FR8RAIL, project 730617
Midterm conference Vienna
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Trafikverket

Shift2Rail

Horizon 2020
European Union Funding
for Research & Innovation

Driving Innovation within Shift2Rail: FR8RAIL project "IP 5Technologies for sustainable and attractive European Rail Freight"

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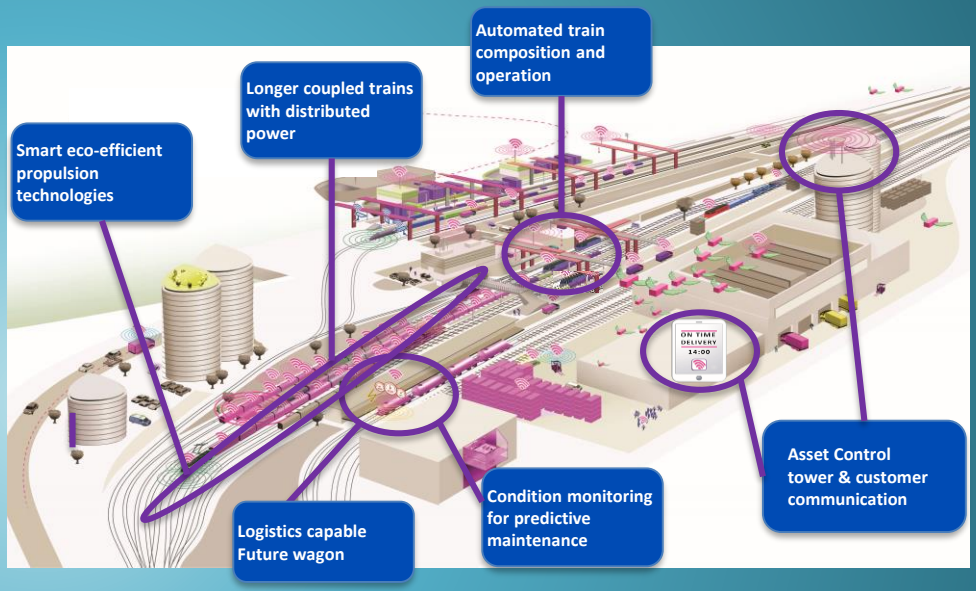
Structure FR8RAIL

Implementation Strategies and Business Analytics	Identification of high level requirements in market segments, KPI's and Migration
Electrification, and Telematics	Telematics and electrification providing more intelligence
Automated couplers	Automated couplers with specifications and migration plans
Wagon Design	Low-noise, lightweight, track friendly running gear, core and new market wagon 2020
Condition based maintenance	Condition based maintenance and predictive maintenance
Synchronization and alignments of technical interfaces	Synchronization of technical findings/specifications between the workpackages
Management and dissemination	Project management

Vision IP5



Targets of Shift 2 Rail

- **Reduction of Green House Gases**
- **Market Growth & Modal Shift**
- **Improved services and customer quality until 2030**
- **Cost reduction**

Automation and digitalisation

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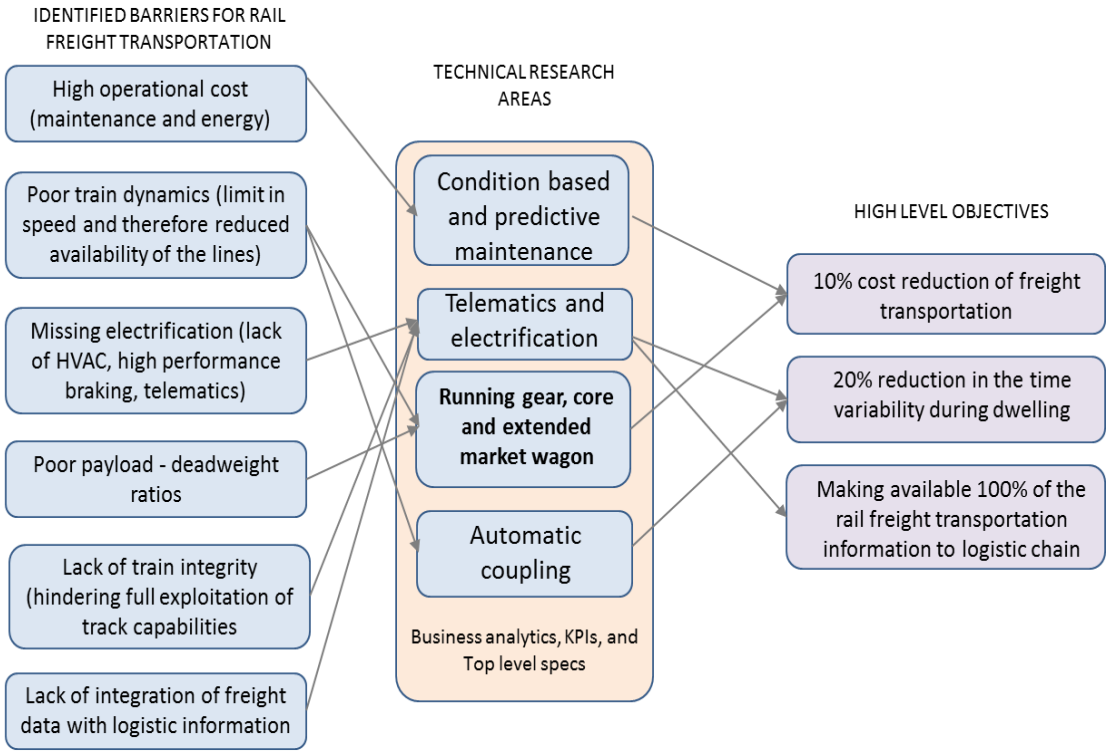
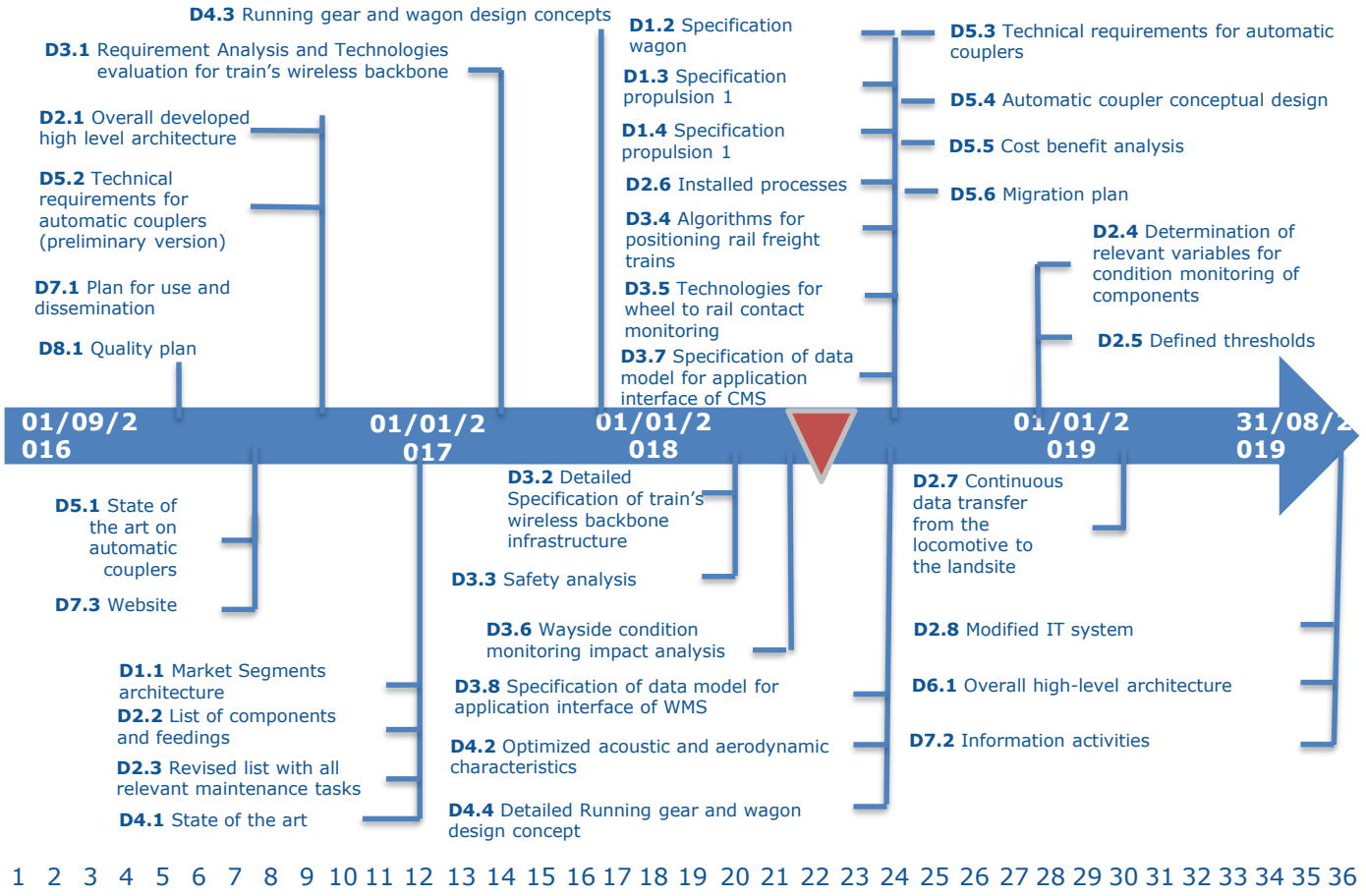
The relationship and contribution to TD in general



