

Our Future Mobility: Electric & Digital

24. IfA Branchengipfel
Arnd Franz | October 19, 2023



MAHLE

How it Started ...



... what is Today

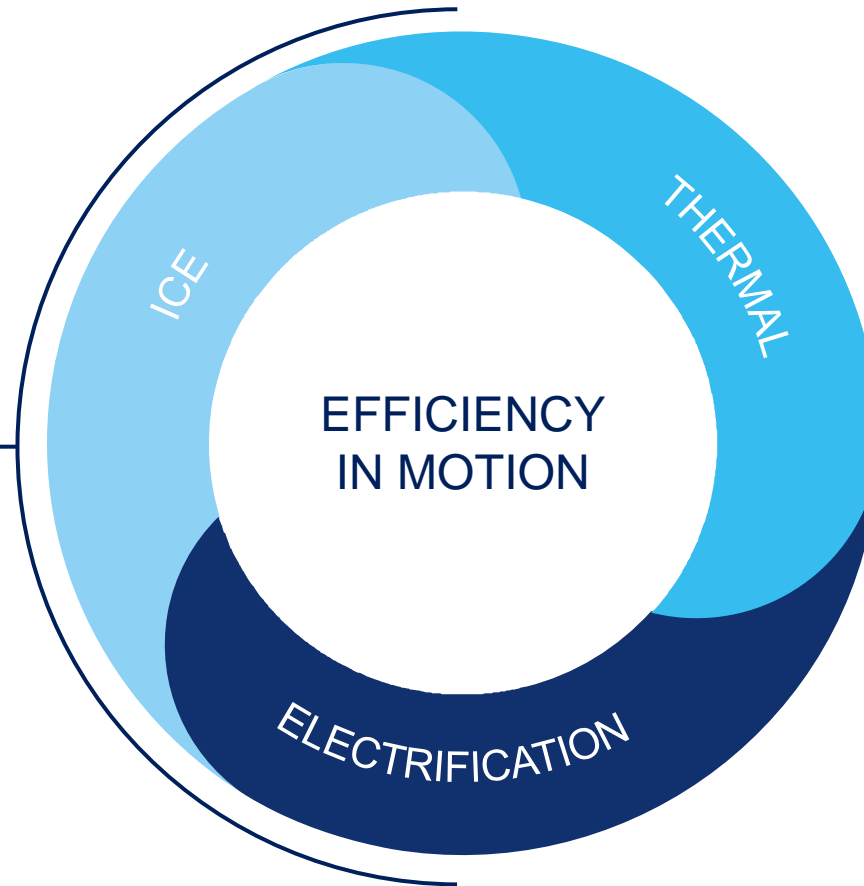


Well Positioned for the Future with our Strategy MAHLE 2030+

Cost Leadership Strategy

ICE champion with superior products, lean cost structures and long trustful customer relationships.

WE SHAPE
FUTURE MOBILITY



System Solution Strategy

Leader in Thermal Solutions driving energy efficiency and superior cabin comfort for sustainable mobility.

Focus Strategy

Creator of ePowertrain innovations enabling profitable e-mobility through leading technology with highest efficiency.

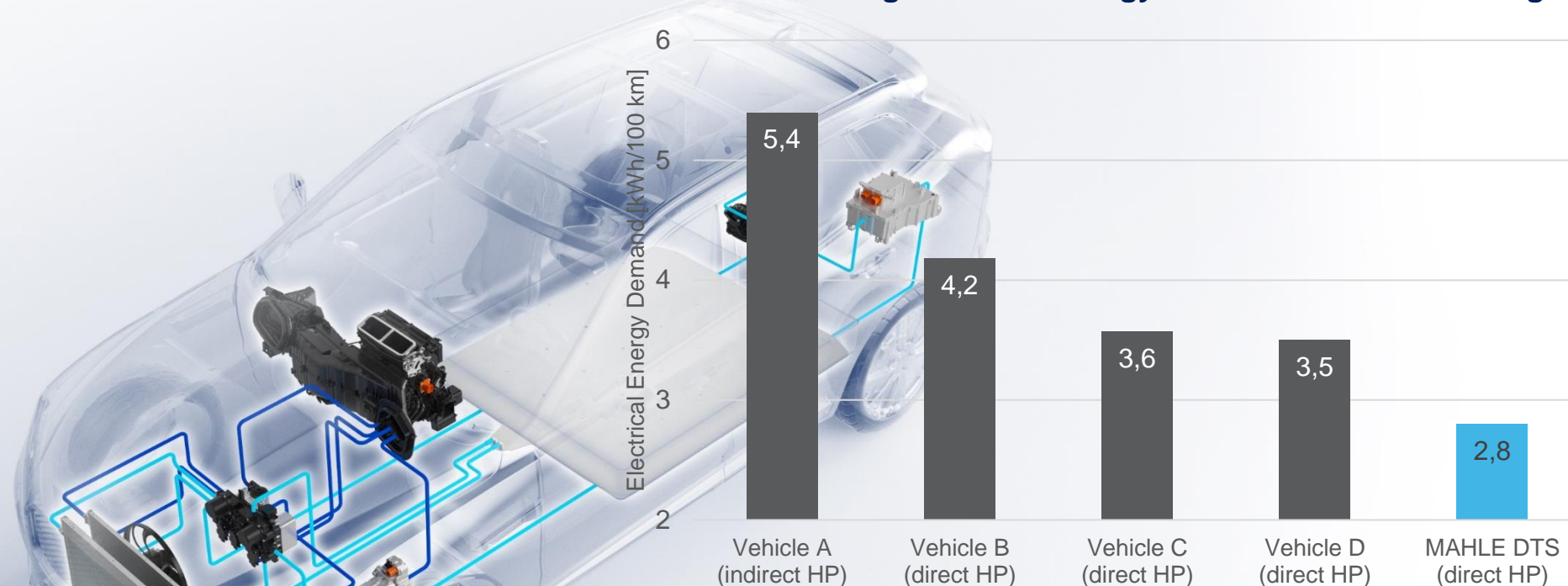
Efficiency in Motion



>> Video

The Perfect Symbiosis of Thermal & Electrification as Dedicated MAHLE Strength and Base for Future Battery Electric Vehicles

Benchmarking electrical energy demand for cabin heating ⁽¹⁾



➤ MAHLE DTS Heat Pump System with **optimum use of available heat sources** (ambient air and coolant) sets the benchmark for vehicle efficiency

