

# railways

The customer magazine of DB Cargo



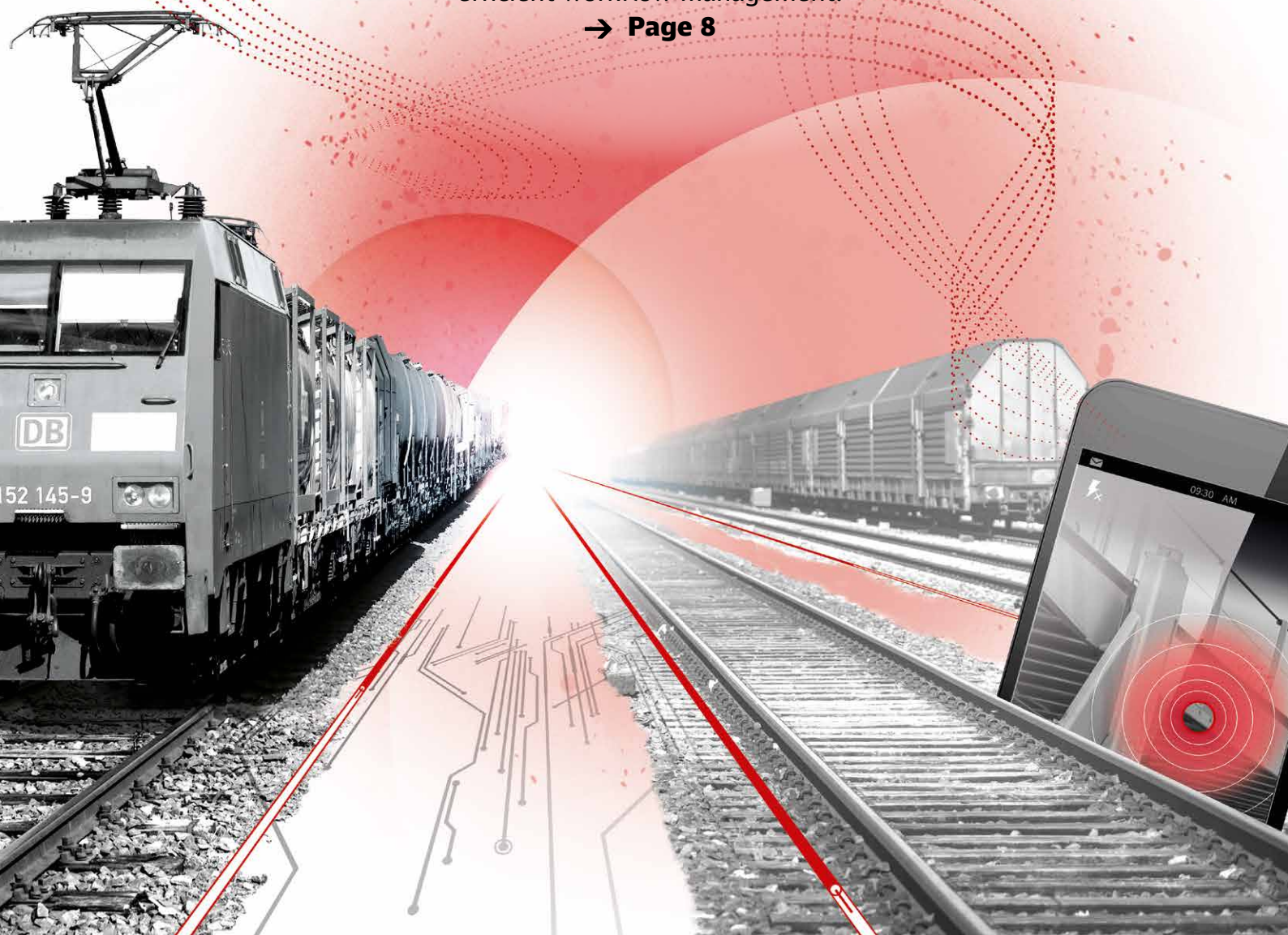
02/18

FOCUS

## Technology & innovation

Logistics providers today are fully integrated into their customers' supply chains. The right technology ensures an efficient workflow management.

→ Page 8







— DB Cargo's open car transport wagons will also be equipped with GPS trackers by 2019.



# Editorial



**Dear Readers,**

BVL International conducted a study to determine how we, as logistics experts, should prepare ourselves for the future. One of the core messages was that innovative technology concepts have considerable potential for optimising our processes. It lists predictive analyses to better forecast and plan our business processes, sensor technology as a source of data, and not least the linking of new technologies with our existing systems and those of our customers.

We are trying to take a more systematic approach to the future, using such tools as predictive analytics and predictive maintenance to make our everyday business that little bit better. And by doing so, we're making our customers' business better, too.

By the way, this is also the reason why we held our innovation workshop on freight wagons, whose purpose is to establish a dialogue between our customers and our development engineers. To give you an idea of what we're doing in terms of personnel to tackle future challenges, we've included an interview with Dr Ursula Biernert, Member of the Management Board for Human Resources.

I hope you enjoy reading our magazine.

**Yours faithfully,**

A handwritten signature in black ink that reads "Raimund Stüer".

**Raimund Stüer**

# technology innovation

## FOCUS

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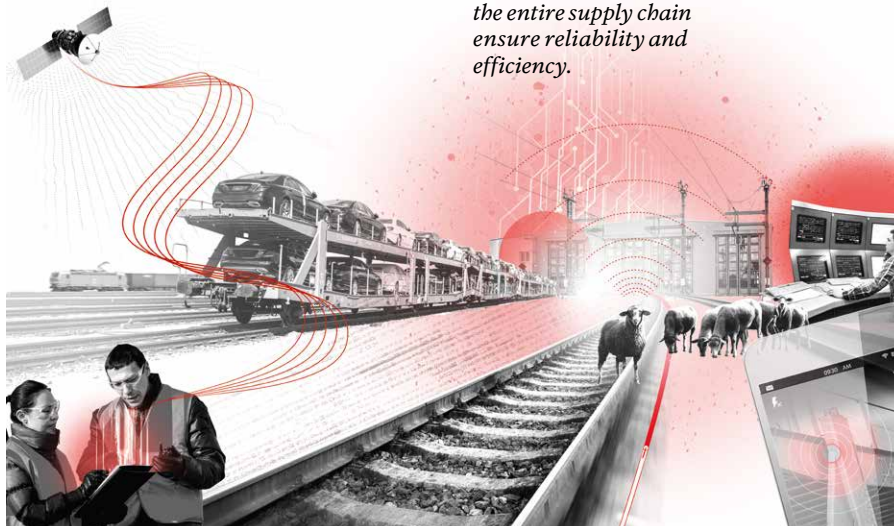
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## NEWSLETTER

Visit our website and sign up for our newsletter:

[www.dbcargo.com/newsletteranmeldung](http://www.dbcargo.com/newsletteranmeldung)



GERMANY

## Tackling future trends together

Fourth DB Cargo Pulp & Paper Summit at DB Academy in Potsdam.

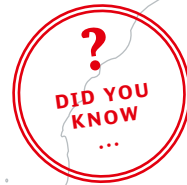


Over 70 customers and logistics partners in the paper, pulp and packaging industry enjoyed a diverse programme at the 4th Pulp & Paper Summit on 15 May, where they discussed current industry trends and their impact on logistics with DB Cargo. The focus was on digitalisation and demographic change, which were addressed during interesting talks and examined in more detail along with additional topics at workshops with the participants.

“The in-depth discussions demonstrated to us that working logistics concepts are absolutely essential for our customers. We need to map out reliable transport services from the very beginning and take end-to-end responsibility,” said Jürgen Röher, Head of Sales and Operations Center Pulp & Paper.

According to Raimund Stür, DB Cargo Board Member for Sales and Marketing, “The event was a resounding success, with exciting talks and in-depth discussions”. ●

*A detailed report on the event is included in railways issue No. 03/2018.*



that

# 100

different nationalities work at Deutsche Bahn?

The world's longest freight railway link, which connects Madrid to Yiwu, China, is

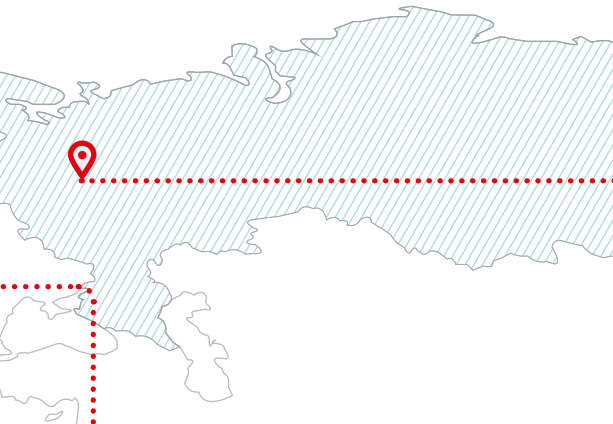
# 13,000

kilometres long?

that

# 60%

of DB Cargo transports cross at least one national border?



**HUNGARY**

**New CEO**

**Dr Jan Busch is the new CEO of DB Cargo Hungária.**



Since 1 May, Dr Jan Busch has been the new CEO of DB Cargo's Hungarian national company, DB Cargo Hungária Kft. in Győr. Busch (41) has been with DB Cargo since 2007 and has extensive experience in sales and controlling. In his most recent role as Head of Sales Processes in Frankfurt am Main, he was responsible for customer satisfaction analysis throughout Europe, several IT projects in sales and bid management. DB Cargo Hungária Kft. was formed when Logistic Center Hungária Kft., which was established by DB Cargo in 2001, was renamed. It received its railway licence in 2011 and since then has successfully offered transport services and helped significantly increase the share of international transport services in the DB Cargo family. ●

**RUSSIA**

## Facts about the 21st FIFA World Cup

Here are a few facts for striking up a lunchtime conversation about the world's greatest sporting event and the first World Cup to be held on two different continents - Asia and Europe.

