

A Report on Trends of Mobility on Demand in the United States

~Part 1~

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1. Introduction

Recently in the U.S., based on the idea of Mobility on Demand (MOD), which is the concept of changing transportation and system management to comprehensively account for people and objects, communities of their own accord have been working on various initiatives, such as developing Mobility as a Service: MaaS. The U.S. Department of Transportation (DOT) defines MOD as “an integrated and connected multi-modal network of safe, affordable, and reliable transportation options that are available and accessible to all travelers.” They believe they can develop MOD for all large urban areas, nearby suburbs, neighboring cities, semi-suburban communities, and rural areas. Although the concept of MOD in the U.S. was developed by the DOT relatively recently, local government and community efforts, as well as federal government initiatives, have been made even before then. For example, the “Smart · City” program introduced by the Obama administration in September 2015 is a typical example of a MOD related pilot program supported by the federal government. In addition, there is a history of developing paratransit throughout the U.S. to protect the rights of people with disabilities in order for them to have access to transportation services in accordance with the Americans with Disabilities Act of 1990 (ADA).

As expectations for MOD rise, in the U.S., where development of transportation systems have centered on automobiles, companies that have initiated MOD-related endeavors have tended to be those who incorporate technological aspects, such as automobile makers that

develop autonomous driving technology, platform companies including TNC, and IT companies that produce applications. However, recently in metropolitan areas, expectations have risen for public transportation to achieve MOD that will shift society from a car dependent one to that where there are sustainable options. Furthermore, it is believed that technology alone cannot expand the possibilities of MOD, and in some areas, there are cases where public transportation organizations have taken initiatives to begin MOD projects. Based on this background, in this report, I will analyze the current situation and challenges of MOD, including looking at field surveys focused on MOD related projects in urban areas with concentrated populations.

2. Mobility on Demand in the U.S.

In this section, as a preliminary before looking into further details, and in order to deeply understand the background of various developments that have already occurred in the U.S., I will examine MOD related projects in U.S. urban areas from the following perspectives:

- ① Comparison of the definitions of MOD in the U.S./MaaS in Europe
- ② The background of interest in MOD in the U.S.
- ③ Required stakeholders for achievement of MOD
- ④ Goals of MOD
- ⑤ Legal systems which influence the development of MOD

2.1 Comparison of the Definition of MOD in the US/MaaS in Europe

Europe's MaaS is a similar concept to MOD. The idea of MaaS was born in Europe prior to MOD's development in the U.S., and has been attracting high interest in many countries and regions, including Japan, for the past few years. MaaS from Europe and MOD, which the U.S. DOT has been initiating across the States, have a common idea to utilize informational technology to create a new transportation system that aids users with transportation services when they need them.

2.1.1 Definitions of the U.S.'s MOD and Europe's MaaS
 The DOT plays the main role of promoting MOD in the U.S. In September 2017, "Mobility on Demand : Operational Concept Report ¹" was published by the Intelligent Transportations Systems Joint Program Office (ITS JPO), a subsidiary of the DOT, which states that MOD and MaaS have commonality in terms of focusing on the needs of public transportation users. However, although MOD is a concept defining how a new transportation system should be, MaaS emphasizes using technology-based "platforms" to enable the provision of a seamless transportation system. On the other hand, MaaS Alliance², a group promoting Europe's MaaS, and whose member countries originated MaaS prior to the U.S., does not refer to the concept of MOD in the U.S., nor do they compare the two theories. Nonetheless, the definition of MaaS emphasizes that a single application (platform) can enable the use of multiple transportation services, and is similar to the DOT's definition of MaaS. (Refer to table 1)

MOD is commonly used for programs and projects led by the DOT. However, there are many cases where MOD and MaaS are used interchangeably in media reports and projects done by some local communities, private companies, and organizations. Therefore, in this report, we will use the term MOD to refer to the DOT programs as a general rule. We will also use the terms MaaS or MOD/

MaaS for field and public bibliographic surveys for using MaaS, even when these programs are in the U.S.

2.1.2 Background of the Creation of a New Concept, MOD, in the U.S.

The reasons why the DOT created MOD instead of using MaaS are considered to be that, as a federal government organization, to avoid being limited to specific industries and technology, to expand the area of use to neighboring cities and less populated areas instead of restricting it to urban cities, and to include cargo transport in addition to passengers. It is also believed that by creating MOD, the DOT wanted to instill a new policy keeping in mind that developed U.S. transportation systems are centered on automobiles, and that while the advancement of public transportations systems have been left behind, various innovations in U.S. society have been led by private companies.