Project Status Overview



FR8RAIL relations

		AWP15	AWP17				AWP18				AWP19				AWP20			
	Summary of Demonstrators (Focus Areas) from current MAAP DRAFT	Q4.16	Q1.17	Q2.17	Q3.17	Q4.17	Q1.18	Q2.18	Q3.18	Q4.18	Q1.19	Q2.19	Q3.19	Q4.19	Q1.20	Q2.20	Q3.20	Q
TD5.0.1	Identification of market Segments																	
TD5.0.2	Development of Specifications and Key Performance Indicators																	
TD5.0.3	Migration Plan																	
TD5.1.1	Condition based maintenance																	
TD5.1.2	Automatic coupling																	
TD5.1.3	Telematics and electrification																	
TD5.2.1	Improved Methods for time table planning																	
TD5.2.2	Real time yard management and Single-wagon load systems																	
TD5.2.3	Real-time Network Management																	
TD5.2.4	Increasing speed of freight trains during day time traffic to increase line capacity																	
TD5.3.1	Running gear																	
TD5.3.2	Core market wagon 2020																	
TD5.3.3	Extended market wagon 2020																	
TD5.4.1	Intelligent (Video) Gate Terminals																	
TD5.4.2	Hybridization of legacy shunters																	
TD5.5.1	Last Mile propulsion Systems																	
TD5.5.2	Long Trains up to 1500m																	
TD5.5.3	Freight Loco of the future																	
TD5.5.4	Driver Advisory System																	
TD5.6.1	Automated freight train																	

Focus areas and projects in MAAP.
FR8RAIL in yellow.

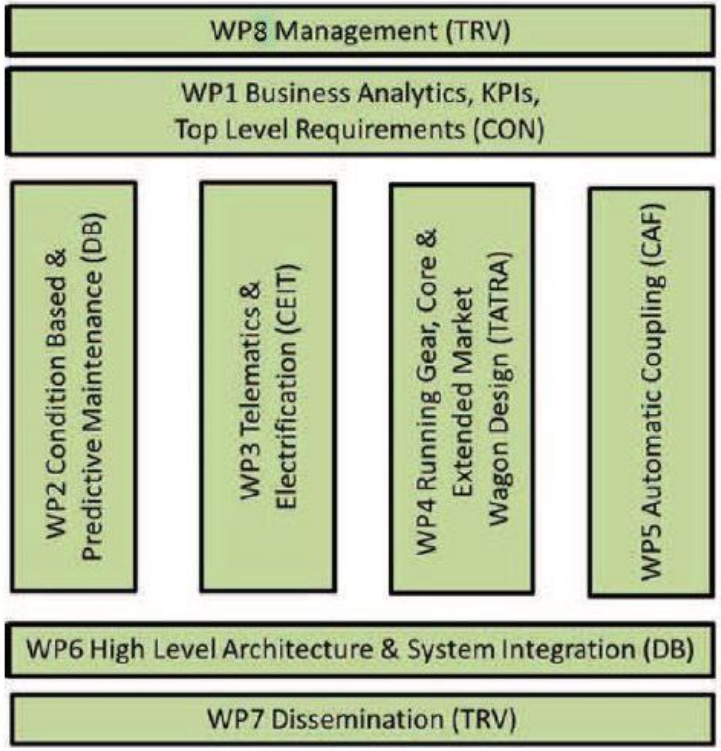
Project status Managment

Project meetings:

- TMT + SC meetings: 02.08, 05.08 (TMT only), 14.09, 07.12.

Overall status:

- Second reporting period 01.01.17 – 31.12.17 All WPs are making progress.
- Some deliverables are delayed in order to allow for better collaboration across WPs and with other projects (e.g. CONNECTA, X2RAIL)
- There is a need to accelerate the project with respect to the Wagon Design in WP4 due to developments in the market.



