

Knorr-Bremse Rail Systems Italia

Digital Freight Train

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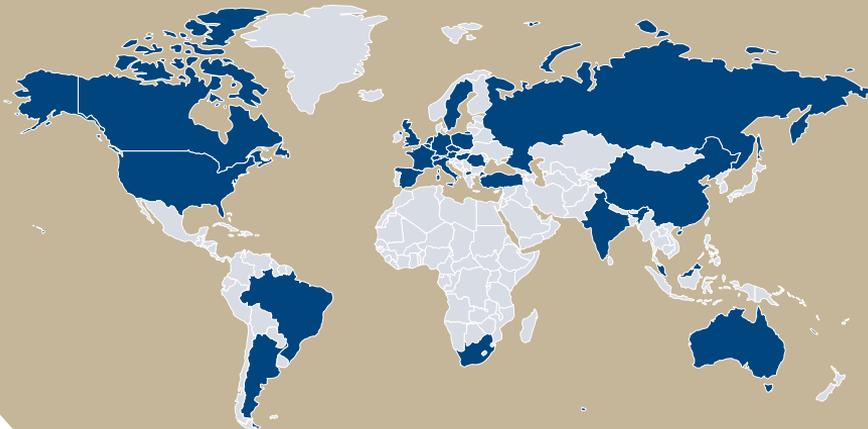
**Knorr-Bremse makes
mobility safe.
By rail and road. Every day.
Across the globe.**

Rail Vehicle Systems

- Braking Systems
- Entrance Systems
- HVAC
- Power electrics
- Signalling systems / TCMS
- Sanitary Systems
- Traction
- RailServices

Commercial Vehicle Systems

- Braking systems
- Air supply systems
- Powertrain systems
- Steering
- Vehicle Dynamics



**Knorr-Bremse is based in 30
countries/regions
around the world at more
than 100 locations,**

REVENUE 2021

€ 6.71bn

EMPLOYEES 2021

30.544

R&D 2021

€ 431m

The digital freight train supported by the DAC will be a game changer

Intelligent Automation - Control and Monitoring



Train Preparation



faster processing

Train Operation



more transportation capacity
dynamic infrastructure utilization

Shunting & Parking



faster processing

Maintenance Services



Sustain, Enhance, Accelerate

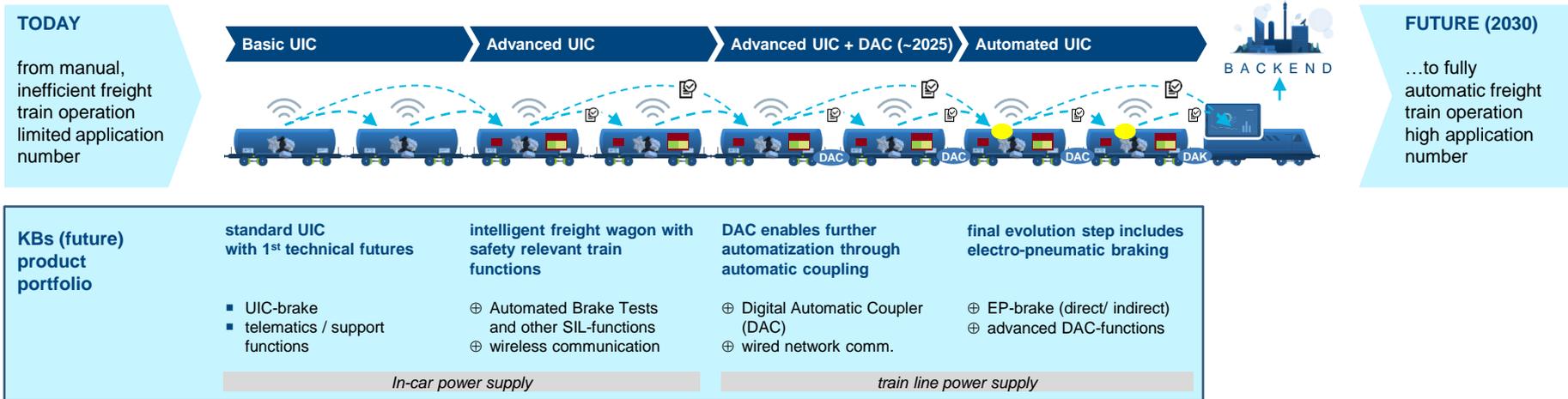
- Automated**
- Brake test
 - Train composition detection
 - Brake weight calculation
- Remote controlled**
- Parking brake control
 - Brake settings
- Automated Coupling**

- Electro-pneumatic brake**
- Monitoring**
- Operational brake monitoring
 - Train integrity detection and monitoring
- Warnings and alerts**
- driver alerts or warnings for critical operation conditions

- Remote**
- Decoupling (DAC5)
 - Parking brake control
- Shunting Assistant etc.**

