

# Public Transport Promotion and Mobility-as-a-Service

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**SUMMARY** Promoting the use of public transport (PT) is considered to be an effective way to reduce the number of passenger cars. The concept of Mobility-as-a-Service (MaaS), which began in Europe and is now spreading rapidly around the world, is expected to help to improve the convenience of PT on the viewpoint of users, using the latest information communication technology and Internet of Things technologies. This paper outlines the concept of MaaS in Europe and the efforts made at the policy level. It also focuses on the development of MaaS from the viewpoint of promoting the use of PT in Japan.

**key words:** *Mobility-as-a-Service (MaaS), public transport, European Commission, policy*

## 1. Introduction

Promoting the use of public transport (PT) is considered to be an effective way to reduce the number of passenger cars, which account for the majority of CO<sub>2</sub> emissions in the transport sector, and studies are under way around the world. However, when a user seeks PT such as a train or a bus with the same level of convenience as that of a passenger car, which can depart for a destination at any time and travel from door to door with no changes along the way, the user cannot use PT as an alternative means unless the route, station, bus stop, number of operations, etc. are sufficient. Furthermore, the resistance to using PT increases when changing trains between transport modes.

Under such circumstances, the concept of Mobility-as-a-Service (MaaS), which began in Europe and is now spreading rapidly around the world, uses the latest information communication technology (ICT) and Internet of Things (IoT) technologies to improve the convenience of PT in a broad sense from the user's perspective. MaaS is expected to make an important contribution to promoting the shift from passenger cars to PT, something that is yet to be achieved fully.

In Japan, except in large cities, private cars account for a large part of the traffic share. In particular, many bus operators have fallen into a vicious cycle in which the number of bus services has decreased because of a decrease in the number of users, resulting in a decrease in convenience and a further decrease in the number of users. Under such circumstances, there are high expectations that realizing MaaS will promote PT.

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This paper outlines the concept of MaaS in Europe and the efforts made at the policy level. It also focuses on the distribution of PT-related static and dynamic data necessary for the development of MaaS from the viewpoint of promoting the use of PT in Japan, and it describes the current status and challenges of such efforts.

## 2. MaaS Concept in Europe

### 2.1 Definition of MaaS

The MaaS Alliance defines MaaS as the “integration of various forms of transport services into a single mobility service accessible on-demand” [1], although the definition tends to differ in three ways depending on the subject under consideration and the means of transport of interest. Specifically, it is considered that MaaS is a digital platform that integrates all modes of transport from departure to destination: planning, booking, electronic ticketing (e-ticketing), and payment services [2] and the like should be used. MaaS is also characterized by an emphasis on the viewpoint of users. Recent developments in ICT and IoT are indispensable for realizing these goals.

The target modes of transport include so-called traditional PT such as trains, trams, buses, demand transport, and taxis, and the means of transport in which vehicles are shared such as rental cars, car sharing, bike sharing, and chartered transport. Vehicle sharing has developed along with the development of ICT and IoT in recent years, and it is a new form of PT that differs from passenger cars that are owned and driven exclusively.

It is hoped that these traditional and new forms of PT can be combined effectively and efficiently to create an environment that is as convenient as private car use.

### 2.2 MaaS Service Configuration

Conventionally, when a user makes a journey plan, booking, payment, etc., it is generally necessary to access each transport company and carry out a procedure. To access each website and smartphone app, you need websites and smartphone apps that access as many transport companies as you use. However, in the case of MaaS, a MaaS provider enters between a user and a transport service provider, and the MaaS provider brings transport service providers together to provide various services to the user at one window (Fig. 1). One website or smartphone app is enough.

