



**SIEMENS**  
*Ingenuity for life*

# Digitalization Changes Everything – Start your IoT Journey Today

April 12th IABSC Monthly Meeting  
*Stephan Ihmels*

Unrestricted © Siemens AG 2018

Realize innovation.

# Milestones of a 170-year history

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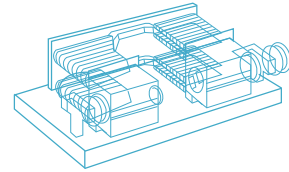
**1816 – 1892**

Company founder,  
visionary and inventor



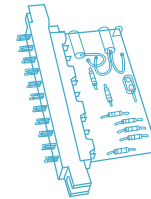
**1866**

The dynamo makes  
electricity part of  
everyday life



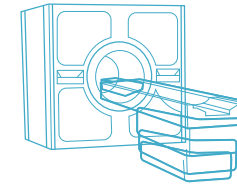
**1959**

SIMATIC makes  
Siemens a leader in  
automation technology



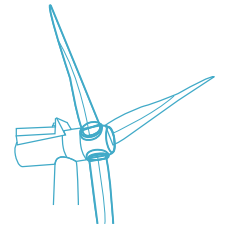
**1983**

First magnetic resonance  
imaging scanner goes  
into operation



**2012**

Test operation of the  
world's largest rotor for  
offshore wind turbines

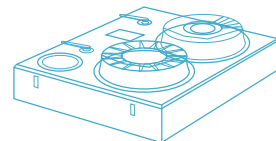


**Werner von Siemens**

**Siemens innovations over the past 170 years**

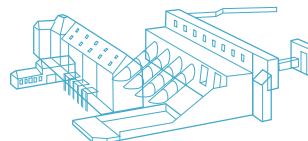
**1847**

Pointer telegraph  
lays the foundation  
of Siemens as a  
global company



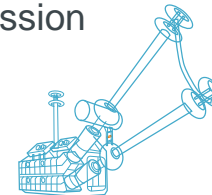
**1925**

Siemens electrifies  
the Irish Free State  
with a hydroelectric  
power plant



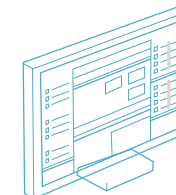
**1975**

Breakthrough of  
high-voltage direct  
current (HVDC)  
transmission



**2010**

TIA Portal takes  
automation a stage  
further



**2017**

MindSphere, the  
cloud-based  
operating system  
for the Internet of  
Things

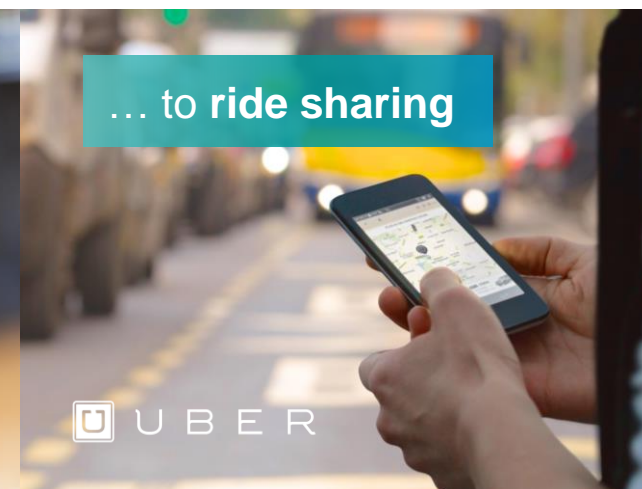
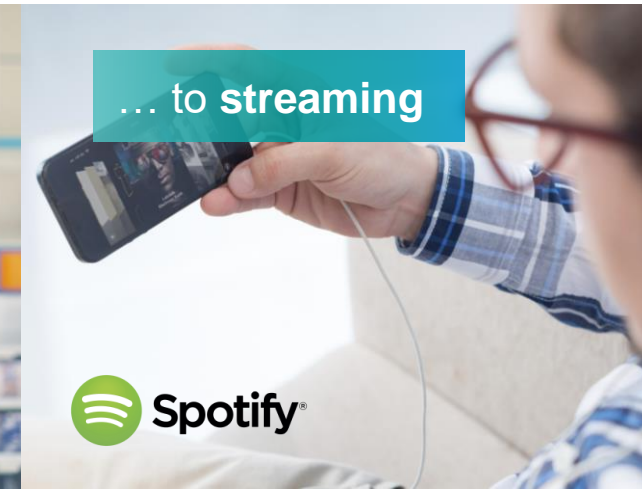
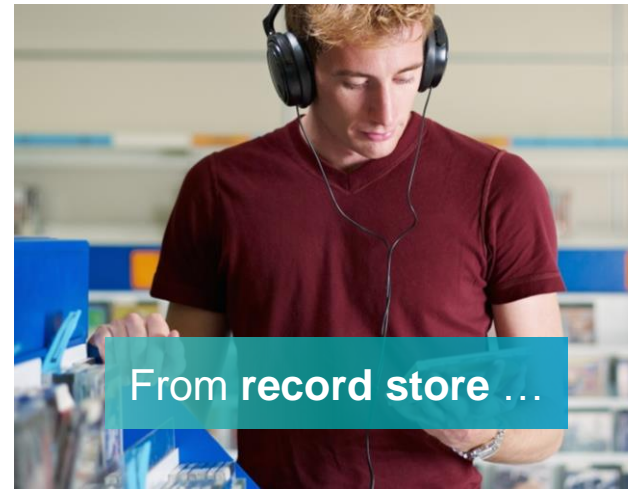


# Digitalization changes everything



# New business models in the internet age are disrupting complete markets

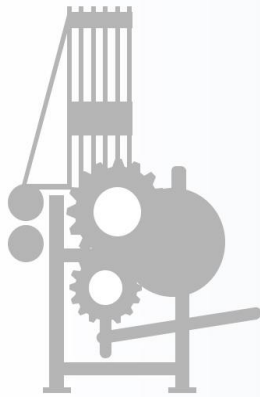
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# The Third Industrial Revolution

## First Industrial Revolution

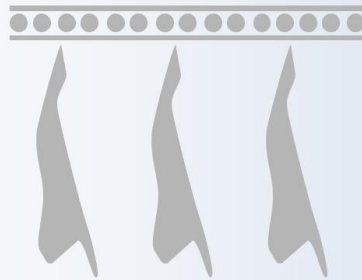
based on the introduction of mechanical production equipment driven by water and steam power



First mechanical loom, 1784

## Second Industrial Revolution

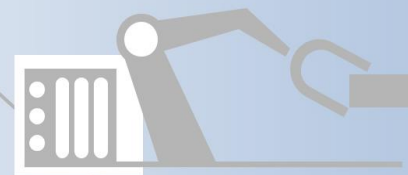
based on mass production achieved by division of labor concept and the use of electrical energy



