



Aspects of security in data logging

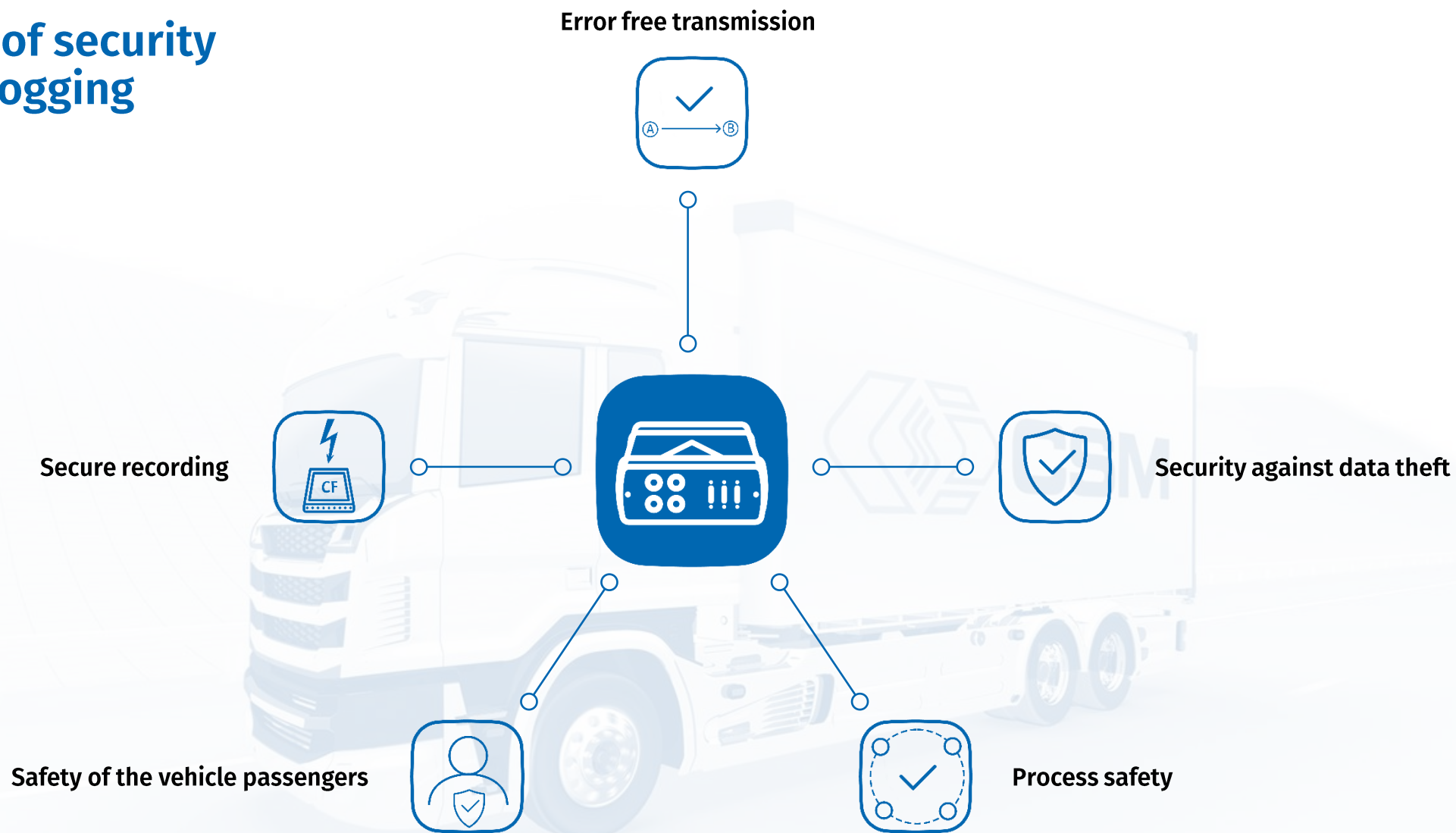
CSM web seminars

CSM **Xplained**
measurement technology



Innovative Measurement and Data Technology

Aspects of security in data logging





Safety of the vehicle passengers



Requirement

The data logger must not negatively affect the safety of the vehicle passengers

Application example

- ▶ Data logger installed in the vehicle of end customers
- ▶ Analysis of the driving behavior





