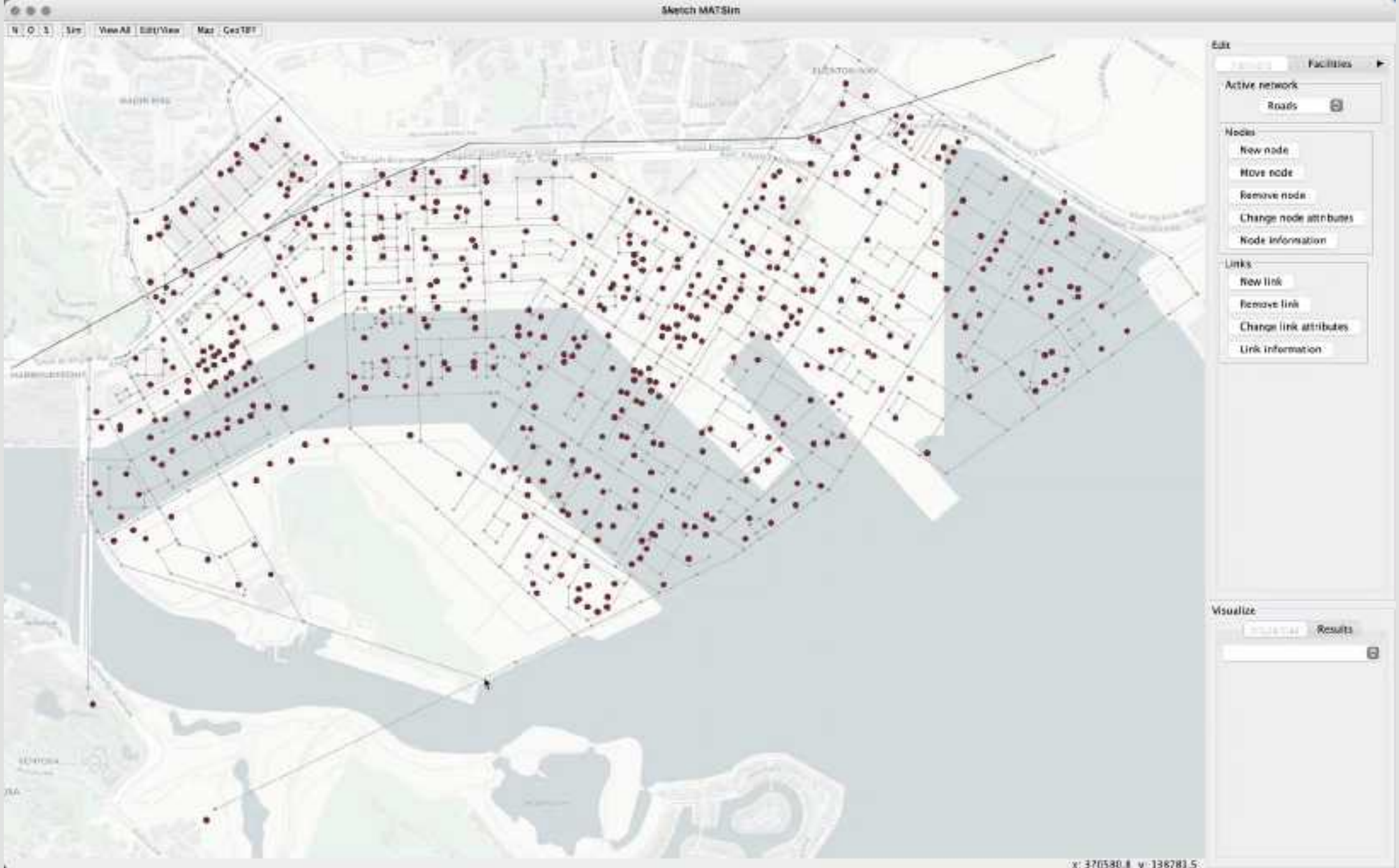

Sketch MATSim
N
O
S
Sim
View All
Edit/View
Map
GeoTIFF
Edit
Facilities
Active network
Rails
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Visualize
Results
x: 369486.1 y: 141094.7

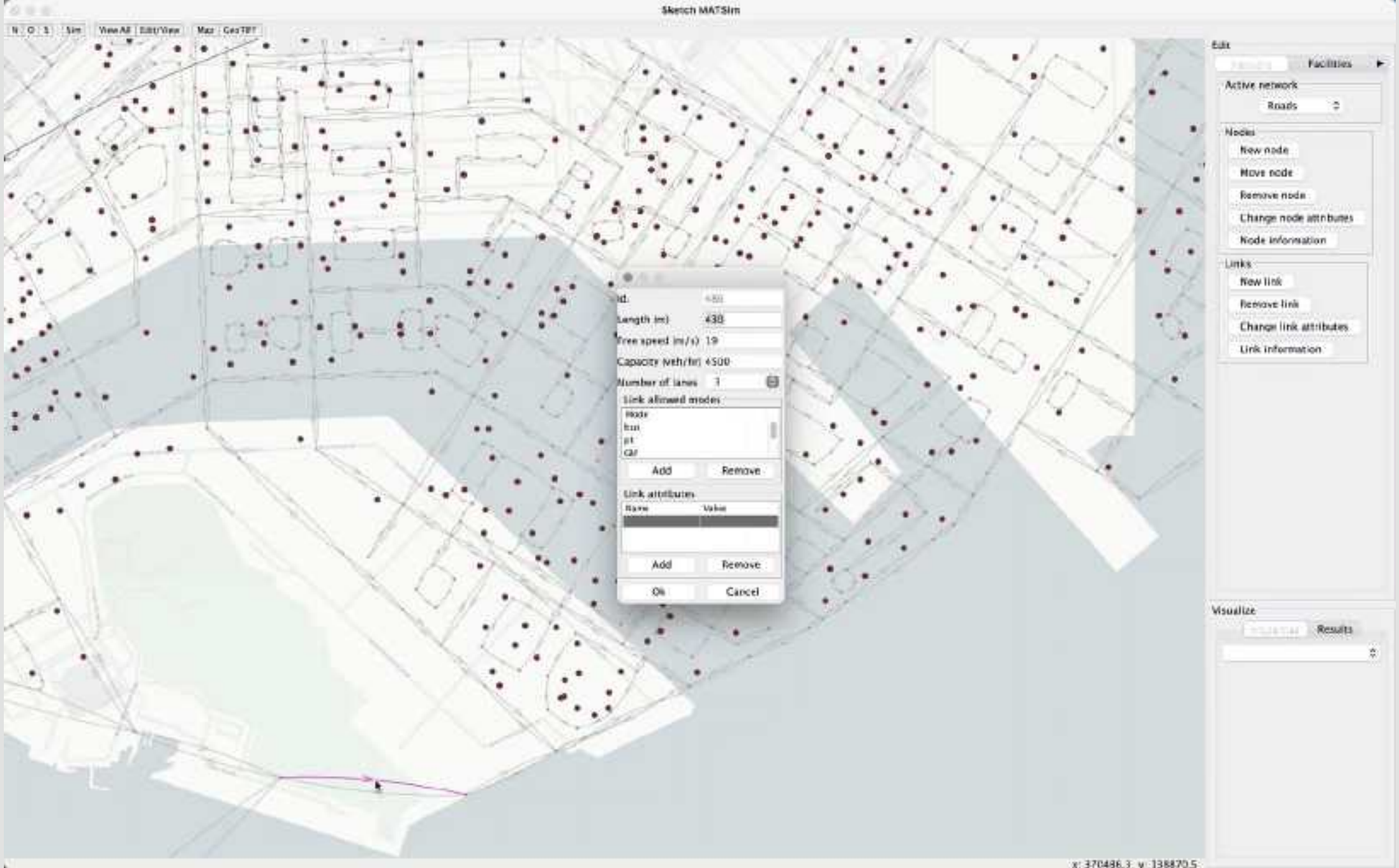

Sketch MATSim
N
O
S
1m
View All
Edit/View
Map
GeoTIFF
Edit
Facilities
Active network
Rails
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Visualize
Results
x: 369364.8 y: 141096.0

