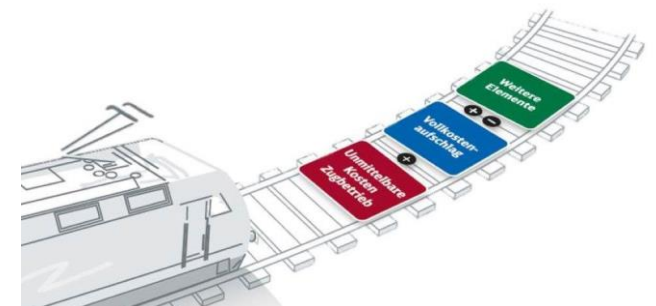




Foto: Volker Emersleben

# Addressing the Challenge of Redesigning a Charging System: the Case of DB Netz



# Agenda

**Background**

**Market Segments**

**Cost Bearing Ability of the Market Segments**

# Driven by changing EU Legislation DB Netz redesigned its Track Access Charges Scheme

## Legislative Changes

## Redesign of the Track Access Charging Concept

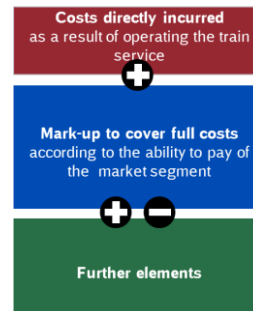
## Industry Consultation

2012

- **Change in European legislation (EU Directive 2012/34)**
- Aim: **Harmonising** the structure of **European railway markets**
- **Implementation** of EU legislation into **national law** since 02 September 2016 (ERegG)
- New regulations for **minimum access package charges**

2013/ 2014

- Based on EU legislation development of a **new infrastructure charging concept**
- **Basic elements:**



- **Scientific/legally grounded** concept in **consultation with the regulatory body**

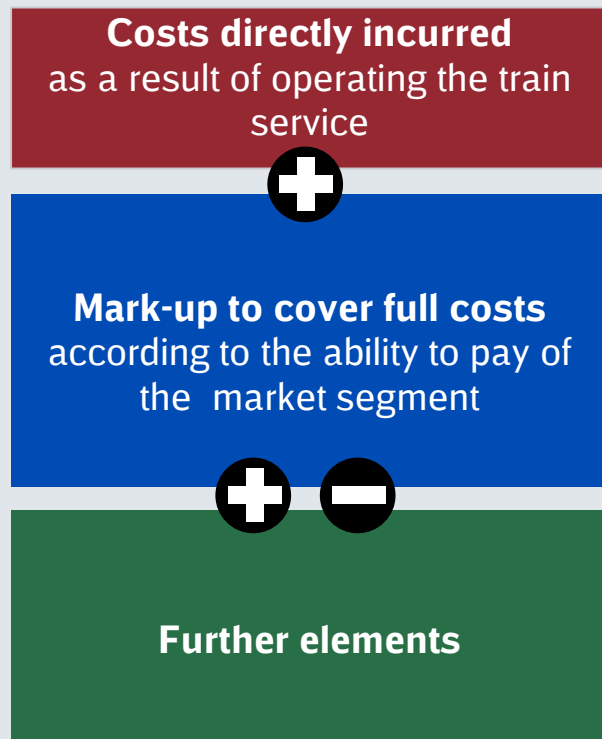
2015/ 2016

- **Consultation of the new concept with the industry**
- Aim: Check for **market orientation** and **testing** the concept
- Evaluation of **feedback from the consultation** and **further advancement** of the concept where required

# EU Directive 2012/34 defines common principles for infrastructure charges

## Basic logic according to EU Directive 2012/34

### Basic elements



### Costs directly incurred as a result of operating the train service (marginal costs)

- Each customer has to bear the costs which he directly causes

### Mark-up to cover full costs according to the ability to pay of the market segment

- Remaining costs are divided among all users to maximise market demand
- The level of the mark-up is based on the ability to pay of the market segment and shall not exclude the use of infrastructure by market segments
- Necessary to secure sufficient funds to finance the infrastructure

### Further elements (incentive components of behaviour control)

- Additional charges defined by the law reflecting e.g. the costs of environmental effects, scarcity of capacity, investments...

