

thyssenkrupp fejlesztések

az autonóm járművek területén

thyssenkrupp developments in autonomous vehicles

29.08.2018 | Dr. Naszádos László
thyssenkrupp Steering

engineering.tomorrow.together



thyssenkrupp

Content

thyssenkrupp introduction

Trends in the automotive industry

thyssenkrupp developments in autonomous vehicles



Content

thyssenkrupp introduction

Trends in the automotive industry

thyssenkrupp developments in autonomous vehicles





thyssenkrupp: a technology company

80 countries, 160.000 employees




We develop the future

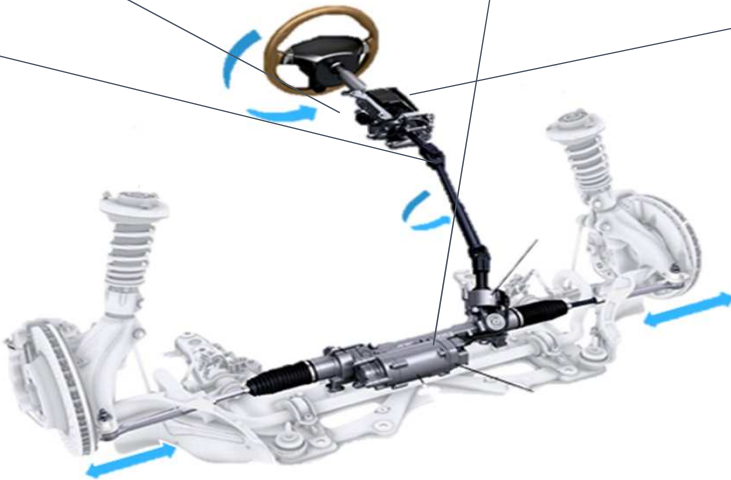
thyssenkrupp Steering is a wheel-to-wheel supplier for steering systems

thyssenkrupp
160'000 Employees, 43 billion Euro/anno

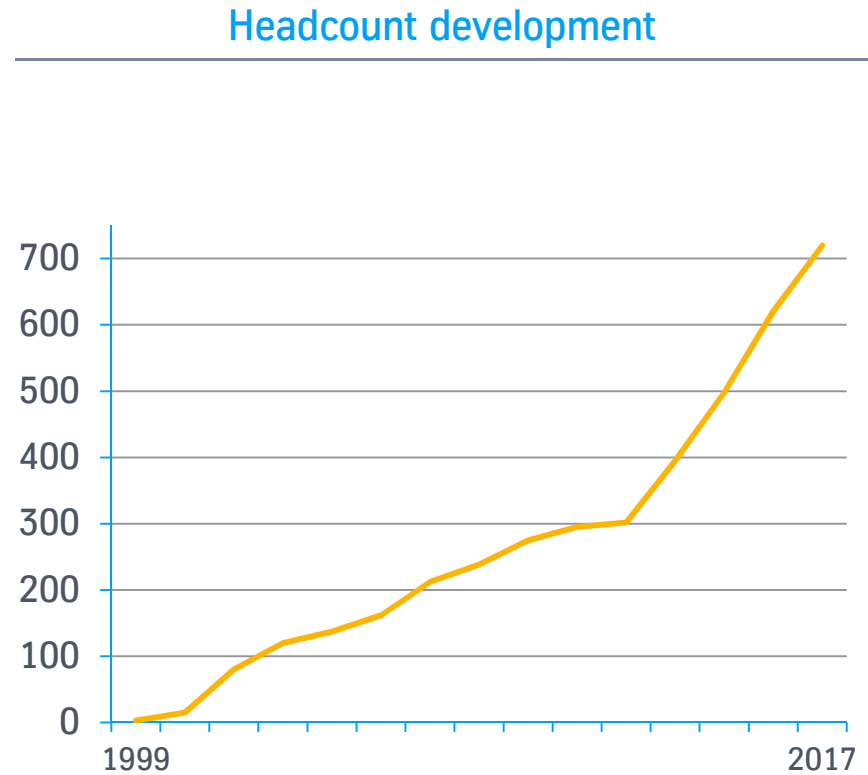
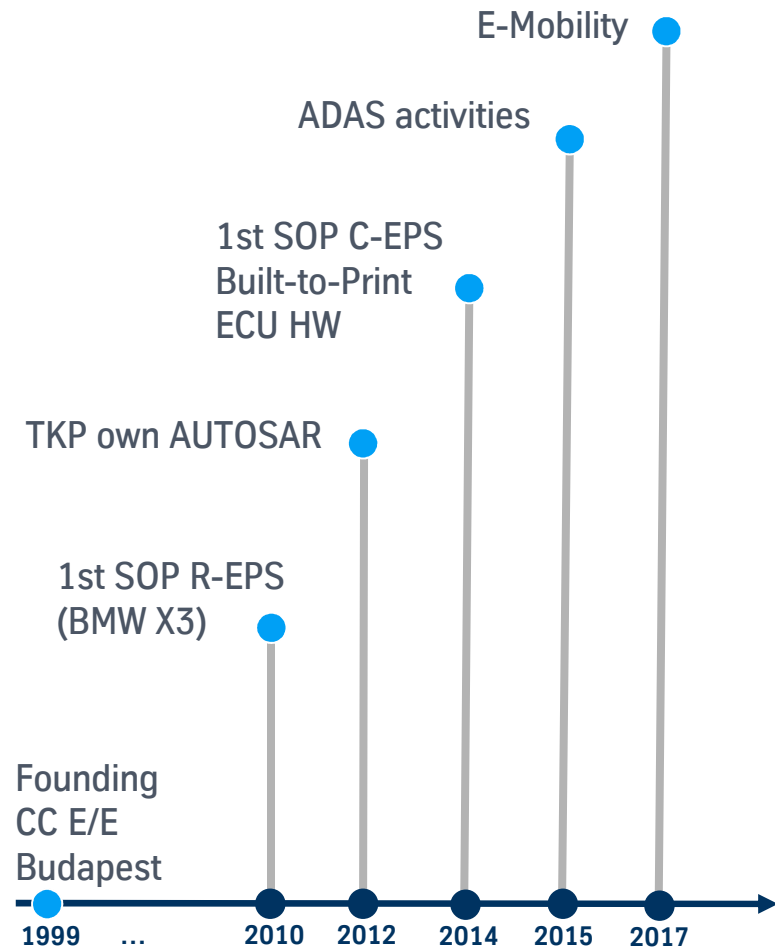
Elevator	Industrial	Components Technology	Material Services	Steel Americas	Steel Europe
----------	------------	-----------------------	-------------------	----------------	--------------

