Technical innovations for an effective rail freight industry

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State of play: The development and implementation of basic innovations for European rail freight are still totally inadequate

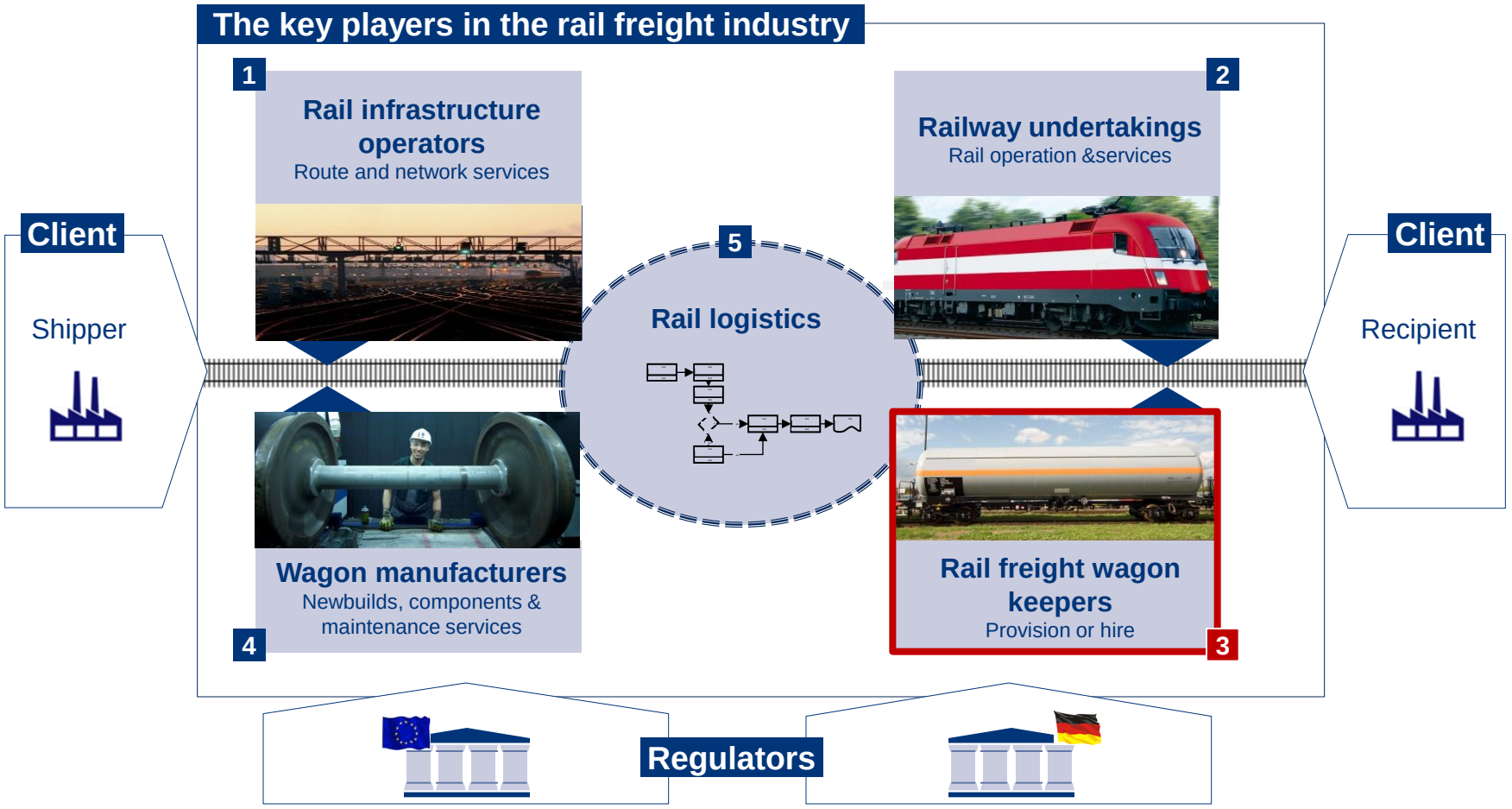
Reasons for this **lack of innovative power** in the sector include:

