

The MAF:

Mobility Assessment Framework

An intermodal
comparison tool
for local mobility
services

dc:cities

Introduction

Technological innovation, legislative changes, policy priorities and the move to Mobility as a Service (MaaS) has seen, and will continue to see, the introduction of new transport modes or services in cities and rural communities. Public and private decision-makers need to understand the impact that these new modes could have on their areas, and potentially compare and narrow down the mobility options available to them in a quantitative way. This analysis could be between different options of the same mode, or between different services using the same mode of transport. This document provides a brief overview of DG Cities' **Mobility Assessment Framework (MAF)**, which was developed as part of the Endeavour autonomous vehicle trials and is designed to support decision-making in this context.

Here, we show what the MAF is, how it works, at a high level, and who it is intended for. For a more in-depth discussion on the methodologies and case study examples, please contact us directly: <https://www.dgcities.com/contact>.



What is the Mobility Assessment Framework?



The MAF is a tool designed to help transport planners, urban designers and other senior decision-makers evaluate local mobility services. It can also be used by mobility service operators to showcase the benefits of their offering.

It consists of 11 KPIs, underpinned by 50 separate datasets, that have been selected to look at the benefits of a mobility service to the economy, society and the environment. The KPIs have been carefully chosen to only use data that can be easily obtained, and to be realistic, controllable, decorrelated and highly relevant.

The MAF is designed to be flexible and adaptive to the strategic priorities of an organisation or particular area. Organisations using the MAF can choose the KPIs that align to their aims and objectives. They can also choose how to present the outcome data in a way that aligns with their particular needs.

MAF can be used to assess both existing and emerging mobility services, as it has capacity to introduce and evaluate new modes, including autonomous vehicles (AVs), as they enter the landscape. Examples included here are:

- Ride sharing services (e.g. Uber or Bolt)
- E-scooter services (e.g. Tide or Voi)
- E-bike services (e.g. Lime or Jump)
- A standard bicycle sharing scheme (e.g. Santander bikes or West Midlands Cycle Hire)
- A shared bus service (e.g. Via or Uber Pool).

“If you’re a developer, how do you plan for the kind of transport residents will be using twenty years from now? Do you need space for car clubs? Electric bikes? This tool gives you a flexible, auditable means to plan, futurecast and assess a range of different options against your strategic priorities.”
Balazs Csucar, Head of Delivery

Background

The MAF was developed as part of [Project Endeavour](#), a mobility project designed to accelerate and scale autonomous vehicle services. Endeavour is made up of a consortium of six companies with varying backgrounds: Immense Simulations, Oxbotica, TRL, BSI, Oxfordshire County Council and DG Cities.



As part of Endeavour, DG Cities has been looking to ensure that shared autonomous vehicle services will cater to people's needs, and will benefit society, existing transport services and the environment. We developed the MAF to capture key parameters in a structured way, and provide a means to present evaluation results clearly.

The MAF's flexibility allows new modes, such as Autonomous Vehicle Rideshare Service (AVRS), to be incorporated into the framework as they become viable offers and choices for users.

Rationale

The MAF is designed to be beneficial for various stakeholders, including:

Transport and planning authorities

MAF helps such stakeholders compare and evaluate mobility service proposals seeking operational approval within a designated area. A transport authority could either use the MAF to support a quantitative evaluation of different modes (eg. an electric bike hire scheme vs. an electric scooter hire scheme), or it could be used to compare a range of service proposals for a single mode (e.g. a tender evaluation of an electric bike hire scheme).

Mobility service operators

MAF helps alleviate regulatory restrictions for these stakeholders by helping them demonstrate the benefits of deploying their service.

Developers and masterplanners

MAF allows direct comparisons to be made between various modal offerings, which could be incorporated into a private development's mobility solutions, ensuring that the benefits they deliver align with the developer's high-level objectives.

