



# Flexible and Cost-Optimized Platform of Inertial Sensor Systems

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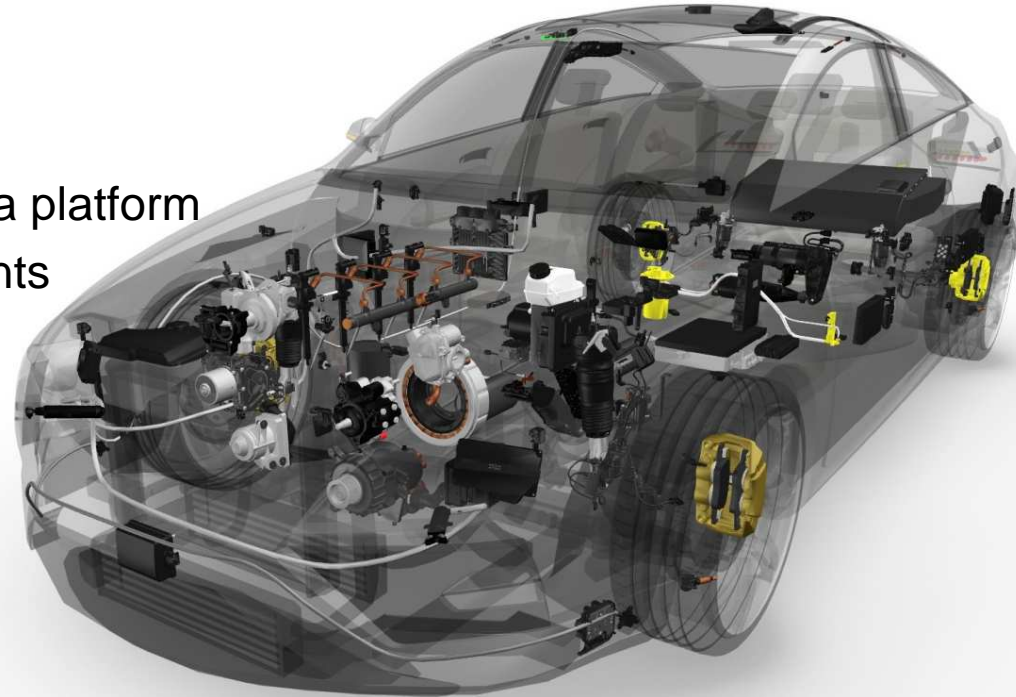
# Flexible and Cost-Optimized Platform of Inertial Sensor Systems

## Challenges to Vehicle E/E Architectures

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Increasing functionality poses a challenge to vehicle E/E architectures:

- ▶ Full performance without malfunction
- ▶ Differentiating features (‘Vehicle-DNA‘)
- ▶ Cost-optimum solution for HW and R&D
- ▶ One approach covering all models within a platform
- ▶ Fullfillment of functional safety requirements