**The World Cup is**  
**36.8**  
 cm tall and weighs  
**6,175**  
 grams

The greatest distance between two venues is  
**2,484**  
 kilometres

France has the most expensive squad at  
**1.08**  
 billion euros

There are  
**338,414**  
 ticket requests from Germany

Panama has the least expensive squad at  
**8.43**  
 million euros

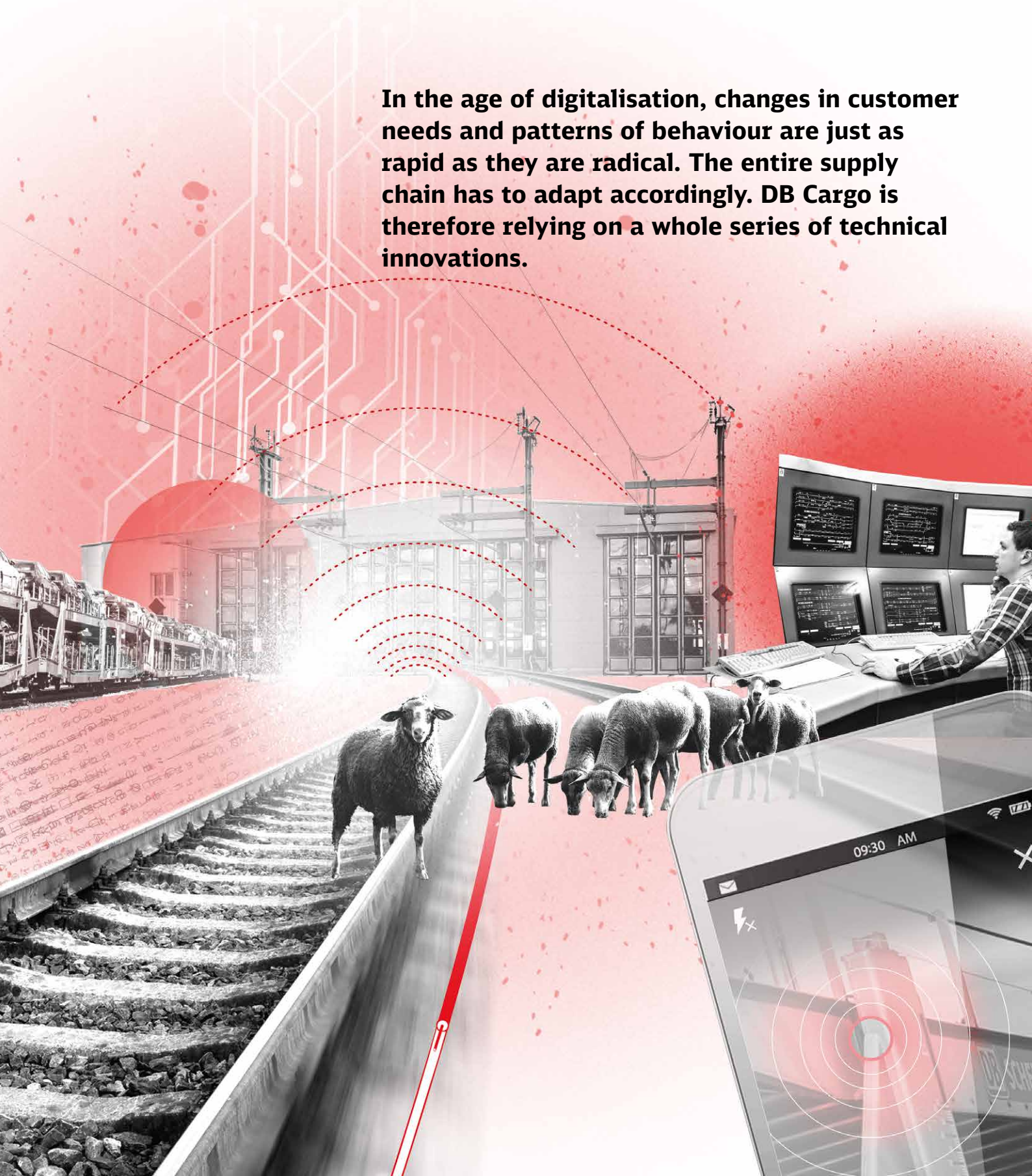
# Transport chain 4.0





📷 — KATHRIN POLIKEIT

**In the age of digitalisation, changes in customer needs and patterns of behaviour are just as rapid as they are radical. The entire supply chain has to adapt accordingly. DB Cargo is therefore relying on a whole series of technical innovations.**



## “The logistics goals with the highest priority are fulfilment of customer requirements, reliable delivery and logistics costs.”

Trends and Strategies in Logistics and Supply Chain Management: Digital Transformation Opportunities, a study by the German logistics association Bundesvereinigung Logistik, “BVL”

**T**he results of the recent study “Trends and Strategies in Logistics and Supply Chain Management: Digital Transformation Opportunities” by Bundesvereinigung Logistik (BVL) show the way: “The logistics goals with the highest priority are fulfilment of customer requirements, reliable and on-schedule delivery and logistics costs.”

The study focuses especially on the technical elements of the supply chain. According to the study, these must be modified in two ways: Suppliers and logistics service providers need to be linked to seamless IT systems, and supply chains need to be designed and analysed by exchanging data across company lines. Predictive analytics, mobile access by customers to data and the corresponding sensors for monitoring are the technology concepts that offer the brightest prospects for logistics. DB Cargo is already investing in these fields.

### Predictive Maintenance

The objective of predictive maintenance is designing the maintenance of locomotives to be more efficient by means of data-based predictions. Sensors and other data recording devices collect data on the infrastructure and vehicles and link it on an open platform to determine what systems need to be maintained or replaced, and at what intervals. This smart data diagno-

sis and analysis appreciably enhances the quality of equipment and rolling stock. But the long-term aim is to go one step further: for example, maintenance optimisation should also assess which incident notifications need to be processed first if there are competing incidents, because one may have a more severe potential impact than the other. This sounds very theoretical, but it yields a specific benefit: if the maintenance of wagons can be planned more efficiently, the availability of wagons for customers will improve, too.

### DB Cargo’s damaged wagon app

The same is true for the damaged wagon app. DB Cargo is using this new application to optimise the handling process for when wagons need to be replaced or repaired. Customers can now report damaged wagons digitally. The app features a simple-to-navigate menu that one can follow to transmit reports, complete with photos of the damage, by means of a few clicks. The photos can considerably speed up any

repairs that may be necessary, which reduces idle time and cancellations for customers. At the moment, DB Cargo is working with two customers from the recycling industry to pilot the app.

### Fibre-optic sensing (FOS)

Deutsche Bahn is also testing a fibre-optic system at present that will make the monitoring of modern transport chains even better. Fibre-optic sensing (FOS) can allow for more rapid detection of animals on the track, landslides or cable theft. It will preserve resources while delivering further safety and quality improvements in rail operations. “Since a year ago, we have been investigating FOS at sites including Berlin Wannsee, the right bank of the Rhine and the new German Unity Transport Project 8.2 high-speed line”, explains Patrick Pohl, project manager for fibre-optic sensing (FOS) at DB Netz AG. The German Unity Transport Project 8.2 (or VDE 8.2) is Germany’s largest rail construction project between Nuremberg and



Berlin. 8.2 is the name for all the new-build sections of the route. The first results are expected by the middle of the year.

### On the way to digitally transformed logistics

DB Cargo's investments are squarely aimed at relationships with customers and satisfying their needs. They do not only offer DB Cargo optimisation of freight wagon availability; data such as runtimes, distance travelled and capacity utilisation of networks also offers the opportunity to improve logistics for customers. •

## CHECKLIST

7 requirements for successful supply chain management

- ✓ Overarching cooperation
- ✓ Transparent exchange of information
- ✓ Fast reaction times
- ✓ Short process times
- ✓ High-performance planning software
- ✓ Comprehensive logistics
- ✓ Clear and binding rules

# GERMAN UNITY TRANSPORT PROJECT NO. 8

Germany's largest rail project between Nuremberg and Berlin is a undertaking filled with superlatives, whose multiple innovations are setting new standards.



— The viaduct over Froschgrundsee: 798 m long, 65 m high, concrete arch with 270 m spans.

The German government approved the multi-billion-euro project in 1991 to improve the transport links between east and west and between north and south, and to close the gap in Germany's high-speed rail network. There is a passing station every 20 km for high-speed express trains to overtake other services. New routes will alleviate bottlenecks in freight transport, and renovated hubs, such as the Halle formation yard, will make it easier to spread freight trains throughout the network.



## 10 billion

capital expenditure costs



## 4,500

employees at work on construction of the route



## 770,000

plans and documents



## 230

kilometres of new-build line



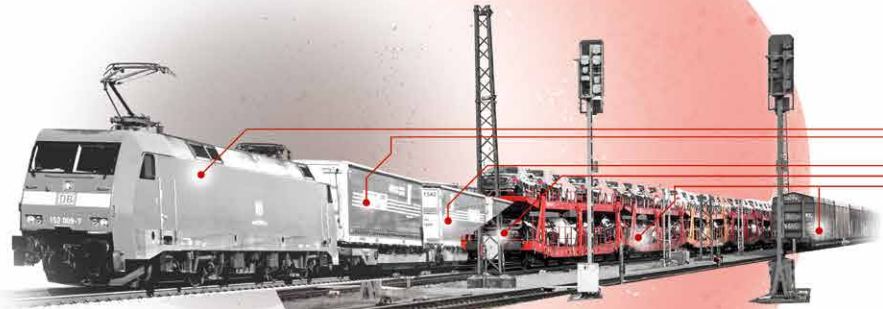
# Predictive planning

**DB Cargo's Utilisation Management uses predictive analytics to determine the proper scope of and manage some 3.6 million single wagonload transports in the network annually.**

**H**ow do you ensure that the right number of wagons reaches the right destination at the right time for your customers? The simple answer is planning. However, you need another solution if you want this planning to be as effective as possible in terms of production quality for customers – meaning reliability and punctuality – and as efficient as possible from a cost vantage point. This is because single wagonload transport is complex and naturally extremely resource-intensive. Extensive HR costs and investments in wagon fleets generate fixed costs that can be managed in an economically reasonable fashion only when resources are distributed appropriately.

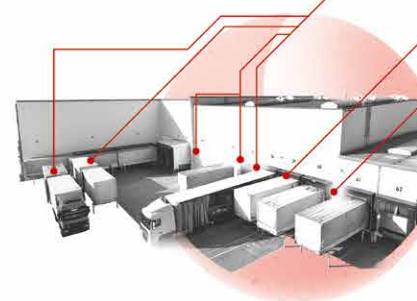
Here is how single wagonload transport works in practice: the customer orders an empty wagon, loads it, and DB Cargo transports the customer's goods from point A to point B. However, since it would not be efficient for a locomotive to pull only one wagon from point A to point B, the wagons are collected at hubs and assembled into trains that transport wagons travelling to similar destinations farther along their route. The process is repeated at the next hub until the wagon reaches the customer. A single wagon is thus transported through the network by several trains. A system this complex requires nuanced planning to ensure that the network has the requisite resources available at all points. This sounds abstract, but customers can notice it directly: it translates into better availability and predictability of their flows of goods.

Single Wagon Network Management, established a year and a half ago at DB Cargo, is breaking new ground to meet these needs. The aim is to be as targeted as possible to assist salespersons when they are planning the transport service customers need for specific routes, in order to predict as precisely as possible what transport service and resources will be needed.



**“You have to know what’s in the data to be able to use it.”**

**DR MARTIN BODESTEDT,**  
expert in Predictive Analytics at  
DB Cargo's Utilisation Management





That will allow sales personnel to be more targeted at how they meet the requirements of their customers and the customers' specific transport. Statistical models and clever algorithms are used to make that happen.

### The future of single wagonload transport

250 salespersons and 70,000 routes can easily generate a million data sets that are simply impossible to view and process manually. A great deal of traffic, such as wood transport, is also seasonal and mathematical models can depict it very precisely. The algorithms can thus be used to generate models that serve as the basis for much more precise forecasts. Single Wagon Network Management is using 16 models to do this, which operate in parallel. The amazing thing is that the system studies the data sets and values of the previous ten years and learns independently when and in what cases a given model will make the most sense. "Machine learning" is the operative term here. Dr Martin Bodestedt, who has been an expert in Predictive Analytics at DB Cargo's Utilisation Management for a year and a half has this to add: "The direction we aspire to head in is to simplify the planning process for customer advisory to a large extent and improve the quality of the process at the same time, so advisory have more time for their customers."

