



White Paper The Intelligent Freight Train

From the innovative freight wagon
to the intelligent freight train

The TIS roadmap for
competitive rail freight



Promotion du Grand Axe Ferroviaire de marchandises
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

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Digitisation and automation strategies must take account of the entire train. Only this approach can pave the way for a competitive rail freight sector.

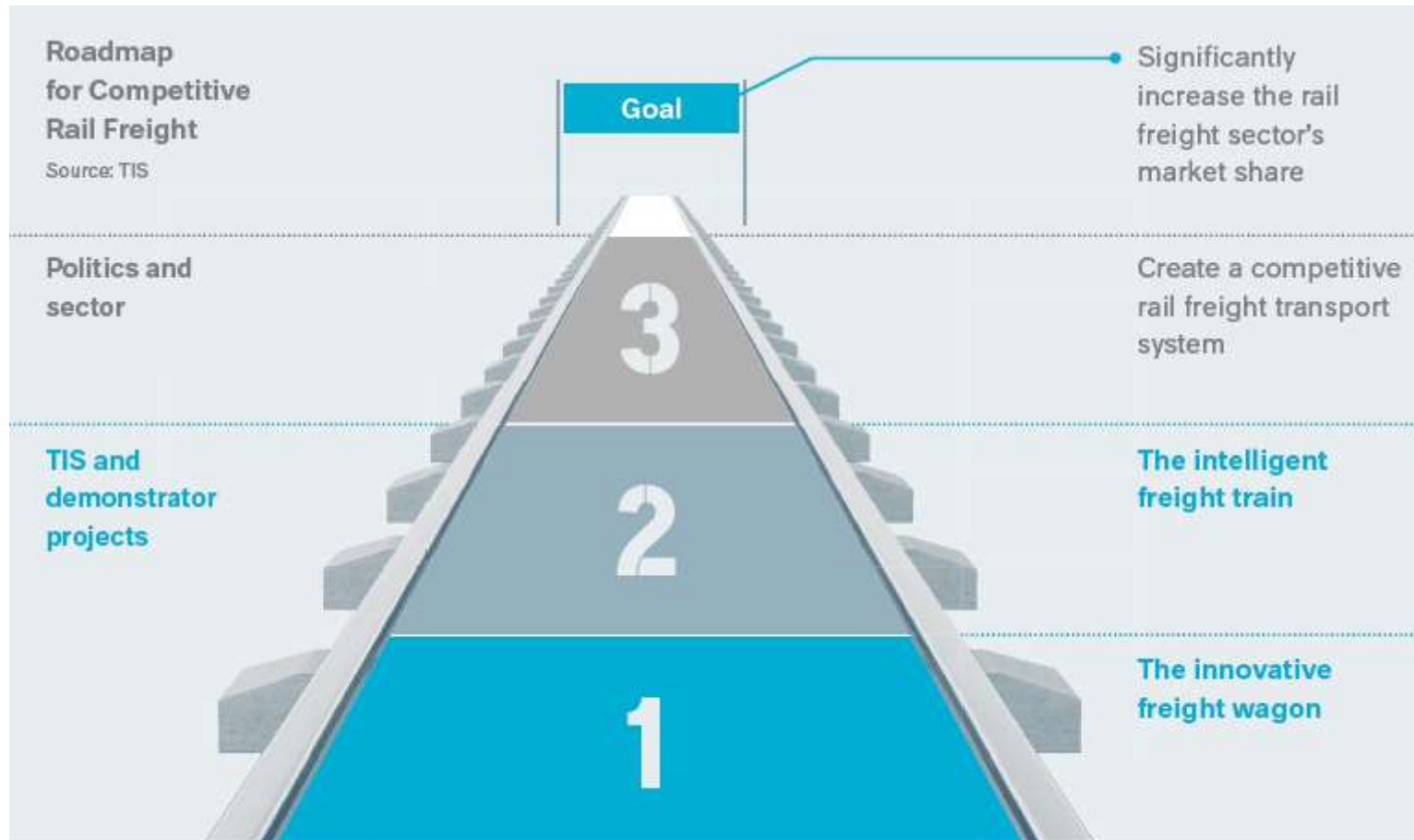
Technical Innovation Circle for Rail Freight Transport (TIS)



14 committed member companies from the rail freight sector are engaged in TIS

<p>BASF SE</p> 	<p>DB Cargo AG DB Systemtechnik GmbH</p> 	<p>ELH Waggonbau Niesky GmbH</p> 	<p>Ermewa SA</p> 
<p>GATX Rail Germany GmbH</p> 	<p>Knorr-Bremse Systeme für Schienenfahrzeuge GmbH</p> 	<p>Rail Cargo Austria AG</p> 	<p>SBB Cargo AG</p> 
<p>VTG AG</p> 	<p>J.M. Voith SE&Co.KG</p> 	<p>Wabtec Europe</p> 	<p>Waggonbau Graaff GmbH</p> 
Scientific Board		Project Office	
<p>Wascosa AG</p> 	<p>Technische Universität Dresden</p> 	<p>Technische Universität Berlin</p> 	<p>hwh</p> <p>Gesellschaft für Transport- und Unternehmensberatung mbH</p>

