

AUTONOMOUS SHARED CARS BECOME PART OF THE IOT: WHY AND HOW



Mobility Technologies | Ulrich Fastenrath

**BMW
GROUP**

THE NEXT
100 YEARS



WHAT DOES IT TAKE FOR THE NEXT URBAN MOBILITY?

1. Autonomous Cars

2. Mobility as a Service / On-Demand Mobility

3. Internet of Mobility Things

4. Traffic Management 2.0

FOR AUTONOMOUS DRIVING FOR GENERATING THE

IMPORTANT SENSOR

In-car sensors alone does not suffice for high-precision localization and a complete digital image. The sensor setup of a HAD/FAD car is therefore completed by the HD Map.

How does the road
proceed beyond what
my sensors see?

End of sensor vision



LIDAR



RADAR



CAMERA



GPS

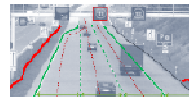
Is the object ahead of
me in my lane?

Where am I laterally
relative to the lane?

HD Map

HD Map as additional sensor, essential for automated driving:

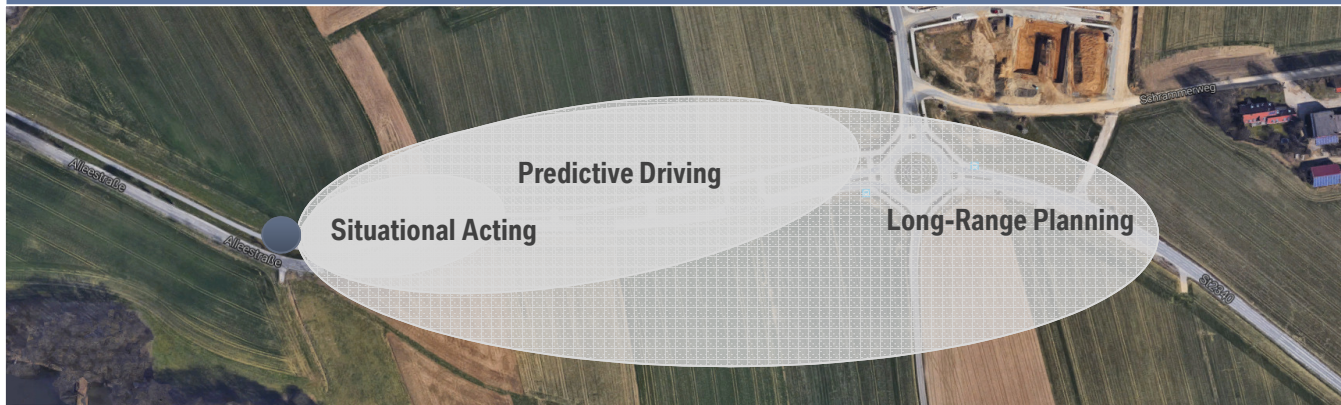
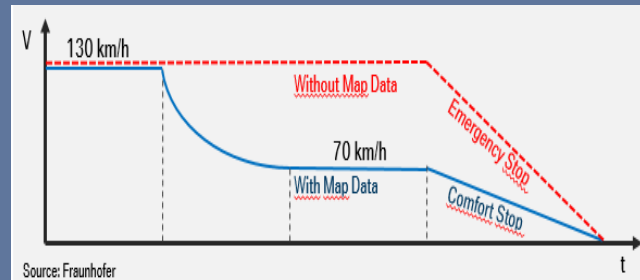
- Localization
- Foresight



THE HD MAP AS SENSOR IS EFFECTING DIFFERENT RANGES OF PREVIEW FUNCTIONS.

HD Map Contribution to HAD/FAD Functions

- Route/Road **preview** and **path planning**
- Enabling **comparison** of real-time-sensor based environment model with map based model
- Contribution of **redundancy** and overall system **robustness**, e.g. localization
- Skeleton for **referencing** dynamic data (e.g. accident on left lane) onto lanes and roads



HD Map Components



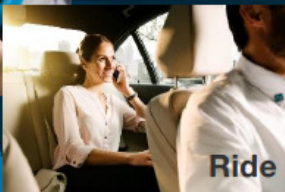
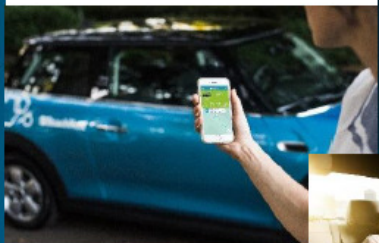
- **Modular**
- **Layered**
- **Tiled**
- **Local and high frequency updates**
- **Self-learning**

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THE NOW FAMILY OF ON-DEMAND SERVICES

