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Joint EC / EPoSS / ERTRAC Expert Workshop 2011  
Electric Vehicle System Integration and Architecture

# Crucial Role of ICT for the Reinvention of the Car

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Berlin, June 30, 2011

Based on a study funded by



Federal Ministry  
of Economics  
and Technology



# eNOVA Strategy Board for Electric Mobility

[www.strategiekreis-elektromobilitaet.de](http://www.strategiekreis-elektromobilitaet.de)



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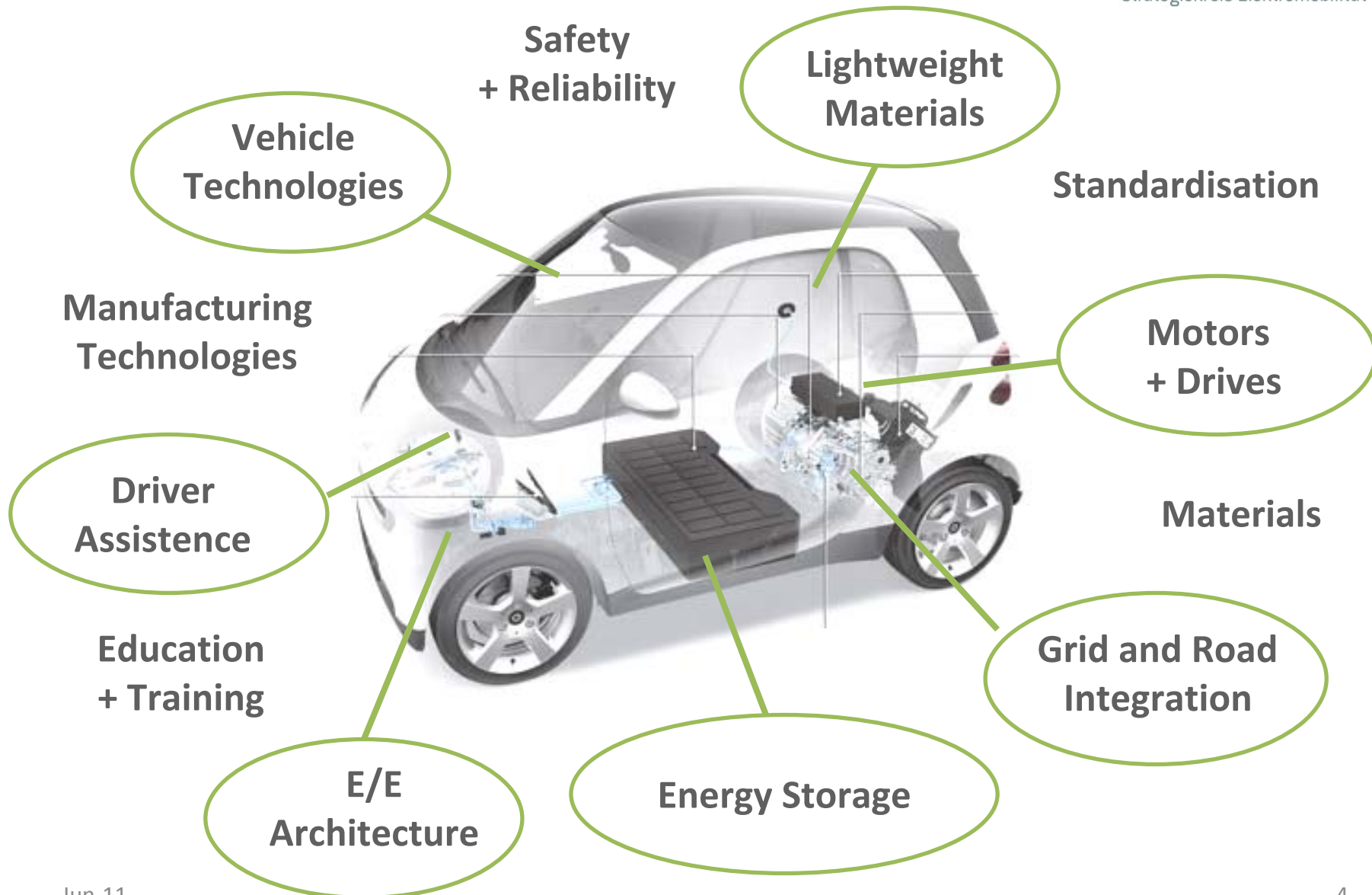
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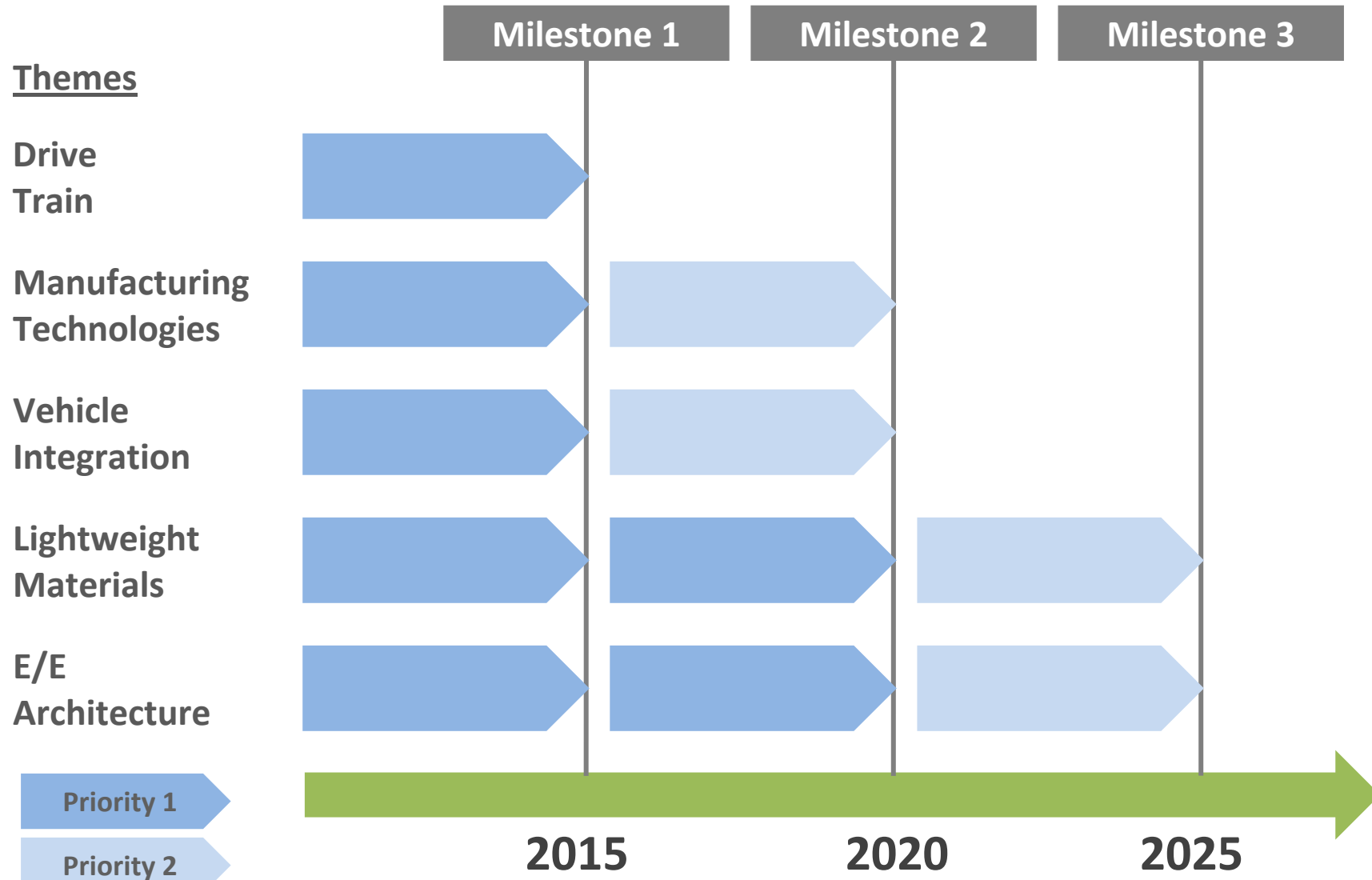
# Involved Stakeholders



