PAVEMENT ASSET MANAGEMENT PRACTICE IN AUSTRIA TOLL ROAD NETWORK

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ASFINAG Service Ltd

Tokyo, 1. November 2017
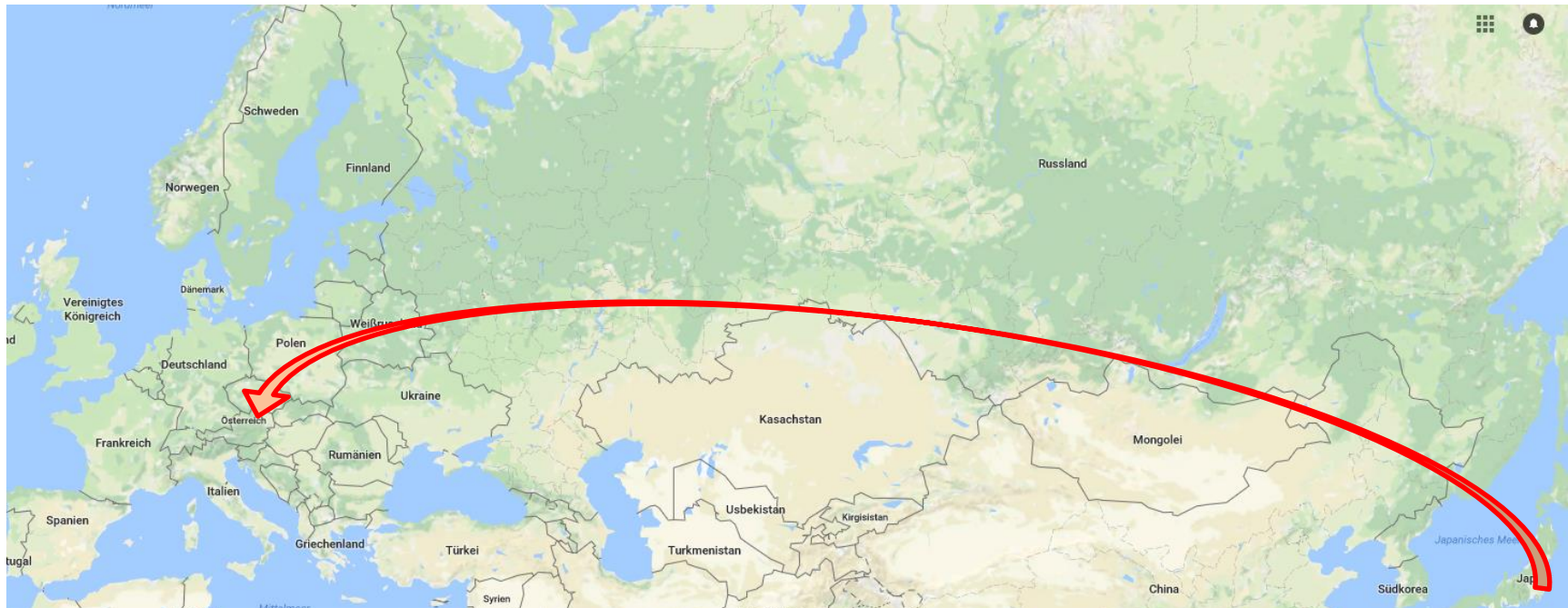
Content

- ASFINAG – organisation and figures
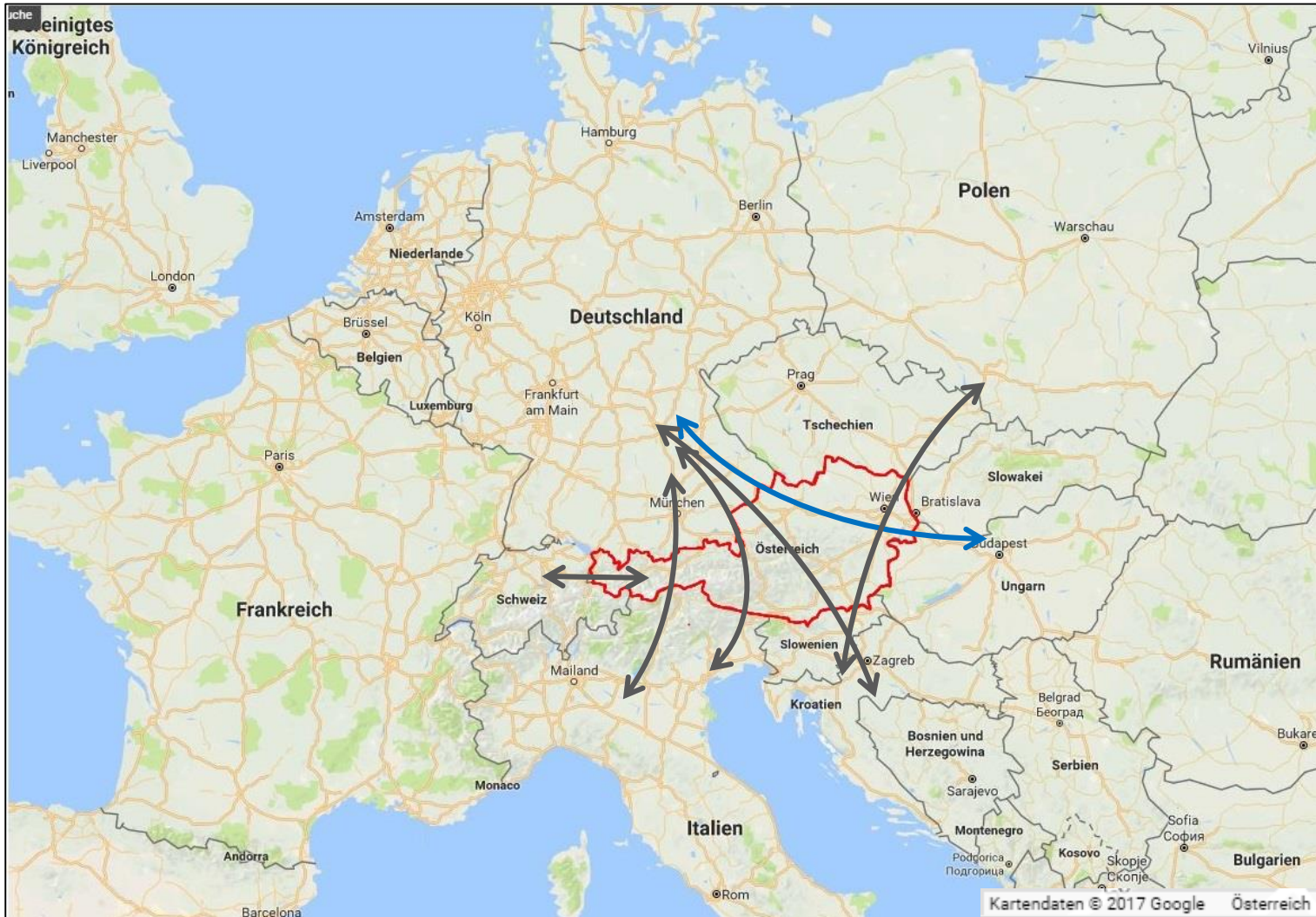- Approach in pavement management

AUSTRIA
In the heart of Europe

