



# SAP Leonardo Live

Not just another business conference

## SAP Cloud Platform Internet of Things

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July 2017

PUBLIC

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# Agenda

## SAP Cloud Platform Internet of Things

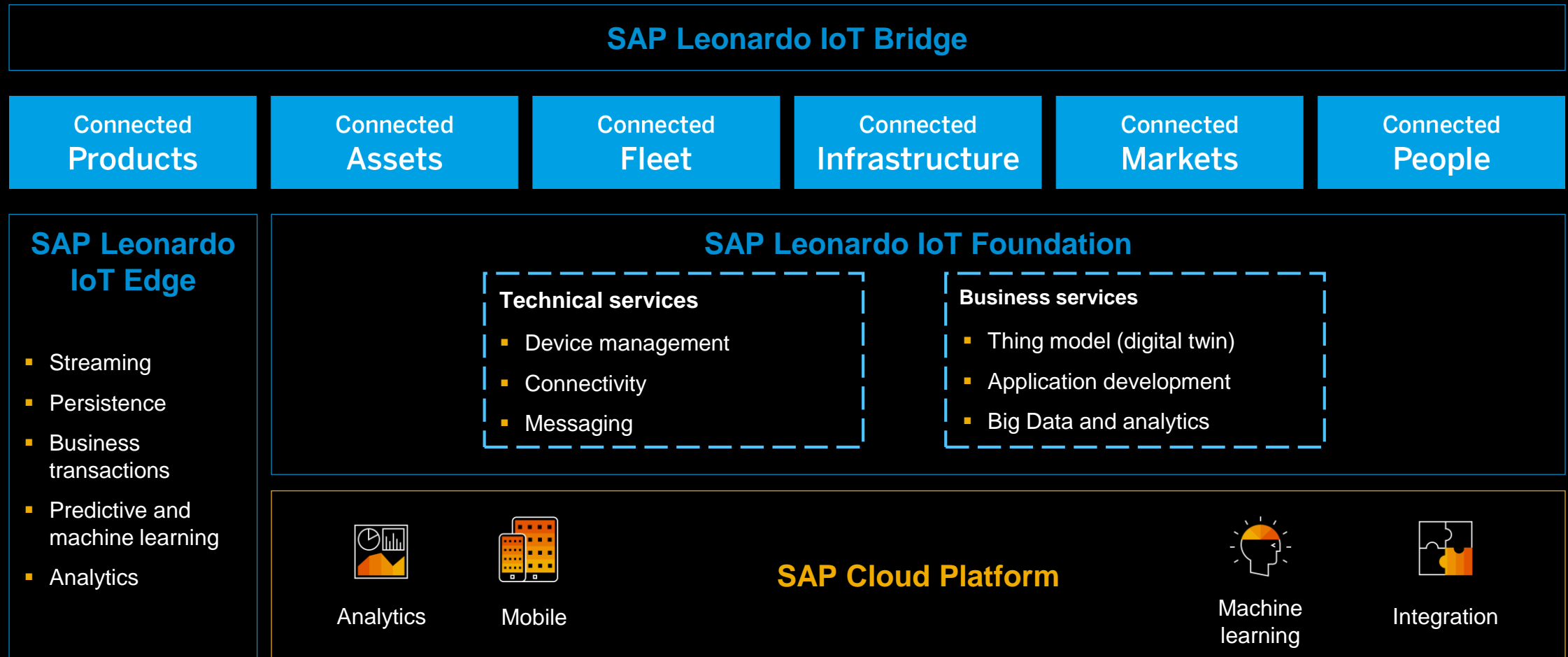
- Introduction
- Key Capabilities
- Demo
- Customer and Partner Examples
- Additional Information