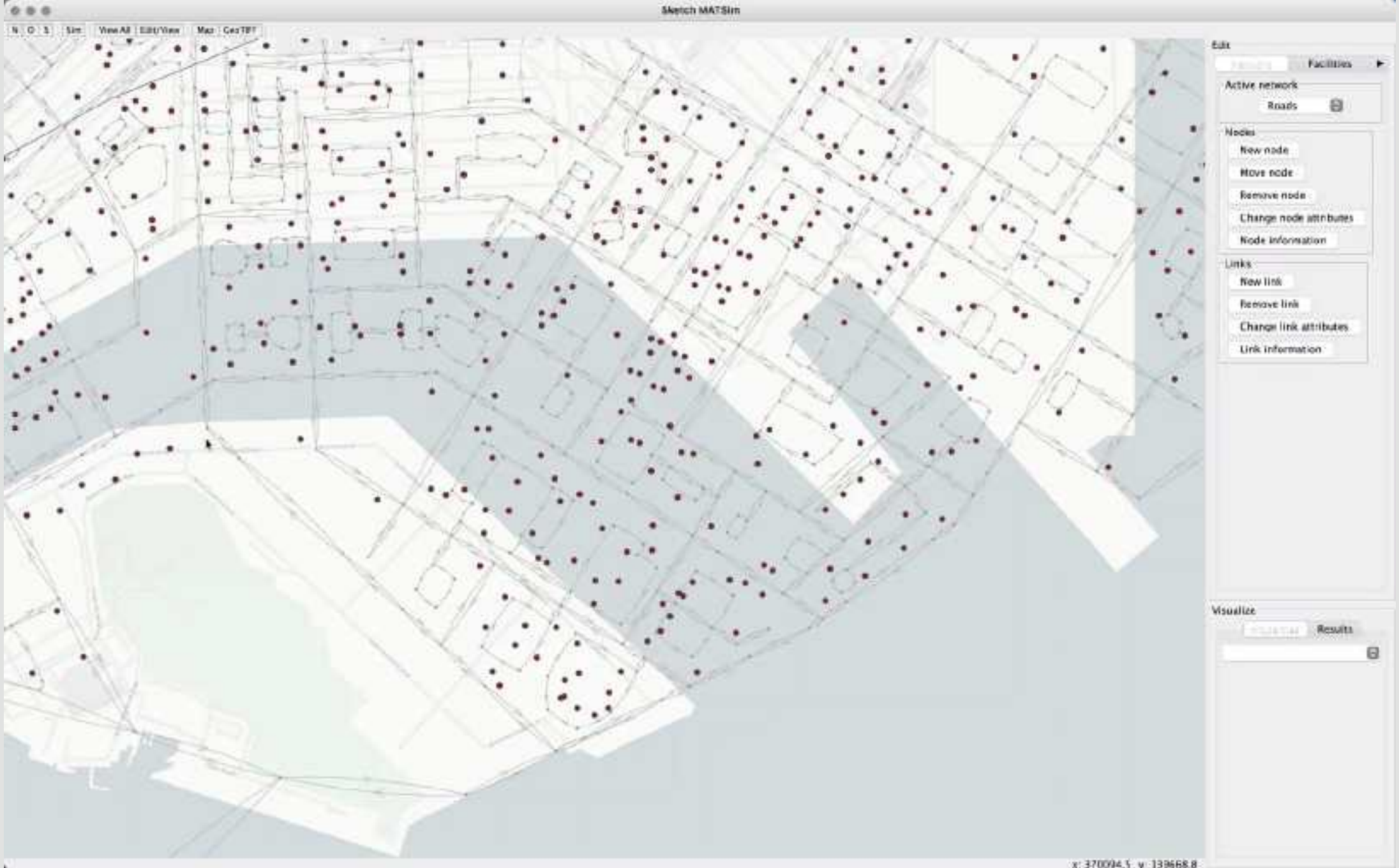

Sketch MATSim
N
O
S
Env
View All
Edit/View
Map
GeoTIFF
Edit
Network
Activity facilities
New facility
New trips facility
New border facility
Move facility
Remove facility
Change facility link
Change facility attributes
Facility information
Visualize
Results
x: 372917.1 y: 139997.9

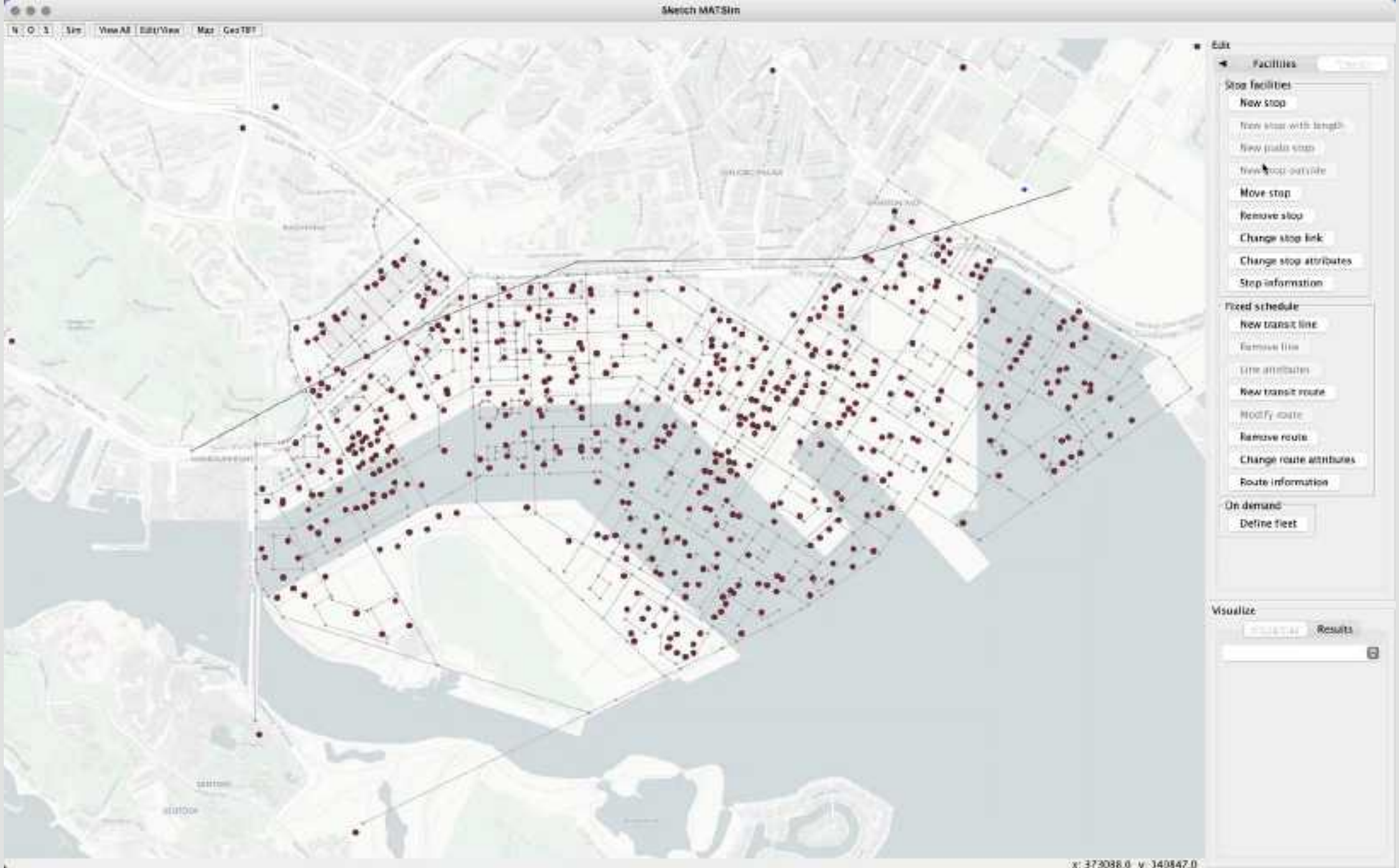

Sketch MATSim
Edit
Network
Activity facilities
New facility
New trips facility
New border facility
Move facility
Remove facility
Change facility link
Change facility attributes
Facility information
Facility properties
Id.
Link id.
Facility activity options
Activity type
Capacity
Add activity option
Remove activity option
Activity option opening times
Start Time (s)
End time (s)
Add opening time
Remove opening time
Facility attributes
Name
Value
work
0.0
other
0.0
Add
Remove
Ok
Cancel
Visualize
Results

