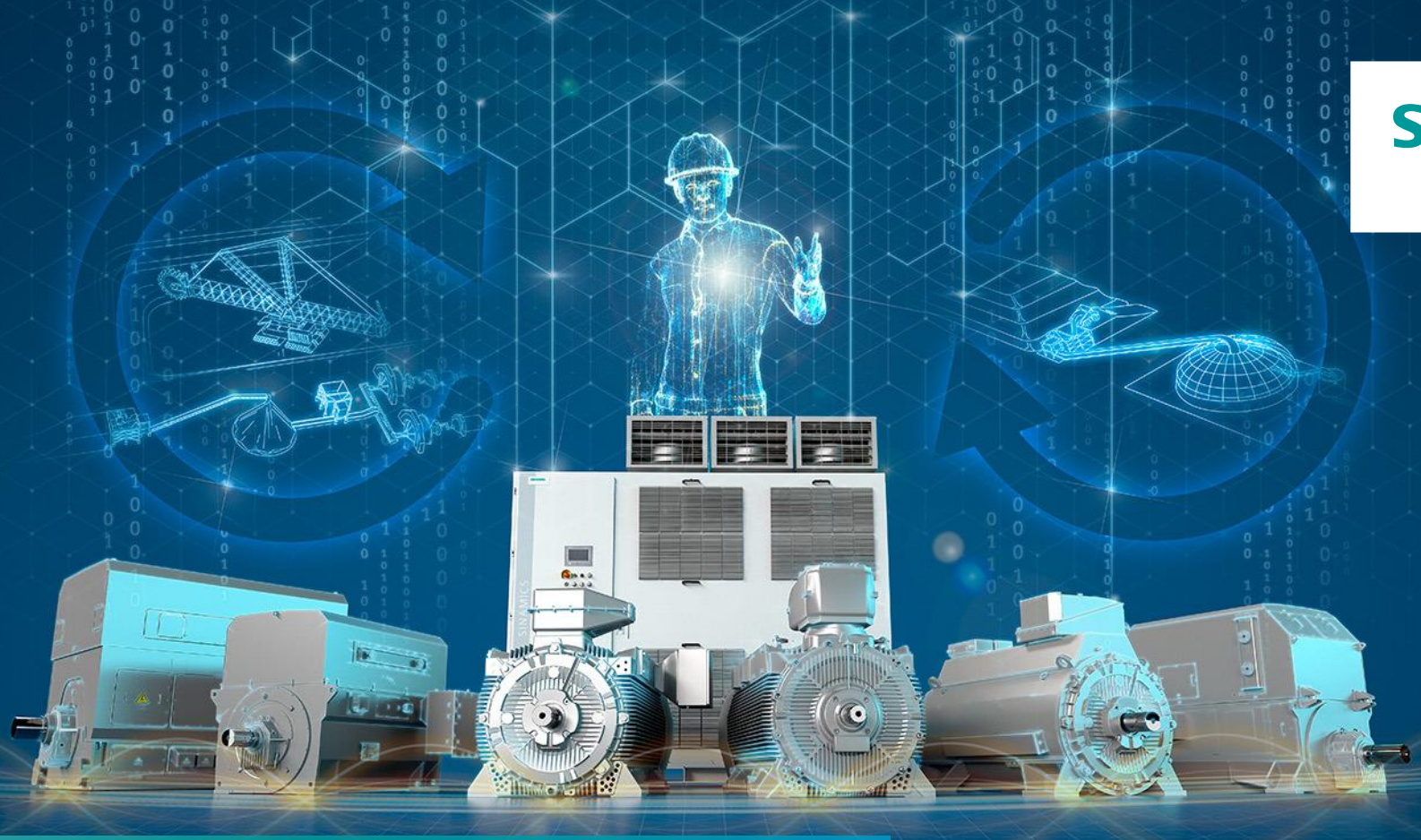

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Gerenciamiento digital de motores y VDF en media tensión

www.siemens.com/sidrive-iq

Gerenciamiento digital de motores y VDF en media tensión

Mauricio Gómez

Johannes Endres

Jorge Quinteros

Agenda

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1 Introduction

2 SIDRIVE IQ View - Augmented Reality (AR) Technology

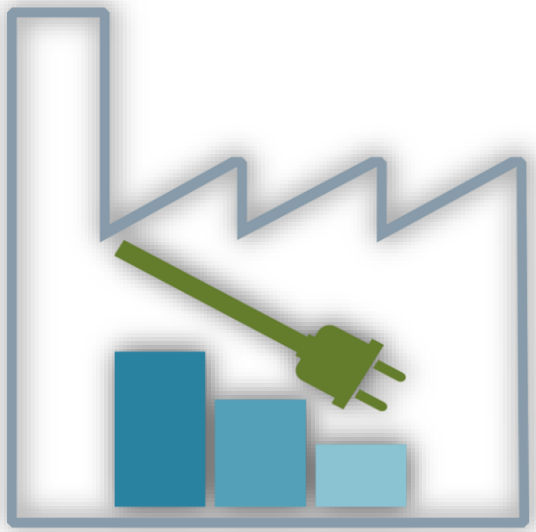
3 SIDRIVE IQ - Value add for your daily business

4 Switch to Remote Initiative – Virtual Factory Acceptance Test

5 Q&A

Mining

Trends in Mining



Our SIDRIVE IQ Connectivity Solutions
for our MV Drives and HV Motors

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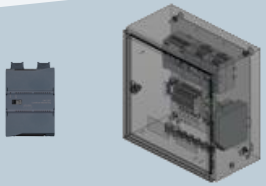
SIMOTICS

SIMOTICS HV C



SIMOTICS HV M

SIMOTICS HV HP

SIMOTICS Connect 600

SINAMICS

SINAMICS (MV)

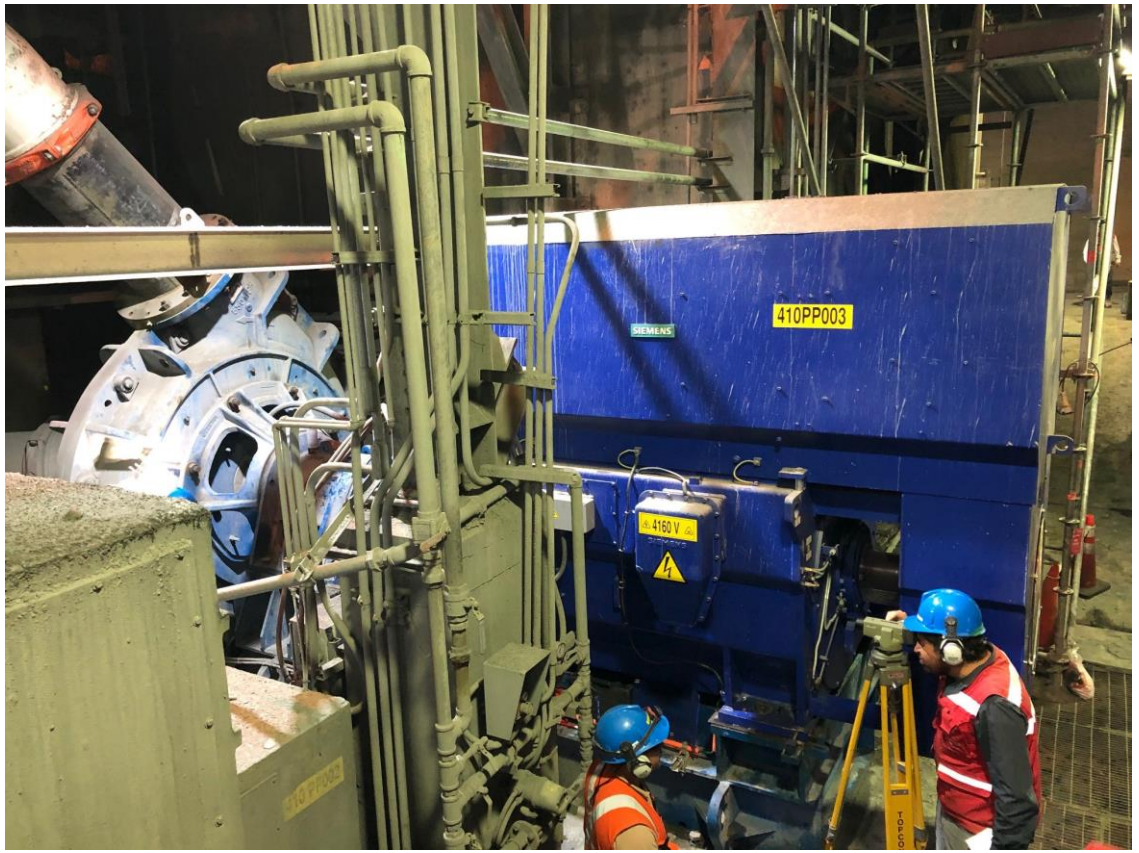
SINAMICS Connect 500

Connectivity Performance

SH	315	…	560	…	800	…	1,600
P	150kW	…	3,2 MW	…	19 MW	…	100 MW

P 180 kW … 100 MW

MV Drives and HV Motors: Siemens Large Drives Applications



HV-M Motor 1560 kW 4.0 kV slurry pump application (gearbox)

