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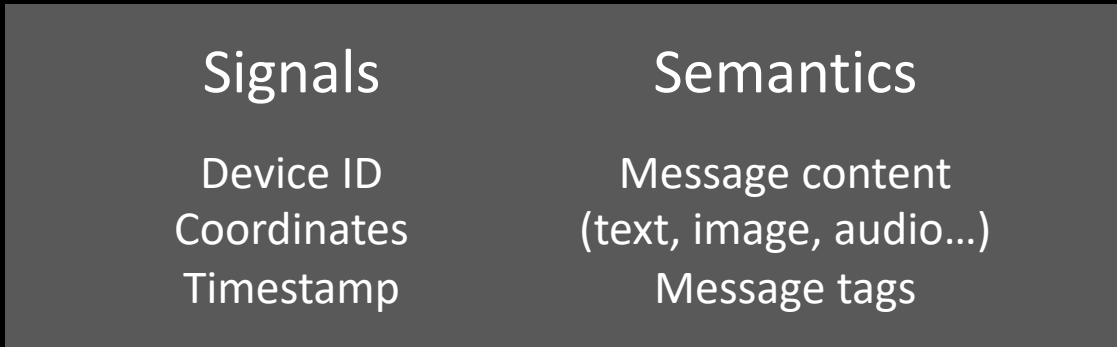
Department of Geography

Learning the social heartbeat of an urban landscape from real-time data traces

Sharon Richardson

January 2021

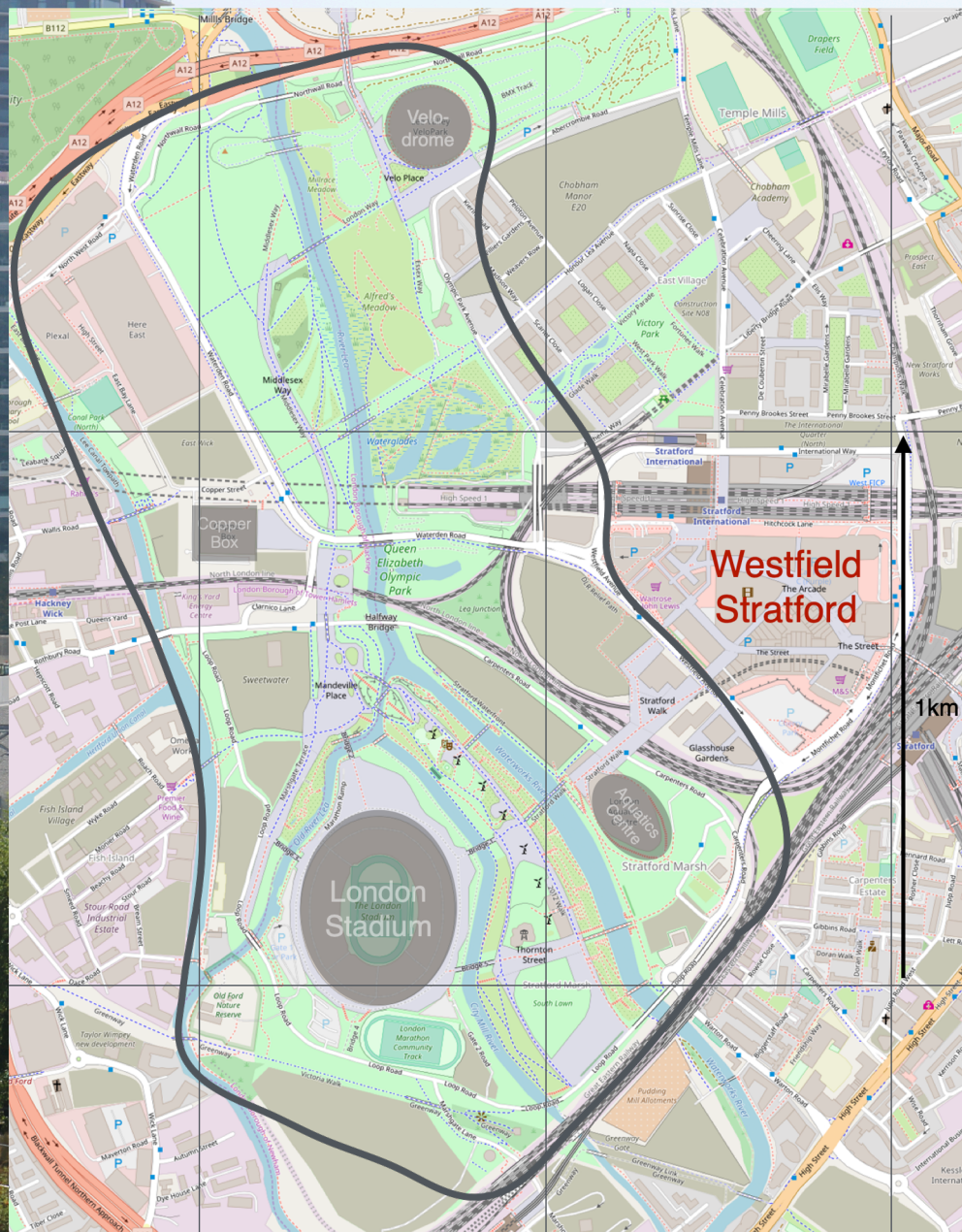
@joiningdots | [linkedin.com/in/sharonr](https://www.linkedin.com/in/sharonr) | www.joiningdots.com



