

The Future of Stability Control Systems

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Chassis Systems

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Evolution of...the radio



Chassis Systems



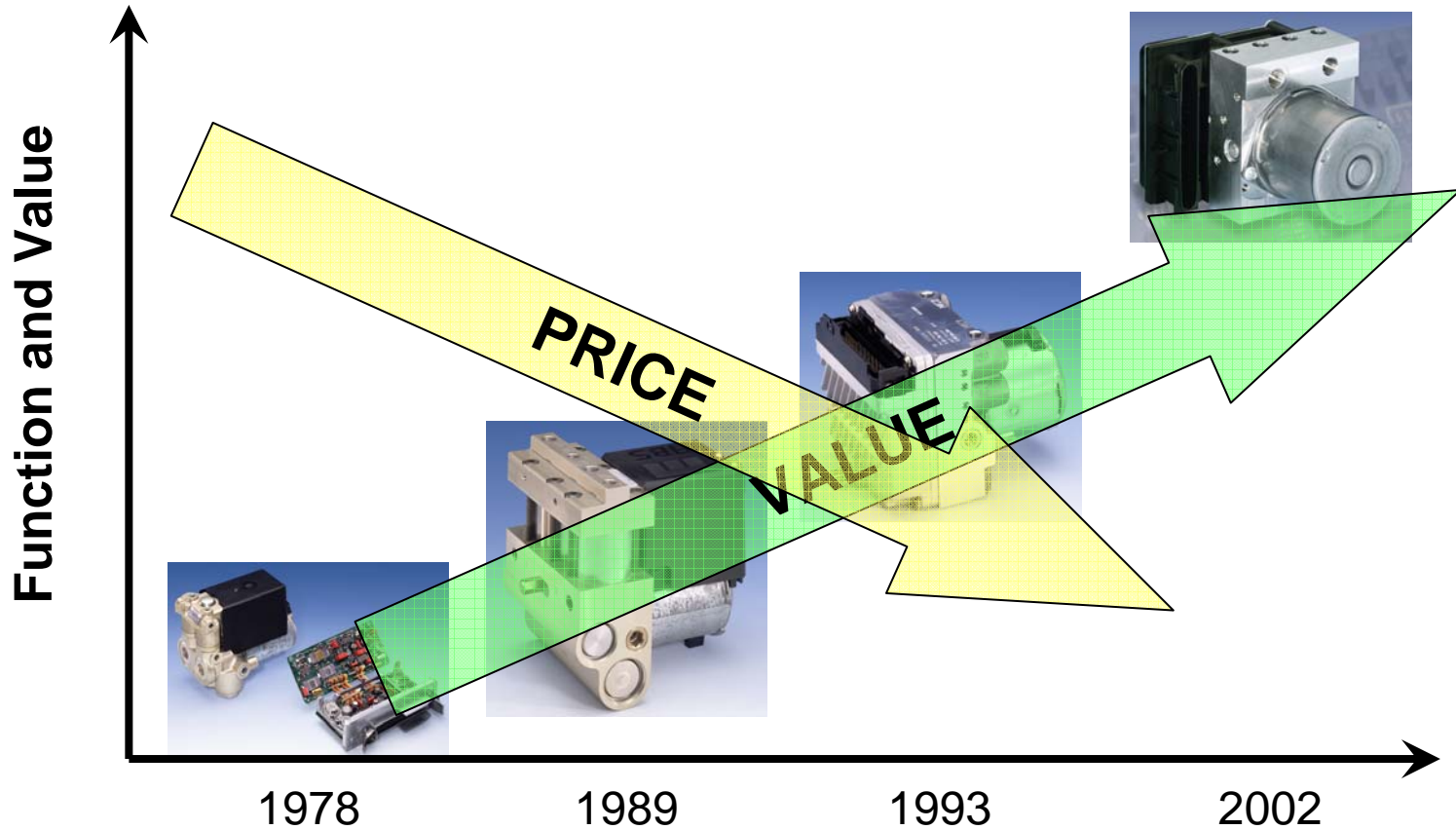
The “radio” has evolved...



