What does it take to succeed in the digital transformation?

May 17, 2019

SIEMENS
Ingenuity for life

Siemens IoT @ scale

Siemens IoT @ scale = Unlocking customer value!

SIEMENS
Ingenuity for life

Customer value
Internal | External

- Time to market
- Efficiency
- Productivity
- Asset management
- Availability

@scale

End-to-end cybersecurity

Easy to use, intuitive User Interface (HMI / UX)

Company Core Technologies (CCTs) / Capabilities

Siemens technology stack and ecosystem at work

Ecosystem

- Customer access (C-level)
- Domain know-how
- Software Suite, PLM
- Digital Twin

- AI and Machine Learning
- Domain know-how

- Software architecture
- Cloud development
- Low-code app dev. (mendix)
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RTOS- or Linux-based connectivity OS for all new Siemens devices, embedded

IoT consulting | prototyping | co-creation | integration

PLM-Suite

MindSphere Application Center
20 verticals, 68 locations

Software tools, applications (mendix), industrial solutions driving value

References[+]

MindSphere – open, cloud-based IoT operating system
easy access to reliable industry hardened cloud services

Connectivity
High performant, low latency, 5G, easy plug and play, low cost

Io"Things" – Edge devices, products, PLC, MCU, sensors, actuators

3rd party "Things"

Atos

Accenture

TcS

…

3rd party applications

Co-creation with customers

Amazon Web Services (AWS)

Microsoft Azure

Alibaba Cloud

on-premise

Standards, Industrie 4.0, OPC-UA, BACnet, MindSphere World,…

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3rd party applications   Co-creation with customers

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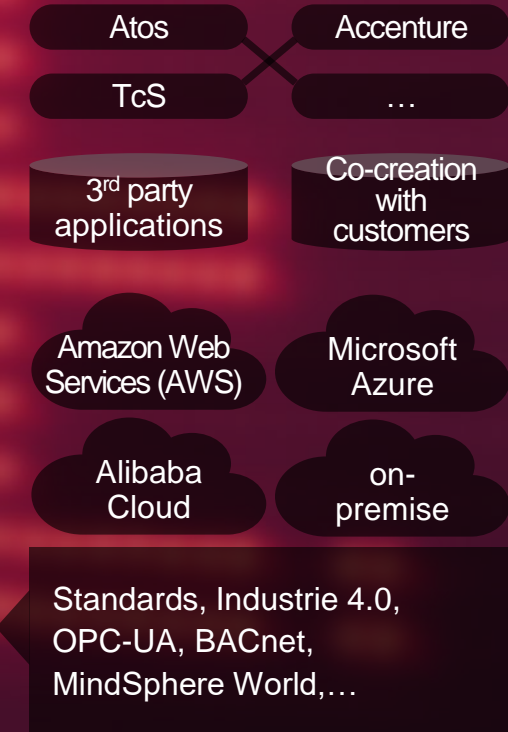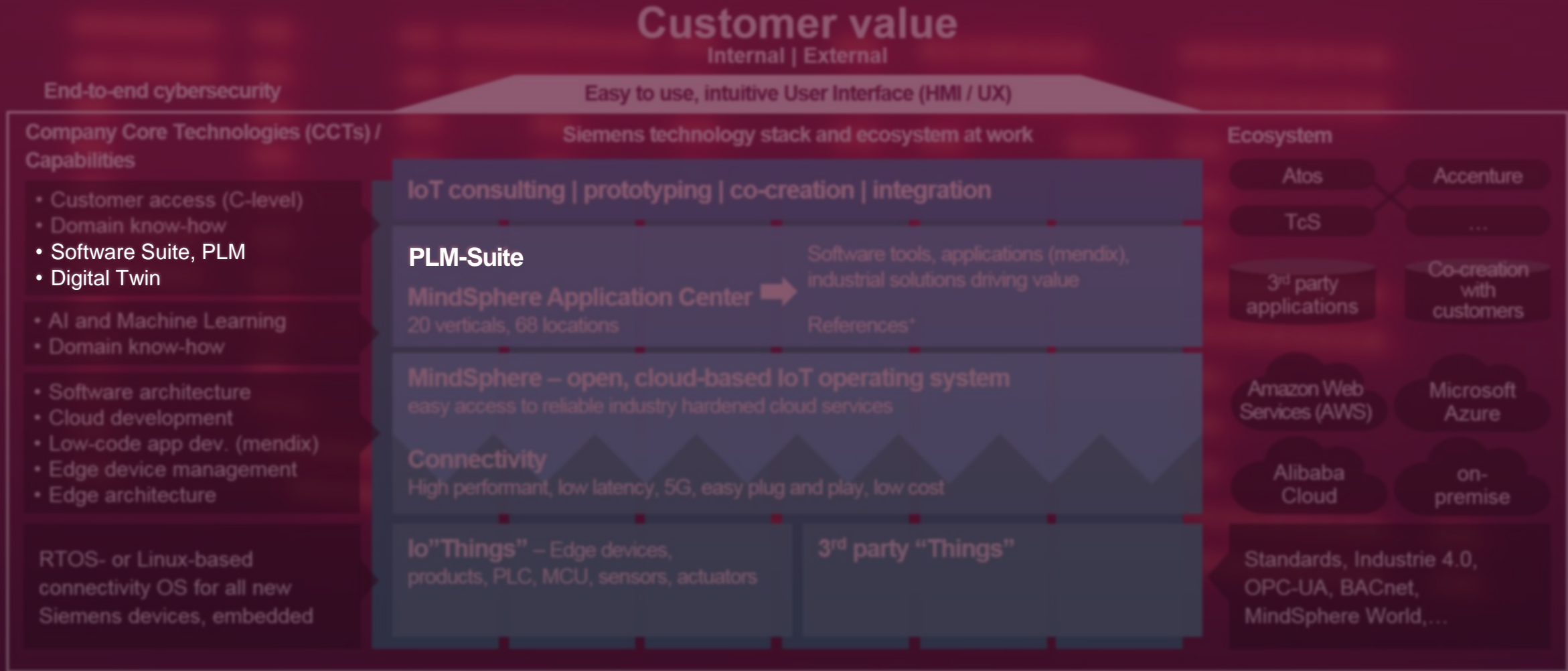
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Creating better prosthetic limbs with Siemens PLM software