 **ReachNow**



 **DriveNow**



 **ChargeNow**



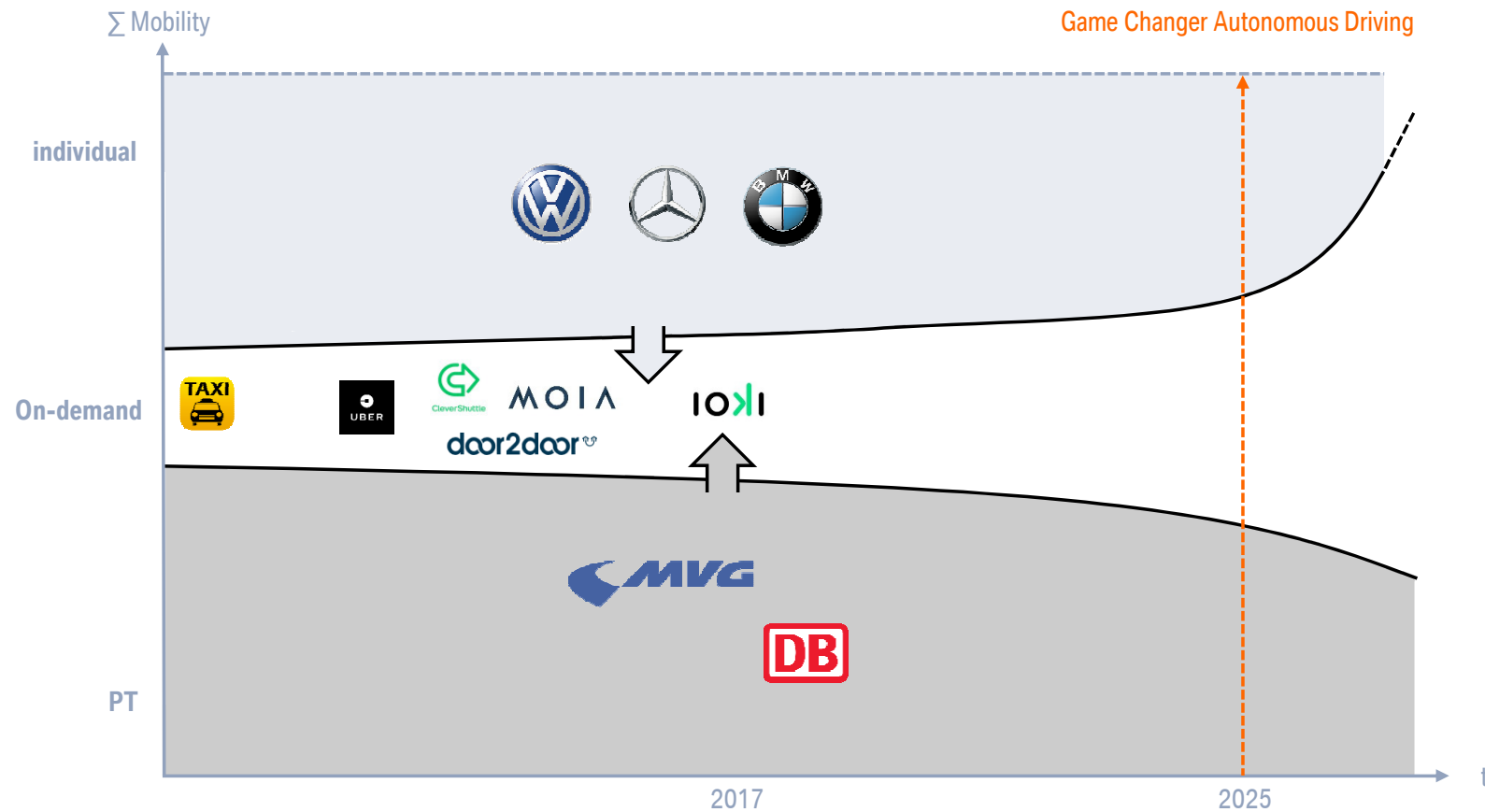
 **ReachNow**
即时出行



 **ParkNow**



ON-DEMAND MOBILITY MEETS AUTONOMOUS DRIVING.



WHAT DOES IT TAKE FOR THE NEXT URBAN MOBILITY?

