

Industrial Edge Computing with SIMATIC

How the technology can transform industries

Future of Automation

...Siemens vision of future manufacturing processes based on key technology elements e.g. Edge Computing, Artificial Intelligence, blockchain and further ...

*Products and technology part of Future of Automation are **not yet available for purchase**, but will be part of our portfolio in the future.*



Siemens Industrial Edge Computing

Table of content

SIEMENS
Ingenuity for life



Introduction	3
Siemens Industrial Edge	7
Edge Computing Applications	20
Use Cases	30
Roadmap	34

Introduction



Edge Computing



Edge computing is a distributed computing paradigm which brings computer data storage closer to the location where it is needed. Computation is largely or completely performed on distributed device nodes. Edge computing pushes applications, data and computing power (services) away from centralized points to locations closer to the user. The target of edge computing is an application or general functionality needing to be closer to the source of the action where distributed systems technology interacts with the physical world. Edge computing does not need contact with any centralized cloud, although it may interact with one. In contrast to cloud computing, edge computing refers to decentralized data processing at the edge of the network.

Edge Computing

Combines both local and cloud computing

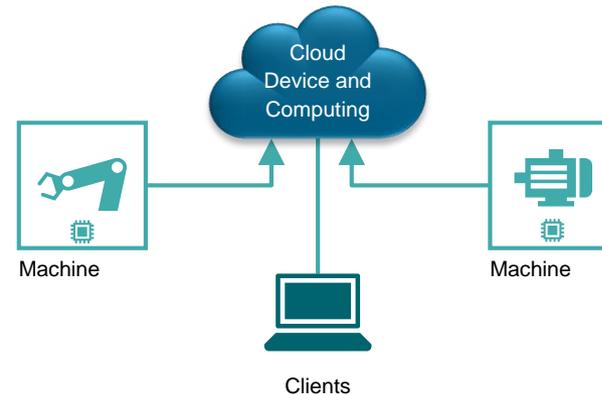
Local computing



Device Installed once – never or seldom updated

- Data transferred per USB stick or local network

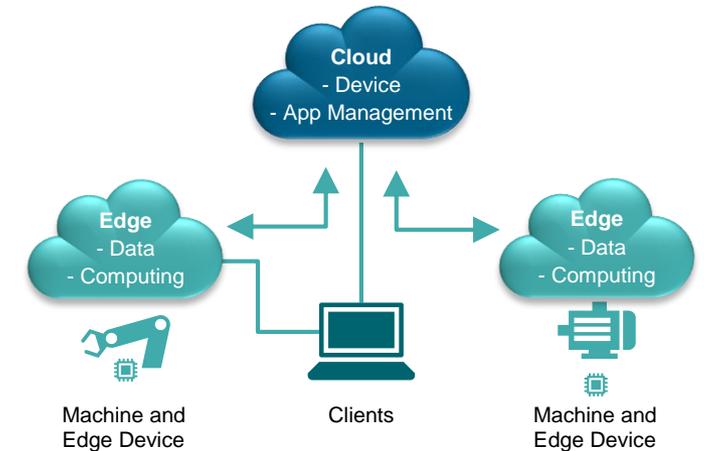
Cloud computing



App installation & deployment on-demand

- Central data and global intelligence
- Quick updates in the cloud
- Low frequency data/high latency of decisions
- Cloud dependency

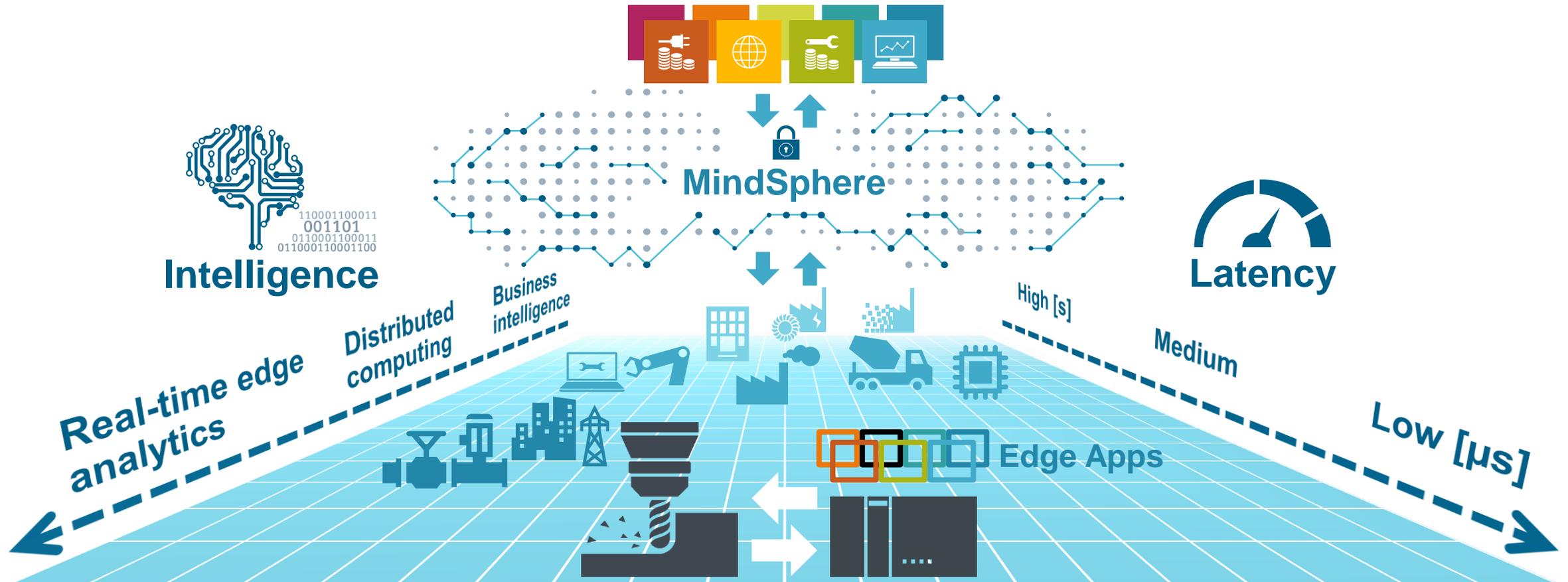
Edge computing



App installation & deployment on-demand

- Local data and global data (if wanted)
- Shift from global to local intelligence
- Quick software update cycles for edge devices
- High volume data and low latency decisions

Edge Computing – Devices must get smarter by moving data analytics and associated services from the cloud close to data sources



Edge Devices will push intelligence into devices respecting their needs and boundary conditions

