



Cargo



# The Digital Automated Coupler DAC

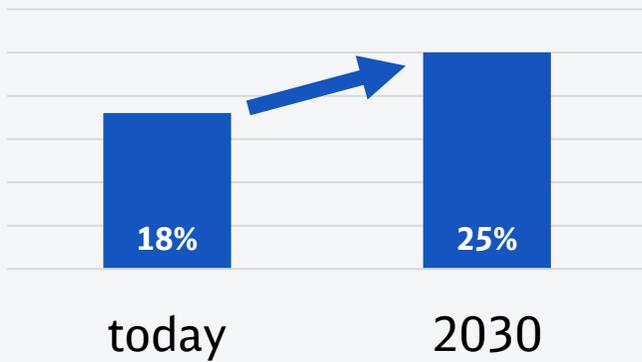
Changing Rail Freight Transport of the Future

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Innotrans 2024 | Berlin | September 24th – 27th

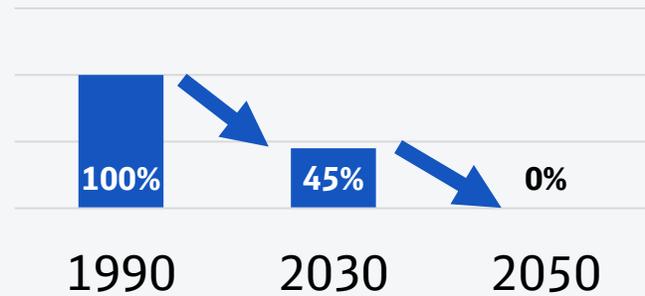
# Deutsche Bahn is contributing to reaching important targets together with partners:

## Target Modal Shift Germany



Source: [BMDV](#)

## Target European Greenhouse Gas Emissions



Source: [European Commission](#)



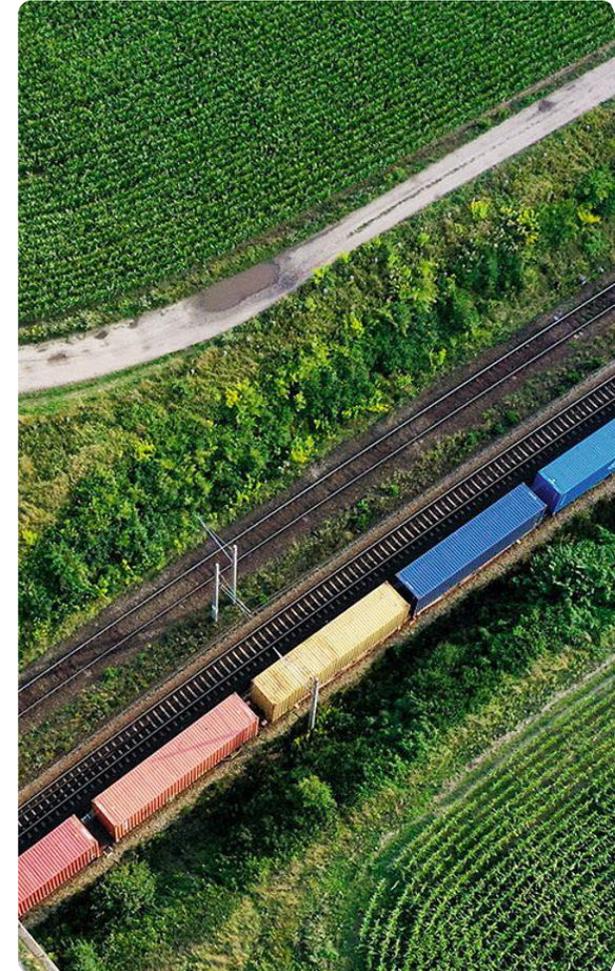
# The situation in rail freight transport: Ambitious targets versus limits to growth

## Ambitious targets

- EU climate targets (until 2030):
  - Rail Freight: + 50 %.
  - Greenhouse emissions: - 55 %.
- German modal shift target (until 2030):
  - 25 % share for rail freight transport.

