INTERNATIONAL UNION OF WAGON KEEPERS

Leveraging new realities to increase rail freight attractiveness and market share

UIP – INTERNATIONAL UNION OF WAGON KEEPERS

WHO DO WE REPRESENT ?

250

We represent **250** Wagon Keepers and Entities in Charge of Maintenance

14

National Associations

Our members have approximately **234,000** freight wagons that produce **50%** of the total of tonne-kms around Europe.

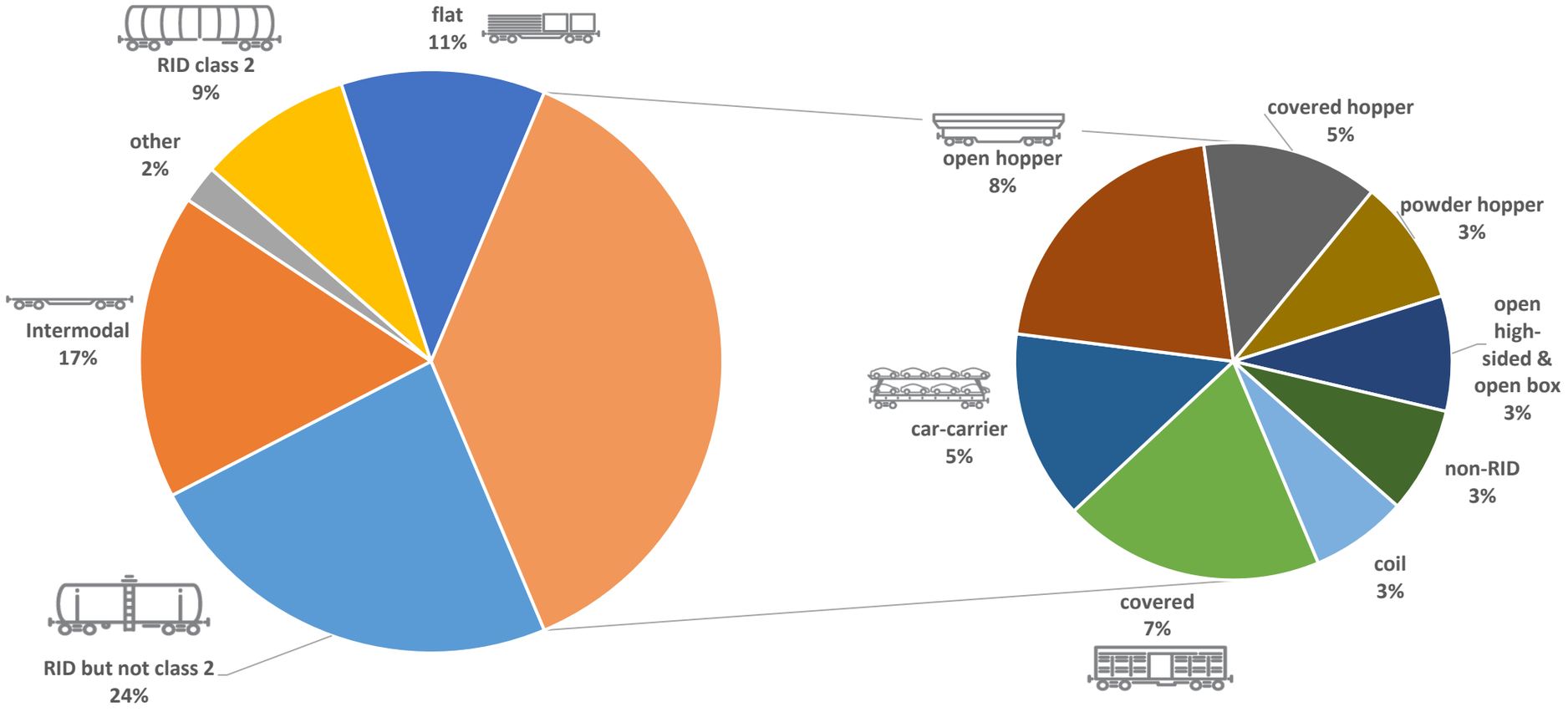
UIP – INTERNATIONAL UNION OF WAGON KEEPERS

WHAT DO WE REPRESENT ?