- Condition (data) based maintenance**
- Device management**
- Over-the-air software update
- Asset management**
- Identification and usage tracking

Freight Train Evolution – from Telematics to Freight Rail Automation



DIGITAL FREIGHT TRAIN combines 3 main streams:

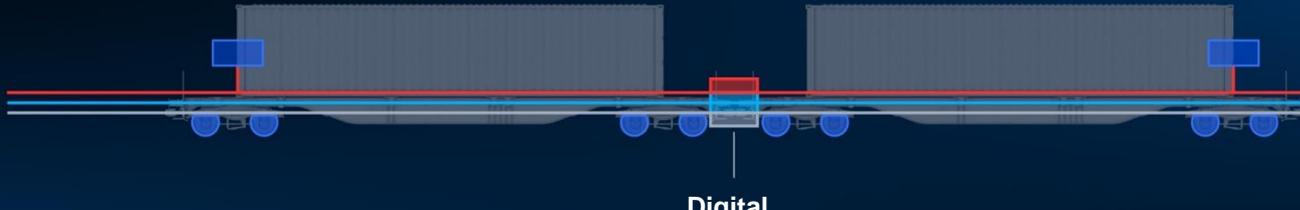
- **Digital Automatic Coupler (DAC) – Freight Link**
- **Freight Rail Automation System – Freight Control**
- **Digital Services**

in a R&D program to support the evolution of rail freight in Europe

DAC makes rail freight fit for the future – it is safe for the staff, automates coupling and enables the digitalization of the freight train

Digital Automatic Coupler

data
pneumatic
power



Digital Automatic Coupler (DAC)

Automatic coupling

-  mechanical
-  pneumatic
-  Electrical / digital

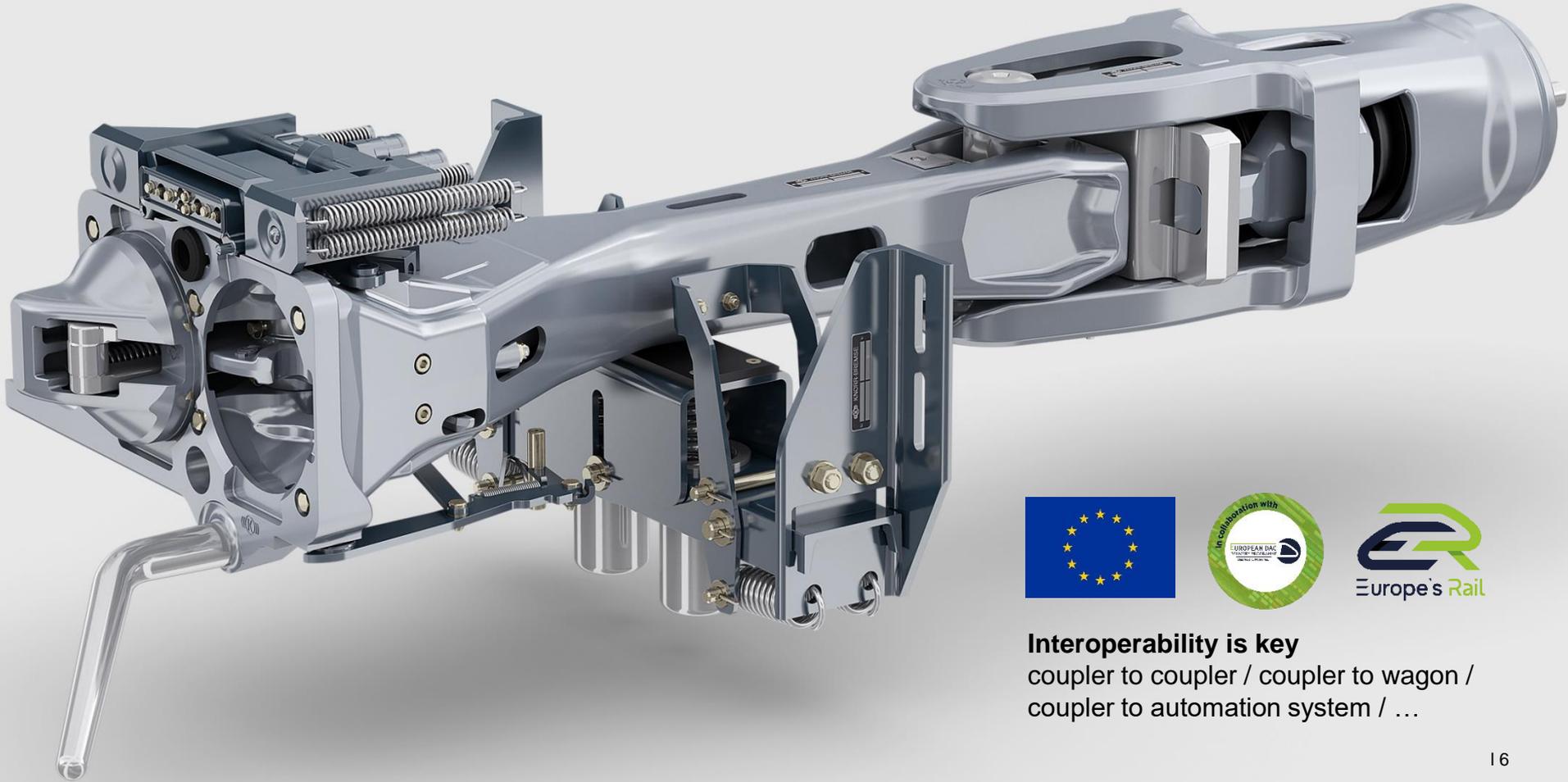
Type 4 – automatic coupling
Type 5 – automatic coupling & decoupling



