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**SEAMLESS TRANSPORT CHAINS THROUGH HARMONISATION**

*Success Stories and Global Perspectives for Rail Freight*

# Session 6: New Technologies, Standardisation

*Moderator: László Mosóczy  
President of HUNGRAIL Hungarian  
Rail Association*



GRFC 2014 VIENNA



**23-26 June 2014**

# Dirk BRUCKMANN



**Since 2011: Senior Researcher at IVT, ETH Zürich; main research topics are rail freight and railway operations, especially energy efficiency of rail freight and optimization of Single Wagonload.**

**2006 – 2011: Senior Expert at SBB Cargo in the field of infrastructure demand management and infrastructure planning**

**2006: PhD at the University Duisburg-Essen about the containerisation of Single Wagonload**



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## SEAMLESS TRANSPORT CHAINS THROUGH HARMONISATION

*Success Stories and Global Perspectives for Rail Freight*

# Energy Efficiency in rail freight

Dr. Dirk Bruckmann  
ETH Zürich



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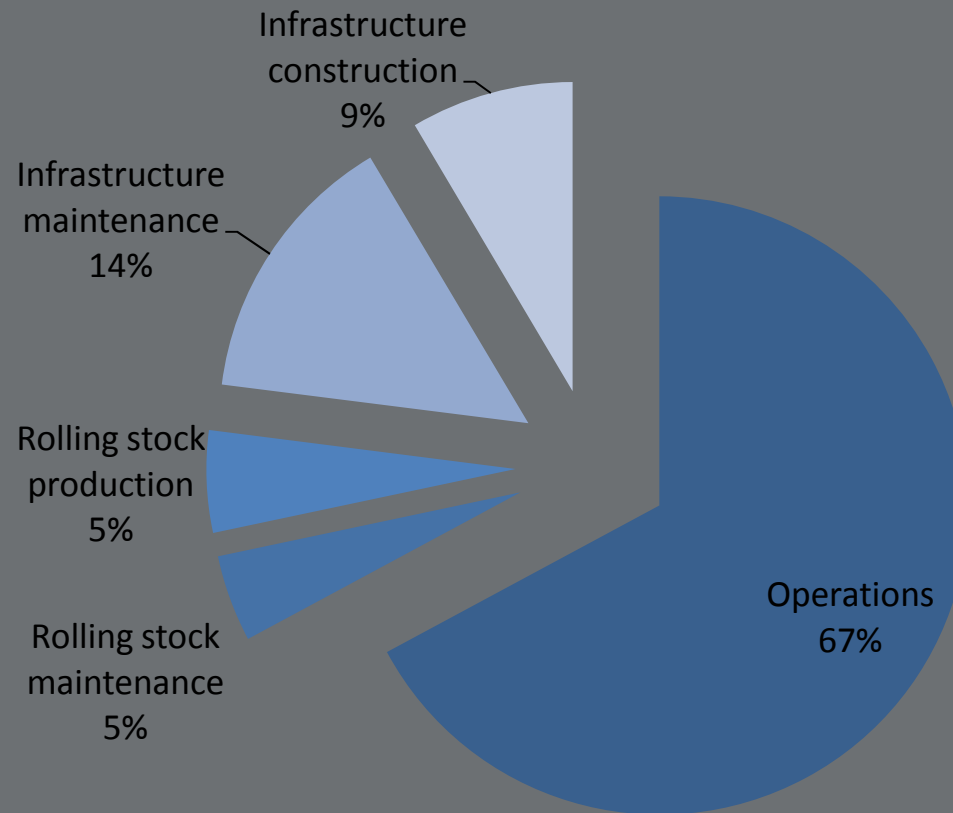
# Energy efficiency in rail freight

Dr. Dirk Bruckmann

Approaches to improve the energy  
efficiency in rail freight

# Energy consumption in EU rail freight

- The largest part of the energy consumption is used for operation purposes
- But there is also a significant use of grey energy for rolling stock and infrastructure



