

# Value Creation in the Digital Economy

## Industry 4.0 - Convergence of IT and OT

Philippe GEOFFROY  
Industry 4.0 Head for France  
January 2016

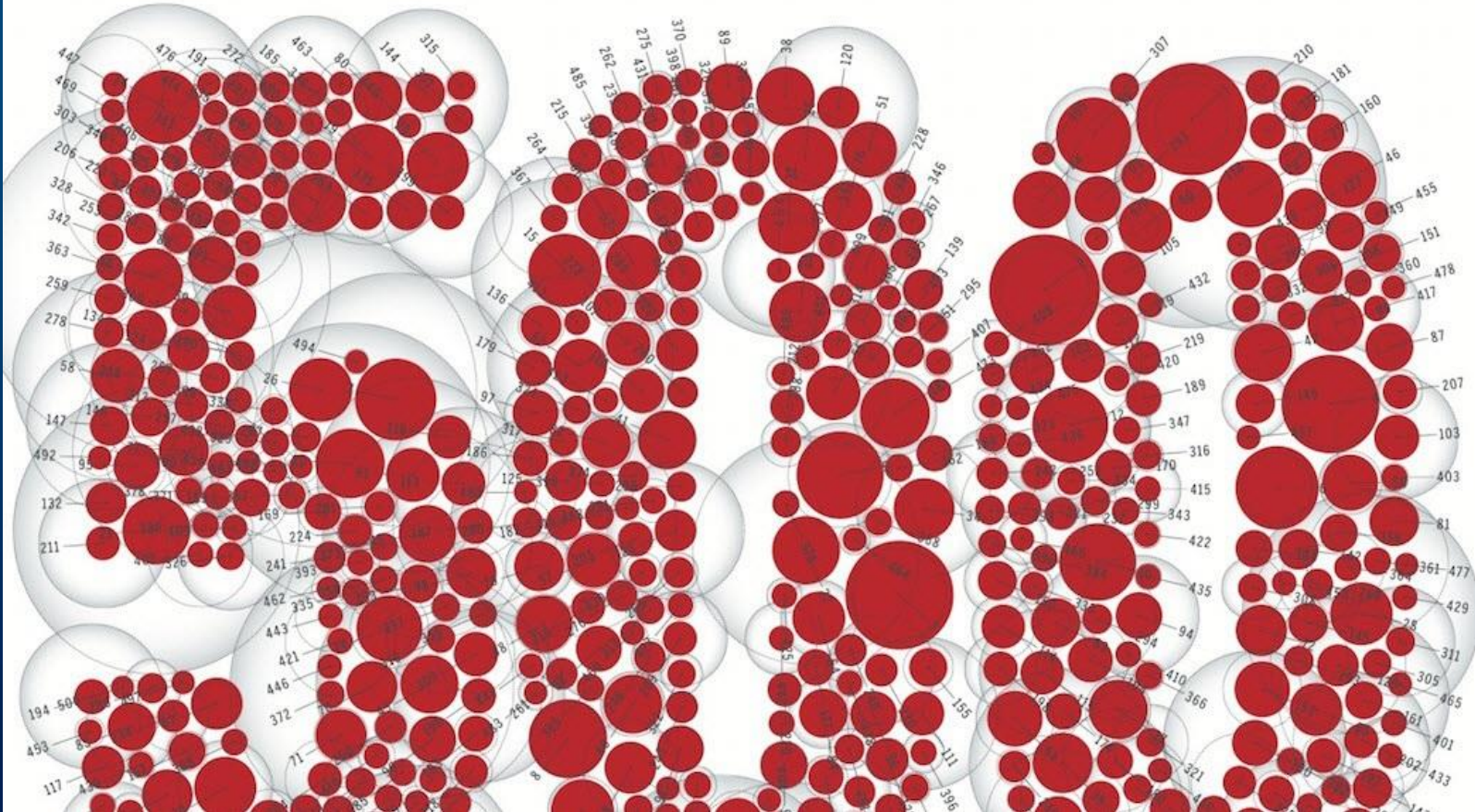


# ARE YOU READY FOR THE DIGITAL ECONOMY?



Video on Youtube : <https://www.youtube.com/watch?v=m3jV6tebTv0>

# FORTUNE

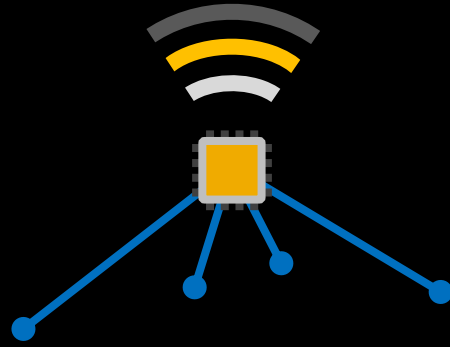


88%

of the **FORTUNE 500**  
companies have  
**DROPPED** from the  
index between 1955  
and 2014