Benefits

-  fast, efficient coupling
-  Automatic coupling
-  Safe operation
-  Enabler for automation

Knorr-Bremse DAC “Freight Link”



Interoperability is key
coupler to coupler / coupler to wagon /
coupler to automation system / ...

Freight Control – Key messages

KB will offer train functions to the railway operators provided by the automation system: „**Freight Control**“

Freight Control Automation System will be integrated by **digital services** for customers beside safety related train functions

Interoperability of the vehicles in a train is **a must have precondition**

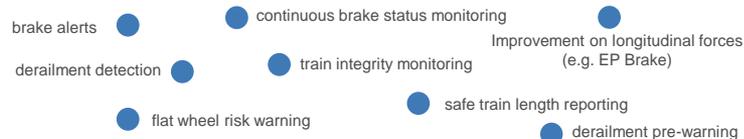
The introduction of automation systems to freight wagons is combined with the central point of **train communication** and an onboard **power supply**

Automation Functions for Operations

Faster and automated Train Preparation



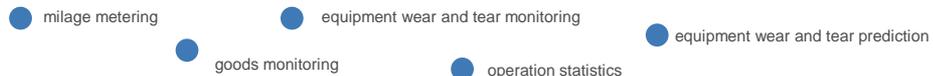
Improvement in reliable and safe Train Operation



