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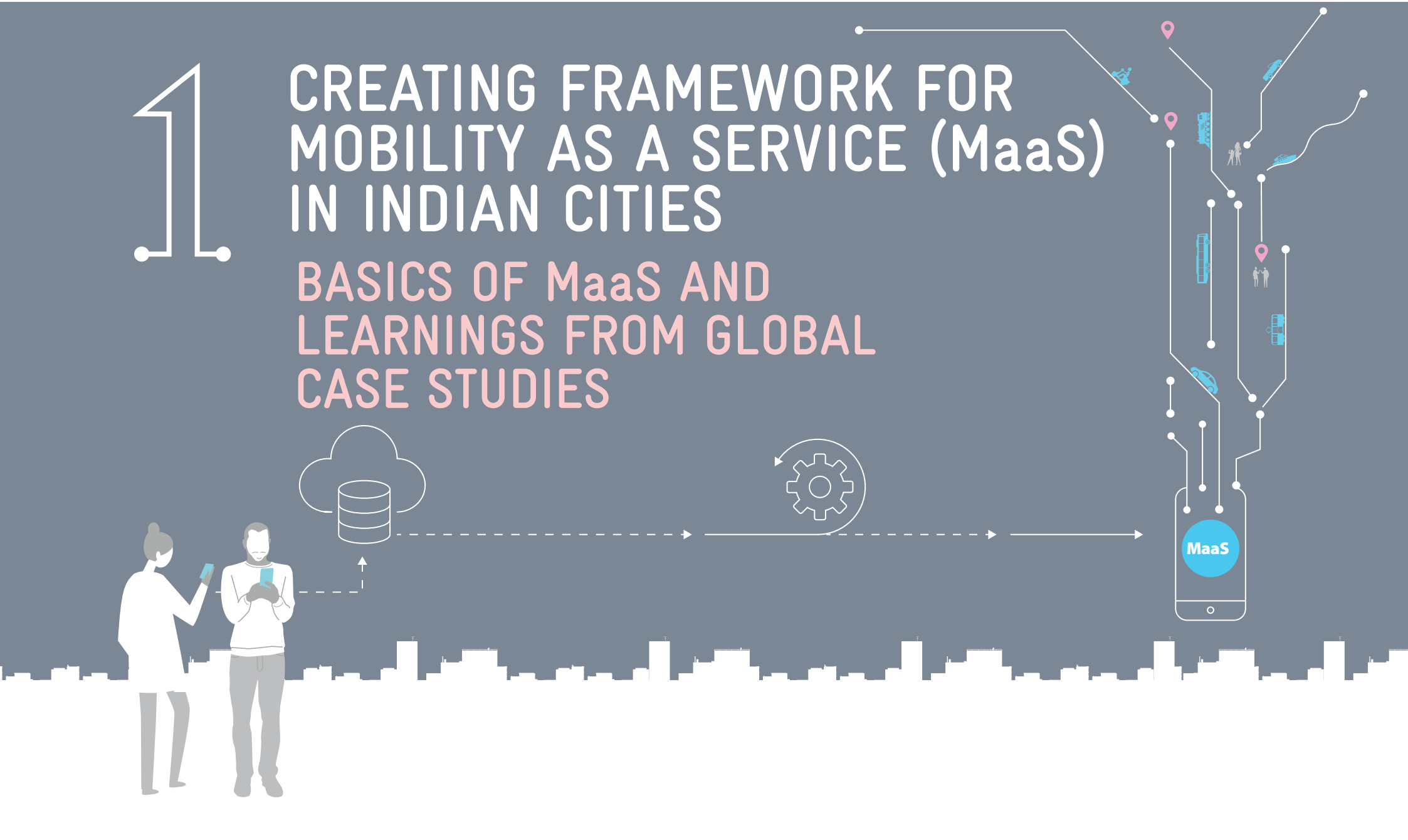
Ministry of Housing and Urban Affairs
Government of India

Green Urban Mobility Partnership

1

CREATING FRAMEWORK FOR MOBILITY AS A SERVICE (MaaS) IN INDIAN CITIES

BASICS OF MaaS AND LEARNINGS FROM GLOBAL CASE STUDIES



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Integrated and Sustainable Urban Transport Systems for Smart Cities (SMART-SUT)
GIZ Office
B-5/2, Safdarjung Enclave
New Delhi-110029
INDIA
T +91 11 49495353
F +91 11 49495391
I http://www.giz.de/india
E giz-indien@giz.de

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Prepared by
SMART-SUT (GIZ), Cities Forum and CoE-UT, CEPT Reasearch and Development Foundation (CRDF)

Officer responsible for the commission
Juergen Baumann
Project Head, SMART-SUT (GIZ)

Project Advisor
Laghu Parashar
Deputy Project Head, SMART-SUT (GIZ)

Project Coordinator
Narendra Verma
Technical Expert, SMART-SUT (GIZ)

Project Team
Cities Forum: Josep Laborda, Sonal Ahuja, Shailendra Kaushik
CoE-UT, CEPT Reasearch and Development Foundation (CRDF): Shalini Sinha, Shaily Gandhi

Design by
Chitrapat Ideas Foundry

Editing support
Appurva Chauhan

Contact
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ABOUT THIS REPORT

This report has been prepared as a part of bilateral technical cooperation project “Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT)” commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) and jointly implemented by Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) GmbH and Ministry of Housing and Urban Affairs (MoHUA), Government of India. The objective of the project is to improve the planning and implementation of sustainable urban transport in selected Indian cities. The project also supports the Green Urban Mobility Partnership (GUMP) between the governments of India and Germany.

Indian cities selected under National Smart Cities Mission are planning, designing, developing, and implementing various urban mobility projects. All these projects, after implementation, produce a huge amount of data. Thus, the management of the mobility data is at centre of increasingly complex urban transport challenges in these cities. The mobility data generated from various sources and in various forms could be used for providing an integrated journey experience to the commuters which is known as ‘Mobility as a Service or MaaS’. Though providing such a service to commuters would require developing standard data collection and management protocols, strong institutional and regulatory framework, interventions related to urban mobility data policies and so on. With this objective in mind, SMART-SUT initiated the study titled “Creating Framework for MaaS in Indian Cities”.

The study aims to explore opportunities for implementing MaaS in Indian cities and identify a structured approach towards developing a smart mobility ecosystem which is required for developing such a solution by leveraging the real value of mobility data. The study outlines a stepwise approach and set of recommendations towards implementing a MaaS solution in the Indian context, a series of reports have been compiled as an output of this study covering various aspects of MaaS. The recommendations from these reports would assist Indian cities embarking on developing various data-driven mobility solutions like MaaS by integrating different transport modes.

ACKNOWLEDGEMENT

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During the course of study, the project team had interactions with global industry partners and MaaS experts who provided their advice on technical details of MaaS solution. We are thankful to the contributions of Mr Adrian Ulisse, Mr Satinder Bhalla, Mr Walid Ward, Ms Lina Al Shnaikat and Mr Meshack Ochieng in this regard.

The team is hopeful of the study outcomes being a useful guide for deploying the MaaS ecosystem in Indian context.

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BACKGROUND

India is going through a rapid digital transformation in the transport and mobility sector. It is estimated that with the current pace of access to internet-enabled smartphones, the internet user base in the country will rise to 829 million people by 2022. Approximately, 97 percent of the internet users across India have access to internet through mobile devices. The user base for these smartphones is expected to cover almost 60% of the population [1].

Smartphones with high-speed internet and various sensor technologies can now generate, record and store a high volume of useful data in phones and applications that feed on personal information. While this data can help solve many mobility problems, it builds on a high potential to overlook privacy issues and personal data exploitation, for commercial purposes.

Hence, it is essential to comprehend how this 'smart' transport data is being generated and managed and decide as to which data can be used to develop mobility solutions. Further, mechanisms for data sharing by the government and mobility companies need to be established so that this could be leveraged to provide innovative travel solutions. In this process, it is critical that the privacy of the users must be ensured under the existing legal frameworks.

Mobility as a Service (MaaS) is an emerging smart mobility service that provides access to integrated journey options across different transport modes in a city using a single travel booking and payment platform to its users. With multimodal transport system in the city, MaaS provides commuters with seamless travel options, ascertaining a comfortable journey. The key aspect that enables this solution is the data sharing between different modes and service providers. The study titled "***Creating Framework for Mobility as a Service (MaaS) in Indian Cities***" aims to identify measures that are required for developing a MaaS solution. The objective of the study is :

- To develop a framework for an effective implementation of "Mobility as a Service (MaaS)" in Indian cities.
- To recommend the requisite data and system specifications for implementing MaaS in Indian cities.
- To design an effective policy and a regulatory framework by contextualizing issues related to data sharing in India.
- To develop a capacity-building toolkit for a better understanding of MaaS and facilitating the decision-making process for its successful implementation in Indian cities

Following reports have been compiled and documented* as an output of this study covering various aspects of MaaS :

i. **Basics of MaaS and Learnings from Global Case Studies**
ii. MaaS Readiness Tool
iii. Urban Mobility Data Policy
iv. Mobility Data Standards and Specifications
v. Legal and Regulatory Framework
vi. System Architecture and Technical Requirements
vii. Reference 'Scope of Work' Document for MaaS Project

This report will help in understanding the concept of MaaS and various learnings for Indian cities (in terms of need of collaboration, data sharing, analysis and data policy) from the various global case studies of Europe, Australia, UK, Japan, Singapore, etc. It identifies the key stakeholders and the need for their imperative coordination in the decision-making for the successful implementation of MaaS projects. It also elaborates the concept of MaaS maturity index (MMI) and its related components.

[1] https://icea.org.in/wp-content/uploads/2020/07/Contribution-of-Smartphones-to-Digital-Governance-in-India-09072020.pdf

*All the reports can be accessed via https://www.maastoolkit.org/ which has been developed as a web-based capacity building toolkit and an open source knowledge resource for all the stakeholders and government agencies planning to implement MaaS in Indian cities.

1. INTRODUCTION

ABI RESEARCH FORECASTS GLOBAL MOBILITY AS A SERVICE REVENUES TO EXCEED $1 TRILLION BY 2030

Source: Smart and Safe City

WHAT IS MaaS?

MaaS is short form of Mobility as a Service, brings information on all means of travel, easily accessed through an app, anytime, anywhere and facilitated through an open data platform accessible to multiple MaaS providers.

MaaS helps people to reach their destination in the smoothest way possible, by presenting all options of travel for real-time trip planning using a MaaS provider's app powered by the open mobility data platform

MaaS simplifies travel using an app to provide access to a range of mobility options, with a single payment channel instead of multiple ticketing and payment operations

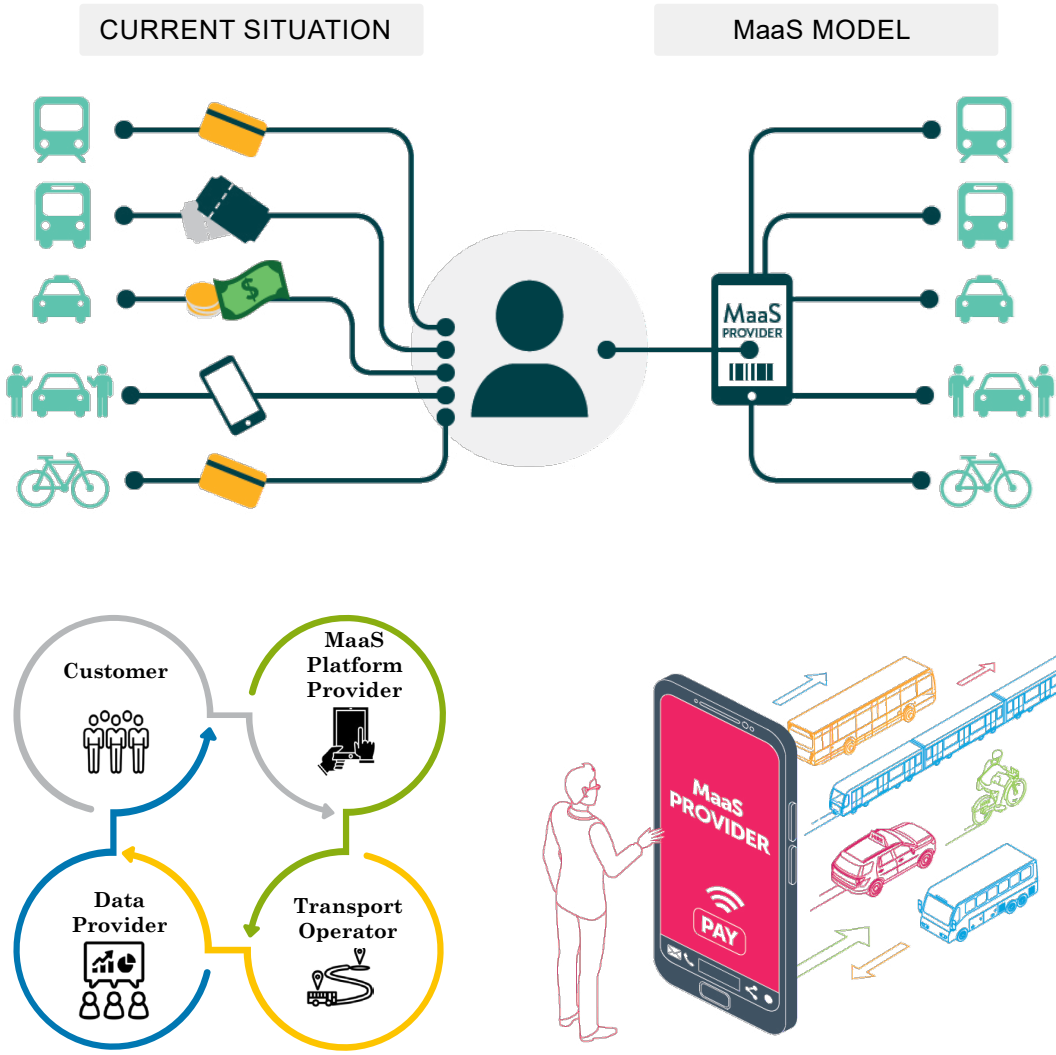
MaaS FUNCTIONALITY

Mobility as a Service is a **user-centric**, intelligent mobility distribution model in which all mobility service providers' offerings are aggregated by the MaaS system provider.

