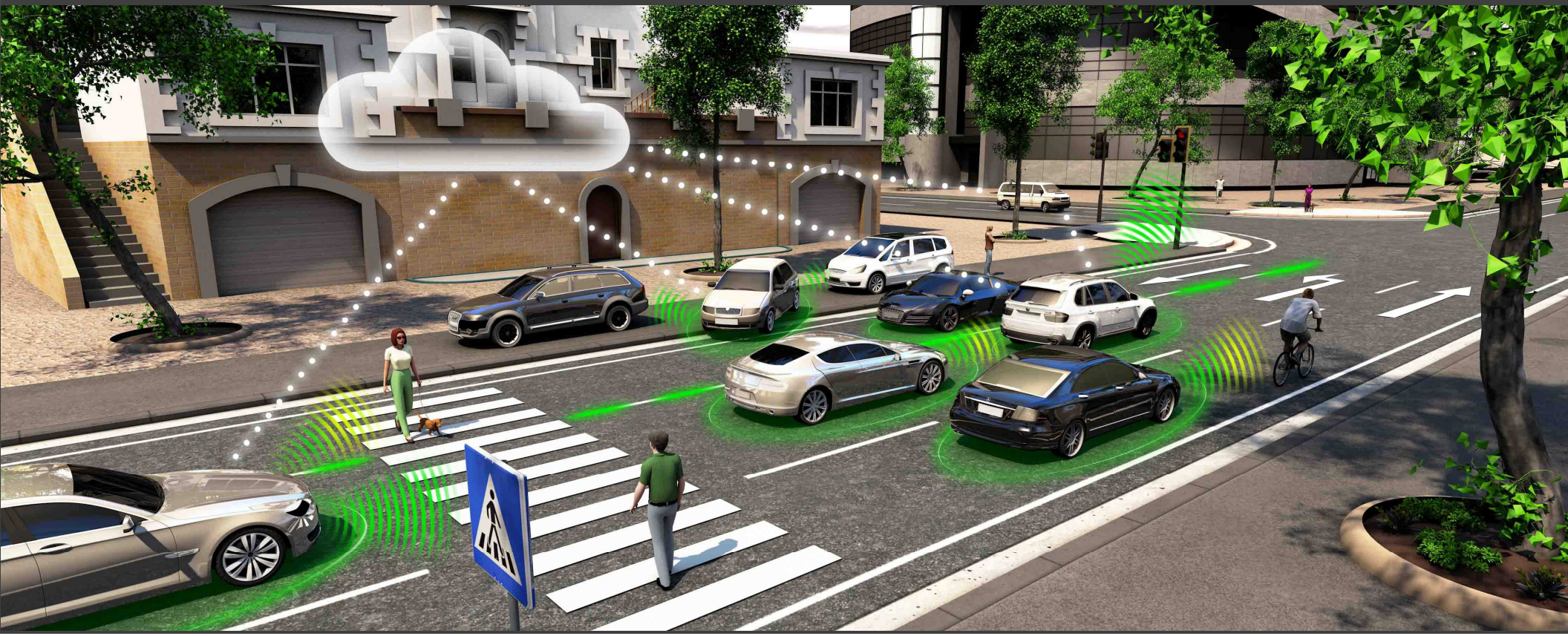
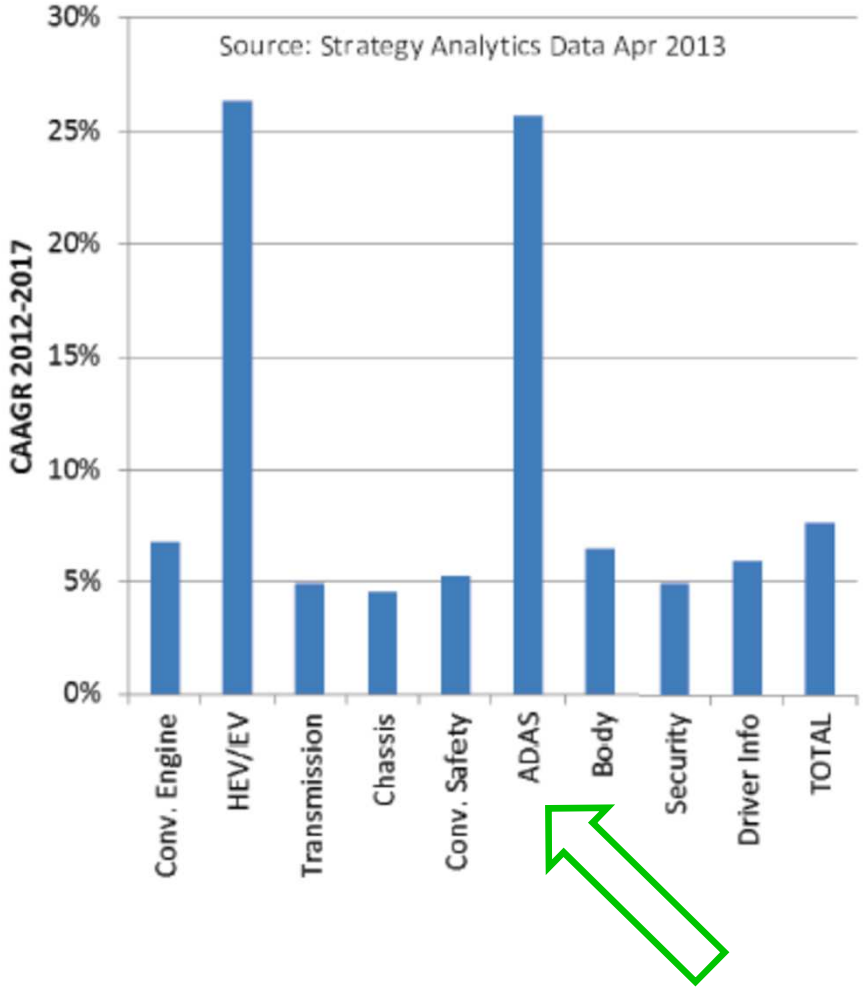
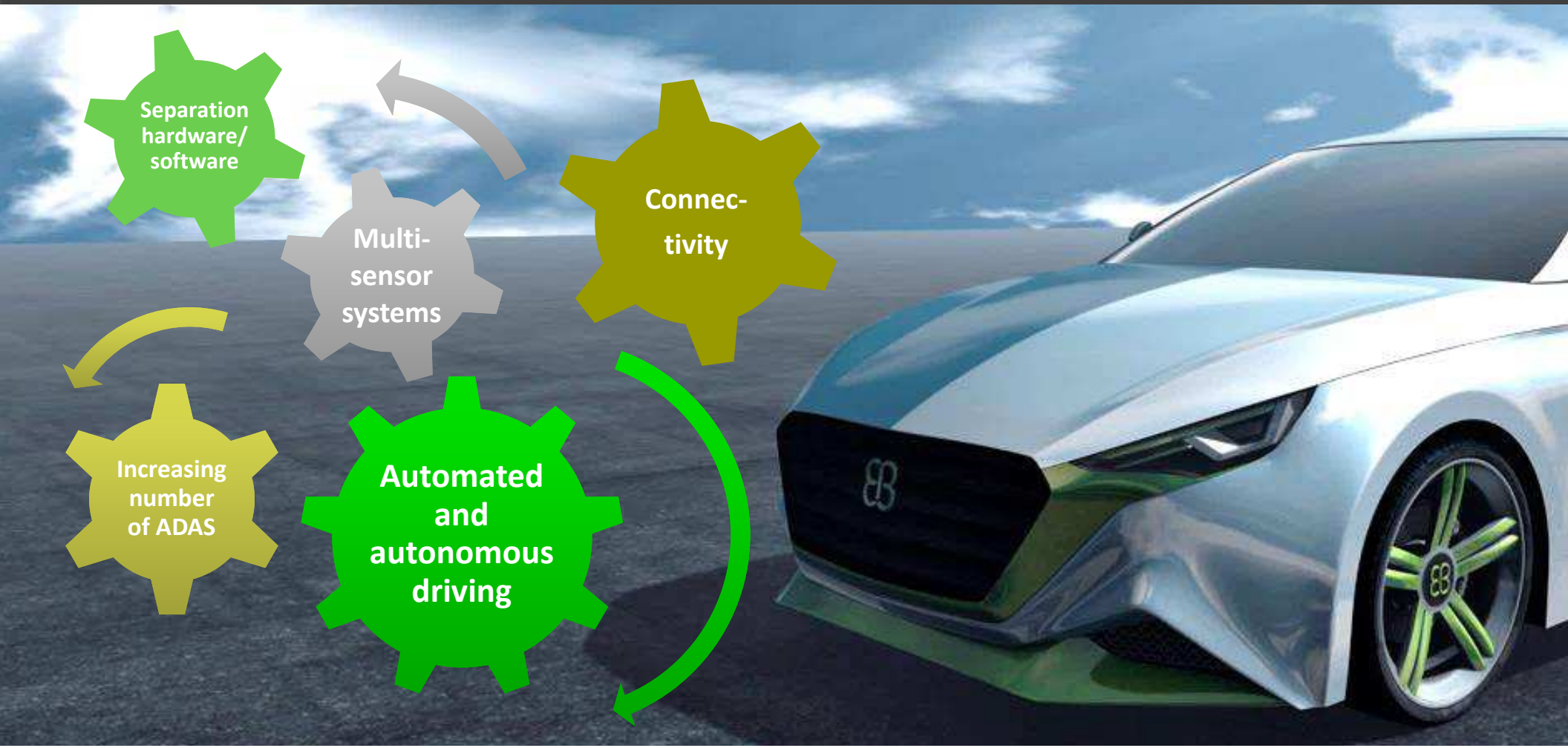
EB Automotive
Driver Assistance
EB Assist Solutions

