

# THE NEXT LEVEL OF SOFTWARE DEVELOPMENT IN COMMERCIAL VEHICLES

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# AGENDA

- 1 Commercial vehicle business & requirements
- 2 EE development - current status
- 3 The next level of software development
- 4 Summary – key take ways

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# COMMERCIAL VEHICLE BUSINESS – MORE A MACHINE LIKE A VEHICLE

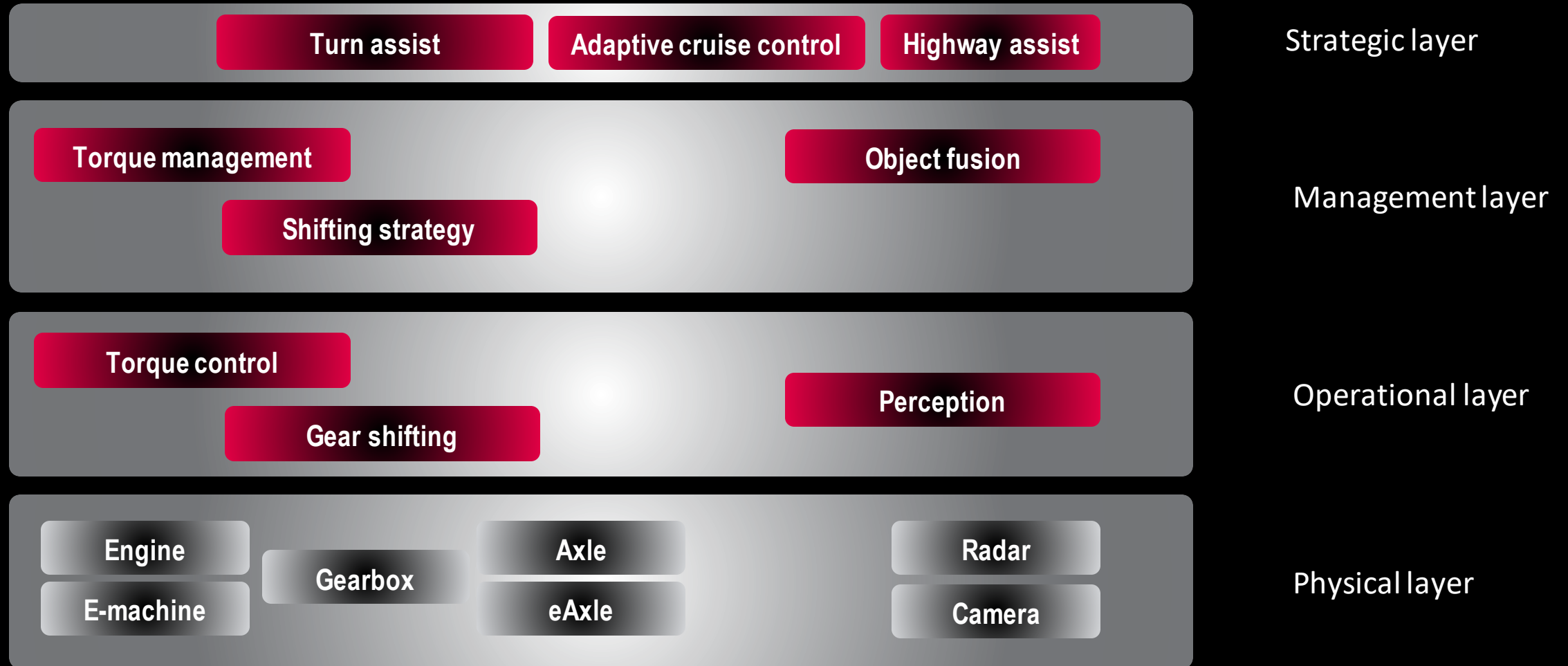


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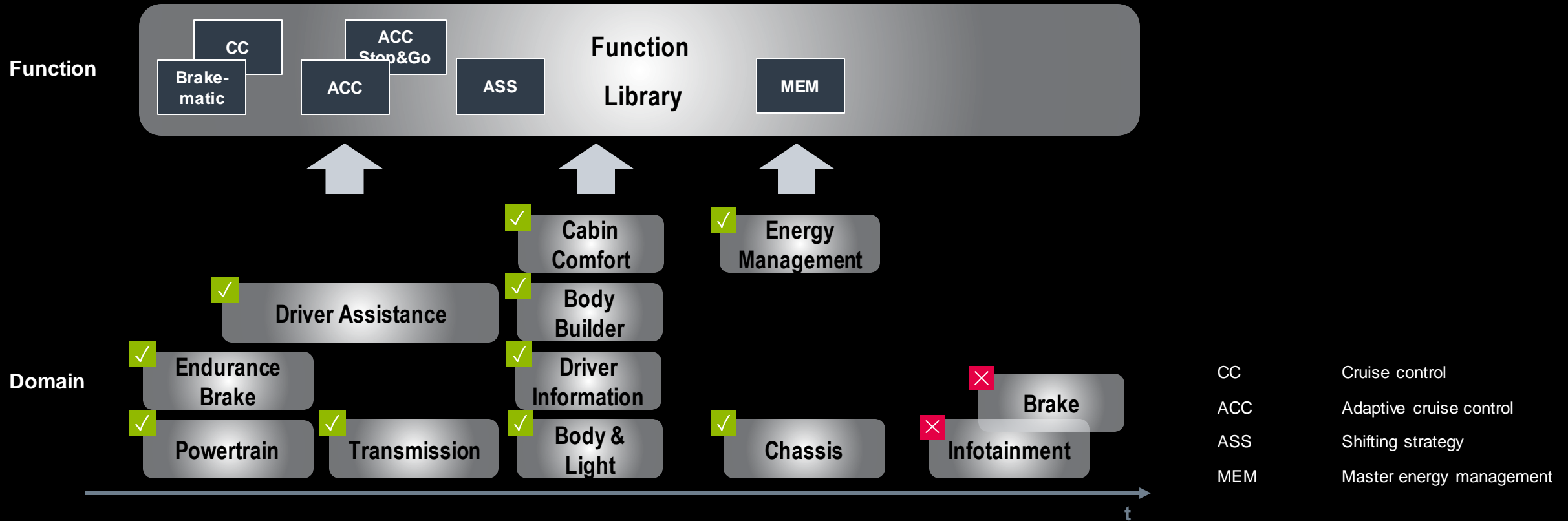
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# CURRENT STATUS - FUNCTIONAL ARCHITECTURE