MaaS encourages **data sharing** between **mobility service providers** and **cities** to work towards shared mobility

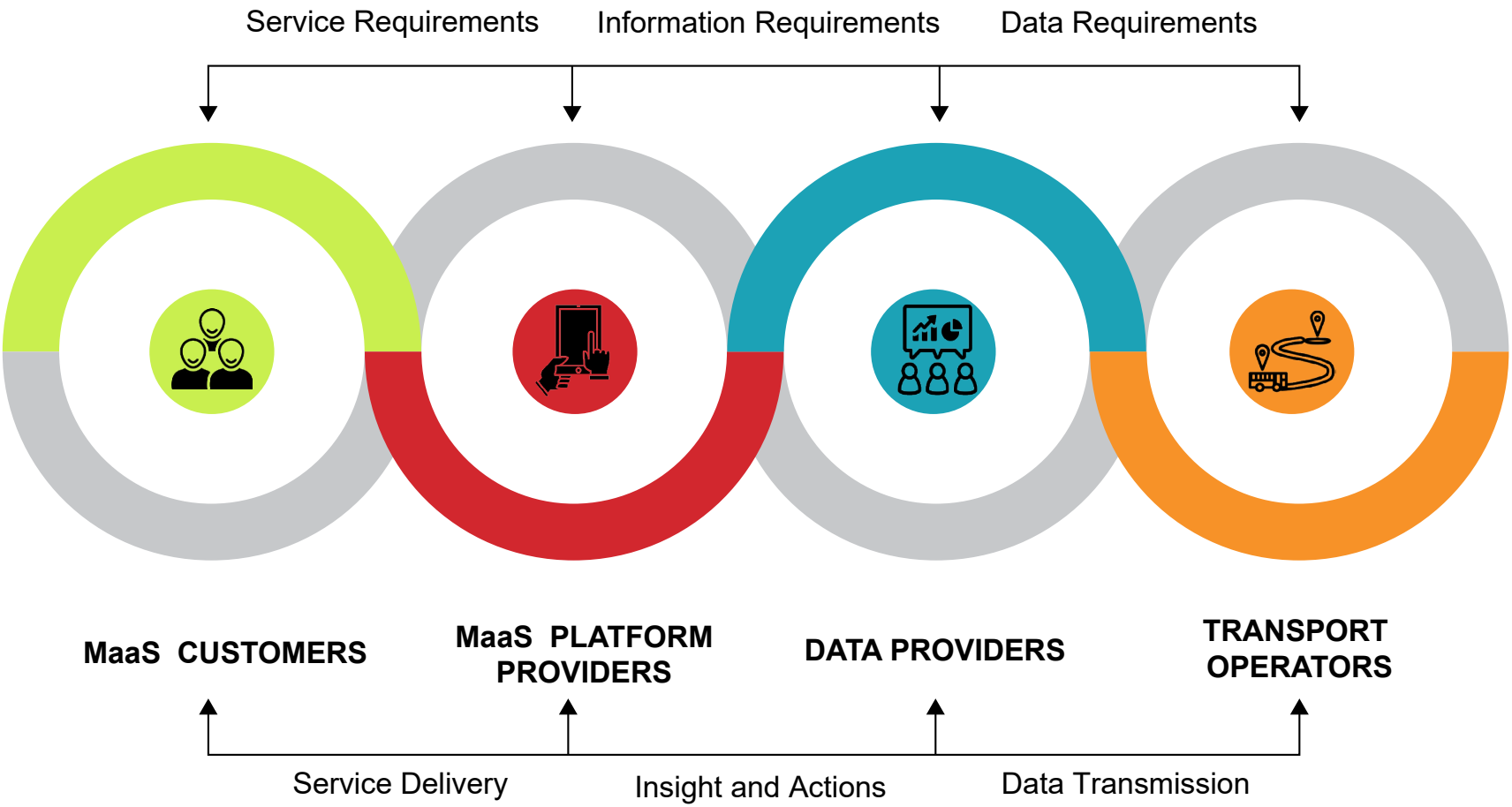
This offers the customer a **tailor-made** mobility solution based on their **individual needs.**

There could be **several MaaS** providers offering their services and using the same MaaS open database platform

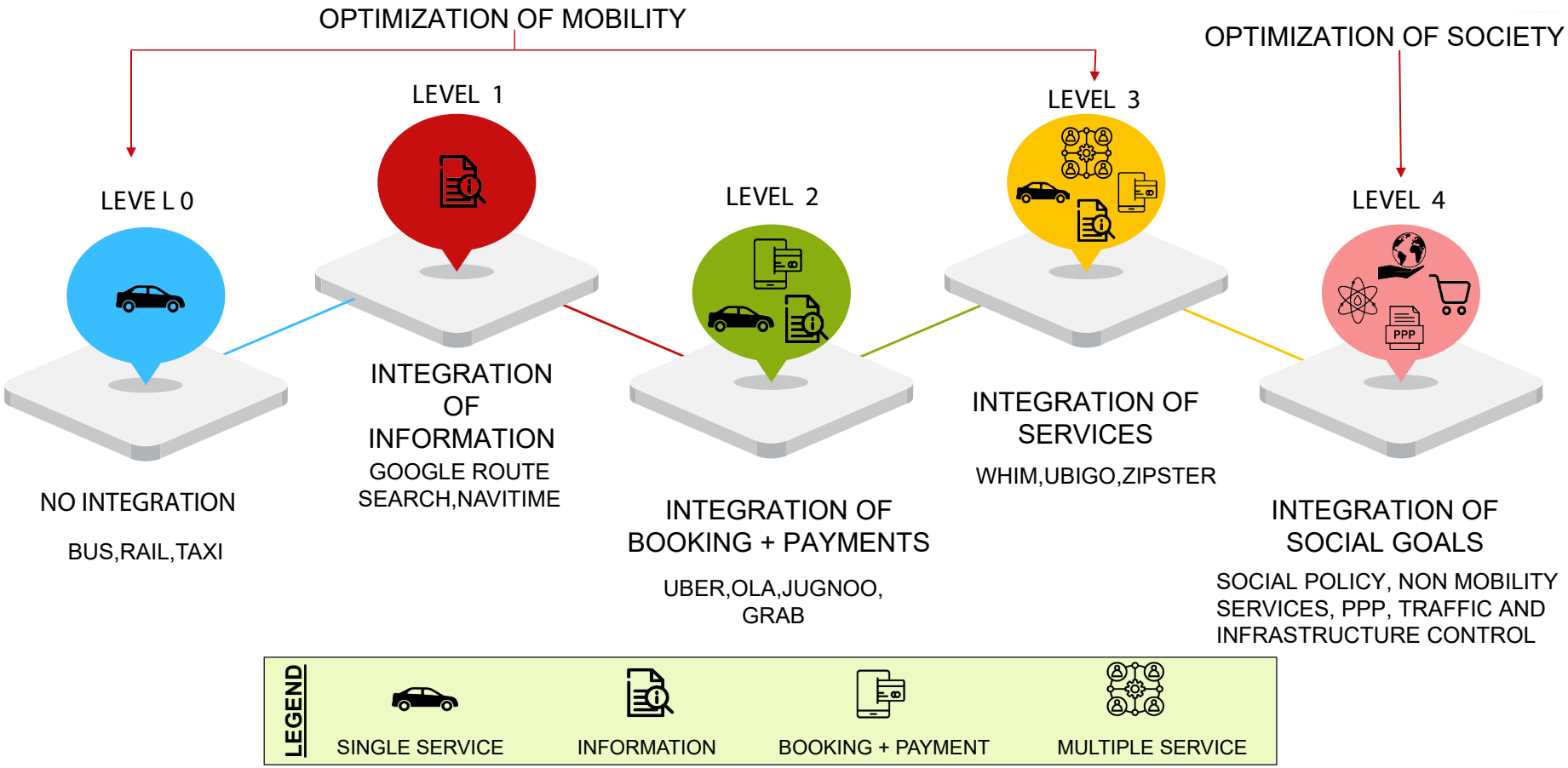


Source: Urban Transport Group and UITP

INTERACTION OF KEY PLAYERS WITHIN MaaS ECOSYSTEM



LEVEL OF MaaS



Source : Sochor et al. (2017) have developed a typology distinguishing four integration levels of MaaS, plus a basic level without integration

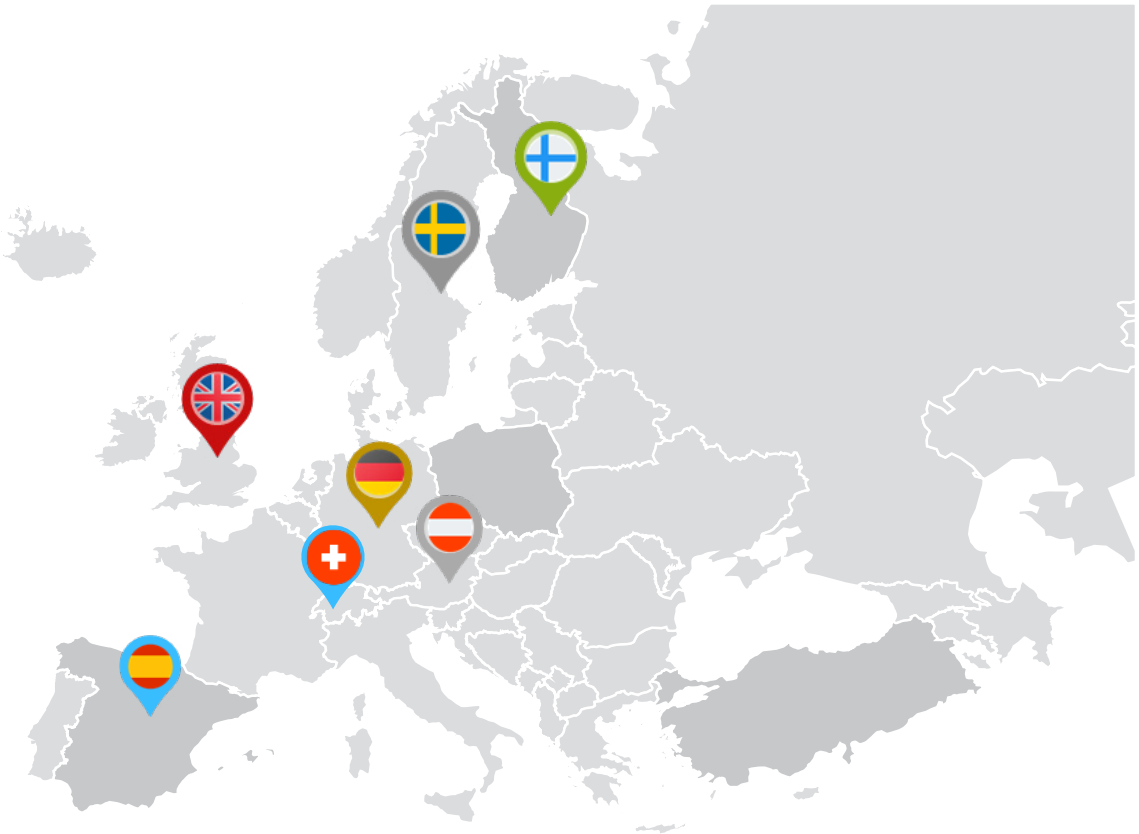
MaaS PROJECTS GLOBALLY

REGION	LEVEL 2	LEVEL 3
USA	24	3
UK AND EUROPE	24	17
CHINA	17	1
JAPAN	13	0

As on date, there are more than 100 MaaS service providers in Europe, UK, the United States, China and Japan.

2. MaaS PROJECTS IN EUROPE

MaaS PROJECTS IN EUROPE



UK
- West Midlands
- Greater Manchester

Switzerland

Sweden
- Gothenburg

Spain
- Madrid

Finland
- Helsinki

Austria
- Vienna

Germany
- Hannover
- Hamburg
- Berlin

CASE STUDY – HELSINKI, FINLAND

Photo Courtesy : Urban Mobility Daily

The capital of Finland was the first city in the world to introduce the first fully commercial "Mobility as a Service" project with an objective to reduce the use of personal cars within the city.

The city decided to revise its transport policy, placing special emphasis on digital technology with subscription-based "Mobility as a Service" (MaaS) concept.

The project combines all public and private transportation modes on a single smartphone app (Whim) that people can use to calculate the best way to get where they need to go.

The ultimate goal is to encourage people to refrain from driving their personal car when a wide variety of alternative shared transport modes are available, including taxis, public transport, scooter and car sharing, car rental and bicycles.

CASE STUDY – HELSINKI, FINLAND: DEMOGRAPHICS AND KEY DATA

Helsinki has a population of 648,042 and a metropolitan population of 1.4 million. 3,034.62 individuals living per square kilometer making it one of the most densely populated municipality in one of the most sparsely populated countries of the European Union.