Damian Barnett – Director Automotive Software
June 5, 2015



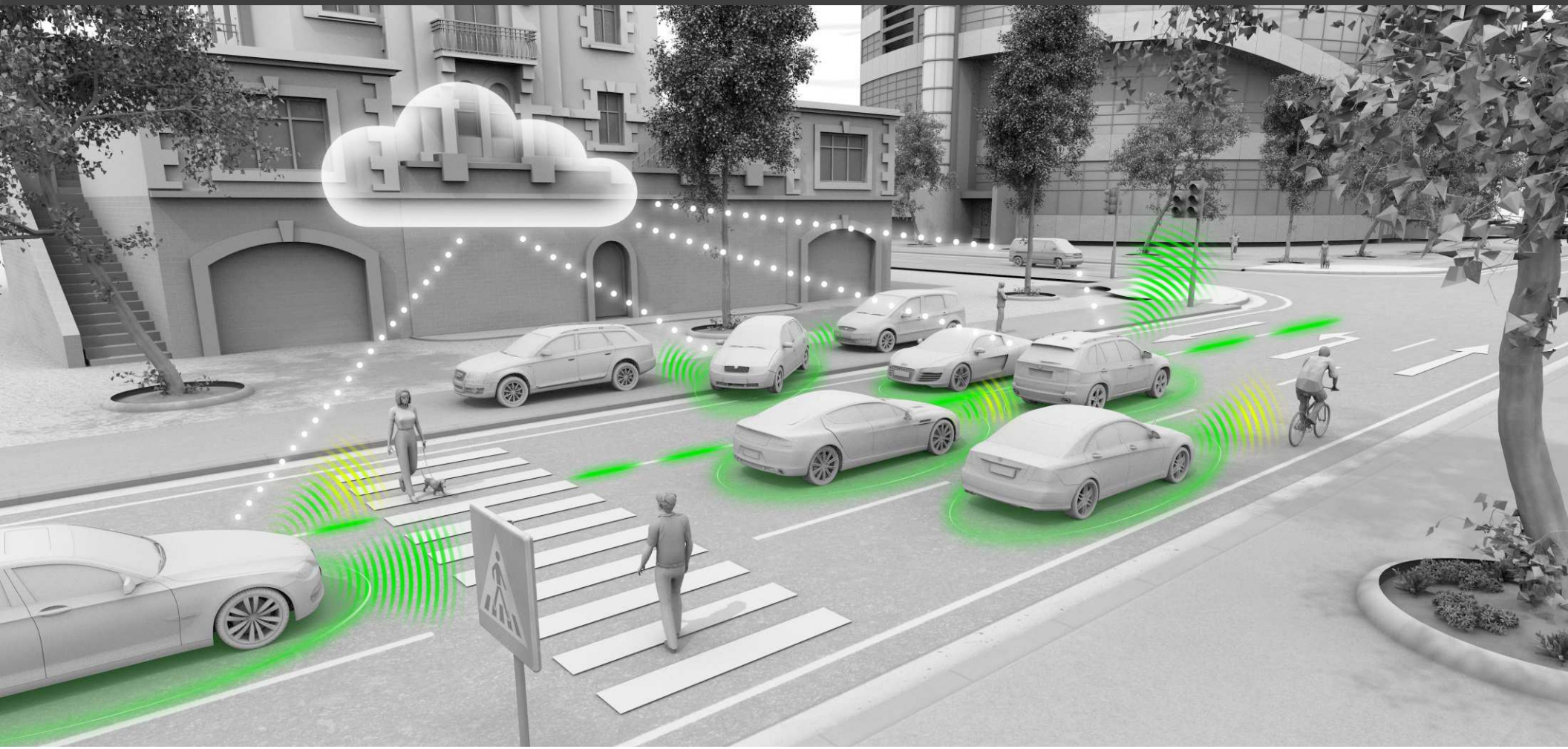
The Growth of ADAS is predicted to be about 25% from 2012 to 2017





Automotive industry

Trends and challenges



Sophisticated and reliable driver assistance software solutions by Elektrobit

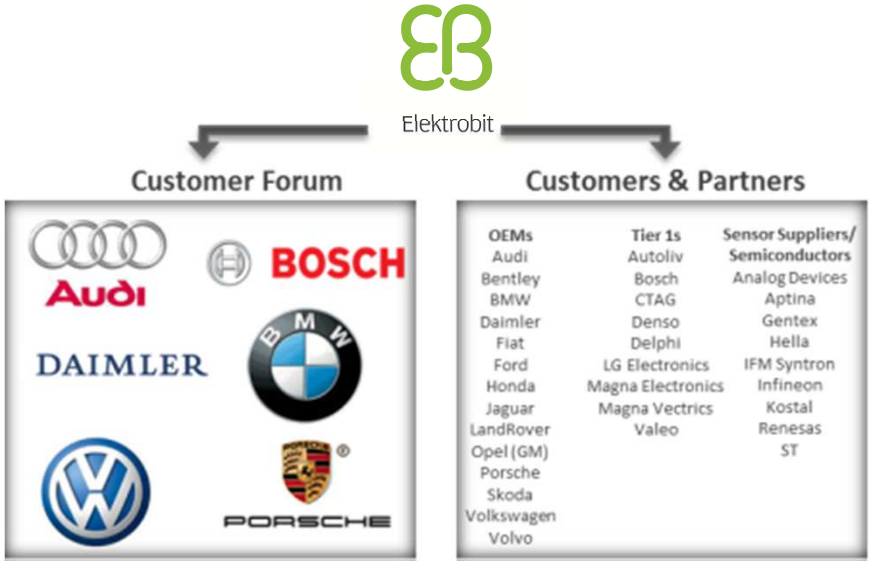
EB Assist products, solutions and engineering services support carmakers in delivering intelligent, safe and comfortable driving vehicles

EB Assist - Driver Assistance products and solutions

EB Assist ADTF – Automotive data and time-triggered framework

EB Assist ADTF

- is the most used development and test environment worldwide for advanced driver assistance systems (ADAS)
- is used in development and series projects
- is used by leading carmakers and suppliers that continue to invest in feature development



EB Assist ADTF covers various use cases and is already utilized for different applications i.e. measurement, sensor evaluation and software validation