H-Compact Motor 1870 kW 4.0 kV High pressure grinding rolls application

Trends in Mining

SIDRIVE IQ VIEW – iOS App
Overview

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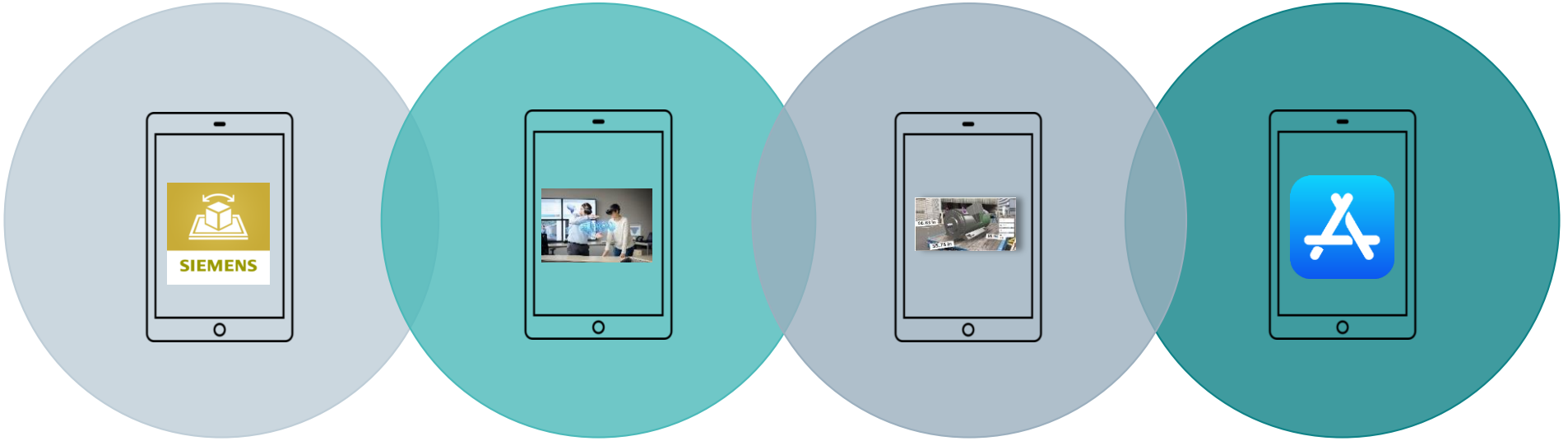

SIDRIVE IQ View is an iPadOS App that uses Augmented Reality (AR) Technology

With the App you can visualize configured motors from the Drive Train Configurator www.siemens.com/dt-configurator

It enables you to view your configured motor in your environment and get a real impression of the motor even before it is produced

Now available in the Apple App Store for free!

SIDRIVE IQ View
Benefits of our latest App

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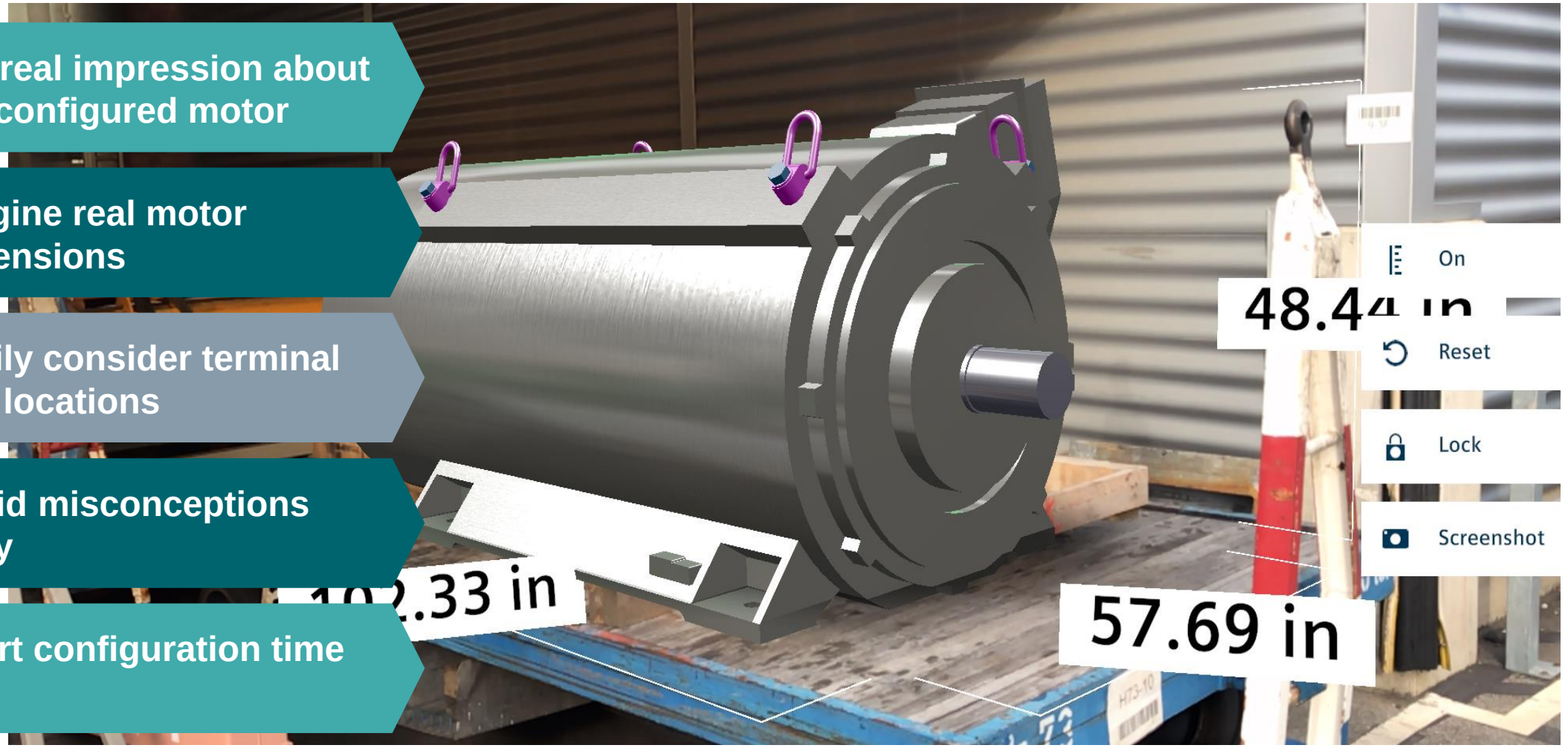
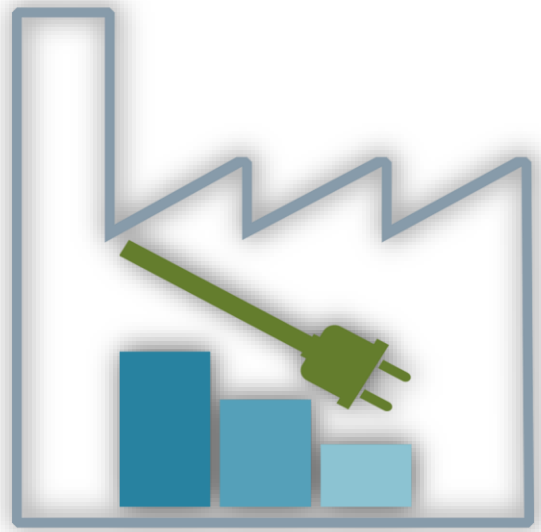
- Get real impression about the configured motor
- Imagine real motor dimensions
- Easily consider terminal box locations
- Avoid misconceptions early
- Short configuration time



