



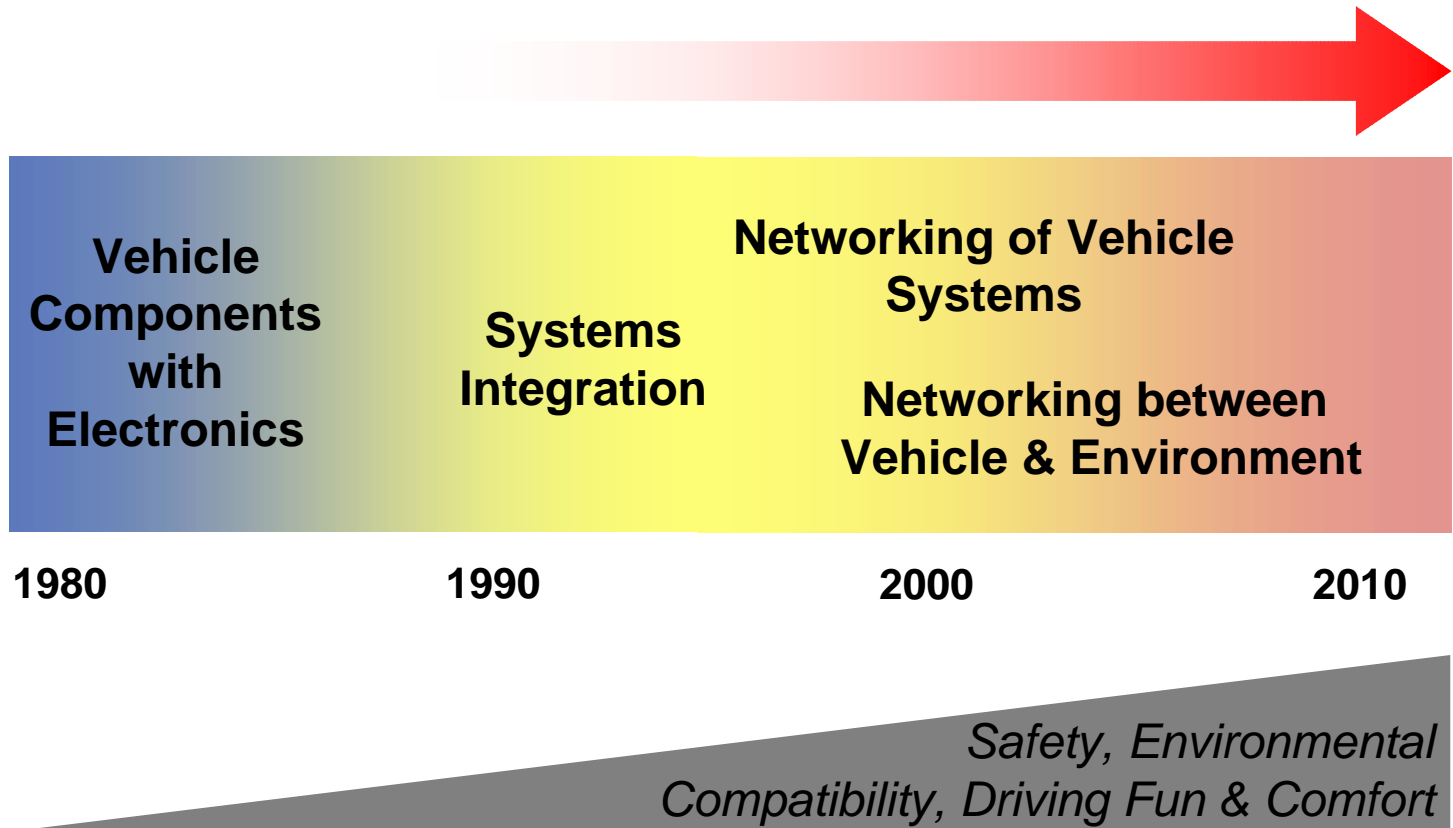
Drive by wire - what will be its impact on future vehicles?