First conveyor belt, Cincinnati slaughterhouse, 1870

## Third Industrial Revolution

based on the use of electronics and IT to further automate production



First programmable logic controller (PLC) Modicon 084, 1969

## Fourth Industrial Revolution

based on the use of cyber-physical systems



1800

1900

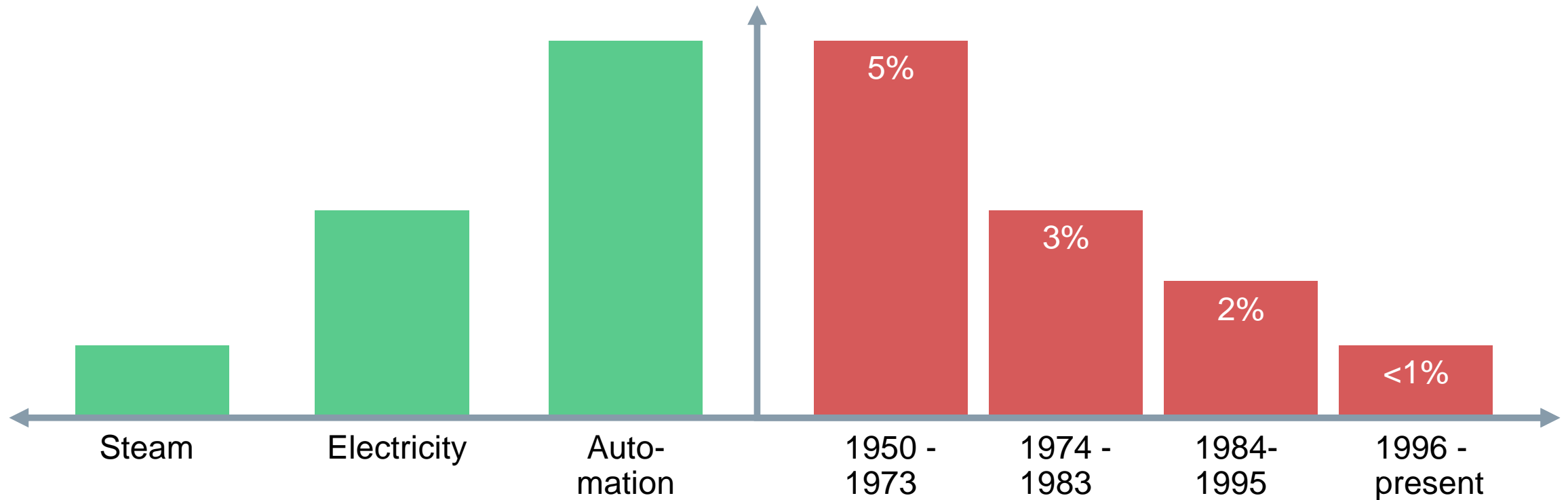
2000

Today

Time

# Productivity Growth Across Major Countries

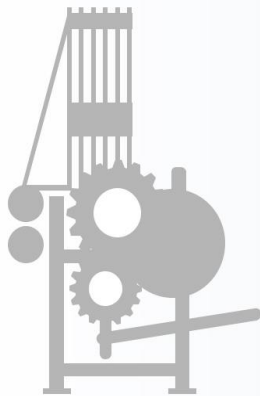
Has been falling since the 1970s



# The Fourth Industrial Revolution

## First Industrial Revolution

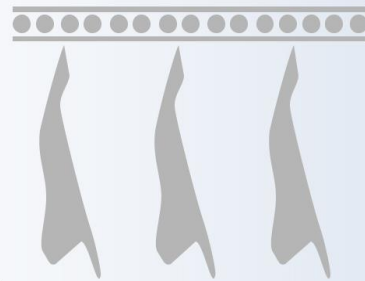
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## Third Industrial Revolution

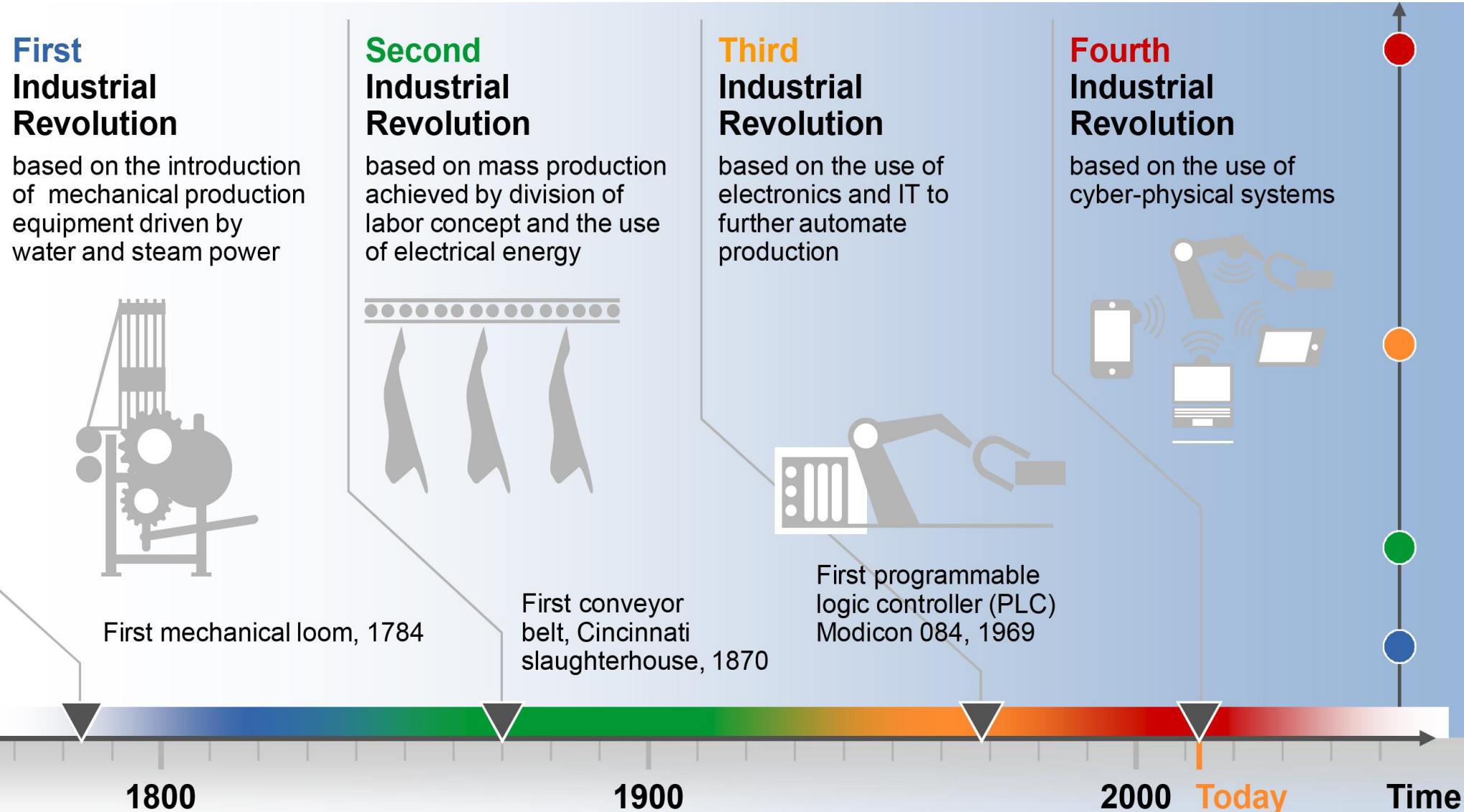
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## Fourth Industrial Revolution

based on the use of cyber-physical systems



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# The Second Half of the Chessboard

The pace of technological advances is fueling digital transformation

The cost per unit of key technologies is falling

	2007	2013
 DRONES	\$100,000	\$700
 3D PRINTING	\$40,000	\$100
 INDUSTRIAL ROBOTS	\$550,000	\$20,000
 SENSORS	\$30,000	\$80
 SMART PHONES	\$449	\$10



Source: Accenture Technology Vision 2015






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- Temperature
- Vibration
- 3-axis motion
- Indoor Location
- Magnetism
- Light

- 10 year battery
- Waterproof



\$15

Source: Accenture Technology Vision 2015

# The Industrial Internet of Things

## A Great First Step In Your Digitalization Journey

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- Temperature
- Vibration
- 3-axis motion
- Indoor Location
- Magnetism
- Light