	Japan	Austria
inhabitants	126 Mio	8.8 Mio
area	app. 380,000 km²	84,000 km²
Expressway network	app. 9,100 km	app. 2,200 km

ASFINAG
Road network in context with Europe

ASFINAG
Toll road network

Vignette (annual vignette, two-month vignette, ten-day vignette) resp. **GO-Box**
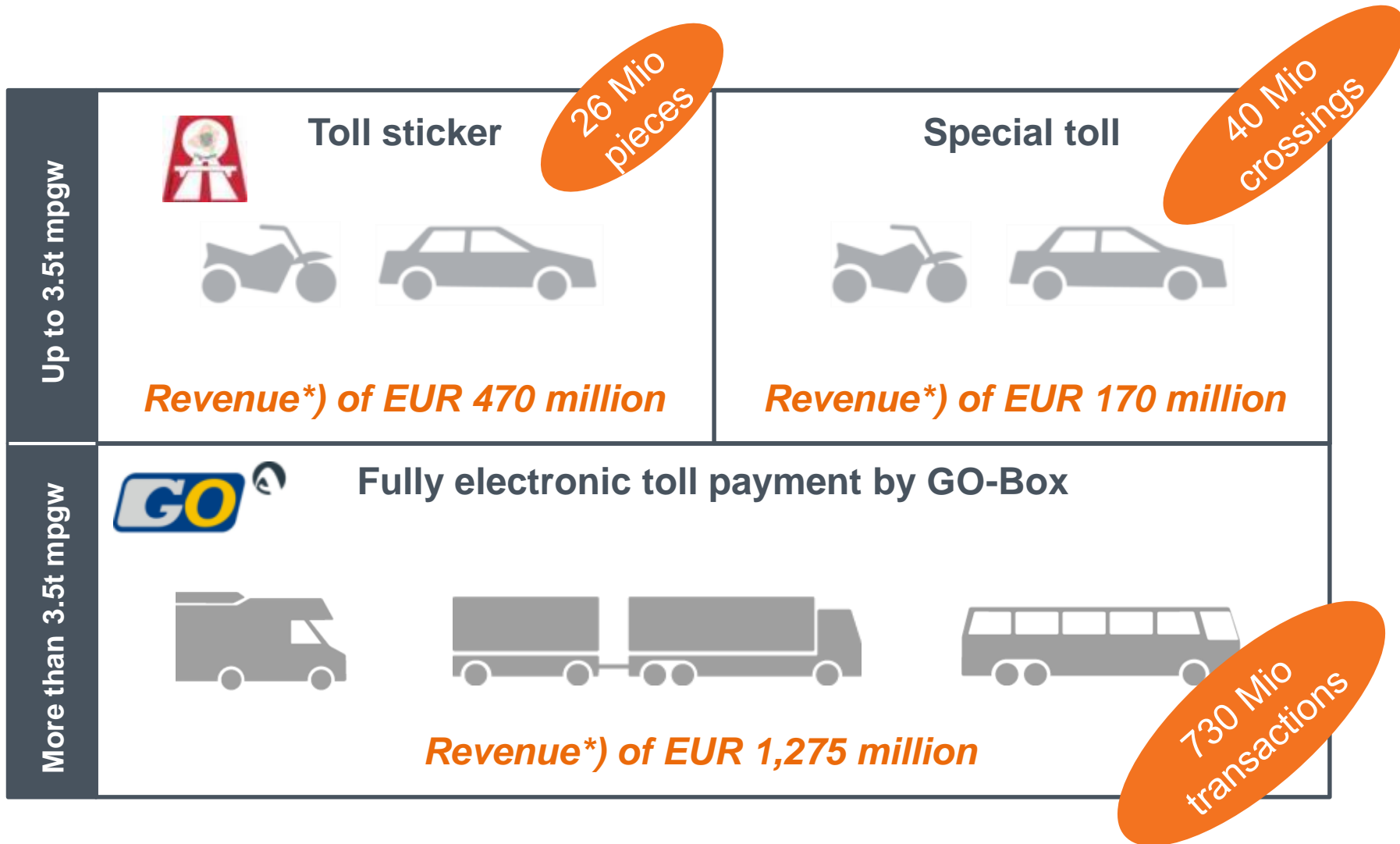
Section toll resp. **GO-Box**

