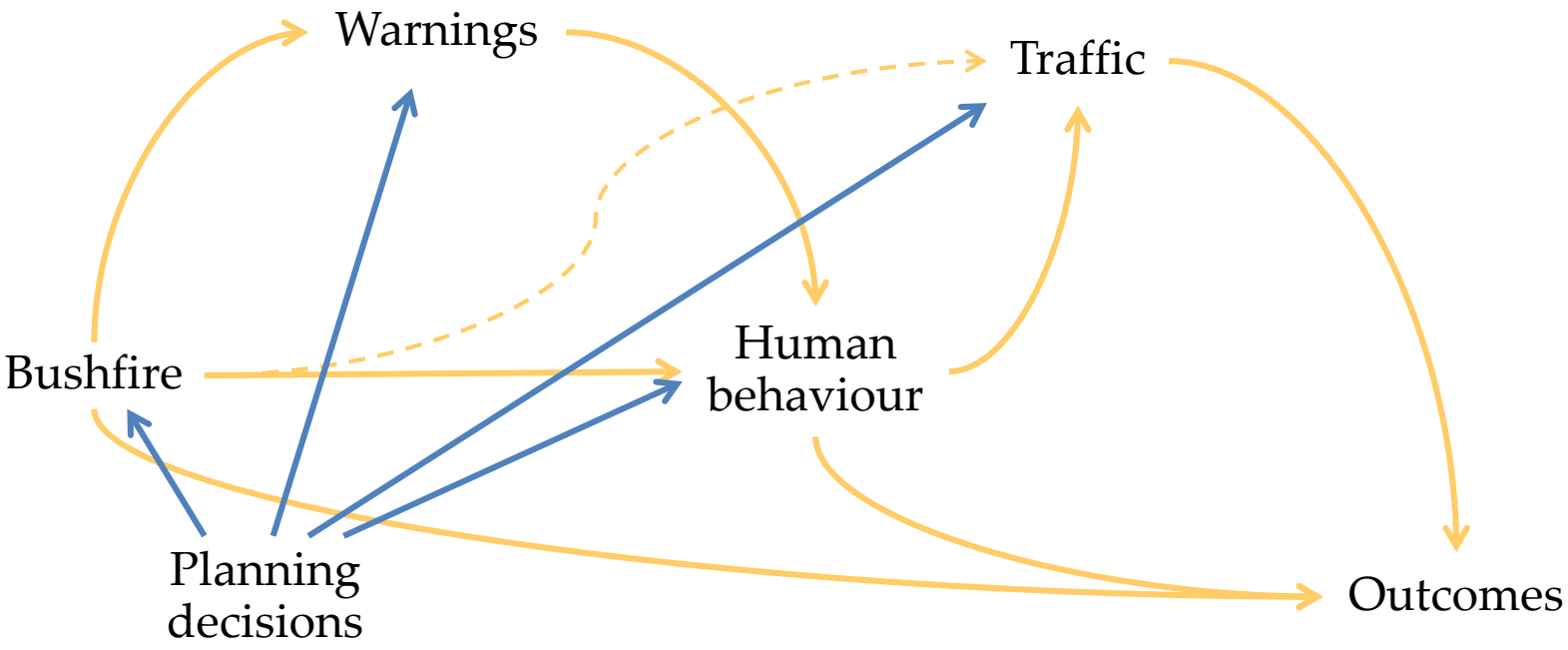
A bushfire evacuation planning service utilising multiple simulation systems