SIEMENS
Ingenuity for life

Siemens Industrial Edge



Siemens Industrial Edge

Integrates decentral data intelligence on automation level

Applications

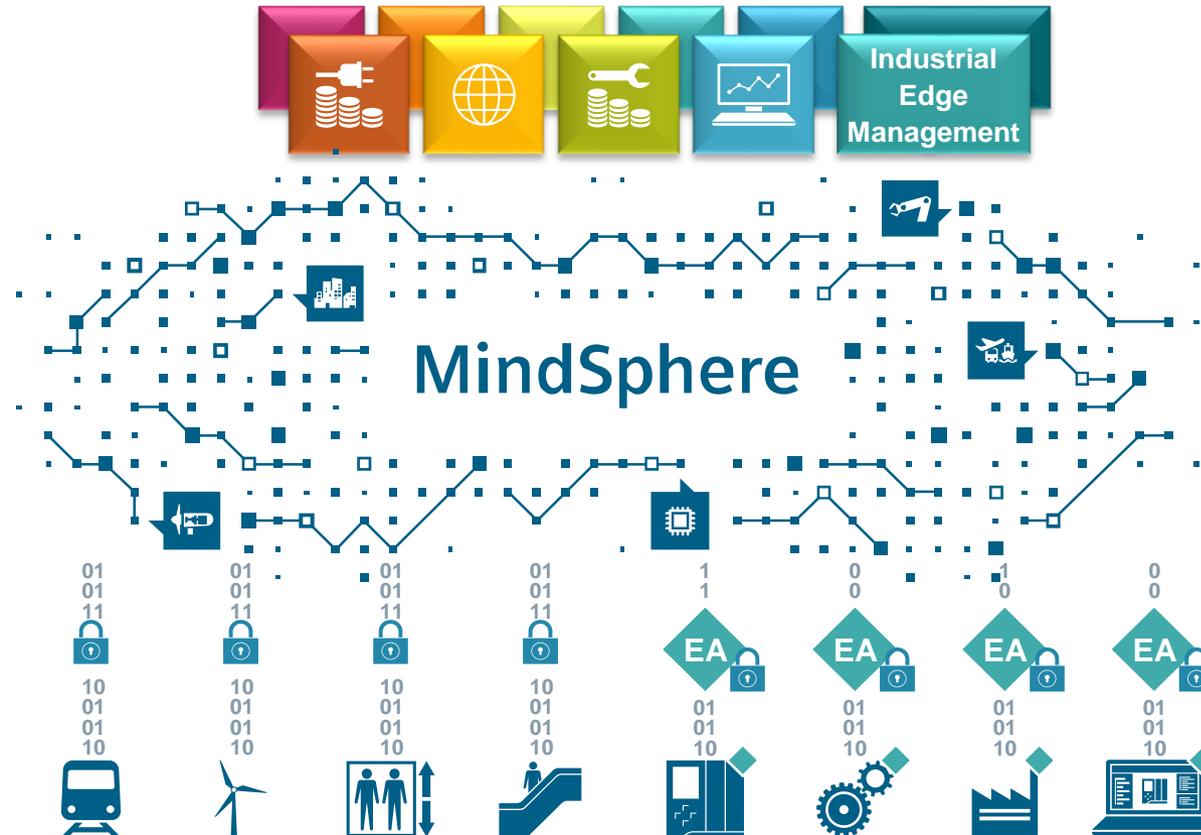
Powerful industry solutions with advanced analytics

Open PaaS

Develop robust industrial IoT solutions faster with global scalability

Connectivity

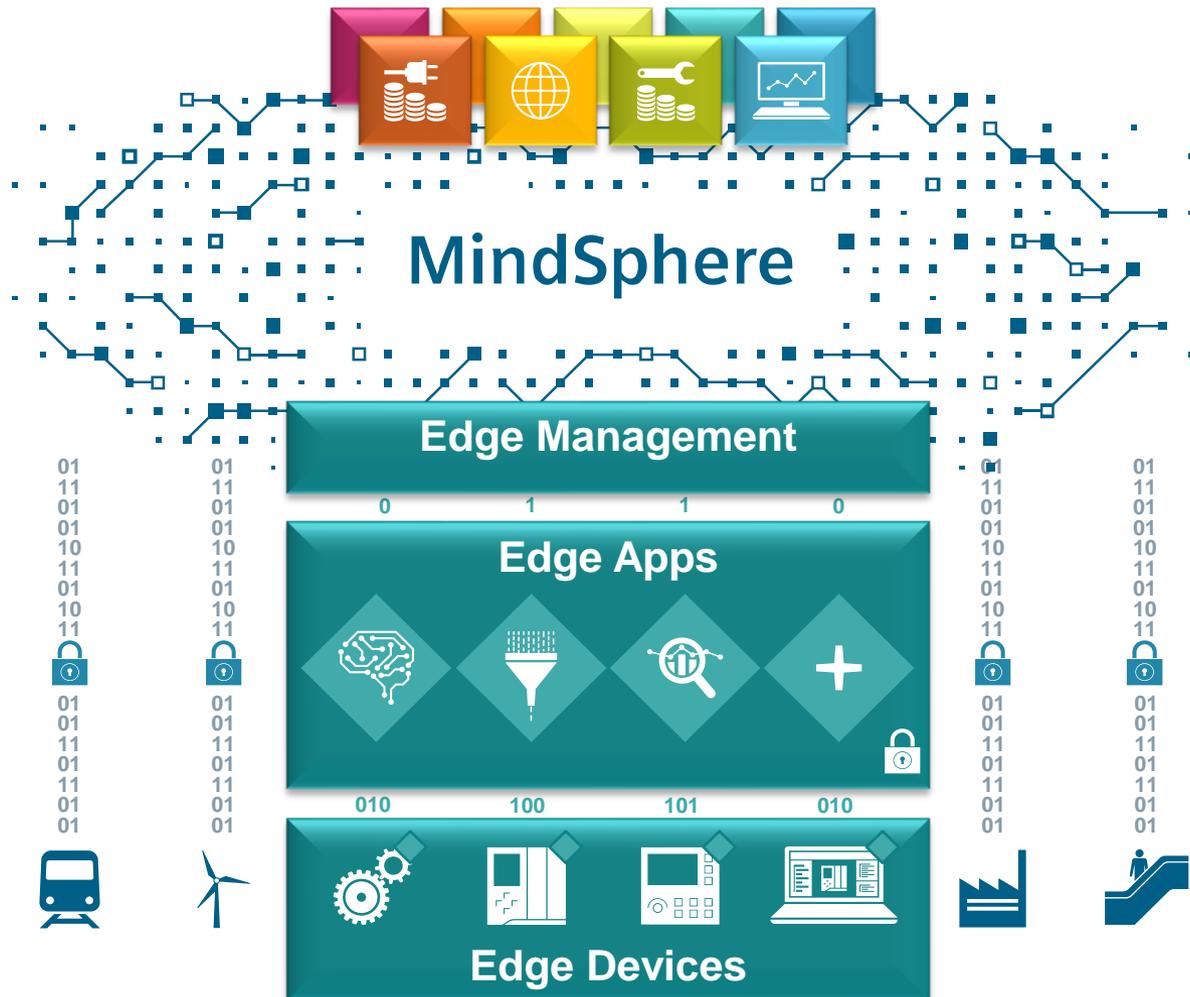
Connect products, plants, systems, machines and enterprise applications



Edge Computing
Open and flexible system for decentral data intelligence on automation level

Siemens Industrial Edge

Secured and flexible infrastructure for Edge applications



Cloud level

Edge Management

Central infrastructure to manage
Edge devices and apps

Cloud based and additionally On-Premise

Automation level

Edge Apps

Applications for intelligent data use
and flexible data exchange

Edge Devices

Secure, future-proof basis for
running Industrial Edge applications

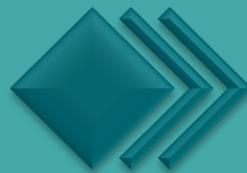
Siemens Industrial Edge expands industrial automation with new data processing capabilities to integrate IT

Factory/Cloud Level



Edge Computing

- Increased flexibility and openness for automation
- Local processing and high frequency data