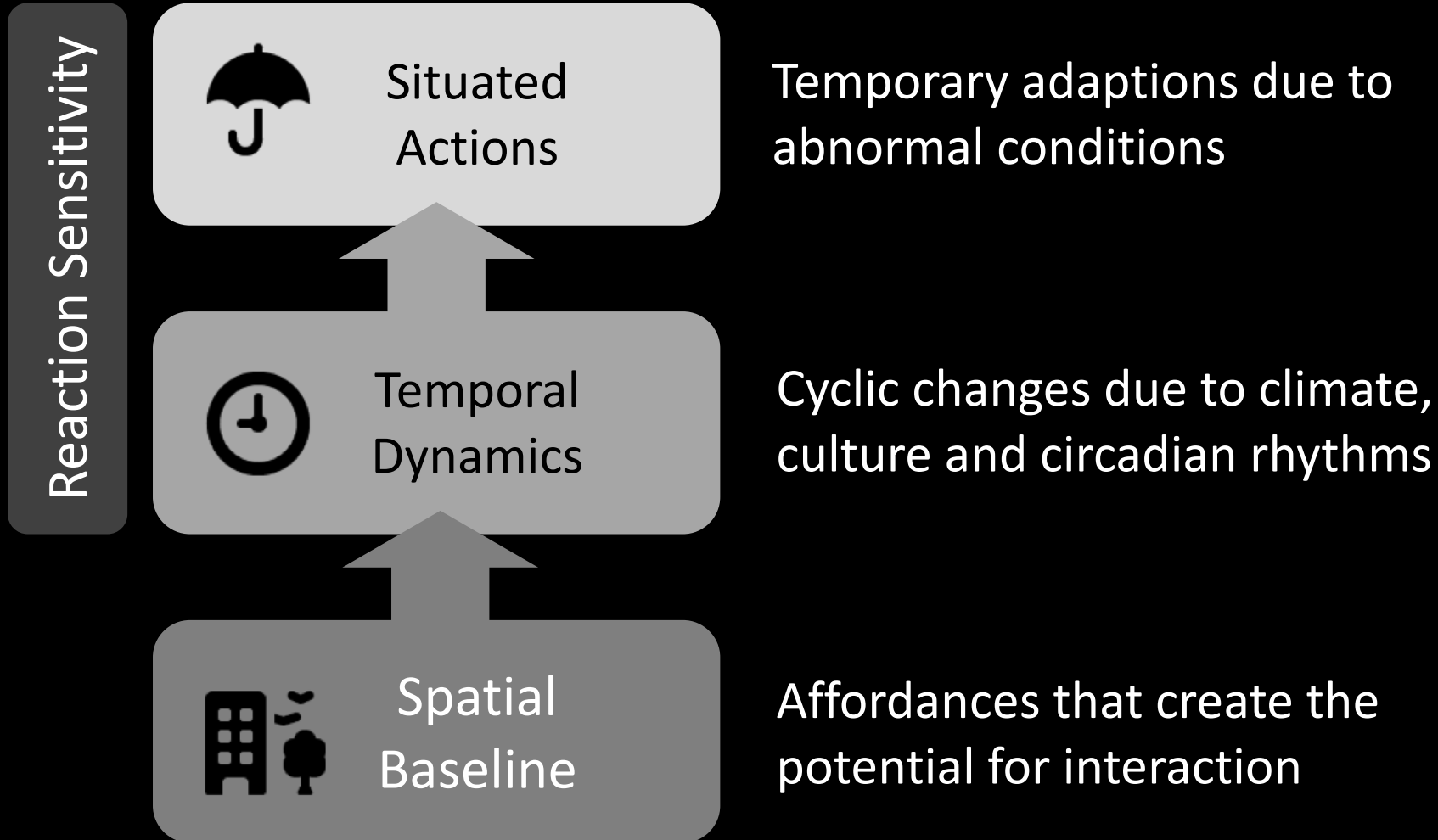
Queen Elizabeth Olympic Park (QEOP) Stratford, East London



