Innovative Rail Freight Wagon 2030 – the 5L future initiative as a basis for growth in rail freight transportation – an example for sector collaboration

Initial Situation

In the past the rail freight sector in Europe did not succeed in implementing fundamental technical innovations for rail freight wagons.

This shortage of innovations in the sector accounts to:

- Small market for new rail freight wagons in Europe. Therefore only small quantities are ordered and costs of development for innovations are high.
- Innovations shall not reduce the interoperability for rail freight wagons in Europe.
- Requirements of wagon keepers are not sufficiently defined and are not bundled.
- Time period for implementation of innovations in rail freight wagons is too long because of long life-cycle of wagons.
- Innovations have to achieve economical advantages for wagon keepers (as decision makers for investments).
- An (economical) benefit is not necessarily generated for the wagon keepers.

Therefore a new sector wide approach for technical innovations in rail freight wagons is necessary.

Source: Weißbuch Innovativer Eisenbahngüterwagen 2030, published during Innotrans, Berlin 20th september 2012

Collaborating Companies in „5L“-initiative / TIS

Date: 28th January 2015

Collaborating companies TIS

AAE, BASF, DB SCHENKER, WBN Tradition seit 1835, GATX, KNORR BREMSE, SBB CFF FFS Cargo, VTG, WAGGONBAU GRAAFF Member of the VTG Group

Steering Committee TIS

Stevenson	Dr. Bieker	Dr. Obrenovic	Dr. Steiner	Kogel-heide	Dr. Fregien	Mues	Hüllen Dr. Davids	Runkel

Speaker of TIS

Dr. Obrenovic	Mues	Hüllen (Sprecher)

Scientific Advisory Council

Prof. Hecht	Prof. König
TU Berlin	TU Dresden

Project Management

Prof. Wittenbrink Hagenlocher
hwh GmbH

Advisory Council

Redeker	Vaerst
	Railmind GmbH

Growth Factors for Rail Freight Traffic - „5L“

TIS – Future Initiative „5L“

Leise (Low Noise)	▪ Significant reduction of noise emissions
Leicht (Low Weight)	▪ Higher payload ▪ Lower deadweight
Laufstark (high performance)	▪ Reduction of failures and standstills ▪ Increase of yearly mileage
Logistik-fähig (Logistical capabilities)	▪ Integration in supply chains ▪ High handling quality
Life-Cylce-Cost-oriented	▪ Quick amortization of investments ▪ Savings in operating costs and maintenance

Effects

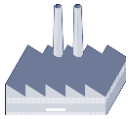
- Creation of growth in rail freight in Europe
- Increase of customer value and profitability
- Promotion of environement protection
- Shifting of modal split in favor of rail transport – important in order to fulfil targets of EU-transport policy

Source: Weißbuch Innovativer Eisenbahngüterwagen 2030

Successful implementation of basic innovations in rail freight wagons presumes on a paradigm shift

Past

„Push“ – *Commercial risk*



Railway Supply Industry

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

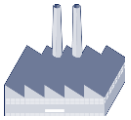
Wagon Keepers

Future

„Pull“ – *tailored to suit a market need*

Wagon keepers

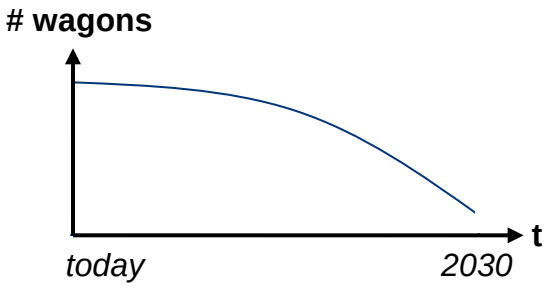
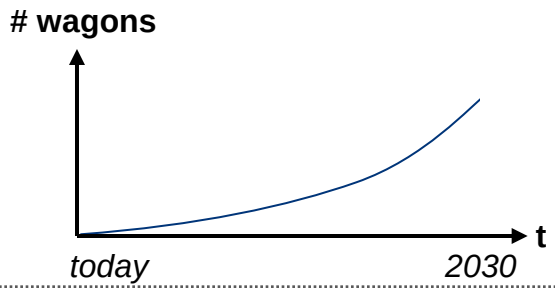
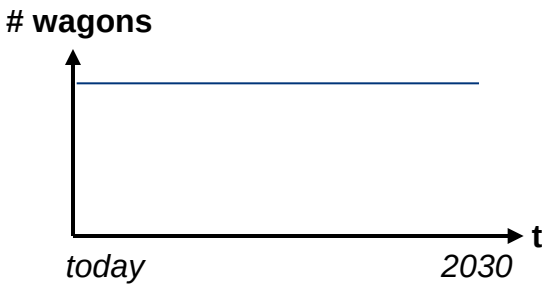
1 **Market!** → 2 **Requirements** → 3 **Development** → 4 **Product / Innovation**



