#### Digital Workshop - Toulouse School of Economics

#### Developments in Smartphone-based Travel Surveys: an Application to New Mobility Services in London

#### Melinda Matyas MaaSLab @ UCL Energy Institute October 4, 2017



#### Outline:

- 1. Background and motivation
- 2. Smartphone based travel surveys / London Mobility Survey
- 3. Application to new mobility services and MaaS
- 4. Current and future research directions



## Background

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## **Background and Motivation**



#### Open data and **APIs**

#### Smartphones for ubiquitous data capture

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	28 29	return "Tube Status"; }		
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## Smartphone-Based Travel Surveys

#### and the development of the London Mobility Survey



### **Travel Surveys**

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#### Common elements:

- Respondent socio-demographic information
- Travel diary: snapshot of an individual's travel patterns (RP)
- Stated preference experiment for new services

#### Evolution of travel diaries:

- 1950's-1960's: face to face interviews and mail out and mail back 1990's and 2000's: computer assisted interviews and surveys using GPS loggers (e.g. Zmud and Wolf, 2003; Oliviera et al., 2011)
- Current state of art: the smartphone based travel surveys

# Smartphone travel surveys

- Smartphone based GPS travel surveys usually come in the form of a downloadable application and an online interface
- Benefits:
  - More accurate trip start and end times
  - Complete trip chain recorded
  - Potential for extensions using open data, APIs etc.
- Recent developments have focused on transport mode detection and activity recognition (Gonzalez, 2010; Nitsche et al., 2014; Hemminiki et al., 2013; Kim et al, 2015)



## Future Mobility Survey (FMS)

- Online interface
- Mobile phone application for tracking (activity diary):
  - mode detection
  - activity recognition









## London Mobility Survey (LMS)

- Step 1: Create your account
- **Step 2**: Answer the pre-questionnaire survey
  - Most of the questions have been taken from LTDS questionnaire
  - Extra questions have been added to customise it to the purpose of our study:

→New mobility services (sharing economy), Journey planners Parking

Step 3: Download the FM Sensing app and start tracking your activities for one week (activity diary)

Step 4: After a week of tracking and validating your activities, go to the post survey page to check your statistics and tell us your opinion about a MaaS for London



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## Activity diary

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#### Capture travel within the UK and even internationally





### Enhancements

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• Open APIs have been linked in the back-end of the system to enhance predictions, reduce response burden, and record more information.



## Using APIs for automatic cost calculation





## **Parallel information**

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• Information from Open APIs can be linked to each trip



## **Mobility Record**

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• Trip data & Pre-questionnaire are used to provide statistics to users



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# Application to Study New Mobility Services



## Mobility as a Service (MaaS)

Seamless mobility





## Mobility as a Service (MaaS)

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## Current situation

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New mobility distribution model including a MaaS Provider/MaaS Operator

For users:

- One, integrated service
- Offer services as:
  - Pay as you go
  - Tailored mobility subscription plans



MaaS model

#### MaaS plans CONFIGURE YOUR PACKAGE Unlimited UBER 120 km Intercity 6 Journeys COST 358 € BUY (per month)

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→ How to create mobility plans to fit user needs?



Sources: maas.fi; Burrows, 2015



# How can we use the London Mobility Survey to help us study individual preferences for MaaS plans?

- Build stated preference experiment as an extension to LMS but using information from LMS
  - Context dependence!
  - Use pre-questionnaire responses
  - Use tracking / mobility record

#### 2. Have more detailed information for later analysis



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#### Sample and response rates

First wave (128) details: Number of fully verified days  $\rightarrow$ 

- Days validated: 788
- Stops validated: 4,108

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■ 7
■ 8
<b>9</b>

	Wave 1	Wave 2	Wave 3	Total
Registration	128 / 100%	108 / 100%	98 / 100%	334 / 100%
Completed pre-survey	128 / 100%	98 / 91%	85 / 86%	311 / 93%
Tracking app download	104 / 81%	77 / 71%	70 / 71%	252 / 75%
7+ days validate in diary	64 / 50%	29 / 27%	37 / 38%	130 / 38%
Post-survey completed	54 / 42%	26 / 24 %	31 / 31%	111 / 33%
(including SP)				

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### Current and future research

Data collection:

- 'Short' version of survey, independent of tracking 1004 respondents
- Further waves of 'long' survey to increase sample

Analysis:

- Spatial-temporal Integration of additional collected data in tracking dataset
- Get data ready for modelling trip chains/networks
- Discrete choice modelling of MaaS SP



#### Thank you! MaaSLab @ UCL Energy Institute

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