The TIS roadmap for the future of rail freight



TIS-White Book „Intelligent Freight Train“ – download www.tis.ag

The success of any innovation must be judged by whether it increases the productivity of rail freight transport. The TIS concept of the “innovative freight wagon” will guide the sector towards marketable solutions.

Innovative Freight Wagon



In 2012 the TIS-White Paper „Innovative Freight Wagon 2030“ has been published

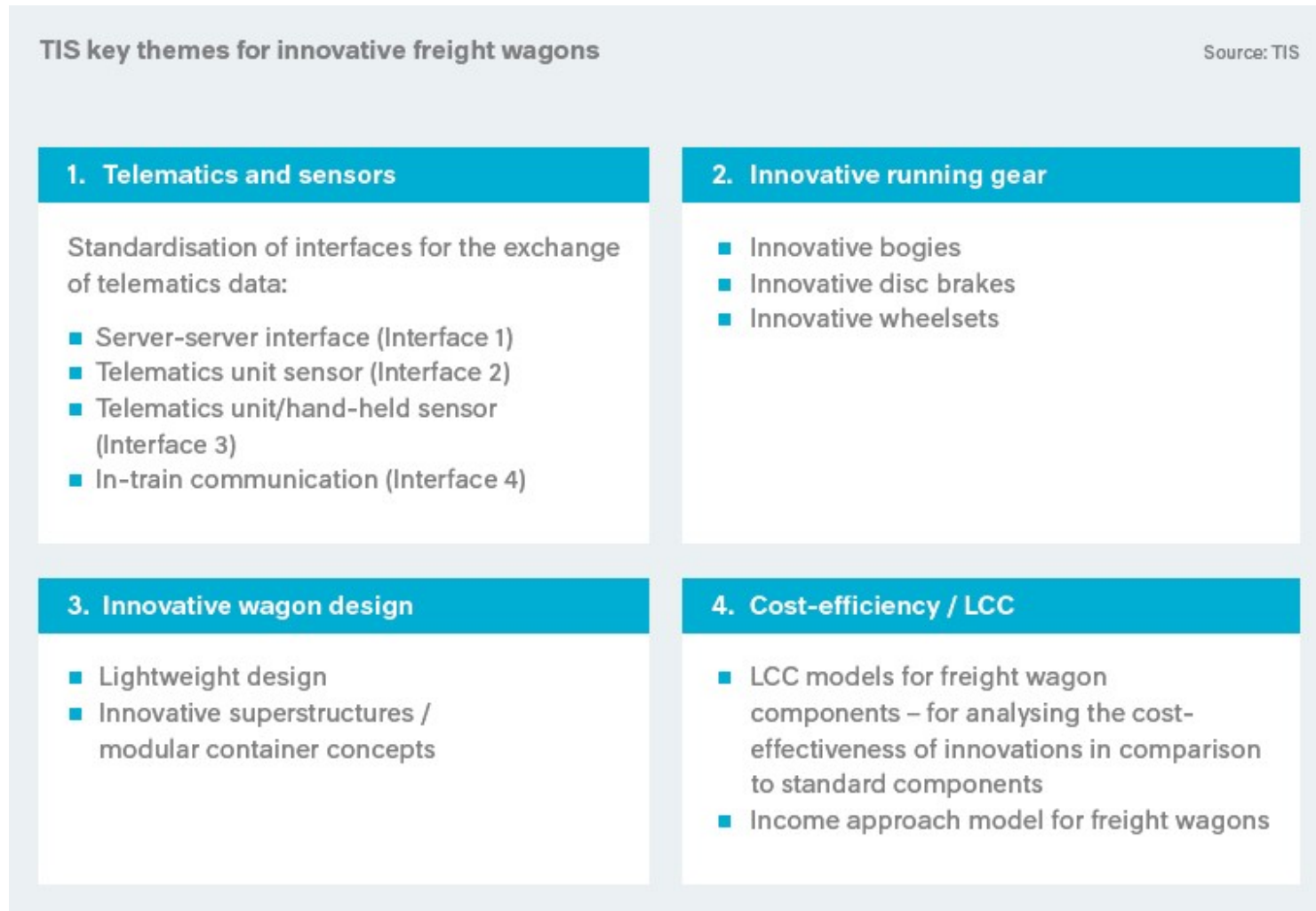
The TIS White Paper 2012 served as the starting signal for the „5L-Future Initiative“