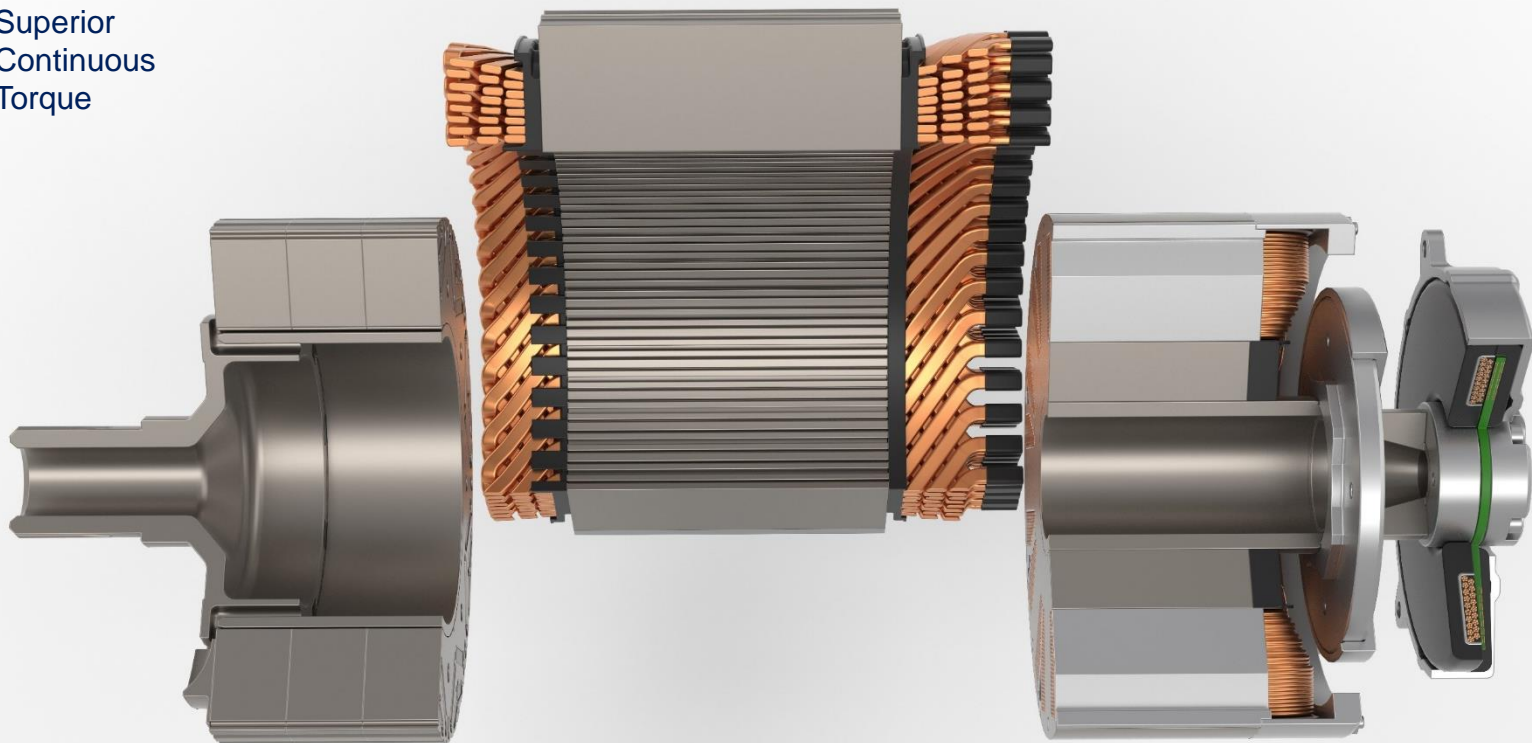
MAHLE Goes Bionic

Battery Cooling
with the Power of Nature



The Perfect E-Motor – Superior Continuous Torque meets Magnet-free Contactless Transmitter