- The European **market** for new rail freight cars is **small** and **volatile**
  ➔ **small volume market /high development costs**.
- Innovations must not restrict **compatibility of freight car deployment**.
- Basic innovation **requirements of wagon keepers are insufficiently defined**.
- **Slow implementation** of basic innovations.
- Innovations must generate **economic gains for wagon keepers**.
- Economic **benefit** of a freight wagon innovation is **not** necessarily reaped by **wagon keepers**.

This calls for a new approach to innovation across the whole industry.

Source: White Paper on Innovative Rail Freight Wagon 2030, presented at Innotrans, Berlin, on 20/09/2012

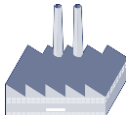
The key players in the rail freight industry



Paradigm shift essential for the effective implementation of *basic innovations*

Past

"Push" – *marketing risk*



Wagon manufacturers

1 **Idea** → 2 **Development** → 3 **Product** → 4 **Market?**

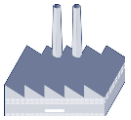
Wagon keepers

Future

"Pull" – *needs-oriented development*

Wagon keepers

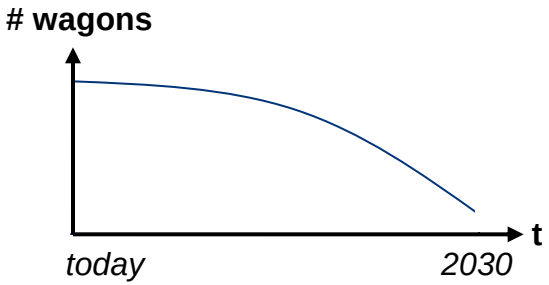
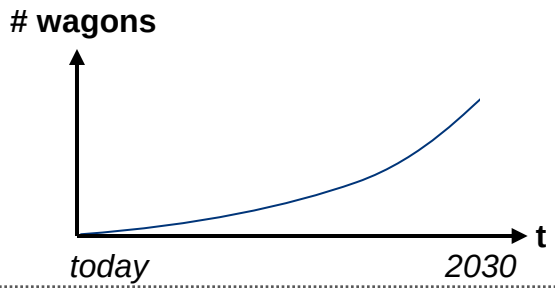
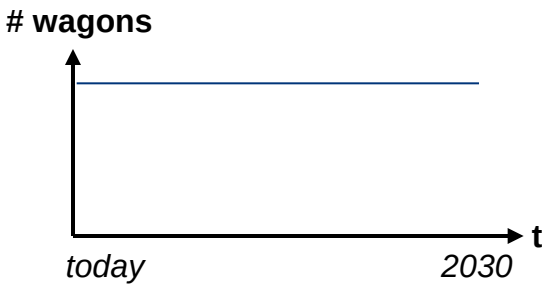
1 **Market!** → 2 **Requirements** → 3 **Development** → 4 **Product**



Wagon manufacturers

Source: White Paper on Innovative Rail Freight Wagon 2030

Basic innovations –
TIS definition of innovation options

Option	Target group for innovation	No. of wagons affected	Period per innovation (development and licensing)
A	▪ Existing fleets ▪ Newbuilds based on existing system & module designs ➜ *Impact on at least 1 L*		approx. 2 to 4 years
B	Newbuilds based on new system & module designs ➜ *Impact on all 5 L if possible*		approx. 5 to 8 years
C [A+B]	All wagons: ▪ Existing fleets ▪ Newbuilds based on existing / new system & module designs ➜ *Impact on all 5 L if possible*		approx. 2 to 8 years

