

# NORTHEAST AUTONOMOUS AND CONNECTED VEHICLE SUMMIT

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# Corporate Social Innovation

## **MOVEMENT**<sup>^BMW</sup>

BMW has always been about the thrill of putting people in motion, and we put the same ingenuity, expertise, and resources to the service of moving society forward. MOVEMENT<sup>^BMW</sup> is driving innovation on sustainability and mobility, investing in STEM education and safety training, all while giving back to the communities in which we operate.

**This is BMW and we're changing the way the world moves.**



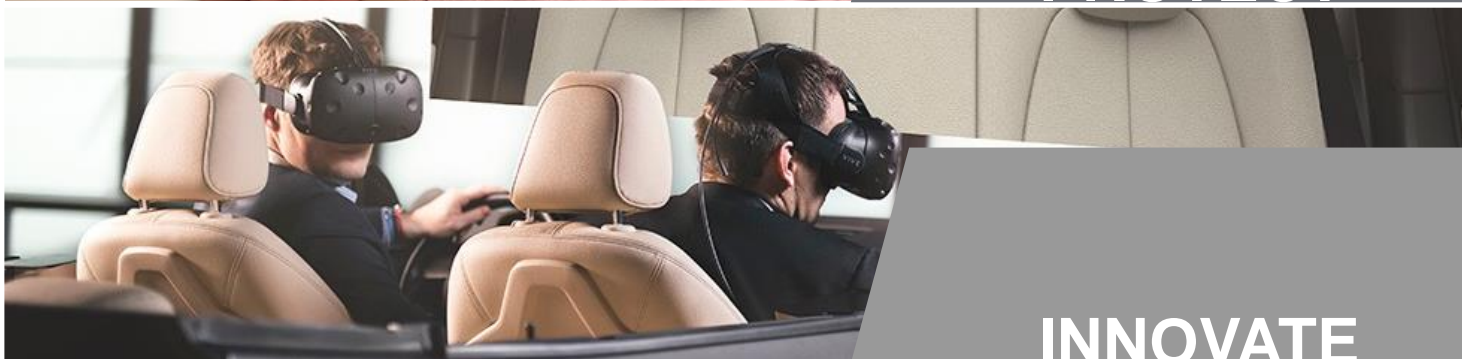
**SUSTAIN**



**TEACH**



**PROTECT**



**INNOVATE**

# STRATEGY NUMBER ONE NEXT.

**We are Number ONE.**

We inspire people on the move: We shape tomorrow's individual premium mobility.

