IoT und künstliche Intelligenz für die Steigerung der Produktivität bei Automobilzulieferern

Harald Lösch & Stefan von Wittgenstein

Where today meets tomorrow.

Siemens Cloud Solutions / MindSphere IoT

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MindSphere is designed and developed by Siemens for <u>IoT</u> in <u>Industrial Environment</u>.

Siemens provide <u>Solutions</u> for Electrification, Automatization and Digitalization. <u>IoT</u> and <u>Cloud is</u> fundamental <u>core technology</u>.

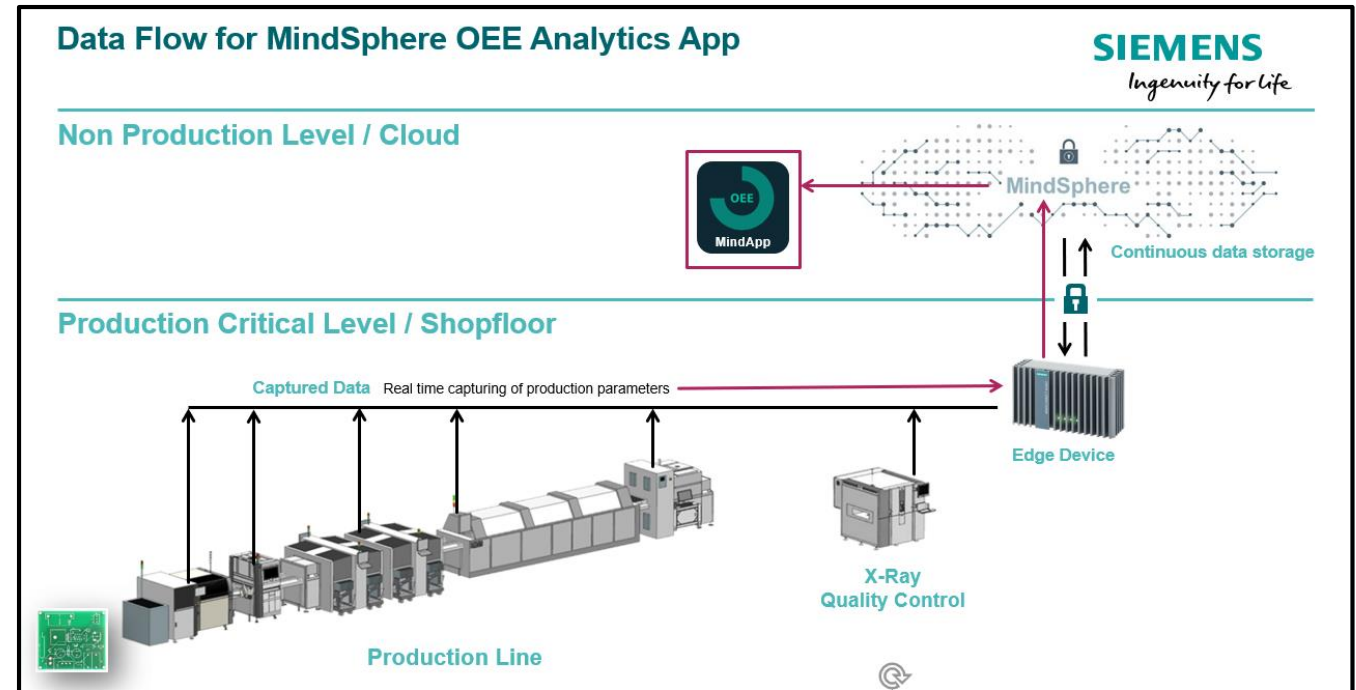Siemens is committed to open standards.

Siemens support heterogeneous manufacturing environments.

Industrial <u>Edge</u> Technology <u>is key</u> for future solutions.

Siemens Digital Industries Software

IoT in Automotive Supplier Industry
Line Monitoring & Data Driven Decision Making

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1. Line Monitoring

… get IoT Data
from production line
to perform …

Data Flow for MindSphere OEE Analytics App

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Non Production Level / Cloud

MindSphere

OEE MindApp

Continuous data storage

Production Critical Level / Shopfloor

Captured Data   Real time capturing of production parameters

Edge Device

X-Ray
Quality Control

Production Line

2. Data Driven
Decision Making

Siemens Digital Industries Software

Bold. Committed. Open Minded.

Siemens AI Lab

The platform for AI based innovation projects and community exchange

Projects

You want to learn about AI?
Orientation *Workshop*

» See the big picture of AI opportunities
» Identify your very own use case
» Learn what it takes to get started

8 hours

Format: Team Workshops

You want to build something with AI?
Acceleration *Sprints*

» Bring your very own use case
» Work with a committed team of experts
» Fail fast or win big

5 days

Format: Coding Sprint

You want to break new grounds in AI?
Exploration *Research*

» Dive into unexplored fields of AI
» Work with top-level research interns
» Generate scalable research results