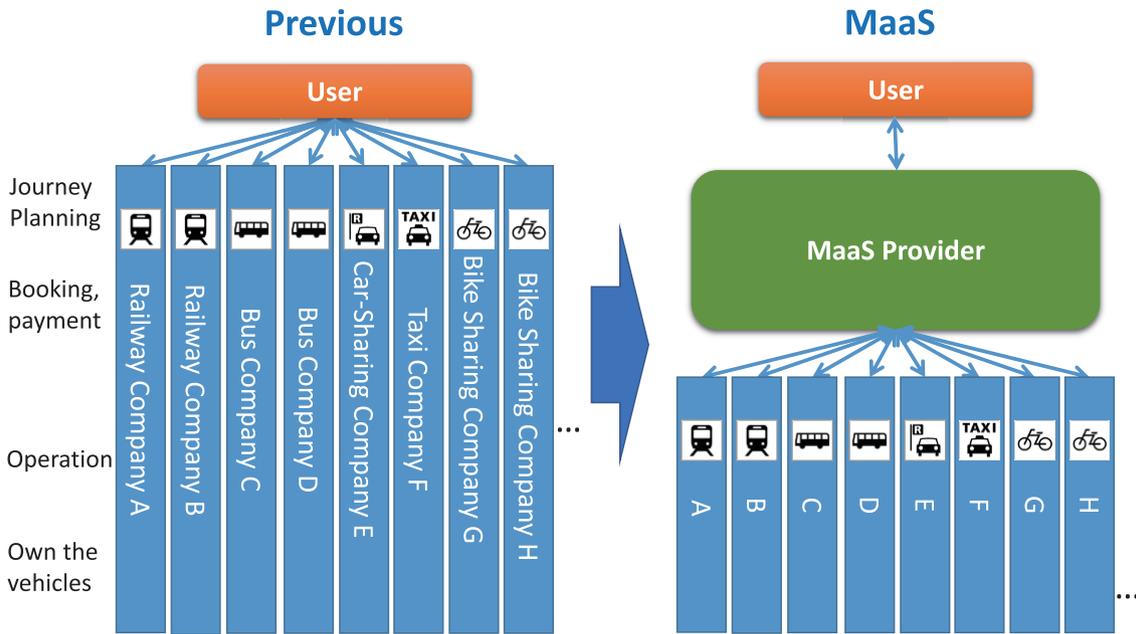


Fig. 1 Configuration of MaaS services.

Here are some examples of how MaaS has evolved through five levels from 0 to 4 [3]. In level 0 (no integration), all information is provided separately. In level 1 (information consolidation), we can find information on timetables, routes, fares, etc. In level 2 (integrating bookings and payments), we can explore, book, and pay for single trips. In level 3 (integration of service offerings), we have unlimited rides across the different transport modes. Finally, in level 4 (integration with policy) we have public–private cooperation. In Europe, there are many examples of MaaS, such as Whim in Helsinki, Finland (private-sector initiative), UbiGo in Gothenburg, Sweden (public initiative), Moovel in Stuttgart, Germany (private-sector initiative), and WienMobil in Vienna, Austria (public initiative) [4]. In particular, Whim [5] and UbiGo [6] are classified as level 3 because they combine multiple transport modes and include services such as unlimited rides for a month.

### 2.3 MaaS Business Models

Possible business models for MaaS involve the MaaS provider being public-led, private-sector led, or coordinated. In many European cities, PT such as trains, buses, and trams is often managed and operated by a single public transport authority. In many cases, the fare system is a flat rate for each zone regardless of the mode of transport. In that case, the public transport authority that manages PT in the city can be a MaaS provider. WienMobil in Vienna is a case in point.

In some cases, the MaaS provider will be a private company with technical expertise in multi-modal journey planning, booking, and payment systems. A case in point is Whim in Helsinki. In doing so, it is essential to ensure the distribution of static and dynamic travel and traffic data in

each mode of transport. Therefore, policy cooperation by the government is essential.