SCT
Superior
Continuous
Torque



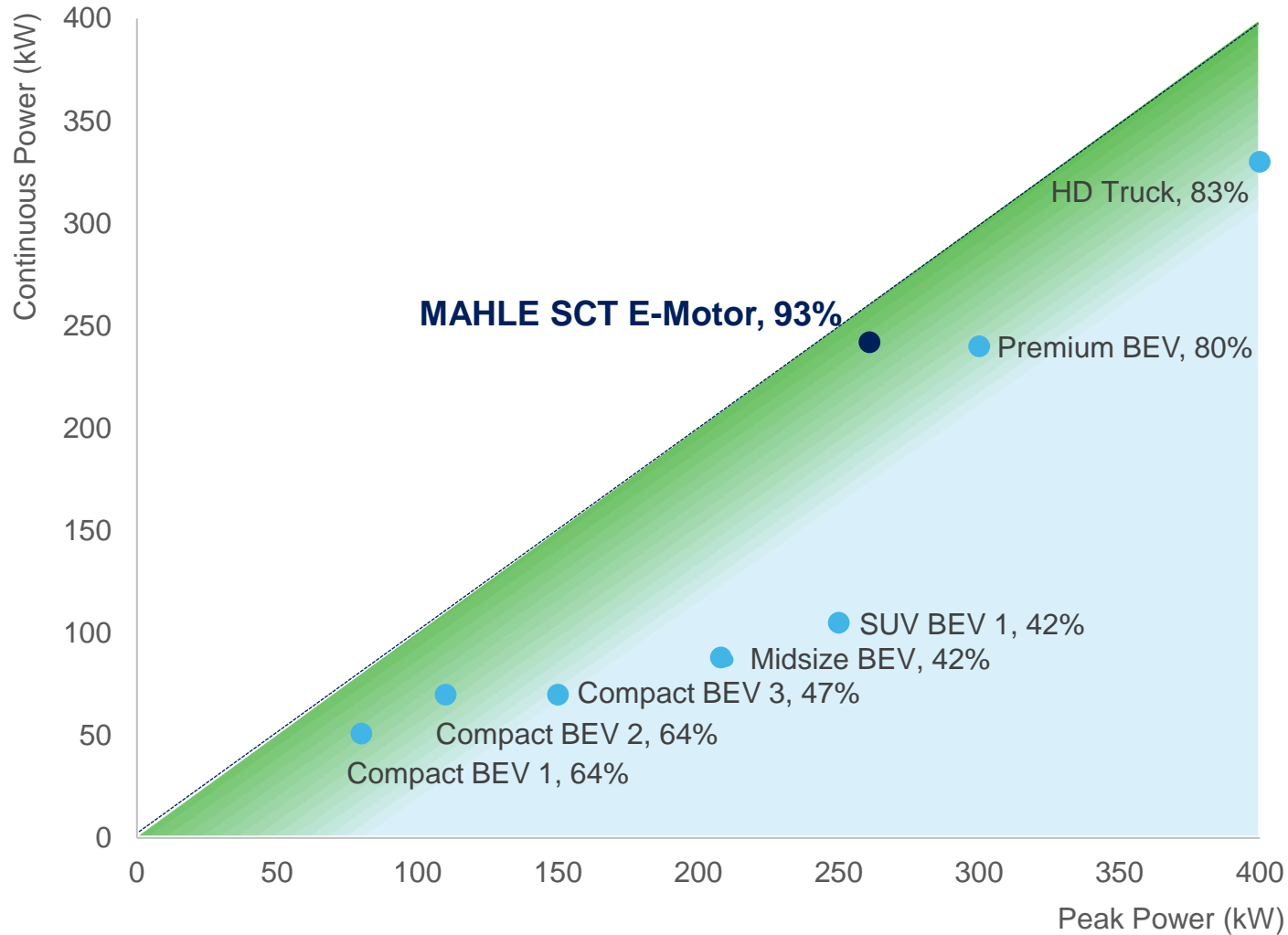
MCT
Magnet-free
Contactless
Transmitter

E-Motor Technology Kit
for customer-specific
solutions

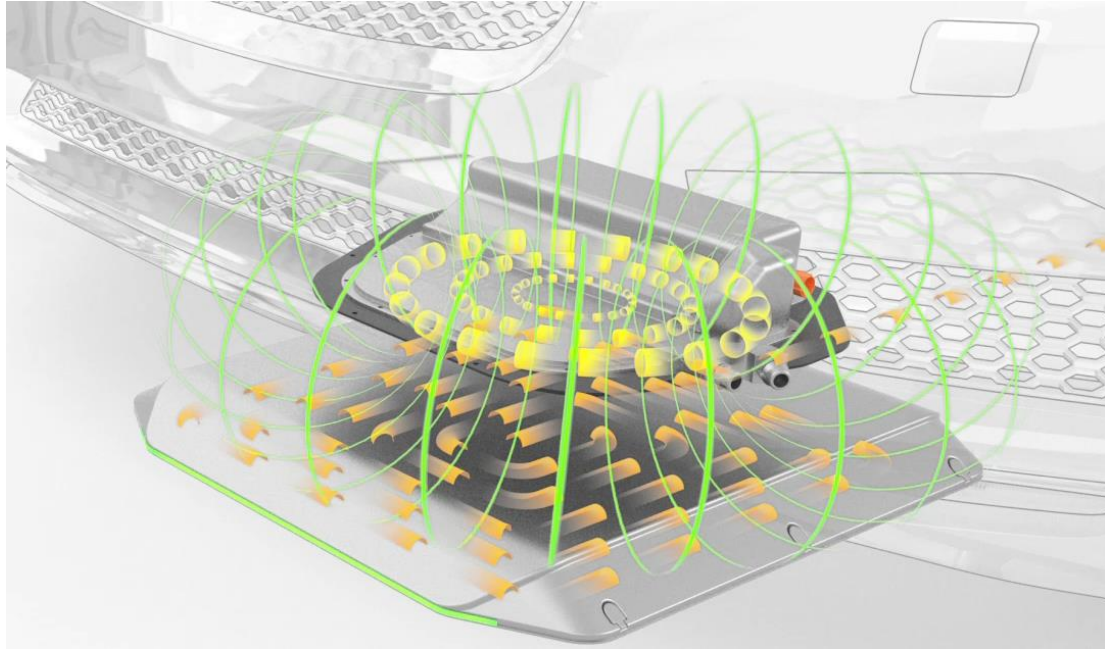
SCT Cooling Concept
enables high torque for an
unlimited period of time

MCT Rotor Excitation
is a wear-free solution for
Externally Excited
Synchronous Machine
(EESM) and avoids
dependencies on rare earths

SCT with Best-In-Class Continuous to Peak Power Ratio

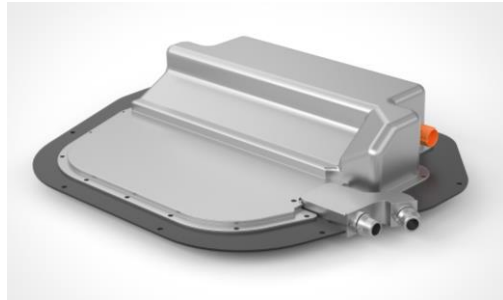


Advanced Comfortable Charging Solutions



chargeBIG
Cost efficient and
scalable charging
infrastructure

Wireless Charging
Comfortable, reliable and
safe solution for
autonomous charging