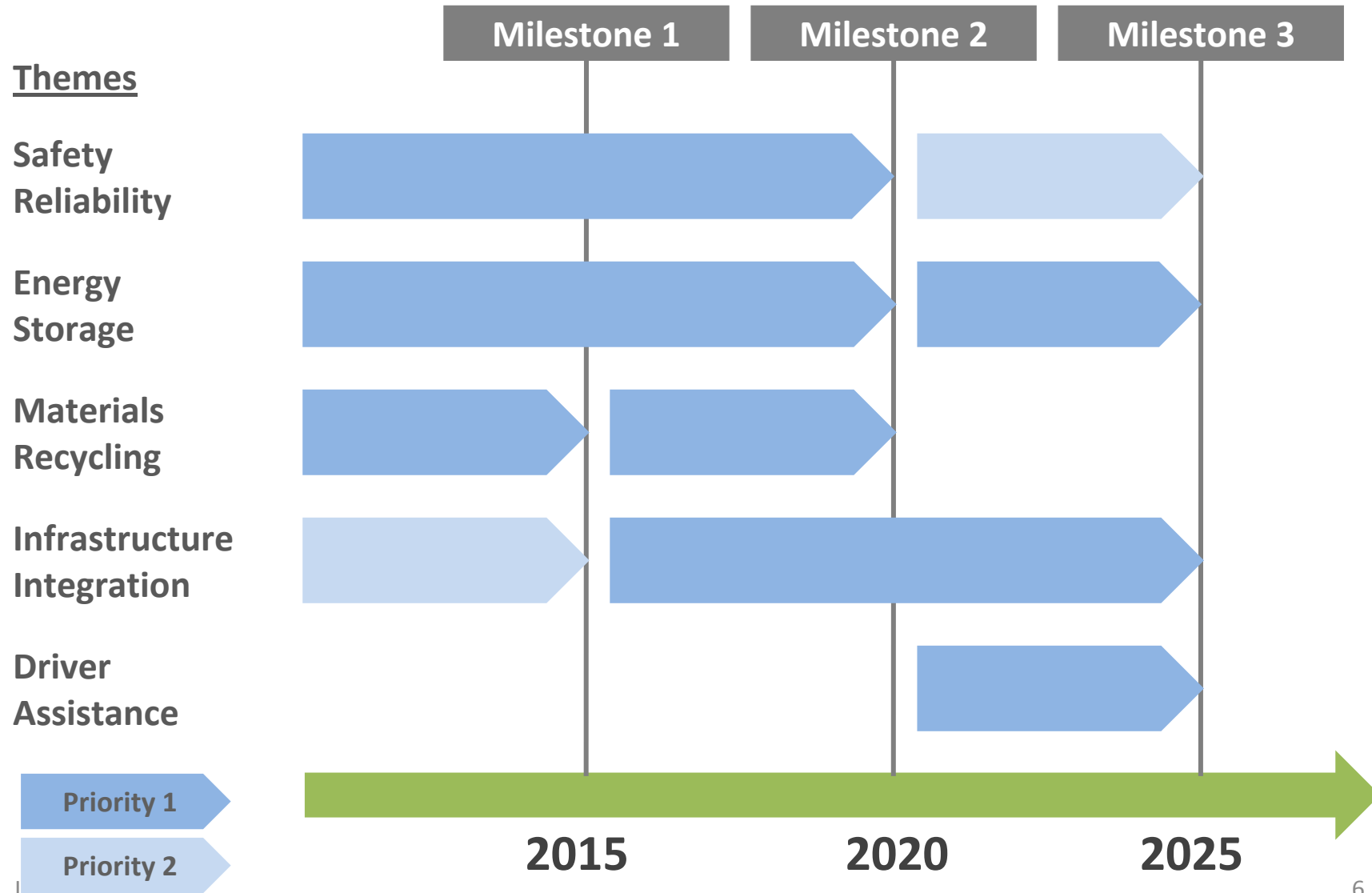
# Topics



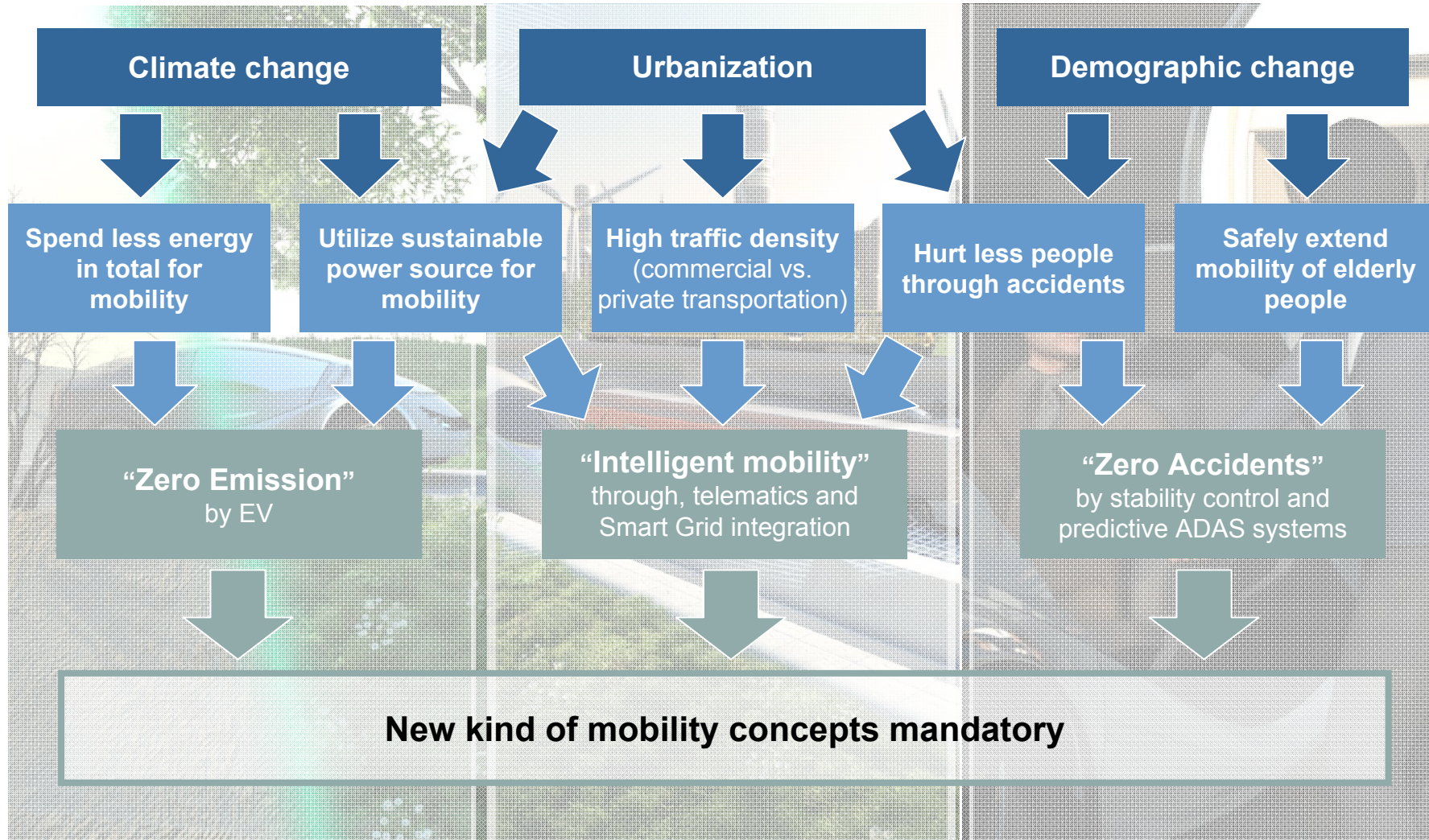
# Roadmap Part 1



# Roadmap Part 2



# Global Megatrends strongly influence the future of mobility



## “Zero Emission” can be achieved with electric vehicles

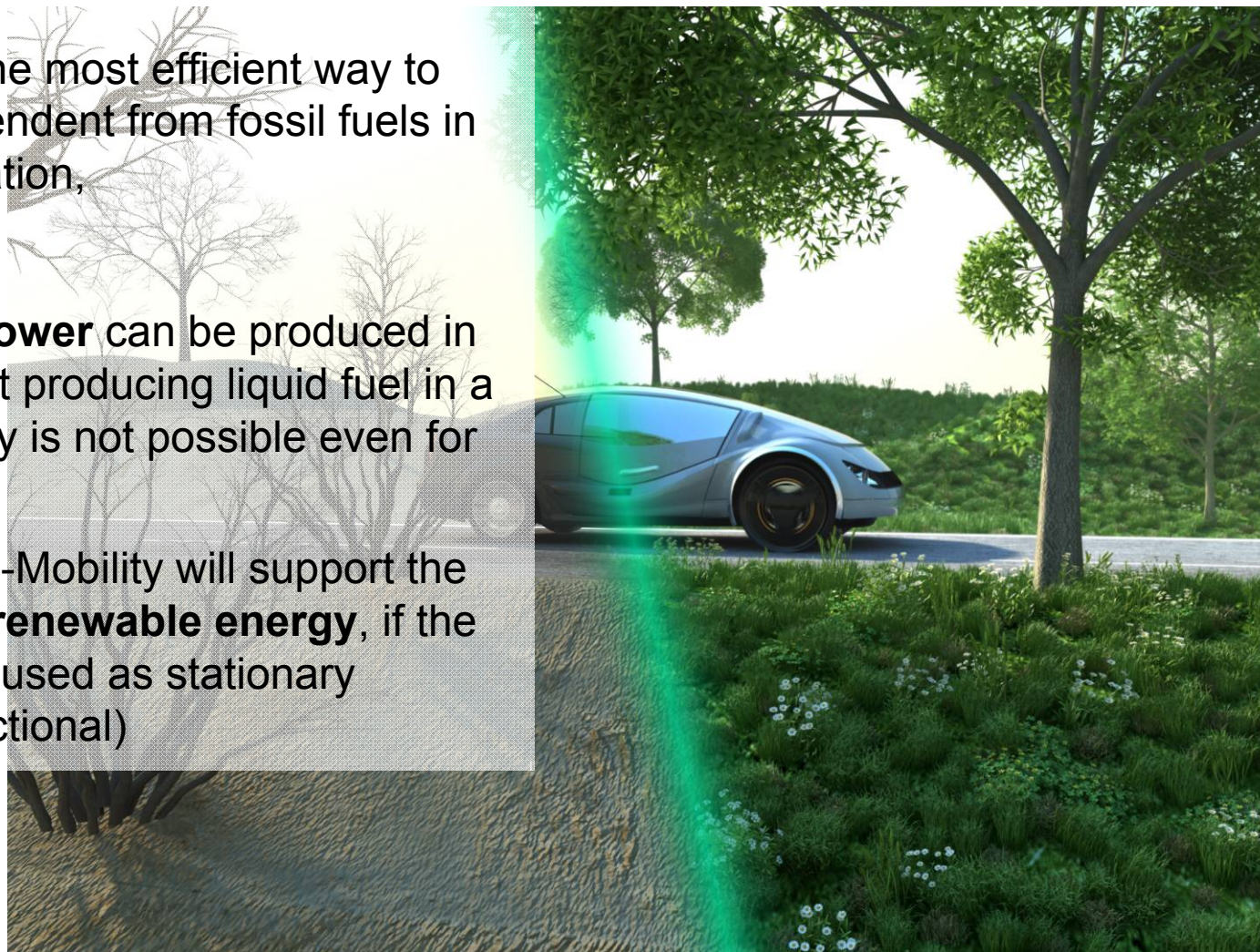
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**E-Mobility** is the most efficient way to become independent from fossil fuels in road transportation,

because

**Sustainable power** can be produced in many ways, but producing liquid fuel in a sustainable way is not possible even for today’s fleets.