**Why now?**

**Enablers  
for  
Digitization**



**Hyperconnectivity**



**Cloud Computing**

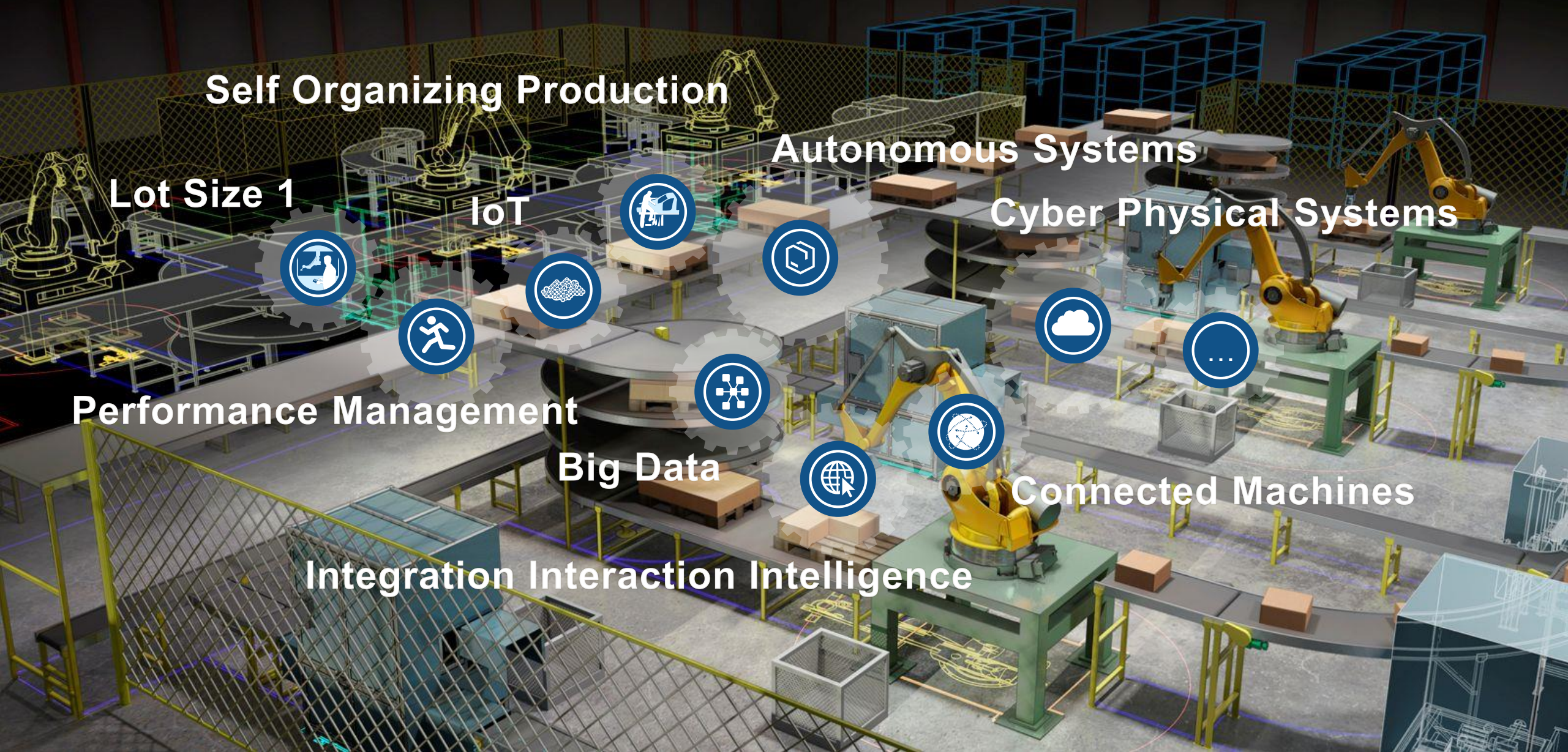


**Smarter World**



**Big Data Capabilities**

# Industrie 4.0 – What is it?



Self Organizing Production

Autonomous Systems

Cyber Physical Systems

Lot Size 1

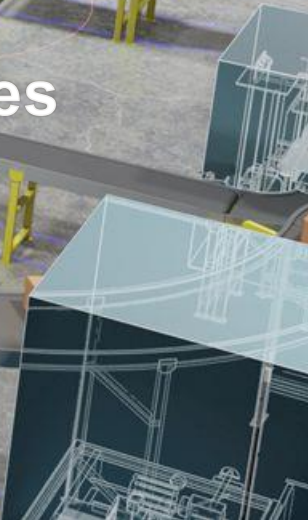
IoT

Performance Management

Big Data

Connected Machines

Integration Interaction Intelligence



# The fourth Industrial revolution based on cyberphysical systems



## Enablers:

### 1. Mobile networked computing



- Embedded software
- Ubiquitous computing
- Unlimited network access

### 2. Cloud Platforms



- Performant
- Secure
- Available

### 3. Big data capabilities



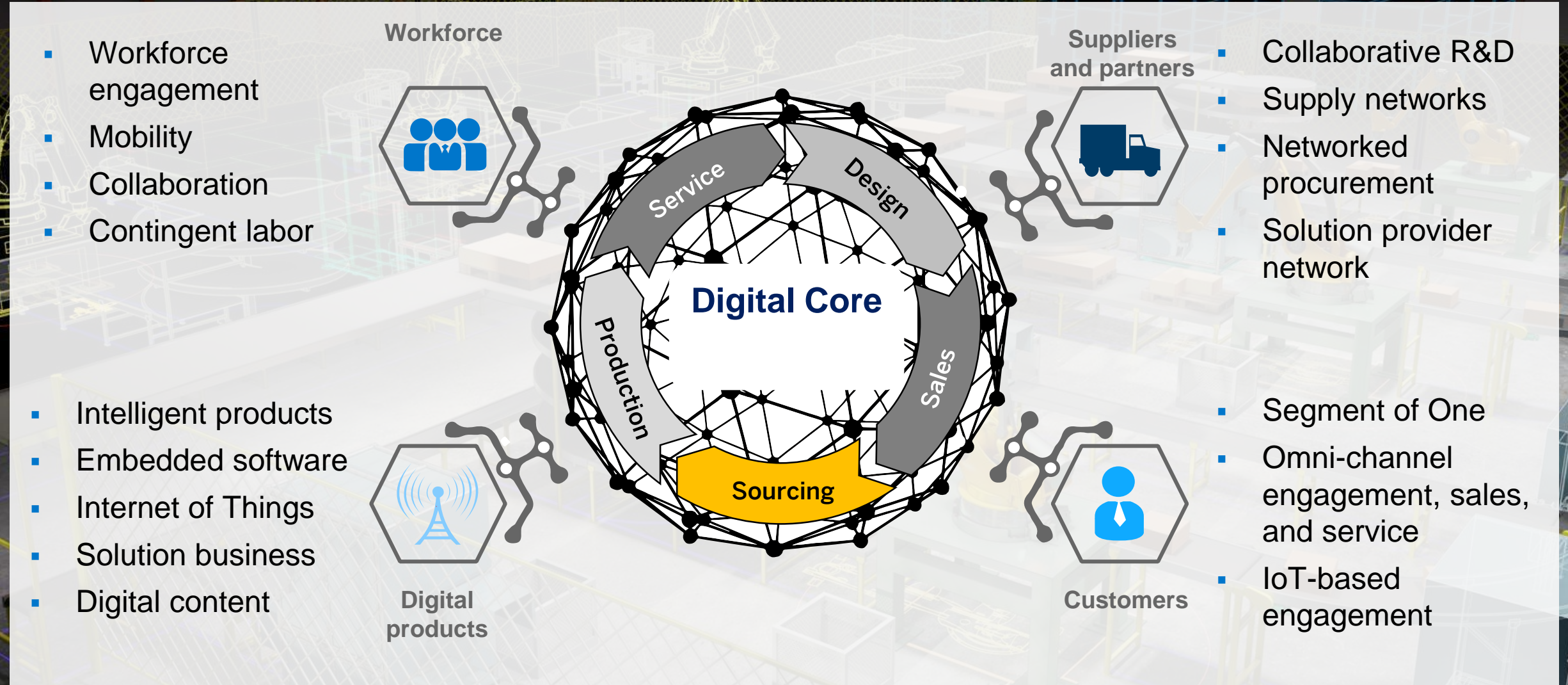
- IoT optimized data acquisition
- Event streaming
- Geo spatial
- Predictive

create growth interaction integrate resilient project social  
design creativity economics new management priorities products systems talent  
chaos competition entrepreneur digital leadership stakeholders unique  
change authenticity teams transformation  
action agility business companies experiences ideas organizations technology  
interconnected invention sustainable trust  
consumers innovation flexibility open risk people services resources  
strategy

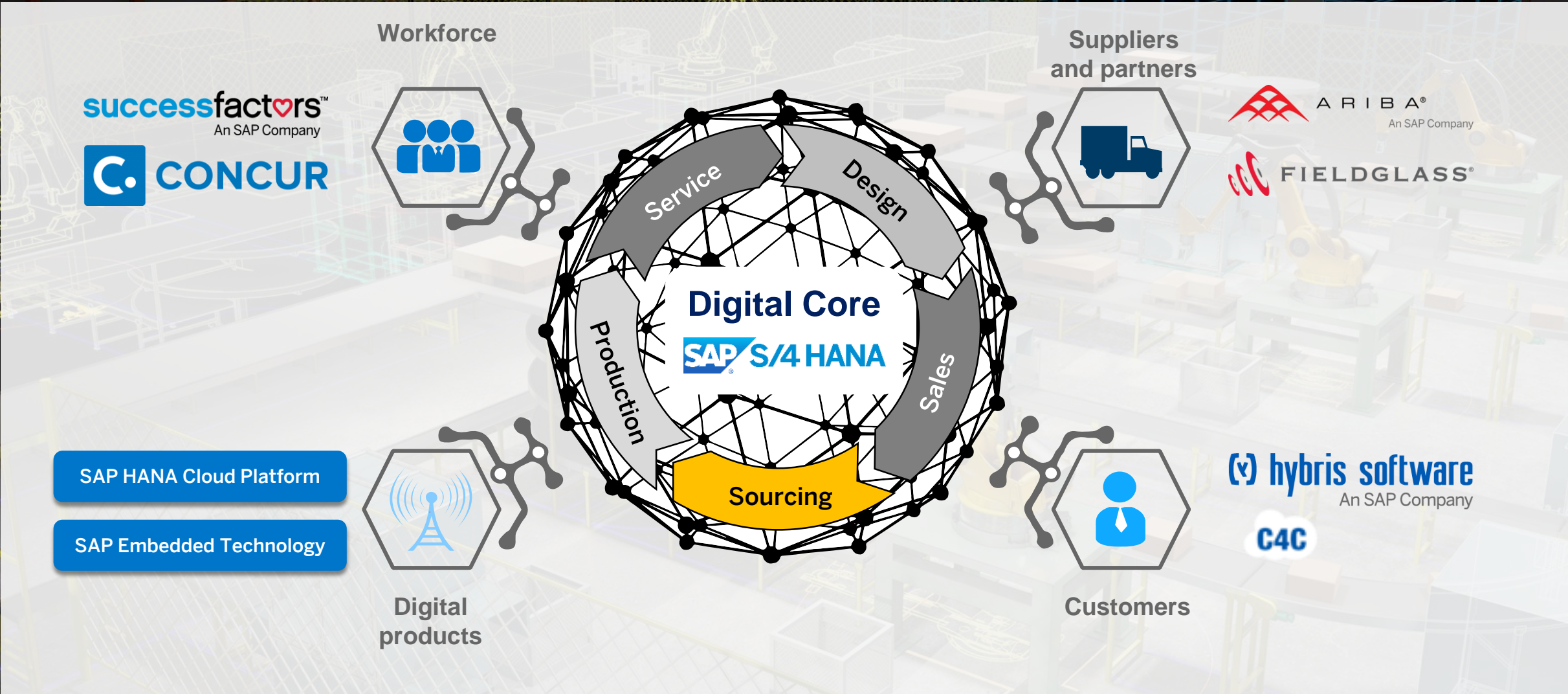


# SAP Point of View:

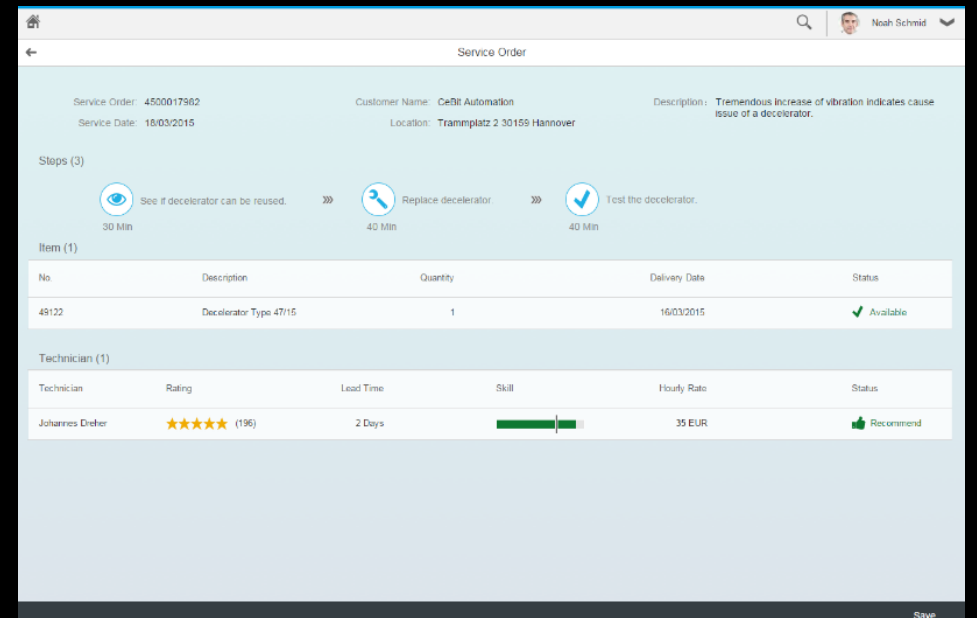
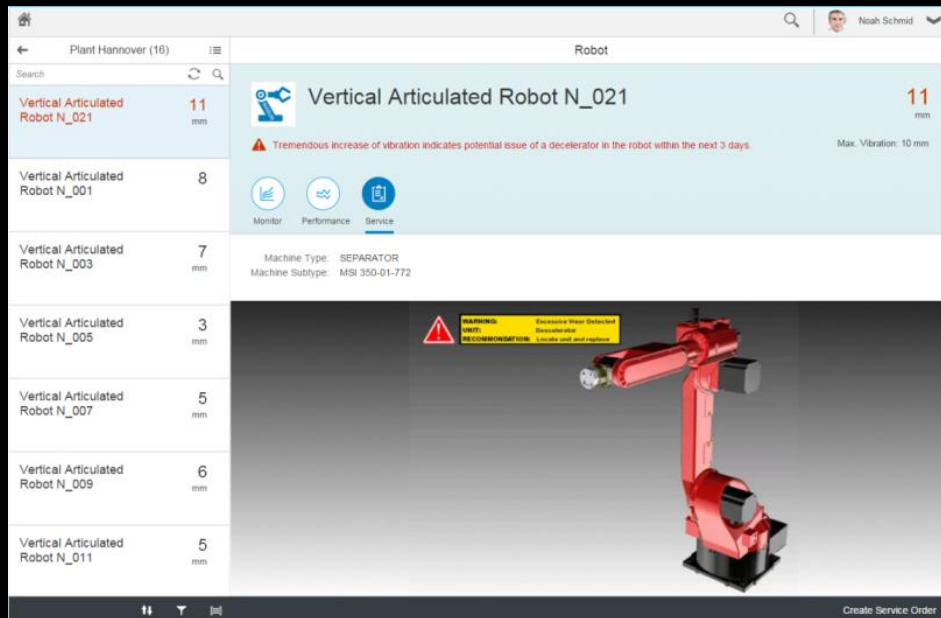
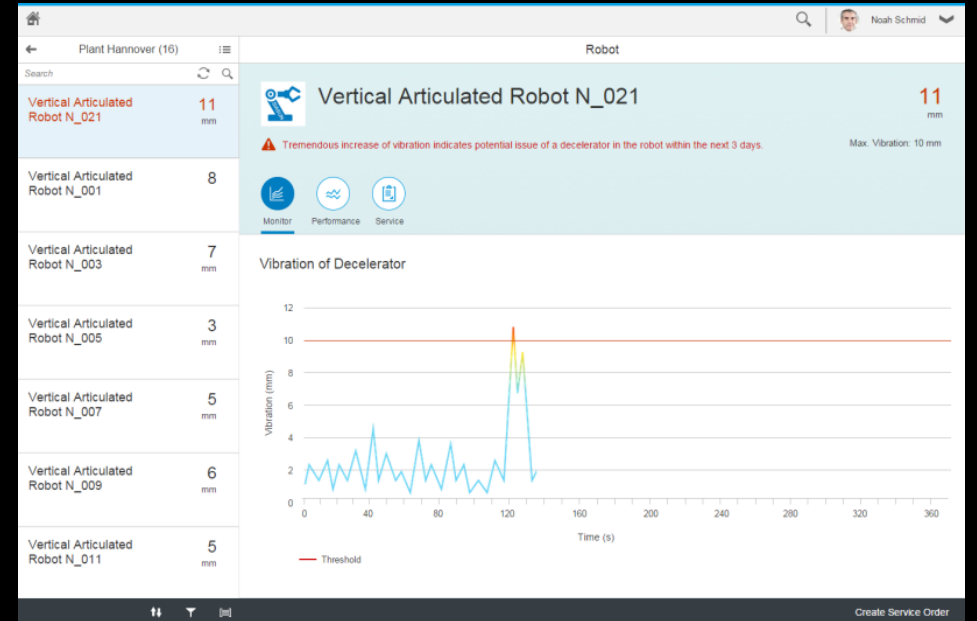
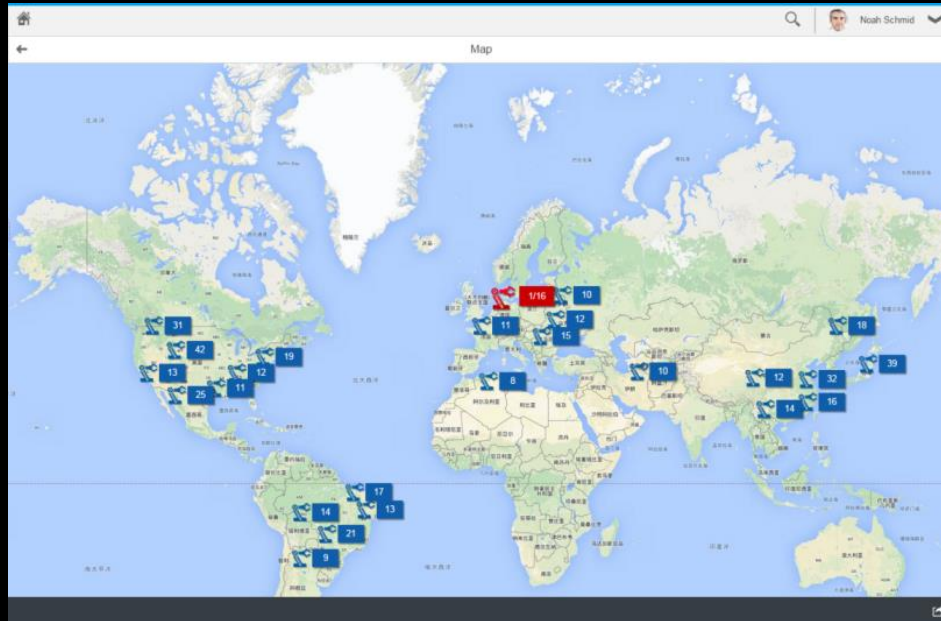
A simple Systems Architecture for the Digital Manufacturing Company