Business Analytics, KPI, TLR

Work break-down structure

FR8RAIL WP1 – Business Analytics, KPIs, Top Level Requirements

1.1	1.2	1.3	1.4
Market Segments (Leader: CON)	Top level requirements, development of technical specifications for Wagon application (Leader: CON)	Top level requirements, development of technical specification for Propulsion (Leader: BT)	Development of Key Performance Indicators (Leader: CON)
D1.1 - Market Segments architecture	D1.2 - Specifications Wagon D1.2.1 core market wagon D1.2.2 extended market wagon D1.2.3 automatic coupling	D1.3 - Specifications Propulsion D1.3.1 New Propulsion last mile applications D1.3.2 Locomotive boogie	D1.4 Key Performance Indicators for IP 5 D1.4.1 Novel wagon vs typical UIC standard wagons D1.4.2 Running gear and automatic coupler D1.4.3 Locomotive D1.4.4 Propulsion

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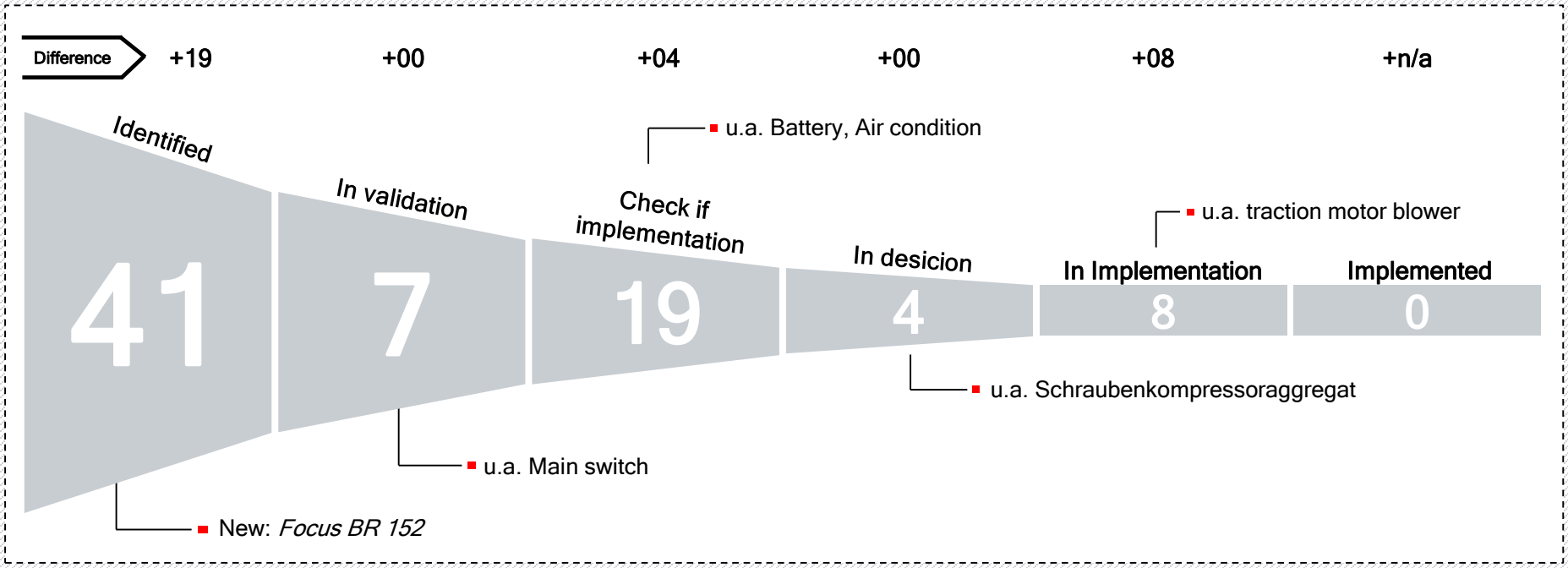
First trache of our CBM initiatives are already in implementation WP2

Funnel (BR 185, 189, 152, 29x und 26x)



- Clear quality gates are defined to manage all CBM ideas through the process
- Weekly update calls and meetings are in place to monitor progress

Telematics and Electrification
WP3

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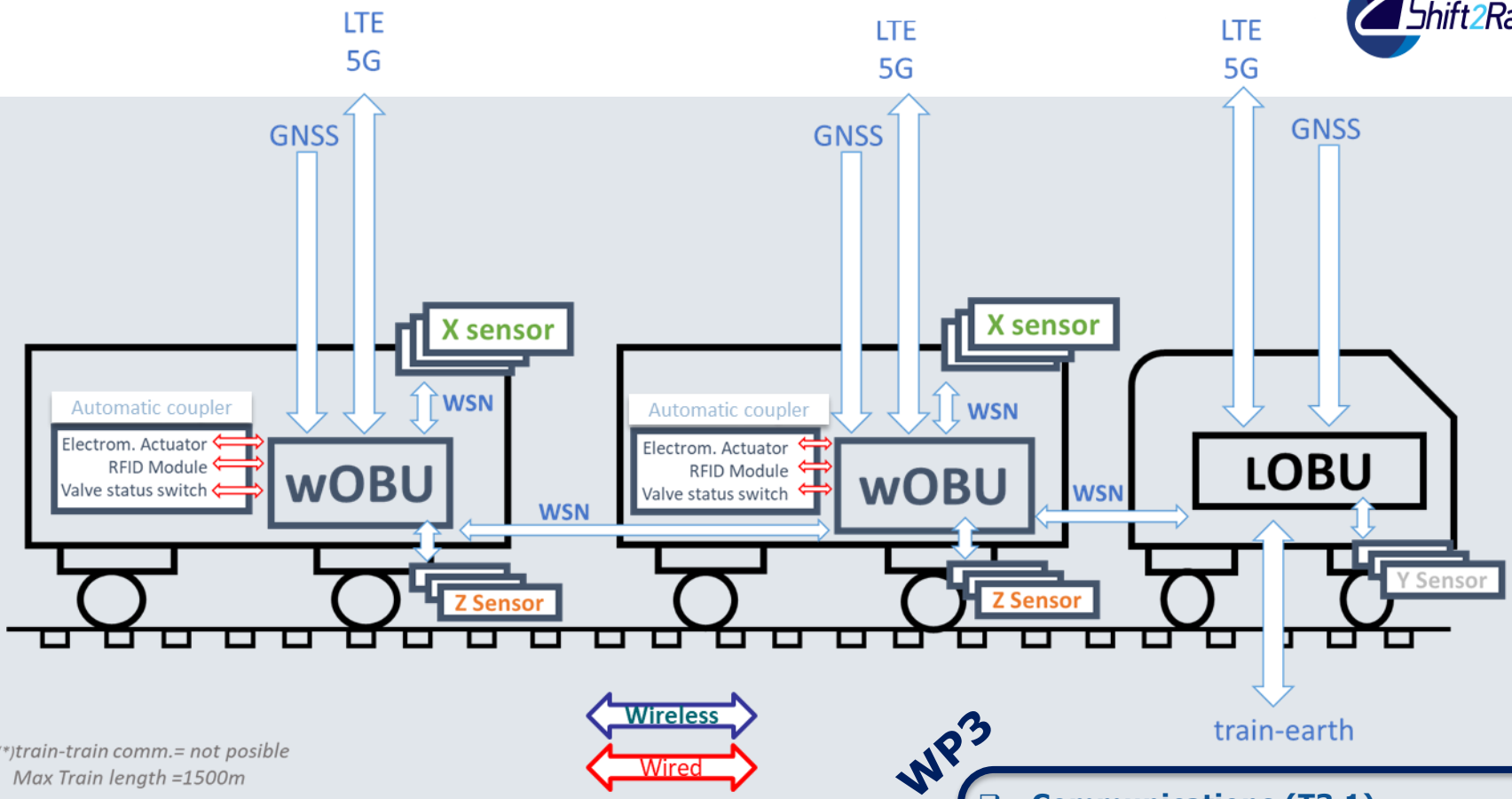