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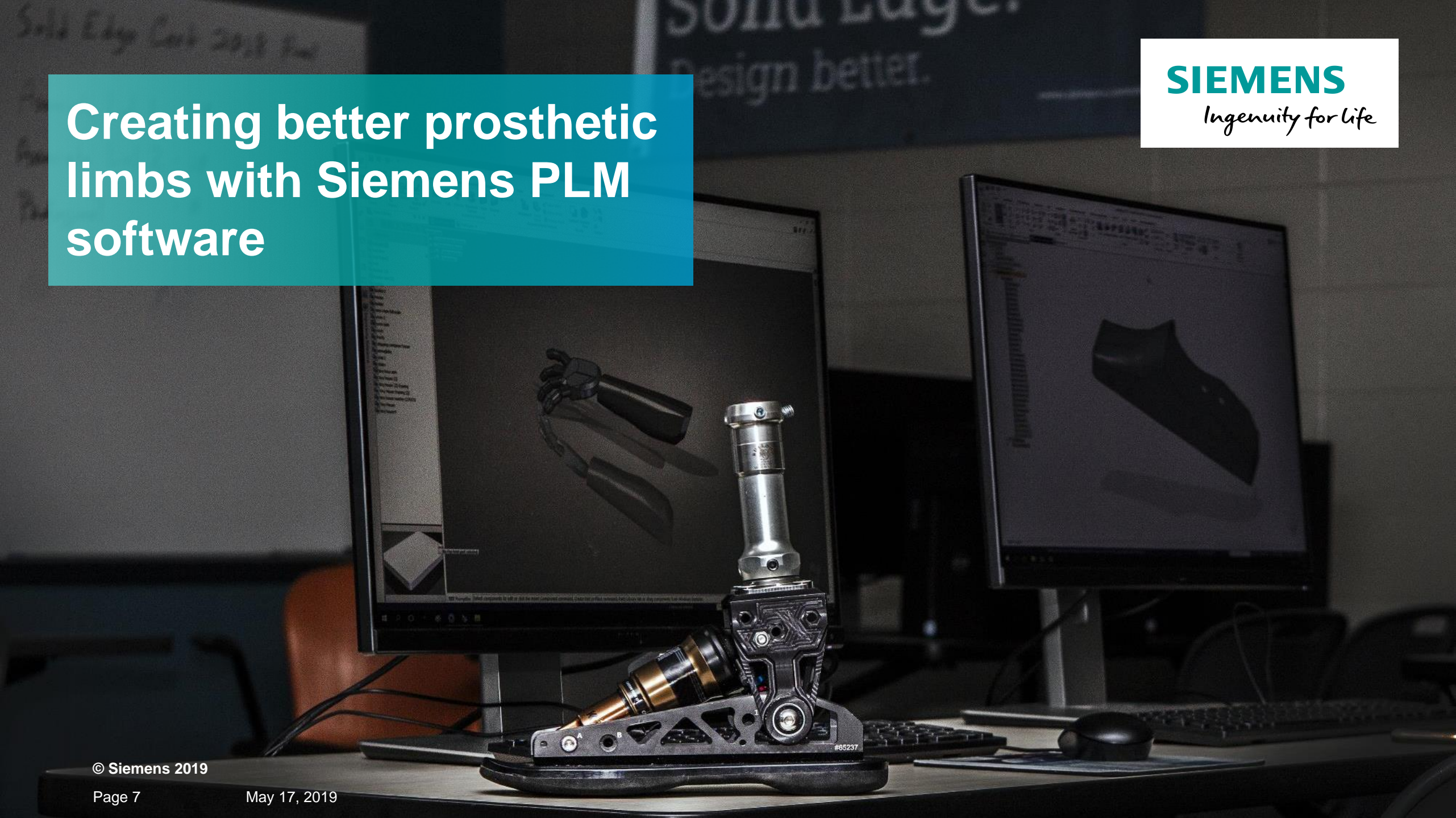Io"Things" – Edge devices, products, PLC, MCU, sensors, actuators