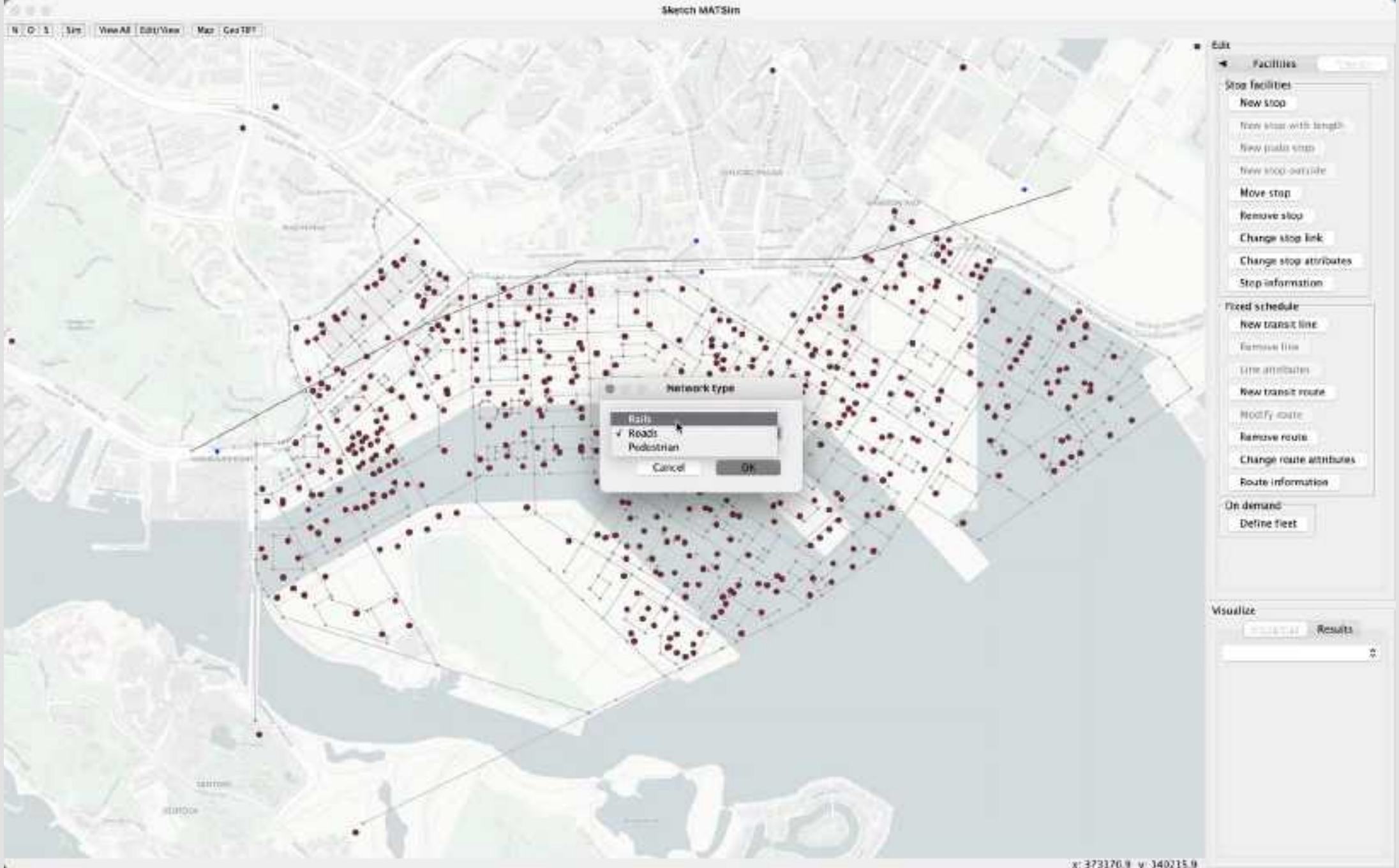

Sketch MATSim
Edit
Network
Activity facilities
New facility
New trips facility
New border facility
Move facility
Remove facility
Change facility link
Change facility attributes
Facility information
Visualize
Results

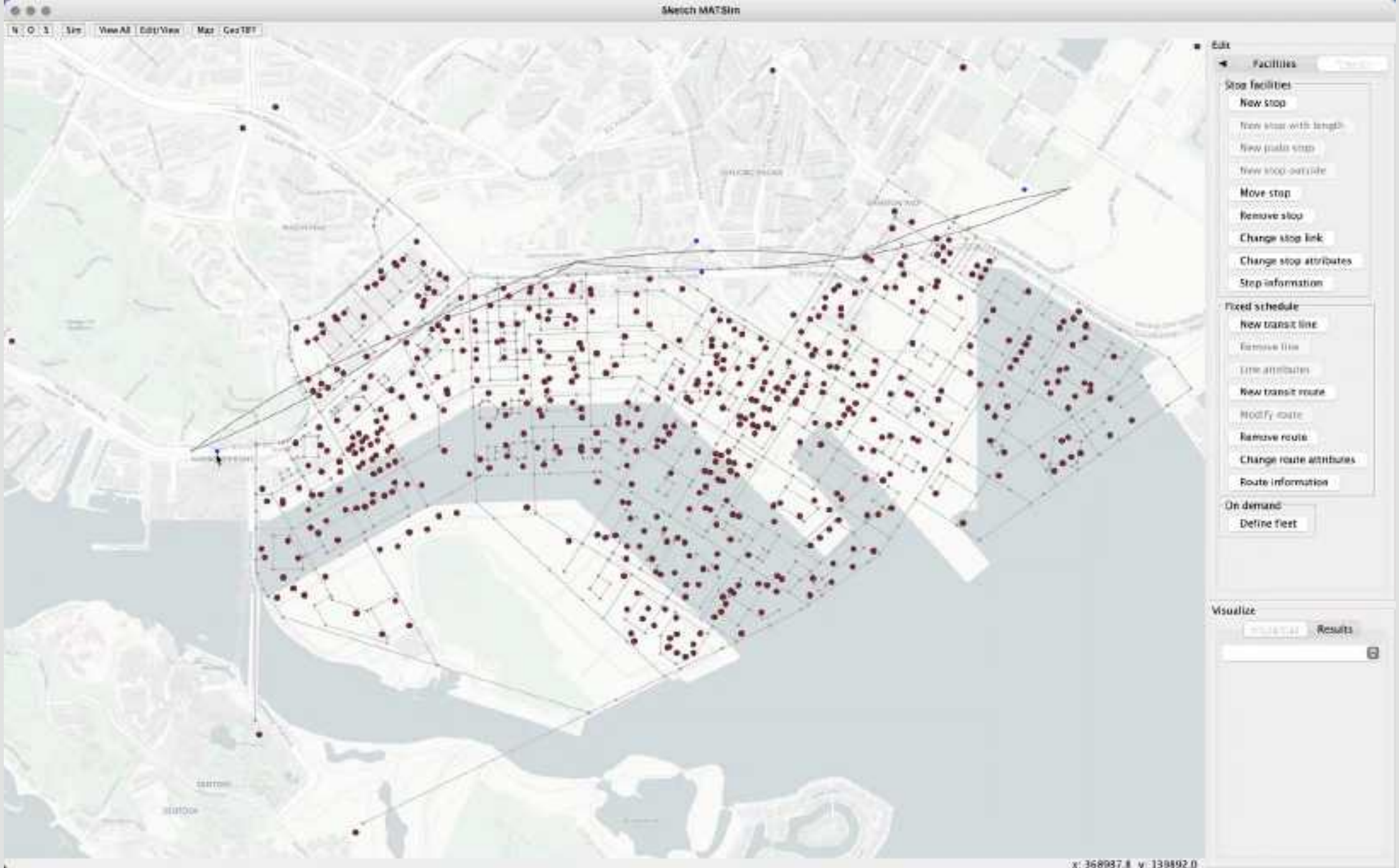

Sketch MATSim
Edit
Facilities
Active network
Roads
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Visualize
Results

