

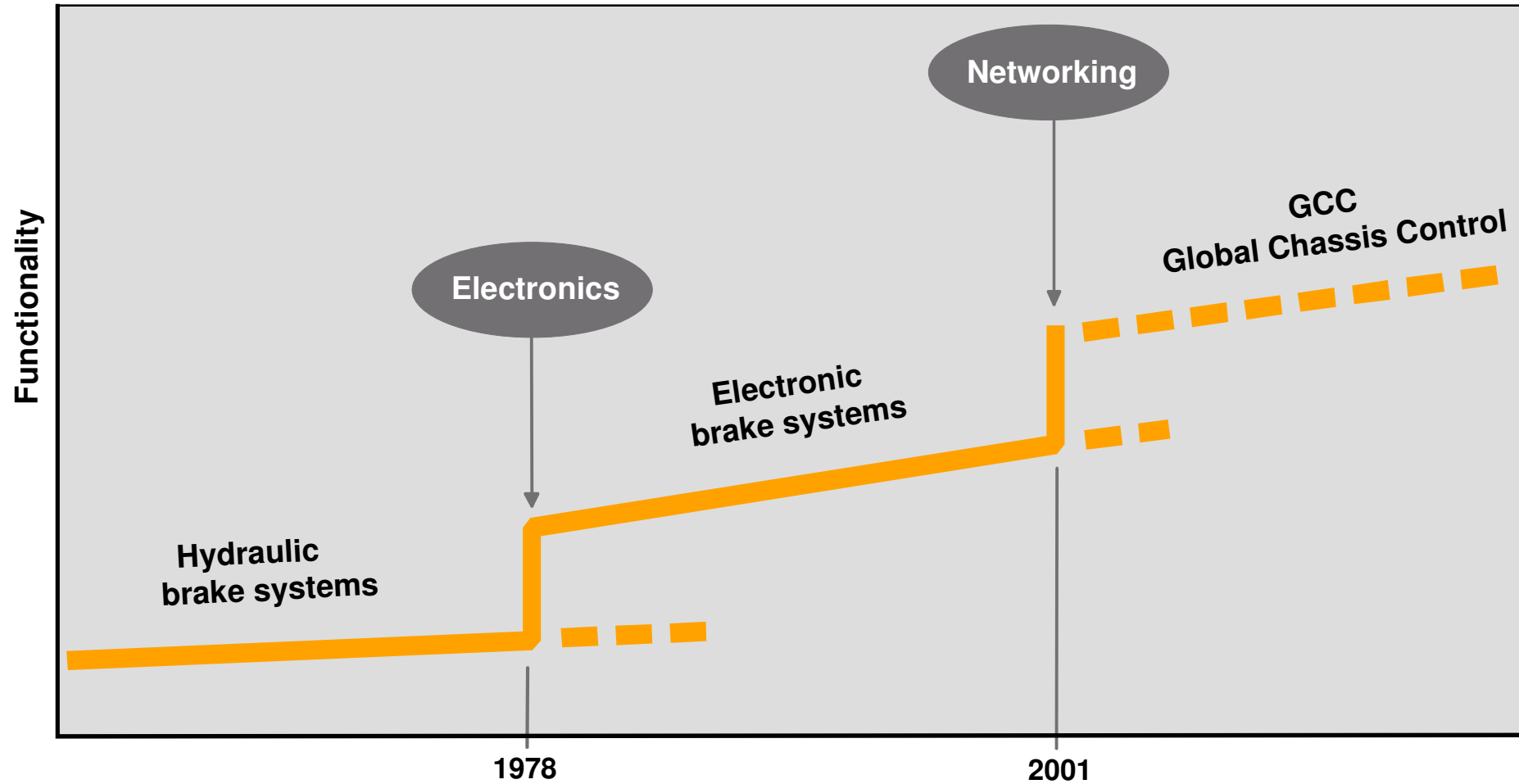


SAE 2006
Automotive Dynamics, Stability and Controls
Conference and Exhibition

**Panel Discussion:
Advanced and Next Generation Stability Systems**

Dr. Peter E. Rieth, Continental Automotive Systems, Frankfurt/Germany

Technology Change – The Stepping Stone of Functional Further Development (e.g. brake system)



