Dr Simone Zarpelon Leao
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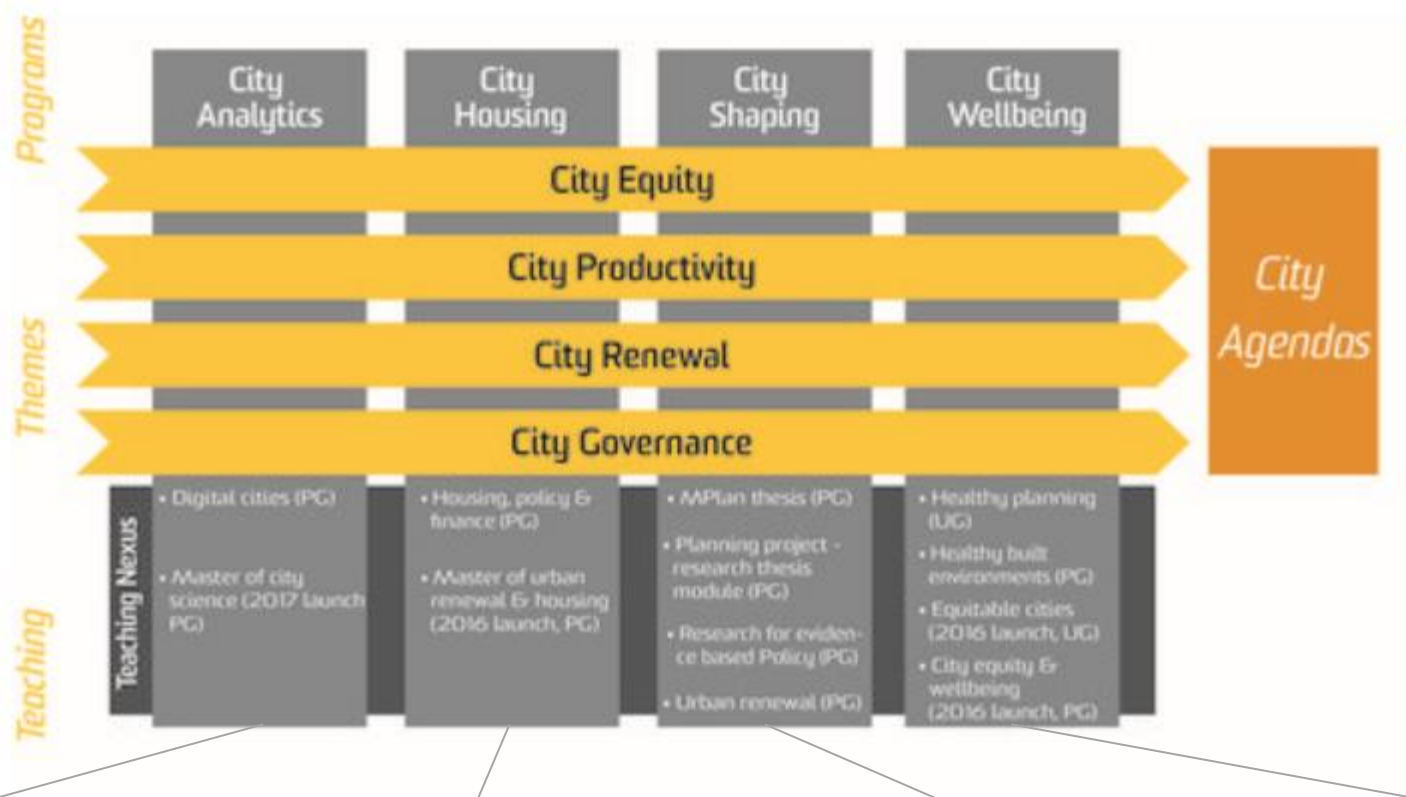
City Futures Research Centre/City Analytics
UNSW Built Environment

City Analytics for Sustainable Mobility


Programs
City Analytics
City Housing
City Shaping
City Wellbeing
Themes
City Equity
City Productivity
City Renewal
City Governance
City Agendas
Teaching
Teaching Nexus
• Digital cities (PG)
• Master of city science (2017 launch PG)
• Housing, policy & finance (PG)
• Master of urban renewal & housing (2016 launch, PG)
• MAPlan thesis (PG)
• Planning project - research thesis module (PG)
• Research for evidence based Policy (PG)
• Urban renewal (PG)
• Healthy planning (UG)
• Healthy built environments (PG)
• Equitable cities (2016 launch, UG)
• City equity & wellbeing (2016 launch, PG)