The objective of the experts surrounding Dr Martin Bodestedt is to determine the perfect size of the network. "Strong forecasts in terms of time and geography as a foundation for planning make it possible to get more out of locomotives, wagons and personnel. This leads in turn to fewer quality problems and faster turnaround cycles for wagons, making them available faster for the next customer", says Carolina Lasse, head of the Single Wagon Network and Utilisation Management unit in Industrial Sales. The faster turnaround cycle times enable DB Cargo to perform more transports with the existing fleet of wagons and to better cover custom-

ers' transport needs at times of peak demand. The optimal capacity utilisation of the fleet can boost reliability for customers, because increased earnings achieved at the same cost can free up the funds needed to invest in locomotives, wagons and human resources.

## THIS IS HOW PREDICTIVE ANALYTICS WILL HELP WITH PLANNING BY SALESPERSONS AT DB CARGO:

### 1 — INTEGRATION

The models and dashboards developed will be integrated in DB Cargo's infrastructure.

### 2 — VENDOR PLANNING USE CASE

As the first use case, the predictive analytics models will be integrated into salesperson planning to support the forecast in VIPS (DB Cargo's sales, information and planning system).

### 3 — ADDITIONAL USE CASES

The methodology can be applied to other use cases such as freight wagon availability or determining the proper size of the network or local service.

### Think integrated

"You have to know what's in the data to be able to use it", says Martin Bodestedt, neatly summarising the requirements facing data scientists at DB Cargo. "You need an understanding of mathematics to grasp where the numbers are coming from. That is the only way to integrate them into the process to improve it." When various parameters are available, such as the number of wagons, net tonnage or revenues, data scientists need to decide which figures make valid forecasts possible. In most cases, net tonnage per transport is the key figure that is most ideally suited, since it directly reflects the transport service that customers need. That is why one also needs a basic understanding of business to succeed in mining a company's available data to generate added value for planning. •



Dr Martin Bodestedt,  
Utilisation Management, DB Cargo  
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# Keeping a digital ear to the ground

**Damage from storms, cable theft and animals on the track. It would be great if we could always keep an ear to the ground to be able to respond to these events immediately by warning trains, closing off routes and dispatching safety personnel. There is a solution, and it's called "fibre-optic sensing", or FOS for short.**

## CHECK BOX

### How fibre-optic sensing works

- 1 — People or animals on the track trigger sound waves, which cause microbends in the optical fibre in the fibre-optic cable on the track, which reflects the transmitted light impulses.
- 2 — Sending light impulses and measuring how the light is reflected in the fibre-optic cable makes it possible to see and evaluate sound waves.
- 3 — Software constantly compares the incoming acoustic data with known digital fingerprints to provide information about the type and position of the noise source and the time the noise occurred.
- 4 — FOS systems can monitor areas of up to 40 km and pinpoint sources of noise within five metres.

**F**ibre-optic cables are used to rapidly transmit data, for internet connections for instance. The oil and gas industry has used fibre-optic cables to monitor pipelines in remote areas for quite some time. Deutsche Bahn is currently conducting tests at three locations to determine whether the technology can be harnessed for rail transport.

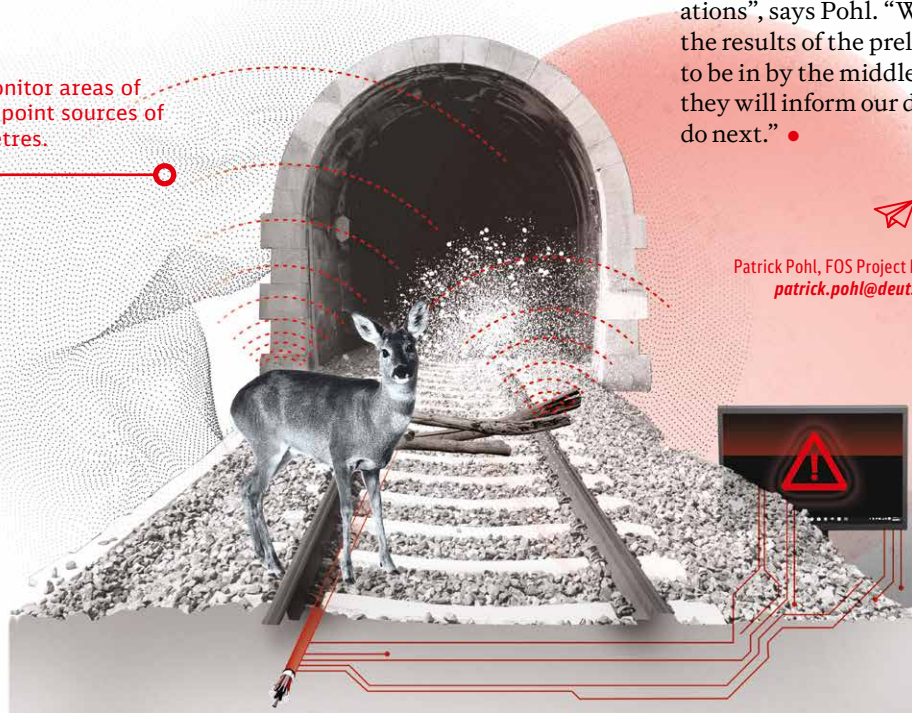
### Acoustic fingerprint database

"Fibre-optic sensing works like a microphone that picks up noises along a rail line", explains Patrick Pohl, FOS Pro-

ject Manager at DB Netz AG. Some 2,500 light impulses per second are continuously transmitted via a glass fibre located in the cable next to the line. If sound waves impact the cable, for example as a train passes by, the glass fibre will change shape near the microphone, deflecting the light. These deflections will be checked against the acoustic fingerprints of diverse types of influences, which are recorded in a database. "This will ultimately put us in a position to determine exactly what is happening, and where, with an accuracy of up to five metres, and we will be able to act, if needed", says Patrick Pohl.

### Three preliminary projects in constant use

Back in 2014, a 33 km test field on the Fulda-Würzburg route was installed for an 18 month study. Berlin-Wannsee, the right bank of the Rhine and the new high-speed line for the German Unity Transport Project 8.2 were equipped with permanently installed fibre-optic sensor systems in December 2016. "We want to find out how fibre-optic sensing can be integrated into regular rail operations", says Pohl. "We are expecting the results of the preliminary projects to be in by the middle of the year, and they will inform our decision of what to do next." •



Patrick Pohl, FOS Project Manager, DB Netz AG  
patrick.pohl@deutschebahn.com



# Processing damaged wagons with an app

Customers used to have to fax damaged wagon reports to DB Cargo for the company to be able to provide replacement wagons and repair damaged ones. Now DB Cargo's new damaged wagon app is digitalising the process.

**S**nagged bogies, stuck hinges and dented doors: damaged wagons are an annoyance for customers. DB Cargo's new damaged wagon app is making it easier to report them. Until now, reporting damaged wagons was quite cumbersome and time consuming: customers had to print out a form on A4 paper and fax it to Customer Service and the office. "Our new app streamlines this process", explains Jürgen Bosse, Head of myRailportal and Customer Integration at DB Cargo. "Not only do our customers save time and money, but they can also send the information directly to several parties involved in the process."

## Reporting damage by photo chat

The new smartphone app is customisable and features a simple-to-navigate menu that customers can follow to submit damaged wagon reports with their user profiles by means of a few mouse clicks. Customers can attach photos so Production can get an immediate idea of what the damage looks like. This lets technicians decide whether a new wagon has to be delivered to a given customer, or whether it would be worth sending out a mobile team to repair the existing wagon.

## New process benefits customers

Those customers that frequently have to contend with loading and unloading damage linked to specific industries and models stand to benefit the most from the new application. It was this that prompted DB Cargo to pilot the app in collaboration with two customers from the scrap industry. "The damaged wagon app will greatly simplify our work process," says Thomas Grötzinger, Head of Logistics at Scholz Recycling GmbH. "Our employees will use the app on their smart phones. Any damage that is identified will be

photographed right away and digitally relayed to DB Cargo. That will noticeably accelerate the decision of whether new wagons have to be ordered."

## Broader rollout by the end of 2018

Other customers will have the chance to use the app as soon as this year, says Jürgen Bosse. "We are planning to kick off a second phase by the end of 2018 that will make the app available to a wider clientele." •

**"The damaged wagon app will greatly simplify our work process."**

THOMAS GRÖTZINGER, HEAD OF LOGISTICS  
AT SCHOLZ RECYCLING GMBH.



Jürgen Bosse, Head of myRailportal and Customer Integration  
at DB Cargo  
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# Innovative freight wagons



## INNOVATIVE BOGIES

- ▶ Three-axle bogie for flat wagon/BraCoil
- ▶ Ongoing development based on existing bogie designs
- ▶ Optimised wear patterns on bogie through interior structure reinforcement
- ▶ Greater cost effectiveness and lower life cycle costs

(BraCoil)



## POWER CABLE/ DATA BUS

- ▶ Goal: 48V power cable and CAN data bus cable
- ▶ Battery charging for telematics devices
- ▶ Control of electropneumatic brake functionality (ep brake) via CAN data bus
- ▶ Status quo: 110V power cable for ep brake control

(BraCoil, Laaeffrs 561)





**In the only research project of its kind in Germany, DB Cargo has joined forces with VTG AG and other well-known project partners to develop the freight wagon of the future.**

**M**ore efficiency, more reliability, lower costs: customers' requirements for rail freight transport of

the future are nothing new, but in an age of digital transformation and fast-paced markets, the demand for innovative technical services is great. In 2016, DB Cargo and VTG AG joined together to launch the "Innovative freight wagons" research project on behalf of the Federal Ministry of Transport and Digital Infrastructure (BMVI). For Holger Schmidt, project manager at DB Cargo and spokesperson of the VTG-DB Cargo consortium, the long-term goal is to test innovative components that contribute towards significantly reducing a freight wagon's life cycle costs. "Our focus in this project is therefore clearly on noise reduction and energy savings," Schmidt explains. The schedule is brisk: as early as September 2018, the new freight wagons are set to be exhibited at the InnoTrans trade fair in Berlin, even before the project ends on 31 December 2018.

### **SPECIFICATIONS: BRACOIL**

*Specific use:  
Transport of steel slabs, steel coils  
and containers*

- 1 — Length over buffers: 16.40 m
- 2 — Loading length: 15.16 m
- 3 — Loading width bet. cradles: 2.40 m
- 4 — Width bet. stanchions: 2.63 m
- 5 — Bogie spacing: 9.40 m
- 6 — Wheelset diameter: 92 cm
- 7 — Axle load: 22.5 t
- 8 — Tare weight (incl. stillage): max. 35 t
- 9 — Max. payload: min. 100 t
- 10 — Max. total weight: 135 t

### **Spotlight on two wagon types**

For the VTG-DB Cargo consortium, there is no reason for last-minute panic: the team is right on schedule. In the past two years, they have developed twelve new freight wagons in total based on four wagon categories and placed them on the tracks as prototypes in January and February 2018. The development work by DB Cargo focused primarily on two wagon categories: a six-axle flat wagon for

- ▶ transporting steel products and a two-part open car transport wagon.

### ep brake “light”: hidden champion of components

The ep brake “light” is something like a hidden champion among the components.

In contrast to a conventional brake in freight trains, it enables simultaneous control of appropriately equipped wagons during braking, improving the train’s braking precision and saving energy. The technology is being used for the first time in a freight train with a hybrid brake system – that is to say both conventional and electropneumatic.