Furthermore, E-Mobility will support the **expansion of renewable energy**, if the car’s battery is used as stationary storage (bidirectional)





**“Intelligent Mobility” means that the vehicle becomes a part of a greater service network**

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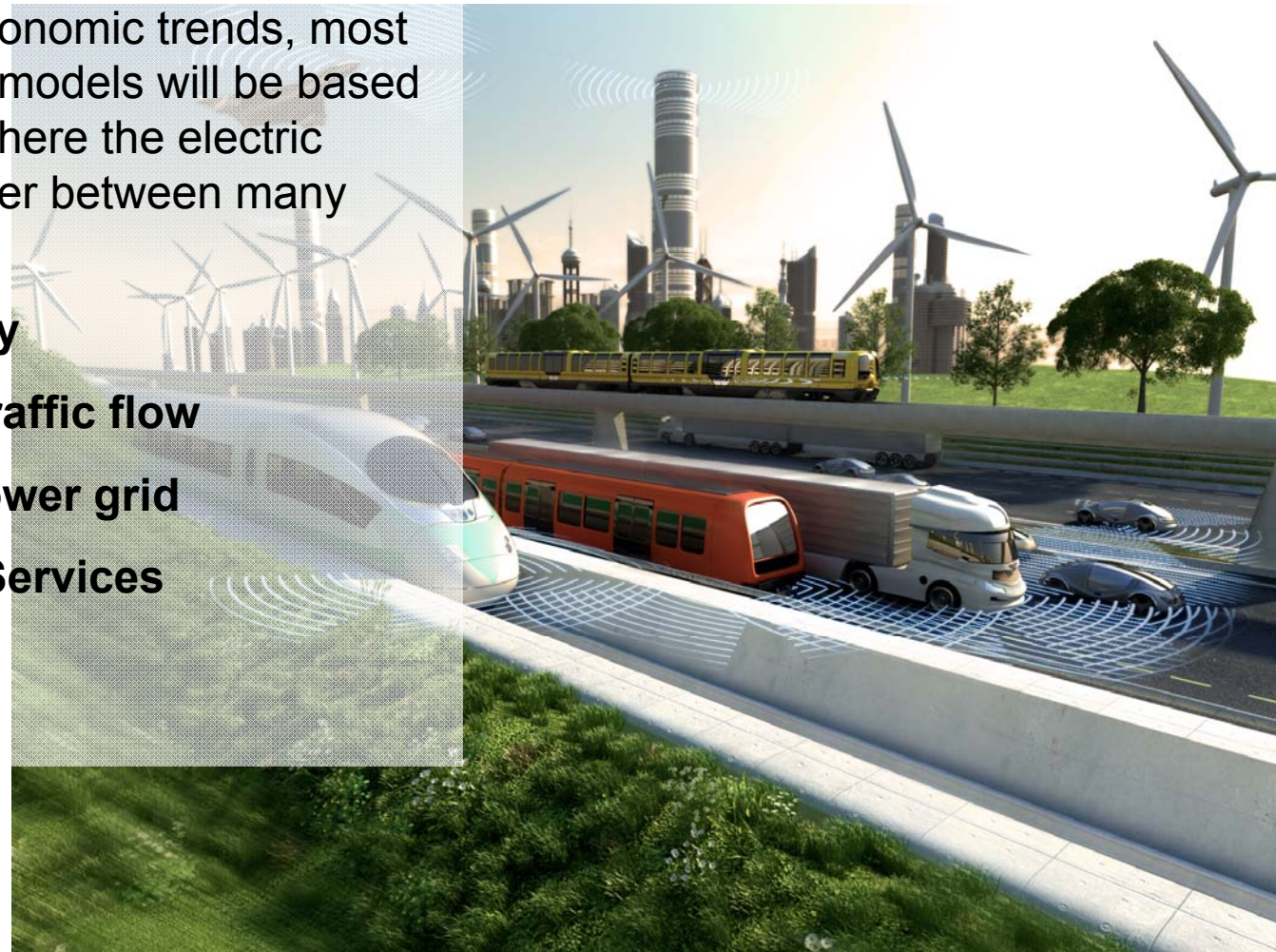
Driven by socio economic trends, most of future business models will be based on new services where the electric vehicle is one player between many others:

**Seamless Mobility**

**Optimization of traffic flow**

**Stabilizing the power grid**

**Location Based Services**



**“Zero Accidents“ becomes attractive if safety is combined with comfort**

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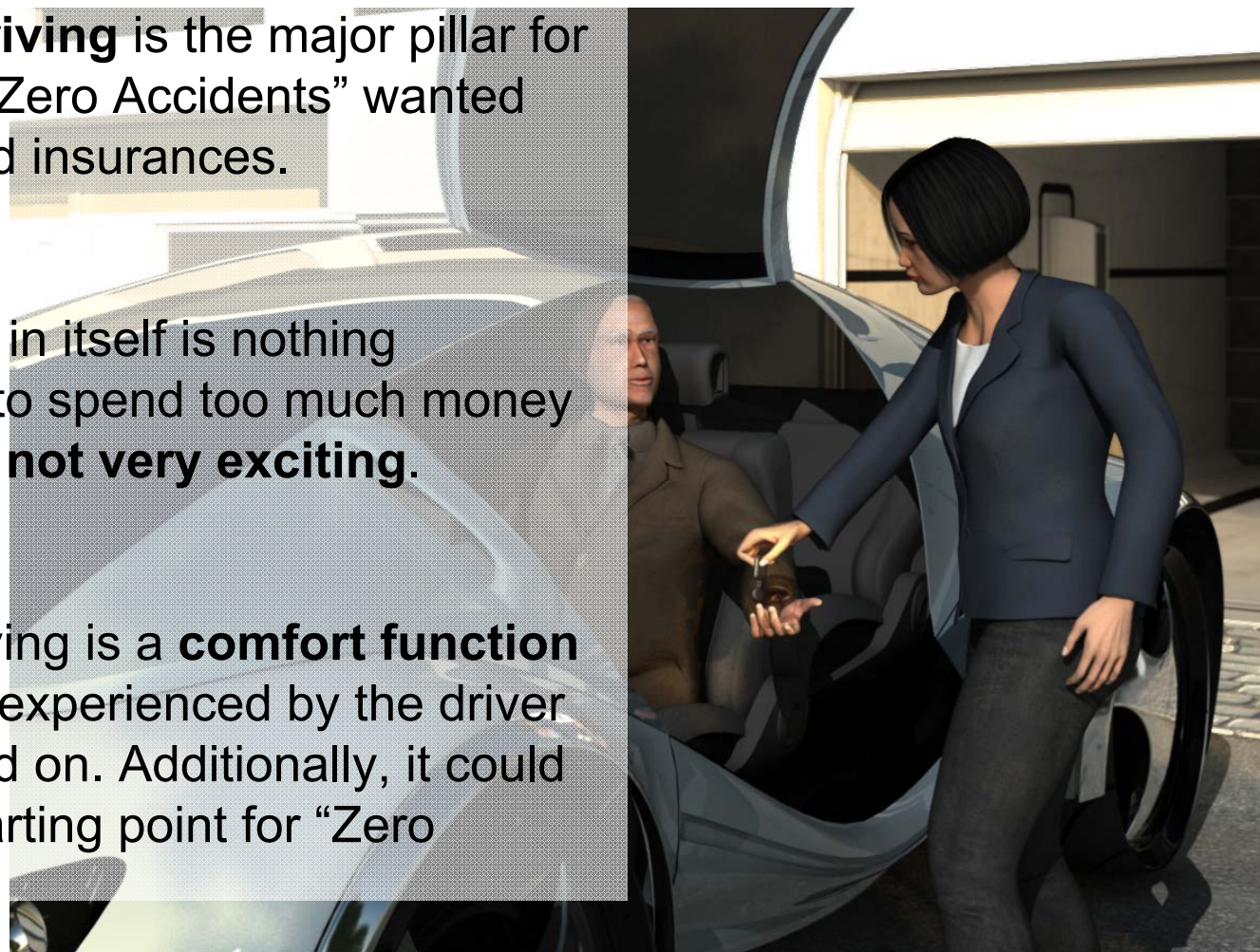
**Autonomous driving** is the major pillar for getting close to “Zero Accidents” wanted by legislators and insurances.

