Artificial Intelligence & Mobility-as-a-Service

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DELPHI Project
Roundtable Discussion:
Challenges and Future Needs in Traffic Management

June 18, 2026

AI in Mobility

- AI supports urban mobility change, influencing and redefining transport operations.
- Enables data-driven decision-making through Big Data, IoT, and machine learning, allowing dynamic and adaptive mobility management.
- AI applications extend beyond autonomous driving to Mobility-as-a-Service (MaaS), intelligent transport systems (ITS), drones, and urban logistics.
- AI integration supports sustainability goals by managing congestion, emissions, resource consumption and road crashes within smart cities.

Smart Road Infrastructure

- Road infrastructure is constantly being updated to accommodate present and future road users (e.g., Connected & Automated Vehicles)
- Smart infrastructure examples: Smart road signs, Intelligent pedestrian crossings, Electric Roads
- Advanced Traffic Management Systems (ATMS)
  Real-time monitoring, communication and control Rapid detection and reaction to events
- Advanced Traveler Information Systems (ATIS)
  Crashes (location, severity, duration), Weather and traffic conditions, Delays and travel times, Optimal routes, Recommended speeds, Timetables

Additional AI Mobility applications

➢ Demand Management:

- Dynamic ridesharing & traveler information

➢ Smart Public Transport:

- Automated Vehicle Location (AVL) information
- Automated Passenger Counters
- Scheduling and dispatching response
- Traffic signal priority

➢ Intelligent Parking Systems:

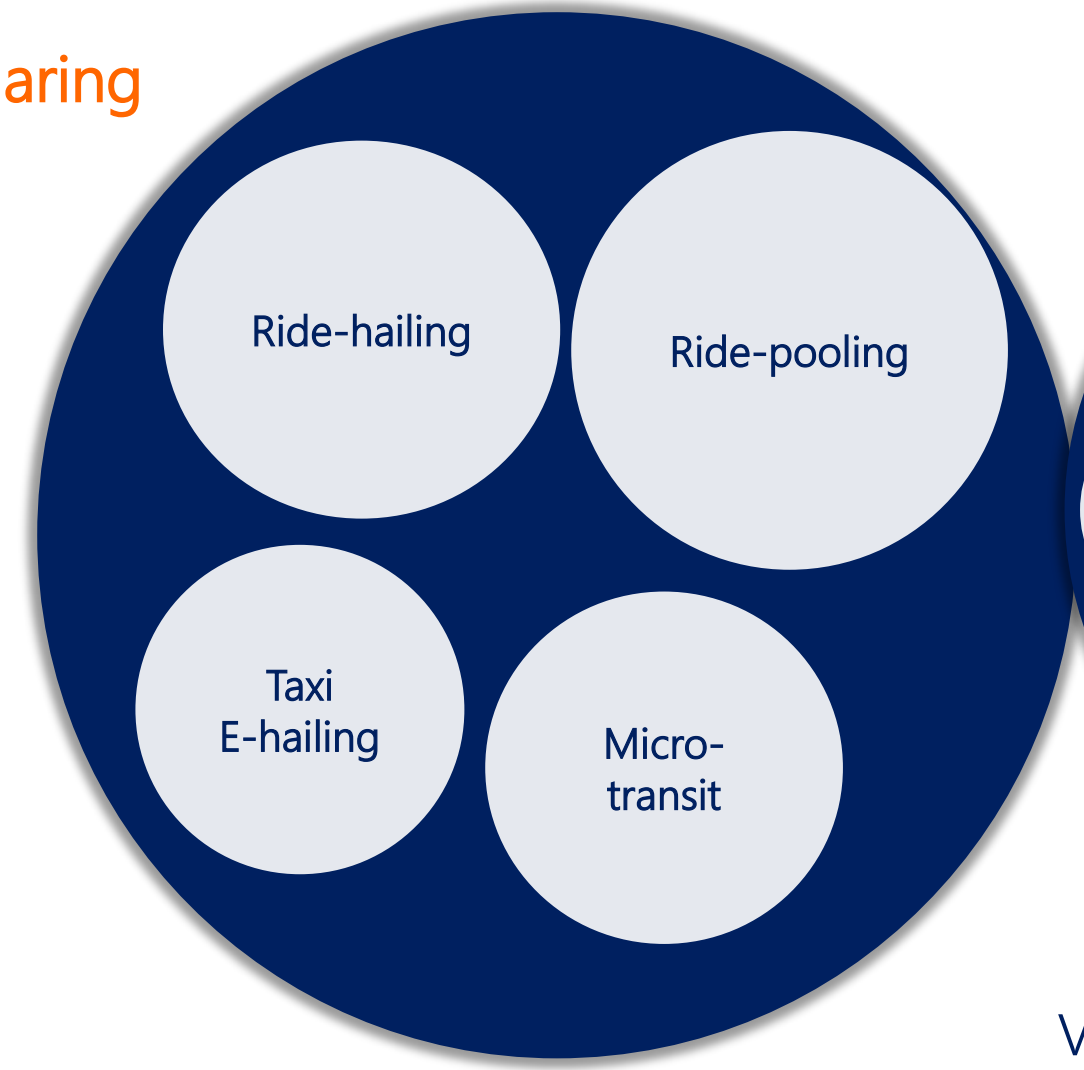
- Intelligent on-street parking management
- Parking networking and demand management
- Dynamic pricing & automatic reservations and payments
- Integration of parking in door-to-door mobility solutions