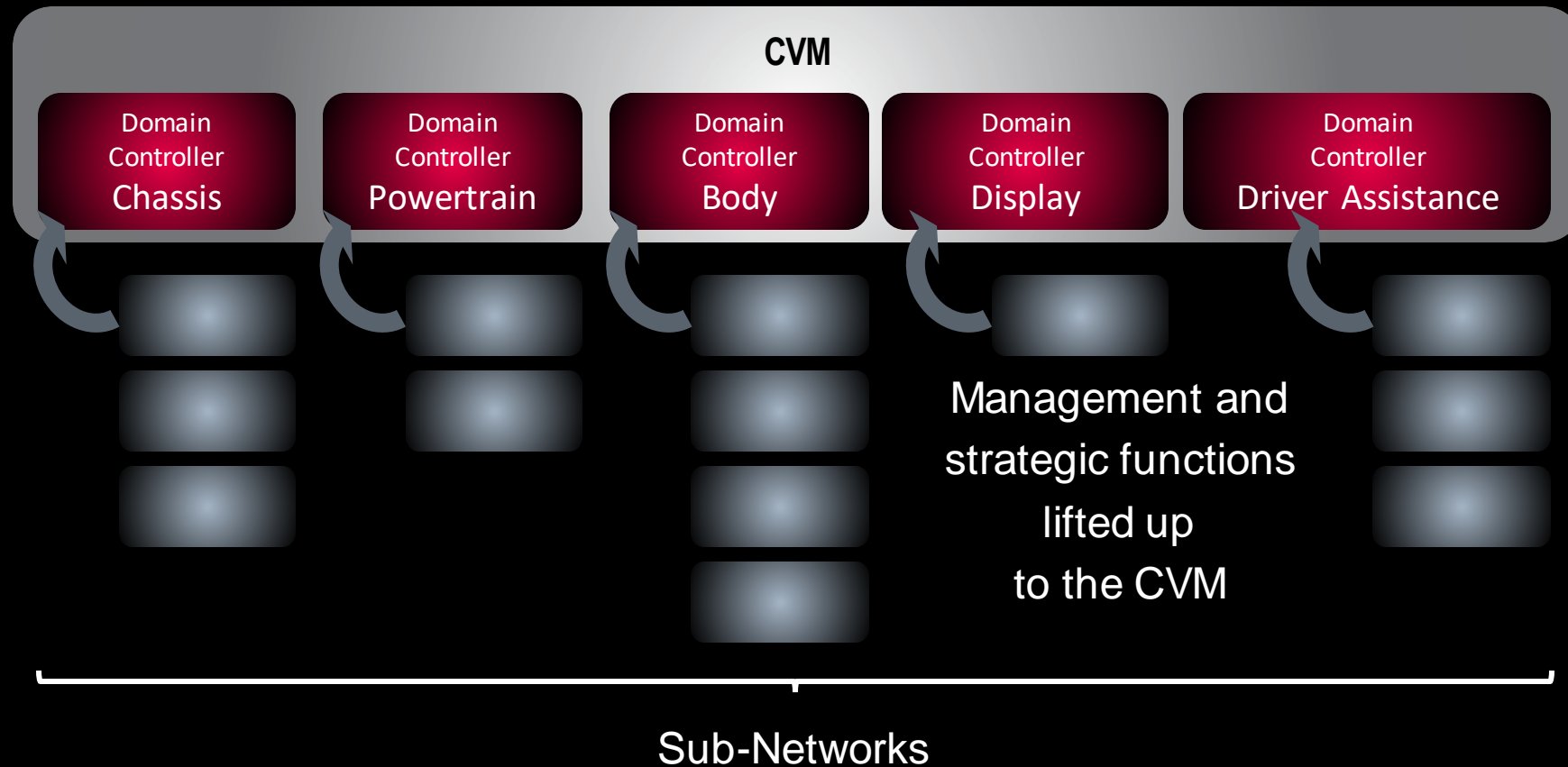


# FUNCTIONAL DEVELOPMENT STRATEGY I



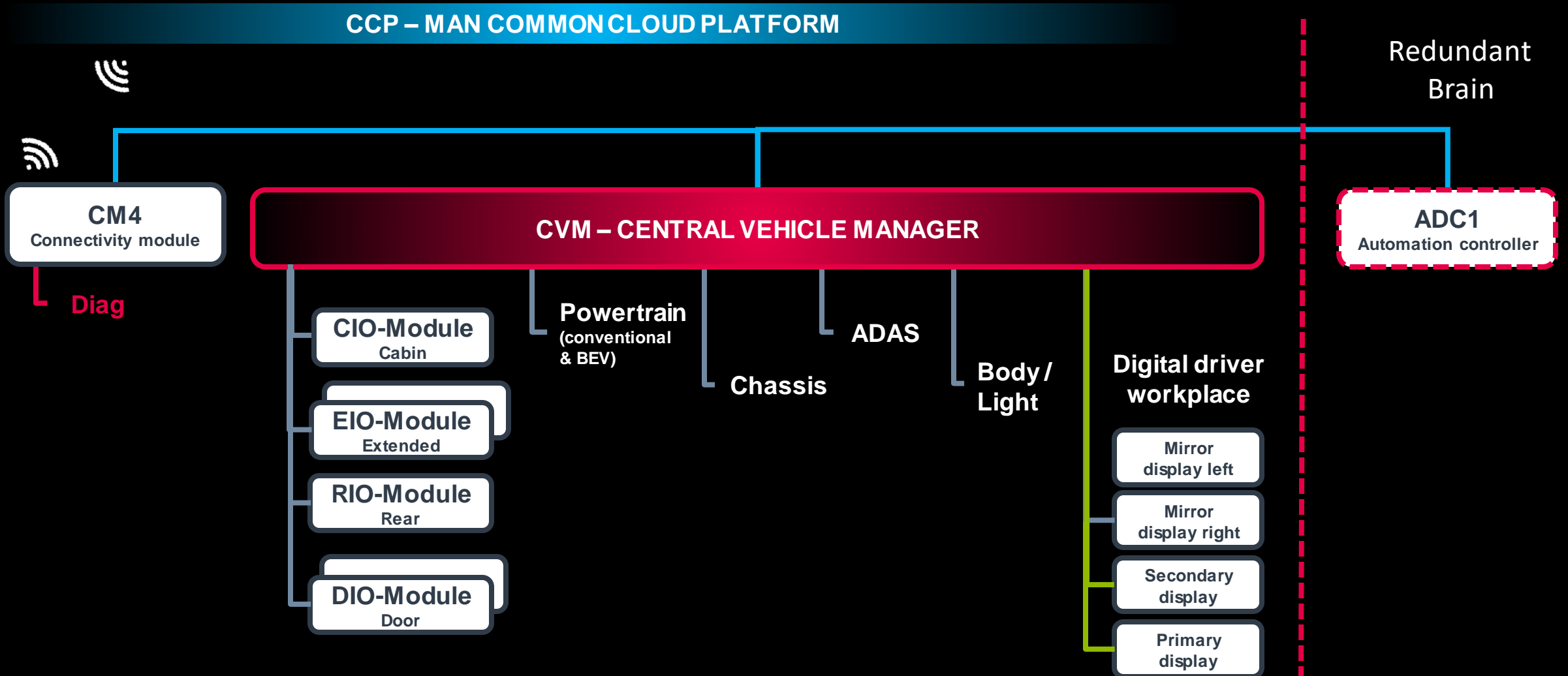


# FUNCTIONAL DEVELOPMENT STRATEGY