Railway Supply Industry

Source: Weißbuch Innovativer Eisenbahngüterwagen 2030

Basic innovations –
Definition of versions for innovations

Version	Target group of innovations	Amount of wagons	Time period for innovation (Development and licensing)
A	▪ Existing wagons ▪ New builds on basis of <u>existing</u> system and module constructions ➜ *Effect on at least „1L“*		appr. 2 - 4 years
B	New builds on basis of <u>new</u> system and module constructions ➜ *Effect on all „5L“*		appr. 5 - 8 years
C [A+B]	All wagons: ▪ Existing wagons ▪ New builds on basis of existing and new system and module constructions ➜ *Effect on all „5L“*		appr. 2 - 8 years

Projects of the „5L“-initiative and project status

	Projects „5L“ / TIS	Project Status
1	Innovative Bogies	Requirements of wagon keepers defined and discussed with railway industry
2	Telematics	Requirements of wagon keepers defined and in discussion with telematics industry
3	Innovative Coupling Systems	Definition of requirements of wagon keepers in progress
4	Light Weight Construction	In preparation
5	Innovative Platform	In preparation
Cross Section Project		
6	Value-/LCC-Modell	Fundamental systematics defined and LCC-modell for bogies completed

Project Innovative Bogies
„5L“-requirement for innovative bogies

Laufstark (high performance)

Reduction of noise emission of -2 dbB(A) for existing wagons resp. -4dB(A) for new builds.

Leicht (low weight)

At the moment same weight as existing Y25-bogie sufficient.

In the long run low weight of innovative bogies in comparison to Y25 preferable

Logistikfähig (logistical capability)

Not relevant for innovative bogies (need for telematics see project

„5L“

Leise (low noise)

Application of disc brakes

Application of radial adjustable wheel sets in order to reduce wear and tear

Increase of inspection intervalls through application of innovative wheel sets (see ESFA-project*; e.g. mileage until inspection min. 1,2 Mio. km)

LCC-oriented

Higher or at least same LCC as Y25-bogie

Reduced procurement costs for disc brakes in order to introduce disc brakes also in wagons with lower yearly mileage.

* European Standard Freight Axle

TIS follows a holistic approach consisting of…

Frame

- No further activities needed

Running Gear

- Two alternatives for innovative running gears:
  - Application of Gigabox
  - Application of cross anchor solution in different versions
- Both alternatives are in development by different suppliers

Brake System

- TIS supports the application of disc brakes also in wagons with lower yearly mileage
- TIS sees potential for further technical but especially commercial improvements for disc brake solutions.
- Therefore a dialogue with the brake system suppliers will be initiated

Wheel Set

- Project ESFA*, optimized wheel set with mileage of 1,2 Mio. km without non-destructive testing
- TIS should ensure that inspection intervalls of optimized wheel set gets synchronized with intervalls of total bogie

*ESFA = European Standard Freight Axle

Standard model for collaboration in TIS

1 Decision for initiating TIS-working groups for basic innovations	2 Definition of technical, operational and economical requirements for innovations	3 Initiation of dialogue process with railway industry	4 Decision, Development, Testing, Implementation
▪ Identification of necessary basic innovations for rail freight wagons in TIS steering committee. ▪ Interdisciplinary composition of TIS consisting of wagon keepers, railway undertakings, forwarders, suppliers and wagon industry supports a 360° view on innovations.	▪ TIS-working groups with experts from the TIS-participants define requirements for basis innovations in technical, operational and commercial aspects. ▪ Final result of the working groups is a report with the requirements for basic innovations .	▪ TIS invites the railway industry to join a dialogue process. ▪ Requirements of TIS are discussed in platform meetings and later on in bilateral talks with suppliers, who show interest to fulfil the requirements of TIS in their developments.	▪ In case of positive feedback from the suppliers and promising perspective on the LCC/value of the identified innovative solution a decision for starting a development process is made. ▪ Continous contact with suppliers in order to support development process.

Conclusion & Outlook

- TIS stands for a sector-wide collaboration with the objective of enhancing basic innovations for rail freight wagons.
- TIS follows a holistic approach with focus on profitability of basic innovations for rail freight wagons.
- Therefore not only wagon keepers participate in TIS but also railway undertakings, forwarders, wagon producers and suppliers of components.
- The wagon keepers which participate in TIS are willing to implement basic innovations in existing wagons as well as in new builds.
- TIS therefore defines technical, operational and economical requirements for basic innovations and initiates a dialogue with the railway industry.
- Current focus of TIS lies on innovative bogies, telematics in rail freight transports, innovative coupling systems as well as life-cycle-cost models.
- Further TIS-projects as light weight constructions or innovative platforms are in preparation.
- TIS coordinates activities with state- or EU-funded projects like e.g. „Shift²Rail“.