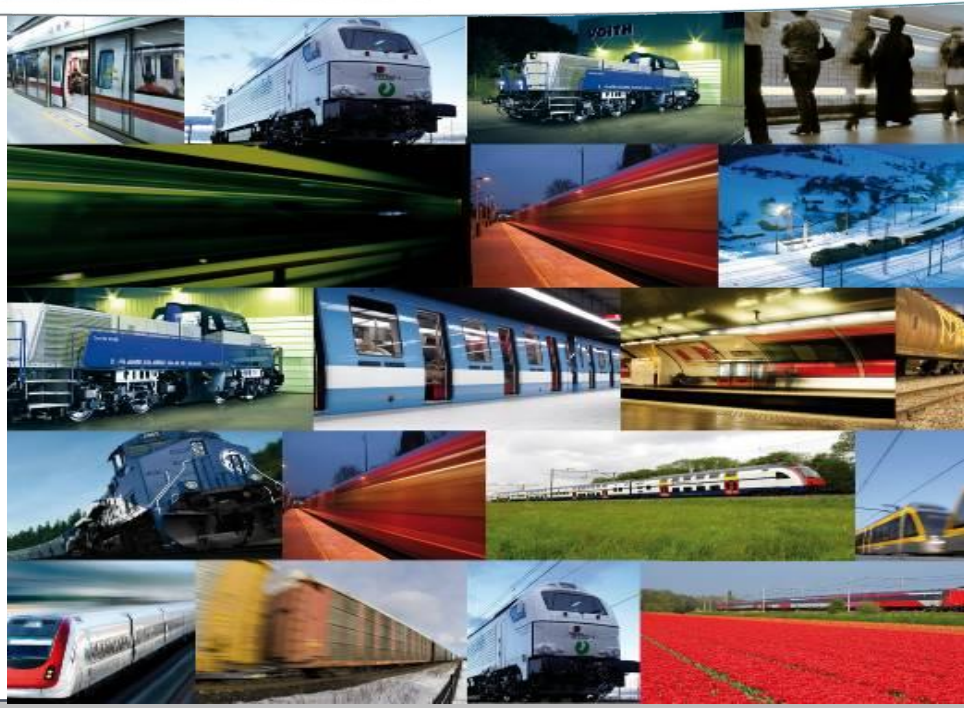
KNORR-BREMSE

Digitalisation in Passenger and Freight Rail Traffic

Solutions of Knorr-Bremse



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Knorr-Bremse SfS GmbH

DIE BAHNINDUSTRIE.
VDB VERBAND DER BAHNINDUSTRIE IN DEUTSCHLAND E.V.

Digitalisation has become a dominating factor also in the railway sector; successful operators, OEMs and system suppliers are embracing this trend.

