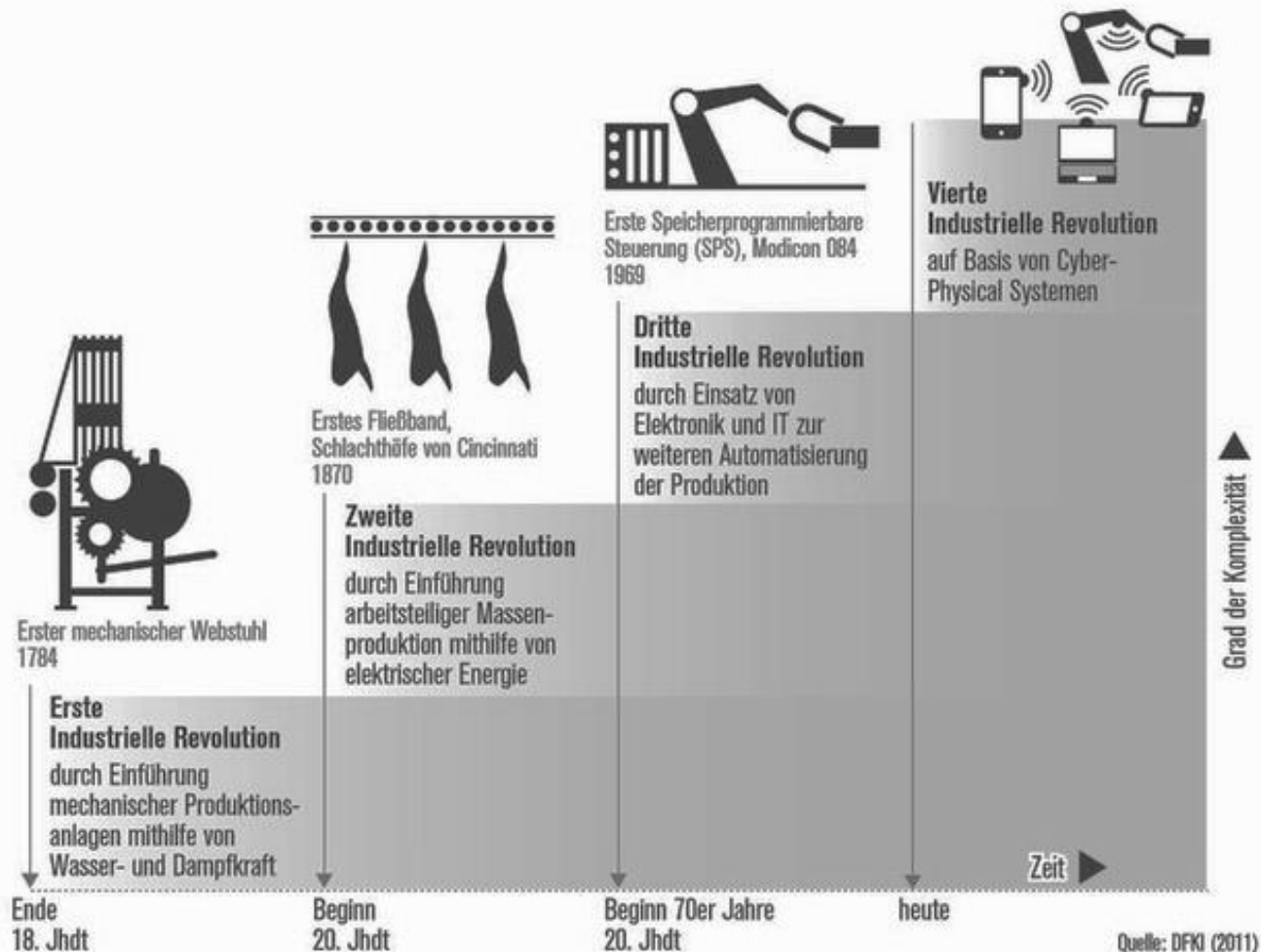




Rail Data Sharing between actors: case study for the intelligent freight wagon

The Railway

... on the way to Industry 4.0



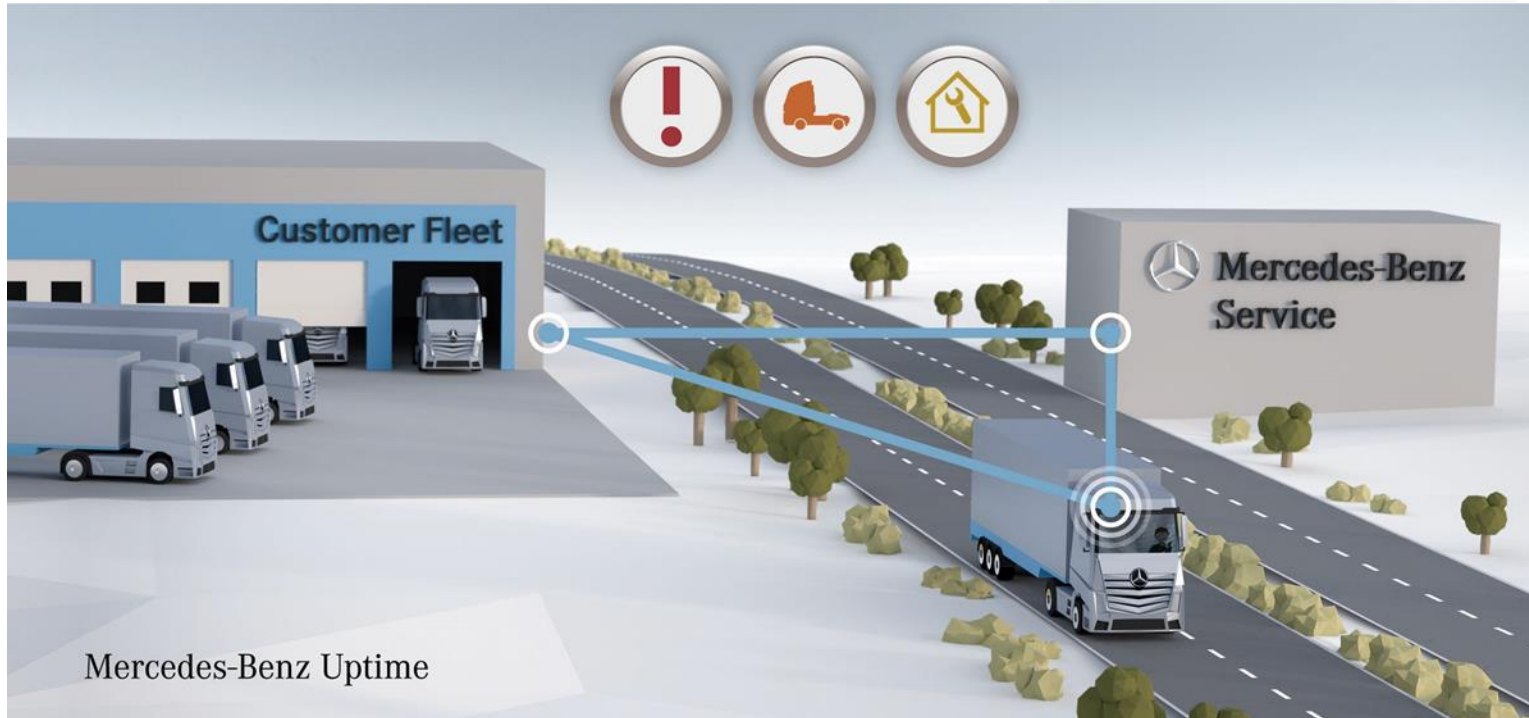
Data sharing is already common in other sectors ...