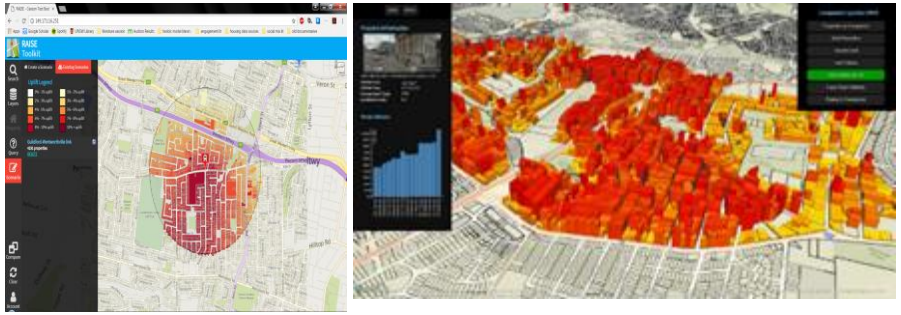

City Analytics


City Housing


City Shaping


City Wellbeing

Masters of City Analytics



City Analytics Research Program

City Analytics

City Analytics Laboratory CAL

CityViz

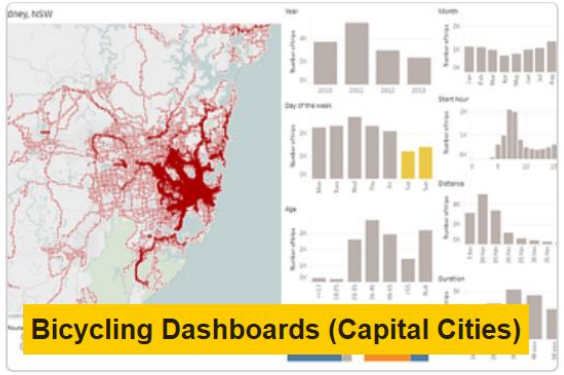
CityViz – Making urban big data visible

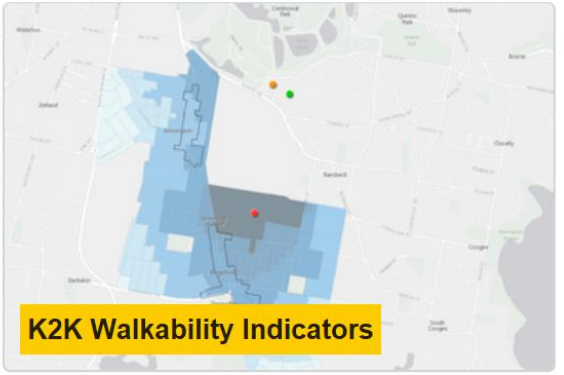
CityViz is a new data visualisation and analytics initiative by City Futures capitalising on our unique access to urban big data for Sydney. Over the next few months a range of data will be presented on this site that will start to build a comprehensive and integrated visual depiction of our changing city.

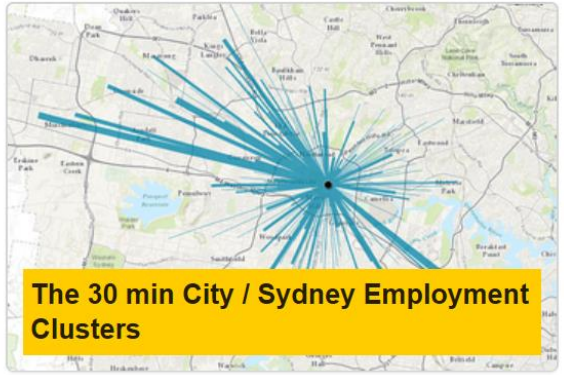
To start, we have assembled new data on Sydney's emerging housing market – affordability, strata development and our 'million dollar property' map.

In coming months we will be adding to and updating these data with new data on, for example, urban wellbeing, transport and bike use, health services and other newly available datasets. Watch this space!

