



RAILWAY  
SYSTEMS  
by voestalpine

# ENABLING CHANGE: HOW DATA CAN OPTIMIZE FLEET MANAGEMENT

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ONE STEP AHEAD.



DATA IS THE NEW OIL – But why?

## „DATA IS THE NEW OIL“...but why?

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- Oil from the well is not the product we consume.
- It must be refined before it becomes of value to its market.
- The specific refining process defines how the product is consumed.
- Common Standards applied to the end product assure consumers can obtain and rely on it's value.

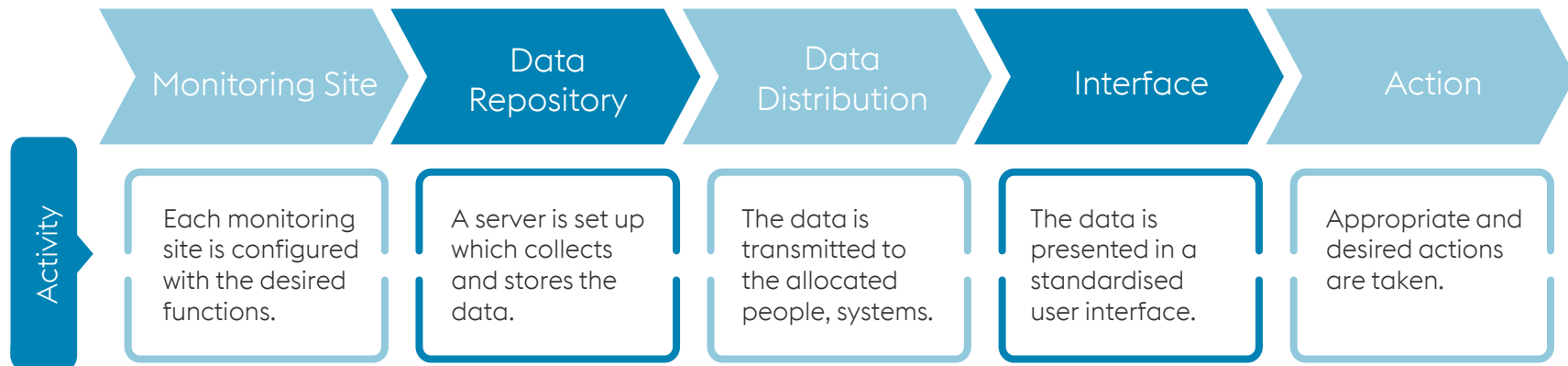
# „DATA IS THE NEW OIL“

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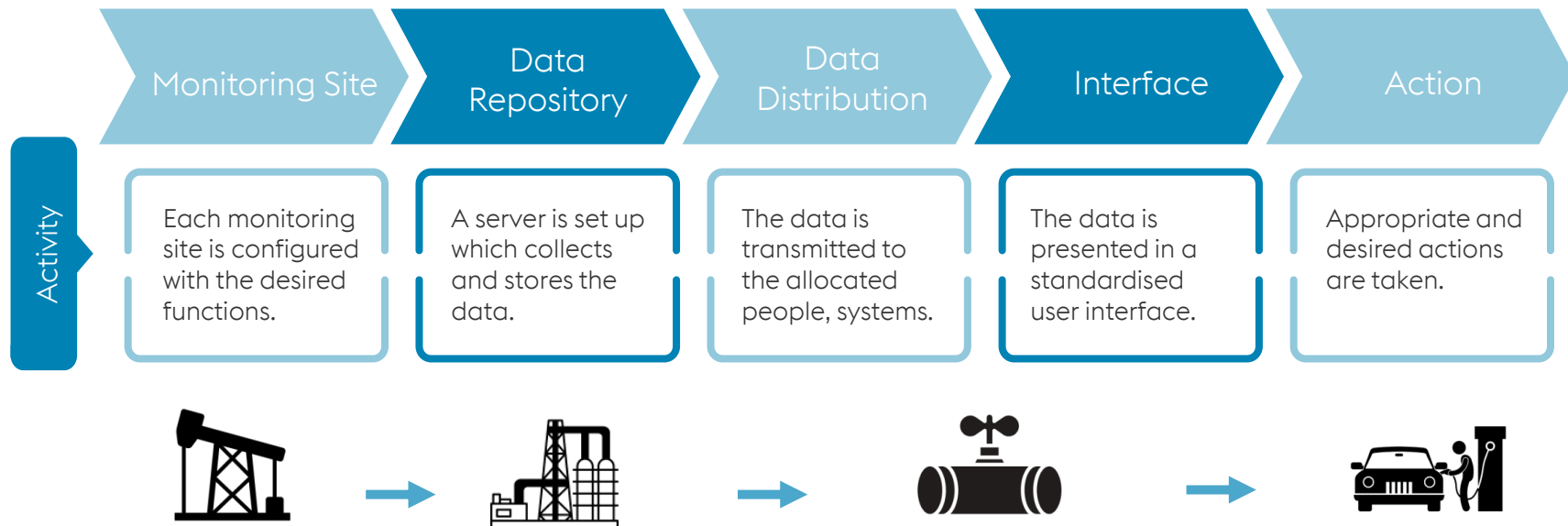
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# BUILDING THE MONITORING DATA “PIPELINE”