9 months

Format: Researcher in Residence

Events

Inception *Exchange*

Stay in touch with an AI-soaked future

Discuss new chances and emerging tensions

Create joint opportunities

∞

Hackathons, Meetups & Talks, Open Events

AI Lab Enablers

AI Experts   Business Experts   Integration Experts   Innovation Experts

AI Lab Key Topics

Deep Learning   Natural Language Processing   Knowledge Graphs   Reinforcement Learning   Data Analytics   Predictive Maintenance   Chatbot/Virtual Assistant   Responsible AI   Big Data
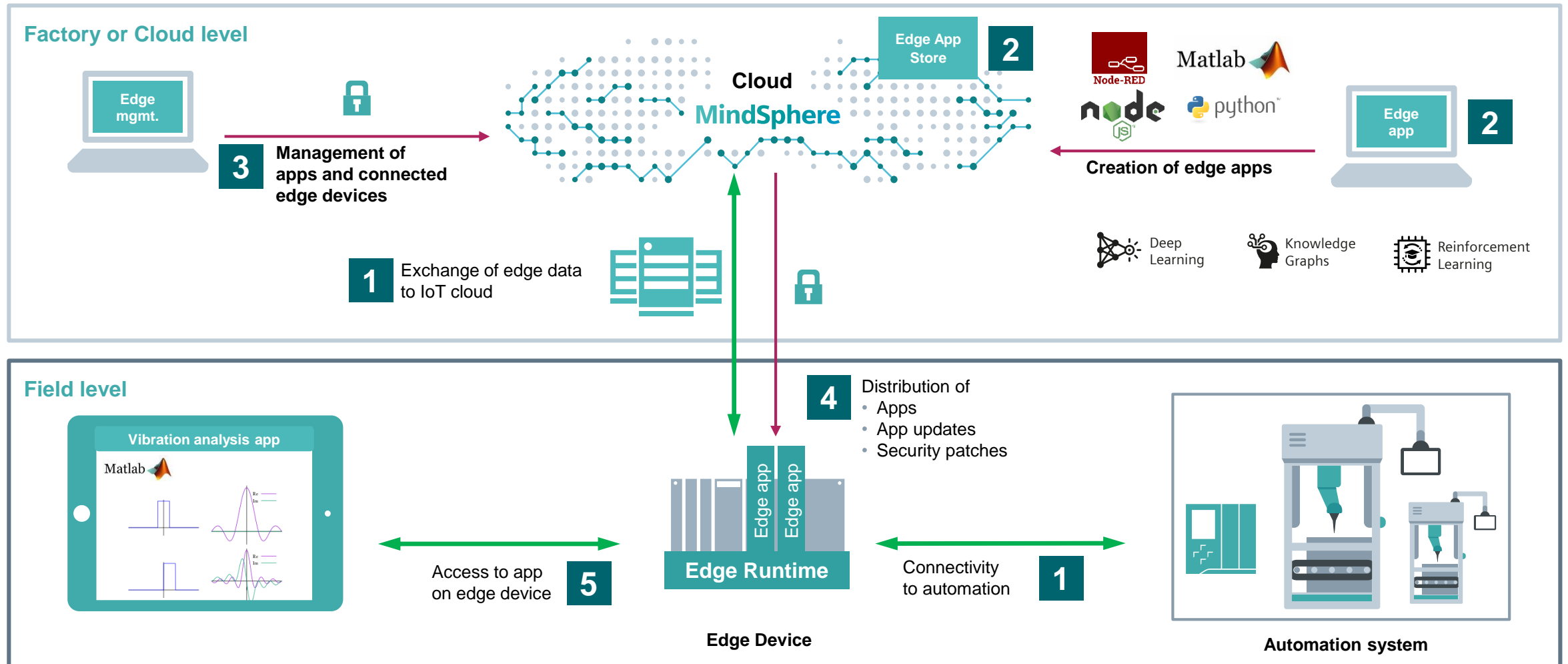
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Use Case: Siemens Industrial Edge
Operations Management Overview

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Factory or Cloud level

Edge mgmt.

3 Management of apps and connected edge devices

Cloud
MindSphere

Edge App Store **2**

Node-RED
Matlab
node JS
python
Edge app **2**

Creation of edge apps

Deep Learning

Knowledge Graphs

Reinforcement Learning

1 Exchange of edge data to IoT cloud

Field level

Vibration analysis app

Matlab

4 Distribution of
- Apps
- App updates
- Security patches

Edge app Edge app

Edge Runtime

Access to app on edge device **5**

Connectivity to automation **1**

Edge Device

Automation system

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MindSphere IoT Solutions Capabilities:
Line Monitoring & Data Driven Decision Making

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Line Monitoring

OEE Calculation (real-time, global) / Digital Machine Logbook

Performance Monitoring / Alarm Handling

Campus Network (5G, 4G Advanced, Naro-Band IoT)

Data Driven Decision Making (Artificial Intelligence)

Quality Control based on Production Parameters

Identify Root Cause of Failures

Predictive Monitoring / Avoid Unplanned Stops

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MindSphere – How we start

SIEMENS

Manage MyMachines

Manage MyMachines from Siemens Motion Control leverages expertise in machine tool operations in state and conditions including alarms.

Learn More >

SIEMENS

SIMATIC Performance Insight

Improves machine productivity for various industries with worldwide access to machine data to visualize machine conditions that help improve productivity.

Learn More >

SIEMENS

Analyze MyPerformance /OEE-Monitor

Observe your machine utilization and increase its performance with Analyze MyPerformance /OEE-Monitor.