# SAP Cloud Platform IoT

## Introduction



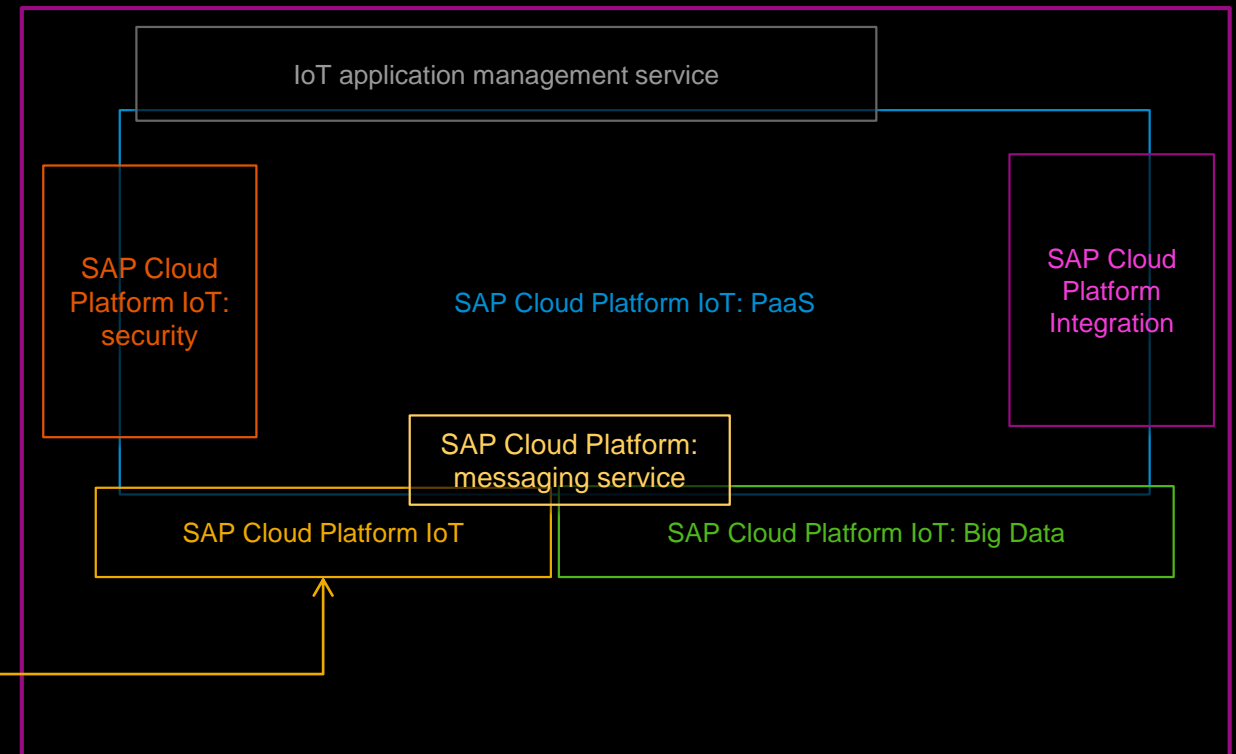
# SAP Leonardo IoT Foundation and SAP Leonardo IoT Edge



# SAP Cloud Platform Internet of Things 4.0

## Recap – SAP acquisition of PLAT.ONE

- PLAT.ONE is an application enablement platform for IoT.
- PLAT.ONE is a GA product used by global customers.
- Acquisition was completed July 2016.
- PLAT.ONE will form a cornerstone of the IoT offering based on SAP Cloud Platform.
- PLAT.ONE in SAP Cloud Platform is available today as SAP Cloud Platform Internet of Things 4.0.





# Explore SAP Cloud Platform Internet of Things 4.0 through

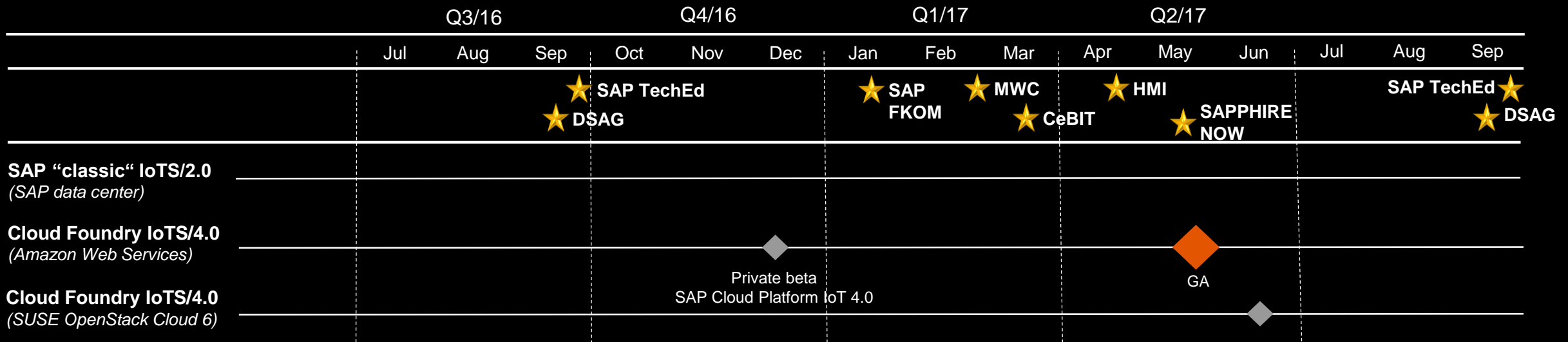
## Top 10 IoT services architectural differentiators

1. Distributed, customizable IoT services  
(edge and cloud)
2. Breadth of protocols
3. Edge processing capabilities
4. Unique multi-tenant model
5. Semantic data model – dynamic properties  
with role-based views
6. Enterprise-grade IoT data processing
7. IoT integration with analytics and actions
8. IoT app builder – plug-and-play authoring
9. Prebuilt templated applications
10. Connection to SAP apps and ecosystem

# SAP Cloud Platform Internet of Things 4.0

## Road map and release date

- SAP Cloud Platform IoT 4.0 based on PLAT.ONE
- General availability of SAP Cloud Platform IoT 4.0 since May 2017
- PLAT.ONE feature parity through collaboration with SAP IoT Application Enablement team (application builder)