Origin: www.produktion.de

The Railway

... on the way to Industry 4.0



Quelle: Mercedes-Benz Uptime



The Railway

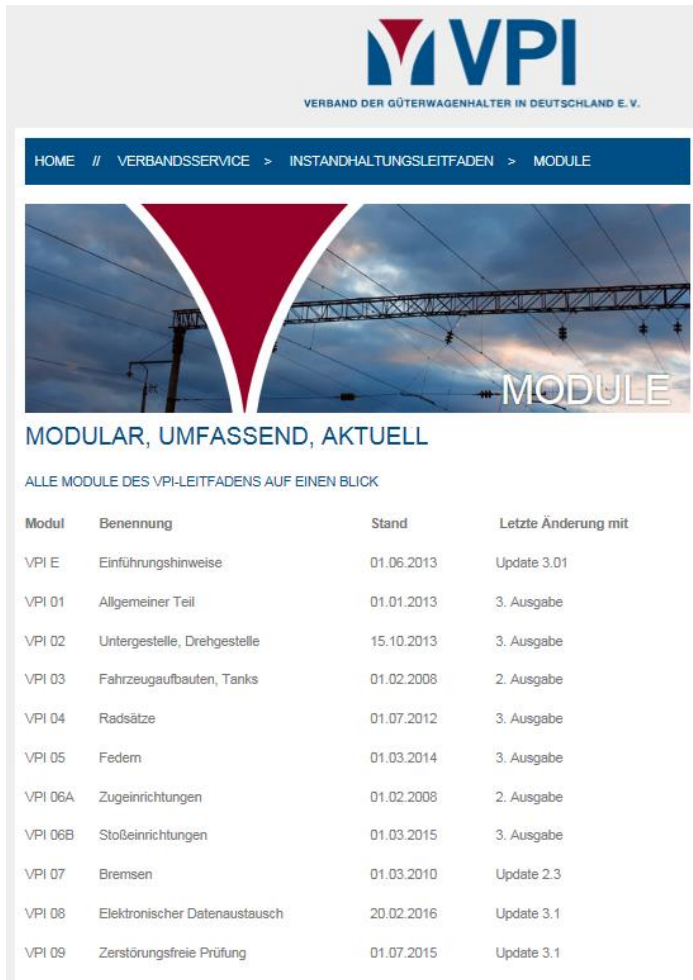
... on the way to Industry 4.0

...and this is how much a wagon-keeper knows about his wagons during operation.

For this reason we need complex maintenance programs

... with complex safety requirements.

... where many collaterals have been considered, there are also inefficiencies.



VPI
VERBAND DER GÜTERWAGENHALTER IN DEUTSCHLAND E. V.

