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Manufacturing Data Platform

The role of predictive maintenance

How to collect and analyze data from various sources to identify patterns and anticipate maintenance needs.

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" Another flaw in the human character is that everybody wants to build, and nobody wants to do maintenance.

Kurt Vonnegut

A huge opportunity for data-driven automation and decision support!

Today's agenda

Industry 4.0 and Manufacturing Data Platform

01

All about Manufacturing Data Platforms

02

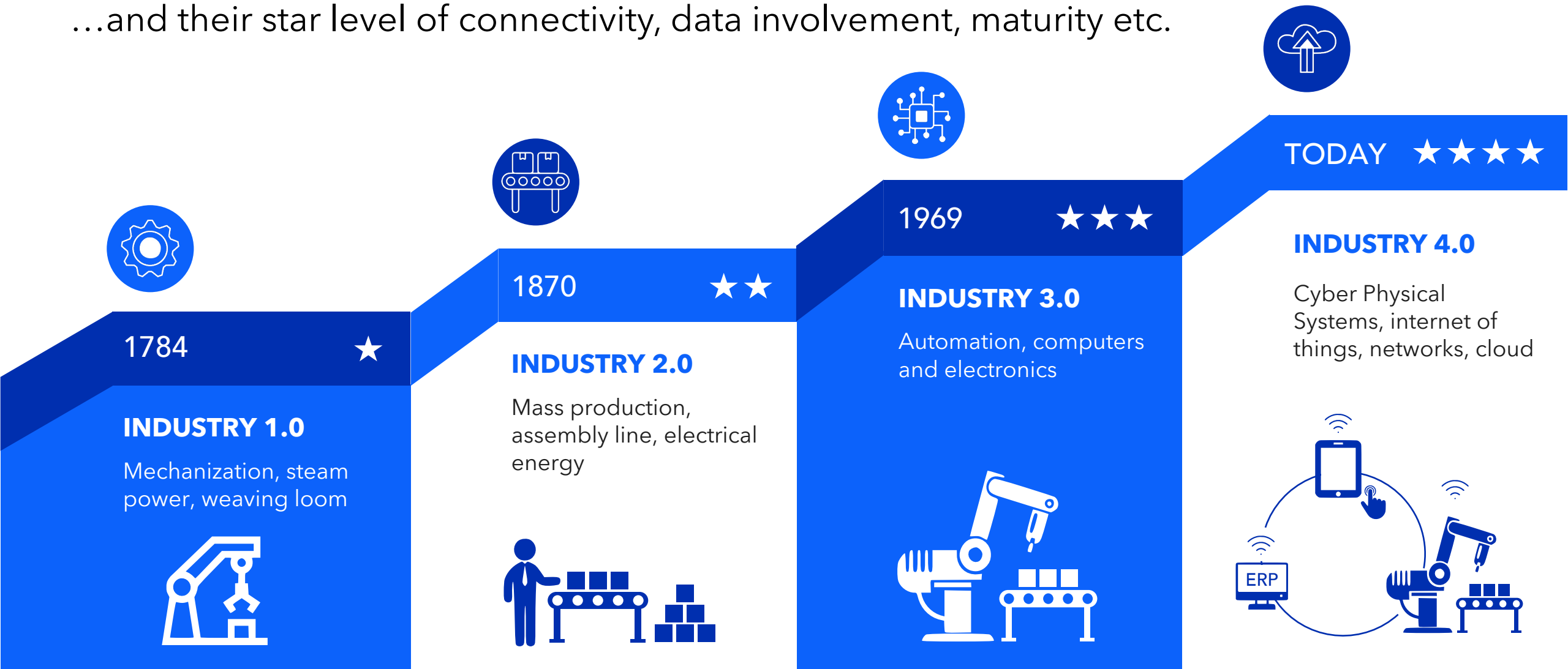**The role of predictive Maintenance**

03

Where are we now and where to go next?

04

Industry stages...

...and their star level of connectivity, data involvement, maturity etc.