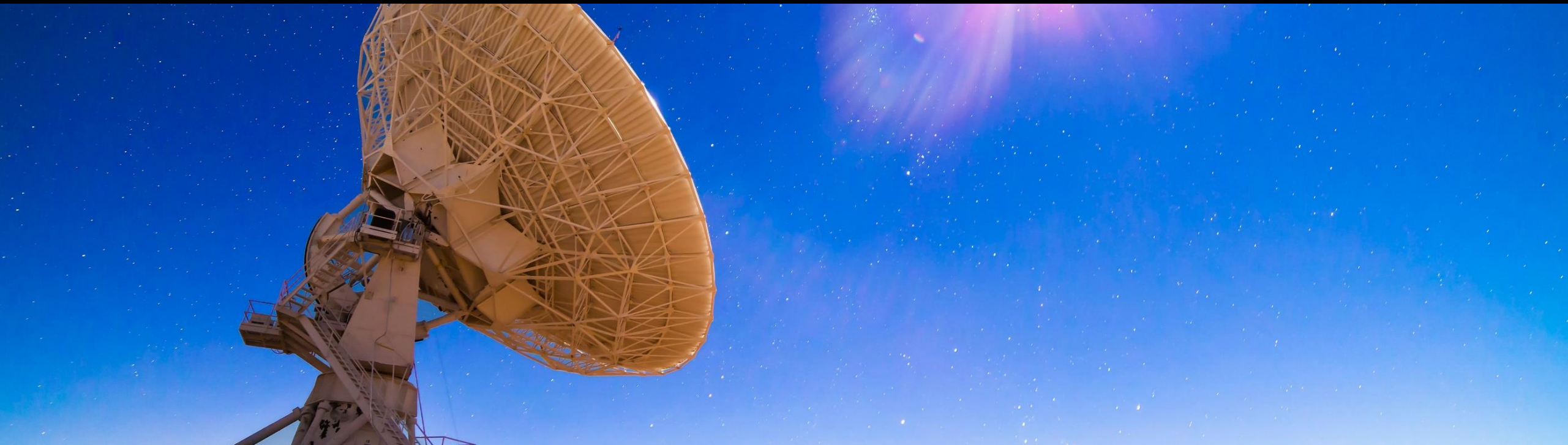


DSAG – German-speaking SAP user group  
MWC – Mobile World Congress



# SAP Cloud Platform IoT

## Key Capabilities



# SAP Cloud Platform Internet of Things

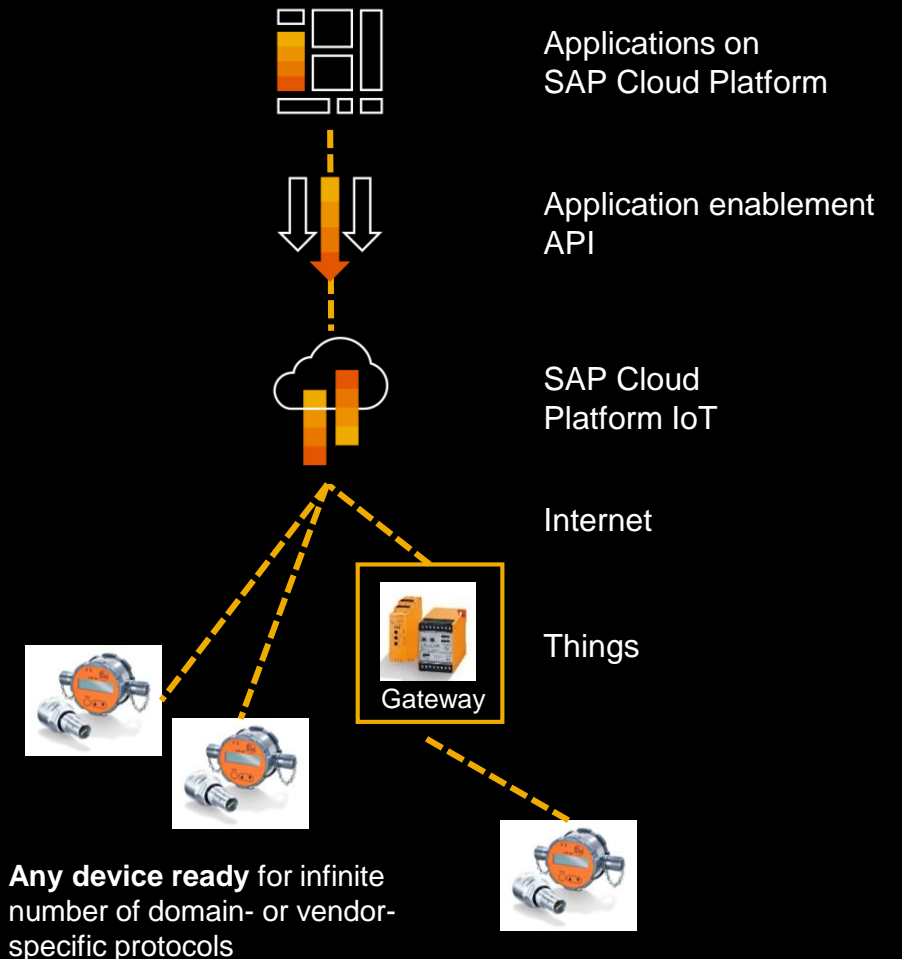
Develop, customize, and operate IoT applications in cloud

