

Siemens Mobility

Experiencias aplicadas de
mantenimiento predictivo



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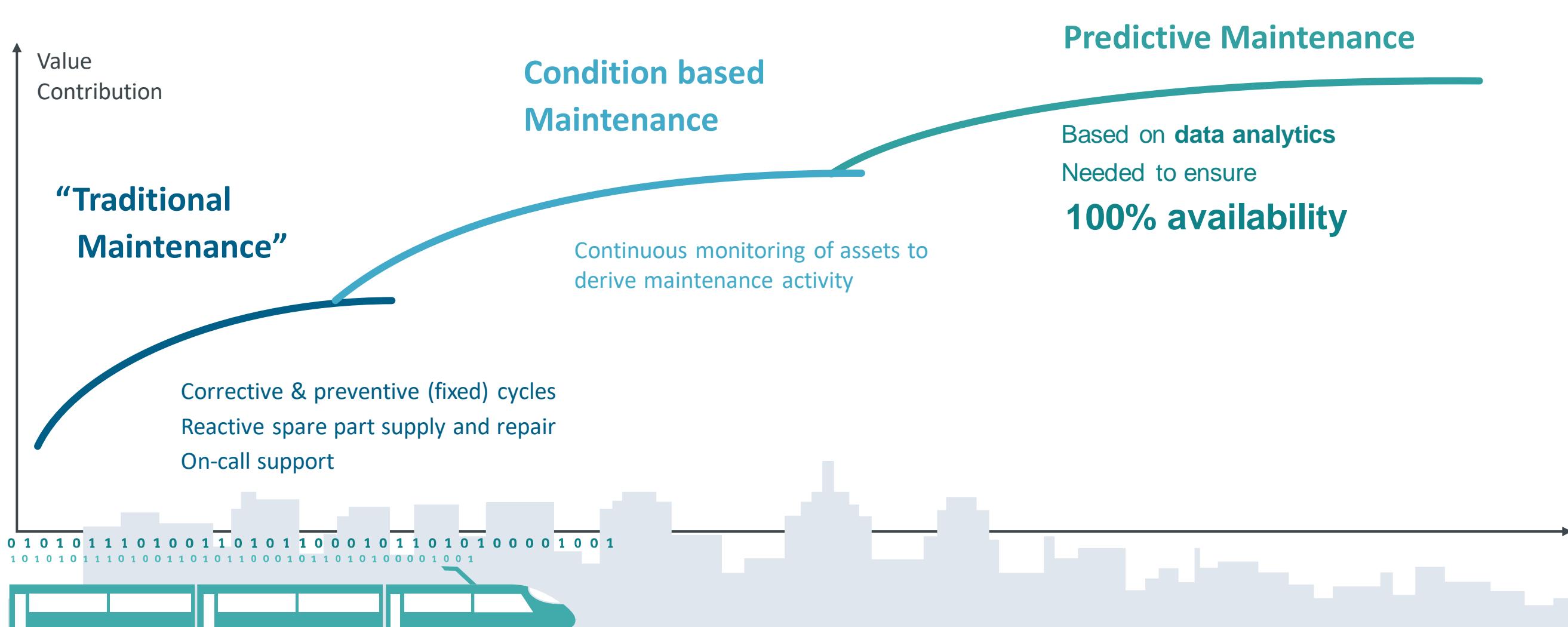
1. Nuestra visión
2. Mantenimiento predictivo, 100% disponibilidad
3. Inspección de rieles
4. Fallas en puertas
5. Fallas en máquinas de cambio
6. Fallas en rodamientos de trenes de alta velocidad
7. Conclusiones

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.*

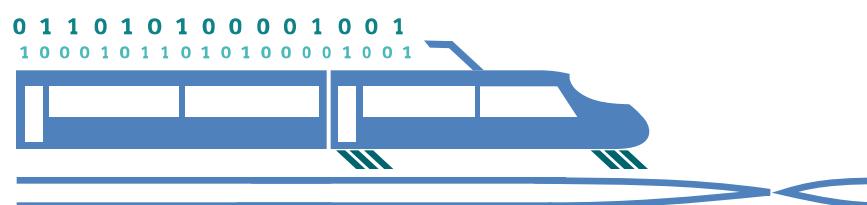
Siemens Mobility

The evolution of maintenance processes New possibilities enhanced by digitalization