# Agenda

**Background**

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**Cost Bearing Ability of the Market Segments**

# Segments in long-distance passenger traffic are based on three segmentation criteria



\* 9 am to 8 pm at week-ends

\*\* 6 am to 9 pm at week-ends

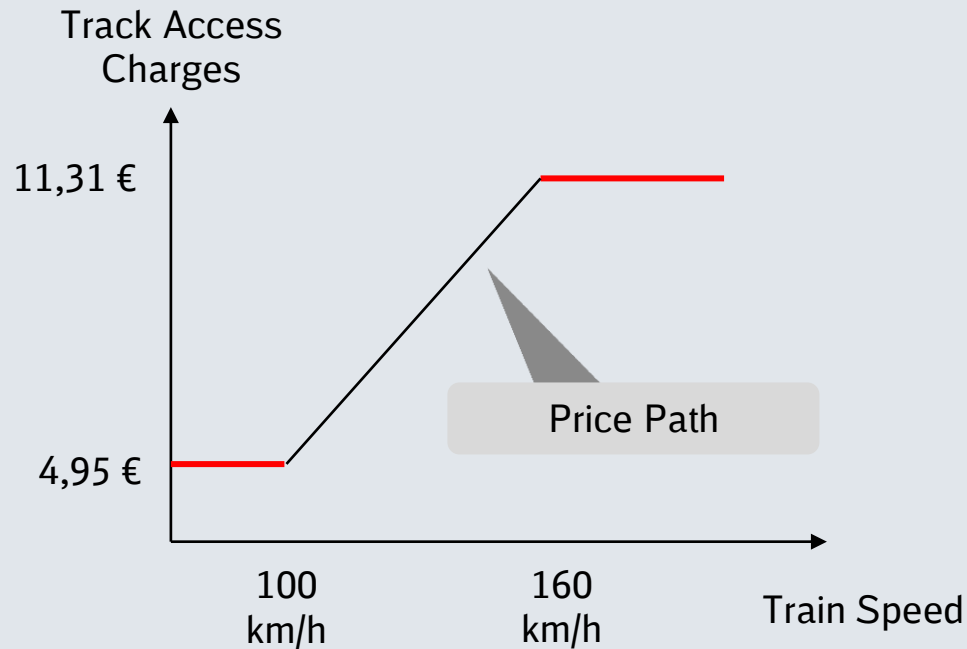
\*\*\* btw. 100 km/h and 160 km/h charges are based on average speed

# Train Speed based charges in market segment Metro Day

## Metro Day



Train connects metropolitan railway stations between 6 am - 8 pm, with speed based charges between 100 km/h and 160 km/h



- Calculation of **Ø-Train Speed** for every section between two metropolitan railway stations
- **Linear pricing between 100 and 160 km/h** avoids charging 'jumps'

# Segments in local/suburban passenger transport had to be adapted to new national legislation – states as market segments

## Requirements § 37 ERegG



- **States as market segments in local passenger transport**
- **Average charges for local passenger transport for every state** have to **equal** the average charges of the corresponding traffics **in the respective states** in Timetable Period 2016/2017
- **Outlook: Average charges per state in this market segment will rise by 1,8% p.a., starting in Timetable Period 2017/2018**

## Adaptation of the local passenger transport concept



- **Dismissal of the former segmentation based on passenger throughput of train stations and travelling time** within the market segment local passenger transport
- **New: One market segment per state<sup>1</sup>**
- **Determination of average charges per state according to legal requirements of § 37 ERegG**

old:

	06:00-20:00 Uhr*	20:00-06:00 Uhr*
Zug fährt im Umkreis 50 km um Metropolbahnhof	Zentrum Tag 	Zentrum Nacht 
Zug fährt außerhalb 50 km Umkreis um Metropolbahnhof	Umland Tag 	Umland Nacht 