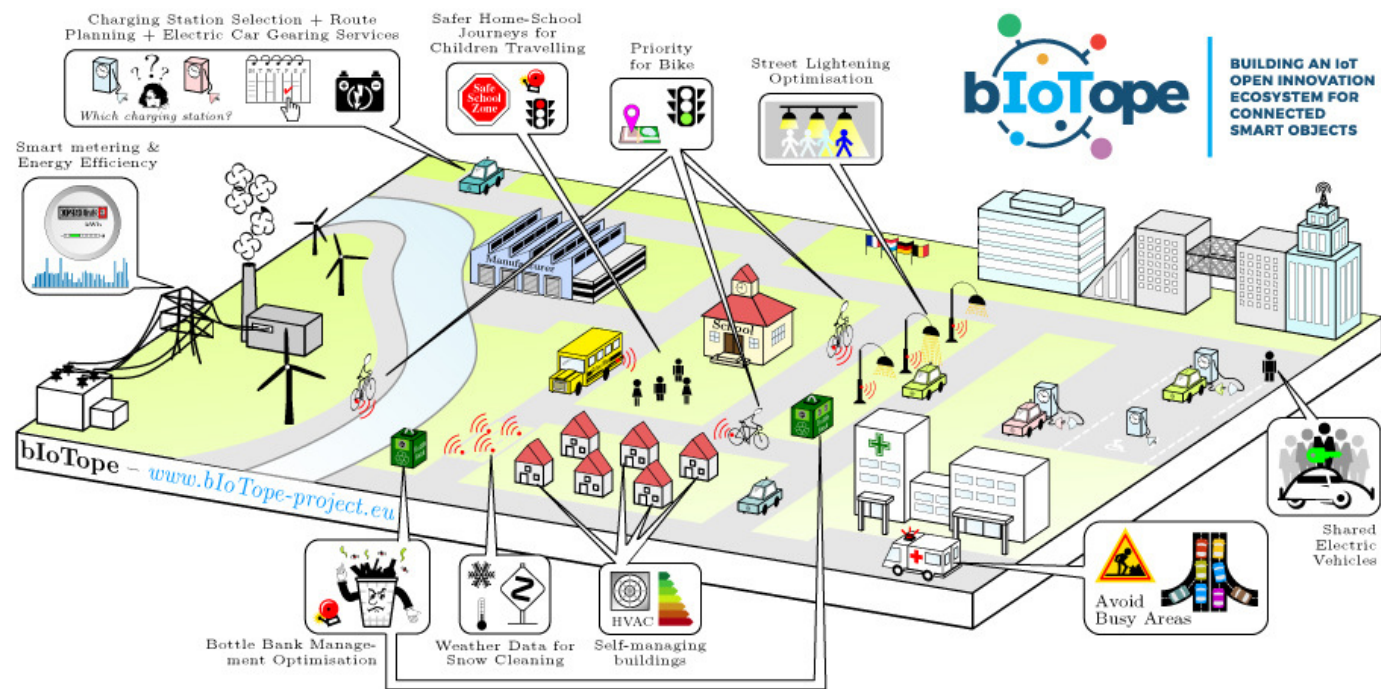
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VISION
DIGITAL

Creation of a complete virtual instance of the vehicle in a fully digitized environment with unlimited possibilities to derive context and functions.

OVERVIEW



	Finland Helsinki city	Belgium Brussels Region	France Grand Lyon
Smart Metering & Energy Efficiency	Involving local third parties (via Open Calls)		FORUM VIELUM HELSINKI A!
Shared Electric Vehicles			FORUM VIELUM HELSINKI A!
Smart Parking Guidance		Involving local third parties (via Open Calls)	FORUM VIELUM HELSINKI A!
Smart Mobility for Emergency Services			FORUM VIELUM HELSINKI A!
Safer Home-School Journeys for Children Travelling			FORUM VIELUM HELSINKI A!
Bottle Bank Management		Involving local third parties (via Open Calls)	GRAND LYON Cityzen
Street Lightening Optimisation			GRAND LYON Cityzen
Weather Data for Snow Clearing			GRAND LYON Cityzen
Charging Station Selection + Route Planning + Electric Car Gearing Services	Potentially implementable in any of the involved cities		FORUM VIELUM HELSINKI Fraunhofer BIBA
Self-Managing Buildings & Equipment			enervent A!
Smart Air Quality	Potentially implementable in Melbourne (via Open Calls)		FORUM VIELUM HELSINKI iTrust
STANDARDISATION BODY : THE Open GROUP			

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CONTINUOUSLY INCREASING REQUIREMENTS FROM CUSTOMERS AS WELL AS INFRASTRUCTURE CAN BE SOLVED WITH NEW TECHNOLOGIES.

