

# Data analytics of mobility systems for optimized operations



## Optimized operations require 100 percent availability

### The data available

- Rail vehicles today send between 1 and 4 billion data points per year
- Additional data:
  - Work orders
  - spare parts data
  - geographical data
  - weather data

### The challenge

Turn

**data**

into

**information**

and drive appropriate

**actions**

**Ensure 100%  
operational  
availability**

# Siemens provides digital services to improve availability of rail assets and support customers

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**Maintenance Services**

**Spare Part Services**

**Digital Services**

**Upgrade Services**

**Qualification Services**

**Operation Services**

**1**

**Smart Monitoring**

Data transmission and visualization

**2**

**Smart Data Analysis**

Data evaluation and analysis

In order to implement this portfolio, Siemens built a large team of experts supported by strong technological capabilities

## Human Resources

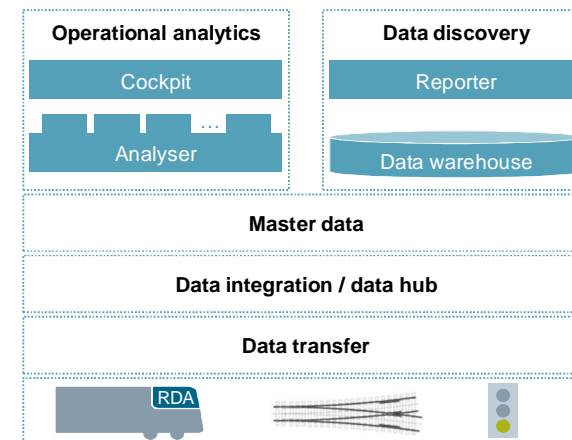
- Data scientists
- Technology experts
- Implementation managers

## Skill profiles

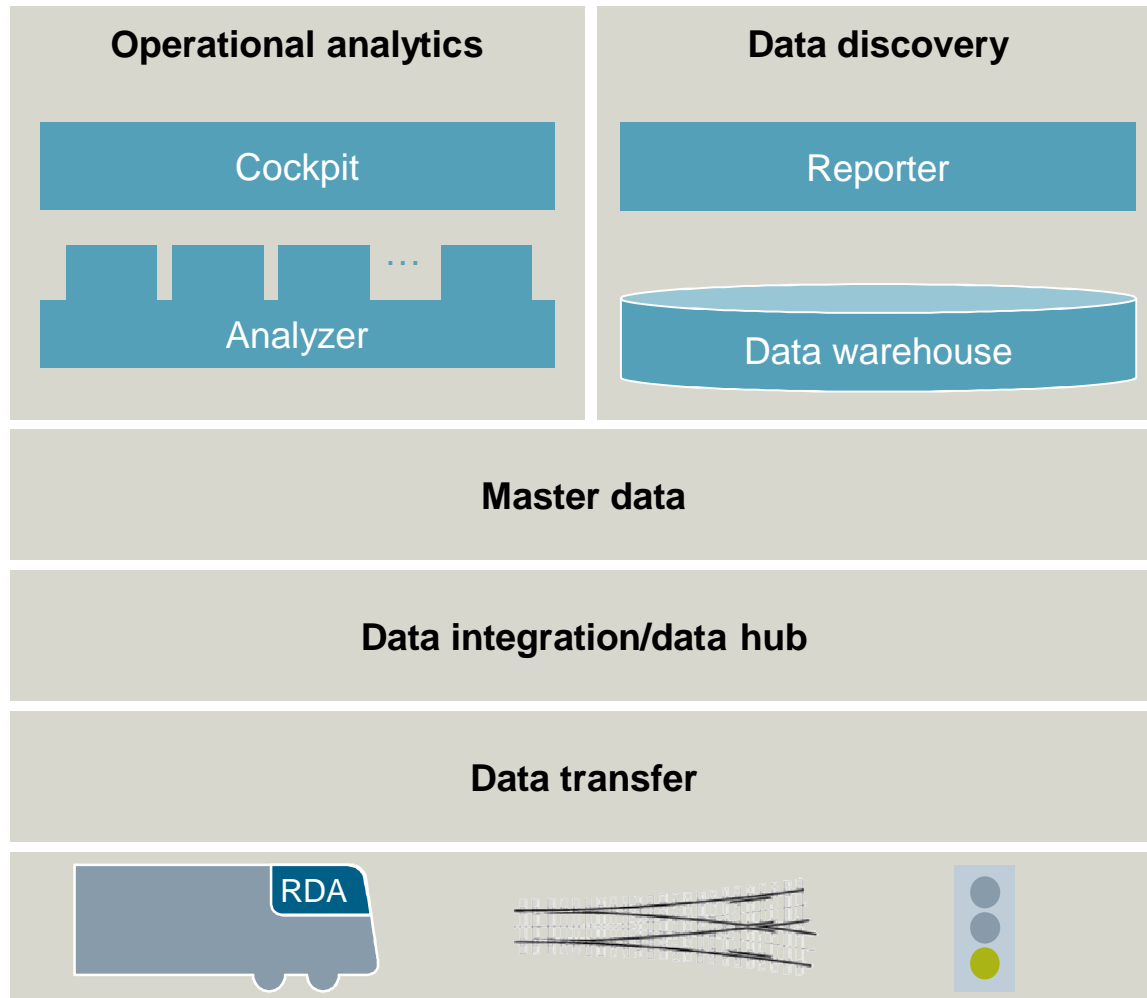
- Data science
- Big data technology
- Platform architecture
- Mobility domain expertise
- Project implementation management