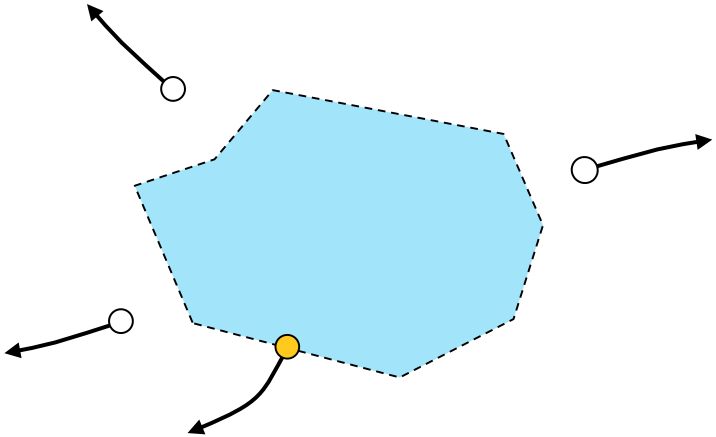
Kent Steer

IBM Research

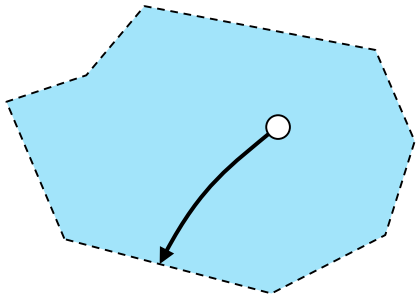
Motivation


Warnings
Traffic
Bushfire
Human behaviour
Planning decisions
Outcomes

Outcome evaluation

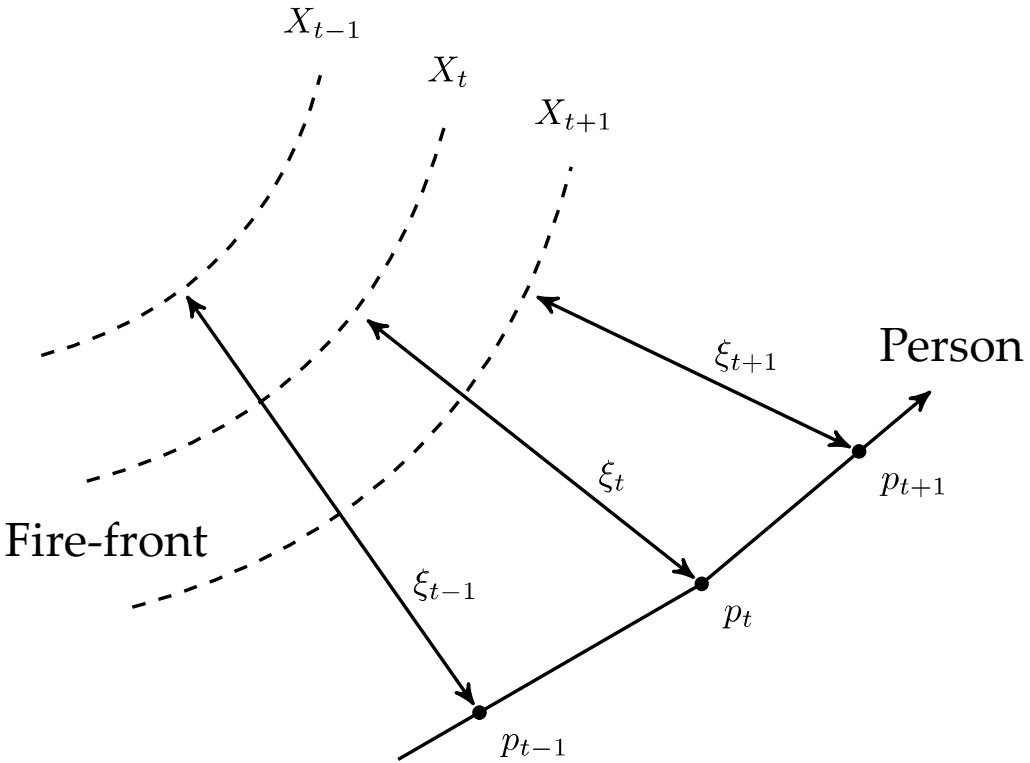


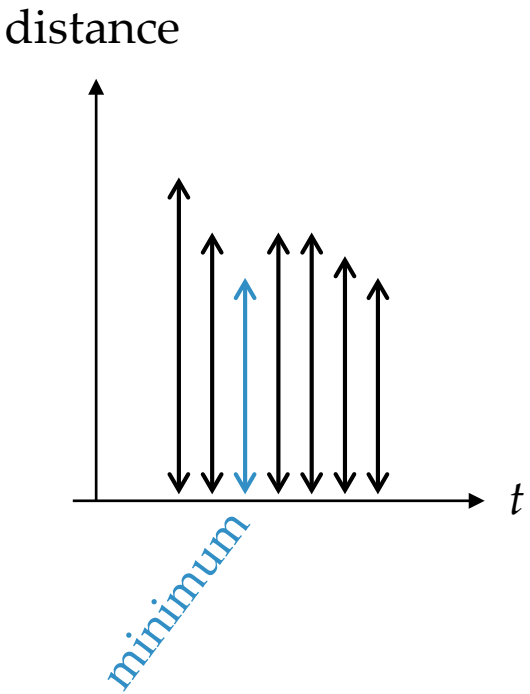
Clearance time
(time of *last exit*)