Connected Diagnostics

Energy Management

Noise Reduction

life-cycle Cost

Reliability

Minimised Down Time

Standardised Products

Condition Based Maintenance

Time To Market

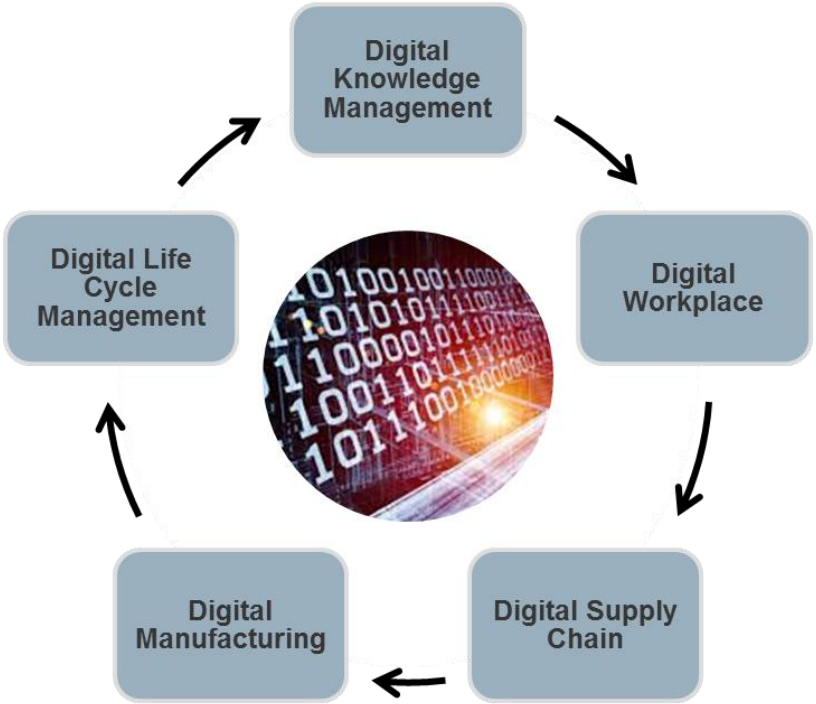
Authorization

Sustainability

Availability

Engineering Cost

Digitalisation affects not only functions and products. It also influences the processes over the whole life cycle.



Digital Security is one of the key issues

Automated Train Operation in Australia

RioTinto

Operator

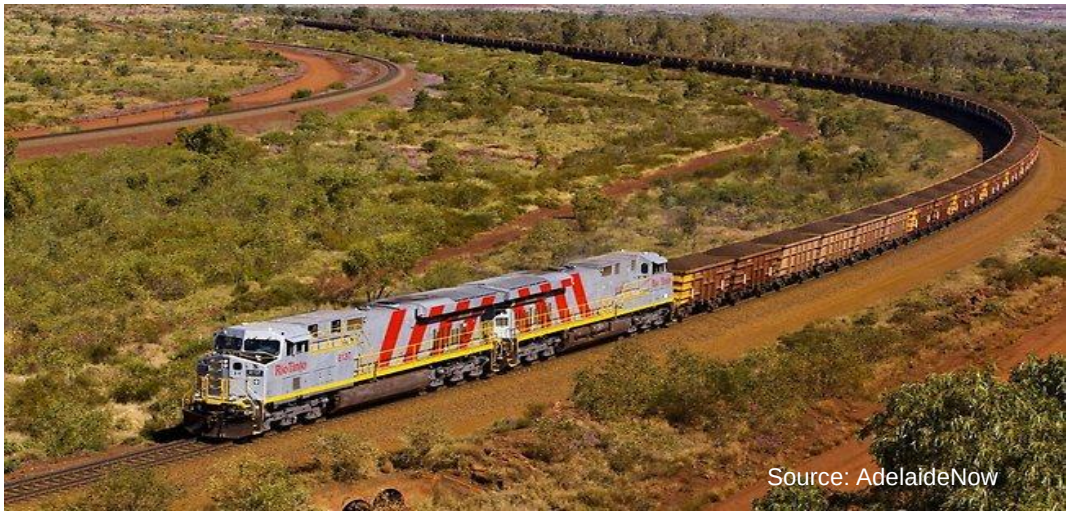
KNORR-BREMSE

Driving Strategy Engine
= „Driver“

AnsaldoSTS
A Finmeccanica Company

Automated Train Operation

Lack of drivers demands new solutions.



Vehicle Application: „Etihad Smart Car“ Project

Etihad Rail

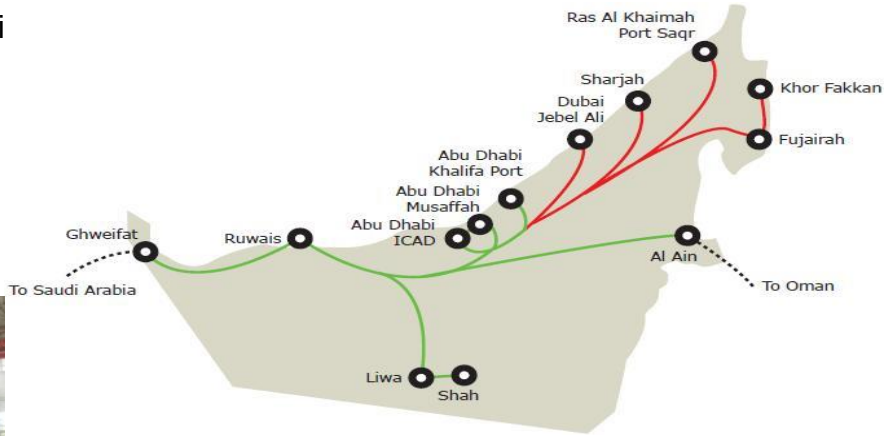
- Founded in 2010, to erect a National Railway System within the United Arabic Emirates.