A very modern society where 85% of the people living in Finland reside in or around a major city.

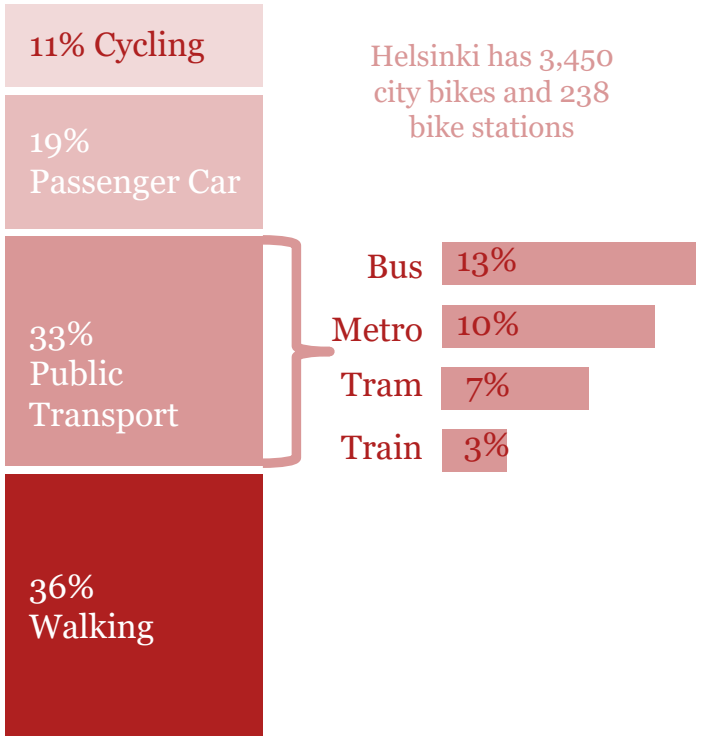
Helsinki is fairly a young city with an average age of resident is 40.7 years.

The total number of households in Helsinki is 330,933, and the average size is 1.9 persons. With a 74% employment rate.

ONE-PERSON	TWO-PERSON	THREE-PERSON	FOUR OR MORE PERSON
48.6%	30.7%	10.2%	10.6%

As per 2019 figure

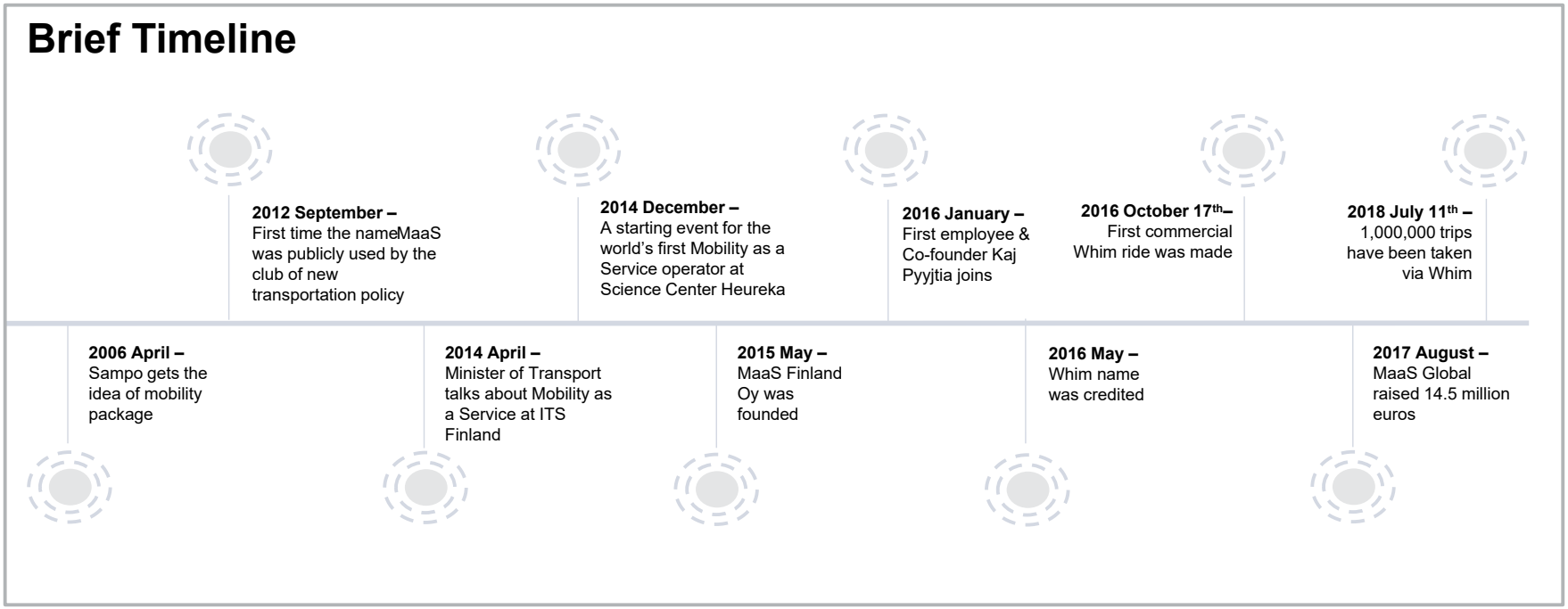
MODE SHARE IN HELSINKI



Source: Helsinki facts and figures 2019

CASE STUDY – HELSINKI, FINLAND: TIMELINE FOR DEVELOPMENT

Brief Timeline



Source: Whim app

In 1996, the concept of an "intelligent information assistant" integrating different travel and tourism services was introduced

The idea then gained widespread publicity through the efforts of Sampo Hietanen, then CEO of ITS Finland (later founder and CEO of MaaS Global), and Sonja Heikkila, then a masters student at Aalto University and the Finnish Ministry of Transport

MaaS became a popular topic at the World Congress on Intelligent Transport Systems 2015 in Bordeaux, and subsequently, the Mobility as a Service Alliance was formed in Europe. In 2017 the MaaS Alliance published its white paper on Mobility as a Service, and how to create foundation for thriving MaaS ecosystem.

CASE STUDY – HELSINKI, FINLAND: KEY CHARACTERISTICS

The city saw a steep growth of automobile transport as a result of expanding its road network to create more capacity. This increased traffic within the city and impacted the city's air quality.

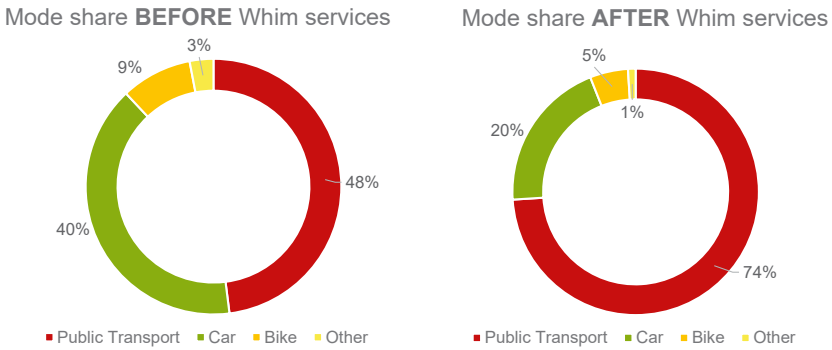
The city authorities are working to transform the transport network across the urban area as part of their plan to reduce greenhouse gas emissions by 30% by 2030 and achieve carbon neutrality by 2050

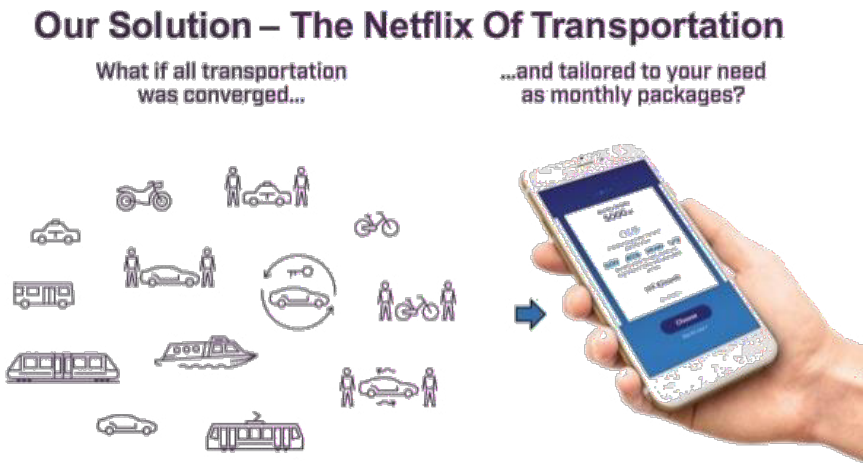
To achieve this, Helsinki has introduced the MaaS concept, which relies on all transport operators to feed their user services into the common interface.

The project details are :

- **MaaS operator:** MaaS Global (Private Operator)
- **Application/Platform:** Whim (Developed jointly with Operator)
- **Launch date:** Late 2016 with some features, followed by a full launch in November 2017.