II

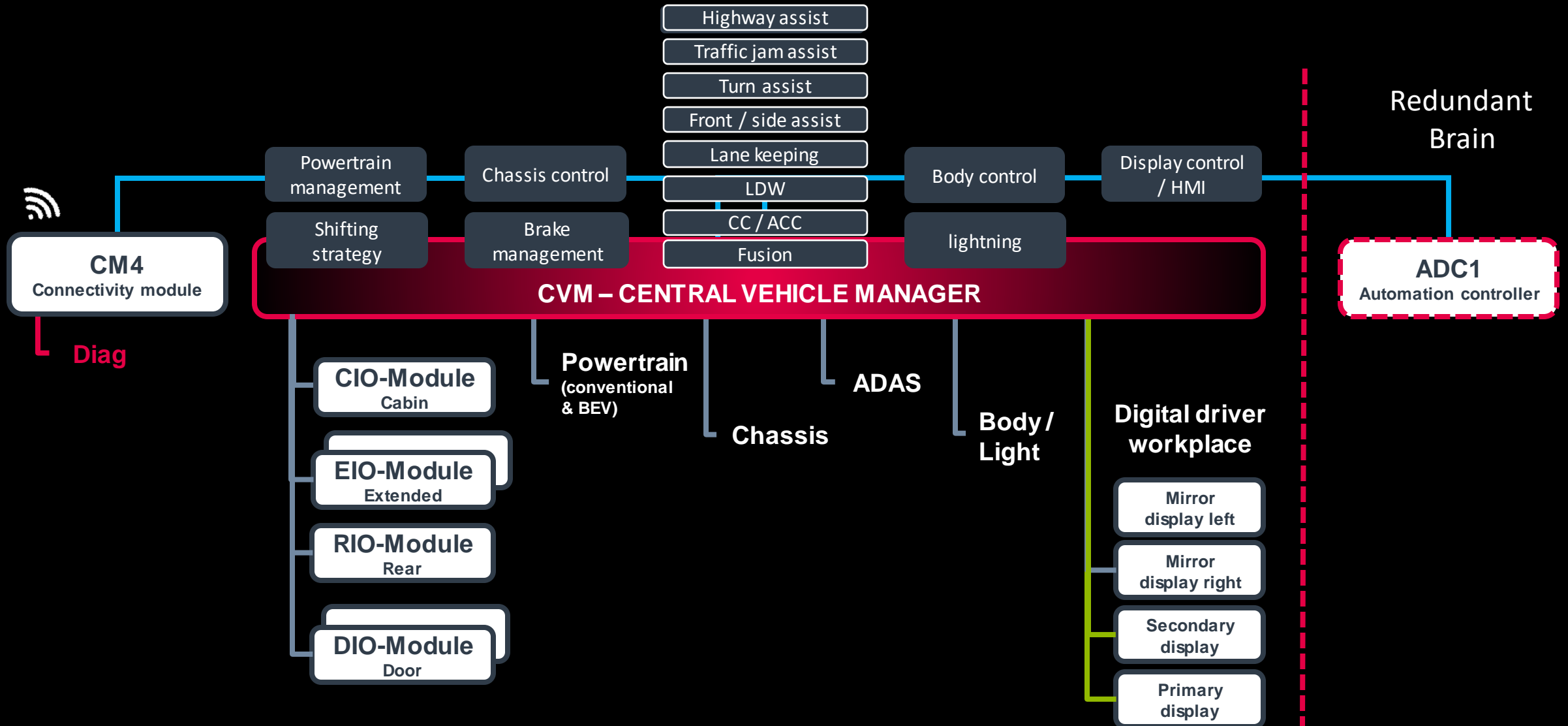


Many new functions only correlates existing information (signals)  
→ easy to implement on the middleware

