

Activity based modelling for a sustainable introduction of new mobility services in rural areas

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Activity based modelling for a sustainable introduction of NMS in rural areas

- Need to provide new tools to appraise MaaS
- Barriers perceived by different Stakeholders
- A data-driven approach to transport policy
- Requirements for a Large-scale demonstrator
- Transferability in rural areas



Business Case for New Mobility Services Demand Modelling tools

- Technology-driven market
- Need from the Government to appraise NMS and MaaS schemes
- Market Needs for the introduction of New Mobility Services
- Demand Modelling to de-risk the introduction of NMS and support Local Authorities in the assessment
- Identify requirements for a Large-scale demonstrators to accelerate the adoption of a common methodology across the UK

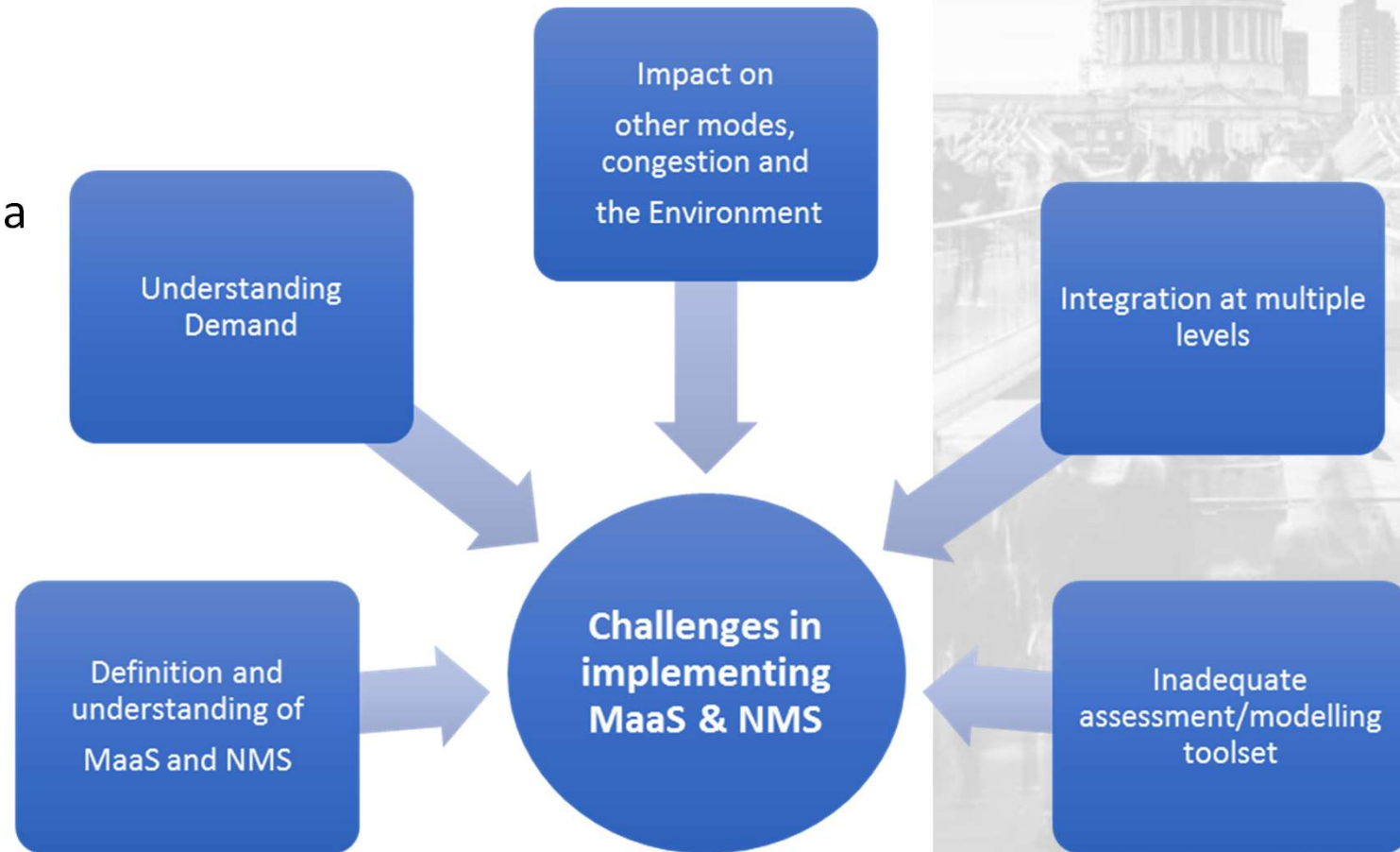
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Business Case for New Mobility Services