## Data management capabilities

- Scalable data storage (MPP)
- In-database analytics
- Data quality validations



# The data platform is based on Sinalytics and is scalable, proven, and operational



Why are we doing analytics? To ensure “no surprises” for operations!

Train data  
ensures “no  
surprises” for  
operations

### Value drivers

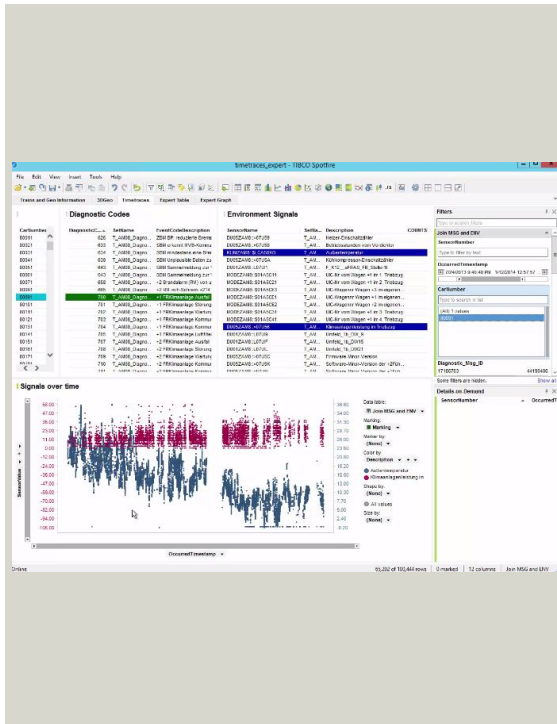
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- Improved maintenance
- Root cause analysis of failures
- Reduction of preventive maintenance cost
- Increase in availability

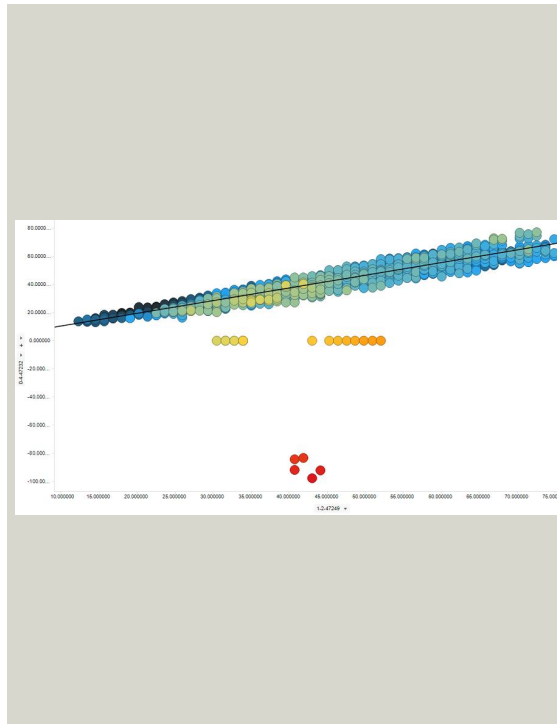
# Data from rail assets is analyzed to create an automated failure prediction: process example