Growth factors for the rail freight industry – The “5L” Future Initiative

Participants in the Technical Innovation Circle for Rail Freight Transport

TIS Zukunftsinitiative 5L

Wagon keepers	Railway undertakings	Shippers	Wagon/Component manufacturers
AAE	BASF	BASF	KNORR BREMSE
BASF	DB SCHENKER		WAGGONBAU GRAAFF Member of the VTG Group
DB SCHENKER	SBB CFF FFS Cargo		WBN Tradition seit 1835
GATX			
SBB CFF FFS Cargo			
VTG			

Academic support

TECHNISCHE UNIVERSITÄT DRESDEN

TU berlin

Project management

hwh Gesellschaft für Transport- und Unternehmensberatung mbH

Standard procedure for identification and migration of basic innovations in rail freight wagons

1 Launch of interdisciplinary task forces

- Identification by TIS steering group of basic innovations required for rail freight wagons.
- Interdisciplinary composition of TIS with wagon keepers, railway undertakings, shippers/ railway agents, wagon manufacturers and components industry, permitting a 360° perspective.

2 Definition of technical, operational and commercial requirements

- TIS task force with experts from the TIS companies draws up a profile for defined basic innovations, consisting of operational, technical and commercial requirements.

3 Launch of dialogue process with wagon manufacturing industry

- TIS invites the wagon manufacturing industry to participate in a dialogue.
- TIS requirements for basic innovations are presented and discussed.
- Bilateral talks are conducted with willing manufacturers about how to proceed with the development and migration of basic innovations.

4 Decision, development, trial, migration

- Manufacturers, and if appropriate TIS, make decisions about the development of a basic innovation.
- Practical trials are conducted if required.
- Elaboration of migration scenarios.
- Decision to introduce the basic innovation in TIS companies.

Summary of progress in the various sub-projects

TIS Innovation Projects	Project Status
1 Innovative Bogies	Requirements defined and agreed with industry, dialogue initiated with manufacturers of brake systems
2 Sensors / Telematics	Requirements defined, industry platform launched for standardisation of interfaces
3 Innovative Couplings	Review compiled of current practical and scientific knowledge
4 Lightweight Construction – Use of Innovative Materials	No activities yet
5 Innovative Structure	No activities yet
Cross-cutting project	*Cross-cutting project*
6 Earnings-Adjusted/ Basic LCC Model	Detailing of LCC model for bogies with brake system components

Task force on “Innovative Bogies”
TIS pursues an integrated, systemic approach towards innovative bogies, consisting of …

Frame

- TIS sees no further need for itself to take action towards further development of the frame

Running gear

- From a TIS perspective, radial wheelset control in the running gear can be achieved through:
  - wheelset coupling via shock-absorbent system
  - cross anchor, damper effect of rubber suspension and radially responsive pivots
- Both methods are being explored by a number of manufacturers, so again there is no further need for TIS to take action