Firstly, I would like to look at the impacts of having automobiles as the core for development of transportation systems in the U.S. In Europe, where MaaS originated, public transportation such as rail is the base of transportation systems. On the other hand, transportation systems have been developed centered on automobiles in the U.S., and limited cities have received the benefits that come from public transportation systems, such as rail. For example, the table below from "Sekai no Tokei 2020" by the Ministry of Internal Affairs and Communications of Japan shows the volume of rail passengers and the number of automobiles owned per 1,000 people in 8 developed countries, and is an indicator showing a transportation system centered on automobiles in the U.S. From this table, we can tell that the number of automobiles owned per 1,000 people in the U.S. and Canada are significantly higher compare to the rest of the world. On the other hand, the volume of rail passengers is significantly lower compare to

¹ <https://rosap.ntl.bts.gov/view/dot/34258> (Accessed : 2019/12/12) ; Commissioned by ITS-JPO, summarized by the U.S. consulting firm Booz Allen Hamilton, University of California, Berkeley, and Transportation Sustainability Research Center : TSRC, established in Richmond Field Station, <https://tsrc.berkeley.edu/contact> [Accessed : 2019/12/2],

² The international Mobility as a Service Alliance, founded by ERTICO in 2014, together with other key players, such as the Finnish Ministry of Transport and Communications, FIA and IRU. <https://erticonetwork.com/maas-modes-movement/> (Accessed : 2019/12/2) ; <https://ertico.com/focus-areas/urban-mobility/> (Accessed : 2019/12/2)

Japan and other mainland European countries. Especially for the latter, this can be seen more clearly when we calculate for the volume of rail passengers per population. (refer to table 2)

Considering these situations, the DOT first created MOD, and then started working on automobile related programs, which was a different approach from Europe's public transportation based MaaS. The MOD-related programs and projects done by the DOT are summarized in "Mobility on Demand : Operational Concept Report," mentioned above. From this, we can see that there were more programs related to automobiles and roads in early 2015 under the Obama administration. Later, the Federal Transit Administration (FTA), which is under the DOT, took initiatives to start MOD-related programs, such as the "MOD Sandbox Program" in 2016. Due to these actions, the role of public transportation in accomplishing MOD has been getting bigger attention.

In addition to this, although this may be a somewhat skeptical view, while various developments in the U.S. have resulted through innovations and technological advancements made by private companies, public transportation systems, which are supposed to be the basis of MaaS, have been left behind. I believe that this has helped to propel MOD instead of MaaS policy. Regarding MOD policy led by the FTA, the DOT especially encourages U.S. local governments and public transportation organizations to utilize various informational technology, including those found in MaaS, after they first examine the needs of their regions and people. I assume that they did not want to promote it as a "MaaS policy" since there was concern that introducing MaaS-related technology could be the main goal of in this initiative instead of achieving transportation services that reflected real users' perspectives.

Related to this, with awareness of U.S. public

transportation problems, during a February 2020 interview conducted by the American Public Transportation Association (APTA)³, one of the members who participated in APTA's field survey on European MaaS in June 2019 said the following. "The U.S. already has the technology to build a MaaS system, so there isn't a problem with the level of technology. However, there is no clear goal to plan transportation policies and local public policies in the U.S."

Until now, the U.S. generated many global companies worldwide, and increased international competitiveness by creating new markets, changing existing industrial structures, and utilizing the robust innovations and technological developments of private companies. Recently, private companies have also designed innovations in transportation industries. The Transportation Network Company (TNC), which include such organizations as Uber (founded in 2009) and Lyft (founded in 2012), was established in the U.S., and triggered the expansion of shared mobility to not only the U.S., but also to Europe and Asia. In addition, new startup companies have formed one after another, and have led the world in contemporary mobility related technology, such as autonomous driving. However, we have seen more transportation-related technological advancements created for automobiles rather than those applied to public transportation in the U.S.

On the other hand, a majority of operations of public transportation in the U.S. have been supported by public funds, with the perspective of valuing safety and the public good. Therefore, the principle of competition hasn't worked in the U.S. transportation system, with many cases that, from users' perspectives, have not improved services or actively implemented technology. While the number of TNC increased rapidly, transportation authorities were unable to quickly react to market trends, and the legal system was not developed to respond to these changes at

³ APTA is a U.S. and Canada public transportation – related organization which has both public and private organizations and companies as members. Their main activities are to bring to public awareness to public transportation through policy and public funds, and to provide support through research, consulting, technological support, seminars, etc. There are over 1,500

members, and these companies are related to over 90% of all public transportation in the U.S. and Canada, such as planning, manufacturing, construction, operations, and maintenance organizations. There are also transportation authorities of local independent organizations, research institutes, start-up mobility services (TNC, scooter/bike share companies, etc.)

the time. Due to this, TNCs not only decreased the number of taxi companies, but also the number of public transportation users in some U.S cities. Many projects under the MOD Sandbox Program, started by the FTA, focus on user-friendliness and resolving problems of

existing transportation systems that are introducing new technology.

Table 1 Definition of MOD/MaaS.