Initial experiences during field testing show that the effect is clearly noticeable in the test train, in which only the innovative freight wagons are equipped with the ep brake “light”. If this impression is confirmed with corresponding measurement results and the energy savings are thus quantified, a future equipping, and even retrofitting where appropriate, of the wagons with the ep brake “light” technology could subsequently be assessed in operational and economic terms.

### BraCoil: multifunctional allrounder for steel products

The first new development from DB Cargo is the six-axle flat wagon for transporting steel products. This “BraCoil” is multifunctional and is capable of transporting containers in addition to steel slabs and steel coils. A key feature of the BraCoil is that it enables cargo to be transferred without modifying the wagon. ●



### EP BRAKE “LIGHT”

- ▶ Electronic brake valves are controlled via a power cable/data bus and electropneumatic brake functionality is established.
- ▶ All wagons can be braked simultaneously
- ▶ With a focus on cost savings, only one air line and air reservoir must be refilled in the conventional manner after braking

(BraCoil, Laaeffrs 561)



### INNOVATIVE WHEELSETS WHEELSET COATINGS/ WHEEL NOISE ABSORBERS

- ▶ Testing of various combinations of low-noise wheelsets, wheel coatings and wheel noise absorbers
- ▶ Wheelsets and wheel noise absorbers for wheels with tread brakes
- ▶ Testing of low-noise wheels in the acoustic lab of project partner RWTH Aachen to identify their sound effects

(BraCoil, Laaeffrs 561)

### TECHNICAL DATA LAAEFFRS 561

*Specific use:  
Transport of large car models,  
minibuses and pickups*

- 1 — Maximum car height: approx. 1,990 mm
- 2 — Length over buffers: 33 m
- 3 — Loading length (lower loading level): 32.18 m
- 4 — Loading length (upper loading level): 32.55 m
- 5 — Max. payload: 36 t
- 6 — Number of axles: 4



Holger Schmidt,  
Head of Technical Management Freight Wagons  
[holger.hl.schmidt@deutschebahn.com](mailto:holger.hl.schmidt@deutschebahn.com)







## DIGITAL BRAKING INDICATOR

- ▶ Indicates whether the brake and handbrake are off or applied
- ▶ Monitors brake pads

(BraCoil, Laaeffrs 561)



## TELEMATICS

- ▶ Basic functionalities, such as location determination and recording of distance travelled
- ▶ Additional equipment with RFID/NFC tags for fast wagon identification and retrieval of wagon history via mobile app

(BraCoil, Laaeffrs 561)





# On the way to smart predictive maintenance

**Sluggish manufacturing processes, loss of production and frustrated customers: what costs time and money in the machinery and automotive industries can also delay processes along the entire supply chain in the logistics industry. The solution is smart predictive maintenance.**



**O**ne cancelled freight train can easily cost hundreds of thousands of euros. When a locomotive that works perfectly well is taken out of service for maintenance, it upends processes that are calibrated right down to the second in an infrastructure where one thing counts above all: efficiency. That's why logistics services providers such as DB Cargo are on the lookout for solutions to minimise disruptions like these and to ensure existing assets are utilised to the fullest. One such solution is the digital transformation of asset management and maintenance processes, which are still



# Camera bridges, wheelset diagnostics, brake block diagnostics. “These technologies are absolutely crucial – both for the digital assessment of freight wagons and for DB Cargo’s asset digitalisation strategy on the whole.”

JAN MÜLLERSCHÖN

Project Manager for Digital Appraisal

largely carried out manually. This transformation is set forth in the Asset and Maintenance Digitalisation (AMD) programme. The AMD programme encompasses a variety of different digitalisation projects, which are being carried out at the Digital Asset & Maintenance Lab at the House of Logistics and Mobility in Frankfurt. The lab is the central data and analysis hub, which makes it the brains behind digital fleet management and optimised maintenance processes at DB Cargo.

## The four-stage model and connected workers

The AMD programme takes aim at two core targets. Its first and primary objective is creating added value for customers by providing digital products. Second, it aspires to drop maintenance costs by ramping up efficiency and asset availability. This is precisely where digital transformation opens up an efficient path to condition-based, predictive maintenance (CBM). “Having the right information at the right time is the crucial point here”, says Holger Niggemann, Head of Condition Based Maintenance (CBM) at DB Cargo. “To ensure this happens”, says Niggemann, “we are phasing in condition based maintenance for our locomotives and predictive maintenance, which takes CBM further”. The new maintenance strategy will be rolled out by around 2021 using a four-stage model.

“The key to our success will be condition monitoring of locomotives, i.e. monitoring rolling stock and applying the information we obtain to ensure that the assets are maintained as needed”, Niggemann continues. “This is already being implemented at DB Cargo through the TechLok project. To put it simply, locomotives are equipped with transmission computers, known as ‘boxes’. They transmit all the necessary signals to the land side. We can use this data to assess the condition of locomotives early on and accurately so we can draw the right conclusions for maintenance.” So what does that mean for employees at maintenance depots? “The initiatives of the individual stages ensure that employees will increasingly be ‘connected workers’ who will have the right expertise, the right tools and the right digitalised information about operational steps, which they will be able to apply at the right time and at the right place at the right maintenance depot using the right materials to maintain the right locomotive. It will be like a Formula One pit stop”, says Niggemann. “To ensure that this happens, it is crucial for all of the projects in the AMD programme and related programmes and systems to operate in synch with one another, like clockwork.”

Deutsche Bahn is increasingly networking data from systems on an open, generic platform. For instance, regular trains and self-propelled track recording cars monitor infrastructure, such as track geometry, overhead ▶

## THE FOUR-STAGE MODEL

*The rollout of the maintenance strategy is based on these four process stages:*



### STAGE 0:

**Modular overhaul (2016–2019):** Dividing complex overall maintenance requirements into individual modules.



### STAGE 1:

**Condition monitoring 2017–2020:** Live-tracking rolling stock and using the information obtained to maintain locomotives through all current management levels.



### STAGE 2:

**Condition based maintenance 2017–2021:** The first step is to monitor rolling stock to bring all components in line with limit values that have been checked or newly specified.



### STAGE 3:

**Predictive maintenance 2018–2021:** Developing algorithms for certain asset components and designing the maintenance of these components to allow them to “report themselves” in a timely fashion even before damage occurs so that locomotives can be brought to maintenance depots on time.



**“Our aspiration is to strengthen capacity utilisation, improve the availability of asset and production resources and to step up energy efficiency, quality and customer satisfaction.”**

**JAN MÜLLERSCHÖN**

Project Manager for Digital Appraisal

► lines and the dynamic response of vehicles. Conversely, the infrastructure also monitors rolling stock and its parameters at checkpoints, for example, by identifying out-of-round wheels and measuring wheel loads and lopsided loads. In the process, the infrastructure also monitors itself by rendering additional data on infrastructure components, such as diagnostics of points or level crossings, usable on a central platform. There are considerable advantages. More precise diagnostics and more reliable forecasts can substantially improve the quality and speed of traffic.

“Another advantage of predictive maintenance is that it makes it simpler to pool interests with other operators by exchanging visualisations and assessments. In collaboration with industry, this method also makes it simpler to connect to existing assets digitally and specify exact interfaces to ensure the stability of the overall infrastructure. There are many benefits”, stresses Niggemann. “Not only does it determine the maintenance strategy for certain components; it can also intervene intelligently in exceptional situations. For instance, when there are competing error notices, it can decide which of them to prioritise in future. We are working step-by-step with all our partners internally and with industry representatives externally to improve all of this.”

#### **Smart predictive maintenance of freight wagons**

Jan Müllerschön knows this topic through and through. He works at DB Cargo in Mainz, where he heads up the Semi-Automated Damage Detection Wagons (SDW) project, which is part of the AMD programme. He and his team are developing digital solutions for asset management and maintenance. When anyone asks him how digitalisation can help improve workflows, planning efficiency and thus the availability of the freight wagon fleet when it comes to the maintenance of DB Cargo’s fleet of roughly 90,000 freight wagons, his answer gets right to the point: “Here’s how: our SDW project reduces unscheduled wagon cancellations due to damage by introducing preventive maintenance based on additional condition analyses, which are generated automatically while wagons are in service. Moreover, we are enabling digital wagon appraisal, which lets us commission maintenance earlier. All of this happens before wagons even arrive at maintenance depots. At the same time, we are designing the modern and attractive workplace of the future.”

Having worked on building and developing a European maintenance network over the last three years, the 32-year-old industrial engineer joined

his current project in March 2018. He is responsible for making maintenance commissioning viable for the future as part of DB Cargo’s technology and innovation strategy. Müllerschön and his colleagues are laying the foundation for changing how maintenance is planned, managed and carried out. “Essentially, we are transforming reactive and deadline-based maintenance into smart and preventive maintenance that rests on predictive intelligence.” The team collects the condition-based data required for this using diagnostics systems, which the project team installs on infrastructure in collaboration with DB Netz.

#### **A mammoth digital task**

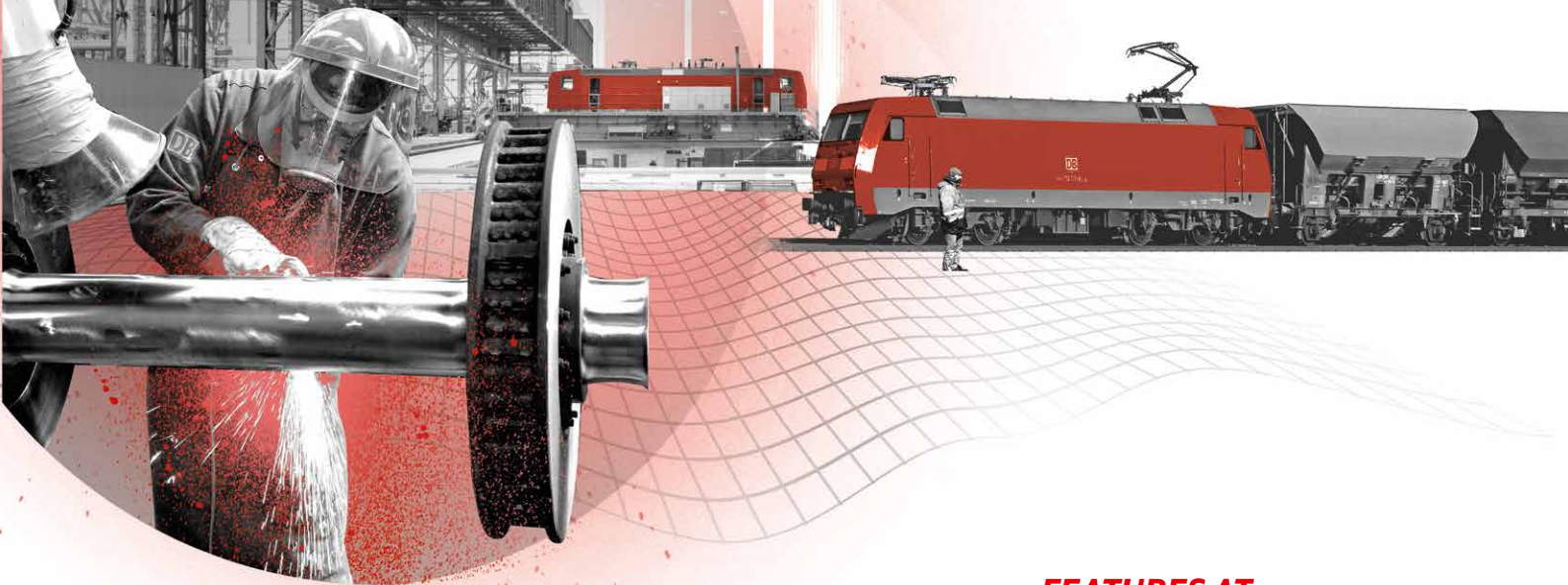
Two core elements are crucial for making a project like this feasible in the first place: digitalisation and transformation. “Our main objective when it comes to digitalisation is selecting the right technologies and taking the processes that are still largely carried out manually and making them fit for the future. When it comes to transformation, employees take centre stage. In particular, this means providing employees with the appropriate digital support to help them continue to deliver their key contributions to DB Cargo’s business performance.” For Jan Müllerschön, Heinz Frank, Marcus Jäger, Thomas Ziesmer and the rest of the team, the underlying strategic objective is both to encourage people



**1** — *The SDW Project Team at work, consisting of staff at the head office and the regions.*



**1** — Thanks to the TechLOK systems, locomotives only need to visit the depot if the evaluated data indicates a need for this.



and challenge them at the same time. “What we want to achieve is improved availability of freight wagons, which has a direct bearing on production quality, and by extension, on customer satisfaction. Aside from that, we want to design a modern and attractive workplace of the future that will benefit both our new and experienced colleagues.”