VISION

COMPETITIVE  
ADVANTAGE

STRATEGIC  
APPROACH

CORPORATE  
CULTURE

# A C E S – FUTURE OF MOBILITY.

**CONNECTED**

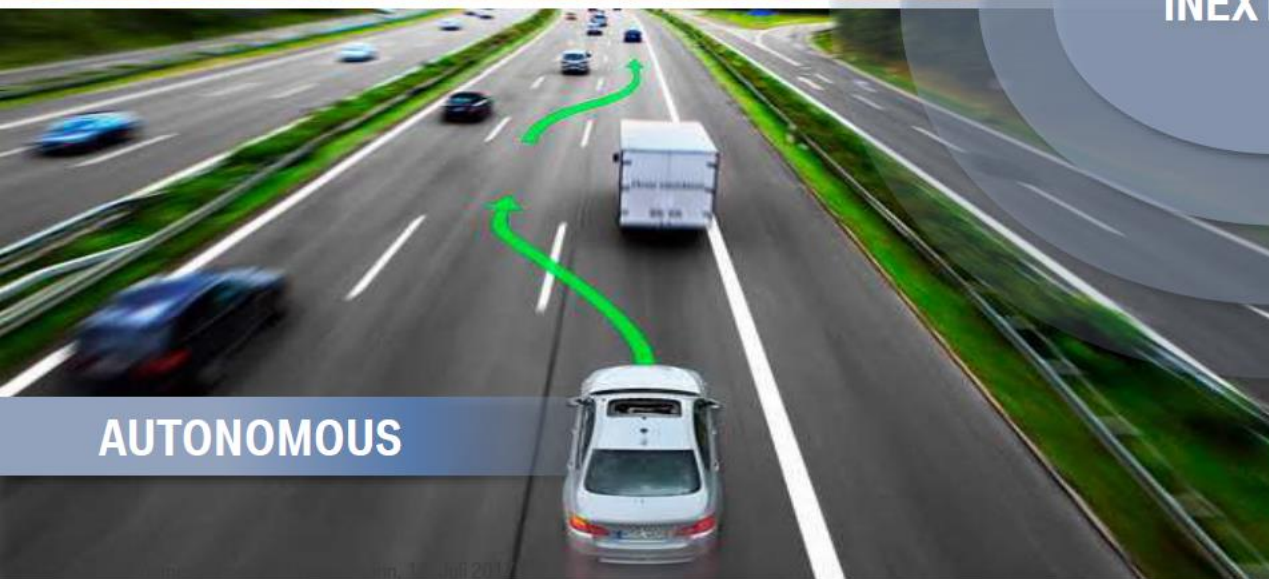


**ELECTRIFIED**



**iNEXT 2021**

**AUTONOMOUS**



**SHARED**



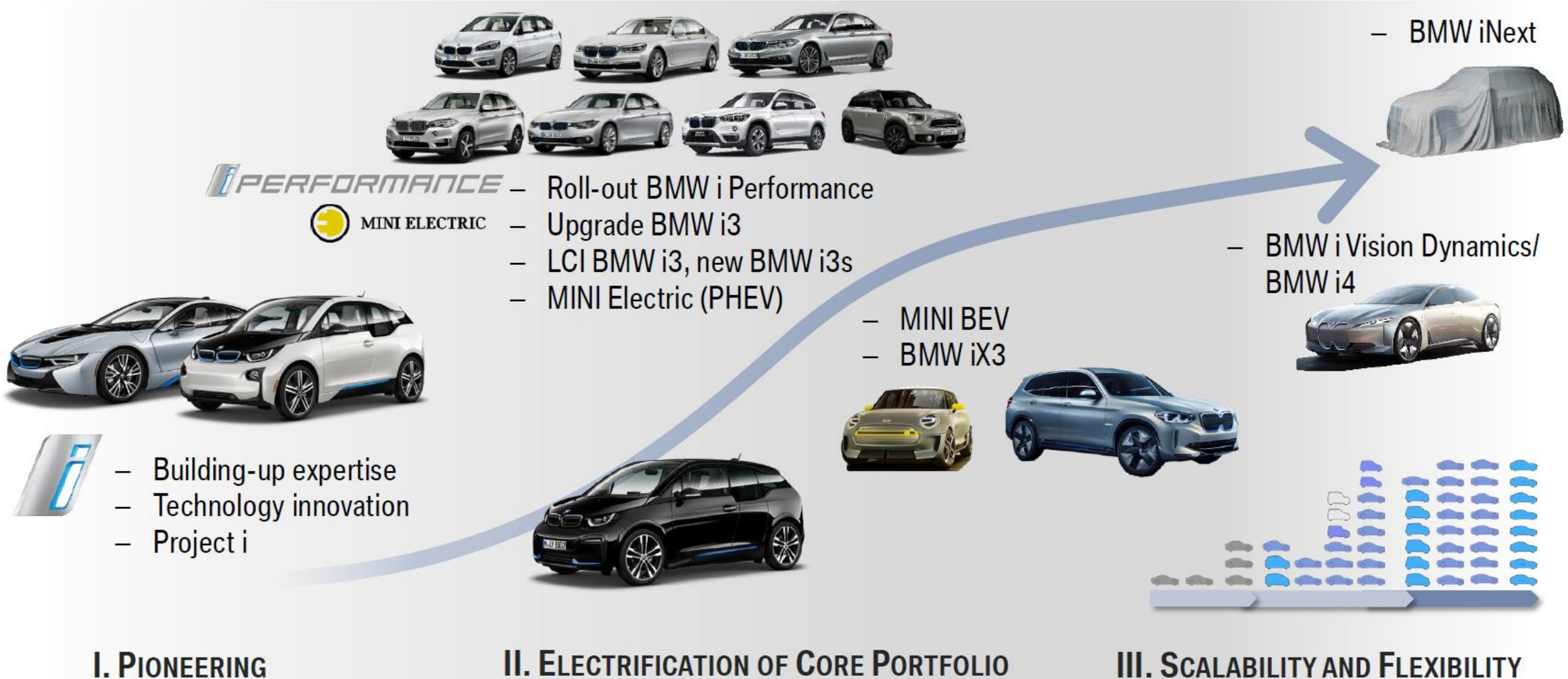
# MOBILITY SERVICES.