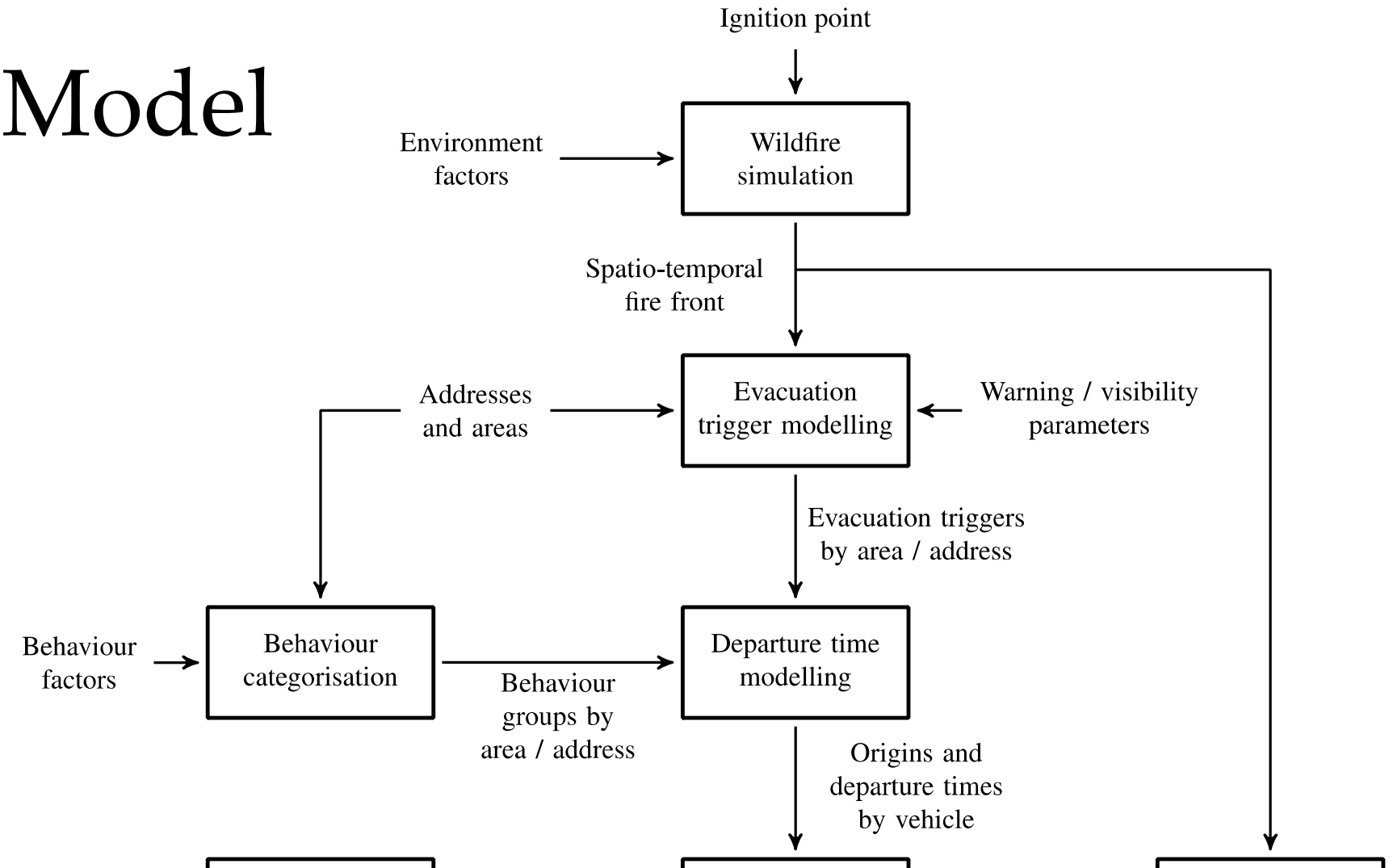
Egress time
(time *to exit*)