## Limits to growth

- No end-to-end digitalisation.
- Low level of automation.
- Lack of infrastructure capacity.
- Industrial restructuring.
- Demographic change.

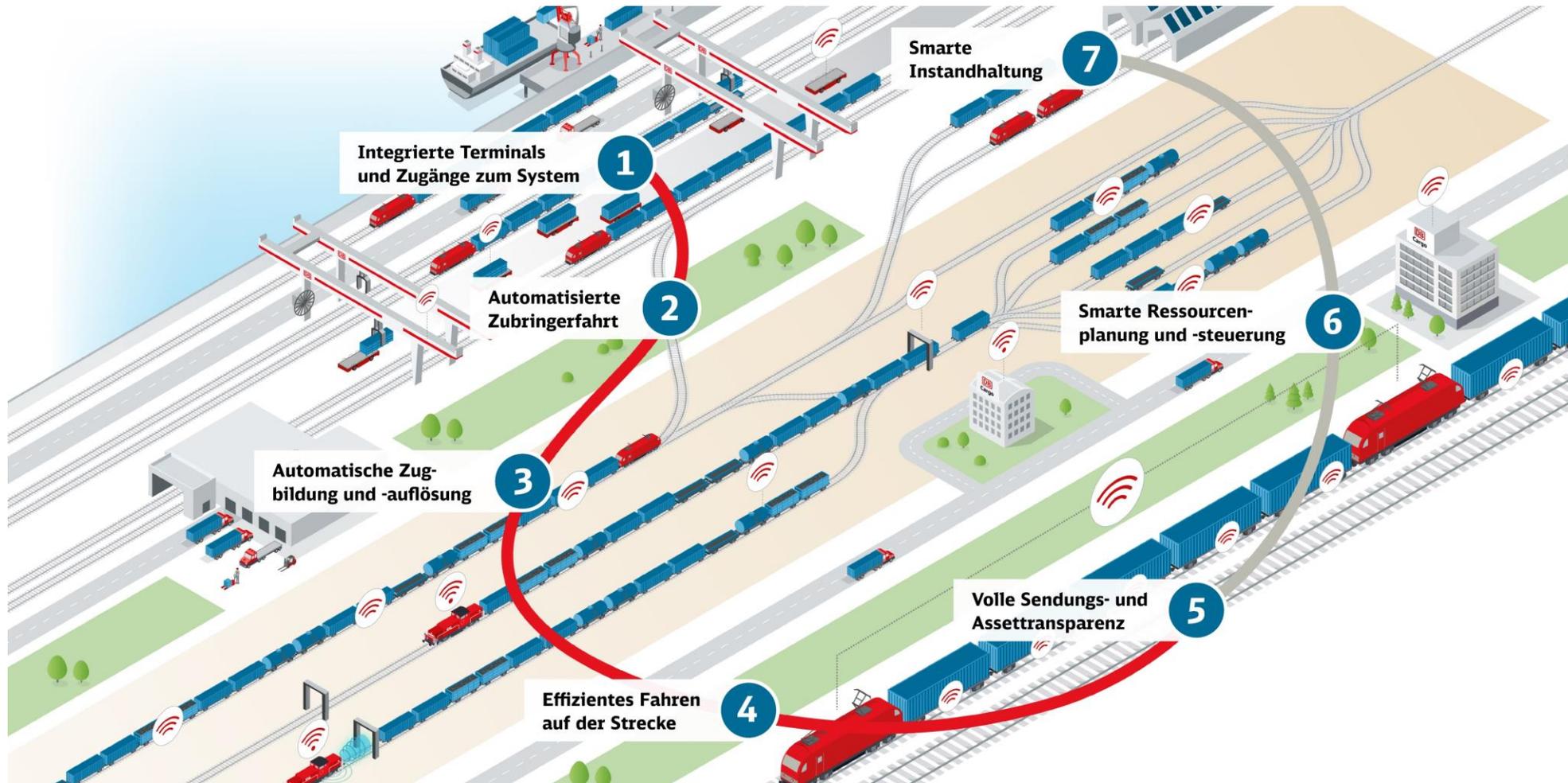


**The tools to reach EU climate goals and to support the shift to rail for freight transport:**

# Digitalisation & Automation

# The Intelligent Rail Freight Transport System

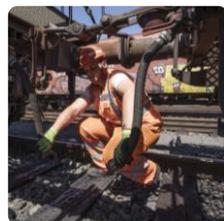
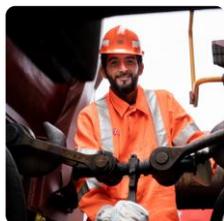
## Our Target Vision 2030+



With our innovation projects, we are advancing digitalisation & automation in defined fields of action along the entire value chain. **For the future of rail freight transport.**

# The DAC is a powerful automation platform

Selected functions in the basic package  | Future expansions



The basis: mechanic coupling plus power and data connection for faster and simpler processes, increased bearable forces