thyssenkrupp Steering
7'400 Employees, 1.7 Billion Euro/anno

Cold-Forging	Steering Column	Steering Gear	Column-EPS
			



History and future technology – thyssenkrupp Presta Hungary



Continues growth in know-how, technology and responsibility



Content

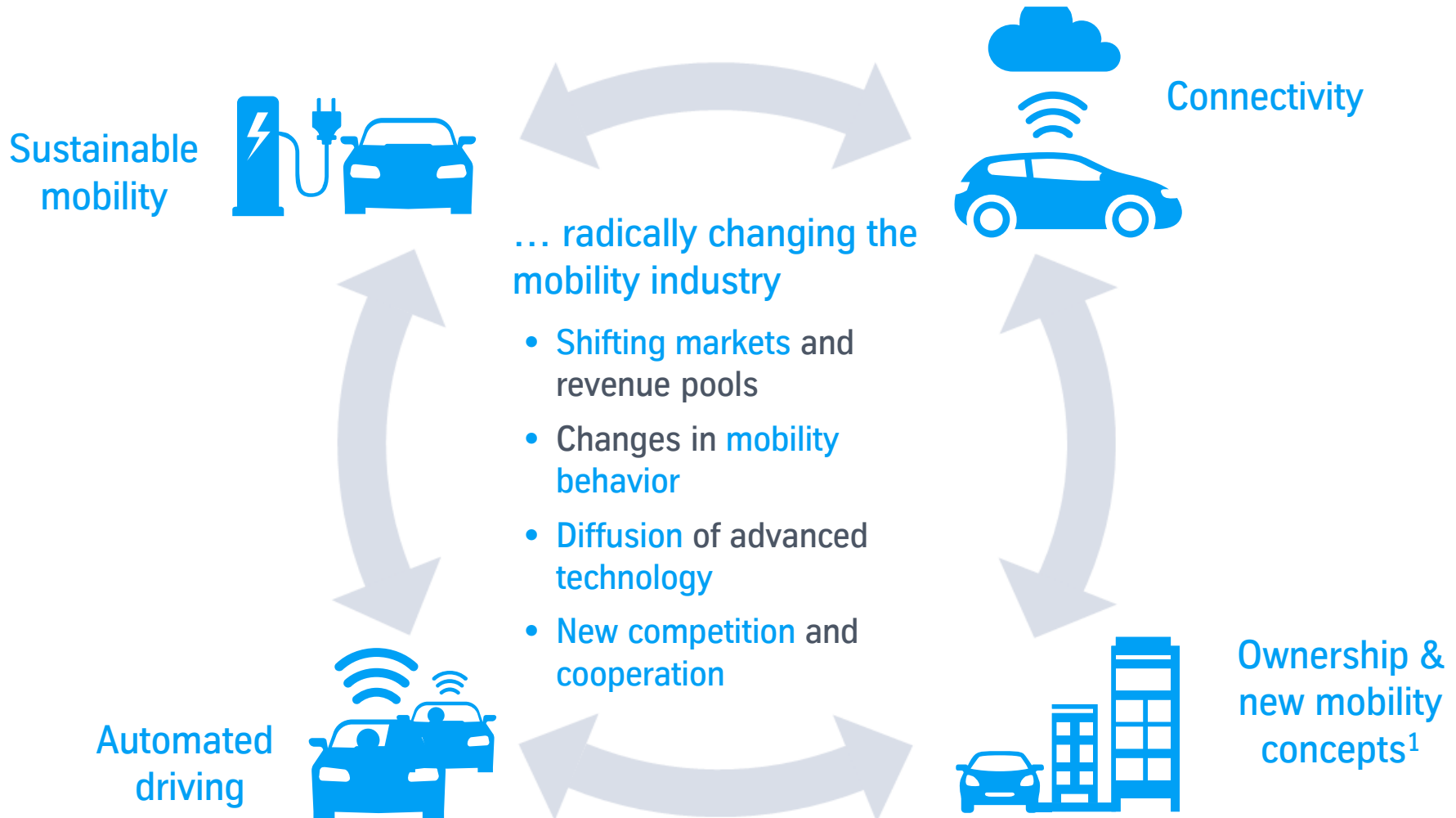
thyssenkrupp introduction

Trends in the automotive industry

thyssenkrupp developments in autonomous vehicles



The automotive industry faces 4 big technology-driven trends



Autonomous

Daimler: “large-scale production [...] 2020-2025”

All major OEMs with \geq Level 3 AD by 2021

accelerated



Trends

stable



Pushed by driver assistance & safety