Trends in Mining



SIDRIVE IQ

Value add for your daily business

Johannes Endres, IIoT Digitalization Specialist

New business models in the internet age are disrupting complete markets

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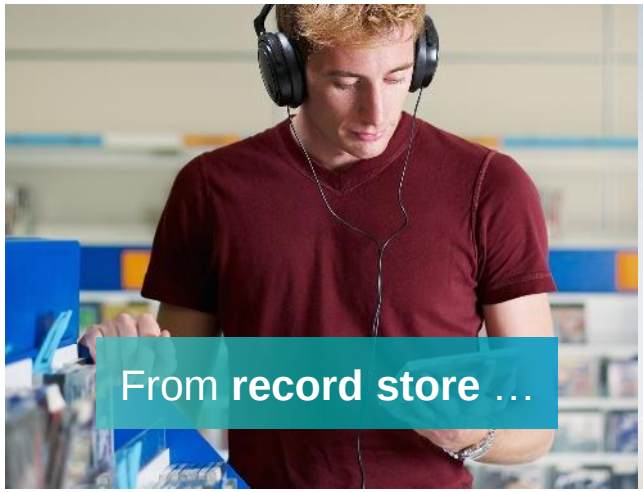

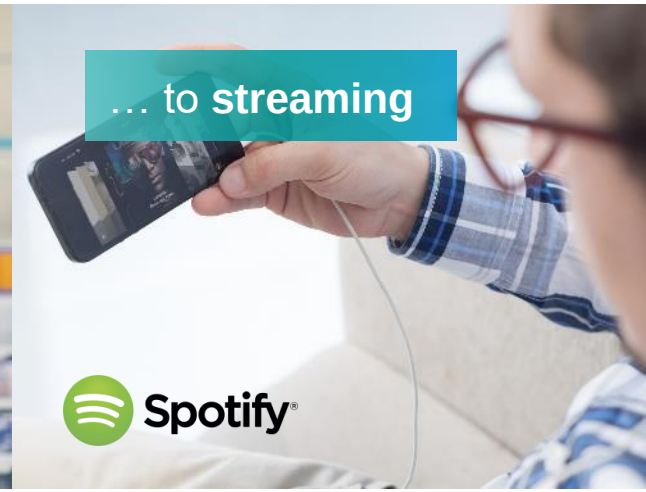

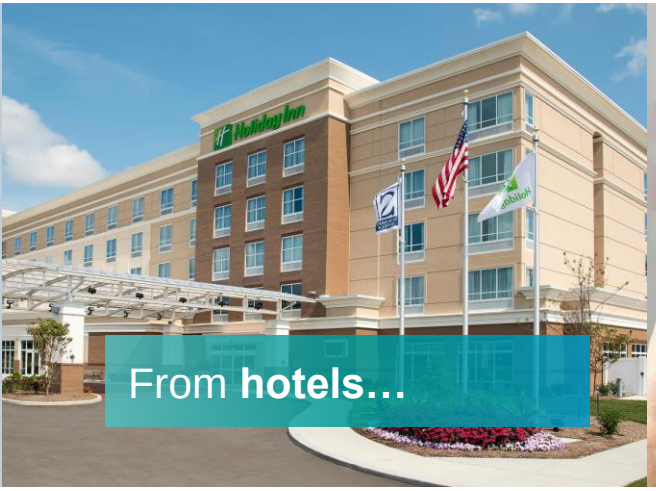

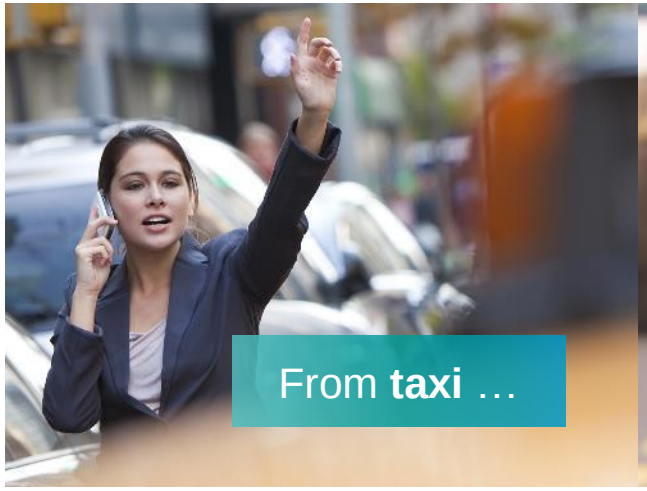

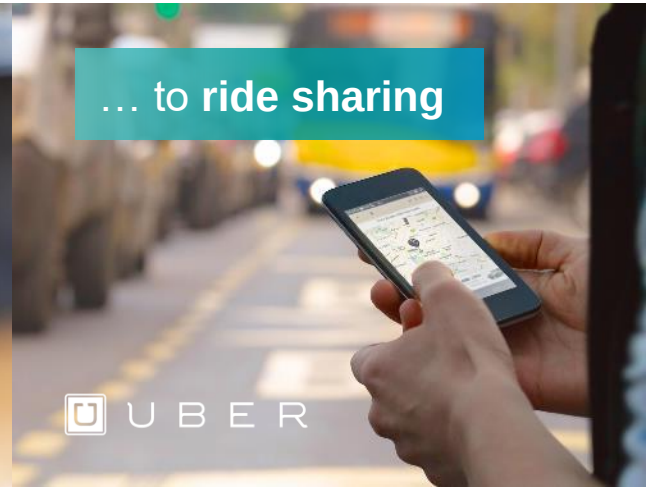

The Future is Digital

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“Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000.”

- Pierre Nanterme
CEO Accenture

WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD

“The **Very Management Practices** That Have Allowed [Companies] To Become Industry Leaders Also Make It Extremely Difficult For Them To Develop The **Disruptive Technologies** That Ultimately **Steal Away Their Markets.**”

The Innovator’s Dilemma - Christensen

Focus on digitalization efforts can result in game-changing operational improvements

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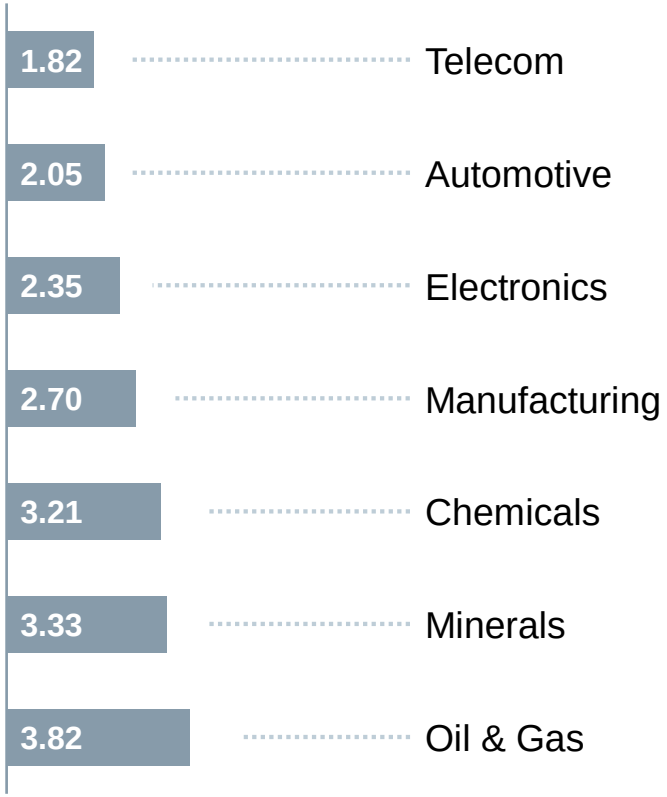
Digitalization by Industry



Digitalization Opportunities and Benefits

- **Asset management and business analytics**
- **Remote Operation**
- **Industrial Internet of Things (Web of Systems)**
- **Cloud applications**
- **Big data analytics**

$80B Will be spent in the next 24 months on **operational efficiency**…

-25% … that could lead to reduction in OPEX **if smartly spent on digital**…

↑8% … and **produce game-changing** field recovery rates …

+11% … resulting **in sustained profit increase**

Source: McKinsey and Co; Accenture; **1** = high, **2** = medium, **3** = low, **4** = rudimentary

Maintenance Approach vs. Holistic Approach to Digitalization in Drive Systems

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Most suppliers currently offer the support and maintenance aspect of digitalization for drive systems. Siemens takes a more holistic approach.