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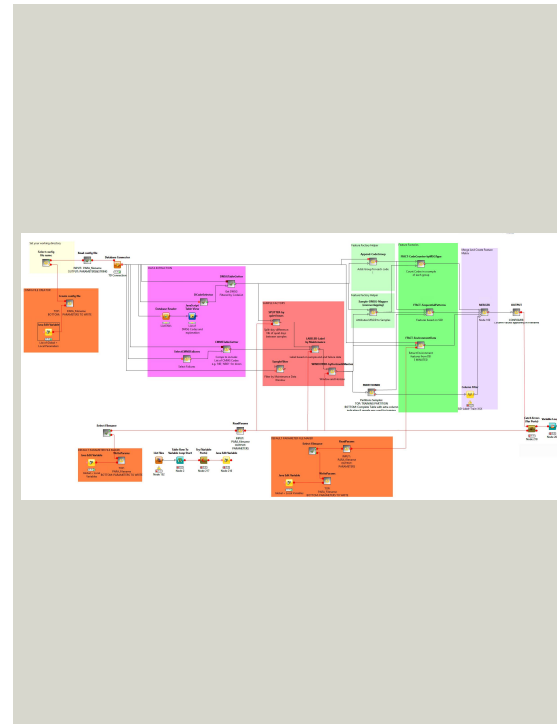
Data access



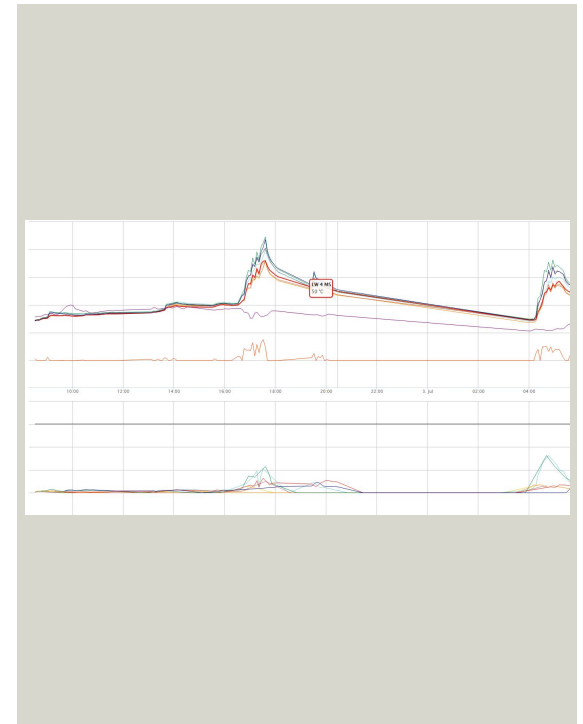
Search for  
patterns



Machine  
learning

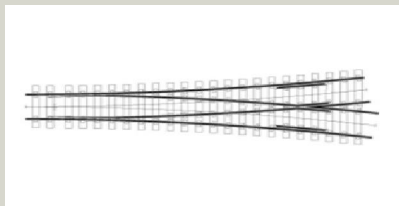
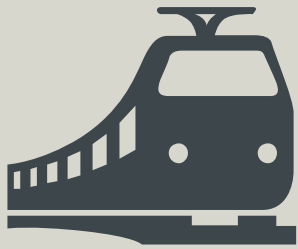


Automated  
failure prediction



# Data analytics models need to combine data science with domain expertise to guarantee customer value creation

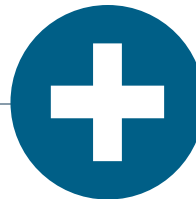
## Data



## Problem: Prediction of rare events

### Data mining/machine learning

- State-of-the-art algorithms
- Siemens' intellectual property, several patents pending
- Innovative analytics approaches