Learn More >

MindSphere

Sinumerik Controller

Simatic Controller

Edge / Line PC

Machine

Machine
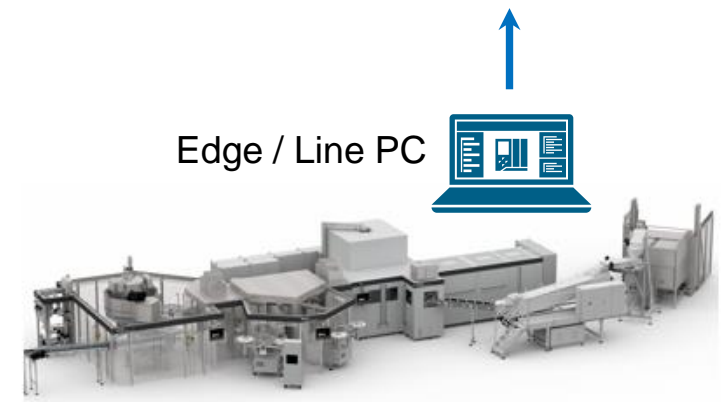
Line

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MindSphere for Automotive Tiers – Smart Factory

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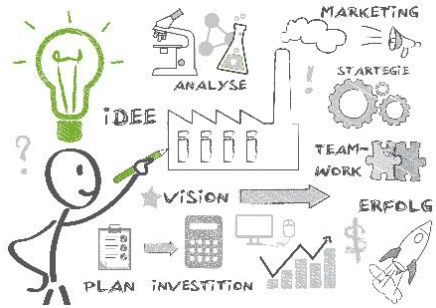
Product Development
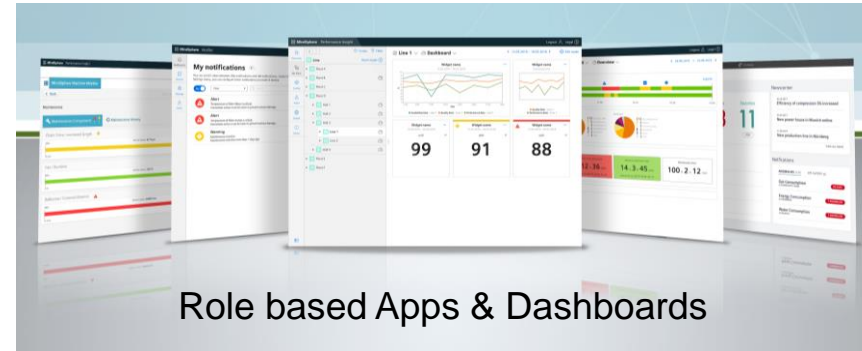
Role based Apps & Dashboards

Public Data

SAP
Customer Order

MES
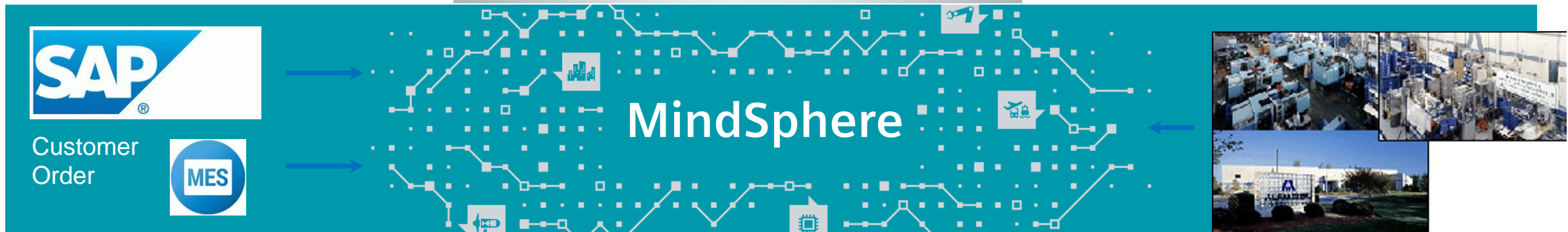
MindSphere

Customer Facility

MES / CAQ Historian Data

Line PC

Line

Sinumerik Controller

Machine

Logistic Indoor / Outdoor

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Partner Solutions in MindSphere App Store

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Patti Engineering
CNC PIPM

CNC PIPM can establish the connection with any CNC machines regardless of communication protocols.

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Edge2Web® Inc.
Edge2Web Director

Develop high-powered MindSphere dashboards and applications in hours using Edge2Web Director's visual app builder platform.

mehr lernen →

piagroup
piaMonitor

Enable deep insights into ongoing production processes allowing better centralized management decisions for worldwide production.

mehr lernen →

AUNOVIS GmbH
Power Dashboards

Provides a dashboard for MindSphere assets and aspects. Power Dashboards is based on the manifold, impressive and aesthetic visualization possibilities.

mehr lernen →

Rittal GmbH & Co. KG
Rittal Smart Service

Increase machine availability, reliability and efficiency in your production by using Rittal Smart Service for intelligent remote monitoring.

mehr lernen →

seioTec GmbH
seiotecmaint

Save money and avoid unplanned downtime with seiotecmaint application for Smart Maintenance.

mehr lernen →

Senseye
Senseye™

Reduce unplanned downtime and maximize OEE with Senseye: The leading, scalable industrial predictive maintenance product.

mehr lernen →

Codewerk GmbH
Visual Hierarchy Modeler

The Visual Hierarchy Modeler enables simple and efficient visual modeling of plant and machine data structures in Mindsphere.

mehr lernen →

https://www.dex.siemens.com/mindsphere/Applications

… many more B2B Apps are available.

Ready to Use Solutions in MindSphere App Store

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Manage MyMachines
SIEMENS

Manage MyMachines from Siemens Motion Control leverages expertise in machine tool operations in state and conditions including alarms.

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Manage MyMachines /Remote
SIEMENS

Faster problem solving through remote machine tool access.

Learn More >

Manage MyMachines /Spindle Monitor
SIEMENS

Extension to Manage MyMachines enabling main spindle unit specific data collection and visualization.

Learn More >

Analyze MyPerformance /OEE-Monitor
SIEMENS

Observe your machine utilization and increase its performance with Analyze MyPerformance /OEE-Monitor.

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SIMATIC Notifier
SIEMENS

Reduce reaction times and downtimes by monitoring your assets and sending notifications right to your staff's pocket.

