



Asociación Latinoamericana de  
Metros y Subterráneos

# Siemens Mobility

Experiencias aplicadas de  
mantenimiento predictivo



# Experiencias aplicadas de mantenimiento predictivo

1. Nuestra visión
2. Mantenimiento predictivo, 100% disponibilidad
3. Inspección de rieles
4. Fallas en puertas
5. Fallas en máquinas de cambio
6. Fallas en rodamientos de trenes de alta velocidad
7. Conclusiones



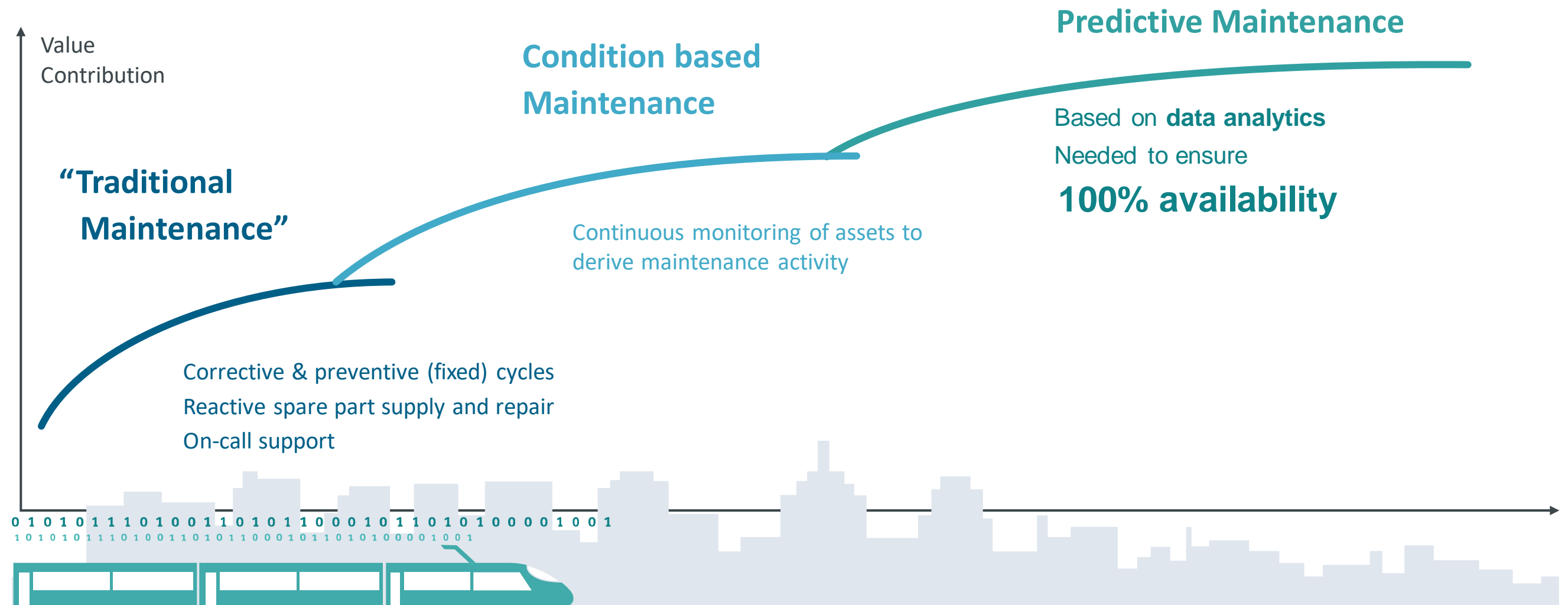
# Moving beyond.

*We are global entrepreneurs,  
trusted by our partners  
to pioneer transportation,  
moving people sustainably  
and seamlessly  
from the first mile to the last.*

## Siemens Mobility

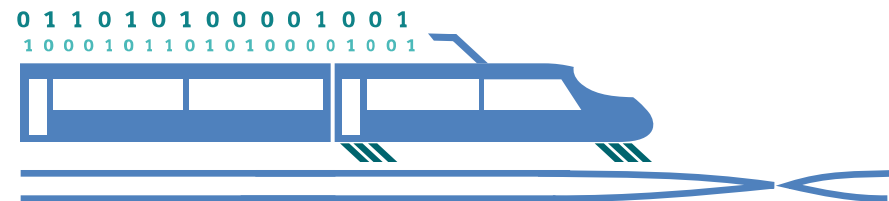
# The evolution of maintenance processes

