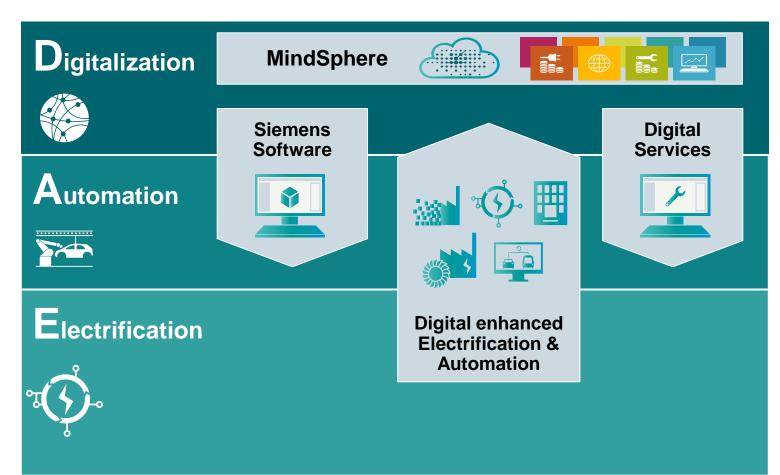


### Siemens in brief

# Digitalization is a key driver of innovation and growth





### **Revenue split in FY17:**

- Digitalization ~ 5.2 Bn EUR
- Automation ~ 19 Bn EUR
- Electrification ~ 43 Bn EUR
- Classical Services ~ 17 Bn EUR

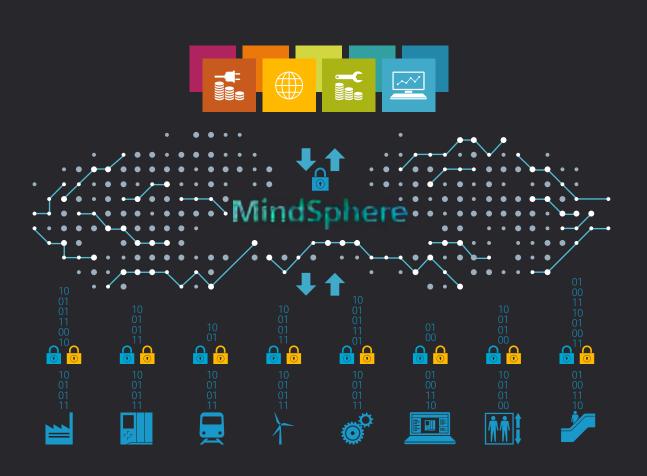
### **R&D** ~ 5.2 Bn EUR

For Digital Business ~ 1.8 Bn EUR

**Currently 377 000 employees thereof 24 500 Software engineers** 

# MindSphere – Open cloud based Industrial IoT operating system





## **MindApps**

- Use apps from Siemens, partners or develop your own
- Gain asset transparency & analytical insights
- Subscription based pricing model

## **MindSphere**

- Open interface for development of customer specific apps
- Integration with 3rd party clouds and -applications
- Various cloud infrastructures: AWS, SAP, Microsoft Azure, Atos etc. offered as public, private or on-premise

### **MindConnect**

- Open standards for connectivity, e.g., OPC UA
- Plug and play connection of Siemens and 3rd party products
- Secure and encrypted data communication
- Edge and fog computing

# Strong open ecosystem emerging around partners





# MindSphere IoT

# Core platform investment areas going forward



DF PL CAS S

Edge Services	Starter Services	Partner Services	IoT & Storage Services	Analytics Services	Product Intelligence
Manage devices in the field	Get started on digital journey	Platform ready for partner apps	Make use of data & context	Make <b>industrial</b> data analytics	Intelligent value chains
	8	Can be a second		easy	CDD