A 234’000 rail freight wagons fleet:

- 12bn € investments in rail freight wagons
- yearly 400-500mio € in new rolling stock

> **~50% of European fleet**



UIP – INTERNATIONAL UNION OF WAGON KEEPERS

WHO DO WE WORK WITH?

THE WAY TO 30% MODAL SHARE – A NECESSARY TRANSFORMATION

RAIL AS THE BACKBONE OF FREIGHT TRANSPORT IN EUROPA UNTIL 2030

Ports

- gates to the world

Modular systems

- flexible and adaptable

Digital Platform

- a new way of working together

Intelligent Infrastructure

- Cloud-based signalling

Efficient land use

- loading/ unloading/ transshipping

Integrated in city logistics

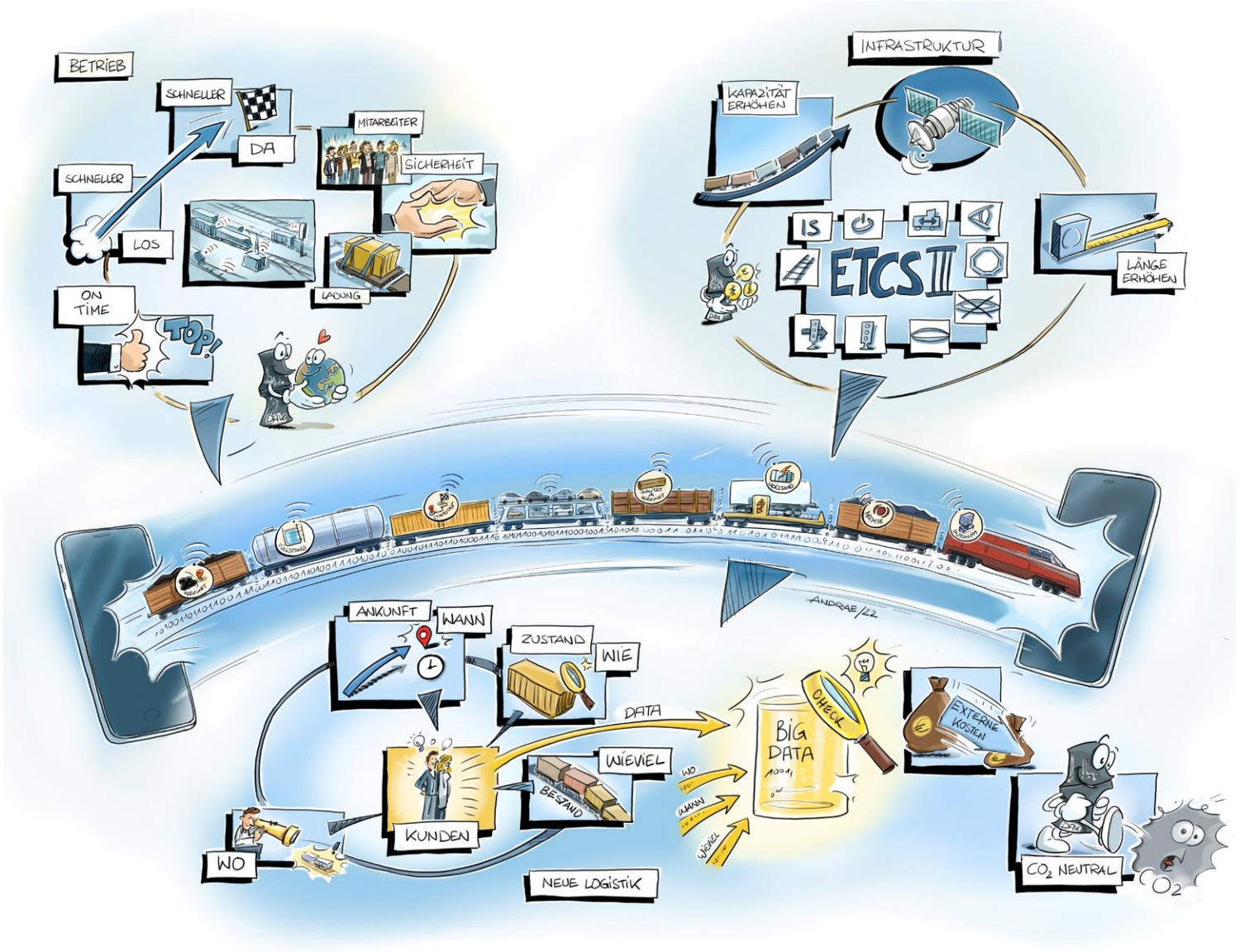
- combined and multimodal

Digitally connected in the train

- Full Digital Freight Train Operations - **FDFTO**

THE FUTURE IS DIGITAL

DIGITAL **A**UTOMATED **C**ONNECTED: THE BENEFITS OF DAC FOR THE SYSTEM AND SOCIETY



Operations

- “faster”
- safer
- longer / heavier

Infrastructure

- from ATO to ETCS
- more capacity
- less new construction

Assets

- condition-based maintenance
- attractive
- increased availability

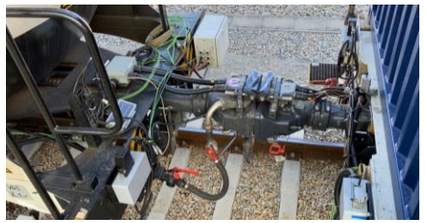
Customers

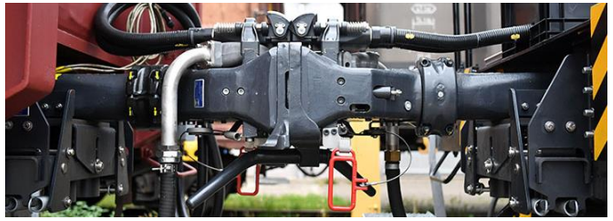
- reliable, fast transports, real-time tracking
- efficient cargo traffic ready for modal shift
- fully integrated into the supply chain

DIGITAL AUTOMATIC COUPLER PROJECT

CURRENT INVOLVEMENT WAGON KEEPERS IN NEW STRUCTURE

Prerequisites for a European DAC deployment





- ONE European system
- Proven technology
- Tried-and-tested operational procedures

Europe's Rail

Europe's Rail JU Innovation Pillar

Flagship Project 5: TRANS4M-R