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Accenture

TcS

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3rd party applications

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Standards, Industrie 4.0, OPC-UA, BACnet, MindSphere World,...

Steadily growing ecosystem surrounding MindSphere – now running on AWS, Microsoft Azure and Alibaba

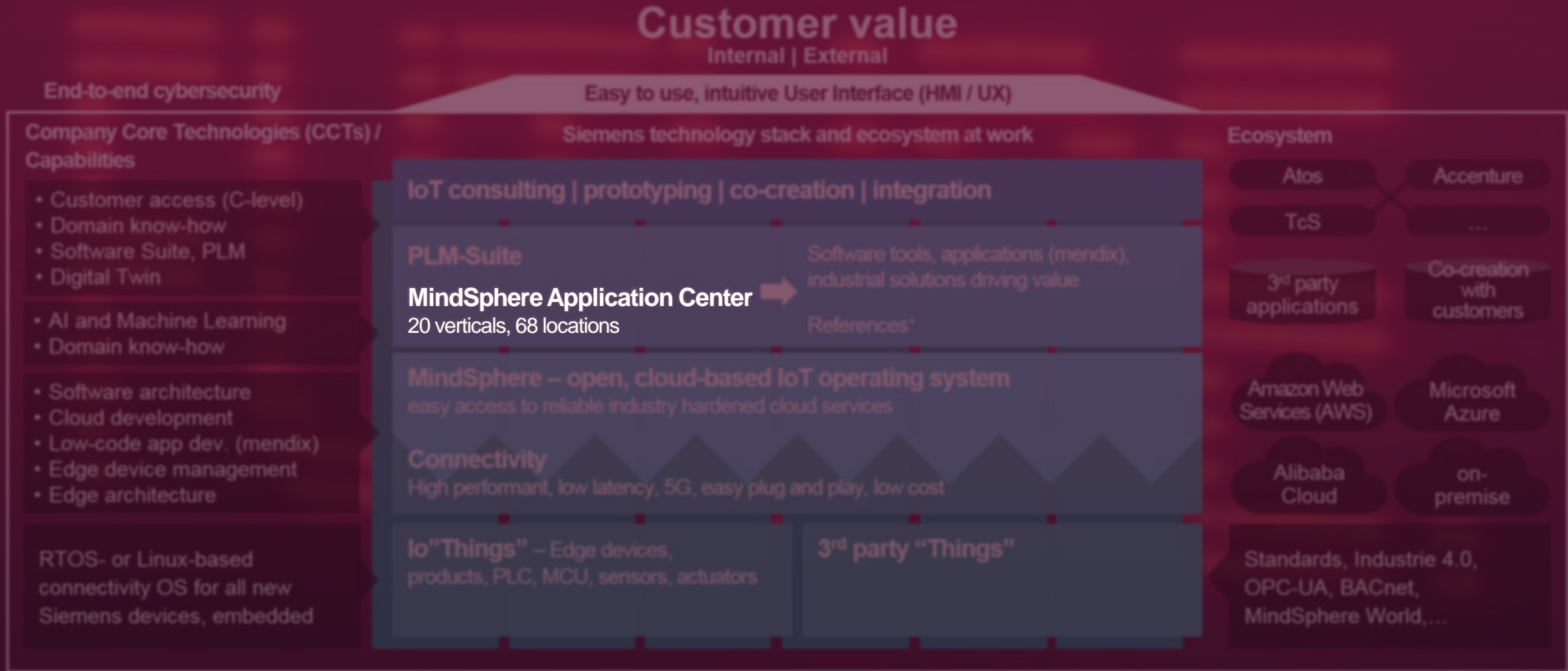## MindSphere on AWS

- Since January 2018
- Worldwide

MindSphere on Azure
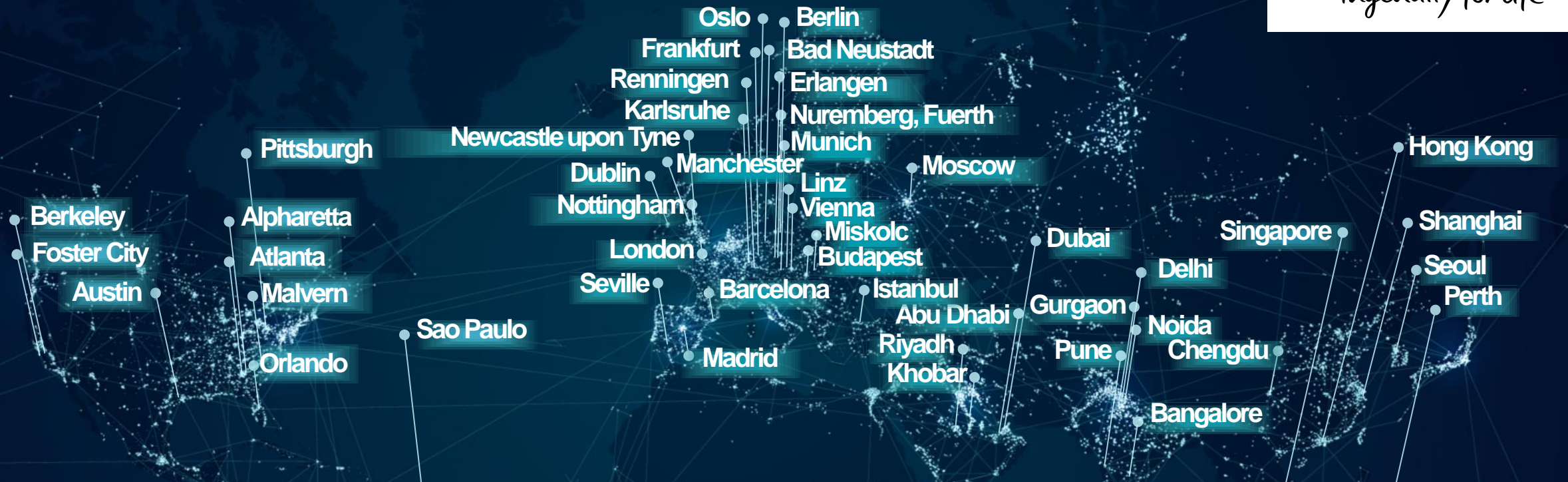
- Since January 2019
- Worldwide

MindSphere on Alibaba

- Since April 1, 2019
- In China

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Standards, Industrie 4.0, OPC-UA, BACnet, MindSphere World,...

MindSphere Application Centers – Locations around the globe

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Oslo Berlin
Frankfurt Bad Neustadt
Renningen Erlangen
Karlsruhe Nuremberg, Fuerth
Newcastle upon Tyne Munich
Dublin Manchester Moscow
Nottingham Linz
Vienna
Berkeley Miskolc
Foster City London Budapest Dubai Singapore
Austin Seville Barcelona Istanbul Delhi Shanghai
Alpharetta Abu Dhabi Gurgaon Seoul
Atlanta Madrid Riyadh Noida Perth
Malvern Khobar Pune Chengdu
Sao Paulo Pittsburgh Hong Kong
Orlando Bangalore

20
MindSphere
Application Centers

~70
Locations in ~20 countries
across the globe

>1,000
software developers, data
specialists and engineers

Rail Mobility & Infrastructure

Oil & Gas

Power Utilities

Distribution System Operators

Healthcare Providers

Auto, Electronics

Cities

Chemical, Pharma

Industry Services

Minerals, Cement, Fiber

Mining

Battery Technology

Road Mobility & Infrastructure

Water & Waste Water

Airports

Pumps, Fans, Compressors

Buildings

Distributed Energy Systems

Machine Tool Builders

Food & Beverage

Volkswagen also to cooperate with Siemens for Industrial Cloud

MindSphere

Siemens as integration partner ensures efficient networking of production systems, machinery, and equipment at 122 Volkswagen plants

Data transparency and analysis to lay foundations for further productivity improvements