Brake system

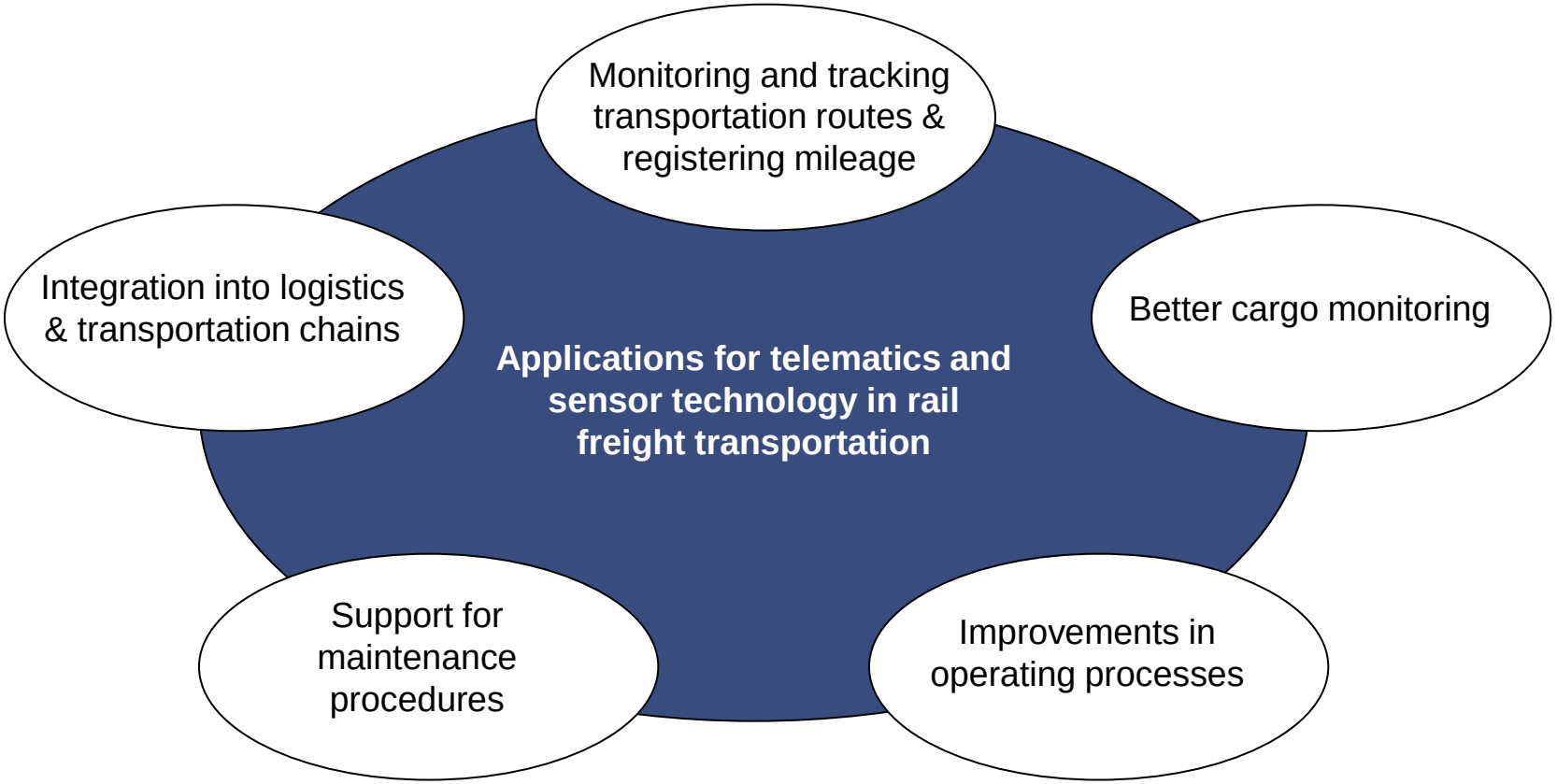
- TIS hopes to extend the use of disc brakes to freight cars with lower annual mileage
- TIS believes there is still not enough potential for technical and commercial optimisation of axle-mounted disc brakes
- The use of wheel-mounted disc brakes should also be explored
- The technical and above all commercial issues around the use of disc brakes need to be discussed with brake manufacturers

Wheelset

- ESFA* project, optimised wheelset for distances of 1.2 million km without NDT
- There are already three wheelsets which by and large meet the ESFA requirement profile
- TIS must ensure that optimised wheelsets are incorporated into the TIS requirements for bogies

*ESFA = European Standard Freight Axle

Task force on “Telematics and Sensor Technology”
Scope for telematics applications in rail freight transport



Industry has accepted the task of standardising interfaces for telematics applications

Tasks for industry from TIS dialogue platform “Telematics & Sensor Technology”

- Telematics applications from different suppliers are currently not always compatible as there is no standardisation.
- TIS has created a document setting out the requirements for telematics and sensor technology.
- The key now is for the industry to pick up this demand for standardisation and implement it in development activities, ideally fostering cooperation between different providers of telematics and sensors and system integrators.
- This is the only way to ensure that applications from different manufacturers can function in harmony, and to seize the opportunity to deploy telematics and sensor technology throughout the rail freight sector in future.