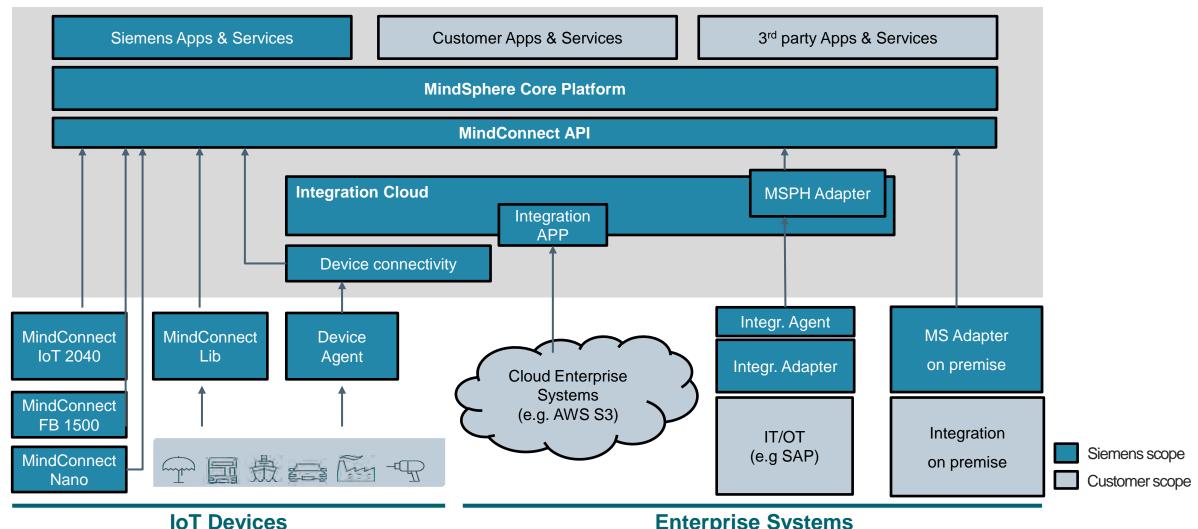
Developer Services	Connectivity Services	Advanced Services	Core Services	Exchange Services
Enable Developers	Easy & secure data transfer	Ready-to-use platform APIs	Basic Platform Services	Buy & sell apps and training
-	ST.	*		

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## **Connectivity Big Picture**

# Connection of IoT Devices and Enterprise Systems



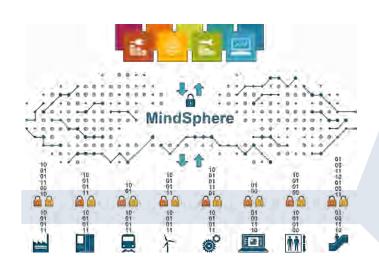


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**Enterprise Systems** 

# MindConnect – Easy and integrated connectivity





#### **MindConnect Main Characteristics:**

- Dedicated IoT Connectors with MindConnect Nano, MindConnect IoT2040
- MindConnect embedded in standard Siemens industrial products, e.g. SINUMERIK and RUGGEDCOM
- MindConnect Software, APIs and Libraries for own integration into assets / devices

### **Key MindSphere Connectivity Suite Features**

**Dedicated IoT Connectors** MindConnect Nano and MindConnect IoT2040



2 MindConnect embedded Agents in standard Siemens industrial products





MindConnect Software for every further product, including 3<sup>rd</sup>-party





Windows / Linux

MindConnect Lib





# Highly scalable, cost efficient

Highly scalable, cost efficient cloud-infrastructure based on Cloud Foundry

# Highest security standards

- MindConnect Elements based on ICS (Industrial Controls System) Security oriented to industry standard IEC 62443
- Unique MindConnect gateways with hardened and locked Linux based OS
- MindSphere Platform IT Security oriented to industry standard ISO 27001, IEC 62443, BSI
- **Data in rest** is located on SAP datacenters that comply to all required certificates
- Data in motion is always at least 256 bit SSL/TLS encrypted

# Maximum confidentiality

- The customer controls these authorization levels and is the owner of this data
- Siemens acts a data custodian

#### **STEP 1 CONNECT**

Get MindSphere user account, receive and integrate Connector Box into machine / equipment





### **SIEMENS**

Ingenuity for life

#### STEP 3 GO

Monitor e.g. health status of all assets and drill into details using MindApp Fleet Manager

and Visual Analyzer via

MindSphere

# **Out-of-the-box MindApps**

# Fleet Manager & Visual Analyzer



# Additional features adding value to core component

- Search for assets using map location
- Simple asset-based export
- Asset explorer
- Get an overview over variables/tags of an asset
- Create "virtual aspects"
- Rules with email notification
- Visual Analyzer as base for simple analytics

