Consumer Data Research Centre

An ESRC Data Investment

UNIVERSITY OF LEEDS

Simulating Urban Flows of Daily Routines of Commuters

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http://surf.leeds.ac.uk/

ABMUS 2018, Stockholm, 15 July 2018

Ambient population

Not (only) where people live...

But where they are throughout the day

An ABM of the Ambient Population

1. Simulating urban flows

2. Agent behaviour and activities

3. Study area and data

4. Results and conclusions


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Objectives

How many people at urban locations?

Which activities are they doing?

Calibrate with ((live) ‘big’) data

Possible applications

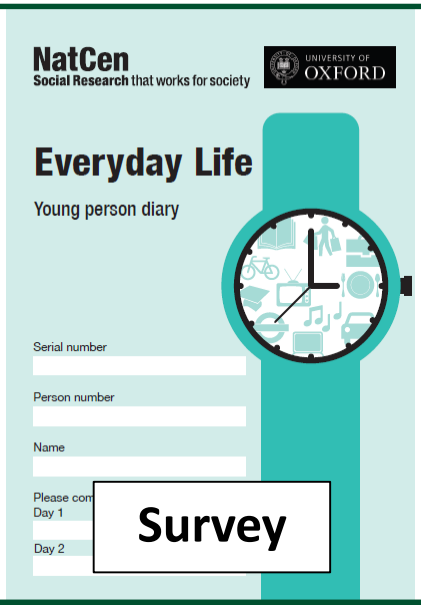
Crime risk: more people, more crime?

Air pollution risk: more people, more people affected

Transportation: e.g. optimising public transport

‘Big’ and ‘traditional’ data for calibration and validation

Census



Survey

Footfall

Twitter / Apps

Smart card

Phone signal data

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Agents and their activities

Individual agents that move around to do these activities:

- Being home
- Working
- Shopping
- Lunch / dinner in restaurants
- Leisure (sports, going out, …)