## Key capabilities

- Lifecycle management at scale for IoT devices from onboarding to decommissioning
- Securely connect to remote devices over a broad variety of IoT protocols
- Collect and process sensor data at scale already at the edge or in the cloud and store it on SAP Cloud Platform for use by other applications
- Easily develop new IoT applications and services by consuming open standards-based technology and APIs offered by SAP Cloud Platform

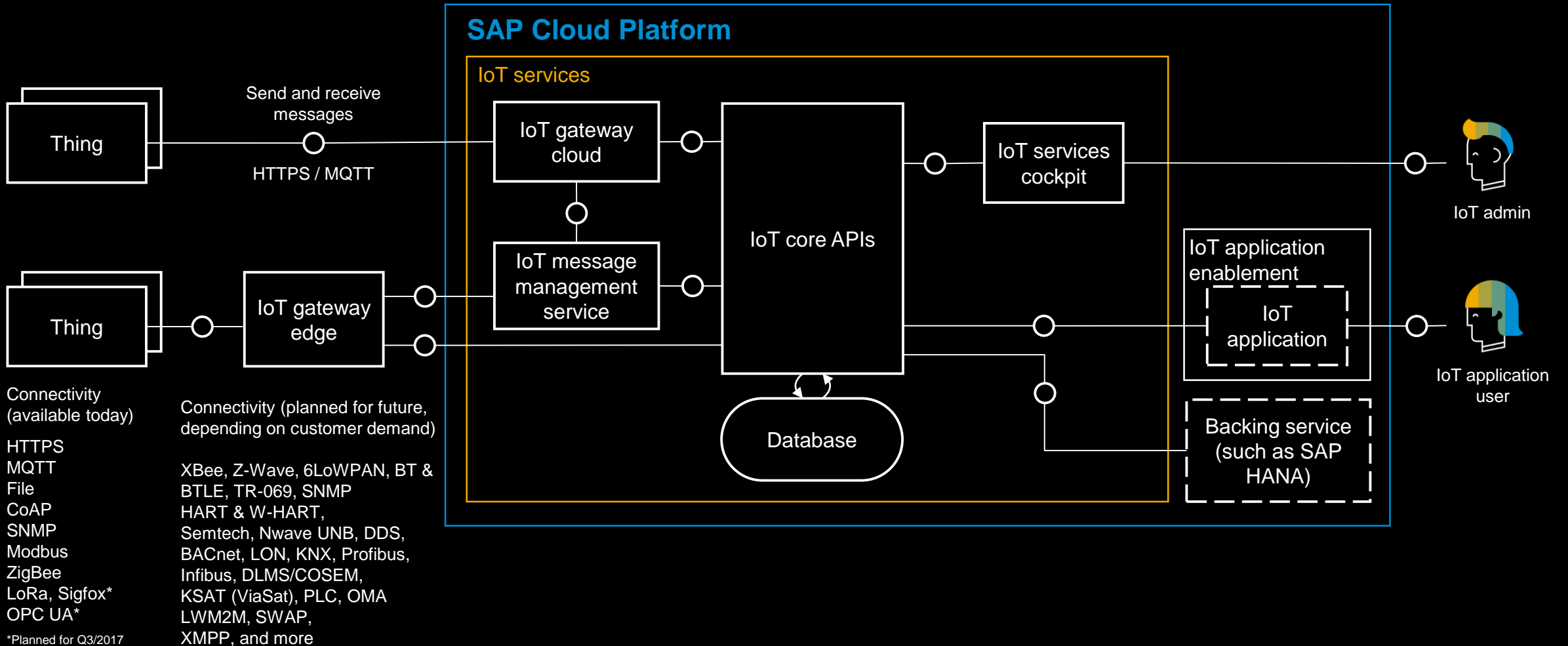
## Benefits

- Enablement to develop, customize, and operate IoT business applications
- Scalable ingestion of IoT data and broad device connectivity
- Large-scale device management



# SAP Cloud Platform Internet of Things

## Architecture and connectivity overview



# SAP Cloud Platform Internet of Things (based on customer demand)

Further protocols via IoT gateway plug-Ins

## Protocols

- HTTP
- ZigBee
- XBee
- Z-Wave
- 6LoWPAN
- BT & BTLE
- WiFi & LPWiFi
- IEEE 802.15.4
- MQTT
- CoAP
- File
- TR-069
- SNMP
- HART & W-HART
- Sigfox\*
- Semtech LoRa
- Nwave UNB
- DDS
- BACnet
- LON
- KNX
- Modbus
- Profibus
- InfiBus
- DLMS/COSEM
- KSAT (ViaSat)
- PLC
- OPC UA\*
- OMA LWM2M
- Active Message
- SWAP
- XMPP
- LoRa\*