Safety of the vehicle passengers

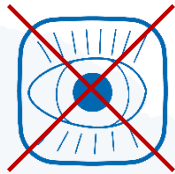


Requirement

The data logger must not negatively affect the safety of the vehicle passengers:



▶ No need for intervention by the driver



▶ No distraction of the driver



▶ No effects on driving operation

Application example

- ▶ Data logger installed in the vehicle of end customers
- ▶ Analysis of the driving behavior



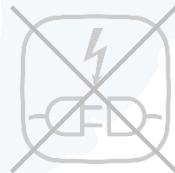
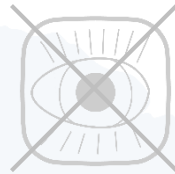


Safety of the vehicle passengers



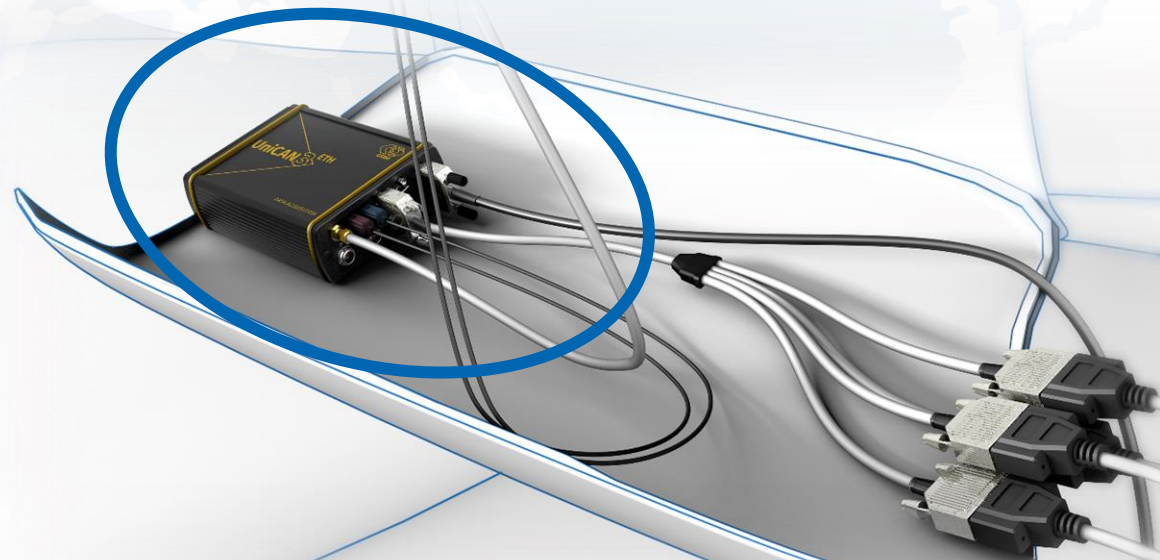
Requirement

The data logger must not negatively affect the safety of the vehicle passengers:



CSM Solution

- ▶ FPGA architecture and special operating system





Safety of the vehicle passengers

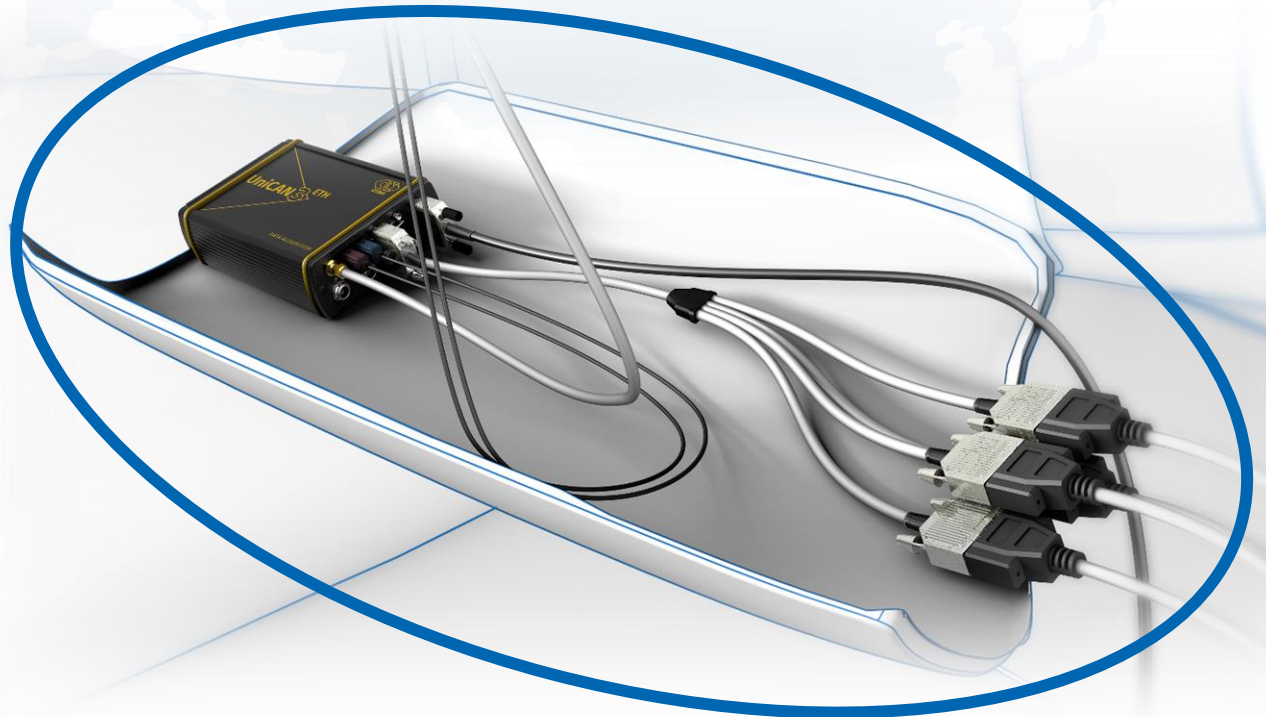
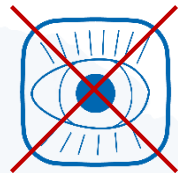


Requirement

The data logger must not negatively affect the safety of the vehicle passengers:

CSM Solution

- ▶ Easy installation in the glove compartment or under the seat
- ▶ No operation necessary for recording
- ▶ Silent operation due to passive cooling concept