WP3

- **Communications (T3.1)**
- **Positioning (T3.2)**
- **Z Sensors: Wagon monitoring (T3.3)**
- **X Sensors: Cargo monitoring (T3.4)**
- Y Sensors: Loco monitoring (WP2)
- Automatic coupler (WP5)

WSN: Wireless Sensor Network
OBU: on-board unit
wOBU: Wagon OBU
LOBU: Locomotive OBU
Freight Telematic System (FTS)= OBUs = wOBUs + LOBU

TELEMATICS automated brake test

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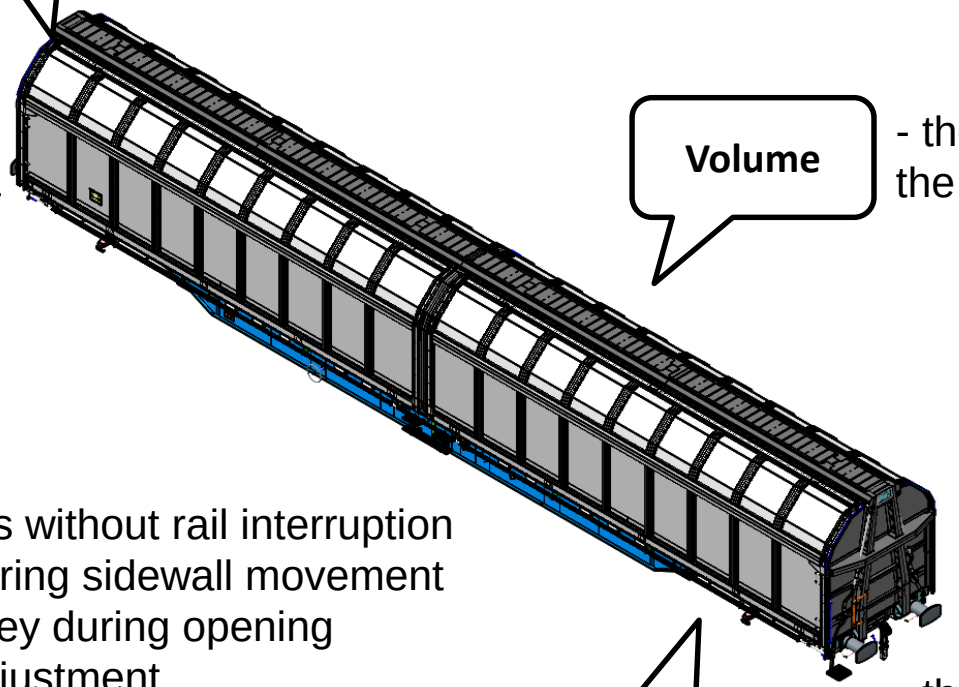
WP 4 Wagon design-Core Market Concepts



Tightness

- improved tightness by multiple labyrinths
- secondary rubber sealing

Volume

- the largest volume at the market

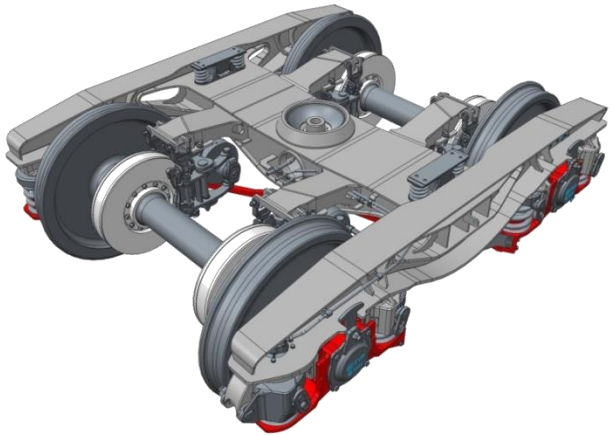
NEW mechanism

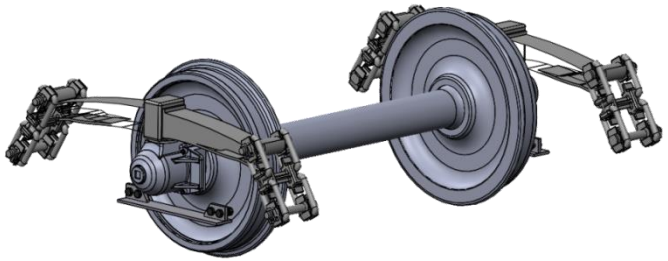
- Favourable kinematics without rail interruption
- Minimal resistance during sidewall movement
- Without friction of pulley during opening
- Simple control and adjustment

Weight

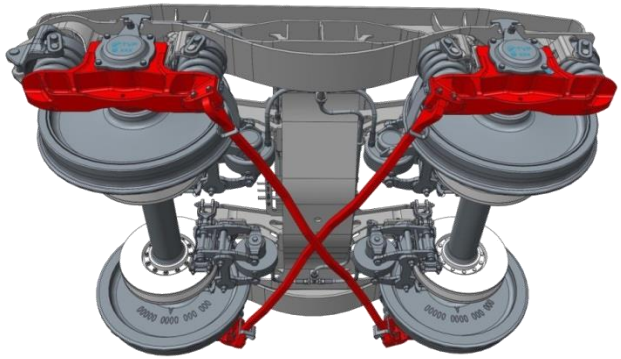
- the lowest weight
- max. stiffness of design