Basic Customer Needs



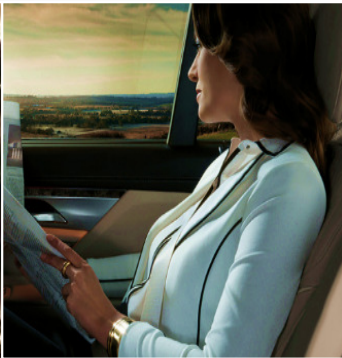
SAFETY



COMFORT



EFFICIENCY



Major challenges in urban areas



EMISSIONS



AVAILABILITY OF SPACE



FLOATING TRAFFIC



STATIONARY TRAFFIC



Customer Expectations

"I would like to use mobility services as I want to."

"I'm never get stuck in a traffic jam, again."

"I never have an accident again."

"I'll always find a parking spot."

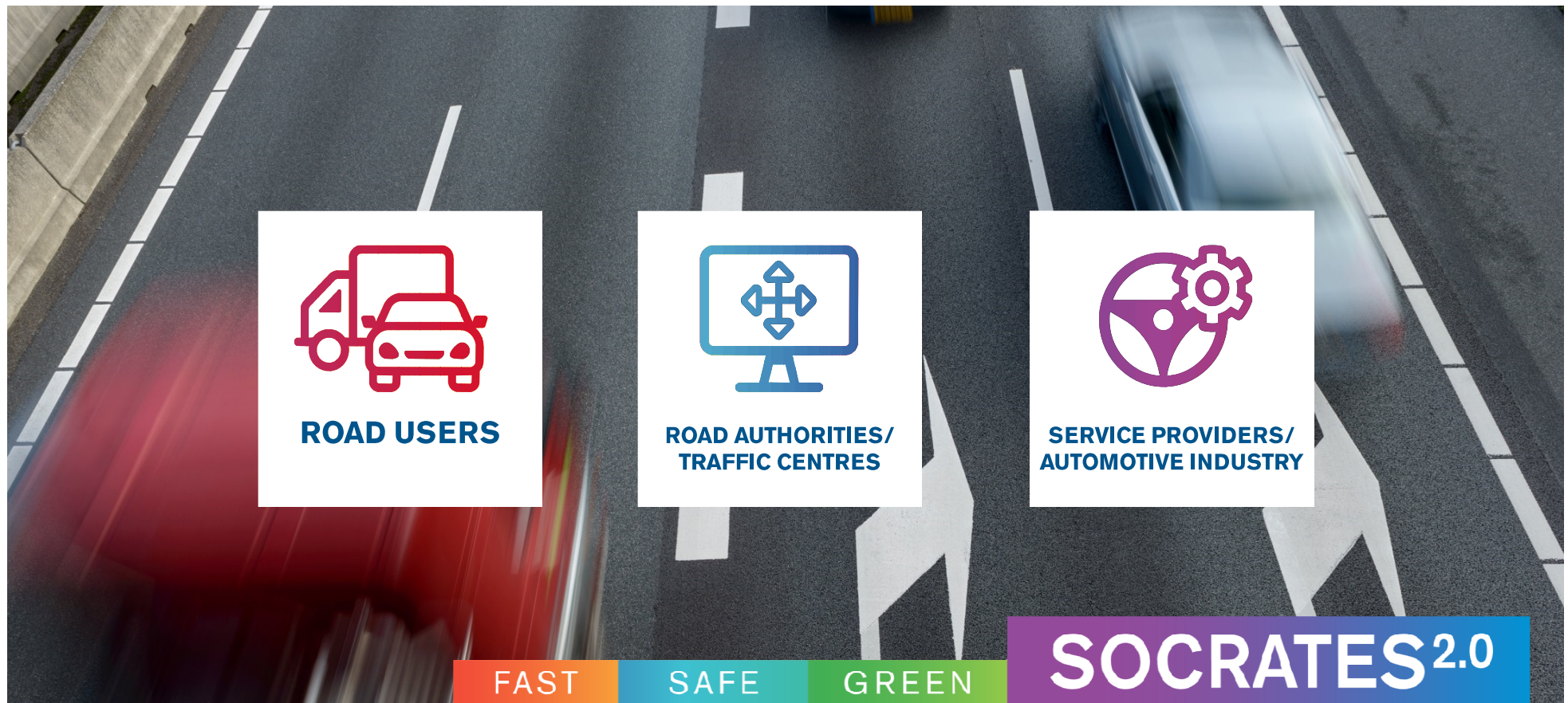
"I don't have to bother with services like maintenance, filling up gas, charging or cleaning."

"I am allowed to drive in big cities (without emissions)."

"no more waiting on red traffic lights."

SOCRATES 2.0

CREATING A WIN-WIN-WIN SITUATION





“...Future mobility will be: **Autonomous, Connected, Emission-free** and **Shared** - and it will be geared to meeting the individual needs of each and every single customer...”

Dr Ian Robertson, BMW AG Board Member