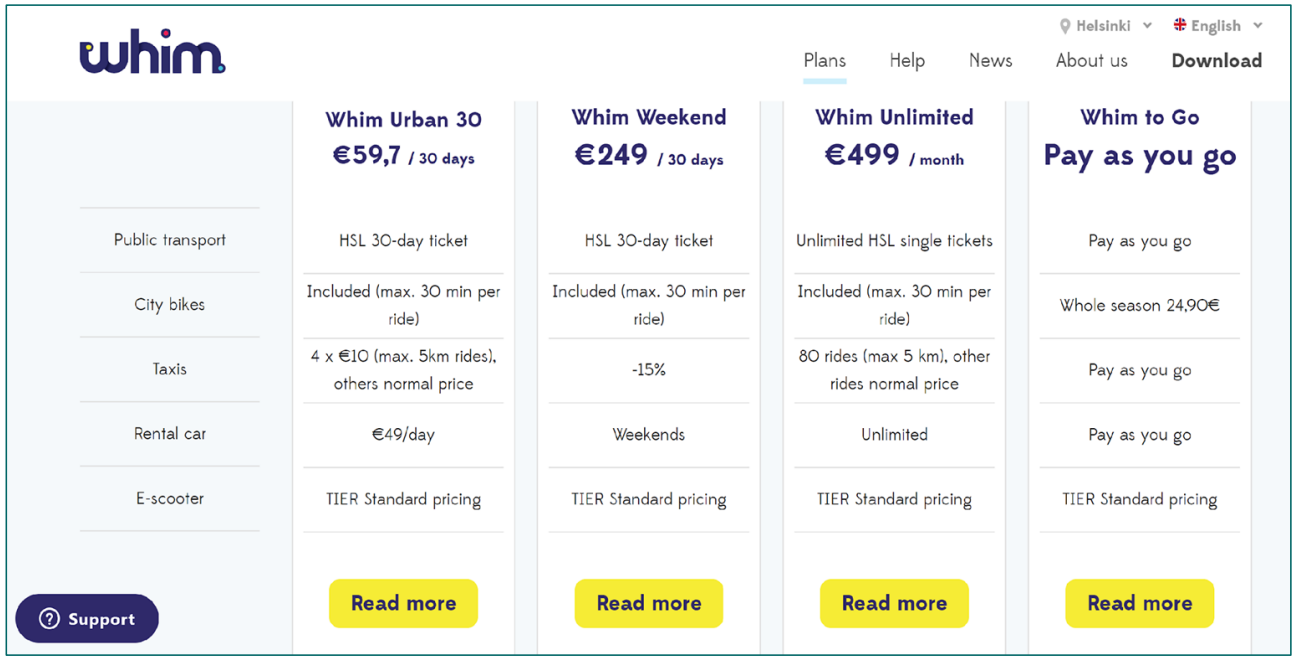
MODE SHARE BEFORE AND AFTER LAUNCH OF WHIM SERVICES

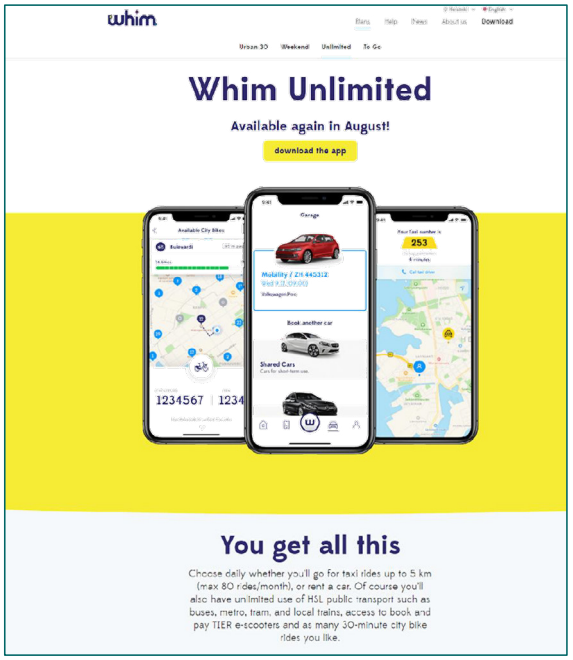




Source : Global Mass Transit

CASE STUDY – HELSINKI, FINLAND: SUBSCRIPTION DETAILS

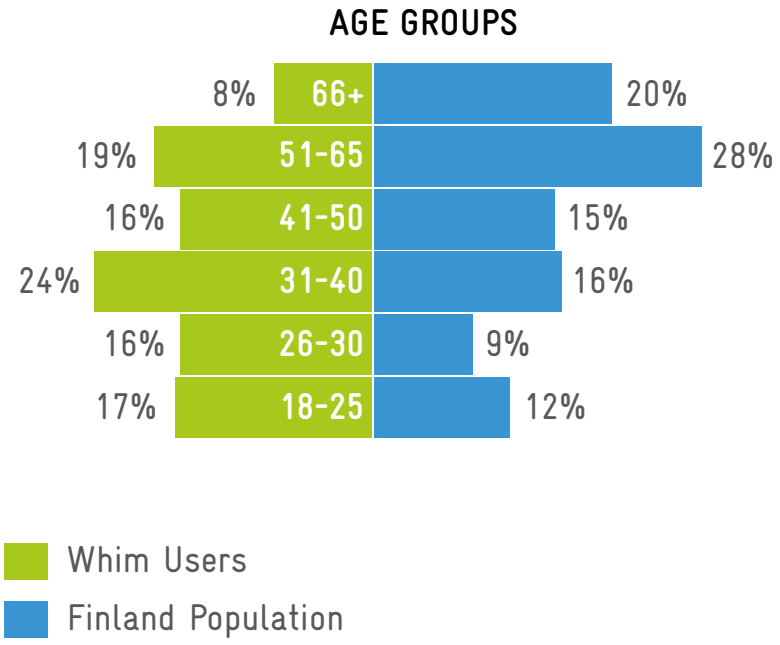




Source : MaaS Global

CASE STUDY – HELSINKI, FINLAND: KEY INSIGHTS

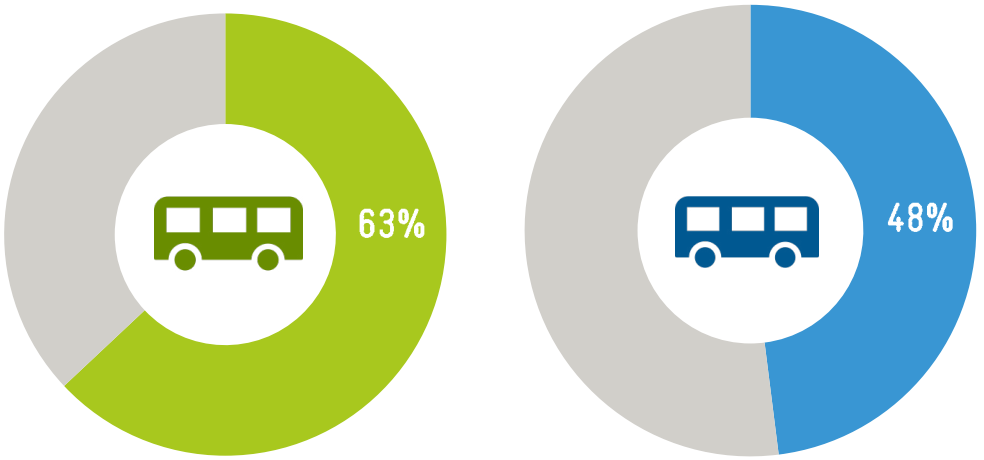
WHIM USERS BY THE END OF FIRST YEAR OF ITS LAUNCH



Source: Ramboll

PUBLIC TRANSPORT SHARE COMPARISON

MaaS USERS RIDE PUBLIC TRANSPORTATION MORE THAN THEIR HELSINKI METROPOLITAN AREA COUNTERPARTS

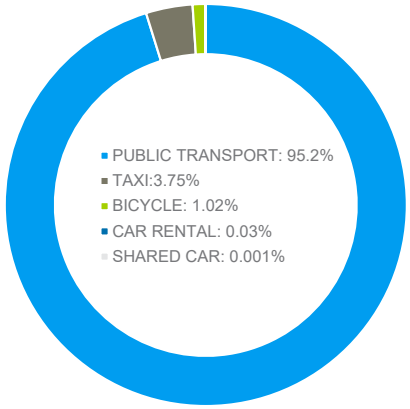


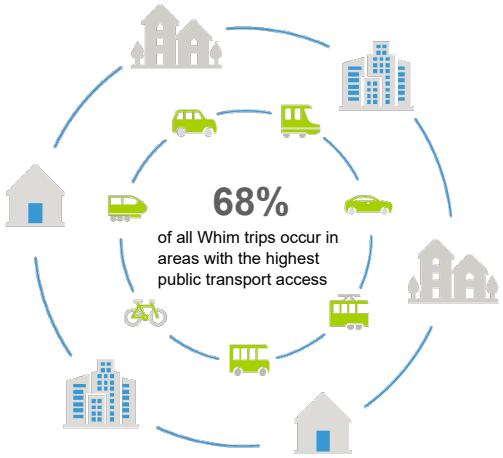
*Whim data have been normalized for comparison purposes with Helsinki metropolitan area residents in the Travel behavior survey

Source: Ramboll

CASE STUDY – HELSINKI, FINLAND: KEY INSIGHTS

PUBLIC TRANSPORTATION IS THE BACKBONE OF MaaS





AVERAGE DAILY TRIPS OF MaaS USERS AND TYPICAL HELSINKI RESIDENTS ARE ABOUT THE SAME i.e. 3.4

WHIM-TRIPS AVG PER PERSON	NO. OF TRIPS	MODAL SHARE%
Public transportation	2.15	63%
Taxi (from Whim data)	0.07	2%
Car (Trips added, Travel behavior survey)	0.2	6%
Bicycle+Walking (Trips added, Travel behavior survey)	1.0	29%
TOTAL	3.4	

CONTROL GROUP AVG PER PERSON (FROM HSL DATA)	NO. OF TRIPS	MODAL SHARE%
Public transportation	1.6	48%
Taxi	0.03	1%
Car	0.2	7%
Bicycle+Walking	1.4	44%
TOTAL	3.3	

MaaS DOES NOT CHANGE THE TRANSPORT SYSTEM ITSELF; RATHER, IT FACILITATES A MORE DYNAMIC AND INCLUSIVE USE OF THE EXISTING ONE.

Whim users travel by taxi **2.1** times more often than the typical Helsinki resident

WHIM

Modal share 2.1%

HELSINKI

Modal share 1%

Source: Ramboll

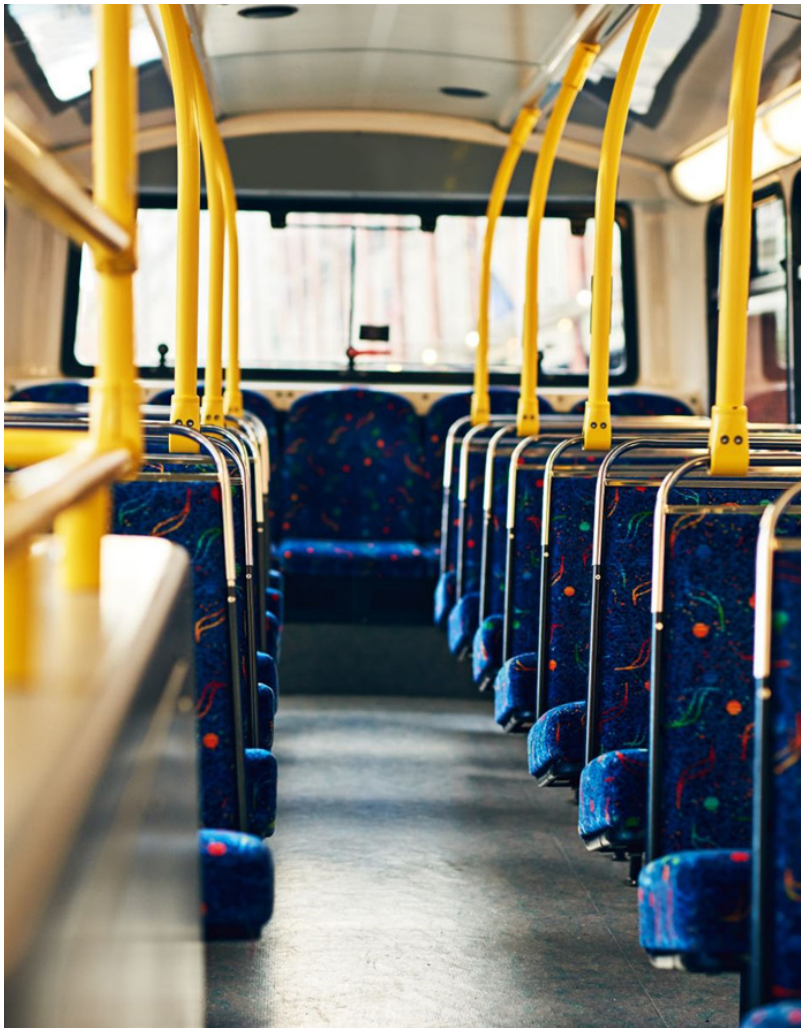
THE FINNISH ACT ON TRANSPORT SERVICES

Source : https://daily.scot/2020/12/09/post-covid-city-challenges-central-focus-at-the-eit-urban-mobility-summit-2020/

NEW LEGISLATION ADOPTED IN FINLAND TO ENABLE MAAS

- In order to launch a full scale MaaS project, in 2018, The Act on transport services in Finland brought together legislation on transport markets.
- The aim of the legislative reform is to provide the users with better transport services and to increase freedom of choice in the transport market.
- Part of this act ensures that regardless of the mode of transport, a provider of passenger mobility services shall ensure that essential, up-to-date data on its services is freely available from an information system (open interface).
- The data should be provided in a standard, easy to edit, and computer readable format.
- At minimum, this essential data shall include information on routes, stops, timetables, prices, availability, accessibility as well as access to the sales interface of their ticket and payment systems

CASE STUDY – HELSINKI, FINLAND: KEY FINDINGS



- MaaS users are multimodal user
- Within various modes, MaaS Users ride public transport more
- MaaS help solve first and last mile connectivity
- Taxi trips get a boost after implementation of MaaS system
- Short city trips on shared bike increase on implementation of MaaS Project
- MaaS does not increase in average daily trip rare of a transport user
- Public transport is the backbone of MaaS
- MaaS grows faster along public transport corridors
- MaaS could help reduce 38% private car trips
- Rental car business increase on implementation of MaaS project
- A legislation enables MaaS project implementation very smooth

HANNOVER AND BERLIN, GERMANY

EXAMPLES OF HEAVY PUBLIC SECTOR INVOLVEMENT

HANNOVER MOBILITY SHOP

FIRST MaaS WORLWIDE BY PUBLIC TRANSPORT OPERATOR

MaaS operator : Üstra and the Greater Hannover Transport Association

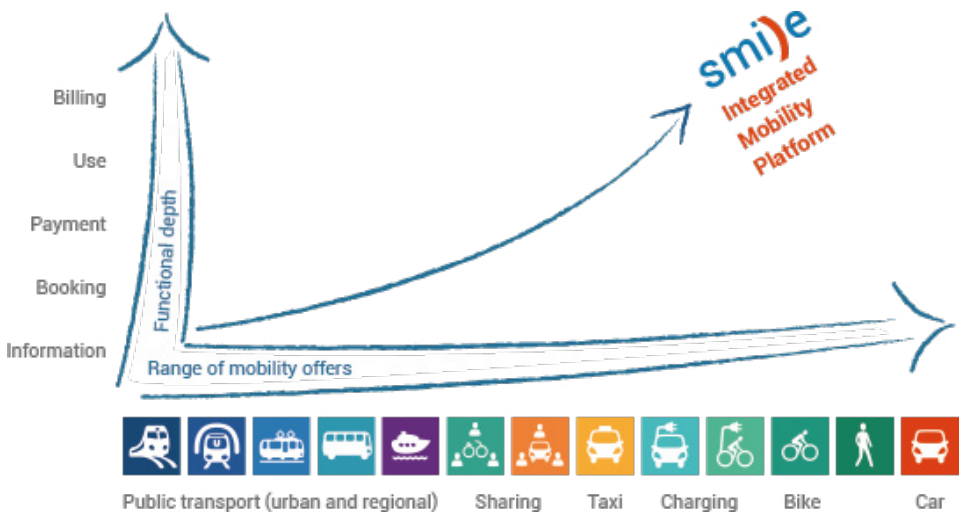
Launch date: A pilot version was trialed in November 2014 launched in February 2016, is one of the first fully operational examples of MaaS.

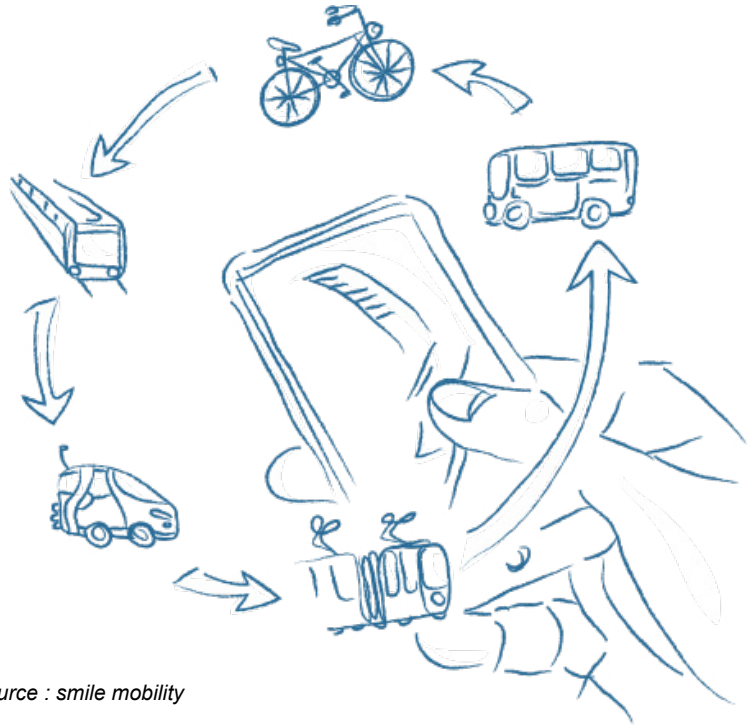
- Customers can use the application to look up journeys and receive information about the cost and duration of that trip by a range of modes; they can then either buy a public transport ticket, make a car share reservation or call a taxi.
- At the end of the month Üstra does the multimodal billing, provides customers with a joint invoice and redistributes revenues.