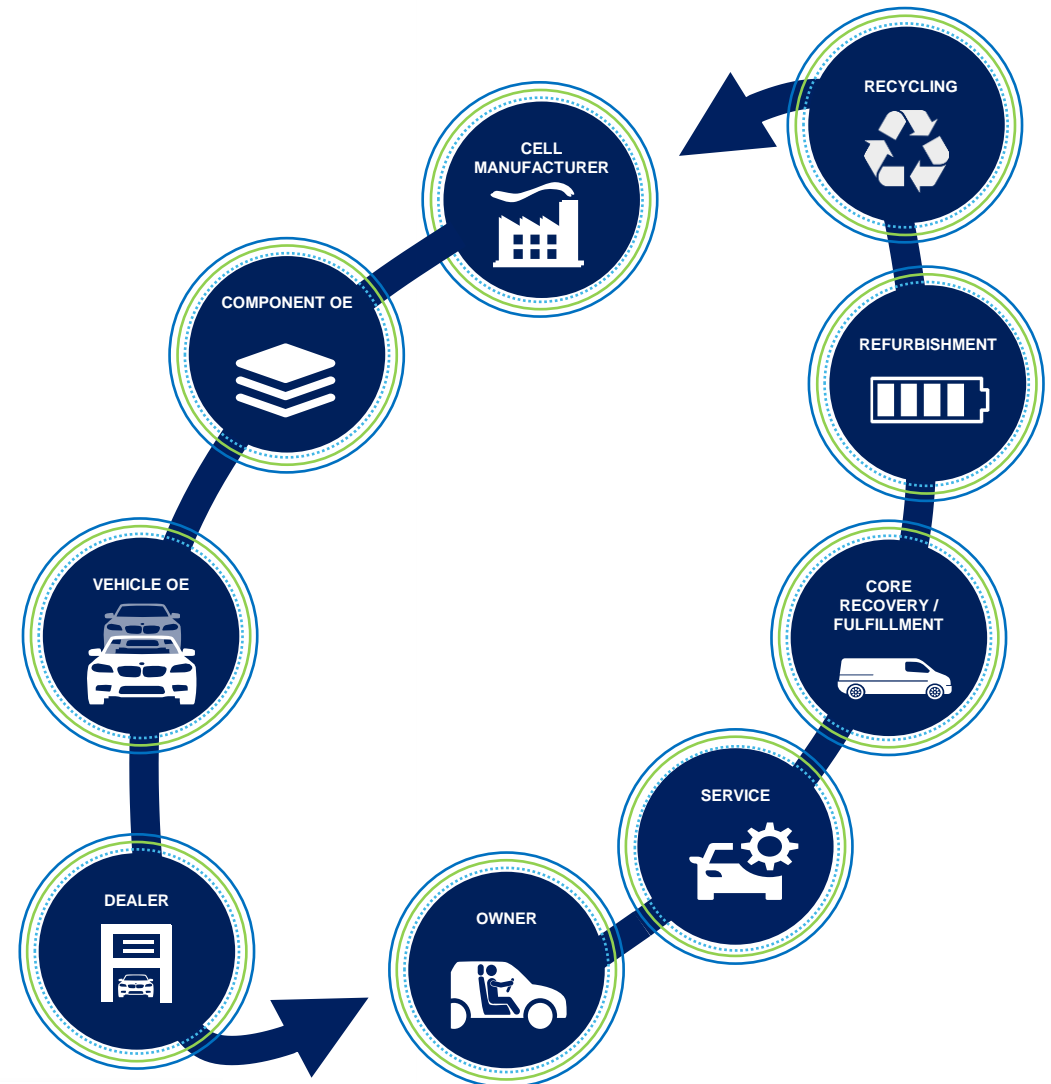
Our Repair and Service Solutions



Create Added Value – all along the Electric Value Chain

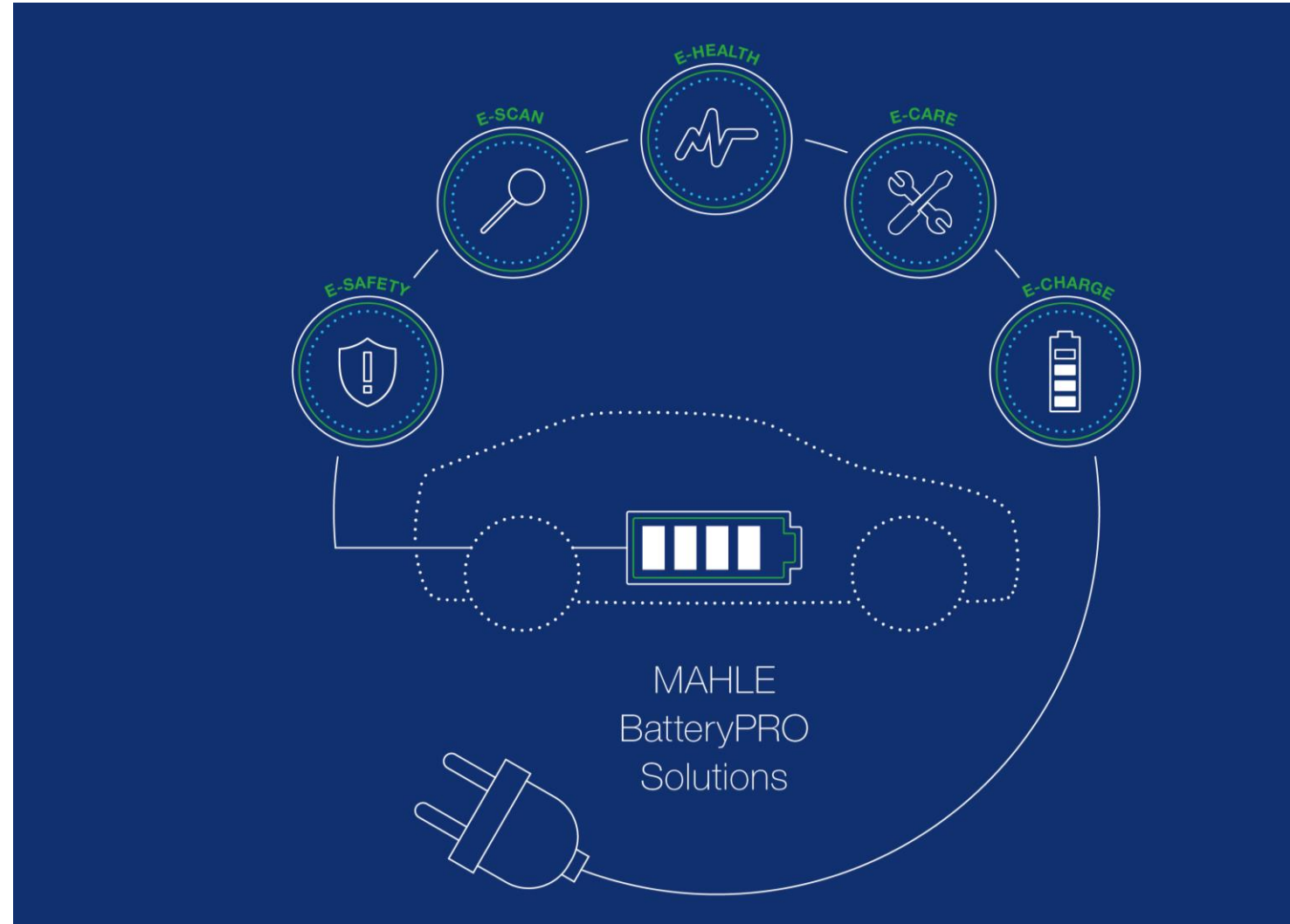
➤ Traction battery can make up over 25% of the overall vehicle cost and varies greatly from vehicle to vehicle