City Movement Indicators



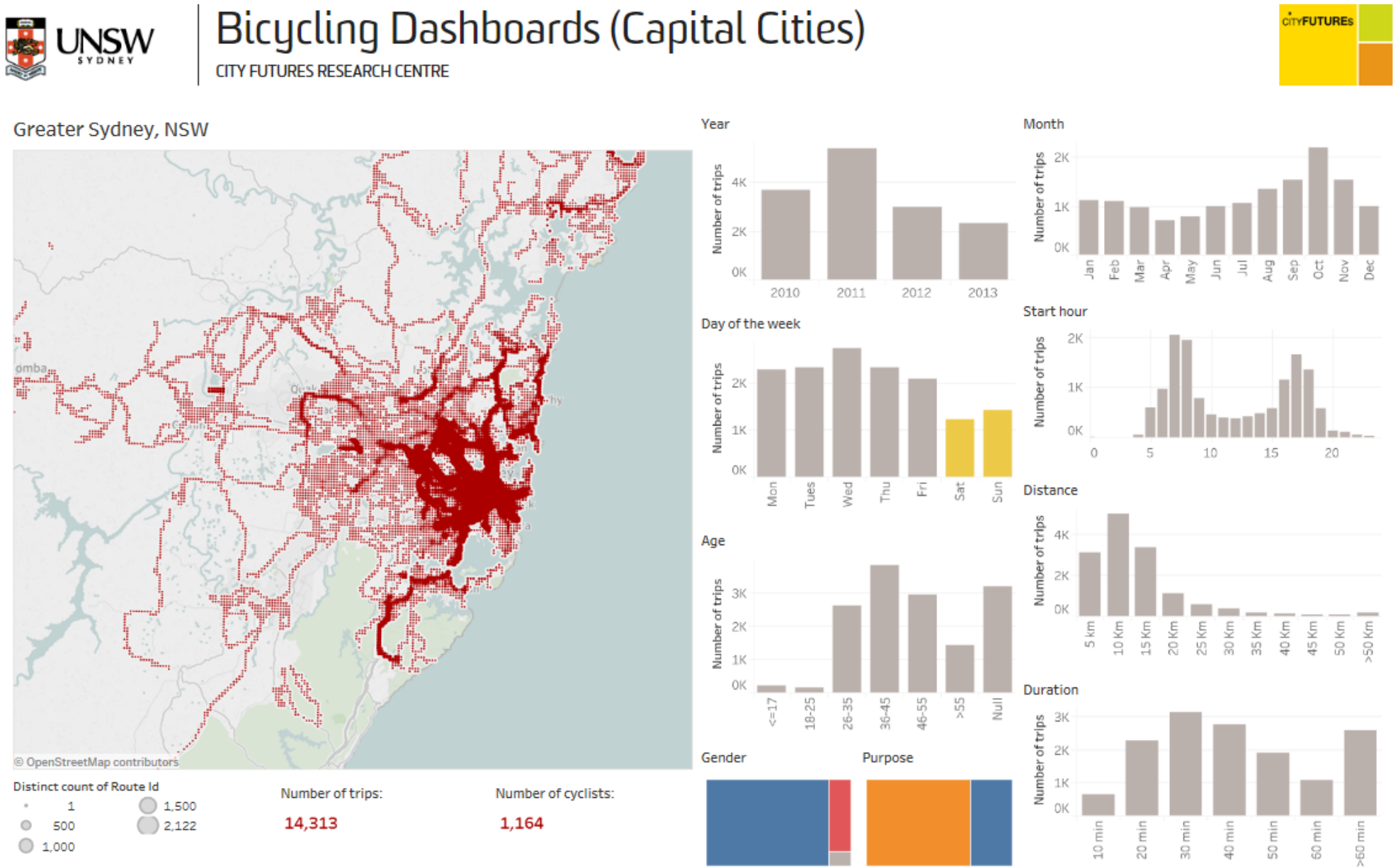




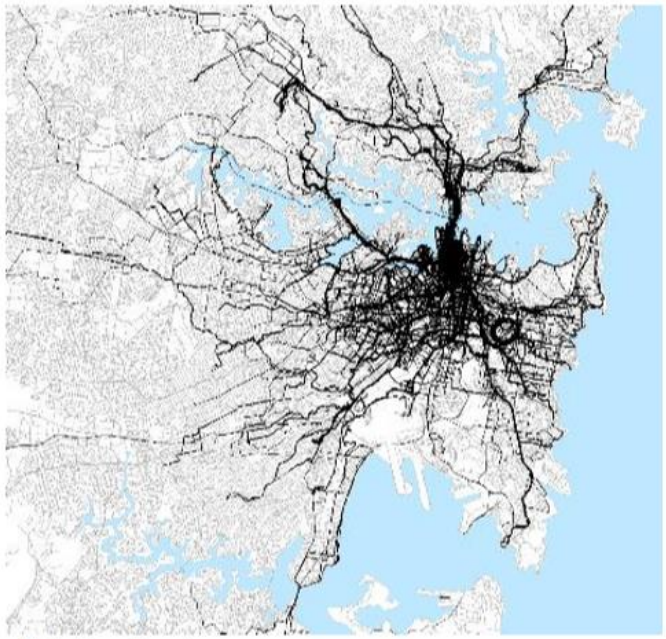
CityViz – Cycling in Sydney over a 24 hour period