Running Gear – Core Market

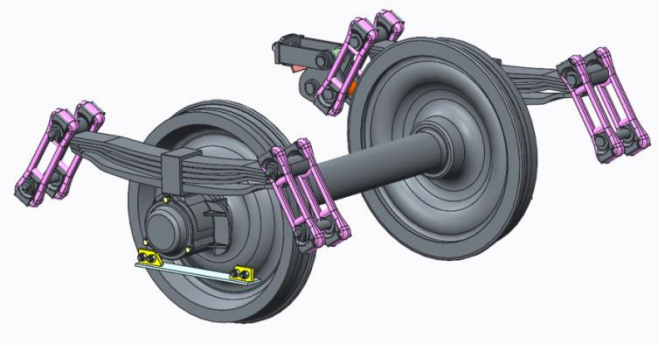




Running gear
with double suspension



Headstock-free bogie with disc brake and radially adjustable wheelsets by means of „cross-coupling“

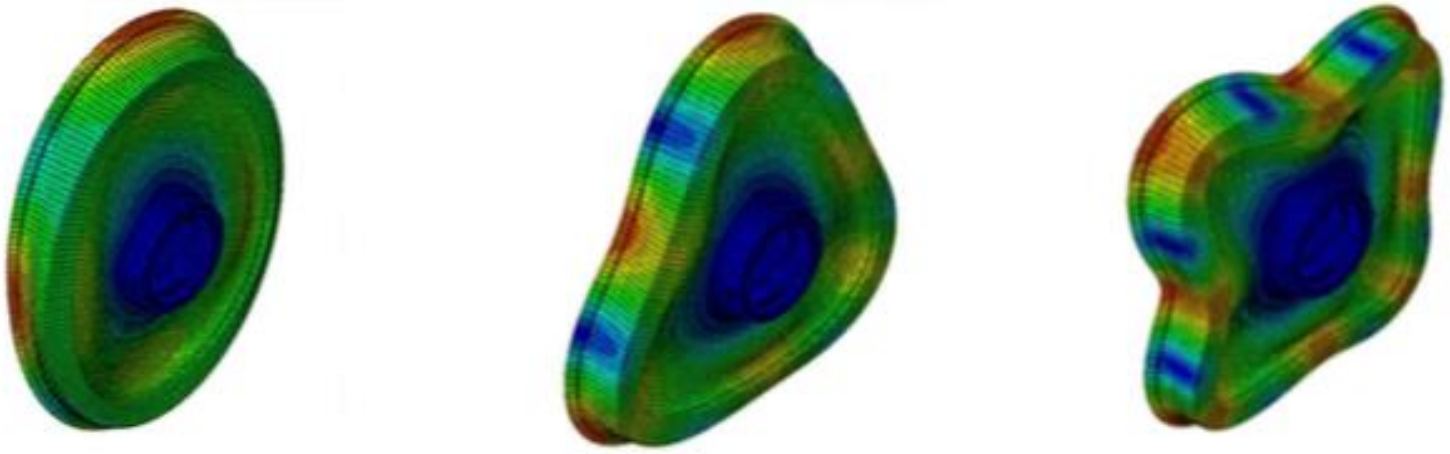


Running gear
with single suspension

Wheel Sets

Acoustic optimization of wheels

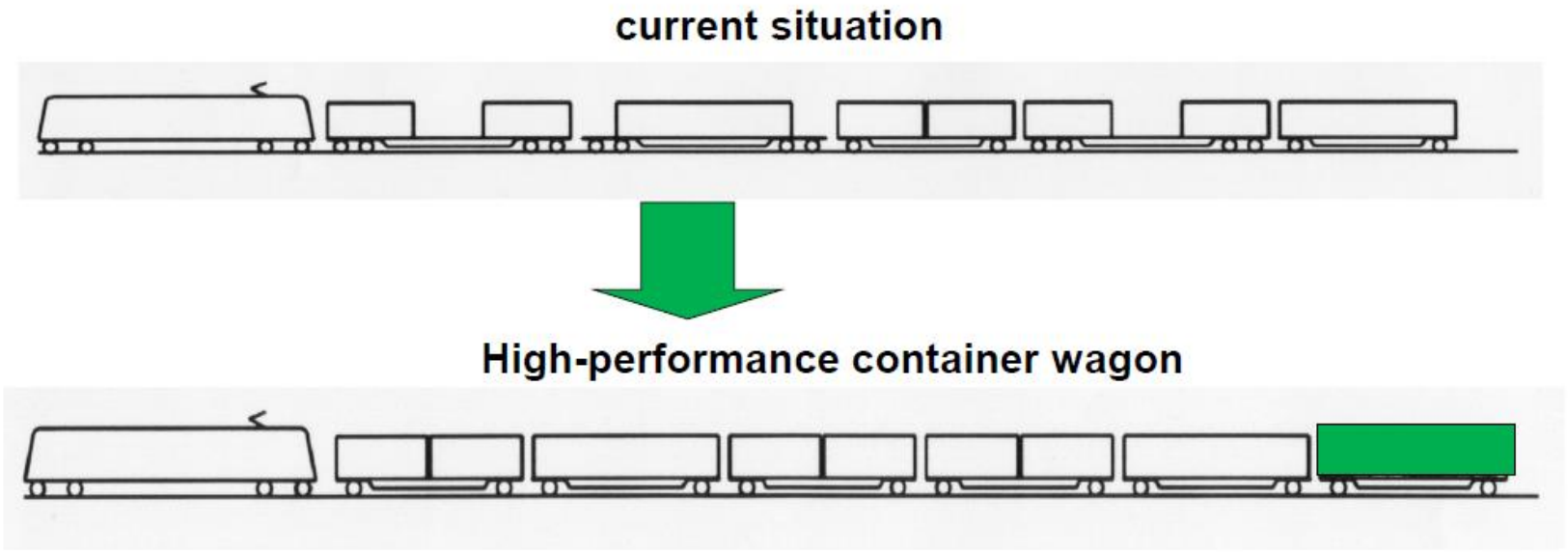
- For the wheel with straight web, according to internal Know-How.
- Noise calculations in progress



R2 R3 R4

Modal shapes of the three most relevant modes for the wheel with straight web.

Modular Wagon for ext. Market



- Optimization of the usable train length by **flexible adjustment** of the load length of the wagons with coupling rod
- Increase of the payload by the **low mass of the wagons**
- Reduction of the wagon costs by **using 2 axle wagons**
- Universal applicability for different container types
- **Improved aerodynamics** and thus reducing air resistance and energy consumption