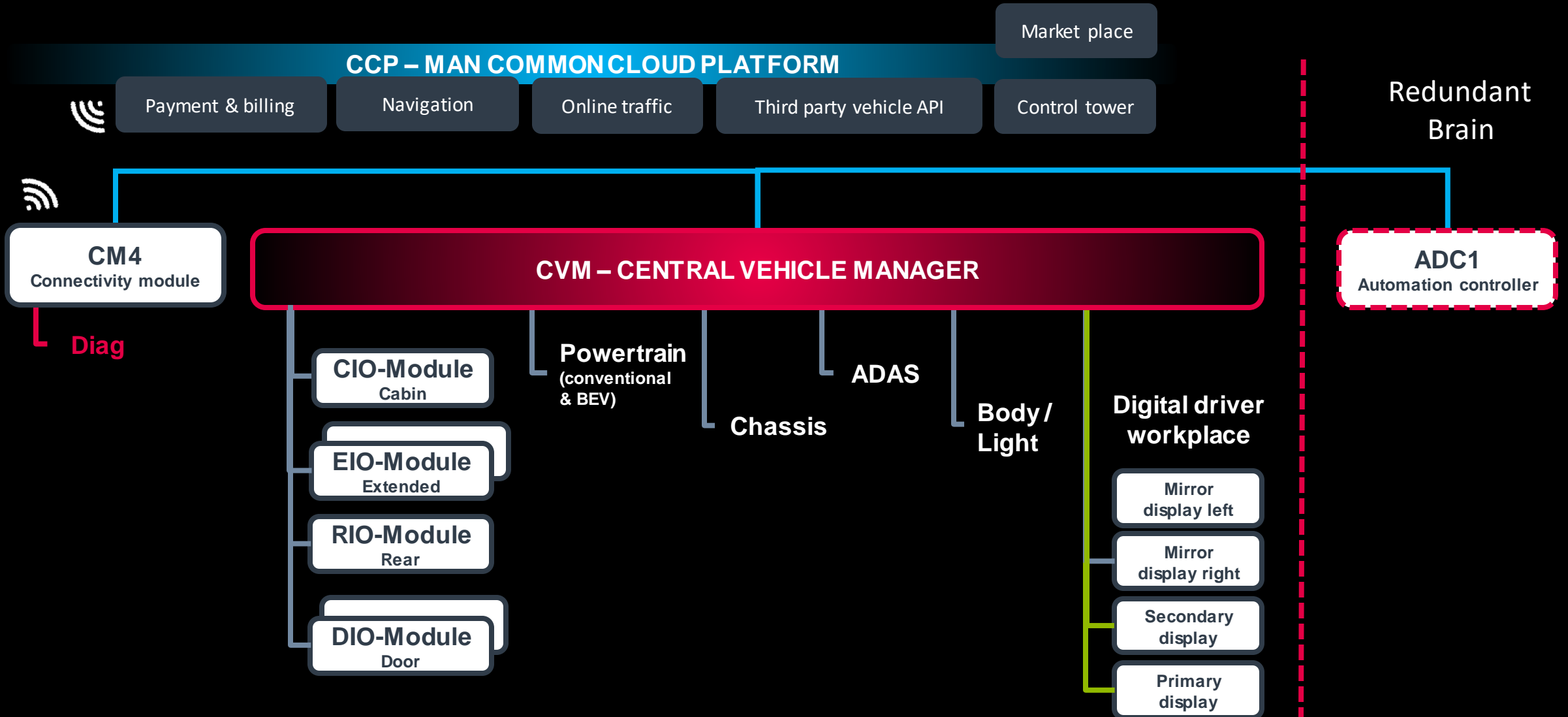
# TOPOLOGY



# SYSTEM ARCHITECTURE



# SYSTEM ARCHITECTURE



# TECHNOLOGY MAP

## Network

LIN  
CAN  
CAN-FD  
Ethernet

## Connectivity

4G / 5G  
WLAN  
Bluetooth

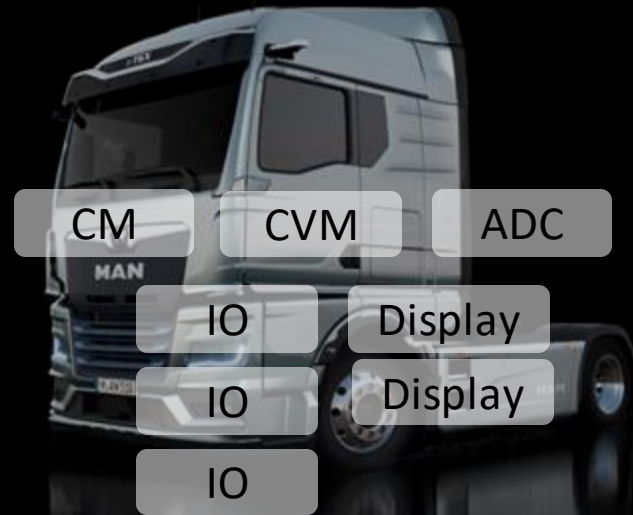
## AppFrame

HTML/Jscript  
QT



## Backend

AWS technology



## Operating system

Hypervisor/Partitioning  
Micro C OS (AUTOSAR compatible)  
QNX  
LINUX / POSIX

## Standards

MAN meta model  
(signal based & service oriented)  
AUTOSAR classic  
Adaptive AUTOSAR