- 10 year battery
- Waterproof



# The Industrial Internet of Things

## A Great First Step In Your Digitalization Journey



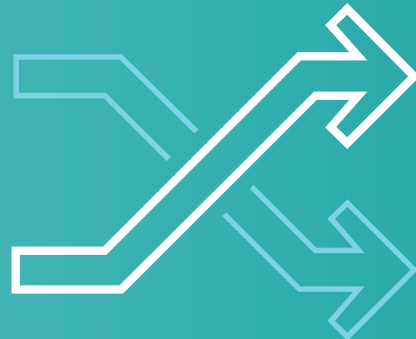
- The IoT is a **network** of intelligent computers, **devices**, and objects that collect and **share data**
- The data is usually also aggregated in the **cloud**, analyzed using **Big Data Analytics**, and delivered to users as **insights**
- Things can **reason independently** via onboard algorithms, or **rely on internet services** to provide intelligence. Either way, this ‘intelligence’ turns an IoT device into a **Smart Device**.
- IOT devices with actuators are called **cyber physical systems** and can directly and autonomously affect the process

# Our customers have essential requirements

Speed



Flexibility



Quality



Efficiency



**Security**



## And airports?



**Increased  
operational efficiency**



**Improved  
baggage process**



**Improved  
passenger experience**



**Security**



DRIVING DIGITALIZATION

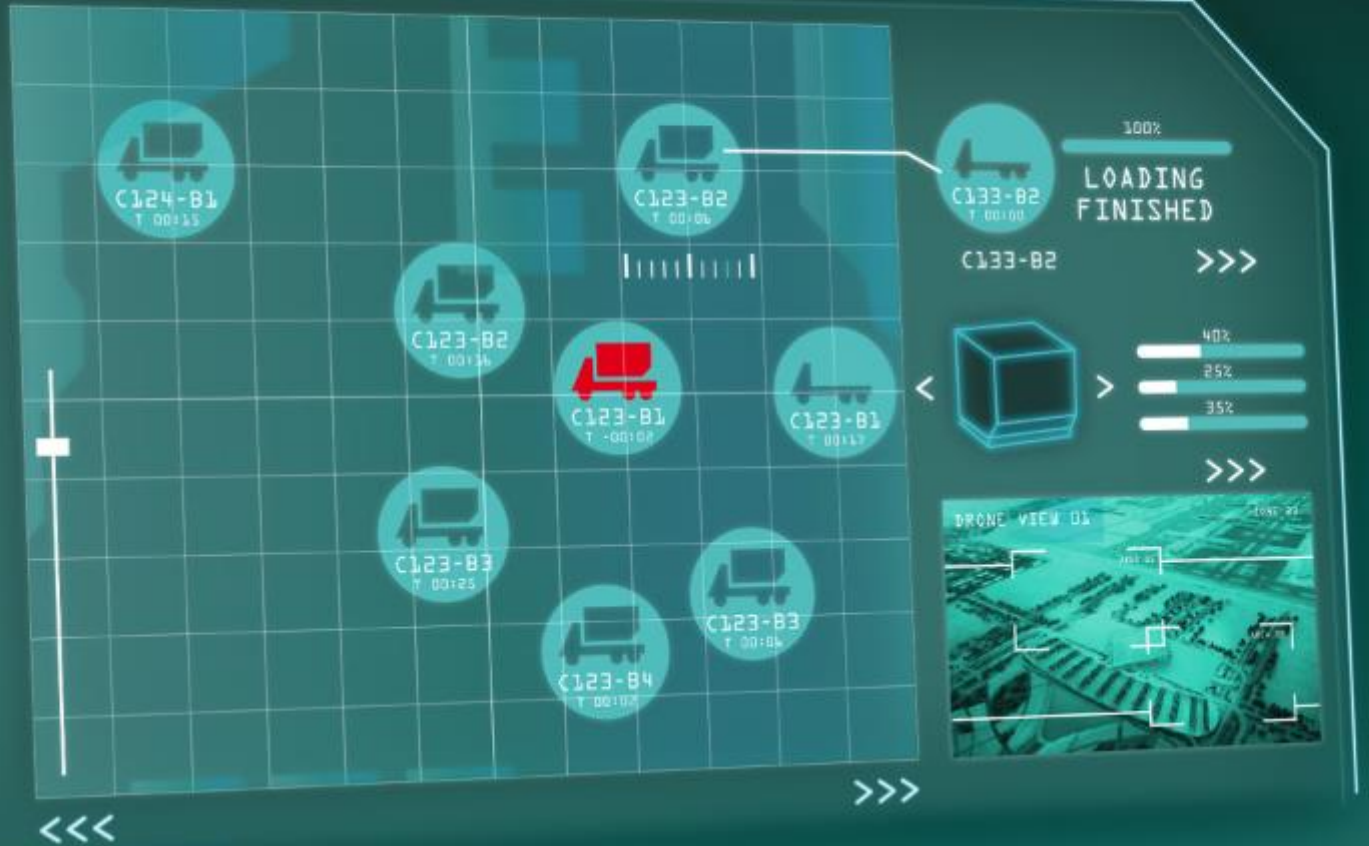


HELLO  
NICK\_

YOUR BAGGAGE  
IS ALREADY  
AT THE  
AIRPORT\_:)

PASSENGER EXPERIENCE

## PERFORMANCE



SMART BAGGAGE OPS





Belt B578\_A

Divert D346\_B >>>  
(A2V 0000 1285 9845)

INCREASED AVAILABILITY



**“There are no  
consequences in  
the virtual  
world”**

**Anton Huber | 2005**

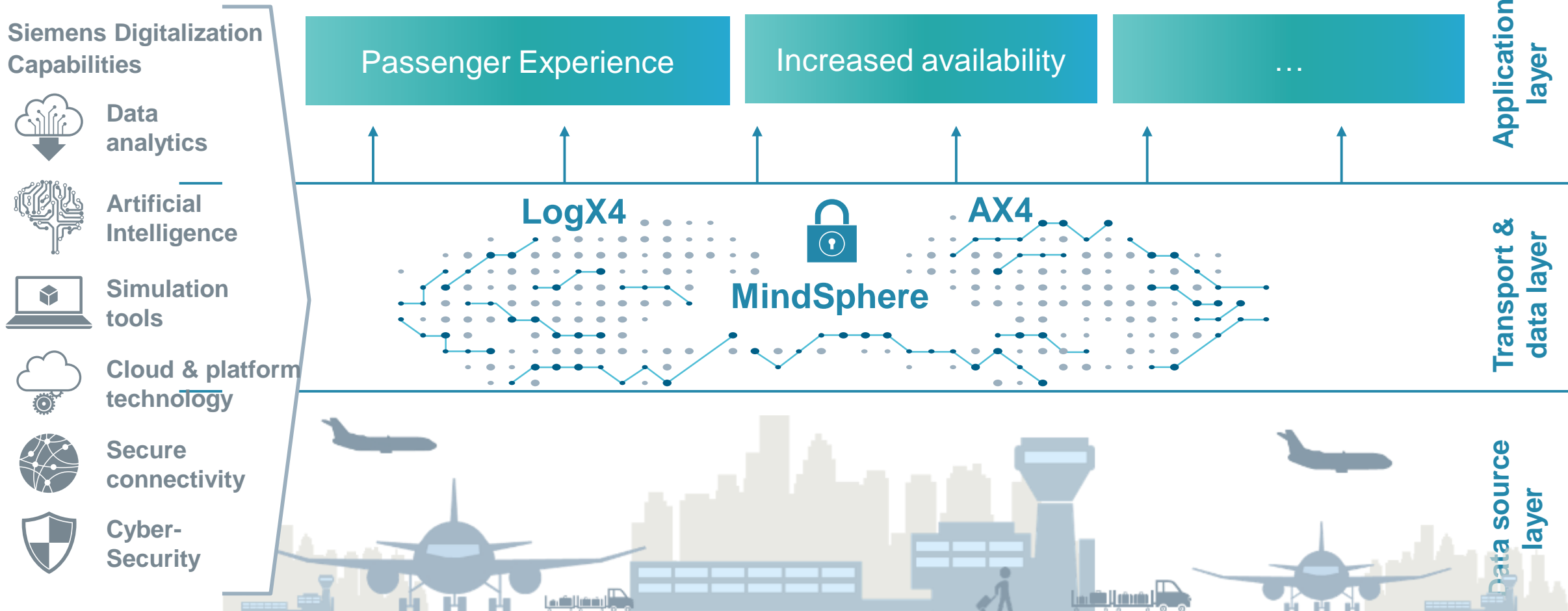
Let's bring together the virtual and the real world