## Vendors

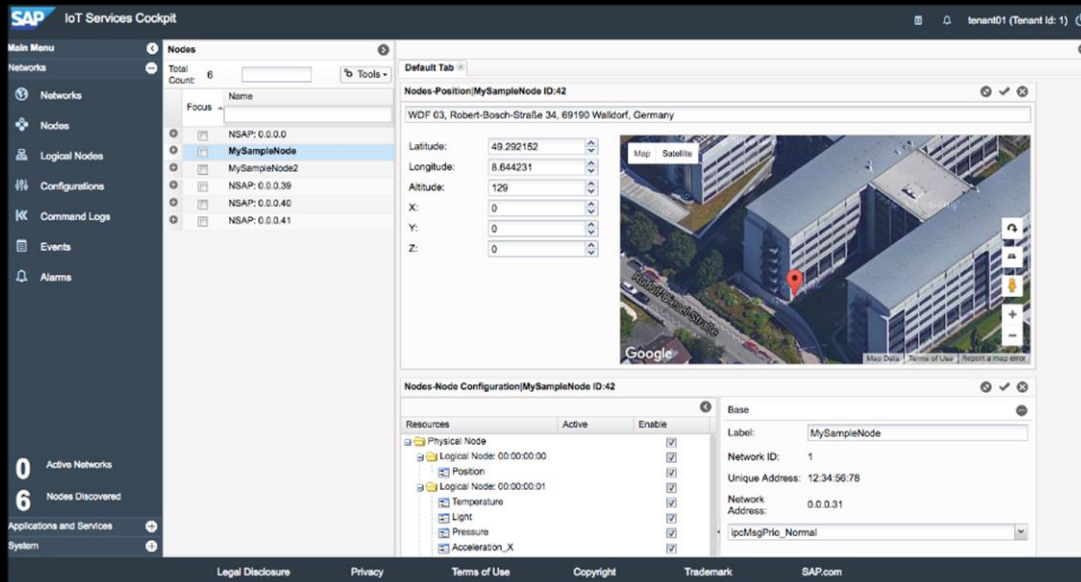
- Agora Energy
- Agulla
- AnyData
- Arduino
- Ashoka
- ATIM
- Axible
- AXIS
- B&B Electronics
- CalAmp
- Cisco
- CloudGate
- CPL
- Cradlepoint
- Dell
- Digi
- Digicom
- Distech Controls
- E-Senza
- Ekahau
- Elster
- EpiSensor
- Eurotech
- Honeywell
- Intesens
- ITRON
- Kamstrup
- Libelium
- Marvell
- MeterSIt
- MICRON
- Mobile Devices
- Morey Corp
- Naelbox
- NetComm Wireless
- Netvox
- Nwave
- Orbiwise
- Packet Power
- PARADOX
- PIKKERTON
- Pulsar
- Radiocrafts
- Raspberry Pi
- Schneider Electric
- Semtech LoRa
- Sensinode
- Sierra Wireless
- Sigfox
- SimpleHomeNet
- SITEC
- Smarteo Water
- Smartex
- STMicroelectronics
- Sterela
- Telecom Design
- Telit
- Tekpea
- Tridium
- ViaSat
- WAGO
- Wi-NEXT
- Worldsensing
- Xirgo