➤ OEM warranty up to 8 years / 160,000 km for batteries

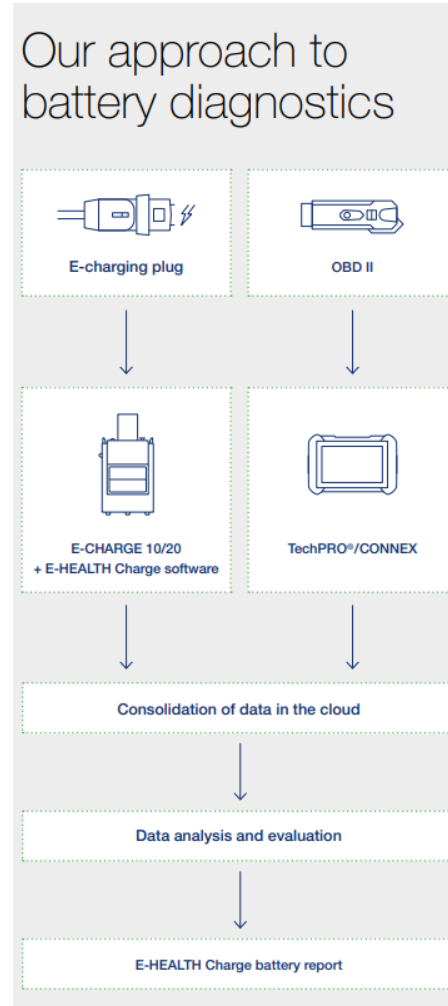


MAHLE BatteryPRO

- **E-SAFETY**
devices for monitoring the safety of HV and 12 volt batteries
- **E-SCAN**
enables battery diagnostics in electric vehicles
- **E-HEALTH**
diagnoses the condition of a battery
- **E-CARE**
Service device for the maintenance of the cooling circuits of vehicle batteries
- **E-CHARGE**
individual charging solutions for fast charging of battery vehicles



HV Battery Diagnostics: E-HEALTH Charge



volytica diagnostics
MAHLE

E-HEALTH battery report

Vehicle data			
Customer (vehicle owner)	145204end	Manufacturer	Toyota
Official identification	AA-X 123E	Model	bZ4X
First registration	06/29/2019	Engine identification	Not available
Mileage	11,435 km	FIN	ABC123 ABC 1234

Implementation Details			
Reviewer	MAHLE	Version loading profile	1
Location	Stuttgart	OBD Availability	Yes

Test data			
Duration	10:45 min	Max. loaded performance	14.4 kW
Start of SoC	56%	End of SoC	62%

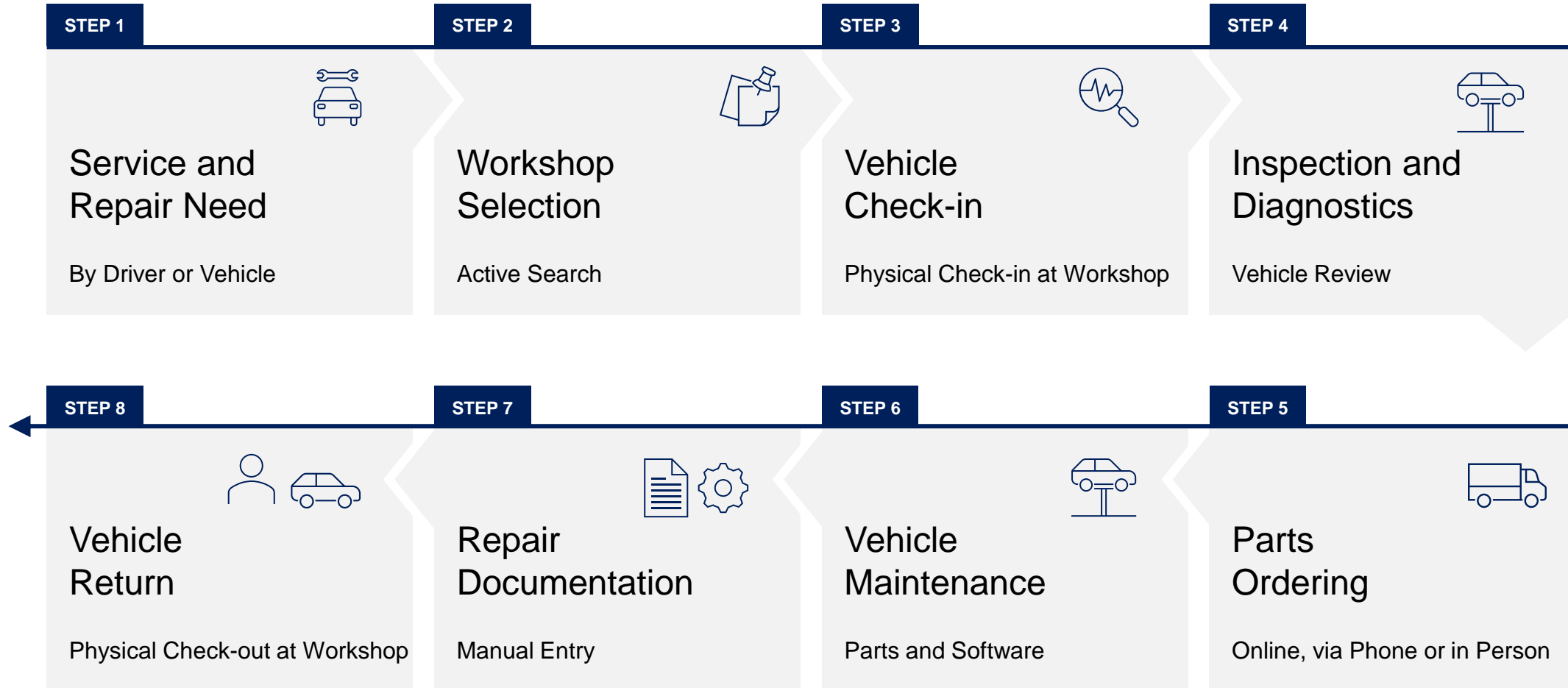
Indicator of available residual capacity Estimation of the residual capacity released by the manufacturer in relation to the nominal capacity	90%-95%
Performance indicator Comparison with a new vehicle of a similar model	✓
Vehicle charging system Vehicle can be charged	✓
Implementation of test cycle Test cycle of the battery quick test successfully completed	✓
Manufacturer-SoH Value of the residual capacity estimated and issued by the manufacturer	98%