TODAY ★ ★ ★ ★

INDUSTRY 4.0

Cyber Physical Systems, internet of things, networks, cloud

1969 ★ ★ ★

INDUSTRY 3.0

Automation, computers and electronics

1870 ★ ★

INDUSTRY 2.0

Mass production, assembly line, electrical energy

1784 ★

INDUSTRY 1.0

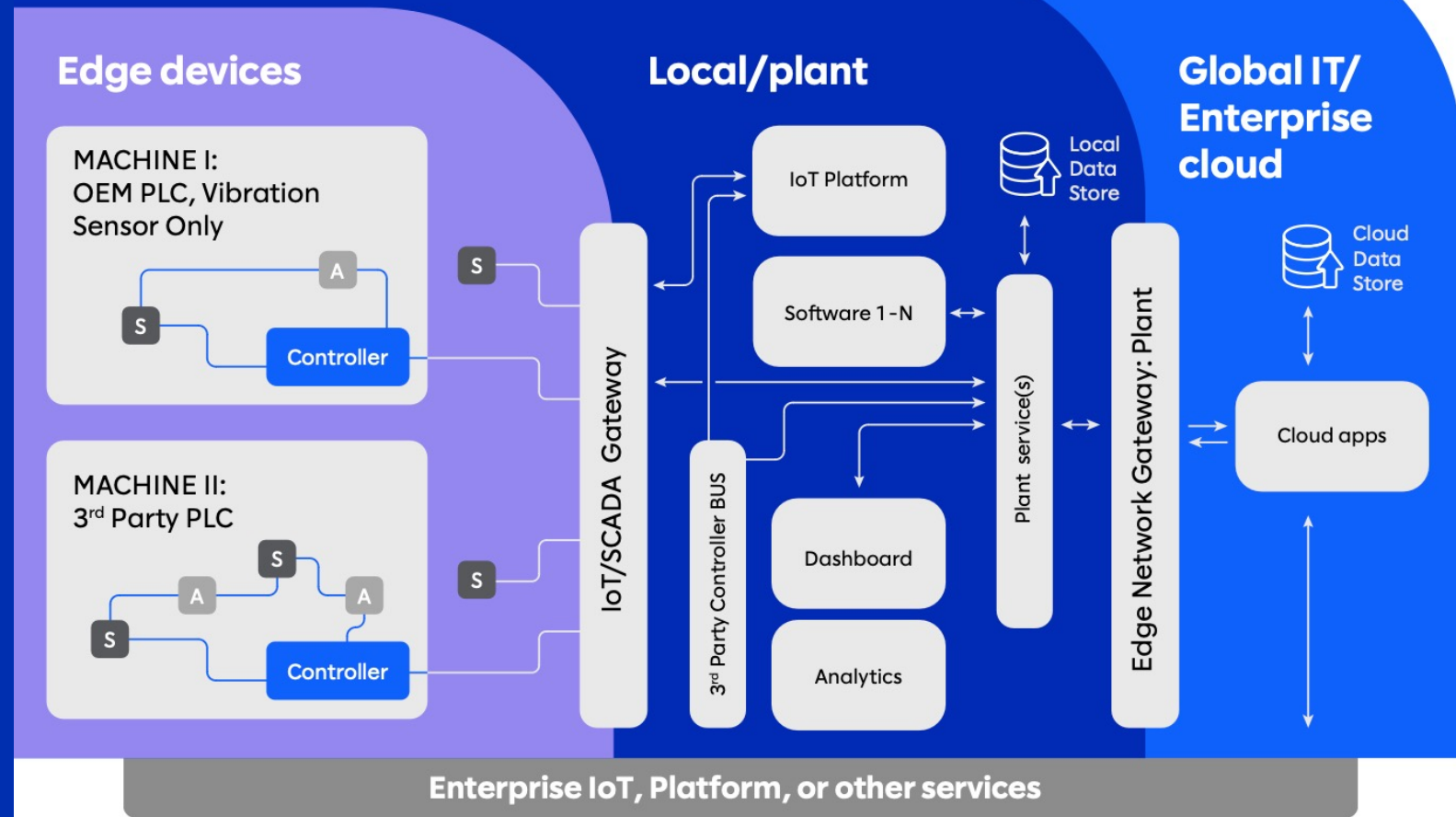Mechanization, steam power, weaving loom

ERP

Manufacturing Data Platform

Components of MDPs

Manufacturing Data Platform

Centralized system that collects, processes, and analyzes real-time data from various sources to real-time data to optimize manufacturing processes