DAC / „Full Digital Freight Train Operations"

Technology, Tests, Demos, Specifications, Authorisation principles (2022-2026)

Europe's Rail JU System Pillar

Drive standardisation works
Prepare change requests for revision of TSI WAG and OPE (2022-2026)

- Adequate funding available
- Manageable authorisation
- Viable migration roadmap

DAC migration EDDP „NEO"

- **Fleet analysis & Upgrade Engineering**
- **Infrastructure & IT adaptations**
- **Placing into service plan (safety, workforce training, rulebooks etc.)**
- **Upgrade capacity plan (workshops, workforce, components)**
- **Upgrading plan (traffic & customer sidings analysis, operational plan)**
- **Funding & Financing concept**
- **Cost / Benefit analysis (Updates)**
- **Investment & procurement plan**
- **Other regulatory & legal framework plans**

EUROPEAN UNION AGENCY FOR RAILWAYS

Develop efficient & adequate authorisation process & requirements

TSI Revision

DIGITAL AUTOMATIC COUPLER PROJECT

FOLLOW-UP AND PROPOSAL TO PROGRESS ON KEY TOPICS

The challenges

- Achieve widespread acceptance by all sector stakeholders and customers at least Europe-wide
- Find appropriate resources for a deployment according to migration schedule
- Define necessary technical effort for upgrading a heterogeneous European wagon and locomotive fleet
- Finalise technical specifications
- Assess costs for
  - Material
  - Upgrade expenditures
  - Maintenance/LCC
- Finalise costs- and benefits analysis and provide appropriate storyline(s)
- Define the financial needs for the whole sector
- Achieve the highest possible acceptance for adequate funding by the EU and Member States