**“Ultimately, it will be our customers who benefit”**

In order for smart predictive maintenance to be possible in the first place, innovative solutions are required, and Müllerschön and his team are also responsible for developing and testing them. The technologies that they use are camera bridges and wheelset and brake block diagnostics systems. “These technologies are absolutely crucial – both for the digital appraisal of freight wagons and for DB Cargo’s

asset digitalisation strategy on the whole”, Müllerschön says. First, they play a key role in ensuring that the individual projects in the AMD programme can work in concert with one another. Second, they ensure that processes throughout the entire supply chain are automated, which makes them even more reliable. “It goes without saying that the ones who benefit from this the most are our customers”, Müllerschön adds. ●



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Assetmanagement & Technology Locomotives  
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Jan Müllerschön,  
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Detection in Wagons (SDW)  
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## FEATURES AT A GLANCE

*After the three technologies have been successfully validated, 30 systems are set to be installed throughout Germany (ten per technology).*

### Camera bridges

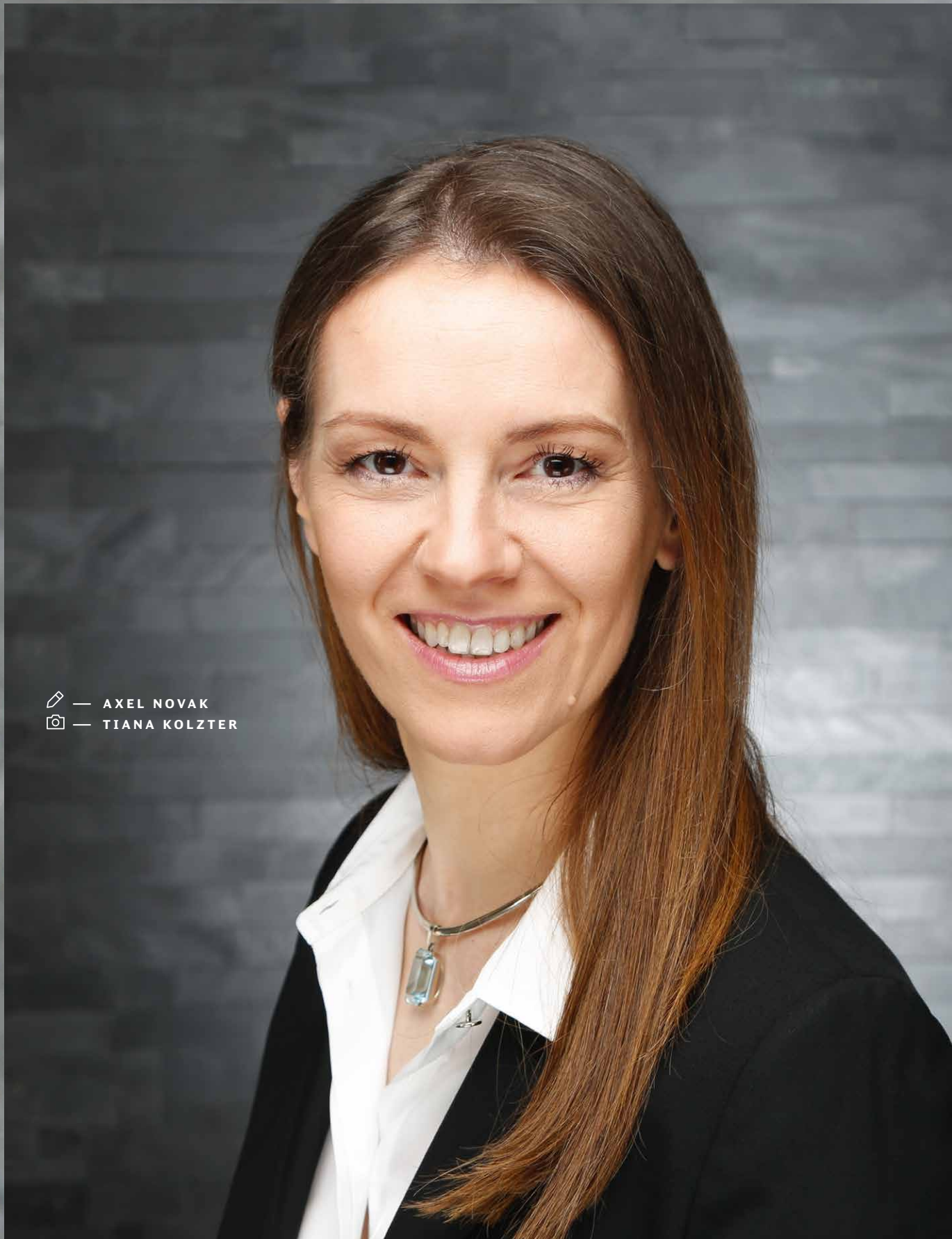
- 1** — Identification of damaged wagon superstructures and chassis frames by trained staff
- 2** — Appraisal of damaged wagons – many other application scenarios (for example identification of cargo residue, documentation for handovers of leased wagons)

### Wheelset diagnostics

- 1** — Regular measurement of wheelset profiles in operation
- 2** — Analysis of wear characteristics
- 3** — Identification of damaged wheelsets

### Brake block diagnostics

- 1** — Regular measurement of brake blocks in operation
- 2** — Analysis of wear characteristics
- 3** — Identification of damaged brake blocks and direct management of mobile repair teams



 — AXEL NOVAK  
 — TIANA KOLZTER



A CONVERSATION WITH DR URSULA BIERNERT

# The new DB Cargo: digital, international, diverse

**Human resources at Europe's largest freight operating company: demographic change, the international alignment and, last but not least, digitalisation are bringing changes to DB Cargo. Member of the Management Board for Human Resources Dr Ursula Biernert explains in an interview how the company is responding to these developments.**

**Dr Biernert, the situation at DB Cargo is not an easy one. Digitalisation, growing internationalisation and demographic change: what does all this mean for the Human Resources division?**

**UB —** Right now, these are turbulent times for rail freight transport; we are number one in Europe, employing some 29,000 employees in 16 countries. But there is fierce competition among modes of transportation and rail companies. At the same time, we have to respond to the gaps that demographic change is opening up at our company. DB Cargo's new growth strategy has enjoyed market success since last year, which sent our staffing needs soaring starting in the summer of 2017. DB Cargo wants to grow, and we need more staff to do it! Our aim is

to add over 3,000 new employees to our ranks in the coming years. That includes train drivers, shunting locomotive drivers and wagon inspectors, but also planners and chief dispatchers in Production.

**It sounds like you have a lot of different areas to tackle at once. Are you actually enjoying yourself?**

**UB —** I absolutely am, because my previous work always had an international bent, and I see a great deal of opportunity in DB Cargo's European network. We are building a European HR organisation, and we have to be integrated and think European. Despite the diversity of the countries, for the most part, our national companies share the same set of strategic and operational challenges. To be more

specific, we are currently working on international recruiting channels and concepts at the Group and business unit level. That's very enjoyable. At HR, we also stand in very close solidarity with our business partners, and we fight hand in hand to ensure business performance, stability, customer satisfaction and growth.

**What sort of an impact has digitalisation had on DB Cargo?**

**UB —** The megatrends on the logistics market affect all the stakeholders, and the same goes for digitalisation. On the one hand, digitalisation offers enormous opportunities for boosting efficiency and automation. On the other hand, it means we need to adapt existing professions and point out alternative career paths. We need to empower our employees and managers to respond to these trends.

**Does that mean chief dispatchers will turn into programmers and wagon inspectors will become data analysts?**

**UB —** Well, maybe it won't be quite that drastic. It's all about the company taking advantage of the opportunities that digitalisation presents. Let's take one example: at the moment we are outfitting our locomotives and freight wagons with sensors and GPS modules that continuously send data about the condition of components, their location and other information. ▶

► This data is collected, analysed and evaluated in a way that will allow it to generate added value for us and our customers, whether that's through keeping customers better informed, digital fleet management, automated functions or the warehouse management system at our maintenance depots. We need to prepare our employees for this.

### So digitalisation isn't an end in itself...

**UB** — Digitalisation won't make us into machines; it will save our employees from having to perform many tasks, and it will free up time for new tasks. That applies to our maintenance workshops, for instance. The maintenance workshop management system there is digitalising certain workflows, cutting down on paper and bureaucracy and adding clarity. Everything is entered into an app, material can be reserved, and volumes can be queried. In this way, digitalisation is helping to reduce the burden of administrative tasks and paperwork that falls on employees so they can intensify their focus on the core competencies of their work in areas that create added value.

### You want to hire a lot of new employees. How are you going about it?

**UB** — Germany and many other European countries are complaining

about a major staff shortage on the labour market today. This shortage puts us in fierce competition with our competitors and other major industrial companies. We therefore have to motivate career changers to come to us. Then we train them. We are also fighting to attract junior employees, especially in the operational organisations. I see digitalisation as an opportunity here for us to position ourselves as an attractive employer.

### Does DB cargo appeal to employees?

**UB** — DB cargo is often still perceived as an organisation in the midst of layoffs. Both internally and externally, our new growth strategy and the strong opportunities it offers our employees are not yet fully recognised. We need to increase DB Cargo's visibility on the market as an attractive employer and ensure that layoffs are a thing of the past.

### How are you doing that?

**UB** — We are putting various recruitment marketing and recruiting measures into effect to increase our visibility: we are expanding Performance Marketing to promote job vacancies at DB Cargo as needed. That includes Google keywords, job aggregators and recruiting events. By using geofencing marketing, we can appeal to target groups at specific locations. For example, in the DB Cargo 2017 autumn cam-

paign: we successfully addressed certain target groups at seven sites with particular shortages by using large posters, image ads in newspapers and regional media cooperation.