Functional Expansion and Integration

- AM/FM (still uses radio waves!)
- Satellite/MP3
- Cassette Tape
- CD and CD Changer
- Bluetooth phone capability
- GPS Navigation
- Speed compensated volume
-

Evolution of ...Chassis Control Systems



Chassis Systems



Electronic Stability Control ... what's next?

- “Conventional” hydraulic brake systems will be installed on the majority of light vehicles for the next 10 – 15 years
 - ✓ *Just like radio waves still dominate the radio market*
- Brake-by-wire systems are and will continue to be a small part of the future, mainly HEV's and high-end vehicles
 - ✓ *Just like radio compatibility with iPod's appeals to a few!*
- Therefore, the main focus is on increased efficiency with current hydraulic systems (i.e.: cost) and expanding and integrating functionality
 - ✓ *Just like expanding radio functionality*



Increased functionality

- Roll Over Mitigation
 - Mitigates the potential for frictional (un-tripped) roll-overs at limit handling maneuvers, for example at a highway exit.

- Electronic Brake Pre-fill
 - Brake Pressure build-up (3 – 5 bar) if accelerator pedal is released quickly.

- Brake disc wiping
 - Light brake apply to remove water film from brake disc in wet conditions. Based on rain sensor input.

- *(your idea here!)*



Vehicle Dynamics Management (VDM)

Principle

Coordination of active vehicle systems effecting vehicle motion

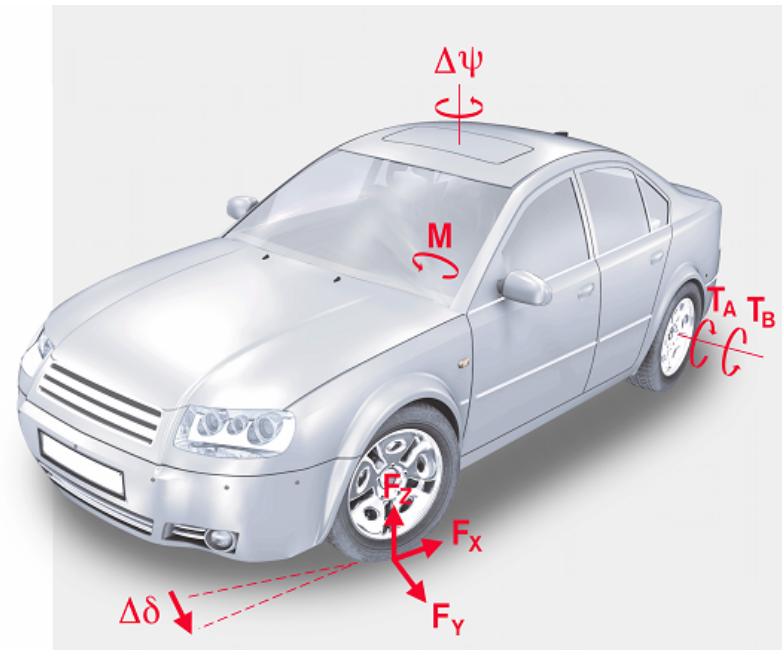
Brake

Steering

Suspension

Drive train

Differentials



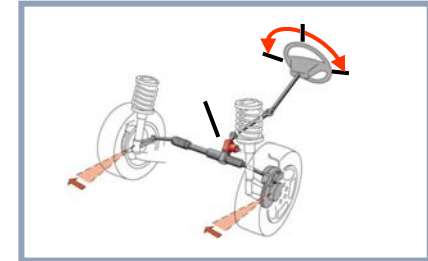
VDM is a multi-variant combination of networked active actuators

Examples of VDM functions

Dynamic Steering Angle Control

Control of wheel steer angle for yaw stability and straight running in special situations