## Shunting and train formation

Easy, fast and efficient



Wagon sequence



Parking brake



Brake test



Uncoupling via Push-Button



Wagon inspection



Air valves



Tail signal



Remote-controlled uncoupling

## Train run

Heavier, faster and longer



Braking regime



EP-brake



tractive/compressive forces



Derailment detection



Train integrity



Distributed traction

## Logistics of the future

Additional value for the processes of our customers



Displays



Telematics 2.0



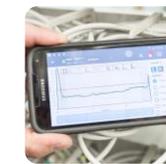
Lights



Customer interfaces

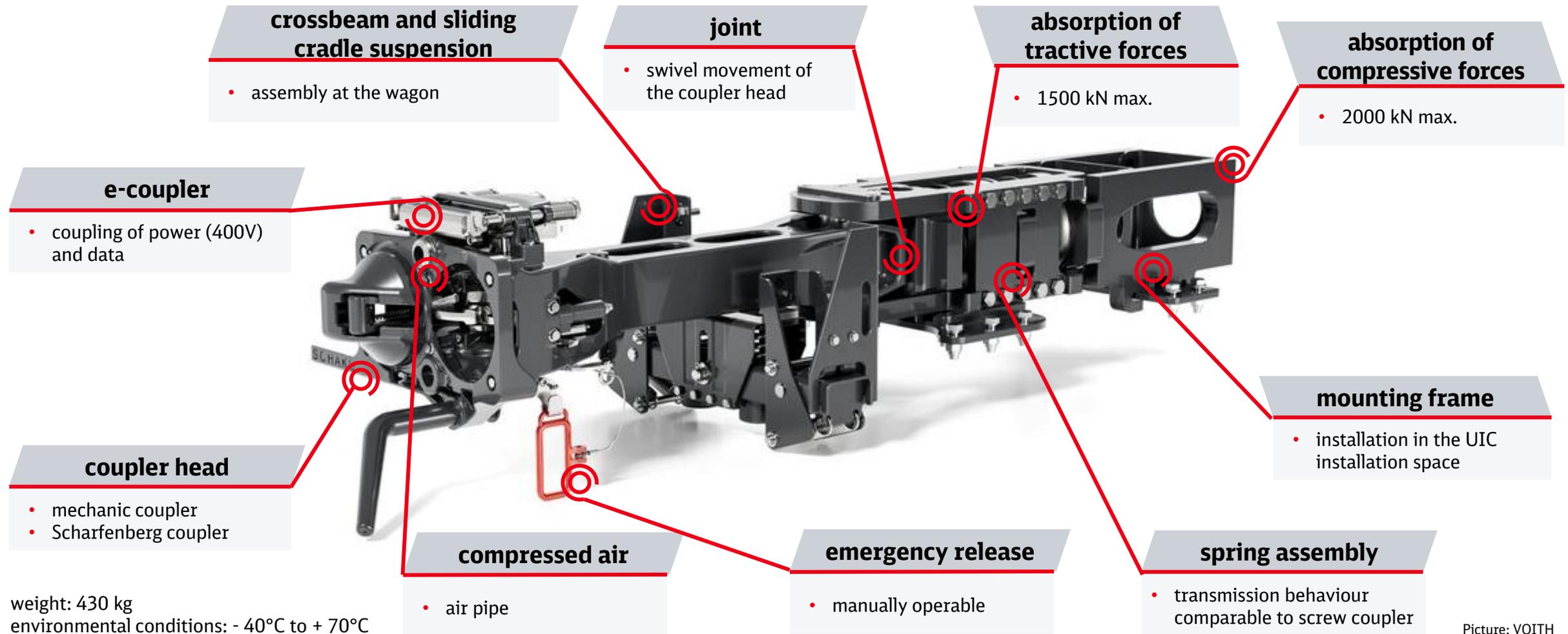


Surveillance



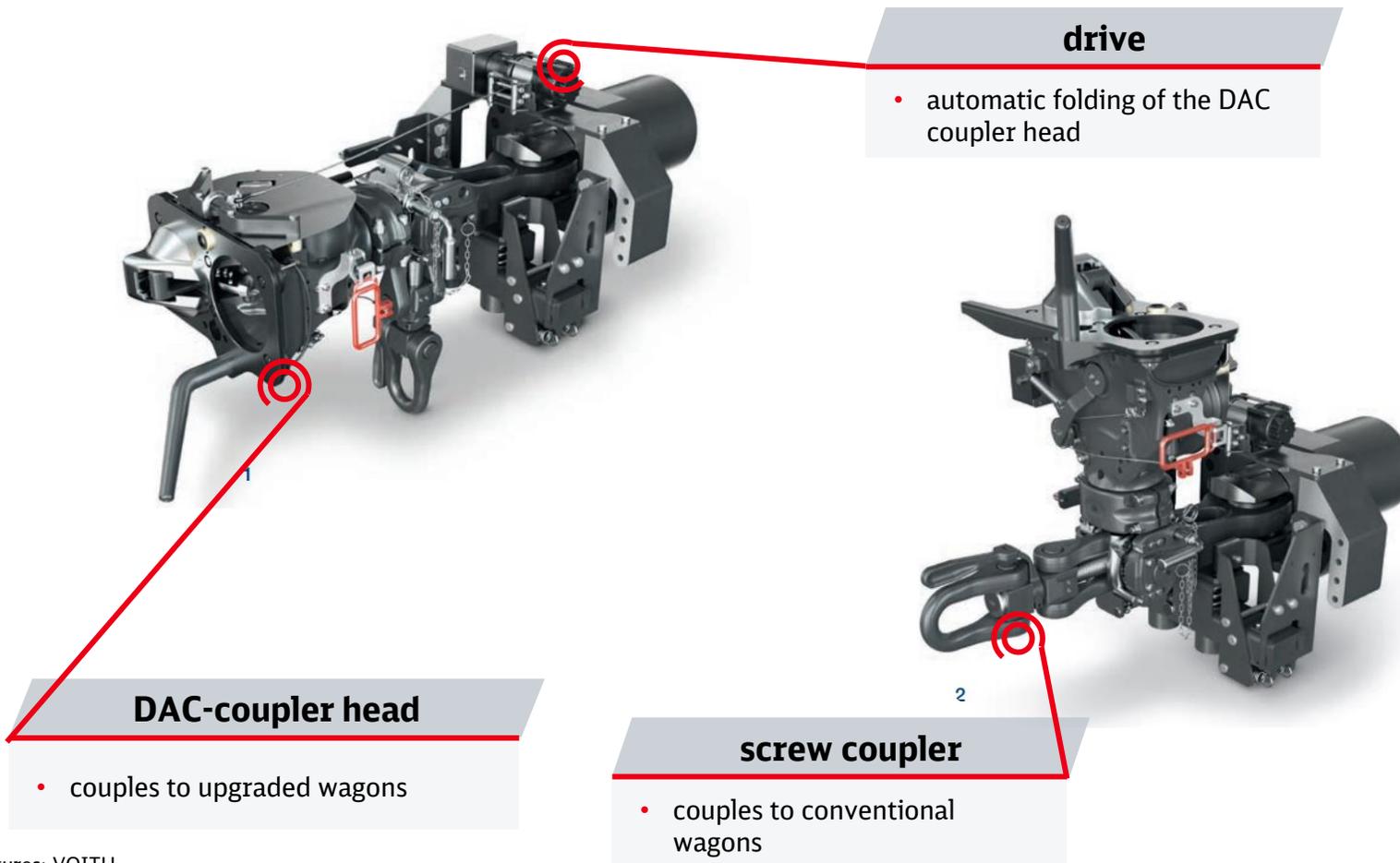
Condition based maintenance

# The technical design of the DAC is based on the Scharfenberg coupler, which is used in passenger transport



Picture: VOITH

