Optimizing Mobility as a Service to Drive Smart City Initiatives

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The transportation landscape has changed dramatically in recent years, particularly with the rapid emergence and expansion of options, including ride sharing, car sharing, bikes, and scooters. For public transportation agencies trying to advance their smart city programs, accessing—and keeping up with—large volumes of traveler data present a challenge to gain the business insights and value they need from their Mobility as a Service (MaaS) initiatives.

MaaS packages public and private transportation services into a single, seamless offering that covers the entire trip from point of origin to destination. A traveler can open an app and buy rail tickets, rent a scooter, pay for parking, or hail a rideshare. This improves efficiency of the delivery of transportation services in a smart city, while balancing the use of various modes of transportation.

But when implementing MaaS, cities run into these challenges, which often stops progress:

- Deciding which agency or entity will operate MaaS
- Getting competitors to agree to being together on a single platform
- Overemphasis on operating costs rather than capital investment
- Achieving cooperation between public and private sector organizations
- The effective use of analytics for internal and external role

This may be why only a handful cities globally have managed to successfully adopt MaaS, including Helsinki, Tokyo, Singapore, and Antwerp.

The missing piece is a data and analytics platform like Teradata Vantage ™, with its unique blend of big data analytics and transportation expertise. Vantage helps public transportation agencies understand—and realize—the true potential of MaaS, and the analytic insights that can be generated to drive smart city programs. This includes identifying and delivering the critical analytics required for world-class MaaS decision making and performance management, from an internal perspective and for end-˘ user decision support.

The Role of Mobile Devices

Mobile devices are one of the critical enablers for MaaS. Statistics show that 97% percent of the US population uses mobile devices. Mobile devices have become ubiquitous, acting as a key interface to information services and a secure, convenient means of payment. They also play a crucial role in providing the raw data Vantage uses to manage MaaS applications.

MaaS Components

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Movement analytics data from mobile devices can provide insight into traveler behavior and trip making patterns, along with the ebb and flow of transportation demand within the smart city environment. Driver location data can provide keen insight into a better way for supply and demand management. Traffic congestion data from Traffic Management Systems can help better estimate driver arrival time, and reduce travel time, by suggesting the optimal path in real time.

This data has important implications for understanding supply and demand conditions, prevailing transportation conditions, and the performance of various services that comprise the MaaS application.

The implementation of MaaS also provides a high degree of connectivity between transportation service operators and service users. This can form the basis for the delivery of other services within a smart city such as eGovernment, connected citizen, and visitor services.

First and Last Mile Challenges

First and last mile issues have always been at the heart of US public transit efficiency challenges. With few exceptions, cities have been designed for the private car, with subsequently low density of land use. This makes regular public transit services uneconomic—and acts as a barrier to the investment required to make public transit ubiquitous. By adopting Mobility as a Service techniques, it's possible to connect public transit and other services to create an end-to-end, comprehensive offering to the traveler; providing a wider range of choices and information at any given time.

Mobility as a Service changes the traveler's perception on who provides the services, offering a one-stop-shop for gaining services access that include both public and private sector options. These options can be made available on demand, increasing the flexibility available to the traveler.

Teradata can help your organization choose the best business model based on transportation demands in your region, and optimization of mobility and accessibility. Services that may be available on a MaaS menu include:

- Public transit
- Ridesharing
- Bike and scooter sharing
- Parking
- Car sharing and rental

This will require the acquisition and management of data from the following sources, at a minimum:

- Traffic management sensors and centers
- Public transit operations
- Ride sharing operations
- Parking operations
- Car sharing and rental operations

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Choosing a Suitable MaaS Business Model

Mobility as a Service could be operated by the public sector, the private sector, or a combination of the two. Organizations that are likely to be involved, include:

- **Car manufacturers**—adapting to the trend toward on-demand transportation instead of vehicle ownership

- **Car manufacturing OEM**—looking to extend their offering to car manufacturers and the range of products and services to the public

- **Car rental companies**—reacting to the shift toward ridesharing

- **Public transit companies**—adapting their service offerings to be more complete for the higher value proposition

- **Rideshare companies**—expanding their existing market position to include other services

- **Scooter sharing**—extending their offerings to new market positions

- **Telecommunications service providers**—extending their existing market position to offer new services to existing subscribers

MaaS Analytics

Teradata delivers the MaaS analytics expertise and trained specialists skilled in converting data to information—then information to understanding that leads to actionable insights and, ultimately, key business strategies. This, in turn, provides effective decision support and value to the MaaS service provider or operator, the end user, and traveler.