- Options for strategic development.
- 100 million active customers by 2025.
- A complete, all-inclusive ecosystem for our customers.
- Agreement with Daimler AG to form Mobility Services Joint Venture.\*

\*Subject to approval by relevant authorities.

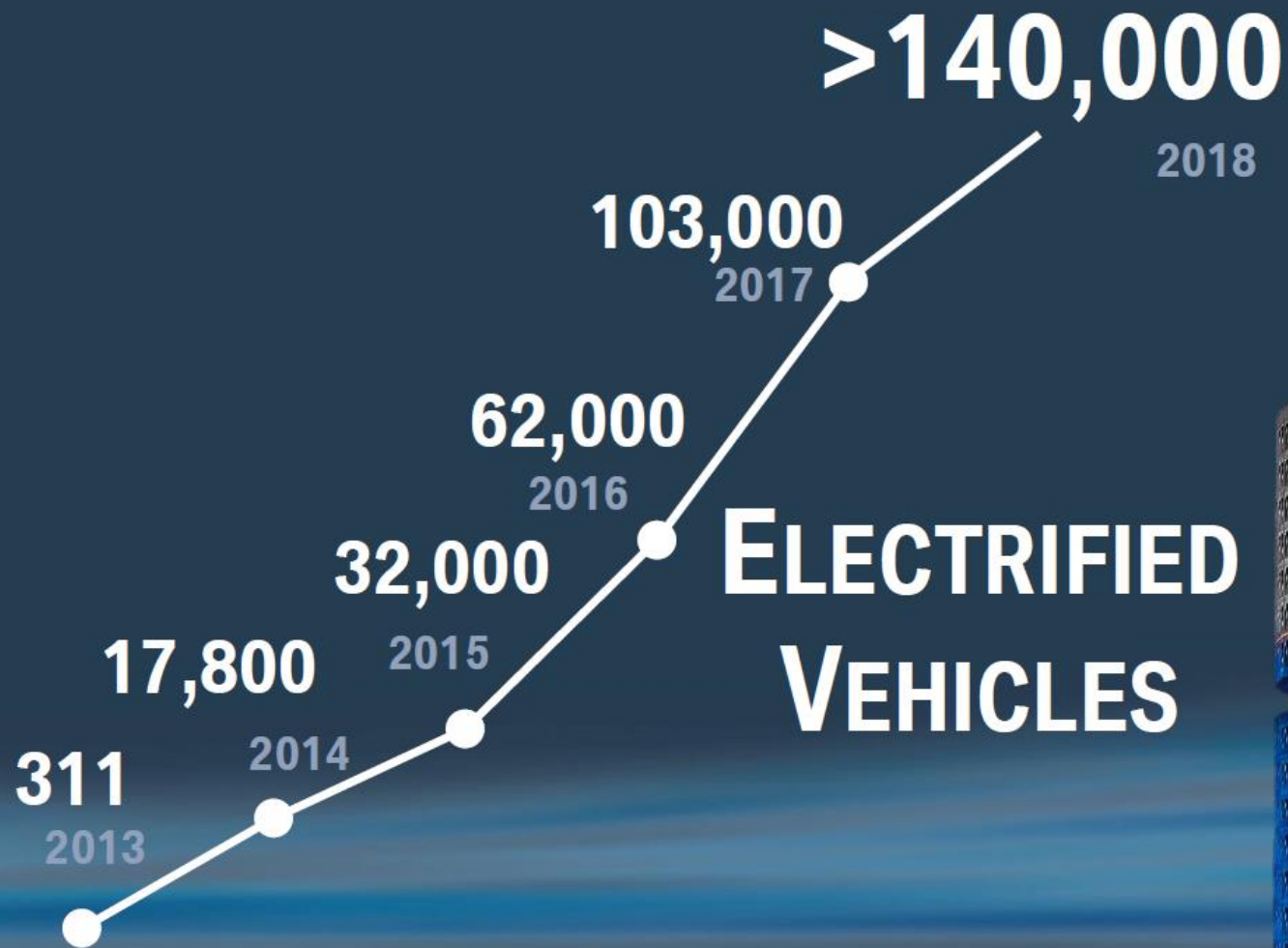


# BMW GROUP'S ELECTRIFICATION PATHWAY.



Battery Electric Vehicles (BEV)  
 Plug-in Hybrid Vehicles (PHEV)  
 Life Cycle Impulse (LCI)