# Hybrid couplers on locomotives can be used with the DAC and screw couplers



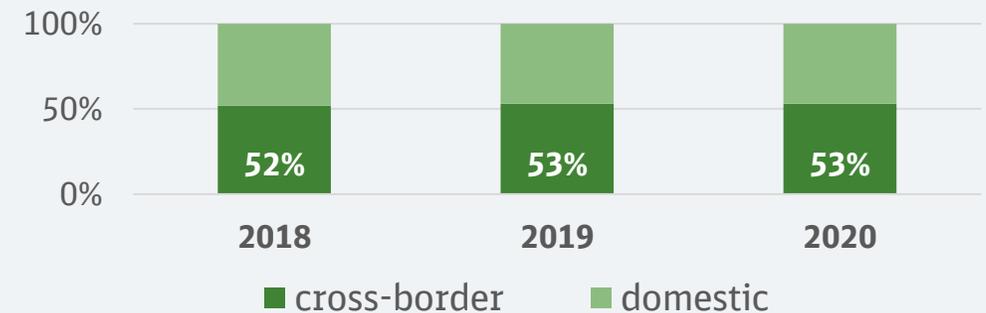
Pictures: VOITH

# Digital Automatic Coupling is an European effort

## European project framework for DAC



## Share of cross-border rail freight traffic of DB Cargo



Digitale  
Automatische  
Kupplung für Europa

# European framework for DAC



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EDDP Supervisory Board

EDDP Programme Board

Europe's Rail  
Flagship Project 5

EDDP

development/follow-up of migration roadmap,  
sector-wide coordination, risk management,  
prep. of decision-making



EC/ERA

Europe's Rail  
System Pillar

ESOs



FP 5 FDFTO  
sounding boards

## DAC migration roadmap

11 actions



DAC/  
"Full Digital  
Freight Train  
Operations"

target operat. proc.  
functional requ'mts  
system architecture  
tech. development  
testing & demos  
tech. specification  
authoris. dossiers



Technology  
(mirroring &  
sector feedback)



Operational  
Procedures  
(mirroring &  
sector feedback)



Fleet Analyses  
& rtf Engineering  
(rtf readiness)



Retrofit  
capacity plan  
(workshops,  
work-force,  
components)



Funding &  
Financing plan



CBA  
(updates)



development of  
efficient &  
suitable  
authorisation  
provisions &  
requirements



operational  
procedures  
standardisation  
(plan &  
execution)



GENELEC



Executing  
European  
standardisation



Infrastructural  
& IT adaptations



Retrofitting plan

(traffic & customer  
sidings analysis,  
operational plan)



Investment plan  
& procurement  
framework plan



TSI revision



Placing into service  
plan(safety, workforce  
training, rulebooks etc.)