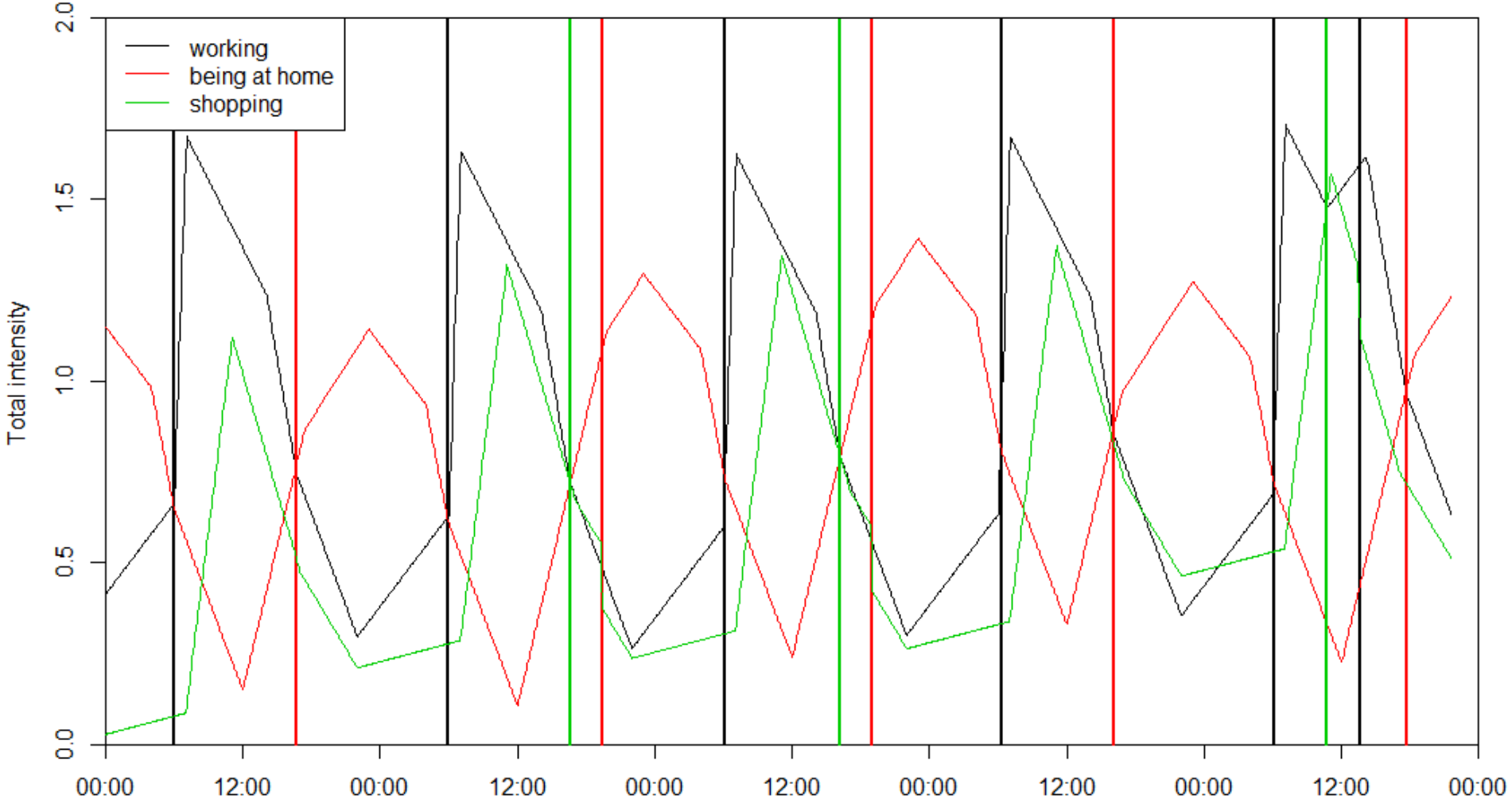
Agents

- Individuals
  - » Not yet households

Agents and their activities

Intensities as a behavioural framework

→ No daily schedules for agents



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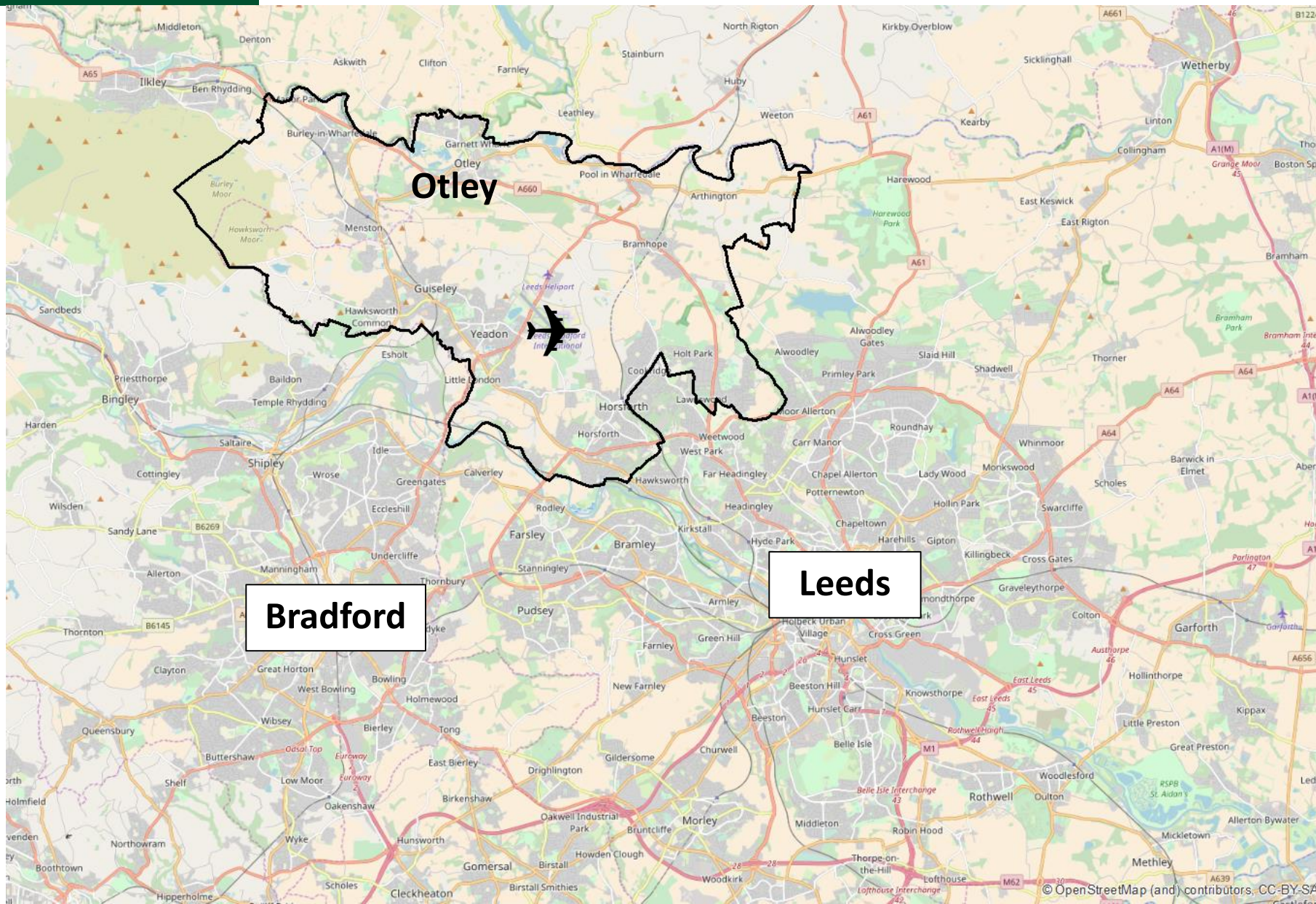
Study area