Modular Wagon Concepts for ext. Market

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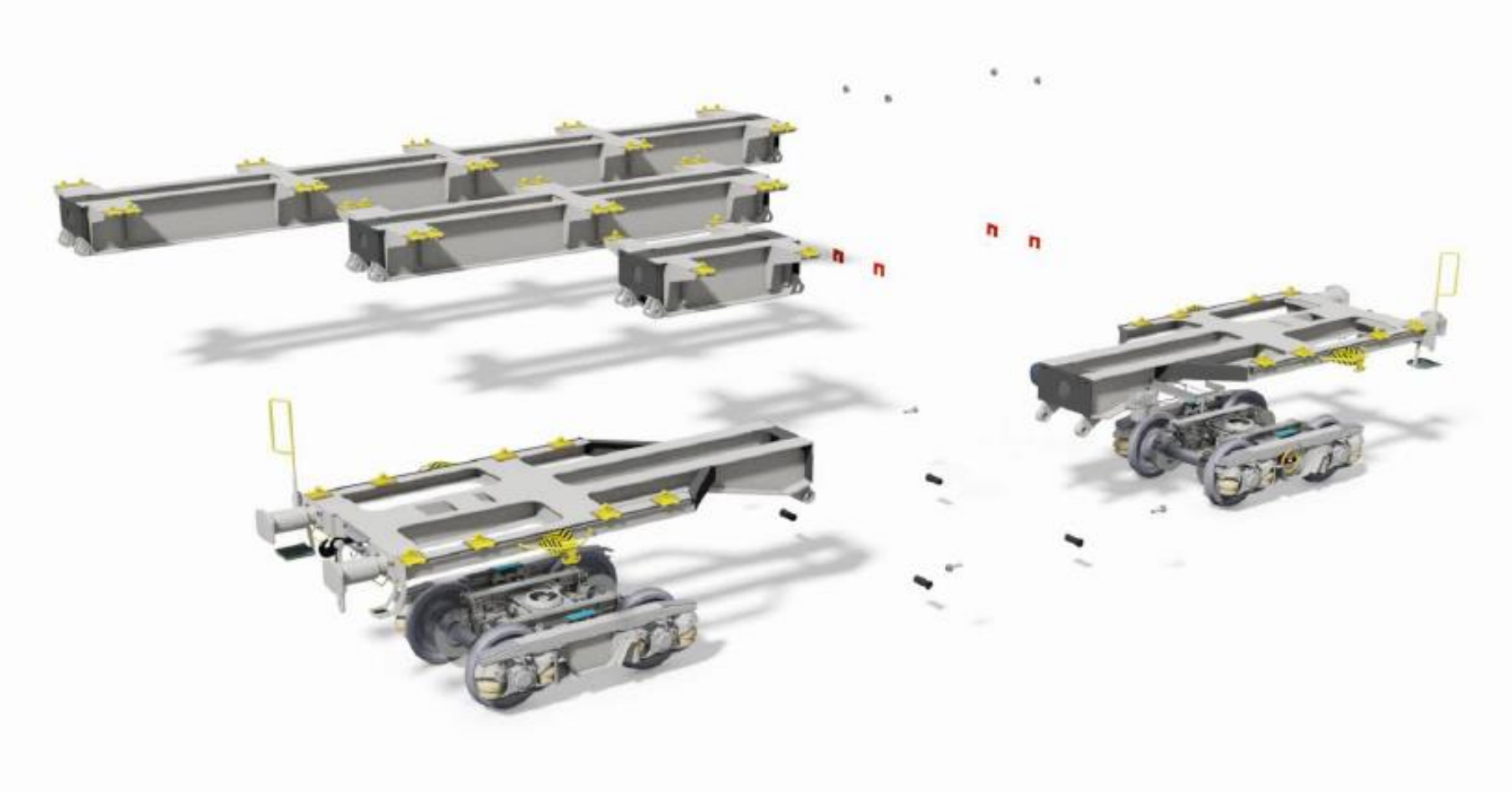
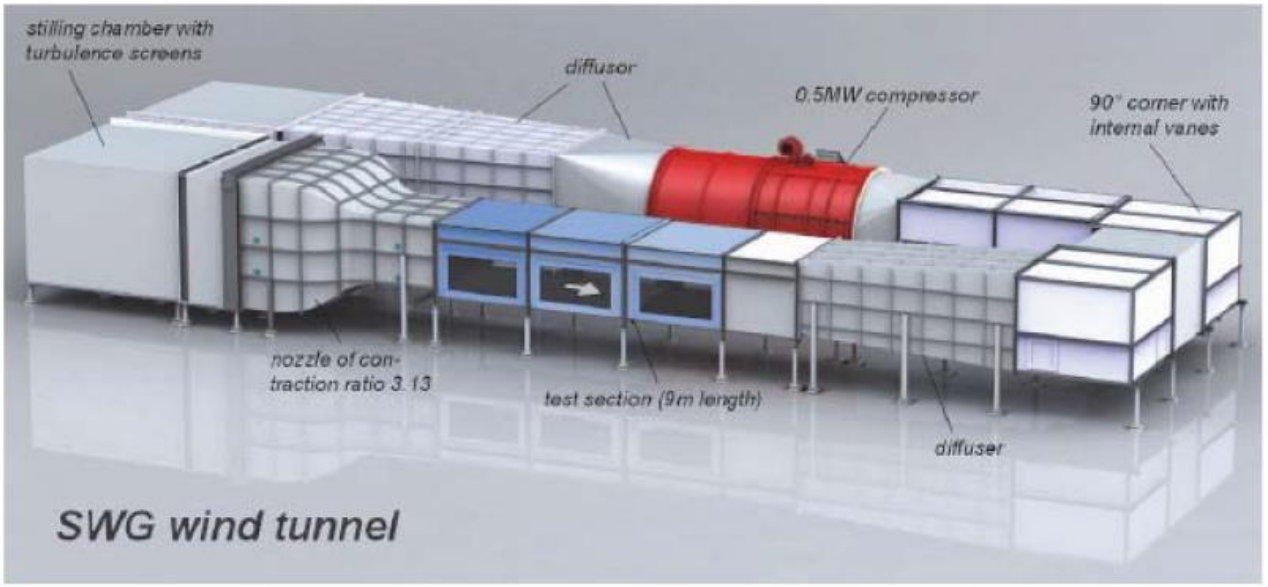
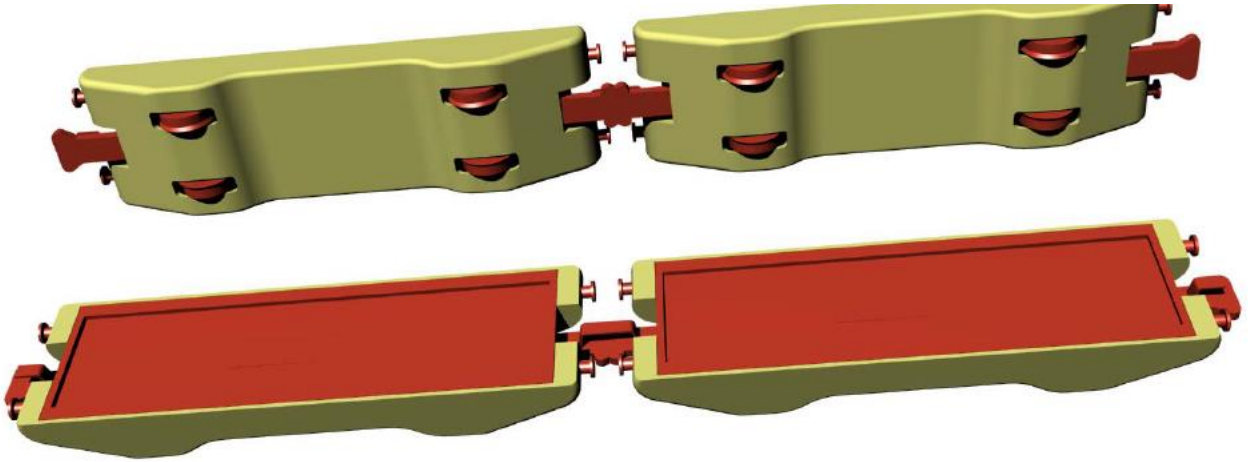
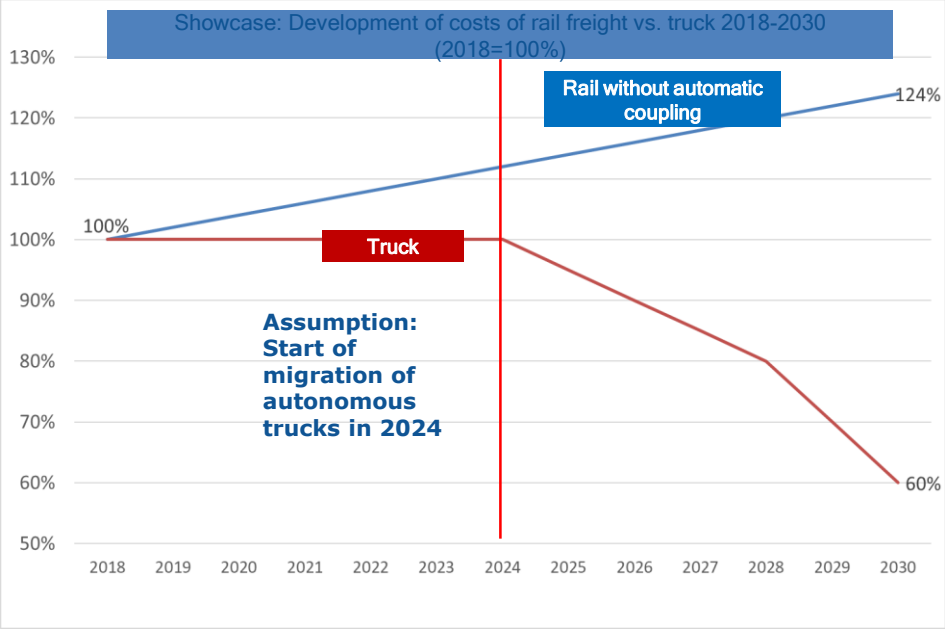