## New possibilities enhanced by digitalization

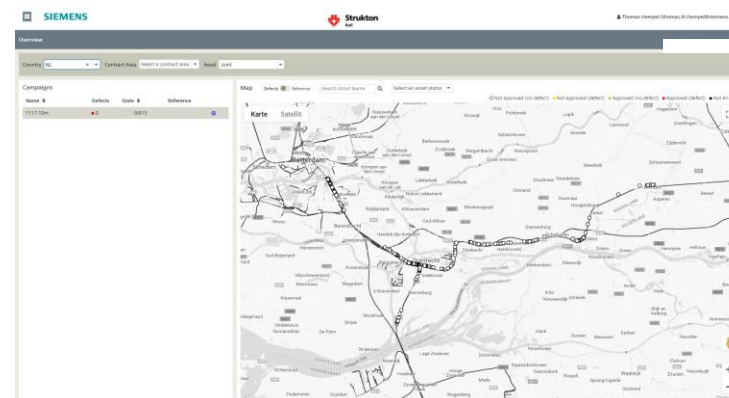


# Video Track Inspector Overview

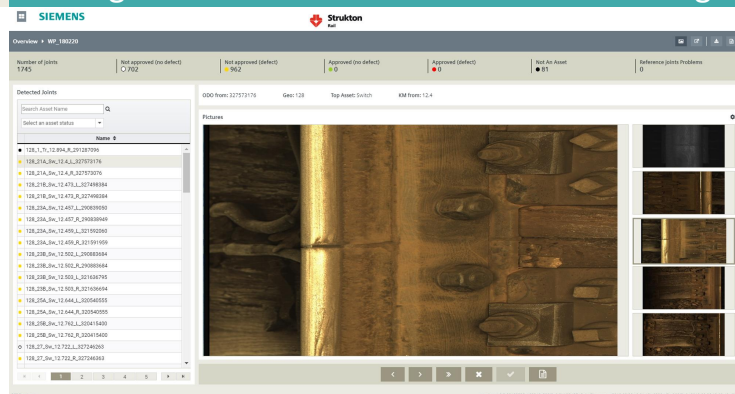
**1 Data Acquisition:** Linscan cameras generate high resolution images of the superstructure



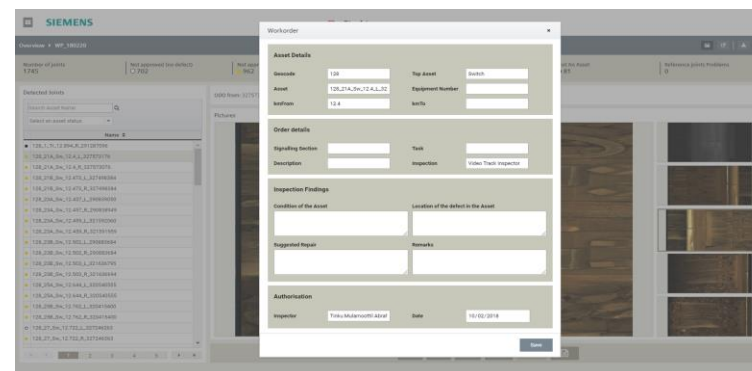
**2 Data Transmission:** Upload of the raw data and pre-processing on Railigent powered by MindSphere



**3 Data Analytics & Decision Support:** Visualisation of the algorithm results in an intuitive UI on Railigent



**4 Implementation:** Transfer of validated action proposals to work orders in the CMMS





## Benefits of the solution:

- Monitoring at operating speed
- regular updates of infrastructure condition
- higher track availability
- improved cycle times for maintenance