Automation

Process control, highly encapsulated,
Ensures high machine availability



Enhancement of automation with Edge



Connectivity tasks



Local data pre-processing



Data and Device security



Openness



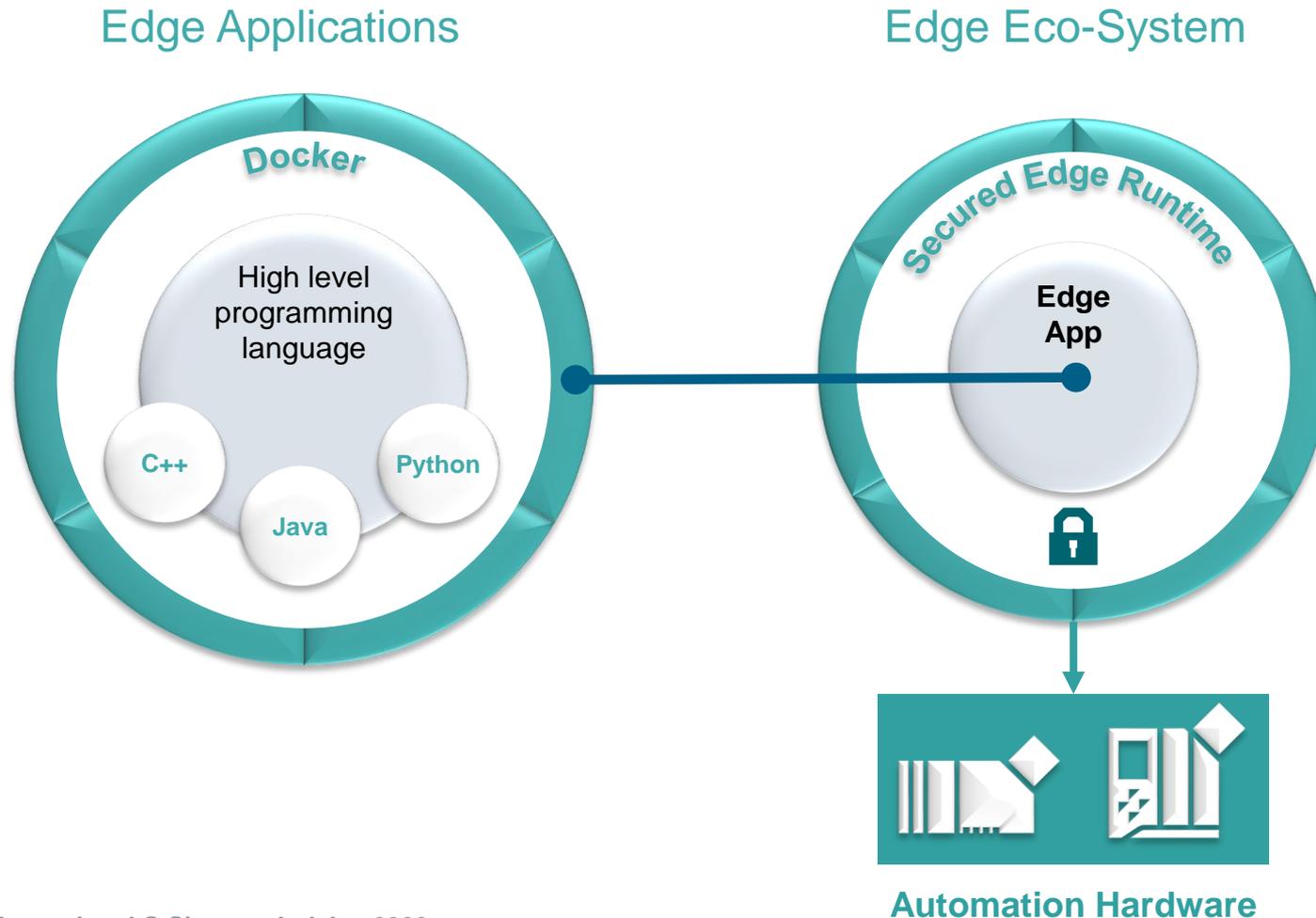
Intelligence in field such as AI



Fast Innovation cycles



Siemens Industrial Edge for machines and plants – Hardware independent data processing based on Edge Apps



Benefits

- Easy app integration on various Hardware
- Security included by default in devices by Siemens
- System openness to program and integrate nearly any app

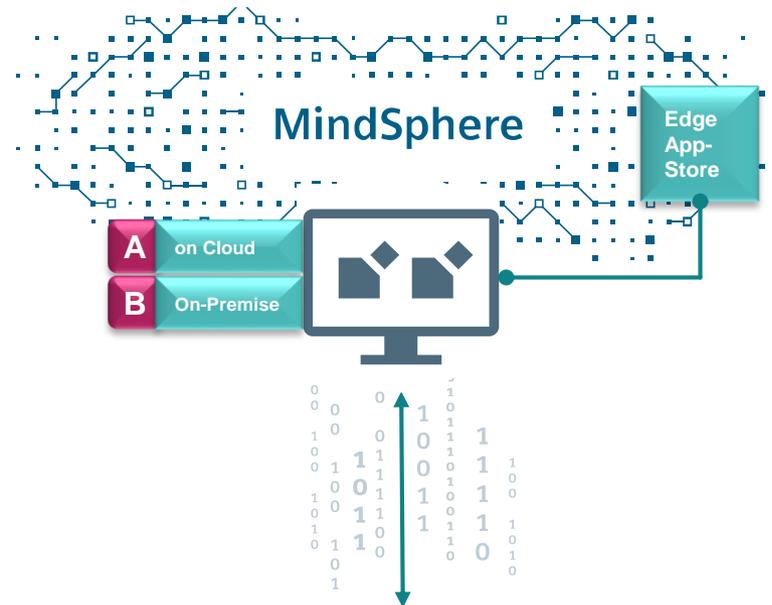


Siemens Industrial Edge – Vision – Totally Integrated Automation enhanced with Edge