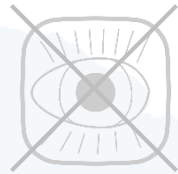


Safety of the vehicle passengers



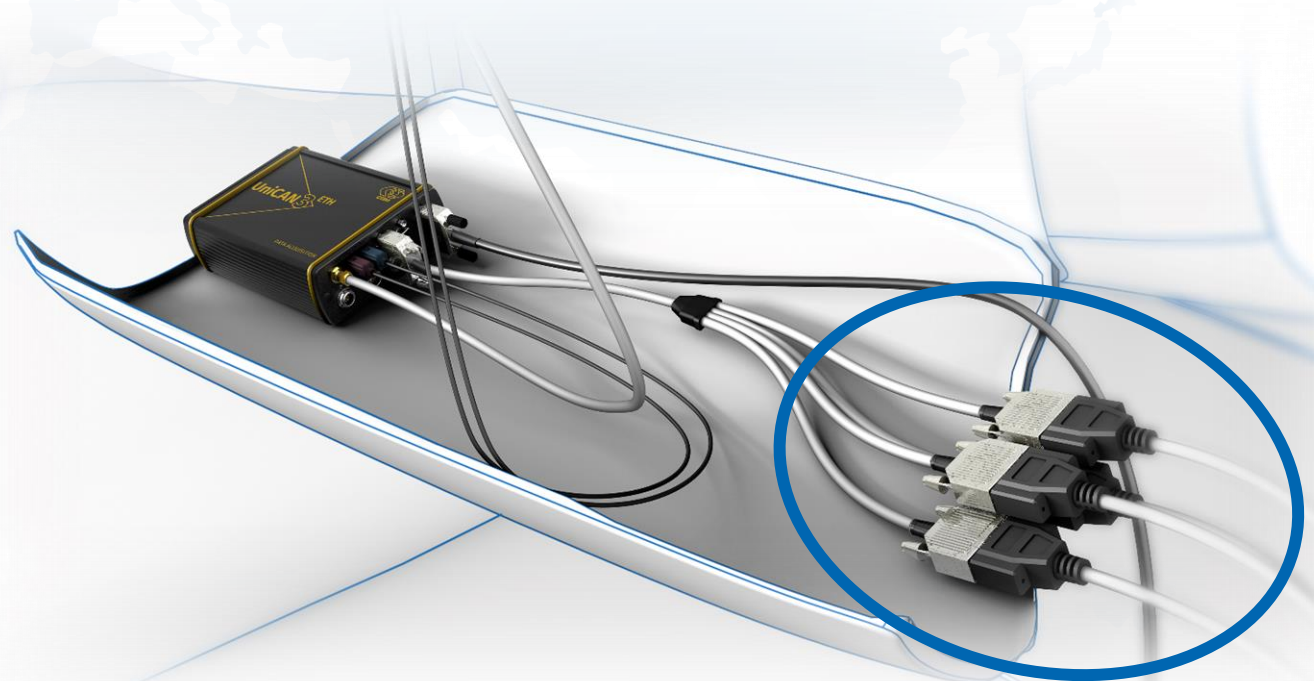
Requirement

The data logger must not negatively affect the safety of the vehicle passengers:



CSM Solution

- ▶ Listen only switchable
- ▶ Good experience with non-galvanically isolated CAN ports
- ▶ Galvanically isolated version available





Safety of the vehicle passengers



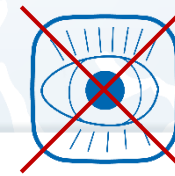
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CSM Solution

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Secure recording



Requirement

Continuously reliable recording even in the event of malfunctions and failures

Application example

- ▶ Data logger records continuously over several months
- ▶ Test electric vehicle in early stage of development
- ▶ Problems with on-board electronics
 - ▶ Control units do not reliably switch to stand-by when parked
 - ▶ Battery for on-board electronics runs down
 - ▶ Logger does not receive supply voltage
- ▶ Logger must start up again automatically and record data as soon as supply voltage is available again





Secure recording



Requirement

Continuously reliable recording even in the event of malfunctions and failures



No on-site intervention
necessary



Continue recording after
malfunction



Low data loss in case of supply
voltage failure

Secure recording



Requirement

Continuously reliable recording even in the event of malfunctions and failures



No on-site intervention
necessary

CSM Solution

- ▶ Reliable recording
- ▶ FPGA architecture and own operating system



Continue recording after
malfunction

CSM Solution

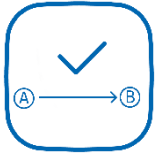
- ▶ Fast booting after power failure (< 1s)
- ▶ All tasks (recording and data transfer) are restarted according to configuration



Low data loss in case of supply
voltage failure

CSM Solution

- ▶ In the event of sudden failure of the supply voltage or removal of the memory card, only data in the FIFO is lost (max. 1s)



Error free transmission

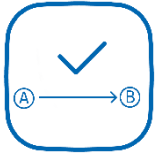
Requirements

**Complete and error-free data transfer
to the server**



Application example

- ▶ Test drives in rural areas
- ▶ Data transmission via LTE
- ▶ Network coverage poor in some places
- ▶ Breakdown of data transmission