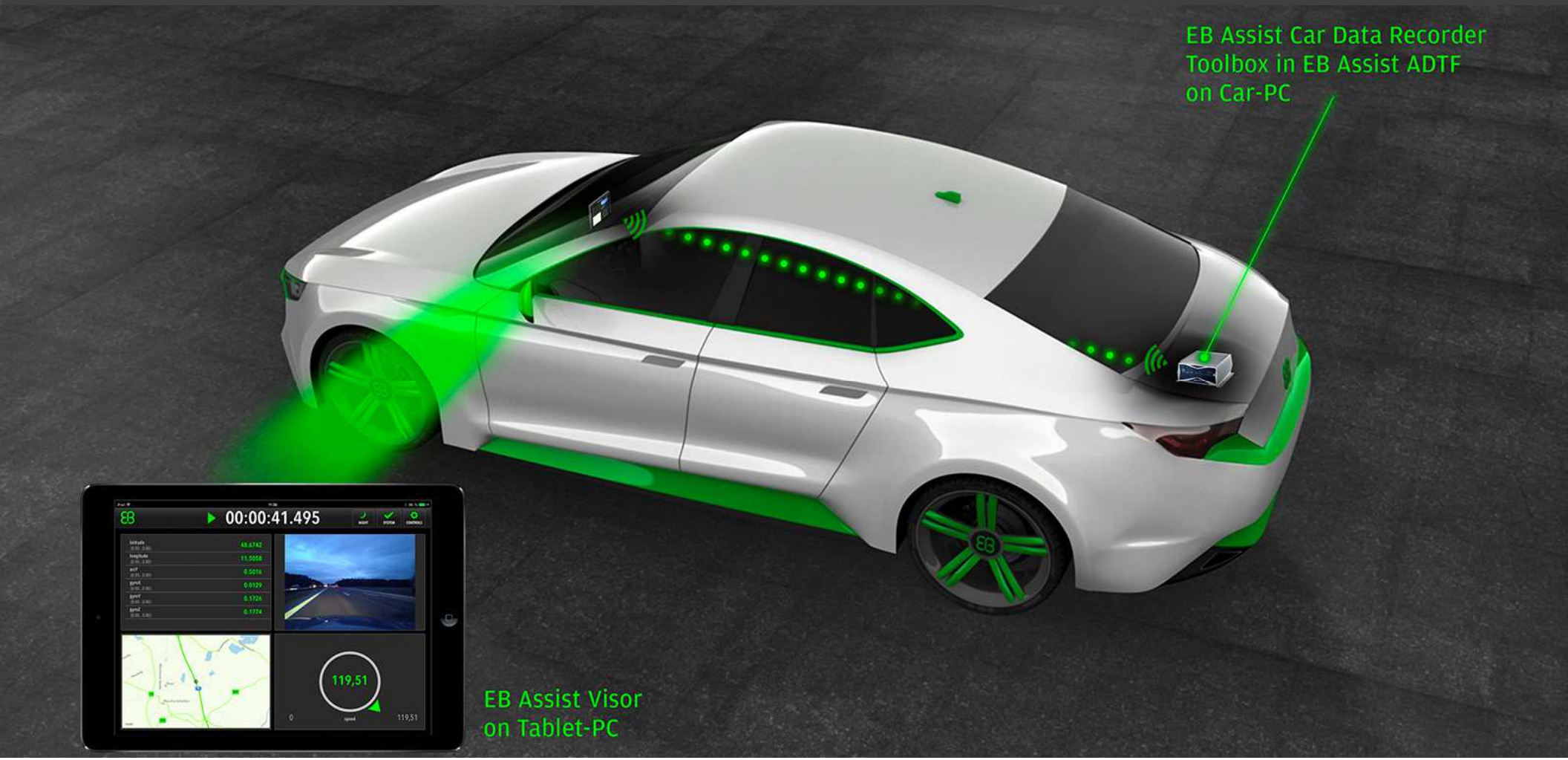
Applications range from comfort features to safety systems including e. g.:

- Lane Change Assistance
- Adaptive Cruise Control
- Collision Mitigation
- Adaptive Light Control
- Lane Departure Warning
- Blind Spot Detection
- Traffic Sign Recognition
- Driver Drowsiness Detection
- Night Vision
- Pedestrian Recognition

EB Assist ADTF – Scope

EB Assist ADTF – a flexible framework that

- is extensible to customer needs
  - already compatible with several sensor technologies
  - software / programming « your filters »
- provides 3 types of displays
  - Scope, 2D, 3D Scene
- supports whole lifecycle
- record & playback multiple data
- streams, e.g. video, CAN, Ethernet
- visualization & debug



EB Assist Car Data Recorder (CDR)

Measurement technology for simplified and efficient test drive recordings

Test environment: EB Assist ADTF in test cars

Many "home-brew", special tailored, incompatible solutions exist

Typical recording setup

- Notebook mounted on passenger side
- Cables to interface to car busses and sensors
- Driver or passenger controls EB Assist ADTF via touchpad or mouse

↘ Bad usability in a moving car (small Windows UI elements + touchpad)
↘ Not all information is visible or is simply too small
↘ Controlling the recording process is hideous
↘ Lots of cables in the car front
↘ Not presentable to customers or management

EB Assist Car Data Recorder (CDR)

EB Assist Car Data Recorder – benefits at a glance

Usability

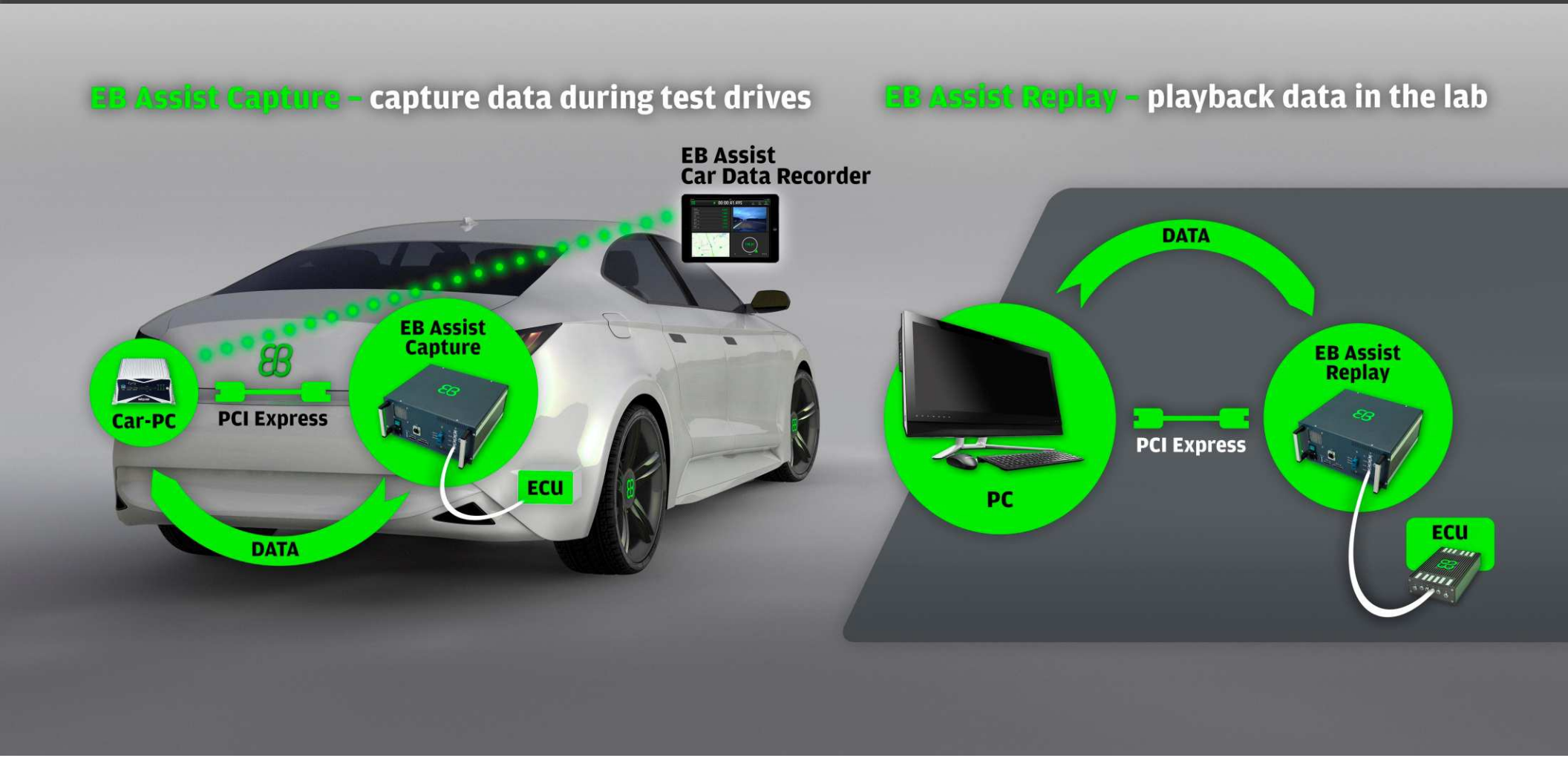
- Intuitive and easy control
- Clear visualization of signals
- Immediate feedback during test drive
- Low distraction during test drive
- Tidy hardware setup in the car
- Standardized hardware and easy installation