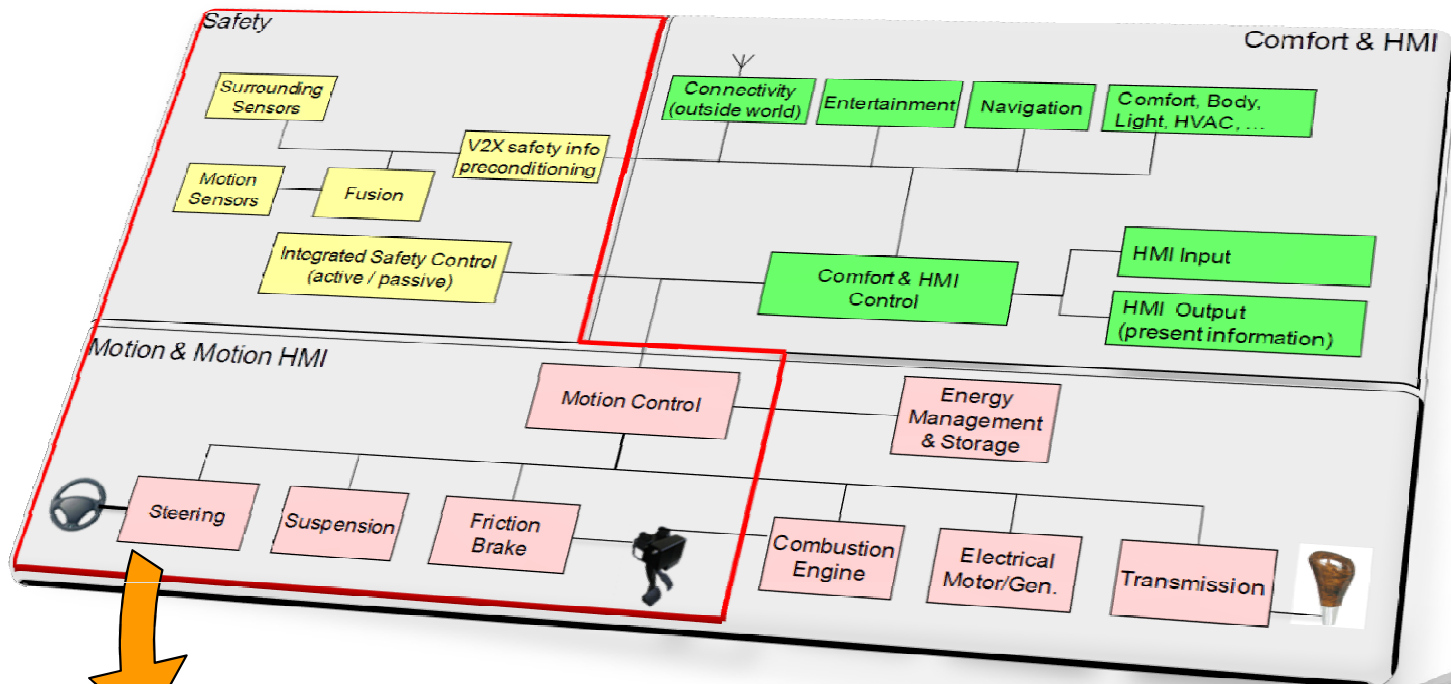


Therefore vehicle E/E architectures have to be developed featuring

- ▶ modular & scalable HW & SW
  - ▶ Functional vehicle identity via specific function modules
  - ▶ Standardized modules for non-differentiating functions, e.g. basic SW
- ▶ clear & standardized interfaces
- ▶ a structured functional decomposition based on already intensively networked functional areas (domains)

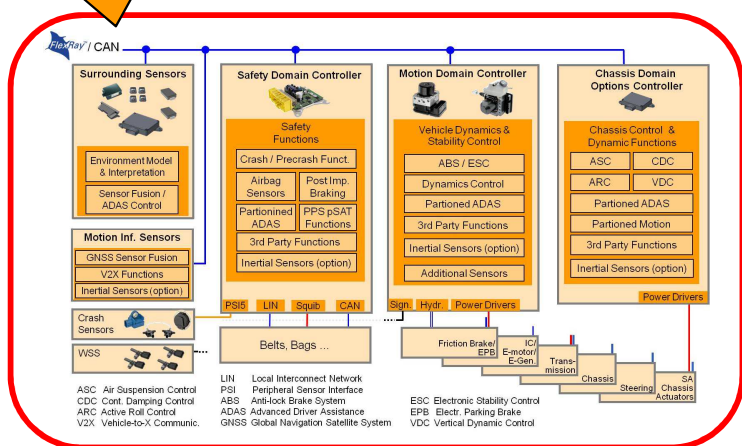
# Flexible and Cost-Optimized Platform of Inertial Sensor Systems