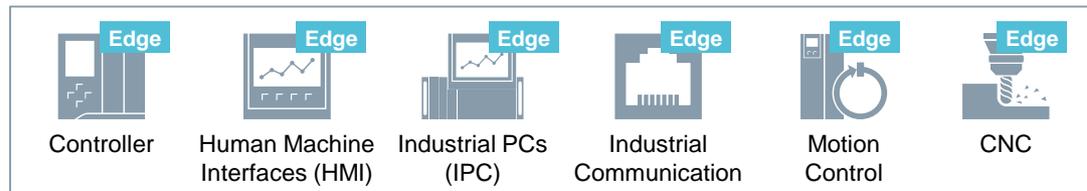
**Factory/
Cloud
Level**

**Automation
Level**

Industrial Edge



Totally Integrated Automation



Edge Management

- Edge App Store
- Edge Apps Management
- Edge Device Management

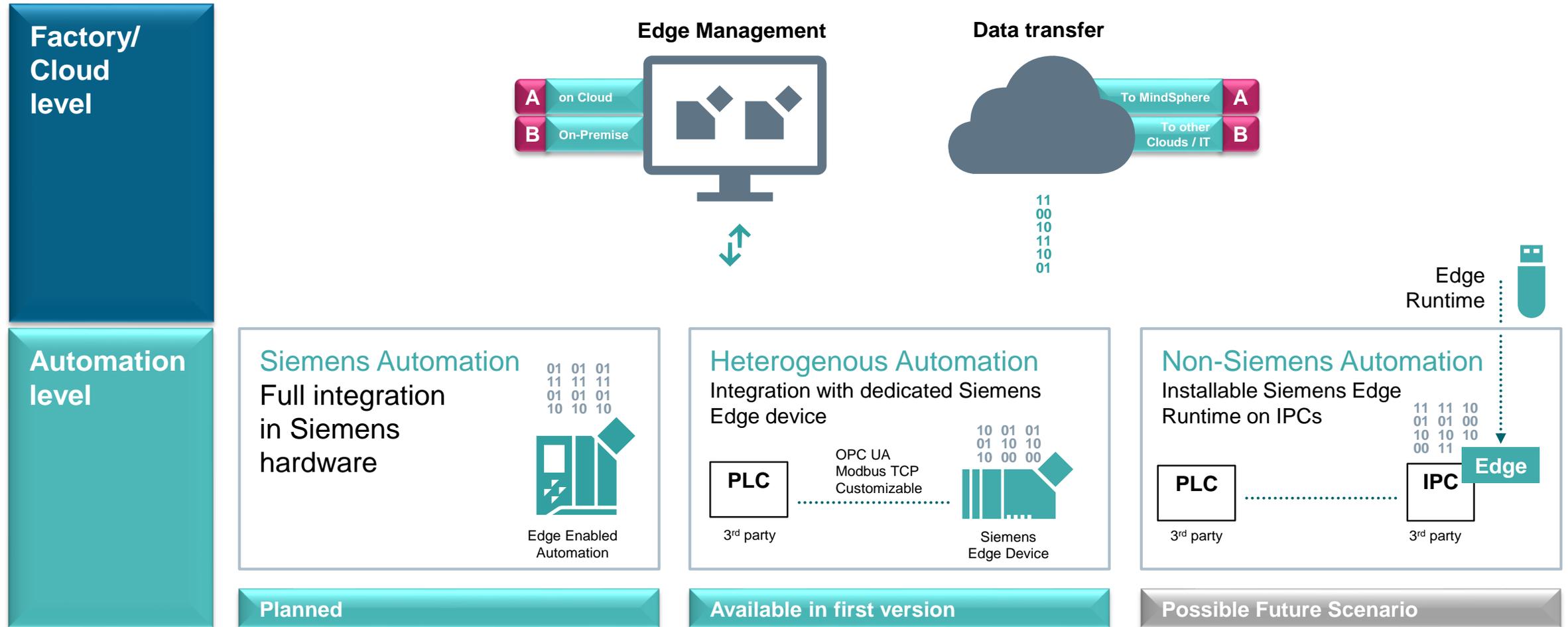
Edge Apps

- Data processing and connectivity applications
- Apps provided by Siemens, Partners and own developed

Edge Devices

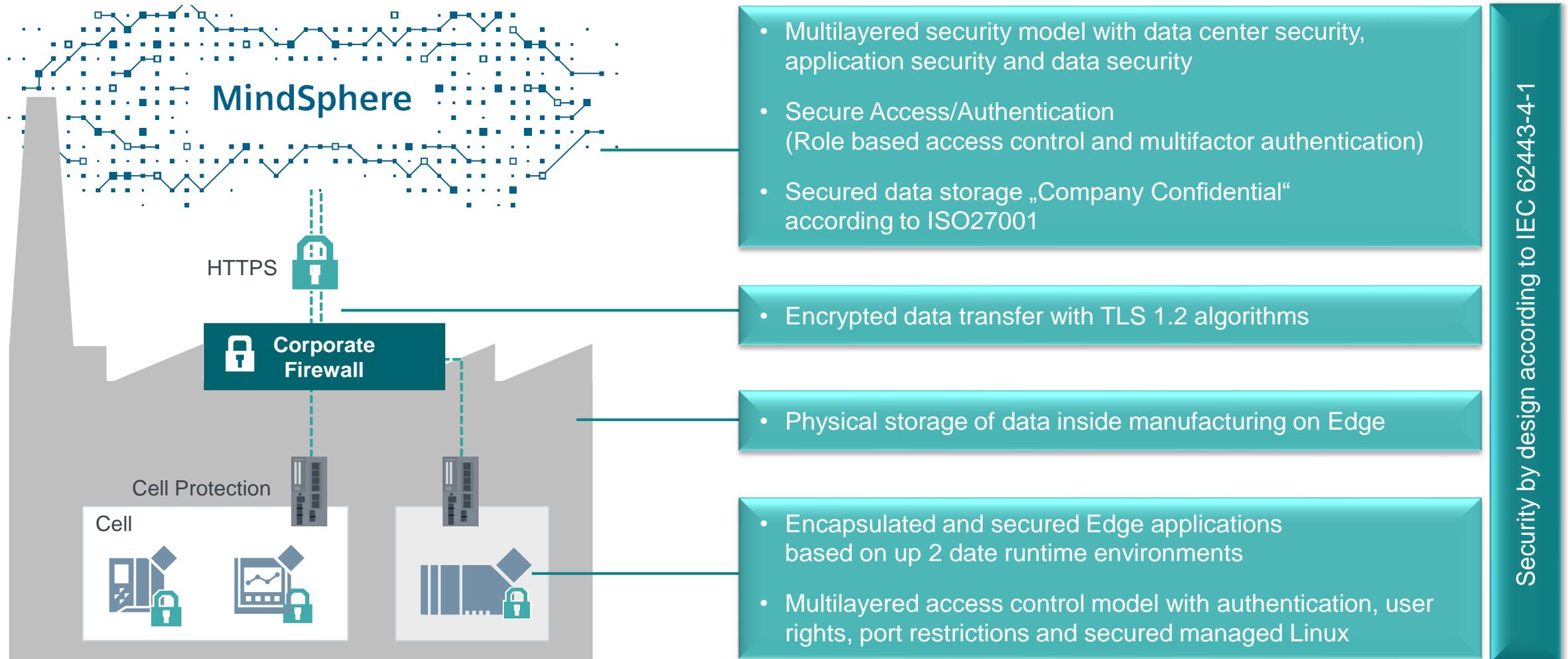
- Infrastructure to execute Edge apps
- Remote updating of apps
- Integrated security and connectivity

Siemens Industrial Edge for machines and plants – Designed for openness and 3rd party integration

