

The image features a night-time aerial view of a city with lights reflecting on a river. Overlaid on this are several vertical columns of glowing blue digital data points and circuit-like patterns, suggesting a high-tech or artificial intelligence theme. The Siemens logo and tagline are positioned in the top right corner.

SIEMENS
Ingenuity for life

MindSphere

Filka Marian

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[siemens.com/mindsphere](https://www.siemens.com/mindsphere)

MindSphere is your entry point to drive performance with digitalization

Increase Performance ...

...powered by digital transformation



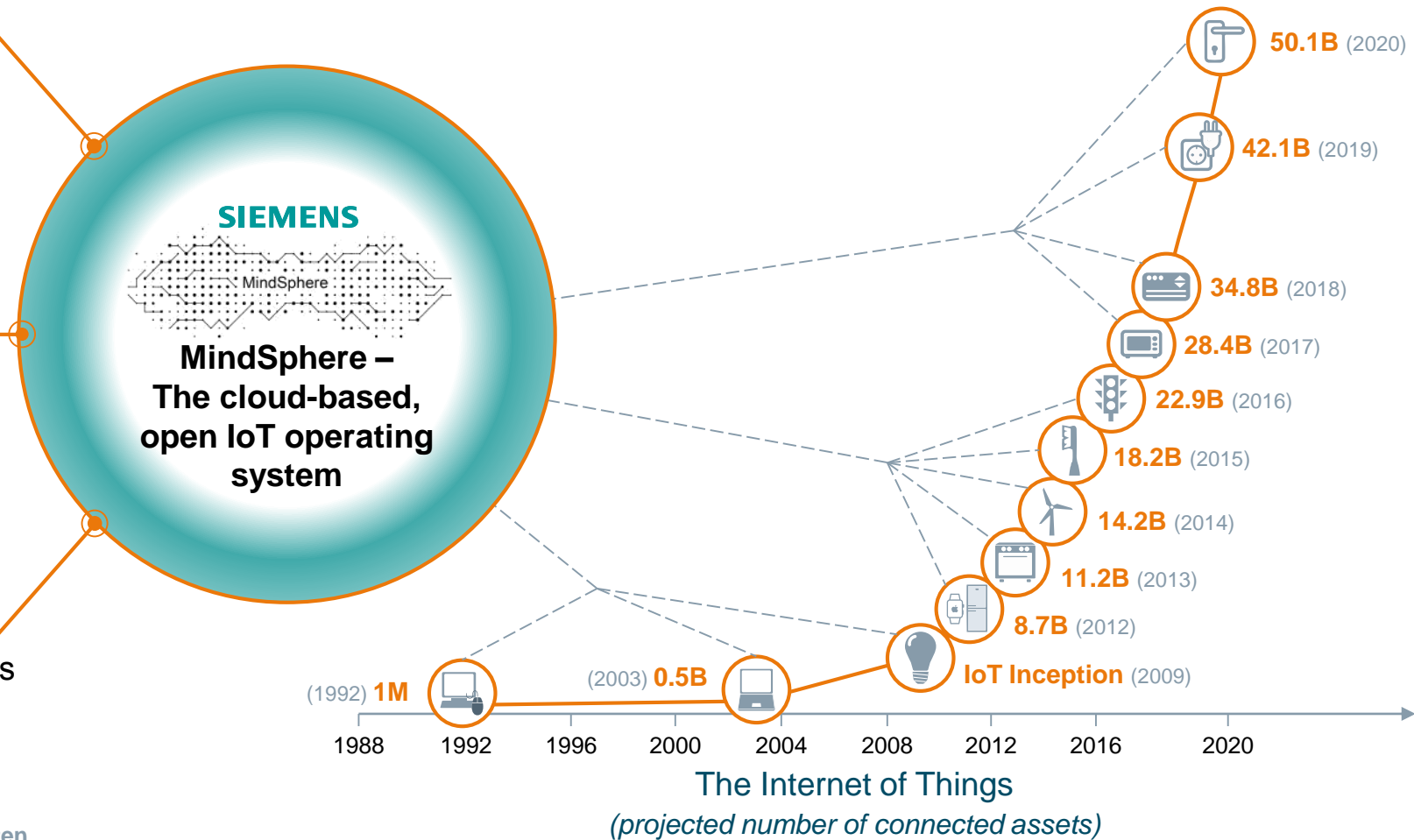
Build Digital Business ...