Scotland
Aberdeen
Dundee
Edinburgh
Glasgow
Londonderry/
Derry
Newcastle
upon Tyne
United Kingdom
Sunderland
Northern
Ireland
Isle of Man
Leeds
Preston
Hull
Sheffield
Ireland
Dublin
Galway
Ireland
Liverpool
Nottingham
Birmingham
England
Norwich
Wales
Waterford
Worcester
Cambridge
Cork
Gloucester
Oxford
Swansea
Cardiff
London
Bath
Dunkerque
Exeter
Southampton
Brighton
Calais
Portsmouth
Plymouth

Study area


Otley
Bradford
Leeds
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Data

Census data (for calibration)

Flows between home and work for Output areas

→ **Focus on commuters / workdays in the model**

Activity survey (for calibration)

UK Time Use Survey 2014-2015

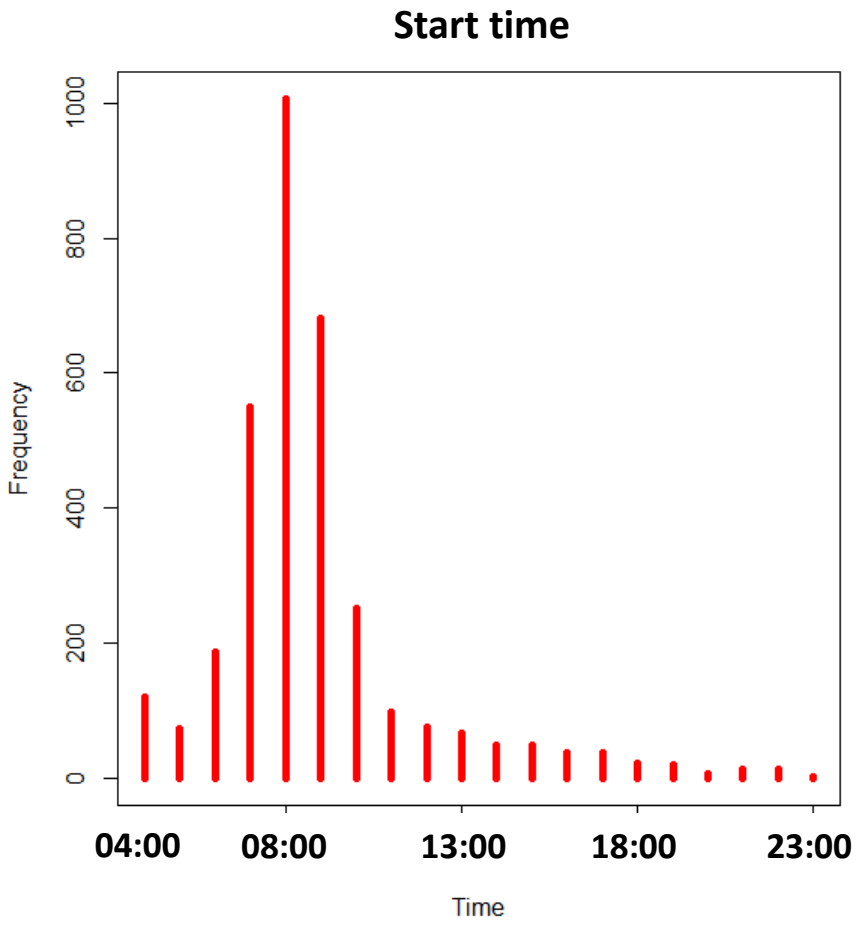
WiFi sensors (for validation)