**But**

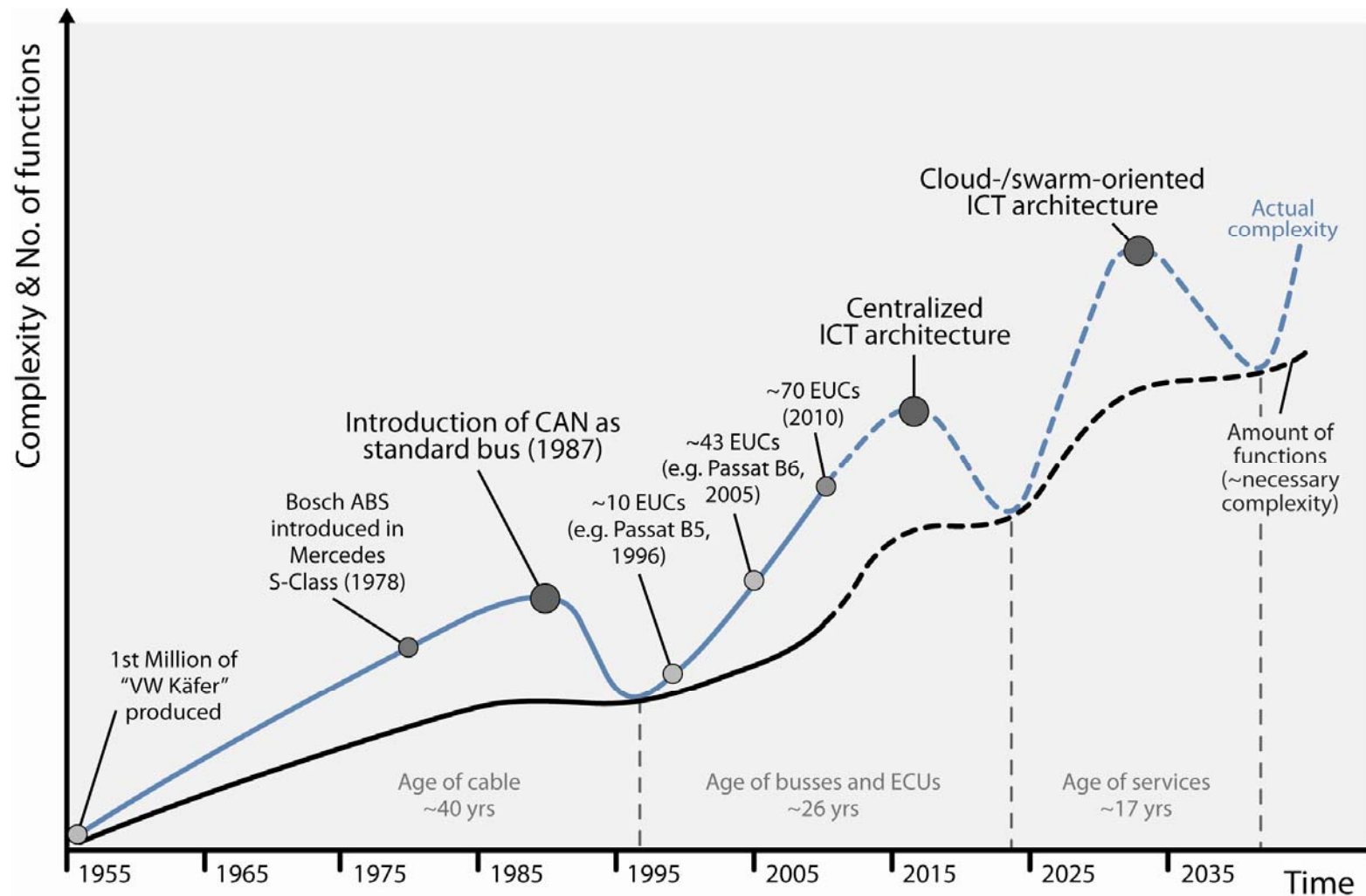
“Zero Accidents“ in itself is nothing customers want to spend too much money for, because it is **not very exciting**.

**Solution**

Autonomous driving is a **comfort function** and thus can be experienced by the driver as a valuable add on. Additionally, it could be the basis and starting point for “Zero Accidents”.

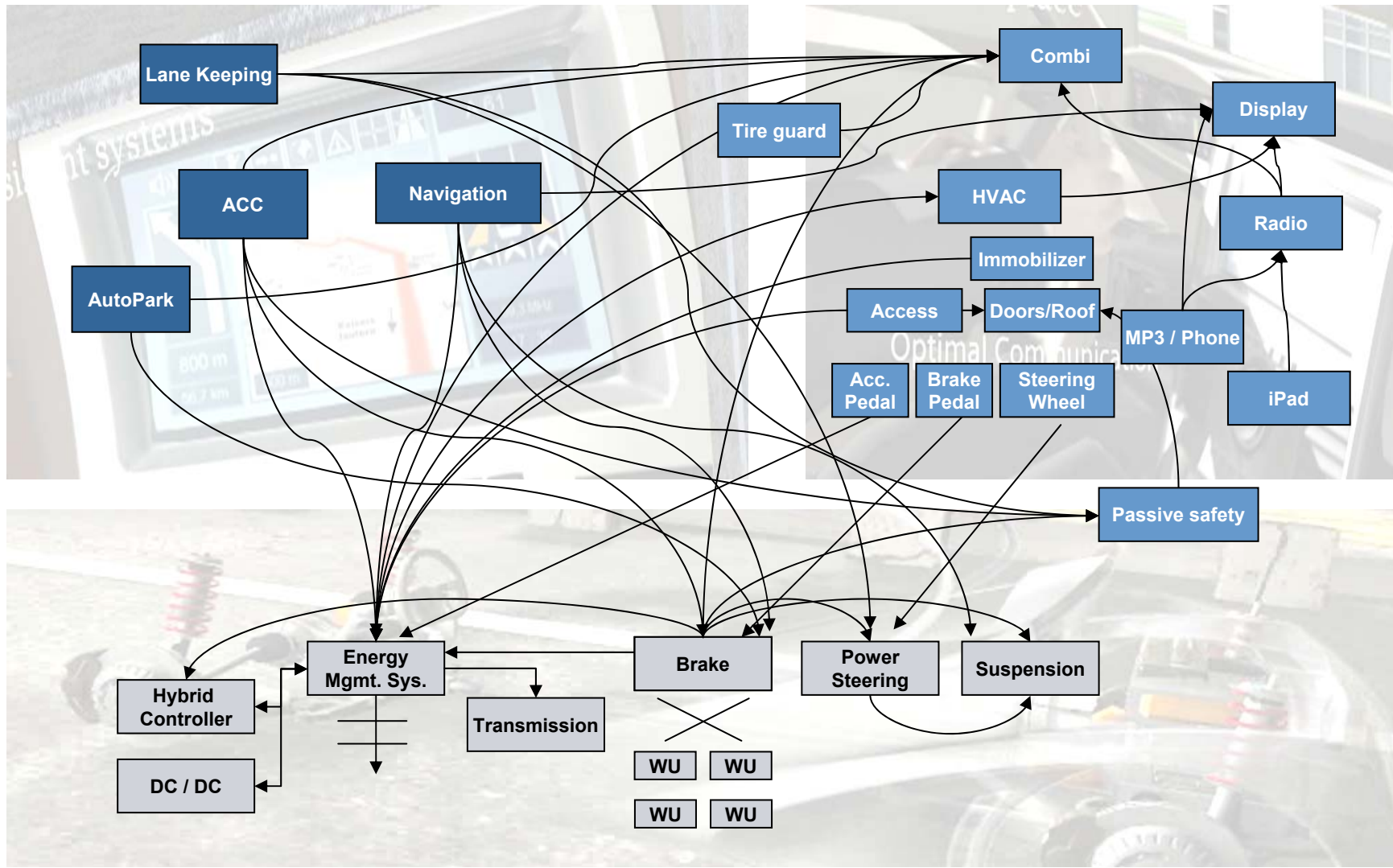


# One major driver of today's system architecture is the Evolution of complexity



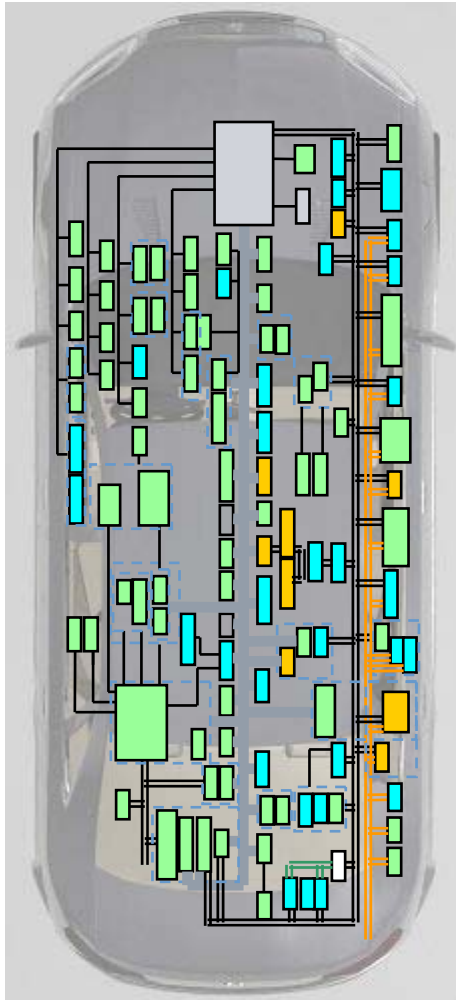
Source: "The Software Car: Information and Communication Technology as an Engine for the Electromobility of the Future", page 48