# Video Track Inspector UI large overview

Overview ▶ WP\_180220

Number of joints  
1745

Not approved (no defect)  
○ 702

Not approved (defect)  
● 962

Approved (no defect)  
● 0

Approved (defect)  
● 0

Not An Asset  
● 81

Reference joints Problems  
0


Detected Joints

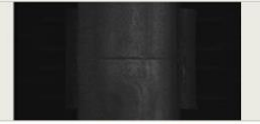




Select an asset status

Name
128_1_Tr_12.894_R_291287096
128_21A_Sw_12.4_L_327573176
128_21A_Sw_12.4_R_327573076
128_21B_Sw_12.473_L_327498384
128_21B_Sw_12.473_R_327498384
128_23A_Sw_12.457_L_290839050
128_23A_Sw_12.457_R_290838949
128_23A_Sw_12.459_L_321592060
128_23A_Sw_12.459_R_321591959
128_23B_Sw_12.502_L_290883684
128_23B_Sw_12.502_R_290883684
128_23B_Sw_12.503_L_321636795
128_23B_Sw_12.503_R_321636694
128_25A_Sw_12.644_L_320540555
128_25A_Sw_12.644_R_320540555
128_25B_Sw_12.762_L_320415400
128_25B_Sw_12.762_R_320415400
128_27_Sw_12.722_L_327246263
128_27_Sw_12.722_R_327246363

ODO from: 327573176
Geo: 128
Top Asset: Switch
KM from: 12.4

Pictures



1 2 3 4 5

< > » × ✓

OSS Readme

Version: 1.0.2-20180928\_180040\_209f9e6-SNAPSHOT / Build Timestamp: 2018-09-28 18:04:49 +0200 / Git: 209f9e6 / 2018-09-28 18:00:40 +0200

# Video Track Inspector

## First Partner and Customer Feedback very positive



*Minimizing track occupation for inspections, high quality assessment and predicting the future asset states are the main reasons to incorporate the Video Track Inspector, it reduces cost and provides more uptime.*

Joost van Kalsbeek | Maintenance & Asset Management specialist



**Strukton**  
Rail



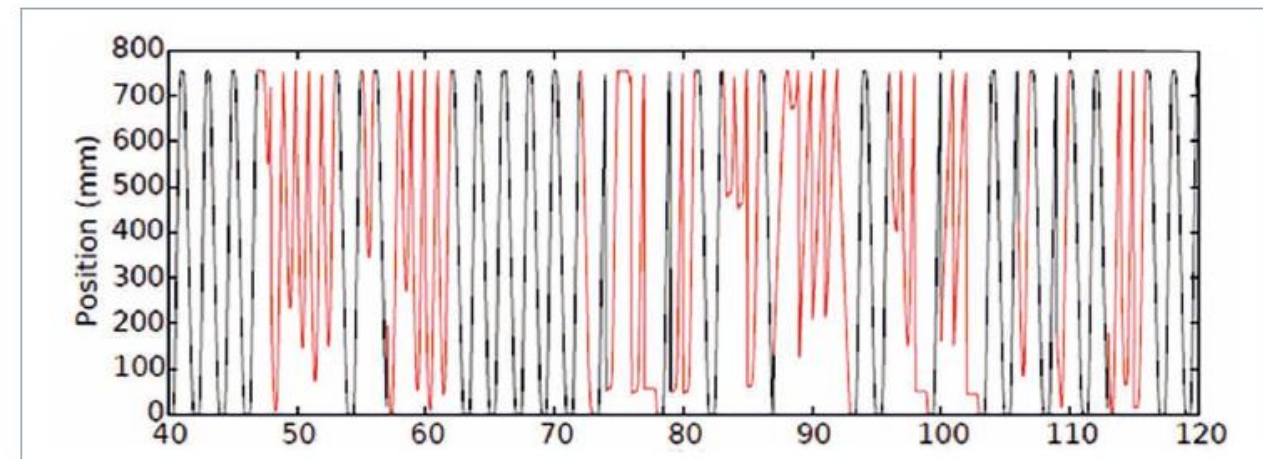
# Data analytics for Rolling Stock doors helps to avoid unplanned service failures

## Challenge

- Creating a scalable monitoring tool that aggregates, filters, and scores millions of motor currents and position sequences into a simple, intuitive application
- Develop a predictive failure model that is sufficiently sensitive to long-term trends and robust enough to ignore noise from the operational environment

## Siemens Solution

- State-of-the-art **machine learning** is combined with **expert knowledge**
- End-to-end trainable algorithm: The tool independently learns to classify between normal behavior and noise, it generates a filtered dataset and outputs a score on failure likelihood