HOME // VERBANDSSERVICE > INSTANDHALTUNGSLEITFADEN > MODULE

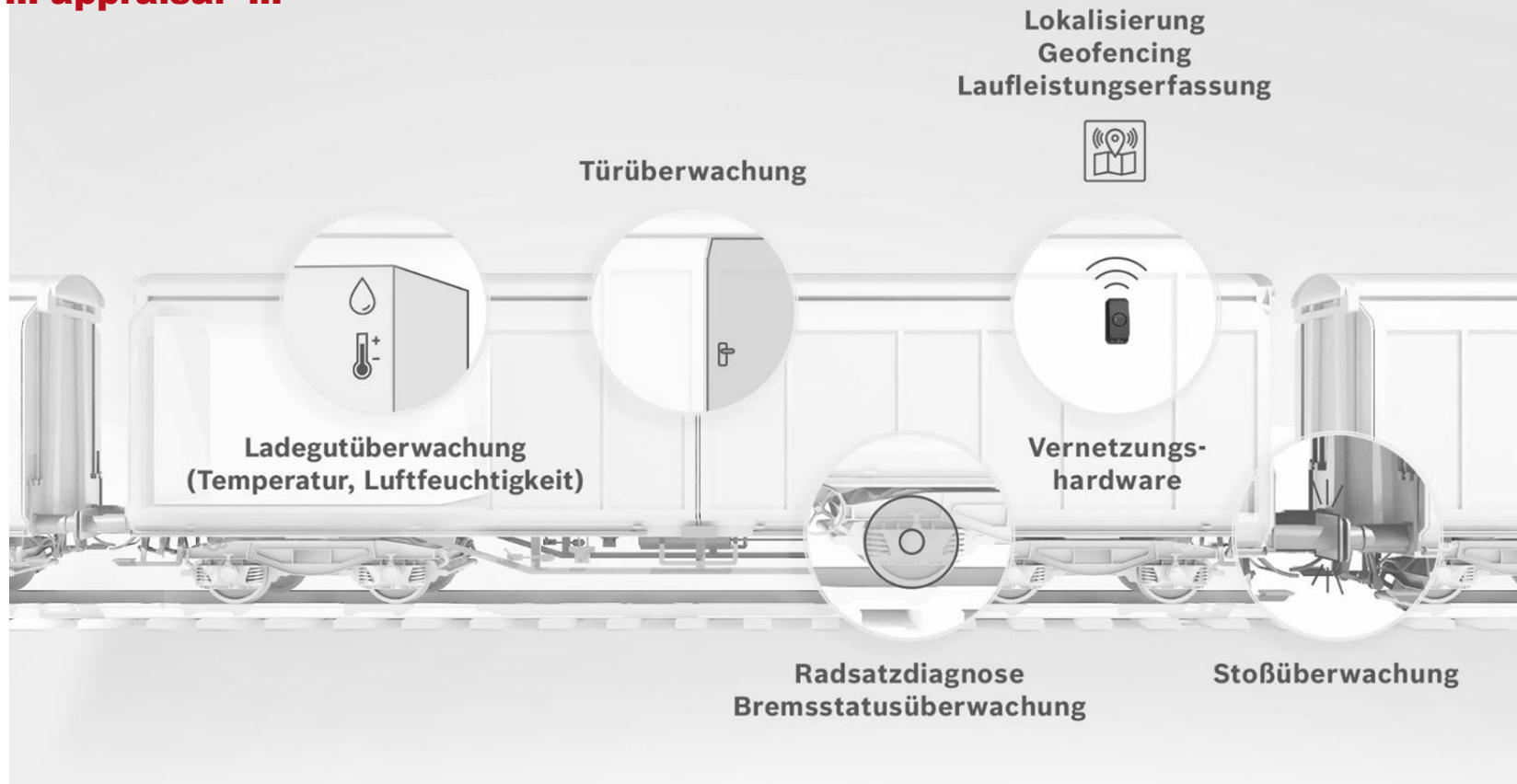
MODUL, UMFASSEND, AKTUELL

ALLE MODULE DES VPI-LEITFADENS AUF EINEN BLICK

Modul	Benennung	Stand	Letzte Änderung mit
VPI E	Einführungshinweise	01.06.2013	Update 3.01
VPI 01	Allgemeiner Teil	01.01.2013	3. Ausgabe
VPI 02	Untergestelle, Drehgestelle	15.10.2013	3. Ausgabe
VPI 03	Fahrzeugaufbauten, Tanks	01.02.2008	2. Ausgabe
VPI 04	Radsätze	01.07.2012	3. Ausgabe
VPI 05	Federn	01.03.2014	3. Ausgabe
VPI 06A	Zugleinrichtungen	01.02.2008	2. Ausgabe
VPI 06B	Stoßeinrichtungen	01.03.2015	3. Ausgabe
VPI 07	Bremsen	01.03.2010	Update 2.3
VPI 08	Elektronischer Datenaustausch	20.02.2016	Update 3.1
VPI 09	Zerstörungsfreie Prüfung	01.07.2015	Update 3.1

Asset Intelligence shall help to increase the rail safety and efficiency

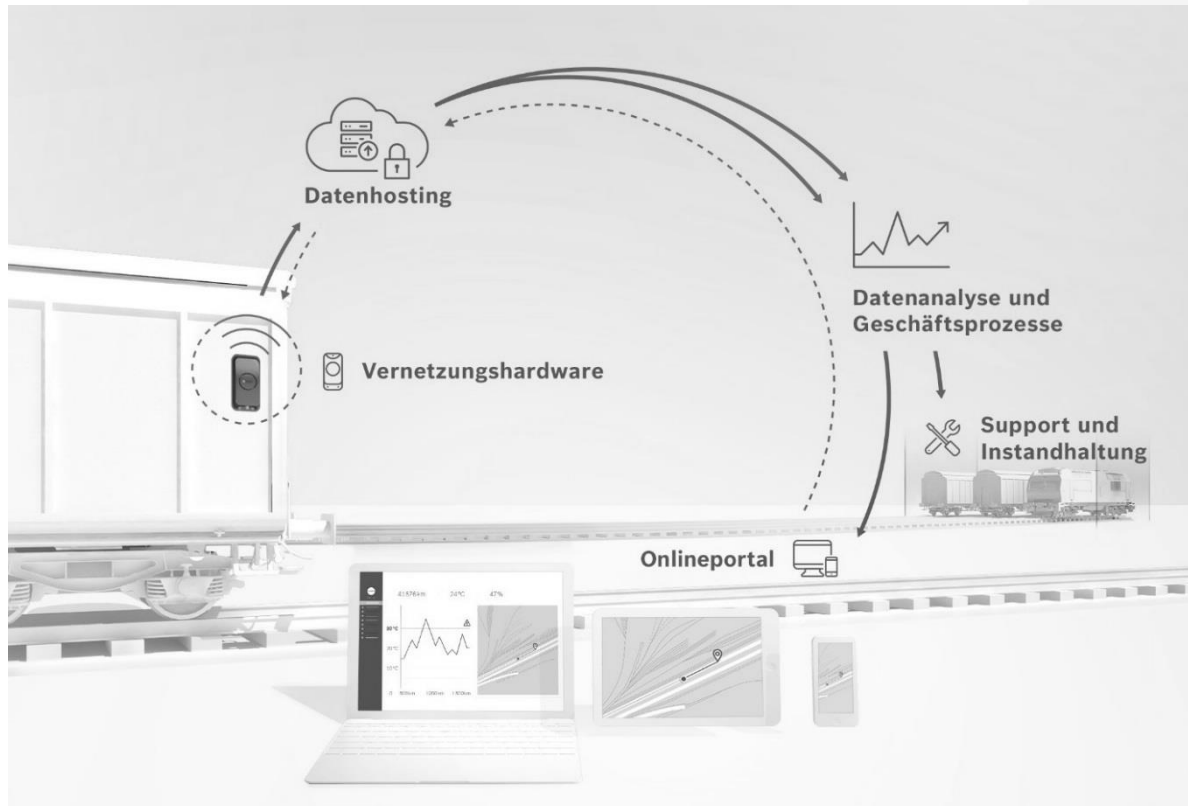
... appraisal ...