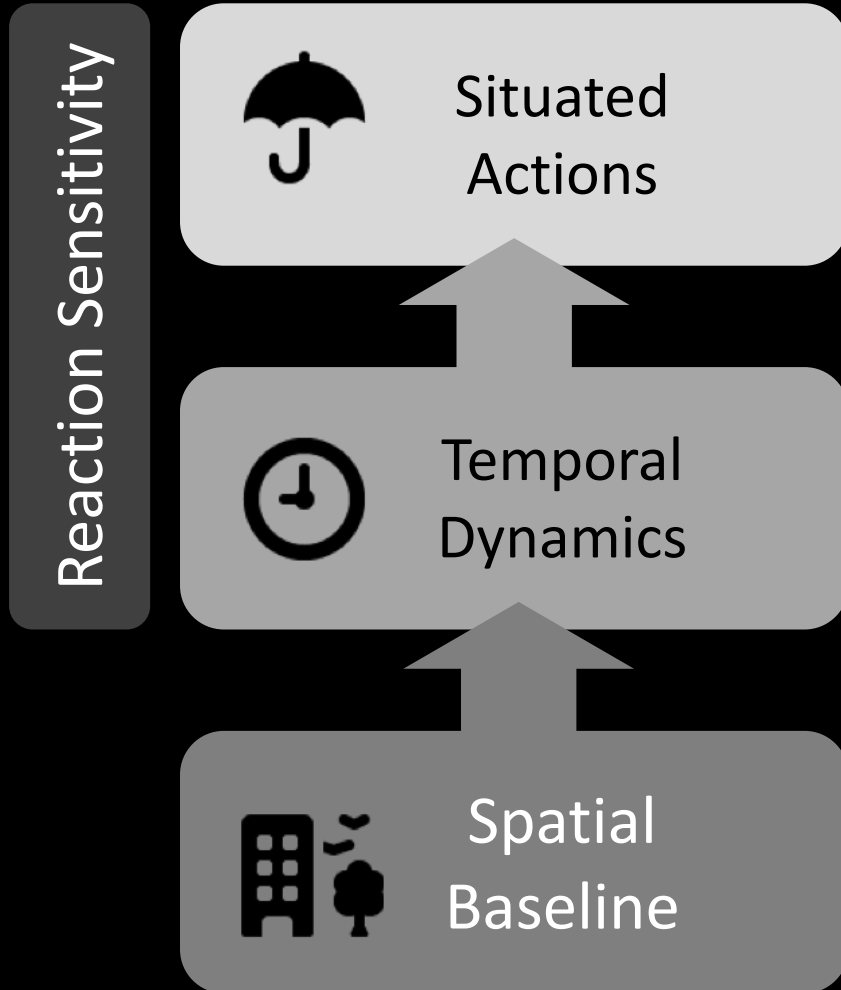
Queen Elizabeth Olympic Park (QEOP) Stratford, East London