...through development of applications & digital services



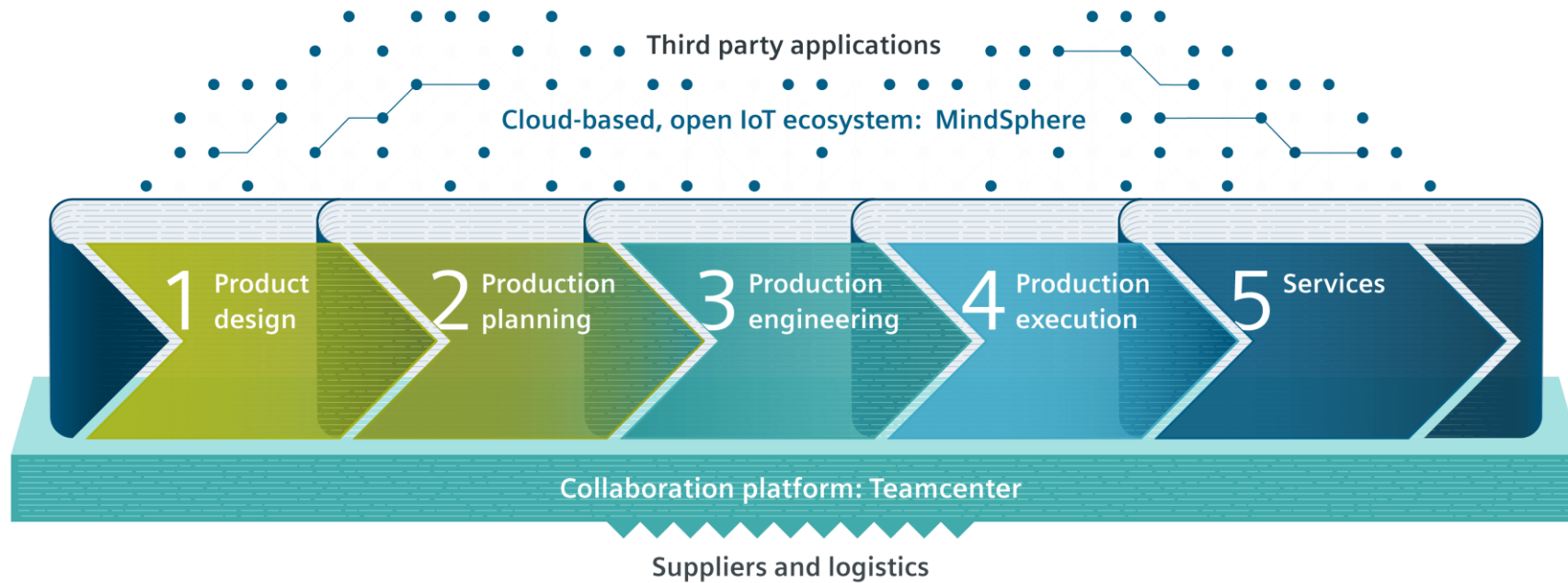
Differentiate in the Market ...

...through new service and business models



Integrating and digitalizing the entire value chain is key to staying competitive in the future

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Summary – The Vision Comes to Life

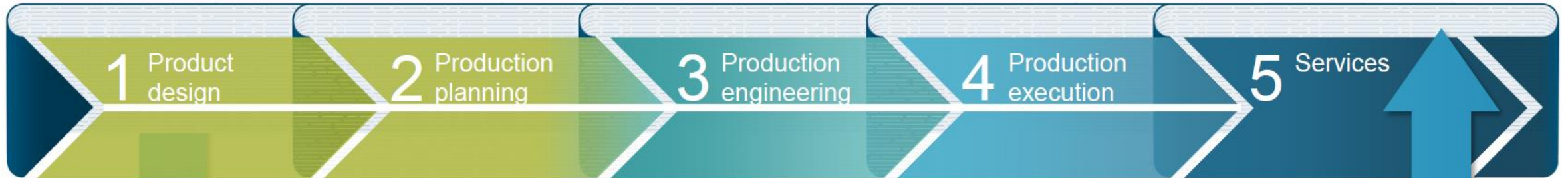
Key Advantages of Digitalization



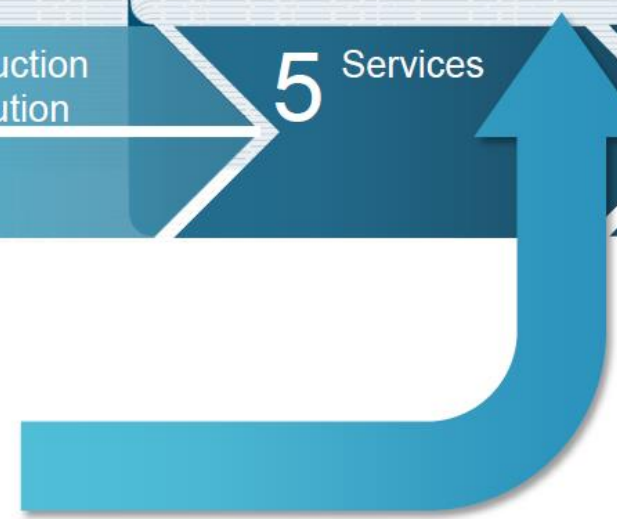
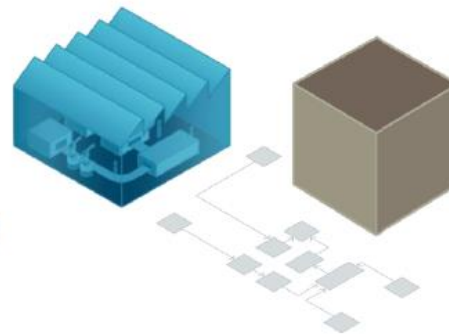
Use Simulation to achieve foresight in the Virtual World