Standardization

- High reliability and flexibility
- Easy data exchange due to ADTF format
- Reuse of existing configurations, modules and filters
- Good availability and low costs of hardware
- Well-known handling

Extensibility and flexibility

- Setup can be easily extended by the customer
- Different stages of expansion available
- Easy adaption to different use-cases and test scenarios



EB Assist Capture and EB Assist Replay

Embedded modular system to capture and replay sensor data highly time synchronized and precisely

EB Assist Capture & EB Assist Replay

Dedicated hardware

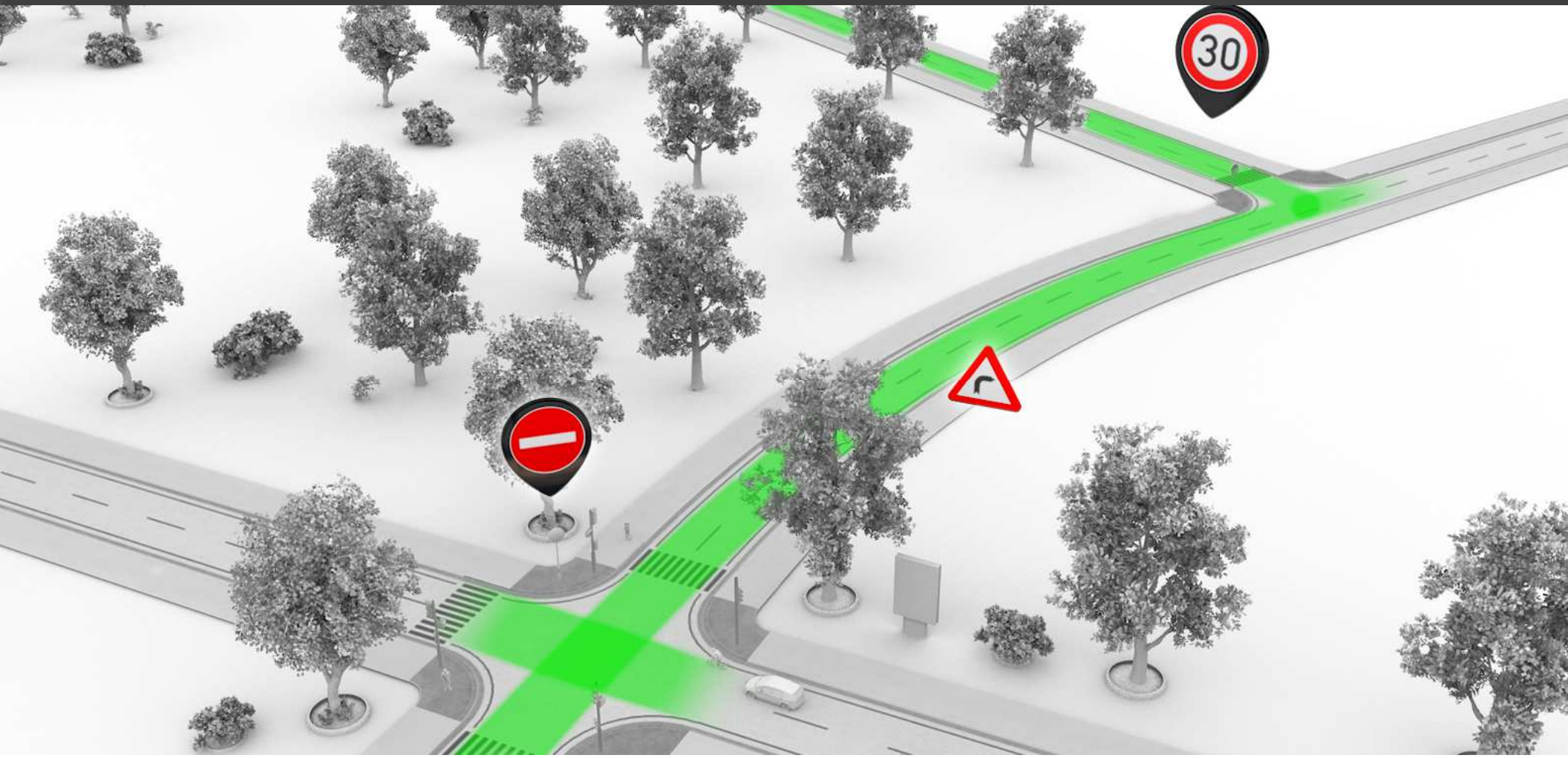
- Flexible I/O configuration using adapter boards, Video, CAN, FlexRay, LIN, Ethernet, GPS
- Precision timestamping @ 25 ns resolution
- Precise synchronization with one clock
- High transfer rate
- Automotive power supply
- Ready to use with easy access to connectors

ADTF filters and configuration for recording and replaying

Our high precision, modular built capturing and replaying hardware is prepared working in collaboration with EB Assist ADTF

EB Assist Capture and EB Assist Replay provide

- high synchronous capturing and replaying of up to 4 HD video streams
- capturing and replaying of CAN and FlexRay vehicle bus data
- identical time base used to synchronize multiple sensor data & to ensure synchronous time controlled data transmission
- time stamp resolution – 25 ns
- linking multiple sensors with a single interface to a PC (PCI Express)
- ready to use application with EB Assist ADTF development environment
- time stamp and replay accuracy < 1µs
- a synchronization interface
- modular interface architecture



EB Assist ADASISv2 Electronic Horizon Solution

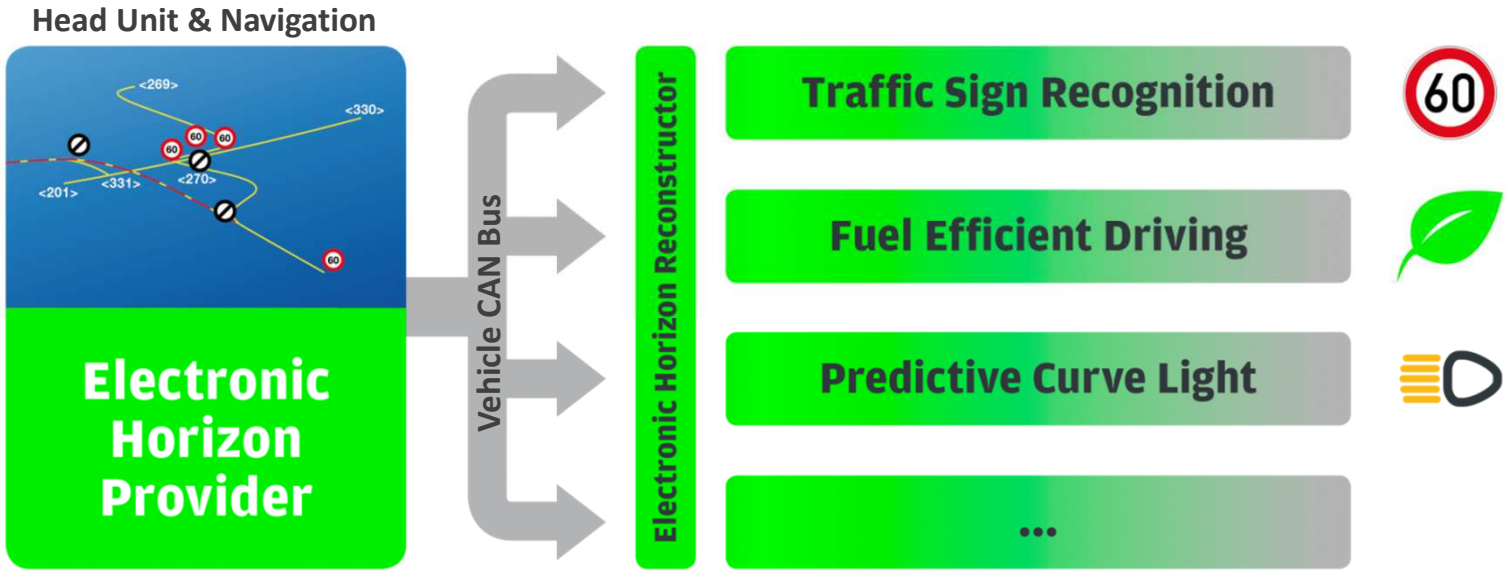
EB Assist development tools and software modules for predictive driving