Stakeholders' Perspective

- Confusion around the definition of MaaS
- Current challenges in implementing Mobility as a Service and New Mobility Services
- Modelling to assess the impact of NMS
- Data requirements for integration at multiple levels



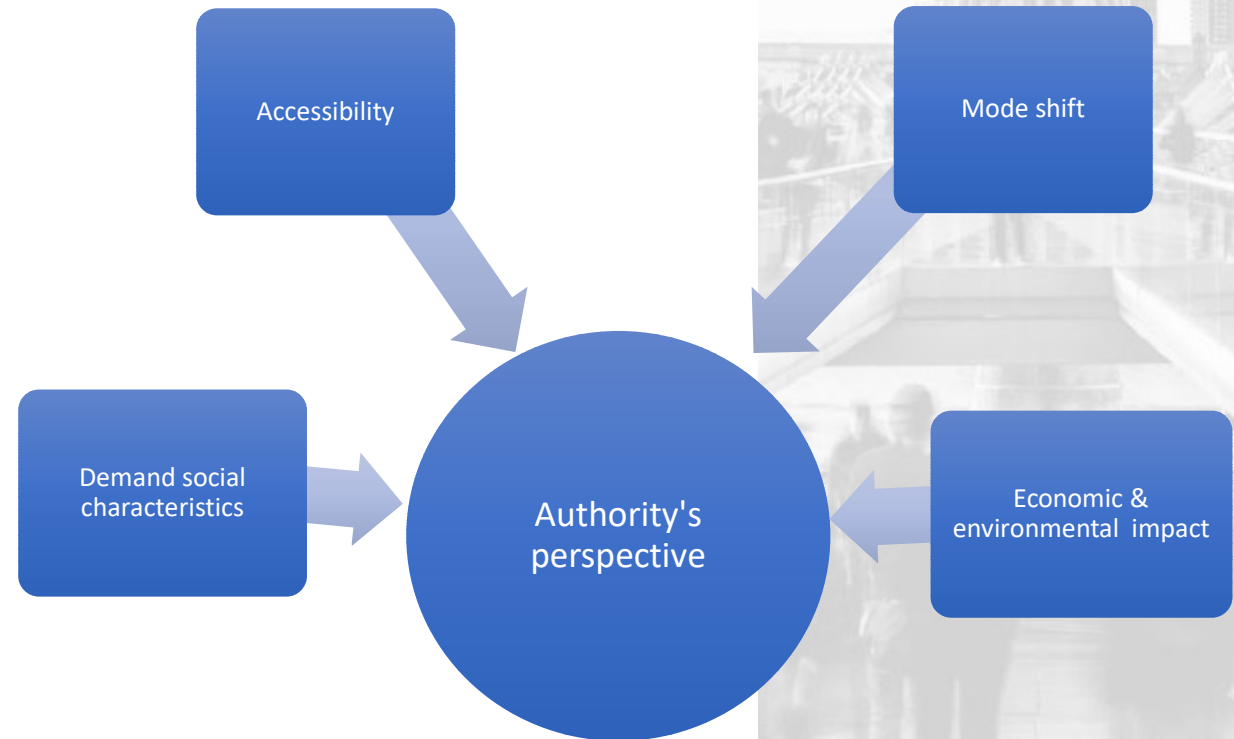
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Business Case for New Mobility Services