DIGITAL AUTOMATIC COUPLER PROJECT

CURRENT STATE OF PLAY

DAC & EDDP: a strong initiative from the sector	• Active participation in EDDP increased to almost 90 companies from all around Europe • ER JU FP5 project started with 27 beneficiaries/ 71 partners • DAC promotion activities intensified in particuarly towards SEE/CEE area
DAC standardisation and technical development is progressing well	• Scharfenberg design chosen as EU standard • Integration of DAC into the „technical report“ of the TSI revision 2022 • Specifications for DAC (mechanical/pneumatic) are well advanced • Specifications for DAC (data/ energy) will be completed as quickly as possible
DAC operational target processes in progress	• Operational target processes nearly ready for first use cases (shunting, train formation, train running), for the first time EU-wide harmonization. Operational tests were carried out (enabled by DAC4EU) and testing continues.
DAC migration	• Development of solid and feasible migration scenarios • Analysis of consequences for employees (Safety aspects, new work profiles / skills)
DAC funding und financing	• Progress in costs-benefits-analysis, currently undergoing the first public consultation • Work on the European Investment Plan continues

THANK YOU FOR YOUR ATTENTION

Austria | Belgium | Czech Republic | France | Germany | UK | Hungary

Italy | Netherlands | Poland | Slovak Republic | Spain | Sweden | Switzerland

Gilles PETERHANS

Secretary General

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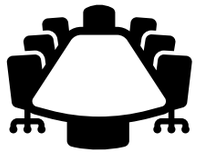
TRANS4M-R brings together 71 European partners willing to proceed with a paradigm shift

- EUR 40.6m of funding for a duration of 45 months
- More than EUR 100m in TPC



- One consortium with 71 partners
- Well balanced between end-users, large industry, railway undertakings – operators and wagon keepers, SMEs, academia and research

- Willingness to proceed with paradigm shift
- Political awerness is increasing
- More than 100 Deliverables incl demonstrators

TRANS4M-R divided into two work streams with focus on DAC development and deployment preparation

Competitive Digital Rail Freight Services

Full Digital Freight Train Operation

- **Demonstration of Digital Freight Train** in **2025** w/ DAC Type 4 & 5 incl. Energy and Data Supply, Hybrid Coupler and automated brake test
- Preparing further development of **Full Digital Freight Train** incl. Distributed Power, EP-Brake for further **Demonstrators** in 2027 and 2030
- Development of systems and solutions for **automated shunting operation**