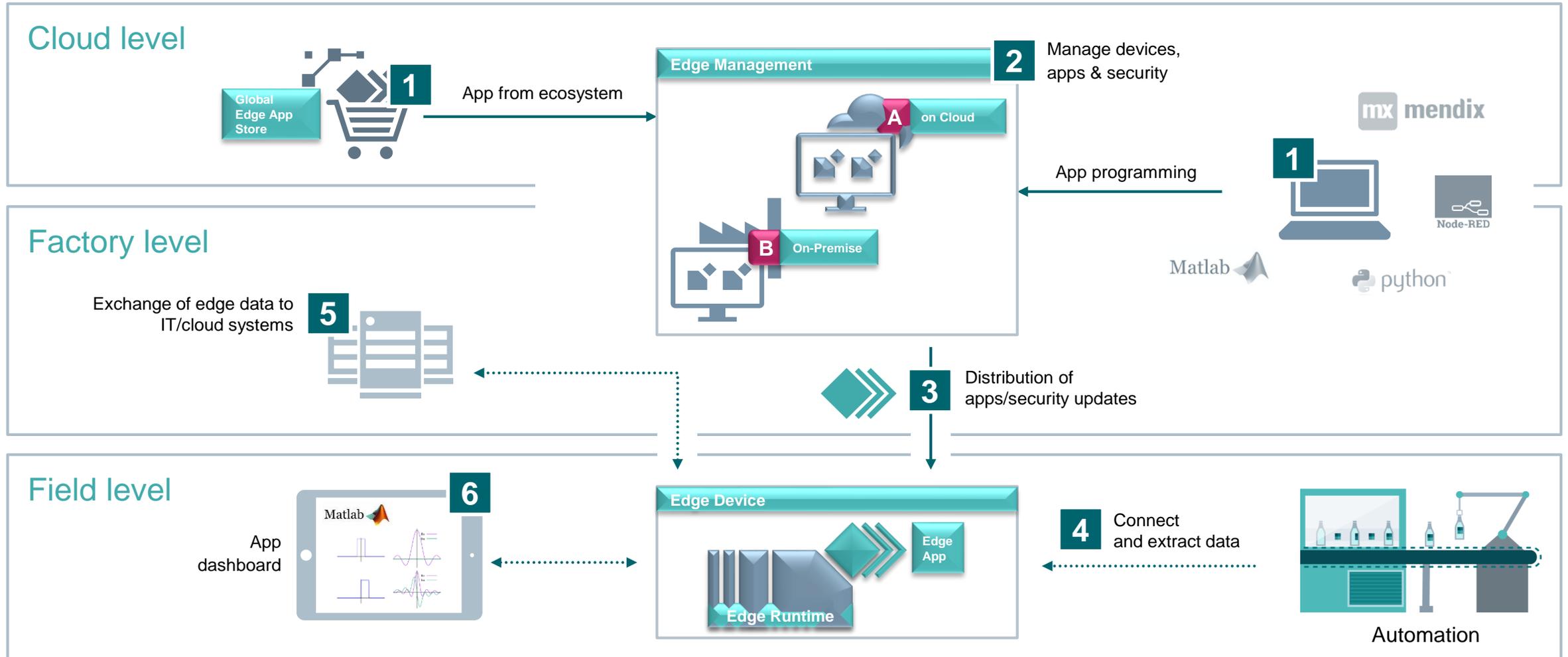


Comprehensive security mechanisms on all layers

Important facts to be used in data security discussions



Siemens Industrial Edge for machines and plants – Exemplary workflow

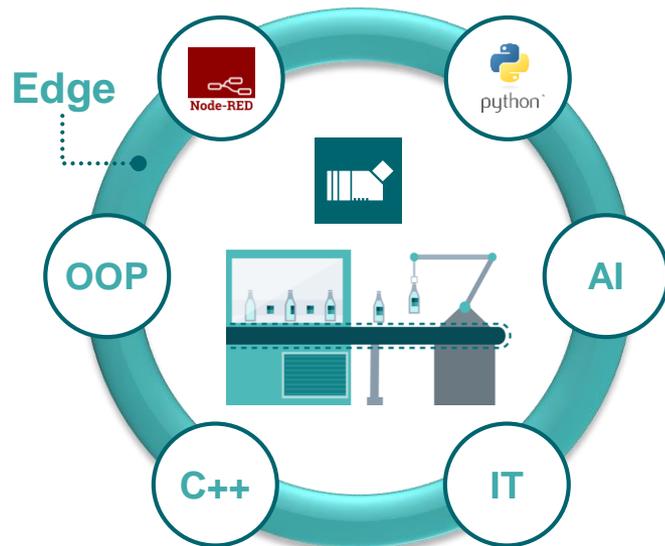


Edge Computing applications



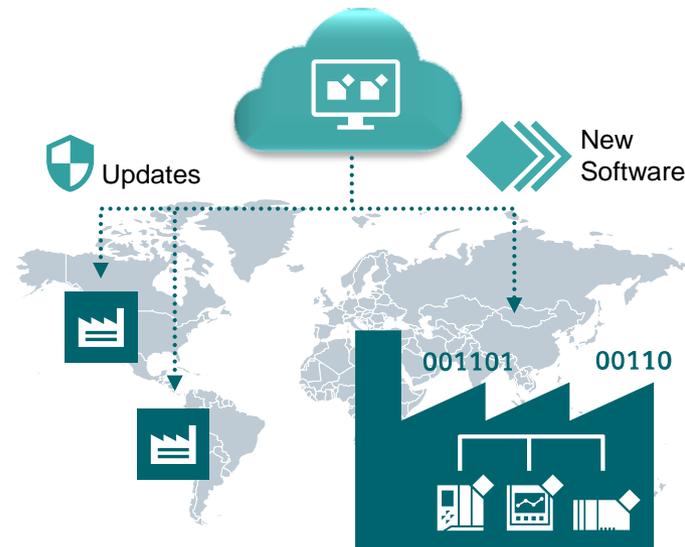
Typical application scenarios for Edge Computing (1/2)

Extend machines with new, advanced functionality for data processing



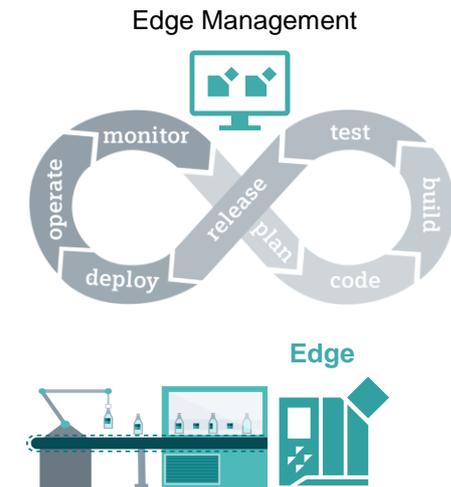
Integration of new technology into automation e.g. AI for data analytics near to the machine to e.g. predict next maintenance.

Increase operations efficiency with a global device, software & security management



More efficient software and version management as foundation for new business models for OEMs e.g. SaaS.

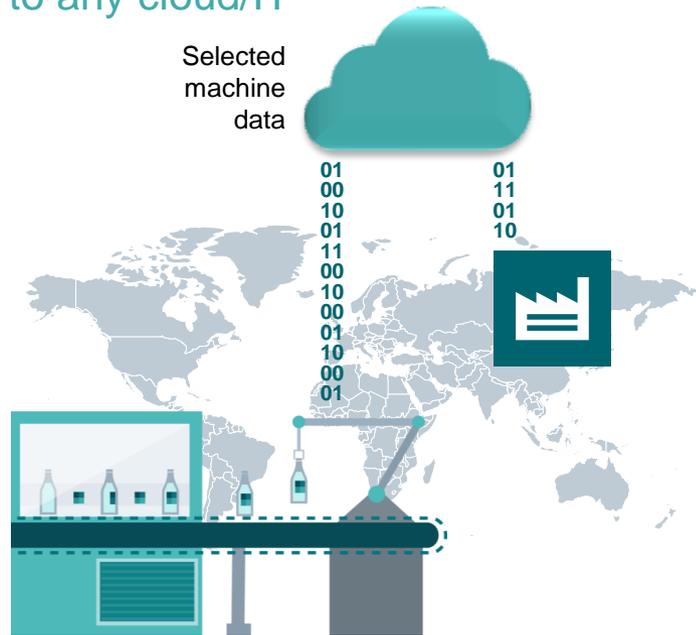
Increase software innovation cycles for machines with continuous updates for Edge devices



Separation of automation and Edge ensures high machine availability and on top fast innovation cycles with continuous updateability