Error free transmission

Requirements

Complete and error-free data transfer to the server



- ▶ No data loss in case of connection interruptions

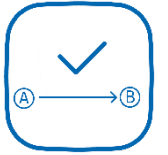


- ▶ No errors due to transmission path for uploaded measurement data



Application example

- ▶ Test drives in rural areas
- ▶ Data transmission via LTE
- ▶ Network coverage poor in some places
- ▶ Breakdown of data transmission



Error free transmission

Requirements

Complete and error-free data transfer to the server



CSM Solution

- ▶ If the connection is interrupted, the incompletely uploaded data packet is retransmitted with the next connection setup
- ▶ Only completely and error-free transmitted data packets are deleted from the memory card



CSM Solution

- ▶ As part of the transmission protocol used (FTPS / SFTP), **complete and correct transmission of each data packet is checked**
- ▶ The compact and compressed binary format ensures efficient data upload so that the memory card does not fill up as much as possible





Security against data theft

Requirement

**Sensitive data must not be readable
by third parties**

Application example

- ▶ Test drives on public roads
- ▶ Risk of vehicle theft quite high
- ▶ Sensitive logger data could be leaked to third parties





Security against data theft

Requirement

Sensitive data must not be readable by third parties



- ▶ Stored data on the logger must not be readable by third parties



- ▶ Secure remote transmission for measurement data and configuration data

Application example

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Security against data theft

Requirement

Sensitive data must not be readable by third parties



- ▶ Stored data on the logger must not be readable by third parties



- ▶ Secure remote transmission for measurement

CSM Solution

- ▶ Proprietary file format: CSM proprietary file format is not readable by third parties
- ▶ Data bases are never stored on the device
- ▶ Optional increased data security configurable: Additional encryption of data container and configuration with AES method





Security against data theft

Requirement

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CSM Solution

- ▶ Secure login and data transfer to the server: FTPS / SFTP

Process safety



Application example

- ▶ Fleet in operation worldwide
- ▶ Different versions of the pre-series
- ▶ Measurement data to be extensively evaluated and compared



Process safety

Requirement

**A high degree of process safety
provides good comparability of the measurement data**

Application example

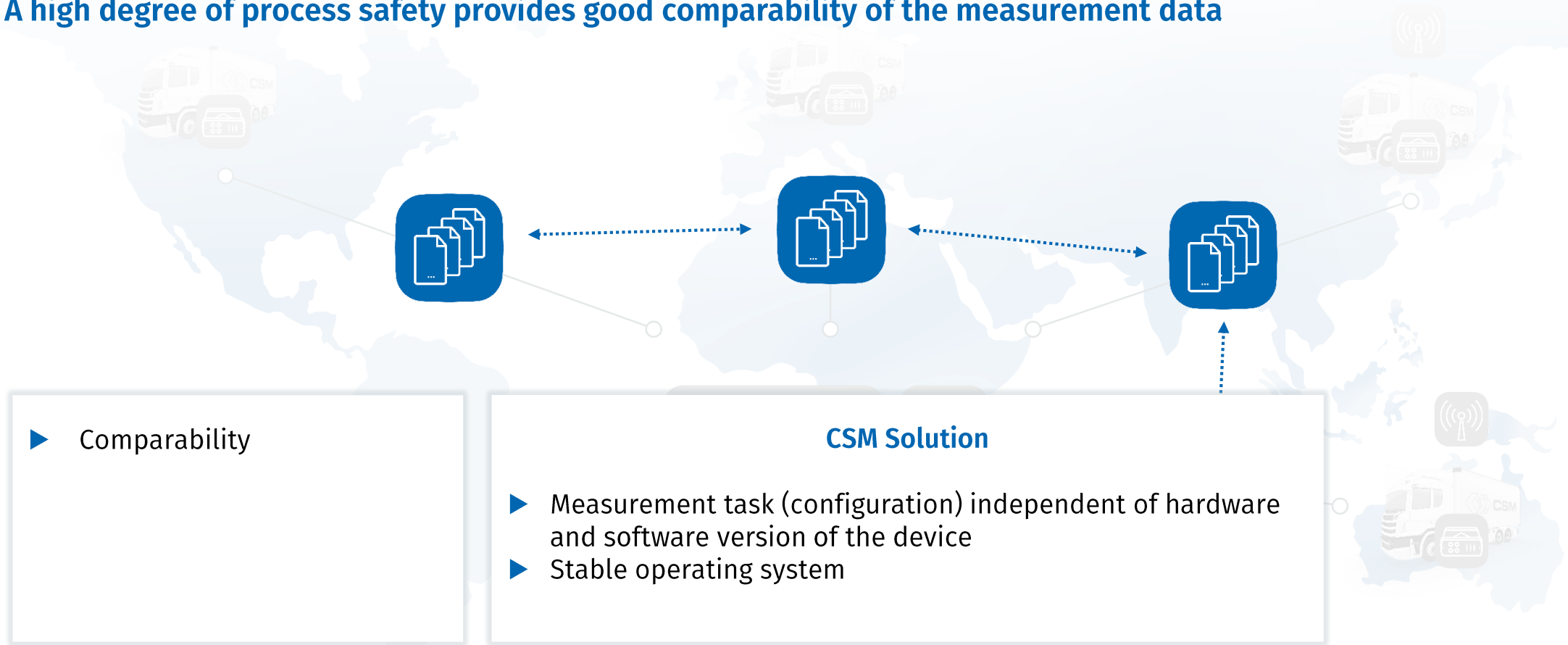
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Process safety