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# Let's bring together expertise and innovation

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# MindSphere is the Siemens open IoT cloud based operating system

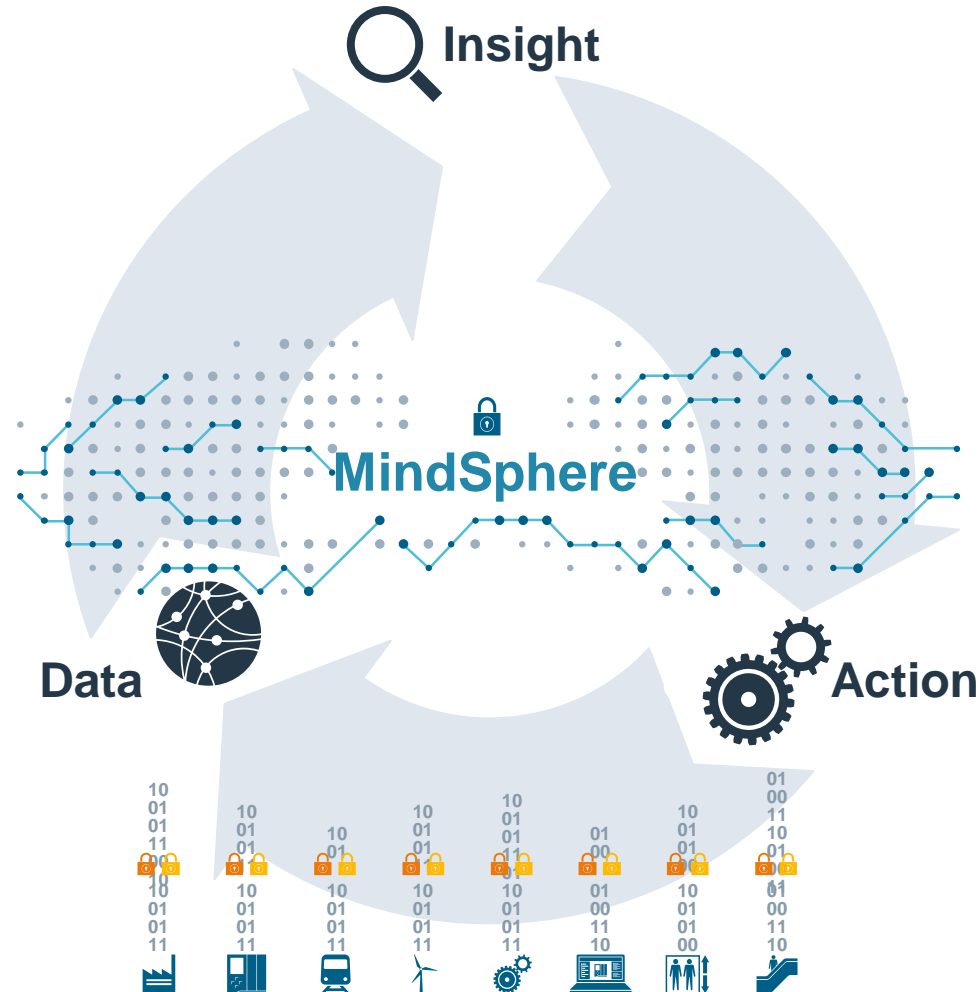
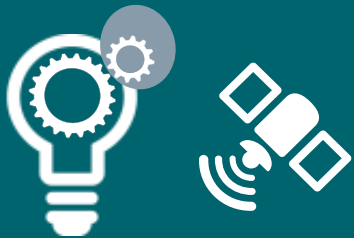
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## Operations



## Collaboration & Communication



## Maintenance & Support



## Customer experience



# ONE common platform across multiple stakeholders and industries

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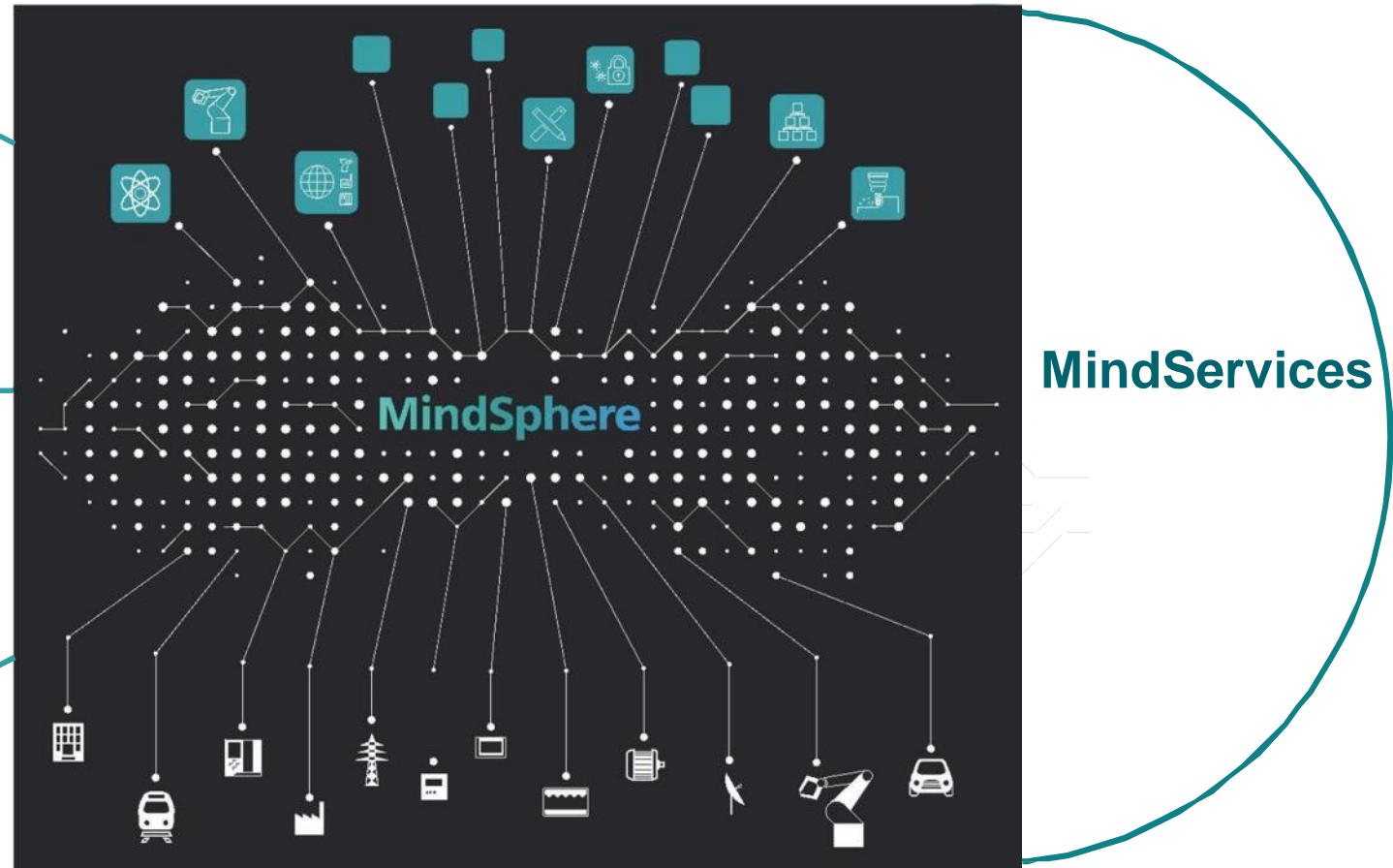
## MindApps