# An ever increasing inter dependability reaching the limits of integration for an affordable price

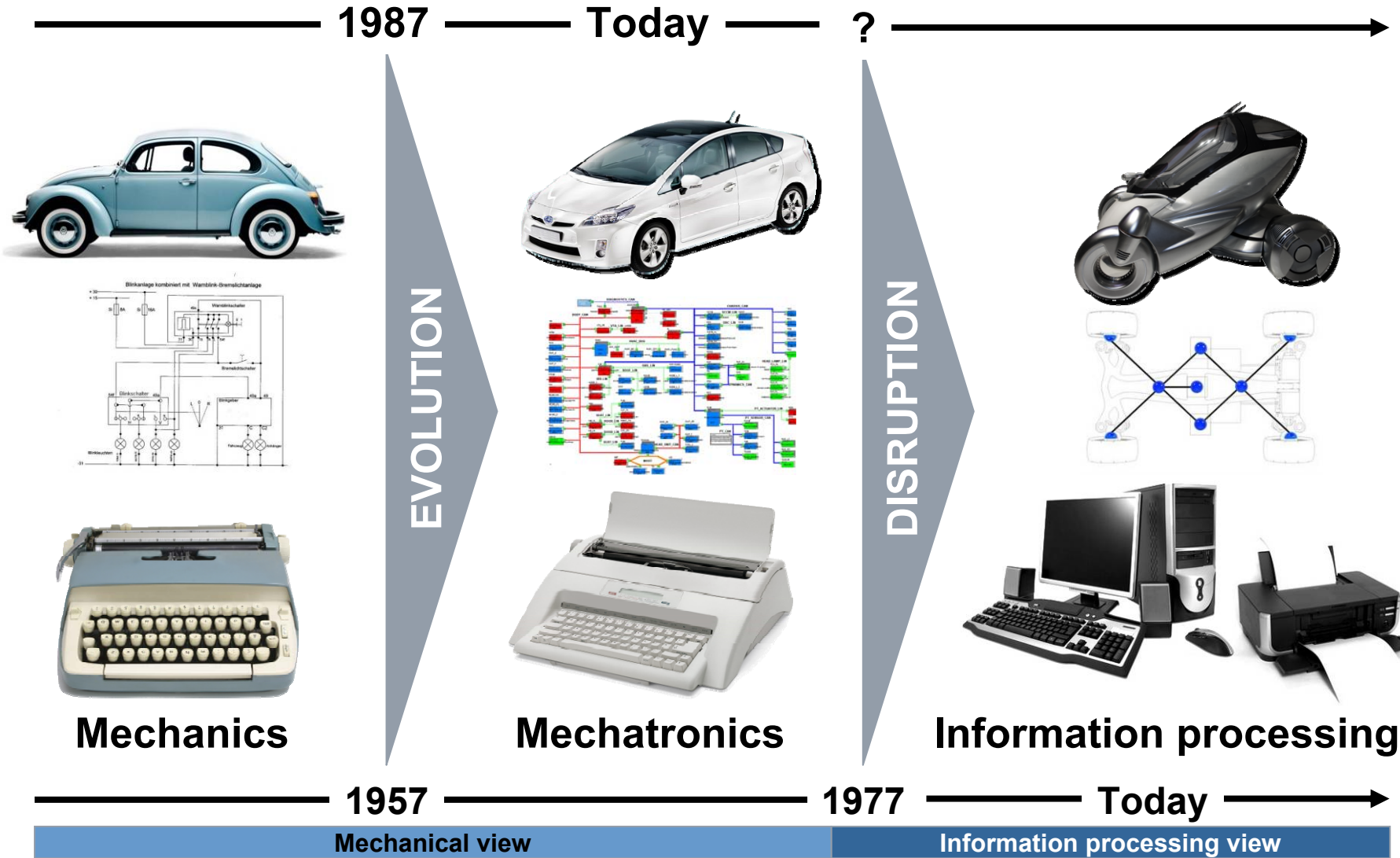


**Physical complexity, power consumption and installation space used drives the integration of new functions to the limit**

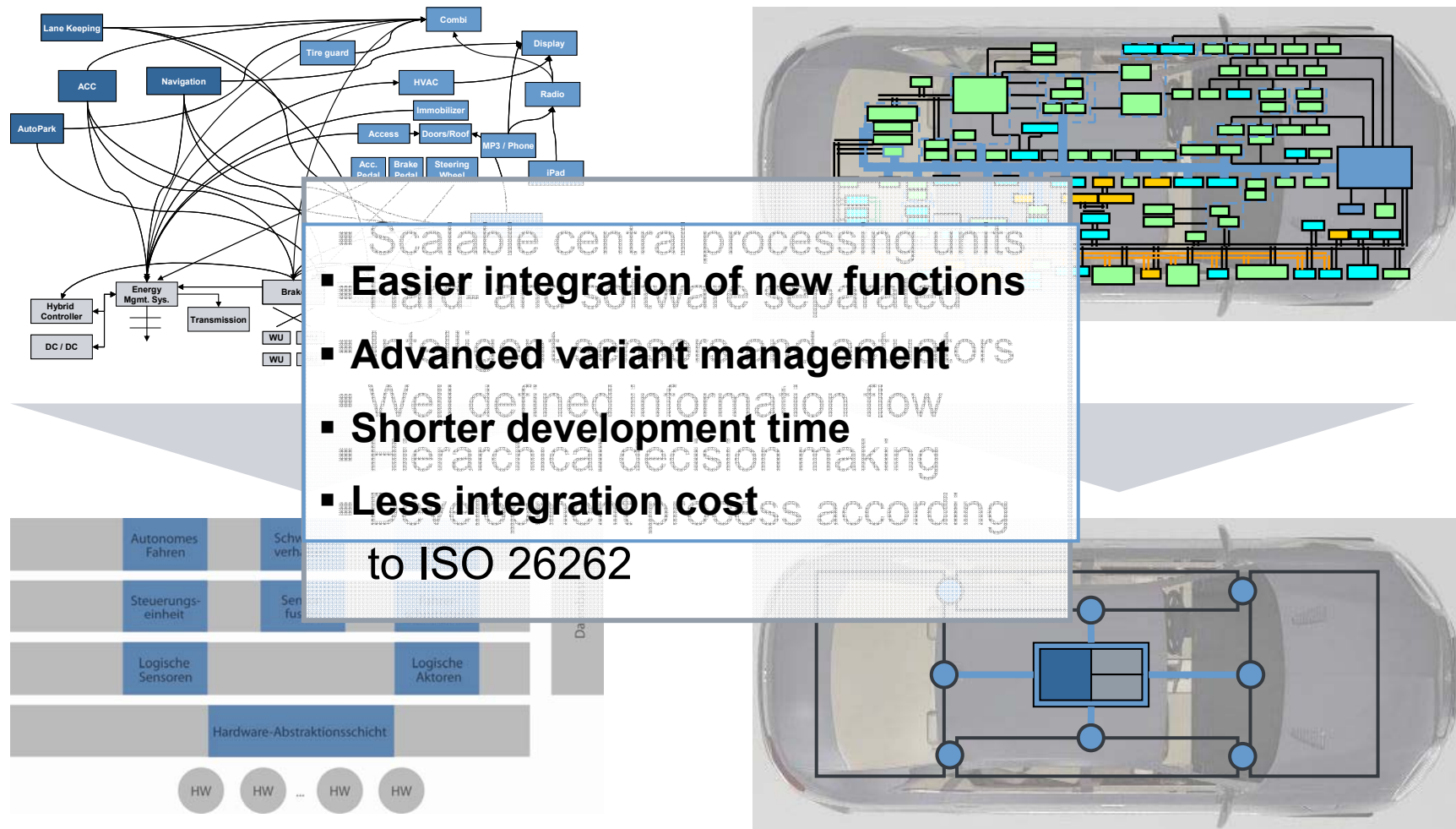
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**Time for a change – it happened before**