Total length of road network: approx. 2.199 km | Version: September 2017

Toll Revenues 2016

1,915 Mio EUR (256.6 Bil. JPY)

ASFiNAG

Up to 3.5t mpgw	Toll sticker	*26 Mio pieces*	Special toll	*40 Mio crossings*
	Revenue*) of EUR 470 million		*Revenue*) of EUR 170 million*	

More than 3.5t mpgw

GO — **Fully electronic toll payment by GO-Box**

Revenue*) of EUR 1,275 million

730 Mio transactions

ASFINAG toll road network

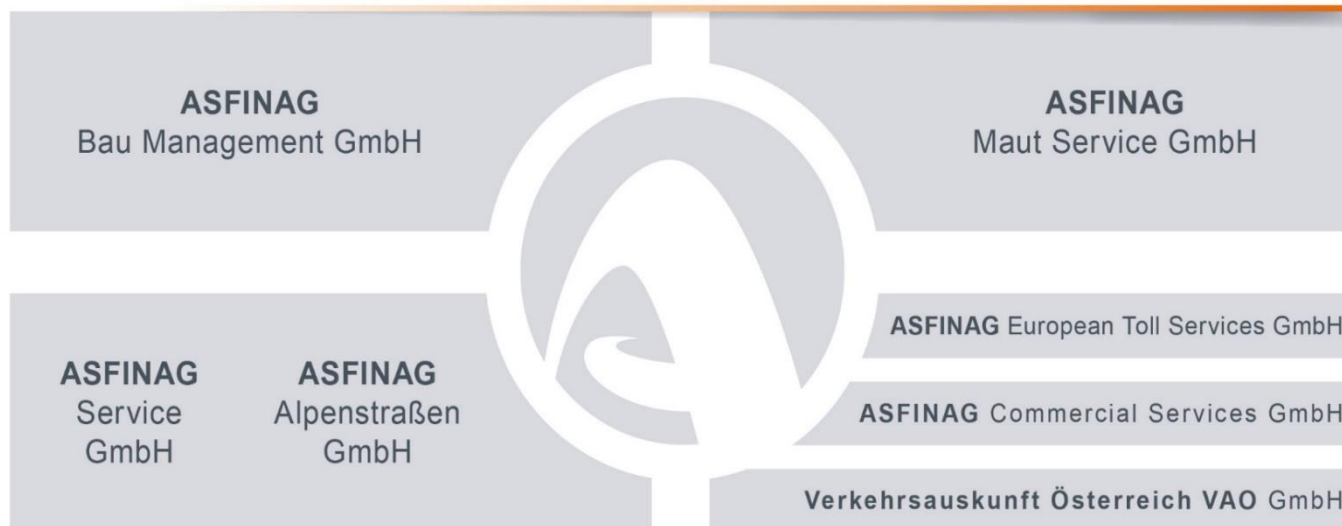| assets in the responsibility of ASFINAG	number (piece)	length (km)	lane (km)	area (Mio. m²)
pavement		**2 199**	**9 211**	**51.33**
asphalt pavement		1 439	5 684	18.91
concrete pavement		760	3 527	32.42
bridges	**5 077**	**340**		**5.65**
on the road	4 142	279		4.90
overpasses	935	61		0.75
tunnel tubes	**160**	**385**		
galleries	**98**	**24**		
retaining walls	**1 341**	**123**		**0.602**
walls	1141	99		0.430
anchored walls	200	24		0.172
noise barriers	**3 613**	**1 000**		**3.421**
gantries	**3 191**	**34**		
sumpans	**27**	**4**		**0.001**
protective constructions	**190**	**18**		**0.001**

ASFINAG
Company structure

ASFINAG was founded in 1982 and is 100 % owned by the Republic of Austria.