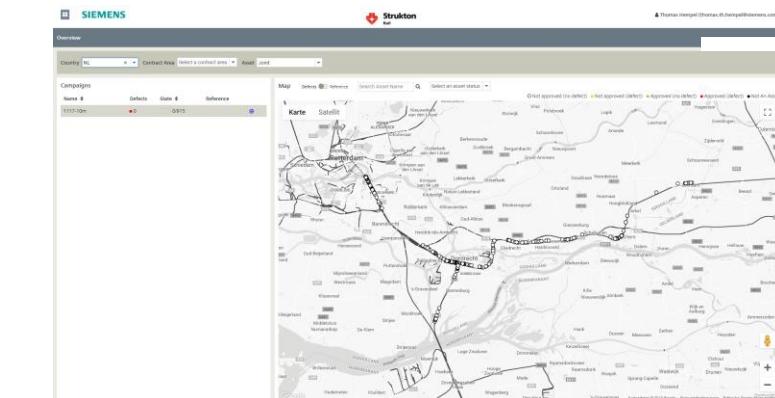


Video Track Inspector Overview

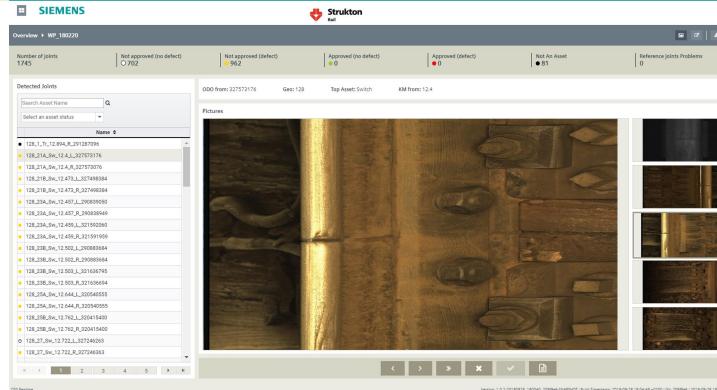
1 **Data Acquisition:** Linsecan cameras generate high resolution images of the superstructure



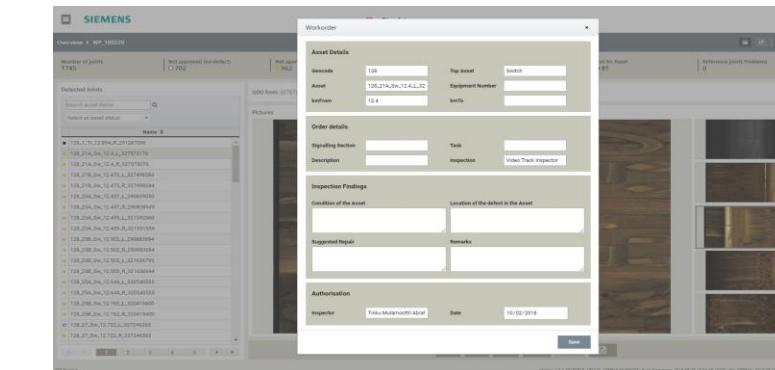
2 **Data Transmission:** Upload of the raw data and pre-processing on Railigent powered by MindSphere



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	Not approved (no defect)	Not approved (defect)	Approved (no defect)	Approved (defect)	Not An Asset	Reference joints Problems
1745	○ 702	● 962	● 0	● 0	● 81	0

