Impacts of Mobility as a Service on existing sustainable modes: A pilot indicator to engage transport decision makers

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Summary

Transport decision makers planning for the resilient, sustainable and equitable governance of smart mobility seek insights from geographical indicators of the impacts of change on people in places. Initial indicators must be produced in a timely fashion, so may be a "minimum viable product". The purpose of these indicators is to raise policy relevant questions from the data and ensure further iterations help the organisation move from data to decisions. We present an example indicator of the potential impacts of Mobility as a Service on sustainable mode share and car use.

KEYWORDS: Transport, 'Mobility as a Service', People, Energy

1. Introduction

Critical evaluation of the positive and negative outcomes which could arise from new mobility technologies and services is a key objective of planning authorities planning for the resilient, sustainable and equitable governance of smart mobility (Docherty et al., 2017). To deliver public value, authorities may seek insights from geographical indicators of the impacts on people in places. It is important to consider both the transport infrastructure and the activity system of people in developing resilience and adaptation policies for transport planning (Marsden et al., 2014, Hagerstrand 1970).

Indicators serve multiple functions. Simple indicators: "minimum viable products" may have a discursive purpose to engage policy makers and draw attention to questions which require further investigation, others may be more complex analysis (Boulanger, 2007). In this paper we present indicators of the former type.
We present example indicators of the potential impacts of Mobility as a Service(MaaS) on sustainable mode share and car use.

2. Data

Data Sources: ACORN geodemographic classification data via UK Data Service
https://www.ukdataservice.ac.uk/
Vehicle miles Travelled: MOT Project EPSRC EP/K000438/1
https://environment.leeds.ac.uk/transport-research/dir-record/research-projects/754/mot-motoring-and-vehicle-ownership-trends-in-the-uk
Postcode population data
https://www.nomisweb.co.uk/census/2011/postcode_headcounts_and_household_estimates

The presented indicator looks at greater Manchester, but could also be calculated for other UK cities. Analysis was carried out in R (ggplot, tidyverse & tmap packages).

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3. Method

Step 1: Buffer a 3 mile radius of the city centre to define an initial MaaS catchment for Greater Manchester where the full range of MaaS services including unlimited taxi use would be available. Whim West Midlands has a rule that you can only start a Gett journey within 3 miles of the city centre. https://helpcenter.whimapp.com/hc/en-us/articles/360002685713-Whim-Subscription-Plans-in-Birmingham

Step 2: Define affordability (see **Figure 1**) The Whim unlimited MaaS package was initially priced at £349 per month. As a simple assumption exclude any areas which are in ACORN categories 4 and 5.

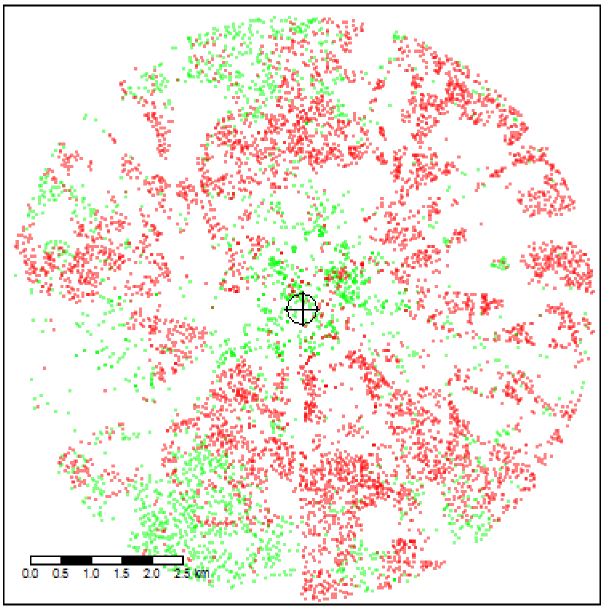

Figure 1 Postcodes where people are more likely to afford MaaS are shown in green, those less likely in red. The centre of the city and buffer is marked.

Step 3: Calculate the number of people in each post code meeting the criteria in steps 1 and 2 who currently commute using each sustainable mode (walk, cycle, Metro-link and bus) show in **Figure 2**. Also calculate the number of people commuting by car.