### How is recruitment coming along?

**UB** — We are doing away with obstacles in the application process. For instance, by organising recruitment days. People who are interested can apply there informally and come by for interviews. In remote regions, we rely on minibuses, which can be used as mobile interview lounges. Employee recommendations are a key tool for recruiting new staff. In 2017, 16% of staff were recruited at the recommendation of DB employees. We want to leverage this even more. There have also been internal changes: we have realigned the recruiting process from the applicant's perspective.

### What tasks did the HR division take on for these changes?

**UB** — We want to fulfil our responsibility for business performance. That means that we assist managers as an HR partner. This entire staffing process, for example, is supported and implemented by our internal DB talent acquisition organisation. It pools the requisite expertise for the entire process to run efficiently and from a single source. So ideally, everyone does what they do best: HR is a consultant and

## THESE ARE THE JOBS OF THE FUTURE

*Digitalisation is changing employees' tasks. Three examples:*



### Train drivers

More than ever, the train drivers at DB Cargo ensure reliability and customer quality. In addition to their traditional duties, they now also use digital tools to drive more efficiently and for professional development and orientation on new routes.

### Planners and chief dispatchers

The story of DB Cargo's growth is built on tailor-made solutions for customers. Planners and chief dispatchers implement new services and business models in production management. They have an affinity to digital solutions and also undergo further training on an ongoing basis.

### Data analysts

DB employees, external scientists and creative staff work at Deutsche Bahn's Asset and Maintenance Digital Lab. They use historical data to create new business models and services for customers.





**CV****1998**

Dr Ursula Biernert studied in Passau and completed her PhD in Munich. She first entered the field of HR at Volkswagen AG in Wolfsburg in 1998

**2001**

Head of human resource management for subsidiaries and international assignments at Dr Ing. h.c. F. Porsche AG in Stuttgart

**From 2009 to March 2013**

she was Vice President of Human Resources & Communications at Thales Deutschland GmbH, Stuttgart

**Since 1 April 2013**

she has headed Human Resources at DB Cargo as part of the business unit's management team

expert for employee and organisational topics. Managers manage their employees and assume responsibility for them. However, we are not doing this by ourselves, but as part of a network within the DB Group.

**Could you elaborate on that?**

**UB —** In the summer of 2015, Deutsche Bahn created the Future of HR Management project to mount a response to the changes in today's workplace. The project reduces administrative workload at many levels, which frees up time. That shores up our trained HR organisation as a key partner and helps managers take on more responsibility for their employees. It also adds to transparency throughout the company.

**How is the project being implemented?**

**UB —** Online-based software is a critical pillar of the project. It makes HR work more digital by following the motto "Speed. Convenience. Performance." At the same time, it makes the jobs of managers, employees and our HR professionals easier. In addition, we are strengthening integrated staff support, and thus setting the framework for managers to exercise responsible management. The objective is for our employees to enjoy working at our company and deliver the best possible performance.

**So you are ensuring better working conditions...**

**UB —** Right, because that is critical to being viewed as an appealing employer, both internally and externally. Training is a key element of the process. To that end, we started the 2020+ training campaign to create a standardised, efficient and transparent model for functional training at DB Cargo. The content and methodology of training sessions like these are adapted to the relevant needs. They help to ensure that new employees in new environments are well-equipped and can carry out their jobs competently at all times.

**How have the employees reacted to these changes?**

**UB —** We aspire to give our employees a reason to renew the choice they made to work at DB Cargo and their commitment to the company every day, and we are doing a very good job of it. We keep a comprehensive portfolio ready for this: from onboarding for new employees, to professional development and employee management, to a wide variety of formats for sharing experiences. Apart from information sharing per se, we are also strengthening the sense of solidarity and enabling top management to keep its finger on the pulse of the organisation.

**Do you have any initial results yet?**

**UB —** We have some strong successes to point to: we have now found people to fill roughly two-thirds of all job vacancies. At DB Cargo, we have taken a step forward in our efforts to entice the best employees to work for us. Ultimately, that means that we in the HR division are making a considerable contribution to the company's performance and the satisfaction of our customers. ●



# Blockchain technology in logistics

**In the world of logistics, the digital age began a long time ago. First came IT tools and the ability to perform smart analyses, and now complex administrative processes are next in line – the blockchain model could help international logistics service providers and their customers operate in a safer and more transparent way.**



**W**hile logistics does involve building and operating complex supply chains, it also deals with the question of how to rapidly process reams of information transparently and reliably. With this in mind, blockchains hold a great deal of potential for companies grappling with logistics issues. Any company, whether a vessel-operating ocean carrier, freight forwarder or rail freight company, can improve its internal processes by making a strategic investment in this new technology. Particularly when it comes to international traffic, blockchains could help build customer confidence in the stability of processes and the security of data. This is why the transport industry is following a trend that has spread across the entire logistics industry. Blockchain, which refers to a chain of transaction blocks, is a decentralised system for storing and verifying infor-

mation. The chain stores information in encrypted data units, known as blocks, using a broad network rather than a single, centralised computer. The transaction blocks are reviewed by all actors in the system before they are saved and updated, and they are validated as part of the saving process. The result is a kind of decentralised database containing up-to-date information that companies and private individuals can use to make payments and perform other transactions without involving banks or brokers as intermediaries.

## High volume, slow speed

Blockchains do have some downsides, however. For instance, the processes underlying them slow to a crawl under heavy processing loads. This can occur when data stored in the blocks accumulates to huge amounts over time, as BVL International notes. Data queries performed on blockchains are also considerably more sluggish than they are in normal databases. Finally, blockchains still have quite a few legal hurdles to clear. Bearing all this in mind, it is not yet clear what impact the new system will have on the industry.

Many companies are currently testing potential applications of blockchain. Deutsche Bahn, for example, is looking into possible uses for blockchain technology that include smart contracts, which could be documented transparently in online blockchain records. The city of Rotterdam is interested in harnessing blockchains to provide new services. Partnering with the city, the Port Authority of Rotterdam started what it calls the BlockLab. Rotterdam plans to use its lab to test services such as inventory financing, which will allow credit lines to be extended to companies based on their

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Potential savings – even today, as much as

# 50%

of transport costs can be attributed to paper-based documentation

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— *The Pioneering Spirit, the largest working ship in the world, in the Port of Rotterdam.*

inventories. One of the lab's first pilot projects is focused on a manufacturer's e-bikes. The manufacturer's bank grants it a line of credit, which is backed by collateral in the form of batteries stored in its warehouse which have yet to be mounted on bikes. Both parties exchange data directly through the blockchain. This is one way the system will create opportunities for new services to be provided at various points in the supply chain.

### Communication along the supply chain

Blockchain technology also creates opportunities to simplify billing and provide intermediate financing at various stages of the transport chain. At present, there are often 15 to 20 steps that have to be taken by various partner companies in order for a single company to secure financing. To make things worse, fees are incurred at every step, adding up to a percentage of the transported items' value. Using blockchain technology, a single bank could handle the entire financing process from start to finish, which would slash transaction costs by up to a third.

The Port Authority of Antwerp is also interested in using blockchain to automate container handling. The technology has the potential to simplify communications among the more than 30 different players involved, including transport companies, consigners, freight forwarders and drivers. When goods are transported by container, as much as half of the transport costs are attributable to the preparation of paper-based documentation, so blockchain technology could cut costs in a big way. ●

4

#### Recipients

receive transaction data, which makes them the proprietors of the information or data

3

#### Miners (network)

supply computing power and verify the transaction records

2

#### Relay (swarm)

checks and confirms the legitimacy of the transaction data. Blockchains maintain their transparency because they are monitored on the network

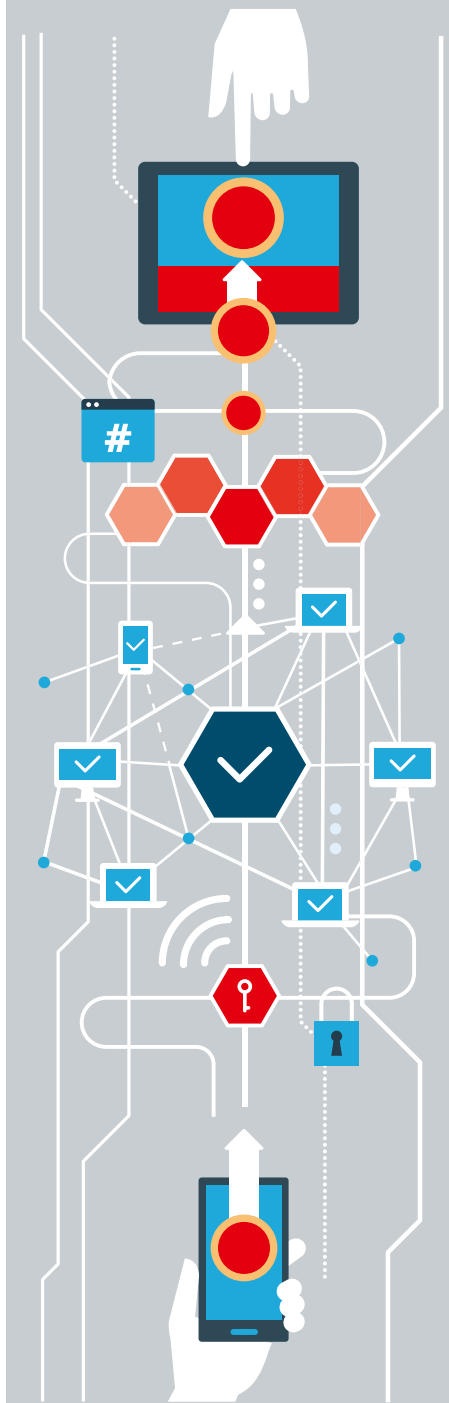
1

#### Senders

send information and data as transactions, adding to the blockchain

## BLOCKCHAIN MODEL

The term blockchain refers to a list of transaction records, also known as a chain of blocks.



# Think tank and laboratory of the future

**Where is artificial intelligence going and how can we benefit from it? Where are big data and Logistics 4.0 taking us? And how can digitalisation support companies in future? A visit to DB Cargo's amspire lab in Frankfurt.**

**I**ncreasing traffic volumes present an immense challenge to the logistics sector. What's more, a company now has to prove itself in the real world as well as the digital world to win the global competition. This development automatically raises questions that need answers now for the survival of the logistics sector. How can mobility and logistics have a secure future without reducing value added? What role will sustainability need to play? And what can the digitalisation of asset management, maintenance and related internal processes contribute? Whoever wishes to develop solutions to these challenges needs the expertise of interdisciplinary experts and must pool and proactively manage this

expertise. One of the organisations that is doing this is Deutsche Bahn's Asset & Maintenance Digital Lab in Frankfurt.

**“Offering customers the support they need”**

The Asset & Maintenance Digital Lab, amspire lab for short, opened at the beginning of 2017, and combines digital expertise in asset management and maintenance with a comprehensive overview of digital megatrends and state-of-the-art technology: data-science jobs, high-performance servers and an Internet of Things platform. The lab brings together interdisciplinary teams from DB Cargo, DB Heavy Maintenance, DB Long Distance, ▶





Wartungssteuerung  
Wartungsbeauftragung

DB

Wartungsbeauftragung

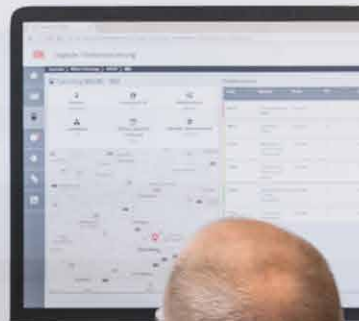
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Entwicklungsergebnisse  
für das Jahr 2018

für das Jahr 2018

DB

Digitale Fortschrittsteuerung



rechnerische Betriebsfreigabe/  
Wiederinbetriebnahme

— A look inside the lab: agile and dynamic collaboration on the issues of the future.