Learn More >

SIMATIC Performance Insight
SIEMENS

Improves machine productivity for various industries with worldwide access to machine data to visualize machine conditions that help improve productivity.

Learn More >

SIMATIC Energy Manager
SIEMENS

Increase energy efficiency and reduce energy costs using different analytics for consumption.

Learn More >

SIMATIC Machine Monitor
SIEMENS

Track your maintenance intervals and monitor the productivity of your connected production machines for an optimized machine service.

Learn More >

Predictive Learning
SIEMENS

Schedule predictive maintenance, predict product performance and increase operational efficiency.

Learn More >

https://www.dex.siemens.com/mindsphere/Applications

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SIMATIC Notifier
Receive push notifications on your Smartphone
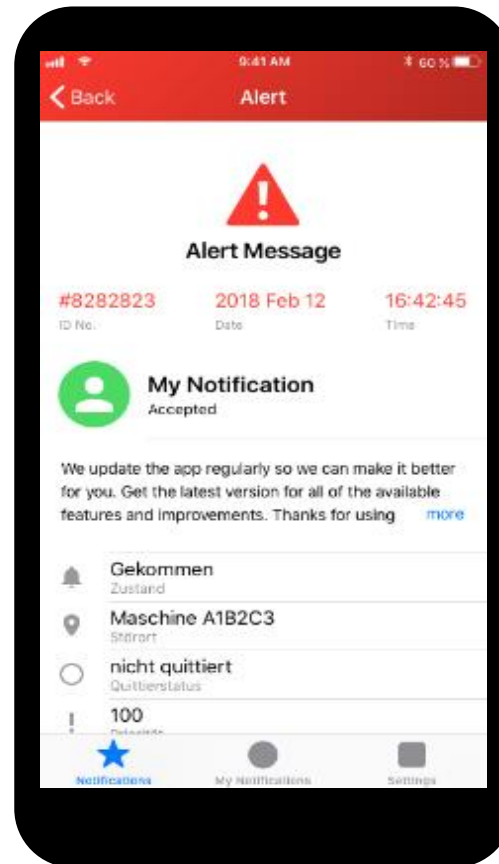
Functionality

- Notifications "to go".

- View and handle notifications on your mobile device.

- Receive and track notifications based on individual configured messages e.g. info, warning and alert

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Notifier Mobile App available in App Stores
Apple App Store and Google Play

Siemens Digital Industries Software
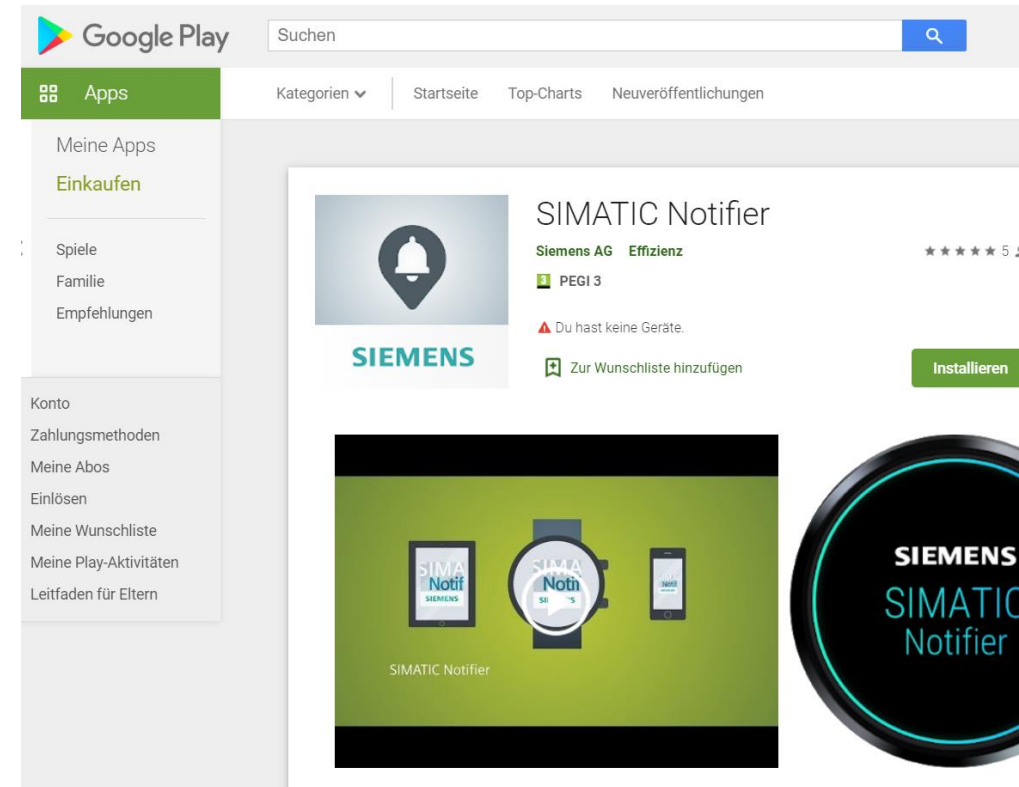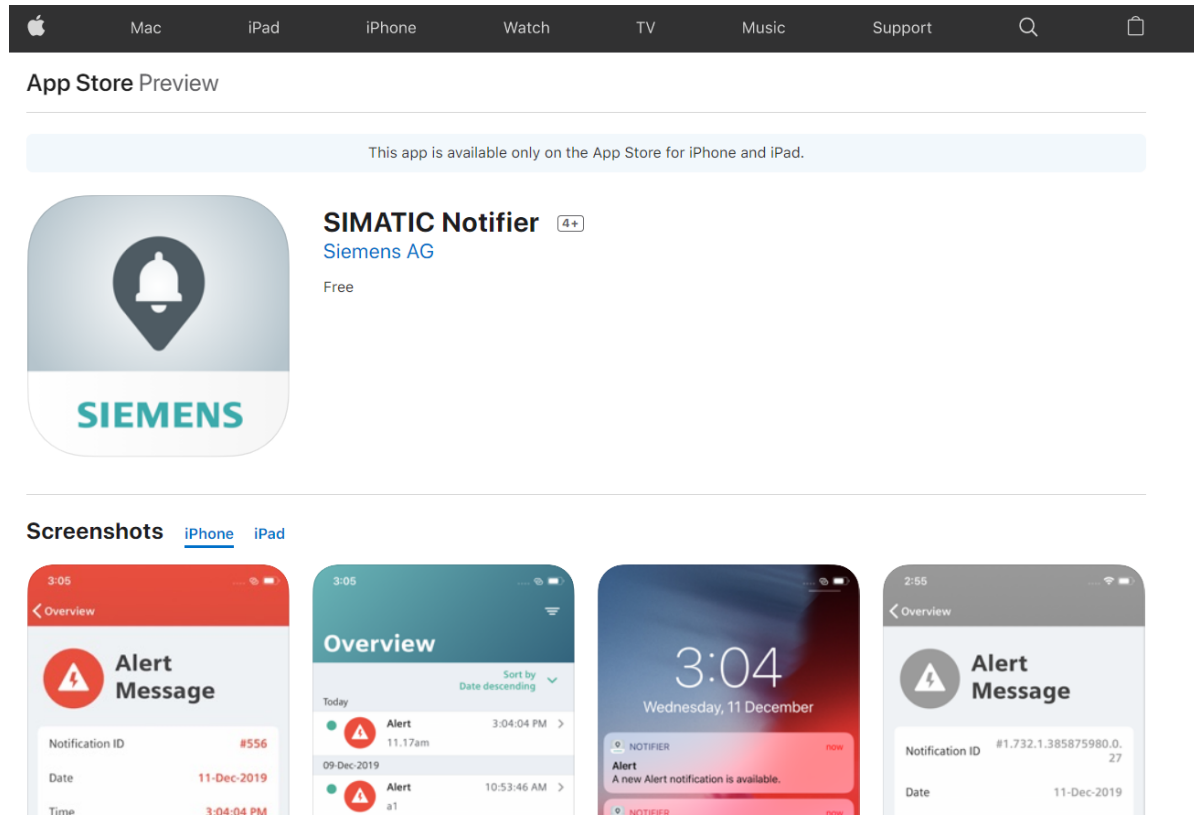
The Leading Low Code Platform for the Enterprise
Build better apps faster while relieving pressure on IT resources