# Approaches to reduce the energy consumption

## Infrastructure

- Building materials
- Infrastructure use

## Rolling Stock

- Traction (efficiency of use, recuperation,...)
- Wagons (weight, aerodynamics, rolling resistance)

## Planning

- Network design
- Scheduling

## Operations

- Drivers assistance
- Adaptive train control

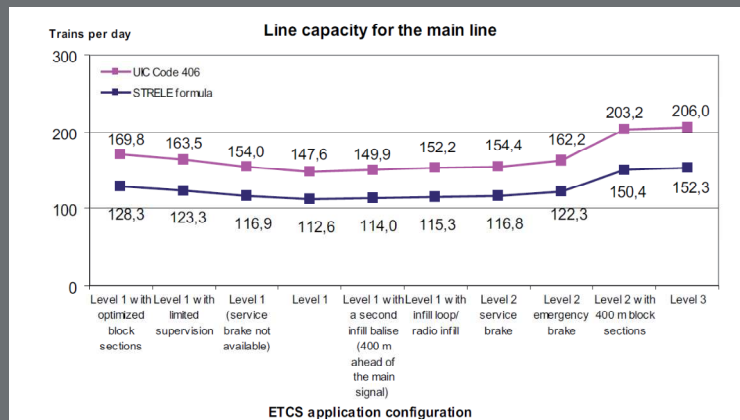
## Modal Shift

- Modal shift from Road to Rail

# Infrastructure

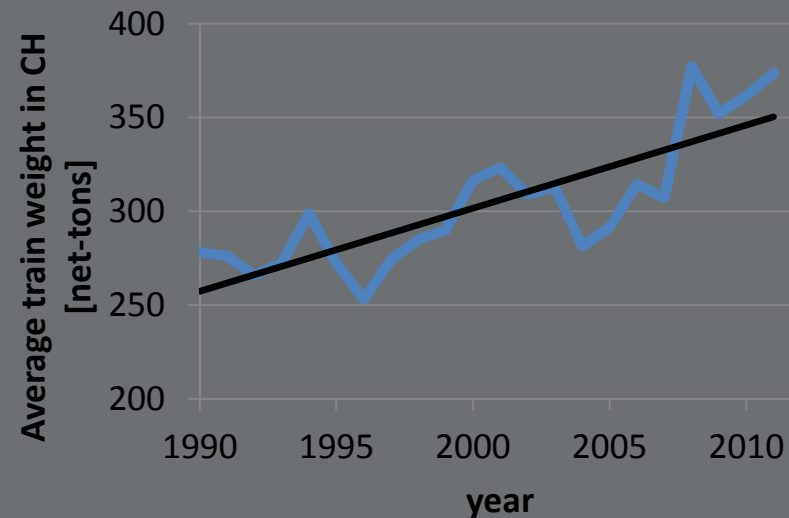
Reducing energy consumption by increasing the efficiency of infrastructure use:

More train paths through optimized signalling technologies



Source: UIC/VIA Verkehrsconsult

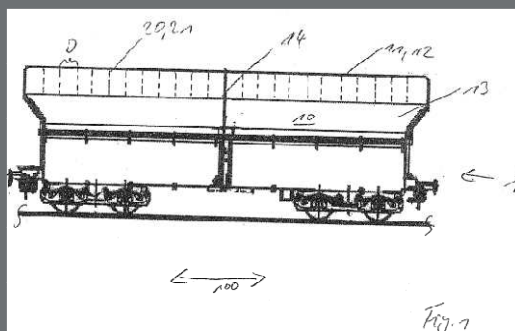
Efficient use of train paths by longer and heavier trains:





# Rolling stock

Aerodynamic  
optimisation of freight  
wagons



Source: Hecht et al.