Use Smart Data Analytics to gain insight and drive continuous improvement

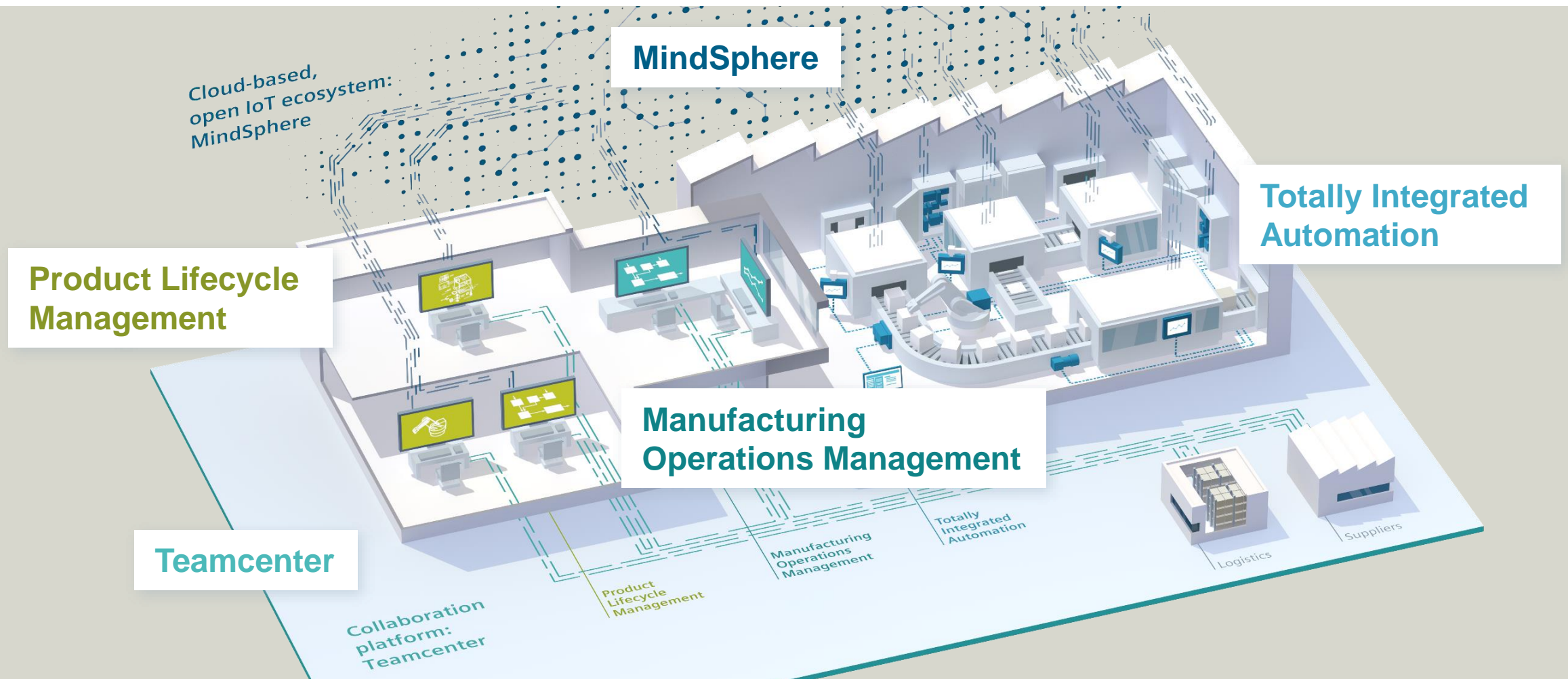


Drive intra-company and supplier collaboration via data integration

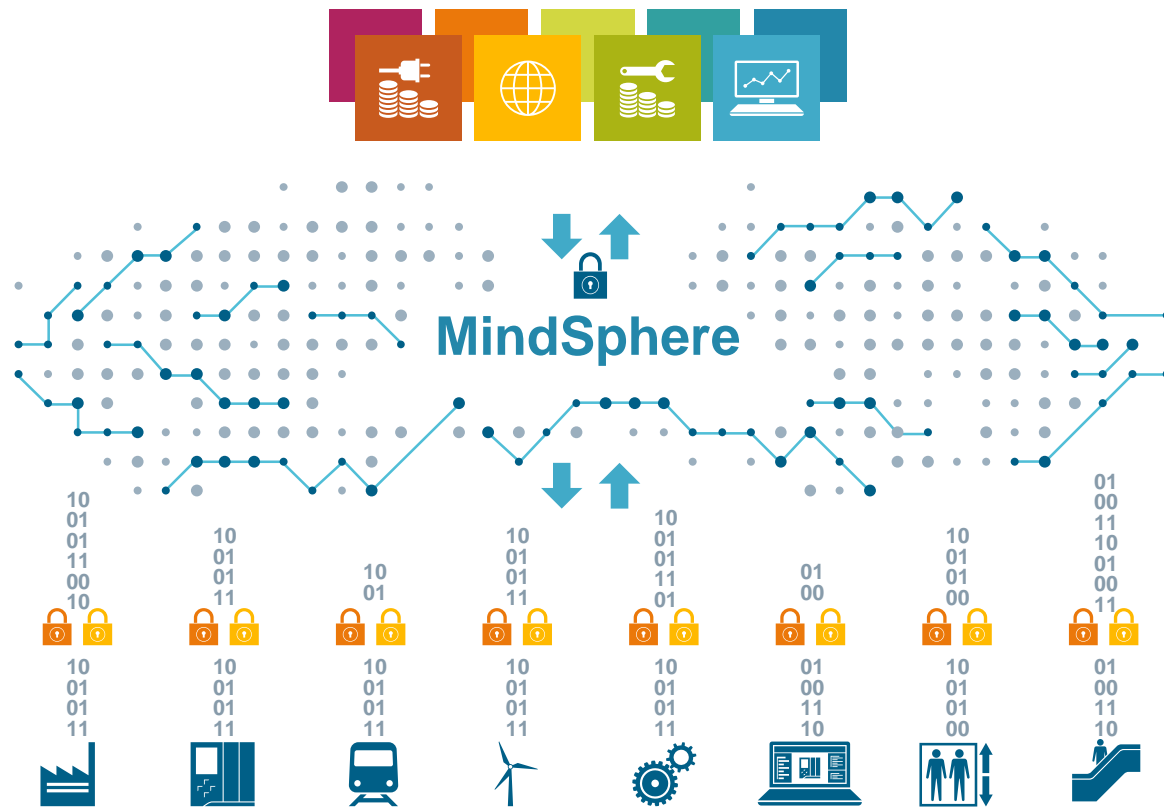


Digital Enterprise Suite – Siemens' answer to customer requirements

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MindSphere – The cloud-based, open IoT operating system from Siemens



MindApps

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

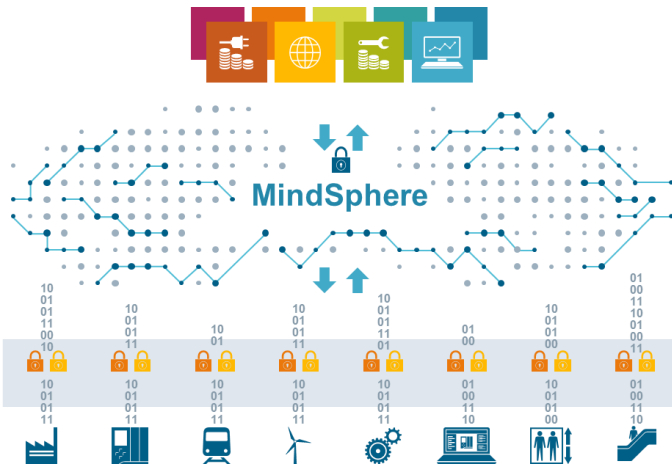
MindSphere

- Open interface for development of customer specific apps
- Various cloud infrastructures: SAP, AtoS, Microsoft Azure offered as public, private or on-premise (planned)