Remote Assistance

Technical support upon request

Condition Monitoring

Remote connection

Condition Monitoring Portal

Predictive Maintenance

Predictive analytics & active monitoring

The Future of Digitalization

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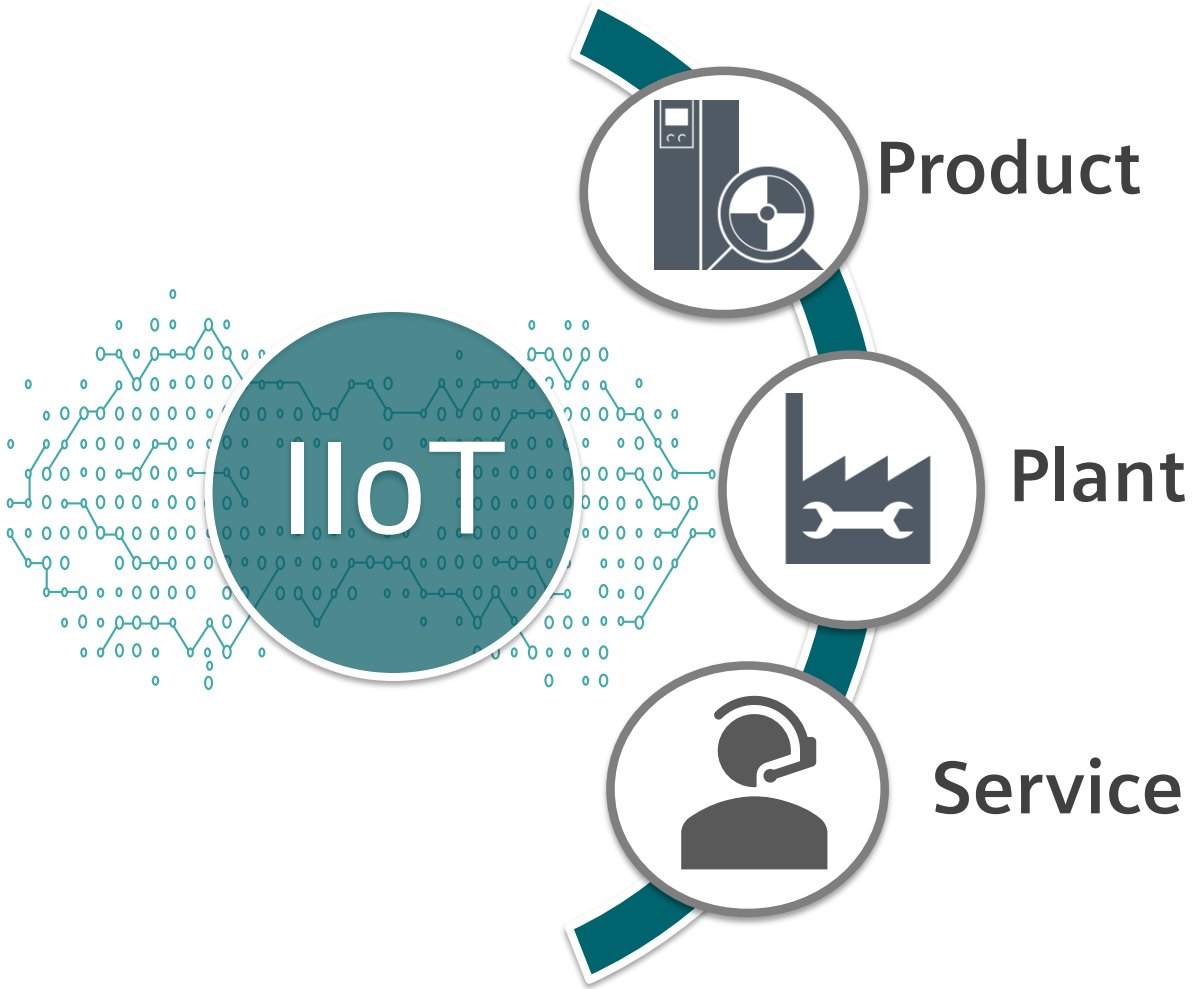
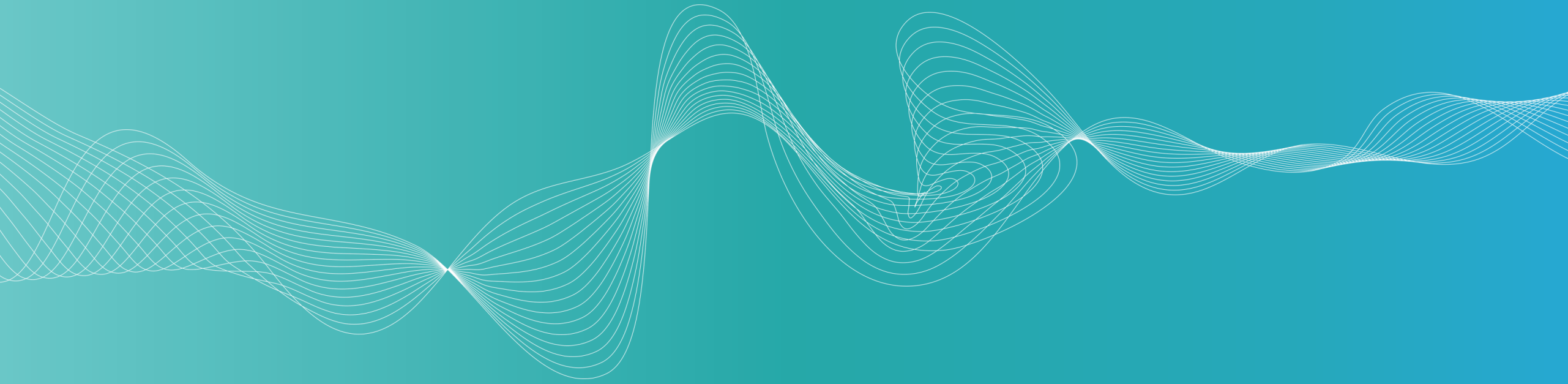


The future of digitalization will take a holistic approach to increasing availability in a plant

By implementing digital solutions across the three essential pillars of any successful operation: efficient plant processes, intelligent products and digitized service, users can increase availability and enhance reliability like never before.

Siemens Large Drive Applications Business currently offers complete Drive Systems and Solutions for the industry



Digital “abilities“ is the theme …

… for the next product life-cycle of HV/MV drive systems & solutions

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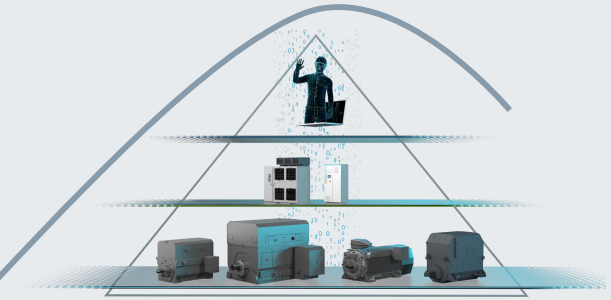
Transformation of product / offering into the next era



Transformation of organizational capabilities

Digital Abilities
Available in our drive systems and solutions

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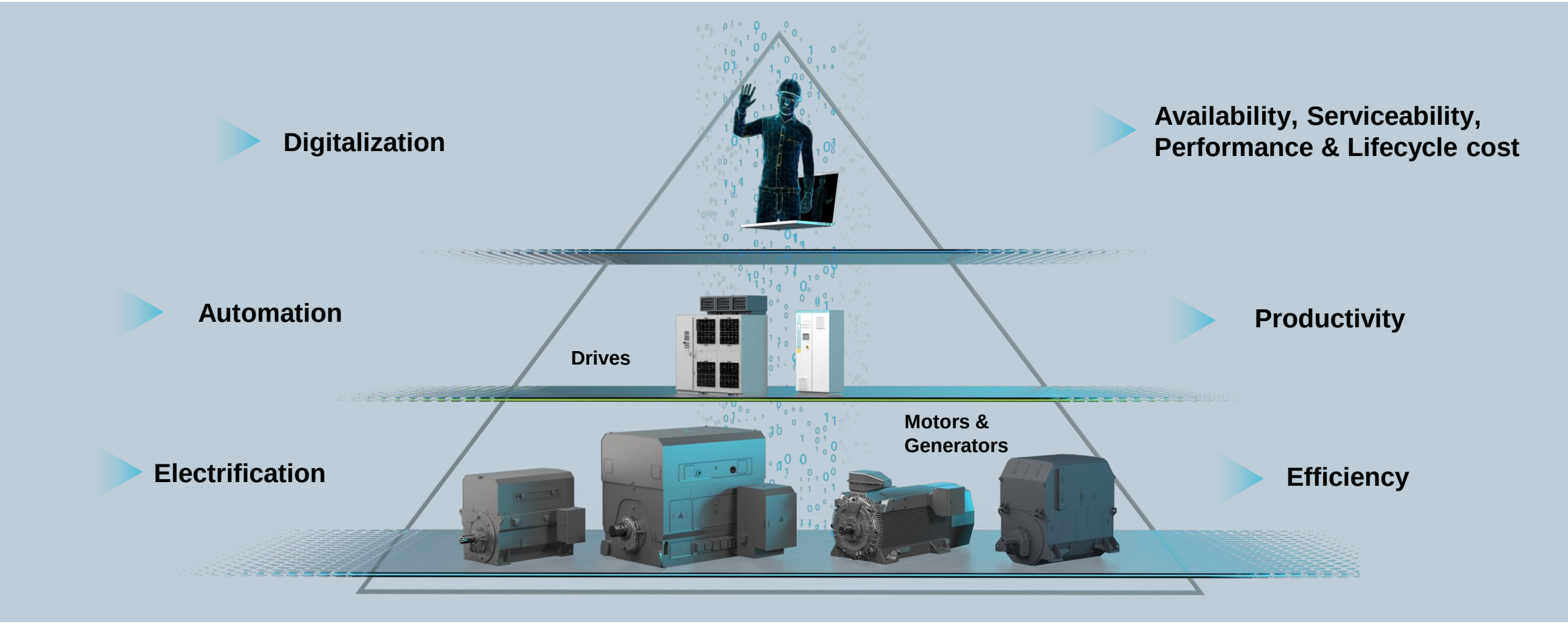