+35% CAGR, exponential market penetration

Electrified

BMW: 25 electrified vehicles by 2025 – 12 all-electric

GM: 2 new EVs within 18 months, 20 within 5 years

accelerated



stable



Pushed by regulation & concepts of new players

China generates biggest revenue pool: US\$22 bn

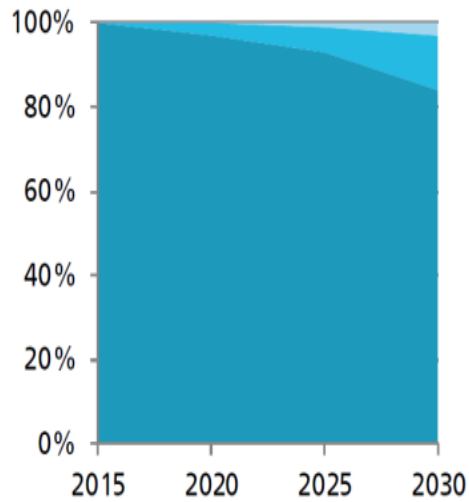
Connected

Shared



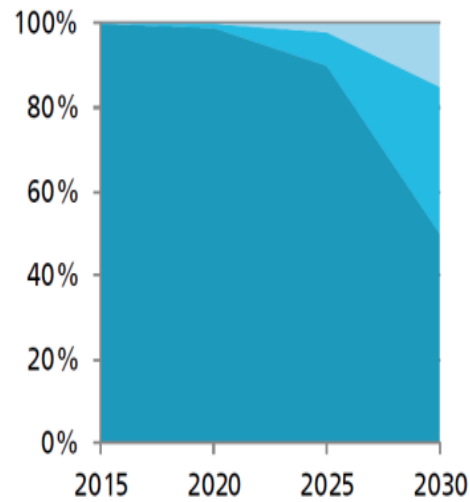
Automated cars: Shares of global sales

Scenario A



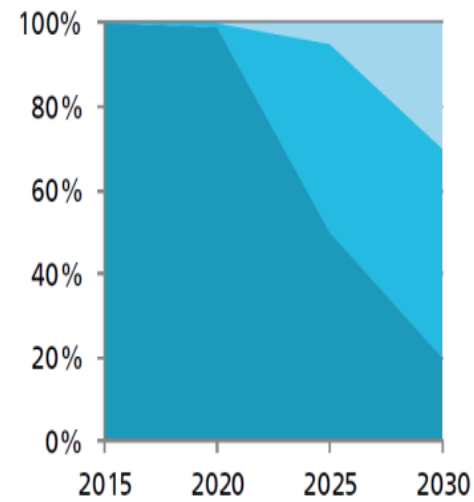
AlixPartners 2016

Scenario B



McKinsey 2016

Scenario C



Fraunhofer

- high up to full automation
- conditional automation
- No up to partial automation