In Berlin, the public transport company BVG launched Jelbi in summer 2019 which integrate all modes in the city.

Hamburger Hochbahn, operator of bus and heavy rail, is developing a digital MaaS solution called Switchh.

VIENNA, AUSTRIA





Source : smile mobility

SMILE– MaaS PILOT SCHEME IN VIENNA

PILOT PHASE: 2013 TO 2015.

For over a year all functions of the mobility platform were tested. Afterwards the changes in mobility behavior were surveyed.

KEY FINDINGS:

- 48% of respondents increased their usage of public transport
- 10% increased use of bike share
- 21% reduced their use of private car
- 22% reduced their use of taxis (though 7% increased taxi use)
- 69% tried new routes
- Intermodality increased, with 26% of users increasing their public transport use in combination with private car.

WIENMOBIL APP

LAUNCH DATE: JUNE 2017

Findings from the **SMILE** scheme led to the development of **WienMobil**, an app which enables the booking of and payment for a range of mobility services in Vienna.

Wiener Linien and Wiener Stadtwerke a public transport operator developed WienMobil.

INTEGRATION OF MODES IN THREE MaaS EUROPEAN CASE STUDIES

PRODUCT FEATURES	WHIM (HELSINKI)	WIEN MOBIL (VIENNA)	MOBILITY SHOP (HANNOVER)
Main Line Trains	x	x	x
Regional Trains	●	●	●
Underground, Tram, Bus	●	●	x
Bike Sharing	x	●	x
E-scooter Sharing	x	●	●
Moped Sharing	●	●	●
Car Sharing*	●	●	●
Taxis*	x	x	x
Car service with driver	●	●	●
Personal Car	x	●	x
Personal Bike	●	x	x
Rental Car	●	x	x
Car Park*	x	●	x

●
Route calculation only

●
Route calculation, booking, ticket purchase

X
Non-Integrated service

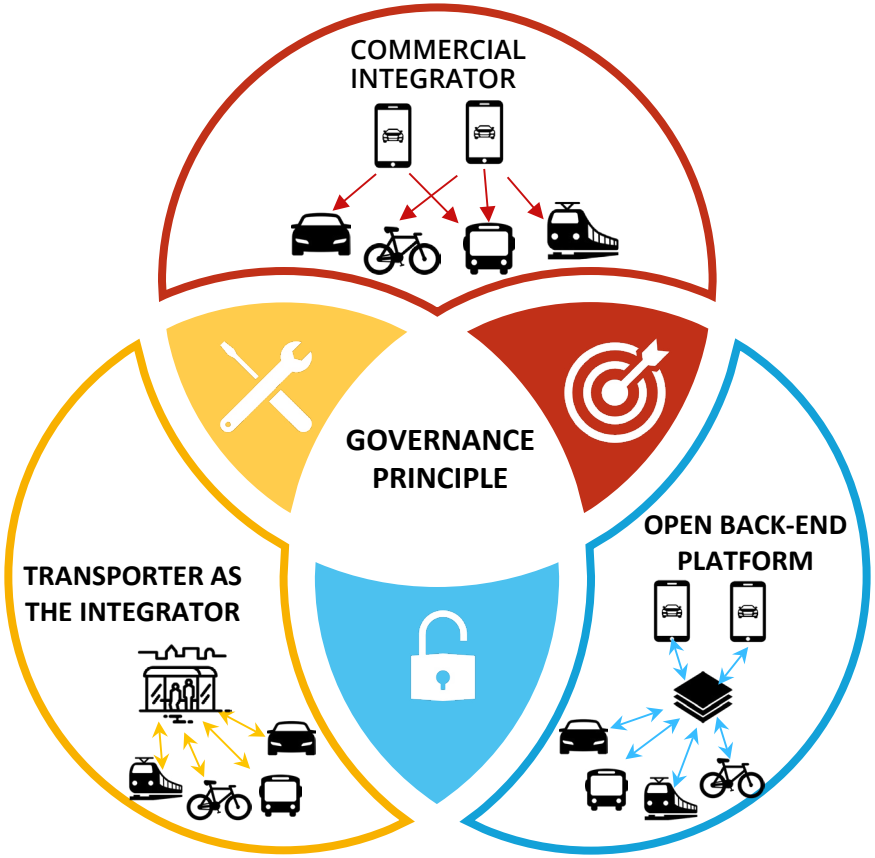
*
Limited operators only

GOVERNANCE PRINCIPLES FOR MaaS PROJECTS

- Fully private model
- Perceived as providing a customer-oriented and innovative solution.
- Might not be socially inclusive.
- Data would probably not be shared with public authorities.
- The risk of a bias.
- Marketplace with agreements between MaaS provider and transport operators
- Competition
- Free, unregulated market

- MaaS develop and run by public operator with selected mobility services
- Other mobility services providers may have to open up their API's.
- Opportunity of to improve
- Might provide a less customer-oriented and innovative service

- Set up by a public entity with multiple private sector MaaS operator
- Serves as public infrastructure on which different actors could build a MaaS solution
- All mobility services have to open up their API's
- Competition on the front side
- Ability to offer a customer-oriented, innovative and impartial service
- Local mobility providers are more likely to be integrated
- Financing the open back-end platform needs to be addressed



Source: UITP

GOVERNANCE PRINCIPLES FOR MaaS PROJECTS

MODEL	COMMERCIAL INTEGRATOR	OPEN BACK-END PLATFORM	TRANSPORT AS THE INTEGRATOR
Example	Whim (Helsinki)	Wien Mobil (VIENNA)	Mobilitatsshop(HANNOVER)
Investment by the authorities	Low	Average	High
Ability to innovate and provide customer-oriented offers	Assumed to be high by private MaaS operators	Left to the initiative of MaaS operators	Assumed to be more limited by the transport operator
Ability to integrate different mobility services	Assumed to be high	Left to the initiative of MaaS operators	Risk of focusing on the transport operator's historical partners
Presentation of mobility offers	Risk of favouring the commercial interests of the MaaS operator	Possibility of imposing fair and non-discriminatory rules	Possibility of imposing fair and non-discriminatory rules
Contribution to public policy	Risk of favouring the commercial interests of the MaaS operator	Establish clear policy for open API regulation	Alignment with public policies
Customer relationship	Risk of losing the customer relationship by the local authority	Competition on the front side	Control of customer relations by the local authority
Control of data	Risk of losing control of data for the local authority	Control of supply data, risk of losing control of usage data	Control of data by the local authority
Competition between MaaS operators	Possible competition between several MaaS operators	Competition facilitated, as part of the investment is paid for by the public authorities.	Monopoly of the authority (except in the case of an offer created by a commercial integrator)

MADRID, SPAIN

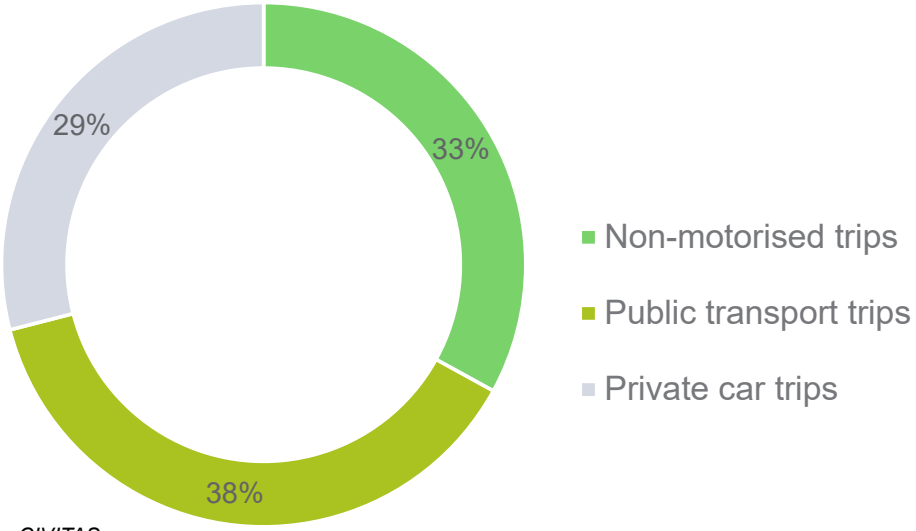
Madrid meets the two basic conditions for MaaS developments to take place in a city:

- a robust public transport system and
- a growing and diverse shared mobility offer.

Madrid concentrates the largest number of **transport operators** (public and private), with **23 companies**, followed by Milan and Paris, with 19 operators and at least **35 shared mobility** services managed by 29 operators

The largest fleet is offered in car-sharing services with 10,471 units, followed by scooter sharing with 9,859 units.

MODAL SHARE



Source: CIVITAS

City area	605.77 km^2
Popuation	3.165.883 (1-1-2016)
Population density	794 inh/km^2
Climate	Cold semi-arid climate with continental influences
Gender	53%/47% (F/M)
Life expectancy	84
Car ownership	457 cars / 1000 inhabitants
Accidents (2015)	24 deaths, 11,723 accidents (8.6% in city lab)
Elderly population (65 and above)	Madrid: 20.4% Puente de Vallecas: 18.6% Villa de Vallecas: 12%

MaaS LANDSCAPE IN MADRID

PUBLIC SECTOR

MaaS operator: Municipal Transport Enterprise (EMT)

Platform: MaaS Madrid

Launch date: July 2018

It provides information on most of the available mobility services at a specific location and enables users to find alternatives for private car use. It also offers traffic information, air quality, parking and charging points for EVs. It will later incorporate reservation and payment of travel options.

Renfe, the primary public rail operator in Spain, is also developing its MaaS application, called “Renfe as a Service (RaaS)”.

They launched the beta version of the app in November 2019 and pilot version being tested by 500 people.

PRIVATE SECTOR

MaaS operator: Wondo (company owned by Ferrovial)

Platform: Moovit

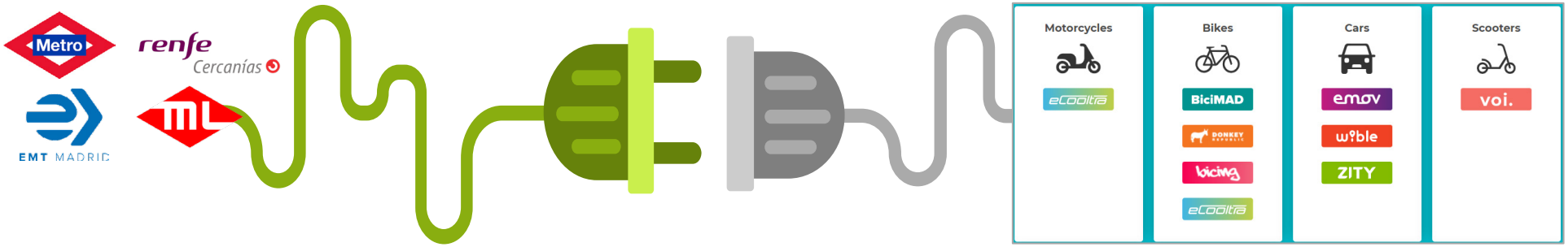
Launch date: November 2019

Moovit aggregates real-time information on different mobility

services and allows users to buy shared mobility rides for some of the moto-sharing and scooter-sharing companies through Wondo tickets.

Other Private MaaS Aggregators

- Chipi
- CityTrips
- Urbi
- Imbric



MaaS LANDSCAPE IN MADRID

Leading companies in terms of fleet are:

- Uber and Cabify (for ride-hailing),
- ShareNow (for free-floating car sharing),
- eCooltra, Movo - a company owned by Cabify, also deploying kick-scooters, with all these services available through the Cabify app in a “walled garden” fashion.
- Acciona (for moto sharing),
- Bicimad (for bike sharing)
- Circ, Bird and Bolt (for scooter sharing).

Madrid has made publicly available several sources of mobility data. Namely

- Multimodal Mobility Portal
- Mobility Labs Portal:
- Open Data Portal

Bicimad has around 65,000 active subscribed users, with more than 3 million trips according to their open data.

E-cooltra as the most popular service, with 750,000 users in Spain, while Muving has 350,000 users.

In the case of car-sharing services, ShareNow has reported having 237,000 users in Spain, compared to Emov (Free2Move), which has 200,000 users, Zity with 157,000 and Wible with 100,000.

MaaS INITIATIVES IN THE UK

WEST MIDLANDS, UK

MaaS operator : MaaS Global
Platform : Whim
Launch date : April 2018

Three trial packages:

- **Pay as you Go,** £0 to access pay per ride on public transport, taxi and car hire
- **Whim Everyday,** £99 per month, which included unlimited use of public transport in the West Midlands and a capped price of £49 for enterprise car hire.
- **Whim Unlimited** £349 per month, which included unlimited use of public transport, taxi rides within 3 miles of the city centre and unlimited enterprise car hire.

