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

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.
Train data ensures “no surprises” for operations

Value drivers

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

<table>
<thead>
<tr>
<th>Data mining/machine learning</th>
<th>Insights</th>
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<tbody>
<tr>
<td>- State-of-the-art algorithms</td>
<td>Validated action proposal from domain experts</td>
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<td>- Siemens’ intellectual property, several patents pending</td>
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<td>- Innovative analytics approaches</td>
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<table>
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<th>Deep domain expertise</th>
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<tr>
<td>- Engineering knowledge</td>
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<td>- System simulation results</td>
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<td>- Design expertise</td>
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Example: Data-driven model development for bearings

From manual data discovery …

… to a dynamic machine-learning model

Probability: 0.0677%
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Thank you.