# ESTABLISHING THE DATA “PIPELINE”



# CONSUMER BEHAVIOUR: ACTING ON SIGNALS

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# CONSUMER BEHAVIOUR: ACTING ON SIGNALS



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# CONSUMER BEHAVIOUR: ACTING ON SIGNALS



# ACTING ON SIGNALS: AN EVOLUTION OF NEEDS



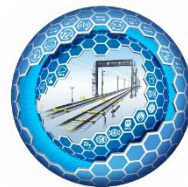
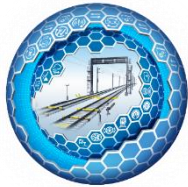
HABD1 (left)			HABD2 (right)		
Min/Max/Avg	10.8 / 146.4 / 17.7		Min/Max/Avg	16.8 / 33.8 / 21.9	
35 cm, 17.3 °C	1		23.8 °C, 35 cm		
34 cm, 18.1 °C	2		23.2 °C, 34 cm		
33 cm, 146.4 °C	3		23.9 °C, 33 cm		
33 cm, 16.9 °C	4		23.1 °C, 33 cm		



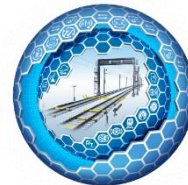
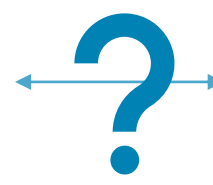
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ONE STEP AHEAD.

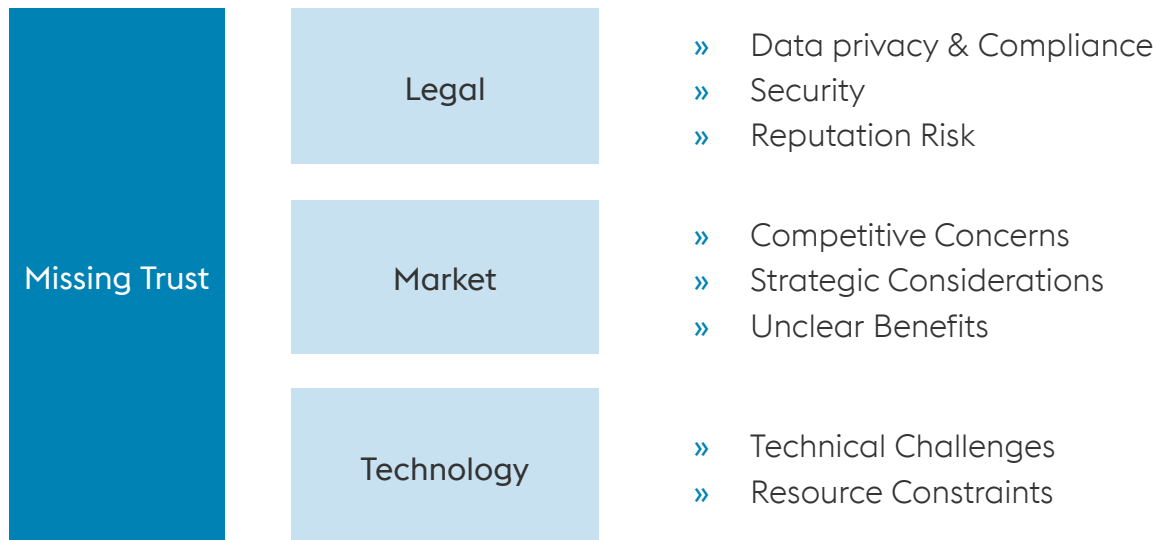
# DATA STANDARDS: IS THERE ALIGNMENT IN THE PIPELINE?