### Deep domain expertise

- Engineering knowledge
- System simulation results
- Design expertise

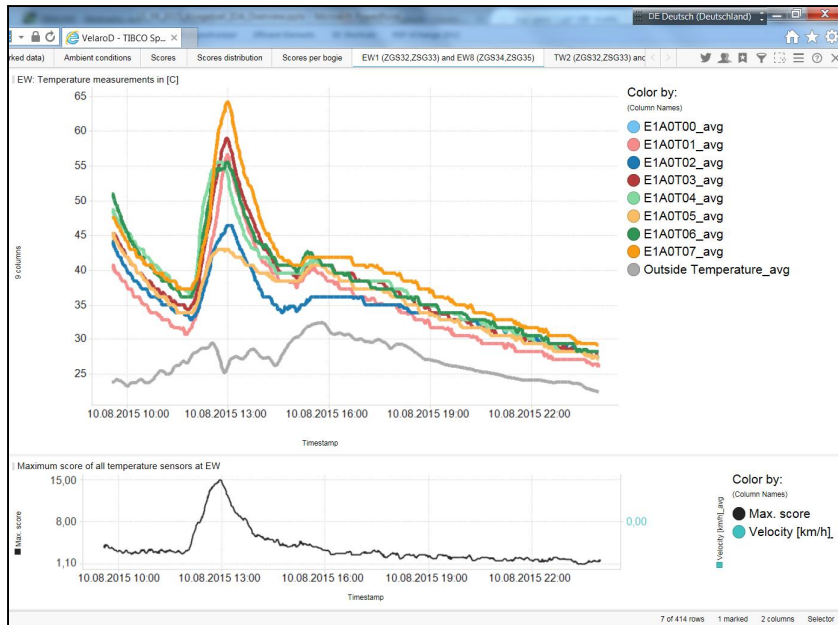
## Insights

**Validated action proposal from domain experts**

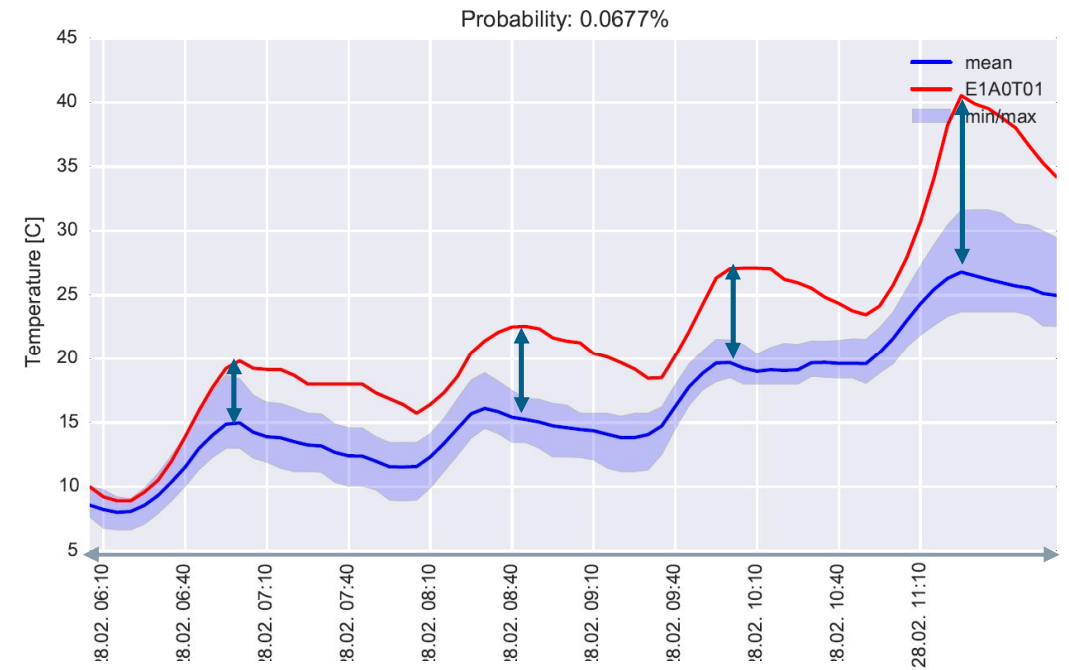


# Example: Data-driven model development for bearings

From manual data discovery ...



... to a dynamic machine-learning model





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Thank you.