„5L“-criteria

	Logistics-capable Integration into supply chains; high level of operability
	Lightweight Higher load volume due to lower wagon tare weight
	Life-cycle-cost-based Ensuring the profitability of an investment over the life cycle
	Low-noise Significant reduction of rail freight wagon noise emissions
	Lasting the Course Reduction of downtimes and stynby times, increase in annual mileage

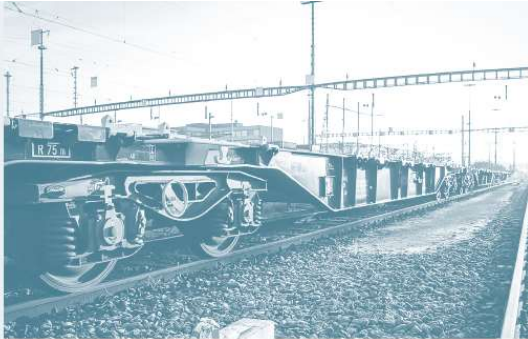


Four TIS key topics for innovative freight wagons



Projects on innovative freight wagons have been carried out by TIS members

"5L" demonstrator train from SBB Cargo



„5L“-demonstrator train from SBB Cargo

- Innovative bogies, wheelsets and disc brakes
- Telematic applications
- Automatic couplings
- Container concept

Innovative freight wagon from DB Cargo AG and VTG AG



BMVI-project „Innovative freight wagon“ - DB Cargo and VTG

- Four innovative freight wagon types
- Innovative bogies, disc brakes, wheelsets
- Telematic/sensors, digital brake monitoring systems
- Power and data cables, ep-brakes, automatic coupling

Innovative tank container concept from BASF SE



Innovative tank container concept from BASF

- Innovative container wagon (light weight)
- Innovative, large tank container
- Automated tank container storage
- Automated Guided Vehicles (AGV)

Source photos: SBB Cargo, DB Cargo/VTG, BASF

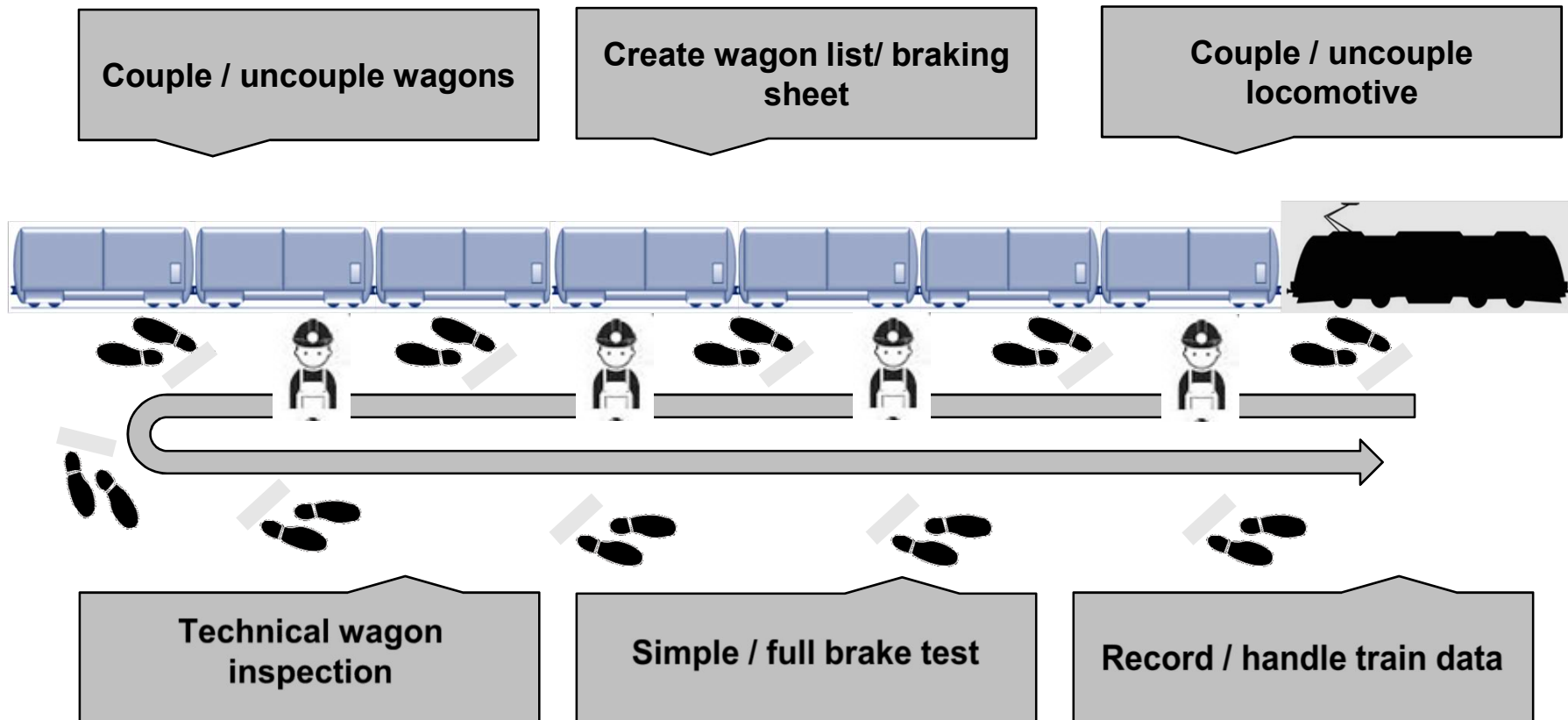
The intelligent freight train
puts efficiency back on track.
The heart of the system:
the digital automatic coupling
with continuous power and
data lines.