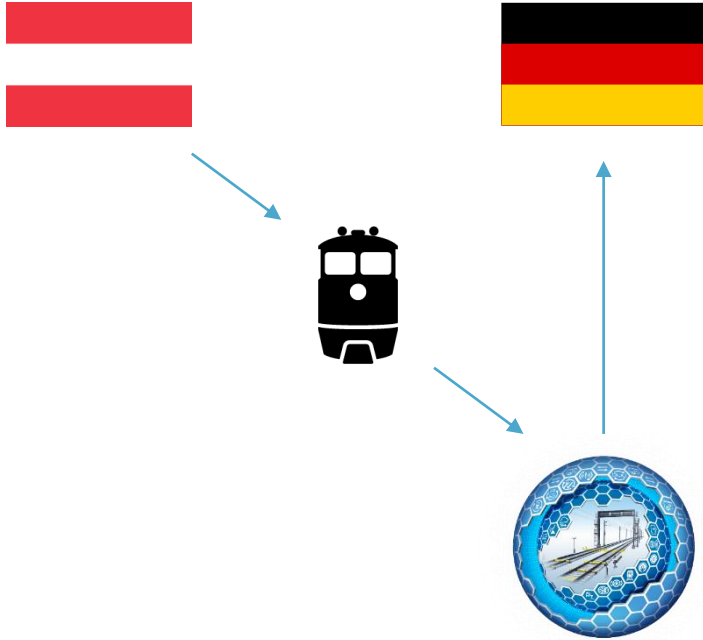
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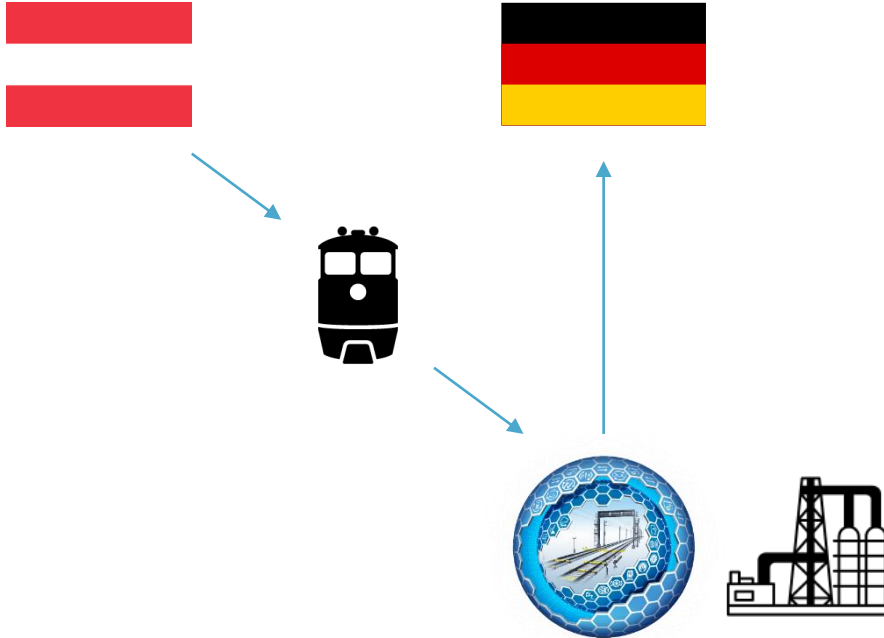
# WHY COMPANIES DON'T SHARE DATA