Volkswagen, Siemens, and machinery and equipment suppliers develop new functions and applications together
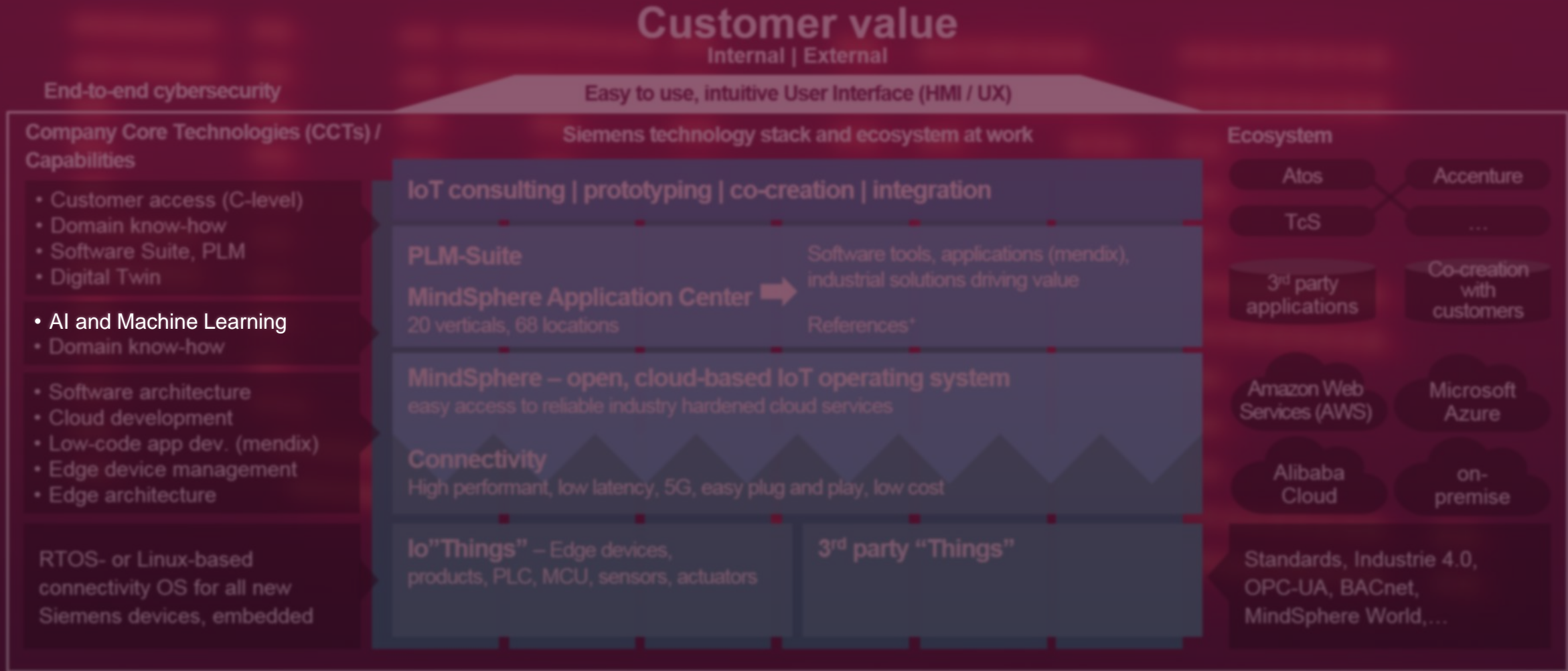
Global access to machine data, and new pay-per-use business model with MindSphere

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Siemens IoT @ scale = Unlocking customer value!

Customer value
Internal | External

End-to-end cybersecurity

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Microsoft Azure

Alibaba Cloud
on-premise

Standards, Industrie 4.0, OPC-UA, BACnet, MindSphere World,...

40% lower energy consumption in data centers with AI-based thermal optimization

SIEMENS
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33% fewer delays and higher availability of trains with data-based monitoring and maintenance optimization