➢ Intelligent Freight Transport:

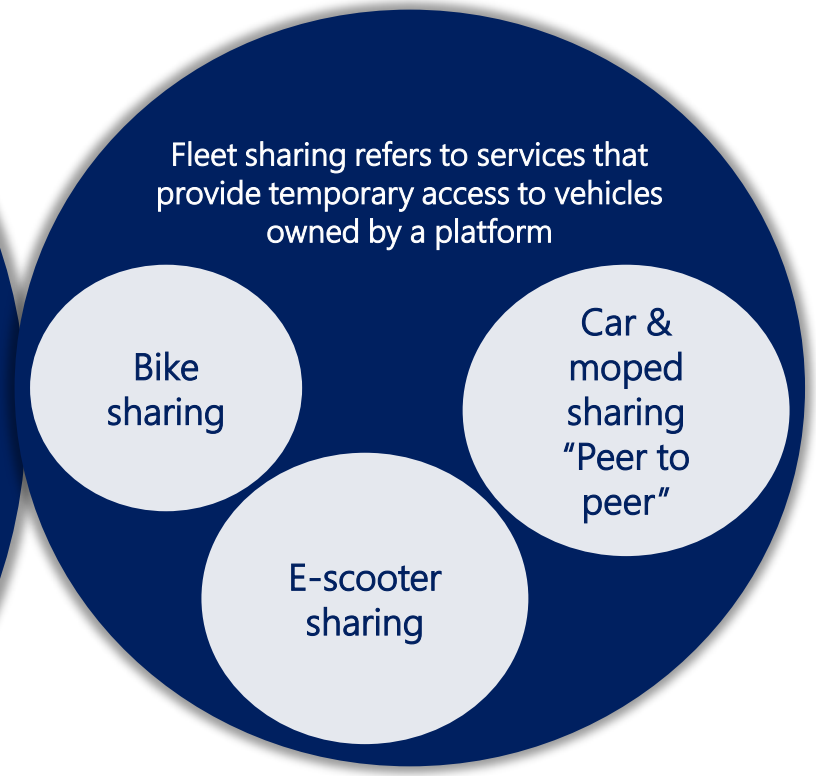
- Traffic Management System (ANPR cameras, radar, electromagnetic strips)
- Dynamic reservation of loading space
- Micro-distribution with small load bicycles or drones

Mobility On Demand

Ridesharing



Fleet Sharing



Various opportunities for AI enhancement in both pillars culminating in MaaS

Mobility as a Service (MaaS) overview

- Mobility as a Service exemplifies the integration of multiple transport options into a seamless digital service
- It is based on the use of digital platforms (e.g. mobile app, planner/e-ticketing) to implement the full set of actions required to move a person (or good) from A to B, including:
  - Route planning
  - Mode combination (e.g. bus & metro) & parking
  - Availability control/Ticket booking
  - Payment
- ITF (2021):
  "MaaS uses a digital platform and a set of data to deliver a transport project".