# DATA STANDARDS: Is there alignment in the pipeline?

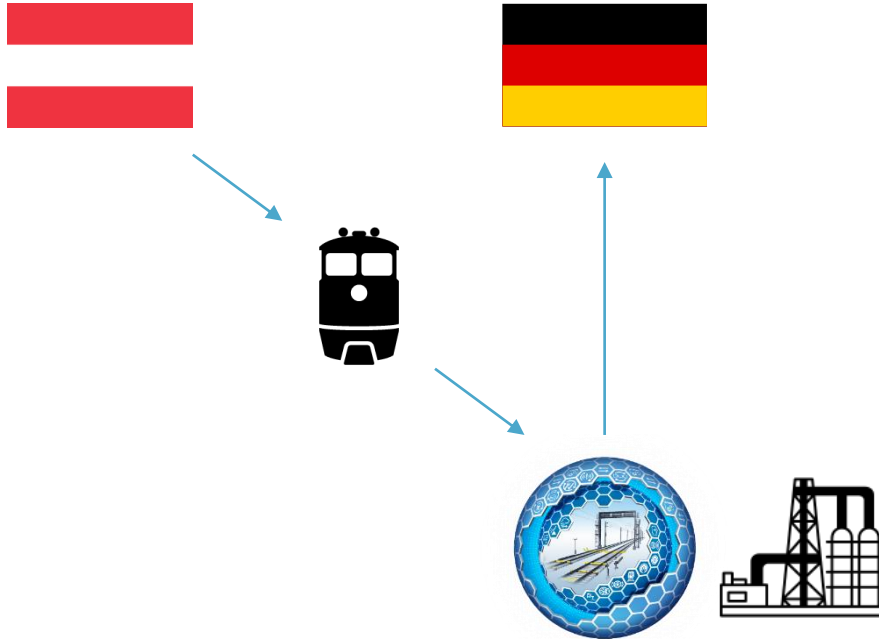


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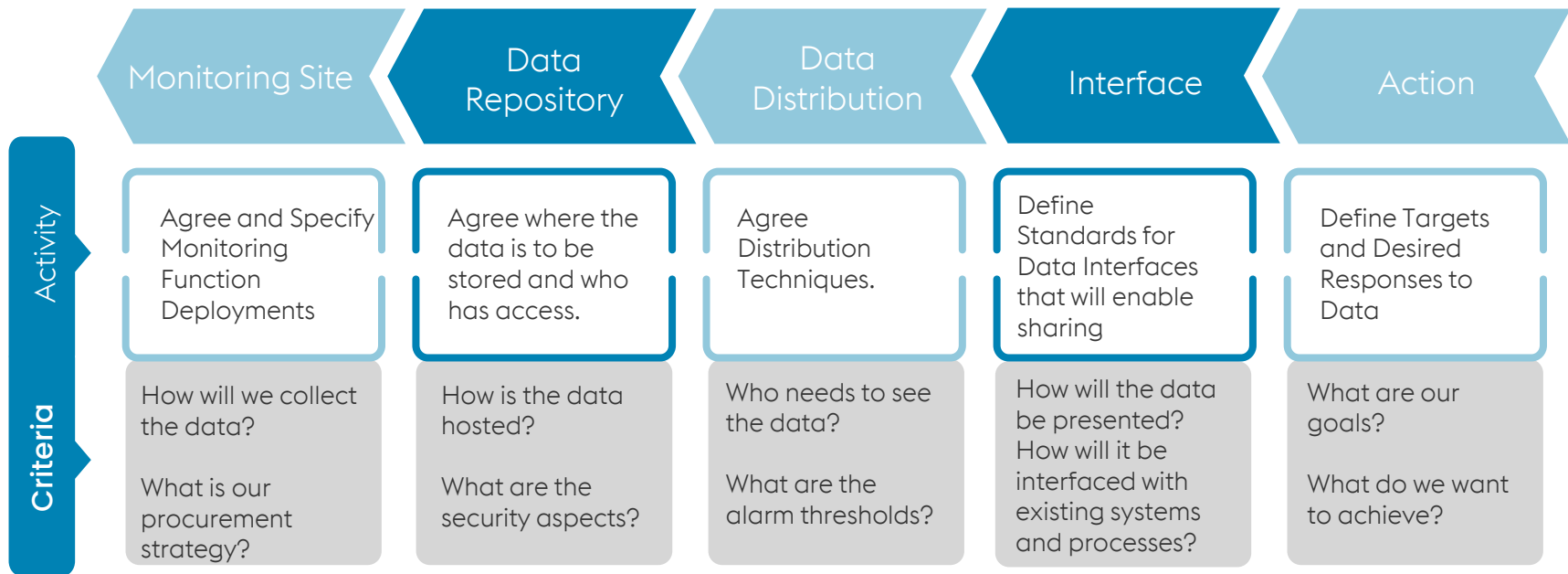