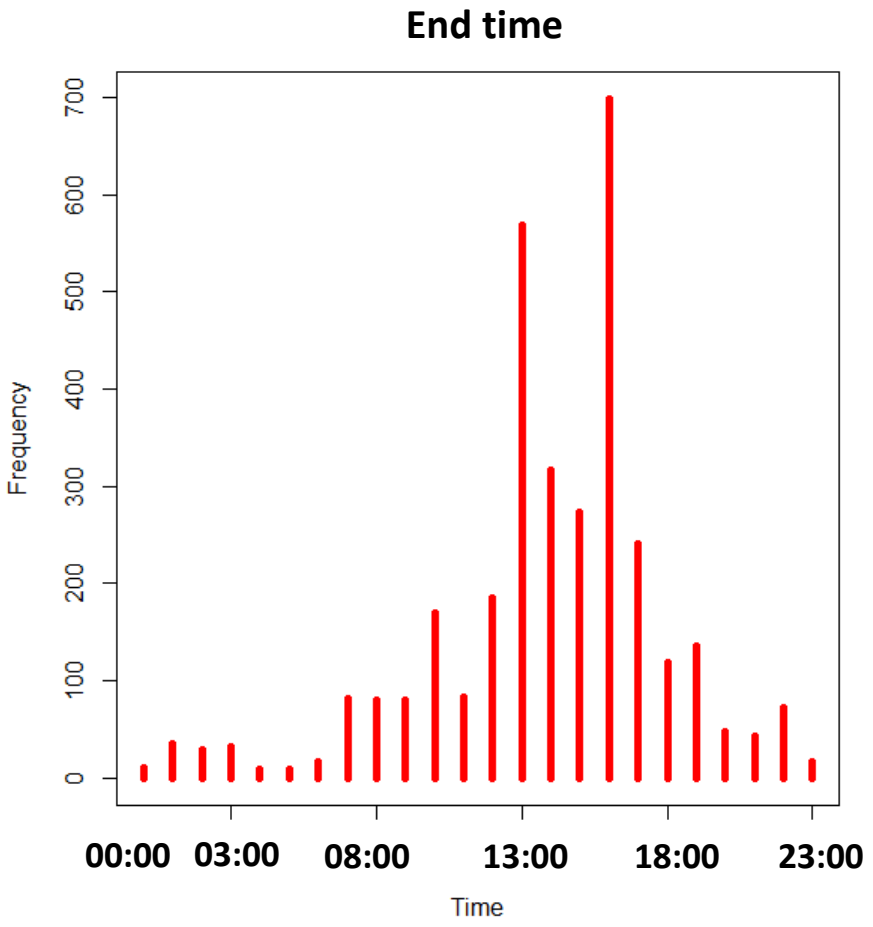
Count individual phones passing by in Otley