## MindSphere (APIs, Analytics, DevOp)



## MindConnect (Gateways + Edge)



# What is MindSphere ? The non technical version !



Open  
like Android  
to choose  
applications and  
“underlying”  
technology



Open  
environment  
to develop own  
apps or  
connectivity



Open  
App Store  
to purchase or  
sell products and  
services

# Growing MindSphere partner ecosystem...

## Consulting / strategy partners



# SIEMENS

## Technology Provider



## Application Developer



MindSphere

## IaaS Provider



## System Integrator



MindSphere –  
The cloud-based, open  
IoT operating system

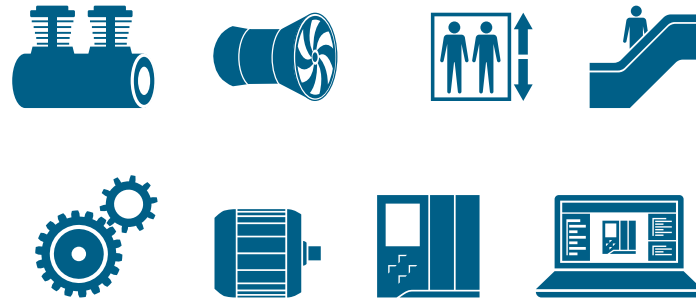
## Connectivity Developer



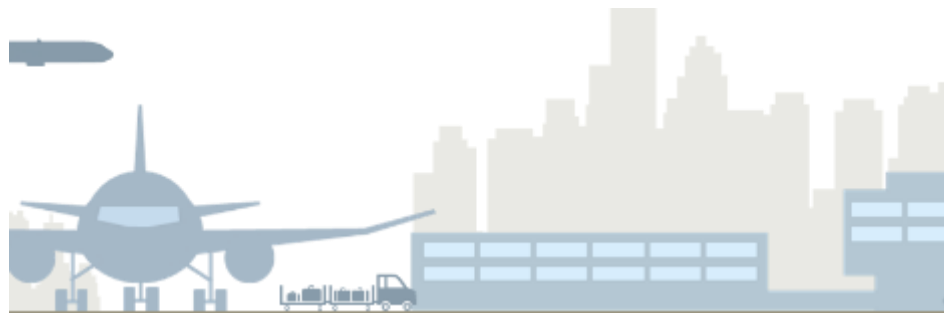


# IIoT increases business value for equipment suppliers and operators

## Equipment supplier



## Equipment operator



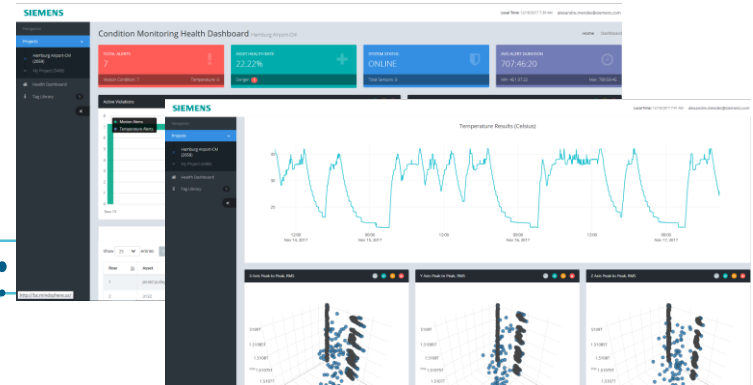
## Business Value

- **Increase Service efficiency/** lower warranty expenses
  - Offer **additional services** (e.g., availability)
  - **Enhance products** via feedback loop to R&D
- 
- **Increase uptime/asset availability**
  - Optimize assets
  - Increase maintenance efficiency

# Automated Analytics as a Service Drive condition monitoring

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BluFi Gateways



## Automated Analytics

- Temperature trending
- Peak to Peak / RMS
- Machine Learning

## User Dashboard

- Overall health status
- Individual health status
- Temperature and vibration alarms
- Operating hours
- Integration on work flow (optional)