# SAP's Portfolio for the Digital Manufacturing Company



# Show the value



Imagine a Producer of  
industrial robots





# Map







Search 🔍

Vertical Articulated Robot N\_021 11 mm

Vertical Articulated Robot N\_001 8 mm

Vertical Articulated Robot N\_003 7 mm

Vertical Articulated Robot N\_005 3 mm

Vertical Articulated Robot N\_007 5 mm

Vertical Articulated Robot N\_009 6 mm

Vertical Articulated Robot N\_011 5 mm



# Vertical Articulated Robot N\_021

11 mm

⚠ Tremendous increase of vibration indicates potential issue of a decelerator in the robot within the next 3 days.

Max. Vibration: 10 mm



Monitor

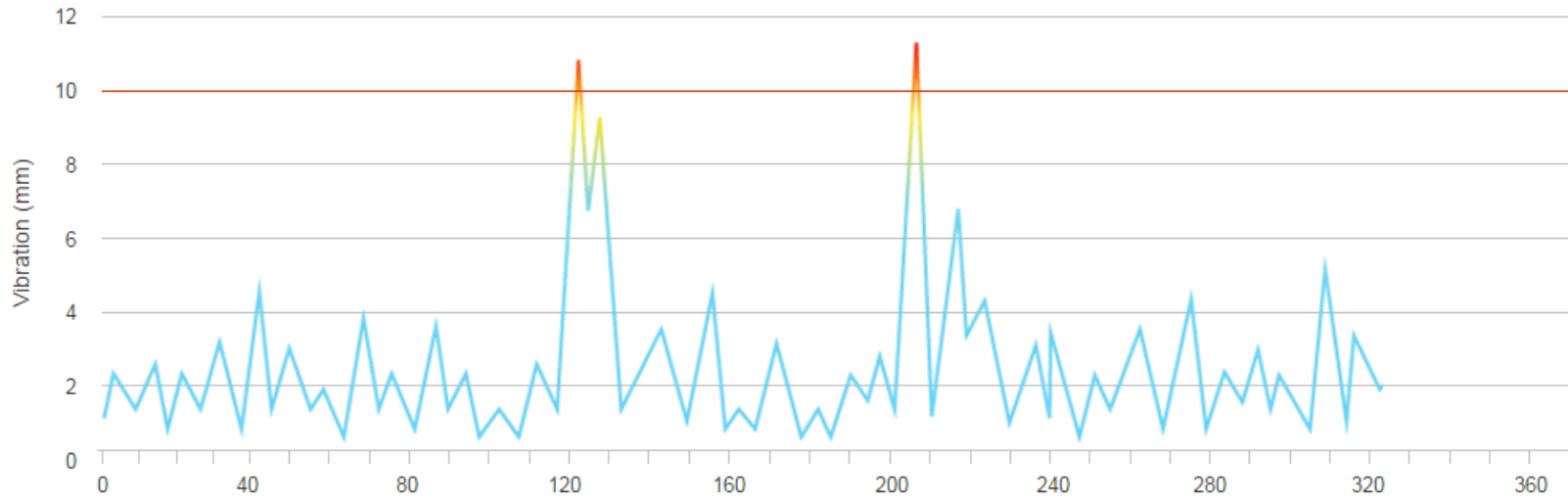


Performance



Service

## Vibration of Decelerator



— Threshold



Search ↻ 🔍

Vertical Articulated Robot N\_021 11 mm

Vertical Articulated Robot N\_001 8 mm

Vertical Articulated Robot N\_003 7 mm

Vertical Articulated Robot N\_005 3 mm

Vertical Articulated Robot N\_007 5 mm

Vertical Articulated Robot N\_009 6 mm

Vertical Articulated Robot N\_011 5 mm



# Vertical Articulated Robot N\_021

11 mm

**⚠** Tremendous increase of vibration indicates potential issue of a decelerator in the robot within the next 3 days.

Max. Vibration: 10 mm



Monitor



Performance



Service

Machine Type: SEPARATOR  
Machine Subtype: MSI 350-01-772



**WARNING:** Excessive Wear Detected  
**UNIT:** Decelerator  
**RECOMMENDATION:** Locate unit and replace

Proceed to Visual Work Instruction  
Decelerator Replacement -001







Search ↻ 🔍

Vertical Articulated Robot N\_021 11 mm

Vertical Articulated Robot N\_001 8 mm

Vertical Articulated Robot N\_003 7 mm

Vertical Articulated Robot N\_005 3 mm

Vertical Articulated Robot N\_007 5 mm

Vertical Articulated Robot N\_009 6 mm

Vertical Articulated Robot N\_011 5 mm



# Vertical Articulated Robot N\_021

11 mm

⚠ Tremendous increase of vibration indicates potential issue of a decelerator in the robot within the next 3 days.

Max. Vibration: 10 mm



Monitor

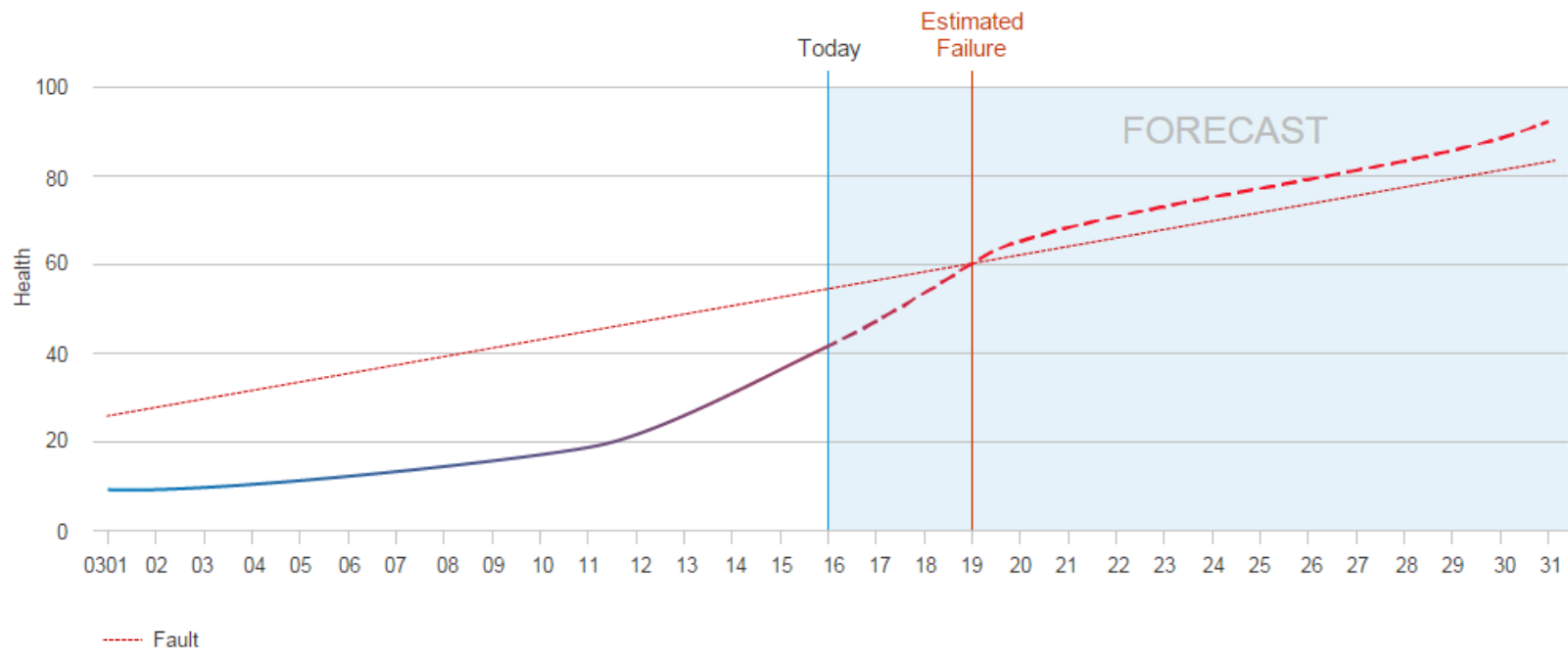


Performance



Service

## Vibration of Decelerator





Noah Schmid



## Service Order

Service Order: 4500017982

Customer Name: CeBIT Automation

Description: Tremendous increase of vibration indicates cause issue of a decelerator.

Service Date: 18/03/2015

Location: Trammplatz 2 30159 Hannover

## Steps (3)



See if decelerator can be reused.

30 Min



Replace decelerator.

40 Min



Test the decelerator.