Automated Wagon Shunting and Parking Activities

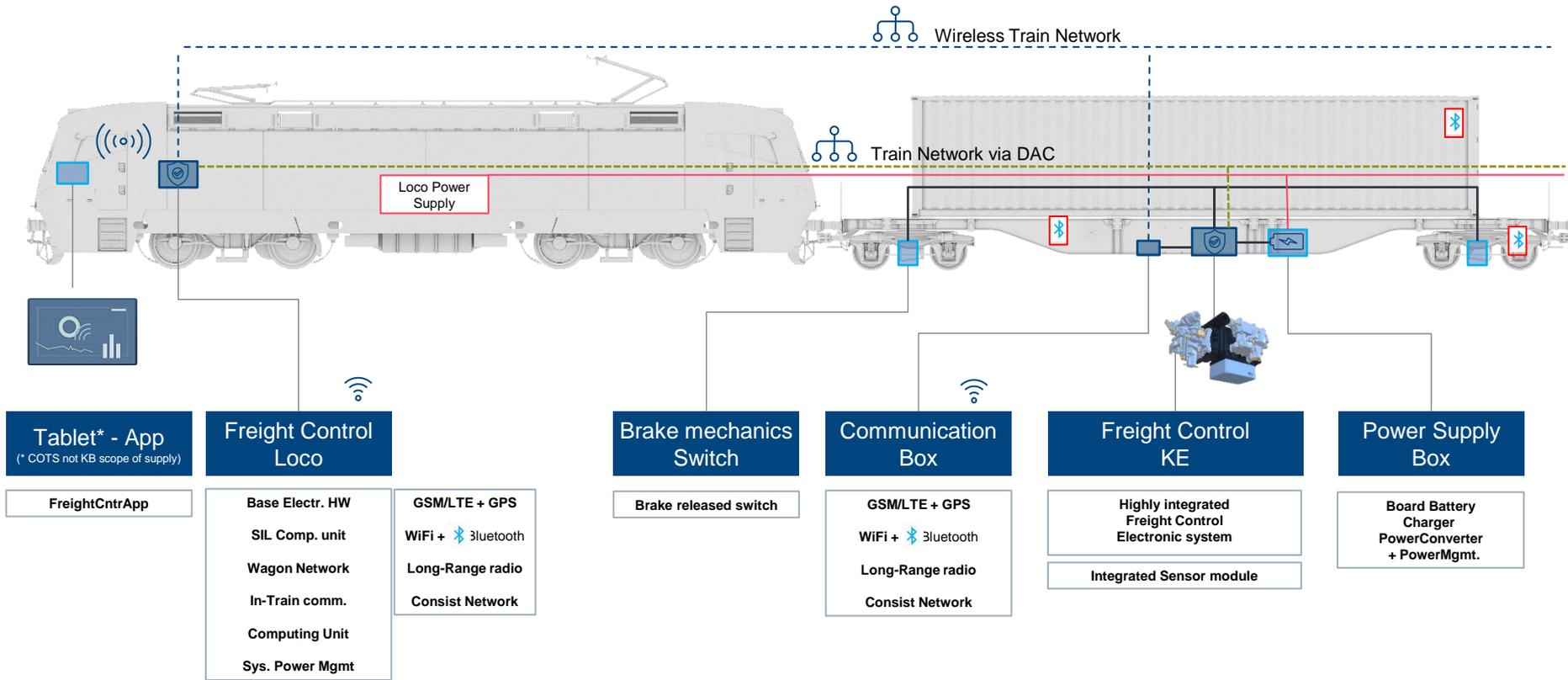


Functions for Maintenance (CBM) / Logistics Telematic / Digital Services



Freight Control – Freight Rail Automation System

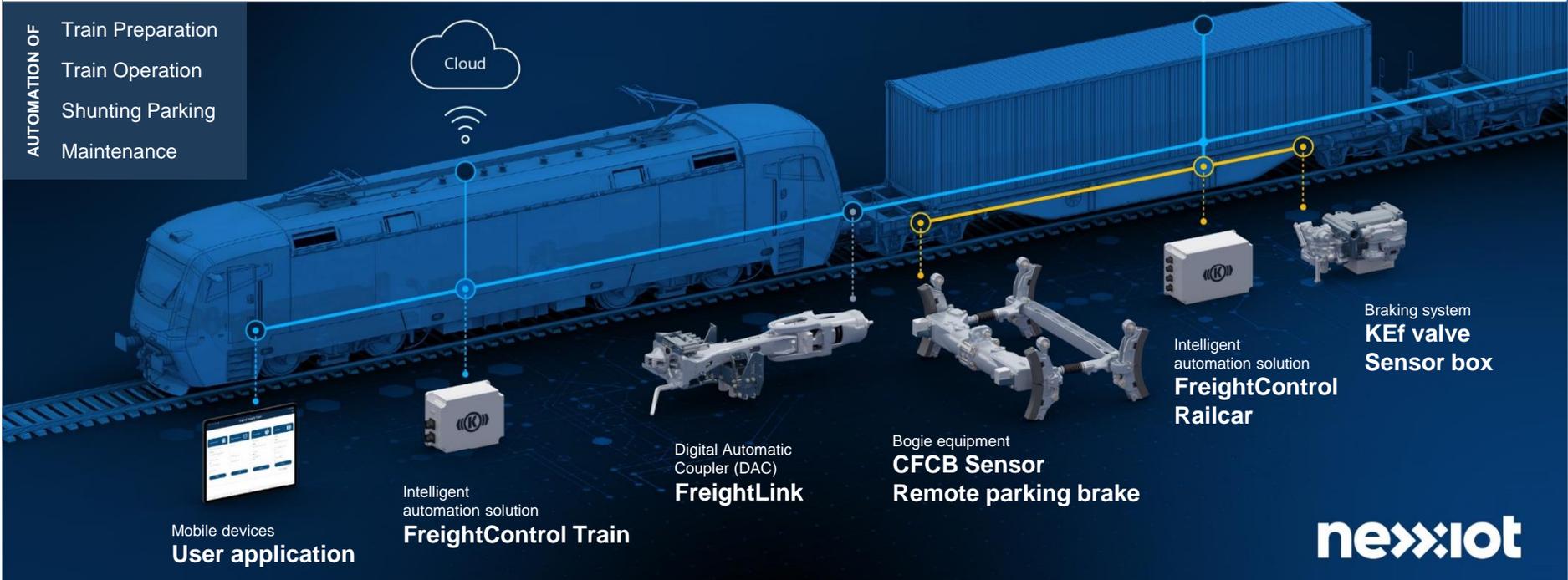
Advanced Asset + Device Mgmt.
Data Collection
Digital Services



“KB Digital Freight Train” provides the needed technology for the automation of all critical processes from train preparation to parking & maintenance

Knorr-Bremse Digital Interoperable Freight Train Eco-System - Technology

- AUTOMATION OF
- Train Preparation
- Train Operation
- Shunting Parking
- Maintenance



Mobile devices
User application

Intelligent
automation solution
FreightControl Train

Digital Automatic
Coupler (DAC)
FreightLink

Bogie equipment
CFCB Sensor
Remote parking brake

Intelligent
automation solution
**FreightControl
Railcar**

Braking system
KEf valve
Sensor box



Grazie per l'attenzione!

Thank you for your attention!

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