Your vehicle*

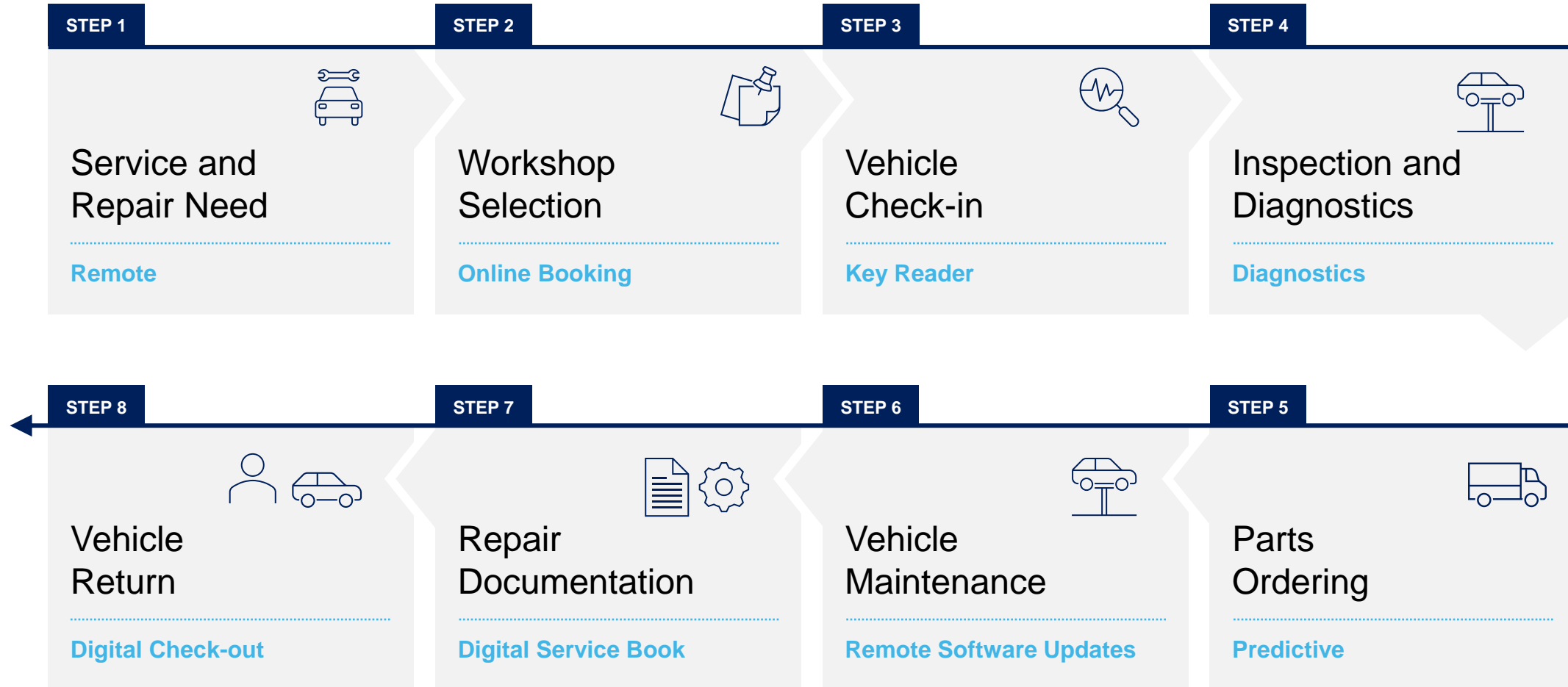
0% 60% 70% 80% 90% 100%

*The accuracy of the assessment can be increased by a longer test duration.

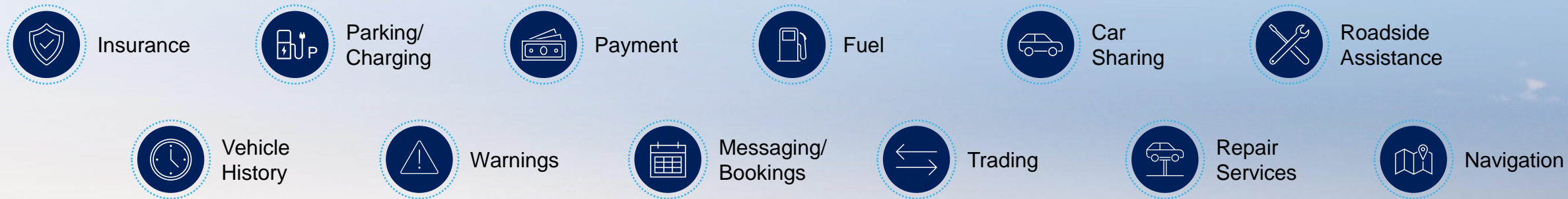
Evolutionary Digitalization of each Step has Started