## From Functional to HW Architecture



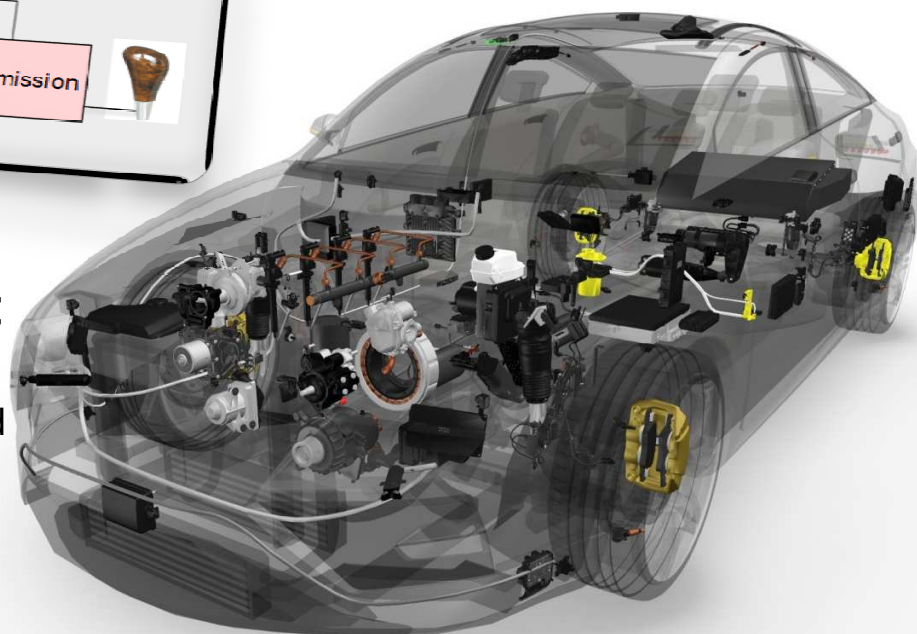
### Top Level Functional Architecture:

- ▶ Safety Domain
- ▶ Comfort Domain
- ▶ Motion Domain



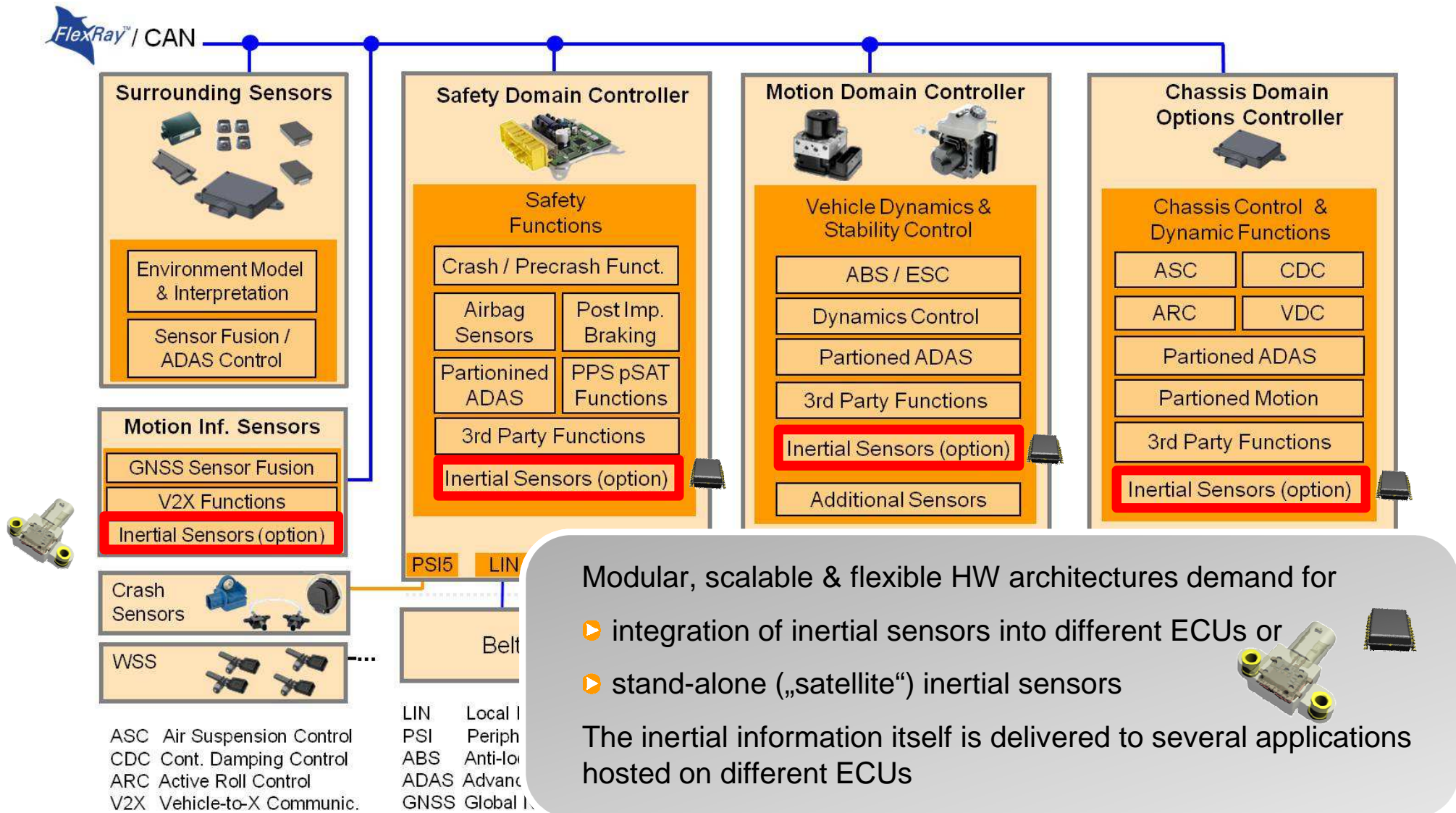
### HW Architecture:

- ▶ Domain Controllers
- ▶ Satellite Sensors and Actuators
- ▶ Interfaces



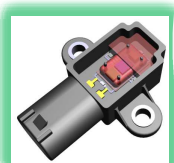
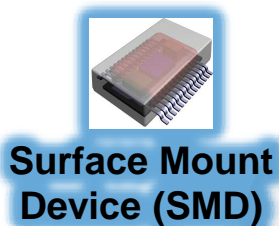
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## Vehicle HW Architecture of the Safety and Motion Domains



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## Product – Function Matrix

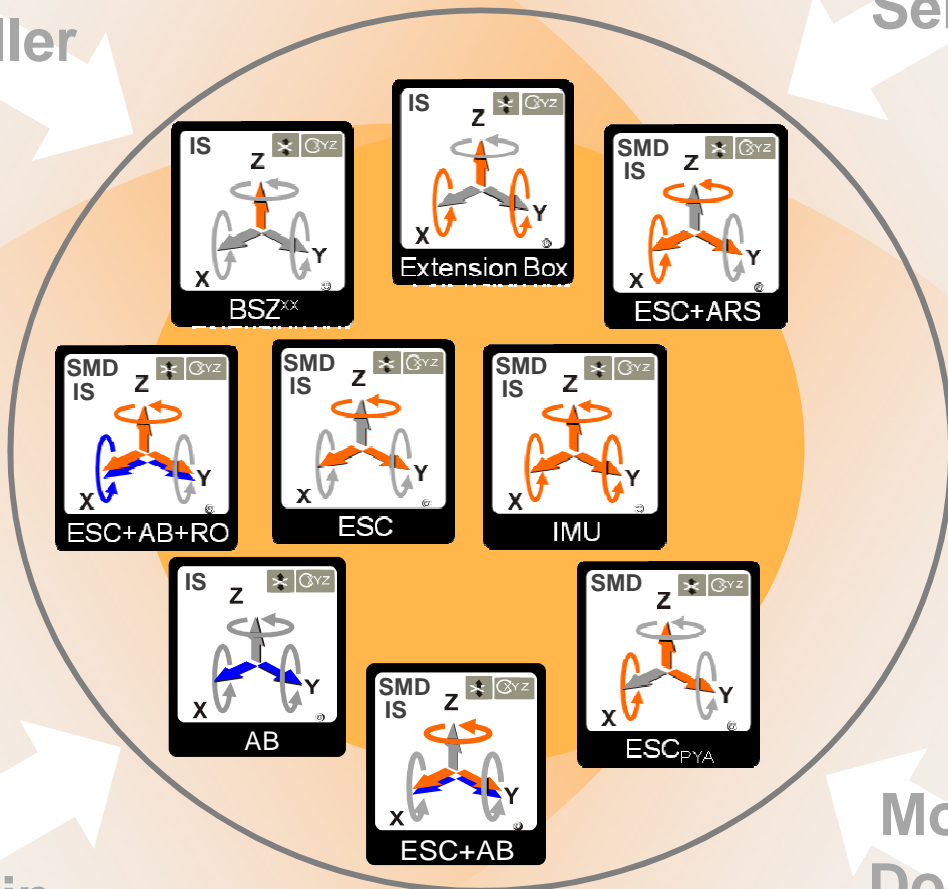


### SC300/3000 Platform

- Compact
- Modular
- Standardized

Safety Domain Controller

Chassis Domain Controller



➔ Passive safety  
➔ Active safety, vehicle dynamics

Satellite Sensors

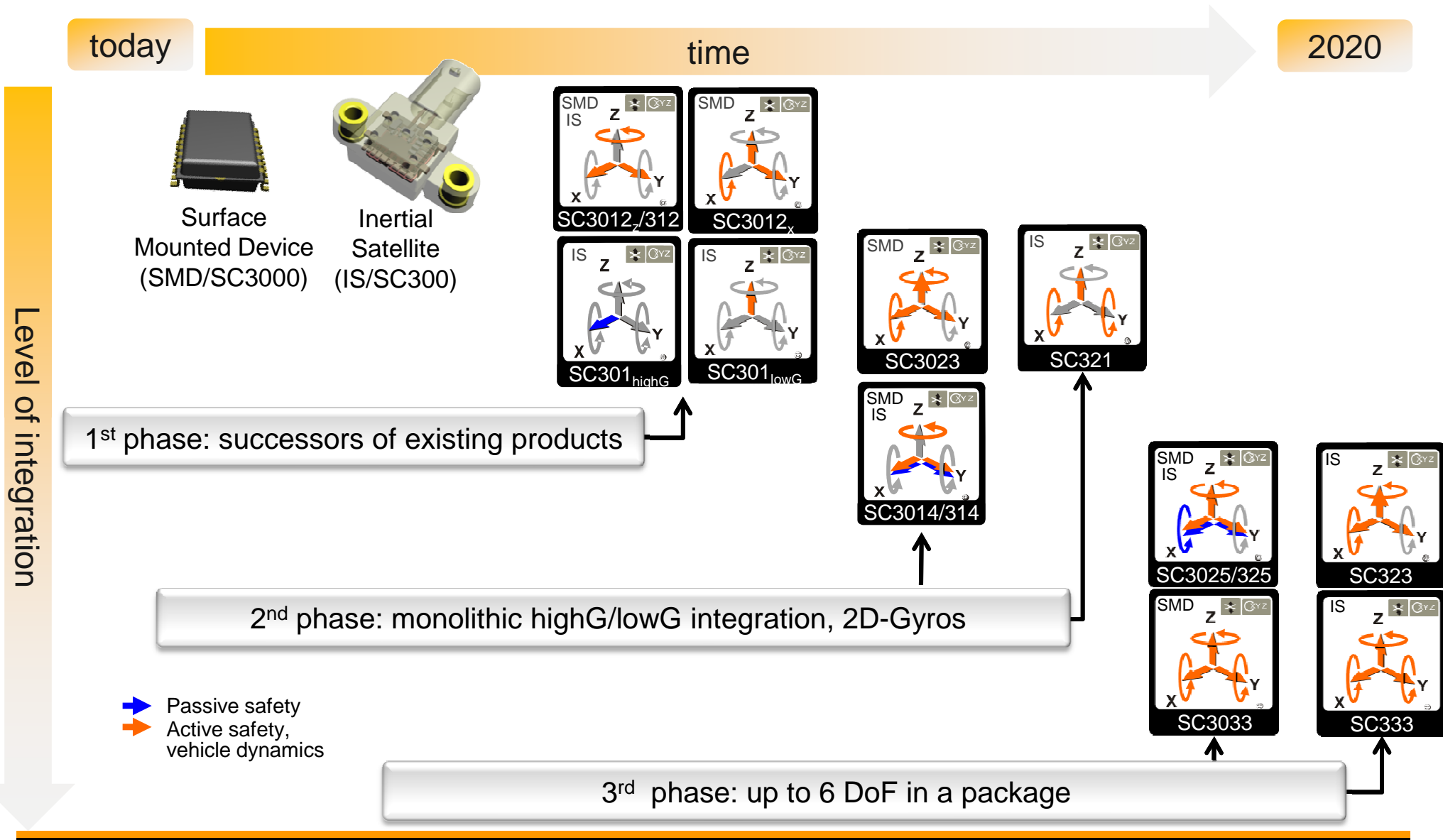
Motion Domain Controller