Defining location-based contexts



P-STAR framework



$$P = f(S, T, A, R)$$

P = population behaviour

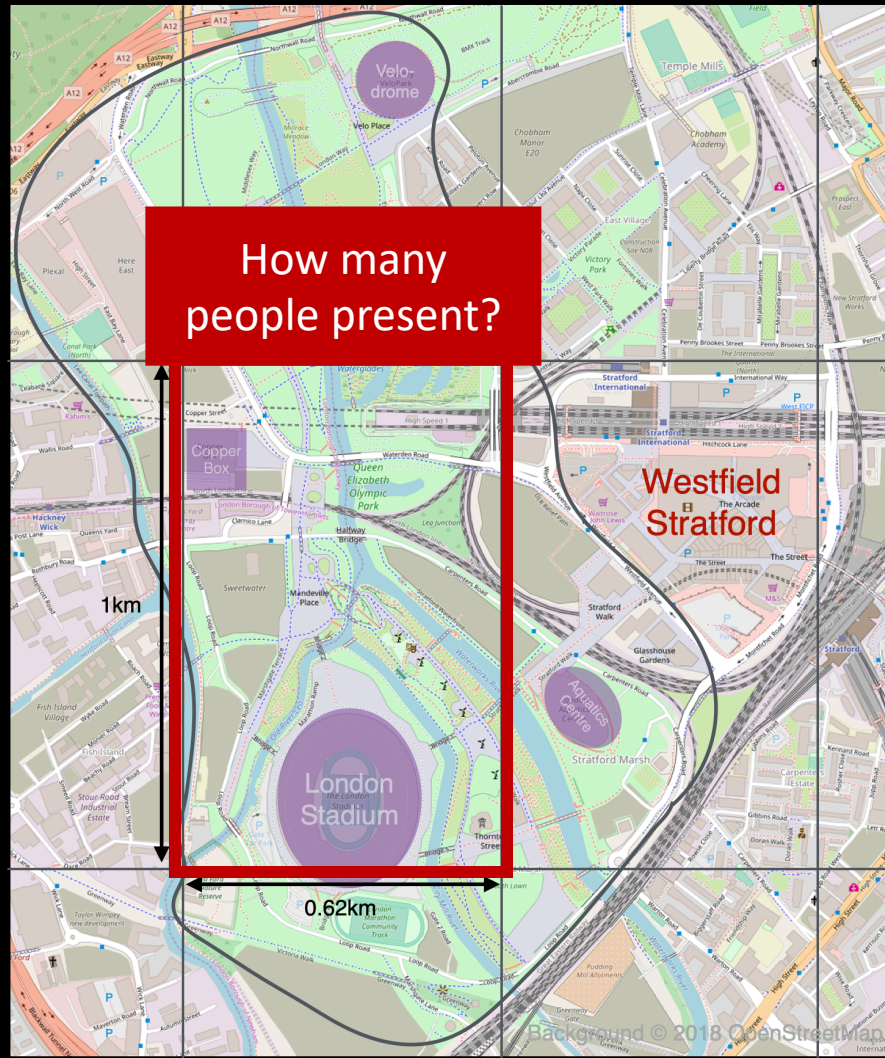
S = static spatial baseline

T = cyclic dynamic

A = acyclic adaption

R = reaction uncertainty

Estimating the active population...



Residential
(2011 census)
0

Ambient average
(2015 LandScan)
Approx. 6,000

Contextual
knowledge
Up to 80,000+

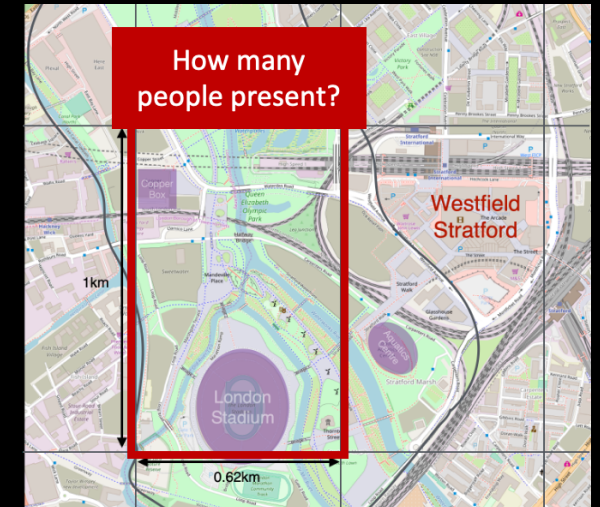
● Regular ● Tourist



Estimating the active population...