Developing Smart Products for the Next Generation of Operation

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1 Superior HMI & Advanced Diagnostics

Advanced Diagnostics

- New HMI offers users advanced diagnostics including:
  - Summary of line-side status including input voltage, current and power
  - Transformer Temperature
  - Temperature of the hottest cell inside the drive
  - Summary of the motor's performance, voltage, current, speed, torque and power
  - Trend up to 8 custom values on a single graph, converter failure

2 Troubleshooting Mobile Technology

- Gives instant access to years of accumulated drive knowledge, helping to more efficiently and accurately diagnose any problems
- Provides troubleshooting steps specific to the faults and alarms indicated by the drive's keypad or HMI
- Easier to contact CS with automatic service requests initiated by the push of a button.

3 Environmental Condition Monitoring Technology

Smart Cell Technology

- New 'smart' cell technology for medium voltage drives equipped with sensors enabling monitoring of:
  - Cell Temperature Ambient
  - Cell Humidity
  - Cell Pressure
  - Arc Flash Detector
  - IGBT Heatsink Temperature Feedback

4 Monitoring Capabilities Integral To All Drives

- Optimized maintenance activity and maximum availability to increase productivity, across the entire life cycle
- Modules record relevant operational data via sensors and communicate that information to the cloud.

Developing Smart Products for the Next Generation of Operation

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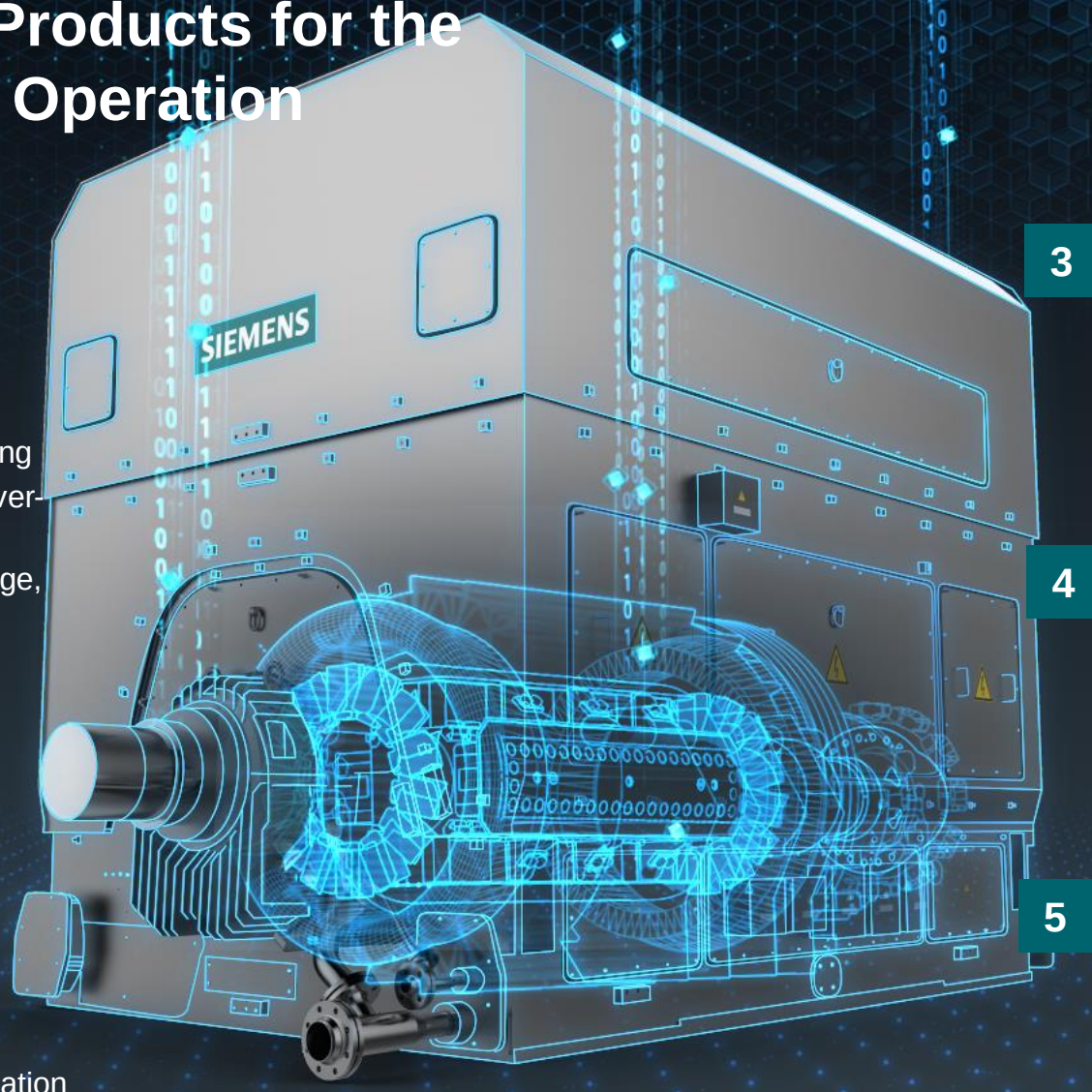


1 Bearing Technology

Roller Bearing

- **Measurement**: Envelope of vibration acceleration, temperature
- **Detection of**: Inner and outer bearing ring damage, cage damage, ball damage, over-temperature
- **Possible consequence:** Bearing damage, motor failure

Sleeve Bearing

- **Measurement**: Shaft displacement, oil temperature
- **Detection of**: Oil whirl, oil temperature, shaft vibration
- **Possible consequence:** Bearing damage, motor failure

2 Rotor Technology

- **Measurement**: Speed, amplitude of vibration velocity (via shaft vibration)
- **Detection of**: Rotor unbalance
- **Possible consequence:** Bearing/rotor damage, motor failure

3 Cooling System Technology

Air/ Water

- **Measurement**: Temperature, pressure, flow
- **Detection of**: Cooling problems
- **Possible consequence:** overheating

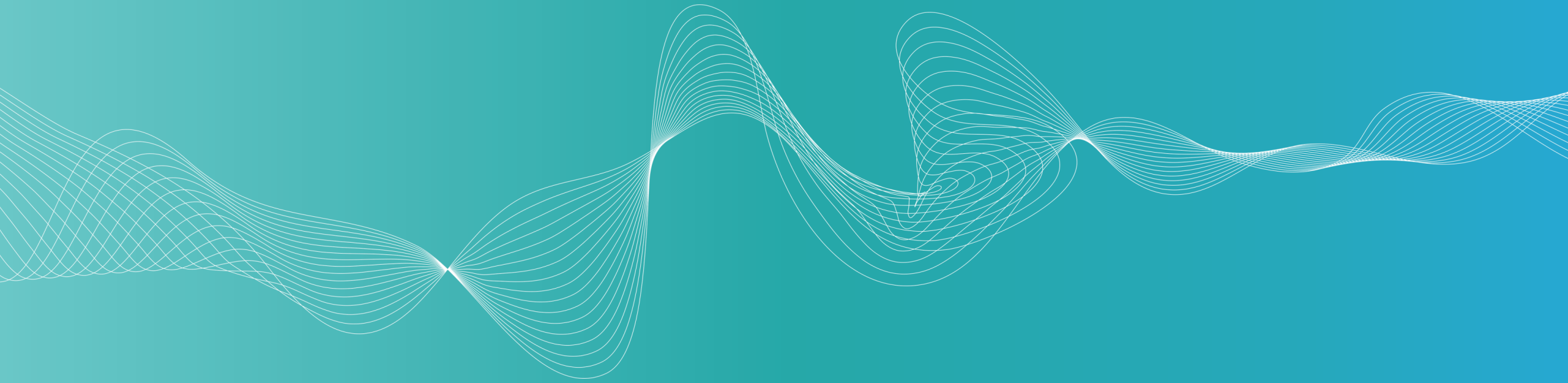
4 Winding Technology

- **Measurement**: Partial discharge, load profile, temperature
- **Detection of**: Insulation damage, overload
- **Possible consequence:** Short circuits, over-heating (hot spots), motor failure

5 Stator Technology

- **Measurement**: Amplitude of vibration velocity
- **Detection of**: soft foot, imbalance, misalignment
- **Possible consequence:** Bearing damage, motor failure

How do you design and operate your Drive Systems for its lifecycle?