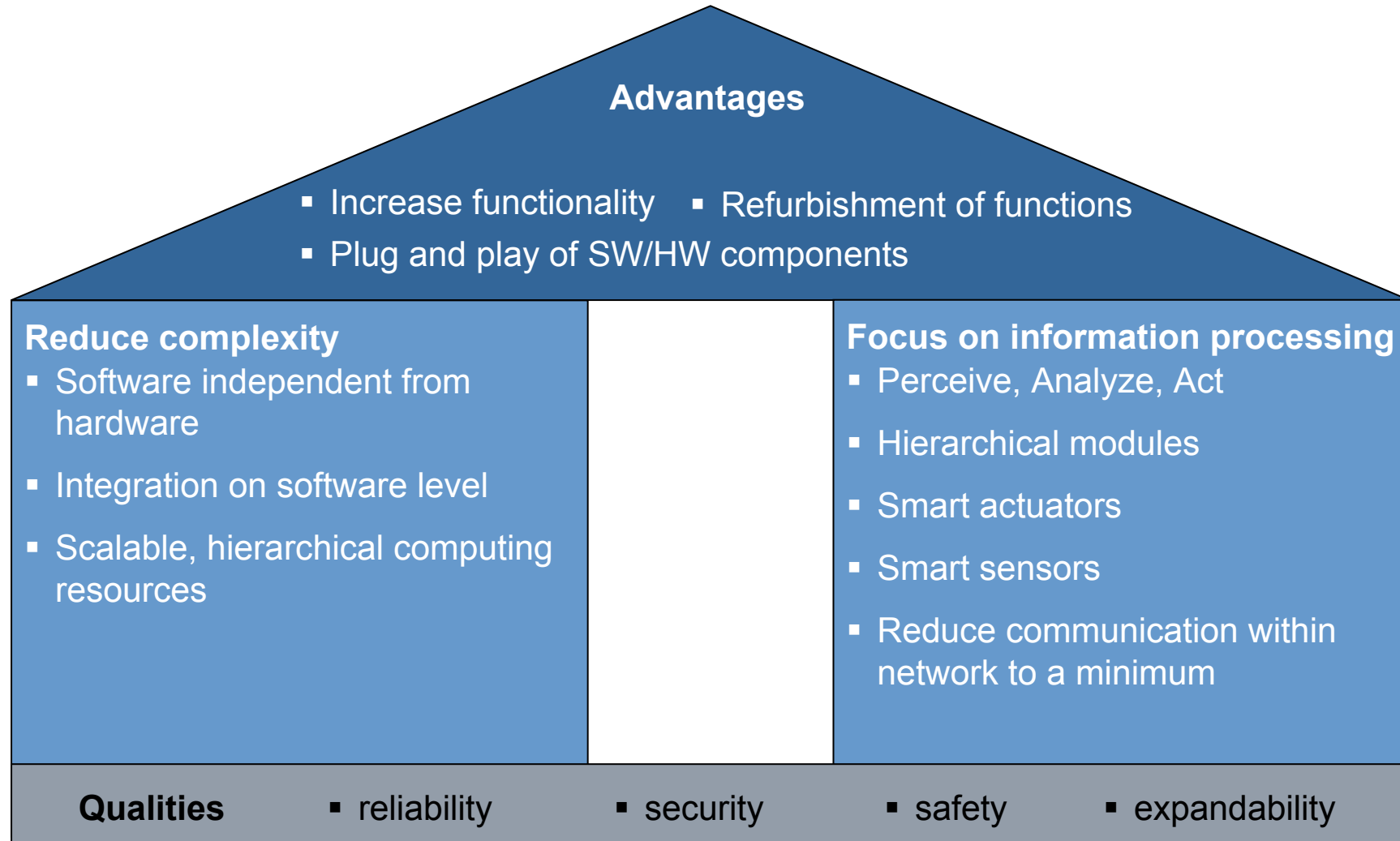


To cope with the challenges, mentioned before, a new kind of System Architecture is mandatory