Eclipse plug-in for new protocols

Templates for USB, serial, API, or network based

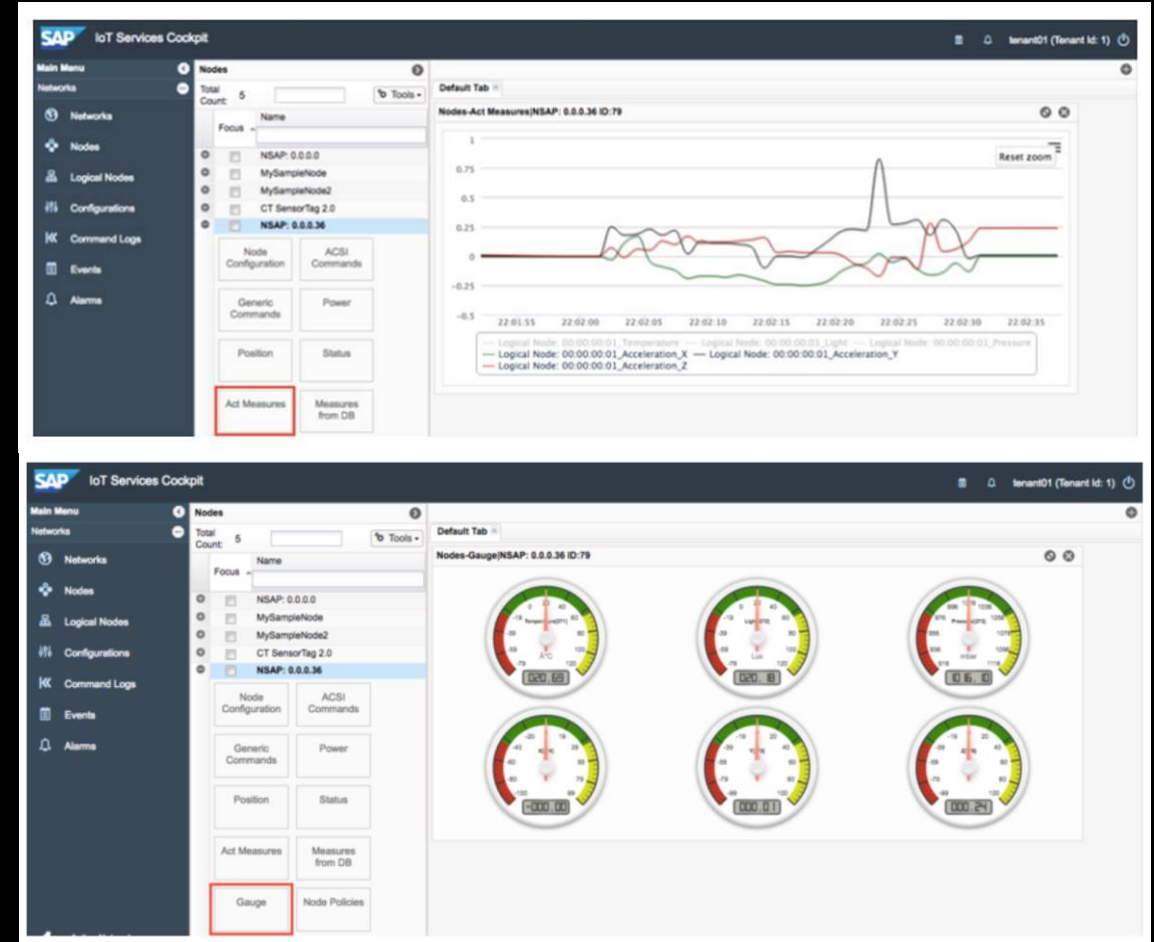
\*Planned for Q3, 2017

# SAP Cloud Platform Internet of Things – cockpit



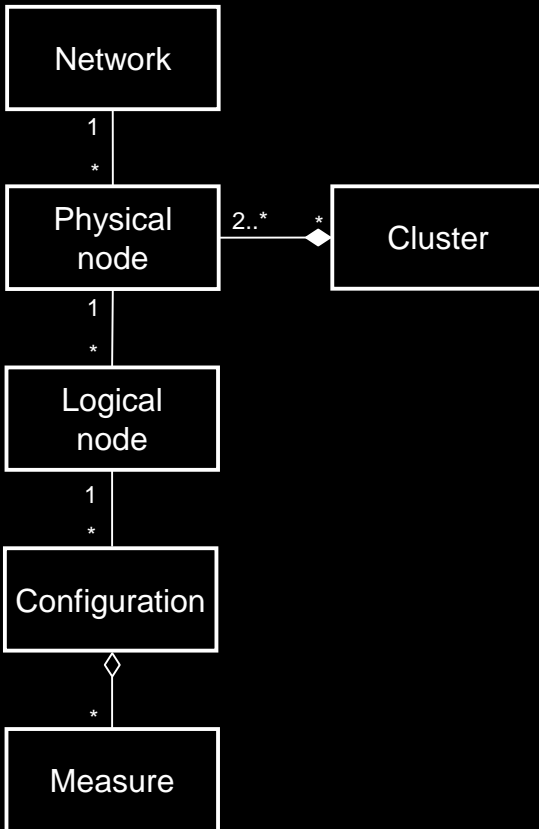
**IoT cockpit** is the main admin monitoring and configuration console that can be accessed by IT and operations staff to:

- **Monitor** managed resources
- **Assess** usage and performances
- **Manage** and control resources, security, and users



# SAP Cloud Platform Internet of Things

## Device model



Protocol-specific network (one per IoT gateway), **such as MQTT**

Unique, addressable entity (device), **such as drilling machine**

Sensor or actuator of physical node, **such as temperature sensor**

Distinct message format (sensor) or description of command (actuator), **such as temperature**

Instance of configuration with specific point in time (time series data), **such as temperature value and time stamp**