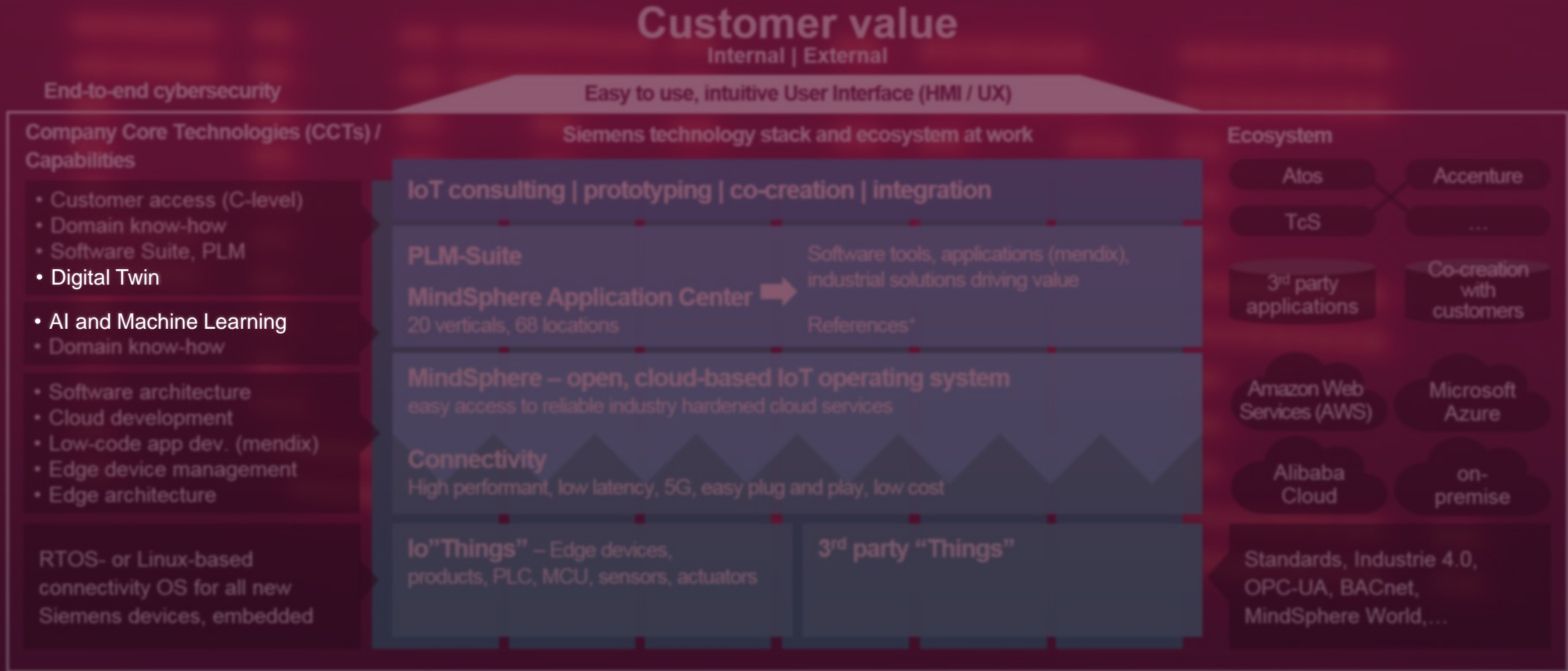SIEMENS
Ingenuity for life

AI-operated gas turbines with 15–20% lower NO$_X$ levels

SIEMENS
Ingenuity for life

**China Aerospace Science and Industry Corporation, Guizhou – 50% higher production efficiency and 56% less non-conforming products**

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Standards, Industrie 4.0, OPC-UA, BACnet, MindSphere World,...

Digital twin and AI for smart motor surveillance and optimization

May 17, 2019

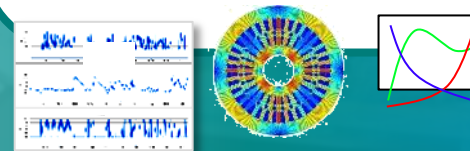# Digital twin and AI for smart motor surveillance and optimization

Smart Sensors
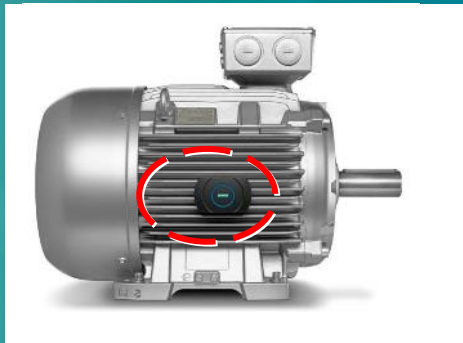
Signals and data

Temperature, acceleration, pressure, force, magnetic field, …

Vibration

Temperature

Speed
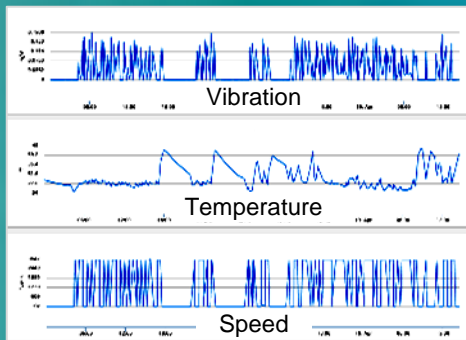
Data Analytics / AI

Cloud computing
Edge computing

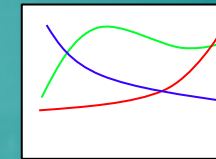Motor status, torque, wear, …
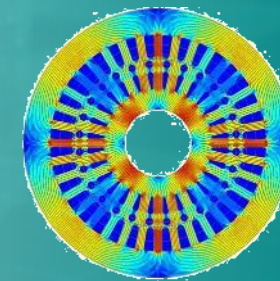
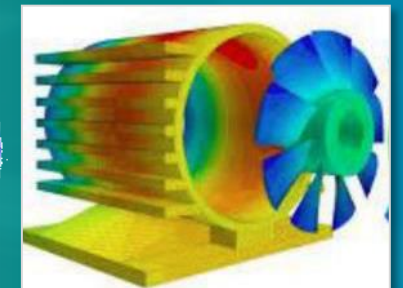**Operational Decisions**