## Interfaces

SAE J1939  
MAN Middleware – Mont Blanc

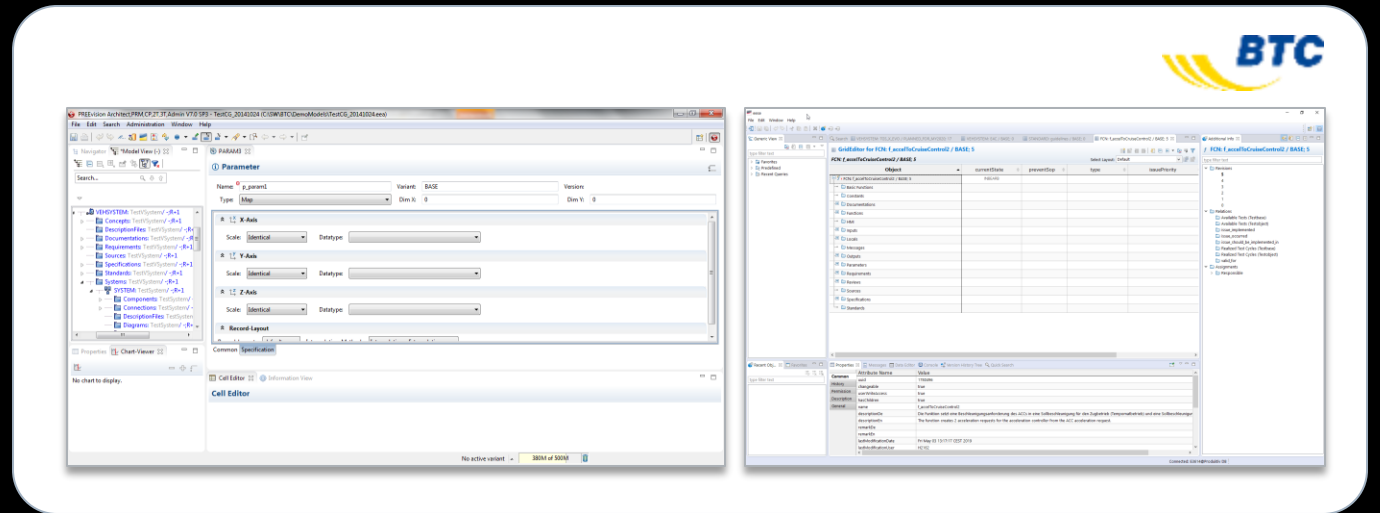
## Safety & Security

ISO 26262 up to ASIL D  
UNECE cyber security

# eesone DATABASE FOR ALL ENGINEERS

## KEY-FUNCTIONALITY

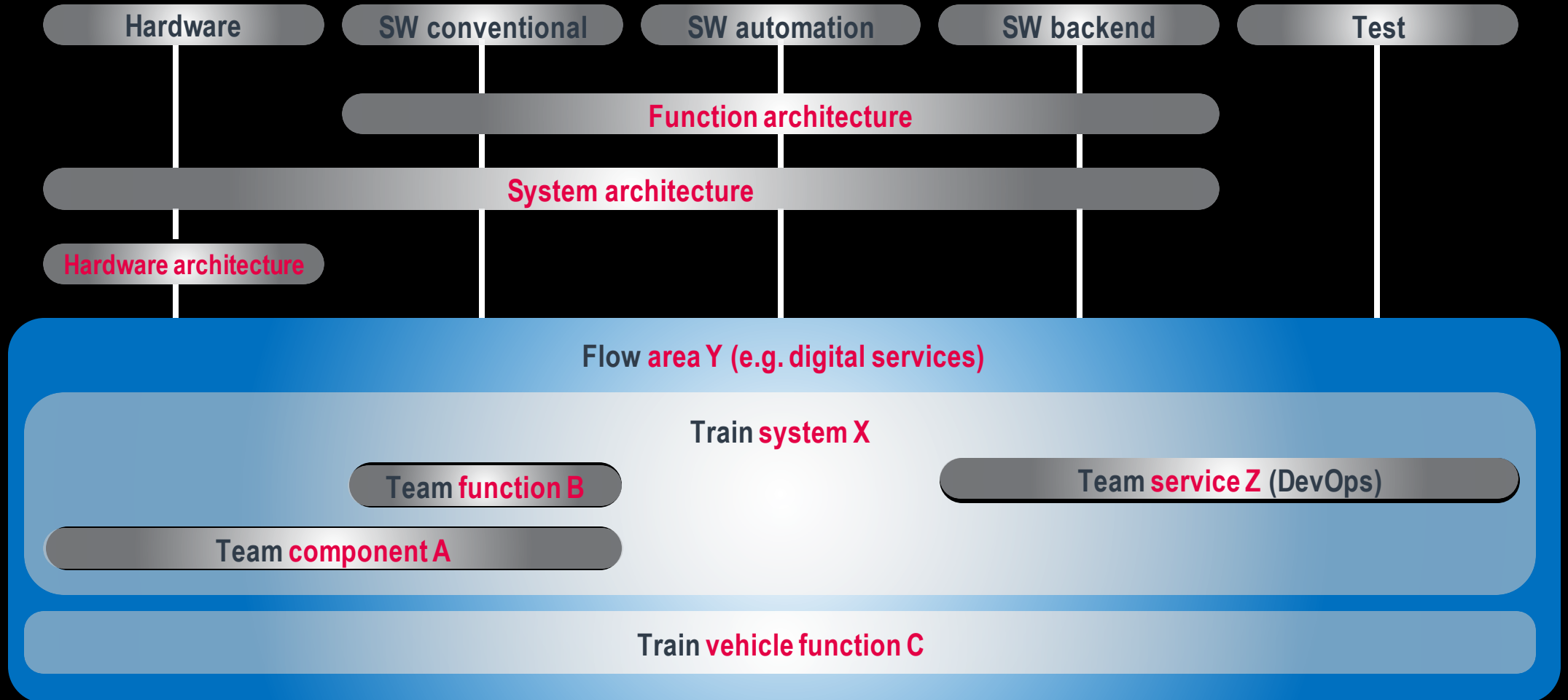
- Content management – version / variant control
- “THE relation tool”
- Requirement management
- Function data management
- Source-code management
- Architecture management
- Change/Issue management
- Agile planning component (SAFe compliant)
- Test management
- Dataset management
- Digital twin