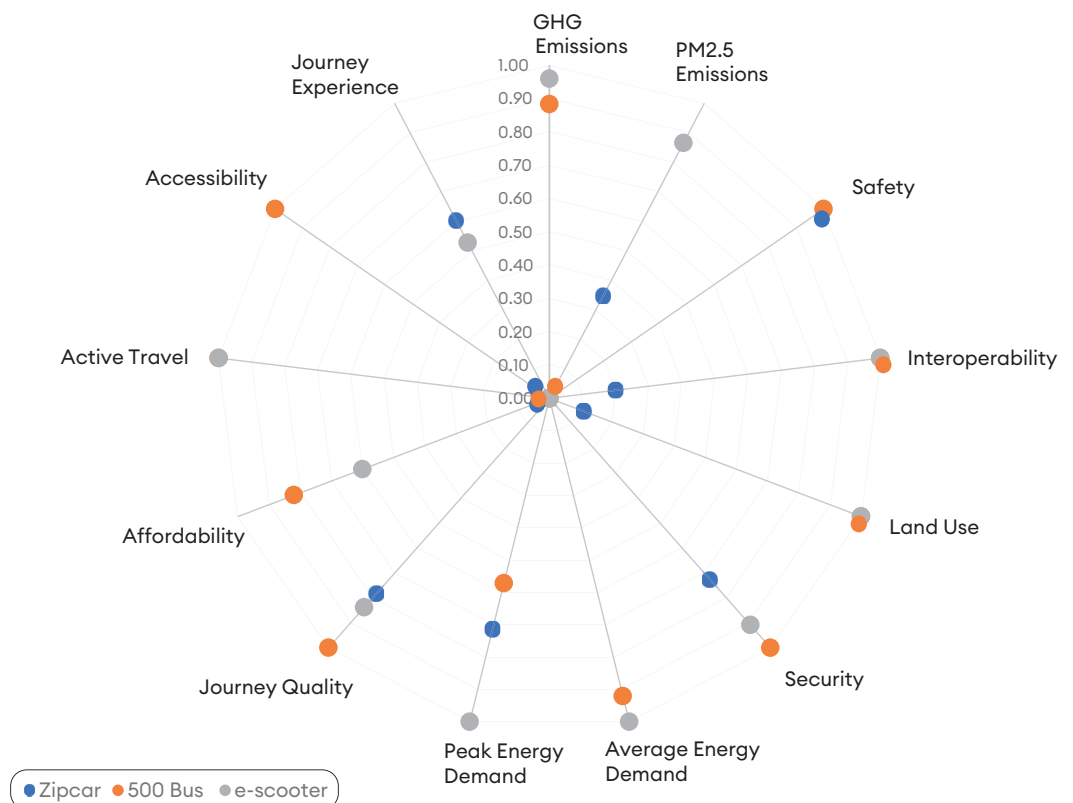
"When I used to review high-value tenders for the council, I had to develop my own matrix to judge each bid. This tool gives transport planners in a similar position the potential to assess and compare different modes, but also – say you had three tenders who came in for electric bikes – it gives you a format to judge them against each other and more importantly, a quantitative basis to validate your decision. For FOI requests and transparency, this auditable decision-making process would have been really useful."
Kim Smith, Head of Smart Mobility

MAF: Structure

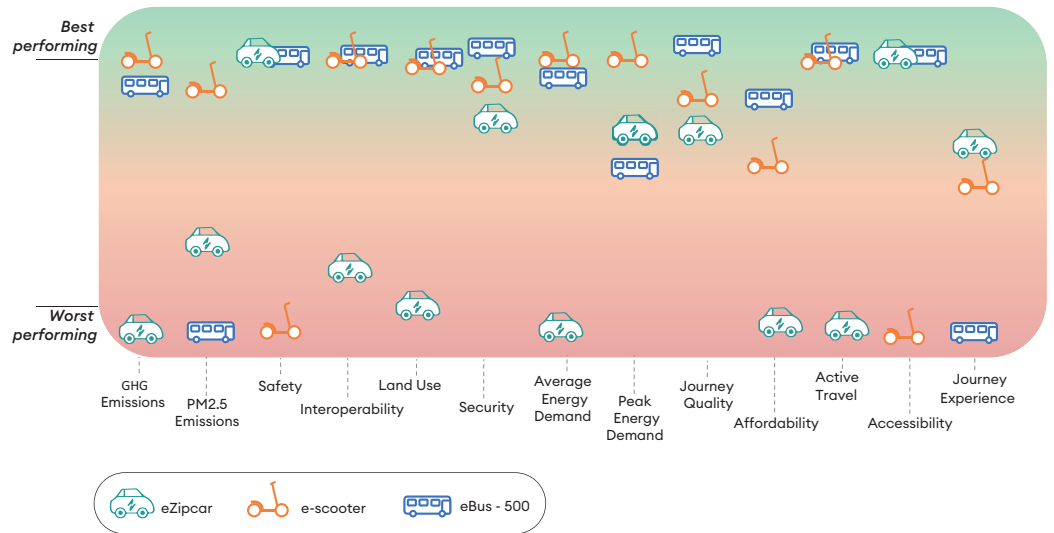
The foundations of the MAF are more than 50 datasets. We have identified these as critical for assessing the benefits of a mobility service to the economy, society and the environment. These datasets have been used to construct 11 KPIs, which are then assessed in combination to look at the holistic impact of a service on the economy, society and the environment.