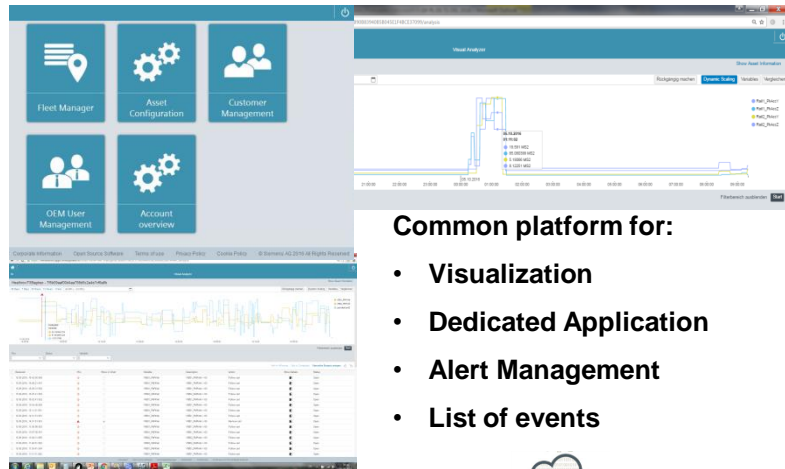
Sensor Beacons



## Real Time Data

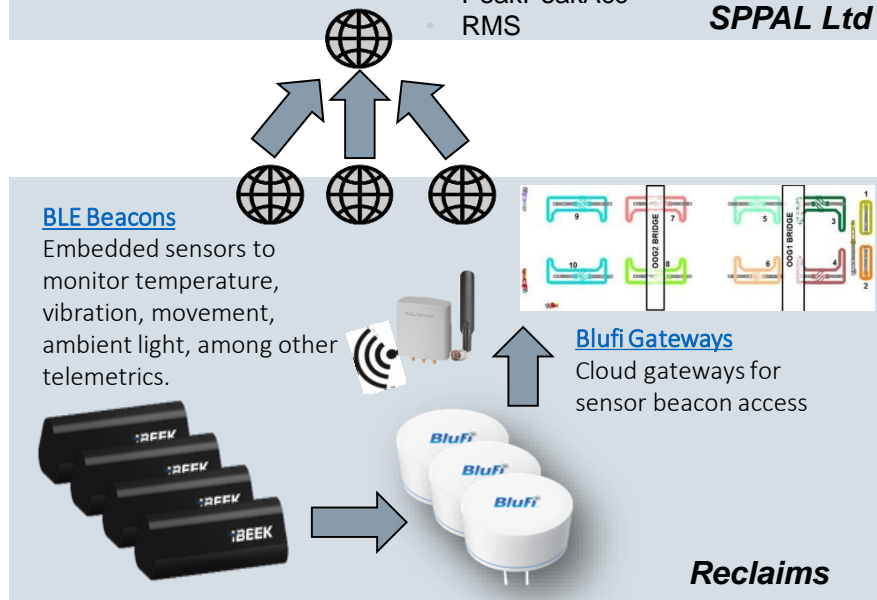
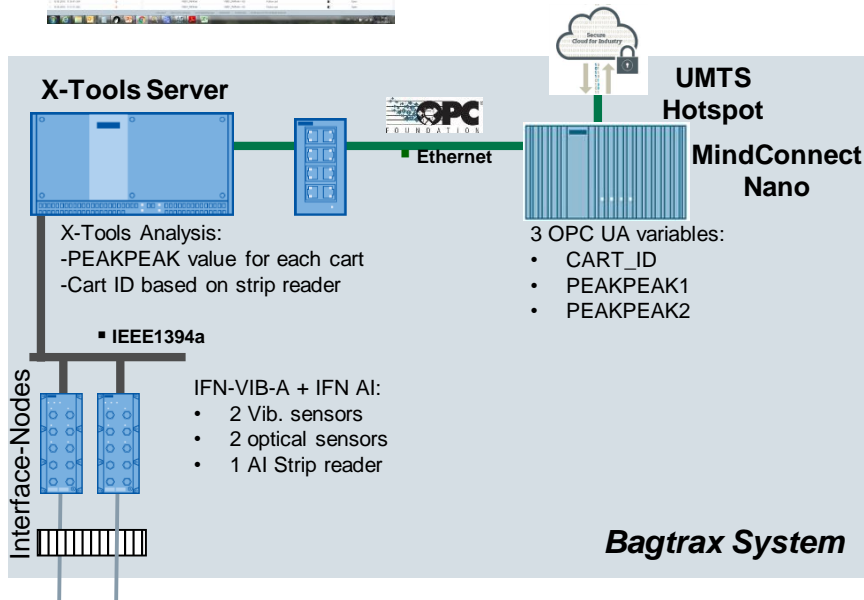
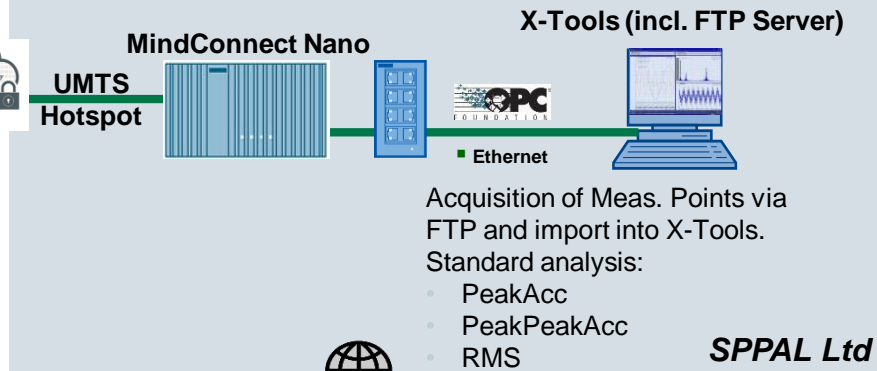
- Temperature
- Vibration
- Operating hours


# MindSphere provided by Siemens PPAL Ltd for Bagtrax & Reclaim at a major European airport



Common platform for:

- Visualization
- Dedicated Application
- Alert Management
- List of events





# Product Intelligence

**Automate insight** from big data to create actionable intelligence

# Condition-based Maintenance Scenario

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# Landing Gear Use-case

## Challenge:

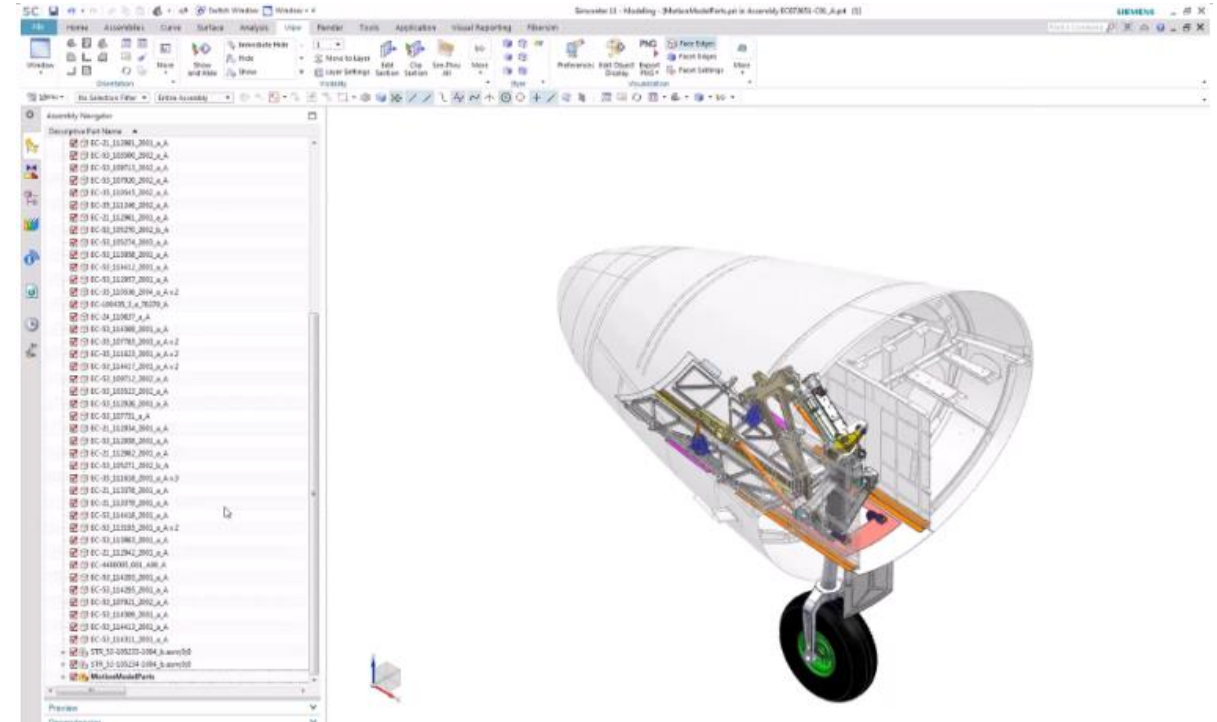
- Airline does not know if aircraft experiences a hard landing
- Service events are currently done to landing gear based on maintenance schedules

## Solution:

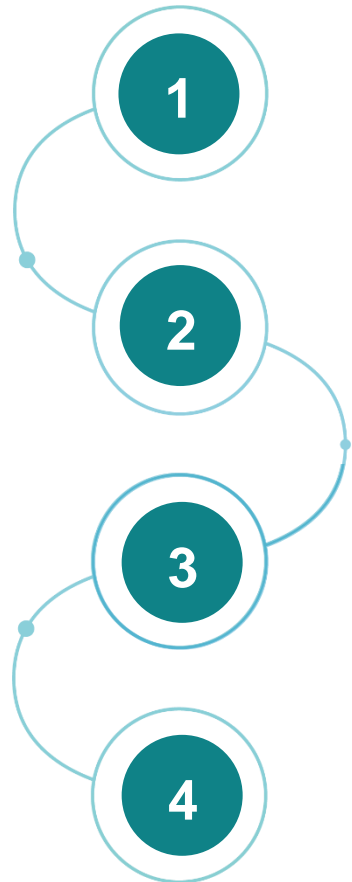
- Add MindConnect device and Accelerometer to the landing gear
- Utilize Fleet Manager to monitor the g-force that each plane experiences upon landing

## Value:

- Airline can reduce delays and increase safety by scheduling the service event to the landing gear as soon as possible