Requirements

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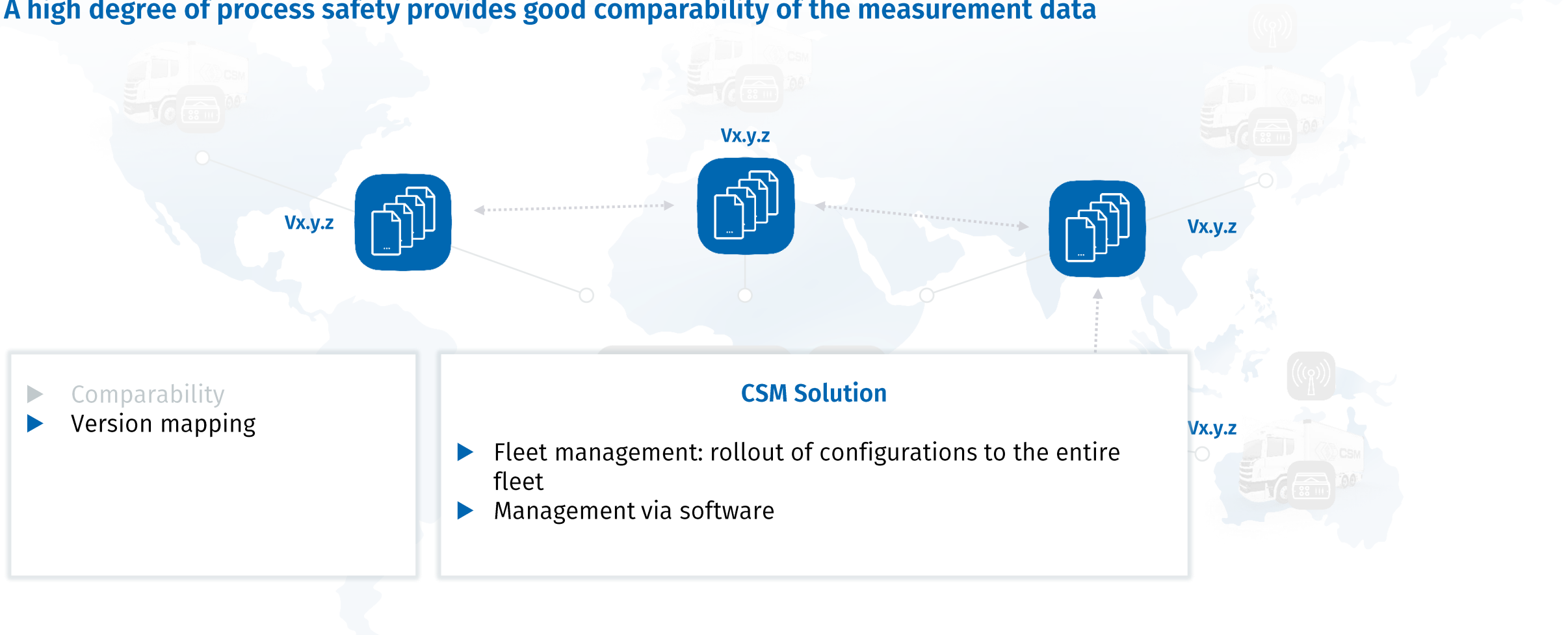