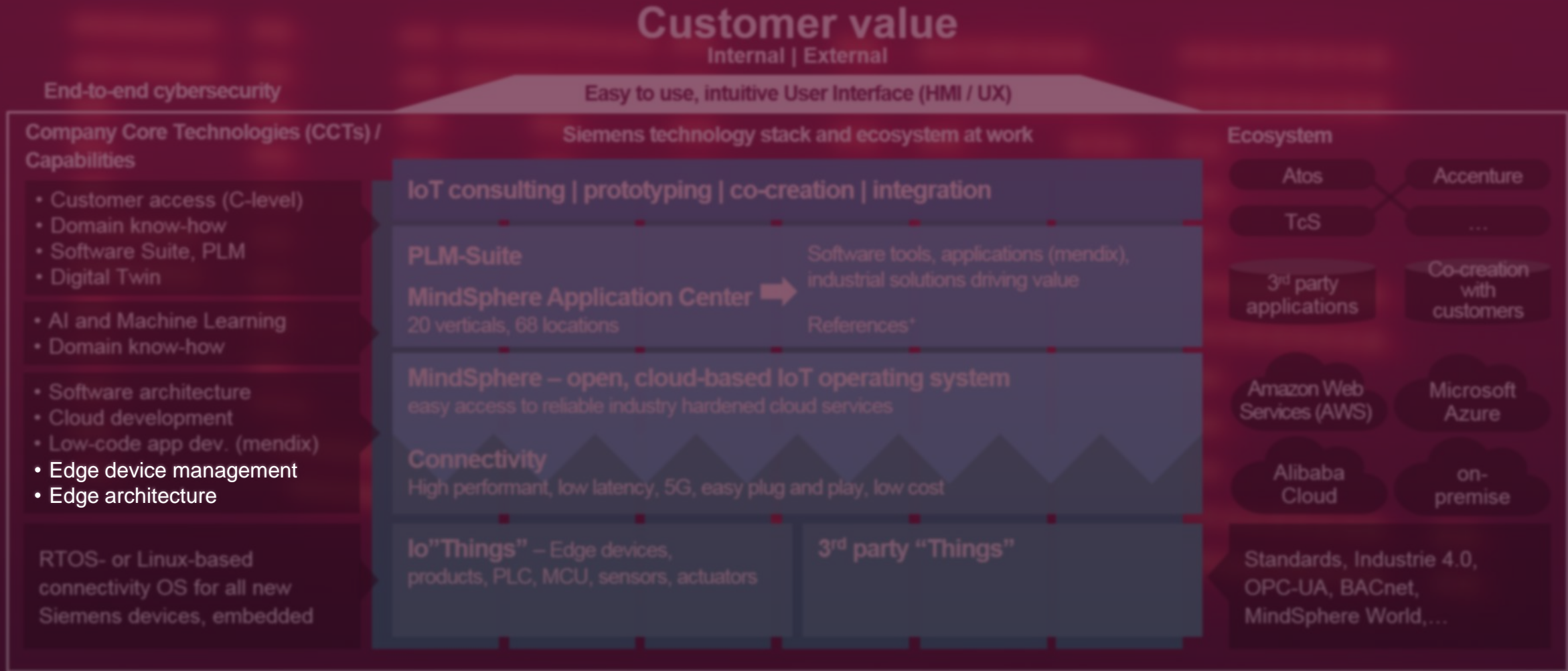Availability

Performance

Serviceability

Digital Twin

Multi-physical models

Magnetic Field Simulation

Temperature Simulation

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3rd party applications
Co-creation with customers

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Microsoft Azure

Alibaba Cloud
on-premise

Standards, Industrie 4.0, OPC-UA, BACnet, MindSphere World,...