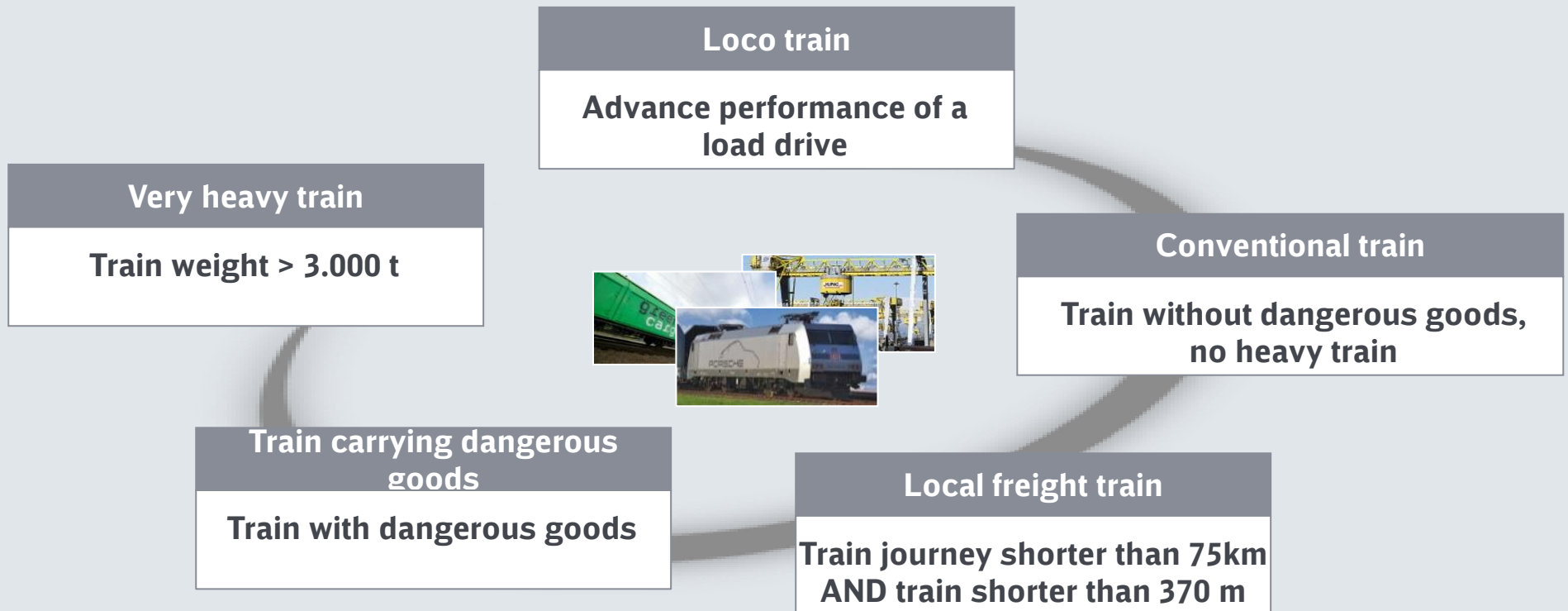
new:



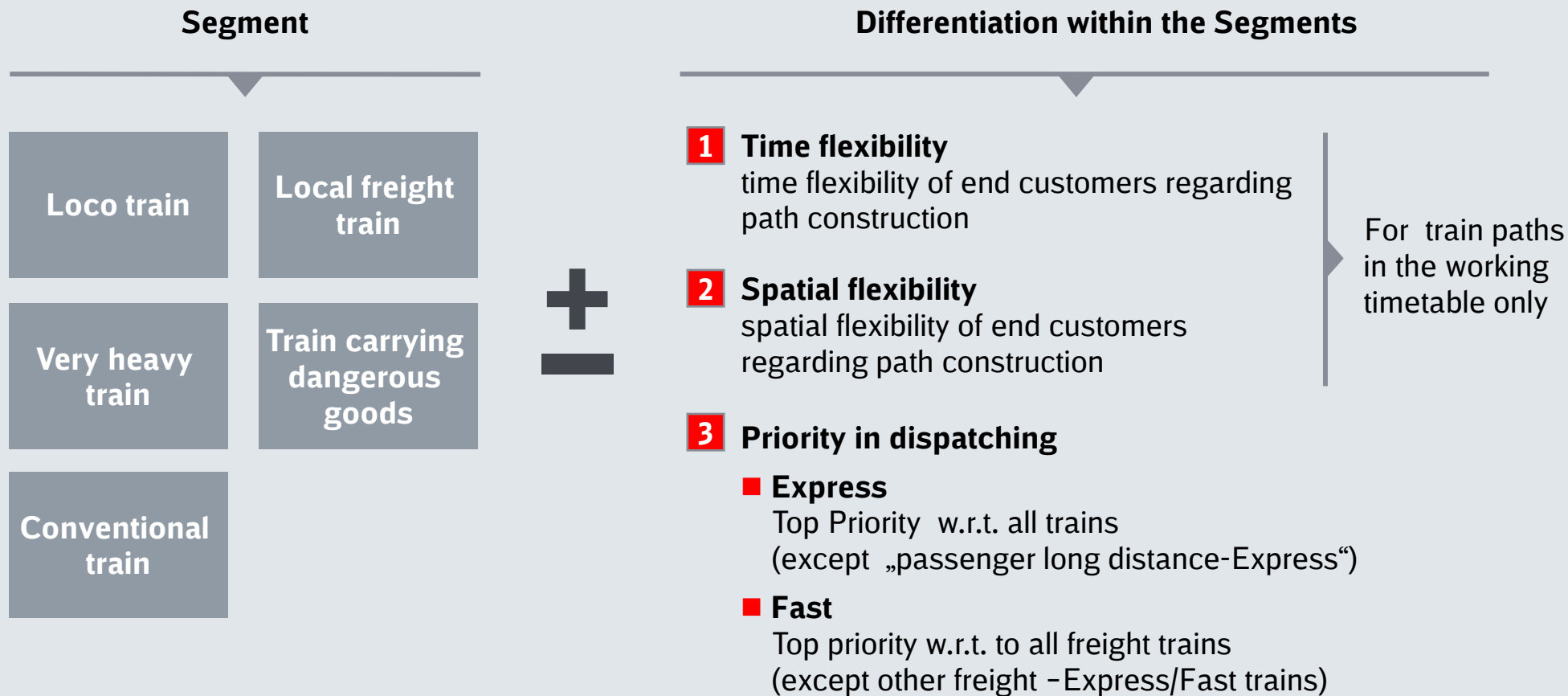
<sup>1</sup>The other segment “Empty run” remains