Trip Activity by Time
CLONTARF
CAMMERAY
CROWS NEST
MOSMAN
RHODES
GLADESVILLE
LONGUEVILLE
CREMORNE
GREENWICH
NEUTRAL BAY
KIRRIBILLI
DRUMMOYNE
LIDCOMBE
CONCORD
SYDNEY
DARLING POINT
DOVER HEIGHTS
LILYFIELD
DARLINGHURST
BELLEVUE HILL
CROYDON
LEICHHARDT
PADDINGTON
CAMPERDOWN
BONDI
REDFERN
NEWTOWN
BRONTE
LAKEMBA
MARRICKVILLE
KENSINGTON
RANDWICK
KINGSFORD
ROSELANDS
MASCOT
DACEYVILLE
OSTOW
EARLWOOD
BRIGHTON-LE-SANDS
MAROUBRA

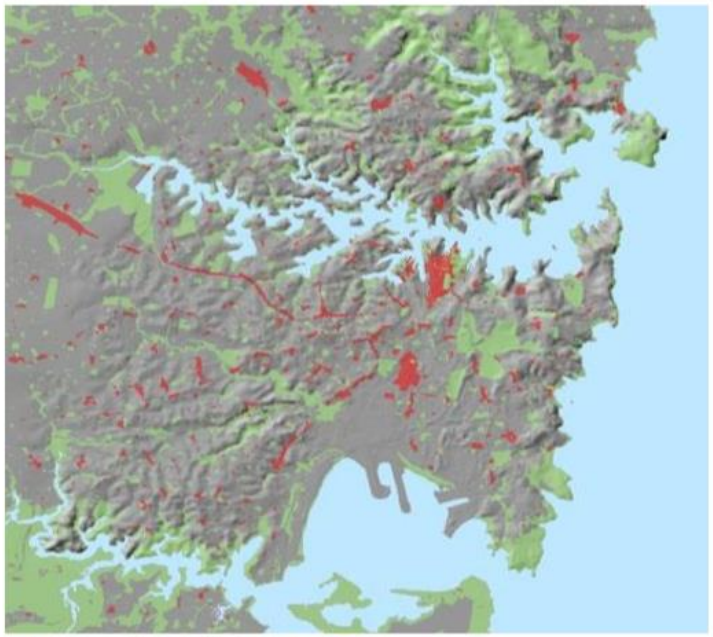
Communicating and visualising cycling data



Integrating cycling data to varied contextual information



a. GPS tracked cycling routes map



b. Slope, parks and commercial centres

c.Cycling infrastructure

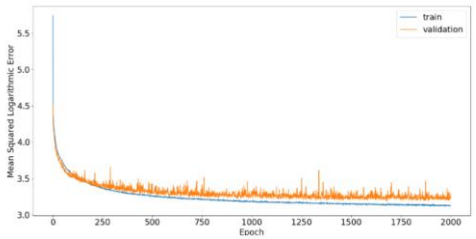
B

Table 2. Summary of multiple regression analysis – Dependent variable: Route_Distance

Predictor Variable	B	SE_B	β	Part-Correlation
Intercept	245.896	243.338		
Gender	298.284	74.855	.028	.027
Distance to commercial areas (DistComm)	1.040	.022	.343	.318
Distance to Parks and coastal areas (DistParks)	1.253	.018	.525	.470
% of the overall track with slope <= 2%	3551.991	200.030	.150	.121
% of the overall track with slope >2 and <= 5%	-669.270	333.528	-.021	-.014
% of the overall track with slope > 10%	12469.117	504.025	.258	.219
% of the overall track with mixed traffic lanes	5822.758	180.877	.227	.168
% of the overall track with no cycling infrastructure	-1129.253	225.874	-.035	-.034

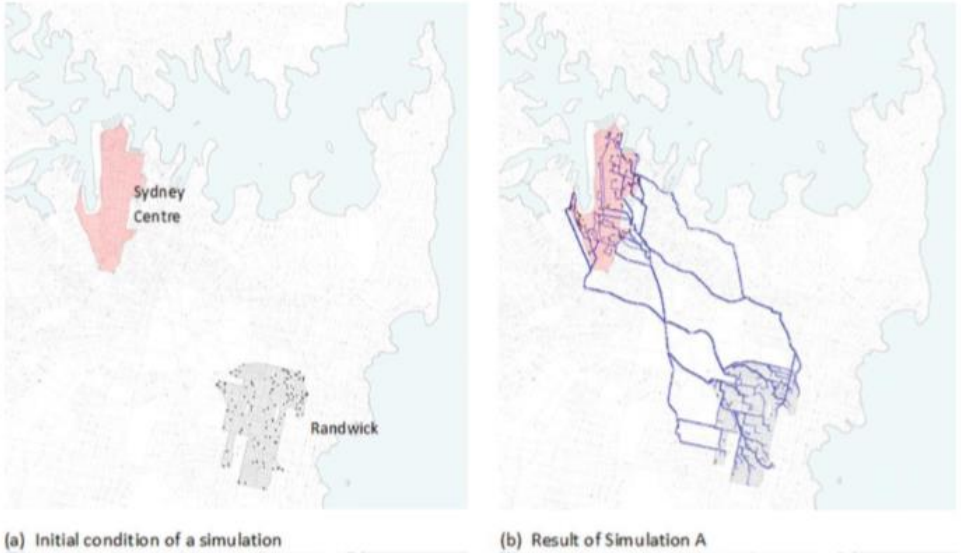
*Note: * p < .05; B= unstandardized regression coefficient; SE_B= standard error of the coefficient; β =standardized coefficient*