## DATA STANDARDS: Is there alignment in the pipeline?



- How is your data refined outside of your jurisdiction?
- To what standards is it refined?
- Do you have access to consume the end product?
- Is the **Signal Interpretation** standardised?

# REVIEWING THE DATA “PIPELINE”



# DATA STANDARDS:

## UNDERSTANDING STAKEHOLDER PERSPECTIVES

» What does Condition Based Maintenance mean to your organisation?

I want to repair any train defect  
as soon as it occurs



I want to run the train  
for as long as possible  
before maintenance



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# CASE STUDY: DATA IMPLEMENTATION

HIGH SPEED ONE  
UNITED KINGDOM

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## HIGH SPEED ONE – CUSTOMER LANDSCAPE

Infrastructure Maintenance

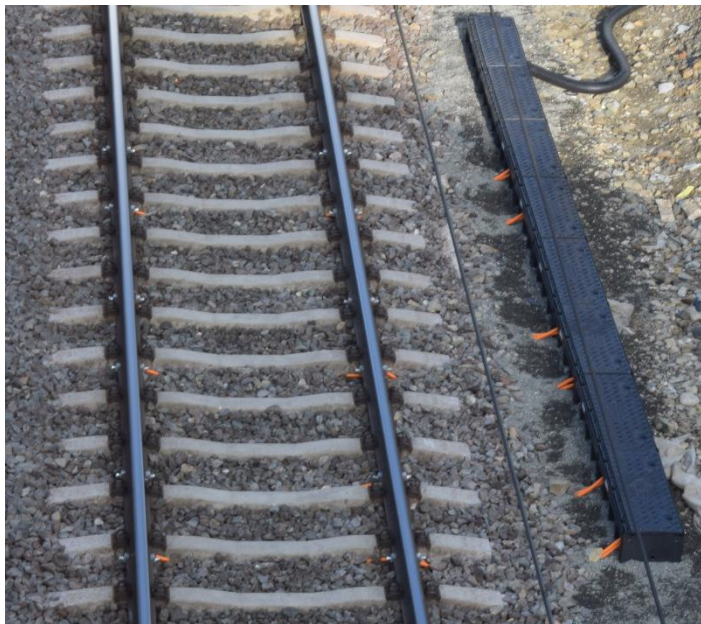


Train Operating Companies





# WHEEL IMPACT LOAD DETECTION (WILD) PHOENIX<sup>MDS</sup> WDD/WIM





# HIGH SPEED ONE – DATA USE CASE



PHOENIX<sup>CMS</sup>

STOP ALARMS FOR  
SERIOUS WHEEL  
IMPACTS



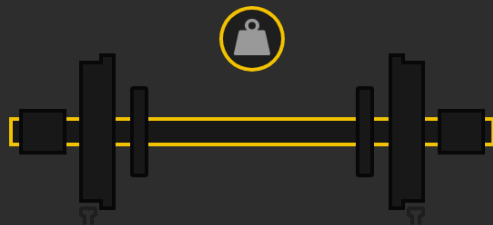
One alarm found for this train passage.