In early 2019, MaaS Global withdrew the Everyday and Unlimited packages, due to low uptake, and is now looking to set up a Whim Everyday Bus package

GREATER MANCHESTER, UK

Transport for Greater Manchester (TfGM), is exploring MaaS as part of its 2040 Transport Strategy. In October 2017 TfGM, working with Atkins ran a trial, called **MaaS Evolution**.

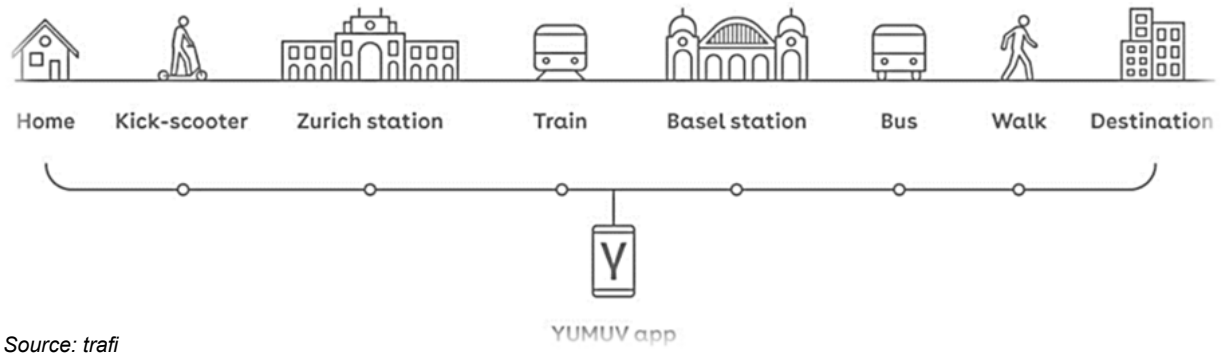
39 participants were selected from 230 volunteer residents.

They were provided access to multiple subscription packages, car and bike share options , on demand buses etc.

- A total of 626 journeys were made and of these 73% included two or more different modes of transport.
- 21% of participants were now more willing to use active travel following the experiment and 26% were more willing to use public transport.
- Six months after the trial, 82% of participants wanted MaaS to be implemented.
- 20% of participants had incorporated active travel into their commute.

YUMUV : MaaS INITIATIVES AT REGIONAL LEVEL

WORLD'S FIRST REGIONAL MOBILITY AS A SERVICE WITH SUBSCRIPTION



Source: trafi

- **OWNED** by Swiss Federal Railways (SBB CFF FFS), public transport operators (PTOs) in Zurich (VBZ), Basel (BVB), and Bern (BERNMOBIL)
- **Launch date :** August 2020
- **Platform Provider:** Trafi (same that created Jelbi in Berlin)
- A joint regional entity orchestrated Mobility as a Service between three Swiss cities.

They completely integrated the well-known micromobility brands like Tier, Voi, and BOND into a single, holistic multimodal service.

FIVE CRUCIAL FEATURES OF YUMUV –

- A multi-city approach
- Micromobility supplements public transportation
- Mobility subscriptions
- Taking data privacy seriously
- Customizable off-the-shelf solution

3. MaaS PROJECTS IN NORTH AMERICA

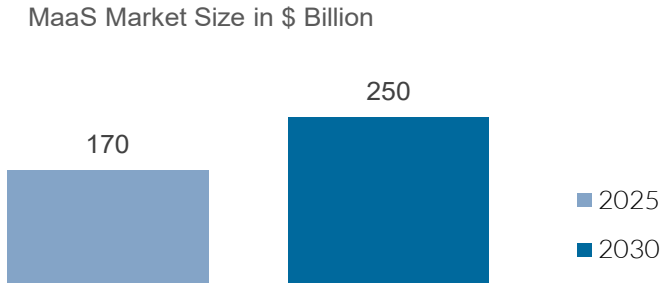
MaaS INITIATIVES IN USA

The development and deployment of Mobility as a Service (MaaS) systems in Europe has been increasing at a rapid rate over the past few years. However, in the U.S. during the same time frame, MaaS implementation has been limited.

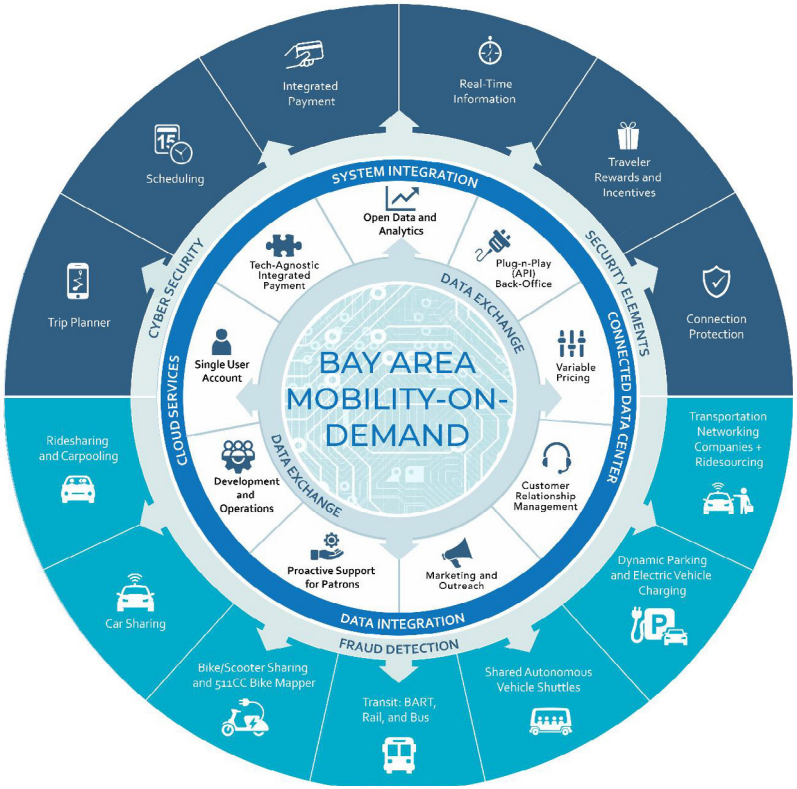
While there are no MaaS systems in the U.S., several systems are under development. MaaS is gaining momentum and holds the promise of improving the transport offerings to the commuters

MaaS America is the body that govern the collaboration with several MaaS players in the USA

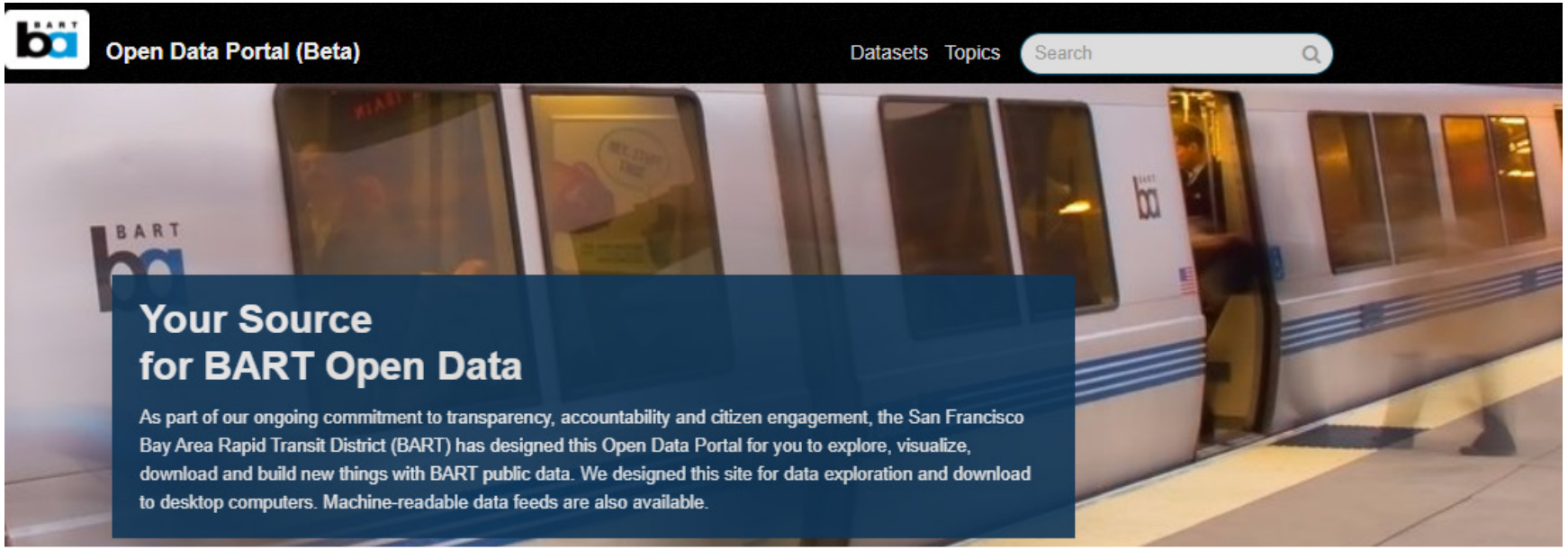
The U.S. mobility-as-a-service (MaaS) market size is expected to reach from USD 170 Billion to USD 250 Billion between 2025 and 2030.

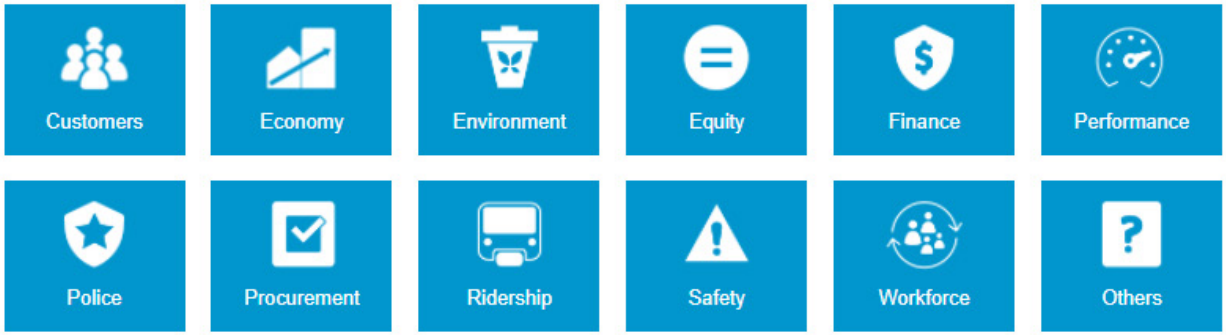


Source: MaaS America



MaaS INITIATIVES IN USA TRANSOPEN OPEN DATA PLATFORM IN BAY AREA





Source : The image has been taken from https://data.bart.gov/

4. MaaS PROJECTS IN AUSTRALIA

MaaS INITIATIVES IN AUSTRALIA

The Australian iMOVE Cooperative Research Center (CRC) consortium launched two Mobility as a Service (MaaS) initiatives

First being a report titled Mobility as a Service in Australia - customer insights and opportunities which led to launch of the second project described in later slide.

Participants : Intelligent Transport Systems Australia (ITS Australia) , TransLink, Department of Transport, Transport for Victoria, University of South Australia, NSW government

	PERSONA I: PERSONALISERS	PERSONA II: SOCIALISERS	PERSONA III: ROAMERS	PERSONA IV: PLANNERS	PERSONA V: CAR LOVERS
Share of the Australian population	14 per cent	7 per cent	17 per cent	22 per cent	41 per cent
Average MaaS purchase probability	87 per cent	51 per cent	33 per cent	2 per cent	1 per cent
MaaS use	Likely to use for all travel	Most likely to use for one-off social trips		-	-
Attitudes towards MaaS	MaaS could help reduce car dependence and car ownership			MaaS unlikely to have effect on car dependence or car ownership	
Geography	Evenly spread across metro, regional and remote areas	More likely to live in metro areas	More likely to live in metro areas	More likely to live in regional and remote areas	More likely to live in regional and remote areas
Demography	More likely to be younger, male, college educated, employed, have children at home	More likely to be middle aged, female, college educated, high household income	More likely to be college educated, single and living with parents, high household income	More likely to be older, female, not college educated, retired, empty nesters	More likely to be older, not college educated, retired, empty nesters
Current travel behaviour and attitudes	High overall travel needs, high motorcycle ownership, high use of mobility devices	Negative opinion of private car ownership and use; open to car sharing	Negative opinion of private car ownership and use; open to car sharing	Low opinion and infrequent use of public transport and car sharing	Low opinion and infrequent use of public transport and car sharing
Average self reported travel costs	$185 per capita per week	$121 per capita per week	$136 per capita per week	$98 per capita per week	$107 per capita per week

Source: ITS Australia

MaaS INITIATIVES IN AUSTRALIA

SYDNEY MaaS TRIAL PROJECT

The Australian iMOVE Cooperative Research Center (CRC) consortium launched its second Mobility as a Service (MaaS) project with a trial of an app-based multimodal transportation ecosystem in Sydney.