Stakeholders' Perspective

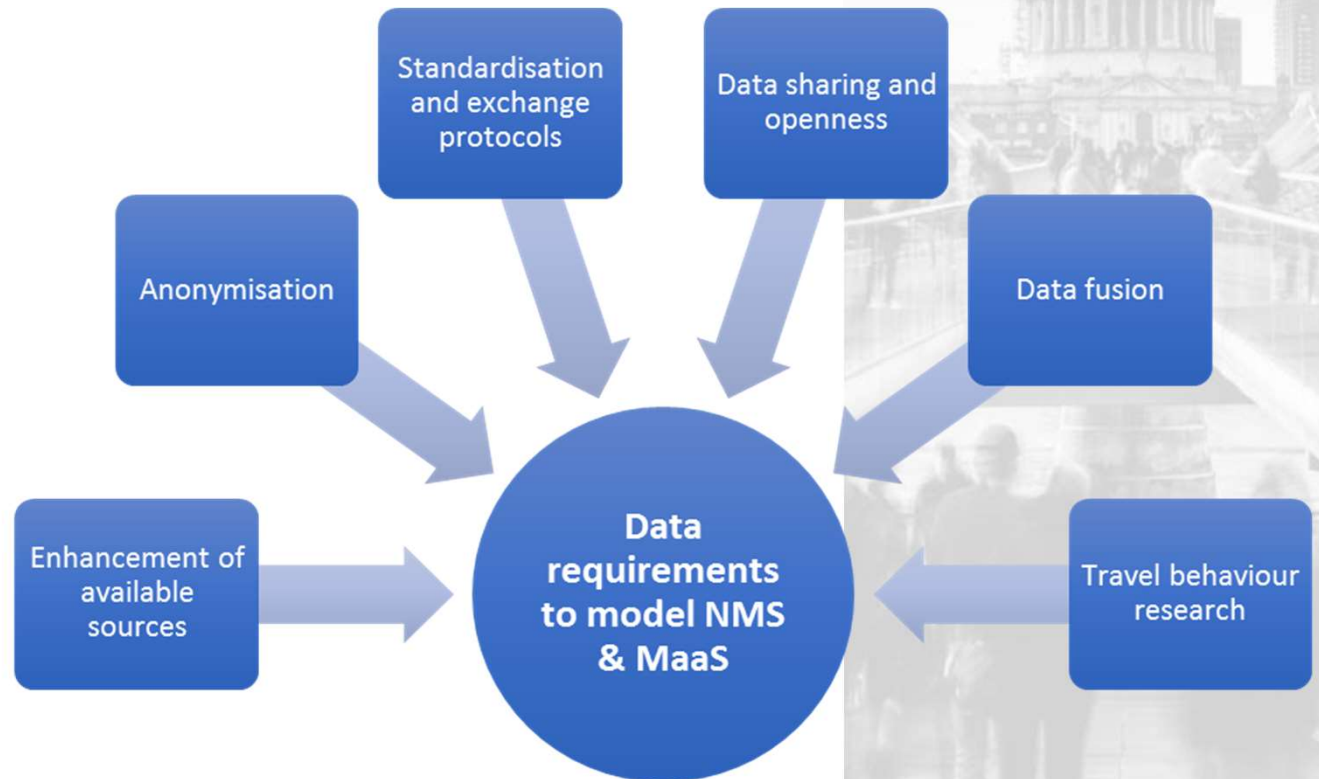
- Uncertainties linked to the uptake and viability of small on-demand services
- Characteristics of the potential customers and their travel habits
- Detrimental effect on the less flexible public transport services
- Data Sharing and Collaboration among operators
- Inadequate tools to assess NMS and MaaS to guarantee Social inclusiveness and accessibility to all



Business Case for New Mobility Services

Data Ecosystems

- Data Landscape for Smart Cities
- Availability of the data and level of Access
- Data Fusion Techniques: approaches required to process the data into usable formats
- Implications on the model calibration and validation.
- Urban and Rural Context