UK Time Use Survey 2014-2015

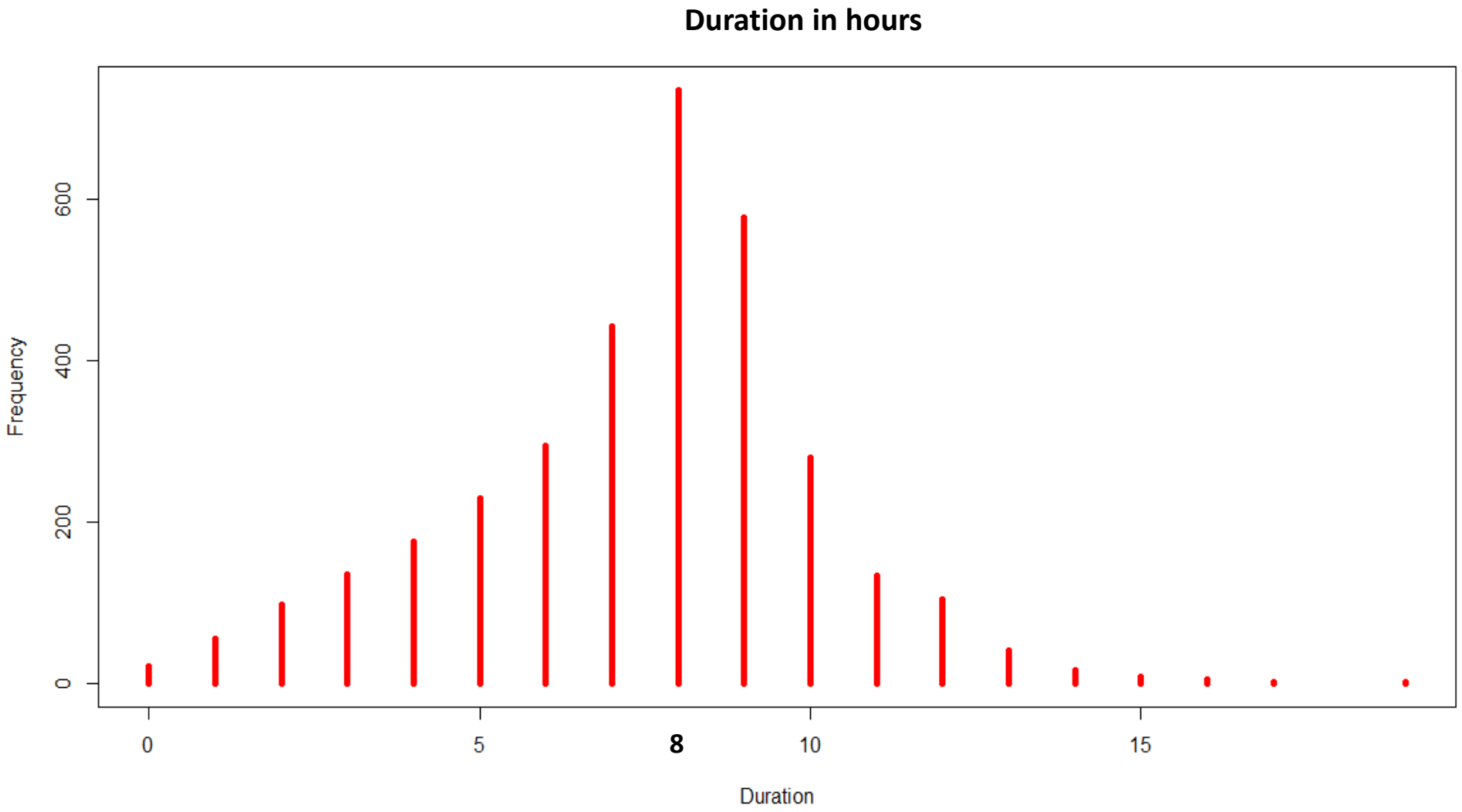
- 8278 respondents
- Demographic and household information
- 10 minute intervals
- Main and secondary activities
- Type of location
- Only 2 days per person

