

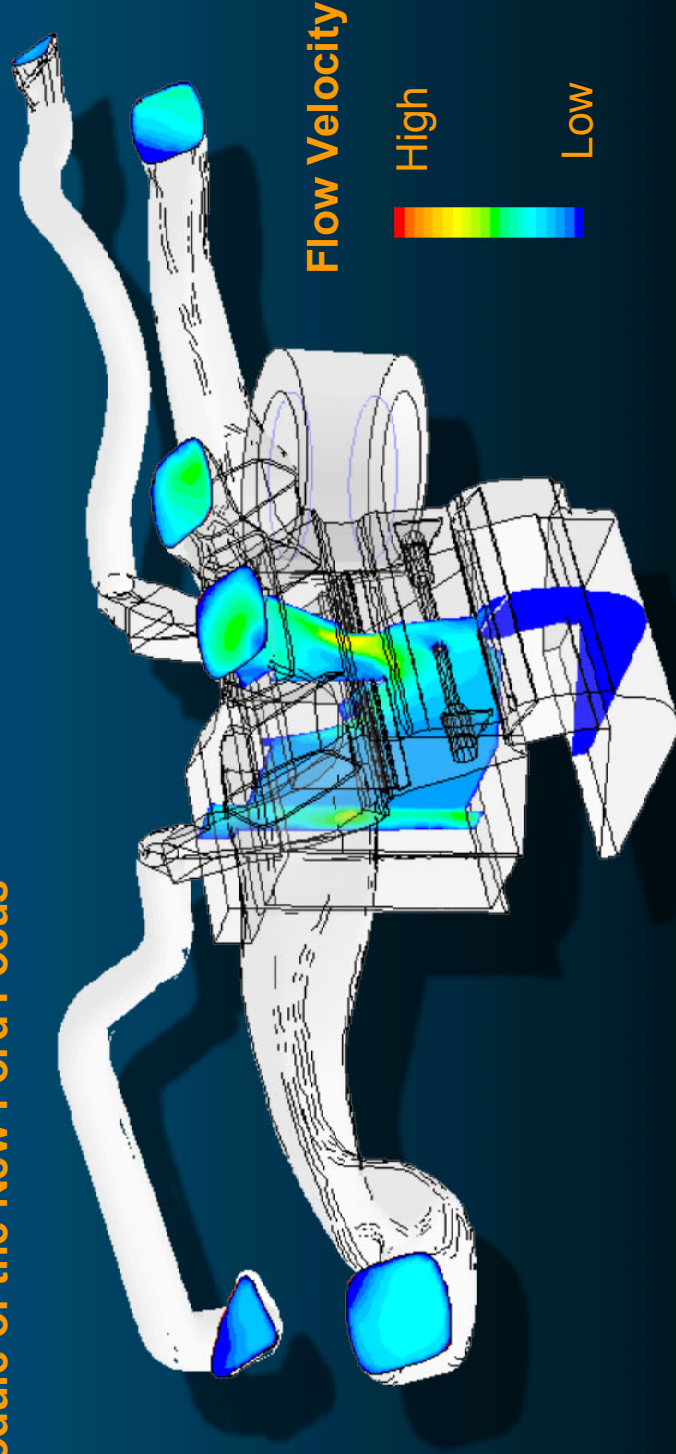
Future Heat Management Simulation Tools - A Challenge

Prof. Dr.-Ing. Norbert Deussen
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CFD Analysis

HVAC - Module of the New Ford Focus



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Trends in Car Development - a Foundation of Future Software Demands

- Challenges for Future Software
- Environment of Software Development
- Objectives of Simulation