Detected Joints

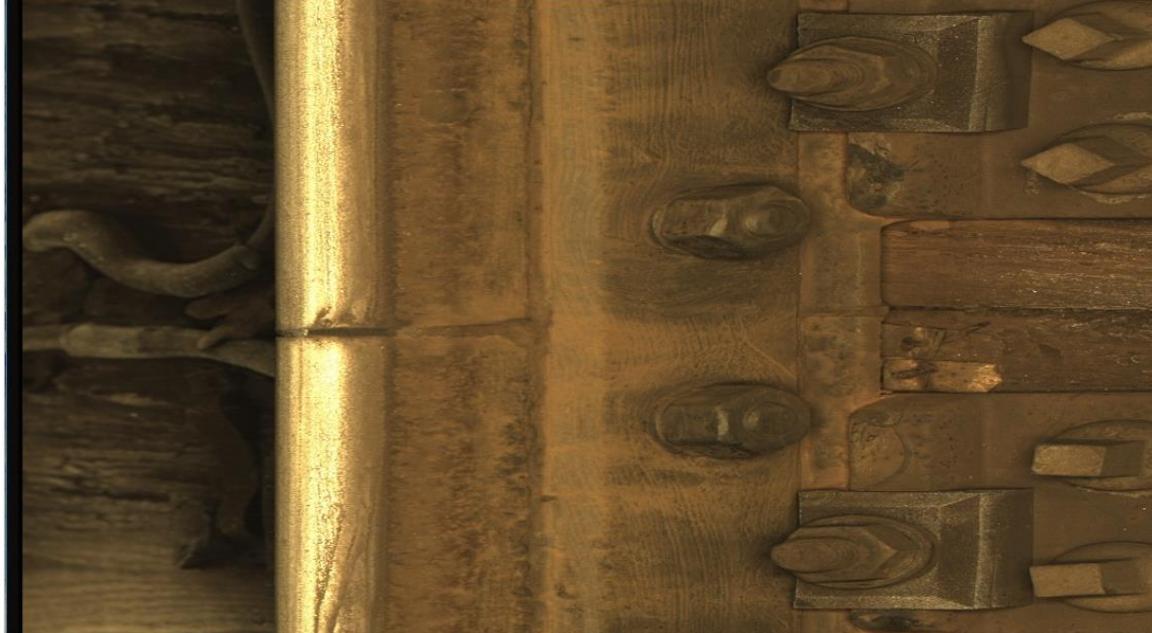
Search Asset Name
Q

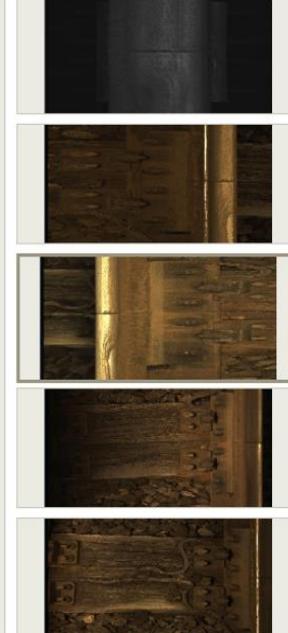
Select an asset status

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