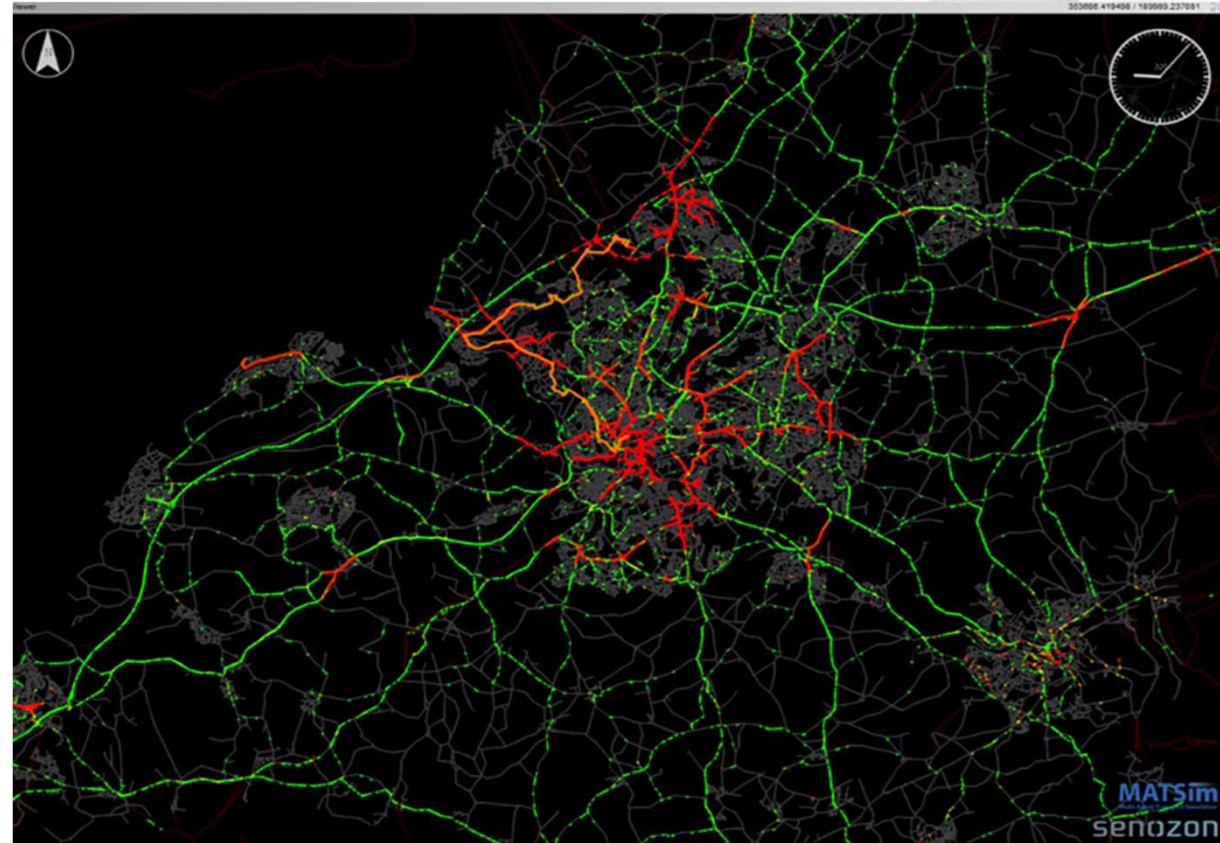


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Business Case for New Mobility Services

Demand Modelling Requirements – Key Changes

- Contribution that private on-demand services provide to a wider public transport ecosystem, but also
 - End-to-end users' journeys
 - Multimodal journeys
 - Travel behaviors, users' preference and attitude towards sharing
- Shift towards Activity-based Modelling to represent the end-to-end users' journeys