### Axle overload High - Axle

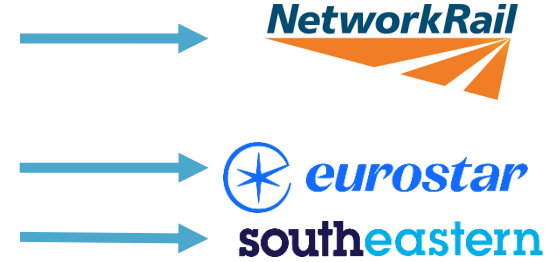
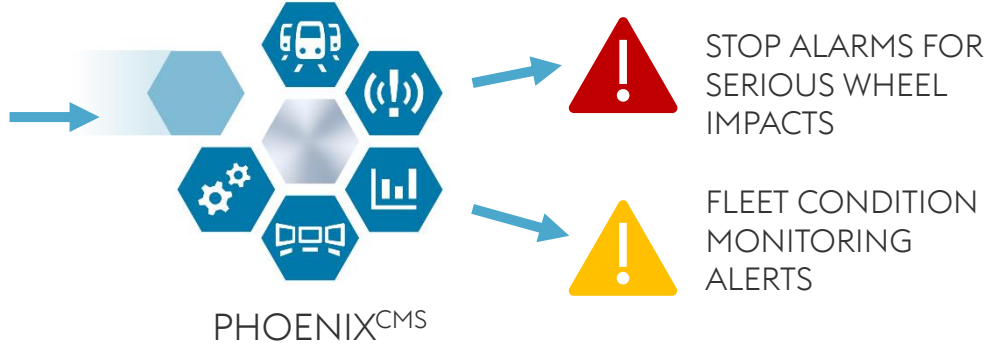


created

Vehicle Number	Vehicle Number Counted	Platform Axle Count	Platform Count	Axle Number
1234567891234	4	4	4	13
Value	Orientation	Wheel	Kind	Type
25.27 t	Unknown	-	-	anon



# HIGH SPEED ONE – DATA USE CASE



Vehicles

Search

Status

609

Last Passage  
09/09/2022, 01:57:19 PM

Last Change of Defect Level  
09/09/2022, 01:57:33 PM

112110

Last Passage

Last Change of Defect Level

T-4 (2'2')

Last Passage  
10/24/2022, 07:41:09 AM

Last Change of Defect Level  
06/23/2022, 01:44:09 PM

Hot Bearing

RTC should check this

T-4 (BoBo)

Last Passage  
10/24/2022, 07:41:09 AM

Last Change of Defect Level  
10/12/2022, 06:46:44 PM

test#

T-5 (A'A'A'1A')

Last Passage  
10/24/2022, 07:27:53 AM

Last Change of Defect Level  
08/04/2022, 07:00:06 AM

T-8 (2'2'2'2')

Last Passage  
10/24/2022, 07:41:07 AM

Last Change of Defect Level  
10/06/2022, 08:55:11 PM

T-10 (2'2'2'2'2')

Last Passage

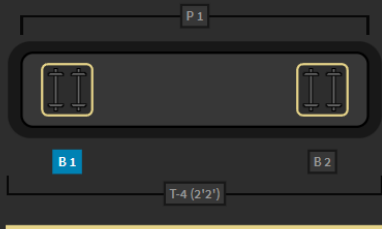
Last Change of Defect Level

Explorer

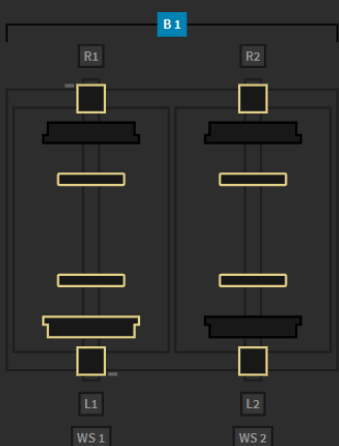
Overview

Train Passages

T-4 (2'2')



T-4 (2'2') / B 1



Bearing (Outside)

Brake (Disc)