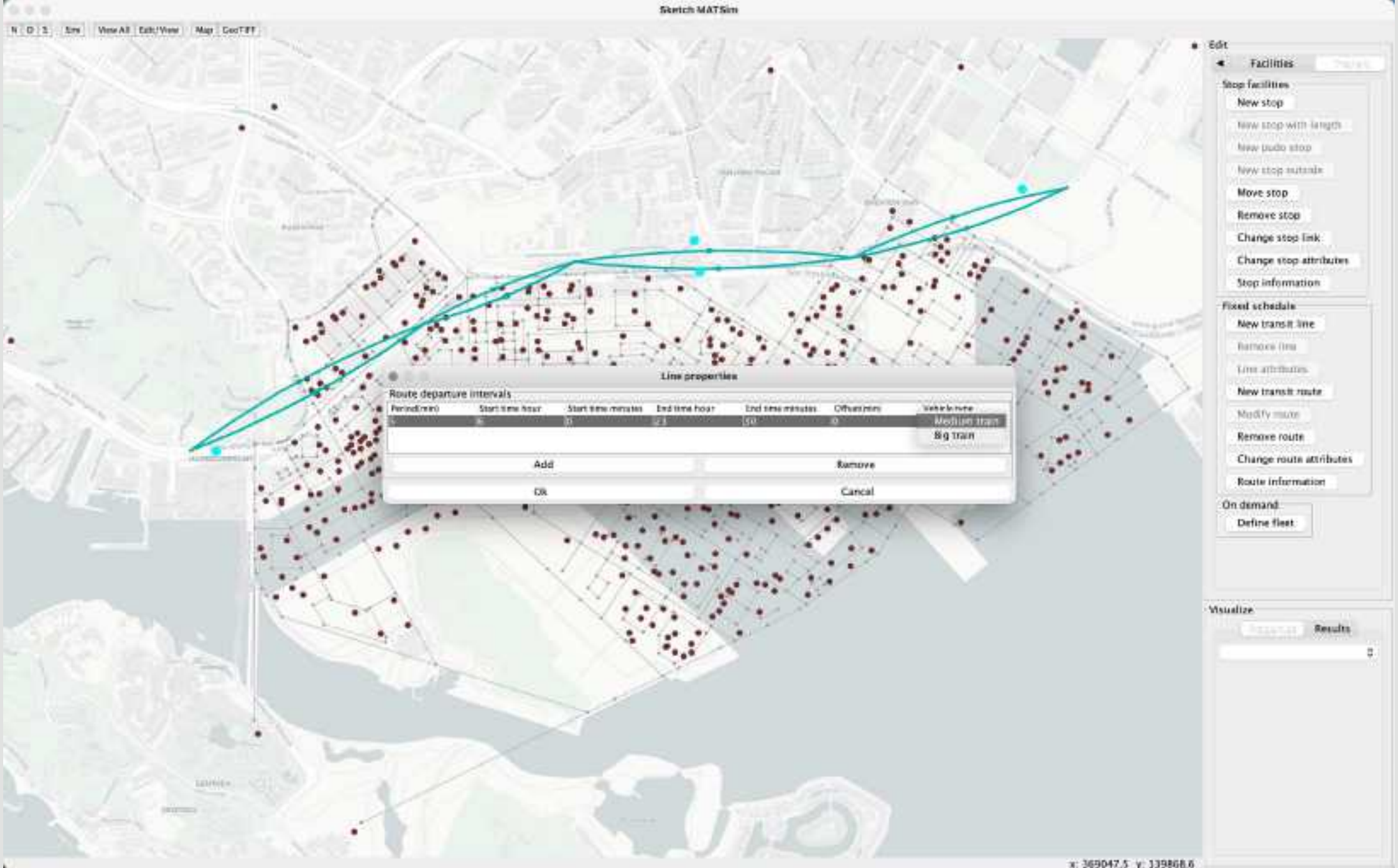

Sketch MATSim
N
O
S
Sim
View All
Edit/View
Map
GeoTIFF
Edit
Facilities
Active network
Roads
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Id.
Length (m) 438
Free speed (m/s) 19
Capacity (veh/hr) 4500
Number of lanes 1
Link allowed modes
Add
Remove
Link attributes
Name
Value
Add
Remove
Ok
Cancel
Visualize
Results

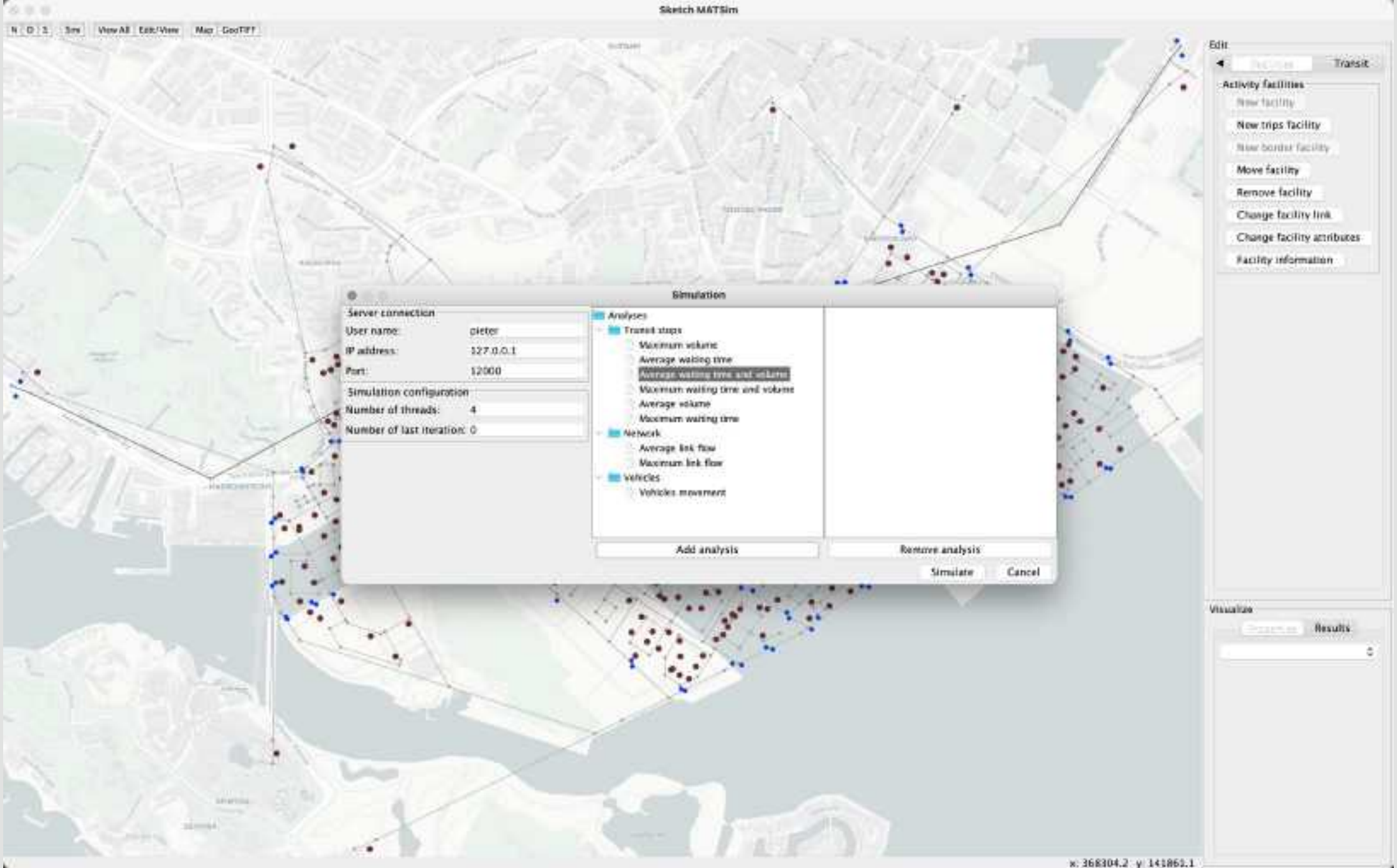

Sketch MATSim
Edit
Facilities
Active network
Roads
Nodes
New node
Move node
Remove node
Change node attributes
Node information
Links
New link
Remove link
Change link attributes
Link information
Visualize
Results