Person-threat distance

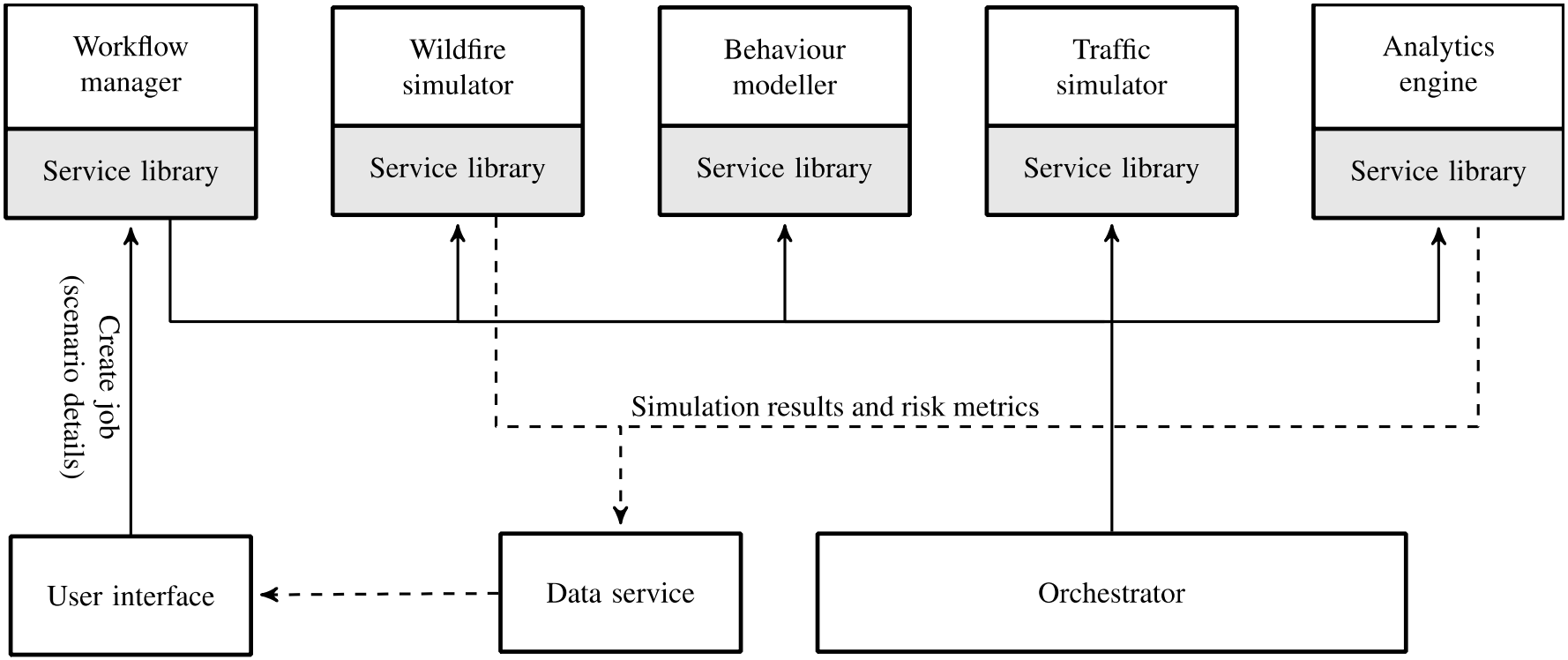




Model


Ignition point
Environment factors
Wildfire simulation
Spatio-temporal fire front
Addresses and areas
Evacuation trigger modelling
Warning / visibility parameters
Evacuation triggers by area / address
Behaviour factors
Behaviour categorisation
Behaviour groups by area / address
Departure time modelling
Origins and departure times by vehicle

Architecture



Wind-speed = 5 km/h

Exposure count

Clearance time

Egress time

Wind-speed = 20 km/h

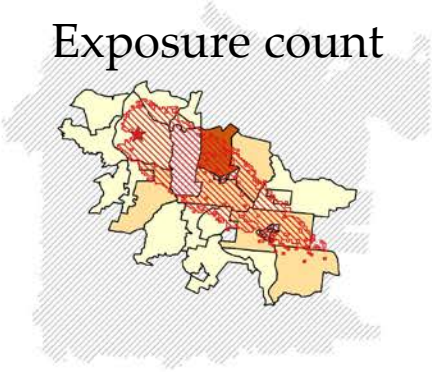
Exposure count

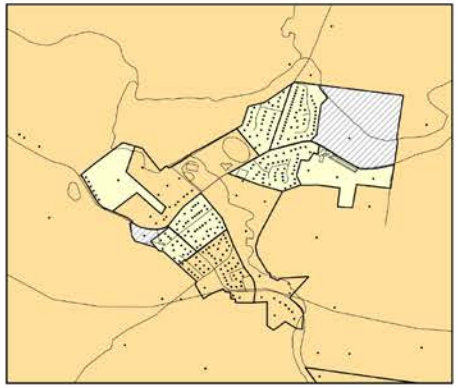
Clearance time

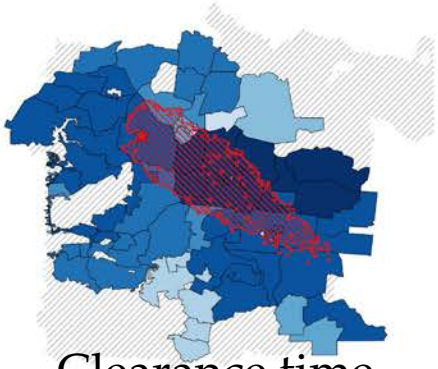
Egress time

Behaviour (0.3 stay / 0.5 warning / 0.2 visible)