How can Digitalization enhance “lifecycle” value?

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Important questions around your digitalization journey?

- Do I know and **understand the equipment** I own and operate?
- Do I have products and or parts in my fleet that are/will soon become obsolete?
- **Do I have the spare parts I need** and is the amount appropriate to address my risk of prolonged downtime?
- **Do I know “as-in-service” status** of my products?
- Do I spend my maintenance budget on what‘s important and needed to help reduce the risk of equipment failure?
- Can a product - from the beginning - bring **value into Total Cost of Ownership**?
- Do I have a centrally coordinated, data driven operating methodology?

Lifecycle view from Customer and Siemens perspective

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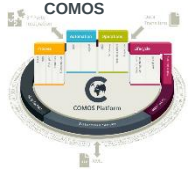
Leveraging Siemens software

TEAMCENTER

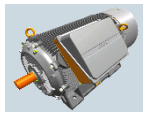
CAx NX

COMOS



TIA

Process & plant design



Providing product data, CAE & simulation models for the design and optimization of the plant / system

Accelerating plant design and reducing effort

Engineering & Commissioning

Detailed product engineering, commissioning products with Data Matrix Code & the Digital Twin

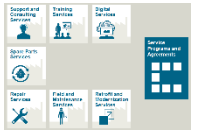
Reducing cost and time in engineering & commissioning

Operation

Fleet management, analytics and KPI's for health supervision & performance optimization

Increasing up-time and performance optimization

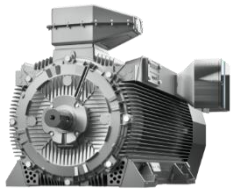
Service

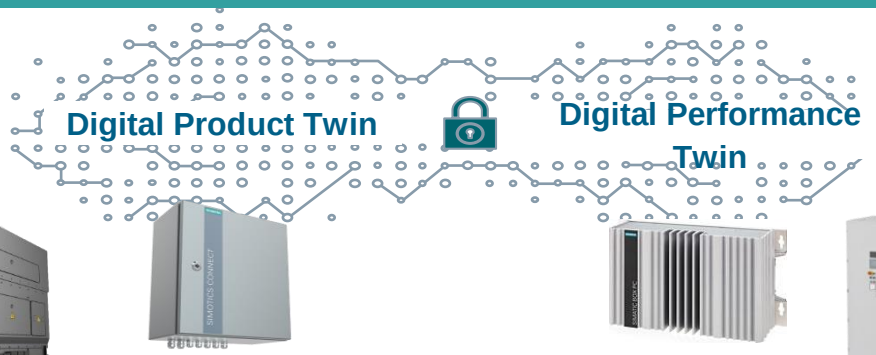


Enabled life-cycle services & performance / outcome-based contracts

Reducing maintenance and TCOs

SIDRIVE IQ powered by Mindsphere





Customer self-designed apps / service

Cloud to cloud interface

Stand-alone or integrating LDA digital products

Fleet Management combines static and dynamic data in a "one-stop shop" solution

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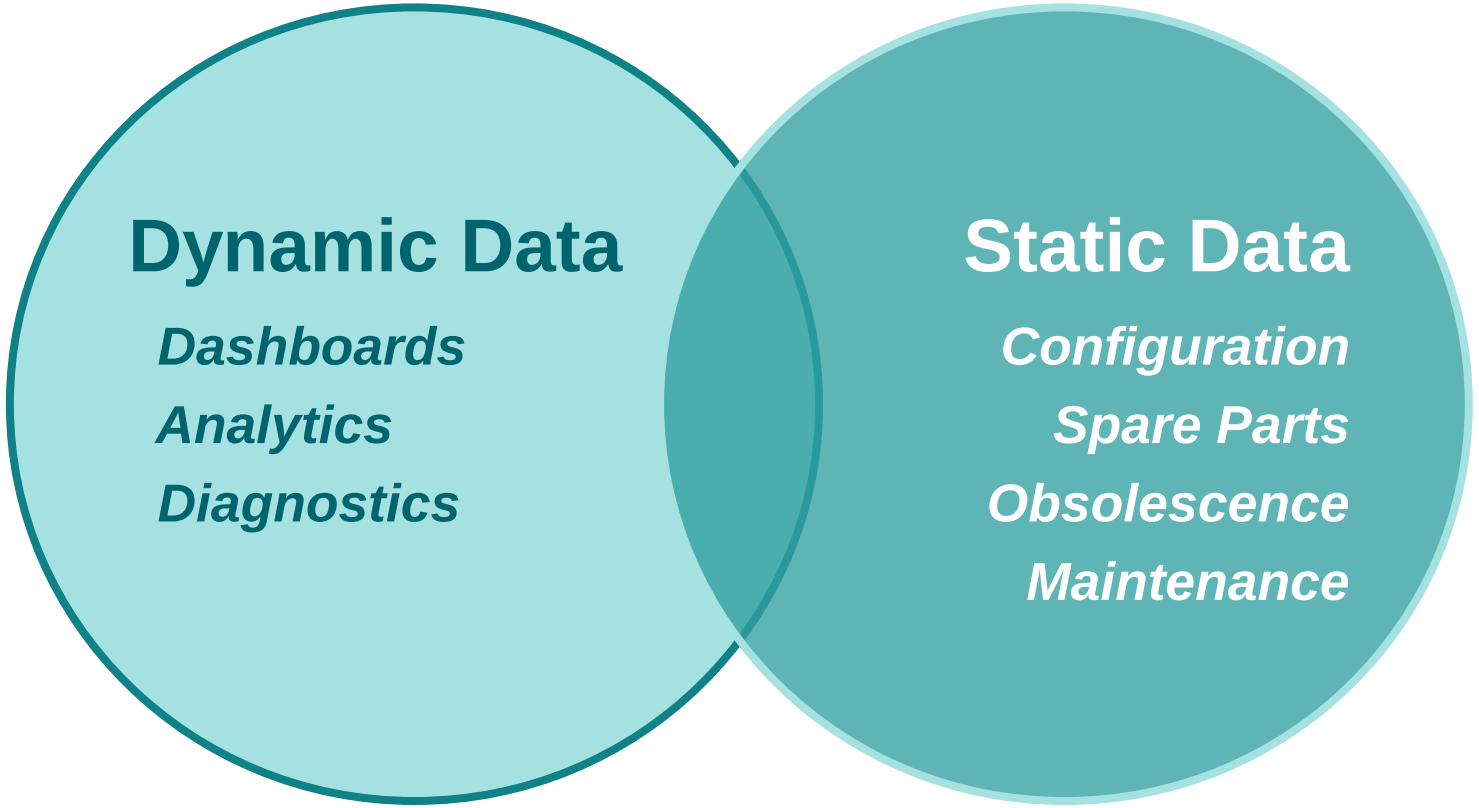
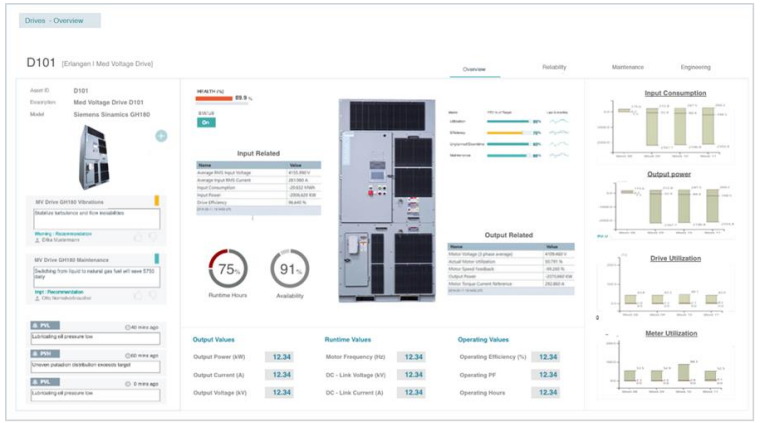
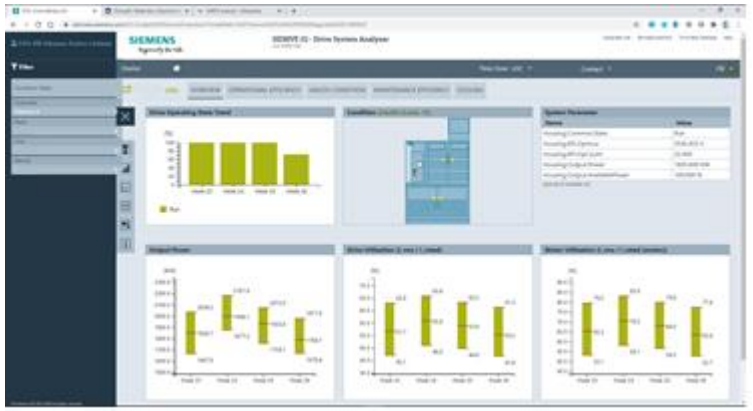
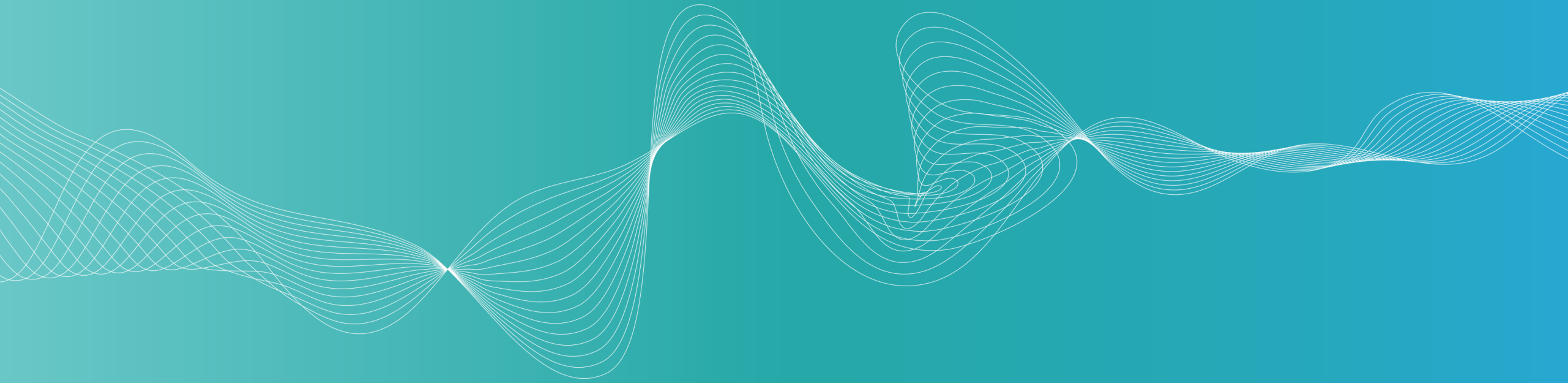
Remote Monitoring + Configuration Management