40 Min

## Item (1)

No.	Description	Quantity	Delivery Date	Status
49122	Decelerator Type 47/15	1	16/03/2015	✓ Available

## Internal Technician (0 / 2)

Technician	Rating	Lead Time	Skill	Hourly Rate	Status
Reinhard Kuntze	★★★★☆ (35)	15 Days	<div style="width: 75%; background-color: green;"></div>	45 EUR	✗ Not Match
Bernd Schreiner	★★★☆☆ (47)	7 Days	<div style="width: 50%; background-color: red;"></div>	37 EUR	✗ Not Match



### Business Network



#### Technician – External Vendor (5 / 39)

<input type="checkbox"/>	Technician	Supplier Name	Rating	Avg. Lead Time	Distance	Skill	Hourly Rate	Status
<input checked="" type="checkbox"/>	Johannes Dreher	Talent onDemand	★★★★★ (196)	2 Days	19 km	<div style="width: 100%; height: 10px; background-color: green;"></div>	35 EUR	Recommend
<input type="checkbox"/>	Frank Zimmermann	Talent onDemand	★★★★☆ (271)	3 Days	45 km	<div style="width: 90%; height: 10px; background-color: green;"></div>	32 EUR	Match
<input type="checkbox"/>	Thomas Maie	EVF Global	★★★★☆ (221)	2 Days	45 km	<div style="width: 90%; height: 10px; background-color: green;"></div>	31 EUR	Match
<input type="checkbox"/>	Gerald Wagner	EVF Global	★★★★☆ (172)	3 Days	38 km	<div style="width: 90%; height: 10px; background-color: green;"></div>	28 EUR	Match
<input type="checkbox"/>	Jochen Lang	Talent onDemand	★★★★☆ (273)	2 Days	42 km	<div style="width: 90%; height: 10px; background-color: green;"></div>	32 EUR	Match
<input type="checkbox"/>	Friedrich Busch	ManPower Co.	★★★★☆ (156)	3 Days	55 km	<div style="width: 20%; height: 10px; background-color: red;"></div>	30 EUR	Not Match
<input type="checkbox"/>	Albrecht Schrempf	EVF Global	★★★★☆ (244)	18 Days	69 km	<div style="width: 90%; height: 10px; background-color: green;"></div>	32 EUR	Not Match
<input type="checkbox"/>	Anton Tischler	ManPower Co.	★★★★☆ (116)	15 Days	45 km	<div style="width: 90%; height: 10px; background-color: green;"></div>	33 EUR	Not Match
<input type="checkbox"/>	Ingo Bach	EVF Global	★★★★☆ (191)	15 Days	62 km	<div style="width: 90%; height: 10px; background-color: green;"></div>	33 EUR	Not Match



## Service Order

Service Order: 4500017982

Customer Name: CeBit Automation

Description: Tremendous increase of vibration indicates cause issue of a decelerator.

Service Date: 18/03/2015

Location: Trammplatz 2 30159 Hannover

## Steps (3)



See if decelerator can be reused.

30 Min



Replace decelerator.

40 Min



Test the decelerator.

40 Min

## Item (1)

No.	Description	Quantity	Delivery Date	Status
49122	Decelerator Type 47/15	1	16/03/2015	✓ Available

## Technician (1)

Technician	Rating	Lead Time	Skill	Hourly Rate	Status
Johannes Dreher	★★★★★ (196)	2 Days	<div style="width: 50%; background-color: green; height: 10px;"></div>	35 EUR	👍 Recommend



Noah Schmid



### Service Order

Service Order: 4500017982

Customer Name: CeBit Automation

Description: Tremendous increase of vibration indicates cause issue of a decelerator.

Service Date: 18/03/2015

Location: Trammplatz 2 30159 Hannover

#### Steps (3)



See if decelerator can be reused.

30 Min



Replace decelerator.



Test the decelerator.

#### Item (1)

No.	Description	Delivery Date	Status
49122	Decelerator Type 47/15	16/03/2015	✓ Available

#### Technician (1)

Technician	Rating	Lead Time	Skill	Hourly Rate	Status
Johannes Dreher	★★★★★ (196)	2 Days	<div style="width: 100%; height: 10px; background-color: #006400;"></div>	35 EUR	👍 Recommend

Message

---

Service order 4500017982 has been sent to Johannes Dreher.

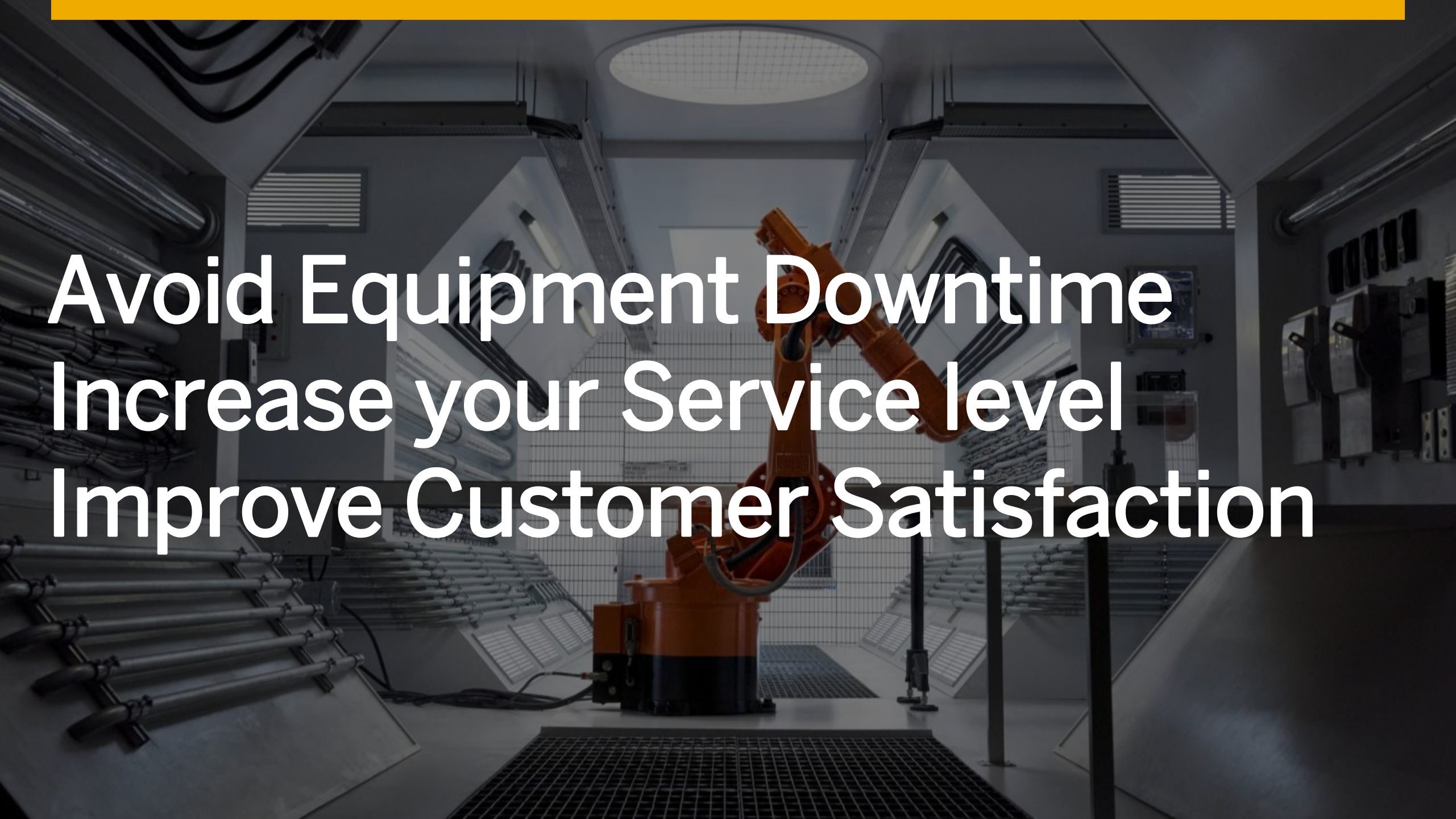
OK
Cancel

Save



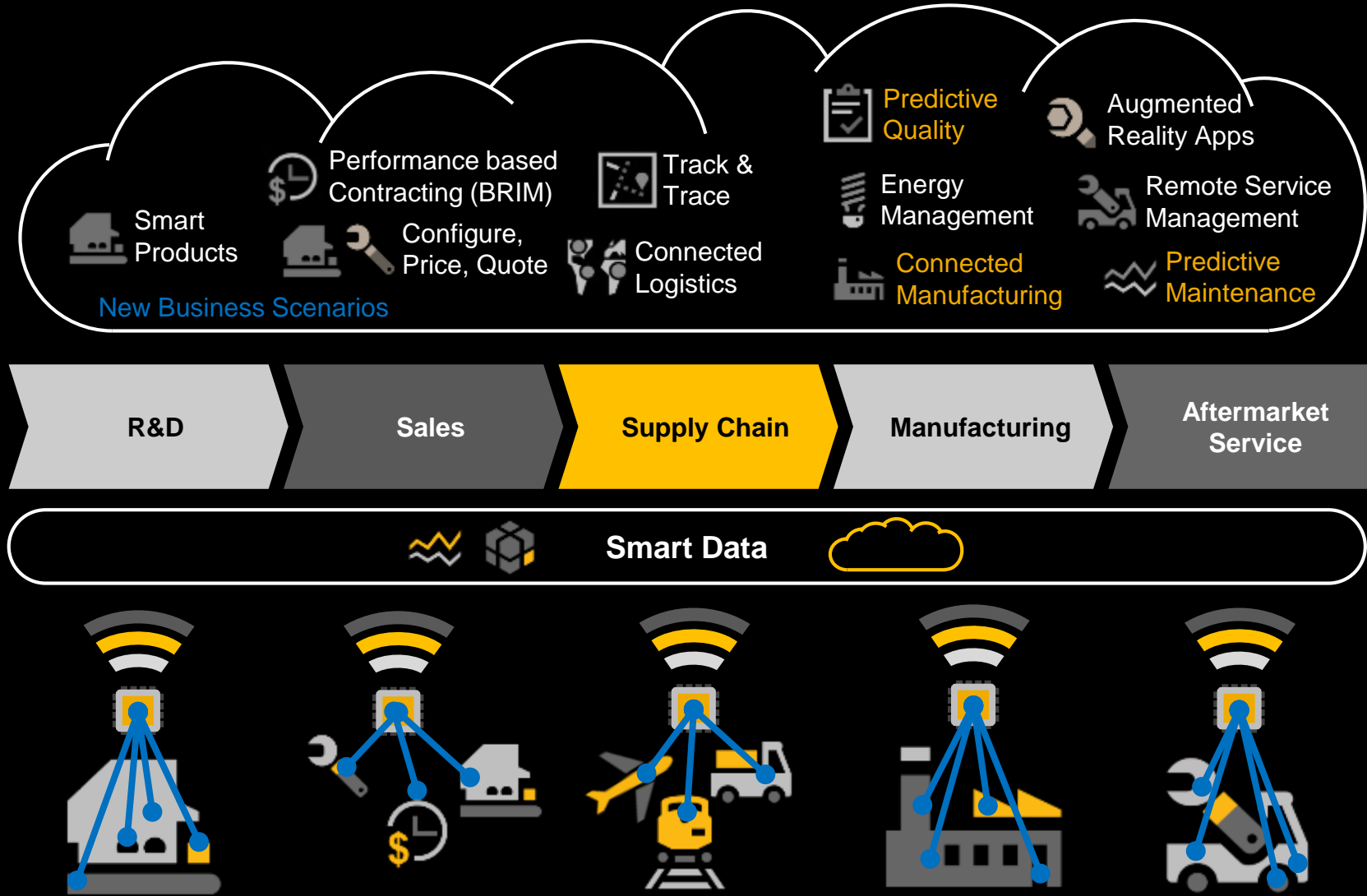
# Map



A photograph of an industrial robotic arm in a factory setting. The arm is orange and black, positioned in the center of the frame. The background shows a complex industrial environment with various pipes, cables, and machinery. The lighting is somewhat dim, with a circular light fixture visible on the ceiling. The overall tone is professional and technical.