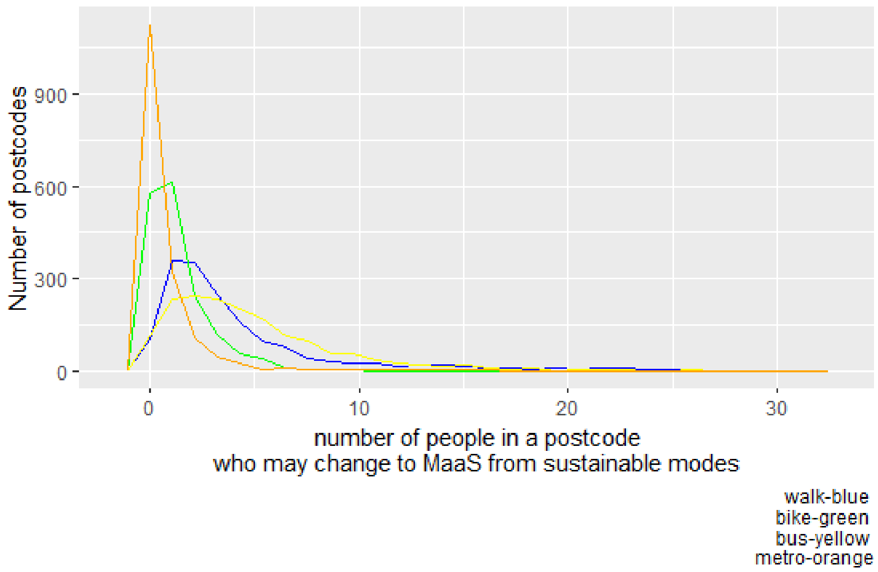

Figure 2 People who may change to MaaS from sustainable modes

Step 4: map the results and note the questions raised.