Project

- Locomotives – EMD (7 Locos)
- Wagonbuilder: China South Locomotive & Rolling Stock Corporati Limited (CSR) (240 bulk wagons for the transport of sulfur)

KNORR-BREMSE **New York Air Brake**

- Electro-pneumatic Brake EP-60
- Bogie supervision
- Sensors, Actuators and Remote Functions

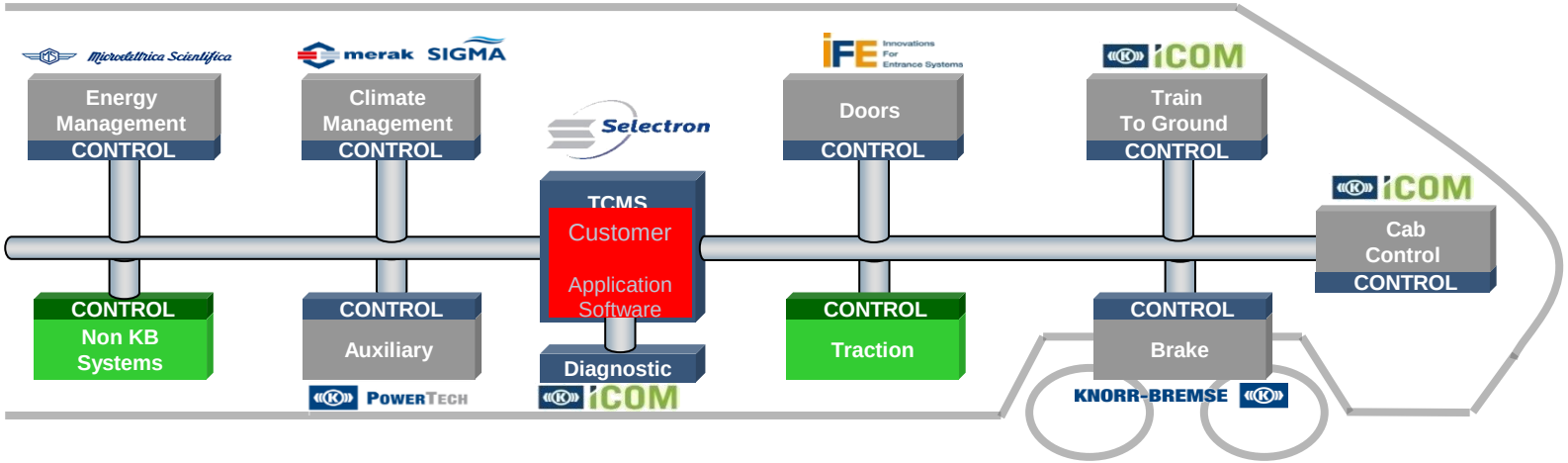


TIS defines requirements for Rail Freight Cars and it bundles relevant players of the telematic applications field:

http://www.innovative-freight-wagon.de/

KB is prepared for the digital age with the “Unified Control System” architecture.