Population estimate = Spatial baseline x Time weight

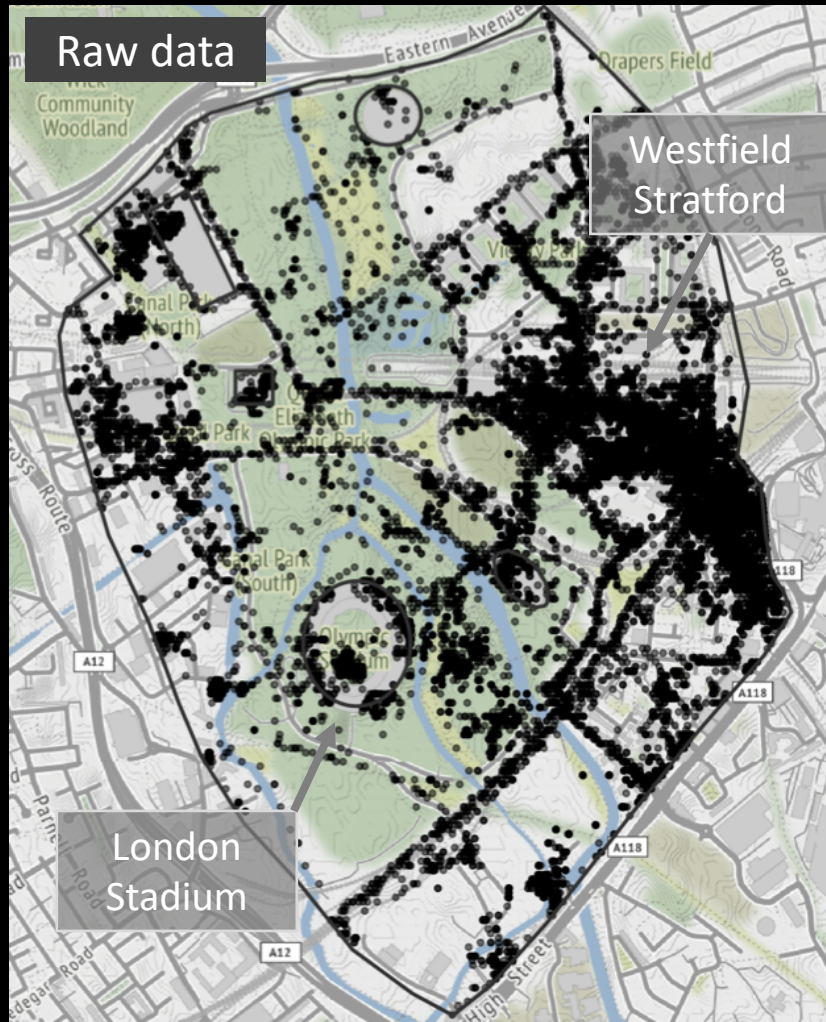
- Spatial baseline: LandScan ambient average
- Time weight created from mobile app data



Context		Estimate ¹ (weight)		Regulars vs Tourists	
S	Ambient average	5,907	(1.00)		
T ₁	Friday normal at 10am	1,700	(0.28)	33%	67%
T ₂	Friday normal at 6pm	9,900	(1.67)	40%	60%
A	Friday event at 6pm	55,100	(9.33)	4%	96%

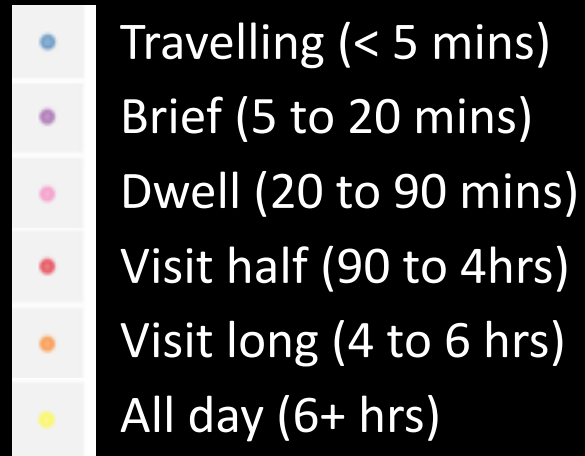
¹ Excluding LandScan ambient average, estimates have been rounded to nearest 100

Learning dwell and movement patterns



Cluster analysis to segment landscape into active spaces

Behaviour classified based on duration in active space



Limitations of mobile data analytics

- How to respect privacy *and* gain insights into behaviour?
- Is the data representative of the local/visiting population?
- Are all areas accessible for mobile data collection?
- Sensor-based sources:
 - Is the placement of sensors biased?
- What behaviours and experiences cannot be captured?

Summary

- Spatial analysis produces generalised insights
- Space-Time analysis can produce contextual insights
- A framework enables focus on questions rather than data
- Administrative and land-use methods provide static baselines
- Sensed/Mobile data reveal dynamic presence and experiences
- Consideration is needed for bias, privacy and ethics
- Always think about what data is missing...



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Thanks for listening!

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Learning seasonal and situational influences

Devices connecting to park WiFi daily during 2017
(and month average)