MindConnect

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

Easy and integrated connectivity as key differentiator



MindConnect Main Characteristics:

- Dedicated IoT Connectors with **MindConnect Nano**, **MindConnect IoT2040** and **MindConnect FB S7-1500** (with engineering via TIA Portal v14)
- MindConnect **embedded** in standard Siemens industrial products, e.g. SINUMERIK and RUGGEDCOM
- Upcoming **MindConnect Software, APIs and Libraries** for own integration into assets / devices

Key MindSphere Connectivity Suite Features

- 1** Dedicated **IoT Connectors** focused on brownfield installations with **MindConnect Nano** and **MindConnect IoT2040**



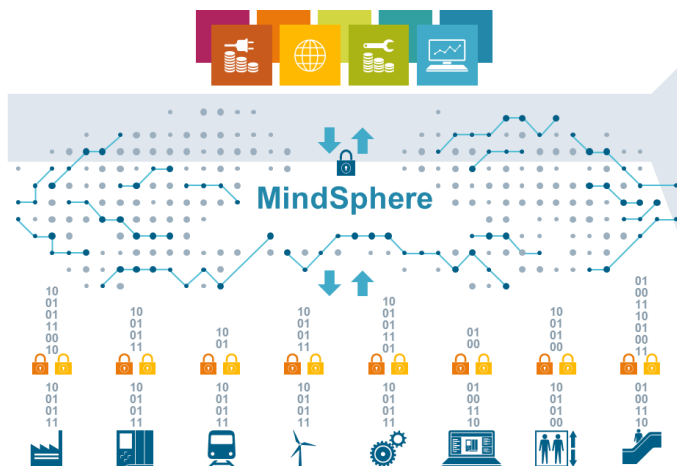
- 2** MindConnect **embedded Agents** in standard Siemens industrial products focused on greenfield as unique differentiator, with e.g. SIMATIC, Sinumerik



- 3** **MindConnect Software, MindConnect APIs and MindConnect Lib** for every further product, including 3rd-party



MindSphere APIs – scalable application and connectivity development



MindApps API Characteristics:

- **Application Programming Interface (API)** of MindSphere for development of customer owned analytical apps (MindApps)
- Optimized for **industrial IoT App development** with additional reusable supporting modules (e.g. parsing, analytics and visualization modules)
- Ensure app **scalability** leveraging MindSphere
- Taking advantage of **future innovation** of platform and connectivity

Key MindApp API Features

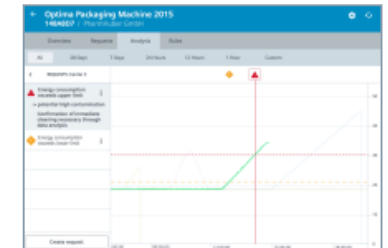
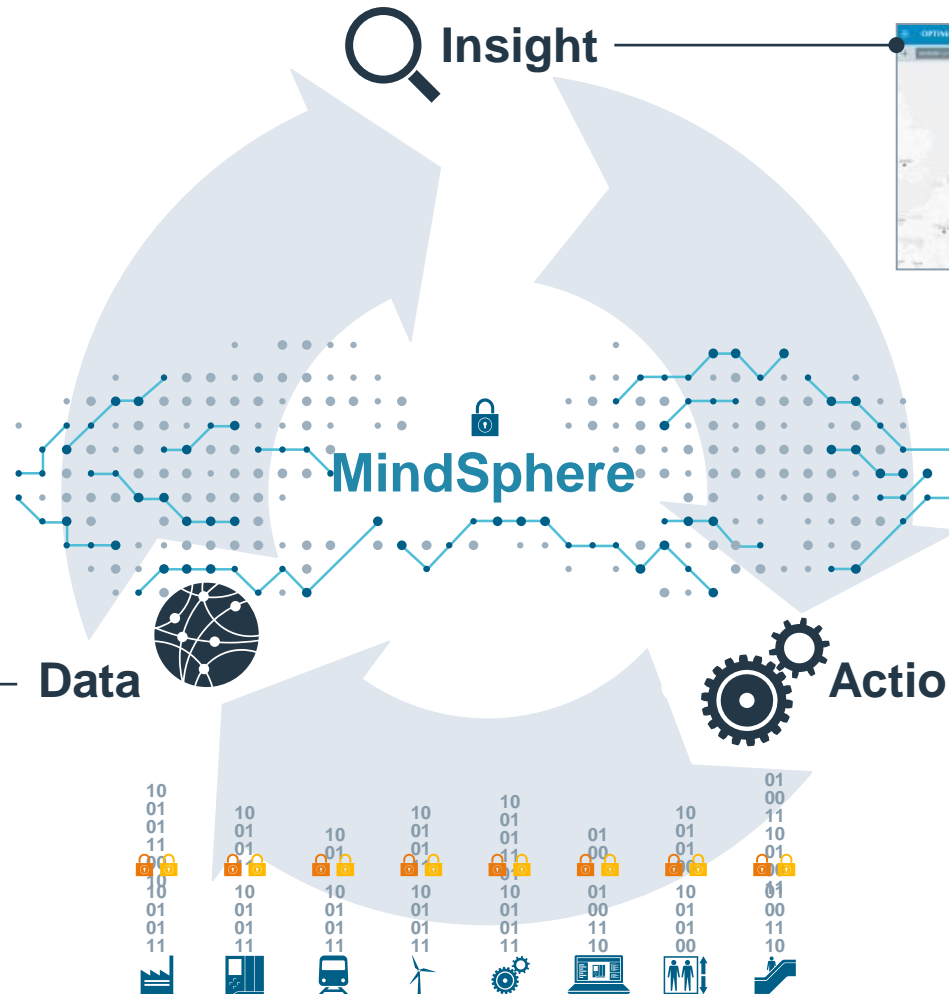
- 1 Development tools** for standard Integrated Development Environments (IDEs) Eclipse. Additional **modules supporting** IoT use cases (e.g. parsing, analytics and visualization modules)
- 2 MindSphere App Store** provides numerous ready to use Applications (MindApps). For App developers the App Store offers a **monetization and promotion channel** to industrial customers.
- 3 Developer community** supported via Developer Portal, Developer Conference, dedicated consulting, free demo apps, and much more