Middleware / Application server

Oracle data base

# CURRENT STATUS - EE ORGANIZATION (SAFe BASED)



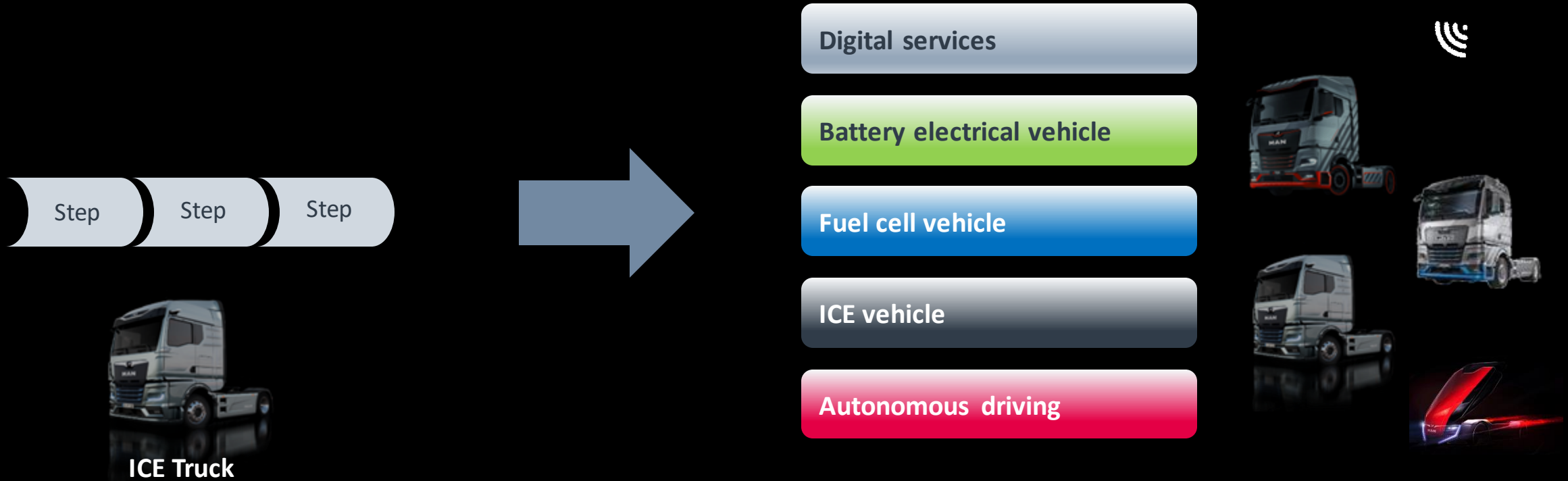
Solution  
table

# AGENDA

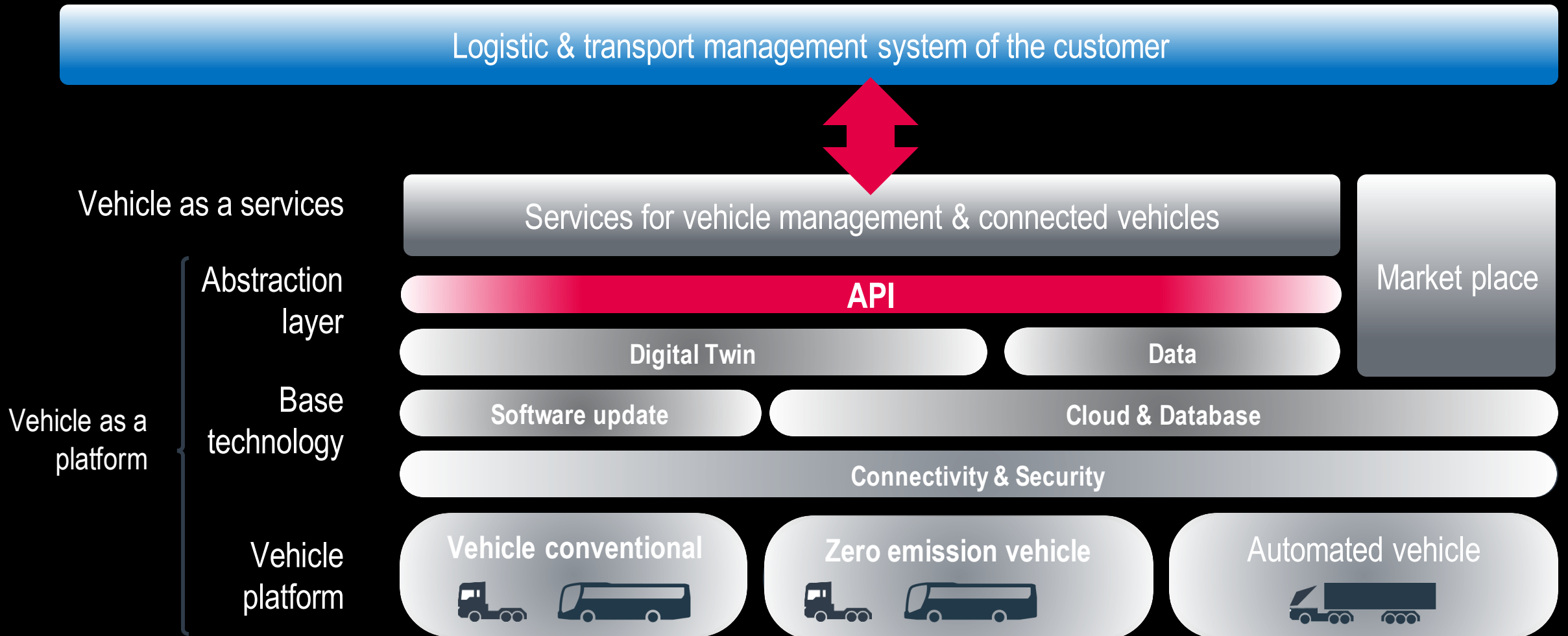
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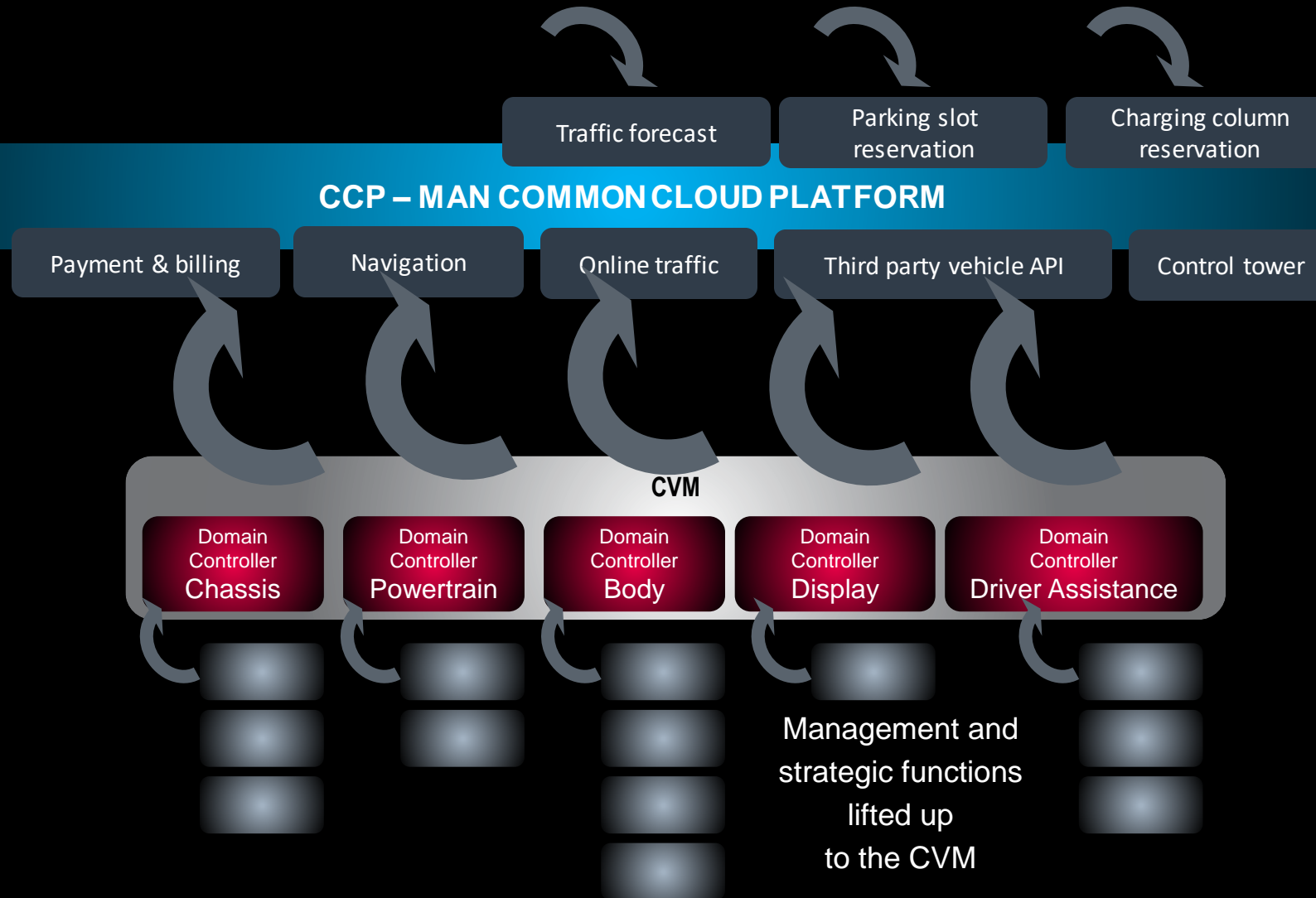
# NEW CHALLENGE - DOING EVERYTHING PARALLEL