**Avoid Equipment Downtime**  
**Increase your Service level**  
**Improve Customer Satisfaction**

# Value creation through deep process and data integration



## Value Creation through:

### 1. Product Innovation



- IoT-enabled products and solutions.
- Extended product and solution portfolio.

### 2. Process Innovation



- Adaptive logistics
- Resilient production
- Energy management
- Predictive maintenance and service

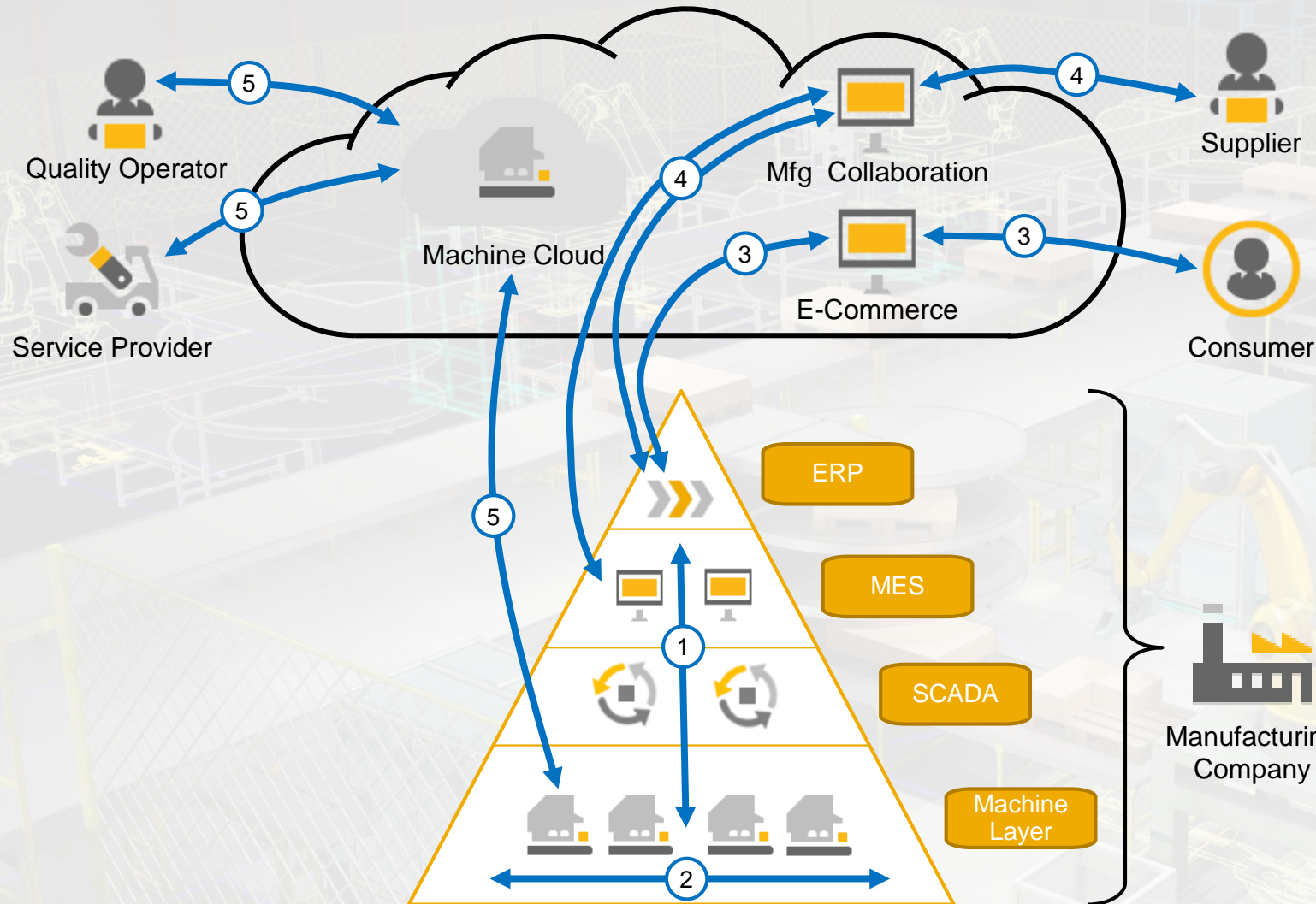
### 3. Business Model Innovation



- Serving the “Segment of One”.
- Performance and usage based contracting and billing.



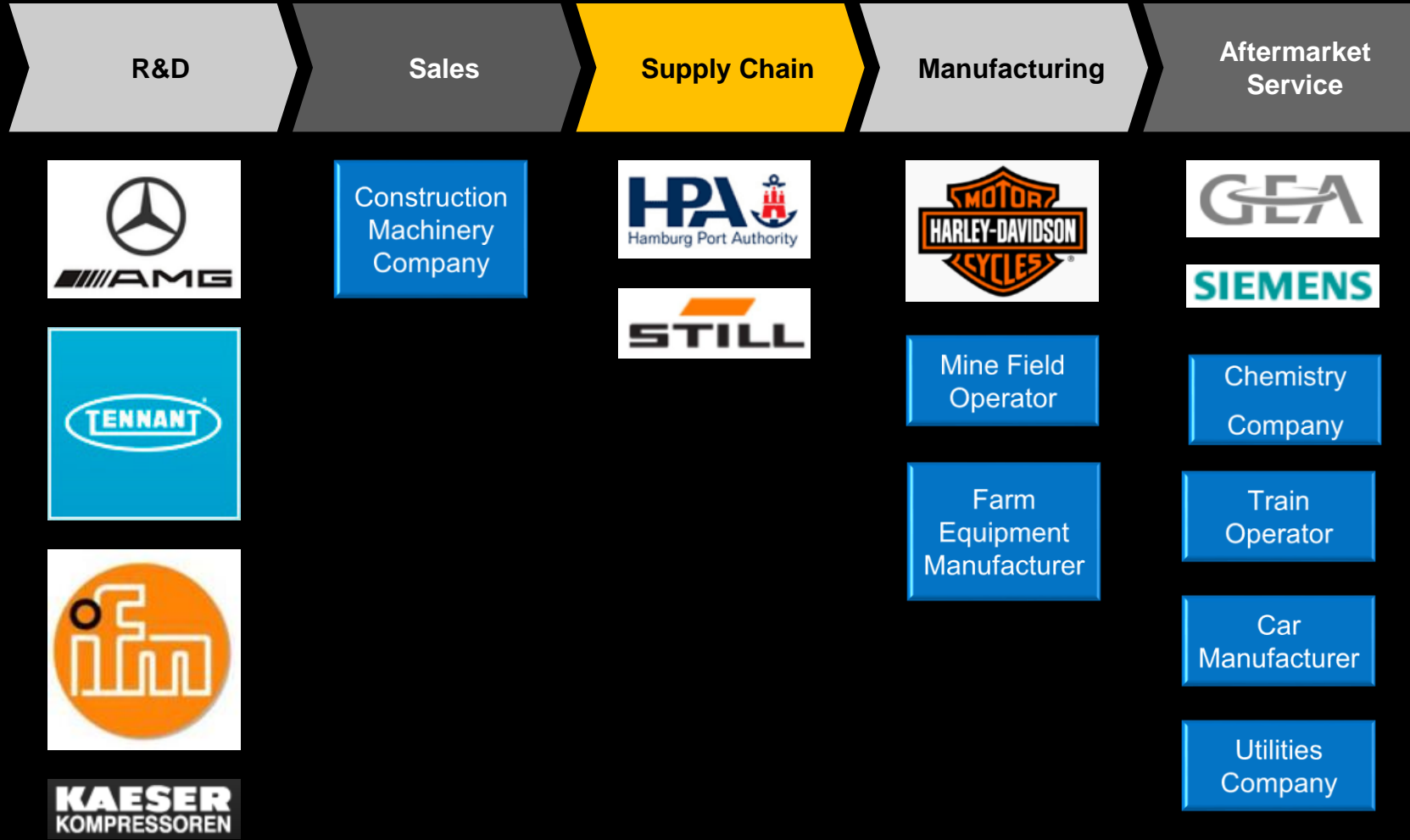
# Connected Manufacturing - 5 Scenarios of “Connectedness”



## 5 Scenarios:

- 1. Shop floor to Top floor**  
Intra company vertical integration
- 2. Machine to Machine**  
Autonomous machines
- 3. eCommerce Integration**  
Direct integration of online configurators
- 4. Manufacturing Collaboration**
  - Visibility
  - Genealogy
  - Quality
  - Kanban / Direct replenishment
- 5. Machine Cloud**
  - Predictive maintenance
  - Predictive quality

# Leading companies are moving ahead



## Value Creation through:

### 1. Product Innovation



- I4.0 enabled products and solutions.
- Extended product and solution portfolio.

### 2. Process Innovation



- Adaptive logistics
- Resilient production
- Energy management
- Predictive maintenance and Service

### 3. Business Model Innovation



- Serving the “Segment of One”.
- Performance and usage based contracting and billing.

# Connected Manufacturing:



VIDEO

## Company

Harley-Davidson is a legendary motorcycle manufacturer.



Situation: Need to optimize manufacturing processes in a completely rebuilt factory, making one factory out of five.

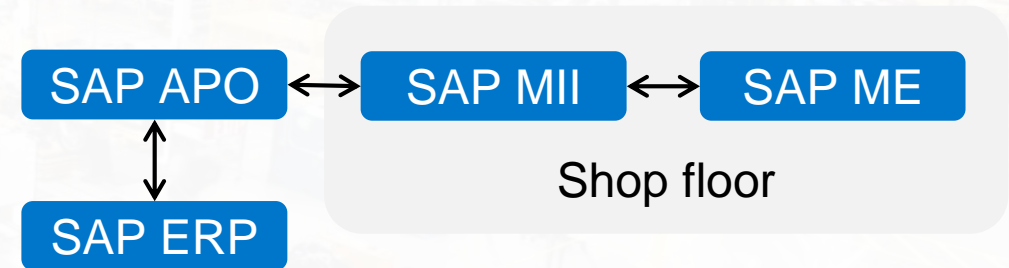
## Solution

- SAP ERP
- SAP APO
- SAP Manufacturing Integration and Intelligence (MII)
- SAP Manufacturing Execution (ME)
- Integration of shop floor equipment like cranes



## Process Innovation

- Each bike is customized individually
- IoT-powered manufacturing planning and execution



## Benefits

- Costs: -7%
- Delivery time down from 21 days to 6 hours
- Agility and predictiveness
- Improved quality

# SAP Predictive Maintenance and Service:



## Company

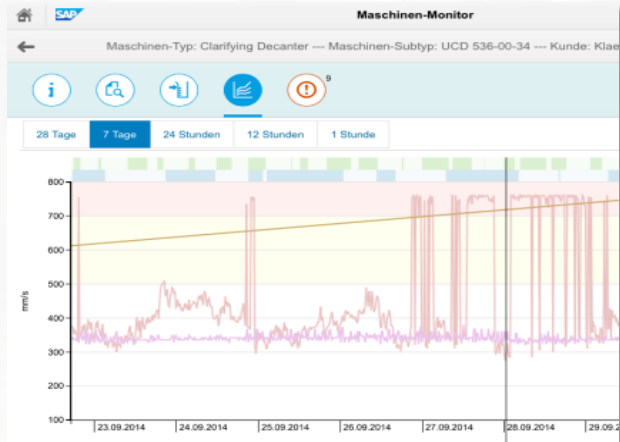
GEA, the leading manufacturer of separators and decanters for industrial usage.



