Machinery With Longevity - How Condition-Based Maintenance (CBM) Is Transforming Industries

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NCS Digital

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Agenda

• Introduction
• Condition-Based Maintenance (CBM)
• Escalator CBM
• Train CBM
• Conclusion
NCS Data Scientist Team

>30 Data Scientists
Ph.D., Masters, Bachelors

Data Science Skills
Anomaly detection, time series analysis, text analytics, optimisation etc

Cross-Disciplinary Team
Statistics, Machine Learning, Computer Science, Engineering, Business, Psychology

Software Competencies
R (e.g. H2O), Python (e.g. TensorFlow), SAS, SPSS, Watson

Cross-Industry Projects
Transport, Defence, Public Safety, Education, Healthcare, Commercial, FSI etc

Completed Meaningful / Iconic Projects
Since January 2015
NCS End-to-End Data Science Coverage

1. Data sources
   - Customer (1st party data)
   - Sensors (Wearables, IoT, M2M, Video)
   - Telco network (cellular, wifi, weblogs)
   - Open source

2. Data preparation & management
   - Business intelligence, reports & dashboards, for planning & operations, chatbots
   - Data warehousing & Big Data: ETL, Data quality management, Storage, Metadata management, OLAP, Hadoop

3. Data modeling & sense-making
   - Foundation analytics
   - Network analysis
   - Distributed analytics
   - Complex event processing
   - Text analytics
   - Forecasting
   - Optimisation

4. Deployment & visualisation
   - Actionable insights for CBM
Condition-Based Maintenance (CBM)
Escalator CBM
Escalator Maintenance Challenges

• Frequent escalator incidents
  – Breakdowns or service interruptions
  – Trapped or even injured passengers

• Escalator data availability issues
  – Sensor data collected in near real-time but belongs to third party
  – Escalator fault and bio data are augmented with building-related data

• Escalator design complexity and significant resource constraints
Train CBM
Rolling Stock Maintenance Challenges

• Minimal capabilities for real-time monitoring of rolling stock
  – Currently doing breakdown maintenance (which is reactive) and preventive maintenance (which is limited by maintenance schedule)
  – Sensor data transmission may be an issue
• Difficulty to troubleshoot issues due to rolling stock design complexity
  – Multiple train variants
  – Not sure if diagnostic, fault and workshop data is all available and of good quality
• Significant resource constraints
  – High rolling stock utilization
  – Maintenance crew and depot unavailability
  – Spare part unavailability
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How to be Successful in CBM?

Data Scientists

Technology Experts

Maintenance Experts

Machines with Longevity
Questions?

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