**“Our team of data scientists, logistics experts and creative minds provides our customers with the opportunity to experience and help to shape digitalisation in asset management and maintenance, concentrated in one space.”**

FABIAN STÖFFLER

Vice President Asset Digitisation DB Cargo

► DB Regio, DB Systel and DB Systemtechnik and external partners to develop future solutions relating to the automation and digitalisation of rolling stock and maintenance processes.

Fabian Stöffler, Vice President Asset Digitisation at DB Cargo says: “Topics like the Internet of Things and predictive analytics are fascinating, but also pose major challenges for our customers. We want to provide the opportunity to face up to the digital future today and learn which technologies and methods from business intelligence, sensor technology and automation we will be able to use in the near future to offer our customers the support they need.”

**Agile work in a 250 m² space**

The amspire lab is located at the House of Logistics and Mobility (HOLM), a stone’s throw from Frankfurt Airport. The 250 m² space serves as a think tank that unites digital expertise in asset management and maintenance with the most important digital issues of our time: big data, blockchain, the Internet of Things (IoT) and cloud computing. The lab is a brain pool in an agile, trend-setting working environment. “Our team of data scientists, logistics experts and creative minds provides our customers with the opportunity to experience and help to shape digitalisation in asset management and maintenance, concentrated in one space”, says Stöffler. “We hope to inspire our customers to join us as we discover the pathways that lead to the digital transformation of their logistics chains. At the same time, the lab’s working environment should stimulate cooperative, dynamic and agile thinking and working”, he adds. The amspire lab is considered the premier spot for anyone who wants to experience the digital future in asset management and maintenance today and is looking for real-world digital use cases. For this to work at all, Stöffler and his team depend on self-organisation, quick decision-making and a readiness to take responsibility. This is the only type of culture to enable more flexibility and greater speed in everyday business.



**“We want the lab to become the central hub for our customers for innovative knowledge transfer on asset management digitalisation and maintenance.”**

**STEFFEN BOBSIEN**  
Senior Vice President  
European Assetmanagement & Technology  
DB Cargo



**1** — Approaches to solutions are discussed by the team.

**2** — New sources of inspiration: good ideas don’t always come from sitting at a desk.

**3** — The amspire lab team benefits from quick decision-making and a readiness to take personal responsibility.



**4** — *Interdisciplinary teams of logistics experts, IT specialists and creative minds meet customers' digital challenges.*



**“Digitalisation must not be an end in itself.”**

The heart of the lab is the Asset Intelligence Center, the lab's own Internet of Things platform. This central data and analysis platform collects all the data that is recorded by sensors on locomotives and wagons or generated by camera systems on tracks. One real-world example is myRailportal. This web-based customer portal, which was developed by sales experts, will give DB Cargo customers more reliable forecasts about when and how their wagons will arrive at different stops in the logistics network. It features a customisable user interface, which means that every user will be able to decide what data to display first and in what form. This example makes one thing clear. “Digitalisation in rail freight is necessary, but it must not be an end in itself”, says Steffen Bobsien, Senior Vice President European Asset Management & Technology at DB Cargo. “It needs to happen at every stage in the value chain and must always meet our customers' requirements.”

#### **Central hub for innovative knowledge transfer**

For this reason, the amspire lab sees itself not only as a research space concerned with the latest digital buzz-

## **FACTS AND FIGURES IN BRIEF**

*The House of Logistics and Mobility (HOLM) is not only well connected digitally. There's hardly a single place in Europe that is better to reach than the site at Airport City in Frankfurt.*

**104 airlines** have **4,600 direct flights** a week to around **300 destinations** in 105 countries. **183 high-speed trains** stop at the ICE station near Airport City each day. And **S-Bahn trains** connect the centres of the Frankfurt Rhine-Main conurbation every day. The Frankfurter Kreuz, the busiest junction for north-south and east-west motorway traffic, is right on the doorstep.

words. Even more so, it is intended as an implementation factory where DB Cargo implements the digital transformation in asset management specifically to address concerns and problems along the supply chains of its customers as well as those of interested companies. “We aim to support our customers in implementing their use cases in the digital transformation age”, says Steffen Bobsien. “That's why we make our technical expertise available. We see the lab as the ideal space for creativity and innovation, as a place that invites people to think and brainstorm together.” As well as serving as a venue for meet-ups on issues such as data science and Industry 4.0, the lab is intended as the central hub for

DB Cargo customers and interested companies for innovative knowledge transfer on asset management digitalisation and maintenance. Gerrit Koch to Krax, Head of Wagon Intelligence at DB Cargo and team leader at the amspire lab explains how this works on page 42 of this issue. ●



Fabian Stöffler, Vice President Asset Digitization DB Cargo  
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# State of the art and fully automatic

**The formation yard in Halle (Saale) will enter service in July 2018. It is one of the most modern yards of its type in Europe. Most importantly, fully automatic gravity shunting offers DB Cargo’s customers more reliable planning and greater transparency.**

cal systems”, explains Laura Dänicke from the Cargo Management Region East at DB Cargo. “In the future, the yard will consist of one set of reception sidings with eight arrival tracks, one hump and 36 sorting sidings.” Humps are usually artificial hills that wagons roll over during train formation on their way to the desired position; due to the falling gradient, only a modicum of energy needs to be expended. Twelve tracks will also be fitted with conveyor systems. The sorting sidings are divided into two eastern sections with a track closure at the end, and two western sections that are integrated into the main lines heading in a southerly direction.

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**259,000 m<sup>2</sup>**  
area

**42,500 m**  
track length

**133**  
points

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**T**he operation of a formation yard, also known as a marshalling yard, fascinates outsiders. Trains roll over the hump here as if guided by an invisible hand. In near perfect silence, single wagons on a fan-shaped system of tracks each find their way onto the right train that will take them on the remainder of their journey. The formation yard in Halle has perfected this process even further: operations here will be fully automatic in future.

**36 sorting sidings, 8 arrival tracks and 1 hump**

Halle’s formation yard has been in existence since 1889. It is a hub for the whole of eastern Germany. In 2011, the German government pledged federal financing for the yard to undergo state-of-the-art modernisation and expansion. “The main task is to renew the track arrangement and all techni-





## More than 42 km of rebuilt track

As part of the modernisation, two electronic interlockings will be set up: one to signal to trains running in and out of the yard, and the second for the fully automated control of gravity shunting. In addition, ancillary infrastructure is being renovated and new tracks are being built for stabling locomotives. More than 130 points and 42 km of track are being renewed. The timing of modernisation efforts currently underway will dovetail with work to connect the new and upgraded Nuremberg–Berlin line (the German Unity Transport Project 8) to the Halle hub.

## What gets things rolling: the hump control computer

A system known as a hump control computer stands at the centre of the fully automatic process at the Halle formation yard. It even coordinates the “humping process”, in which the wagon is pushed over a hump a few metres in height: “in Halle, this process is fully automatic; it is merely monitored by the drivers, who can

apply the brakes in case of emergency”, says Laura Dänicke. The central computer also sets the route that the wagons travel: “it knows where the wagons need to be divided, and sets the points accordingly”, Dänicke explains. The computer automatically controls the facility for pushing down wagons on the sidings and regulates the braking force on the downhill gradient and sorting tracks. The conveyor elements that ensure individual wagons are pushed to the desired spot also move fully automatically and are controlled remotely.

## 120 wagons per hour

The entire process is monitored from a control room to the south-east of the Berliner Bridge, which runs over the yard. Depending on operational requirements, up to four interlocking operators and chief dispatchers of DB Cargo will keep a close eye on operations through the glass frontage. The system will allow for 120 wagons to be sorted in an hour. A total of 100 employees will work at the train formation yard, including shunting locomotive drivers, foreman shunters, wagon inspectors, central order management system staff, train preparers and chief dispatchers. In addition, a hydraulic buffer stop developed especially for the new yard will be used on 16 sorting sidings. It will provide even more safety. “But most importantly, the fully automatic workflows will make our processes qualitatively better and more robust”, says Dänicke. “For customers, that translates into more transparency and stability.” ●



**1** — Deutsche Bahn is investing EUR 180 million in one of the most state-of-the-art marshalling yards in Europe.

**2** — 200,000 m<sup>3</sup> of earth were moved during four and a half years of construction time.

**3** — The track bed required 76,000 tons of ballast.



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**“The fully automatic workflows will make our processes qualitatively better and more robust. For customers, that translates into more transparency and stability.”**

LAURA DÄNICKE,  
 Cargo Management Region East at DB Cargo

# Hydraulic show of strength



## DB Cargo's special freight wagons win over Danish steel manufacturer NLMK DanSteel

Innovation in rail freight transport means digitalisation and new products, but also advancements in freight wagons. The Danish steel manufacturer NLMK DanSteel, for example, manufactures large, wide steel sheets. DB Cargo has developed special freight wagons in order to transport such wide plates that exceed the normal rail loading gauge. The Slps-u 725 model wagons are fitted with a hydraulic tilting mechanism, which tilts the wide metal sheets into a position where they can be transported. “We can use these wagons to reach places where we would otherwise be out of gauge”, says Christoph Deing. “They save us and our customers from having to arrange

for special transports, which is an expensive and time-consuming process to plan.” Deing, an engineer, has 25 years at DB Cargo under his belt, and he has spent nearly 18 years on the loading consultancy and load securing team. Today the department provides customers with advice and training on how to properly load and unload freight and on all issues related to securing loads on freight wagons. With this wagon model in particular, that is no easy matter. Rolling stock needs to be prepared for loading with specific settings that vary depending on the destination country's loading gauge, the smallest track radius at the customer's private siding and the relevant line category. The width and tilt of the loading frame can be set to achieve this. Depending on these factors, steel sheets up to 4,110 mm wide can be transported as regular consignments.

## Great interest in rail

Based in Frederiksværk, the Danish steel company is just an hour's drive from Copenhagen, and is owned by the Russian company Novolipetsk Steel (NLMK). The company employs 400 staff in Denmark and produces 550,000 tonnes of sheet steel every year.

“We have a great affinity for rail, but after the 2008 economic crisis we transported a lot of freight on trucks”, explains Martin Dan Jensen, Shipping Manager at NLMK DanSteel. The company has its own logistics department, which employs around 40 staff. “We were very interested when DB Cargo approached us with a new concept in 2015.”

There are two crucial factors in favour of rail transport: competitive prices and an approach that combines reliability and high-speed trains while giving customers broad latitude for planning. That way, the steel manufacturer can load the wagons at times that fit shift schedules. In the past, doing that with trucks would have been a tall order. NLMK DanSteel has continued to use the existing loading facilities. “Rail is an interesting option for us because a lot of customers in Germany use it. They often have their own private sidings”, explains Jensen. NLMK DanSteel has also kept its siding over the years.