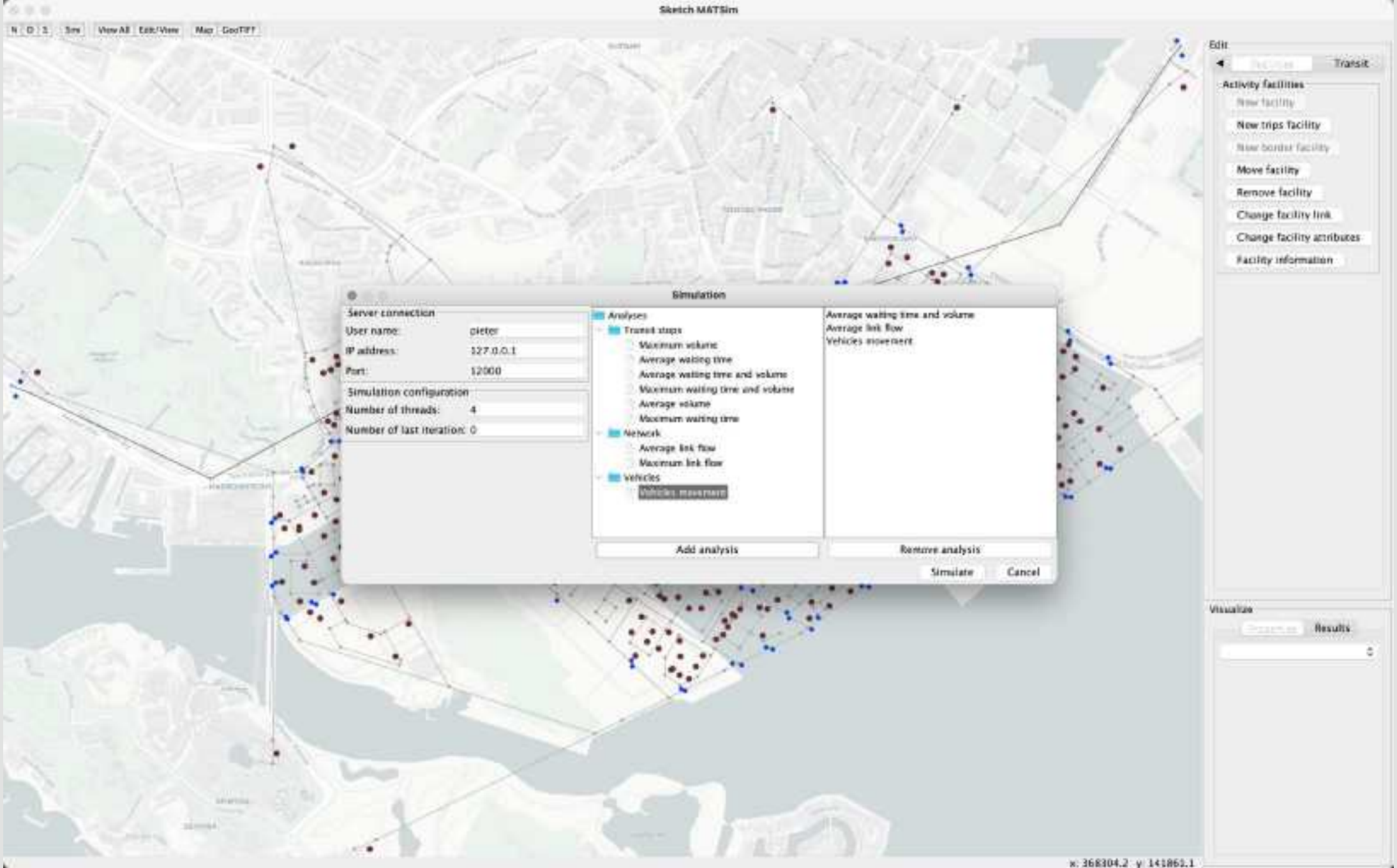

Sketch MATSim
Edit
Facilities
Stop facilities
New stop
Move stop
Remove stop
Change stop link
Change stop attributes
Stop information
Fixed schedule
New transit line
New transit route
Remove route
Change route attributes
Route information
On demand
Define fleet
Visualize
Results

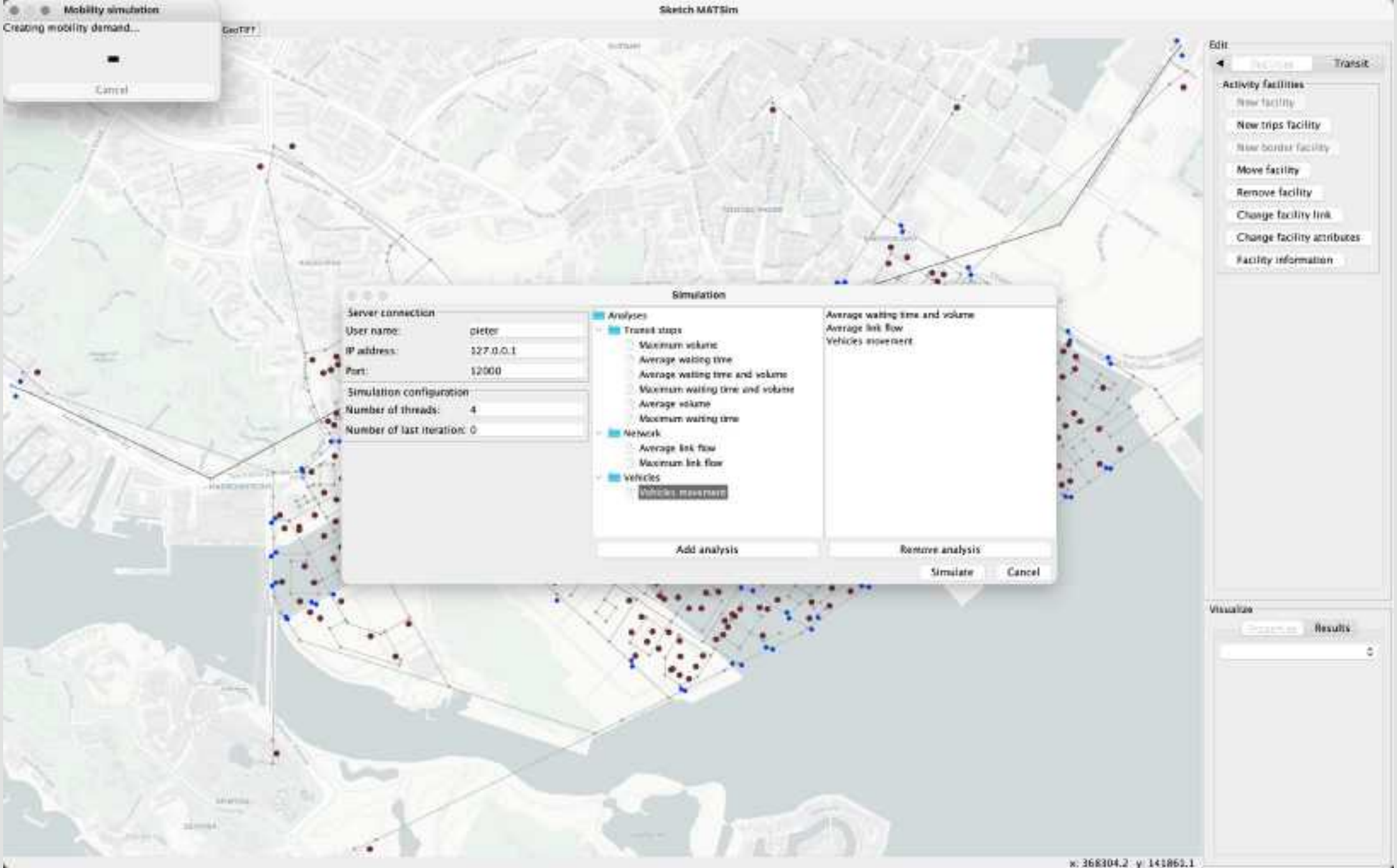

Sketch MATSim
Edit
Facilities
Stop facilities
New stop
Move stop
Remove stop
Change stop link
Change stop attributes
Stop information
Fixed schedule
New transit line
New transit route
Modify route
Remove route
Change route attributes
Route information
On demand
Define fleet
Visualize
Results
Network type
Rails
Roads
Pedestrian
Cancel
OK