Process safety

Requirements

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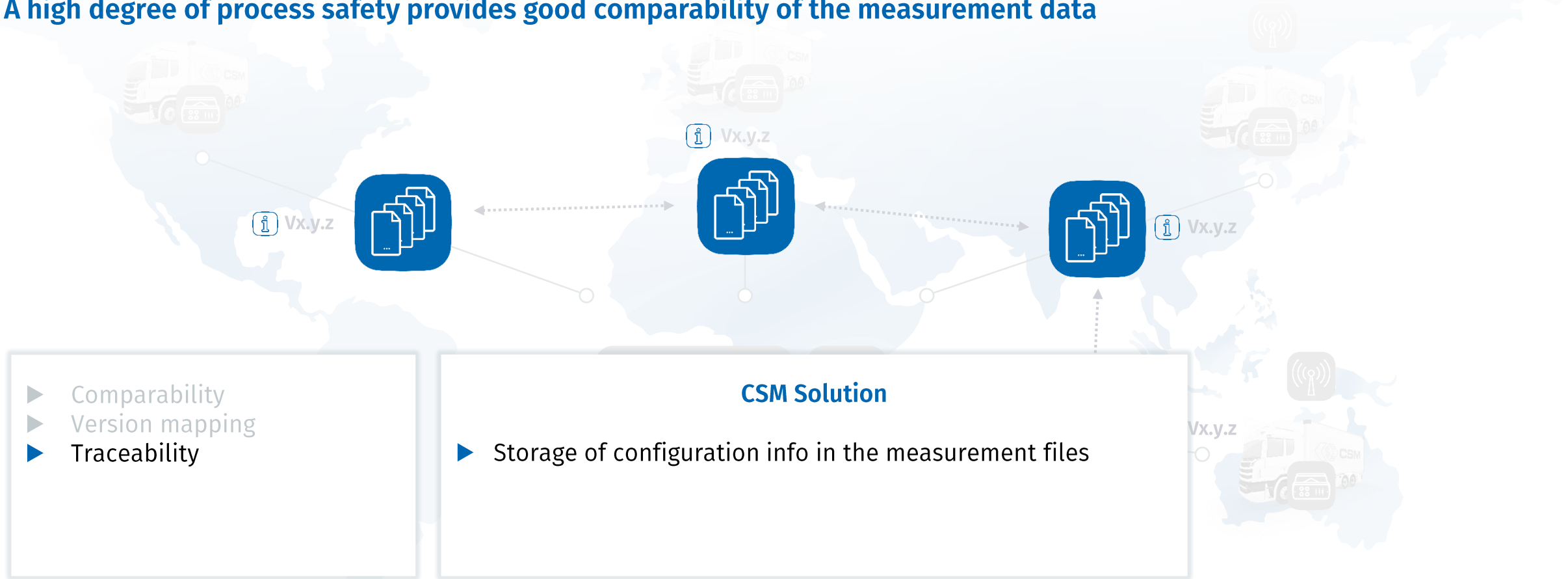




Process safety

Requirements

A high degree of process safety provides good comparability of the measurement data





Process safety

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Process safety

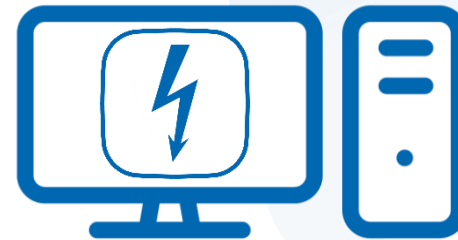
Requirements

A high degree of process safety provides good comparability of the measurement data