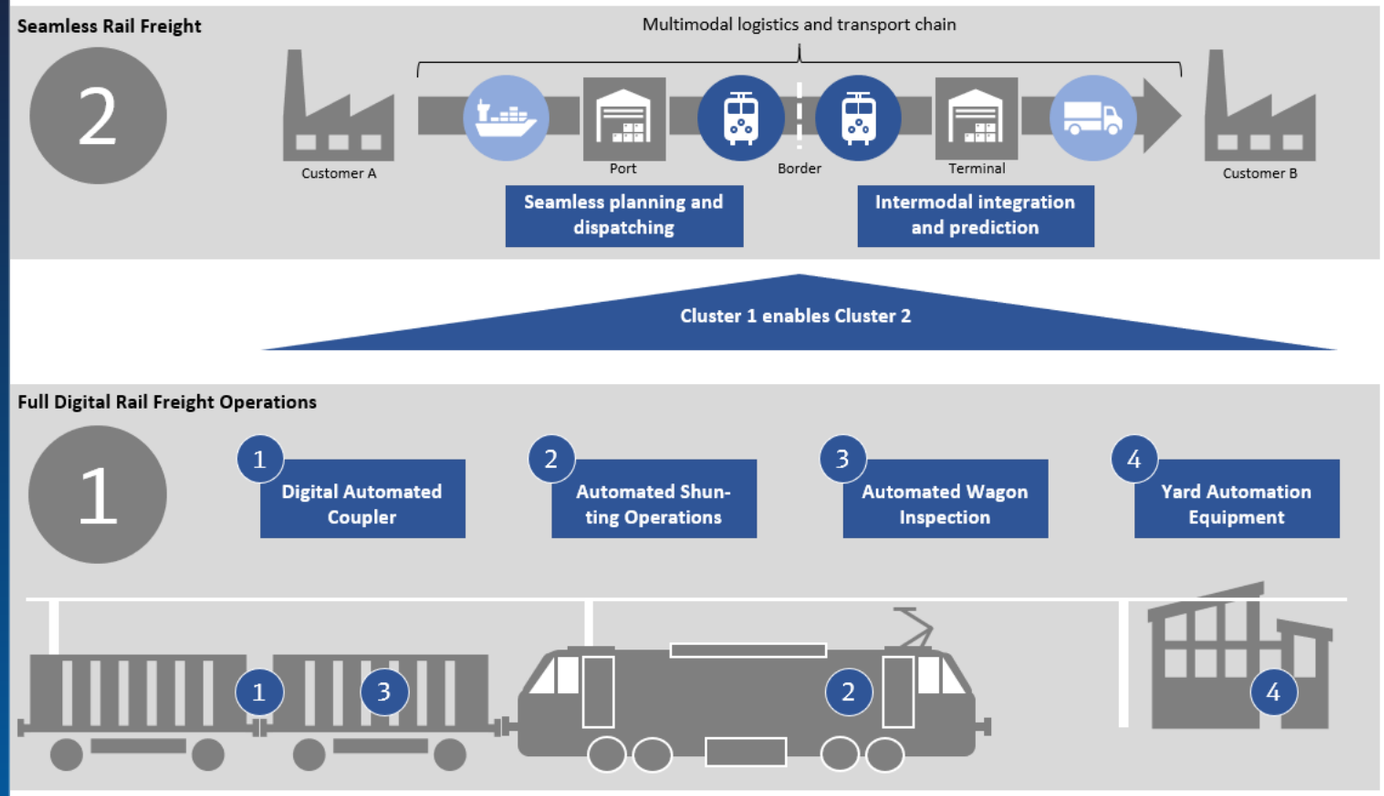
Total Project Costs 2022 to 2026: EUR 80m

Seamless Freight

- **Real-time data management and processing** to improve cross-border timetable planning, timetable management and train path ordering
- Development of **standardised railway checkpoints** to automate handover controls using e.g. sensors, videogates and handhelds
- Development of **dynamic yard/terminal management** systems

Total Project Costs 2022 to 2026: EUR 20m

Modal shift towards rail freight based on a full integration in Europe’s multimodal transport chain



Project will develop 16 technical enablers, which will be tested and brought up to demonstration in real operational environment while achieving:

- Decrease train formation/ decomposition and preparation time
- Increase average train length and higher loads
- Reduce average transportation time and dwell time
- increased productivity, cost-efficiency and maximized safety of personnel while reducing physical health exhaustion

Use Cases realised by FP5 dev. technology (I/II)

Use cases realized via FP5 technology development

benefits =

Gains in the processes (time, system time, cost savings), Gains in capacity Improved reliability Improved quality& safety