PARTICIPANTS

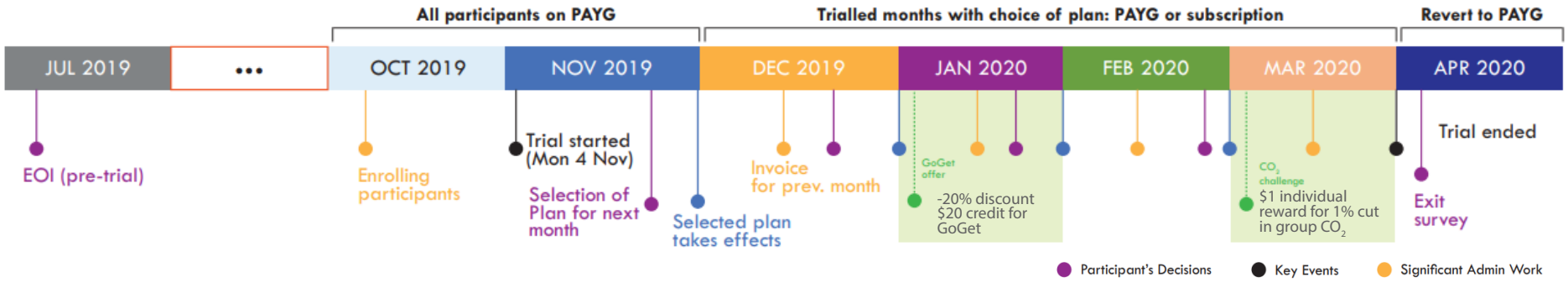
IAG (Insurance Australia Group); the University of Sydney's Institute for Transport and Logistics Studies; and smart mobility app developers, SkedGo.

PLATFORM

Trip

REASON FOR SELECTING SYDNEY

- An extensive public transport system
- Presence of private transport services providers which enables the creation of comprehensive multimodal MaaS bundles



Source: The Australian iMOVE Cooperative Research Center (CRC) consortium

MaaS INITIATIVES IN AUSTRALIA

PLANS PROVIDED

	Pay As You Go	Fifty50	Saver 25	Green Pass	Super Saver 25
	No Monthly Fee	$50/ Month	$25/ Month	$125/ Month	$25/ Month
Opal	No Discount	50% off every trip	25% off every trip	Unlimited trips	25% off every trip
Uber	No Discount	$3 off every ride	15% off every ride	15% off every ride	$3 off every ride + $5 rides to/from any PT station
Taxi	No Discount	$3 off every ride	15% off every ride	15% off every ride	$3 off every ride
GoGet	No Discount	No Discount	15% off every ride	No Discount	No Discount
Thrifty	No Discount	No Discount	No Discount	No Discount	No Discount

Source: The Australian iMOVE Cooperative Research Center (CRC) consortium

Based on travel pattern across 90 days the cost of travel on each plan (including subscription fee) was calculated
Feedback : The overall commute cost using MaaS for the passengers was very much economical then current trend.

MaaS INITIATIVES IN AUSTRALIA

MaaS CHALLENGE

Transport for NSW's new Transport Digital Accelerator launched its first industry innovation challenge, the MaaS Innovation Challenge. The innovation challenge was launched to find innovative ideas that help give customers the ideal door-to-door travel experience where they can plan the optimum travel option or combination.

THE CHALLENGE

- How would you give customers an ideal door-to-door mobility service experience and seamless combinations including the first and last mile options?
- Enable shared data to interact with other systems, improve customer information and assisting the effective management of the transport network.
- What is the feasible approach that will deliver your product, service or solution ready for a customer pilot?
- The seed funding and investment by Transport for NSW required to deliver the products, service or solution and it is best value for Government

ONCE-IN-A-GENERATION OPPORTUNITY TO BE PART OF THE GROWING MASS LANDSCAPE

Seed Funding	**Customer Access** 13 milion Public Transport Customer trips per day	**Transport for NSW** Promotion Money can't buy promotion of your pruducts.
Incubation	**Amazon Web Services Hosting**	**Space at Sydney Start-up Hub**
Partner Mentoring & Coaching	**Exclusive Access to Data & APIs**	**Access to Transport Experts**

Source: Transport for NSW's, https://opendata.transport.nsw.gov.au/maas-innovation-challenge

How would you give customers optimal door-to-door mobility service options and seamless combinations for their situation, including the first and last mile?

Transport for NSW's new Transport Digital Accelerator launched its first industry innovation challenge, the MaaS Innovation Challenge. The innovation challenge was launched to find innovative ideas that help give customers the ideal door-to-door travel experience where they can plan the optimum travel option or combination. Read more about the challenge and it's winners.

What is the Mobility as a Service (MaaS) Challenge?

Mobility as a Service, MaaS, is a dynamic, growing market with small and large players working together to give customers improved travel options that suit the individual needs and circumstances, not just on main transport routes.

5. MaaS PROJECTS IN ASIA

MaaS INITIATIVES IN JAPAN

もっといい「いきかた」
EMot
Mobility with Emotion

MaaS operator : Odakyu Electric Railway Co. Ltd.

Platform : Emot

Launch date : October 2019

Functions :

- Multi modal search route
- Digital ticket
- 3 pilot Projects (Incentives with MaaS service)

MaaS × Sightseeing

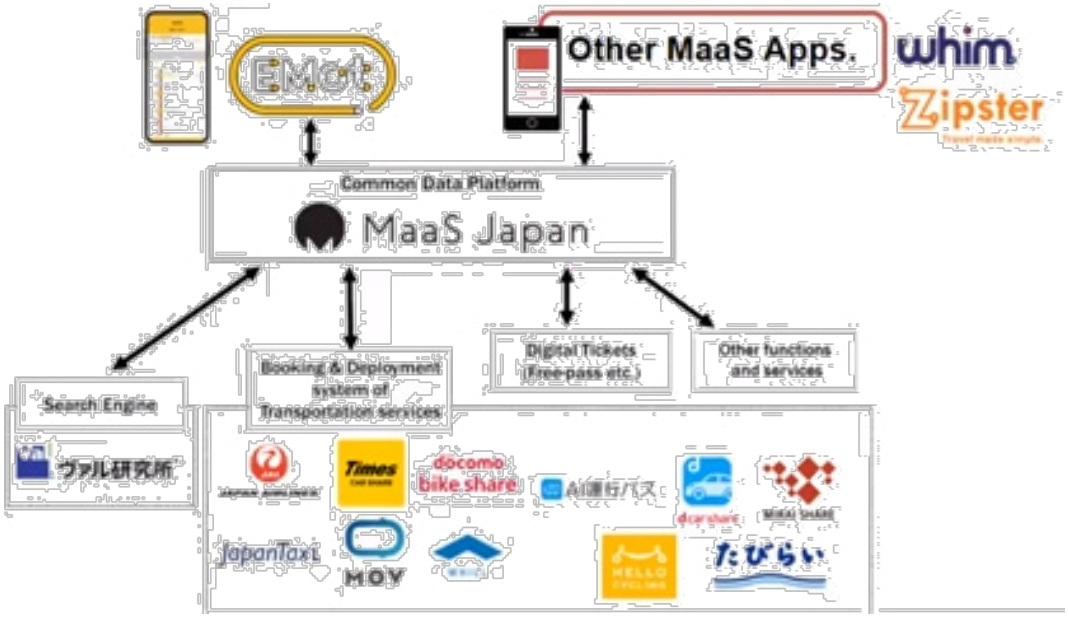
MaaS × Shopping

MaaS × Dining

MaaS operator : Odakyu Electric Railway Co. Ltd

Platform : MaaS Japan

- Common database for MaaS in Japan
- Provides Integrated API and data connection services
- Odakyu has collabaretd with MaaS Global and mobility X for data cponnection and service integration with MaaS Japan.



MaaS INITIATIVES IN SINGAPORE

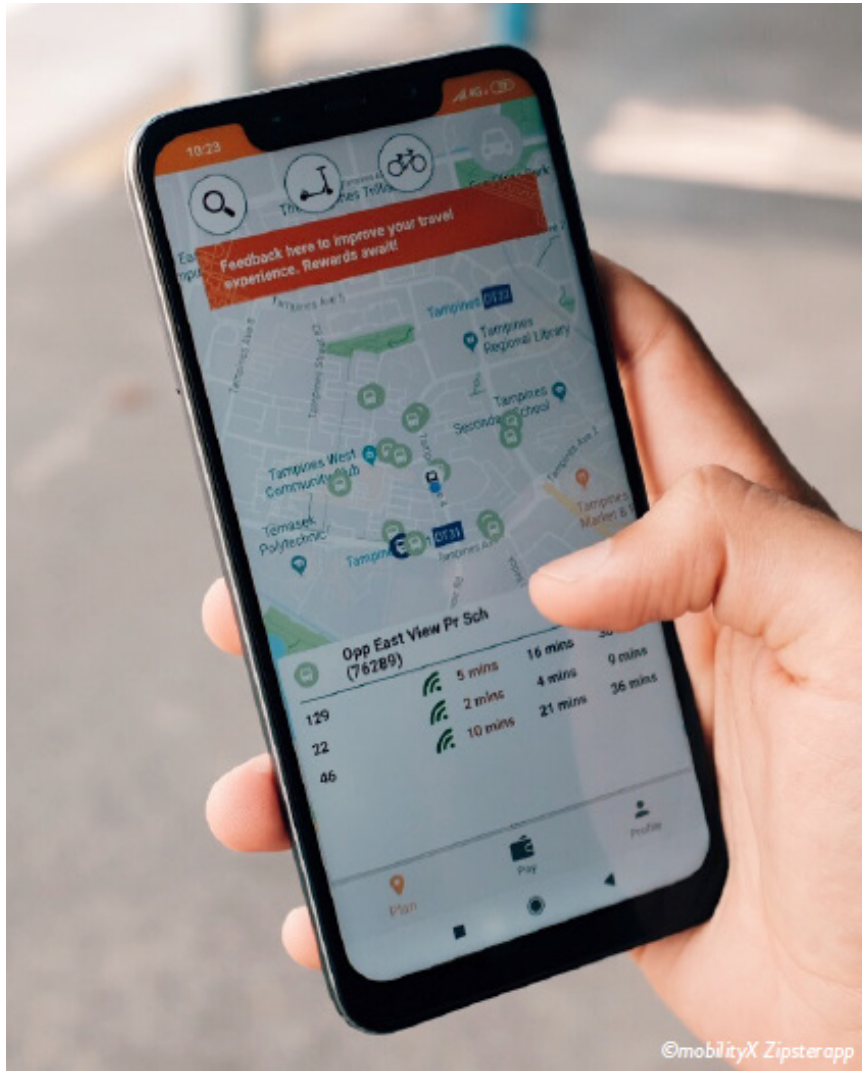
MaaS Provider: MobilityX Pte Ltd (A startup backed by Singapore-MIT Alliance for Research and Technology(SMRT) and Toyota Tsusho.

Launch Date:

1st April, 2019.

- The introduction of MaaS aligns with Singapore's Land Transport Master Plan 2040 and the land use Master Plan 2019.
- **MobilityX** has partnered with **AXA Insurance** Singapore to protect Zipster users across their multi-modal journey

Partners



6. SUMMARY OF MaaS PROJECTS GLOBALLY

SUMMARY OF MaaS INITIATIVES GLOBALLY

INITIATIVE	PLACE	STATUS AND GOVERNANCE	INTEGRATION LEVEL	MODES
yumuv	Switzerland	Operational (2020-) PPP	Level 3	Bike sharing, car sharing, car renting, taxi, urban PT, regional PT.
ZIPSTER	Singapore	Operational (2019-) PPP	Level 3	Bike sharing, car sharing, car renting, taxi, urban PT, regional PT.
Whim App	Helsinki, Finland	Operational (2016-) Private-led	Level 3.	Bike sharing, car sharing, car renting, taxi, urban PT, regional PT.
UbiGo	Gothenburg, Sweden.	Pilot (2013-2014), version 2.0 in preparation Public-led	Level 3.	Bike sharing, car sharing, car renting, taxi, urban PT.
SHIFT	Las Vegas, USA	Planned (2013-2015) Private-led	Level 3.	Bike sharing, car sharing, taxi, collective DRT, valet parking.
Hannovermobil	Hannover, Germany	Operational (2014-) PPP	Level 2.	Car sharing, taxi, urban PT, regional PT.

SUMMARY OF MaaS INITIATIVES GLOBALLY

INITIATIVE	PLACE	STATUS AND GOVERNANCE	INTEGRATION LEVEL	MODES
Smile	Vienna, Austria	Pilot (2014-2015) Public-led	Level 2.	Bike sharing, car sharing, taxi, urban PT, regional PT, parking.
WienMobil Lab	Vienna, Austria Public-led	Operational (2017-) Public-led	Level 2.	Bike sharing, car sharing, taxi, urban PT, parking.
Moovel	Hamburg and Stuttgart, Germany	Operational (2015-) PPP	Level 2 (partial, payment integration).	Car sharing, taxi, urban PT, regional PT.
myCicero	Italy	Operational (2015-) Private-led	Level 2 (partial, payment integration)	Urban PT, regional PT, international PT, parking, permit for urban congestion charging zones.
NaviGoGo	Dundee and North East Fife region, Scotland, UK	Operational (2017-)	Level 2 (partial, payment integration)	Car sharing, taxi, urban PT, regional PT.
iDPASS	France	Operational (2017-) Public-led	Level 2 (partial, payment integration).	Car renting, taxi, valet parking.
EMMA (TaM)	Montpellier, France	Operational (2014-) PPP	Level 2.	Bike sharing, car sharing, urban PT, parking.