Renaissance on the shop floor –
a scalable concept up to the MindSphere Cloud system

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MindSphere apps

Cloud

MindSphere

**NEW:
Apps for Edge
and Cloud**

Edge apps

Shop floor

**Industrial
Edge**

**Machine/
controller**
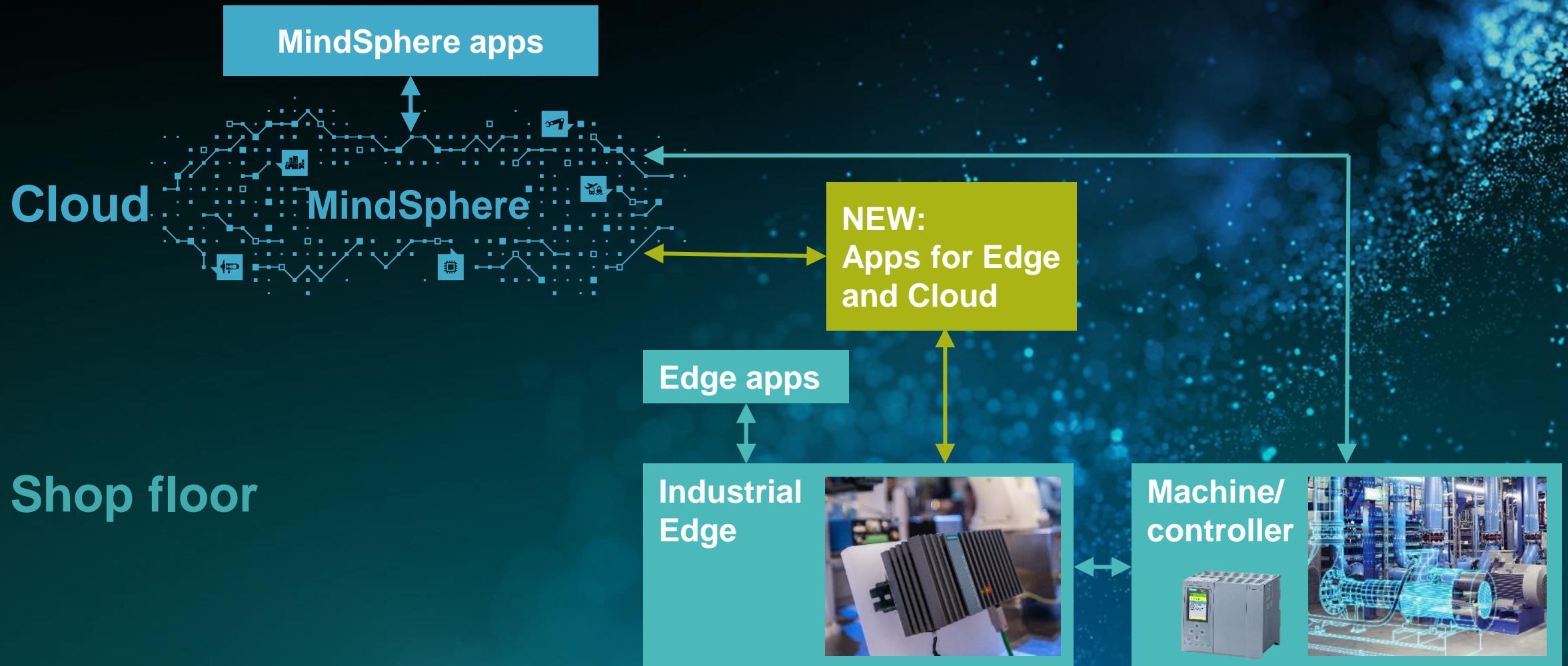
Siemens Elektronikwerk Amberg – €200,000 annual savings through Edge Computing and AI

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TcS		...

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The railway of the future
Norway: optimizing railway operations with digital signaling

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Today

- Technology from the 1940s-50s
- Limited capacity
- Train delays
- Obsolescence issues
- Limited data analysis possible

* Railway interlocking systems

11,200
Signals

330
Interlockings

10
Types of IXL*

15,000
km of cables

Migration

Tomorrow

0
Signals**

1
Digital interlocking

1
Data center

3,000
km of cables

- Shorter journey times
- Greater punctuality
- Higher flexibility
- More train departures
- Increased reliability
- Low maintenance
- … and safety at all times!

** only shunting signals

Siemens unlocks customer value with…

SIEMENS
Ingenuity for life

Customer value
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Siemens technology stack and ecosystem at work

~1,300 cybersecurity experts

€5.6 bn R&D investment

>300 partners in ecosystem

14 CCTs working in your market

creation | integration

8,000 IoT integration service experts

- Customer access (C-level)
- Domain know-how

~30,000 software engineers

>€10 bn investment in SW portfolio

Software tools, applications (mendix), industrial solutions driving value

Atos

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>800 AI experts

30 years track record in industrial AI

20 MindSphere Application Centers

>500 digital offerings

3rd party applications

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~1.4 million connected devices

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on-premise

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Thank you