What does a Digital Solution mean for your Drive Systems lifecycle?



Overview
Digital portfolio for your Drive System

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SIDRIVE IQ

VFDs Motors Gearboxes Equipment

The Siemens **IoT digital service** combining asset connectivity, on-line SIDRIVE IQ software (SaaS), and *Rapid Response* support

Available now

SIDRIVE IQ Troubleshoot
Mobile App for VFDs

GH180 HMI with Advanced Diagnostics

Partner offerings

IQ Ready

IQ Connect

SIDRIVE IQ

Online Software

IQ Services

SIDRIVE IQ

Bringing all the worlds together captures value for customers

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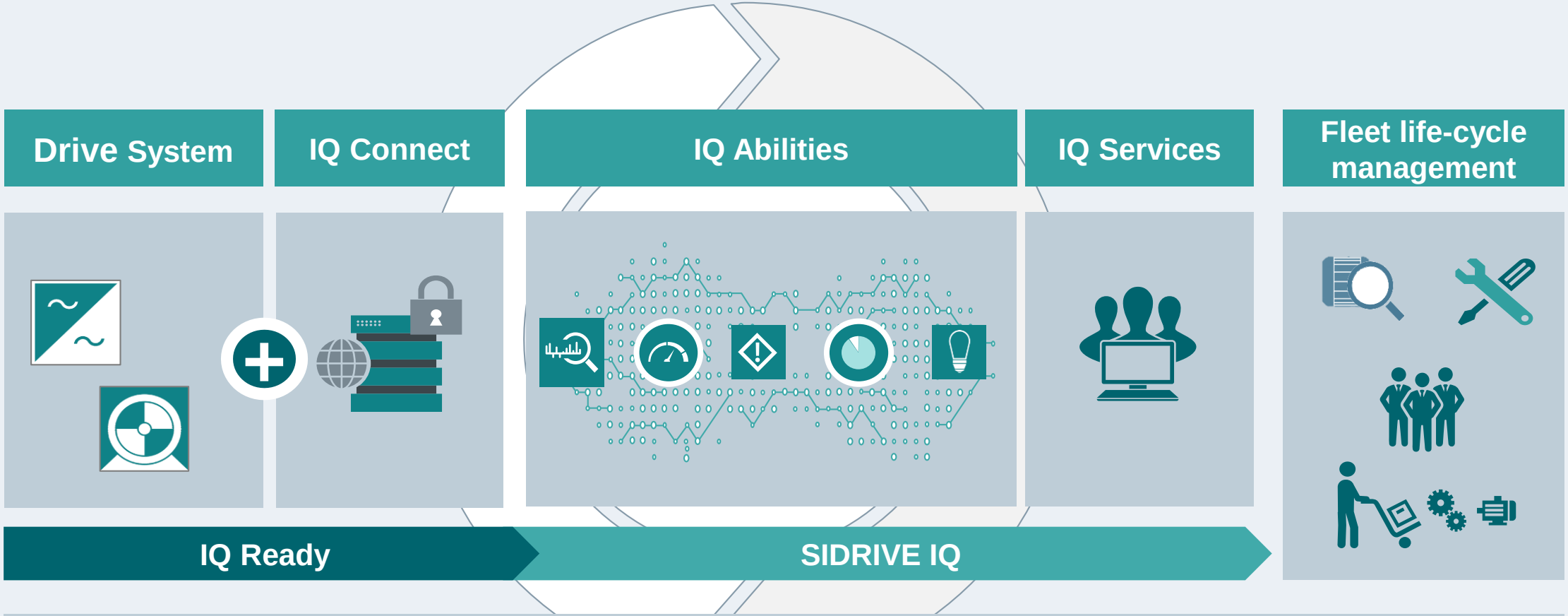

What are the key drivers to start implementing IIoT?

Knowing what, when, how and who

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Typical customer requirements and objectives

Reduce non-scheduled production downtimes …

Accelerate troubleshooting in case of unexpected downtime ...

Facilitate maintenance planning to secure high degree of performance and safety ...

Our answers with SIDRIVE IQ & fleet life-cycle management services

... through continuous health indicators & decision support-information

- Early detection of abnormal conditions in physics of drive system and its components

… through rapid response & diagnosis capability

- Anytime / anywhere access to measurements, KPIs, logs and machine experts for root-cause analysis

… through transparent documentation for preparation of scheduled on-site maintenance

- Condition-based prescriptive maintenance recommendation measures
- Aggregated trends and history

Combing state of the art AI with human experts!