	Multiple Linear Regression	Deep Learning
4-bin Accuracy	50.43%	75.61%



Modelling and simulation of cycling patterns (agent-based modelling)

Ruled-based simulations (current context)



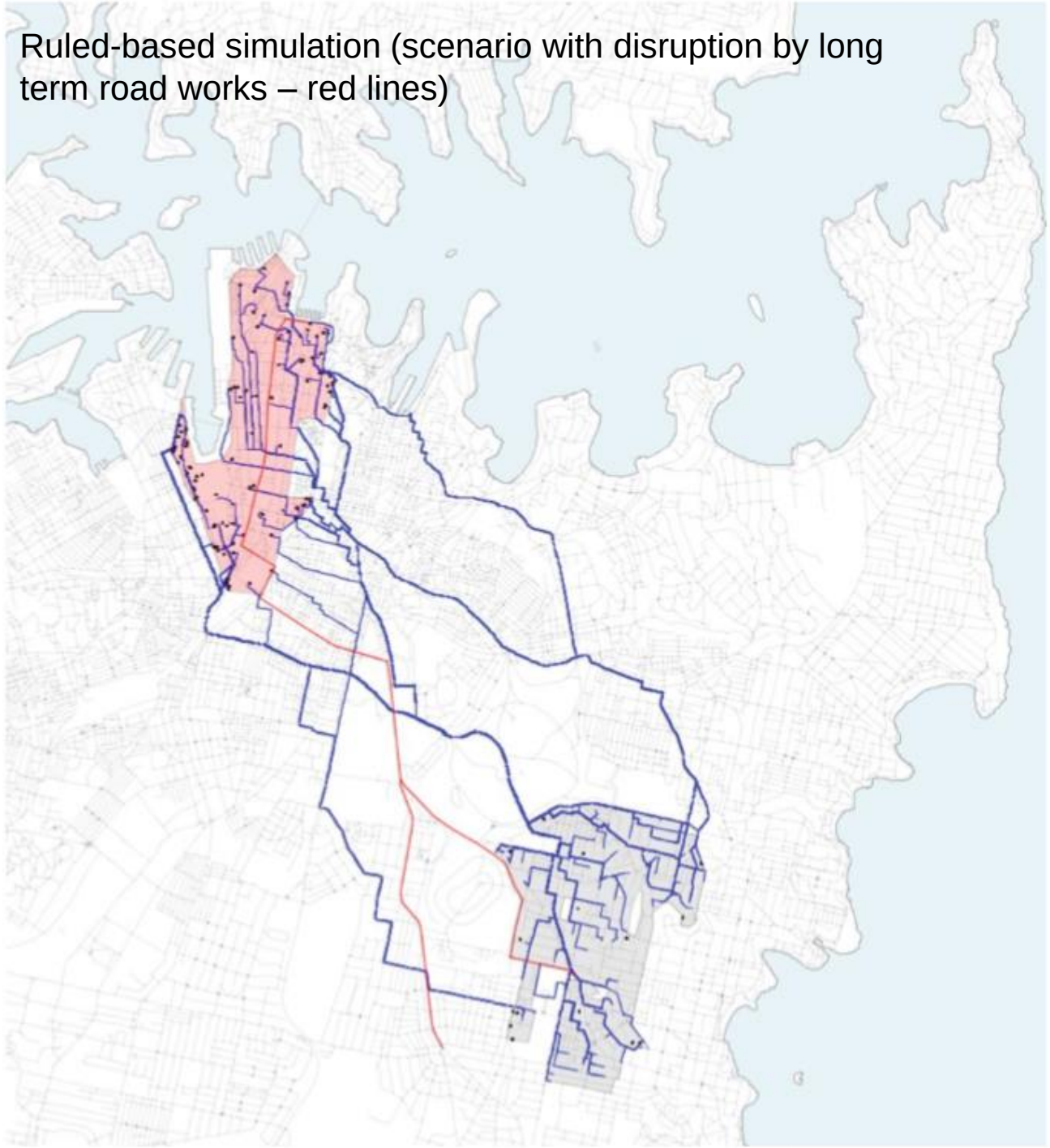