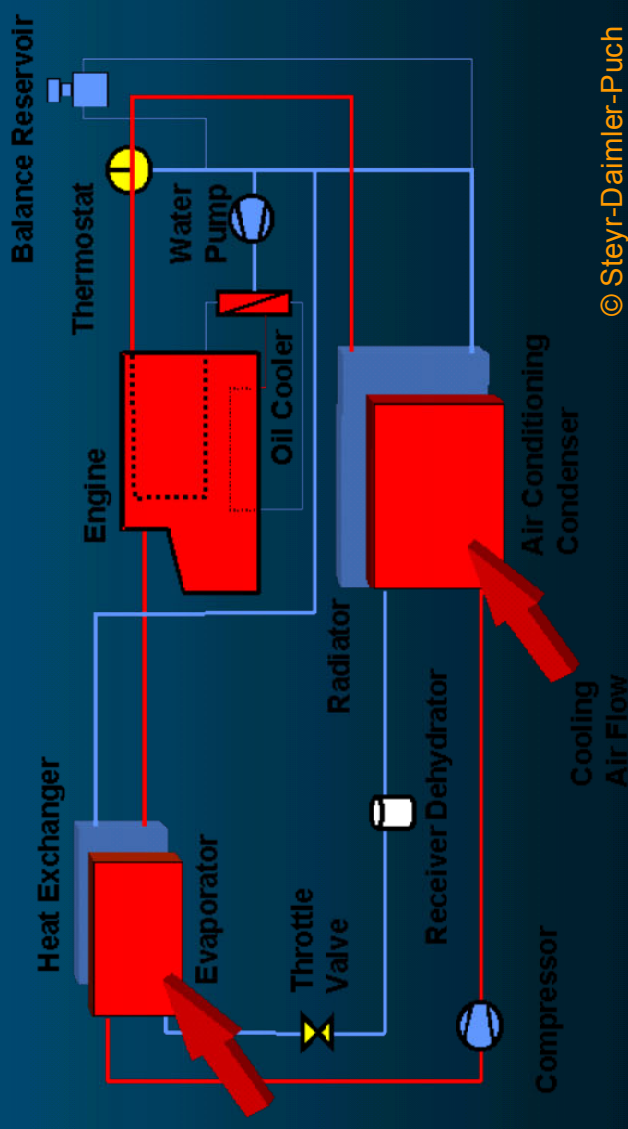
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Supply and Removal of Heat for Passenger Comfort
Cooling for Durability

Influence on

- > Engine Warm-up
- > Fuel Efficiency
- > Emissions
- > Component Wear

Engine Coolant and A/C Circuit



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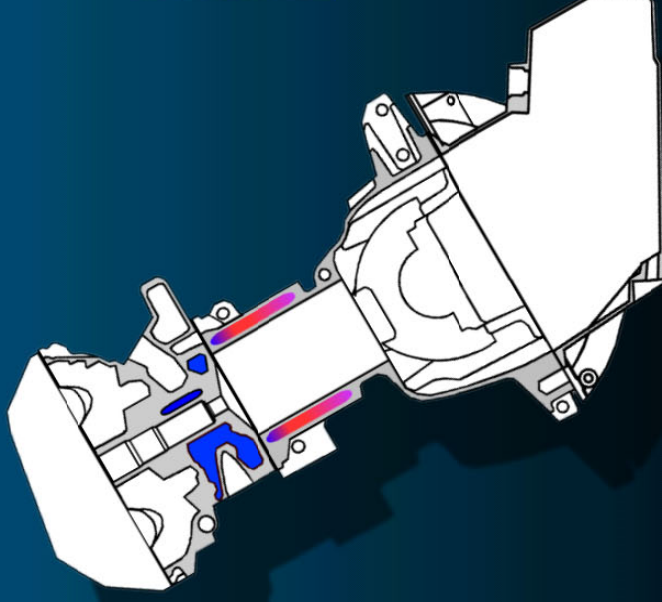
Optimization of the Engine Function

- Influence on**
- > Friction
 - > Thermodynamics
 - > Engine Warm-up
 - > Component Wear

**Coolant
Temperature**

High

Low



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The Volkswagen Lupo TDI:

A Car with Highly Integrated Engine Compartment



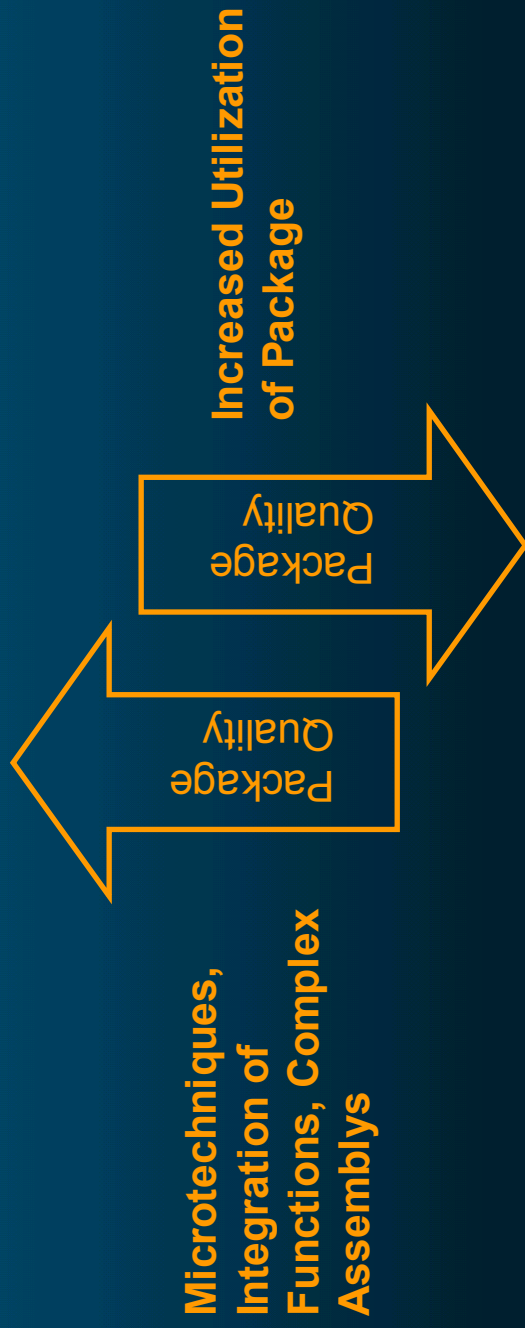
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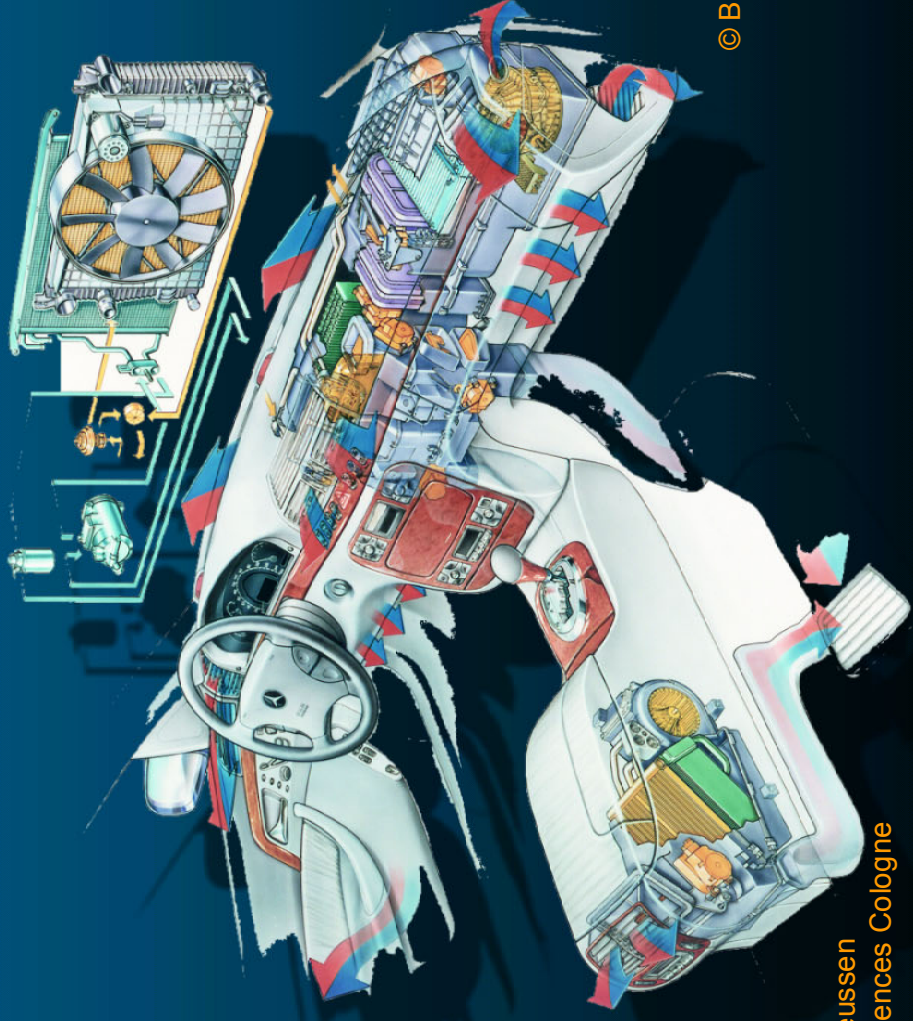
Risks and Chances of an Increasing Degree of Integration

Integration - even the Key Word of Future Car Development



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Behr 4-Zone Climate Control System: Advanced Cosiness at the Rear Compartment