Dyn. Force

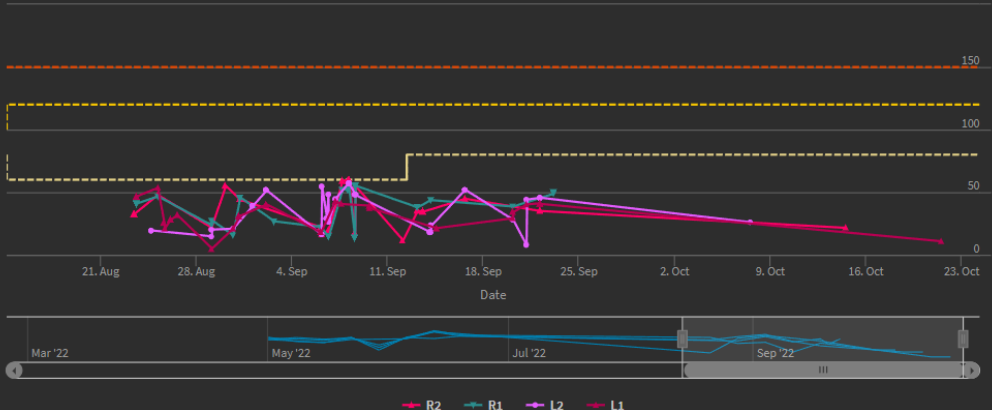
Dyn. Force (mvg. avg.)

RMS Low

Trend on bearing temperatures

Outer Bearing - Bearing (Outside)

Zoom 1w 1m 3m 6m YTD 1y All



# HIGH SPEED ONE – DATA USE CASE



# HIGH SPEED ONE – DATA USE CASE



PHOENIX<sup>CMS</sup>



STOP ALARMS FOR  
SERIOUS WHEEL  
IMPACTS



FLEET CONDITION  
MONITORING  
ALERTS



EXTRACT



REFINE



DELIVER



CONSUME

# FINDINGS AND RECOMMENDATIONS

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- » Stakeholder Engagement
  - » Infrastructure Owners, Train Operating Companies and Suppliers
  - » The system's outputs must be **respected and trusted** by all parties
  
- » Data Distribution Agreements
  - » Establish who gets access and how they will access the data
  - » Consider Data Hosting, Privacy Regulations and Security
  
- » Operational Alignment
  - » Interfacing between systems must be established
  - » **Standardise** how the data gets presented, agree alarm thresholds
  - » **Consultancy is always an option!**

# SUCCESS: AGREEMENT OF STANDARDS

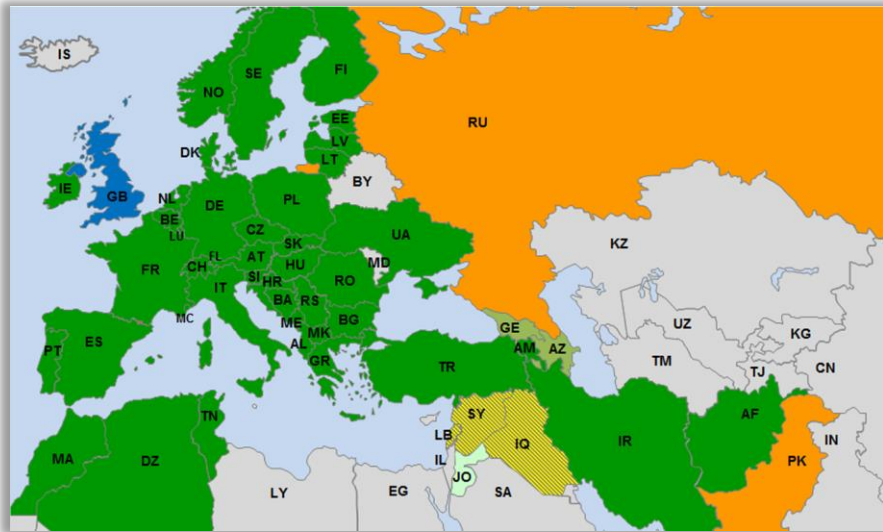
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- » Standardisation of Data **Extraction**
- » Standardisation of Data **Refining**
- » Standardisation of Data **Delivery**
- » Standardisation of Data **Consumption**