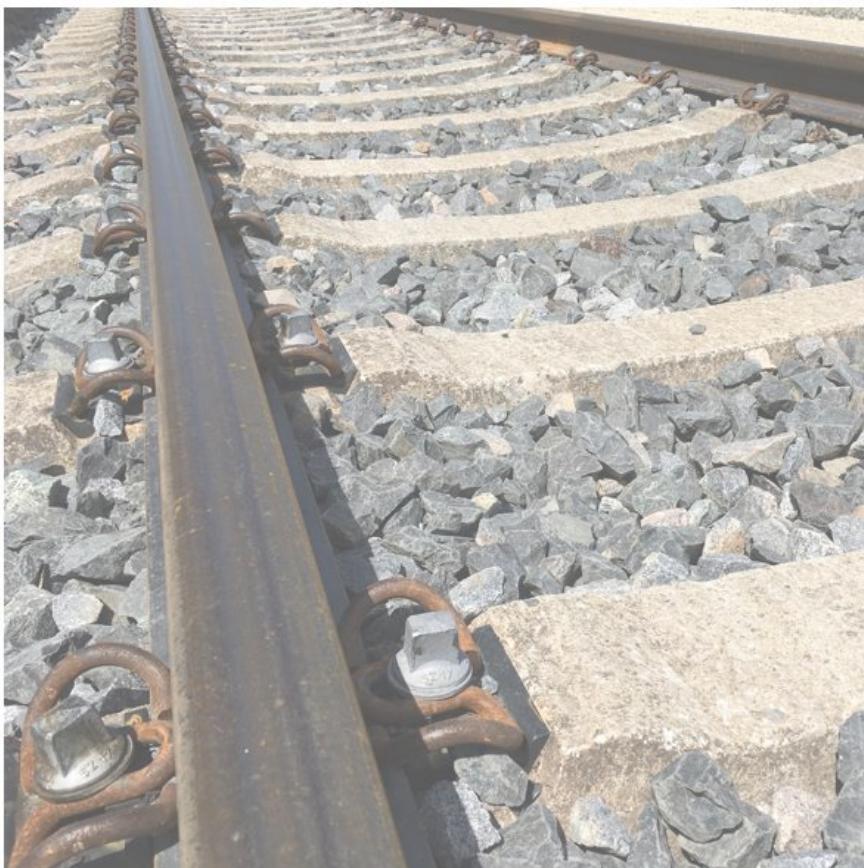
Pictures





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

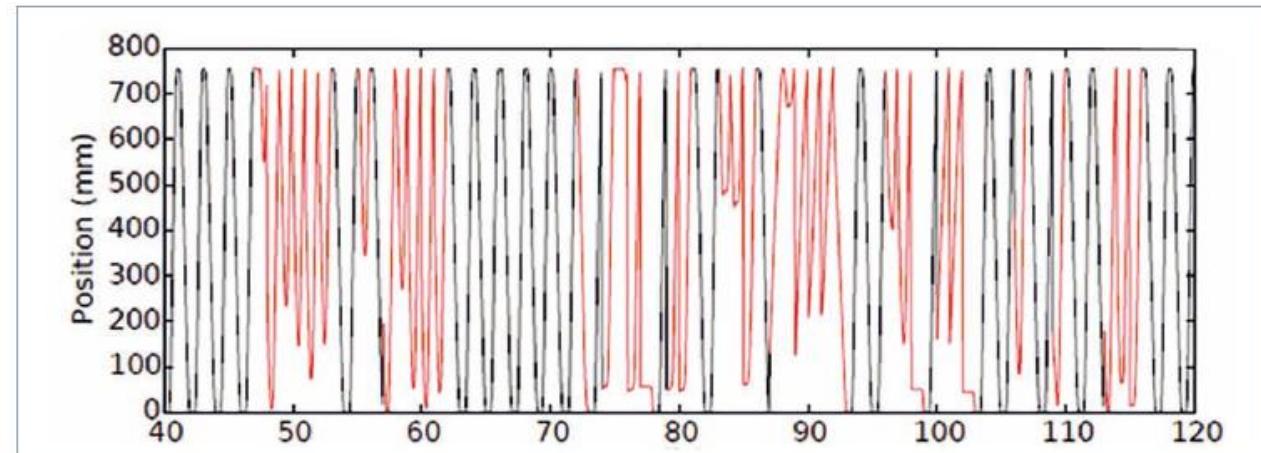
Data analytics for Rolling Stock doors helps to avoid unplanned service failures