KB Rail’s “Unified Control System”

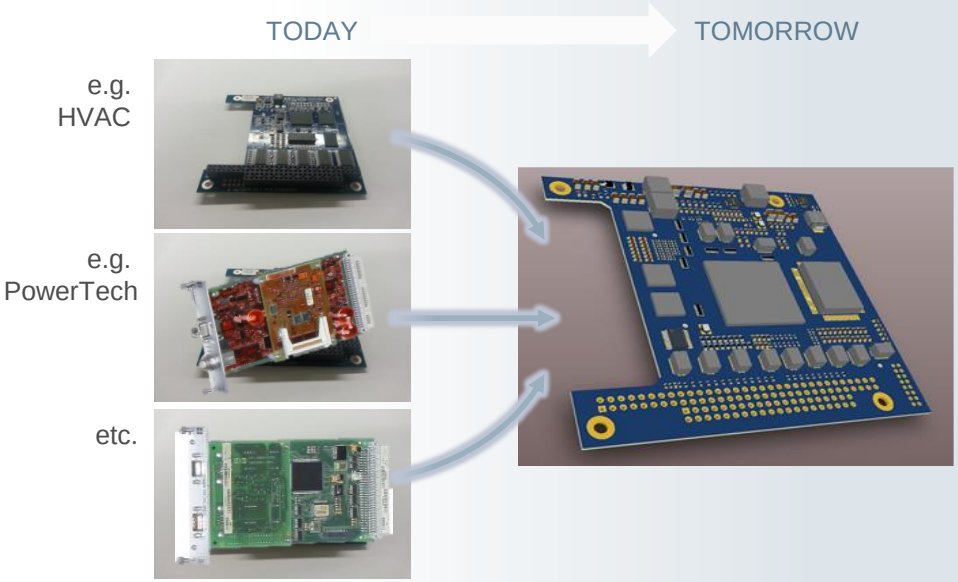


Connected Systems ... the new level of system design

Unified Control System with standardized hardware and interfaces lead to improved communication and reduced obsolescence costs.

Standardized hardware

Example: CPU Standardization – Host CPU Core (HCC)



Technical solution

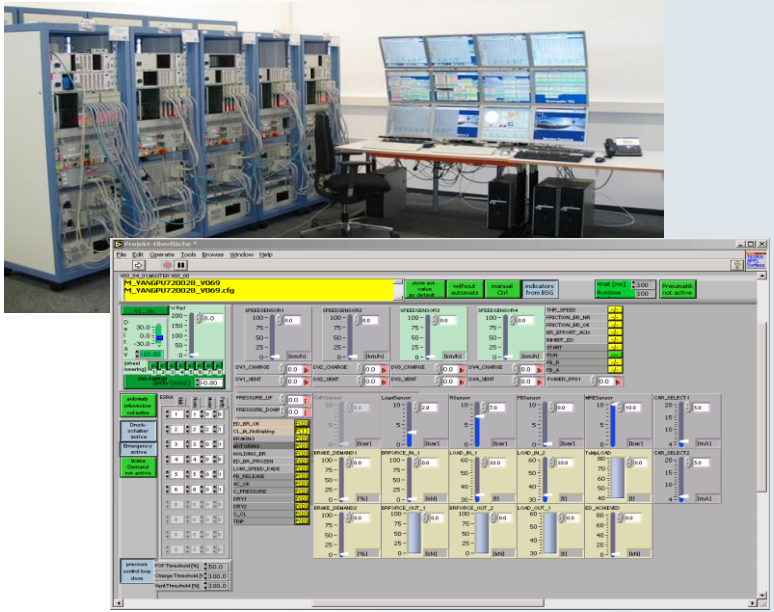
- Standardized and unified hardware with CPU power
- Hardware prepared for automatic configuration of communication backbone
- Standardized interface also for non KB subsystems

Benefits

- High volumes for scale effects
- Cost savings in solving obsolescence issues
- Reduced communication and configuration problems

Pre-tested systems will reduce commissioning, integration and certification effort for all relevant subsystems.