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mx mendix

Model-driven Development
Visual modeling is 10x faster

Business & IT work together
Built for Citizen Developers, Engineers and Pro Developers

Multi-Experience
Cloud-native, API-first, smart, any device, any channel

Deploy to *any* cloud with a single click
No time waiting for environments to be provisioned

Maximize re-use
Enforce standards and go *even faster* next time!

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Cloud-based, open IoT operating system: MindSphere

Product Lifecycle Management

Manufacturing Operations Management

Totally Integrated Automation

Collaboration platform: Teamcenter

Logistics

Suppliers
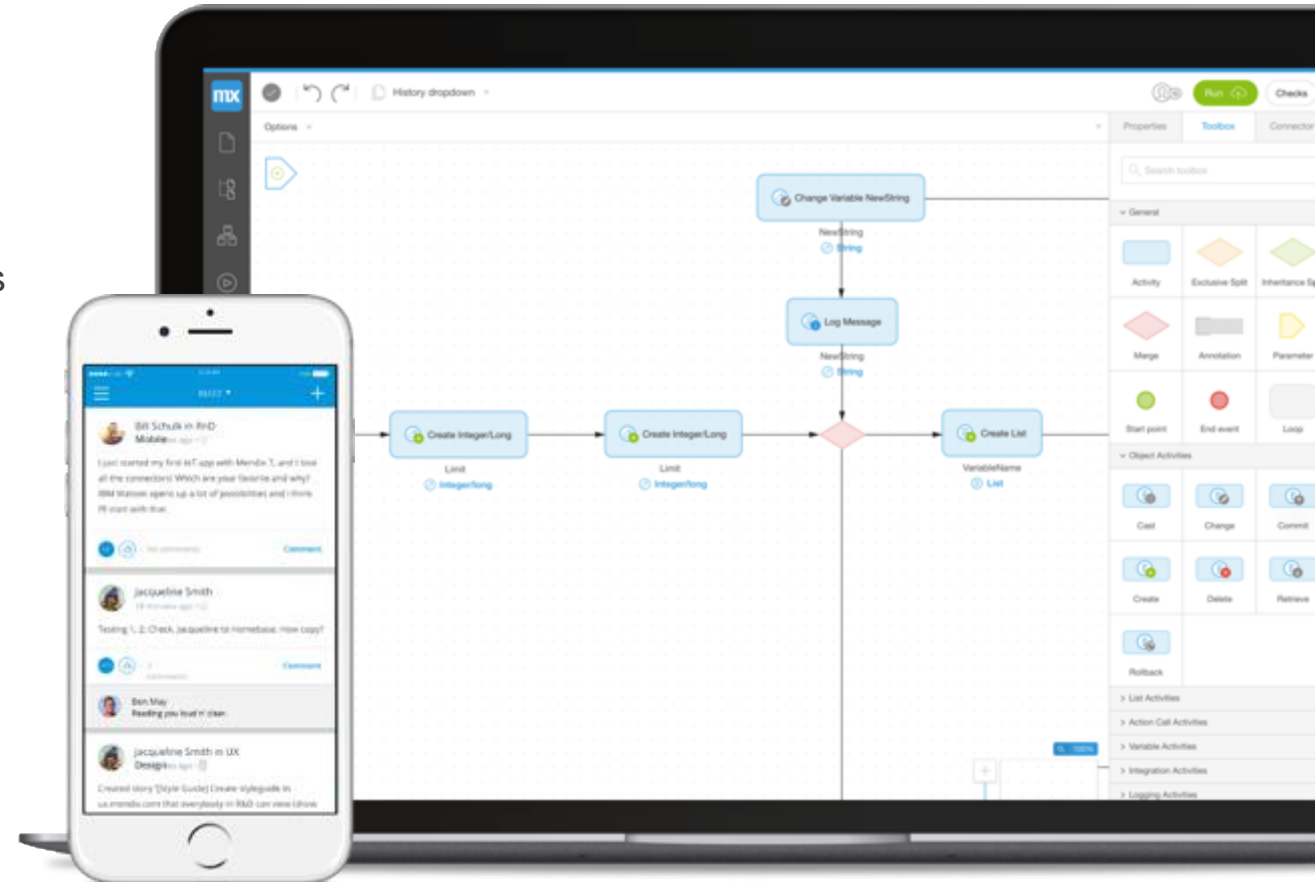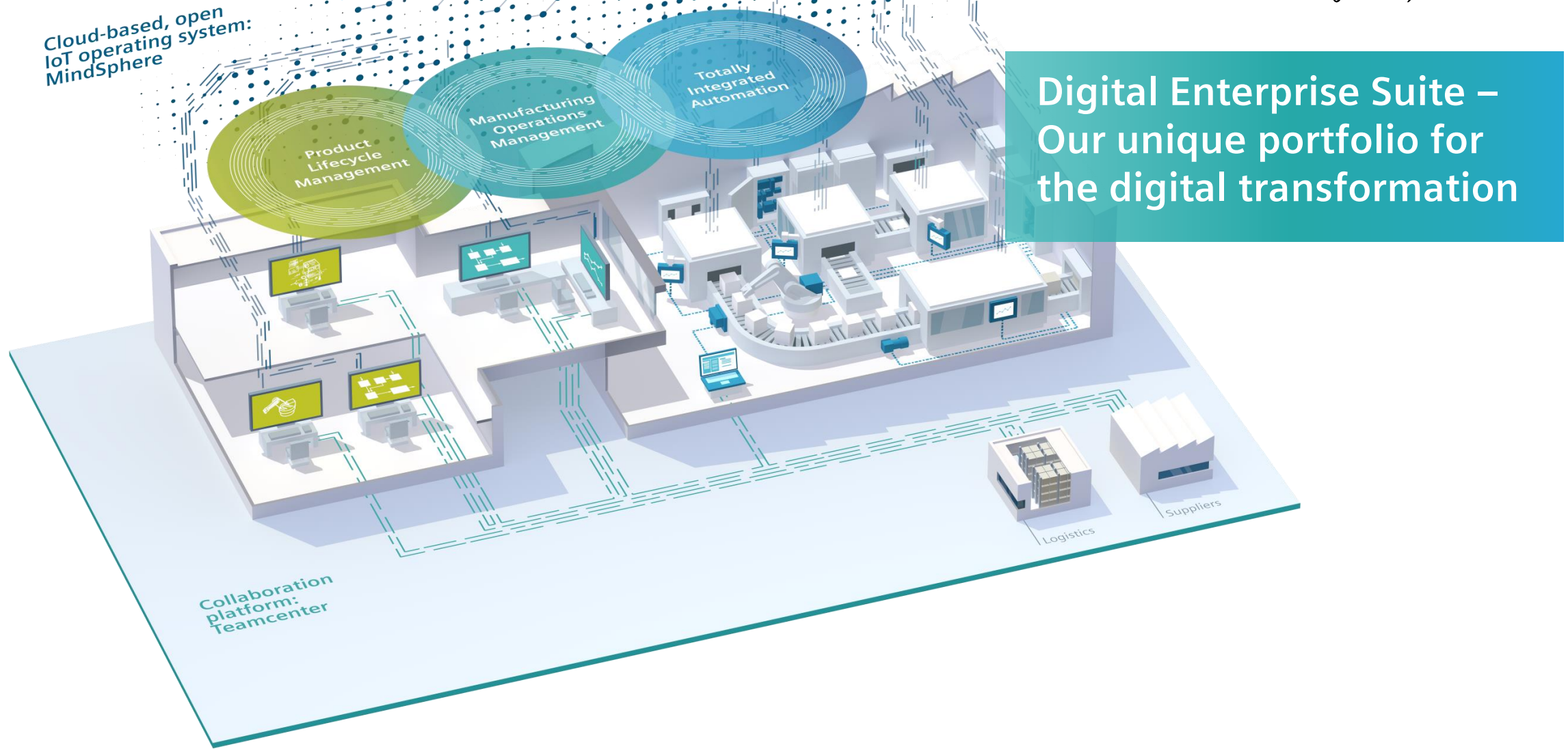
Digital Enterprise Suite – Our unique portfolio for the digital transformation