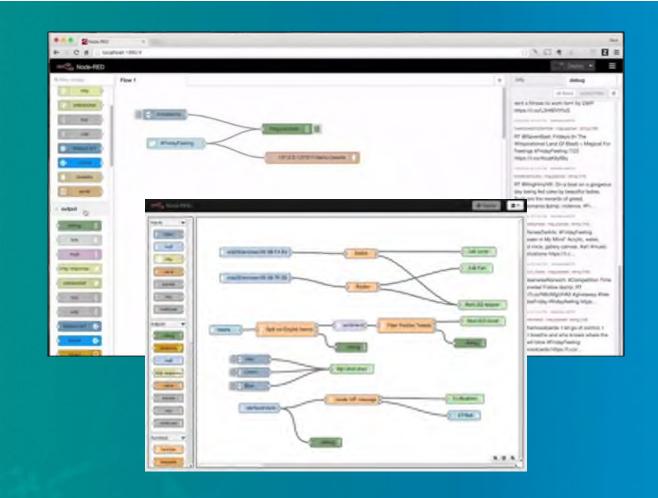


# **Out-of-the-box MindApps**

## Visual Workflow Creator



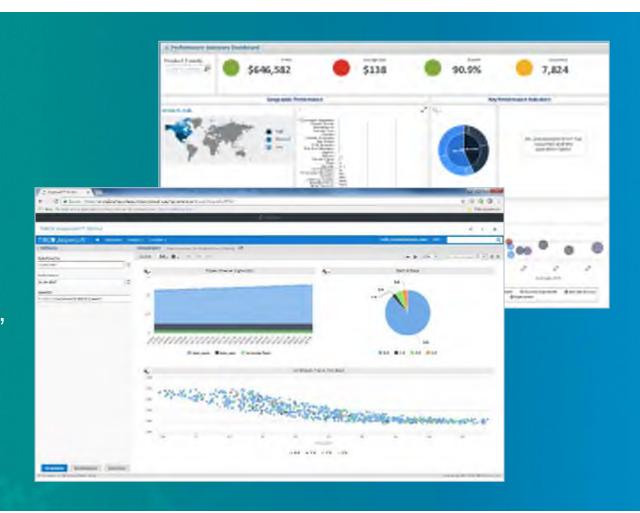
- Configure own workflows
- Standard calculations
- Prepare data for further analysis and visualization
- Aggregate data together
- Define and calculate KPIs
- Trigger more complex actions
   (e.g. send email, if threshold rule is breached under a certain condition etc.)



# Out-of-the-box MindApps Reporting and dashboarding

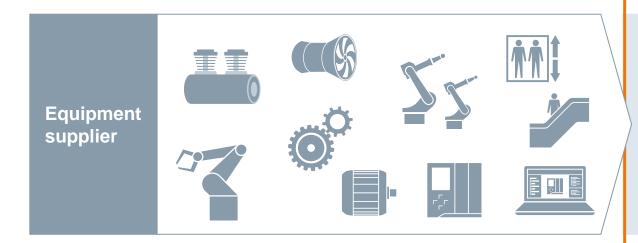


- Enable MindSphere users to create customized Dashboards and Reports
- Integrated in Mindsphere with SSO
- Customized data adapters to import data from MindSphere via MindApp API
- Contains standardized visualization elements, direct access to data in MindSphere, preconfigured templates and an integrated path to publish dashboards and reports



# MindSphere and MindApps to increase business value for equipment suppliers and operators





Equipment operator









#### **Business Value**

- Increase service efficiency / lower warranty expenses
- Offer scalable services / introduce new business models
- Enhance products via feedback loop to R&D
- Etc.
- Increase uptime / asset availability
- Optimize assets
- Increase maintenance efficiency
- Etc.

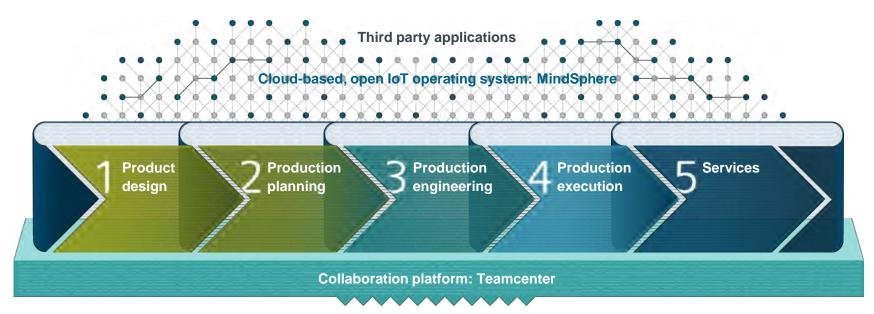
Our customers have essential requirements – throughout the process- and discrete manufacturing industry