Electronic horizon

Map information transmitted over the vehicle CAN bus is commonly called “electronic horizon” .
The electronic horizon makes topographic and ADAS data available for predictive driver assistance features like, e.g.,

- Curve Speed Warning
- Predictive Curve Light
- Traffic Sign Recognition

Electronic horizon based ADAS

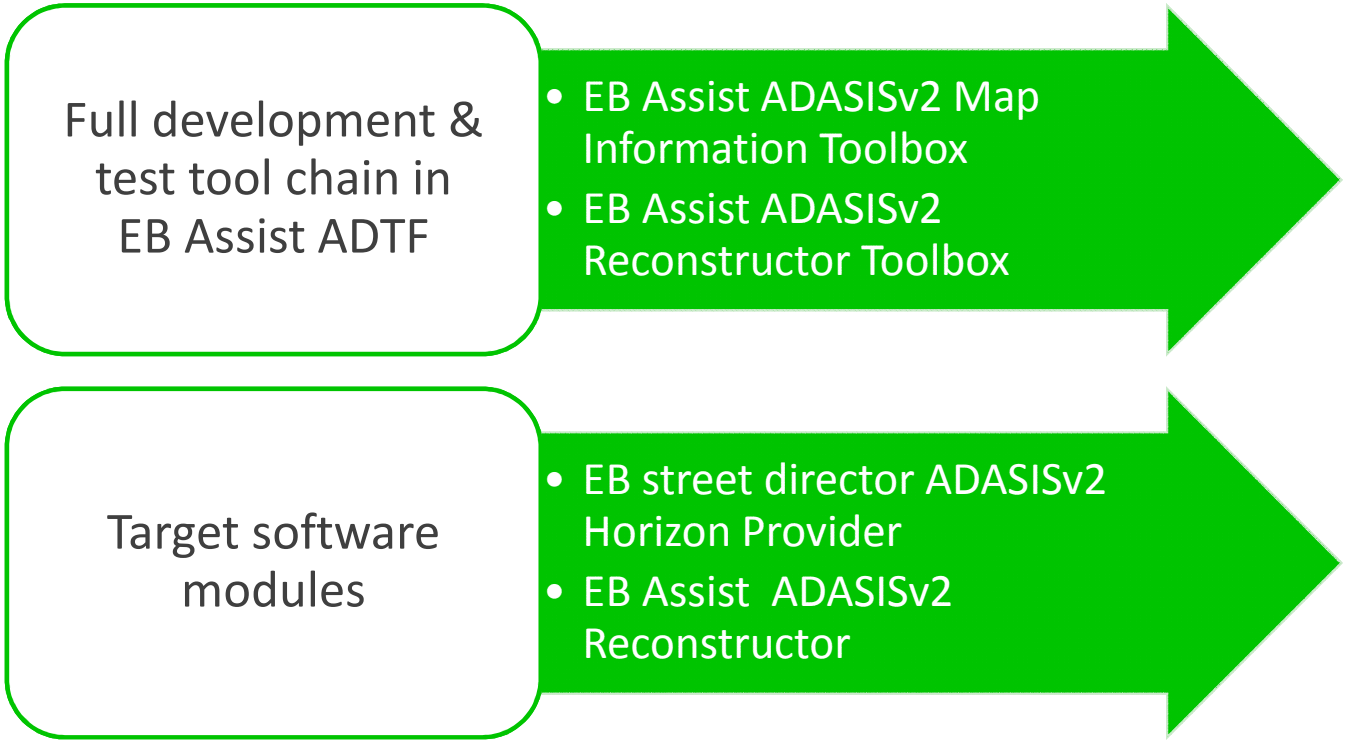


Electronic Horizon provides “roadway ahead” including data such as:

- Route and position, lanes
- Speed limits
- Geometry and curvature
- Street type (crossroad, motorway, …)
- Most probable path

Map attributes are used as a “sensor” and available for several ECU

EB Assist ADASISv2 Electronic Horizon Solution - Overview

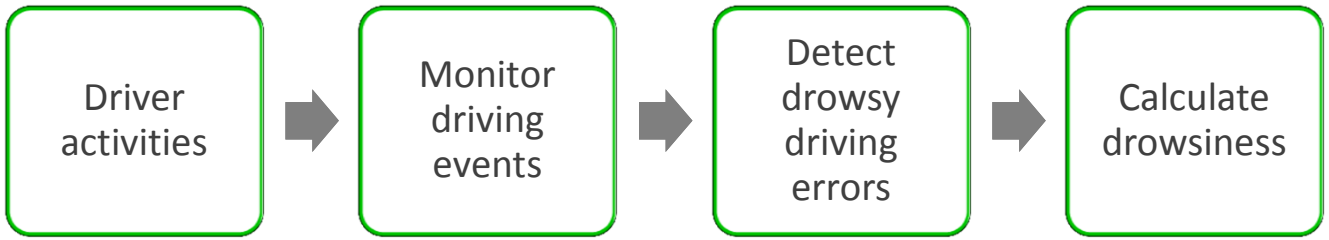


ADAS development from concept to product

EB Assist Drowsiness Detection

Stay alert with EB Assist Drowsiness Detection

Steering based drowsiness detection



Compute an individual steering profile of the driver

Compare the current driver's profile with real- time sensor data

Detect the driver's transition from a state of alertness to a state of tiredness

Trigger an OEM-specific warning channel in line with the cars HMI concept

Steering based drowsiness detection

Primary signals

- Steering wheel angle
- Vehicle speed
- Yaw rate

Secondary signals

- Time of day
- Vehicle state (ESP, DTR, ABS, etc.)
- Vehicle data
- Vehicle controls
- …