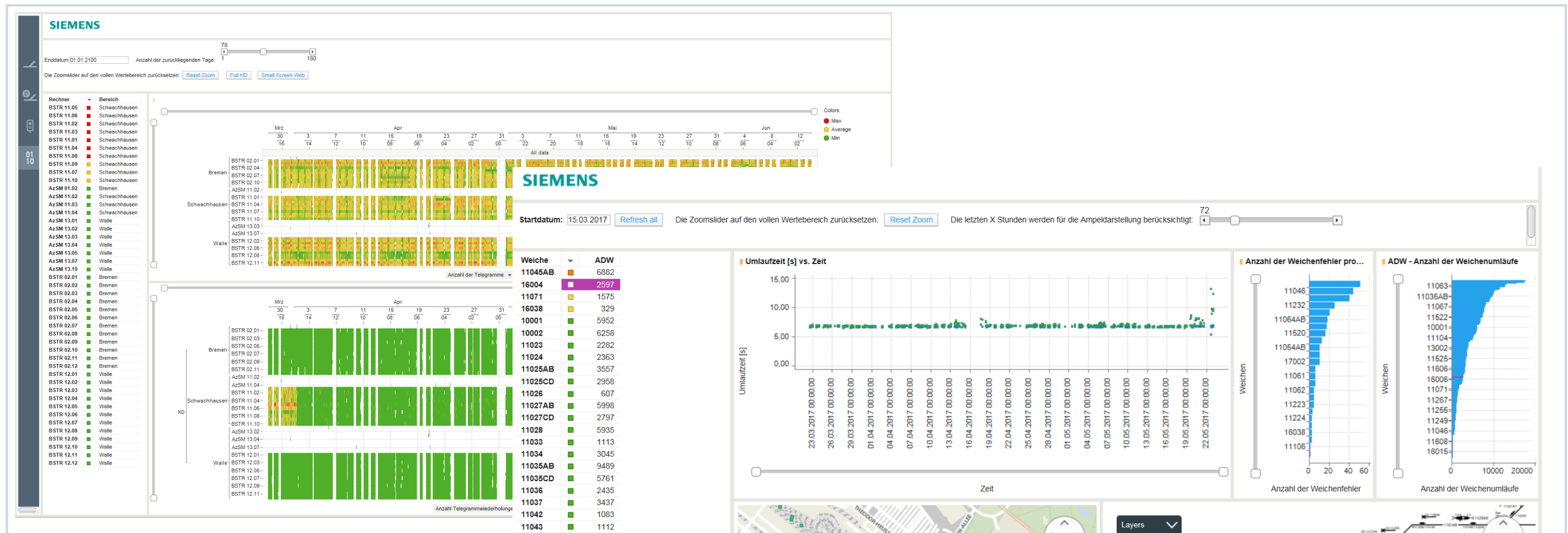
Position measurements for concatenated event cycles.  
The color red demarcates the sections where the neural network classifies the position measurements as belonging to an abnormal event cycle, due to extrinsic events

## Benefits

- Reliable solution for the customer thanks to Siemens Mobility Services data-analytics expertise
- Customers can benefit from this experience and highly increase the availability of their systems by preventing door failures