The task for industry:
present a proposal for the standardisation of interfaces.

So far 8 telematics providers have joined the industry platform to standardise interfaces

Bosch Engineering GmbH
Abstatt

Cognid Consulting & Engineering GmbH
Dortmund

Dresden Elektronik Ingenieurtechnik GmbH
Dresden

Eureka Navigation Solutions AG
Munich

IBES AG
Chemnitz

Knorr-Bremse Systeme für Schienenfahrzeuge GmbH
Munich

Savvy Telematic Systems AG
Schaffhausen (Switzerland)

Siemens AG
Mobility and Logistics Division
Rail Automation
Braunschweig

Task force on “Innovative Coupling Systems”
Beneficial impacts of automatic central buffer couplers

Enhanced industrial safety
Reduced risk of derailment

- Better safety for shunting staff
- Reduced risk of derailment thanks to greater admissible longitudinal forces

Higher productivity in rail operations

- Less manual shunting
- Continuity of shunting operations despite recruitment bottlenecks due to demographic trends
- Formation of longer, heavier trains
- Faster shunting procedures; basis for optimising production workflows

Power supply and telematics in freight trains

- Integration of full-length power supply as a basis for the effective implementation of telematics in freight trains

Lower maintenance costs

- Less maintenance for freight cars (buffer wear, no need for lubrication, less wear on wheelsets)
- Reduced cost of infrastructure maintenance due to smaller transverse forces impacting rolling stock

Recommendations for a Business Plan on the implementation of automatic coupling

Task force “Earnings-adjusted / basic LCC model” Objectives

1. Development of an earnings-adjusted / basic LCC model, agreed across the sector, founded on real or plausibly derived rates
   ➔ **Target: Rail freight sector**
2. Decision-making tool for wagon keepers seeking to invest in innovative freight cars / systems / modules ➔ **Target: Profitability for wagon keepers**
3. Indication to manufacturers of target costs for the development of innovative freight cars / systems / modules ➔ **Target: Wagon manufacturers**
4. Definition and visualisation of benefits to various rail freight stakeholders of innovative freight cars / systems / modules ➔ **Target: Profitable rail freight transportation**
5. Findings from the earnings-adjusted / basic LCC model serve as a basis for developing transfer of benefit models (incentive system) if the benefit is not reaped by wagon keepers ➔ **Target: Profitability for wagon keepers**
6. Formulation of migration scenarios for innovative freight cars / systems / modules based on findings from the earnings-adjusted / basic LCC model and the transfer model
   ➔ **Target: Implementation of innovations to strengthen the rail freight business**
7. Identification of funding agenda or need for seed funding for innovative freight cars / systems / modules ➔ **Target: Political community**

Conclusions & Prospects

- TIS has set out to manage and promote basic innovations towards an innovative rail wagon for 2030.
- TIS pursues an **integrated approach** with a focus on the **business case for basic innovations** in rail freight cars.
- That is why the **wagon keepers** in TIS have been joined by **railway undertakings, shippers** and companies from the **wagon manufacturing industry and component suppliers**.
- Essentially there is a **willingness among the wagon keepers** in TIS to **make use of basic innovations** in newbuilds and in existing fleets.
- TIS defines **technical, operational and economic requirements** for basic innovations and engages in **dialogue** with the **industry**.
- The current focal themes for task forces in TIS are **innovative bogies, telematics &sensor technology, innovative couplings, and earnings-adjusted /LCC models.**
- TIS also coordinates its activities with **development projects** such as **Shift²Rail** at EU level.

Contact

Thank you for your interest

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