Constructing   **Tolling**

ASFiNAG
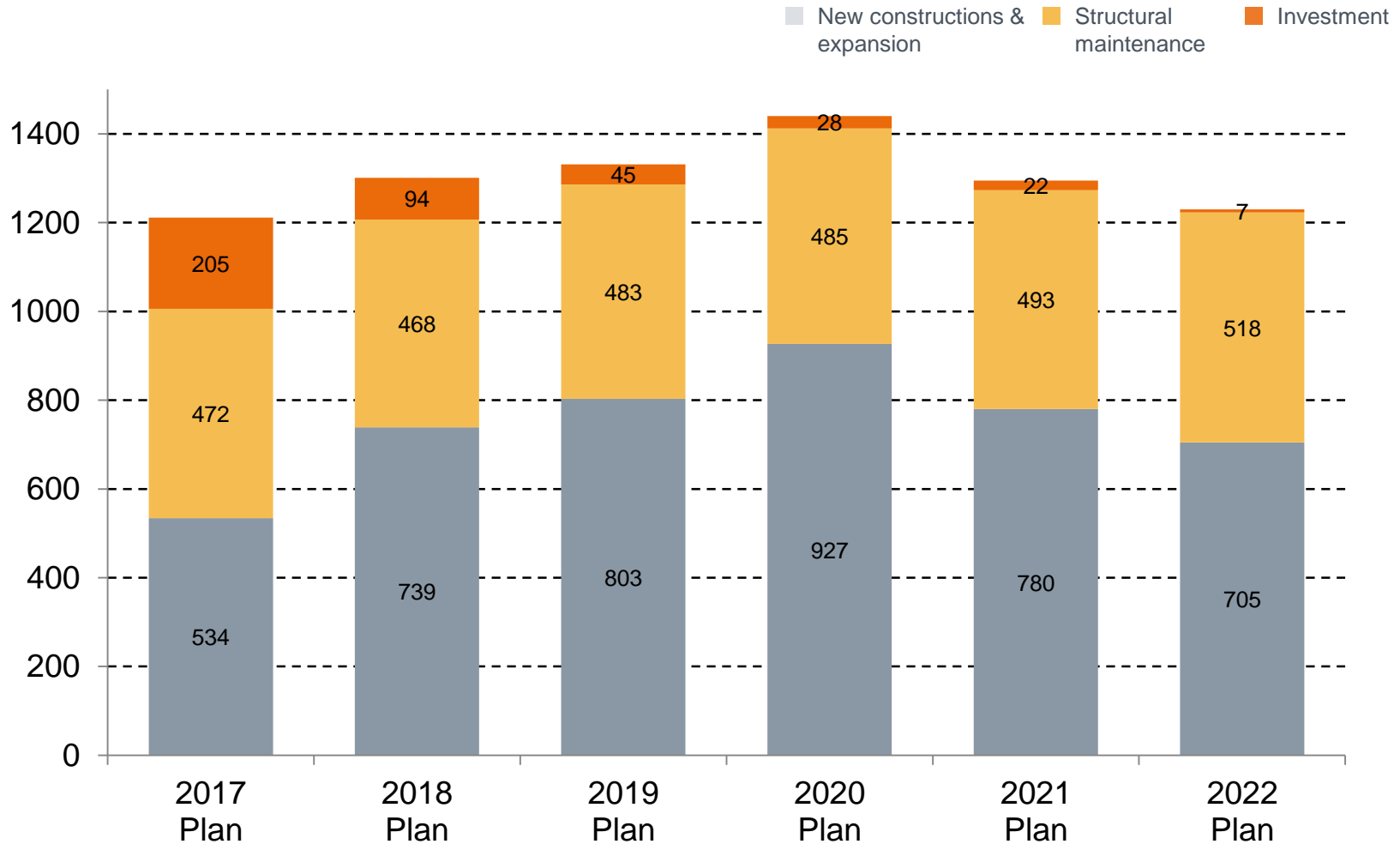Autobahnen- und Schnellstraßen-Finanzierungs-Aktiengesellschaft

ASFINAG
Bau Management GmbH

ASFINAG
Maut Service GmbH

ASFINAG
Service
GmbH

ASFINAG
Alpenstraßen
GmbH

ASFINAG European Toll Services GmbH

ASFINAG Commercial Services GmbH

Verkehrsauskunft Österreich VAO GmbH

Operating

Key financial data 2016 and 2015

	2016		2015	
	Mio. EUR	Bill. JPY	Mio. EUR	Bill. JPY
Net profit for the year	615	82.4	549	73.6
Current and non-current liabilities	11,622	1,557	11,590	1,553
Fictitious debt repayment period	17 years		19 years	

1 EUR = 134 YEN, rounded on October 2017

Current programme for investment in infrastructure
2017 - 2022 in Mio. EURO

Legend: New constructions & expansion · Structural maintenance · Investment

Year	New constructions & expansion	Structural maintenance	Investment
2017 Plan	534	472	205
2018 Plan	739	468	94
2019 Plan	803	483	45
2020 Plan	927	485	28
2021 Plan	780	493	22
2022 Plan	705	518	7

Approach in pavement management

- Strategic objectives

- Data management

- Condition measurement System RoadSTAR

- Assessment of pavement condition

- Analysis method

- Analysis results

Pavement management
Objectives

- **Systematic and objective planning of maintenance treatments**

- **Basis = knowledge about the pavement**
  - Inventory (length, areas, construction types, etc.)
  - Condition from condition inspections

- **Integration of strategic objectives into the maintenance process**

- **PMS as a part of Asset Management**

- **Output**
  - Which maintenance treatments?
  - When is the best point of time for the treatments?
  - Where should it be done?