7. MaaS MATURITY INDEX

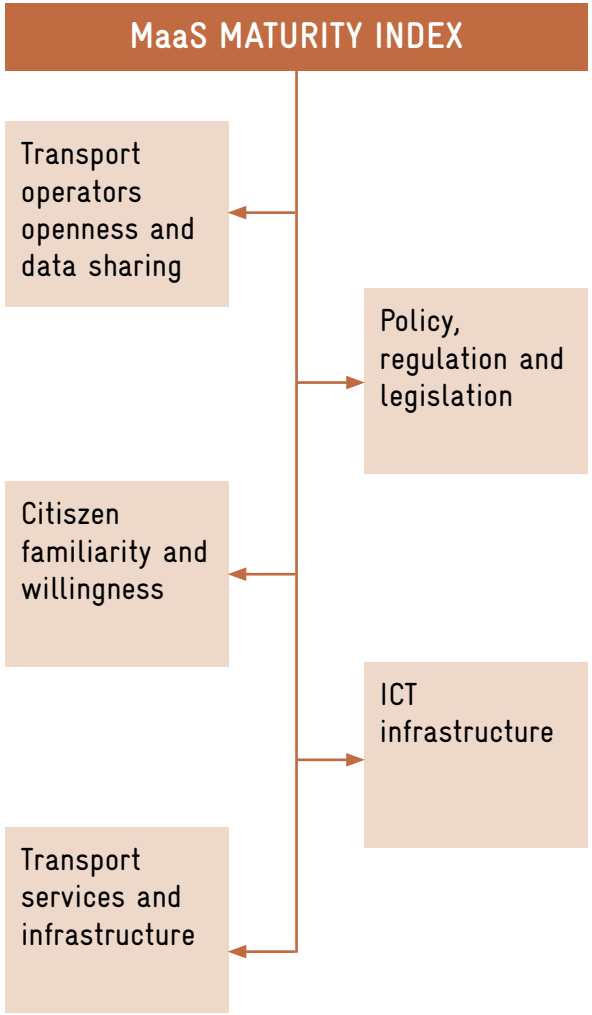
WHAT IS MaaS MATURITY INDEX?

MaaS lab created the MaaS Maturity Index (MMI) to assess the readiness of cities for the implementation of MaaS.

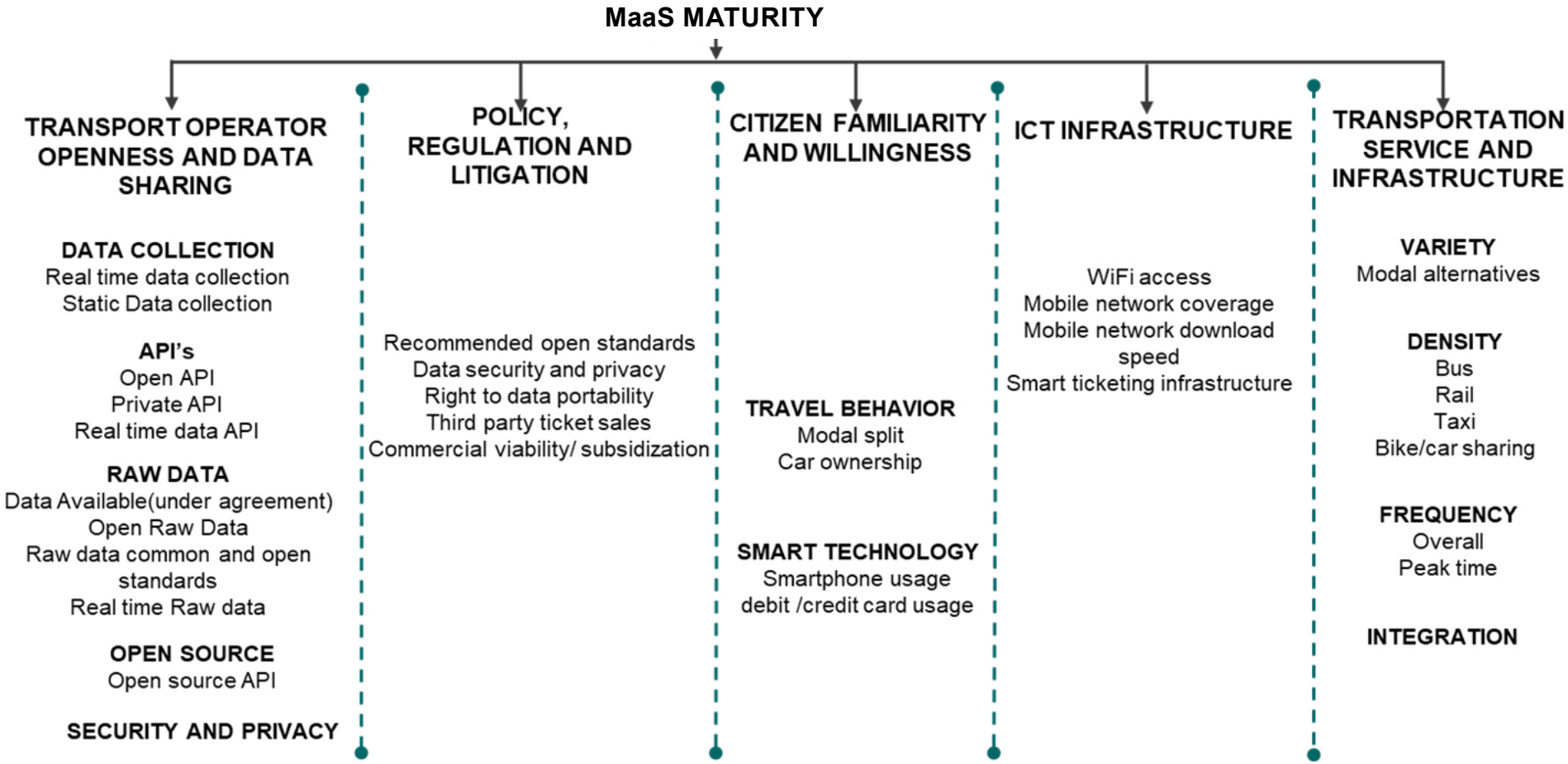
Various characteristics which affect the likelihood of a successful MaaS implementation are assessed to determine an aggregate score showing how ready a city is to implement MaaS.

The calculator can be used to demonstrate what improvements are needed to make a city ready for MaaS. Scores can be compared across cities, showing where MaaS providers could have the greatest impact.

The case studies cities in India shall be assessed based on a customised MaaS maturity index and to assess the level of preparedness required.



MaaS MATURITY INDEX



Source: Goulding, 2018

8. KEY LEARNINGS

COLLABORATION IS THE KEY

- There are four key perspective while offering MaaS
  - Governments, who see MaaS as a way of achieving policy goals and achieving emission targets
  - Transport authorities, who want to provide better and updated services
  - Mobility service providers, who see MaaS as a business proposition
  - Operators, who are often hesitant to have their services integrated for fear of jeopardising brand identity or control.

Considering multiple stakeholders involvement, collaboration is the key for a successful MaaS project

Globally the collaboration is being done through setting up of a specific institutions by bringing all stakeholders at one platform

In Europe, MaaS Alliance is the key body tasked with this collaboration, similarly MaaS America is formed in US with this objective and iMove is set up in Australia

It is advisable that a collaboration initiative to start with stakeholders consultation should be taken up in order to develop MaaS ecosystem in India.

DATA IS THE ENGINE OF MaaS

Data sharing and analysis have a key part to play in the MaaS revolution

MaaS is a digital, data-driven service that uses a number of technological capabilities that are associated with intelligent mobility innovation

It relies on building an ecosystem of stakeholders that, together, agree to manage the supply and demand of the services that travellers want.

The MaaS ecosystem includes data providers that act as brokers to aggregate data from a multitude of operators to support the services of MaaS providers.

In order to buy into MaaS, the customer will be looking for a simple interface to handle all of the pain points traditionally associated with multimodal travel

Shared and open data gathered from smart devices and connected infrastructure will underpin mobility solutions that support integrated, efficient and sustainable transport systems.

Much of the data exists but is not shared. It is crucial to find new ways of making data accessible in a way that protects privacy, takes into account cybersecurity concerns and most importantly makes commercial sense.

We recommend that an initiative towards setting up of an open mobility data sharing platform to be taken and a policy for open mobility data sharing shall be drafted for consultation purpose.

EMBRACE A 'UNIVERSAL MOBILITY AS A SERVICE' FRAMEWORK

A long-term policy inline with the objectives and goals of initiatives like NDC and SDG 2030.

Clear strategy for implementation of Intelligent transport System.

Governance and collaboration must be the main priority in developing MaaS.

- Governments should understand that transport service providers are a major stakeholder in MaaS.
- Public-private partnerships should be established, and they must be open.

Data and payment application programming interfaces (APIs) need to be standardized

Generate confidence in MaaS by addressing data security as priority.

Tailor the MaaS model as per city depending on its MaaS maturity index.

Standards and economic model need to be defined clearly

An initiative should be taken for assessing cities readiness on MaaS and initiate a dialogue on integrated ticketing using NCMC compliance common mobility card.

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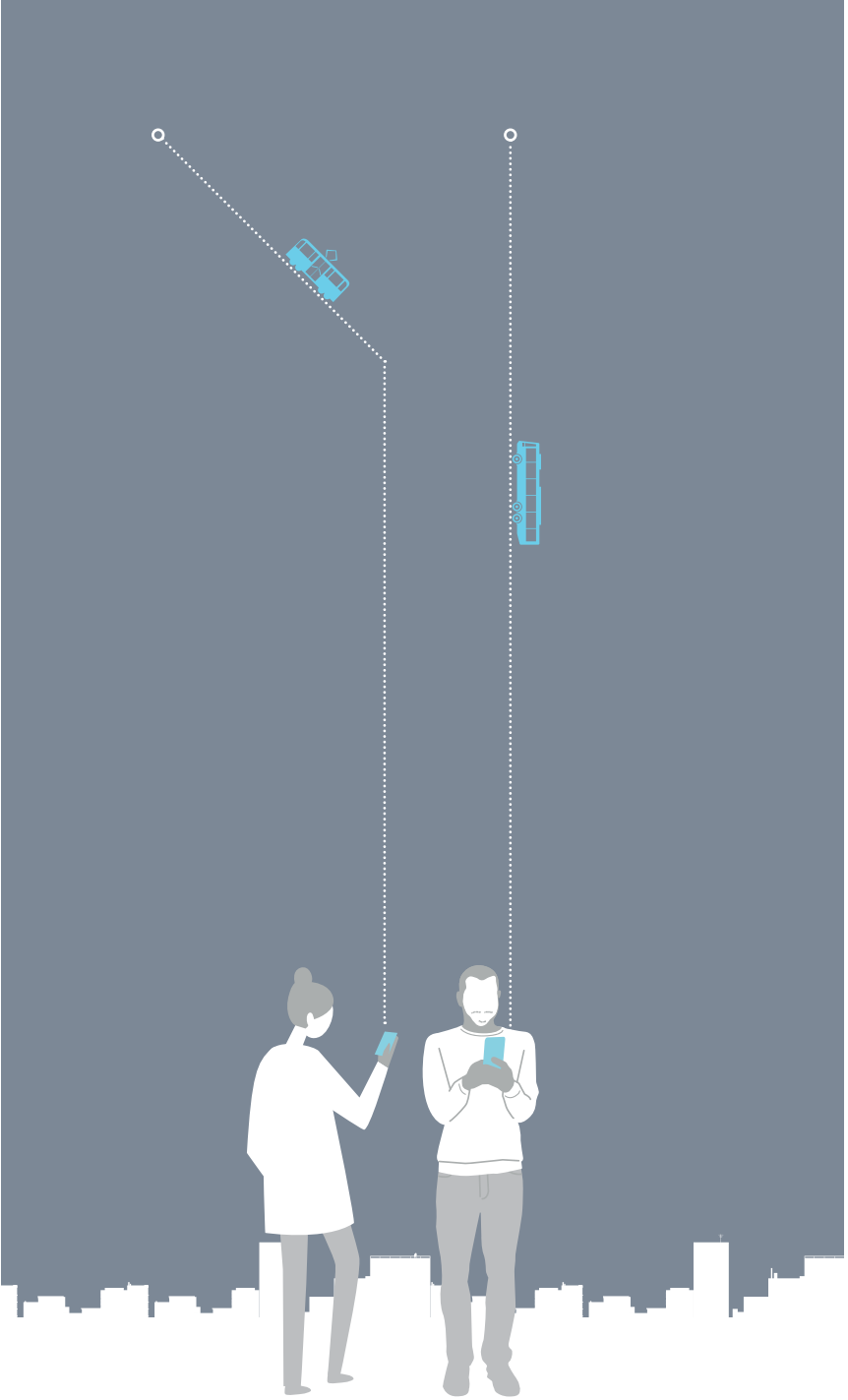

Ministry of Housing and Urban Affairs (MoHUA) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH are jointly implementing the technical cooperation project "Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT)", commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The project works with the three Smart Cities of Bhubaneshwar, Coimbatore, and Kochi and respective state governments of Odisha, Tamil Nadu, and Kerala to promote low carbon mobility planning, and to plan and implement sustainable urban transport projects.

As part of the Indo-German bilateral cooperation, both countries have also agreed upon a strategic partnership - Green Urban Mobility Partnership (GUMP) between Ministry of Housing and Urban Affairs (MoHUA) and Federal Ministry for Economic Cooperation and Development (BMZ). Within the framework of partnership's technical and financial cooperation, the German government will support improvements in green urban mobility infrastructure and services, strengthen capacities of national, state, and local institutions to design and implement sustainable, inclusive, and smart mobility solutions in Indian cities. As part of the GUMP partnership, Germany will also be supporting expansion of public transport infrastructure, multimodal integration, low-emission or zero-emission technologies, and promotion of non-motorised transport in India. Through this strategic partnership, India and Germany intend to jointly achieve effective international contributions to fight climate change.