Driver guidance ability

Environment

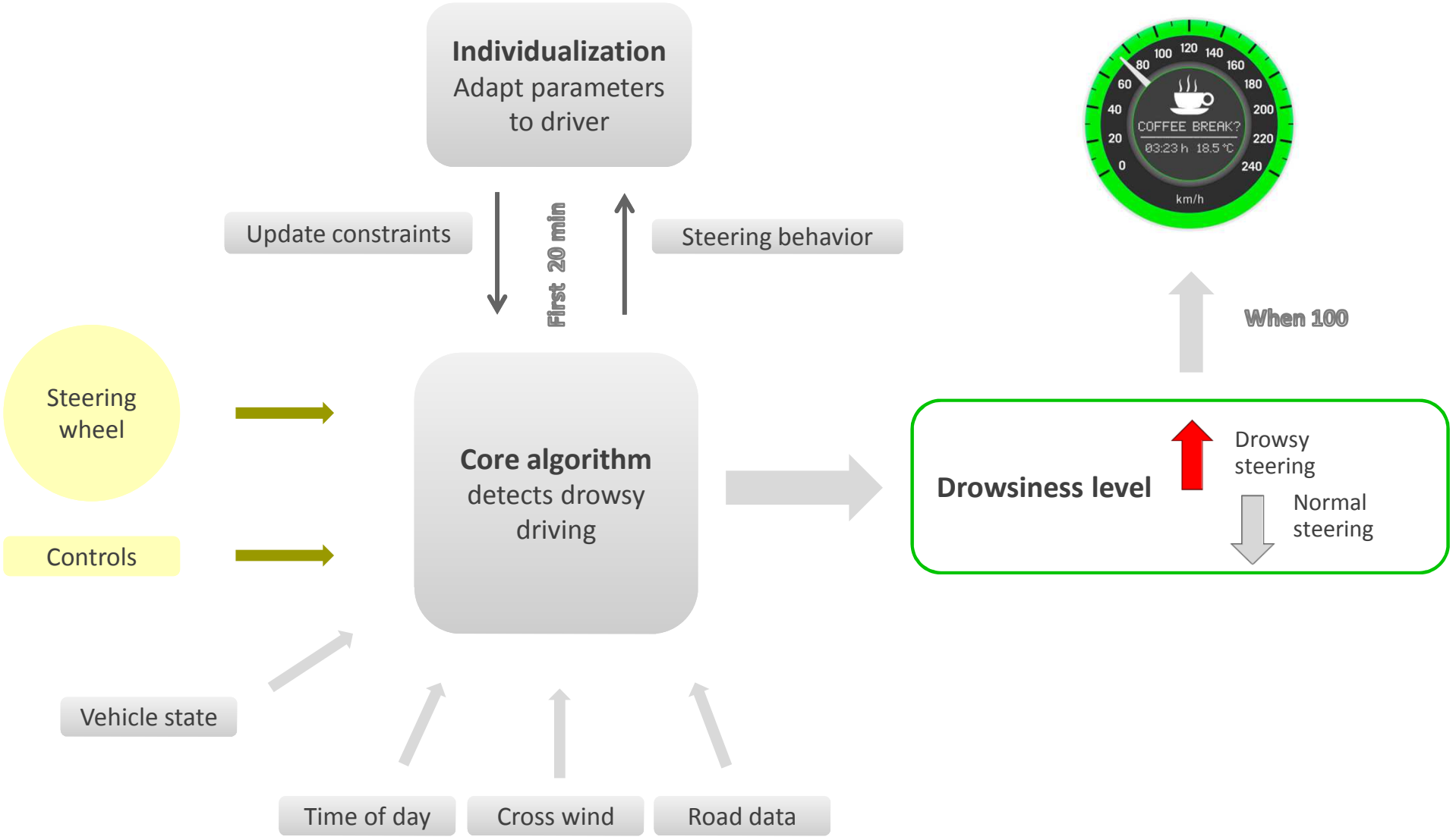
Travel time

Drowsiness Detection

OEM-specific warning

- Warning on/off
- Drowsiness given in 5 steps from 0 to 100
- System active/inactive
- Diagnostic data
- Error memory data

Steering based drowsiness detection



EB Assist Traffic Sign Assistant

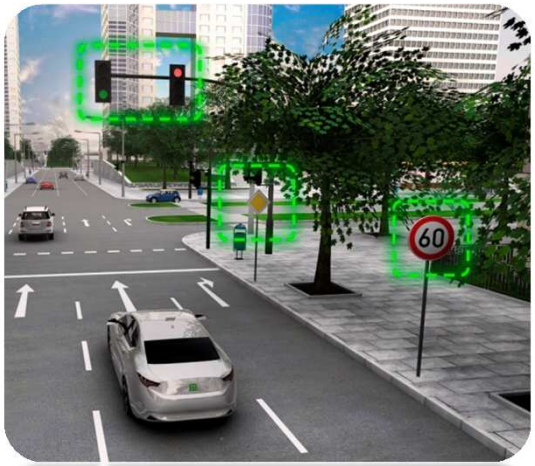
Permanent valid speed limit and road sign information

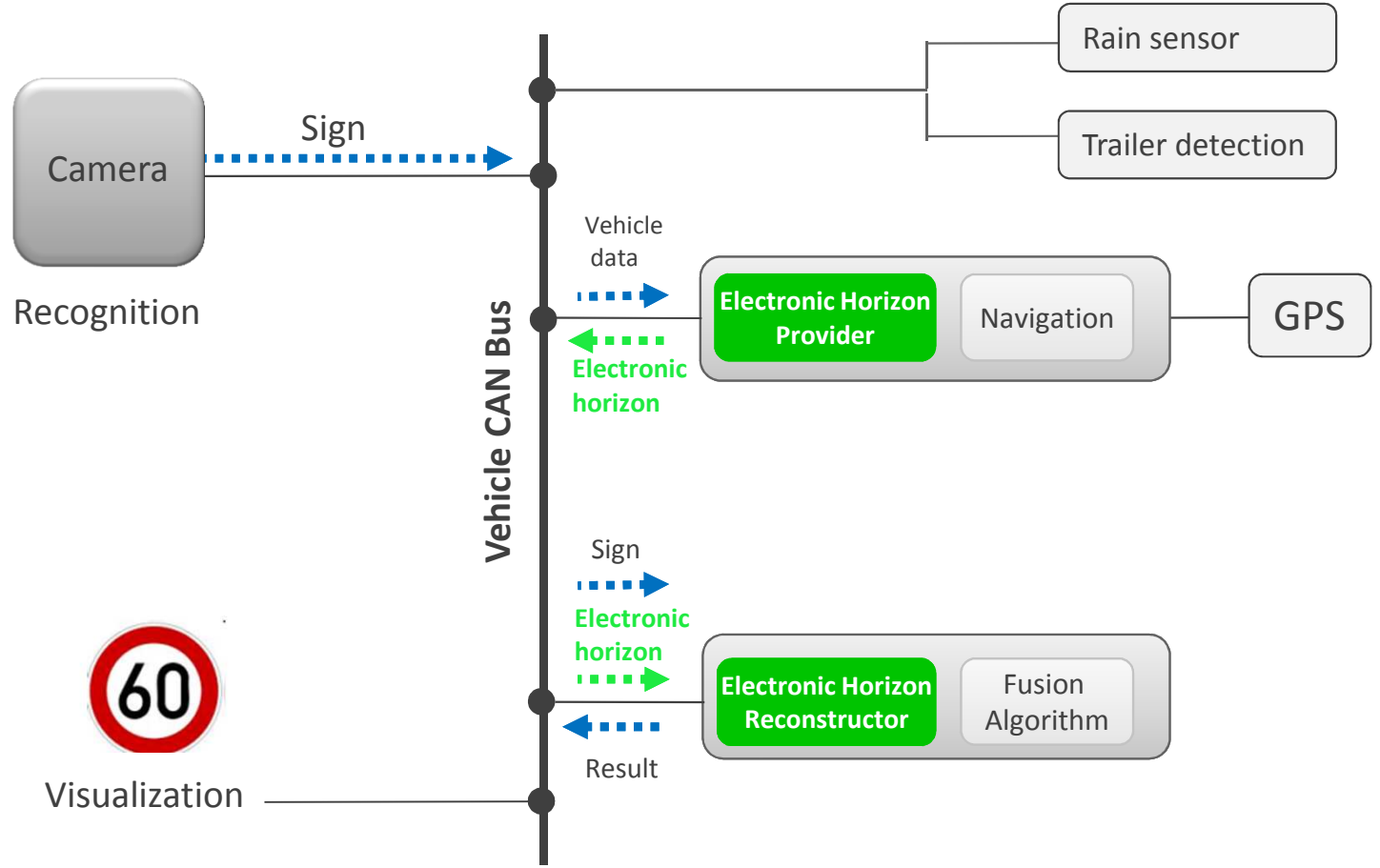
EB Assist Traffic Sign Assistant provides valid traffic sign information by merging data from different sources in an optimized and reliable way

EB Assist Traffic Sign Assistant (TSA)

- Supports speed limit signs and supplementary signs by a front camera
- Check plausibility of camera detected sign with additional information
  - from navigation system
  - from other vehicle sensors
  - a set of rules
- Covers a huge range of urban and non-urban driving situations e. g. covered, polluted or mistakable traffic signs
- Registers special driving situations e.g. tollgates or services
- Platform specific parameter set for configuration
- Triggers a carmaker's specific (speed) warning
- Covers country differences
- Processes over 100 input signals