→ *Steering like a perfect driver*



Dynamic Steering Torque Control

Control of steering torque to support driver reaction in critical situations

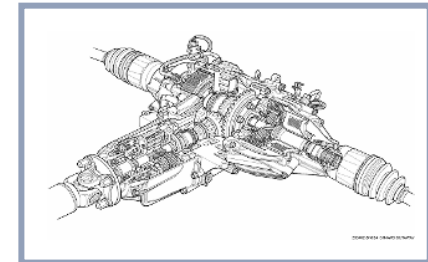
→ *Improve the driver's steering reactions*



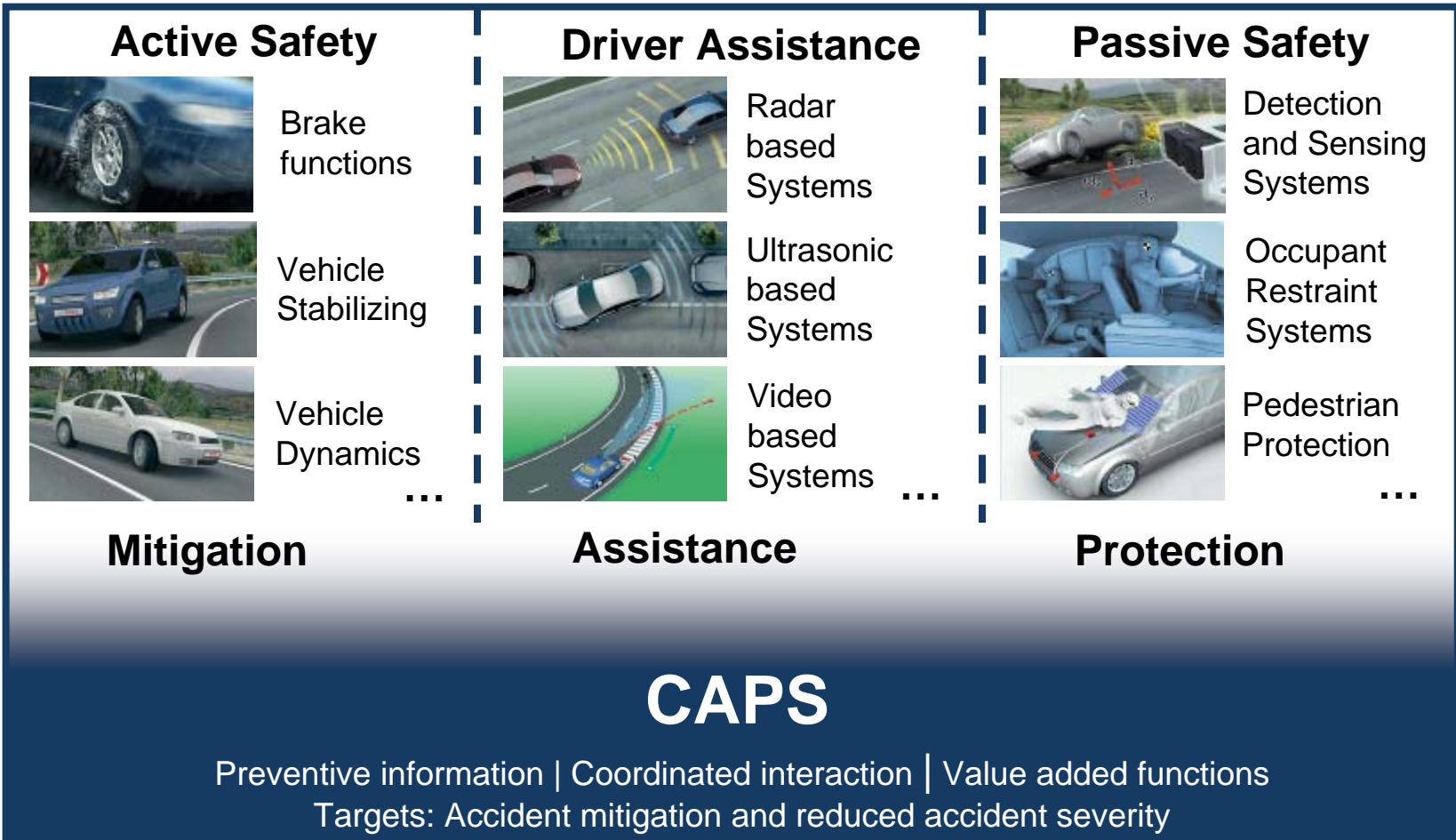
Dynamic Wheel Torque Control

Control of lateral torque distribution to gain agility and stability in certain situations

→ *Improve the sporty characteristics of a vehicle.*



CAPS – the route to a “Safer” Vehicle



CAPS multiphase safety concept

Risk phase



Increased risk: Brake preparation
Raise brake efficiency

PBA



High risk: Driver warning / Accident mitigation
Guide the drivers attention towards crash avoidance

PCW



Crash inevitable: Accident preparation