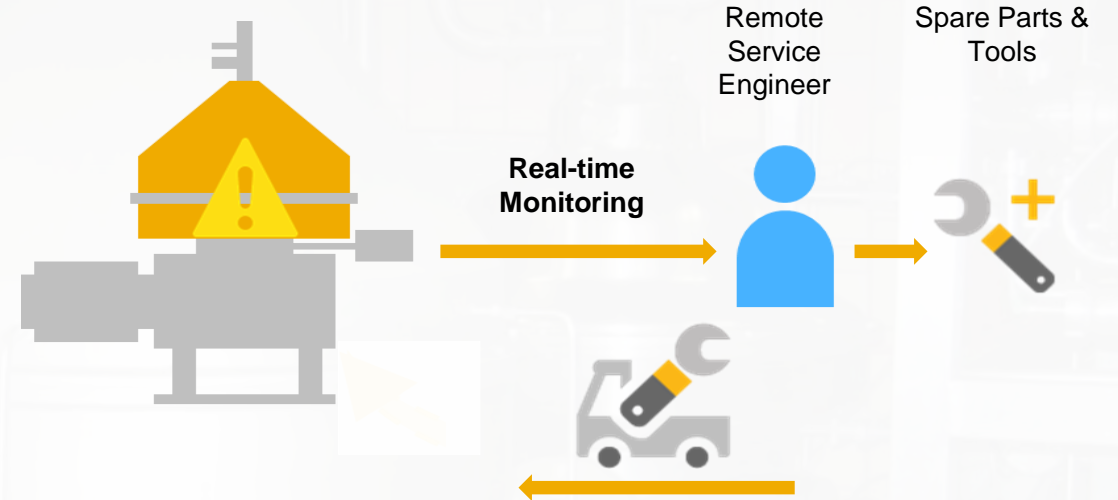
Situation: lacking service contract compliance

## Solution

- SAP HANA Cloud Platform
- SAP Predictive Maintenance & Service – Cloud Edition
- ifm adaptor
- SAP IoT connector
- SAP CRM Service



## Process Innovation



## Benefits

- Service execution based on real-time machine data
- Increased machine uptime
- Improved service contract compliance
- Higher service productivity

# IoT-Powered Customer Service:



## Company

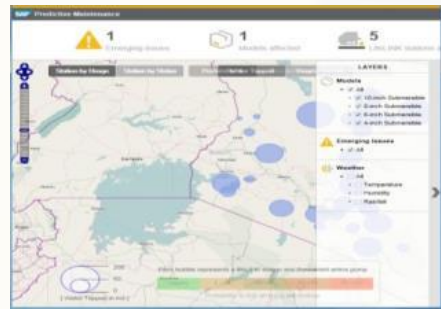
Kaeser Compressors is one of the largest providers of compressed air systems and compressed air consulting services.



Situation: changed the business model from selling compressors to selling compressed air through the *Sigma Air Utility* service.

## Solution

- Compressors equipped with sensors
- SAP Predictive Maintenance & Service with Machine Health Fact Sheet
- SAP HANA
- SAP CRM Service on HANA



## Process Innovation



## Benefits

- IoT as an enabler for the new business model
- Improved availability of compressor stations
- Move from unplanned to planned maintenance

# Connected Logistics: Port of Hamburg

## Company

The Hamburg Port Authority is managing the Hamburg port.

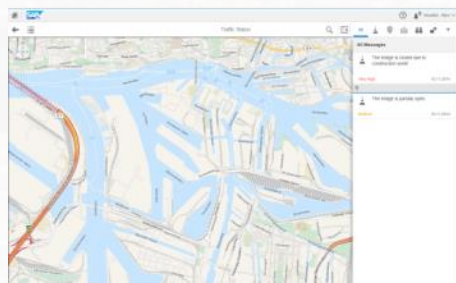


## Situation:

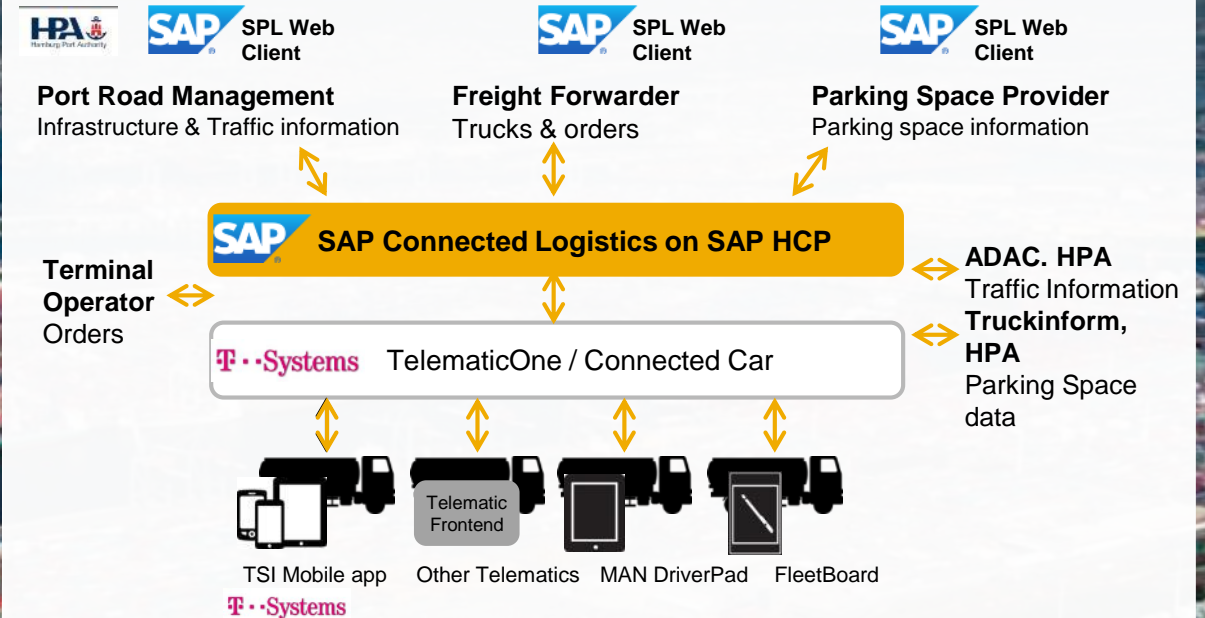
- Geographical limitations and constantly growing container throughput
- No transparency through data overflow

## Solution

- Location sensors on trucks and trailers
- T-Systems telematic solutions
- Data sources for real-time information like traffic
- HPA solution: smartPORT logistics (SPL)
- SAP HANA Cloud Platform
- SAP Connected Logistics



## Process/Technology Innovation



## Benefits

- More efficient operations – higher throughput
- Less idle times for truck drivers
- Less traffic jams

# Smart Products:



## Company

ifm electronic, an industrial automation technology manufacturer and producer of sensors

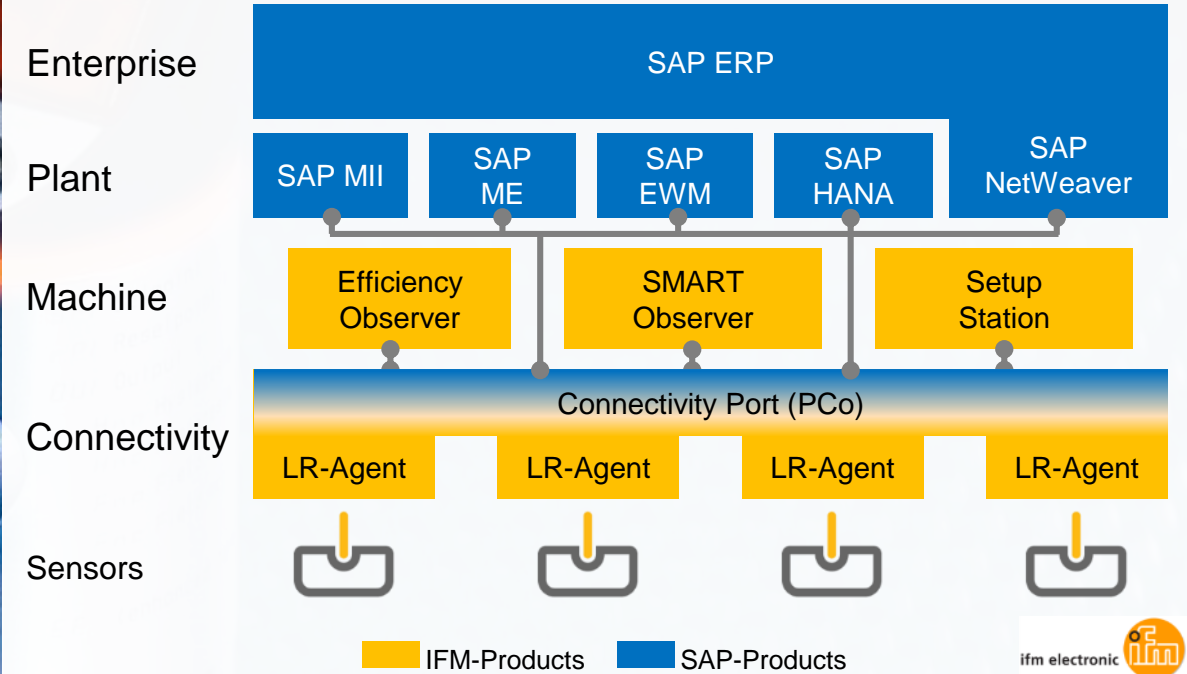


Situation: intention to grow the business through built-in SAP integration

## Solution

- SAP Plant Connectivity (PCo), embedded in the ifm product *Connectivity Port*
- Providing integration to SAP solutions like
  - SAP MII/ME
  - SAP Business Suite
  - SAP HANA
- Business model: OEM

## Technology Innovation



## Benefits

- Add value to the technology offering
- Expand the business through innovation

# Cloud for Industry:

## Company

Siemens AG (industry sector), the leading global producer of Industry Automation and Drive Technologies

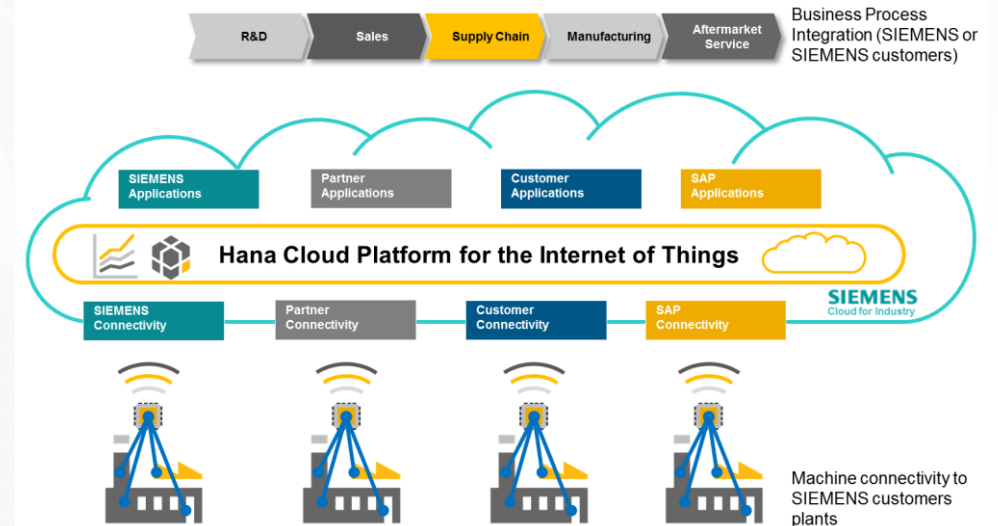


Situation: Siemens wants to offer an open cloud-based platform as a basis for an industrial ecosystem. This will enable OEMs, application developers and customers to integrate devices and to offer data based services.