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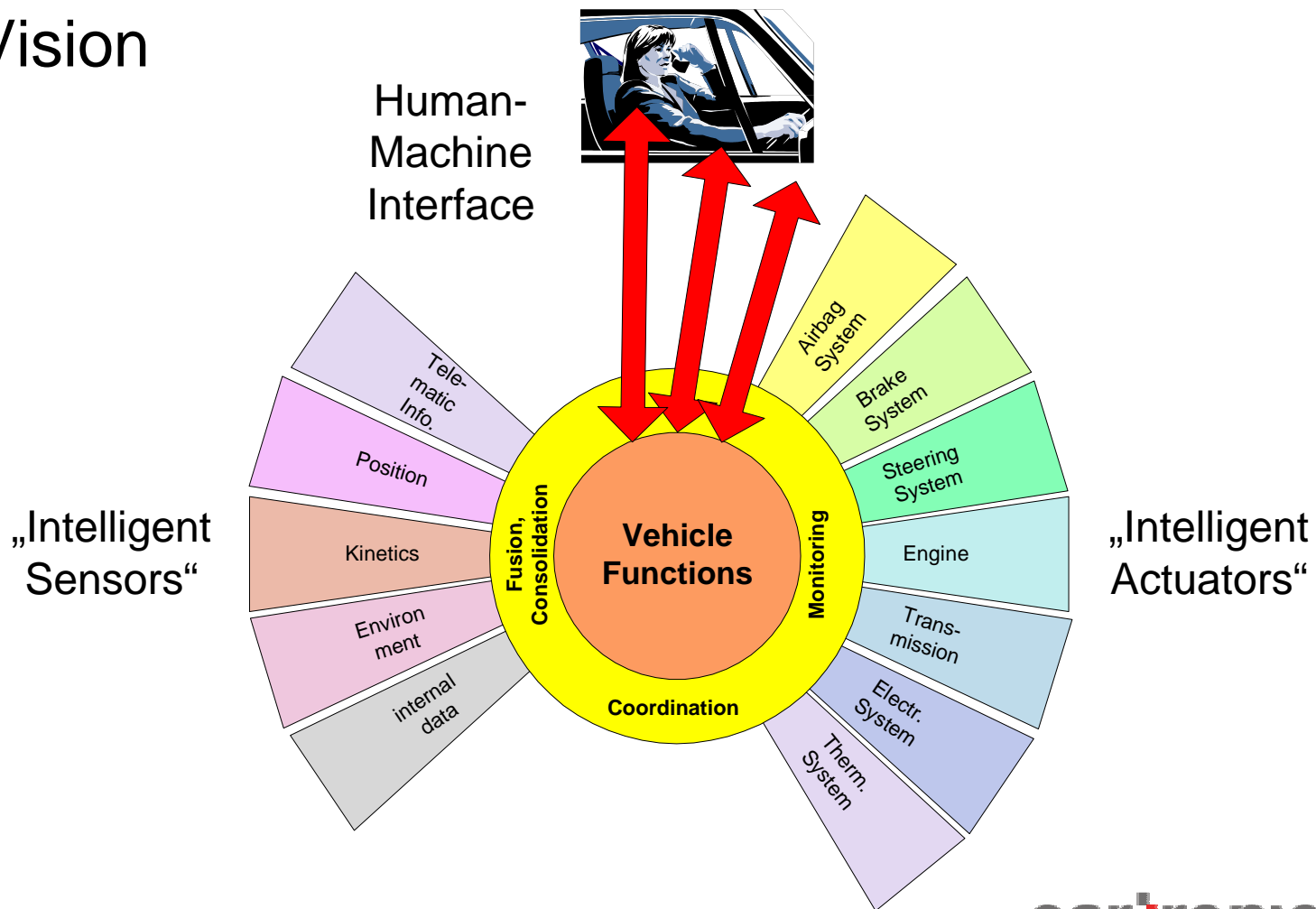


Towards the „Intelligent Vehicle“





Vision





Drivers and benefits

- Advanced powertrain and energy management
 - Advanced vehicle dynamics management
 - New driver assistance systems
 - adaptive cruise control
 - autonomous parking
 - lane-keeping support
 - Removal of mechanic/hydraulic links
- Less emissions and fuel consumption
 - More driving safety
 - Added comfort
 - Accident prevention
 - Improved packaging



By-wire systems are already here!

→ **Accelerate-by-wire**

Introduction 1999

Bosch ME7 with E-Gas



→ **Shift-by-wire**

Introduction 2001

ZF 6HP26 with Bosch electronics



→ **Brake-by-wire**

Introduction 2001

Bosch electro-hydraulic brake (EHB)



= **Complete by-wire longitudinal control available today**



Technical requirements and solutions

- Clear systems architecture with transparent functional, software and hardware interfaces
- Highly reliable data transmission networks
- Highly reliable electrical energy supply
- Highly reliable sensors and actuators
- New, easy-to-learn user interfaces

- CARTRONIC, OSAR, ...
- FLEXRAY
- Electronic power management with back-up storage and redundancies
- integrated mechatronic solutions, distributed processing, redundancy, monitoring, fall-back functions



Technical solutions are on the way, but...

- Which by-wire based functions will consumers really demand ?
- Will the driver ask or accept new human-machine interfaces ?
- Who will to pay for by-wire related higher product development and manufacturing costs ?
- How to handle the added complexity in the development process ?