# Digital Twin of Performance Condition-based Maintenance Scenario

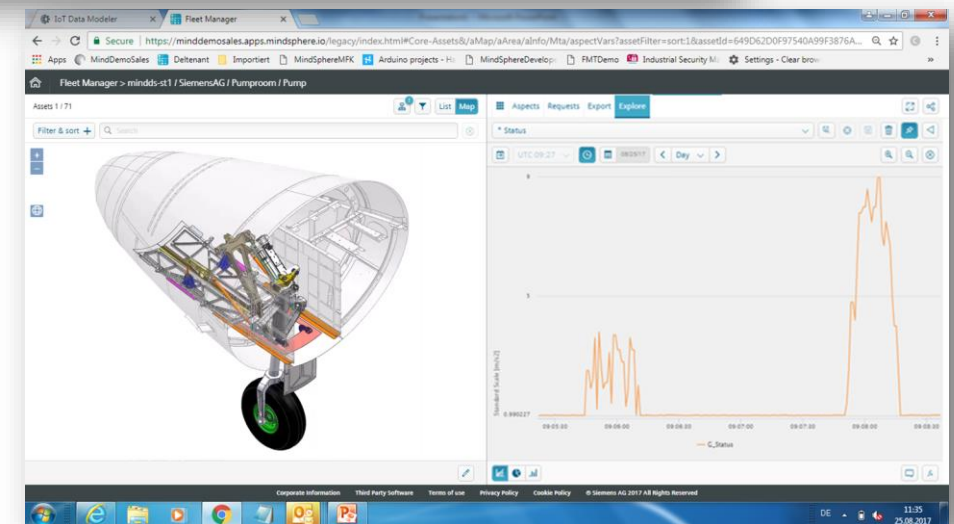
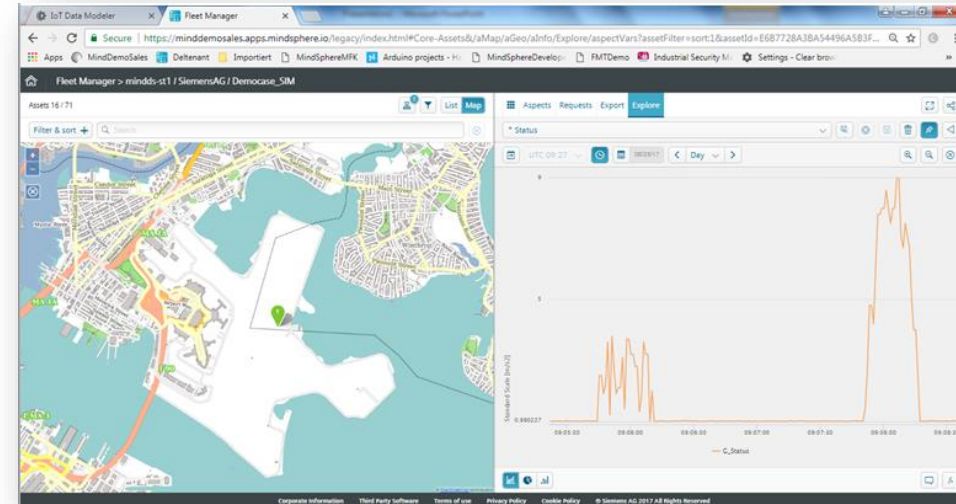


**1** Sensor and automation data pushed to MindSphere

**2** Monitor and visualize

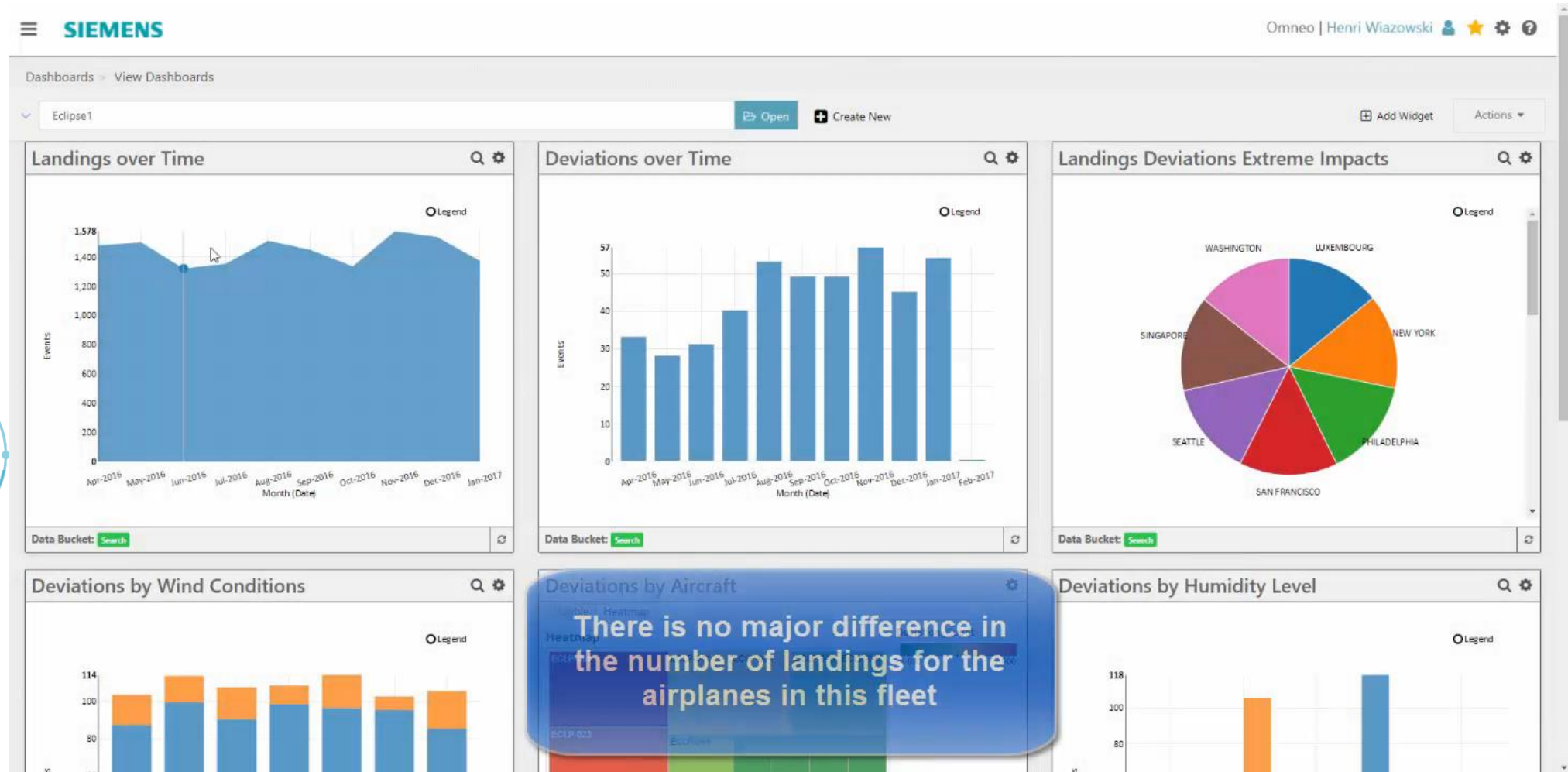
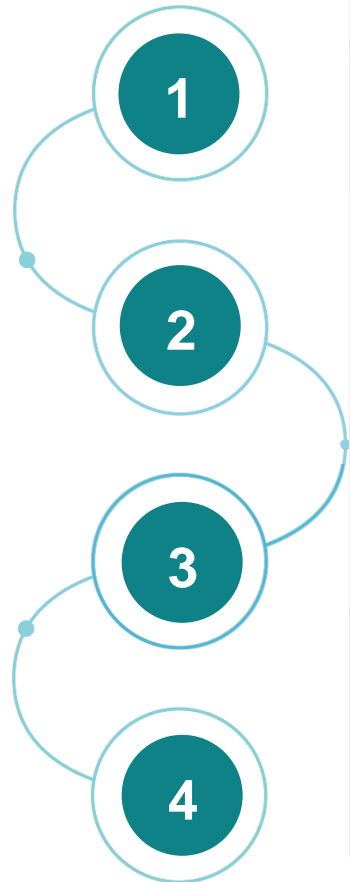
**3** Analyze and contextualize with other IoT data sources