Data-driven services based on MindSphere enable new business

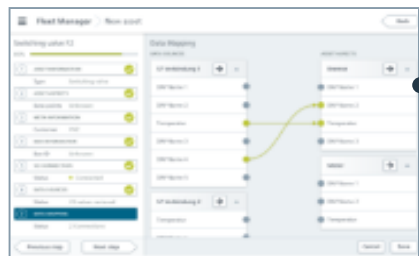
MindSphere –
The cloud-based, open
IoT operating system

Virtual World

Real World



Gain immediate **insights** on whole fleet as well as individual assets using own, Siemens or partner apps



Configure data collection as well as **connectivity** quickly and easily

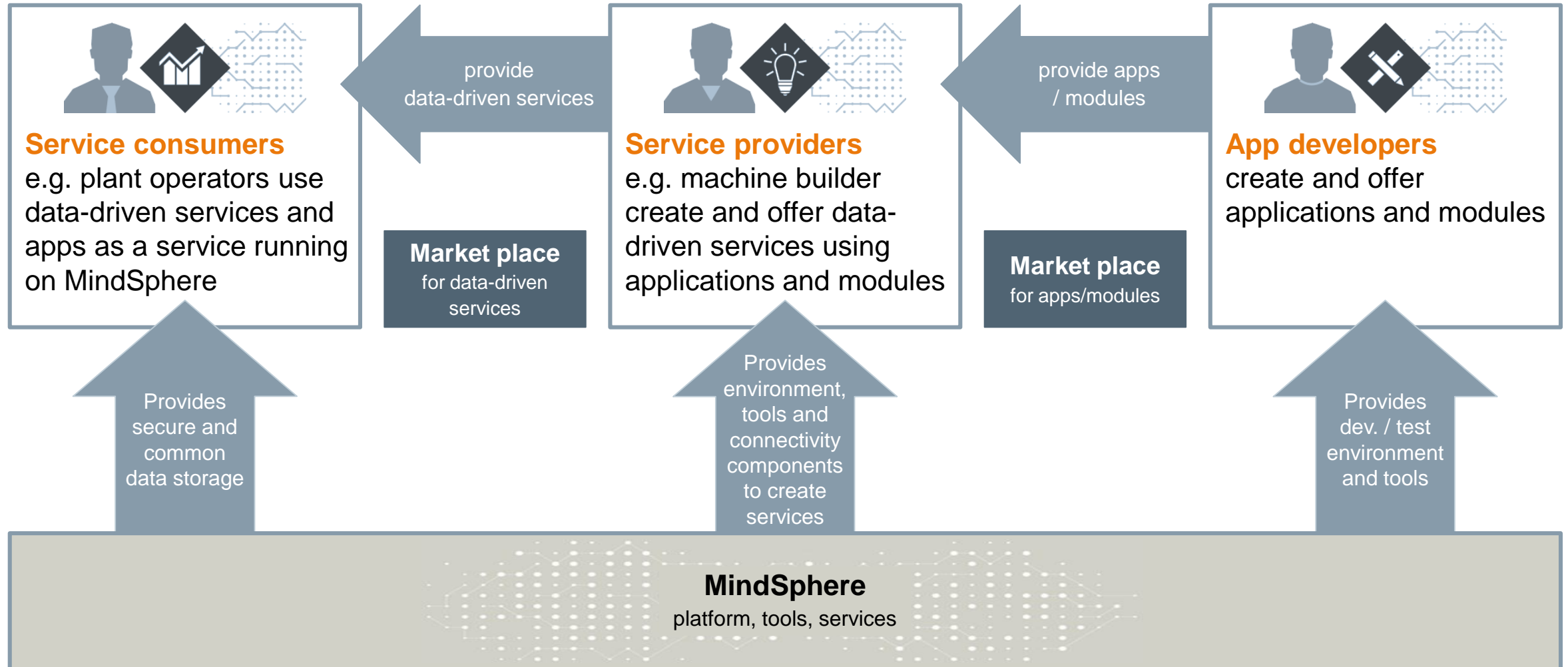


Transform insights into actionable results to **increase uptime and efficiency**



VISION: The MindSphere ecosystem provides value to different participants and enables them to provide value between themselves