+ induced modal shift

	Use Cases intelligent freight train	Technology development within FP5	
DAC Core system 	› Automated coupling & manual uncoupling and digital backbone › Recording of train composition › Automatic (remote) uncoupling › Heavier & longer trains (within existing infra limitations) › Increased payload › Increased speed via improved longitudinal forces	› **Qualified interoperable DAC Functional Level 4** › **Qualified Interoperable DAC Level 5** ready › Qualified Interoperable **Locomotive-Hybrid Coupler** and Wagon DAC for special wagons › **DAC energy supply & data, communication** solution › Train functions: **Train composition detection** (train inauguration) › Train functions: **Automatic coupling and uncoupling** (controlled from a locomotive)	**TRL 8**
DAC shunting 	› Automated parking brake › automatically shunting wagons in Flat and Hump Yards (e.g. via Draining of auxiliary air tanks, Automated air valve)	› Train functions: **Automated parking brake control function** (controlled from locomotive), › *Relevant for DAC 5* › *Relevant for DAC 5*	**TRL 7**

Use Cases realised by FP5 dev. technology (II/II)

benefits =

Gains in the processes (time, system time, cost savings), Gains in capacity Improved reliability Improved quality& safety

+ induced modal shift

Use Cases intelligent freight train

Technology development within FP5

DAC train preparation

- Automatic brake test & calculation of brake capacity

- Train functions: **Automated brake test**

TRL 8

DAC train run

- Vital on train integrity (OTI), enabling ETCS L3 moving block operations
- Increased speed via better braking performance
- Multiple loco traction and trains up to 1500m

- Train functions: **Train integrity monitoring** and **train length determination**
- Train functions: **Train brake control & monitoring** (via train network parallel; EP-Brake)
- Train functions: Distributed Power System – **DPS**

TRL 7

Majority of functional requirements for the DAC defined in DAC specification

DAC specification

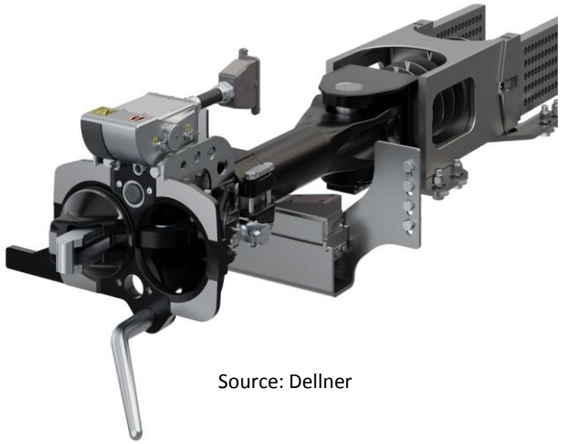
71 DAC and 21 vehicle requirements for the DAC defined, e.g.

- Designed for 1,000 kN tensile forces and 2,000 kN compressive forces without any plastic deformations
- Installation space according to UIC 530-1
- Weight of DAC equal or less than screw coupler and buffers
- Gathering range according to UIC 522 (coupling in narrow curves)
- Automatic connection of $^{5}/_{4}''$ airpipe for brake system
- Four draft gear categories for DAC (like for side buffers)
- Safety requirements

Hybrid coupler specification

83 hybrid coupler and 18 vehicle requirements for the hybrid coupler defined, e.g.

- Functionalities for DAC coupling
- Functionalities for screw coupler coupling
- Definition of switching mode from DAC to screw coupler v.v.
- Safety requirements
- Manual coupling adapter



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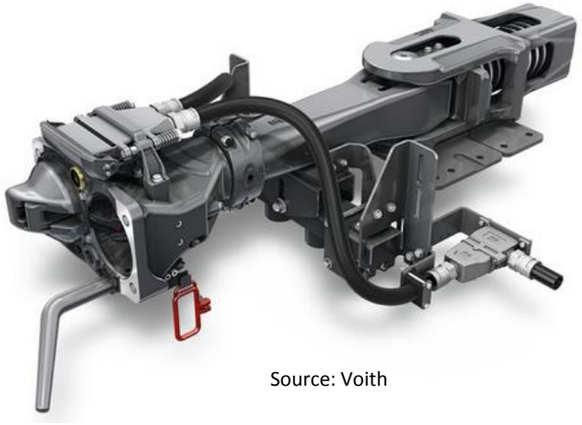