# OUR FUTURE IS ELECTRIC. AMBITIOUS TARGETS FOR SALES OF ELECTRIFIED VEHICLES.



# 500,000

BY THE END OF 2019  
ON THE ROAD



YTD-04/2018  
36,692  
ELECTRIFIED  
VEHICLES SOLD

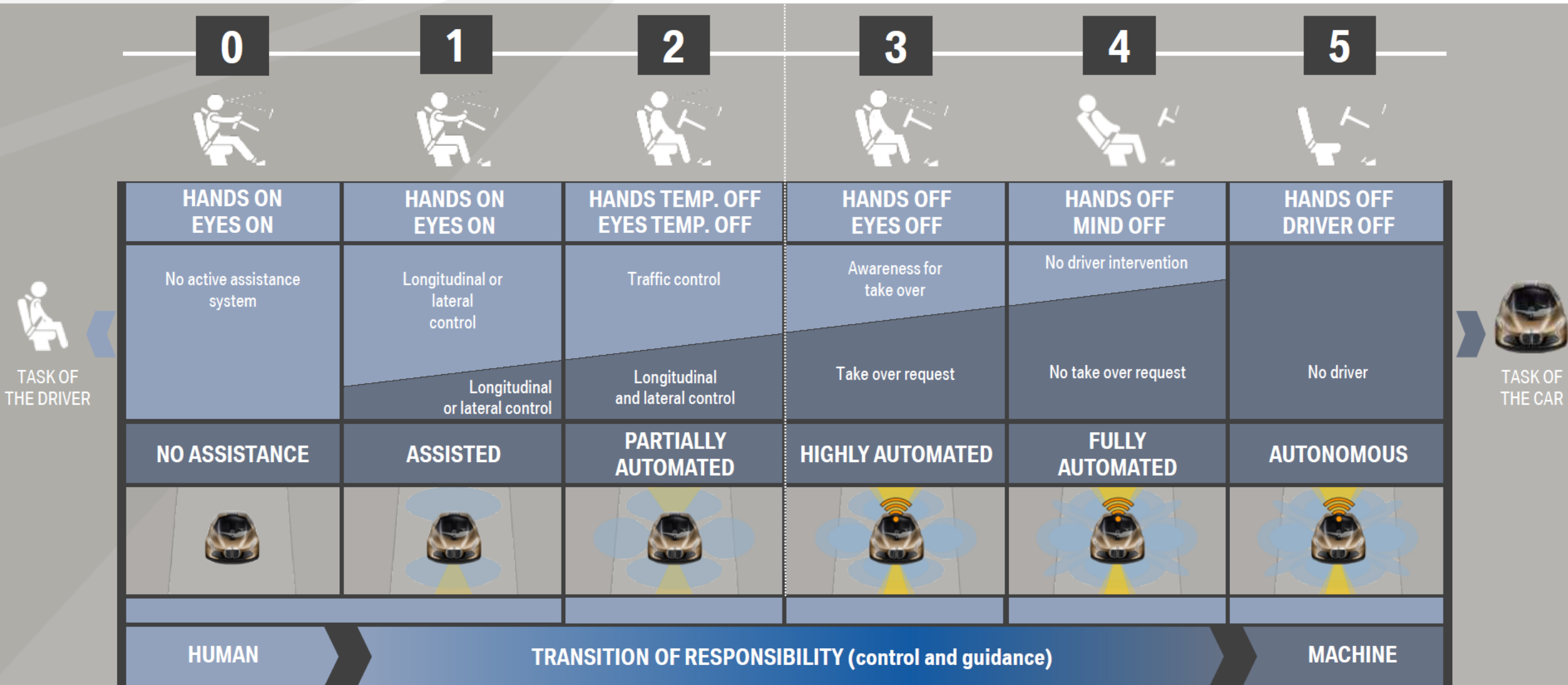
Electrified vehicles = Battery electric vehicles & Plug-in Hybrid vehicles