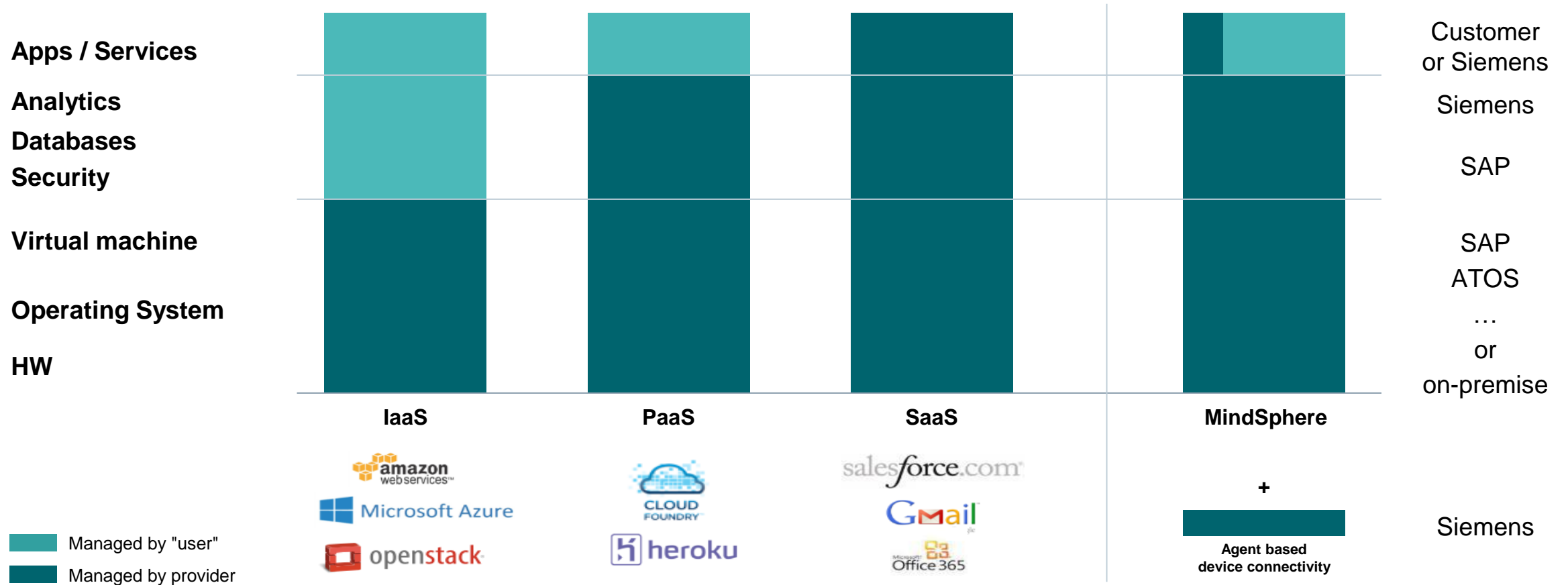
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MindSphere is a end to end IoT operating system that enables a partner ecosystem



Generic overview of different cloud models



Strong open ecosystem emerging around MindSphere, opening new opportunities for our customers and partners

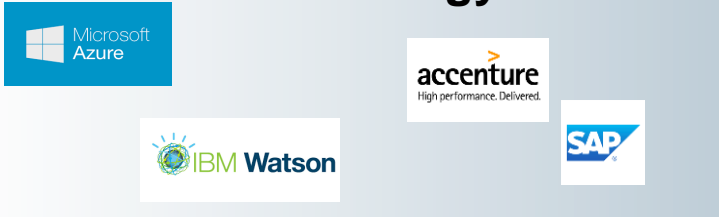


Exemplary Set of Partners

Consulting / strategy partners



Technology Provider



Application Developer



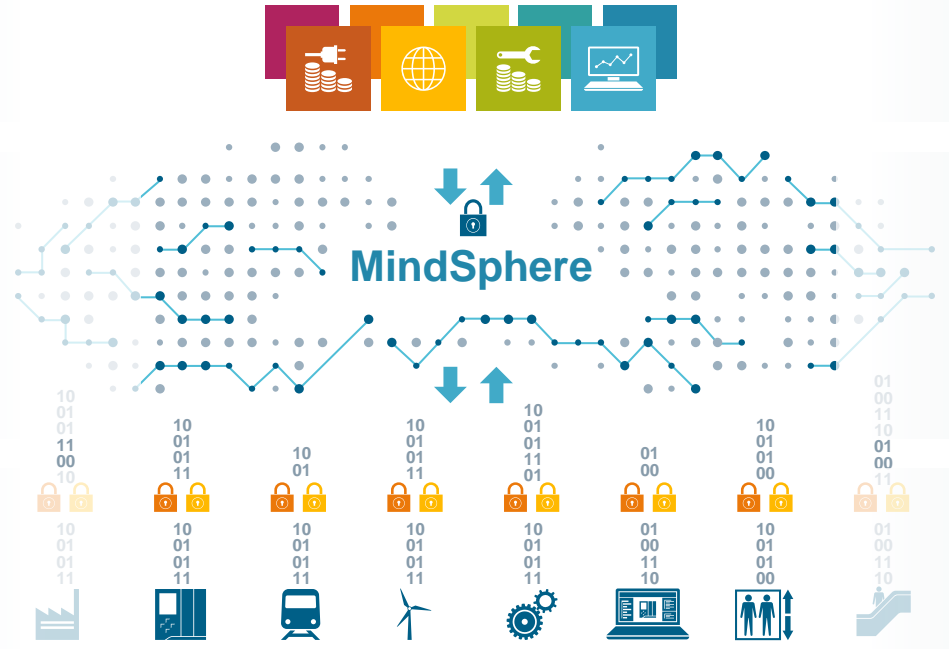
IaaS Provider



System Integrator



Connectivity Developer



MindSphere offers industry hardened, holistic security concept

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
- 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

MindSphere can already enable a broad variety of use cases and business models

CRM, Marketing & Sales



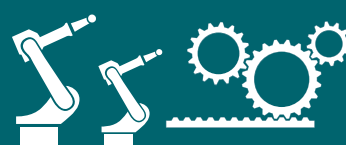
- Performance and Usage Dashboard
- Customer Self-Service Portal
- Customer Intelligence and Cross-/ Up-selling

Research & Development



- Product Usage Analysis
- Product Quality Analysis
- Firmware and Application Management

Operations, Production & IT



- ERP Integration
- SCADA Integration
- Asset and Material Tracing
- Asset Condition Monitoring
- Automated Production and Supply Chain Management
- Automated Analytics and Reporting
- Resource and Energy Management
- Connected Operations Intelligence