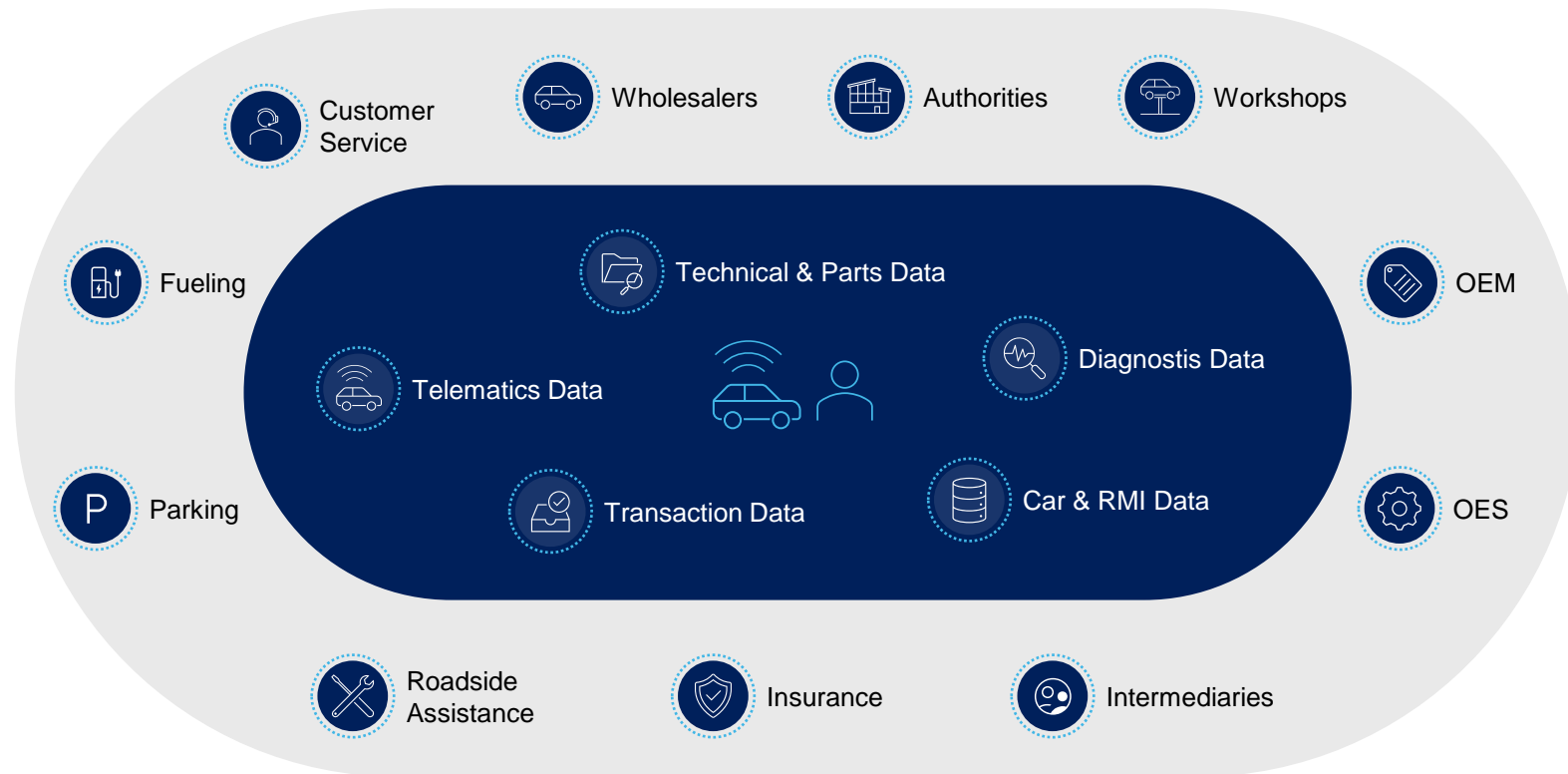
Evolutionary Digitalization of each Step has Started



How Digitalization will Transform the Automotive Value Chain



Future Vehicle Service will Require Automotive Ecosystem without Borders



Consumer Benefits

- Mobility
- Environment
- Safety
- Ease of Use
- Cost

Ecosystem requirements



Stronger Cooperations



Data Sharing Modells



Customer Consent

Use Cases

Smart Roadside Assistance

Predictive Service

Remote Diagnostics

EV/PHEV Charging

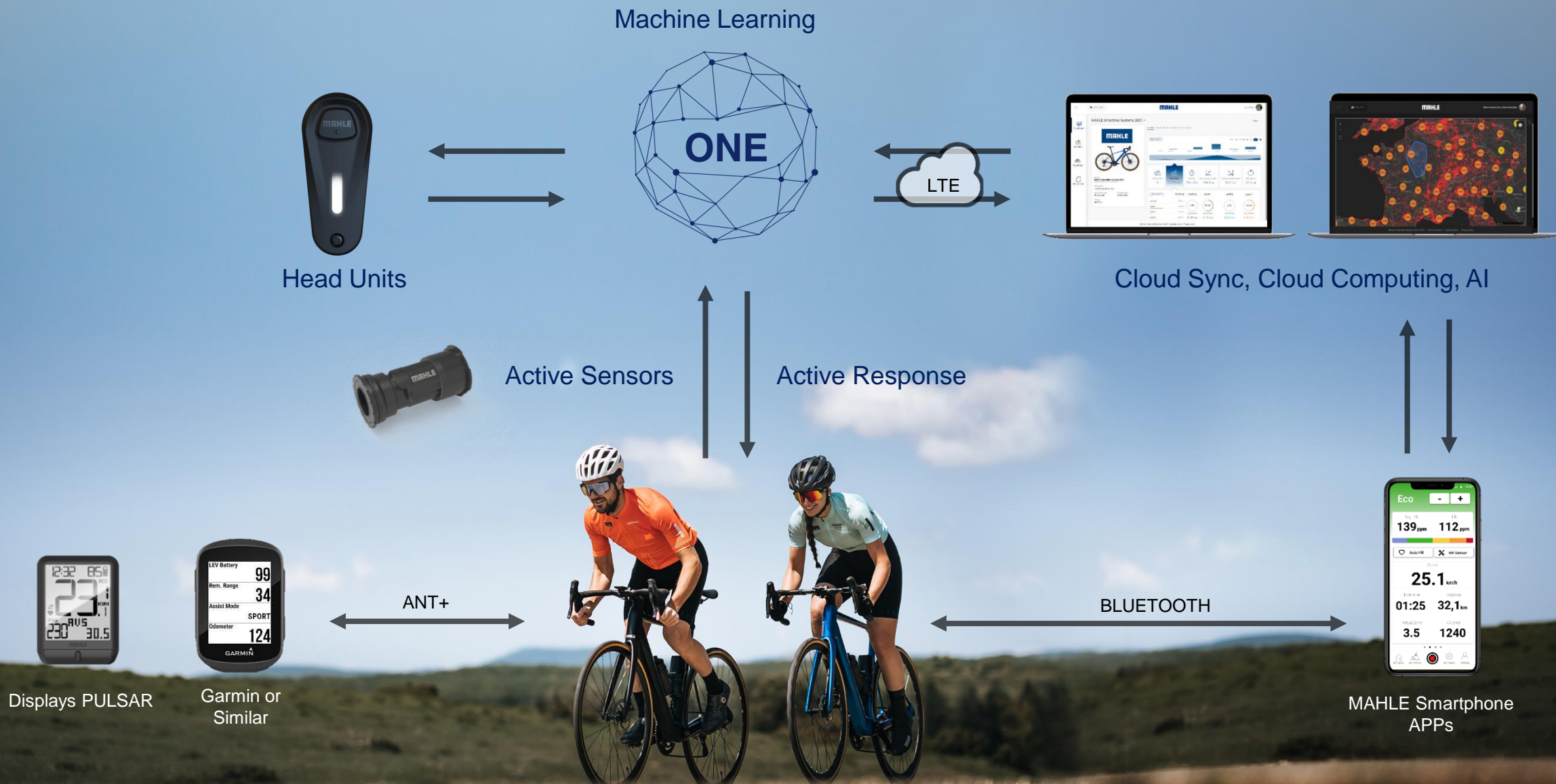
First Notification of Loss

Pay How You Drive

Detection of Hazard Areas

DTC-Based Parts/Cross-Selling

SmartBike Intelligence



X20 System: Ultra-Compact, Light and Smart

55 Nm

Max spd: 25 km/h (EU) & 20 mph (US)

Total integration

Indistinguishable from a muscular bike

Up to 200 km

iX250 or iX350
+ e185 Range Extender

3.2 kg complete system

Complete system assembled

1.39 kg motor

The lightest motor on the market,
with a thru axle and no wires.