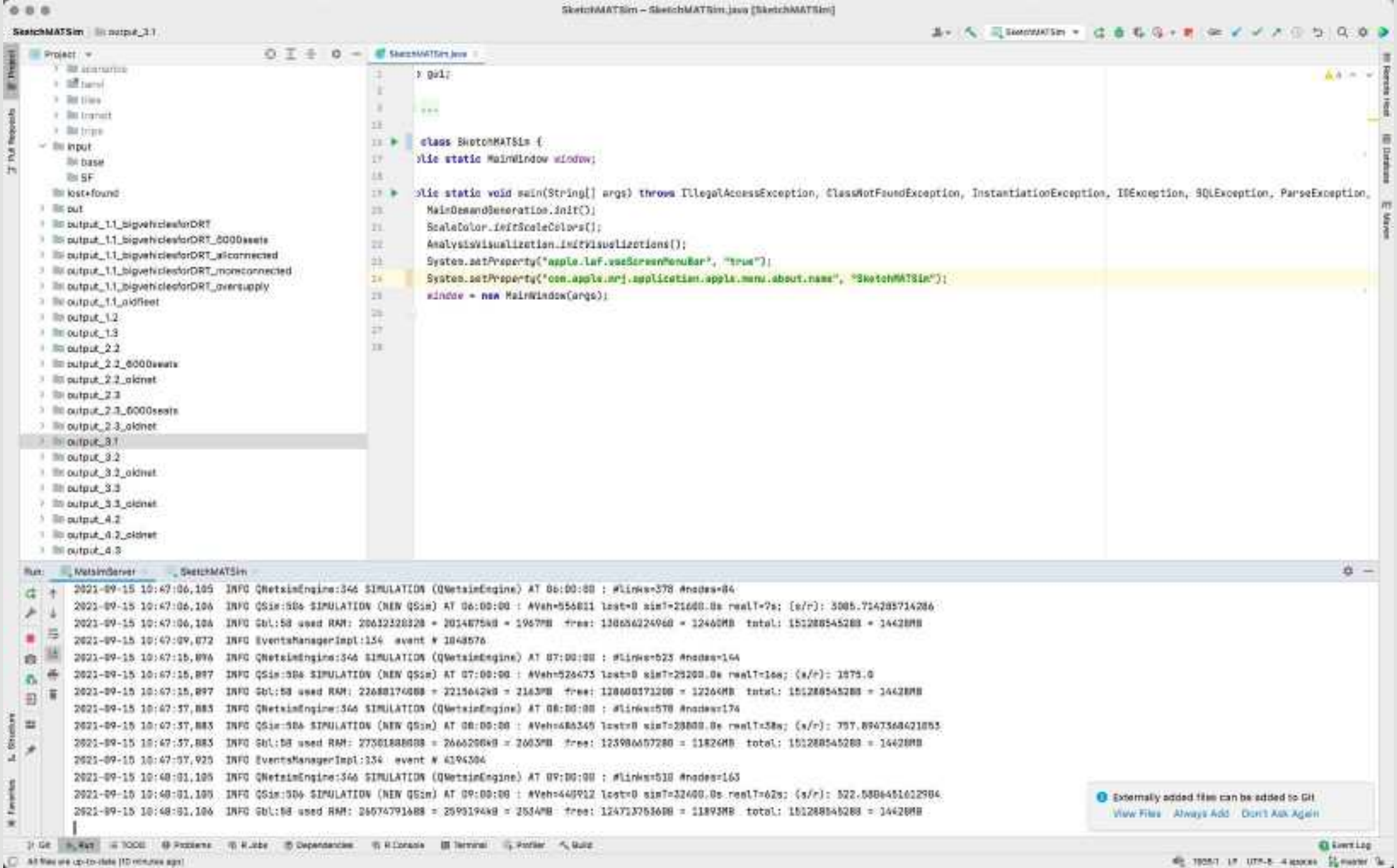

Sketch MATSim
Edit
Facilities
Stop facilities
New stop
Move stop
Remove stop
Change stop link
Change stop attributes
Stop information
Fixed schedule
New transit line
New transit route
Modify route
Remove route
Change route attributes
Route information
On demand
Define fleet
Visualize
Results

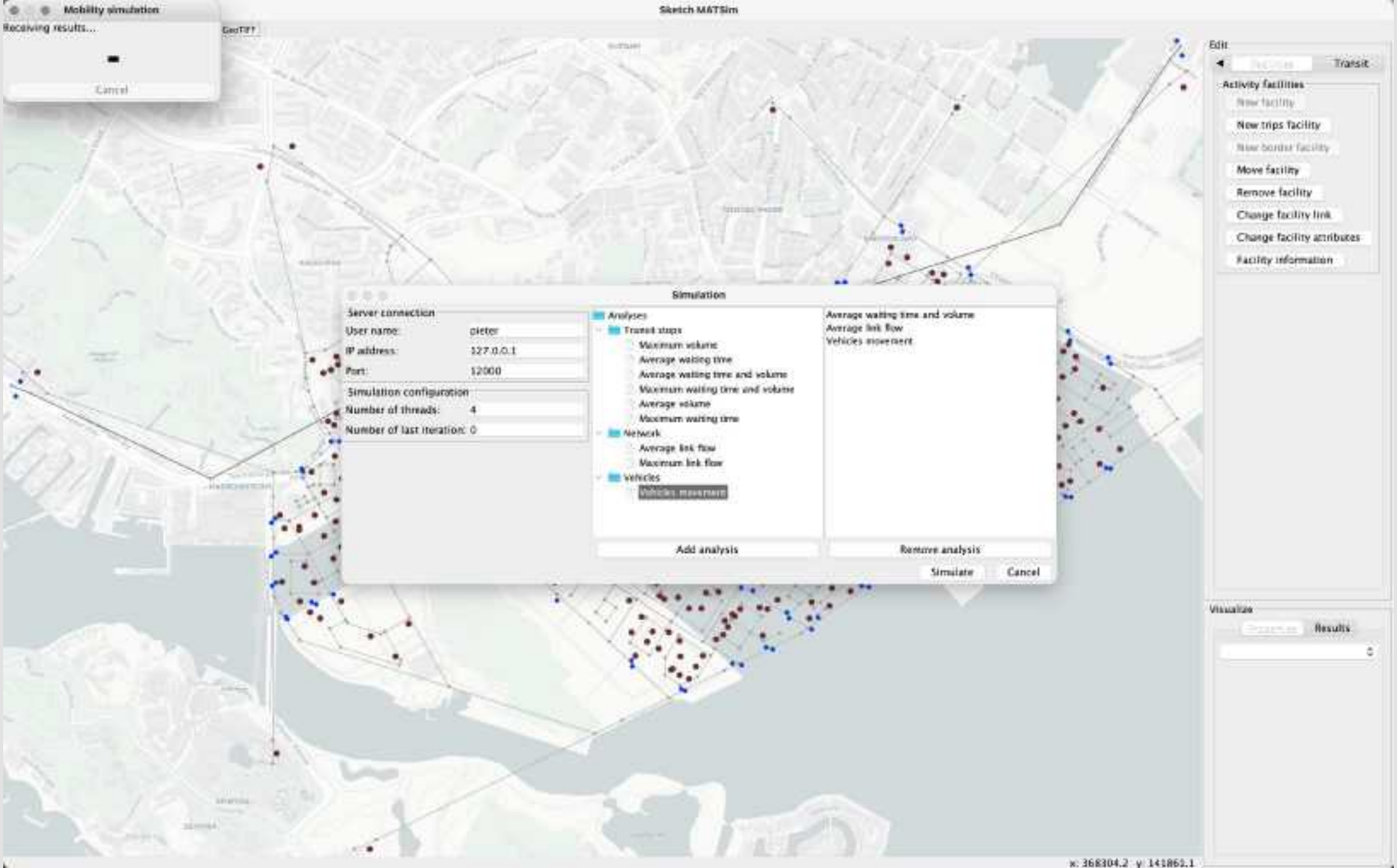

Sketch MATSim
Edit
Facilities
Stop facilities
New stop
Move stop
Remove stop
Change stop link
Change stop attributes
Stop information
Fixed schedule
New transit line
New transit route
Remove route
Change route attributes
Route information
On demand
Define fleet
Visualize
Results
Line properties
Route departure intervals
Big train
Add
Remove
Ok
Cancel