Siemens Digital Industries Software

The most holistic Digital Twin

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Digital Twin
Product

Digital Twin
Production

Digital Twin
Performance

Virtual product

Virtual production

Real production
Automation

Real product

Collaboration platform

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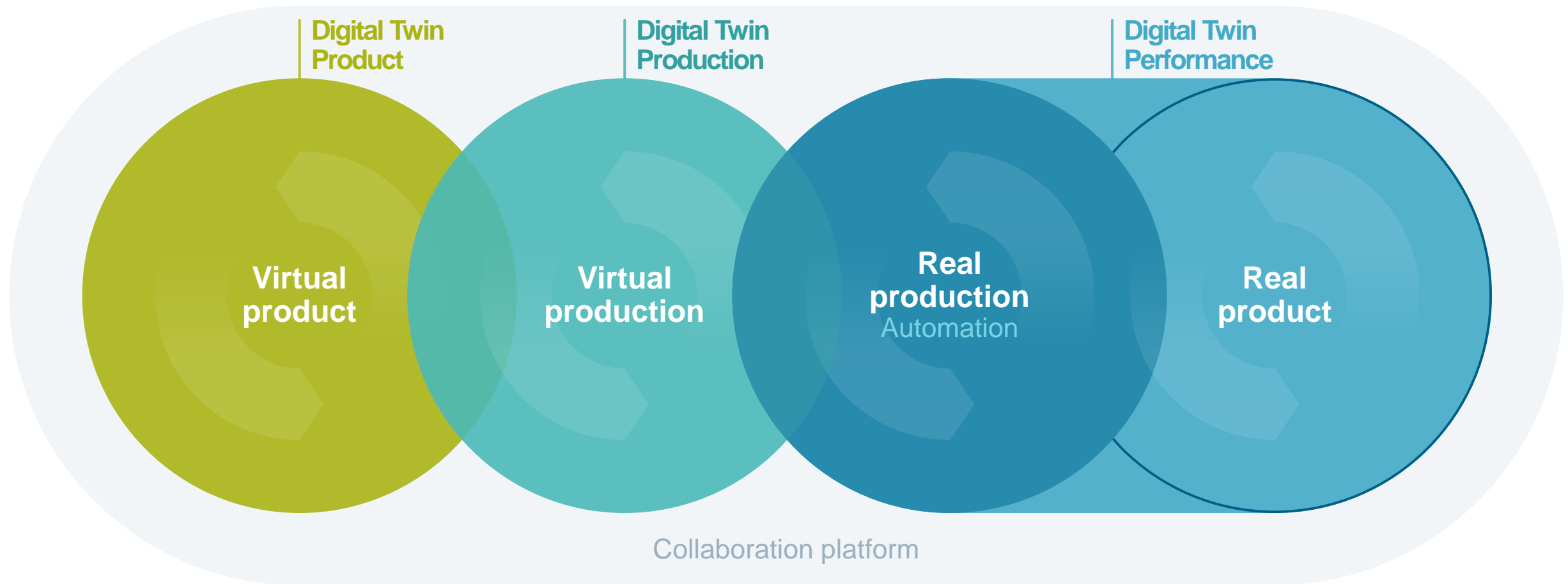
Continuous improvement with the Digital Twin

Digital Twin Product

Digital Twin Production

Digital Twin Performance

Insights from performance with MindSphere

Virtual product

Verification

Specification

Virtual production

Validation

Commissioning

Real production
Automation

Ideal delivery

Real product

Continuous improvement
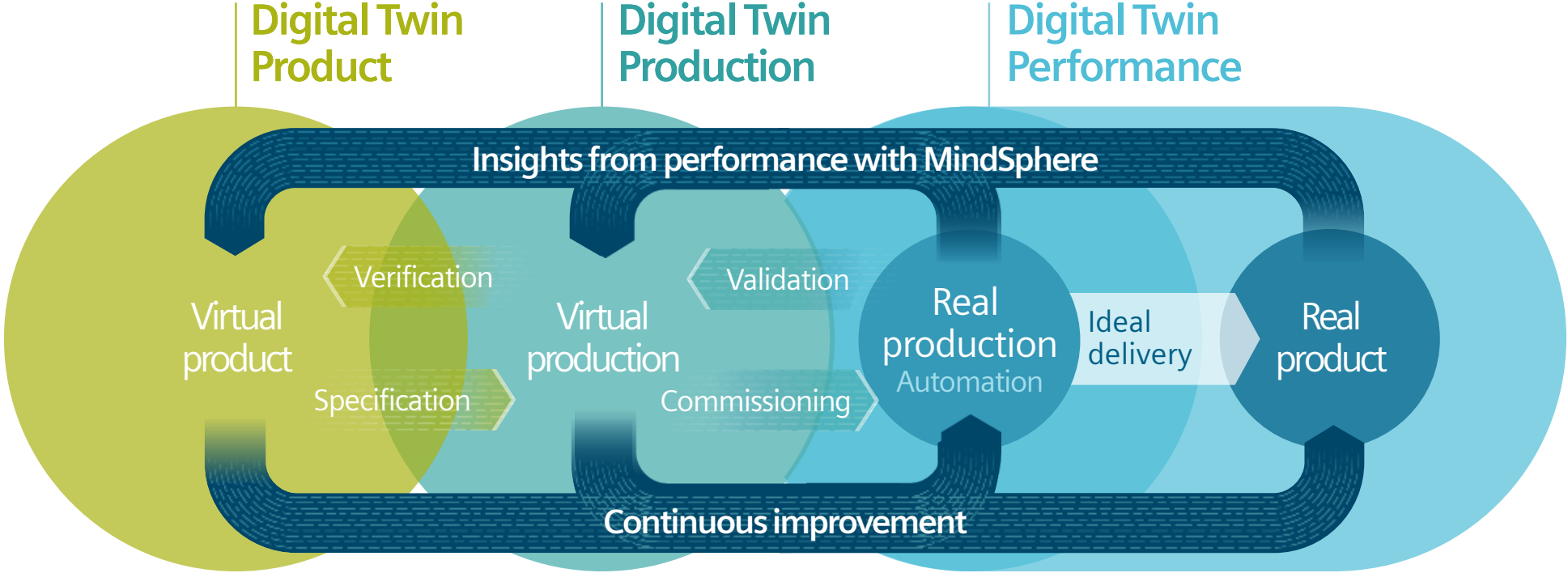
Siemens Digital Innovation Platform