MODLE project- Demand model for the South West of England

Predict Demand to increase the uptake of Mobility Services

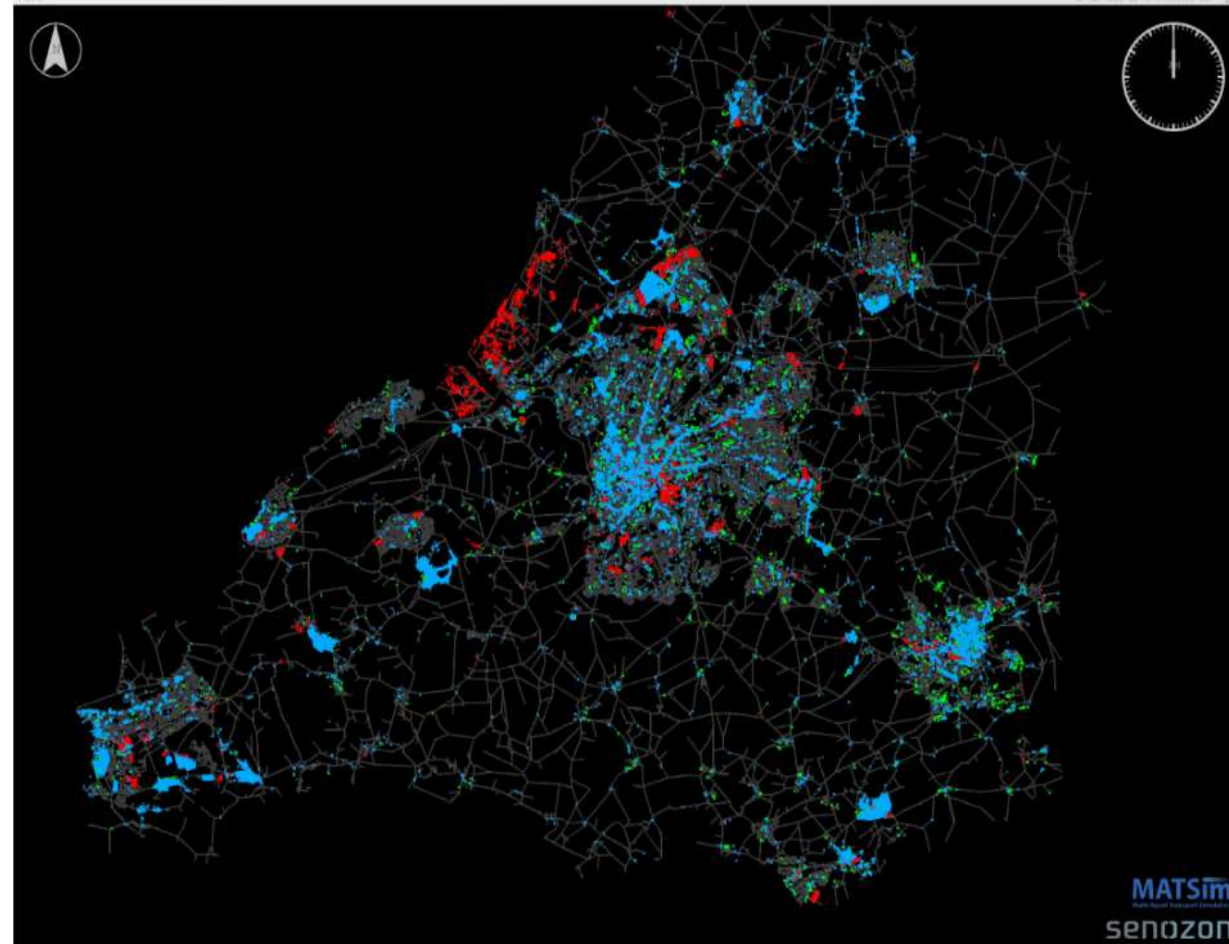
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Activity Based Modelling

- Data –driven Agent- based model built using the open platform **MatSim**
- Activity-based approach allows to represent Door-to Door Travel Patterns from users