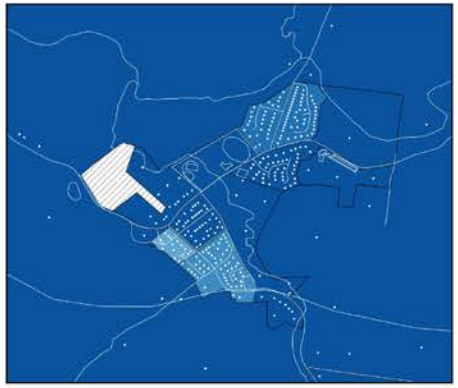
Exposure count

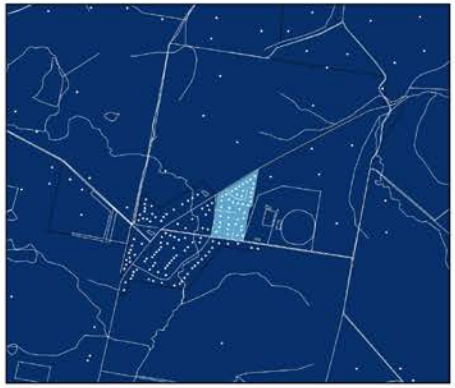






Clearance time





Legend

- Ignition Point
- Roads
- Addresses

Exposure Count (vehicles)

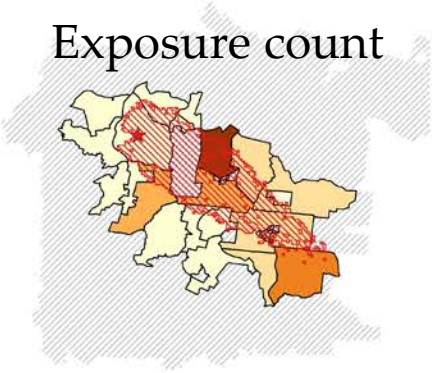
- 0.0 - 8.0
- 8.0 - 16.0
- 16.0 - 24.0
- 24.0 - 32.0
- 32.0 - 40.0
- 40.0 - 48.0

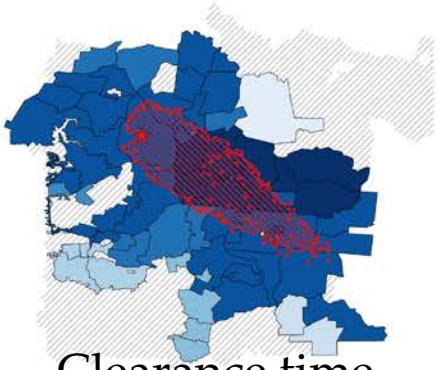
Clearance Interval (hrs)

- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0

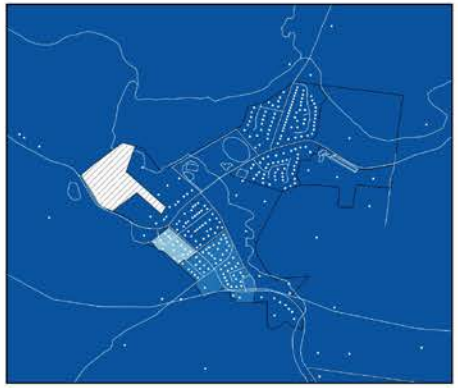
Behaviour (0.2 stay / 0.3 warning / 0.5 visible)