# AUTONOMOUS DRIVING IS A COMPETITION BETWEEN VERY DIFFERENT PLAYERS.





# TECHNICAL LEVEL OF AUTOMATION.



# FIRST IDEAS BEING IMPLEMENTED MORE THAN TEN YEARS AGO.

**BMW Track Trainer  
(2006).**



**Remote Controlled Parking  
(2008).**



**Emergency stop assistant  
(2009).**



**Highly automated driving on the  
motorway (Gen1: 2011; Gen2: 2014)**



**Highly automated driving at the limits of  
vehicle dynamics (2014).**



**Fully automated remote valet parking  
(2015).**



# DRIVER ASSISTANCE IN THE NEW BMW 5 SERIES: DRIVING COMFORT, DRIVING SAFETY, PARKING



**Top View Remote**  
Lane keeping assistant with active side collision protection  
Active cruise control with Stop&Go function  
Rear collision prevention

**Crossroad Assist**

**3D View**  
Top View  
Parking assistant

**Active Park Distance Control**  
BMW Selective Beam  
Remote Control Parking

**Steering and lane control assistant**  
Speed limit and No Pass information

**Panorama View**  
Speed Limit Device

**Crossing traffic warning rear / front**

**Night Vision**

**Lateral parking aid**

**Distance information**

**Lane departure warning**

**Wrong Way Assist**  
Lane change warning

**Speed Limit Assist**  
Approach control warning with braking function

Inset images show: a top-down view of the car on a road, a driver's perspective of the road with a speed limit sign and speedometer, a side view of the car in a parking lot, and a hand holding a smartphone displaying a 3D view of the car.

HAF

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# END-TO-END ARCHITECTURE FOR AUTONOMOUS DRIVING. FOCUS: ENVIRONMENT MODEL, DATA CENTER AND DRIVING POLICY.

**E/E ARCHITECTURE**



Fail Operational

This block shows a server rack representing the vehicle's electronic/electrical architecture. A red oval callout with the text 'Fail Operational' is overlaid on the image.

**BACKEND**



This block illustrates the backend infrastructure, including a server rack and a 3D simulation of a road with vehicles and sensor beams.

**BACKEND SECURITY**



CD BACKEND  
FAS BACKEND  
MS BACKEND

This block focuses on security, showing three database icons labeled 'CD BACKEND', 'FAS BACKEND', and 'MS BACKEND' against a blue digital background.

**SENSORS**



This block shows a car with various colored sensor beams (radar, lidar, camera) projecting outwards to detect its environment.

**ENVIRONMENT MODEL**



HD-MAP  
OBJECTS AND FREE SPACE

This block details the environment model, split into 'HD-MAP' (High Definition Map) and 'OBJECTS AND FREE SPACE' (3D scene reconstruction).

**VEHICLE SECURITY**



This block shows a car with security-related icons and a blue digital background, representing the vehicle's internal security systems.

**MOTION CONTROL**



This block shows a car in motion, representing the control systems that manage the vehicle's movement.