Edge devices

MACHINE I:
OEM PLC, Vibration Sensor Only

S — A — Controller

MACHINE II:
3rd Party PLC

S — A — S — A — Controller

Local/plant

IoT/SCADA Gateway

IoT Platform

Software 1-N

3rd Party Controller BUS

Dashboard

Analytics

Plant service(s)

Local Data Store

Edge Network Gateway: Plant

Global IT/ Enterprise cloud

Cloud Data Store

Cloud apps

Enterprise IoT, Platform, or other services

Data Collection

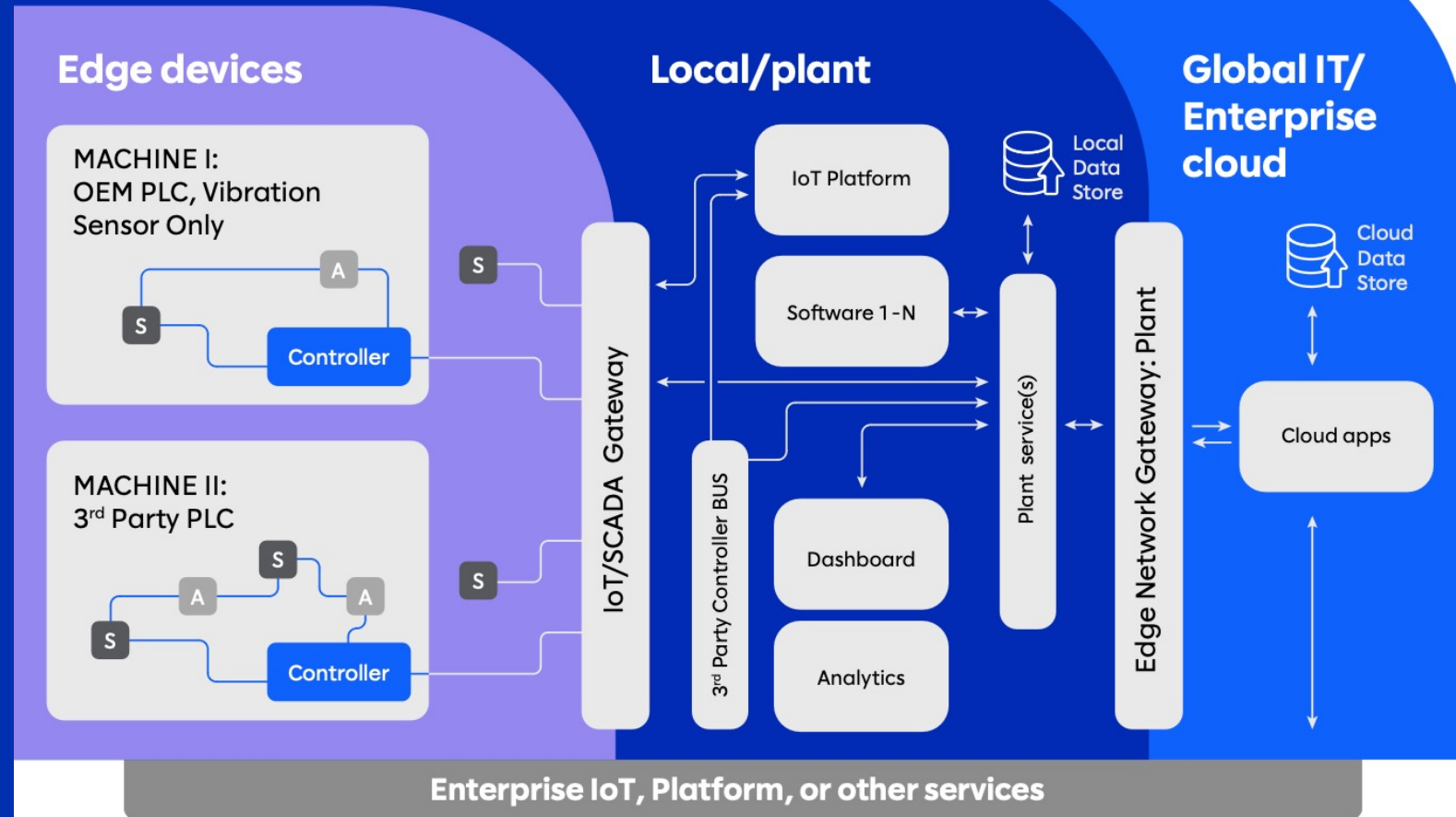Edge Devices

Analytics tools

Data Storage and Processing
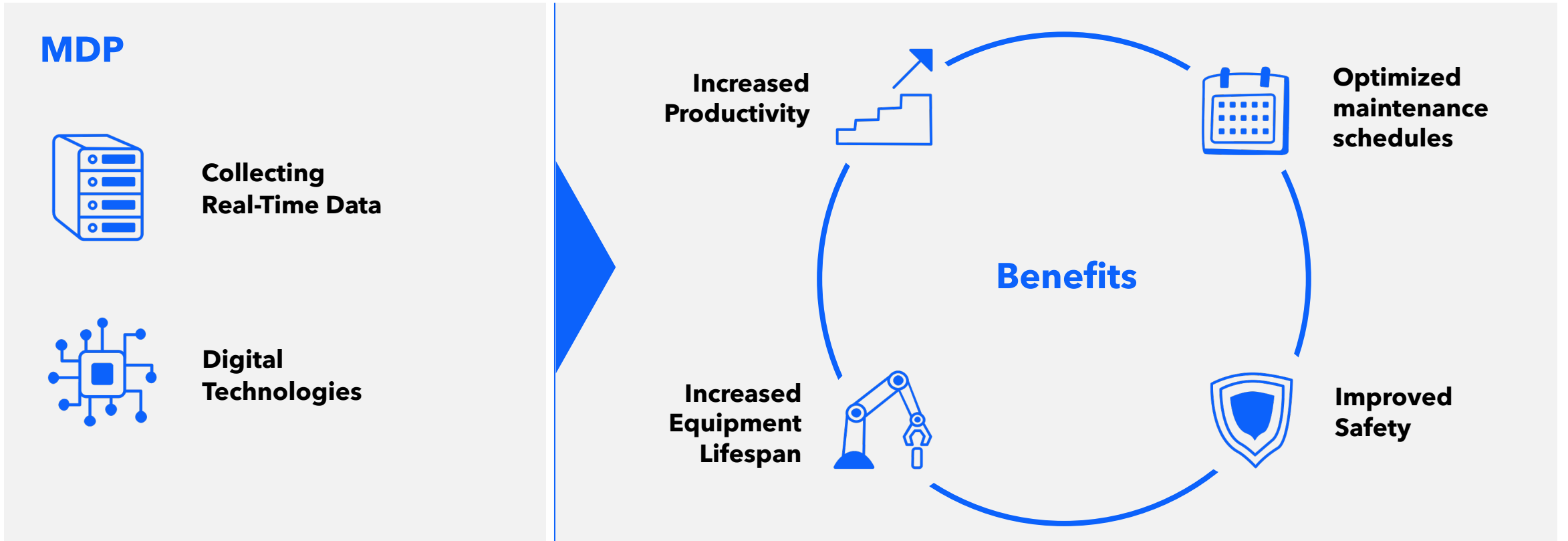
Visualization dashboards

Technical aspects of MDPs

Integration of data sources & Infrastructure requirements

01
Data collection & aggregation

02
Data storage & processing

03
Data integration & normalization

04
Data security

05
Cloud vs. on-premise deployment

06
Analytics & visualization tools

07
Machine Learning algorithms

The benefits of predictive maintenance

Manufacturing Data Platforms

MDP

Collecting Real-Time Data

Digital Technologies

Increased Productivity

Optimized maintenance schedules

Benefits

Increased Equipment Lifespan

Improved Safety

How to adopt predictive maintenance approaches

Manufacturing Data Platforms

Select and implement a MDP

Identify critical equipment/failure modes

Define clear goals and metrics

Implement predictive maintenance actions

Train employees

Monitor and continuously improve

Why Predictive Maintenance is **NO** magic!

