Innovationen im Verkehrsmanagement, einem Schlüsselelement für MaaS
Marcus Zwick, Head of Innovative Mobility Solutions
AVs used as feeders to public transport stations

High capacity core network with fixed line service

Low-demand areas (suburban)

Area-based on-demand AVs

Autonomous car sharing vehicles

Swarm of AVs as robo taxis and on-demand shuttles

Airport

Source: UITP
The need for an Optimized Transportation System is greater than ever before.

- Vehicles with combustion engine
- Electric vehicles
- Autonomous vehicles
- Uber/Lyft vehicles
Machine-controlled vehicles on the road must be as safe as those on railways
Innovative Mobility Solutions

- Individuality/Flexibility
- Safety
- Efficiency
- Full Vehicle autonomy
An Optimized Transport System supported by self-driving vehicles will help to master the future of mobility

- **Enable level 5 of autonomous driving**
  - We increase the total number of scenarios (complex traffic scenarios).

- **Improved safety for complex traffic conditions**
  - We reduce the deceleration of AVs to the required minimum (-1,5m/s²) (Safety / Comfort).
  - We increase the average speed within complex traffic scenarios under each and every condition.

- **Enhanced ease of traffic**
  - Number of AV-deadlock situation is 0.
  - We avoid critical situations before they occur (emergency braking vs. comfort breaking).

- **Enabling individual public transportation on the road**
  - We increase the capacity (throughput) of an intersection (#vehicles/hours).
Our vision – cities will manage the complete mobility ecosystem to achieve its throughput, pollution, safety and energy targets

Cities will manage and inspire...

Centrally managed traffic towards city strategy and KPIs

Point-to-point connectivity seamless across all modes

Demand responsive with flexible routes and schedules

Fully automated SDVs only differentiated by user groups and capacity

Mainly shared fleets, as a service and open to various fleet operators

All electric / hydrogen with 100% renewable power

Mobility Operating System - mOS
Enhanced Perception for SDVs

Vehicle zone

V2X communication

Infrastructure area
Avoid critical situations

Comfortable driving
Vision towards a fully integrated smart infrastructure installation

- Camera
- RTLS
- Road Site Unit
- WLAN access point
- Radar
- Lidar
“SDV Suite” for the complete life cycle

System Planning → Fleet Management → Incident Management → Passenger Management

Traffic Management → Intermodal Trip Management → Shuttle Passenger Information
Incident Management

- Trajectory incident response
- Conflict detection and resolution
- Vehicle operation and guidance

Passenger Management

- Direct communication
- Video surveillance
- Passenger information and announcements
- Check-In/Be-Out, e-ticketing
Backend collects passenger requests and calculates transport recommendations in real time traffic → pools passenger requests into dynamic routes and ensures availability of right amount of shuttles.

1. Shuttles could be coupled into platoons
2. Safe and regulated drive through the city
   • For optimal individualization of mobility, platoons could be decoupled on the last mile

Individual public transport – advanced platooning system and first/last mile

- Solving the first and last mile
- Connecting also areas with lower demand by mobility on demand solutions
- Smooth and efficient trips across all modes of transportation
Singapore 2030

- 6.9 million inhabitants
- Population density: 10,900 km²
- 75% of all passenger km made by public transport
- Island wide AV deployment for public transport
Singapore – We bring the Siemens SDV Suite to CETRAN test field

Autonomous Valet Parking
Intersection Management
Operation Control Center

Centre of Excellence for Testing and Research of Autonomous Vehicles (CETRAN)

CAD of fully equipped test circuit

ILO1 showcases new and innovative mobility concepts
HEAT Hamburg: Siemens SDV Suite in public space close to the Elbphilharmonie

- Joint public funded project: Vehicle/infrastructure, V2X communication, Advanced Traffic Management
- AVs as mode of transport in public space
- Evaluation of legal framework
Test beds in relevant environments – Together in an eco-system of strong partners

Urban

Munich
OTS 1.0

Singapore
CETRAN, RFI, etc.

Hamburg
HEAT

Interurban

KoRa9

Other projects

Rail adaption
Potsdam