Internal Analytics: MaaS Operator

Service Optimization Analytics

Service optimization involves the fine-tuning of transportation services to better match variations in the demand for transportation. This includes adjustments to service frequencies, the location of bus stops, and improved interchange efficiency between services. It can also involve the introduction of new service types; e.g., Lynx in Orlando operates a service known as Neighborhood Link.

Transit vehicles are deployed on a zonal, demand-actuated basis. Travelers can summon a vehicle which will take them to and from their home to the closest fixed route transit access point (in this case, a bus stop). In the longer-term, the technique can be applied to investment planning for major new transit services.
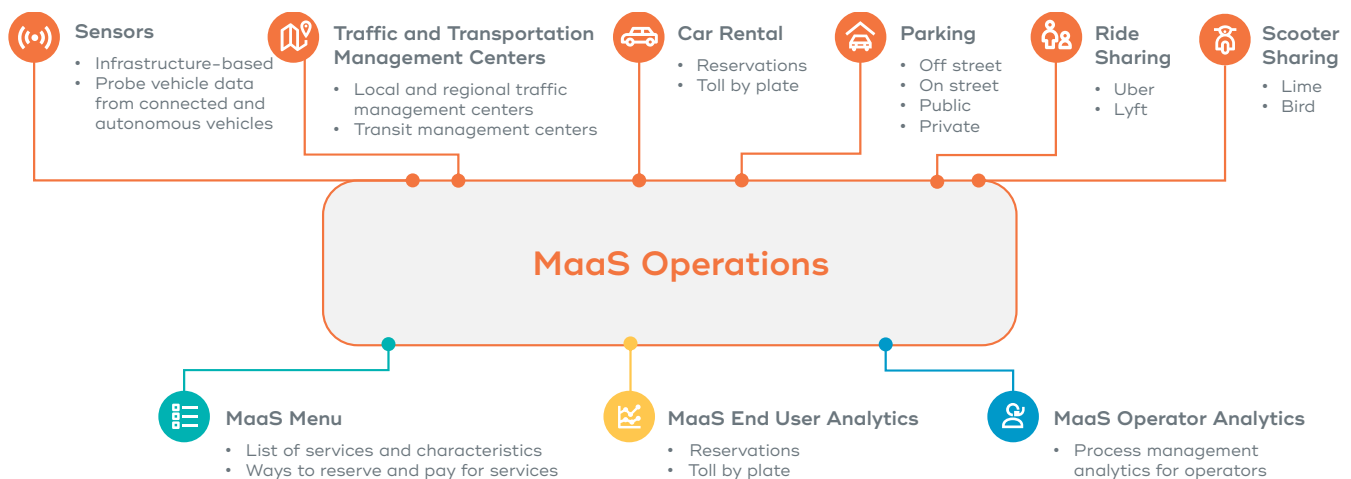

Sensors
- Infrastructure-based
- Probe vehicle data from connected and autonomous vehicles

Traffic and Transportation Management Centers
- Local and regional traffic management centers
- Transit management centers

Car Rental
- Reservations
- Toll by plate

Parking
- Off street
- On street
- Public
- Private

Ride Sharing
- Uber
- Lyft

Scooter Sharing
- Lime
- Bird

MaaS Operations

MaaS Menu
- List of services and characteristics
- Ways to reserve and pay for services

MaaS End User Analytics
- Reservations
- Toll by plate

MaaS Operator Analytics
- Process management analytics for operators

Figure 1. Mobility as a Service Operations

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This is particularly useful in rural areas where fixed route transit services are not ubiquitous. An important analytic for service optimization will be an accessibility index that measures the ease or difficulty of traveling between different zones within the area served by the MaaS application.