Also, in terms of the level of MaaS, the revenue of MaaS providers is assumed to be limited to advertising revenue and service usage fees from users in the case of level-1 MaaS, in which only information is provided. However, in the case of level-2 MaaS, which includes payment, the revenue sources of MaaS providers can be diversified, such as the difference between the transport-mode usage fee and the payment to the transport service provider. In the case of level-3 MaaS, users do not have to pay every time they use the service, but rather they can pay a fixed amount of money for a month. At the same time, based on the concept of scale economy, the payment to transport companies is considered to be cheaper, and the profit margin may be larger than that in level-2 MaaS.

To establish level-3 MaaS, it is necessary to create a new system that allows a third party who is not a transport operator, such as a MaaS provider, to sell tickets, as well as a system in which the price of tickets, can be set freely, and it is considered essential to relax existing traffic regulations.

### 3. Actions of European Commission at Policy Level

In realizing MaaS, government policy support is essential. The European Commission has long been working at policy level to implement a multi-modal information provision and journey plan throughout Europe that will contribute to the realization of MaaS.

#### 3.1 ITS Action Plan

The “Action plan for the deployment of Intelligent Transport Systems in Europe (COM (2008) 886 final)” [7] is the basis

of the ITS policies of the European Commission. This document was issued by the European Commission on December 16, 2008 as the positioning of policy documents “Communication” for relevant organizations and commonly known as the “ITS Action Plan”. ITS Action Plan aims to accelerate and coordinate the spread of ITS in road transport, including its connectivity with other modes of transport, and its implementation is focused on ensuring system compatibility and interoperability, promoting the continuity of ITS services, and coordinating activities at the European Union level. Specifically, it consists of six priority areas and 24 specific actions to be implemented from 2009 to 2014.

“Promotion of the development of national multimodal door-to-door journey planners” is positioned as one of the specific actions. This system is expected to save time and money for users by seamlessly connecting the traffic information of multiple modes of transport when users move from A to B, and to help to promote sustainable modes of transport and competition between modes. However, it has already been pointed out that creating different platforms in different countries will limit the realization of door-to-door multi-modal travel planning systems across European countries. It also points out the need to address issues data availability, data sharing (formats), and data quality. It can be said that European Commission recognized the importance of data compatibility/interoperability for the realization of an electronic toll collection (ETC) system, partly because they could not standardize ETC specifications across Europe.

### 3.2 ITS Directive

The “Directive 2010/40/EU of 7 July 2010 of the European Parliament and of the Council on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport” [8] is positioned as legal support for the ITS Action Plan. This document is commonly known as the “ITS Directive”. During the 12 years following its entry into force, the European Commission will adopt a legally binding “specification” with competitiveness, interoperability, and continuity for ITS solutions across Europe. To make the standard legally binding, the ITS Directive provides a delegated juristic act, or Delegated Act, to the European Commission until August 2022, after its entry into force.

The ITS Directive defines four priority areas and six priority actions. “The provision of EU-wide multimodal travel information services” is one of the priority actions, and legally binding standards for this activity will be adopted.

### 3.3 Delegated Regulation

Based on this, in June 2014 the Communication Staff Working Document entitled “Toward a roadmap for delivering EU-wide multimodal travel information, planning and ticketing services (SWD (2014) 194 final)” [9] was issued. This

document pointed out the necessity of addressing the following elements: ensuring access to public and private multimodal travel and traffic data; improving and maximizing the availability of public and private multimodal travel and traffic data; promoting and developing fully interoperable or compatible formats for data and data exchange protocols; and defining clear terms and conditions for the use and reuse of data.

In December 2017, “Commission Delegated Regulation (EU) 2017/1926 of 31 May 2017 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide multimodal travel information services” [10] was established. This document requires the establishment of the national access point, a digital interface through which data desired to be used in each member states can be accessed together with metadata, and the provision of static and dynamic travel and traffic data with fully compatibility and interoperability by transport operators. Based on this, member states will need to legislate to achieve these goals.