### Functions (selection):

- Electronic stability control (ESC)
- Hill start assist
- Airbag (AB)
- Rollover protection (RO)
- Suspension control by vertical acceleration (BSZ) or pitch & roll
- Active roll stabilization (ARS)

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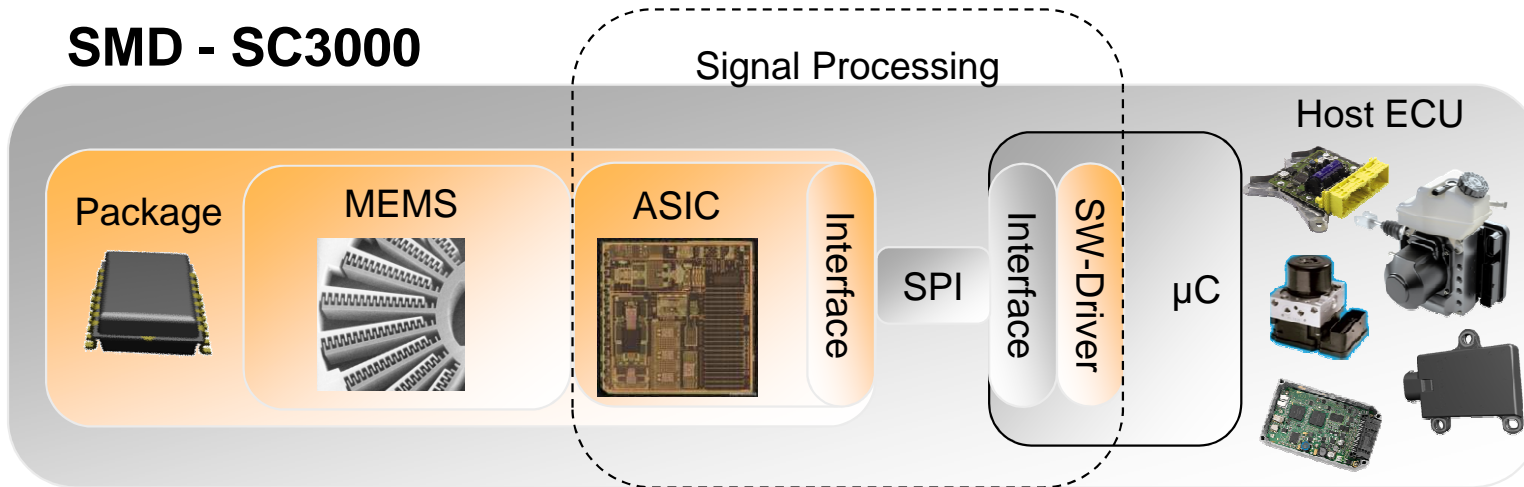
## Long-Term Development Phases/Roadmap