Other regulatory &  
legal framework  
plans

Technical  
harmonisation:  
preparing  
TSI revision &  
driving EU  
standardisation

alignment of  
rail & DAC  
system  
architecture



# Migration from Screw Coupler to Digital Automatic Coupling is thoroughly prepared.

# DAK migration planning ensures operation despite two incompatible coupling systems

## DAC migration planning ensures that...

- ... two vehicles with different couplings do not meet on the same track



- ... the vehicles are not absent from the customer for too long



## Therefore different fields of action have been defined:

- **Migration strategies** taking into account train routing, shunting yards, and sidings
- **Retrofitting concepts and personnel** resources for the workshops
- **Technical layout:** Coupling design in line with migration strategies
- **Framework conditions:** Procurement and public funding programmes without restrictions on migration
- Coordination at **European level**, ensuring **synchronised and controlled migration** over the entire period

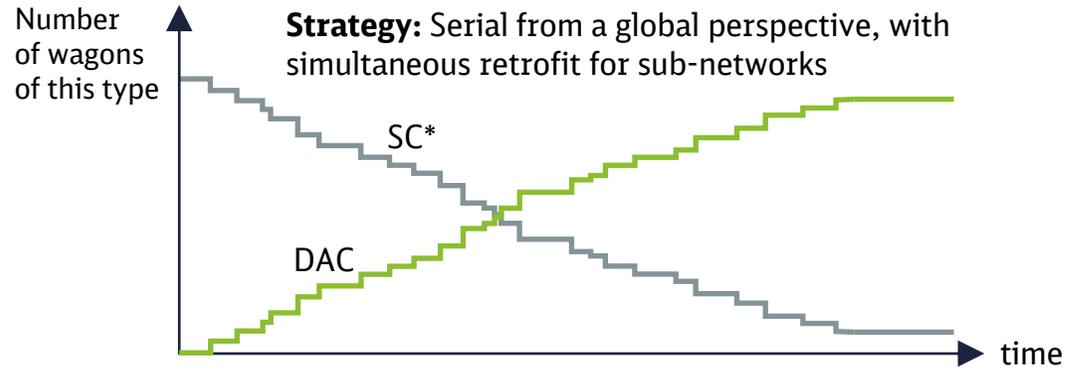
# Serial and simultaneous migration merge into an overall ramp-up