Pre-test and commissioning



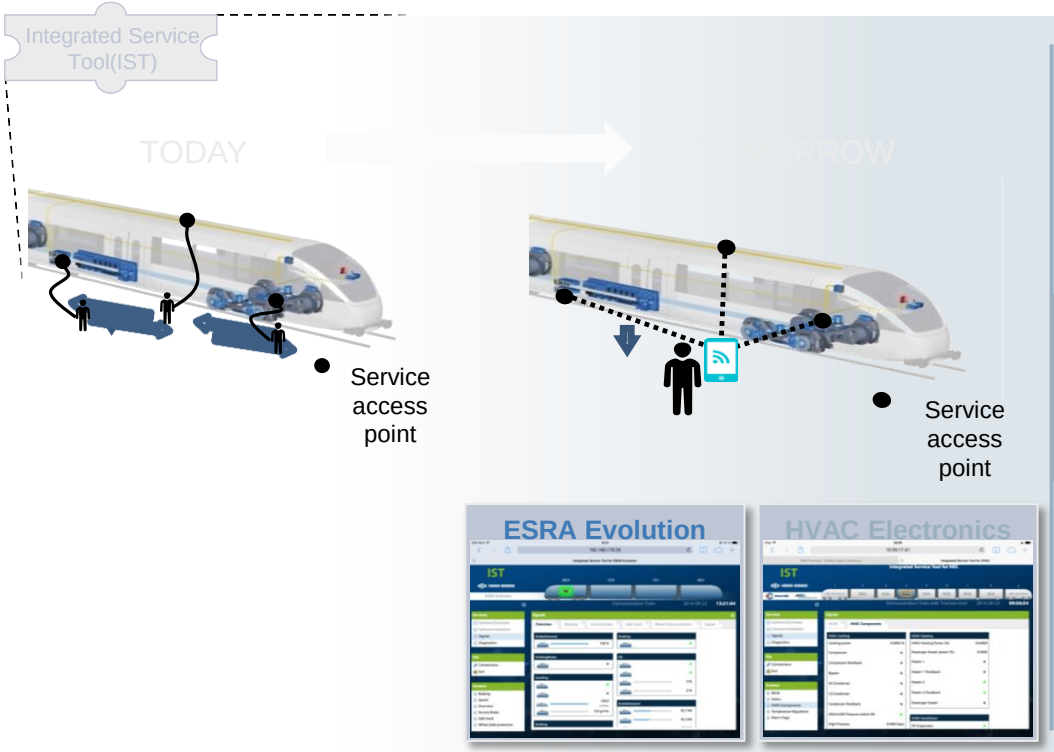
Technical solution

- Systems communication test of TCMS application
- Test-bench for functional testing of all KB subsystems – TCMS necessary
- Integration of non-KB equipment for system functional tests possible

Benefits

- Reduction of integration and commissioning effort
- Pre-tested systems for plug&play integration into the vehicle
- Improve predictability for time schedule
- Supports homologation and certification

Integrated Service Tool (IST) accelerates service and maintenance for all KB-Rail devices.



Technical solution

- Only one access point and unified tool for all service functions on the train
- Web-based, no tool installation necessary
- Pre-configured service contents

Benefits

- One service device for all subsystems
- Reduces effort for service operations
- Less extensive education for service personnel

iCOM is the digital solution for non-safety relevant vehicle applications.

iCOM

iCOM Monitor

iCOM Assist

iCOM Meter

Technical solution

- High efficient hardware unit with modern SW-architecture, dynamically upgradeable
- App based application software with an open system architecture for monitoring, energy metering and driver assistance
- Train-to-ground communication to KB back office for data analysis and visualization

Benefits

- One system for all applications, not affecting the vehicle certification
- Optimized train operation and reduced life-cycle costs
- Basis for CBM and performance based contracting
- Open also for none KB systems

BDM will improve “on the spot” stopping of rail vehicles.

Brake Distance Management

Functions of next generations brake systems

Intelligent brake force distribution	**Deceleration generation independent of variable adhesion parameter**	**Adhesion always known and modifiable**	**Reduced response time of brake components**	**Enhanced diagnostics**

Benefits for car builders and operators

Capacity increase and schedule stability	Reduced energy consumption	Reduced life-cycle costs	“On the spot” stopping	Reduced authorization effort	Reduced noise emission






With market introduction of "Connected-Systems“ Knorr-Bremse supports the implementation of the SMART Train vision.