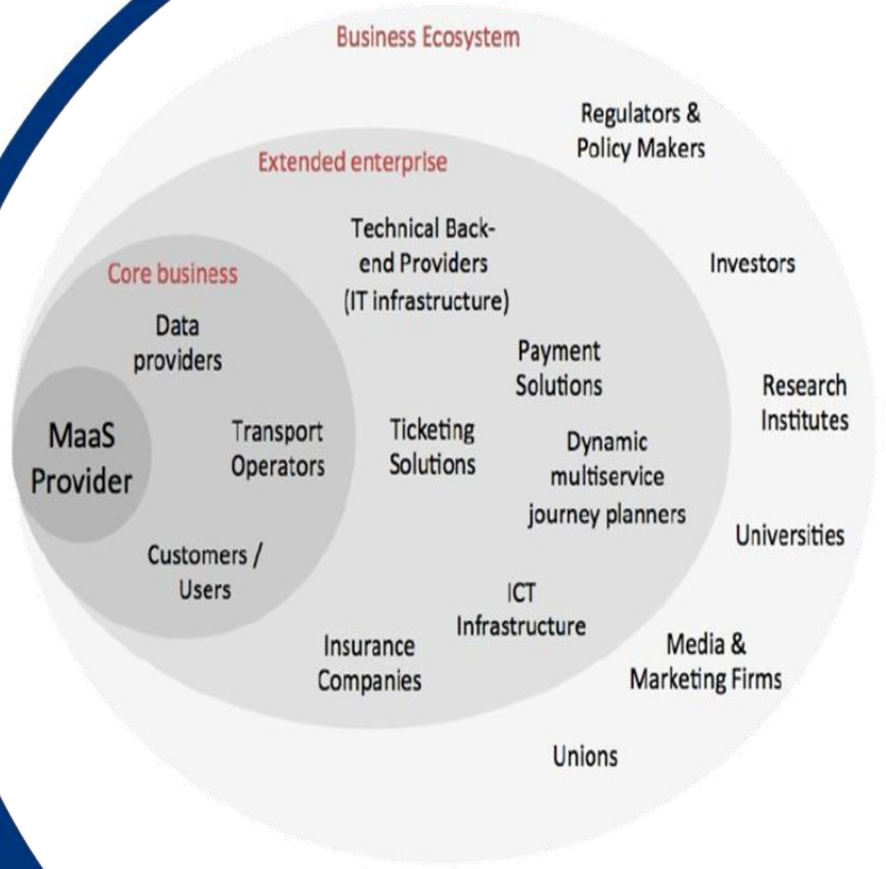


Figure 16. The MaaS ecosystem (Kamargianni & Matyas, 2017)

Exploring MaaS stages

- MaaS systems differ in the level of integration they provide (e.g., route planning and/or organization).

- The following stages of MaaS evolution are distinguished:
  Stage 0: MaaS does not exist
  Stage 1: Provision of information (e.g. telematics)
  Stage 2: Previous + booking/payment
  Stage 3: Previous + combination of modes
  Stage 4: Previous + Integration of long-term goals (e.g. emission reduction, increasing accessibility)

- They are affected by urbanization and congestion levels, but also by degrees of mobility digitalization and connectivity.

AI promoting MaaS development

Ongoing and projected AI enhancements across all MaaS stages:

- **Stage 1 (Information):**
  - AI-powered predictive analytics for real-time traffic & delays
  - Personalized route suggestions using machine learning
- **Stage 2 (Booking/Payment):**
  - AI chatbots for seamless ticketing & customer service
  - Fraud detection and dynamic pricing optimization
- **Stage 3 (Multimodal Integration):**
  - Intelligent mode selection (e.g. best cost–time–emission balance)
  - AI-based demand forecasting for shared mobility & fleet management
- **Stage 4 (Long-Term Goals):**
  - AI-driven optimization of network design to reduce emissions
  - Accessibility enhancement (e.g. tailored services for vulnerable users)

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