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

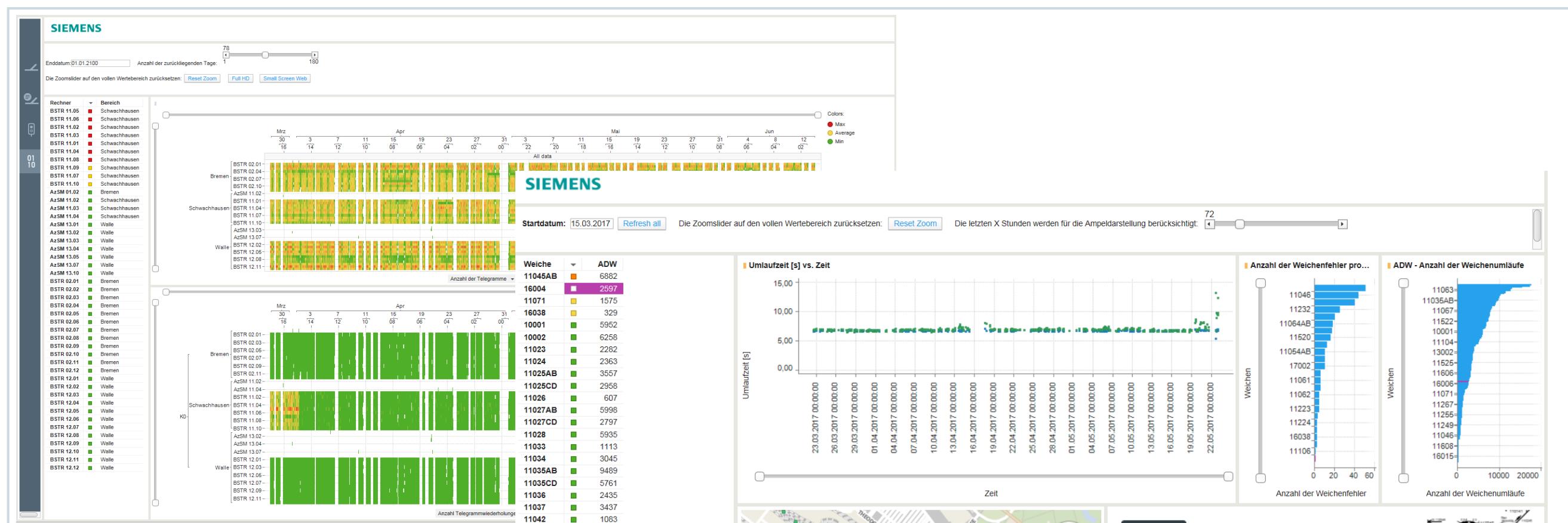


Position measurements for concatenated event cycles.
The color red demarcates the sections where the neural network classifies the position measurements as belonging to an abnormal event cycle, due to extrinsic events

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

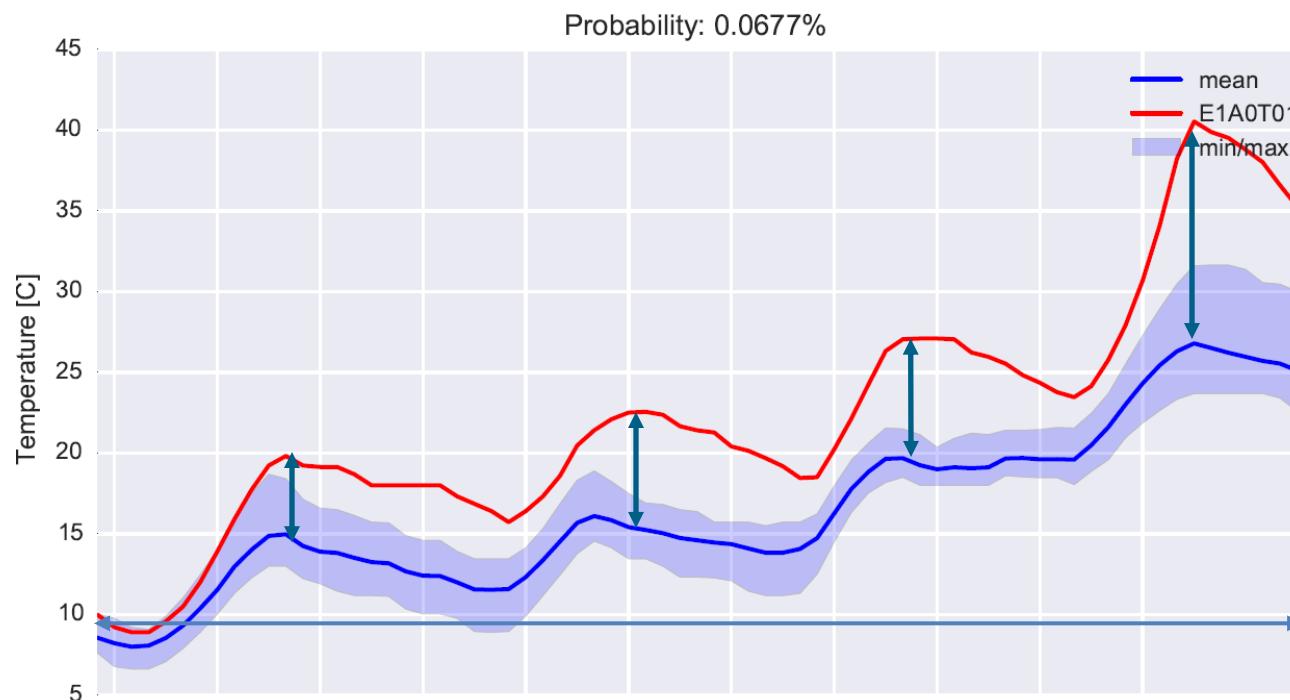
Point machine failure prediction without additional sensors