Hydraulic Brake System

- ▶ drum brake
- ▶ disc brake
- ▶ brake booster

Electronic Brake System

- ▶ ABS, EBD, TCS, BA, ESC
- ▶ electro-hydraulic brake
- ▶ electro-mechanical brake

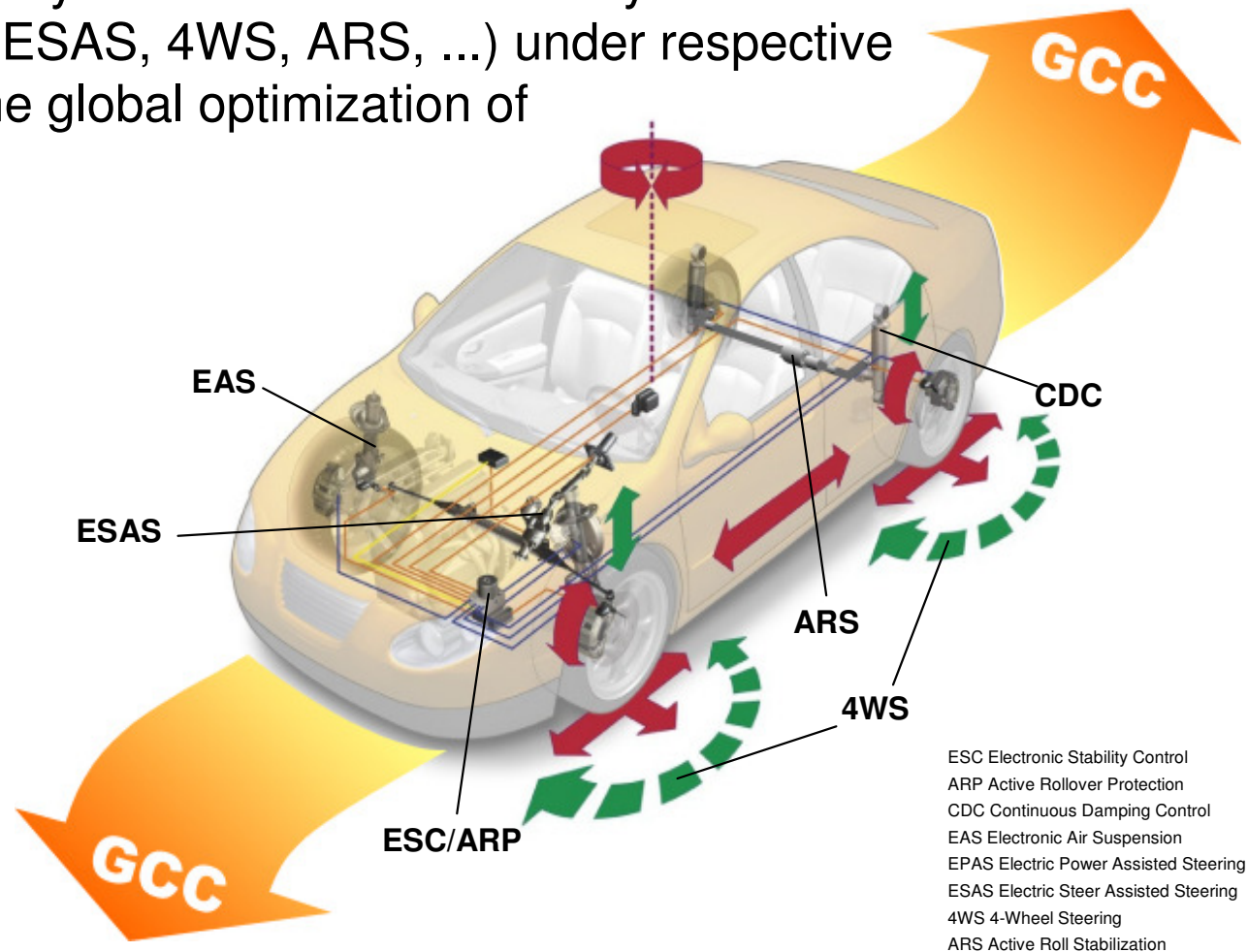
Networked Brake System

- ▶ "30-m car" (brake+chassis+tires)
- ▶ "μ-split" (brake+steering)