## BENEFITS FOR OUR CUSTOMERS

- ✓ Large steel sheets can be transported thanks to maximum utilisation of the clearance gauge
- ✓ Modifying the wagons allows packages of sheets up to 200 mm in thickness
- ✓ Load security is improved thanks to the wagons' optimised wooden supports.



**“We worked with wagon management to find a good solution for NLMK DanSteel that would allow us to provide enough wagons of this type.”**

**MARTIN PRICE**

International Sales Denmark, DB Cargo

### European DB Cargo units cooperate closely

DB Cargo employees in Denmark work very closely with DB Cargo’s Steel Logistics Center in Duisburg. The staff there develop appropriate solutions for customers without their own private sidings. They use railports to move goods onto trucks and then to customers. Another key aspect is having the special Slps-u 725 wagons available for customers. “We worked with wagon management to find a good solution for NLMK DanSteel that would allow us to provide enough wagons of this type”, explains Martin S. Price, Account Manager at DB Cargo Danmark Services.

The customer appreciates these efforts. “We’ve noticed DB Cargo’s great interest in helping to provide us with solutions that fit”, confirms Jensen. The volume of goods transported could come close to doubling as soon as the coming year. ●



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### Reduced CO<sub>2</sub> emissions

Because of this, the first trains were already operating in 2015 – DB Cargo had taken over operation of the facility before then. DB Cargo uses around 150 of the hydraulic wagons made in Poland. Twice a week, block trains from Frederiksvaerk make their way to Maschen via Fredericia, for a total of 46,000 tonnes in 2017. From Maschen, the wagons are transported to the customer on DB Cargo’s single wagonload network. This also eliminates nearly 2,000 trips by truck and the CO<sub>2</sub> emissions they would have produced.

“Our aim is to design our transport to be sustainable”, says Jensen. Since Frederiksvaerk has its own port, NLMK DanSteel exports 65% of its products by ship. The steel-maker now wants to expand its partnership with DB Cargo. A new dispatch area is to serve as a temporary store and logistics hub. DB Cargo is working with its customer to prepare for a third weekly departure.



**1** — The steel sheets are used in shipbuilding, in the transport sector and in turbine construction.

**2** — The hydraulic tilting mechanism of the Slps-u 725 sloping loader enables large steel sheets to be transported.

## NEXT GENERATION

The Slps-u type 725 is an advancement over the tried-and-tested sloping loaders as operated by NLMK DanSteel.



### HIGHLIGHTS IN FIGURES

#### TRANSPORT OF LARGE STEEL SHEETS

Length **max. 19 m**

Maximum width without exceeding the loading gauge **3,970 mm**

If exceeding the loading gauge **5,500 mm**

Maximum thickness of the steel sheet packages **200 mm**

#### THREE FRONT LOADER FRAMES WITH A MAXIMUM TOTAL LOAD OF 57.5 T

Front loaders 1 and 3 (outside): **maximum 28.5 t**

Front loader 2 (centre): **maximum 40.0 t**

**LOADERS CAN BE TILTED HYDRAULICALLY UP TO 50° (CENTRE LOADER UP TO 60°), CHANGE OF POSITION TAKES APPROX. 5 MINUTES.**



# Development on equal terms





1 — A fitting backdrop: the maintenance depot in Paderborn with its over one-hundred-year-old building.

2 — Opening of the Third Innovation Workshop by Dr Jörg Hilker.

## Sharing ideas, specific requests, tangible feedback – with the Freight Wagon Innovation Workshop in Paderborn, DB Cargo offers its customers a direct line to the company’s experts.

In the more than one-hundred-year-old industrial building located in the north of Paderborn, it smells of fresh paint – and innovation is in the air. The contrast between old and new focuses the mind, making the maintenance depot the ideal venue for the third Freight Wagon Innovation Workshop hosted by DB Cargo. Here the development engineers have an opportunity to showcase the trains of tomorrow and beyond. But above all, the developers can also show that they have understood what their customers want and need. Each of the technical innovations presented here is the result of a specific, practical customer requirement. Modular wagons with flexible superstructures, Sahimms coil transport wagons with sensor technology and the myRailportal customer portal – all solutions that can be used to perfect the customers’ supply chain. “We don’t do our development work in isolation. For us, what our customers truly need is important”, says Jürgen Bosse, Head of myRailportal and Customer Integration, as he explains the advantages of the IT platform to interested customers. Dr Jörg Hilker, Head of Industrial Sales at DB Cargo AG,



goes one step further: “We want to bring a benefit to our customers in the shortest time possible. Such developments can only be achieved together”.

### Dialogue with customers

Customers of DB Cargo appreciate this commitment. Numerous participants from every large steel company in Germany accepted the invitation to the maintenance depot in Paderborn – even guests from abroad made the trip specifically for the workshop. Bert Kloppert, Head of Railway Freight Purchasing, thyssenkrupp Steel Europe, knows why: “In 2014 we assessed the first joint prototypes. We saw that DB Cargo listens closely and takes our feedback seriously.” Kloppert is referring to a comprehensive system designed to protect



**“The freight wagon is the logistics interface to customers’ products”.**

**DR JÖRG HILKER,**  
Head of Industrial Sales, DB Cargo AG



**3 —** The freight wagon of the future: connected and equipped with extensive sensor technology.

**4 —** Improved coil transporters make day-to-day business easier for Bert Kloppert.

**5 —** Keynote speech by Mario Carl, innofreight Germany GmbH.

**6 —** Modernised coil transport wagons with sensor technology.



► steel coils from the weather conditions and to increase the coil wagons' operating safety and ease of operation. The fact that professionals from other logistics partners and wagon hire companies also took up the invitation underscores DB Cargo's innovation leadership in the market. A further result of previous workshops: for the first time, DB Cargo is offering its wagons as modular units, thereby separating the superstructure from the undercarriage. The wagon is now assembled in the ordered size at the factory and then equipped with the appropriate attachment. In addition to maximum flexibility, the biggest advantage of this method for customers is that new superstructures do not necessitate individual approval. This saves time and money. The best examples of new modular wagons of this type are the BraCoil wagon and the container wagon with coil stillages. And a trend for further workshops is also emerging: irrespective of the wagon category, more and more specific ideas and applications are being developed for making practical use of sensor technology and data.



**“In previous workshops, we saw that DB Cargo listens closely and takes our feedback seriously.”**

**BERT KLOPPERT,**  
Head of Railway Freight Purchasing,  
thyssenkrupp Steel Europe

## Logistics 4.0

In addition to hard steel, hard figures and data play an important role in general at the Innovation Workshop 2018 – not so much in the exhibits themselves, where the focus is on the tangible and concrete, but certainly in the accompanying presentations. “From the customers' perspective, Logistics 4.0 is still on shaky ground”, notes Bert Kloppert, who heads railway freight purchasing at thyssenkrupp Steel Europe. But Gerrit Koch to Krax, Head of Wagon Intelligence at DB Cargo AG, is already working with his team to make Logistics 4.0 tangible, and above all useful, for customers. The wagons of the future will collect and transmit large quantities of data. An ambitious goal: by 2020, DB Cargo plans to have its complete freight wagon fleet equipped with Asset Intelligence. The real skill here lies in packaging the data collected in this manner into logic that is equally useful for process control, transport, and maintenance. That means the ability to use powerful data flows internally but also making such data available to the customer in a transparent manner. This calls for incremental steps in development work to ensure that the final application fully meets the requirements of staff and customers. “We already supply MVPs (Minimum Viable Products), which are tested in cooperation with our colleagues. This means we already offer added value,” says Gerrit Koch to Krax, referring to the minimum viable version of a product. ●



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7 — The InnoWagon with steel pallets is the new, weight-optimised, low-noise container wagon from Innofreight.

## MVP - MINIMAL VIABLE PRODUCT



### IDEA

- Provide the first viable version of a product with the essential core functions
- Further develop the product incrementally based on feedback until the finished product is obtained

### GOAL

- Avoid products that customers do not want or need, or that do not provide added value or are not helpful for the customer
- Test with low development overheads
- Deliver to users as early as possible
- Create a basis for other products if this one is rejected
- Demonstrate production and development expertise



# THE AMSPIRE LAB

**The digital challenges and requirements of DB Cargo customers are right at the top of the agenda at the amspire lab in Frankfurt. Gerrit Koch to Krax, Head of Wagon Intelligence at DB Cargo, explains what this entails.**

**W**e at Deutsche Bahn have a wide range of labs which deal with various methods of digitalisation. At the House of Logistics and Mobility in Frankfurt, we work on asset management and maintenance and the digitalisation of related processes. That is why our lab is also called the Asset & Maintenance Digital Lab. Our name and our aim to be a real source of inspiration is where we get our “amspire” nickname.

The lab opened in early 2017, and since that time a team some 50 strong has been going the proverbial extra mile to meet our customers’ digital challenges and requirements. Basically we are an agile network of rail experts, IT specialists, experts in digital transformation and data scientists. We work with in-house and external customers to develop innovative use cases on the automation and digitalisation of loco-




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**“Our customers have very specific ideas when it comes to the practical use of data.”**

**GERRIT KOCH TO KRAX**  
Head of Wagon Intelligence, DB Cargo AG

motives, wagons and maintenance processes at DB Cargo. This collaborative co-working approach provides us with direct feedback and helpful input for our products. After all, our top priority is to focus on our customers. Always.

Our Wagon Intelligence project is one of the exciting driving forces behind the digitalisation processes for our wagons. Sensors constantly send data about the condition of the wagon, for example its load status, the temperature or humidity inside the wagon, and of course the location of our vehicle. This data is then pooled in the “brain” of our lab, the Asset Intelligence Center, an Internet of Things platform. We can also analyse the live data of each individual wagon in real time. This in turn enables us to create detailed diagnoses of the performance

of our vehicles or their components and thus optimise operating processes and reduce their cost. By 2020 we and the amspire lab aim to equip DB Cargo’s entire freight wagon fleet – about 90,000 wagons throughout Europe – with smart sensors and telematics systems. And we plan to make the amspire lab the leading think tank for asset management and maintenance for companies of all kinds and for scientists and researchers throughout Germany. ●



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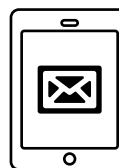
— High-performing  
and one of a kind:  
the DB Cargo network.

// LOOKING AHEAD

## PERFECTLY CONNECTED, EUROPE-WIDE

The DB Cargo network is one of a kind.

The German railway network alone is some 33,200 kilometres long, making it the longest network in Europe. DB Cargo moves some 4,350 freight trains and over a million metric tons of freight a day, and not just in Germany. Sixty per cent of transports cross at least one national border. But it's not only the size that makes the network so unique and effective. Even more so, it is the ideal scope and perfect capacity utilisation – for each and every customer and their own transport. Read about all that DB Cargo does to offer the best solution, regardless of the customer's industry, whether it needs one single wagon or a block train, and whether or not it has its own private siding. What's more, a new dispatching structure ensures even greater reliability. Read more in our interview with Michael Anslinger, Board Member for Production at DB Cargo AG. Using different loading technology, DB Cargo also ensures that customers' freight is expertly loaded and unloaded at all times and in all places – using a variety of special wagons – and that nearly any cargo can be transported by rail. We will be introducing this extensive vehicle fleet in our new series, starting with this issue.



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