Quelle: Bosch Engineering

Asset Intelligence shall help to increase the rail safety and efficiency

... appraisal

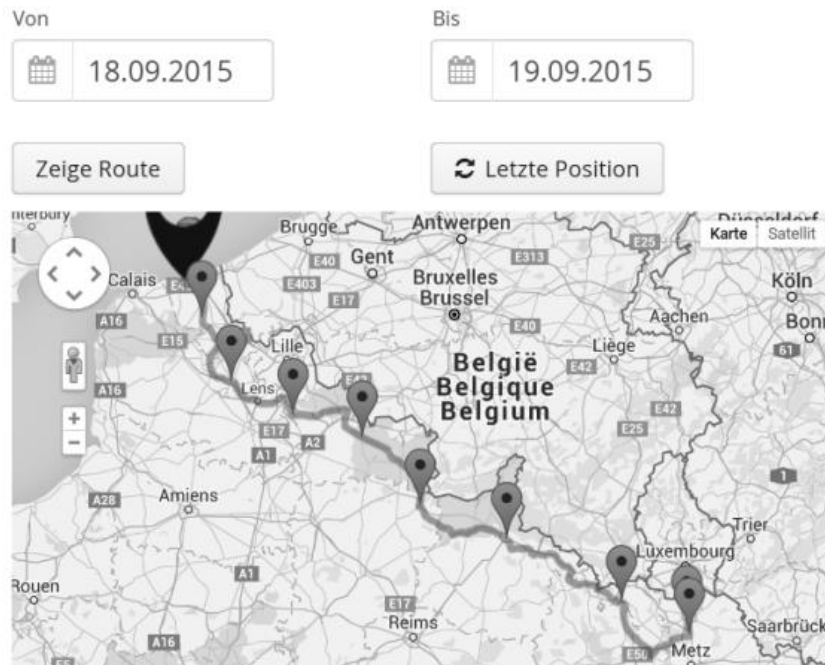


Quelle: Bosch Engineering

... rail asset monitoring designed to logistical needs.

... maintenance has so far hardly been the focus!

Which “Asset data” would be interesting for maintenance optimization??



The actual running performance is pressing because today ...

Maintenance cycles are based on mileage performance ... sufficient reserves are included in the system ... various intervals are matched, e.g. Tank tests with UG revision and RS reworking intervals

Insights from the route profile to the maintenance needs are not to be despised!



... but we still do not know the exact wear ...

Quelle: <http://europetrain.uic.org>

The idea

...condition-based maintenance

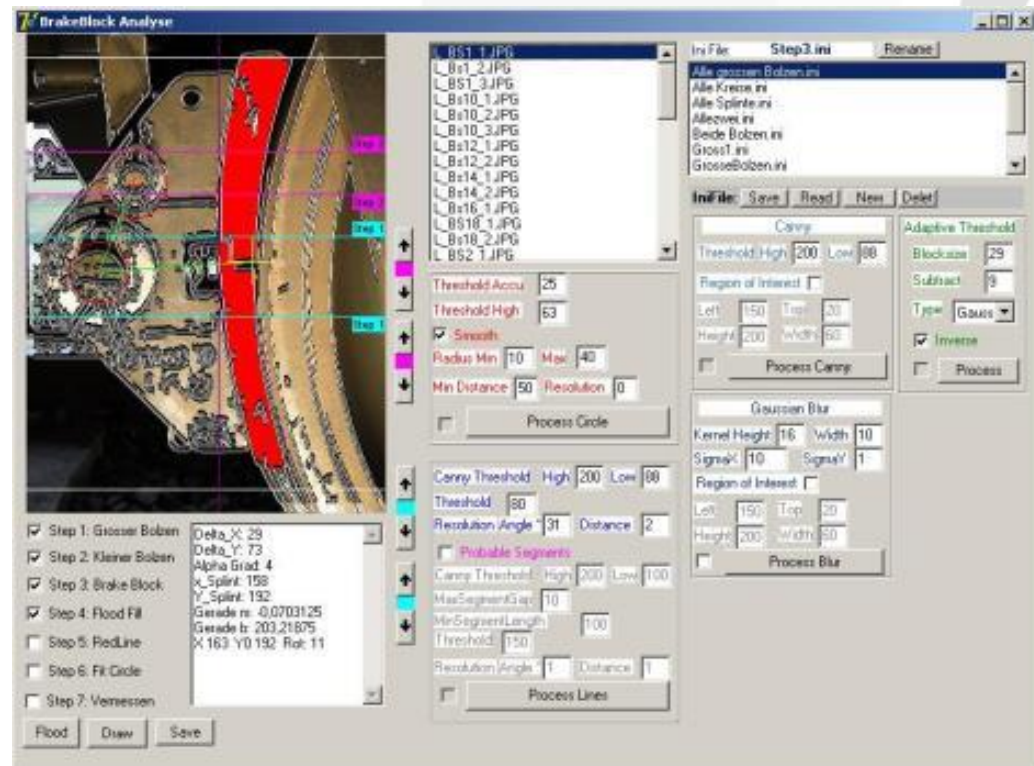


The solution

... intelligent detection of neuralgic components on freight cars

...using the example of brake blocks:

- The camera detects the UIC car number or QR code (or tag) with car identifier when it passes by.
- The camera creates photos of the brake blocks per wheel and identifies the best photo based on features.
- The brake block is then evaluated based on surface integrals and irregularities in the surface.