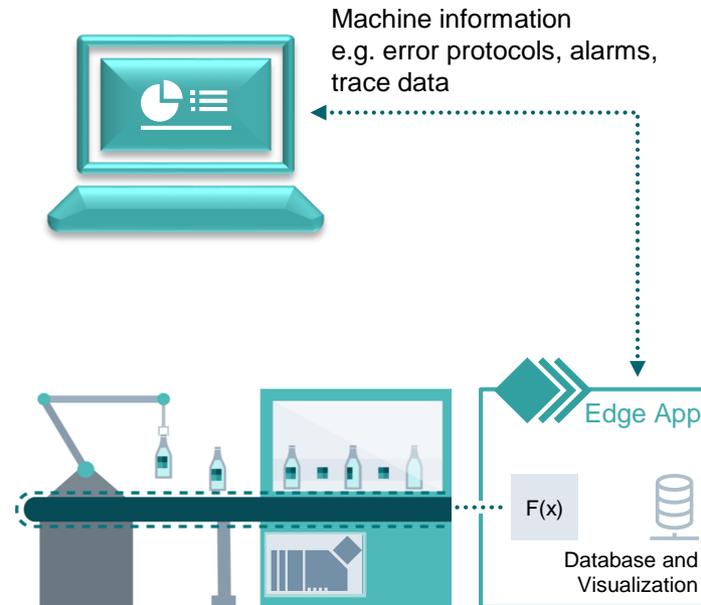
Typical application scenarios for Edge Computing (2/2)

Preprocess data and transfer to any cloud/IT



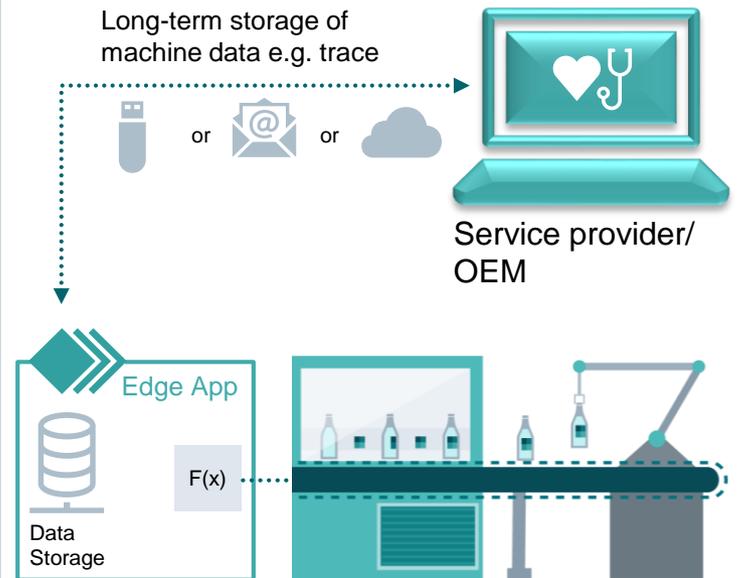
- Economical, secure and local data pre-processing for cloud/IT-systems
- Data access for global machine transparency in cloud for service planning, machine benchmarking

Process data for in-factory visualization



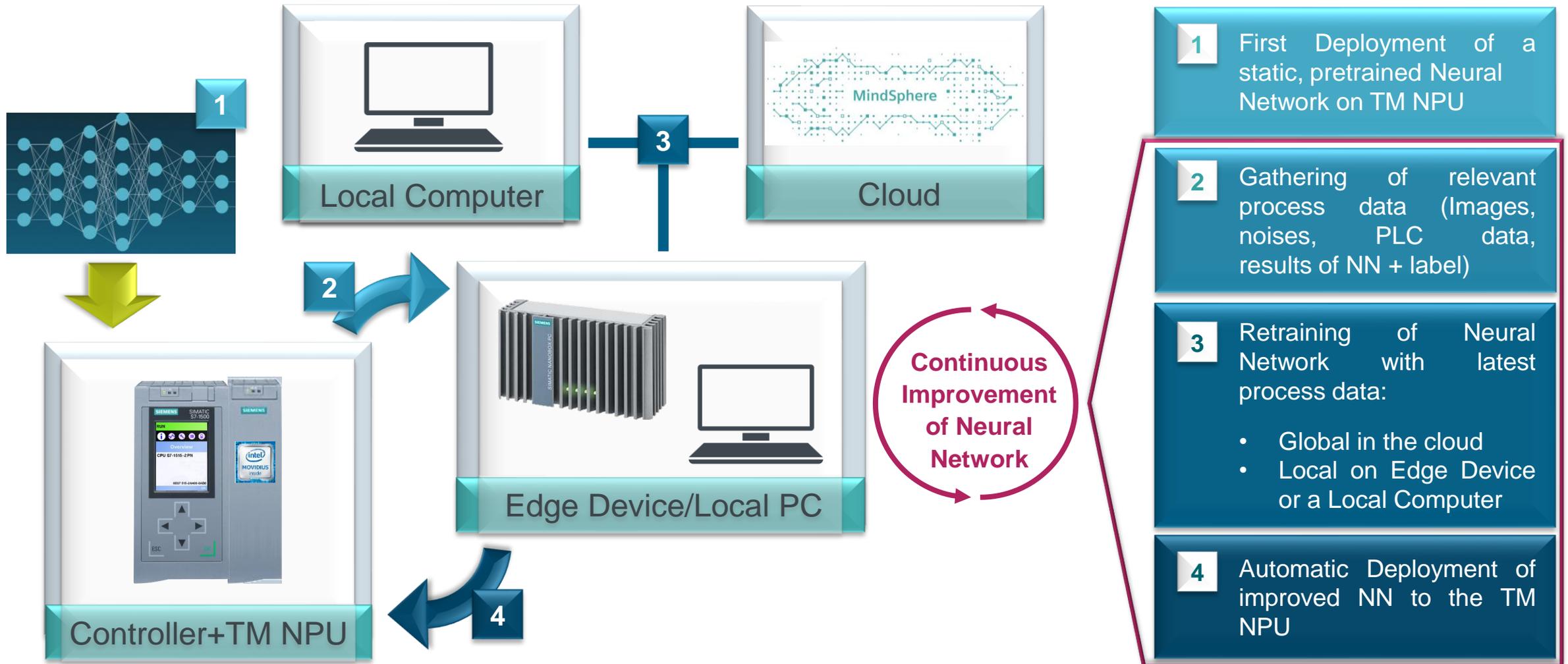
Access to machine information inside manufacturing e.g. flight recorder for machines for error tracing, data collection.

Process and store data for external usage e.g. data analytics services, warranty



Collect information for analysis external analysis and services, e.g. training of AI algorithms, data analytics services (external).

The Future of SIMATIC Artificial Intelligence and Industrial Edge - Vision



SIMATIC Edge Apps Apps planned

Data visualization Apps	Data processing / analytics Apps	Connectivity Apps		Other Apps
 <p>SIMATIC Inventory View</p>  <p>SIMATIC Automation Tool Basic</p>	 <p>SIMATIC Visual Flow Creator</p>  <p>SIMATIC Easy Data Extractor</p>	 <p>SIMATIC S7</p>  <p>MindSphere</p>	 <p>MQTT</p>  <p>OPC UA</p>	 <p>SIMATIC Notifier</p>

Easily program own Edge Apps based on high level programming languages (C, C++, Java, Python, ...)