Each KPI stands alone and does not overlap or correlate with any other KPIs; therefore, the 11 indicators have been carefully selected to be the minimum number of indicators necessary to holistically measure all of the different impacts of a mobility service. An organisation can also decide to put different weights to the KPIs, to better align the assessment to their local objectives.

Each KPI is scored between 0 and 1, with 1 representing the best performing and 0 the least performing service in a KPI. The scores across the KPIs can be totalled to provide a single quantitative impact score.



KPIs can also be presented on a single chart to demonstrate the relative differences amongst mobility services and to provide a holistic visual performance image. An illustrative example of this (below) is the summarised outputs of a comparison between three hypothetical transport modes operating in Oxford: e-scooter hire, an e-car club and an electric bus service.



MAF: KPIs

The methodologies outlined in the following KPIs are based on or adapted from a number of existing UK government accepted methodologies. Where none were applicable, we created our own based on relevant building blocks, industry standards and academic research.



Emissions

In the MAF framework, we measure the particulate and greenhouse gas emissions from the proposed mobility service. These two indicators allow us to assess a key environmental characteristic of services.



Safety

The Safety KPI measures the frequency and severity of accidents from a proposed mobility service, and financial costs associated with those accidents.



Interoperability

This KPI assesses the ability of an individual mode to operate and integrate with other modes of transport in an area. The intent of this KPI is to ensure that prospective users can plan and pay for multi-modal trips, have easy access to any mobility mode and have physical interchanges where relevant.



Land use

This measures the impact of a proposed mobility service on land uptake and change in land use, against other modes of transport. Services that use less public space for their operations, reuse brownfield sites or help to increase traffic flow are scored higher.



Security

As all services today depend on online booking or payment functions, it's important to assess the systems and policies they use to protect their users' data and identity. Similarly, their internal systems that manage CCTV data captured or the vehicle systems need to be to the appropriate ISO standards.



Energy demand

Average and peak energy demand for the proposed transport mobility service is measured. Both are important, as they provide a different view into how supporting infrastructure will need to be built to run the service.



Journey quality

This KPI measures various attributes of a proposed mobility service. The focus is placed on having clean, reliable and comfortable services that have up-to-date information available for all and a responsive customer support network.



Affordability

The financial burden that households bear in purchasing transportation is compared across the modes. It allows the affordability of mobility services to be compared and evaluated specific to the geography and demography that they are serving.



Active travel

An assessment of whether journeys (entire or partial) are taken by walking or cycling. This KPI is important to measure, as active travel reduces the need for more vehicles in cities as well as aligning with the UK's wider public health objectives.



Accessibility

This KPI looks at whether individuals and households can easily access a service, considering both disabilities and the frequency and vicinity of the service from homes.



Journey experience

The journey time aspect demonstrates not only the efficiency of the transport mode, but also the value that the user places on the time taken to get from origin to destination. In economic terms, travel time may be given a monetary value, typically calculated as the ratio of a behavioural coefficient of travel time over a behavioural coefficient of travel cost.

DG Cities

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DG Cities works with local government, private sector developers and service providers to help cities and communities harness the potential of technology to meet their carbon reduction targets. Our work spans net-zero housing, decarbonisation and fleet electrification, electric vehicle infrastructure, autonomous vehicles, public engagement and much more. Get in touch, follow us on [Twitter](#) or our [blog](#) to find out about our current projects.

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