## Solution

- Siemens Industrial Service Backbone (ISB)
- HANA Cloud Platform
- SAP analytical tools and apps
- IoT apps from Siemens and partners
- Business model: OEM PaaS

## Technology and Business Innovation



## Benefits

- Combine the best of both worlds
- A unique, end-to-end and global IoT offering for OEMs, app developers and industrial customers
- Set a new industrial standard to access and make sense of machine data



### Company

Still is a leading supplier of forklift trucks, platform trucks and tractors plus the latest intra-logistics systems.



Situation: Still is evolving from a pure product to a services company.

### Solution

- Still cubeXX concept forklift truck
- SAP HANA Cloud Platform
- SAP Extended Warehouse Management (EWM)
- Mobile app for warehouse worker



### Process/Technology Innovation

- The on-board IoT connector connects the forklift truck with cyber physical systems and cloud apps.
- The warehouse worker uses a smart device to manage tasks between people and machines.
- A 3D picture of the environment is used for orientation and the truck positioning.
- The truck directly receives warehouse tasks from SAP EWM.

### Benefits

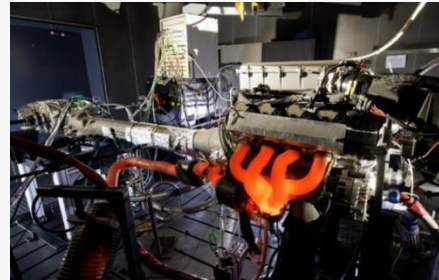
- Efficient, fast and save logistics processes
- Reduced time effort for material handling
- Also applicable for fleet management optimization

# IoT-optimized Engine Testing:



## Company

In line with its motto “Driving performance”, Mercedes-AMG develops high performance cars.



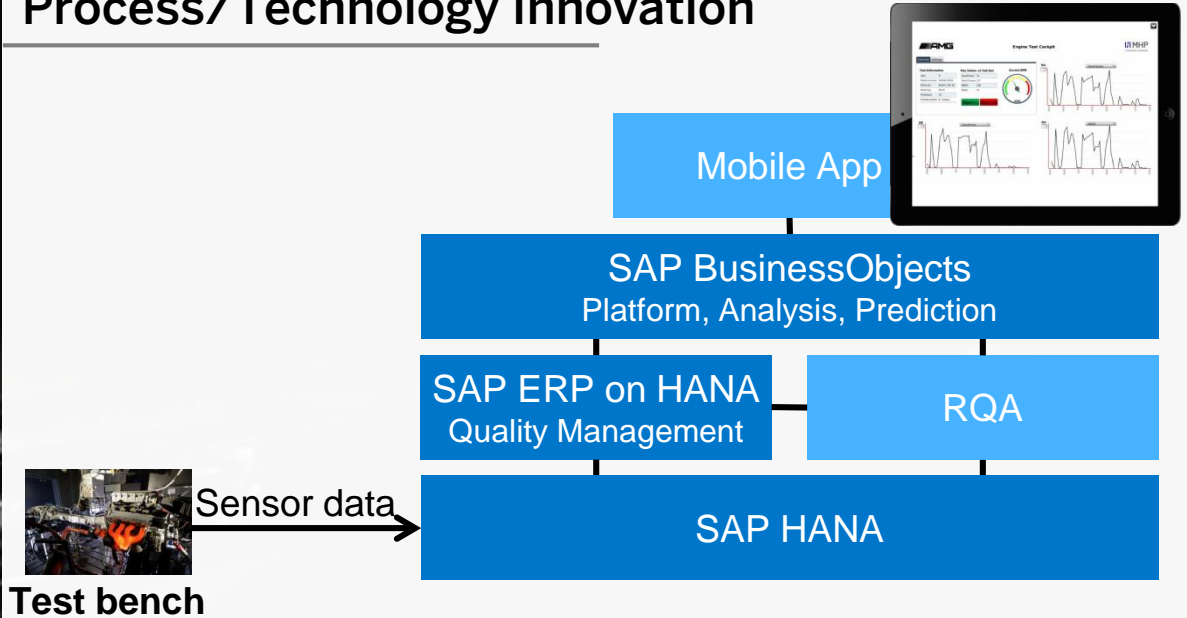
Situation: Engine testing is a costly and data-intensive process. While most engine failures occur within minutes, failed tests could not be identified until after completion, resulting in hours of lost time and resources.

## Solution

- IoT-enabled test bench
- SAP HANA to manage sensor data
- SAP ERP on HANA for Quality Management
- Real-Time Quality Assurance solution (RQA)
- SAP Business Objects products for analysis
- Mobile app for engineers



## Process/Technology Innovation



## Benefits

- >76% improved processes
- 94% faster runtimes
- 1 day equivalent increase in weekly testing capacity

# Re-Imagine Business with IoT and Big Data: Tennant



## Company

Tennant Company provides cleaning machines and solutions.



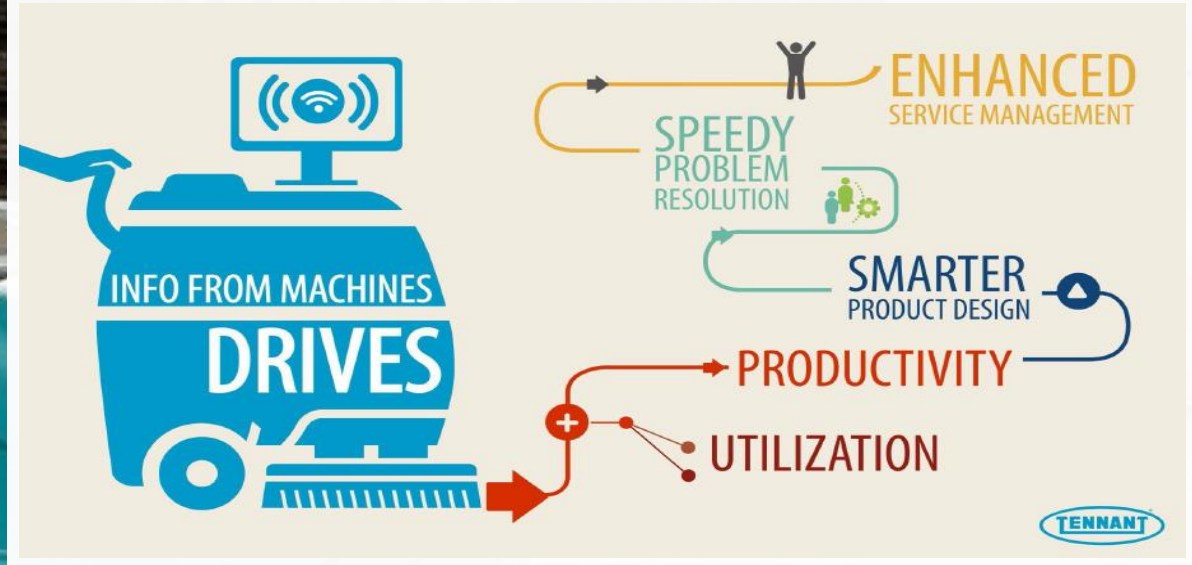
Situation: Need to differentiate from competition to realize future growth plans.

## Solution

- ILS Technology: sensors and device management
- SAP HANA Platform
- Asset management portal on SAP HANA, combining machine and ERP data
- SAP BusinessObjects dashboards



## Process Innovation

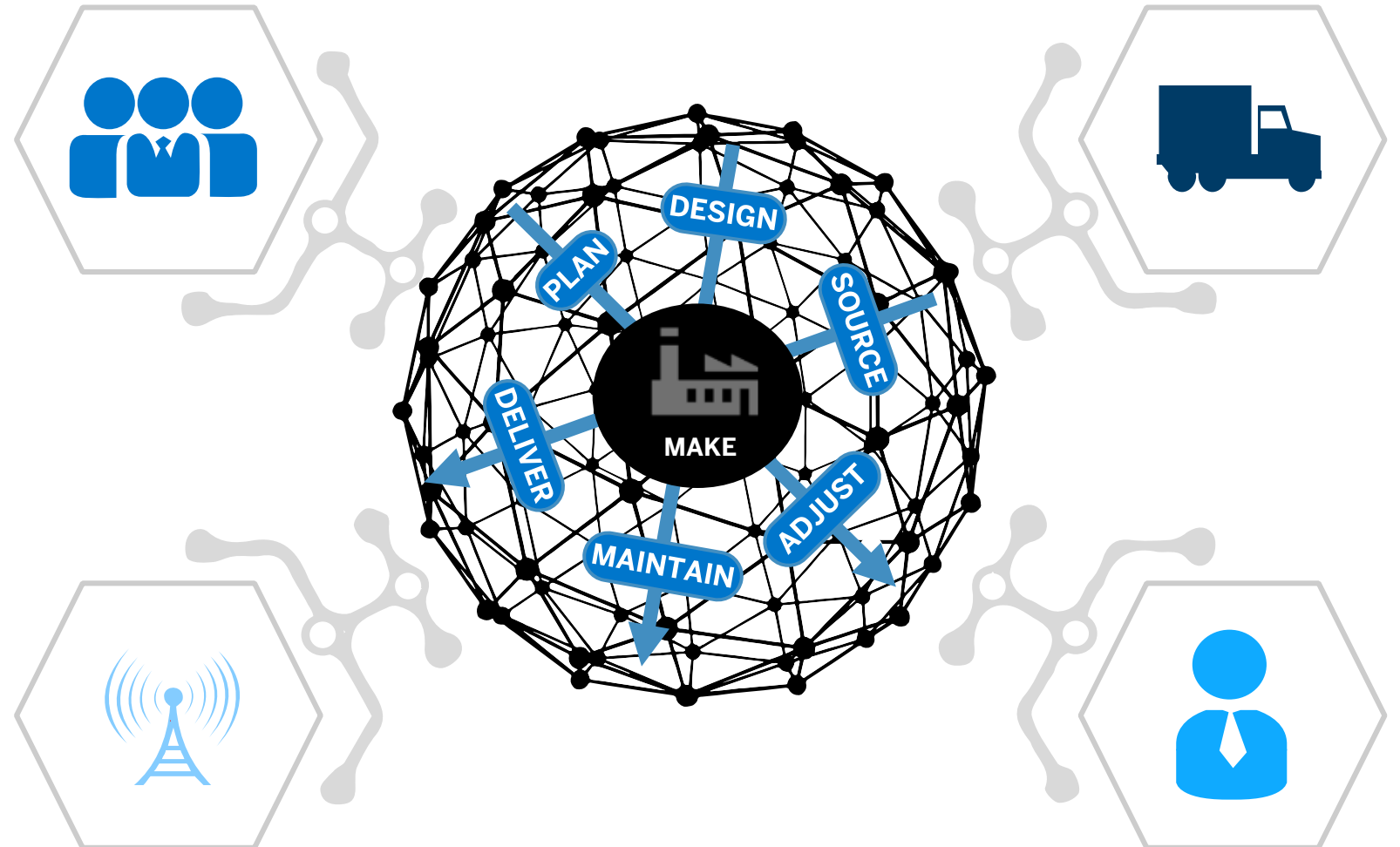


## Benefits

- Competitive advantage through IoT-based offering
- Customer satisfaction and retention
- Higher asset availability and transparency
- Cost reduction