**FAD DRIVING FUNCTION**



TRAJECTORY PLANNING  
DRIVING STRATEGY

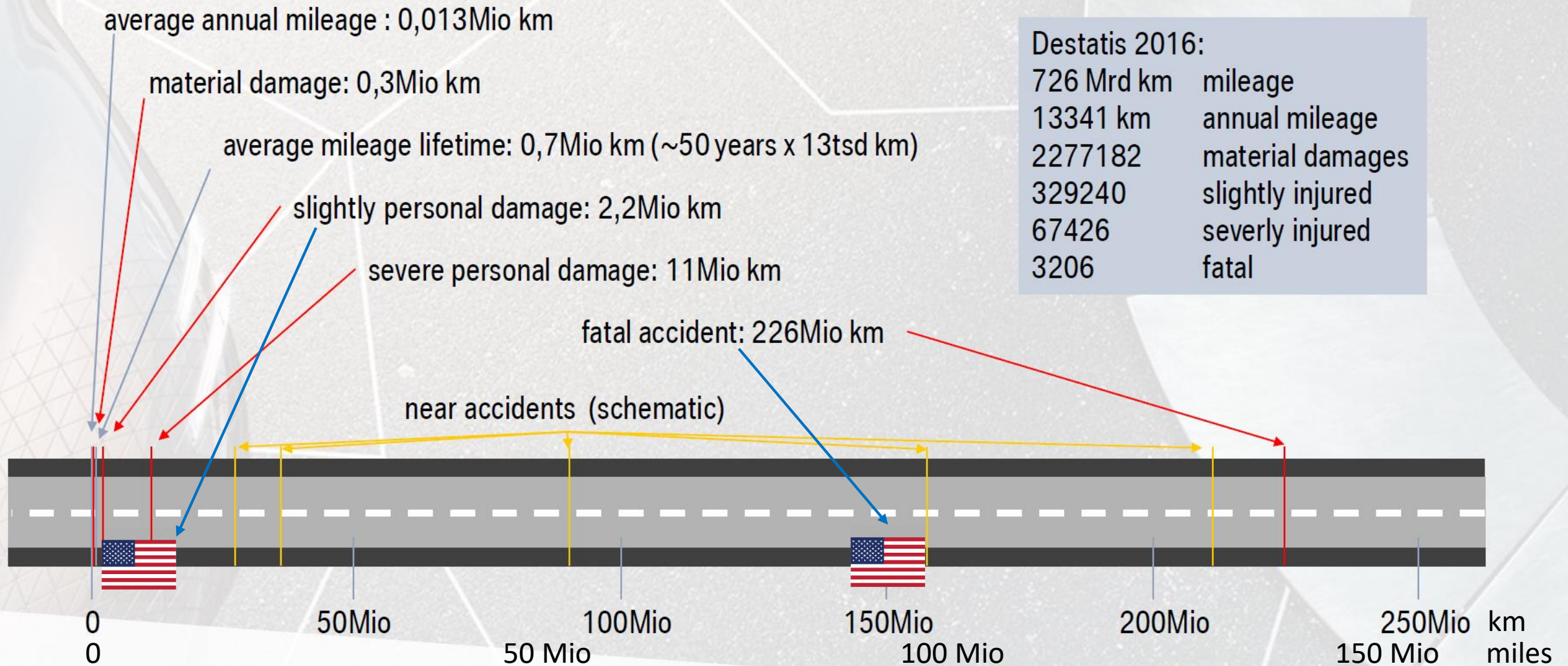
This block illustrates the driving function, divided into 'TRAJECTORY PLANNING' (showing a car with a path) and 'DRIVING STRATEGY' (showing a car on a road with a green path).

**ARTIFICIAL INTELLIGENCE**



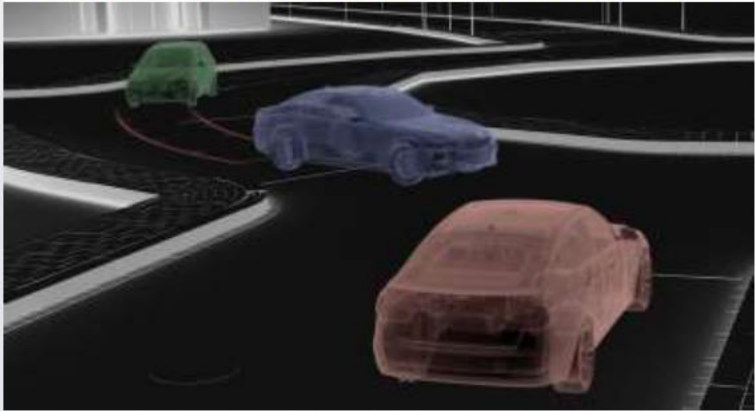
This block features a human head with AI-related icons and a digital interface, representing the intelligence layer of the system.