As a result, the distribution of PT-related data and information is mandatory at the policy level in Europe. Consequently, member states are expected to step up their efforts to adopt new laws. In Finland, “Act on Transport Services”, which will consolidate related laws in order to promote digitization of transport services and more-efficient use of data, as well as realize user-oriented mobility services, was established [11].

## 4. Public Transport Information in Japan

### 4.1 Status of Distribution of Information Related to Public Transport

In Japan, efforts are progressing toward realizing MaaS. Multiple private companies already provide transfer guidance services, mainly for trains. However, especially in the Tokyo metropolitan area, the subway, Japan Railways, and private railway lines are complicated, and the fare changes upon transferring between railway companies, so a service that provides the required time and route to the destination has been in place for a long time. It is also highly practical because trains run according to the timetable. In addition to static travel and traffic data such as timetables, each transport company provides dynamic travel and traffic data such as real-time train position.

As for payment of fees, transport IC cards are widely used, and each transport company or city has its own, so the number of types exceeds 30 [12]. Many of them are interoperable and can be used to pay for many forms of PT across Japan with a single transport IC card. The use of transport IC cards started in the railway industry, but recently their use has expanded to buses and taxis. Transport IC cards can be used not only for PT but also for shopping, and most transport IC cards are the prepaid type.

However, the transfer guidance service corresponding to level-1 MaaS is limited to the railway and some bus

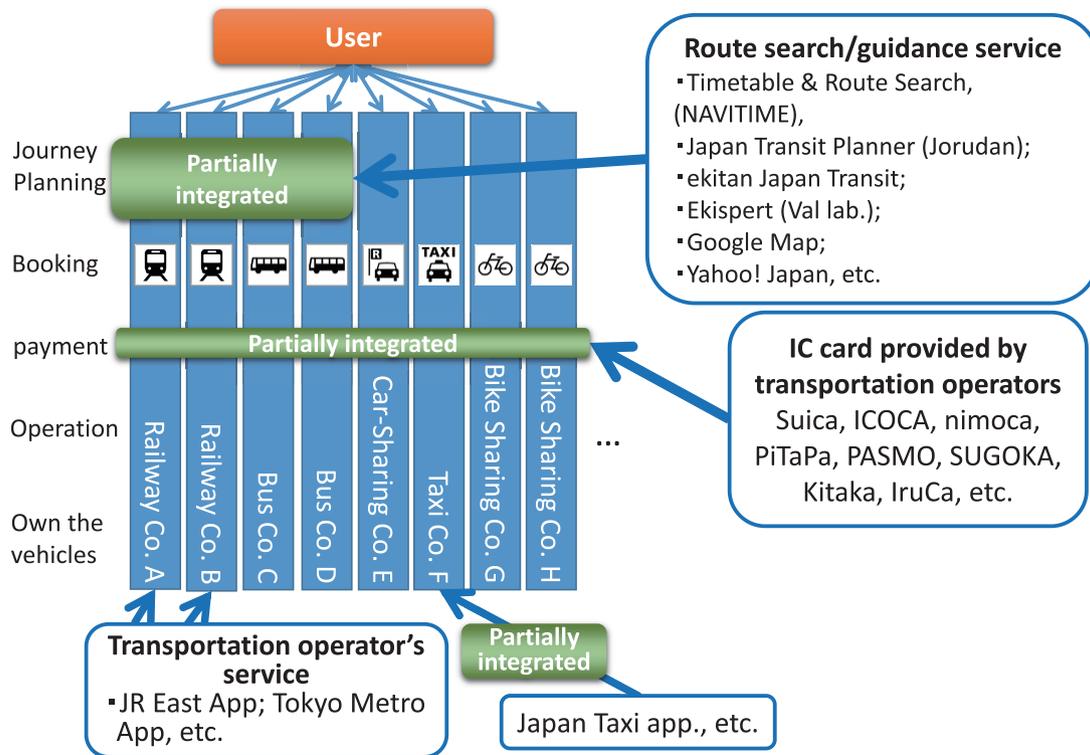


Fig. 2 Public transport information provision services in Japan.

routes. Some trains and buses accept the IC card for payment, but the payment system is only pay as you go, in which payment is made every time you get on a train, and there is no service that integrates journey planning, booking, and payment corresponding to level-2 MaaS (Fig. 2).