## Europe-wide coordination of transport and workshop services

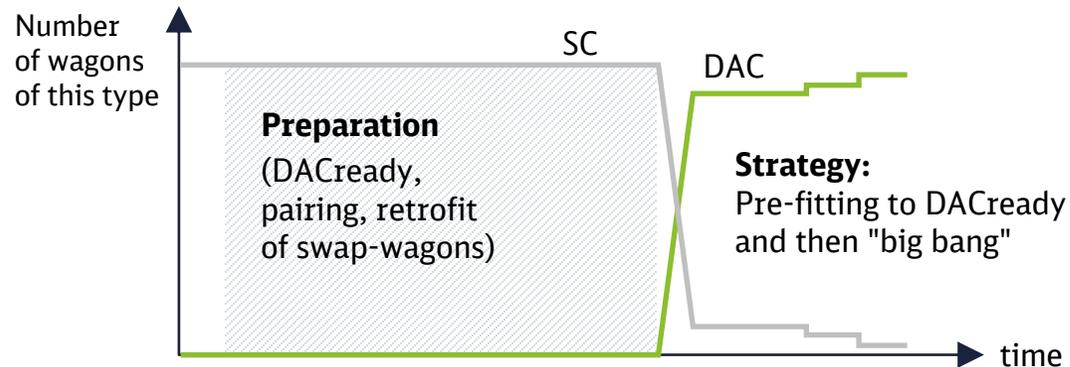


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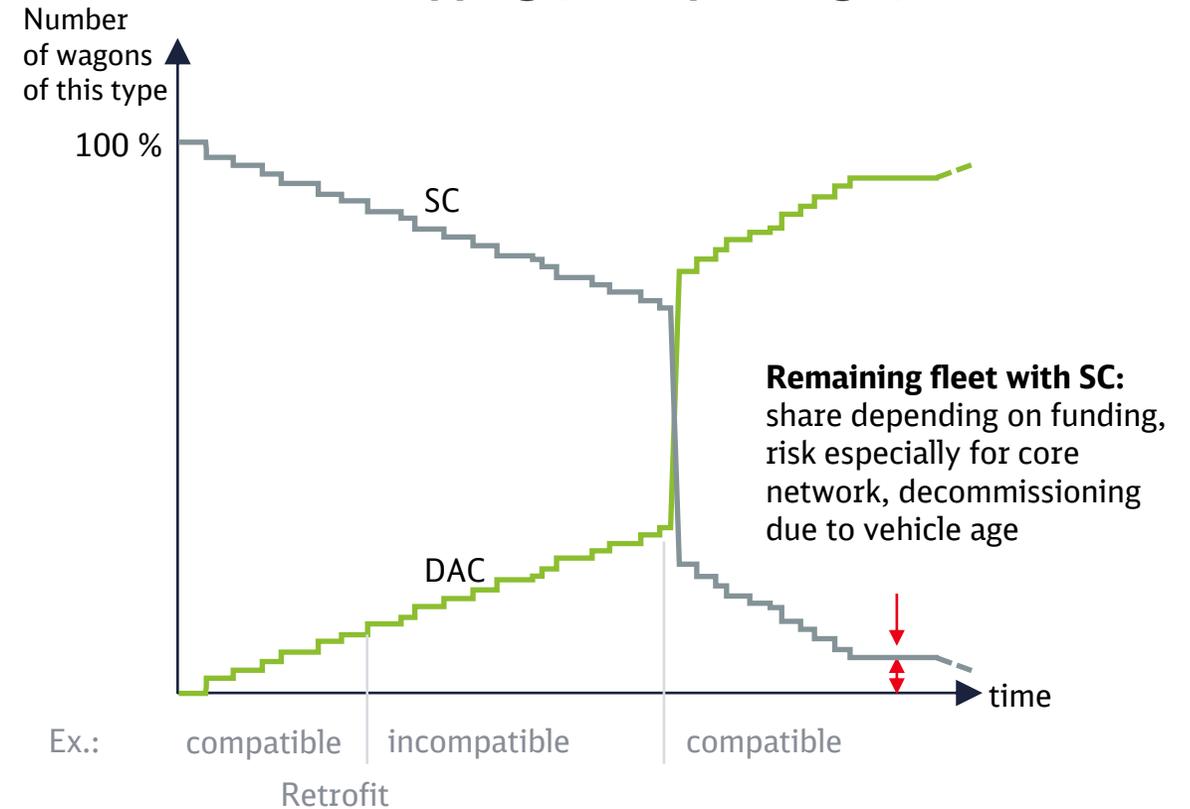
### Wagons of separable runs (sub-networks)