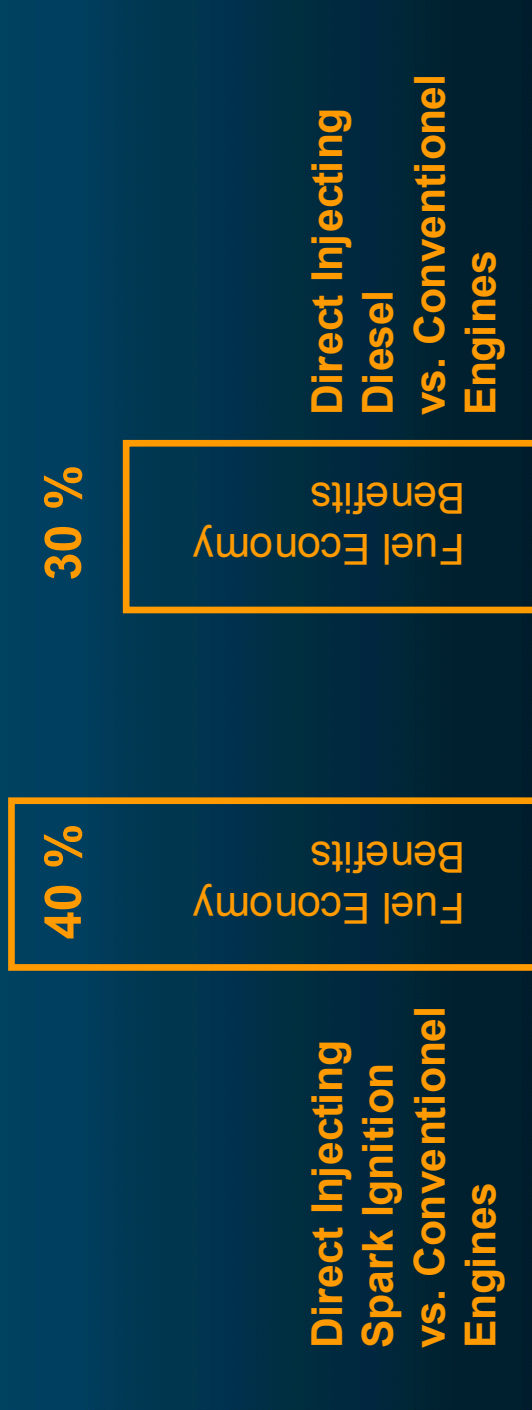
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New Engines with high Fuel Economy

Future Potential of Engine Fuel Economy



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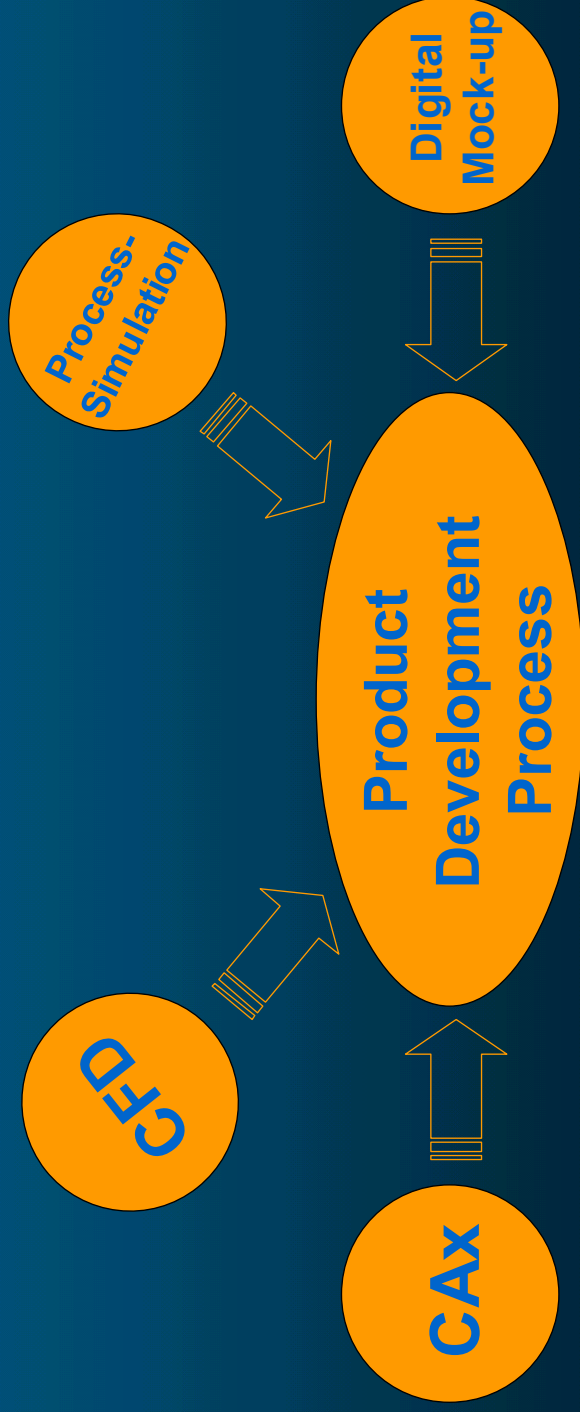
New Techniques and Components