Benefits

- Flexible platform able to handle highly disaggregated data input at higher granularity
- Multimodality
- First/last mile service for mobility services running in integration with Public transport services

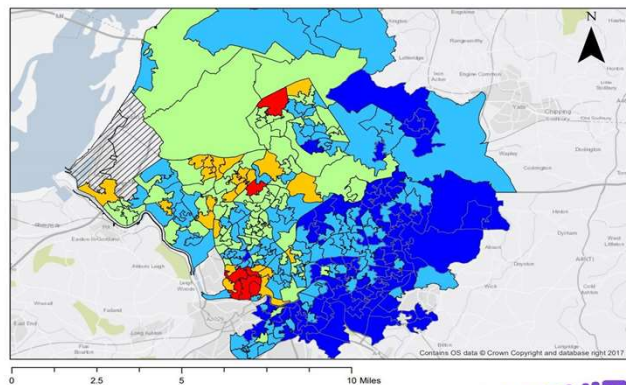


Mobile phone Network Data to generate travel patterns

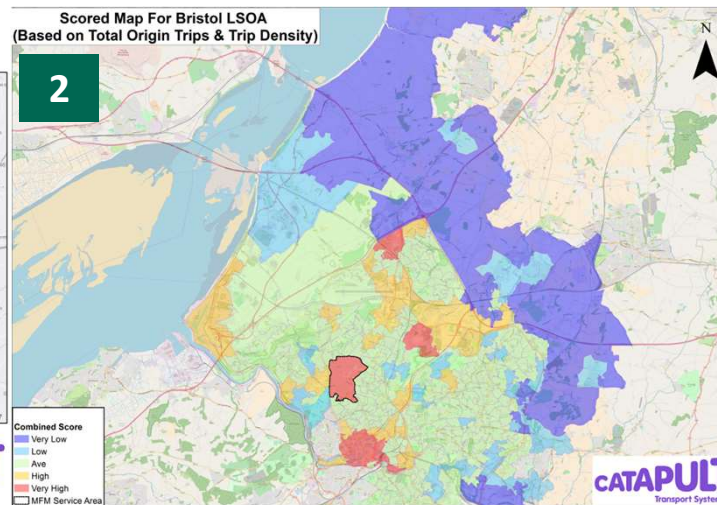
- Daily travel plans generated using **Mobile phone Network Data at Lower Super Output Area in the area of interest** and MSOA in the greater Bristol Area
- Ideal for new dwellings and regeneration areas
- Two dataset used (**Trip-based** and **Trip chains**) visualising the **end to end user journey** rather than single disconnected trips.
- 24 hours simulated allows to capture variations over the day

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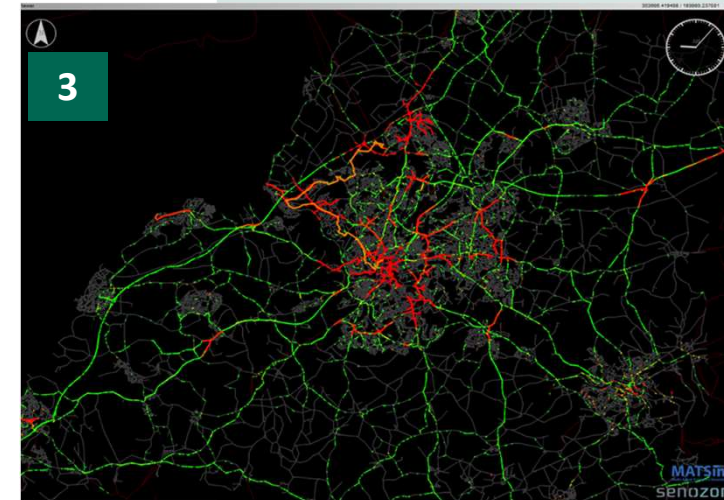
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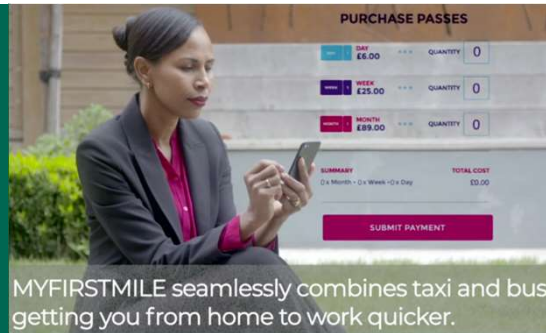
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MY FIRST MILE