- **Input for Infrastructure Investment Program (IIP)**

Pavement management
Strategic objectives and KPIs

- **Customer goals**
  - **Network availability**
    - Limitation of the length of construction site
      - 95% of carriage ways of network free from construction sites
  - **Network safety**
    - Amount of sections with road safety index class 5 must be less then 3%

- **Financial goals**
  - **Annual surplus**
    - Quality of estimated costs
    - Schedule reliability
  - **Sustainability**
    - Best cost-benefit ratio
    - Exceed expected lifetime

Pavement management
Data management - overview

- **Inventory data**
  - Network data
  - Referencing information (GIS)

- **Traffic data**

- **Pavement construction data**
  - Materials and type of layers
  - Thicknesses
  - Year of placements

- **Condition data**
  - Condition measurements
  - Visual inspections
  - Investigations on project level

- **Information of current budget**
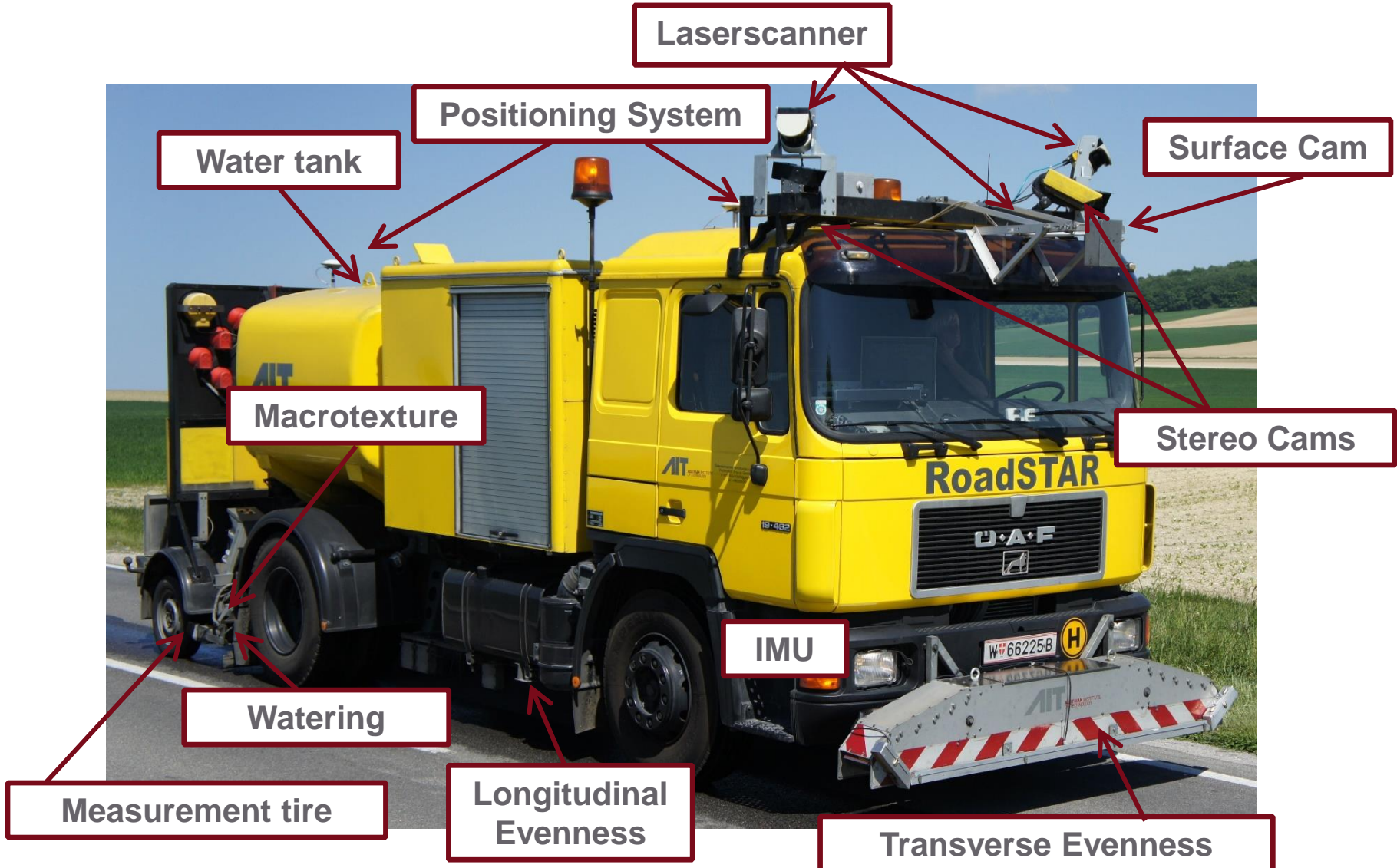 - 6 years committed treatments