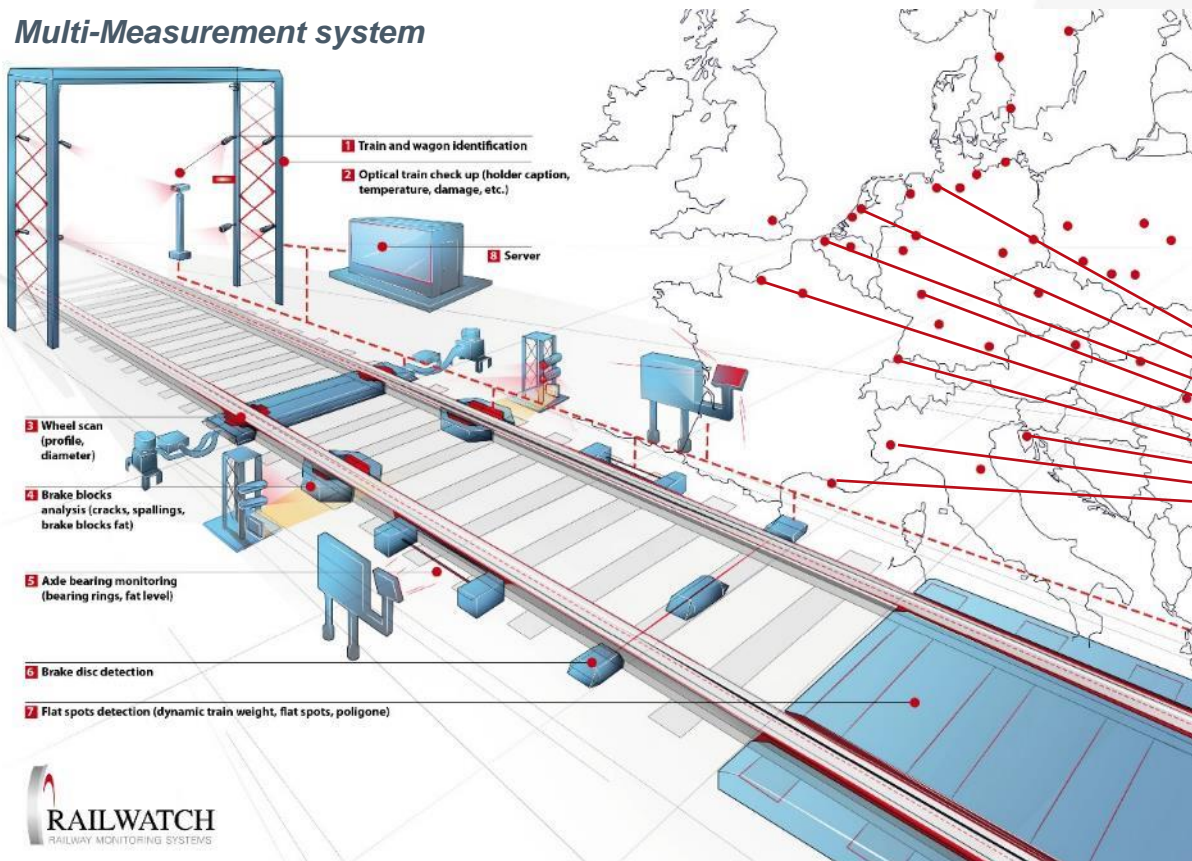
The service

A system for automatic vehicle diagnostics of freight cars

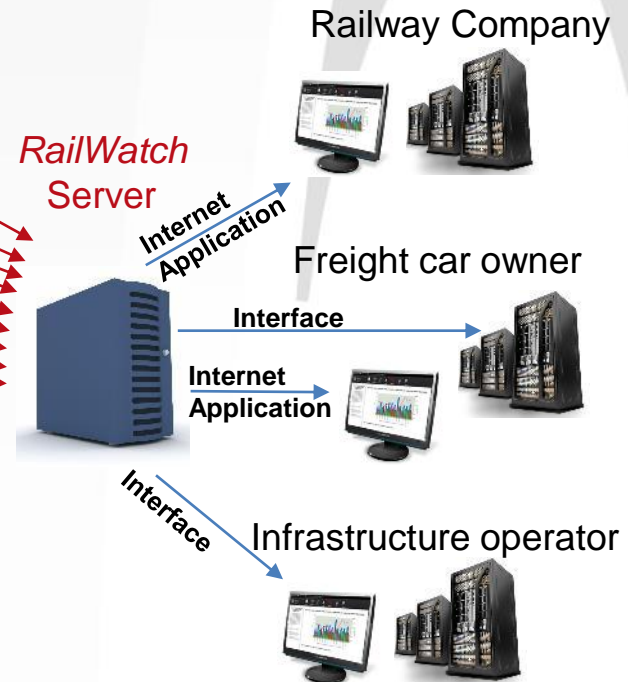
Detection of component conditions during passage of the train. Processing of information in local server stations and forwarding requested (customer's wishes) limit dimensions and damage profiles with photo to the *RailWatch* server.

Processing of information from the server station and forwarding (interface) to customer or saving in a web application.