Global Chassis Control (GCC) - Motivation

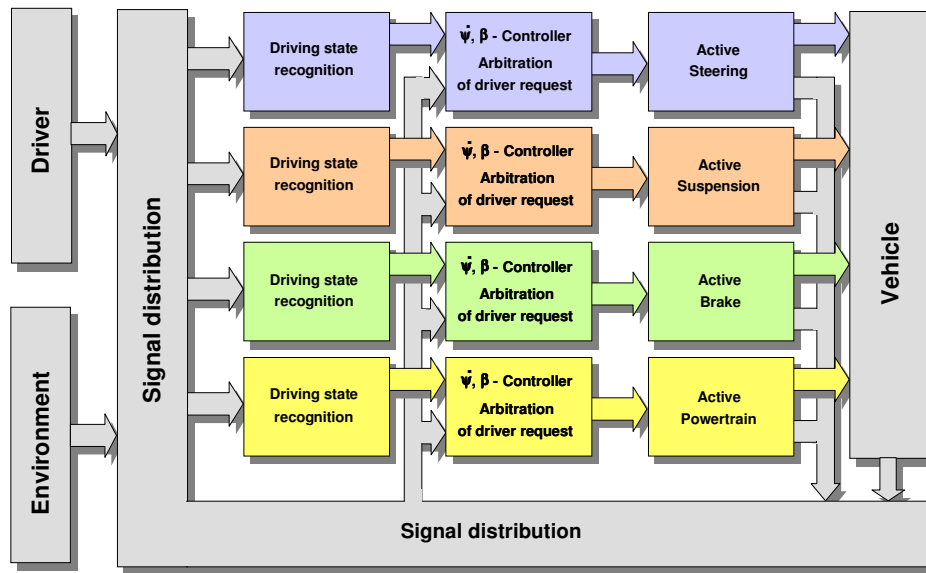
Global Chassis Control (GCC) targets, in the case of a given configuration of electronically controlled chassis-subsystems (ESC, CDC, EAS, EPAS, ESAS, 4WS, ARS, ...) under respective given driving conditions the global optimization of