Traffic Sign Assistant – Architecture overview





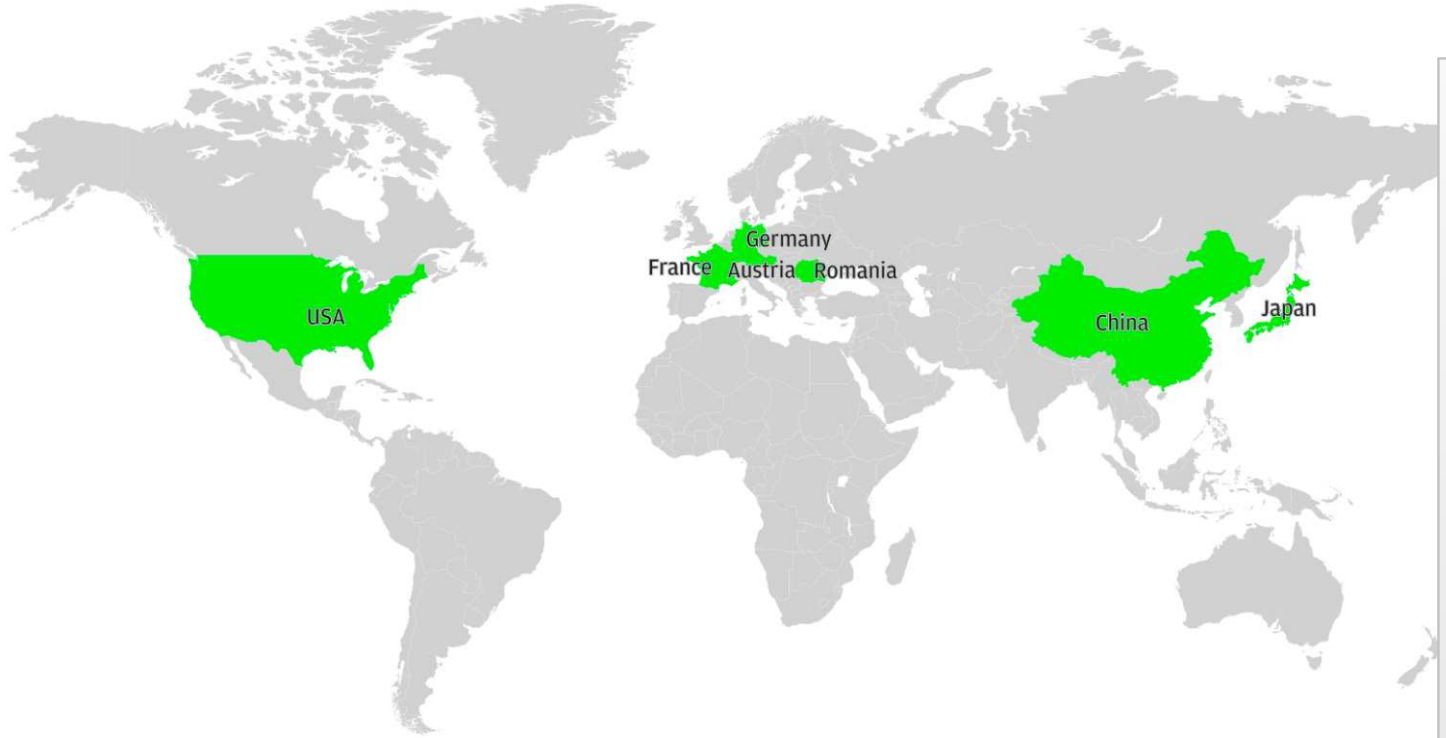
EB Assist Traffic Sign Assistant provides valid and reliable traffic information and enables car makers to achieve competitive edge

	Stand-alone solution	Traffic Sign Assistant
Entering a city: city starting signs	–	
Narrow curves or turns: camera cant recognize signs	–	
Placement of multiple signs at crossings of highway exits/crossings	–	
Failures of traffic sign recognition (false positives, wrong detection)	–	
Speed limits depending on weather conditions (e.g. rain, fog, snow)	–	
Speed limits depending on vehicle conditions (e.g. trailer)	–	

Engineering services

Passion for driver assistance software

Qualified and scalable teams for professional driver assistance projects



Engineering services for

- Basic algorithm development
- Test & validation
- Integration & maintaining

Consulting & Training

- Software architecture
- Performances issues

Support

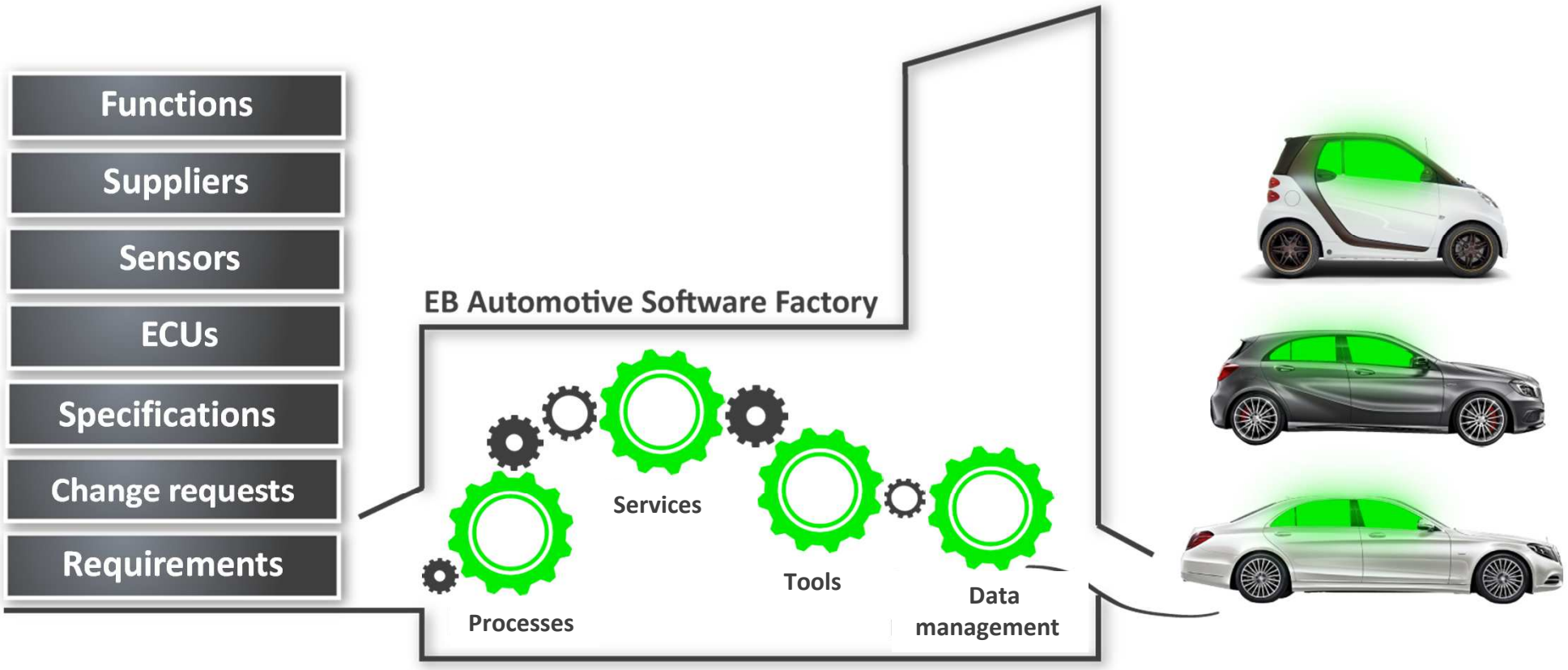
- Customer support for EB Assist products
- Hotline and Helpdesk

Driver Assistance engineering covers

- Requirement management
- Change management
- Configuration management
- Test management
- Safety management
- Quality management
- Project management
- Implementation, integration and testing

Best Telematics Safety & Security Award for Driver Assistance Software Solutions

EB Automotive provides and runs a Software Factory



Driver assistance software implementation – From smart to S-Class

“Since 2010 we have delivered more than 230 version releases with 75 series approvals with EB – and all these releases have been on time. Thanks to EB’s expertise in developing automotive-grade software for driver assistance, we are able to deliver vehicles with a maximum of safety, quality and performance”.

(Joachim Missel, Senior Manager Camera-Systems and Parking-Assistance Mercedes-Benz Cars, Daimler)

The company

Daimler is one of the world’s most successful car manufacturers and leading producers of premium cars. They are an innovation leader in the field of Advanced Driver Assistance Systems and Autonomous Driving.

The solution

In 2010 EB took on the development environment for a smooth transition. Three phases guaranteed the seamless, flowing acquisition of software development and integration by EB Automotive.

The phases were observing and learning, acceptance of responsibility and takeover of some functions as pilot projects and the complete takeover of responsibility for integration during the active phase of operation. Due to iterative, continuous optimizations, e. g. ‘continuous integration’, EB Automotive provided innovation and variant handling, including complexity management, by using the "EB Automotive Software Factory", a concept for automated software engineering. This concept ensures efficiency in terms of time, costs and quality.

The challenge

To keep innovation leadership Daimler looked for a software partner to build a strategic alliance with the best expertise in software development from the first software concept to lifetime care . The partner was expected to take over functions and implementation models, software implementation, module tests and integration tests. One of the most challenging tasks was to smoothly integrate the new development partner by keeping functionalities, timelines and quality at the same time.