Pavement management
Data management - condition data

- **Basis are Austrian guidelines RVS 13.01.15 and RVS 13.01.16**

- **Pavement surface characteristics**
  - Rutting (rut depth under 2m straight edge)
  - Longitudinal evenness (International Roughness Index IRI)
  - Cracking (% of cracked area)
  - Surface defects (% of surface defects)
  - Skid resistance (longitudinal friction coefficient)

- **Collected on each single lane and evaluated in form of 50m sections**

- **Main input information for analysis**

Pavement management
Condition measurement System RoadSTAR

ASFiNAG

Laserscanner

Positioning System

Surface Cam

Water tank

Macrotexture

Stereo Cams

IMU

Watering

Measurement tire

Longitudinal Evenness

Transverse Evenness

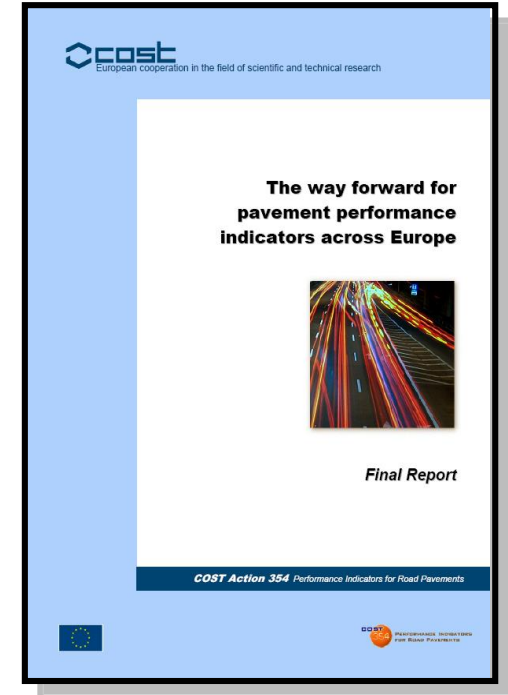# Pavement management
Assessment of pavement condition

- **Single condition indices**
  - Transformation of technical parameters into dimensionless indices (scale 1-very good to 5-very poor)
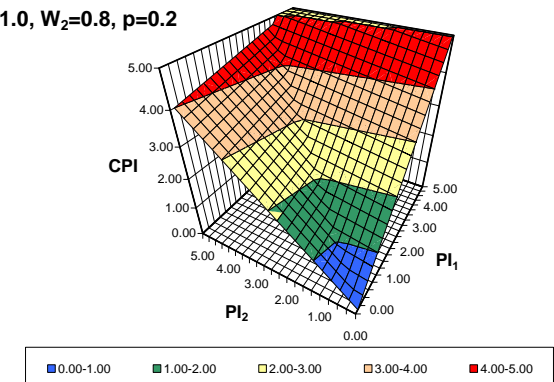
- **Combined indices**
  - Comfort and safety index (CSI)
  - Structural index (SI)
  - Total condition index (TCI)

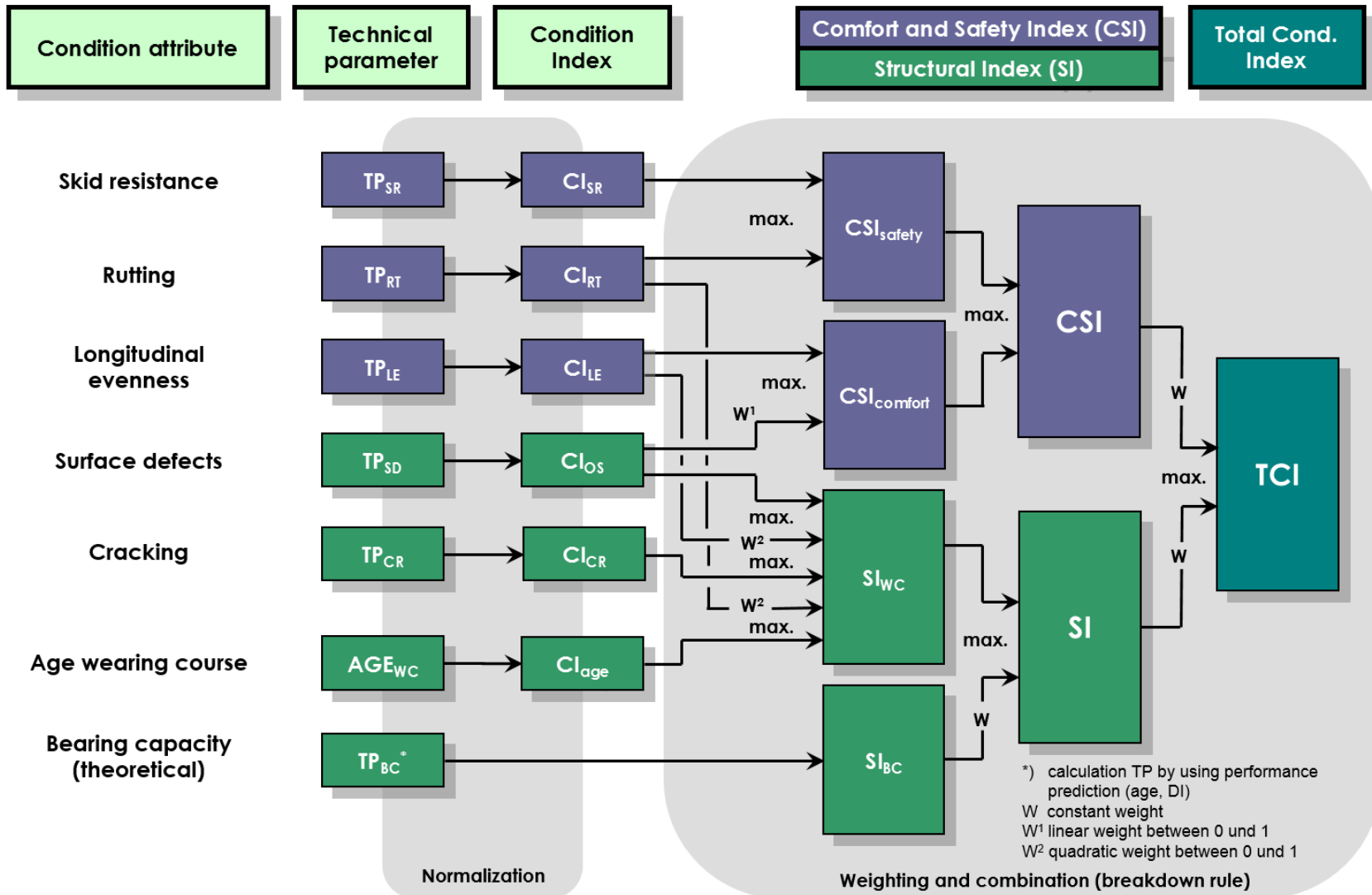- **Basis: COST 354 "Performance indicator for road pavements" (2008)**