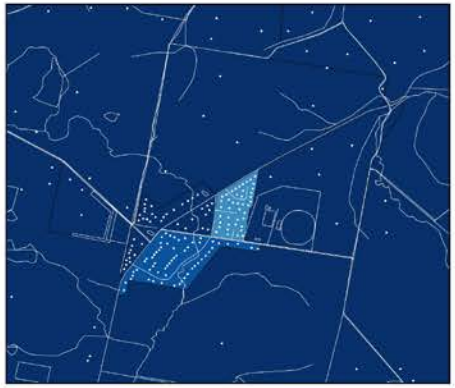
Exposure count





Clearance time





Legend

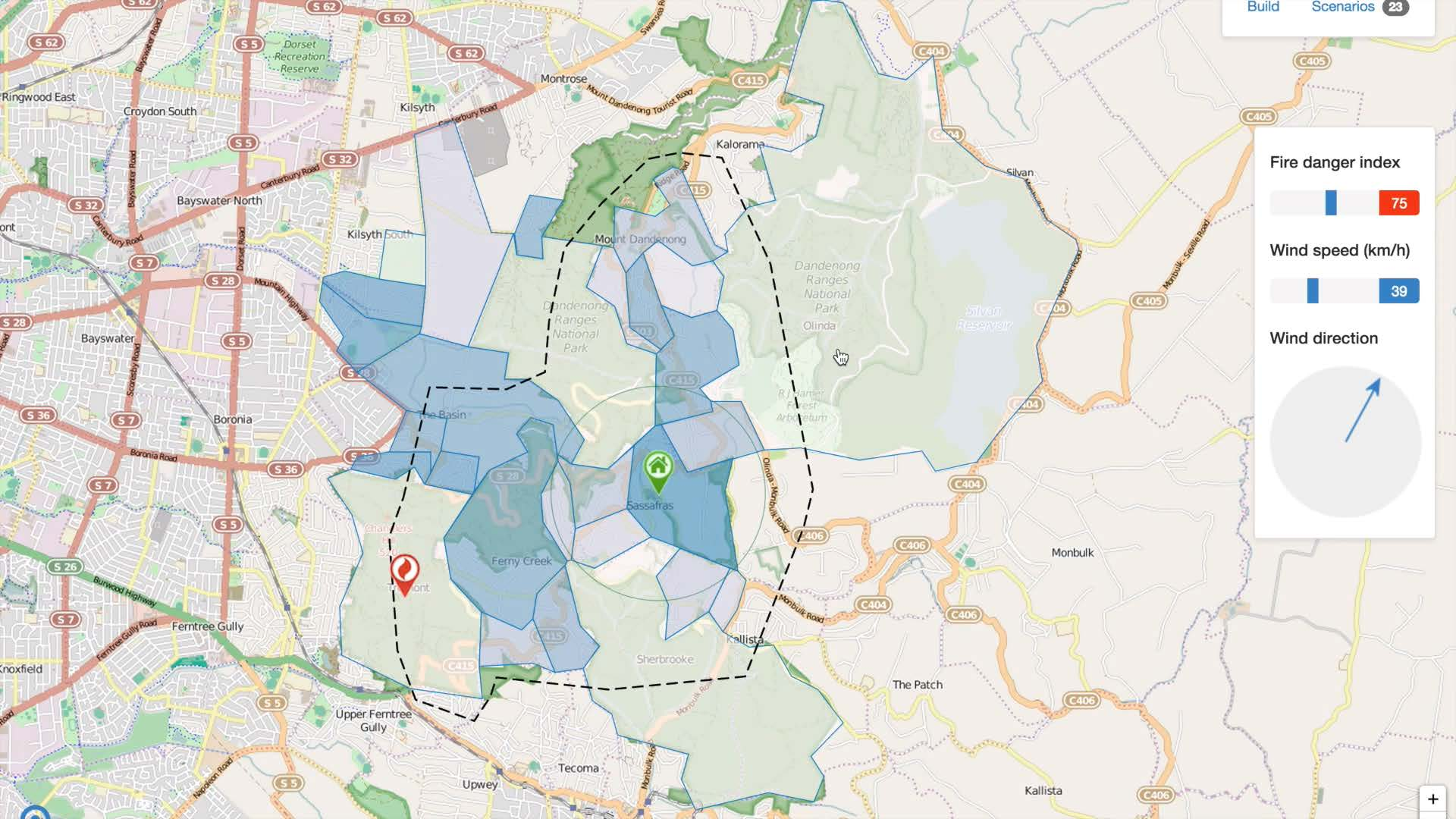