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

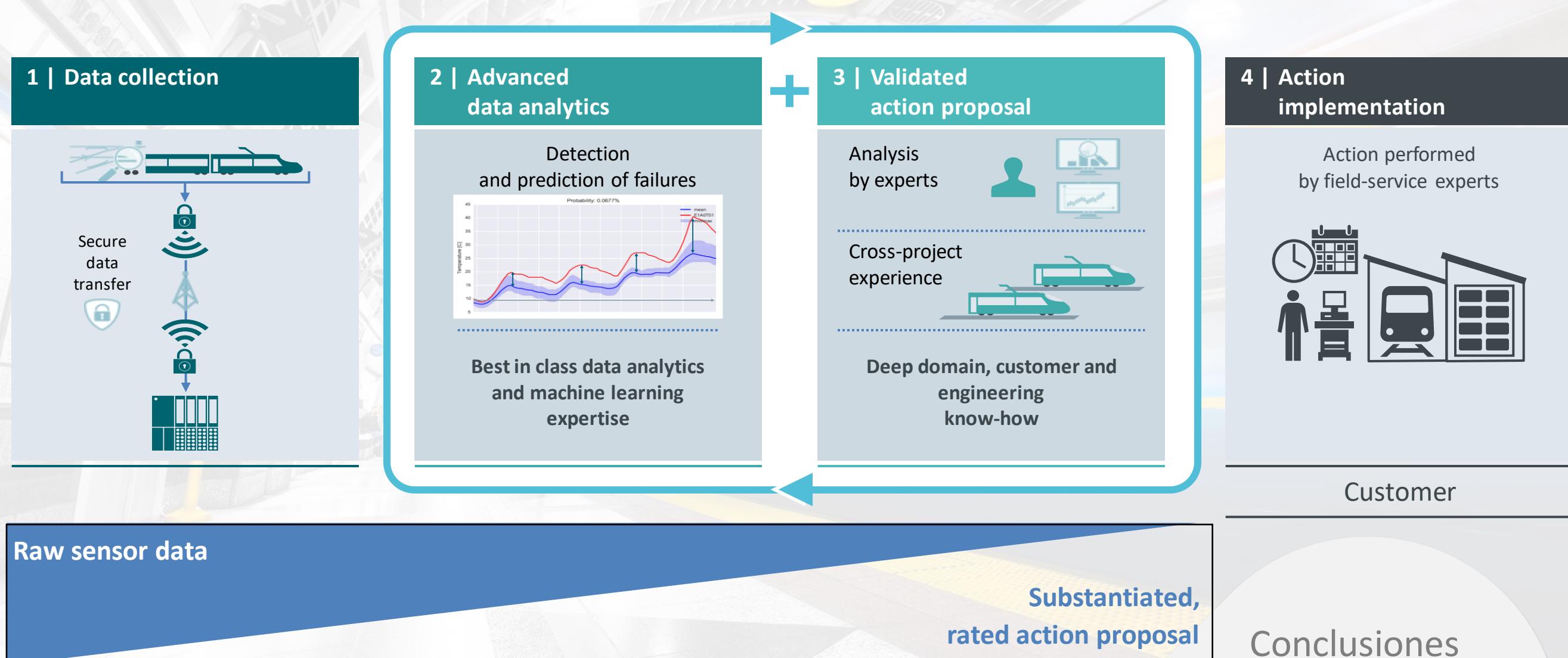


Operational application



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.