- active safety
- driving comfort
- driving pleasure/fun

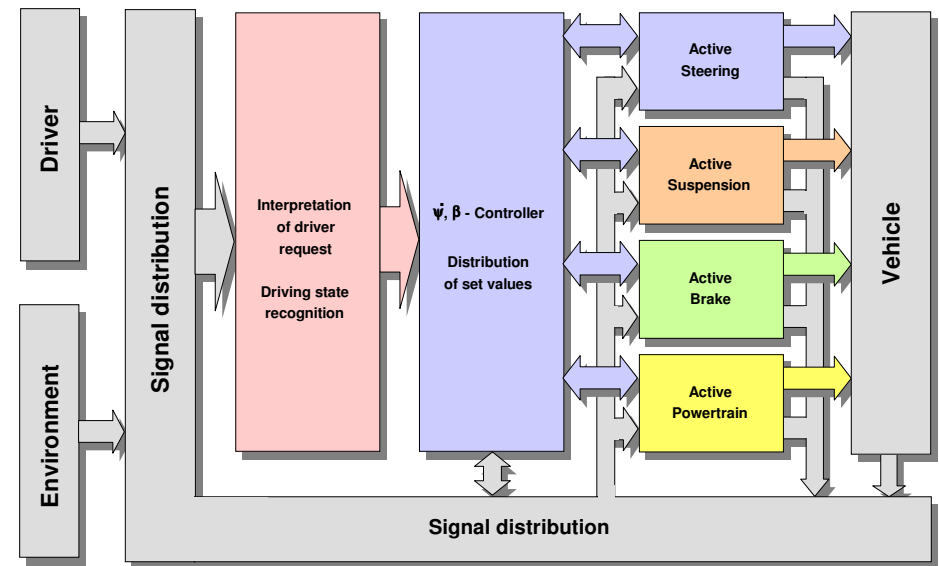


Driving Dynamics Control

a) Co-existence Approach , b) Integrated Approach



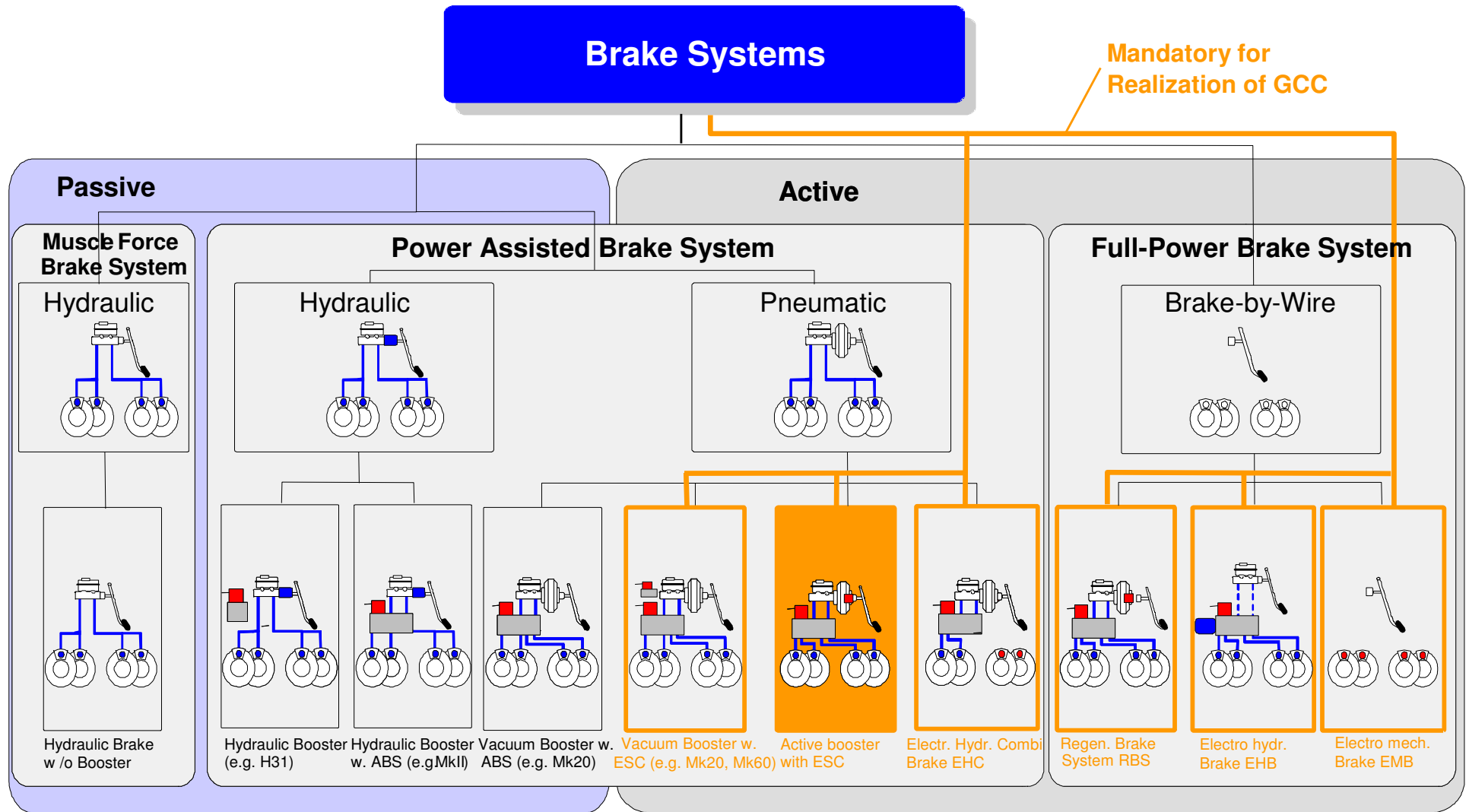
a)



b)