Siemens Digital Industries Software

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MindSphere OEE Analytics
Globale OEE Transparenz mit Hilfe von MindSphere

Smart Machine Assistant
Maschinenbedienung mit Hilfe von Künstlicher Intelligenz

Siemens Cloud Solutions - Summary

Applications

Powerful industry solutions, advanced analytics and machine learning (AI)

mx mendix the app platform

- Robust <u>IoT Core System</u> for Industrial Environment
- <u>Serverless</u> SaaS Solution
- Global <u>Scalability</u>

MindSphere
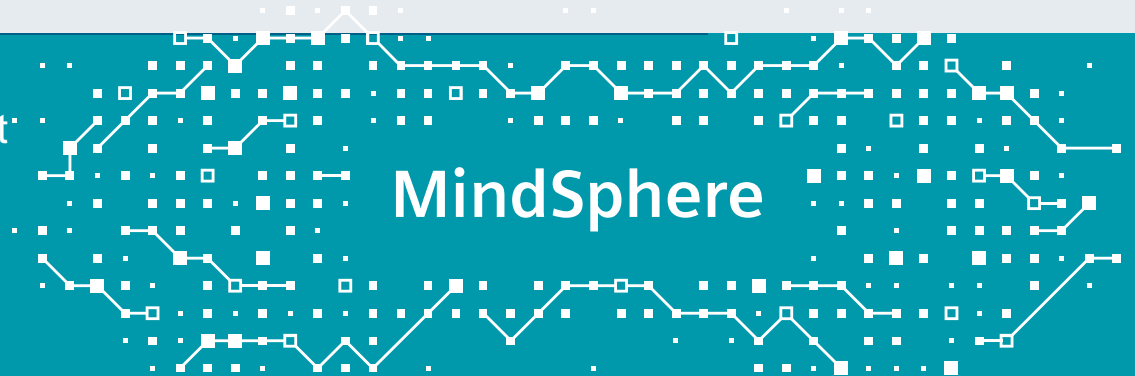
Edge Management

Edge Device Management, Edge App Management, and Edge App Store

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Connectivity

Connect products, plants, systems, machines and enterprise applications (legacy databases)

Edge Apps

Siemens, partner (OEM), and 3rd-party Edge Apps

Edge Devices

Multiple enabled devices hosting the Industrial Edge platform

Siemens Digital Industries Software

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Digital twin of the performance – Siemens Bad Neustadt
Predictive failure analysis

Context

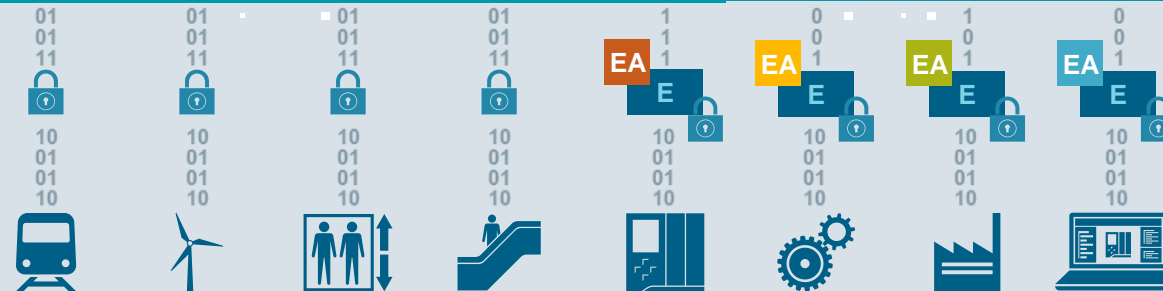- Electric motor plant in Bad Neustadt an der Saale is being developed as a showcase factory for digital applications in metalworking

Transformation results

- Predictive analysis of motor failures
- Increased machine uptime
- Improved maintenance processes
- Efficient maintenance schedule planning

Value

- Comprehensive robot and machine cycle production data collection
- Rich fleet Manager event and failure rules definitions
- Fast connectivity of KUKA robots to MindSphere
- Visual analysis of operations and cycle data

10% Reduction in downtime

Foto: Siemens Bad Neustadt

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Digital twin of the performance – Rittal GmbH & Co. KG
Smart maintenance

Challenges
- Optimizing customer production processes and cost savings through…
  - Standard collection of operational data
  - Data analysis and the ability to understand correlations
  - Visualizations of asset performance and maintenance data

Transformation results
- Collection and transmission of data from cooling and chiller units to MindSphere
- Custom applications to increase asset transparency and leverage analytics
- Implementation of predictive maintenance to limit failures and downtime

Value
- Comprehensive, customer-centric solution that enabled:
  - Increased machine availability
  - Demand driven maintenance (vs interval driven)
  - Rapidly scalability

30% Savings in service and maintenance costs

Foto: Rittal

Thank You!

Harald Lösch
Siemens Cloud Solutions - MindSphere IoT

E-Mail: Harald.Loesch@Siemens.com
Phone: +49 170 922 4661

www.MindSphere.io

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