# Manage the digital twin

Thing data, hierarchies, time series, and events

## Thing hierarchies

- Structure
- Hierarchy
- Relationships

## Thing data

- Basic data
- Properties
- Status
- Documents and specifications

## Thing packages

- Flexible usage in different applications
- Thing configurations

## Time series and events

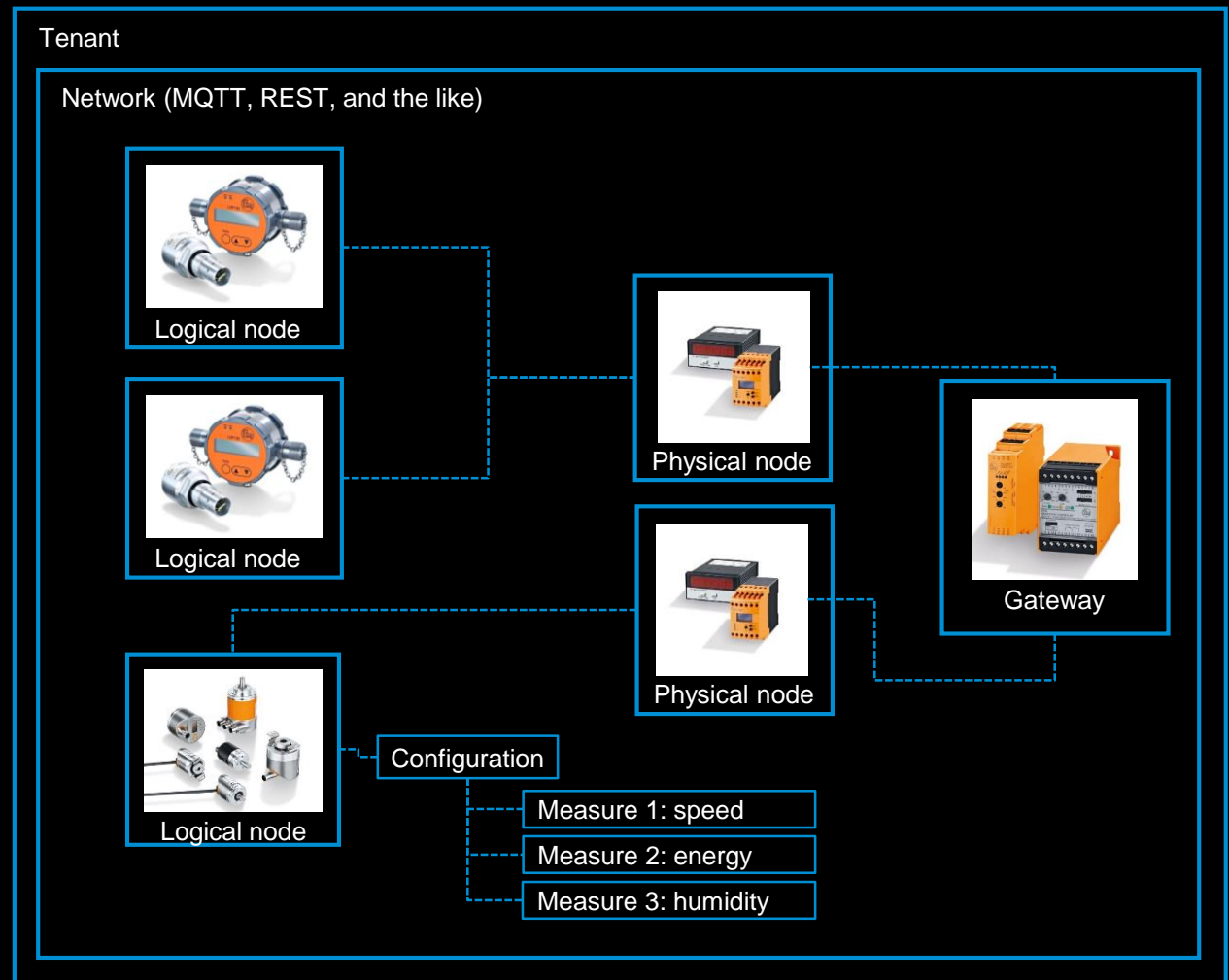
- Measurements
- Thresholds
- Error codes
- Alerts

The screenshot displays the SAP 'Thing Types and Things' interface. On the left, a list of thing types is shown, including 'Kaiser CSG 55-2 Screw Compressor', 'Kaiser Compressor A SK 75-2', 'Kaiser Compressor A SK 90-2', 'Kaiser Compressor A SK 100-2', 'Kaiser Compressor Classic 150-2', 'Herse HA323 Asynchronmotor', 'Herse HA45 Motor, asynchrony', and 'Kaiser K2000.6 Compressor Block'. The main panel shows the configuration for 'Kaiser CSG 55-2 Screw Compressor'. The 'Name' field is 'Kaiser CSG 55-2 Screw Compressor' and the 'Description' is 'Air- / water-cooled dry runner, 37 kW'. The 'Attributes' table lists various properties:

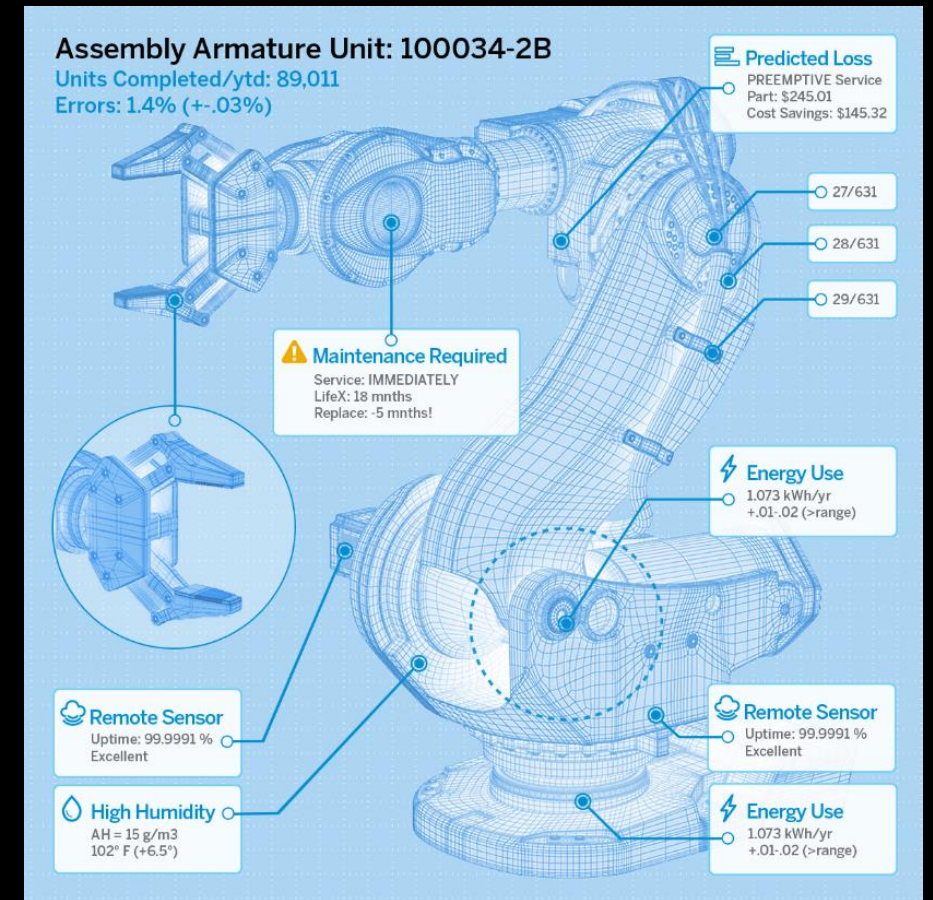
Category / Attribute	Value	Unit of Measure	Type	Length
Carriage large				
Primary color	Signal Black	RAL	Text	30
Secondary color	Yellow	RAL	Text	30
Number of doors	3		Number	2
Dimensions CSG 55-2				
Width	2355	mm	Number	10
Depth	1660	mm	Number	10
Height	2145	mm	Number	10
Motor Air 4				
Rated motor power	37	kW	Number	5
Max. operating pressure	4	bar	Number	5
Cooler version	Air-cooled		Text	20
Sound pressure level	71	db(A)	Number	5
Others				