Multi-Measurement system



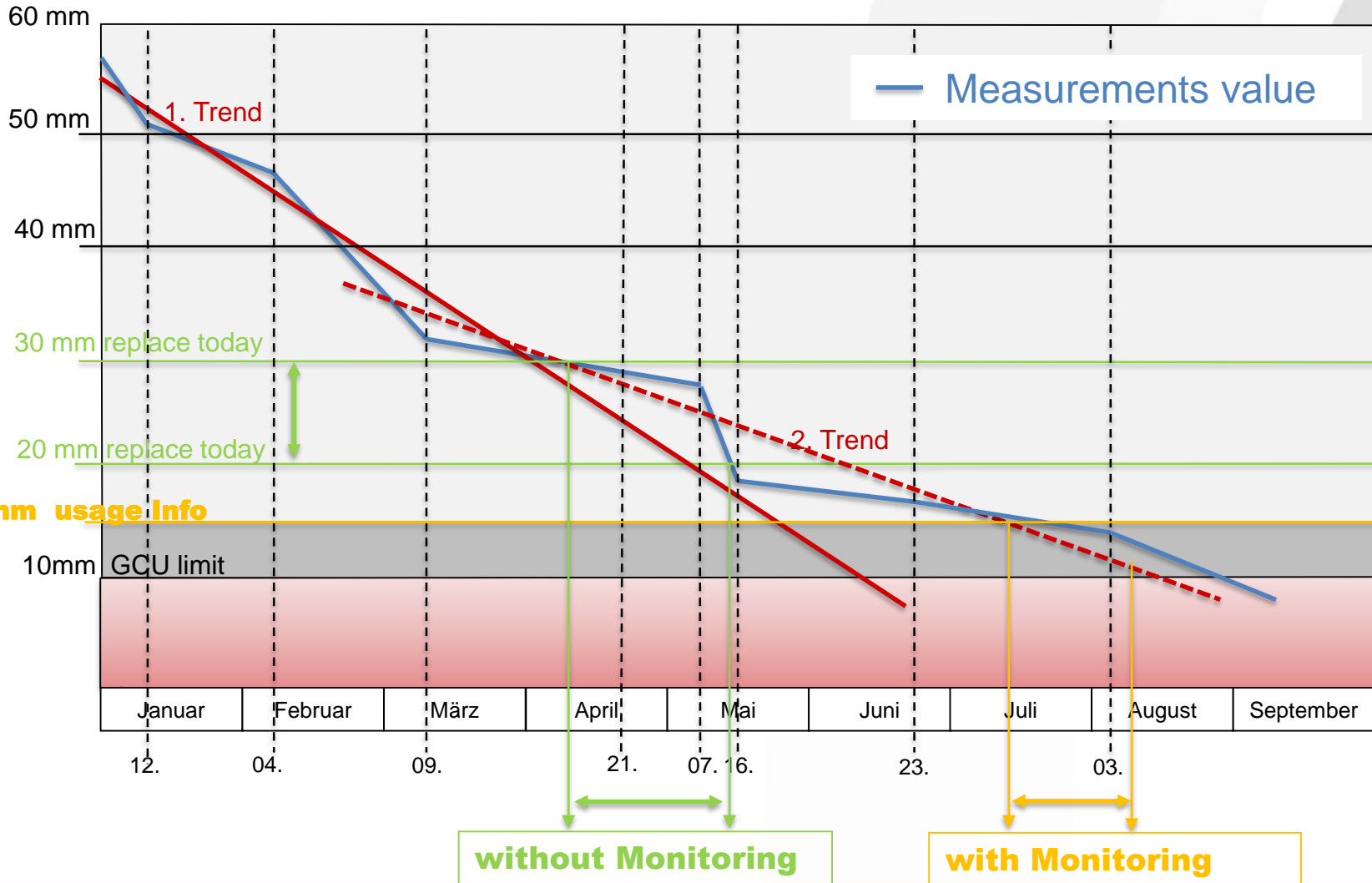
RailWatch Server



The additional benefit

.... the wear analysis from RailWatch

Example for wear trend from synthetics brake block - 60mm



Advantages

for freight car owners and operators

- **Prevention of additional costs** through preventative maintenance management. *Makes it possible to act instead of react.*
- Consequent **avoidance** of unscheduled **train car downtime** and **increased availability**. Productivity increases with simultaneous reduction in number of train cars required.
- **Evidence in AVV of operational defects or quality defects** possible in respect of RCs, freight car workshops and component manufacturers.
- **Cost savings** through expansion of maintenance cycles (LifeCycle) on the basis of operational live data which are stochastically compressed.
- **Reformulation** or further development of the **maintenance guidelines** possible. **Know-how advantage** for the construction of freight cars, **improved components**.

... extract product catalogue for

Freight car owner
Condition-based maintenance

Railway company
Time savings & Train dispatch

Infrastructure operators
safety productivity & fee system

Informationsdienst Güterwagenhalter - Änderungen vorbehalten

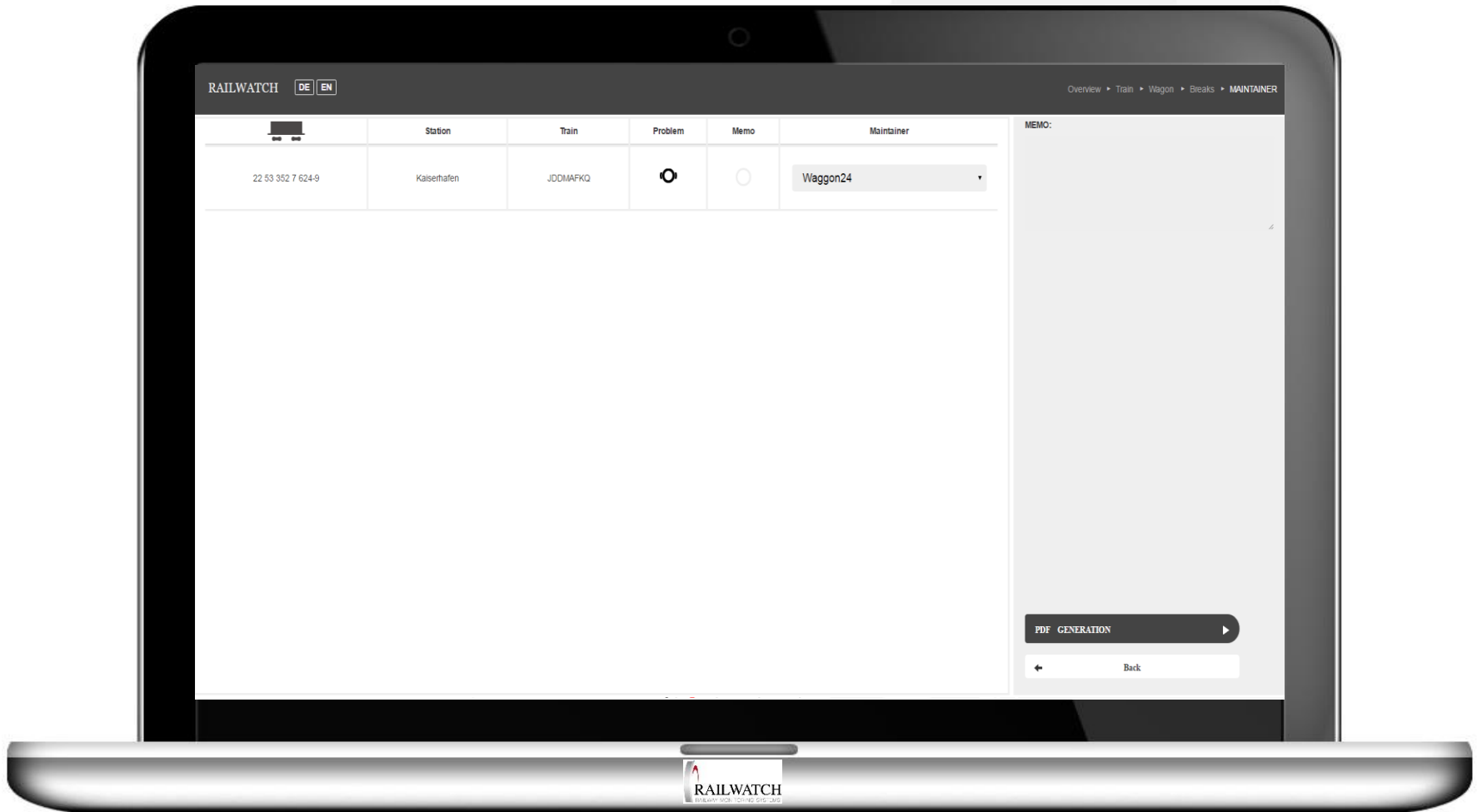
Gruppe	Code	Informationstyp	Inhalt	Maß/Format	pro
Radreifen/Vollrad		Flachstellen	Länge, links/rechts	mm	Radsat
		Polygone	Unrundheit, links/rechts	mm	Radsat
		Radprofil	Spurmaß (SR)	mm	Radsat
		Radprofil	Abstand der inneren Stirnfläche (AR)	mm	Radsat
		Radprofil	Radreifen-/Radkranzbreite (BR), links/rechts	mm	Radsat
		Radprofil	Spurkranzdicke (Sd), links/rechts	mm	Radsat
		Radprofil	Spurkranzhöhe (Sh), links/rechts	mm	Radsat
		Radprofil	Dicke des Radreifens in Meßkreisebene	mm	Radsat
		Radprofil	Spurkranzflankenmaß (qR), links/rechts	mm	Radsat