Content

thyssenkrupp introduction

Trends in the automotive industry

thyssenkrupp developments in autonomous vehicles



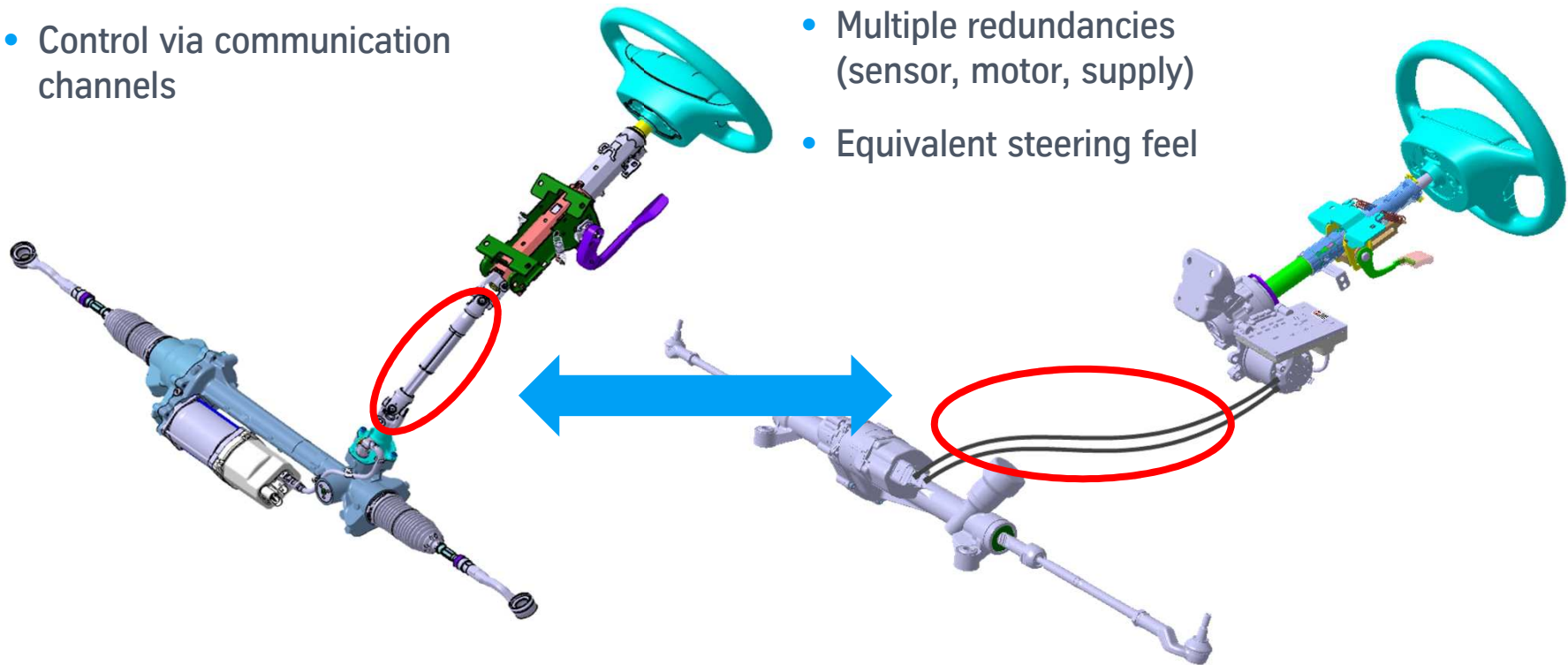
Steer by Wire: Steering systems of autonomous vehicles

Possibilities

- Flexible assembly
- Speed dependent steering ratio
- Control via communication channels

Challenges

- Higher safety and availability requirements
- Multiple redundancies (sensor, motor, supply)
- Equivalent steering feel



Steer by wire systems fulfill most of the steering requirements for autonomous vehicles