Aerodynamical/-acoustics methods & Analysis





Self driving trucks will increase the competiveness significantly.



- Approx. 1/3 of truck costs are costs for drivers.[1]
- With migration of autonomous trucks, road transportation will reduce costs dramatically.
- Without massive increase of productivity, competitiveness of rail freight will be weakened significantly.

Assumptions: Costs for rail freight increase in average by 2% p.a. because of raising costs for infrastructure and electric power supply. Diesel costs and costs for road toll will not increase, other cost increases will be adjusted by gains in productivity. Beginning of migration of autonomous trucks in 2024, all long-distance road transportation with autonomous trucks in 2030.

[1] Source: Cost calculation truck, hwh

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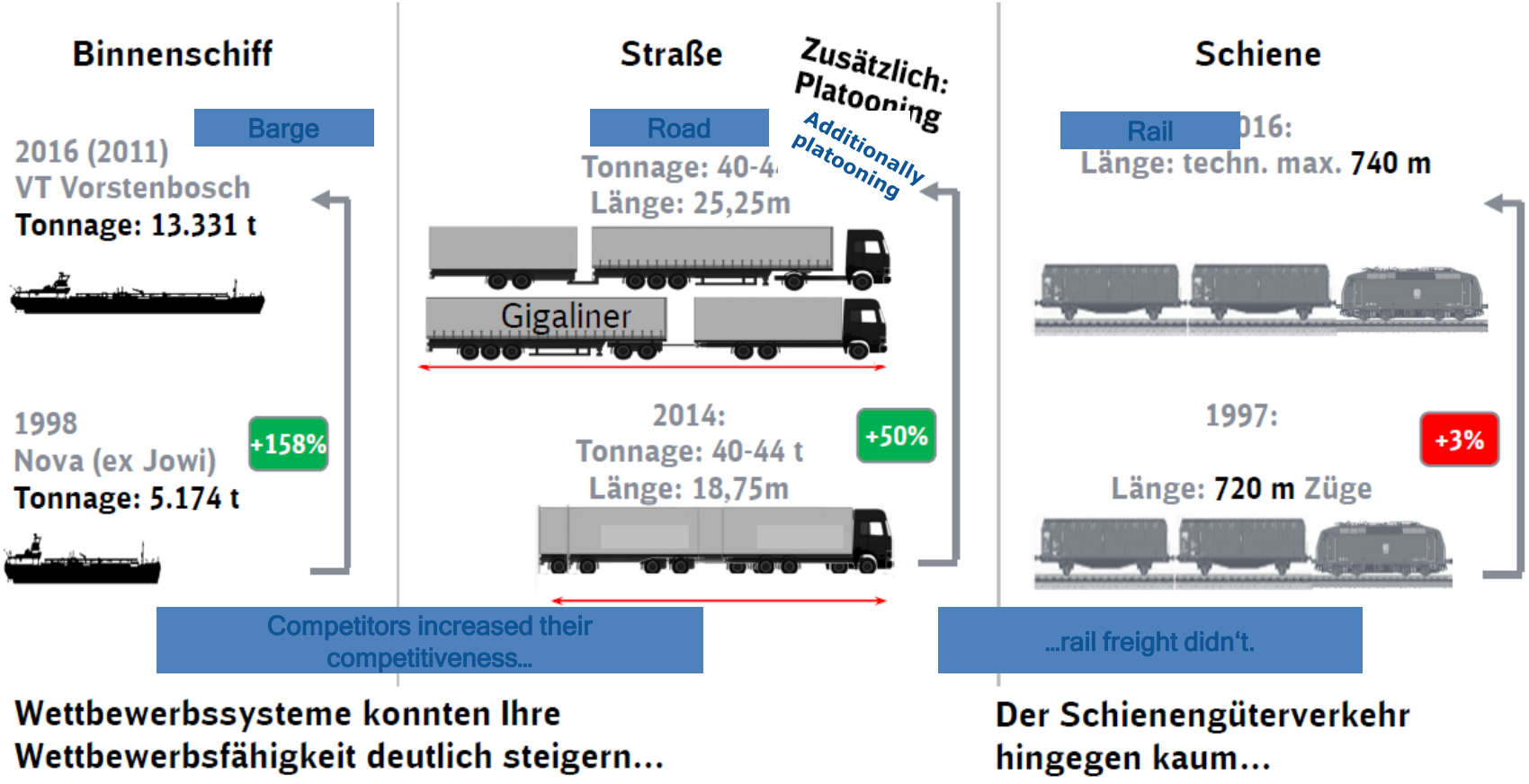
The railway has not increased its productivity in a significant way in the past 20 years.