CSM Solution

- ▶ **CSM Support:** Competent support with short response times

- ▶ Comparability
- ▶ Version mapping
- ▶ Traceability
- ▶ Reliability
- ▶ Fast troubleshooting





Process safety

A high degree of process safety provides good comparability of the measurement data

Comparability

- ▶ Measurement task (configuration) independent of HW / SW expansion of the device. Stable operating system

Mapping of versions

- ▶ Fleet management: rollout of configurations to the entire fleet, management via software

Traceability

- ▶ Storage of configuration info in the measurement files

Reliability

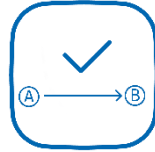
- ▶ Reliable Hardware and software of the devices

Fast troubleshooting

- ▶ CSM Support: Competent support with short response times

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Error free transmission



Security against data theft



Process safety



Secure recording



Safety of the vehicle passengers



About CSM

CSM has been setting technological standards for decentralized measurement technology in vehicle development for over 35 years. Our CAN bus and EtherCAT® measurement devices support worldwide renowned vehicle manufacturers, suppliers and service providers in their developments.

Continuous innovation and long-term satisfied customers are our guarantee for success. Together with our partner Vector Informatik, we have developed an easily scalable and powerful E-Mobility Measurement System for hybrid and electric vehicles and are constantly expanding the areas of application. With our high-voltage safe measurement systems designed for fast and synchronous measurements and power analyses, we actively accompany the change to **E-Mobility**.

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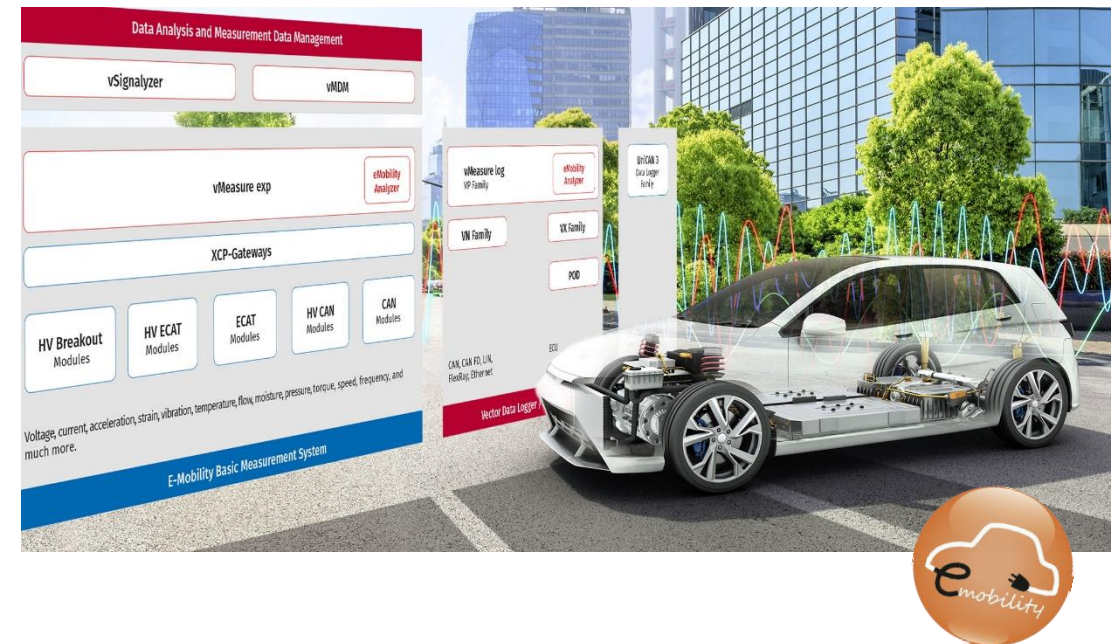
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