The benefit

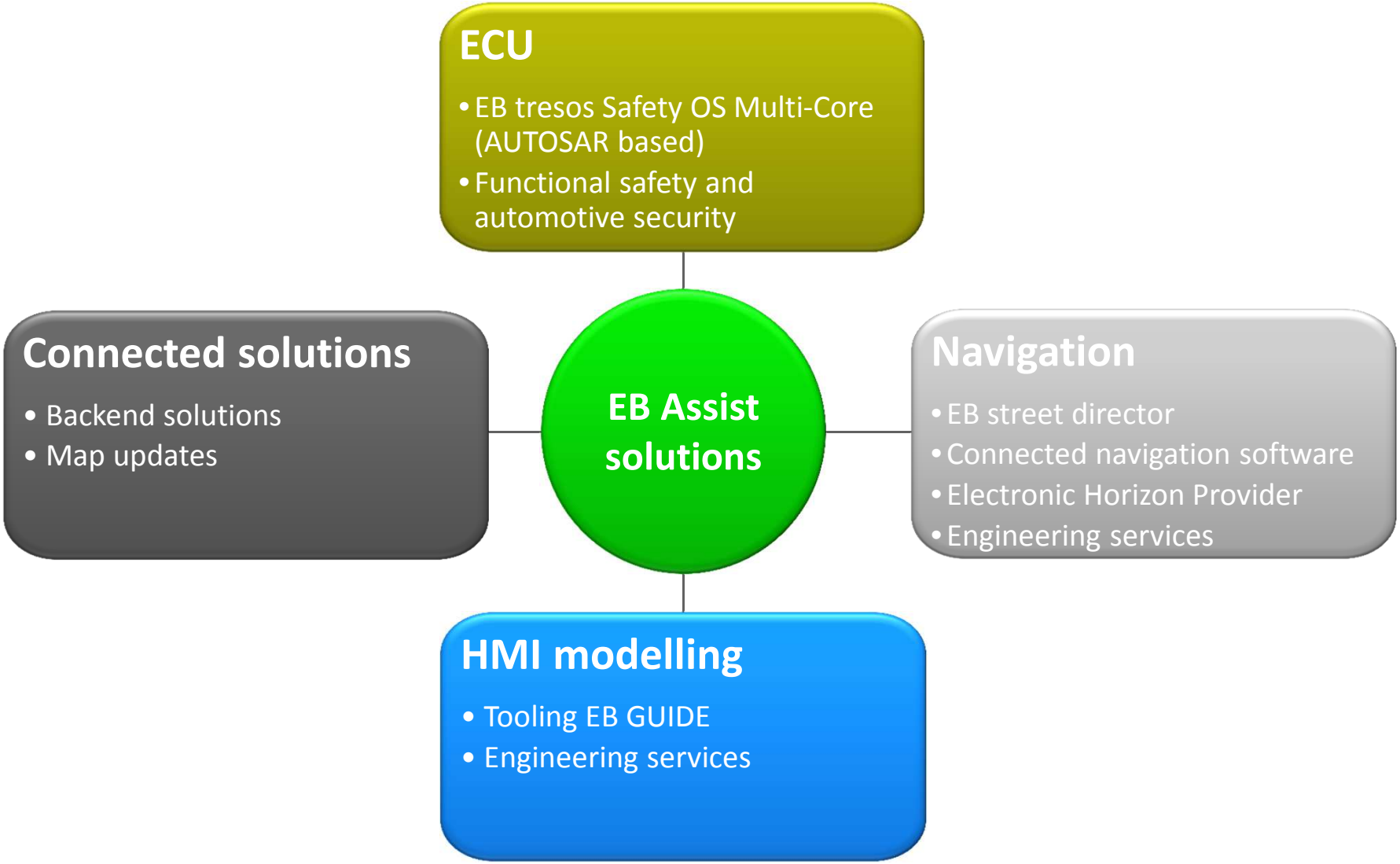
More than 230 version releases with 75 series approvals were delivered on schedule since 2010 to 2013.

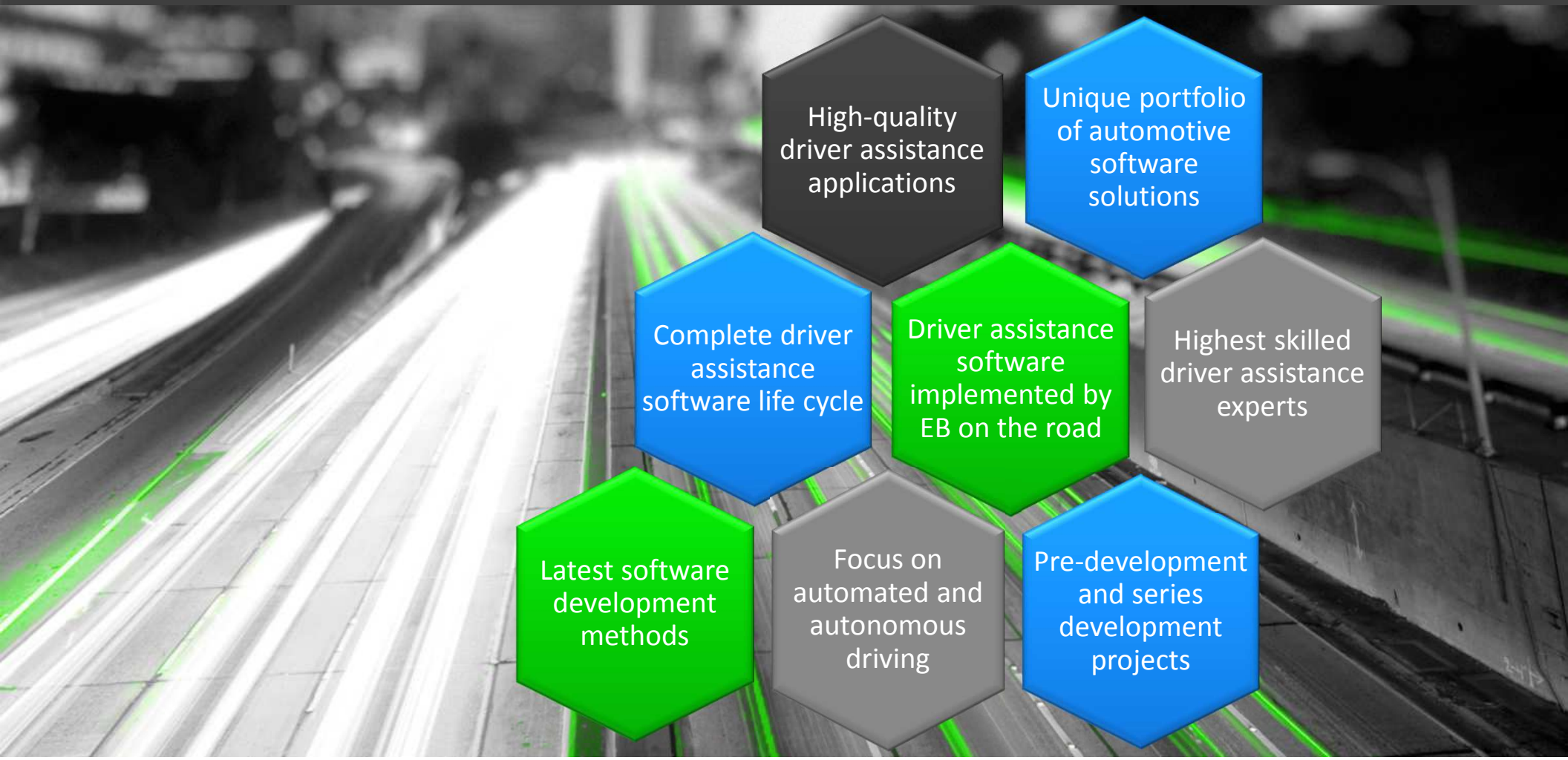
Daimler and EB benefit from the win-win situation of ISO 26262 (functional safety). Experts from both houses have worked very closely since 2010.

Thanks to this valuable partnership, Daimler is able to concentrate on driver assistance algorithm development and self-driving vehicles.

Passing progressively more tasks and responsibilities to Elektrobit will support Daimler in focusing on their core competence: building innovative cars.

EB offers a broad automotive software portfolio, helping carmakers to sell technology driven cars





Why choose EB?

Contact us!

Elektrobit

www.automotive.elektrobit.com
damian.barnett@elektrobit.com