(a) Initial condition of a simulation

(b) Result of Simulation A

(c) Result of Simulation B

(d) Result of Simulation C

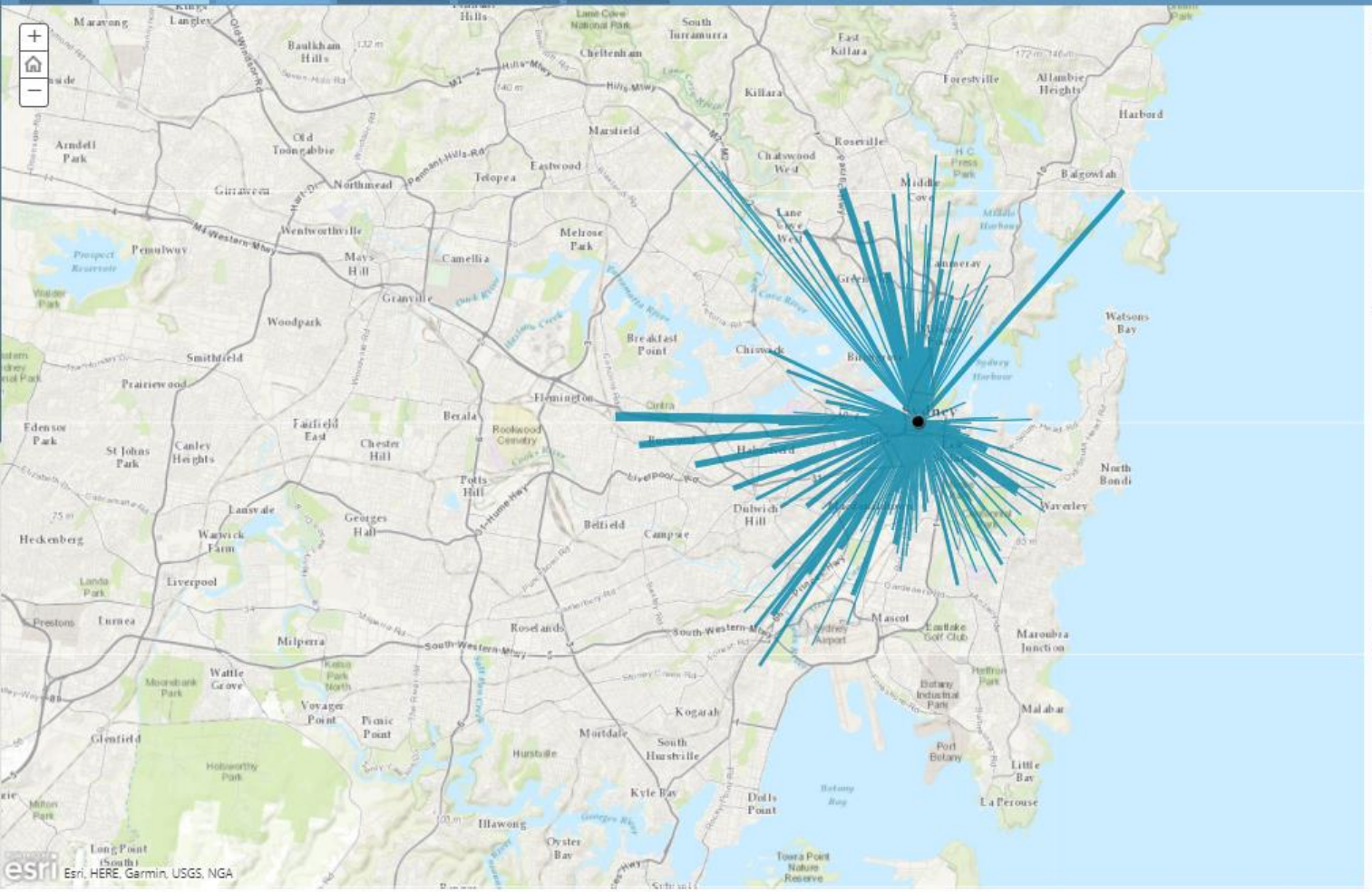
Ruled-based simulation (scenario with disruption by long term road works – red lines)