Synthetic population, built using travel patterns coming from Activity chain dataset, allow to represent the real travel patterns and the end-to-end user journey



MYFIRSTMILE seamlessly combines taxi and bus getting you from home to work quicker.

Multipurpose and mode of travel assigned looking at land use and time of travel



MFM modelled using Dynamic agents (no need to specify route or timetable)

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- Visualise demand for flexible mobility services integrated with mass transit
- Activity chains from MND are an ideal solution for areas where data collection is difficult or not possible
- The simulation identifies pockets of demand for a flexible demand responsive service and a first/last mile service

Demand Modelling for MaaS

Requirements for a Large-scale Demonstrators

- Agent Based Modelling to model the multimodal integration between mobility services and mass transit
- Attitude of people towards sharing to understand the uptake of New Mobility Services and how the MaaS offering will be affected
 - *Changes in the value of time for ride-sharing mobility services and how this will affect the costs in the model*
 - *Understanding the willingness to pay when presented with a range of conventional and new transport options*
- Use of Artificial Intelligence to accelerate the procedure for travel pattern recognition
- Integration with legacy models for strategic modelling and optimization of the mobility service operations
- Transferability



Requirements for a Large-scale Demonstrators Data Ecosystem

- Data Availability:
 - **Urban** context: defined by a data-rich environment where legacy dataset will need to be integrated with new generation big datasets, coming from MND, GPS, sensors and Internet of Things (IoT)
 - **Rural** context: where all legacy datasets are present but often outdated and do not reflect the current travel patterns from users. In this case, location-based data, MND and sensors can help to rapidly generate recent travel patterns.
- Complex scenario to test various NMS interactions with the public transport ecosystem
- Data fusion techniques to minimise the limitations of the datasets used in isolation