Discussions with operators and owners ongoing

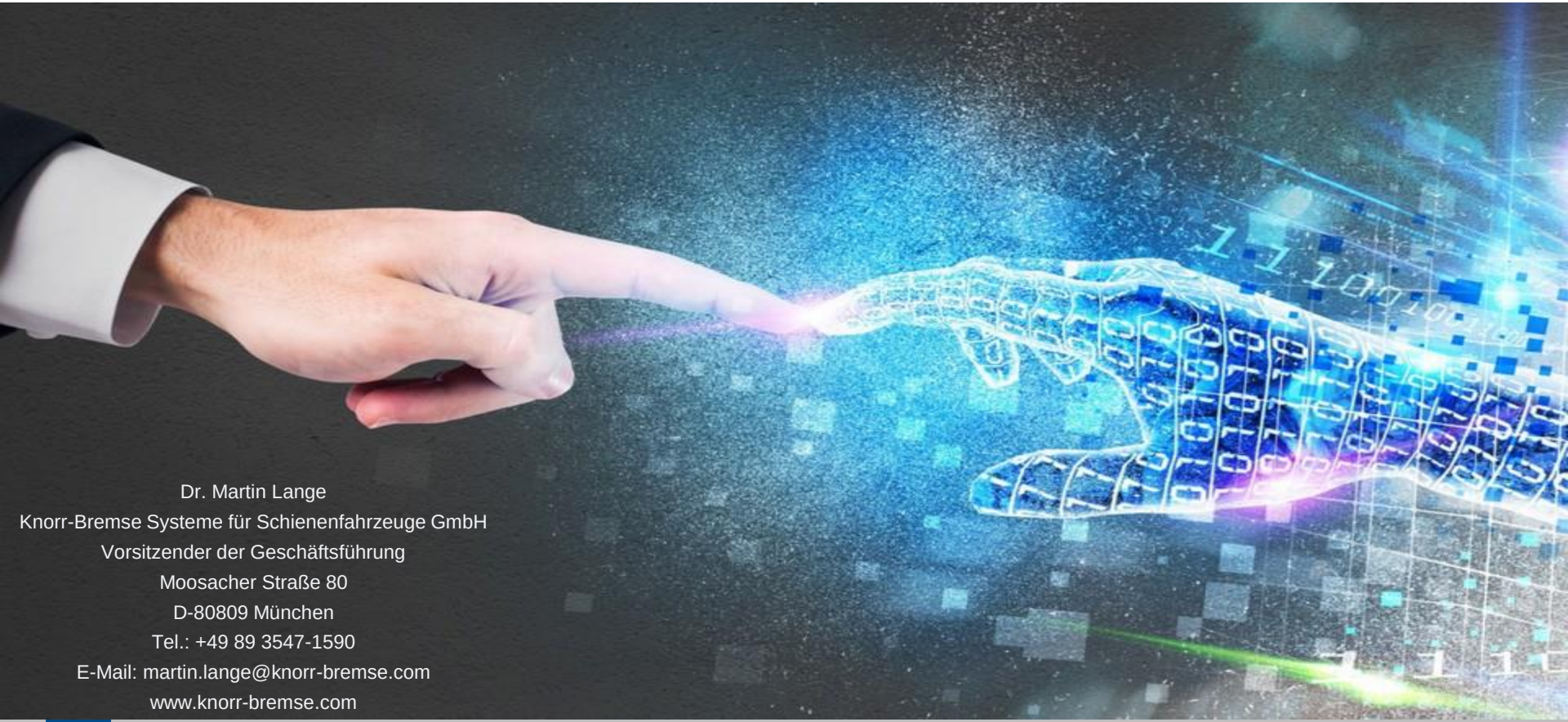
New functionalities

- Integration of additional subsystems (e.g. fire protection)
- Intelligent function connections between different subsystems based on software library of “smart” train functions
- Simulation of virtual train at integration test bench

Additional benefits

- Enhanced comfort and safety relevant functions/performance
- Reduced number of sensors through intelligent share of sensor data
- Enhanced predictive maintenance
- Higher reliability through higher level of pre-tested/pre-integrated systems

Thank you very much for your attention!



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