Source: Wascosa

Optimised bogies and  
axles to reduce the  
rolling resistances

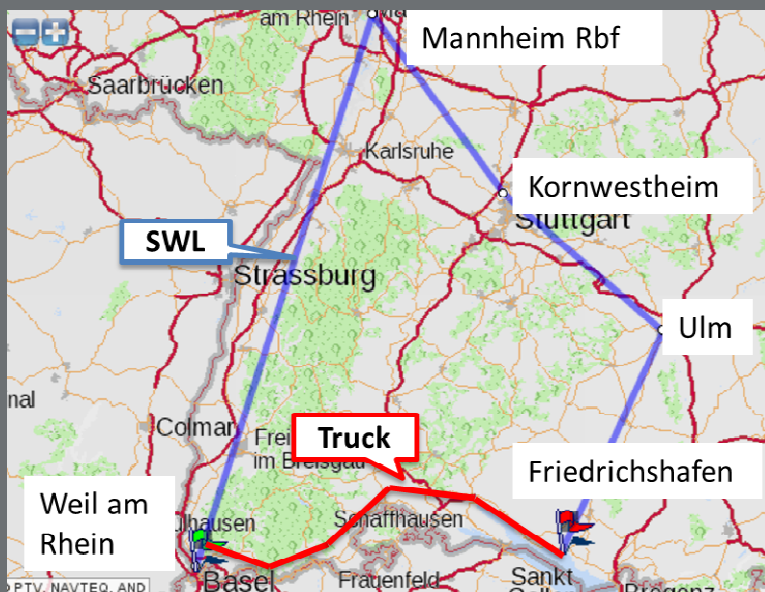


Source: TU Berlin

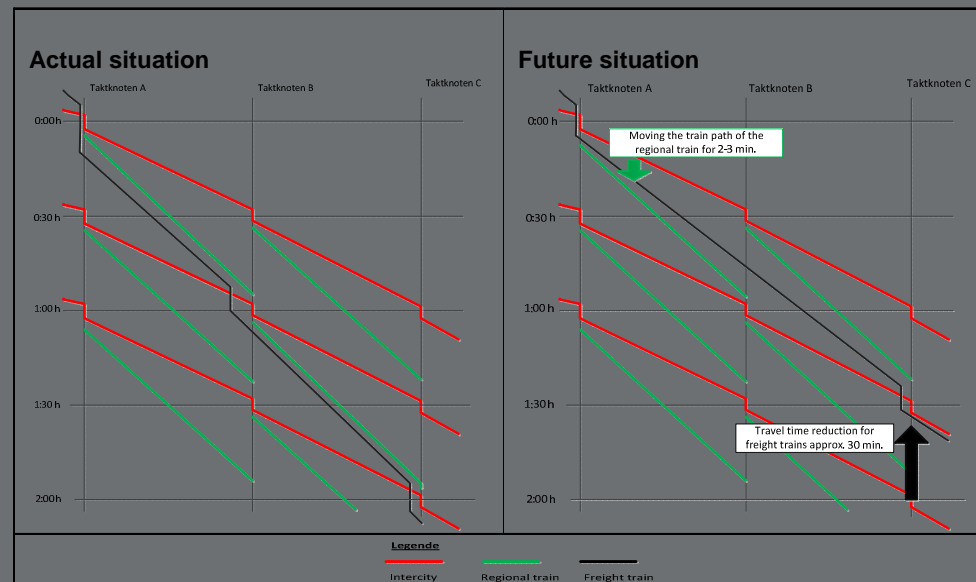


# Planning

Network optimisation to reduce the deviation of freight wagons

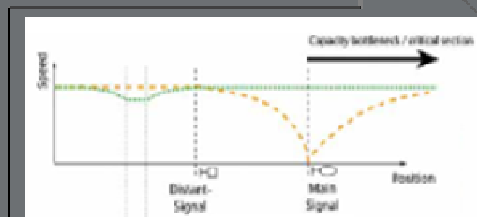


Optimisation of the schedules to reduce overtaking stops of freight trains



# Operations

Adaptive train control  
to avoid conflicts in  
network nodes



Drivers assistance to  
achieve an energy  
effective speed profile



# Modal Shift

- The measures in energy efficiency increase the quality of rail freight and reduce the operational costs.
- Thus the energy efficiency improves the competitiveness of rail freight.
- Additional effects by modal shift can be achieved.

# Any Questions?



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