Working at the office



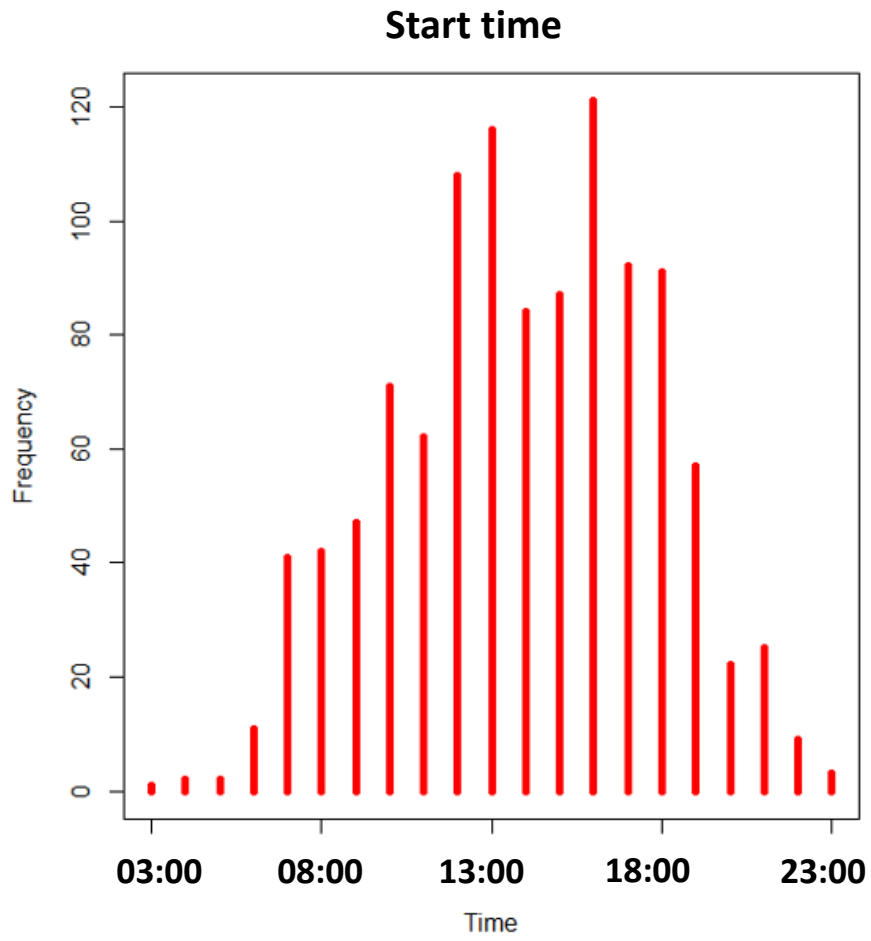


Working at the office

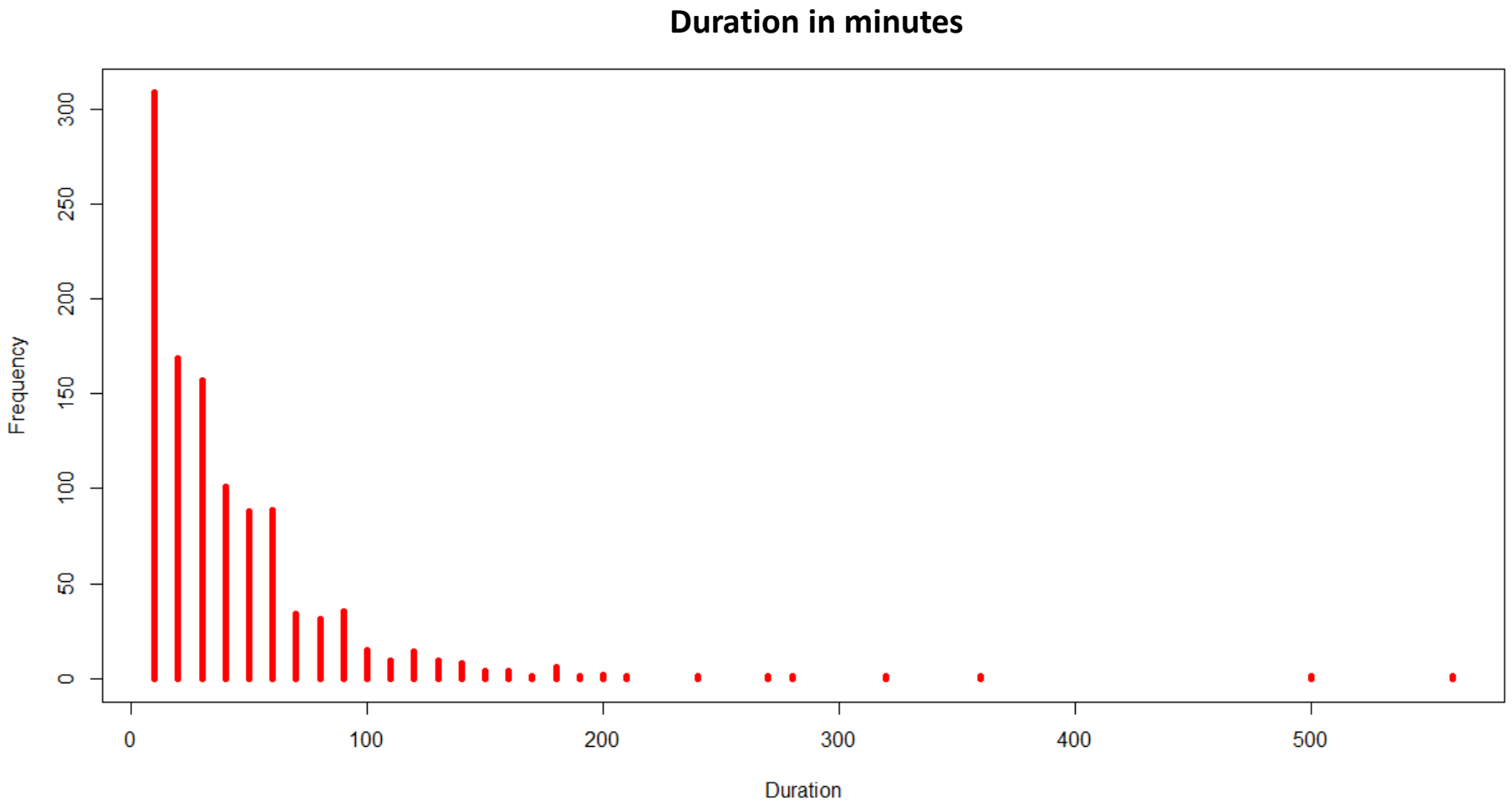


Shopping on a workday

About 30% of respondents do some shopping on a workday



Shopping on a workday



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