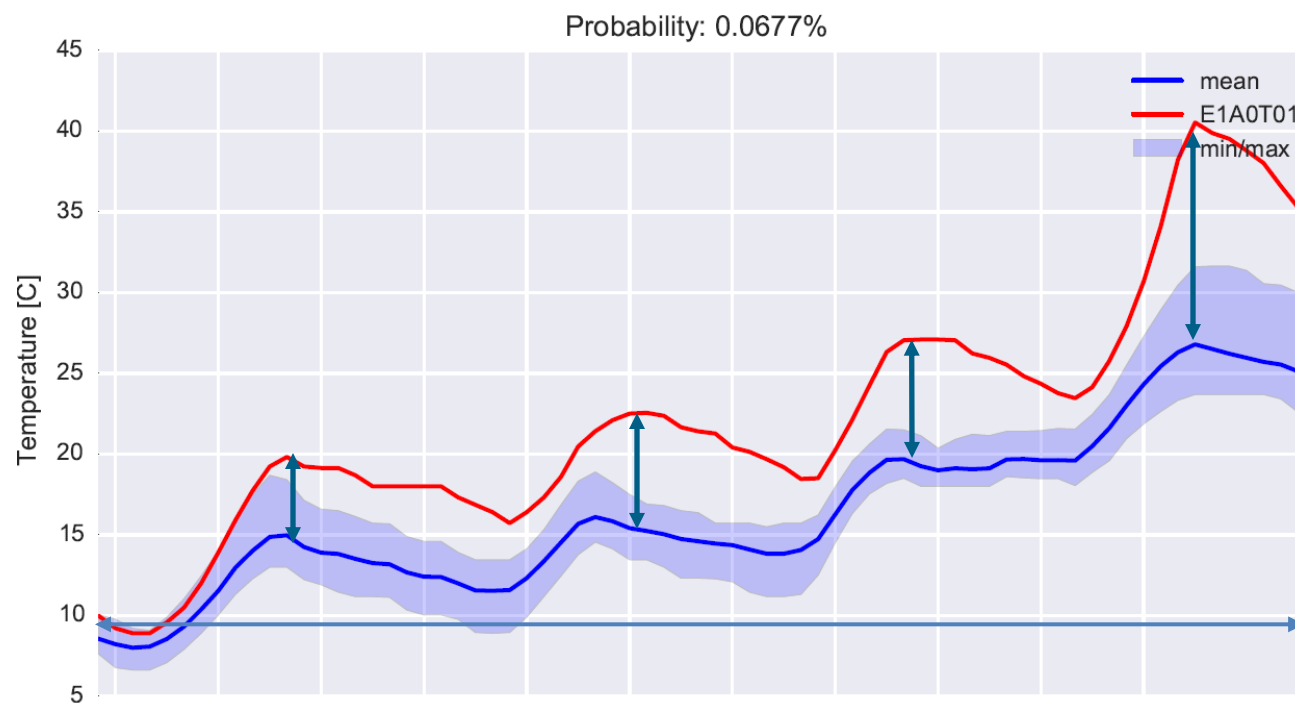
# Point machine failure prediction without additional sensors



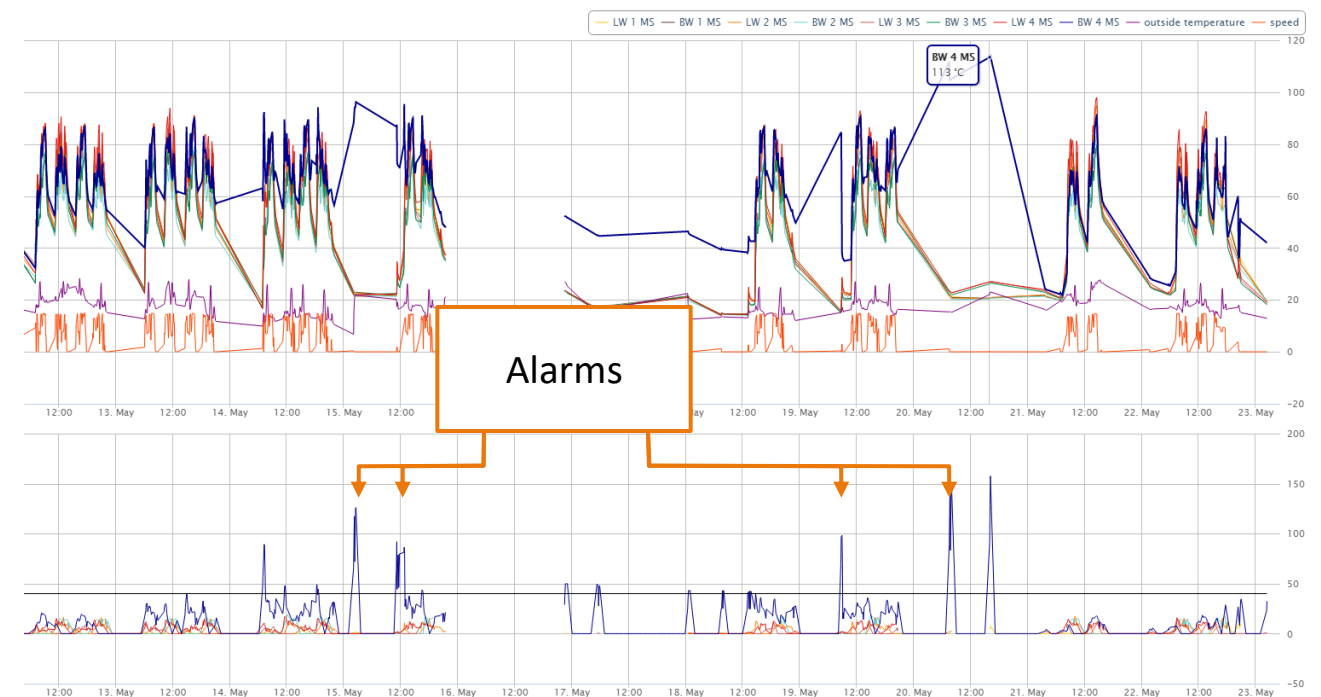
High end data analytics uses the available data to predict point machine failures without needing any additional sensors