Prepare occupant protection, slow down vehicle

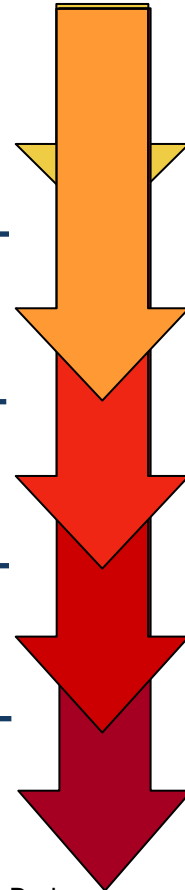
PEB



In-crash: Passenger protection
Optimize occupant protection



After-crash: Information
Inform rescue services, warn following traffic



PBA = Predictive Brake Assist PCW = Predictive Collision Warning PEB = Predictive Emergency Brake

Chassis Systems

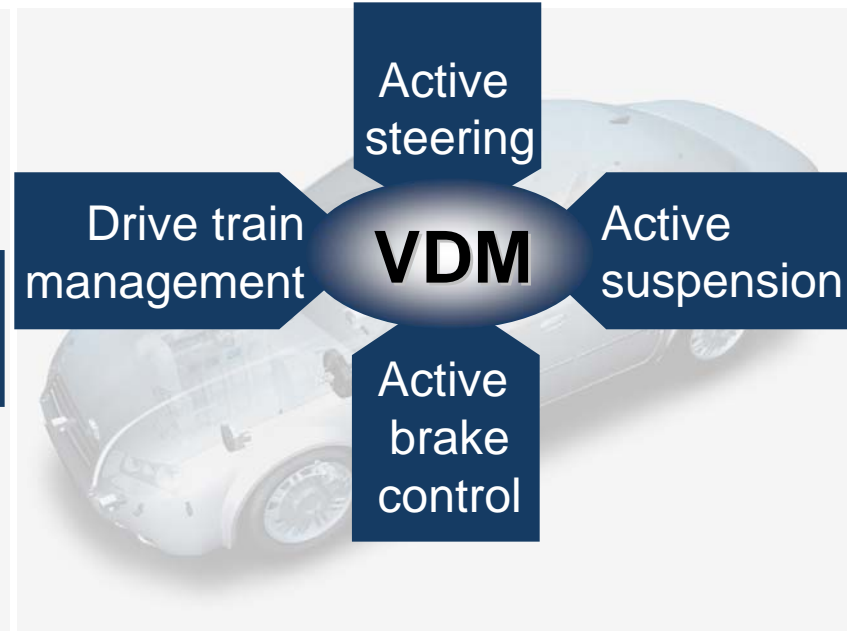


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The Future: System integration & networking



Combined Active and Passive Safety



Vehicle Dynamics Management

→ Improved agility, comfort & safety through functional expansion

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Could it happen ???



Chassis Systems



Thank you for your attention....