# The Digital Factory at the heart of the Digital Transformation

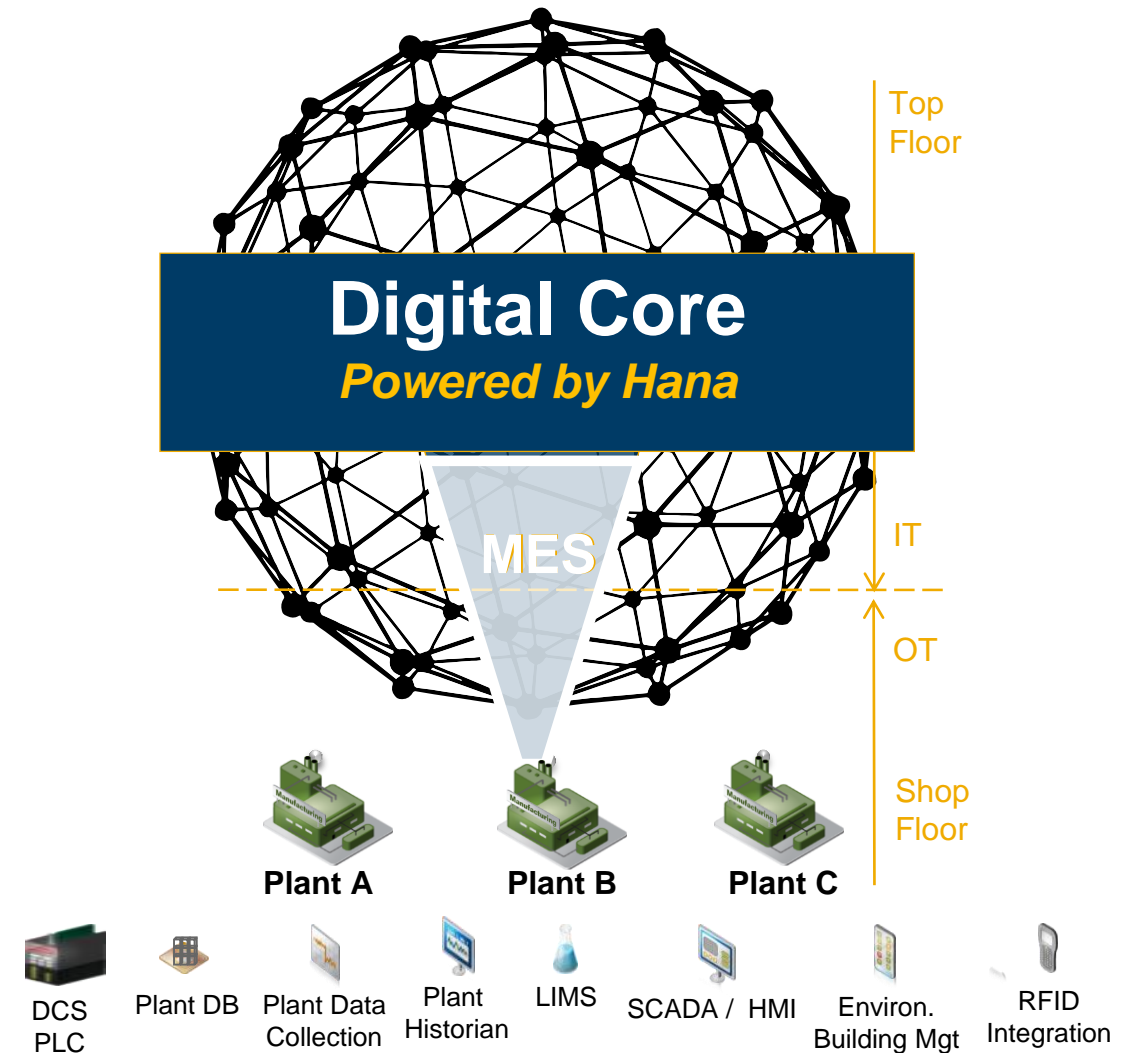
For Manufacturing Industries, becoming truly Digital implies to understand and leverage all drivers from the ongoing **4th Industrial Revolution**, the epicenter of which is **the Factory**



# The Digital Factory at the heart of the Digital Transformation

Hana as the Digital Backbone bridging IT and OT

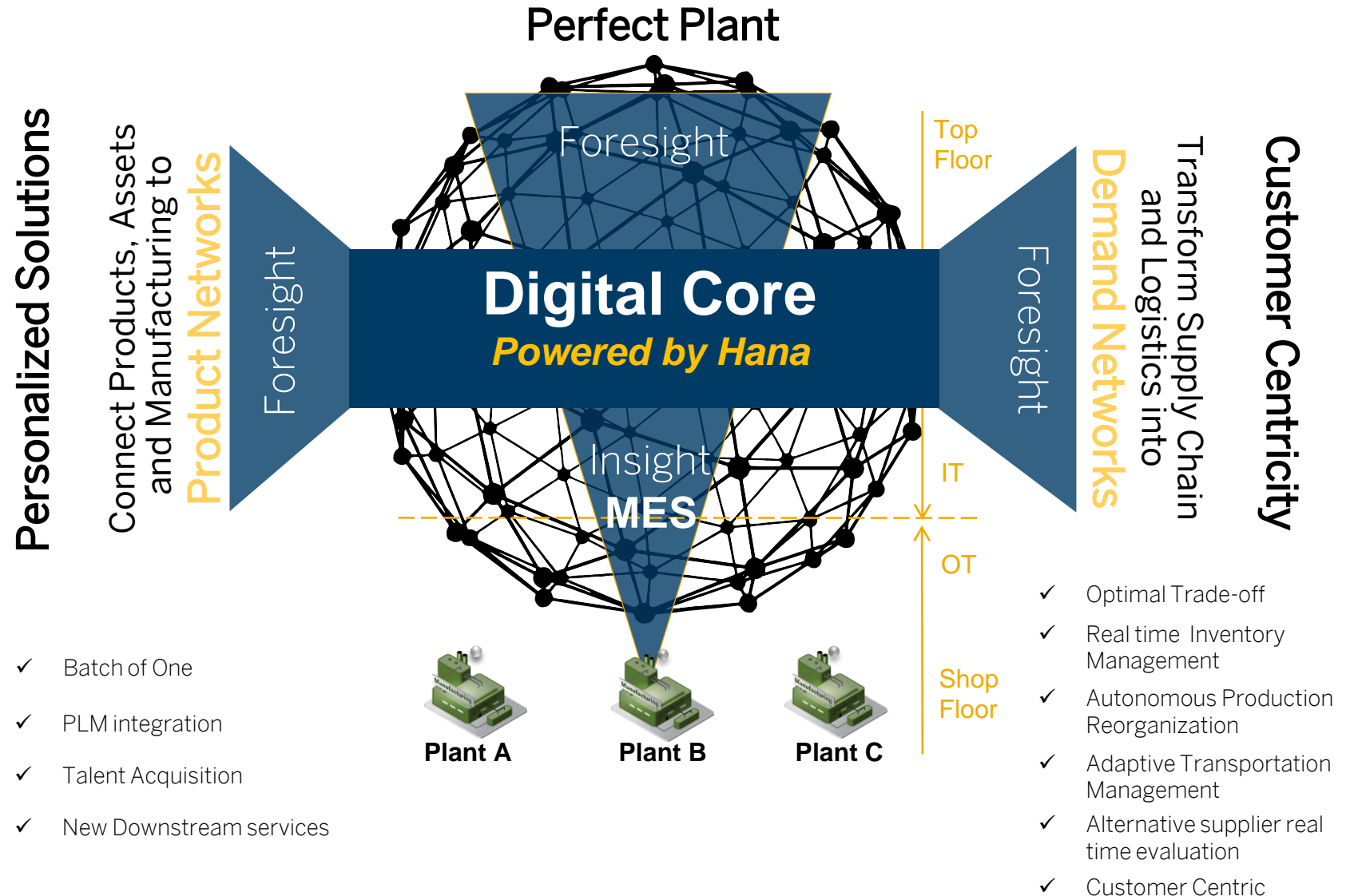
The Digital Core relies on elastic, unified agnostic **computing** power capable to **reveal** low level signals from discrete information, make sense of it through **meaningful visualization** and process **complex events** in order to **take proper action** – starting with the plant



# The Digital Factory at the heart of the Digital Transformation

SAP Perspective on how Digital or the Industrial Internet Enables the Perfect Plant

- ✓ Predictive Quality
- ✓ Predictive Maintenance
- ✓ Remote Support



# Thanks / Merci



Philippe GEOFFROY  
Industry 4.0 Head for France  
+33 6 03 15 74 72  
[Philippe.geoffroy@sap.com](mailto:Philippe.geoffroy@sap.com)

# Appendix: IoT / I4.0 Videos



# Videos 1



**Martina Weidner**  
Solution Sales Executive  
Manufacturing & Logistics, SAP

HMI 2014 short, english



SAP Co-Innovation Lab  
elster  
FESTO

HMI 2014 long, english



Hagleitner, english



Predictive Maintenance and Service for  
Wind Turbines



HARLEY-DAVIDSON YORK MANUFACTURING FACILITY  
UNITED STATES OF AMERICA

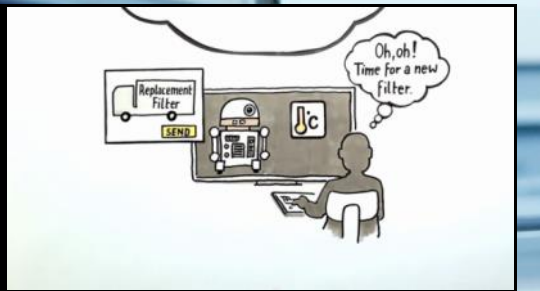
Harley Davidson York, english



Hamburg Port, english



AR Service Technician App, english



IoT will Transform Business



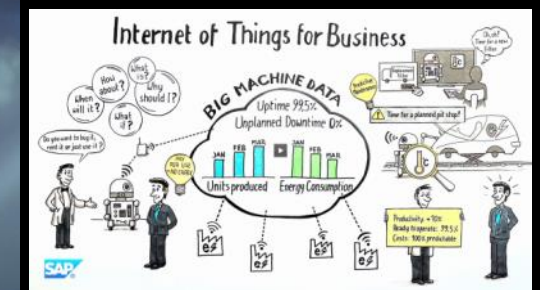
SAP IoT for Business, english



SAP BMW Connected Car, english



AR Warehouse Picker App, english



SAP IoT for Business, english

## Videos 2



McLaren Racecar = CPS



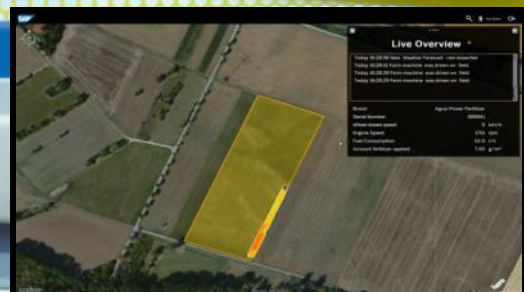
Predictive Maintenance, english



SK Solutions Anti Collision Video, english



Asset Intelligence Network



Digital Farming

And more here: <https://www.youtube.com/user/SAPInternetofThings/videos>