Service & Support



- **Asset/ Fleet Management**
- **Availability Management**
- **Warranty Management**
- **Performance Management**
- **Condition Management**
 - Robot predictive failure analytics
 - Press analytics
- Cross-Factory Benchmarking
- (Condition-based) Diagnostics and Monitoring
- (Condition-based) Predictive Maintenance
- Product Tracing
- Service Parts Planning
- Remote Service and Remote Maintenance

Availability Management

- Automatic evaluation of critical condition values
- Proactive alarming, inspection and problem fixing
- ✓ **Increased machine up-time**

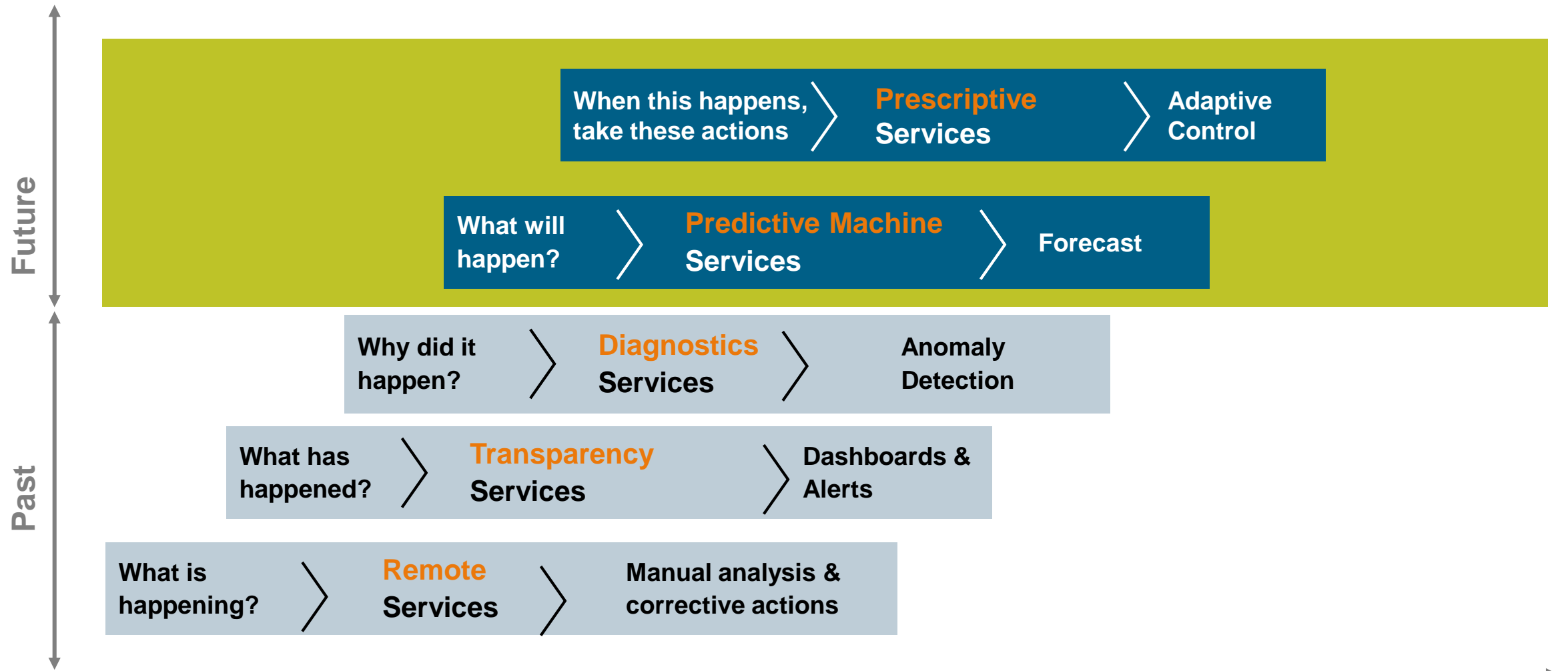
Warranty Management

- OEM analysis of machinery data and maintenance activities
- Expanded warranty given proper, compliant maintenance
- ✓ **Greater warranty reliability**

Performance Management

- Continuous evaluation of components power consumption
- Specific recommendation to optimize configuration
- ✓ **Optimized energy consumption**

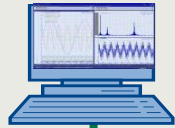
Maturity model for analytics-based services



Reference

Automotive Body Shop – Predictive Maintenance

X-Tools Client

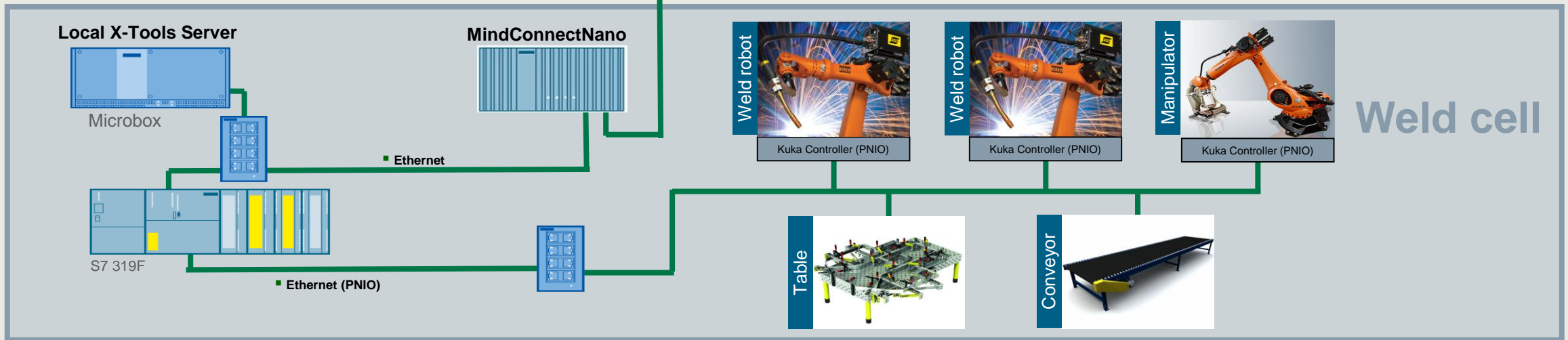


- Collection of high frequency vibration data from robots
- Data pre-processing (vibration RMS values calculated and sent to MindSphere)
- Edge Analytics