The way forward for pavement performance indicators across Europe

Final Report

COST Action 354 Performance Indicators for Road Pavements

W_1=1.0, W_2=0.8, p=0.2

CPI, PI$_1$, PI$_2$

| 0.00-1.00 | 1.00-2.00 | 2.00-3.00 | 3.00-4.00 | 4.00-5.00 |

Pavement management
Assessment of pavement condition

Pavement management
Analysis method

- **Heavy maintenance treatments**
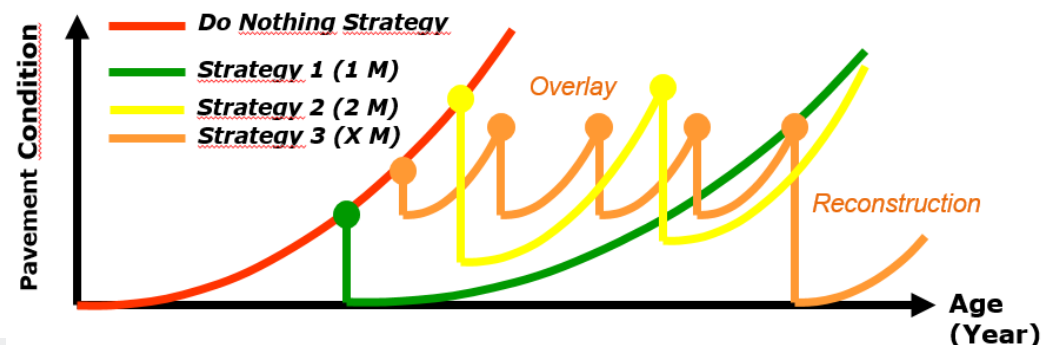   - Surface
    - Wearing course
    - Reinforcement
    - Reconstruction

- **Minor maintenance treatments**
    - Intensive routine maintenance treatments based on risk assessment (CSI and SI)

- **Comparison of maintenance treatment strategies on each single section as basis for LCCA and optimization**

Pavement management
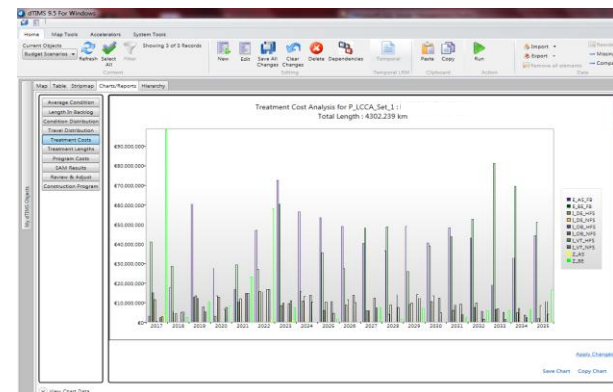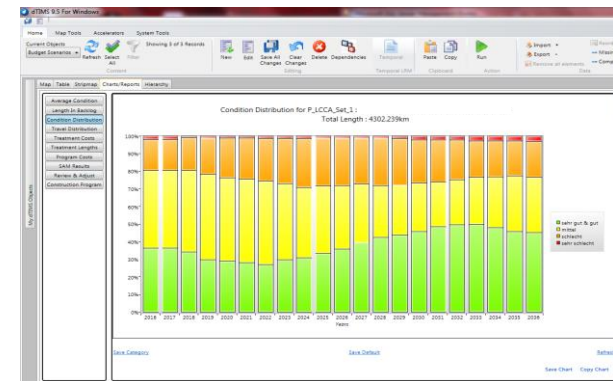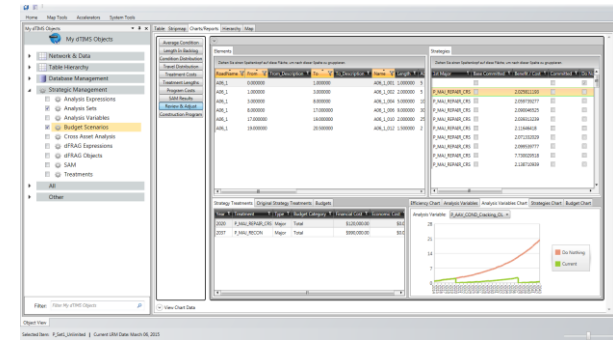## Analysis results