- Ignition Point
- Roads
- Addresses

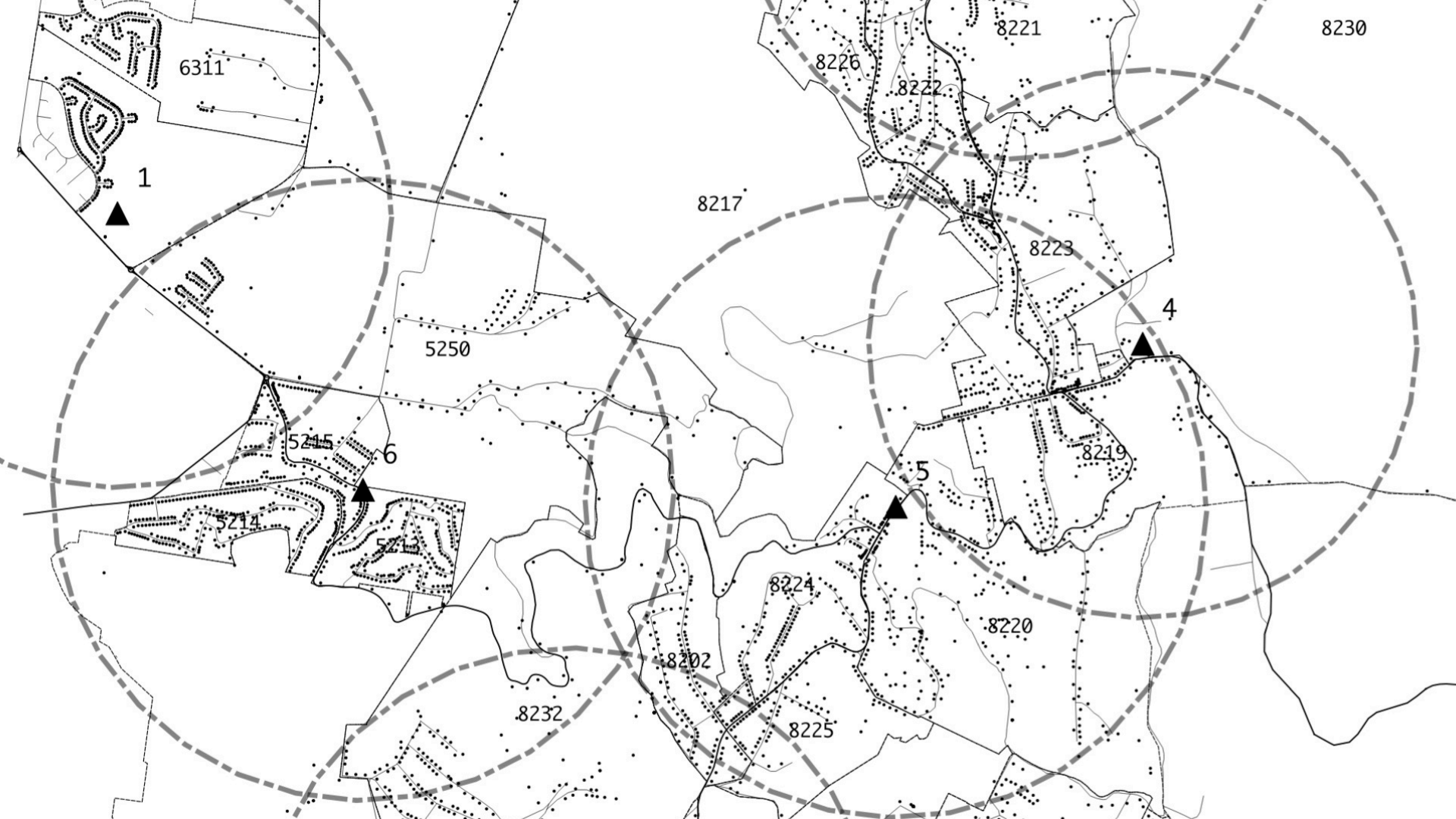
Exposure Count (vehicles)