New requirements of steering systems in Autonomous Vehicles

Higher safety, higher reliability

Functional safety

- Traditional cars: In case of error, system can shut down. Driver is the backup



- New requirement: Even in case of multiple error, the system must go on. Driver can not take over the control

Cyber security

- Increased importance of communication and the autonomous behavior require higher security level



Autonomous vehicles require higher level safety and security in all components



IVDC: Integrated Vehicle Dynamic Control

In traditional vehicles the drivers responsible for all roles

PERCEPTION

COGNITION

ACTION



Based on the perception, driver plans the route and controls all actuators



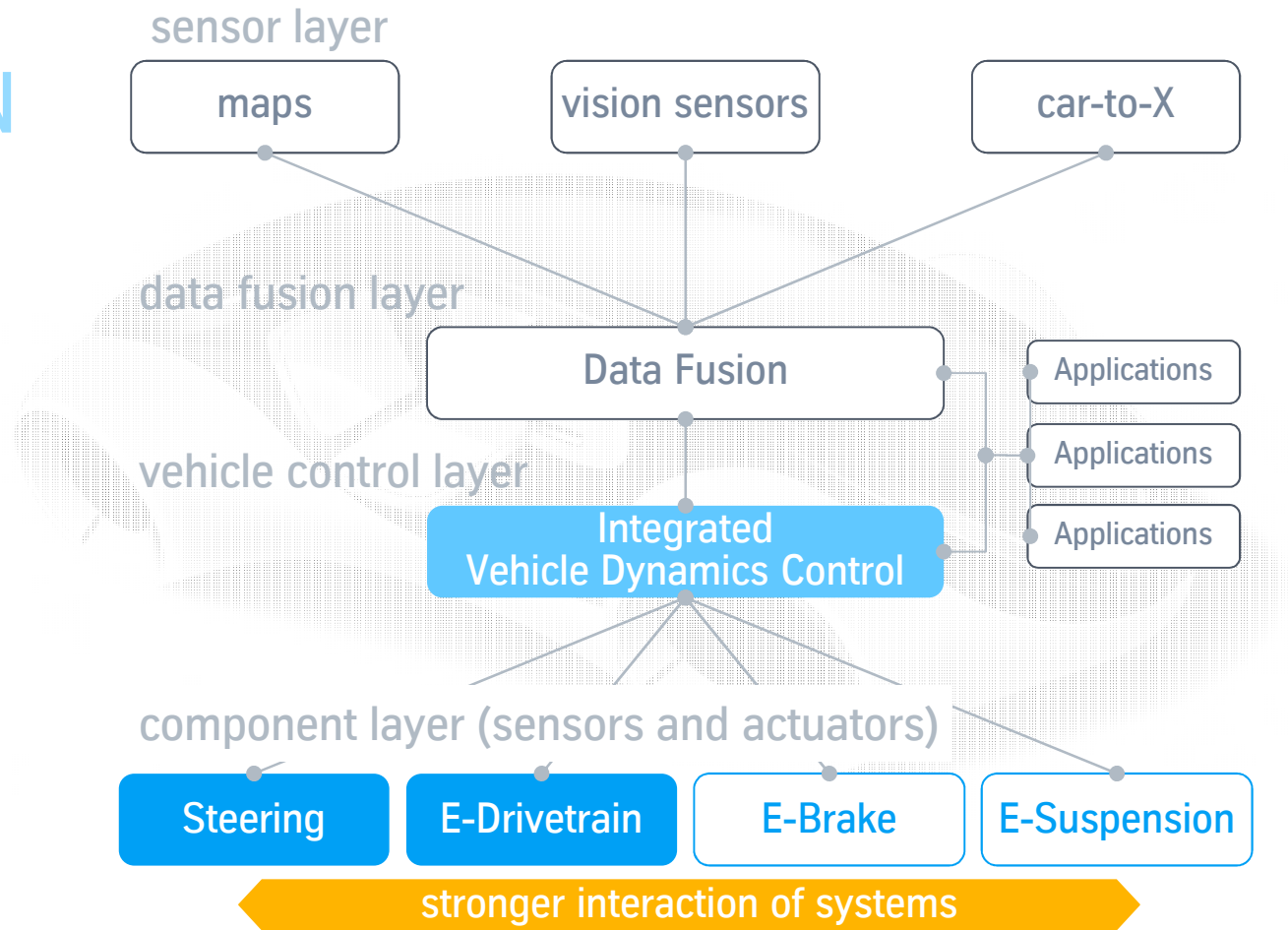
IVDC: Integrated Vehicle Dynamic Control