Source: Voith

Source: Knorr-Bremse

Source: Wabtec

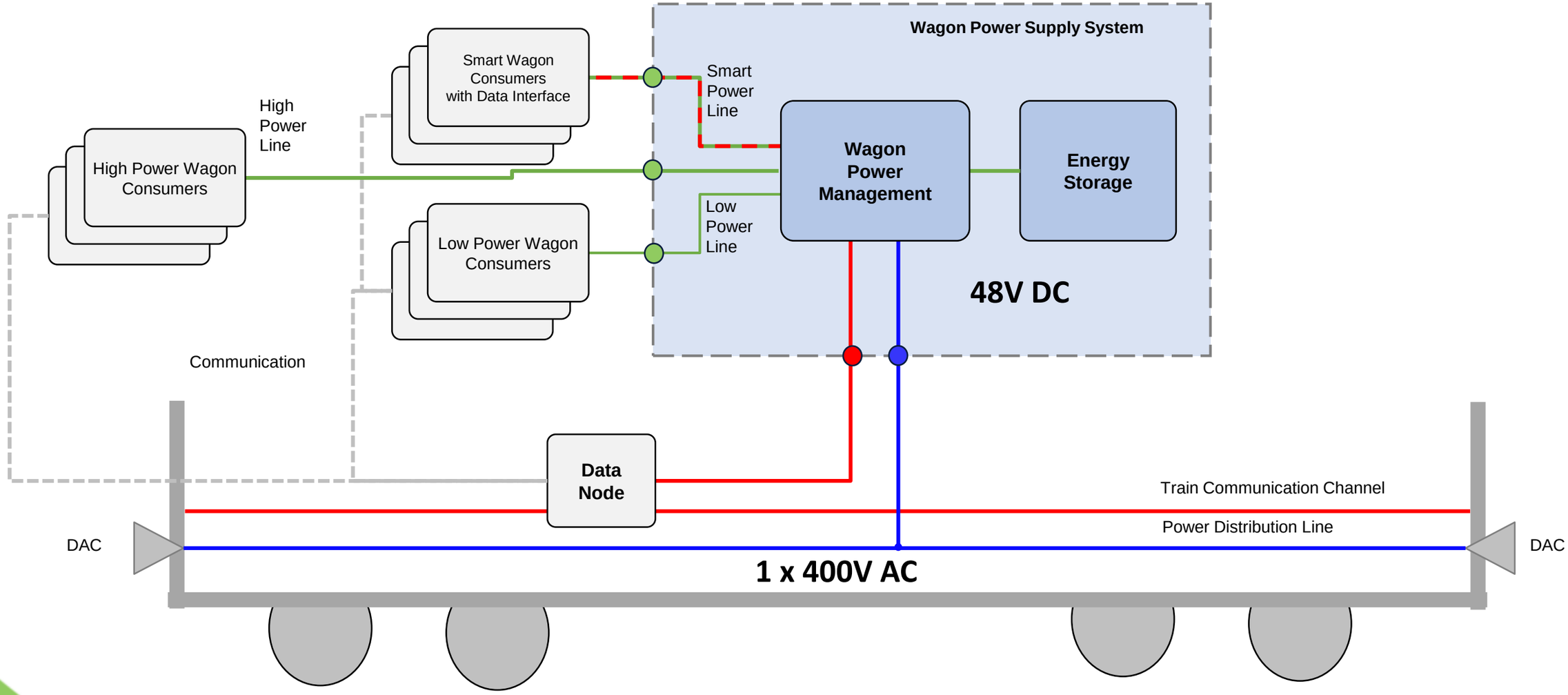
DAC open technical issues in the DAC SPEC