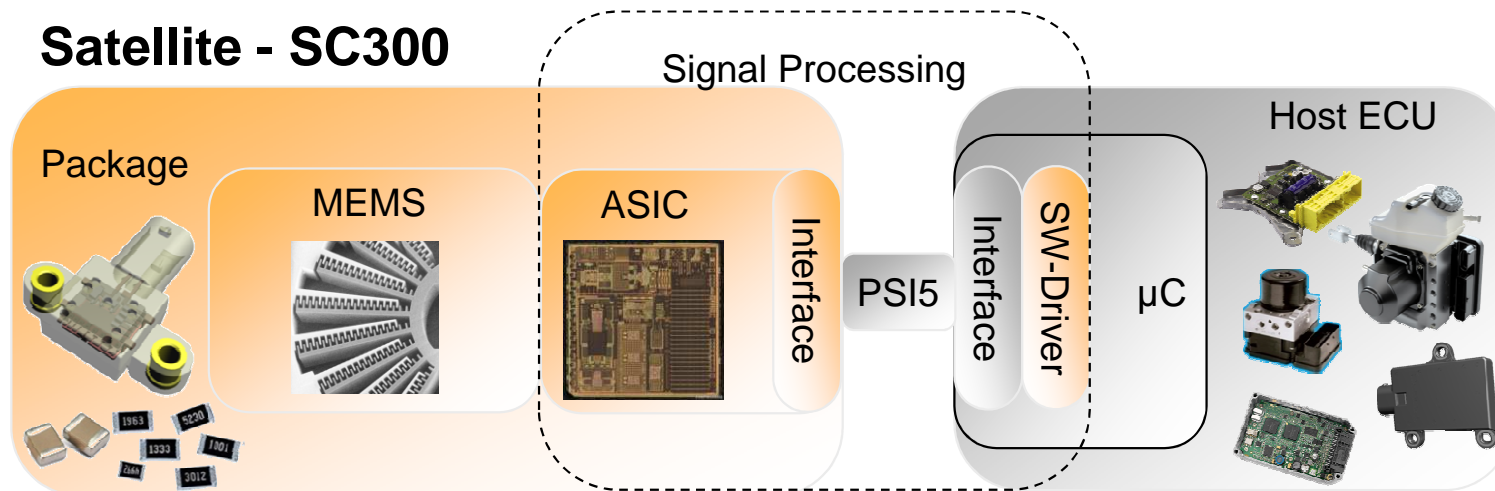
# Flexible and Cost-Optimized Platform of Inertial Sensor Systems

## Product & System Architecture

### SMD - SC3000



### Satellite - SC300



### SC300/3000 Architecture Advantages:

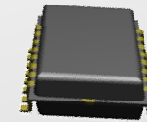
- ▶ Create synergies across considered products for all sub-components
- ▶ Find best-cost & flexible packaging technology for SMD and satellite devices
- ▶ Use cost-reduction capabilities of SW-sensor driver approach (SESI)

## Platform Solution

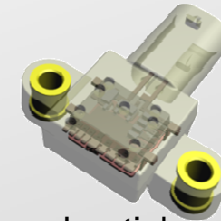
### Platform for Best-Cost Inertial Sensor Systems

Modular & scalable product platform for inertial sensors with a software interface to function algorithms

- Modular concepts for ASIC, SW, MEMS & packaging for a platform of 14 products
- Decision for the most promising cost-efficient platform:
  - Packaging: Leadframe- or PCB based
  - Interface: SPI for SMDs, PSI5 for satellites
  - ASIC: modular ASIC approach;  
no int./ext.  $\mu$ C in sensor HW
  - SW: no SW in sensor HW; modular sensor driver architecture on host-ECU
  - MEMS: set of basic MEMS elements for complete product portfolio



Surface  
Mounted Device  
(SMD/SC3000)



Inertial  
Satellite  
(IS/SC300)





Thank you !

**All Sensing Systems on for More Safety**

Passive Safety & Sensorics