**4** Closed loop product development



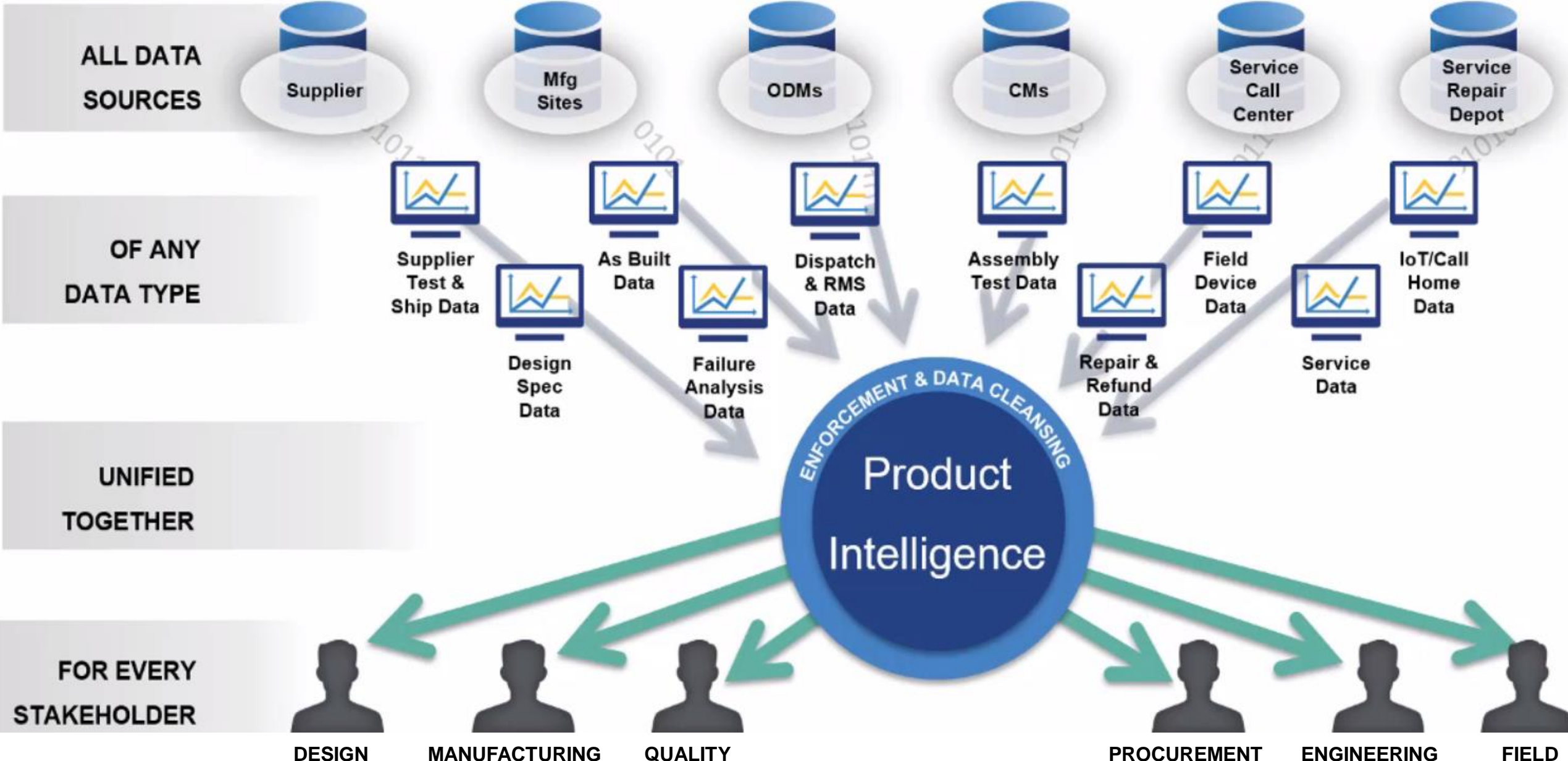
# Digital Twin of Performance

## Condition-based Maintenance Scenario





# Product Intelligence – Unified Data and Analytics Hub



## Change is Inevitable

Digital Darwinism is a significant threat

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**“Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000.”**

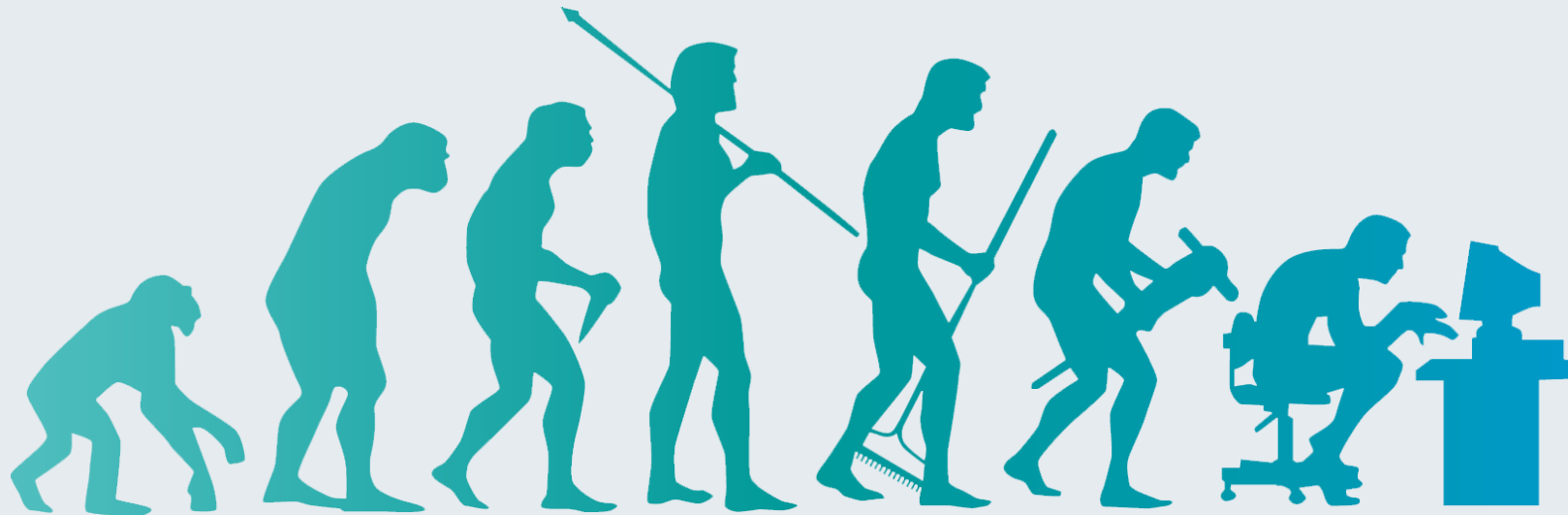
- Pierre Nanterme  
CEO Accenture



## Change is Inevitable

Digital Darwinism is a significant threat

**“More than 50% of companies that attempt to move to a digital model fail.”**



Source: John Chambers, McKinsey & Company Report

# Why do Digital Transformations Fail?

**Companies invest in the latest “siloed” digital technologies and fail to work horizontally**

**They perceive digital as applying purely to operational efficiency**

**They think “Digitization”  
and not “Digitalization”**





**“The pace of  
change has  
never been this  
fast...”**

**...and yet it will  
never be this  
slow again”**

Justin Trudeau | Davos 2018