Service optimization considers the travel time between zones, reliability of travel time, cost of travel as a percentage of household income, and other parameters that measure the ease or difficulty of travel between zones. Drawing on our experience and expertise in transportation and other industries, we can help with the following operator-focused analytics.

Predictive Maintenance Analytics

Teradata has extensive experience in the application of predictive maintenance techniques to railroads and aviation, and sees its application to elements of MaaS. This feeds data into the MaaS application regarding service reliability and quality, and provides valuable information to MaaS operators that can help improve the quality and reliability of the service.

Performance Management Analytics

In addition to the extensive data available on the operational performance of MaaS deployment, the connectivity established between travelers and operator will support the continuous assessment of traveler satisfaction and crowdsourcing type approaches that measure current system performance. A System Reliability Index, Revenue/ Customer Management analytics, and a User Perception of Quality Index can be valuable analytics in this respect.

External Analytics: MaaS End User

Value Proposition Analytics

A Value Proposition Index can be determined on a continuous basis, evaluating the value proposition to the traveler in terms of historic system performance, current system performance, and predicted future system performance. This provides the basis for fine tuning Mobility as a Service offerings, and for longer-term transportation planning. Customer journey analytics can also be used to show how the value proposition varies over time.

"When's The Best Time?" Index

A "When's The Best Time?" index can be developed to show travelers how adjustments to trip timing can improve the reliability of the trip and the overall user experience, taking into account prevailing transportation conditions.

Trip Concierge

Analytics can be used to provide Mobility as a Service users with a continuous stream of advice on how to improve the user experience associated with mobility as a service.

Smart Data Management

Data

Energy
Waste
Mobility
Buildings
Services
Health
Water
Wealth

Analytics

Data Transformation

Policy and Governance

Services

Maas
Data Market
Urban Analytics
eGovernment
Transport Management
Integrated Payment
Connected Citizens and Visitors
Smart Lighting
Operations
Asset Management
Enforcement
Smart Grid and Electric Vehicles

Figure 2. Smart Data Management

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How Teradata's Smart Data Management Can Help You with MaaS

In addition to big data and analytics expertise, Teradata has a long and successful record of accomplishment that can be leveraged to help your agency handle big data and analytics. This proven experience has been gained from working with major banks, airlines, telecommunications, IoT, and other industrial sectors. We bring this same experience to transportation applications:

- Securely managing data from multiple public and private parties

- Creating an information repository for MaaS

- Supporting advanced analytics

- Best integration approach to sharing data and analytics

- Providing the horsepower to support efficient MaaS operation

The best approach to big data and analytics for MaaS involves the use of Smart Data Management—a purposeful and structured approach to the development of data management capabilities for a smart city. We believe this is the only way to extract the maximum value from investments in data collection and data management.

Smart data .management delivers the most cost-effective way to trannsform data into information to insight, and insight to actionable strategies for smart city operations.

Smart data management features include:

- A series of planned investments that deliver immediate and clear value, while providing the business justification for further investments

- A coordinated and coherent data stream from multiple sources, including sensors, other automated sources, and anecdotal data ingested into a single platform using advanced automation

- The establishment and management of a centralized repository that enables data to be both shared and persisted

- Support for multi-genre analytics that can be shared across the enterprise

- A scalable approach that provides immediate value and benefits, while delivering a framework that is easily expandable for future needs

- Support for a data market approach that enables data to be valued from a public and private perspective, and provides a mechanism for a "freemium" approach to data sharing

Teradata Transportation Analytics for MaaS

Teradata is the connected multi-cloud data platform company. Our enterprise analytics solve business challenges from start to scale. Only Teradata gives you the flexibility to handle the massive and mixed data workloads of the future, today.

Talk with us and learn more about Teradata's approach to Smart Data Management, and how Mobility as a Service can be implemented in the most cost-effective and efficient manner—while supporting the data needs for smart city programs.

For more information about Teradata Smart City solutions, visit **Teradata.com.**

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