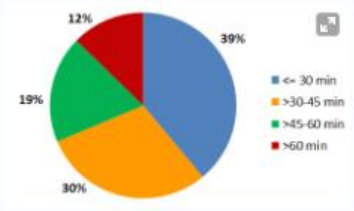
30 minute city, Sydney CBD

Sydney CBD

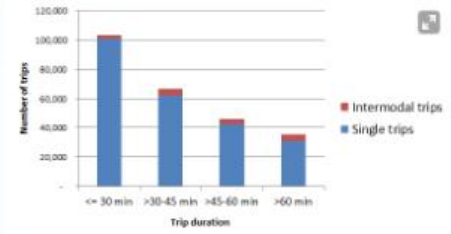
AM Peak | Trips <=30 min | Trips 31-45 min | Trips 46-60 min | Trips >60 min | Origin Counts



Total trips to Sydney CBD AM peak = 244,999 trips
39% = % trips with duration <= 30 min



98% of trips with duration <= 30 min are single trips



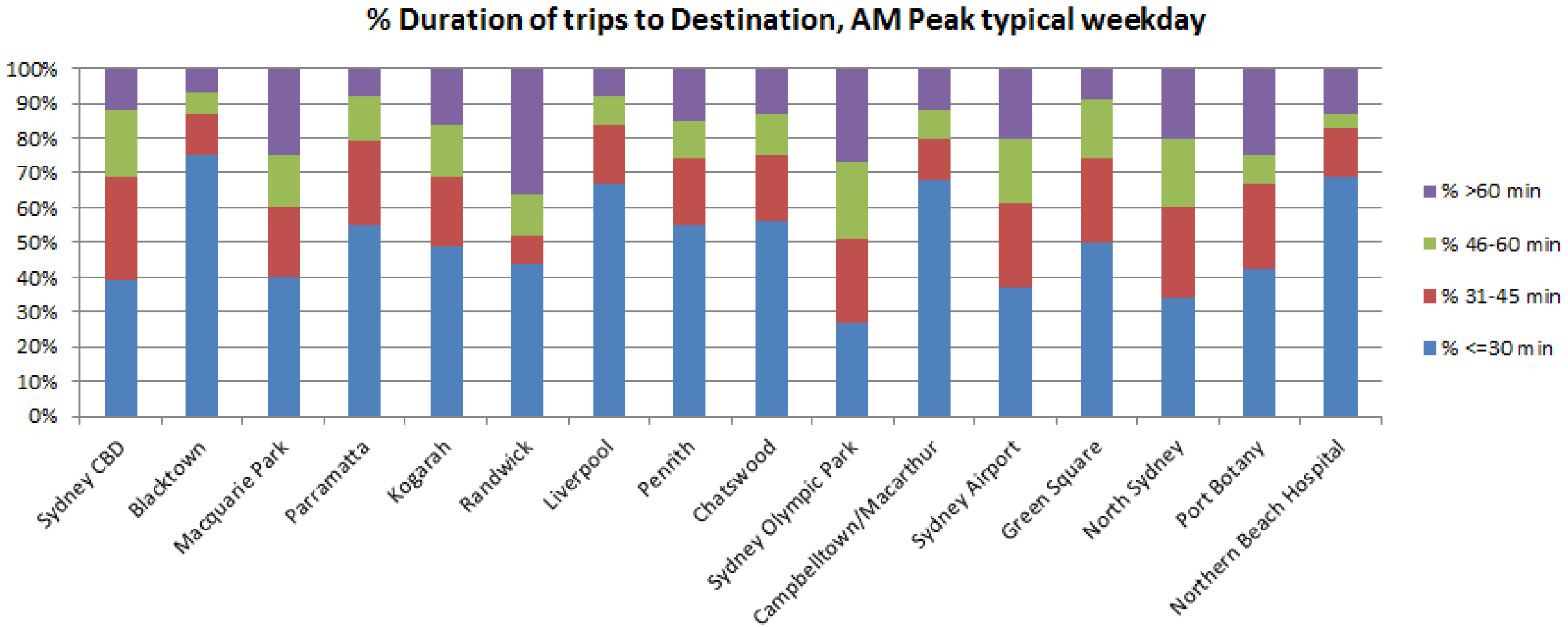
Click on the map features for additional information; zoom in/out for better visualisation.