- **Section based results**
  - Type, year and location of treatment
  - Treatment prioritization
  - Basis for further investigation on project level

- **Network level results**

  Total network or sub-networks
  - Condition distribution
  - Cost distribution
  - Comparison of scenarios
  - Treatment distribution
  - Maintenance backlog
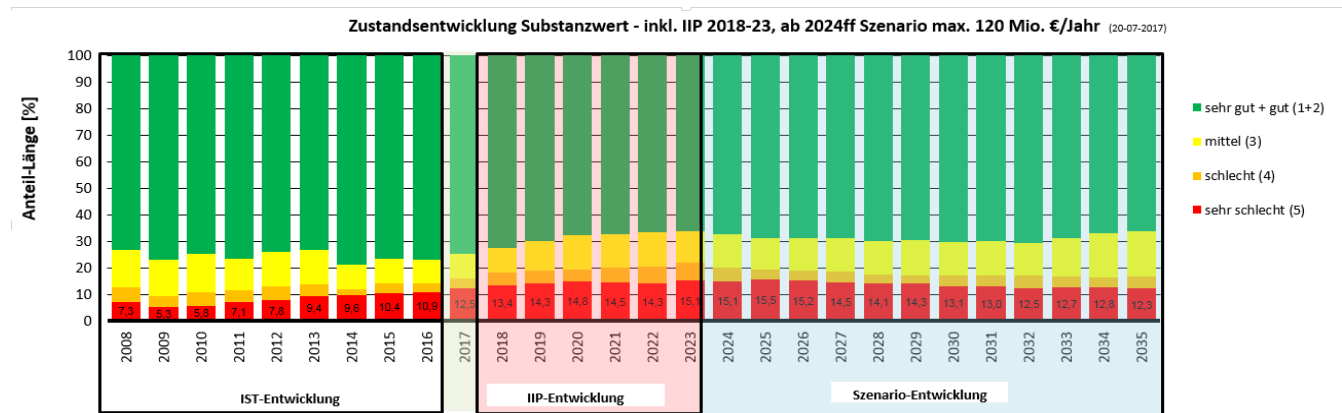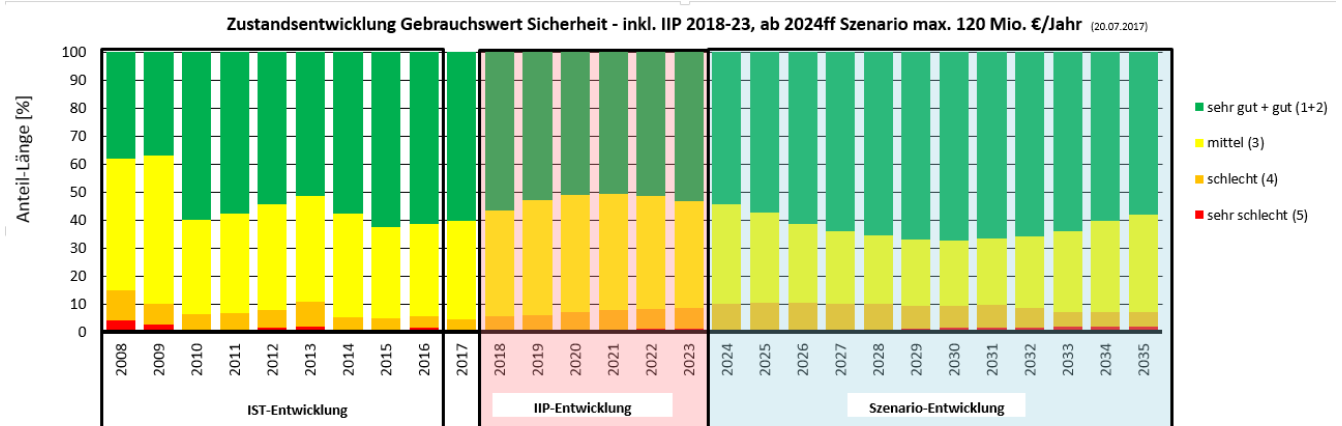 - Development asset value

Pavement management
Analysis results

■ **Long-term prognosis of condition**

Net substance value

Net custom value of security

Thank you for your attention

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