# Siemens' Digital Enterprise Software Suite MindSphere IoT closes the loop

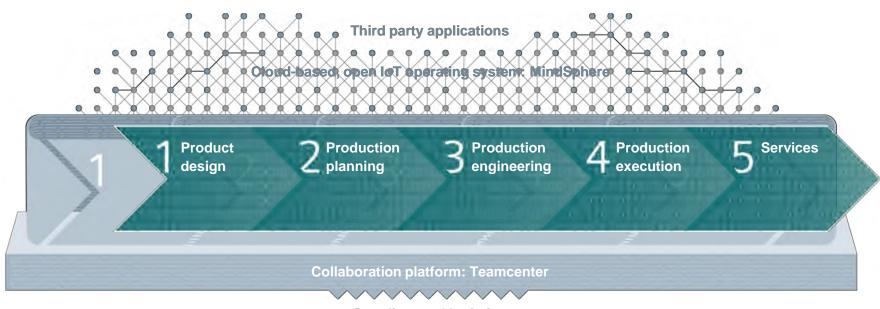




**Suppliers and logistics** 

# Create a powerful Digital Twin of the entire value chain

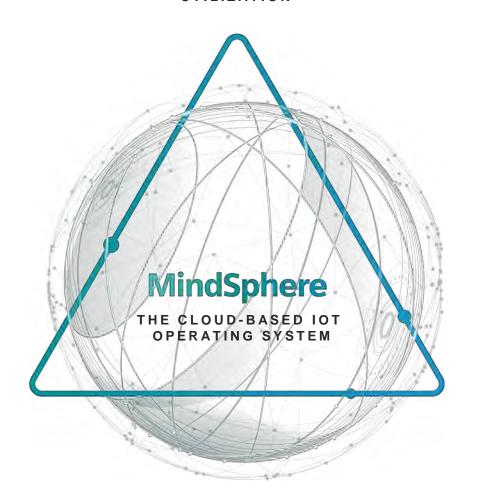




**Suppliers and logistics** 



# Digital Performance Twin



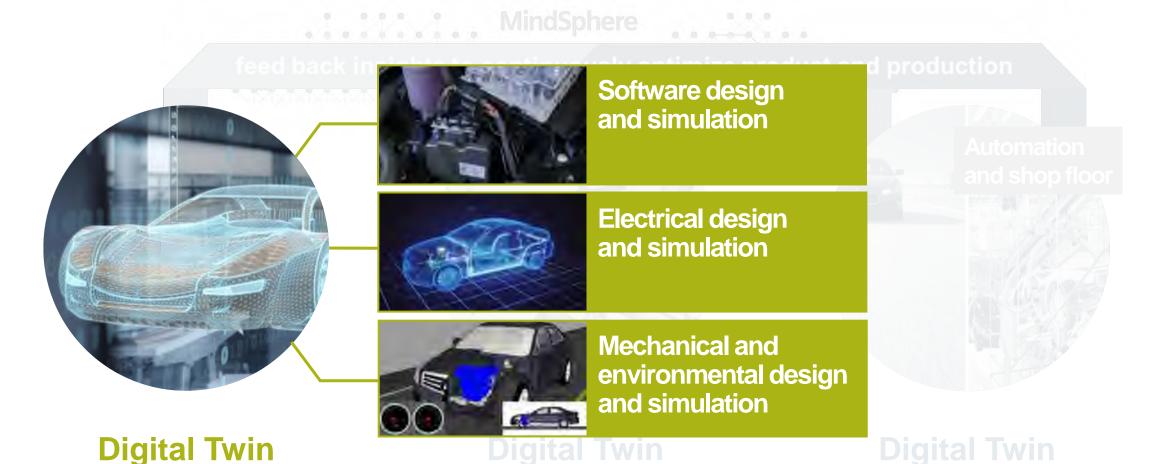
Digital Production Twin

IDEATION

Digital Product Twin

# Creating the most holistic digital twin available on the market





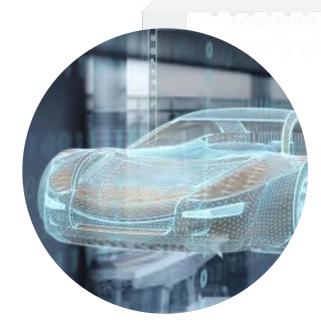
product

# Creating the most holistic digital twin available on the market





feed back insights to continuously optimize product and production





Automation and shop floor

Digital Twin product

Digital Twin production

Digital Twin performance



MindSphere transforms data into knowledge.
And knowledge into business success.