Siemens Industrial Edge for machines and plants – Advantages at a glance



Implementation of new functionality



Open platform enables new types of data analysis in automation, e.g. Predictive maintenance

Long-term security



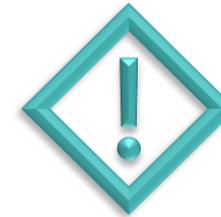
Always at the cutting edge – Updating device functions – worldwide

Maximum flexibility



Easiest way to adapt software to new circumstances

Data privacy



Your data remains on the automation level

New business model

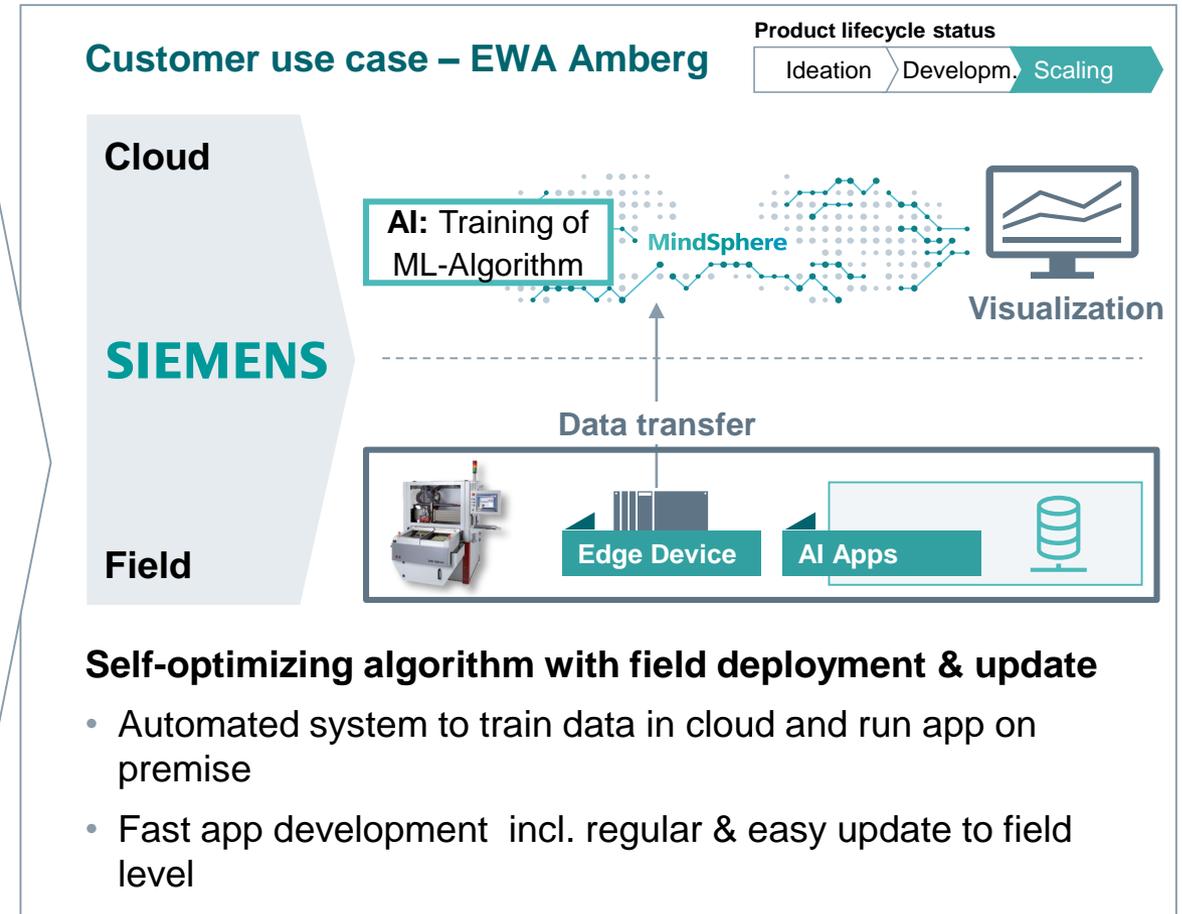
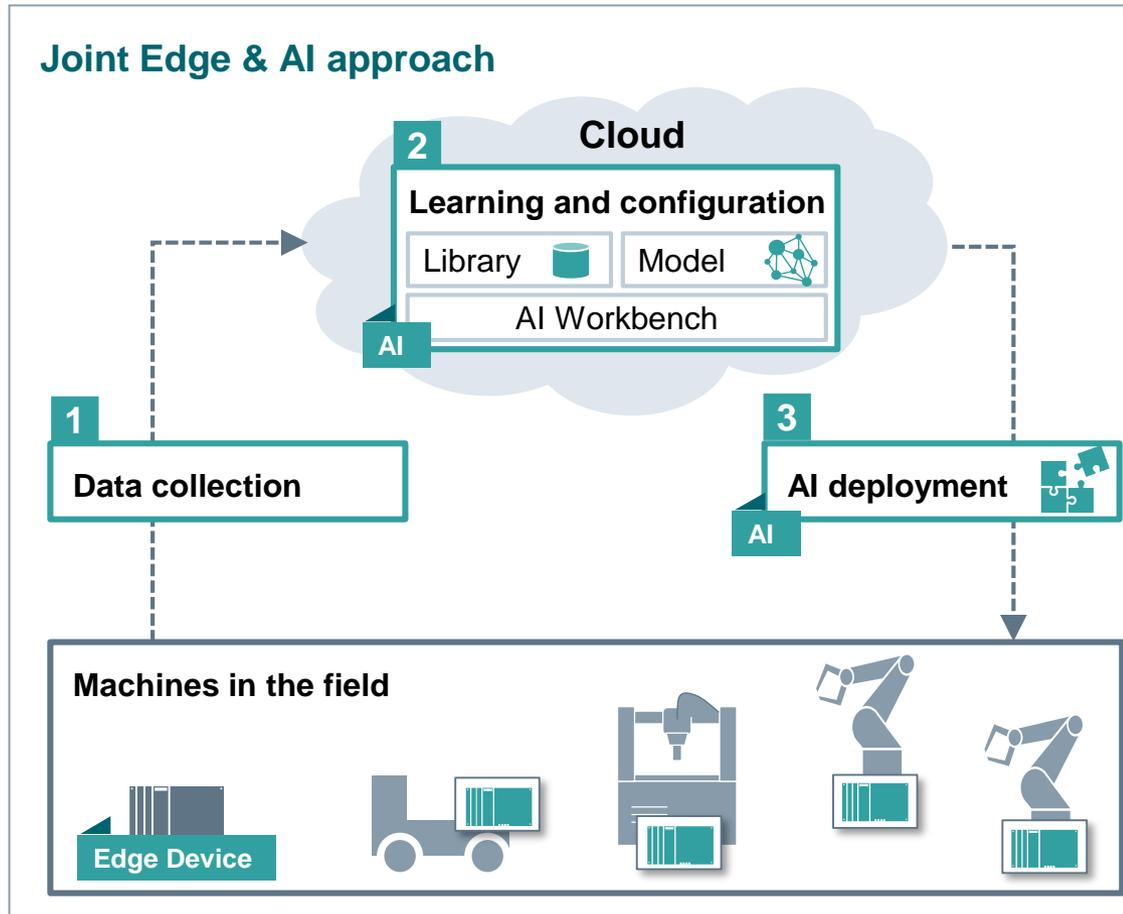


Additional realization of new business models as unique selling point to set us apart from the competition e.g. Guarantee of machine availability

Artificial Intelligence (AI) Use Case with Siemens Industrial Edge



Combine Edge & AI to leverage data collection from the field for AI learning, configuration and deployment