Intelligent Freight Train



Today a lot of manual work has to be done in order to operate freight trains

Exemplary activities for manual operations before train departure



* In single wagon traffic, especially in train formation systems, the manual tasks are much more extensive than shown above.

In order to reduce manual effort TIS follows on four major innovation topics for intelligent freight trains

Intelligent freight train

1. Automated train operations



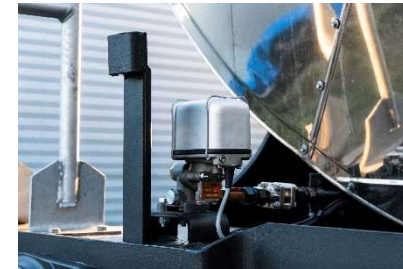
2. Digital automatic coupling (DAC)



3. Energy and data management



4. Electro-pneumatic brake



Source photos: SBB Cargo, DB Cargo, VTG

In recent years there have already been various activities on DAC in the sector

 **SBB CFF FFS**

- AC type 2 demonstrator („5L“-demonstrator“)
- Rollout AC type 2 in 100 intermodal wagons in April 2019
- Exhibition of prototypes DAC type 4 on transport logistic

TIS Technischer Innovationskreis Schienengüterverkehr

- TIS position paper on DAC in autumn 2018
- TIS white book on intelligent freight trains (incl. DAC) in June 2019
- TIS action plan on DAC with 8 topics



- AC type 2 demonstrator „Innovative freight wagon-project“)
- Project „Digital automatic coupling for automation of rail freight transportation in Europe“



- Voith: development DAC type 4 Scharfenberg
- Wabtec: development DAC type 4 Schwab
- CAF: development DAC type 4 SA3



- DAC part of masterplan for rail freight transportation
- Project on migration strategy DAC initiated



- Member of Shift²Rail project on DAC
- Demonstrator project of various DAC type 4 in Sweden in 2020

German Ministry of Transport (BMVI) has launched a study on migration strategy DAC

WP 1: Market overview / state of the art

- Existing freight wagons (amount, age, suitability for migration DAC)
- State of the art DAC
- R&D activities DAC
- National and EU-wide legal framework DAC
- Identification of relevant stakeholders
- Stakeholder plans for migration of DAC
- Standards in electrical power supply and intrain data transmission.

WP 2: migration concept

- Sector-wide process on a coupling type DAC
- Framework for the establishment of a standard
- upward / downward compatibility of various DAC types (1-5)
- Parallel operations of DAC/SC*
- Organizational set-up for roll-out DAC
- Financing / cost distribution model
- Legal / regulatory impact of migration

WP 3: roadmap migration

- Development of a roadmap migration DAC
- Recommendations for the support of R&D, pilots, migration by the ministry
- Identification of obstacles for implementation of DAC

Making rail transportation more competitive

A strong rail freight sector needs a more competitive structure. This includes both an efficient infrastructure as well as financial and political support for research and the roll out of technology.

**Outlook –
making rail
transportation
more competitive**

4

Outlook intelligent freight train

The intelligent freight train has a digital automatic coupling

- Without DAC, complete automation of RFT is not possible
- No migration without agreement on a standardised coupling head and a coordinated migration strategy

Standardisation of energy and data management

- Uniform European concept to energy and data management required

Sector and political authorities must pull in the same direction

- Efforts needed to involve all stakeholders in the concept.
- Political and financial support of the sector required.

Working together for the success of the intelligent freight train

- Individual companies can not put the Intelligent Freight Train on its own - making a huge effort on the whole sector necessary.
- All stakeholders need to get involved.

Thank you for you attention!

Further informationen about TIS can be found on the website
www.innovative-freight-wagon.eu / www.tis.ag

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