AVV Produkte - Änderungen vorbehalten -

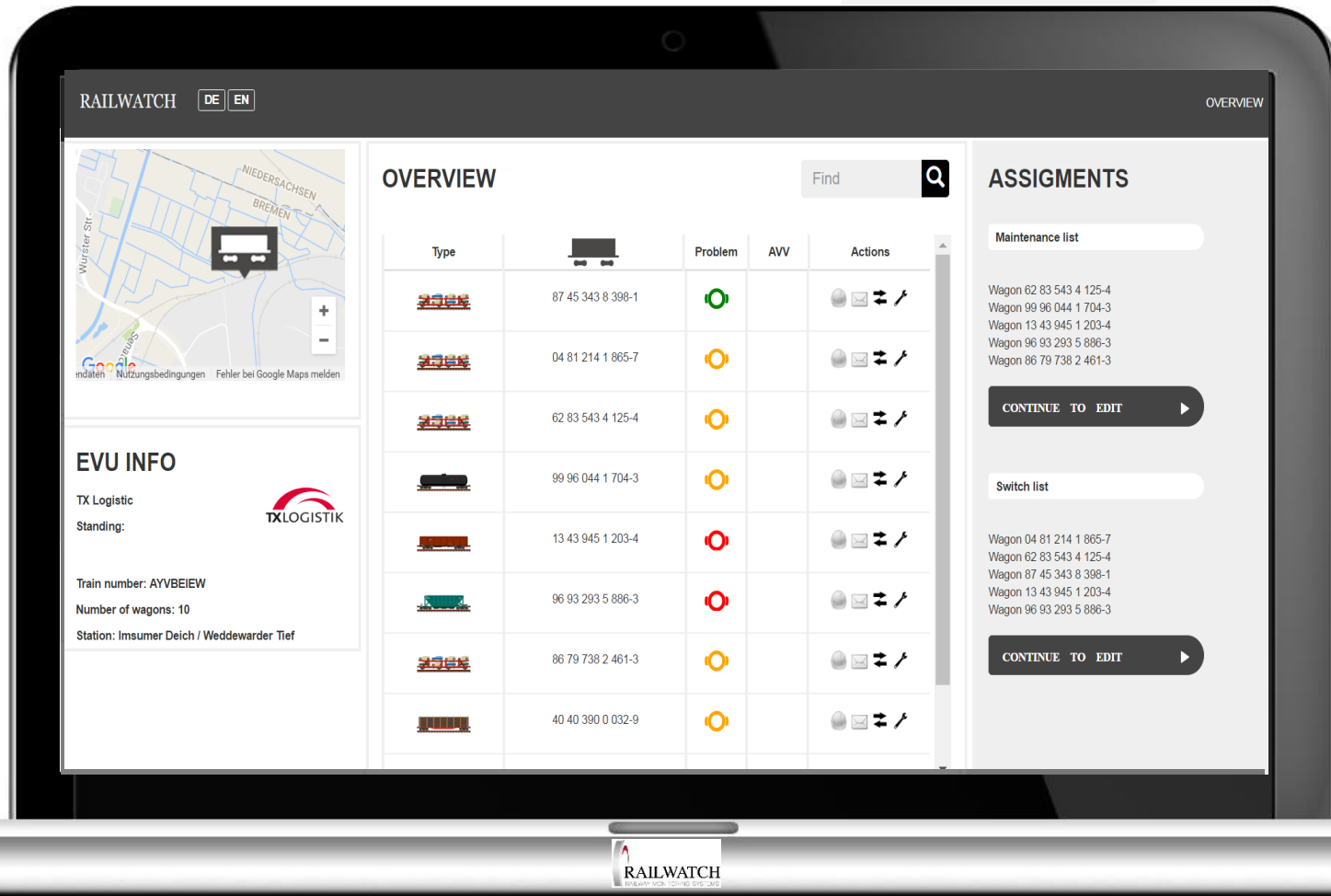
Bauteile	Code	Mängel/Kriterium/Hinweise	Bemerkung	Maß
1.1. Radreifen	1.1.1	Dicke weniger als, für 120km/h zugelassen Wagen (Wagen die das Zeichen	Auss	
	1.1.1	Dicke weniger als, überige Wagen 30mm	Auss	
	1.1.2	Radreifen, gebrochen	Verifizierung	Auss
	1.1.3	Radreifen lose, unreiner Klang	Verifizierung	Auss
	1.1.5	Radreifen seitliche verschoben, Sprengring lose oder sichtbar	Verifizierung	Auss
	1.1.6	Schaden am Sprengring (gerissen / gebrochen / fehlt)	Verifizierung	Auss
1.2. Vollrad	1.2.1	Die Rille zur Kennzeichnung der Mindestdicke ist nicht mehr über ihren ge	Auss	
	1.2.2	Thermische Überbeanspruchung durch die Bremse, Angeschmolzene Bre	Naci	
	1.2.3	Thermische Überbeanspruchung durch die Bremse, Beschädigung der La	Naci	

Informationsdienst Güterwagenhalter - Änderungen vorbehalten

Gruppe	Code	Informationstyp	Inhalt	Maß/Format	pro
Nebenprodukte		Wagengewicht	Gewicht	kg	Wagen
Nebenprodukte		Wagennummer	UIC Wagennummer	UIC	Wagen
Nebenprodukte		Wagenlänge	Länge	m	Wagen
Nebenprodukte		Ladungsnummer	Containernummer(n)	Containern	Wagen
Nebenprodukte		Lärm	Lärmmission (interpoliert)	dB(A)	Wagen
Nebenprodukte		Bremssohle	K-Sohle / Grauguss- Sohle	K / G	Wagen



The smart freight car manages itself and becomes competitive to the road!