Creates impact for your operations

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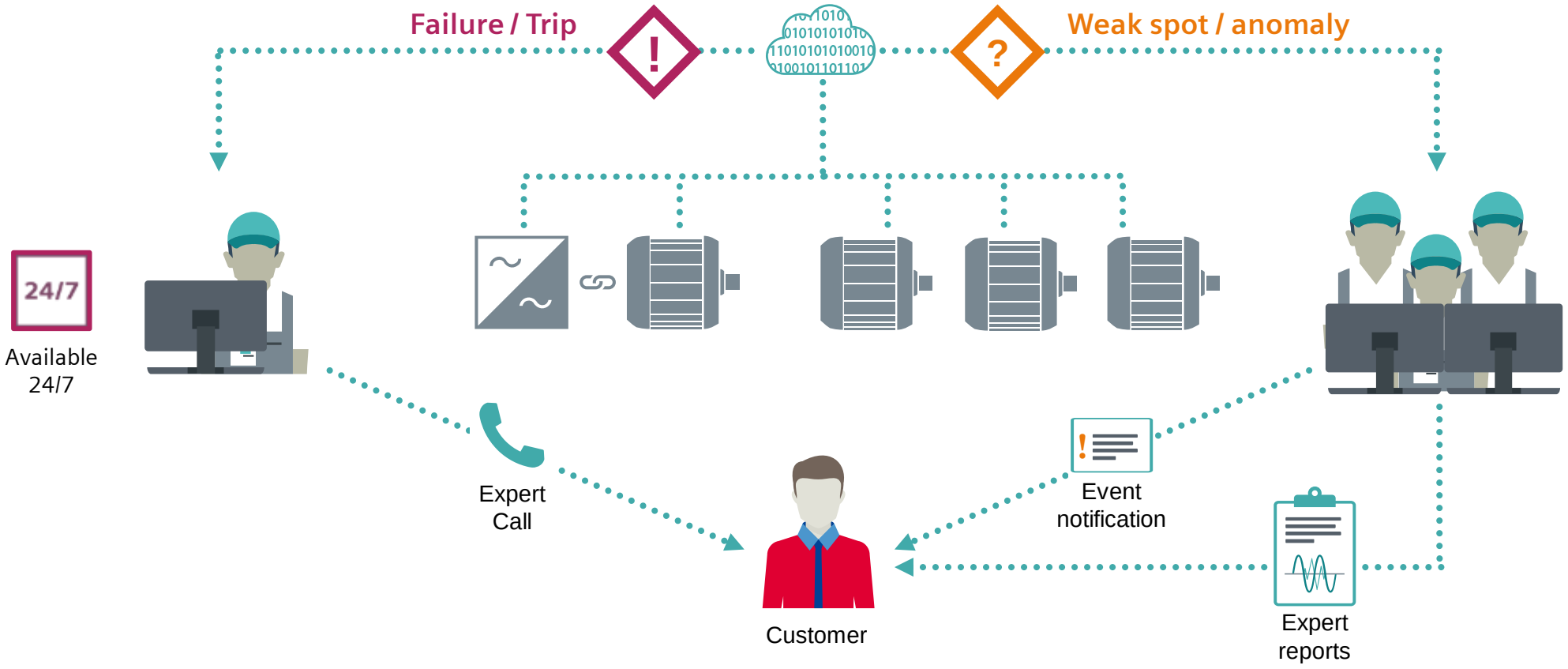

Expert Assistance "Rapid Response/Reactive"

Expert Diagnostics "Preventive"

Demo Video

Creates impact for your operations

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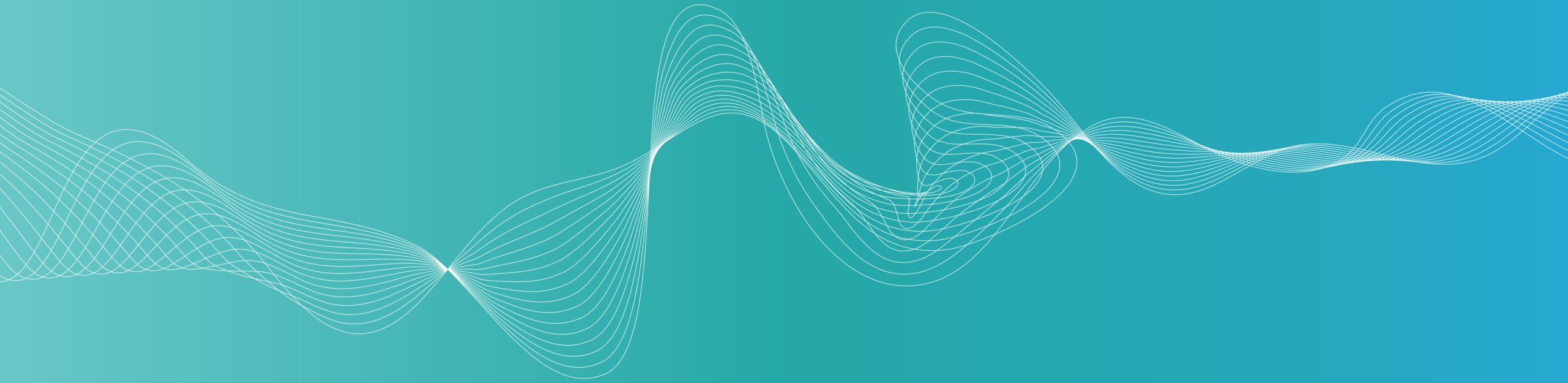
How do we differentiate and bring value?



Cybersecurity along implementing IIoT

Deliver a holistic concept tied into existing customer requirements

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Information Security / Data Privacy

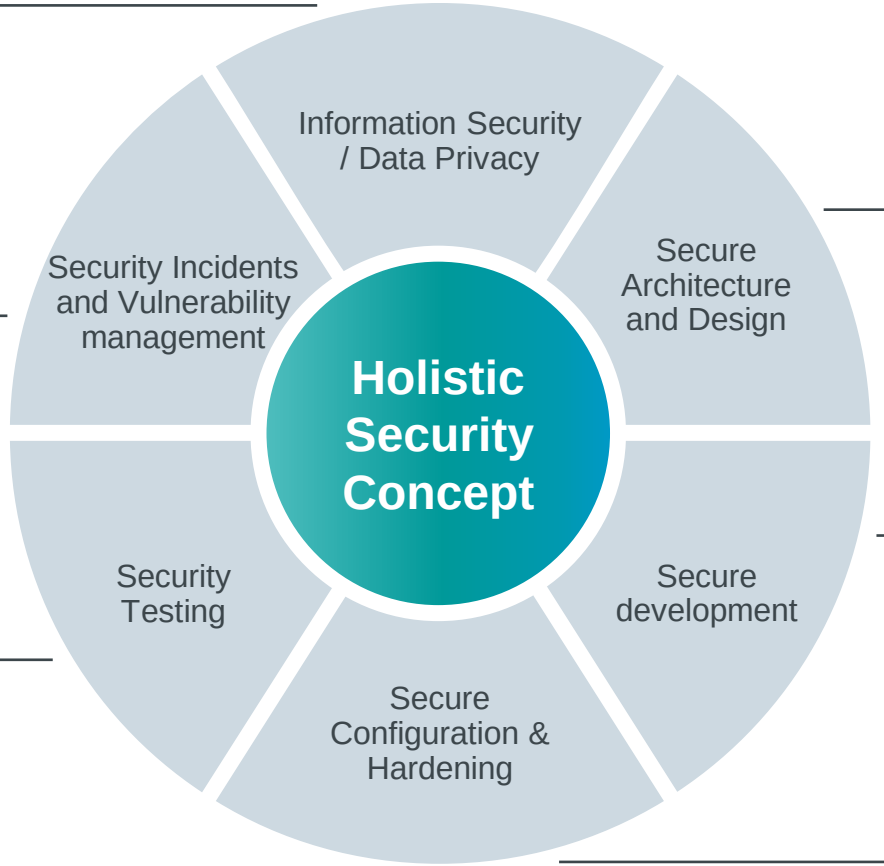
Information Security requirements audit / certification, Privacy by Design review for components

SI / Security Vulnerability Monitoring and Handling

Software component repository and monitoring lists. Security vulnerability notifications. Security Update management

Security Testing

Security verification and validation of components to ensure that product/components meet specified security requirements



Secure Architecture and Design

Security architecture which satisfies security requirements. Threat and Risk analysis

Secure Development

Using security standards for development, security unit testing, peer review

Secure Configuration & Hardening

Apply secure configuration and hardening measures

Use of new technologies
To deliver new insights!

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New technologies are emerging that provide predictive intelligence technology based on high-sampling measurements of electrical and mechanical waveforms.

384,000 data points acquired/second/asset (no sensors mounted on rotating assets)

×

200 operating assets being monitored today and 1600+ through Fluke device

+

AI-based algorithms continuously monitor machine health and performance

Insights are derived using **machine learning** algorithms and **no need of additional sensors**

(e.g. vibration or torque sensors)

We are beyond theory!
Creating value for our customers …

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Power Plant, fossil-fueled 1.600 MW, USA

Accelerated issue resolution on Perfect Harmony GH180 drive, down-time reduction of 80% (< 75 min, instead of typically > 6 hours) & saved down-time cost of ~$120.000

Hanson / Heidelberg-Cement Group, cement plant, United Kingdom

Preventing downtime and initiated spare-part order for 4MW HV M SIMOTICS motor, estim. potential down-time cost of £500.000 per day

Equinor, Hammerfest LNG plant, Barents Sea, Norway

Uninterrupted production of 218 days and targeted extension of service interval from 3 to 4 years for 1x16MW, 1x32MW, 2x65MW compressor trains, estim. potential down-time cost of >4'EUR per day

To learn more? Reach out to your trusted Siemens partner

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