New car concepts will focus on AD and connectivity functionality

PERCEPTION

COGNITION

ACTION

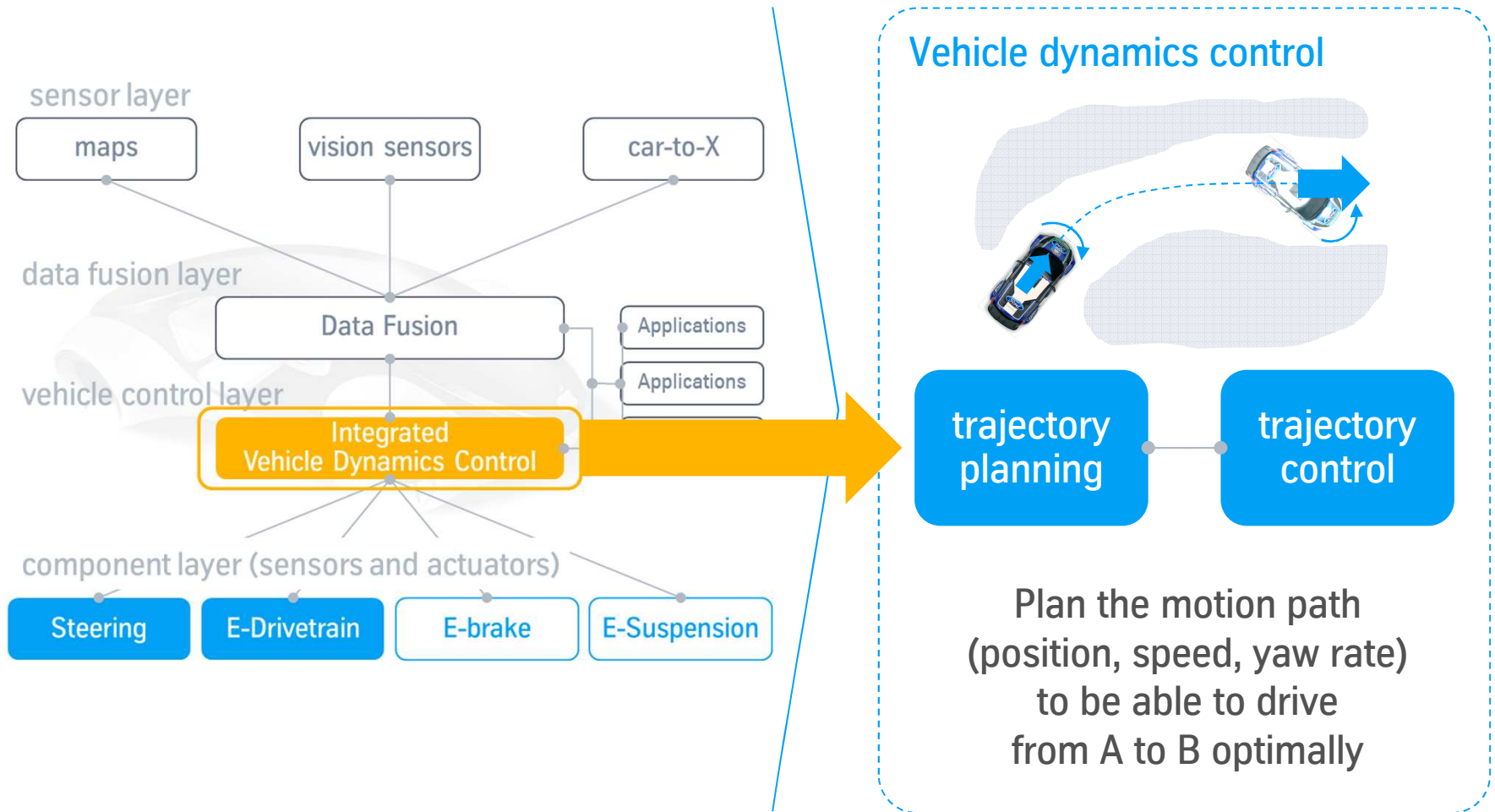


Technology Vision: Become full chassis actuator & controls supplier for future mobility business



Integrated Vehicle Dynamics control (IVDC)

What are we doing?



Automated Driving



thyssenkrupp

thyssenkrupp Autonomous Driving

<https://youtu.be/ZSmB-pigvLk>



„The best way to predict the future...

...is to create it.”

Alan Key



engineering.tomorrow.together.



thyssenkrupp