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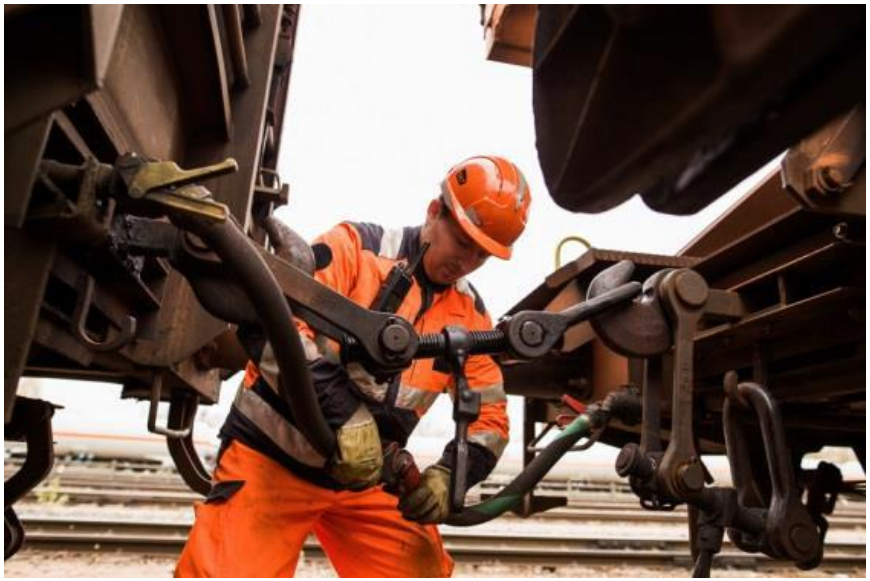
WP 5 Automatic Couplers



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There is a great need for new thinking and migration of innovations

Capacity Infrastructure

- Further develop-ment of rail freight corridors
- Extension of nodes and passing tracks
- ETCS

Dimensioning of freight trains

- Longer trains (>750m)
- Heavier trains
- Faster trains

Digitization

- Intelligent locomotives and wagons
- Telematics and sensor technology
- Predictive Maintenance

Automation

- Automated marshalling yards
- Automated shunting locomotives
- autonomous driving
- Automation of production processes

Premises / Basis-Innovations

- Automatic coupling systems
- Electric power supply on train
- Data transmission on train
- Electro-pneumatical brake

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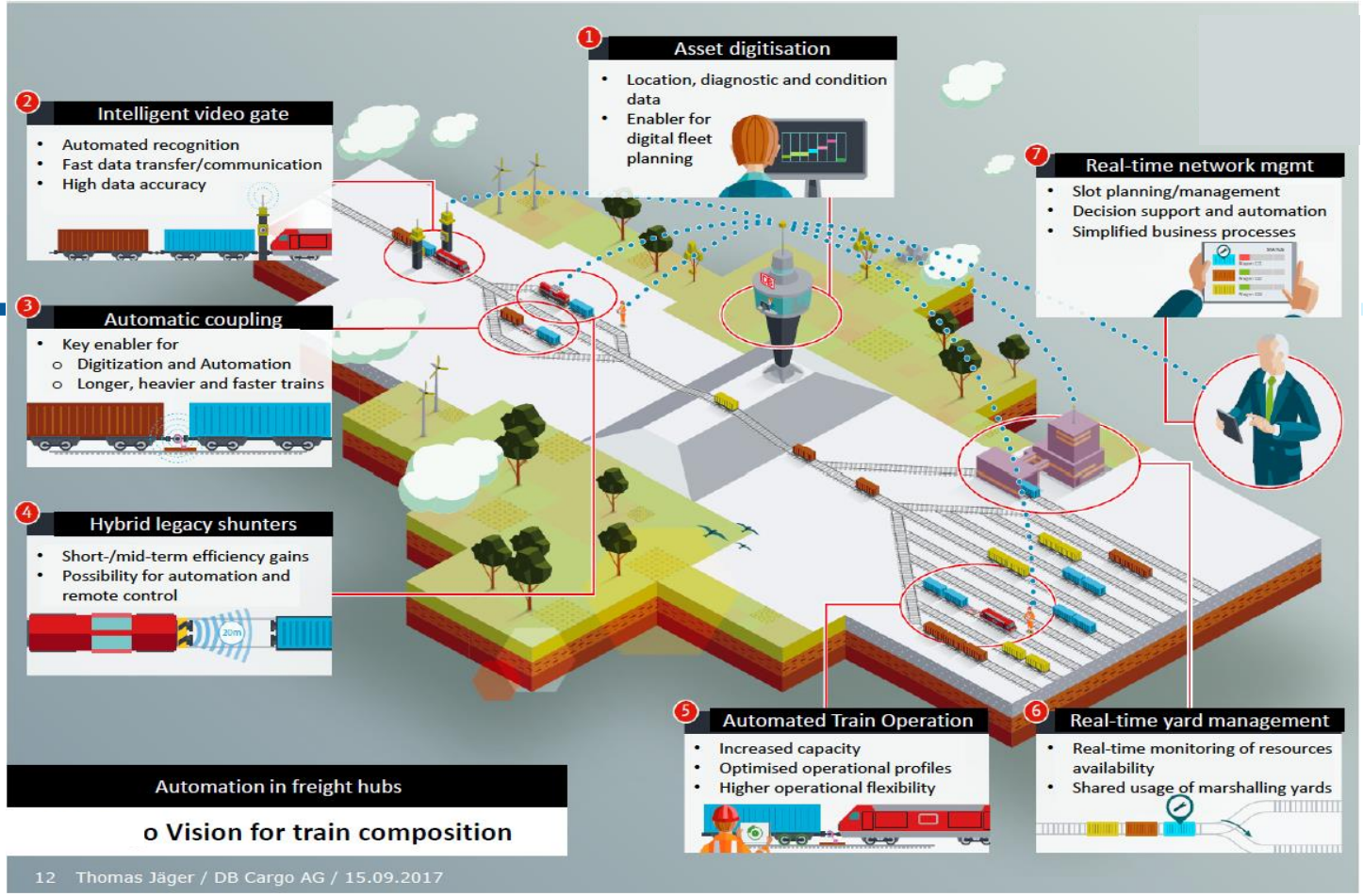

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