### Wagons of the interlinked core network



### Overlapping ("multiple bangs")

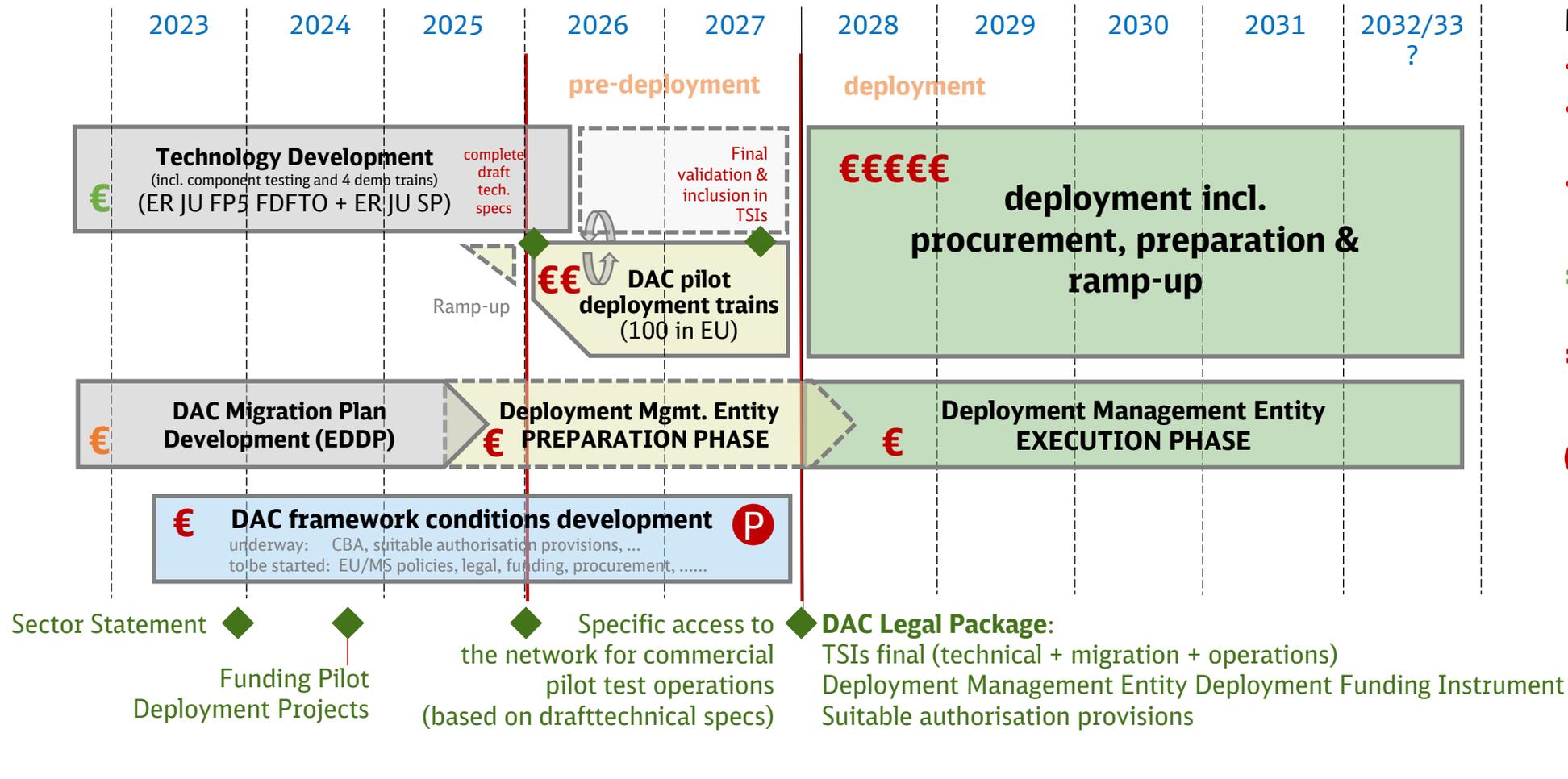


\*) Screw Coupler

# We have made progress and we will continue to do so



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## Major amendments/NEW:

- DAC pilot deployment projects
- DAC framework conditions development
- Deployment Management Entity

€ Budget and resource need (already funded)

€ Budget and resource need (currently mainly unfunded)

P Determining milestone: DAC Legal Package to be implemented before this deadline

# Preconditions for investing in DAC deployment.

## Supported by more than 50 organisations in Europe



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### DAC Sector Statement

Brussels, 10.07.2023

**Rail freight automation and digitalisation is an important enabler for the transport sector to meet the EU's greening targets**

There is a common understanding of the need to strengthen rail freight in Europe, which is in decline today. It is nine times better in terms of CO<sub>2</sub> emissions than road transport and will help Europe in achieving its Green Deal and decarbonisation targets. Electrification of road transport is far from being mature and cost-effective and will still consume seven times more energy than freight transport on rail.

**We are fully committed** to achieve the deployability of this technology through intensive testing campaigns and we are ready, under a clearly pre-defined EU strategy and **with fulfilment of the below preconditions**, to the successive deployment of DAC and its automation and digital technology at European scale. A challenge of this dimension would indeed require the support from the European Commission and the Members States, to ensure that all the necessary investments are properly coordinated and that obvious market failures are addressed by the policy-makers, such as the imbalanced distribution of costs and benefits among actors, and counter-balanced with appropriate funding and financing measures.



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**DB**

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