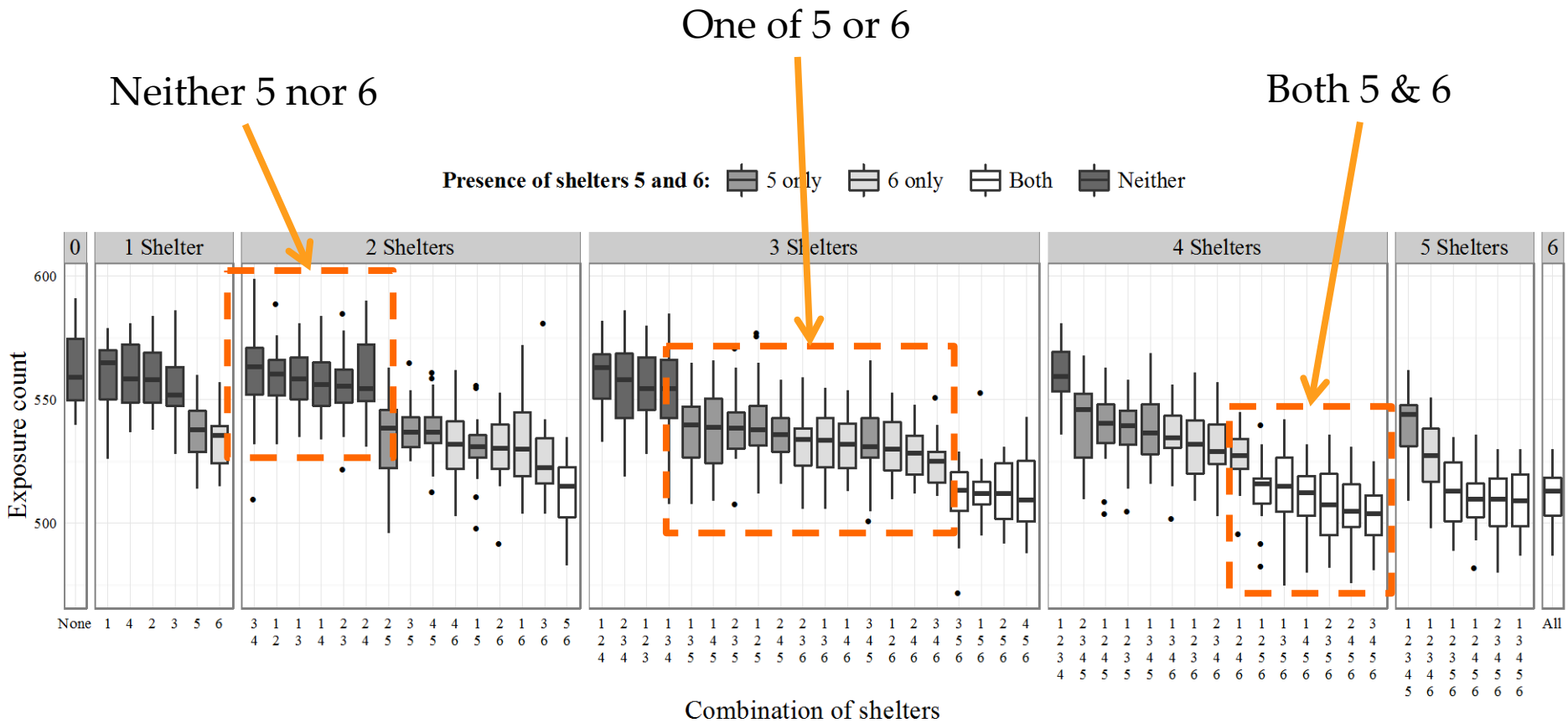
- 0.0 - 8.0
- 8.0 - 16.0
- 16.0 - 24.0
- 24.0 - 32.0
- 32.0 - 40.0
- 40.0 - 48.0

Clearance Interval (hrs)

- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0


Build
Scenarios 23
Fire danger index
75
Wind speed (km/h)
39
Wind direction
Ringwood East
Croydon South
Dorset Recreation Reserve
Montrose
Kilsyth
Kalorama
Silvan
Bayswater North
Kilsyth South
Mount Dandenong
Dandenong Ranges National Park
Olinda
Silvan Reservoir
Bayswater
Boronia
The Basin
Sassafras
Ferny Creek
Monbulk
Kallista
Sherbrooke
The Patch
Ferntree Gully
Upper Ferntree Gully
Tecoma
Upwey
Kallista
Mount Dandenong Tourist Road
Canterbury Road
Dorset Road
Mountain Highway
Scoresby Road
Boronia Road
Burwood Highway
Ferntree Gully Road
Napoleon Road
Olinda-Monbulk Road
Monbulk Road
Monbulk-Seville Road
Ridge Road


6311
1
8217
8221
8230
8226
8222
8223
4
5250
5215
6
5214
5213
5
8219
8224
8220
8202
8232
8225


One of 5 or 6
Neither 5 nor 6
Both 5 & 6
Presence of shelters 5 and 6:
5 only
6 only
Both
Neither
0
1 Shelter
2 Shelters
3 Shelters
4 Shelters
5 Shelters
6
Exposure count
600
550
500
None
1 4 2 3 5 6
3 4 1 2 1 3 1 4 2 3 2 4 2 5 3 5 4 5 4 6 1 5 2 6 1 6 3 6 5 6
1 2 4 2 3 4 1 2 3 1 3 4 1 3 5 1 4 5 2 3 5 1 2 5 2 4 5 2 3 6 1 3 6 1 4 6 3 4 5 1 2 6 2 4 6 3 4 6 3 5 6 1 5 6 2 5 6 4 5 6
1 2 3 4 2 3 4 5 1 2 4 5 1 2 3 5 1 3 4 5 1 3 4 6 1 2 3 6 2 3 4 6 1 2 4 6 1 2 5 6 1 3 5 6 1 4 5 6 2 3 5 6 2 4 5 6 3 4 5 6
1 2 3 4 5 1 2 3 4 6 1 2 3 5 6 1 2 4 5 6 1 3 4 5 6 2 3 4 5 6 1 3 4 5 6
All
Combination of shelters

Thanks.
Any questions?

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Xiaoyu Xiu (Emma)
Pimeng Fu (Preston)
Cynthia Boyton