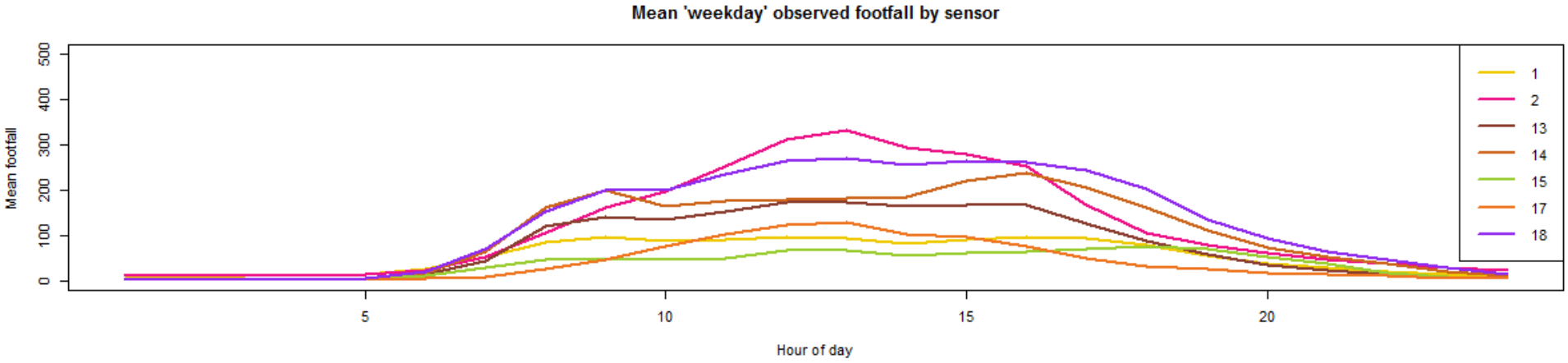
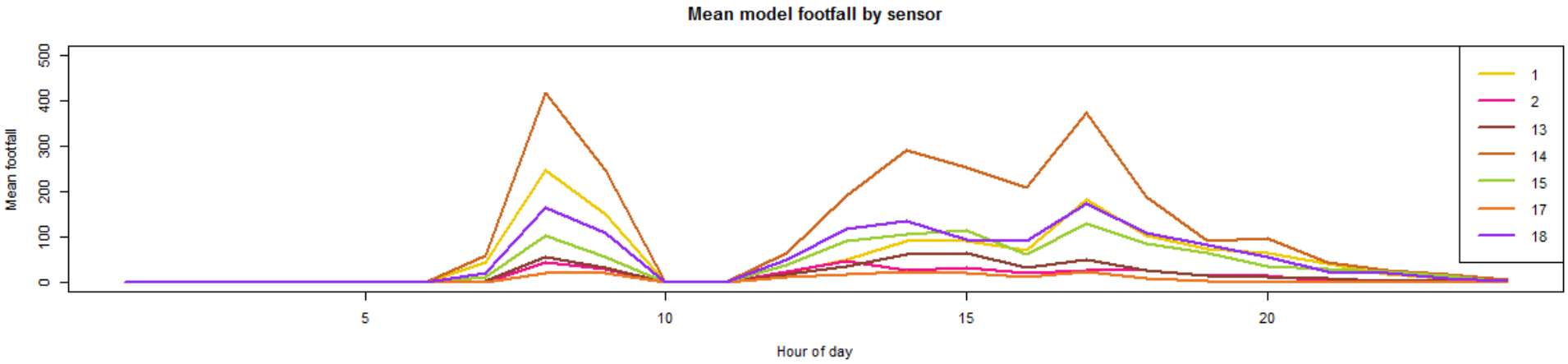
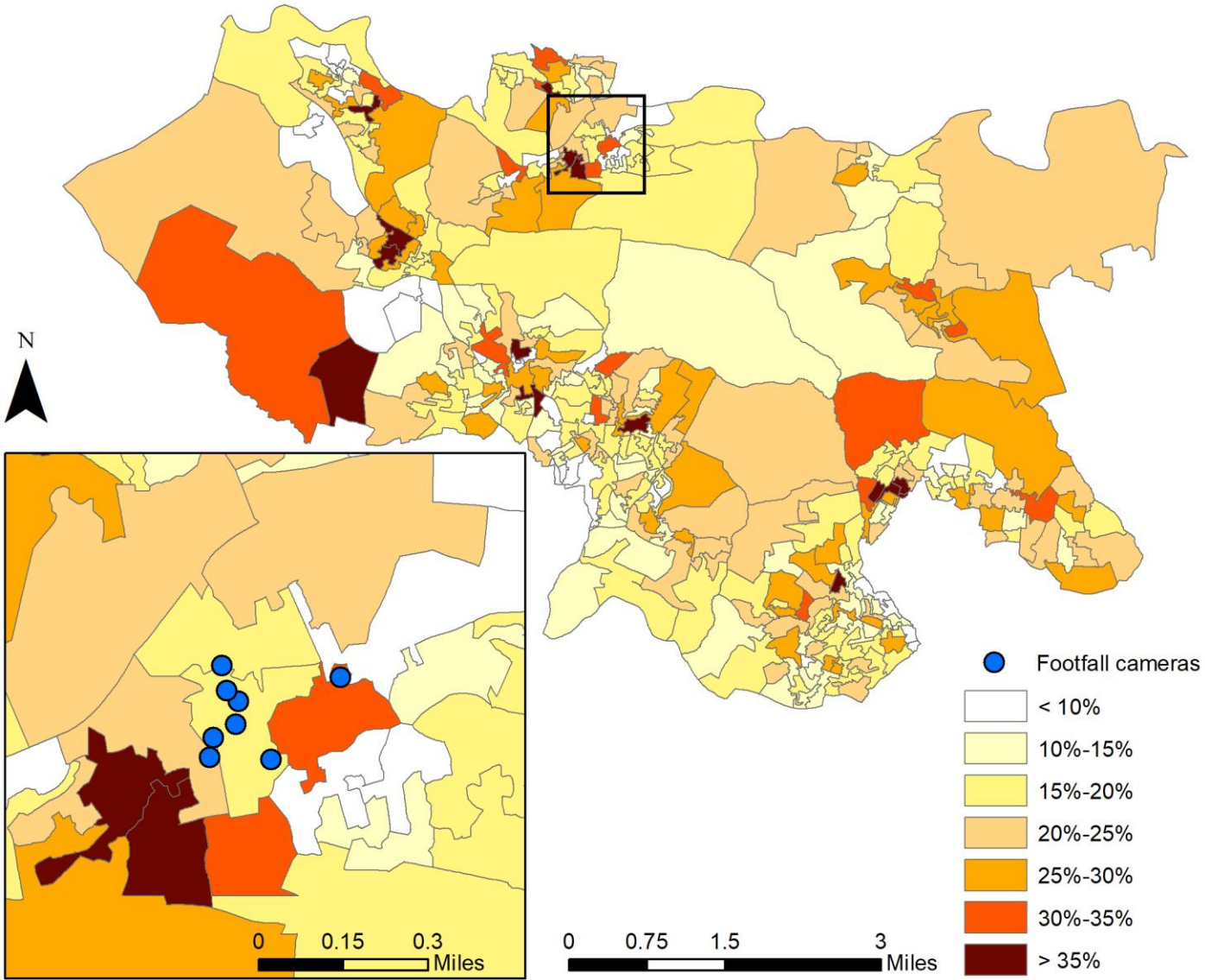
Footfall observations vs. model results





People in age group 65+ in the study area



Conclusions and future work

Modelling the ambient population

- Commuters vs. total population
- Combining ‘traditional’ and ‘big’ data
- Modelling the behaviour of agents

Future work

- Generalising the model
- Dynamic calibration

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Thank you!

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