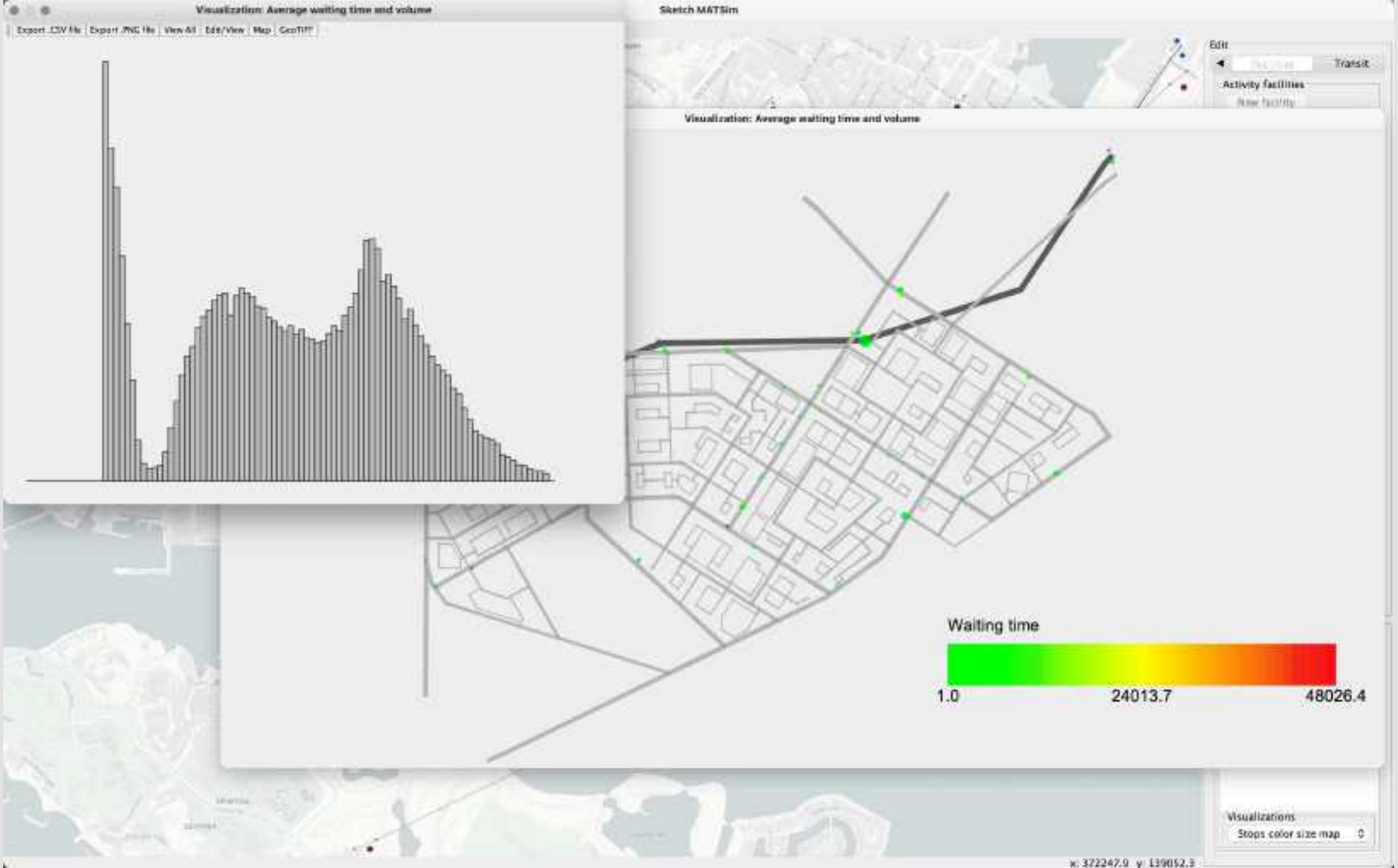

Sketch MATSim
Edit
Transit
Activity facilities
New facility
New trips facility
New border facility
Move facility
Remove facility
Change facility link
Change facility attributes
Facility information
Visualize
Results
Simulation
Server connection
User name: pieter
IP address: 127.0.0.1
Port: 12000
Simulation configuration
Number of threads: 4
Number of last iteration: 0
Analyses
Transit stops
Maximum volume
Average waiting time
Average waiting time and volume
Maximum waiting time and volume
Average volume
Maximum waiting time
Network
Average link flow
Maximum link flow
Vehicles
Vehicles movement
Add analysis
Remove analysis
Simulate
Cancel


Sketch MATSim
Edit
Transit
Activity facilities
New facility
New trips facility
New border facility
Move facility
Remove facility
Change facility link
Change facility attributes
Facility information
Visualize
Results
Simulation
Server connection
User name: pieter
IP address: 127.0.0.1
Port: 12000
Simulation configuration
Number of threads: 4
Number of last iteration: 0
Analyses
Transit stops
Maximum volume
Average waiting time
Average waiting time and volume
Maximum waiting time and volume
Average volume
Maximum waiting time
Network
Average link flow
Maximum link flow
Vehicles
Vehicles movement
Average waiting time and volume
Average link flow
Vehicles movement
Add analysis
Remove analysis
Simulate
Cancel

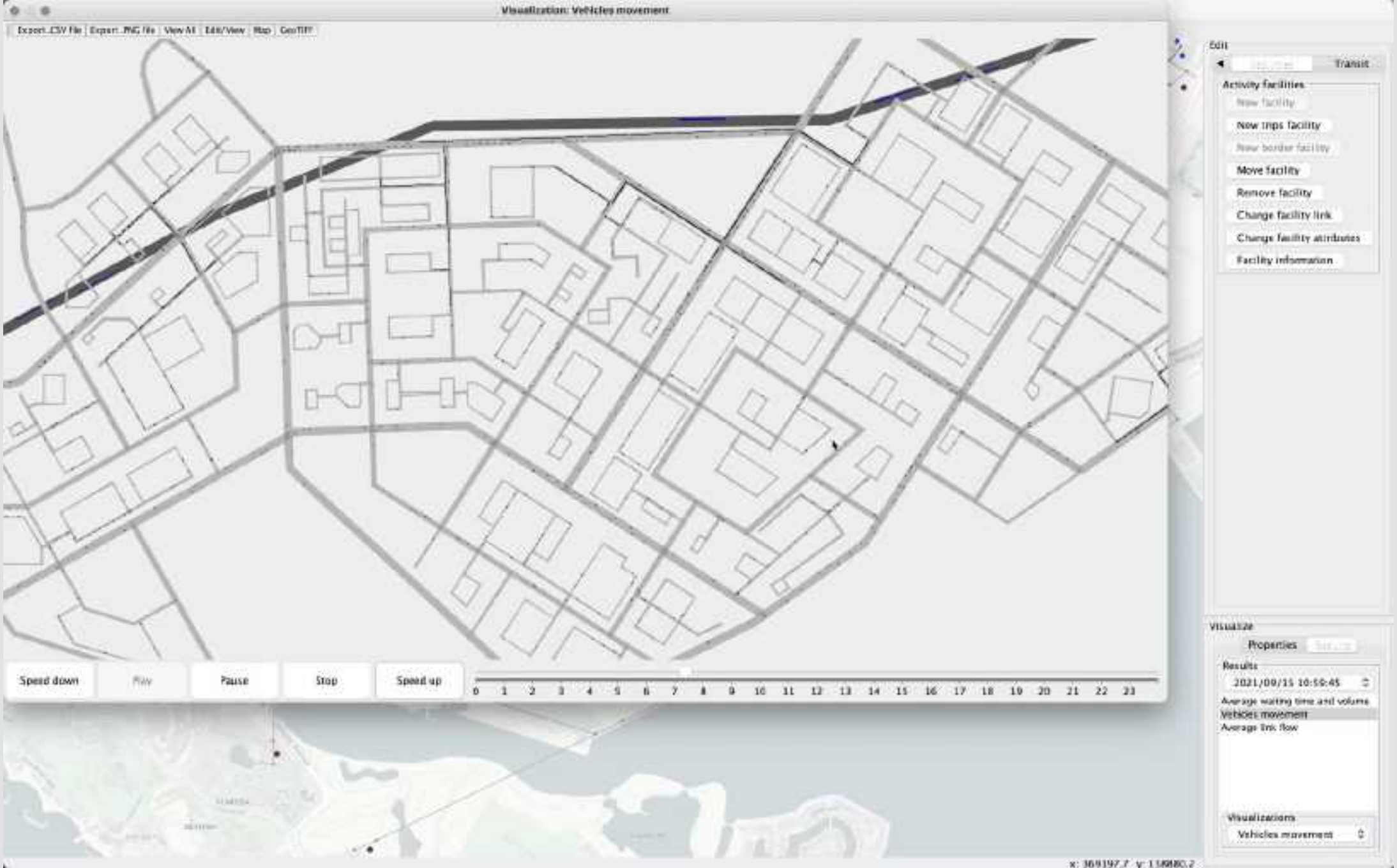

Sketch MATSim
Mobility simulation
Creating mobility demand...
Cancel
GeoTIFF
Edit
Transit
Activity facilities
New facility
New trips facility
New border facility
Move facility
Remove facility
Change facility link
Change facility attributes
Facility information
Simulation
Server connection
User name: pieter
IP address: 127.0.0.1
Port: 12000
Simulation configuration
Number of threads: 4
Number of last iteration: 0
Analyses
Transit stops
Maximum volume
Average waiting time
Average waiting time and volume
Maximum waiting time and volume
Average volume
Maximum waiting time
Network
Average link flow
Maximum link flow
Vehicles
Vehicles movement
Average waiting time and volume
Average link flow
Vehicles movement
Add analysis
Remove analysis
Simulate
Cancel
Visualize
Results
x: 368304.2 y: 141861.1