DeMAND Project

Demand Modelling Assessment through a Network Demonstrator

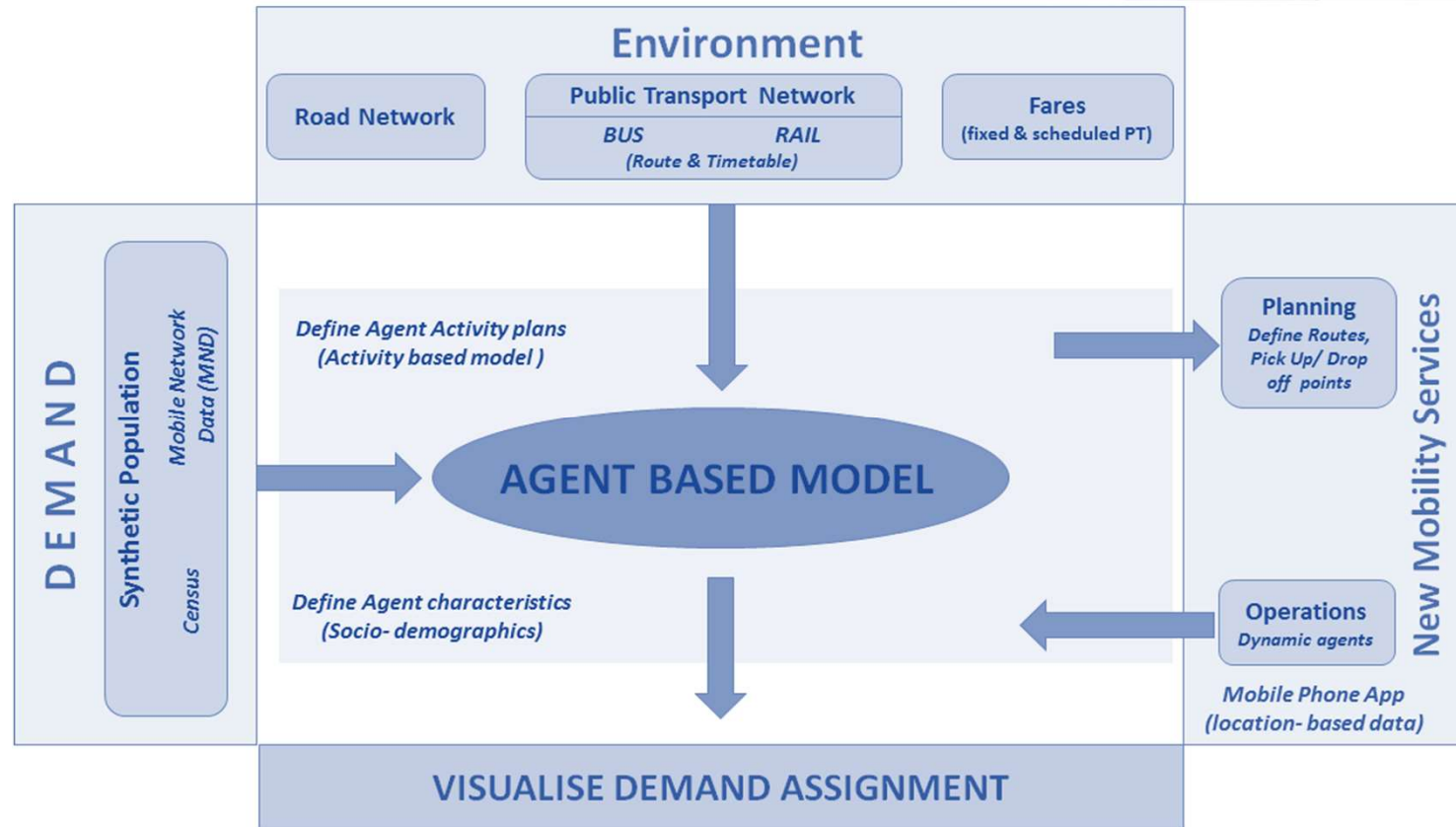
- Provide the **Department for Transport** with a tool able to appraise Mobility as a Service (MaaS) schemes and the introduction of emerging on-demand mobility services
- **Regional prototype** transport model to identify a standardised methodology to assess the demand for the introduction of New Mobility Services and MaaS
- **Agent Based Model** which uses **an activity-based approach**
- **Data rich approach to transport planning**, which relies on Mobile phone Network Data and sensors data to assess impacts on the network and the environment
- **Attitude of people towards sharing** to understand the uptake of New Mobility Services and how the MaaS offering will be affected



Next steps

- **Key changes** to the modelling approach will imply a shift towards Activity based modelling to represent the end-to-end users' journeys
- **Integration** with legacy models for strategic modelling and optimization of the mobility service operations
- **Transferability:** approach and methodologies can be transferred to **Rural Areas** with different approach to **Data Ecosystem**

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Any Questions?

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References

- “Business Case for New Mobility Services: Demand Modelling Tools”
Executive Summary available from July 2019
- Franco P., Ballis H., Stefanescu C., Sari N. (2019) Business Models for New Mobility Service: Demand Modelling tools for a successful implementation of MaaS, ITS Europe Congress, Brainport, 3-7 June 2019
- Franco P., Johnston R., McCormick E. (2018) Role of Intelligent Transport Systems applications in the uptake of mobility on demand services, United Nation “Transport and Communications Bulletin for Asia and the Pacific, 2018, No. 88 - Intelligent Transport Systems”,
https://www.unescap.org/publications?f%5B0%5D=field_publication_series%3A9126

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