MindSphere



- Access to dashboards and MindApps
- Monitor critical KPIs
- Visualize variables
- Set thresholds for variables to trigger alarms and warnings



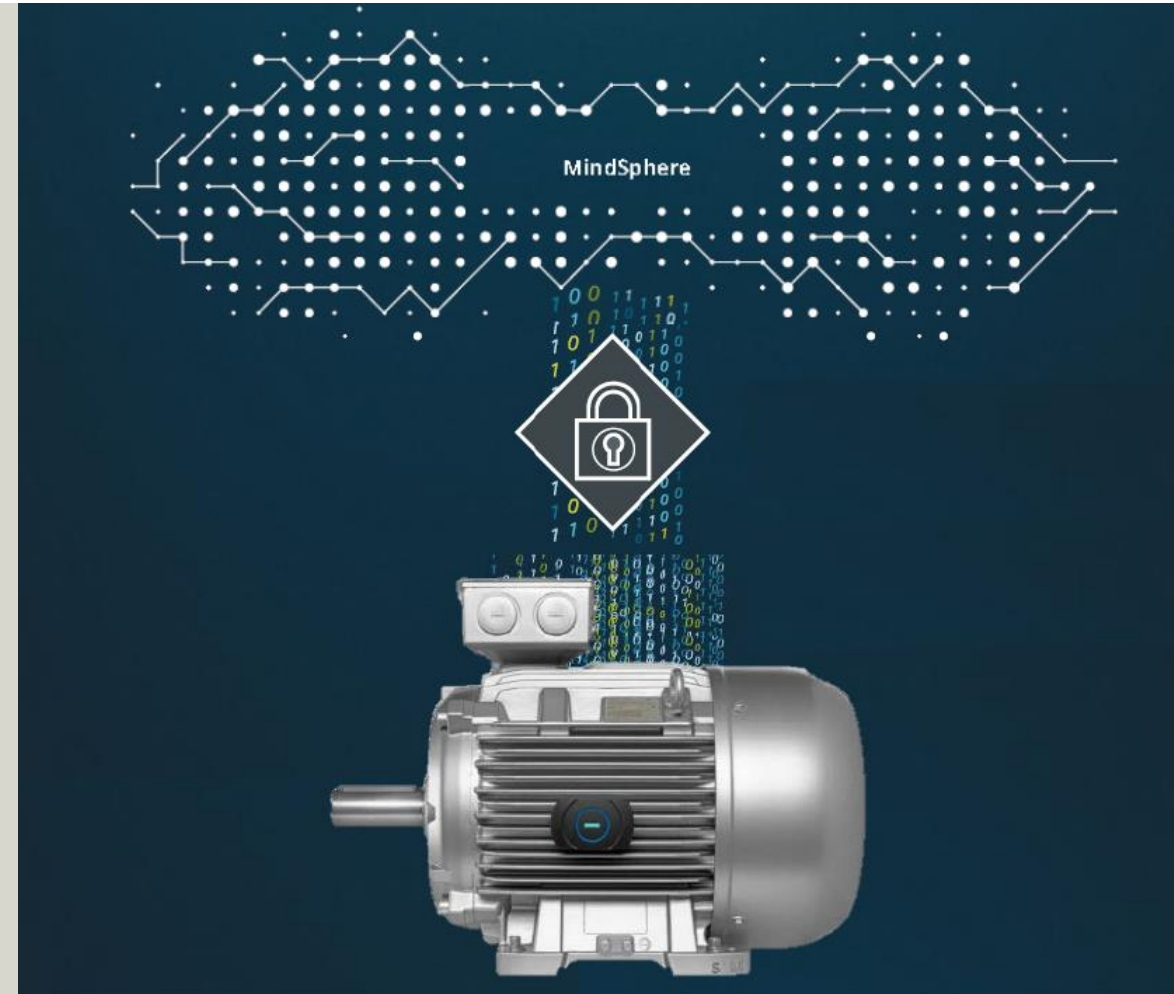
MindSphere – The cloud-based, open Internet of Things ecosystem

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Get an **overview about the status** of your assets e.g.:

- electronic rating plate
- motor health conditions
- asset location
- performance

will be available for motors within **basic applications such as compressors, pumps and fans.**



MindSphere – The cloud-based, open Internet of Things ecosystem

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Future Dashboard of Drive Train MindApp

Assets ↔ ▼ < Global Erlangen F80 Motor B

search...

- ▼ Erlangen F80 1 ●
 - Motor A ●
 - Motor B 1 ●
 - Motor C ●
 - Motor D ●
- ▼ Nuremberg Vogelweih... ●
 - Motor 1 ●
 - Motor 2 ●
 - Motor 3 ●
 - Motor 4 ●
 - Motor 5 ●
 - Motor 6 ●

Performance Health Profile **Support**

Messages Acknowledge ✓ + :


Date	Message	State	User
16-07-06	Maintenance recommended Automatically generated notification.	open	Siemens
16-05-10	Regreasing	closed	Peter C.
15-12-24	Strange noises	closed	Peter C.
15-11-13	Maintenance interval Automatically generated maintenance notification.	closed	Siemens
15-11-10	Maintenance interval Automatically generated maintenance notification.	closed	Siemens

Product support pages


- [i-mall](#)
- [Spares on web](#)
- [SIO service catalogue/product manual](#)

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