SketchMATSim – SketchMATSim.java [SketchMATSim]
Project
input
base
SF
lost+found
out
output_1.1_bigvehiclesforDRT
output_1.1_bigvehiclesforDRT_6000seats
output_1.1_bigvehiclesforDRT_allconnected
output_1.1_bigvehiclesforDRT_nonconnected
output_1.1_bigvehiclesforDRT_oversupply
output_1.1_oldfleet
output_1.2
output_1.3
output_2.2
output_2.2_6000seats
output_2.2_oldnet
output_2.3
output_2.3_6000seats
output_2.3_oldnet
output_3.1
output_3.2
output_3.2_oldnet
output_3.3
output_3.3_oldnet
output_4.2
output_4.2_oldnet
output_4.3
class SketchMATSim {
public static MainWindow window;
public static void main(String[] args) throws IllegalAccessException, ClassNotFoundException, InstantiationException, IOException, SQLException, ParseException,
MainDemandGeneration.init();
ScaleColor.initScaleColors();
AnalysisVisualization.initVisualizations();
System.setProperty("apple.laf.useScreenMenuBar", "true");
System.setProperty("com.apple.mrj.application.apple.menu.about.name", "SketchMATSim");
window = new MainWindow(args);
Run:
MatsimServer
SketchMATSim
2021-09-15 10:47:06,105 INFO QNetsimEngine:346 SIMULATION (QNetsimEngine) AT 06:00:00 : #linkw=378 #nodes=84
2021-09-15 10:47:06,106 INFO QSim:504 SIMULATION (NEW QSim) AT 06:00:00 : #Veh=556811 lost=0 simT=21600.0s realT=7s; (s/r): 3085.7142857142856
2021-09-15 10:47:06,106 INFO Gbl:58 used RAM: 20612220328 = 20146758 = 1967MB free: 130656224960 = 12460MB total: 151288545288 = 14428MB
2021-09-15 10:47:09,072 INFO EventsManagerImpl:134 event # 1048576
2021-09-15 10:47:15,896 INFO QNetsimEngine:346 SIMULATION (QNetsimEngine) AT 07:00:00 : #linkw=523 #nodes=144
2021-09-15 10:47:15,897 INFO QSim:504 SIMULATION (NEW QSim) AT 07:00:00 : #Veh=526475 lost=0 simT=25200.0s realT=16s; (s/r): 1575.0
2021-09-15 10:47:15,897 INFO Gbl:58 used RAM: 22688174088 = 22156420 = 2163MB free: 128680371200 = 12564MB total: 151288545288 = 14428MB
2021-09-15 10:47:37,883 INFO QNetsimEngine:346 SIMULATION (QNetsimEngine) AT 08:00:00 : #linkw=570 #nodes=174
2021-09-15 10:47:37,883 INFO QSim:504 SIMULATION (NEW QSim) AT 08:00:00 : #Veh=486345 lost=0 simT=28800.0s realT=38s; (s/r): 757.8947368421053
2021-09-15 10:47:37,883 INFO Gbl:58 used RAM: 27501888008 = 26862008 = 2603MB free: 123986657280 = 11826MB total: 151288545288 = 14428MB
2021-09-15 10:47:37,925 INFO EventsManagerImpl:134 event # 4194304
2021-09-15 10:48:01,105 INFO QNetsimEngine:346 SIMULATION (QNetsimEngine) AT 09:00:00 : #linkw=510 #nodes=163
2021-09-15 10:48:01,105 INFO QSim:504 SIMULATION (NEW QSim) AT 09:00:00 : #Veh=440912 lost=0 simT=32400.0s realT=62s; (s/r): 522.5806451612904
2021-09-15 10:48:01,106 INFO Gbl:58 used RAM: 26674791688 = 25931948 = 2514MB free: 124713756608 = 11893MB total: 151288545288 = 14428MB
Externally added files can be added to Git
View Files
Always Add
Don't Ask Again


Sketch MATSim
Mobility simulation
Receiving results...
Cancel
GeoTIFF
Edit
Transit
Activity facilities
New facility
New trips facility
New border facility
Move facility
Remove facility
Change facility link
Change facility attributes
Facility information
Simulation
Server connection
User name: pieter
IP address: 127.0.0.1
Port: 12000
Simulation configuration
Number of threads: 4
Number of last iteration: 0
Analyses
Transit stops
Maximum volume
Average waiting time
Average waiting time and volume
Maximum waiting time and volume
Average volume
Maximum waiting time
Network
Average link flow
Maximum link flow
Vehicles
Vehicles movement
Average waiting time and volume
Average link flow
Vehicles movement
Add analysis
Remove analysis
Simulate
Cancel
Visualize
Results
x: 368304.2 y: 141861.1


Visualization: Average waiting time and volume
Export .CSV file
Export .PNG file
View All
Edit/View
Map
GeoTiff
Sketch MATSim
Edit
Transit
Activity facilities
New facility
Visualization: Average waiting time and volume
Waiting time
1.0
24013.7
48026.4
Visualizations
Stops color size map


Visualization: Maximum link car flow
Export .CSV file
Export .PNG file
Link flow (veh/hr)
12.0
540.0
1068.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
odes
New node
Move node
Remove node
Node attributes
inks
New link
Remove link
Link attributes
ualize
Properties
esults
2019/05/13 19:36:27
verage link flow
laximum link car flow
Visualizations
Temporal link map


Visualization: Vehicles movement
Export .CSV file
Export .PNG file
View All
Edit/View
Map
GeoTIFF
Edit
Transit
Activity facilities
New facility
New trips facility
New border facility
Move facility
Remove facility
Change facility link
Change facility attributes
Facility information
Visualize
Properties
Results
2021/09/15 10:56:45
Average waiting time and volume
Vehicles movement
Average link flow
Visualizations
Vehicles movement
Speed down
Play
Pause
Stop
Speed up
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

DISCUSSION

- Let's assume it happens, and price drops to existing taxi prices (Uber's ultimate vision)
- What are the implications for urban development?
- Consider speed, cost of development compared to rail infrastructure
- Anticipate collective human reaction to disruptive transport tech
- Consider implications of 1950s decisions still today when faced with similar situation

- In groups of 5-8, discuss and sketch out the dystopian and utopian mind-map visions of a future where aerial mobility is a reality, such as the example on the right for autonomous vehicles

- Consider context (1 ea. group?):
  - Asian cities, e.g. Jakarta, Manilla, Bangkok
  - Regional development & integration e.g. Indonesia, Sijori
  - US suburbs
  - Africa
  - …
- Social and psychological factors
- Does zero emissions imply zero environmental impact?

RECOMMENDED READINGS & REFERENCES

Littman, Todd (2017) Evaluating Accessibility for Transport Planning Measuring People's Ability to Reach Desired Goods and Activities, available here

Lynch, Kevin (1984) *Good City Form*. Cambridge: MIT Press

Ortúzar, Juan de Dios, and Luis G. Willumsen (2011) *Modelling Transport*. Fourth edition. Chichester, West Sussex, United Kingdom: John Wiley & Sons

Rodrigue, Jean Paul (2013). The Geography of Transport Systems, available here

Townsend, Anthony (2017) Taming the Autonomous Vehicle: A Primer for Cities. Bloomberg Philanthropies, available here