Definitions from the U.S. DOT	
MOD	<ul style="list-style-type: none"> • MOD is an innovative, user-focused approach which leverages emerging mobility services, integrated transit networks and operations, real-time data, connected travelers, and cooperative Intelligent Transportation Systems (ITS) to allow for a more traveler-centric, transportation system- of-systems⁴ approach, providing improved mobility options to all travelers and users of the system in an efficient and safe manner. ⁵ • An idea that considers the overall transportation of humans and goods, and system management
MaaS	<ul style="list-style-type: none"> • Utilizes IT technology for mainly mobile devices, responds to the perspectives of transportation system users, and focuses on a platform for providing a seamless transportation system experience • Emphasizes the integration and convergence of passenger mobility services, mobile devices, real-time information, and payment mechanisms
Definition from Europe's MaaS Alliance	
MOD	Definition of MOD listed in the published information not found.
MaaS	<ul style="list-style-type: none"> • MaaS is the integration of various forms of transport services into a single mobility service accessible on demand. To meet a customer's request, a MaaS operator facilitates a diverse menu of transport options, be they public transport, ride-, car- or bike-sharing, taxi or car rental/lease, or a combination thereof. • MaaS can offer added value through use of a single application to provide access to mobility, with a single payment channel instead of multiple ticketing and payment operations. • For its users, MaaS should be the best value proposition, by helping them meet their mobility needs and solve the inconvenient parts of individual journeys as well as the entire system of mobility services⁶.

⁴ “Synopsis: The System which Merged Multiple System Groups with Different Lifecycles,” “Explanation : Each system that is part of a system-of-systems has their own management and operational design. On the other hand, although a system functions as a component of a system-of-systems, it uses the prepared resources for the system-of-systems to achieve the goals of the entire group. In cases where component systems’ management policies and operational methods are not designed independently, their union is not considered a system-of-system.

(snip) ” (Source : Information Processing Society of Japan, IPSJ Special Interest Group on Information Systems website : <https://ipsj-is.jp/isdic/4454/>, Accessed : 2020/2/27)

⁵ “MOD is an innovative, user-focused approach which leverages emerging mobility services, integrated transit networks and operations, real-time data, connected travelers, and cooperative Intelligent Transportation Systems (ITS) to allow for a more traveler-centric, transportation system- of-systems approach, providing improved mobility options to all travelers and users of the system in an efficient and safe manner.” <https://www.its.dot.gov/factsheets/mobilityondemand.htm> (Accessed : 2019/11/28)

⁶ “Mobility as a Service (MaaS) is the integration of various forms of transport services into a single mobility service accessible on demand. To meet a customer’s

Source: created based on ITS-JPO website⁷, “Mobility on Demand : Operational Concept Report⁸,” and MaaS Alliance website.

Table 1 The Number of Automobiles Owned and Volume of Railway Passengers by Population per 1,000 Individuals in 8 Developed Countries (G8)

	Number of Automobiles Owned by Population per 1,000 Individuals (2016)		Volume of Railway Passengers : PKM (2017*)		
	Number of Automobiles	Ranking**	1 million PKM	Ranking **	Reference : 1 million pkm / 1 million Population ***
USA	804	2	10,660	21	32.8
Italy	715	7	39,016	8	642.8
Canada	648	9	1,535	47	41.8
Germany	619	11	77,500	6	937.1
Japan	609	13	441,614	3	3,485.5
France	585	18	84,682	5	1,306.8
UK	538	25	2,900	41	43.5
Russia	363	41	122,920	4	844.8

* Data from 2015 is used for France and the UK.
 ** Ranking of the countries listed are taken from the sources' statistics.
 *** The population data used for the calculations are from the data collected in 2017, listed in “Changes in Population at 2-3 Major Countries (Year 2010~2019)”, from “Sekai no Tokei 2020” by Japan’s Ministry of Internal Affairs and Communications.

Source : created based on “Sekai no Tokei 2020” by Japan’s Ministry of Internal Affairs and Communications

request, a MaaS operator facilitates a diverse menu of transport options, be they public transport, ride-, car- or bike-sharing, taxi or car rental/lease, or a combination thereof. For the user, MaaS can offer added value through use of a single application to provide access to mobility, with a single payment channel instead of multiple ticketing and payment operations. For its users, MaaS should be the best value proposition, by helping them meet their mobility needs and solve the inconvenient parts of individual journeys as well as the entire system of mobility services.” <https://maas-alliance.eu/homepage/what-is-maas/> (Accessed : 2019/11/28)

⁷ <https://www.its.dot.gov/factsheets/mobilityondemand.htm> (Accessed : 2019/11/28)

⁸ <https://rosap.ntl.bts.gov/view/dot/34258> (Accessed : 2019/12/12)

⁹ <https://www.stat.go.jp/data/sekai/notes.html> (Accessed : 2020/3/20) ; The sources of the each statistics are as follows. The

Number of Automobiles Owned Per 1,000 Population. (2016) : “IRF, World Road Statistics 2018”, Volume of Railway Passengers : PKM

(2017) : “The World Bank, World Development Indicators (downloaded in December, 2019).”, Population data used for calculation “Reference : 1 million pkm / 1 million Population” : Data from “UN, World Population Prospects: The 2019 Revision (downloaded in September 2019) ”.