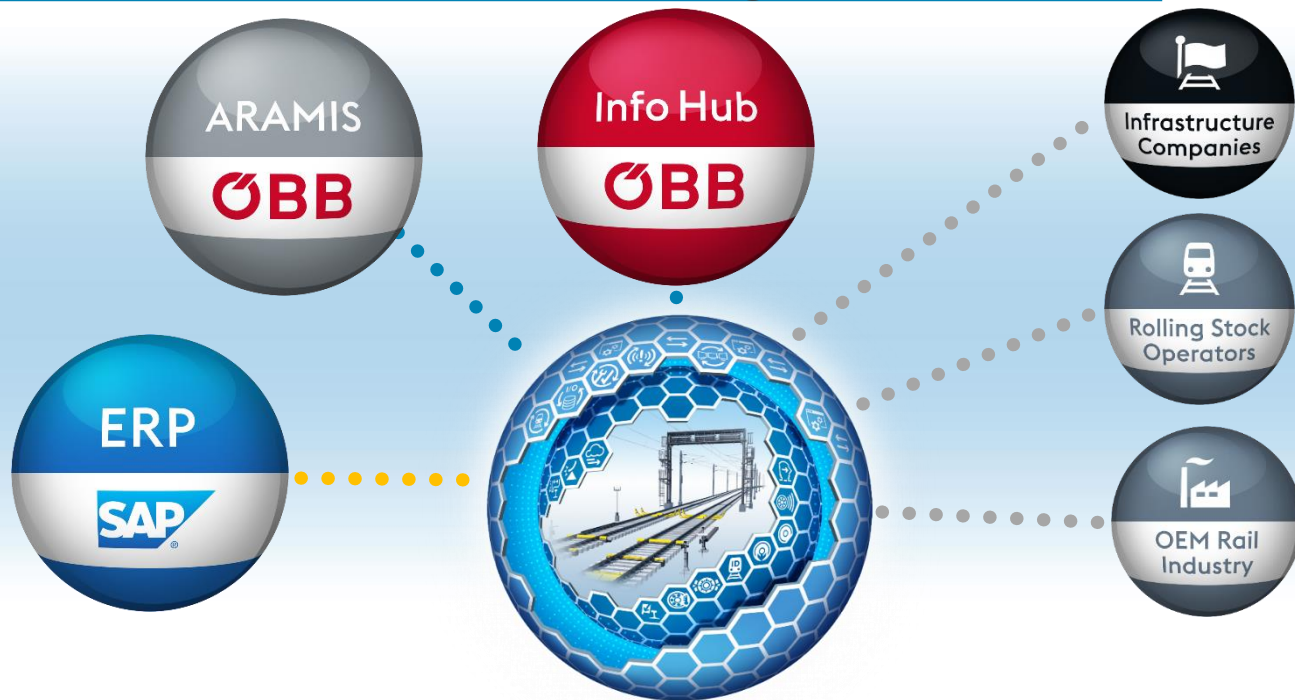
# SCOPE OF GCU/AVV



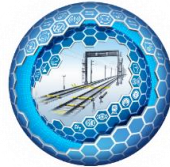
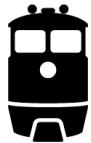
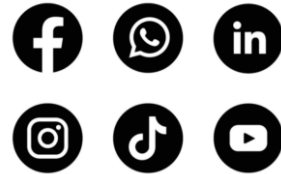
“GCU sets out the conditions for the provision of wagons for by railway undertakings in national and international traffic within the scope of application of the COTIF in force.”

- » GCU is used by all railway undertakings
- » Standard for enscriptions and signs
- » Standard catalog of damages
- » GCU criteria can be used to explain the functionality of our systems in a comparable way

## Current Established Data Sharing Environments



# SUMMARY and CONCLUSION



» Data Sharing is in everyone's interest but we must consider standards in **extraction**, **refining**, **delivery** and **consumption**.