# MABM Fact Sheet

## What is the MABM?

The Melbourne Activity Based Model (MABM) is a new strategic transport model for Melbourne. Strategic transport models represent how people make decisions for day-to-day transport, now and in the future. These models represent how, when and why people travel. The primary purpose of strategic models is to assess how travel behaviour might change in response to interventions like new transport projects or policies.

Infrastructure Victoria (IV) engaged KPMG and Arup to produce the MABM. The MABM provides a platform to test the effectiveness and fairness of a wide variety of transport policy and infrastructure proposals. MABM uses a cutting edge approach which puts the customer at the centre of the analysis.

The MABM builds on the theoretical framework and open source software platform called "Multi-Agent Transport Simulation" (MATSim). The MATSim theoretical framework represents leading practice in strategic transport modelling. KPMG and Arup applied this framework and modified it to suit local conditions in Melbourne.

## Why was it developed?

The MABM was developed to provide an additional tool for IV and the Victorian Government to test the impacts of transport policy and infrastructure proposals on the behaviour of transport system users. It is one of a range of tools that can be used for this purpose.

The MABM uses a different framework than existing strategic transport models used in Victoria. Existing models use the traditional 'four-step' modelling framework. Planners in the USA designed the four-step framework in the 1950s for testing of alternative options for highway construction. Four-step models are mature, tested and well understood by practitioners. As a result, four-step models are still used extensively around the world.

However, the four-step model framework has limitations for certain types of analysis. New techniques have been developed and matured over the last twenty-five years which address some of these limitations. We have incorporated these new techniques in the MABM.

Some issues that MABM is more suited to addressing than the traditional four-step model framework include:

- Understanding the transport's 'customers' and their needs and preferences.

- Understanding how customers with different socio-economic and demographic characteristics - such as income, household composition and age – respond to changes in transport policy or new infrastructure.

- Understanding how fair and equitable a transport policy or investment is, which groups are the winners and losers and to what extent they are impacted.

The MABM is also more suited to modelling behavioural responses to complex changes to the transport landscape that are likely to occur in coming years and decades. Some examples include:

- Increasing popularity of car sharing services.

- Increasing popularity of taxis and ride-hailing services.

- The emergence of connected and autonomous vehicles.

- Demand responsive transport and Mobility as a Service.

- New infrastructure and facilities for active modes like cycling and walking.

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The MABM is not intended to replace existing tools, but rather to complement them. The MABM has strengths in certain areas in which four-step models have limitations. As a result, the MABM extends the suite of tools available for transport planners to test the impacts of changes in transport policy and infrastructure.

## How does it work?

The MABM is built using an advanced approach developed over the last twenty five years at various academic institutions. Some key differences between the approach used by MABM and the traditional four-step model framework are described below.

### Puts the customer at the centre, being person-based rather than trip-based

The basic unit of analysis for four-step models is a 'trip' (i.e. journey). Four-step models represent all motorised trips, their purposes and their times of day. The unit of analysis for the MABM is a 'person'. The MABM represents each person in Melbourne and their daily travel plans, including when, where and how they will access their various activities. It also includes their demographic characteristics like age, income and household composition. This means that the MABM is more suited than four-step models to understanding the user profiles, and therefore equity impacts of transport interventions in greater detail.

### Focussed on plans and activities rather than journeys

Four step models seek to optimise the travel choice (mode or route) for each individual trip. As a result, these models do not consider how trip choices made across the entire day are interrelated. The MABM considers all journeys and activities taken by person in a day. This means that MABM is able to more realistically represent traveller behaviour in some circumstances. For example, if you need to pick your child up from school after work, you might bring your car even if public transport would have been faster. The MABM is able to account for these types of choices.

### Able to consider peak spreading impacts

Four-step models rely on pre-defined 'time periods'. For example, the AM peak is defined as 7am to 9am. Trips are modelled within each time period and not typically allowed to move between them. The MABM uses a continuous timescale in the simulation, with each second of the day modelled. This means that the MABM is well suited for understanding 'peak spreading' impacts.

Peak spreading refers to people making small changes in their departure times to work around congestion. For example, London has a 'wider peak' than Melbourne due to its larger size and density. Peak spreading is particularly important to cities that are growing larger and more congested over time, such as Melbourne.

### Able to produce rich visualisations

Four-step models are run using a series of static calculations that assign trips to various roads and public transport links. The MABM uses a dynamic simulation that models every second of each person's day, including all of their journeys and activities. As a result of this, the MABM is able to produce rich visualisations of how transport conditions change over time, and how people might respond to policy and infrastructure interventions. Visualisation is important to help understand and to communicate outcomes and findings of analyses within Government, to industry and to the general public.

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## How can I find out more?

Further information about the MABM, its development and its calibration and validation is provided in KPMG & Arup, *Model Calibration and Validation Report*, 8 December 2017, Infrastructure Victoria, Melbourne.

The report can be found on Infrastructure Victoria's website.

The MABM is a new model, and like all new models, it can be enhanced through further development, validation and stress testing. Future work may focus on improving the model's performance relating to public transport and active travel, as well as including functionality for testing specific policy scenarios.