MindSphere

 $\rangle 1 \rangle 2 \rangle 3 \rangle 4 \rangle 5 \rangle$ 



## Creating the most holistic digital twin available on the market





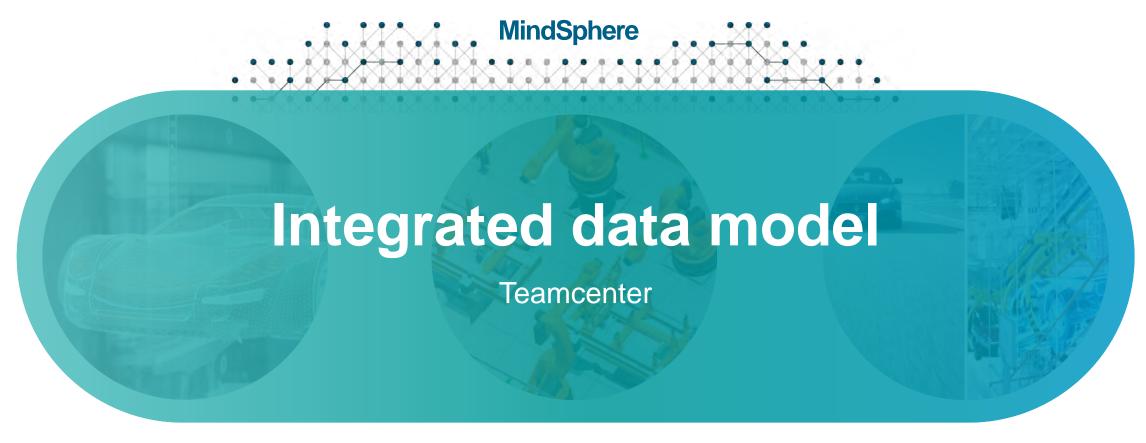
Digital Twin product

Digital Twin production

Digital Twin performance

## Creating the most holistic digital twin available on the market





Digital Twin product

Digital Twin production

Digital Twin performance

# With Siemens' integrated technologies, Maserati reduced development time while increasing production output



30% shorter development time

More than **70,000** combinations available

3 times more cars produced



# Virtual commissioning of a tray line in a food & beverage plant in Finland using the digital twin





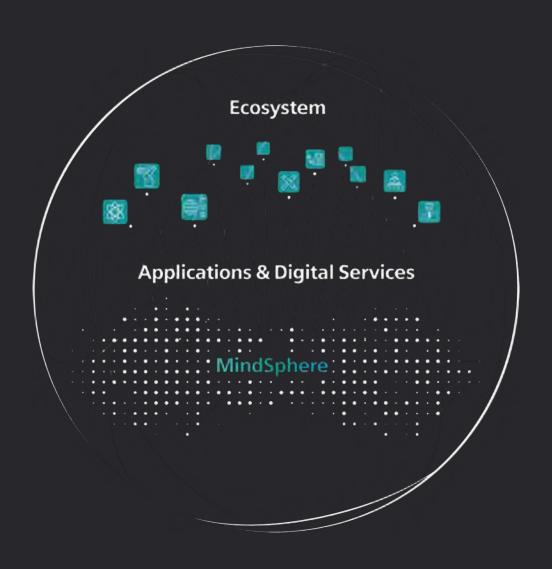
Identification of 10 PLC code errors during virtual commissioning

Validation of a new operation mode to increase production

On time commissioning

## MindSphere The cloud-based, open IoT operating system





## **Key, Unique strengths**

- Global Siemens installed base of millions of devices (30 million automation systems, 70 million contracted smart meters, 800 thousand connected products, e.g., trains)
- Openness in connectivity, infrastructure deployment and App development
- Ecosystem with broad domain expertise and horizontal IT capabilities
- Integrated operational data with Digital Twin to optimize simulation & engineering (model-based analytics)