4. Results

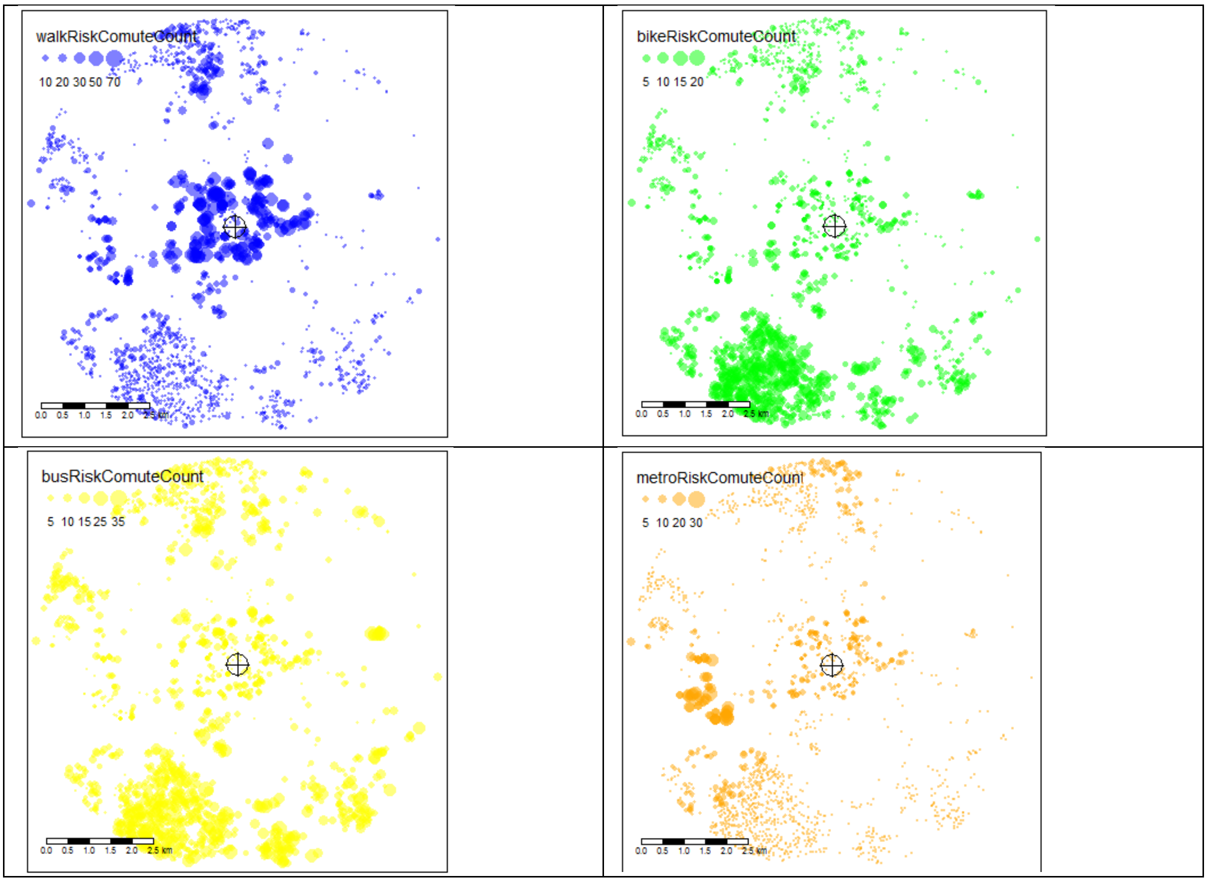

Figure 3 Maps presented to policy makers are saved as interactive maps with an OSM basemap using the 'tmap' package.

5. Discussion

The filtering operations shown in **Figure 1** raise questions about the affordability of a potentially influential new transport mode.

Figure 3 shows simple maps without a backdrop map. As well as plotting to documents, we have used tmap to produce interactive web-maps which users can pan and zoom to get a better view of output. the maps suggest that in certain locations there is a risk some people who currently travel by sustainable modes could switch to using a taxi type of service. This raises questions about which people would and would not change mode? This then raises questions such as: Would a MaaS service have an impact on congestion, or air quality in the city centre? Would walkers stop walking and would this impact upon health?

Figure 4a shows the potential number of current car commuters who could switch to MaaS services. This raises questions about which of these individuals are more likely to replace their car commuting with a MaaS service. **Figure 4b** re-colours the points to emphasise places where car use (Vehicle miles travelled per year per person) is high. This provides a suggestion of where energy saving potential from MaaS might be high.

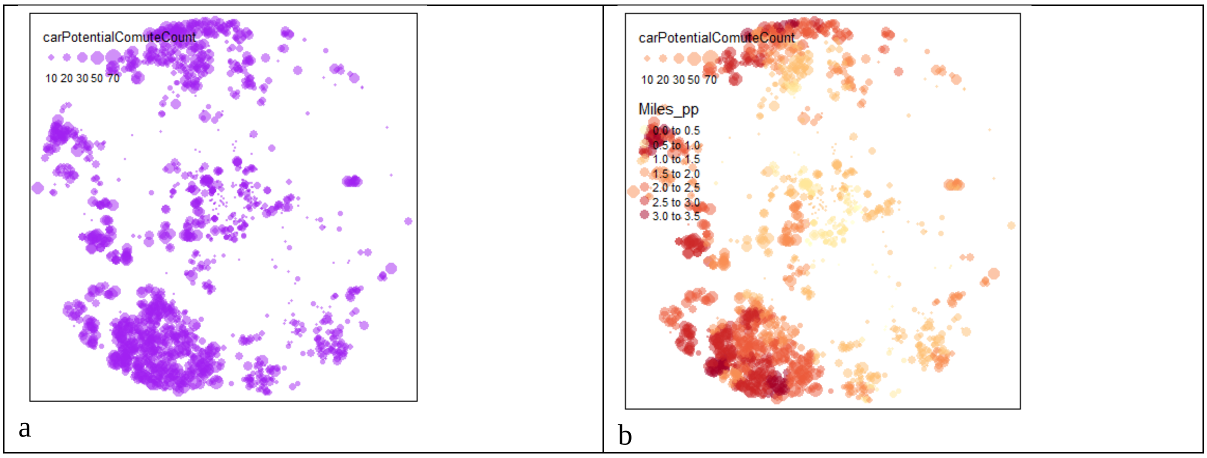

Figure 4 (a) number of individuals with potential to switch from car to MaaS. (b) as (a) but coloured by the current mean car miles travelled per person per year.

The maps illustrate a set of simple indicators with a discursive function. These indicators are being used to engage policy makers and senior officials. This will first generate policy questions, and this in turn will guide the technical specification of further analyses. Adopting an iterative approach to data analysis aims to ensure that methods applied are appropriate to the task and that the outputs arise which are relevant to policy and decision making.

6. Further work

The assumptions of coverage and the ACORN segments most amenable to MaaS are two obvious refinements.

The indicators combine three data sources. However a more technically refined analysis may require further data inputs. For example transport accessibility statistics, and information about transport supply. It may also be desirable to incorporate more information about variation between individuals in each area. This might also require more complex methods of data linkage. For example the authors are currently discussing how spatial-microsimulation may be used to understand more about how the people within Greater Manchester may be affected by transport system changes and what capabilities and constraints people face in terms of achieving an equitable reduction in transport energy demand.

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Biographies

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