SydneyCBD_centroid

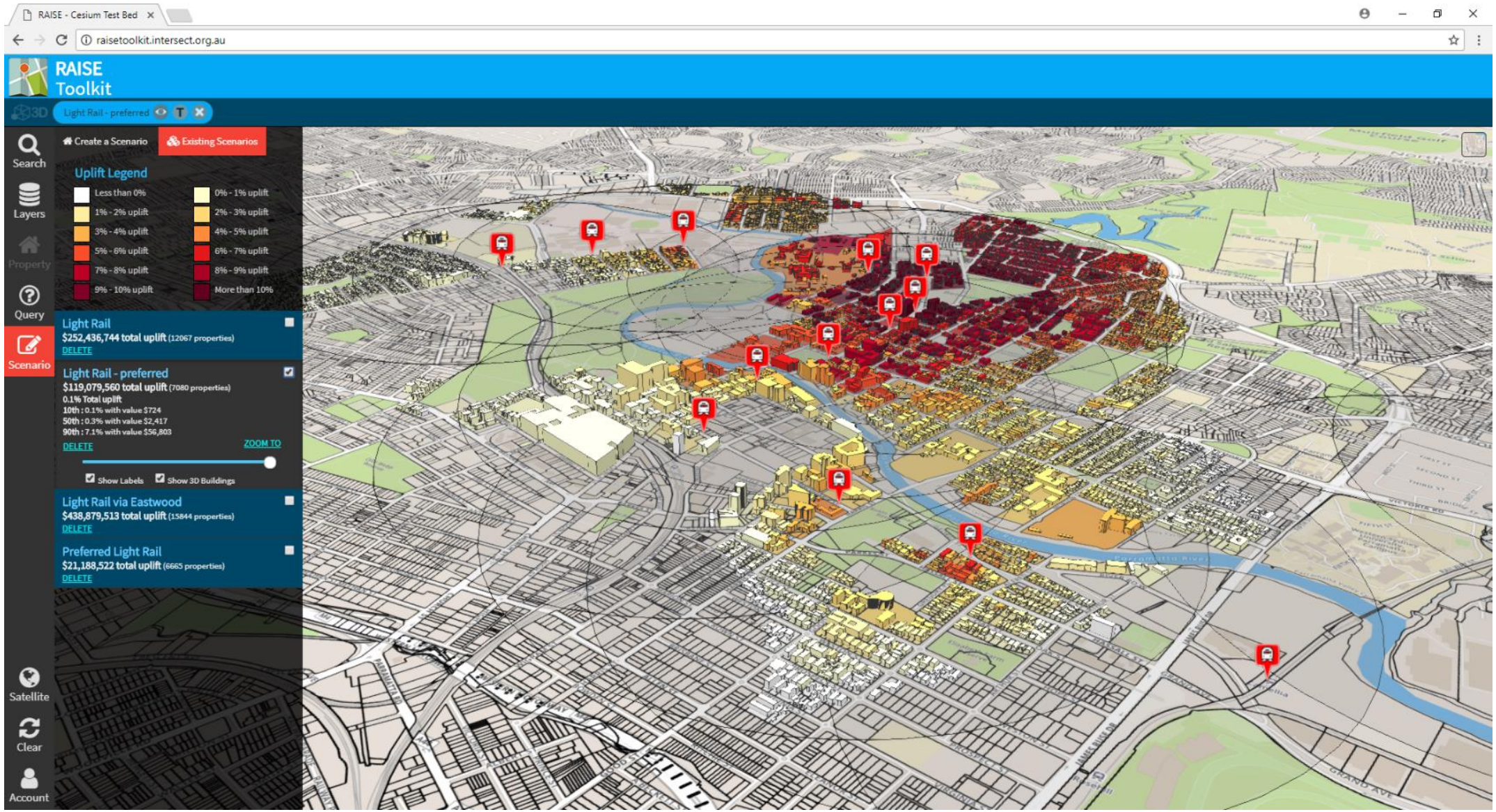
SydneyCBD_30min

Number of trips:

- > 4,000 to 5,200
- > 3,000 to 4,000
- > 2,000 to 3,000


% Duration of trips to Destination, AM Peak typical weekday
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Sydney CBD
Blacktown
Macquarie Park
Parramatta
Kogarah
Randwick
Liverpool
Penrith
Chatswood
Sydney Olympic Park
Campbelltown/Macarthur
Sydney Airport
Green Square
North Sydney
Port Botany
Northern Beach Hospital
% >60 min
% 46-60 min
% 31-45 min
% <=30 min

Parramatta
Light Rail options



Concluding thoughts

- Big data is providing information about active and public transport at a resolution never available before.
- Handling and integrating big data is not an ordinary task, and more development is needed.
- Big data can be used for understanding transport patterns and dynamics, and monitoring change at high spatial and temporal resolutions.
- Tools are needed to assist urban and transport planning to incorporate big data analytics into routine procedures.
- Digital planning tools need to be co-designed with end-users for full usability and impact on urban planning and management.
- Partnerships with academia, government and industry have been essential for our research development.