# CHALLENGE OF VALIDATION. STATISTICS MILEAGE AND ACCIDENTS (GERMANY).

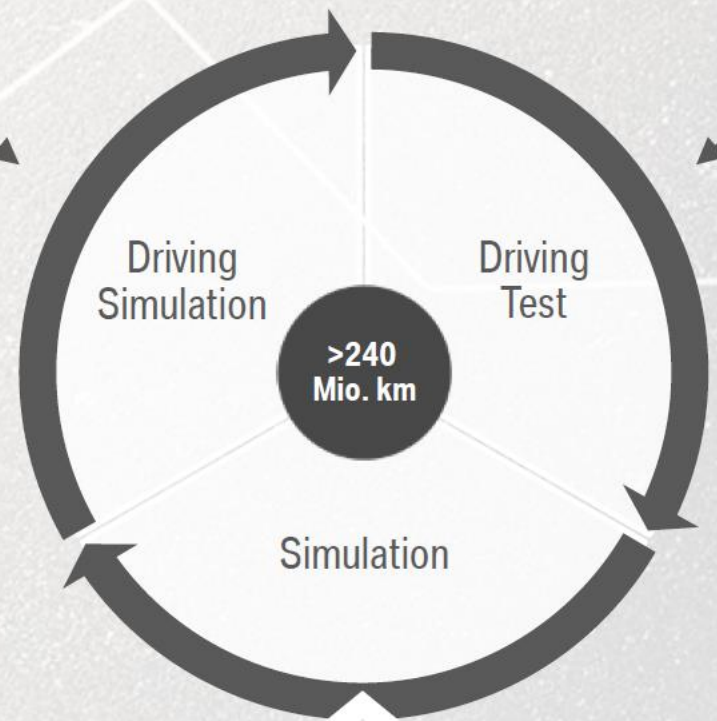


# SAFETY FIRST: MORE THAN 240 MILLIONS OF KILOMETERS WITHOUT ACCIDENTS TO BE COMPLETED.

## DRIVING SIMULATION AND SW IN THE LOOP.



REPRODUCIBLE CUSTOMER USE CASES  
→ REQUIRED >95%

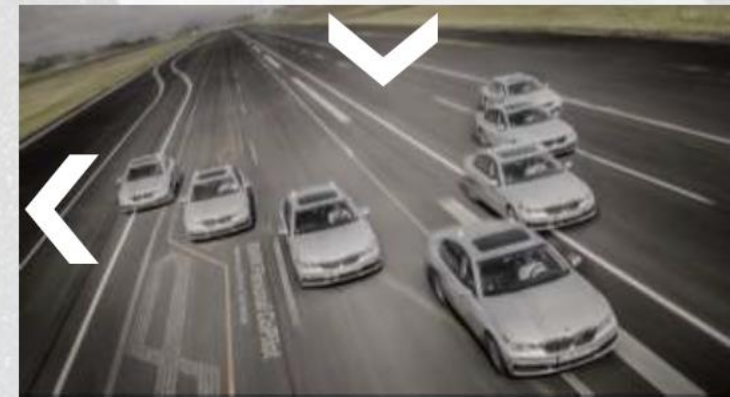
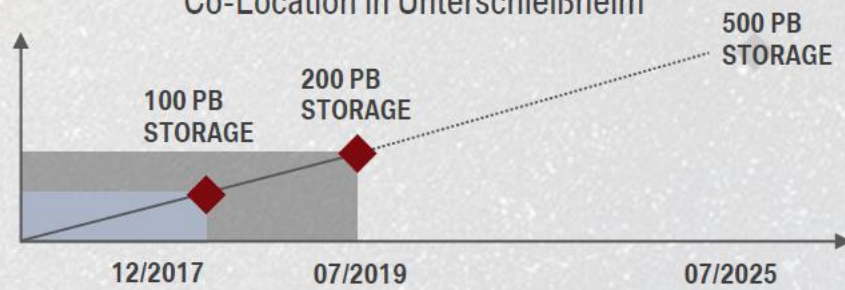


## PROTOTYPE VEHICLE BUILD UP.



FAD: 5TB/H → 40TB/DAY 8H/5 DAY RUNNING  
HAD: 2TB/H → 16TB/DAY 8H/5 DAY RUNNING

## DATA CENTER Co-Location in Unterschleißheim



**EXCITING TIMES AHEAD – THANK YOU FOR YOUR INTEREST.**