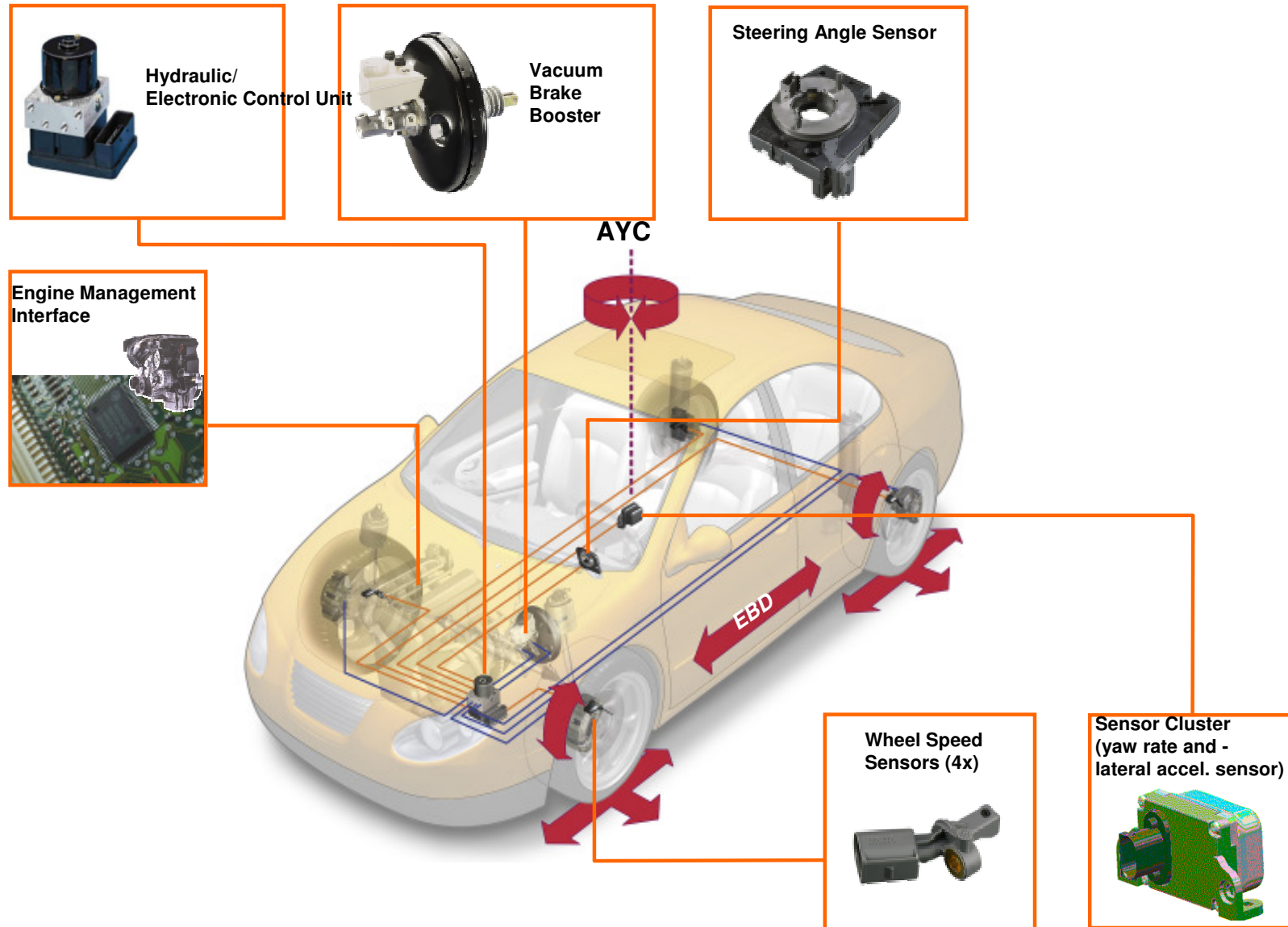
Electronic Stability Control ESC

The Basis for Future Braking Systems

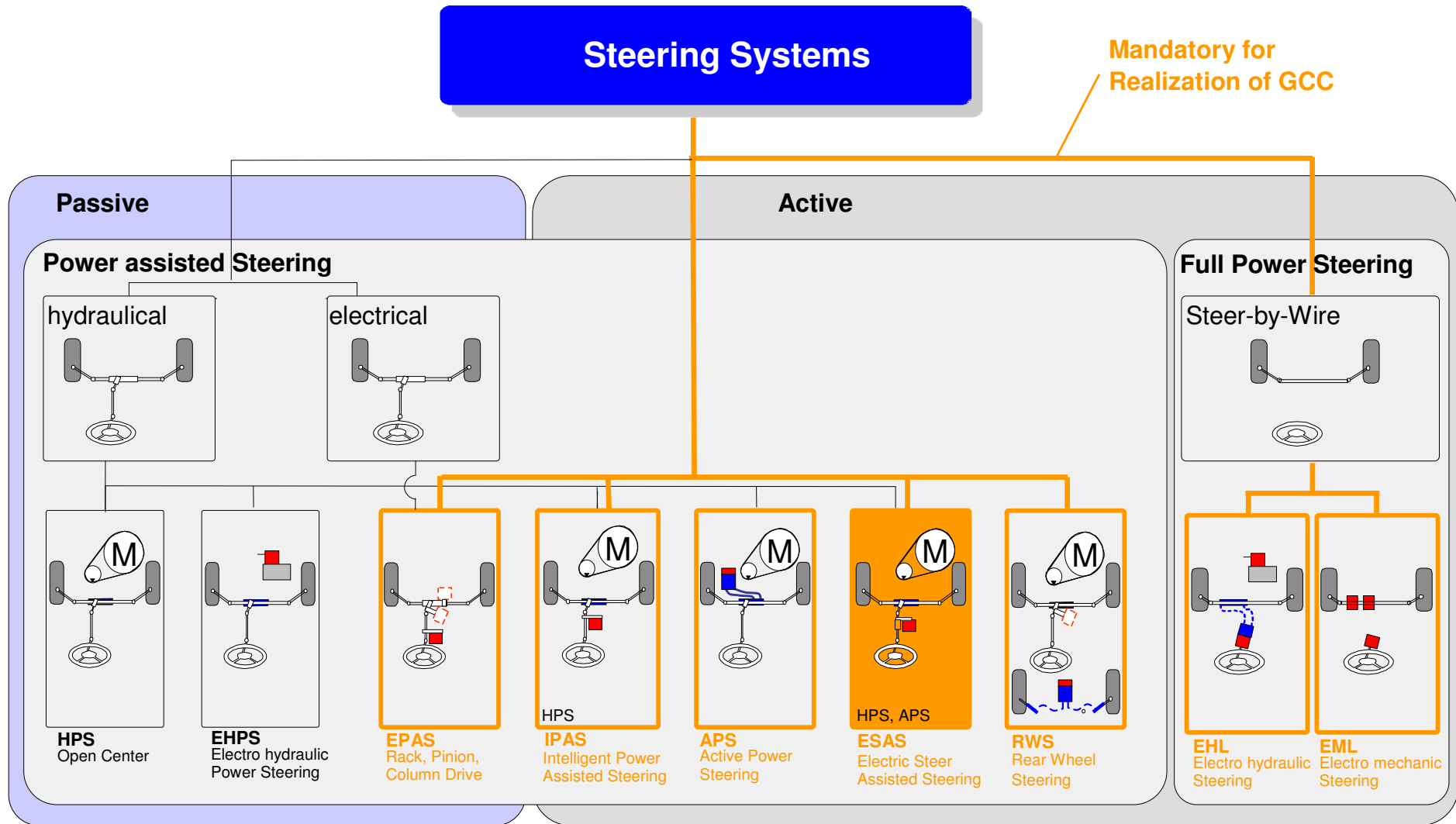


GCC Global Chassis Control

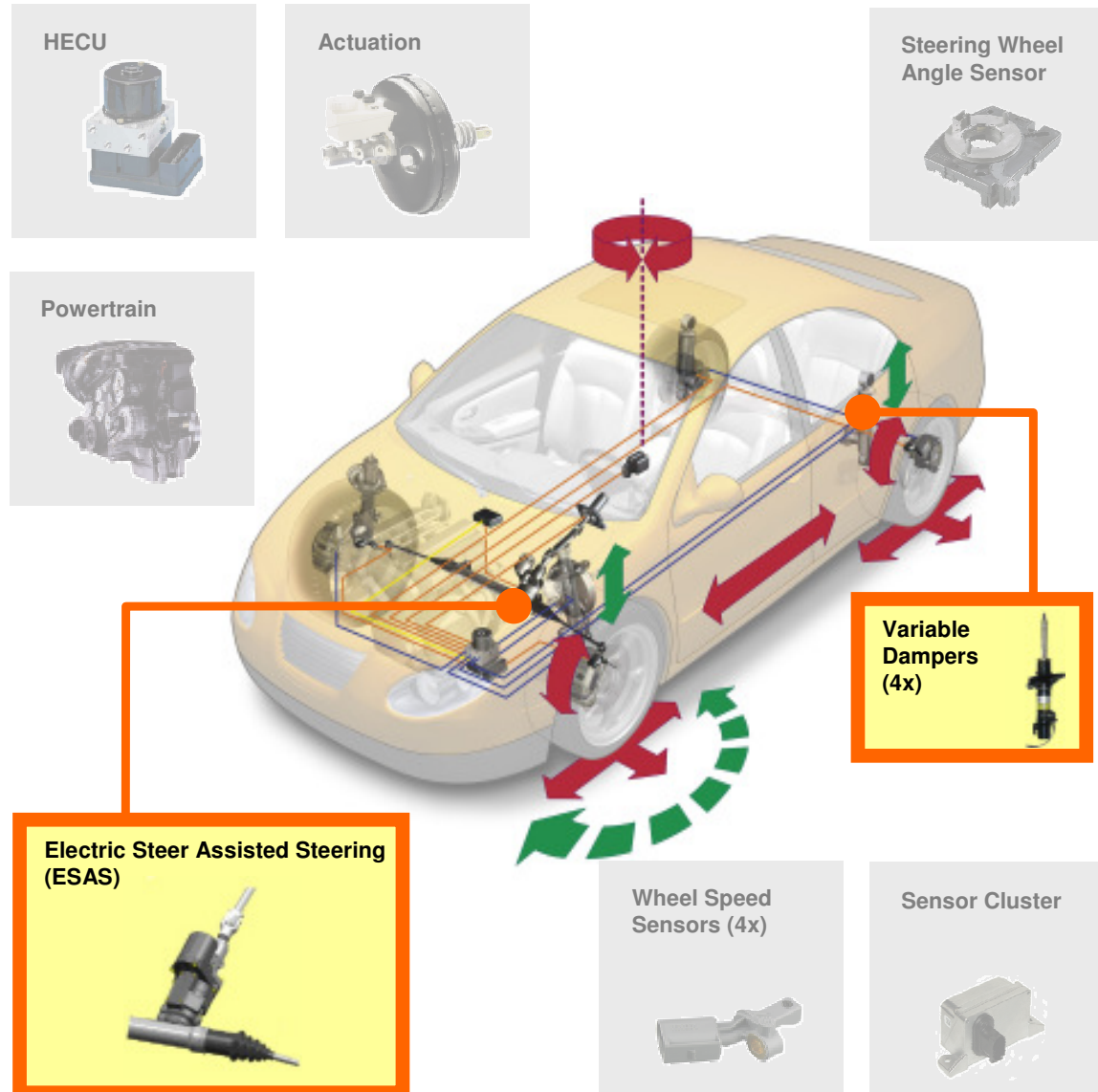
Electronic Stability Control ESC - System Layout



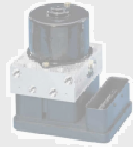
Steering Systems Overview



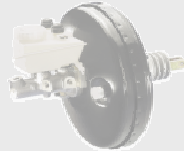
ESC II – ESC with Active Steering Intervention



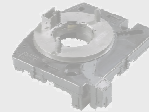
HECU



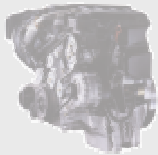
Actuation



Steering Wheel Angle Sensor



Powertrain



Variable Dampers (4x)



Electric Steer Assisted Steering (ESAS)



Wheel Speed Sensors (4x)



Sensor Cluster



Basic Functionality ESC:

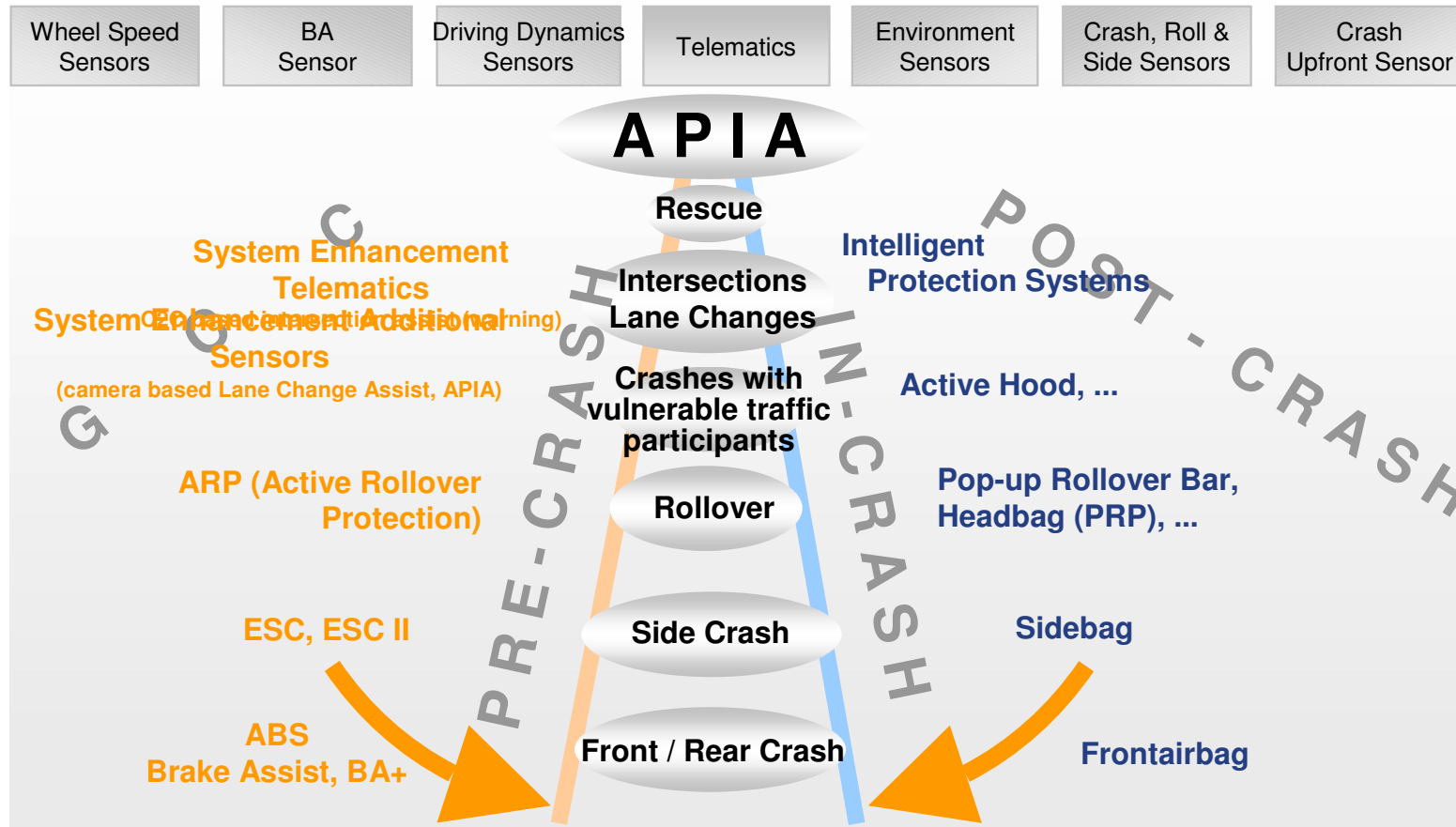
- Anti-lock Brake System ABS
- Traction Control System TCS
- Electronic Brake-force Distr. EBD
- Active Yaw Control AYC

Enhanced Functionality by Angle Superposition ESC II:

- Yaw Torque Compensation by braking on μ -split (Yaw Torque Compensation)
- Active Yaw Control with **steering intervention** (optional suspension) prior to engine and brake intervention
- Understeer Intervention
- Comfortable compensation of load alterations
- Handling Support (Lead Steering)

ESC: Electronic Stability Control

Crash Types, Safety Measures: APIA



Pre-Crash measures with headway sensors to close the Safety Gap!