Increasing Complexity - a Consequence of Additional Components

- Electric Valve Train
- Electric Water Pump
- Integrated Starter Alternator Damper (ISAD™)
- Accessory Drive Management System

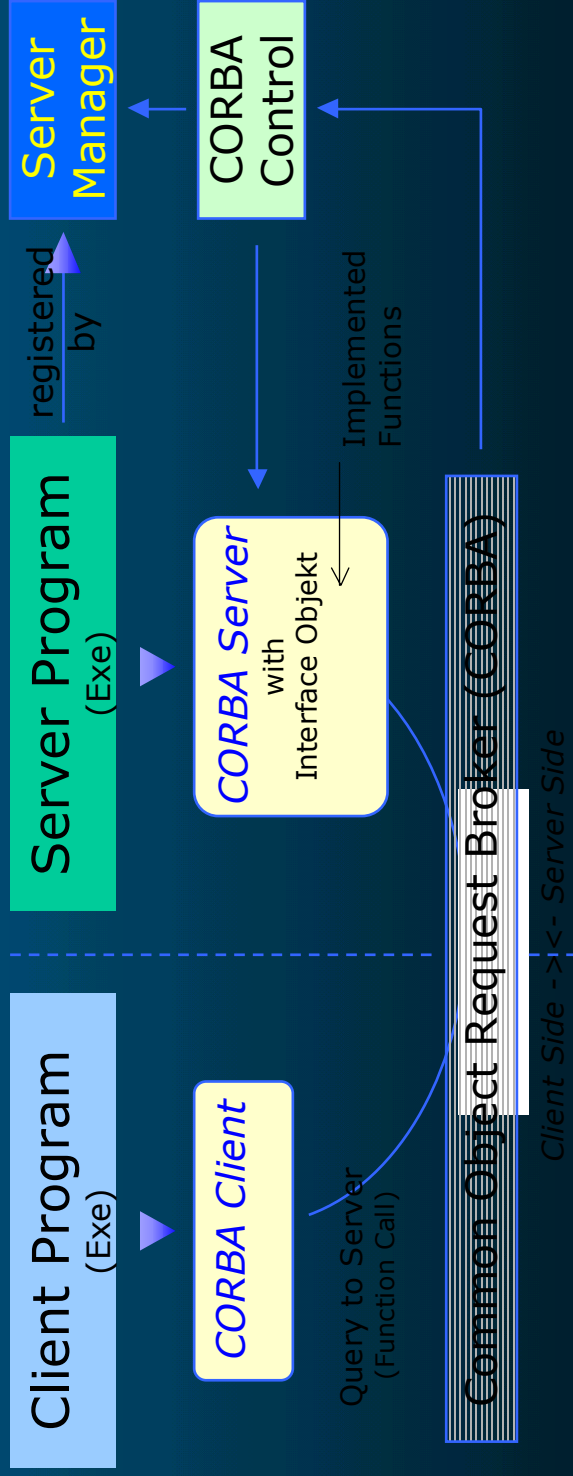
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Trends in Car Development Methodology



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Significance of Programme Communication Increases
Calculation on Distributed Systems including CORBA-Interface



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Summary

Objectives of Future Heat Management Simulation Tools

- **Software - the Driving Force of Innovation**

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Summary

Objectives of Future Heat Management Simulation Tools

- Software - the Driving Force of Innovation
- Advanced Communicative Ability

Future Heat Management Simulation Tools - A Challenge

Summary

Objectives of Future Heat Management Simulation Tools

- Software - the Driving Force of Innovation
- Advanced Communicative Ability
- Calculation on Distributed Computer Systems

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Summary

Objectives of Future Heat Management Simulation Tools

- Software - the Driving Force of Innovation
- Advanced Communicative Ability
- Calculation on Distributed Computer Systems
- Software Becoming a Dialog Partner with the Engineer

Future Heat Management Simulation Tools - A Challenge

Summary

Objectives of Future Heat Management Simulation Tools

- Software - the Driving Force of Innovation
- Advanced Communicative Ability
- Calculation on Distributed Computer Systems
- Software Becoming a Dialog Partner with the Engineer
- Market-Covering Application of Professional Software