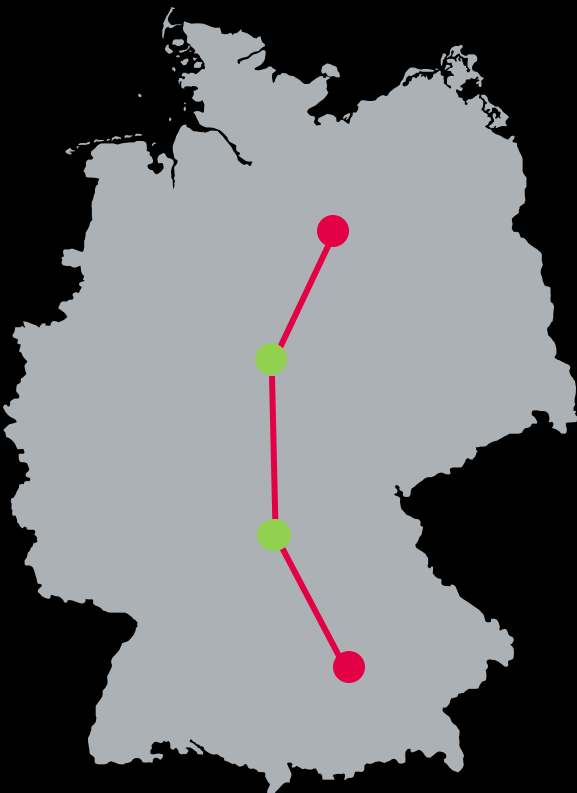
# INTEGRATION OF THE VEHICLE IN THE LOGISTIC ENVIRONMENT



# MOVING FUNCTIONALITY IN THE CLOUD & COMBINE WITH ADDITIONAL DATA



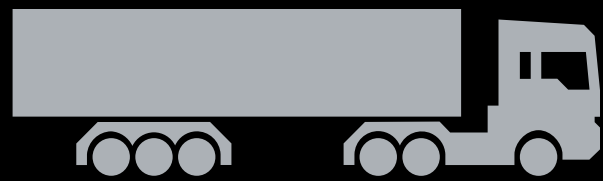
# FUNCTION MEETS SERVICE – EFFICIENT CRUISE FOR BEV



Backend

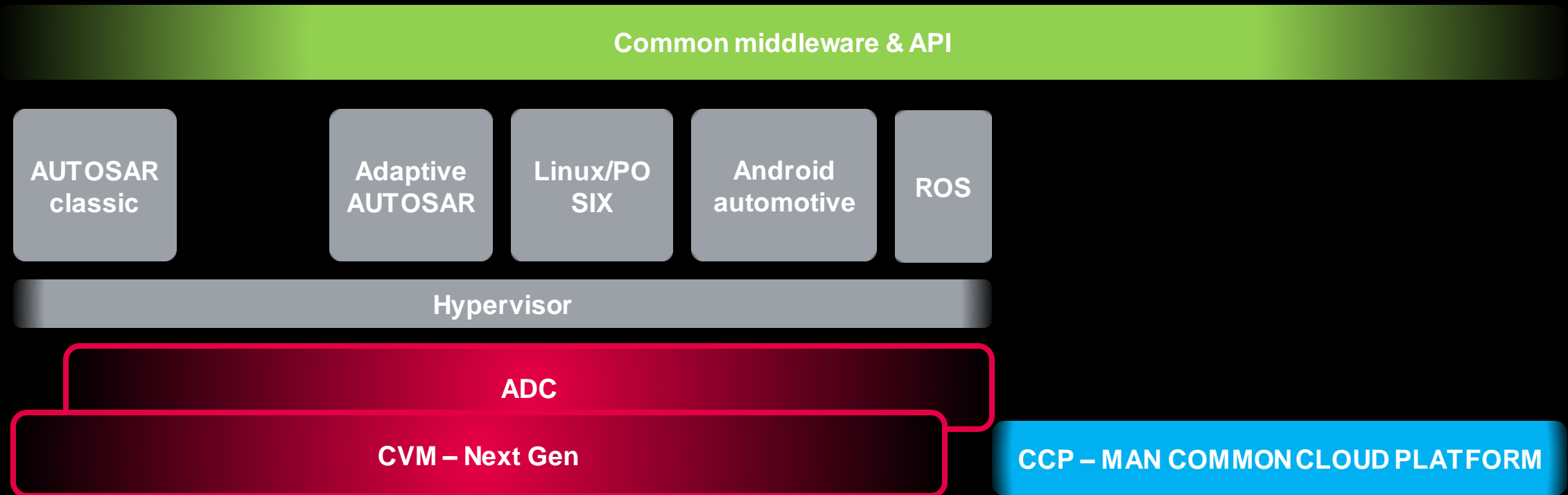
Vehicle

Software driven vehicle



# CURRENT DEVELOPMENT - SOFTWARE DRIVEN VEHICLE

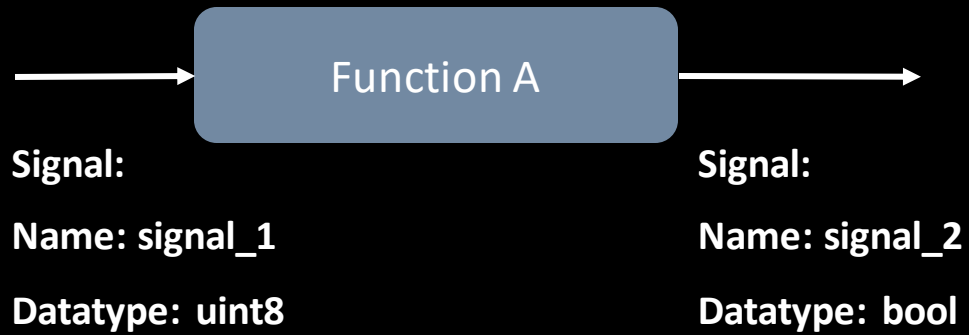
Same software technology (language, API, middleware independent of the environment (vehicle / cloud))