Open technical issues		
	Standardized technical design for manual uncoupling functionality from the side of the wagon	Evaluation of technical concepts ongoing in ER JU FP5
	Standardized technical design for preventing coupling (buffer position) and release of buffer position	Evaluation of technical concepts ongoing in ER JU FP5
	Standardized technical design for electrical coupler	Assessment process for electrical coupler initiated in ER JU FP5
	Validation of limit value for longitudinal compressive forces (LCF) and proof of running safety	Derailment tests and running safety assessment in ER JU FP5
	Technical design for avoidance of open covers in front of the electrical contacts of the e-coupler for workers protection (400V AC)	Evaluation of concepts for protection of electrical contacts against access in ER JU FP5
	Standardization of interfaces for the DAC	Standardization activities in CEN/TC256/WG33 ongoing

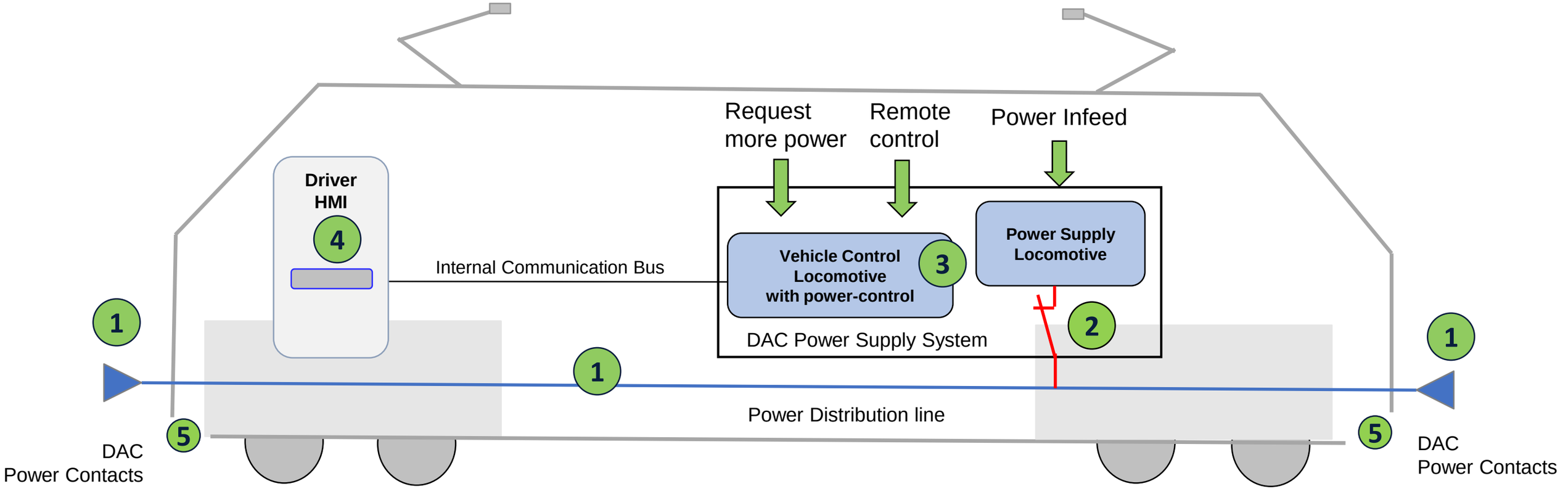
All open technical issues need to be solved during next months to start testing

A	E-coupler assessment and selection of **two** favored designs	**To be finalized asap**
	Manual uncoupling and buffer position	
	Standardized interfaces	
B	Developing and manufacturing of prototypes and provision to ER JU FP5 train test lab and demonstrator trains	**Spring / summer 2023**
C	Testing of DAC prototypes in train test lab and selection of final electrical coupler design	**Until end of 2023**
	DAC testing in train test lab and demonstrator trains	**2023 and following years**

Draft system architecture of electrical energy system on the wagon



Draft system architecture of electrical energy system on the locomotive



1. DAC with coupler contacts and uninterrupted power distribution line
2. Power supply system of the locomotive for DAC
3. Functionality of locomotive power management
4. Operation and control for the locomotive driver
5. Push-buttons for switching-off electrical energy at the sides of a loco (optional)