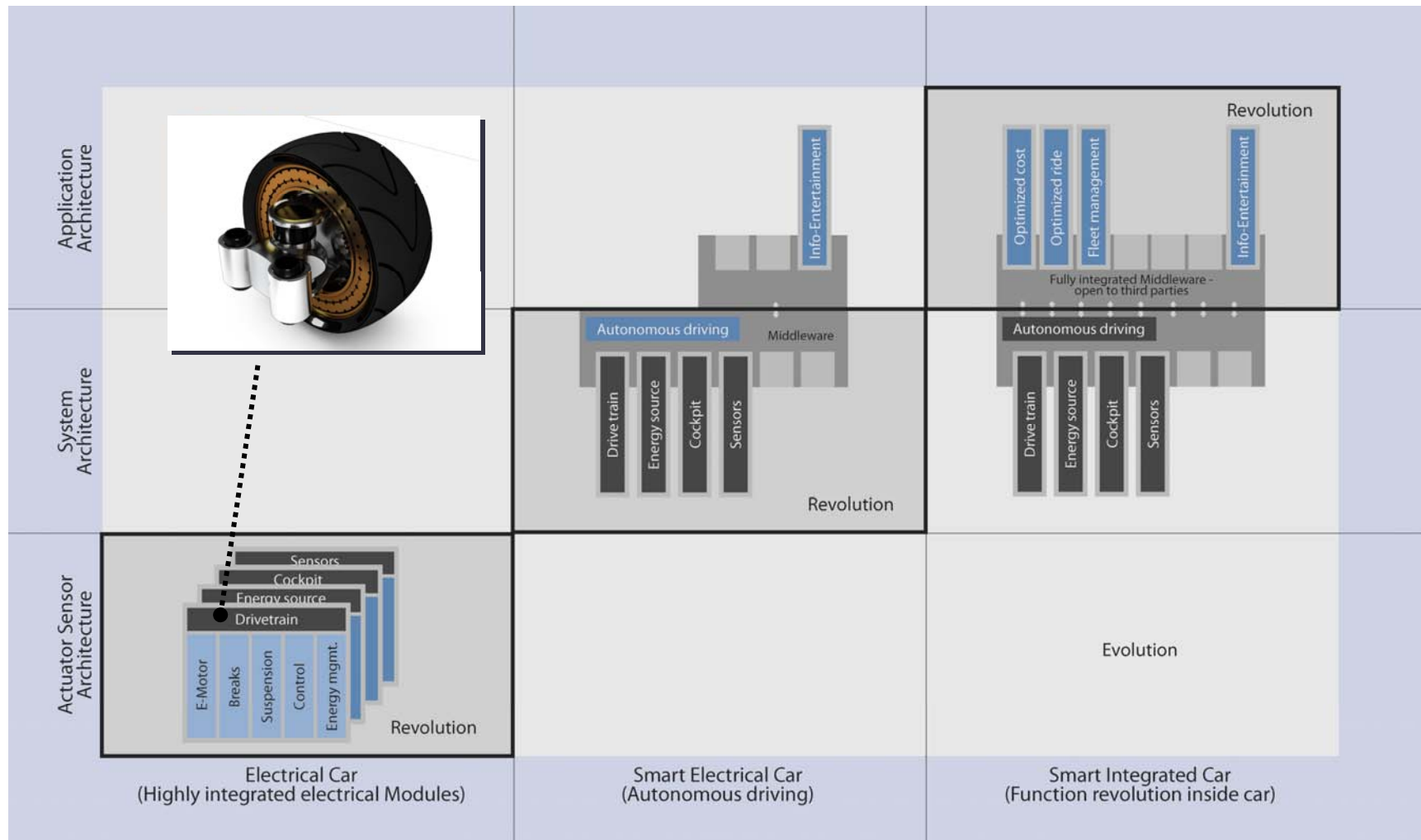
\*Symbolic pictures

**Conclusion of architectural goals**





# Revolutionary steps driven by integration and new ICT system architecture

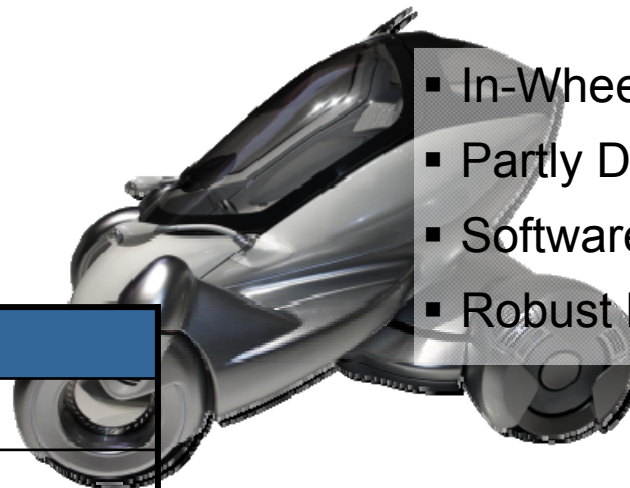
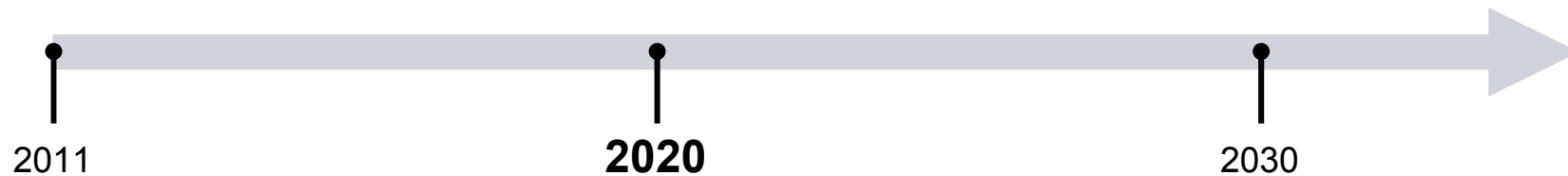


Source: "The Software Car: Information and Communication Technology as an Engine for the Electromobility of the Future", page 49

# Influences of a new system architecture on the automotive industry (1)

## Scenario „Low Function / Low Cost“

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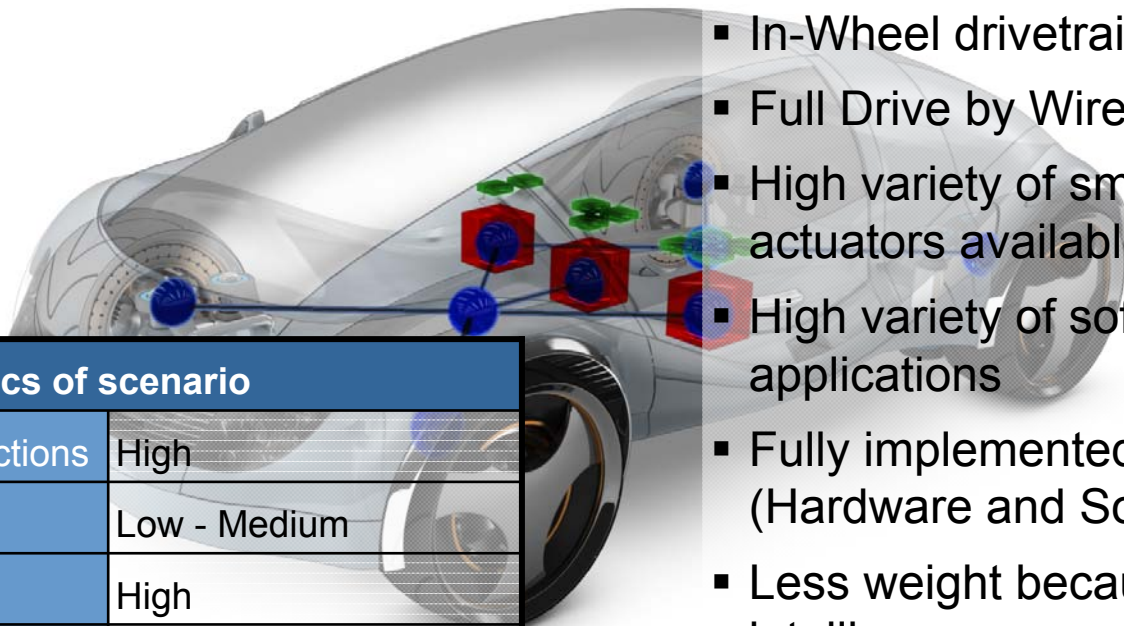


- In-Wheel drivetrain
- Partly Drive by Wire
- Software partly exchangeable
- Robust but simple chassis

Characteristics of scenario	
Variety of functions	Low - Medium
Cost	Low
Extendibility	Low - Medium
Integration effort	Low
Market	Low price segment

# Influences of a new system architecture on the automotive industry (2)

## Scenario „High Function / Low Cost“



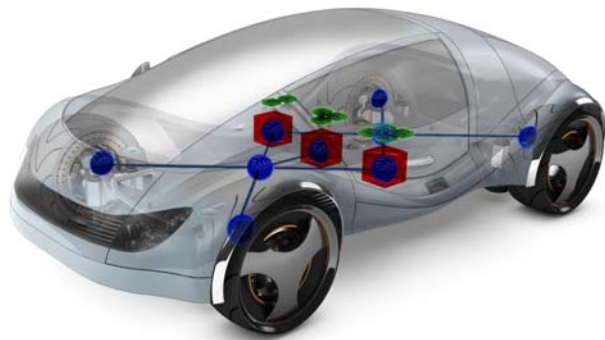
- In-Wheel drivetrain
- Full Drive by Wire
- High variety of smart sensors and actuators available
- High variety of software applications
- Fully implemented plug'n play (Hardware and Software)
- Less weight because of predictive intelligence

Characteristics of scenario	
Variety of functions	High
Cost	Low - Medium
Extendibility	High
Integration effort	Low
Market	All price segments

**A new kind of system architecture will change the automotive landscape...**

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**...and be the basis for further embedded systems**



**Download link for the executive summary:**

**[www.fortiss.org](http://www.fortiss.org)**