# Automated failure prediction – Bearing monitoring on a high speed train

## Machine learning



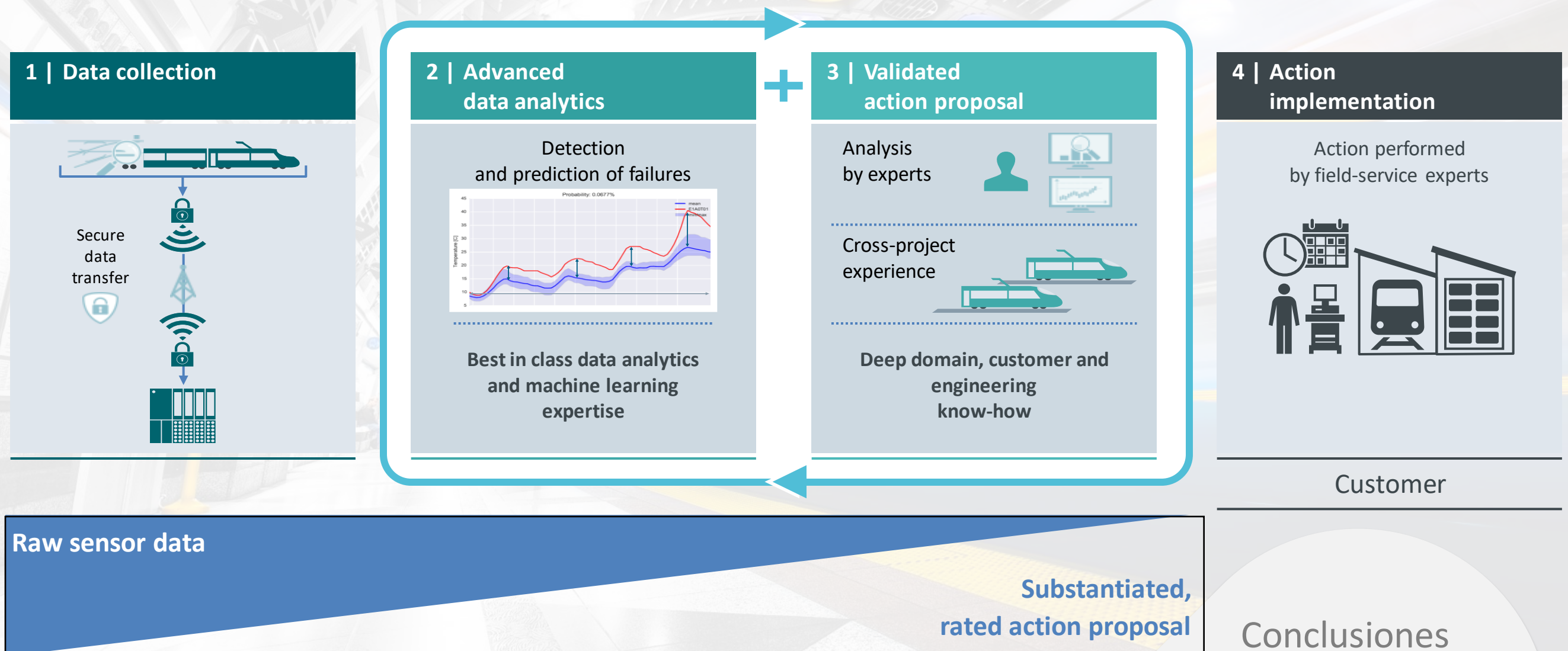
## Operational application



**Simplified picture – In reality 8 machine learning models analyze the complete drive train and help identify the exact component and the failure type**



Through advanced data analytics and deep rail know-how we can derive firm action proposals for maintenance



Siemens Mobility

**Moving beyond.**