PCB cutting machine

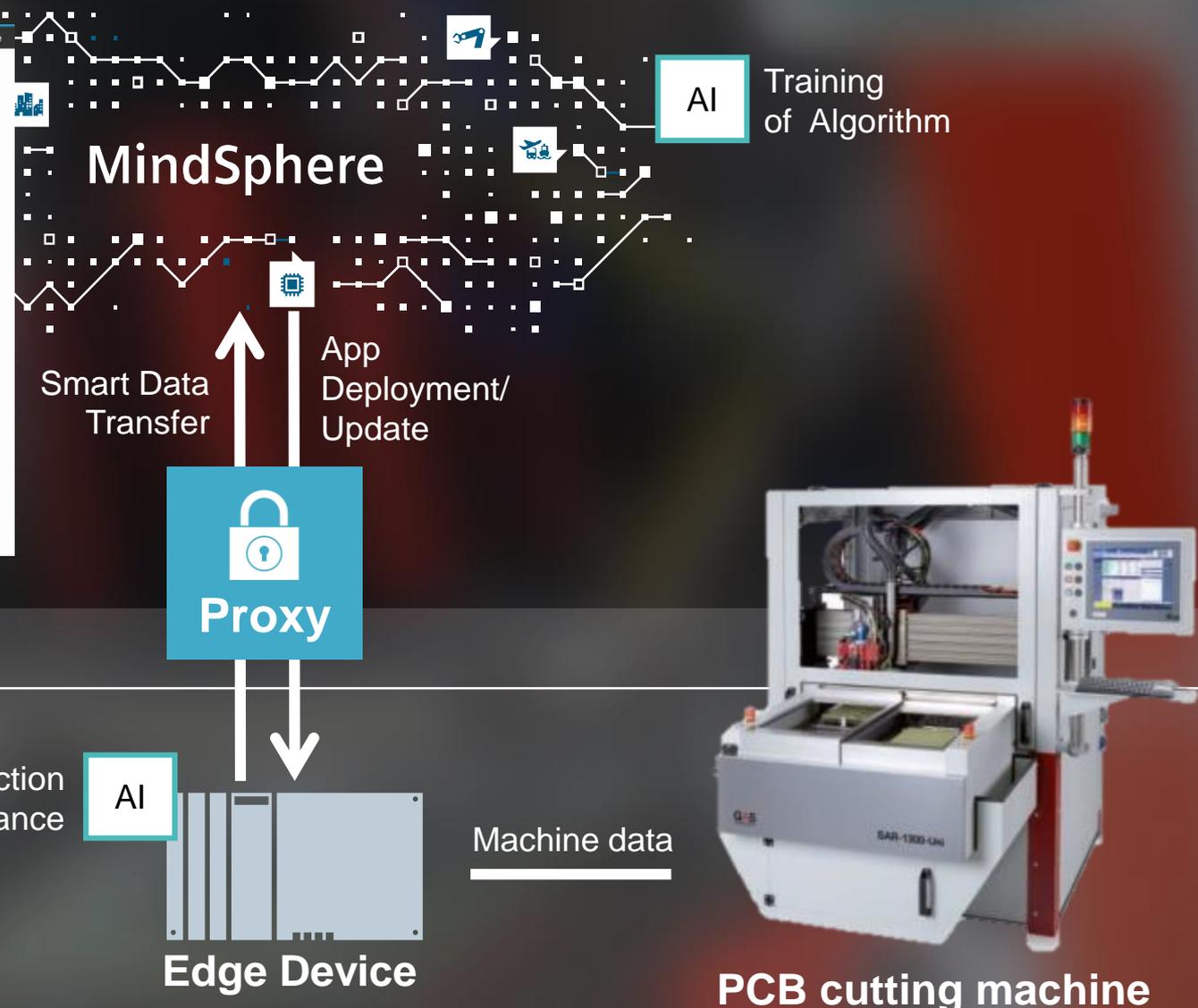
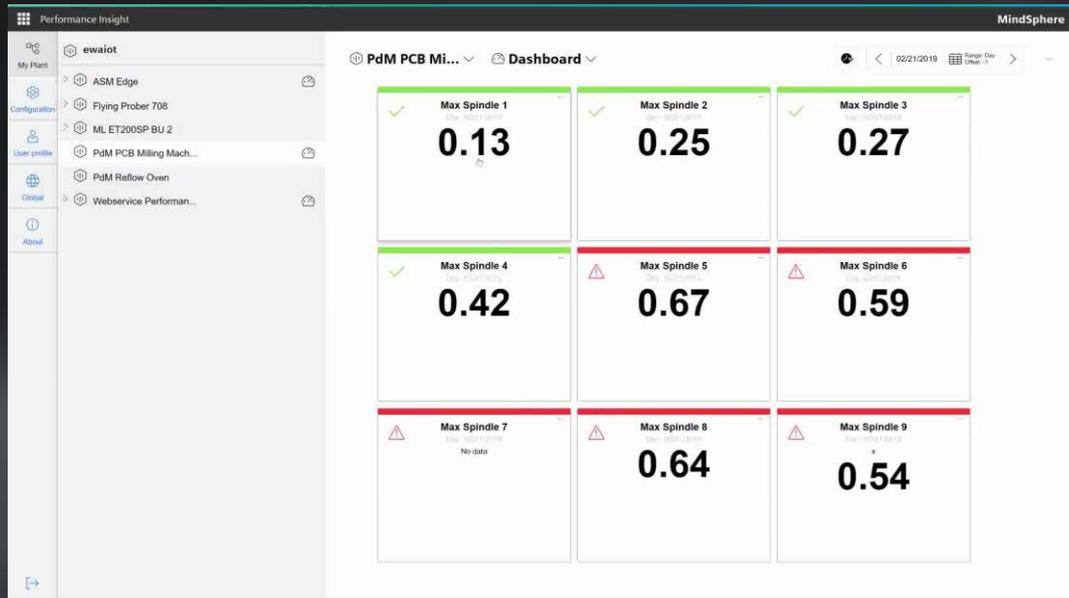
Siemens Electronics Factory
Amberg, Germany

The challenge



Aggressive milling dust causes
drive bearing to get stuck

Non production critical level



Production critical level

Anomaly detection for Predictive maintenance

AI

Edge Device

Machine data

PCB cutting machine

The image depicts a modern industrial setting, likely a factory or laboratory, with a high ceiling and large windows. The scene is dominated by glowing blue and white machinery and equipment. Overlaid on this are various digital data visualizations, including line graphs, bar charts, and icons representing different data points or processes. The overall atmosphere is one of advanced technology and data-driven manufacturing.

SIEMENS
Ingenuity for life

Product Information Links

Siemens Industrial Edge Info material



Product Pitch:

<http://siemenspitch.com/>

Product Links:

usa.siemens.com/industrial-edge

<https://new.siemens.com/us/en/products/automation/topic-areas/industrial-edge/production-machines.html>

Videos:

<https://www.youtube.com/watch?v=M8meiHMvZRM&t=14s>

<https://www.youtube.com/watch?v=Loi6dBgu0yA>

Thank you for your attention!



Alessandra Da Silva
USA AI & EDGE Deployment Team
RC-US DF FA MK HMI

The information provided herein is provided as a general reference regarding the use of the applicable products in generic applications. This information is provided without warranty. It is your responsibility to ensure that you are using all mentioned products properly in your specific application. Although this presentation strives to maintain accurate and relevant information, there is no official guarantee that the information provided herein is accurate. If you use the information provided herein in your specific application, please double check its applicability and be advised that you are using this information at your own risk. The purchaser of the product must confirm the suitability of the product for the intended use, and assume all risk and liability in connection with the use.

usa.siemens.com