RAILWATCH DE EN


OVERVIEW



























EVU INFO

TX Logistic
 Standing: 
 Train number: AYWBEIEW
 Number of wagons: 10
 Station: Imsumer Deich / Weddewarder Tief

OVERVIEW


Find 

Type		Problem	AVV	Actions
	87 45 343 8 398-1			
	04 81 214 1 865-7			
	62 83 543 4 125-4			
	99 96 044 1 704-3			
	13 43 945 1 203-4			
	96 93 293 5 886-3			
	86 79 738 2 461-3			
	40 40 390 0 032-9			

ASSIGMENTS


Maintenance list

- Wagon 62 83 543 4 125-4
- Wagon 99 96 044 1 704-3
- Wagon 13 43 945 1 203-4
- Wagon 96 93 293 5 886-3
- Wagon 86 79 738 2 461-3

CONTINUE TO EDIT 

Switch list

- Wagon 04 81 214 1 865-7
- Wagon 62 83 543 4 125-4
- Wagon 87 45 343 8 398-1
- Wagon 13 43 945 1 203-4
- Wagon 96 93 293 5 886-3

CONTINUE TO EDIT 

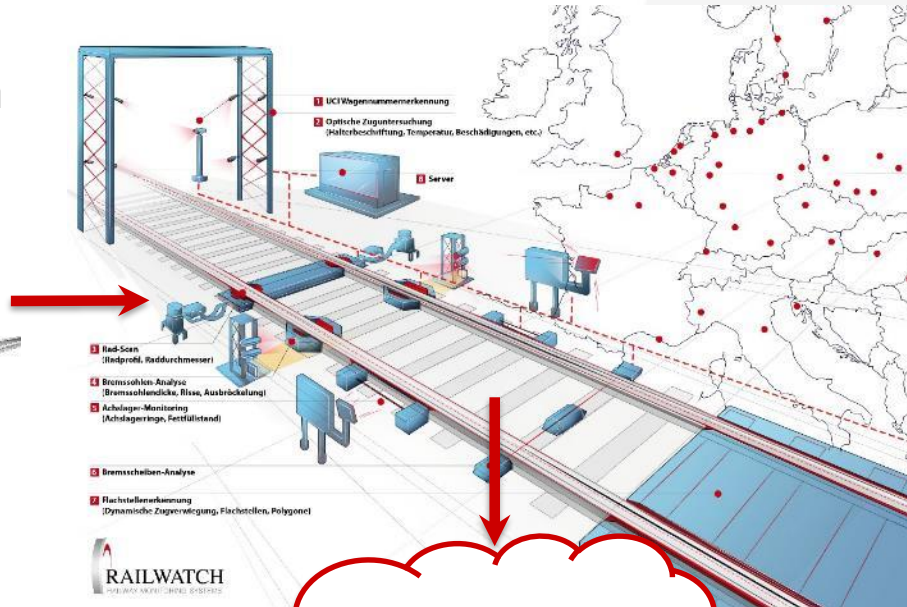
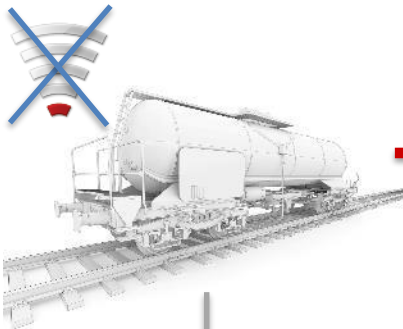
The smart freight car manages itself and becomes competitive to the road!

One Possibility

... the way to a digitisation

... Evolution instead of Revolution

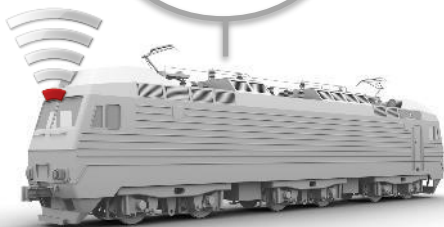
Product System



Information service:

- description, missing/damaged
- graffiti
- temperature
- deformation
- brake blocks
- wheel profile & Diameter
- axel-bearing rings
- axel-box grease level
- flats, polygon
- shelling or flaking
- Burrs
- wheelset load , etc.

Railway Equipment System



RailWatch Device Server

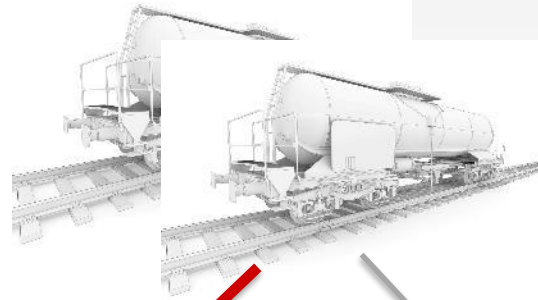
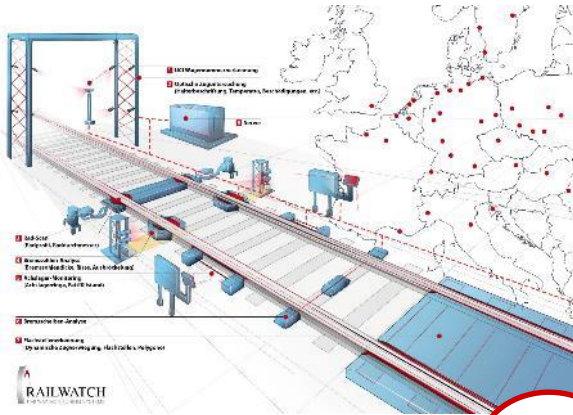
3rd Party Device Server



One Possibility

... the way to a digitisation

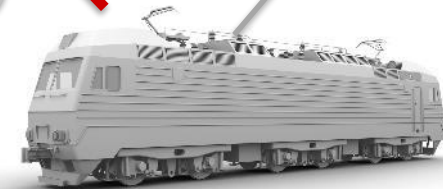
... Evolution instead of Revolution



company
certification
worker

Information service:

- description, missing/damaged
- graffiti
- temperature
- deformation
- brake blocks
- wheel profile & Diameter
- axel-bearing rings
- axel-box grease level
- flats, polygon
- shelling or flaking
- Burrs
- wheelset load , etc.



Railway company
locomotive
Locomotive driver
Pantograph



GPS location
corrugation
cracks

Effects on maintenance rules and procedures



The vision
First steps already
possible

- The wear development can be monitored in each case automatically and the planned maintenance activity to be expected as a result of each traffic.

Potential for:



Improvement
Planability

Failures
Reduction

Cost
Reduction

Understanding
Wear and Tear



Thank You!