01

Build a Manufacturing Data Platform

02

Apply Algorithms to the collected data.

(= Machine Learning)

03

Act based on the ML models, predictions and recommendations.

Or even better: AUTOMATE

04

Monitor your improvement.

For YOU and for OTHERS!

Thank you!

Let's connect

Stephan Theis
Data & Analytics Lead Germany

Client
Stories

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Powering Predictive Maintenance with Machine Learning

Industrial Internet of Things | Machine Learning

WHY

Traditional Predictive Maintenance:
Using human-coded thresholds, alert rules & configurations

Disadvantage:
- Time-consuming and semi-manual
- Doesn't consider more complex dynamic behavioural patterns of the machinery/contextual data
- Likely to trigger false alerts

Solution:
- Strategically fine tuning the alert system by leveraging sensor data & modern machine learning techniques

WHAT

Problem
- Developed machine learning models for predicting parts quality produced on three initial lines in 6 weeks

- Model: Sends in regular intervals email alerting engineers of parts that have potential quality issues & tools that need proactive maintenance

- Enhanced the data preparation process with Python using feature engineering techniques like feature importance/principal component analysis

- Identified best paramaters by leveraging grid search CV, ensemble, regression & anomaly detection methods

- Result: Predicting 81% of total parts that had quality issues. And accurately predicting 70% of total tools that needed early maintenance

WOW

$3m.
Reduction in annual total cost for scraping parts per plant

14%
Reduction in annual total part scraping cost per plant

1
Co-patent filling in process

Manufacturing Inventory Management Automation

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Inventory Management Automation | Alteryx

WHY

- Manufacturers can no longer relying on paper-trail reports to manage their inventories.

- The establishment of overall data lake using Big Data platforms allows information to be created among plants, supporting new opportunities as well as enabling enhancements to existing capabilities.

- The art of modern data management using advanced tools like Alteryx, has enabled created solutions to automate traditional tasks rely on papers.

WHAT

- Created an Alteryx app that allowed the client to generate a custom report with full traceability of parts by their serial numbers.

- Through interactive drag-and-drop functions and filters, management can create custom reports.

- This app also allows management to import reports from a third party supplier for identifying mismatches.

- Using this app, management can quickly pinpoint any missing parts coming in and out of the plant.

WOW

$0,5m.
Reduction in annual total cost for scraping parts per plant

70%
Reduction in time spent on chasing missing production materials

10%
Through put improvement

Manufacturing Traceability and Root-Cause Analysis

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Qlik | Data Analytics | Data Visualization

WHY

- The rise of the Industrial Internet of Things (IIoT) and Industry 4.0 has heightened expectations that a supplier or manufacturer has the production traceability and component traceability to provide a detailed data trail to provide quality assurance in manufacturing.

- A visual tool containing history of production and detail records by serial numbers can ensure any outsourced material, part or sub-assembly produce for customers is not the weak link in their supply chain.

WHAT

- Created a QlikView dashboard capturing data generated by each cycle of a process and test while allowing management and engineers to identify root cause for part failures and rejections.

- Through this dashboard, management and engineers can trace a part by time, test, and model to confirm causes of failures.

- The dashboard also allows management and engineers to evaluate the test results of each part and analyse its trend for assessing the quality of testing machines.

WOW

$60k
reduction in annual labor cost/plant

$60k
reduction in annual production cost/plant

This interactive visualization tool will assist clients with identifying root causes for rejected and failed parts resulting in savings in production and overtime labor costs, increasing jobs per hour, reduction in downtime, and enhancing equipment maintenance efficiency.

Management, tooling engineers, plant floor workers and other plant personnel can fully utilize this tool.