4.2 Efforts to Distribute Bus Travel and Traffic Data

Focusing on buses among PT systems in Japan, a recent survey found that more than 40% of people use the internet or other route search services to find out how to use a bus route at their business-trip destination or other destination (Fig. 3) [13]. However, the transfer guidance service covers around 80% of large bus companies with 30 or more vehicles but only around 20% of small and medium-size bus companies with fewer than 30 vehicles (Fig. 4) [14]. This means that while routes operated by major bus operators appear as route candidates in the route search service, routes operated by small and medium-size bus operators are not included in the route search service, and the situation is similar for users who have no routes.

To realize MaaS, it is essential to enhance PT travel and traffic data. It has been pointed out that it is necessary to provide data that covers the whole country by standardizing the data of transport operators into a common format and making it open data [15].

Under such circumstances, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) formulated GTFS-JP [16], a static travel and traffic data format in the standard bus information format, which is an improvement

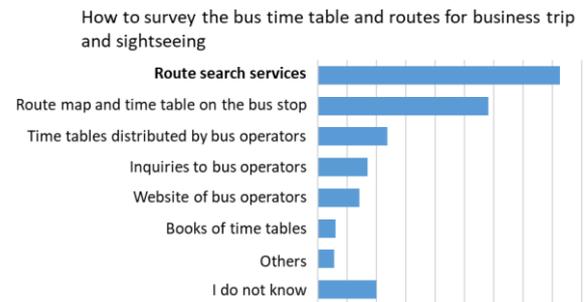


Fig. 3 Public opinion survey results on the use of route buses [13].

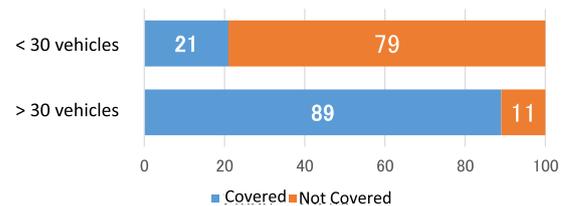


Fig. 4 Bus operators' route search service support status [14].

on GTFS (General Transit Feed Specification), which is searchable on Google Maps, for bus operators in Japan, in March 2017, and revised it in March 2019. This is an effort to establish a common data format for mainly static travel and traffic data such as bus-stop, timetable, and route data required for transfer guidance, and it is expected to promote data distribution between transport operators and transfer guidance service operators. In addition, GTFS realtime [17],

a dynamic data format that supports dynamic travel and traffic data such as bus location data, was established by MLIT in March 2019. The formulation of GTFS-JP is a bottom-up approach led by young IT engineers and young university researchers, but it is unusual and characteristic in PT administration of Japan. These measures are expected to promote the distribution of static and dynamic travel and traffic data, especially among small and medium-size bus operators. However, because the application of these formats is optional and not enforceable, their dissemination is left to the self-help efforts of transport operators. At present, young IT engineers and young university researchers are flying to local governments and bus operators in various parts of Japan to promote their use.

## 5. Conclusion

MaaS efforts are advancing mainly in Europe. Against the background of policies aimed at promoting the use of PT, in addition to pioneering efforts by PT operators and private businesses, policy-level initiatives are being implemented effectively, such as the enactment of legally binding standards to promote the distribution of static and dynamic travel and traffic data.

To promote the use of PT in Japan, it is necessary to create an environment that promotes the distribution of compatible/interoperable static and dynamic travel and traffic data in accordance with the efforts of transport operators. Further policy-level initiatives are required.

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