# Segmentation of freight traffic based on the nature of the traffic



# Differentiation of segments into sub-segments has been carried out in freight traffic



**Background**

**Market Segments**

**Cost Bearing Ability of the Market Segments**

# The reaction of end customers to price changes determines segment price elasticity

## Price / quantity effects

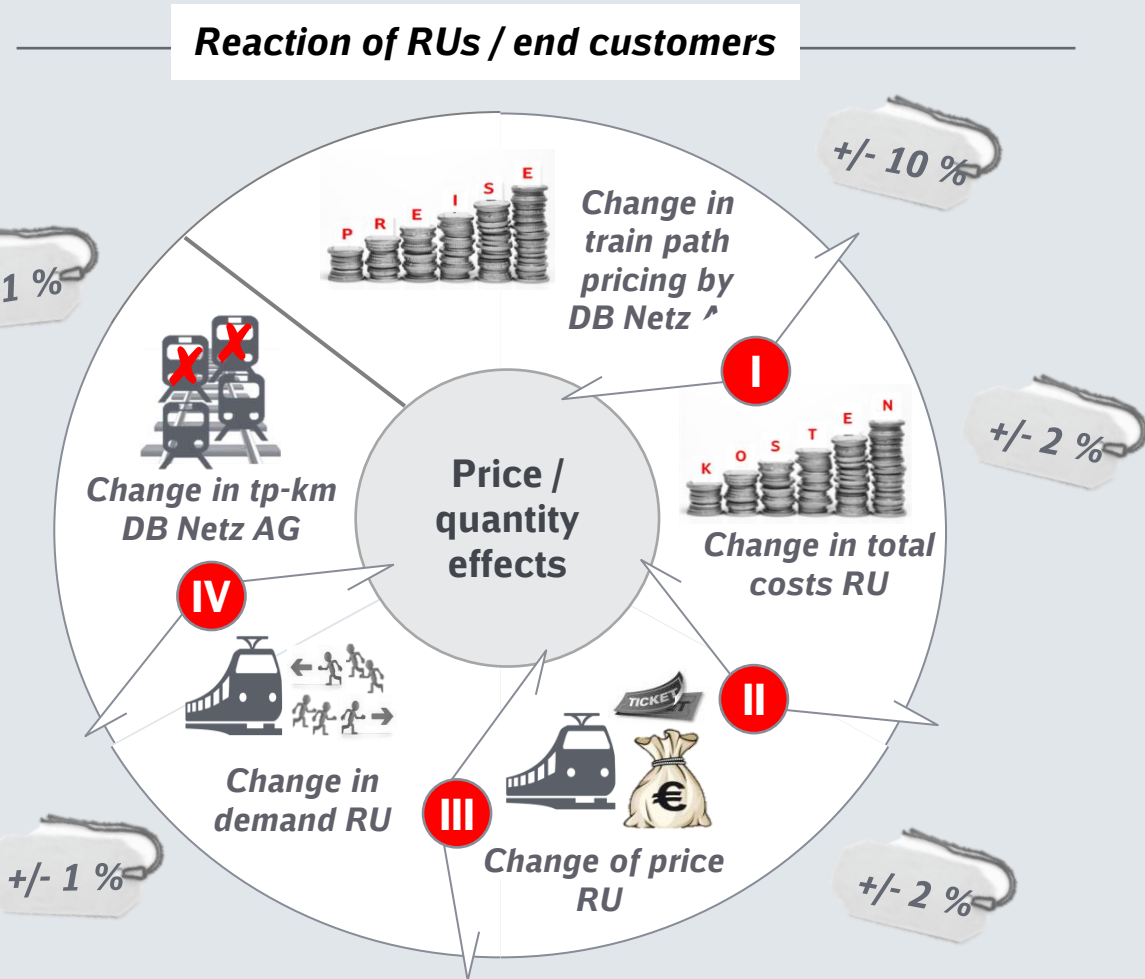
**Question to be addressed**

To what extent is **the track demand** dependent on the **level of infrastructure charges**?

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**Example**

**Increase of the train path charge by 10 %**



By substituting the elasticities formula in the Ramsey formula it is possible to calculate the infrastructure charges

## Ramsey formula

Calculation of mark-ups for each market segment

- $p_i$  results in the Ramsey formula:  $\frac{p_i - DC}{p_i} = \frac{\lambda}{\varepsilon_i}$  in which  $i$  indicates the respective segment
- By substituting the elasticities formula  $\varepsilon_i = \varepsilon_{FC_i} * \frac{p_i}{R_i}$  in the original formula it results  $p_i = DC_i + \frac{R_i}{\varepsilon_{FC_i}} * \lambda$
- Notation
  - DC = Direct Costs (per train path kilometer)
  - P = Track Access Charge (per train path kilometer)
  - $\varepsilon_i$  = Price elasticity of demand for tracks
  - $\varepsilon_{FC_i}$  = Price elasticity of final customer demand
  - R = Revenue of RU(per train path kilometer)

# The way in which the System works is best understood by looking at a simple (fictional!) example

## Example

Costs to be covered	5000
Lambda necessary to cover costs	-0,074

	<b>Volume [in train km]</b>	<b>Direct Costs [in EUR/train km]</b>	<b>RU Revenue [in EUR/train km]</b>	<b>Price Elasticity of Customer Demand</b>	<b>Mark up [in EUR per Train km]</b>	<b>TAC [in EUR/Train km]</b>	<b>IM Revenue = TAC* Volume</b>
<b>Long Distance Passenger</b>	150	1,7	30	-0,5	4,44	6,14	921
<b>Local Passenger</b>	650	1,2	16	-0,3	3,95	5,15	3345
<b>Freight</b>	250	1,8	20	-1,3	1,14	2,94	735

**Challenge accepted!**