# CLASSIC SIGNAL BASED MODEL – TASK: PROCESSING DATA

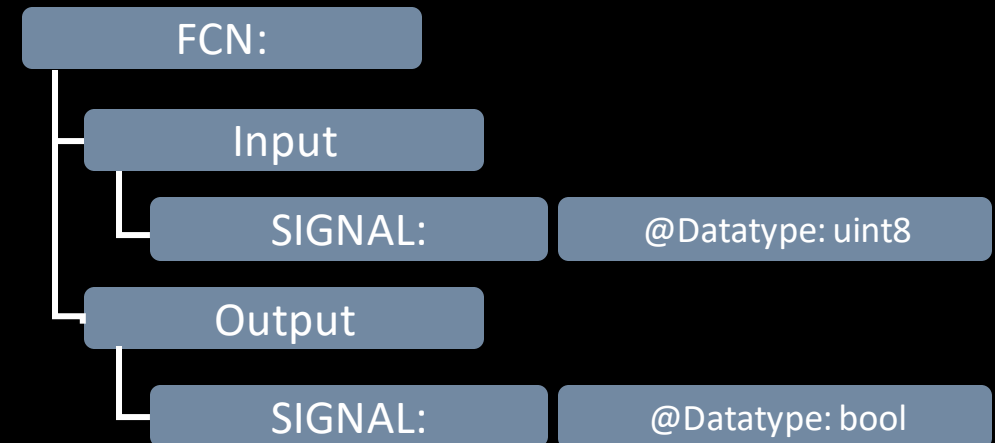
## Model

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## Data structure

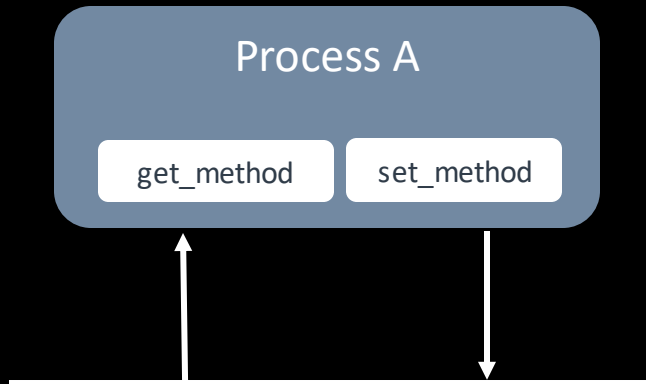
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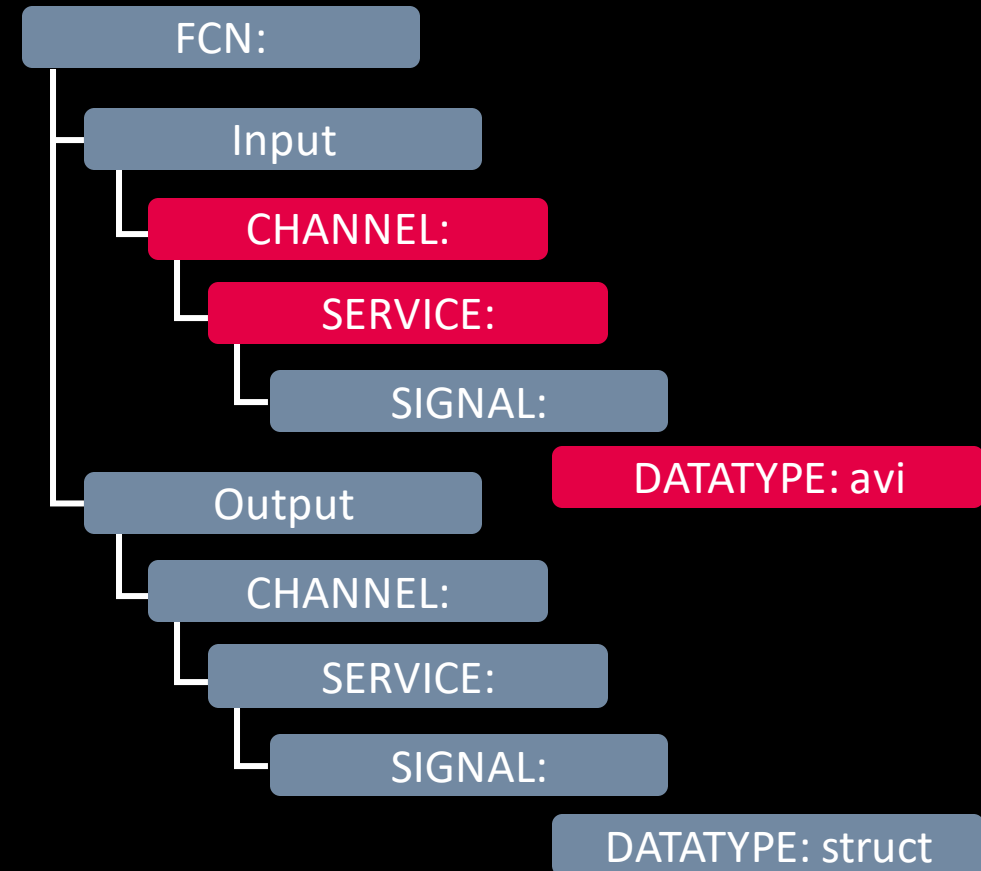


# SERVICE BASED MODEL – TASK: PROCESSING DATA

## Model

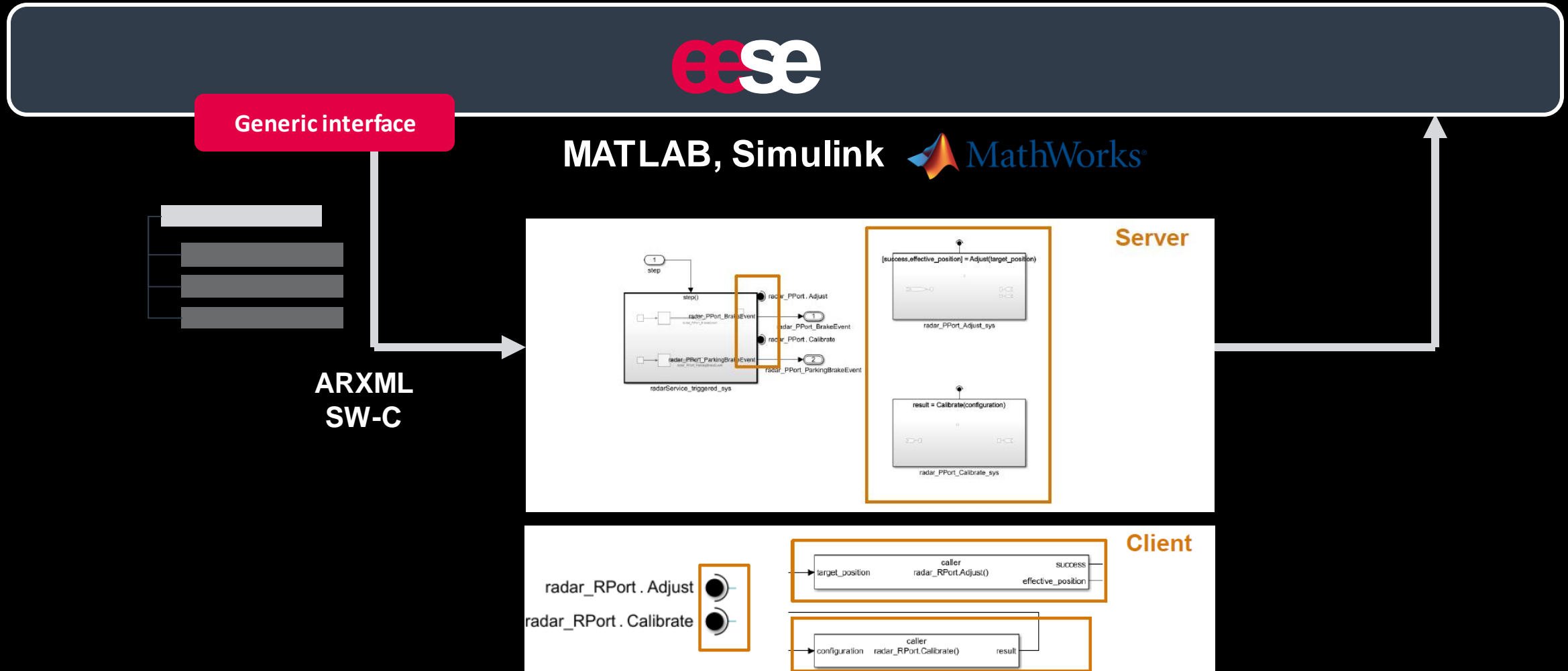


## Data structure





# SERVICE BASED MODEL – CORRESPONDING TOOLCHAIN



# SUMMARY

- 1 A centralized architecture has big advantages in all dimension (cost, quality & time to market)
- 2 New end to end features for the customer leads us to a mix of vehicle & cloud oriented functions & services
- 3 This complexity leads to new development method & tools

**THANK YOU VERY MUCH FOR YOUR ATTENTION.**



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