Active charging

Fast charging 4 A

Smart thinking

Torque and cadence sensor for adaptive riding. 3D accelerometer, BLE, CAN, AI, ML, ANT+, BB and FOTA

SMART . Assist Ready

SMART . Shift Compatible



SmartBike 360° Digital Ecosystem

Accessories

- Head unit (low / high)
- Display (Pulsar One / color)
- Remotes (ONE, TRIO or eShifters)
- IoT (GPS + COMM)
- Smartphone



Drive Units

Batteries & Power

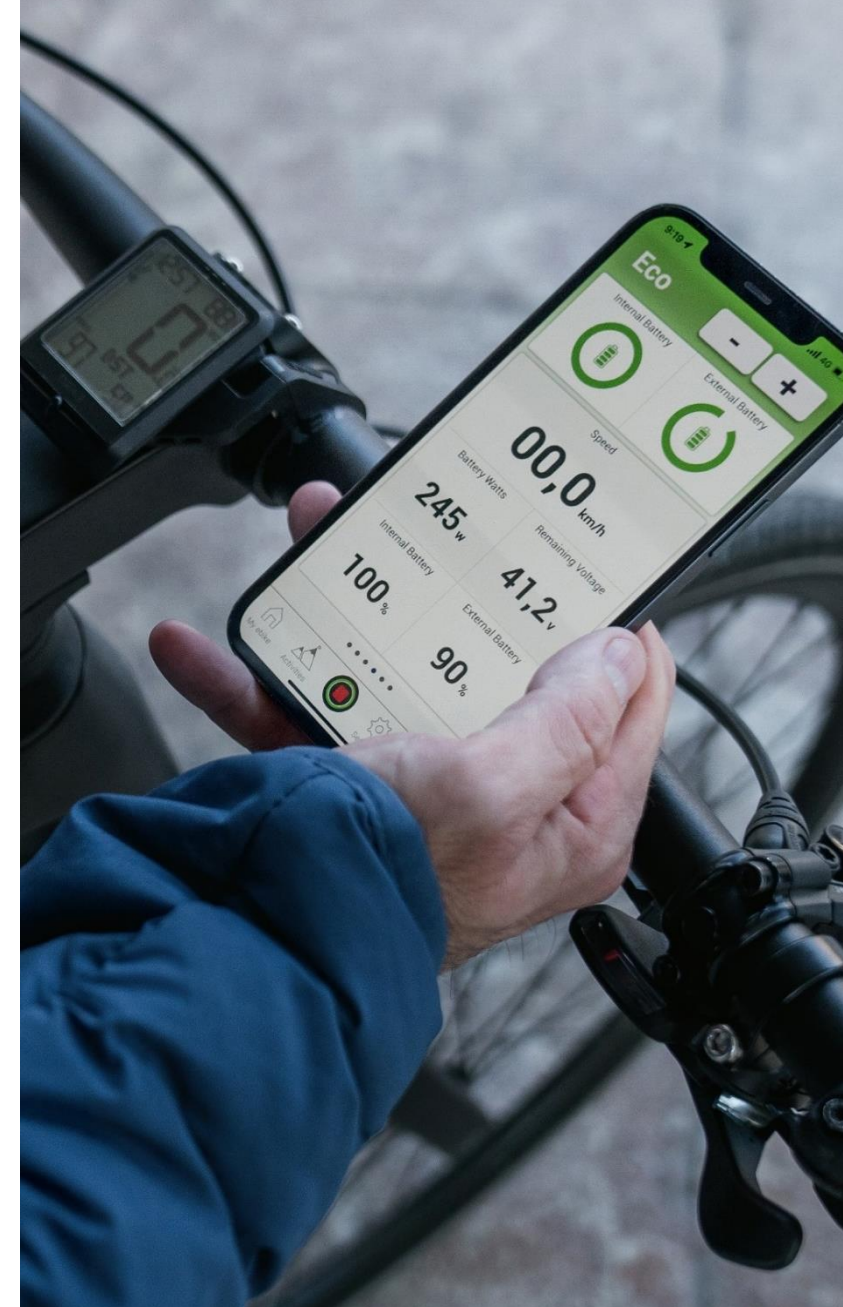
- Internal batteries (i-Series)
- Semi-integrated (s-Series)
- External (e-Series)
- Active & smart charging
- Energy hub

Rider Physiology

- Scientific approach
- Enhance experience
- Adaptive experience
- Personalized experience
- More fun, faster and further

Smartness

- Digital services
- Pre-ride functionalities
- Enhanced riding experience
- Post-ride analysis
- Web & smartphone applications



MAHLE Innovations Shaping Future Mobility

Hydrogen engine components

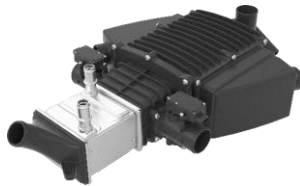


Battery Cooling Plate

TechPRO®



Fuel Cell Humidifier



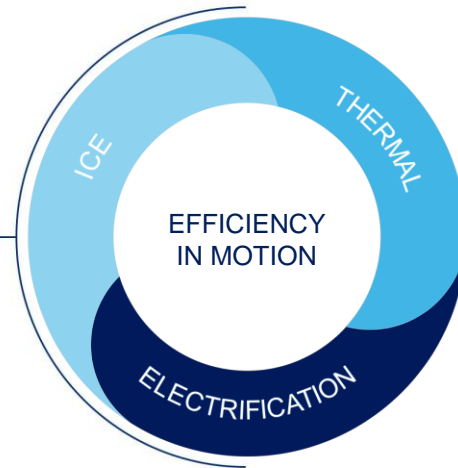
Technology Kit for Electric Motors



BatteryPRO



chargeBIG



WE SHAPE FUTURE MOBILITY

EFFICIENCY IN MOTION



E-Compressor



E-Bike drive systems



Onboard-Charger



Wireless Charging



**WE SHAPE
FUTURE MOBILITY**