# SAP Cloud Platform IoT – mapping terminology



Devices and network objects



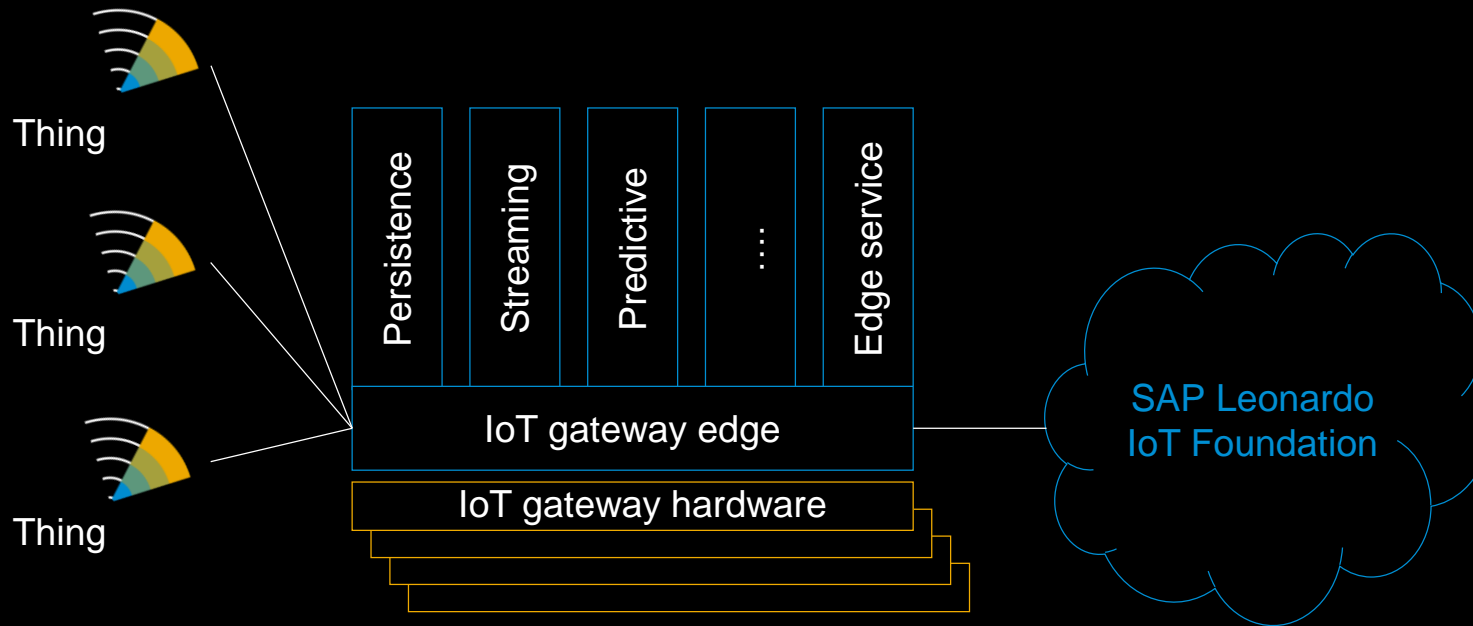
Things as business objects

# SAP Leonardo IoT Edge

## Business benefits

### IDC estimate:

“By 2019, **45%** of IoT-created data will be stored, processed, analyzed, and acted upon close to, or at the **edge** of, the network.”



**Immediate response** for decisions to be made in real time, when data latency is key

**Data volume versus available bandwidth and cost of transmission** – send only higher-level events such as alerts to the cloud

Local data processing and decision making in case of **intermittent connectivity**

# SAP Cloud Platform Internet of Things – gateway edge

## Device management capabilities

Ability to distribute any logic at the edge near devices. This can include analytics or event-driven rules processed locally.

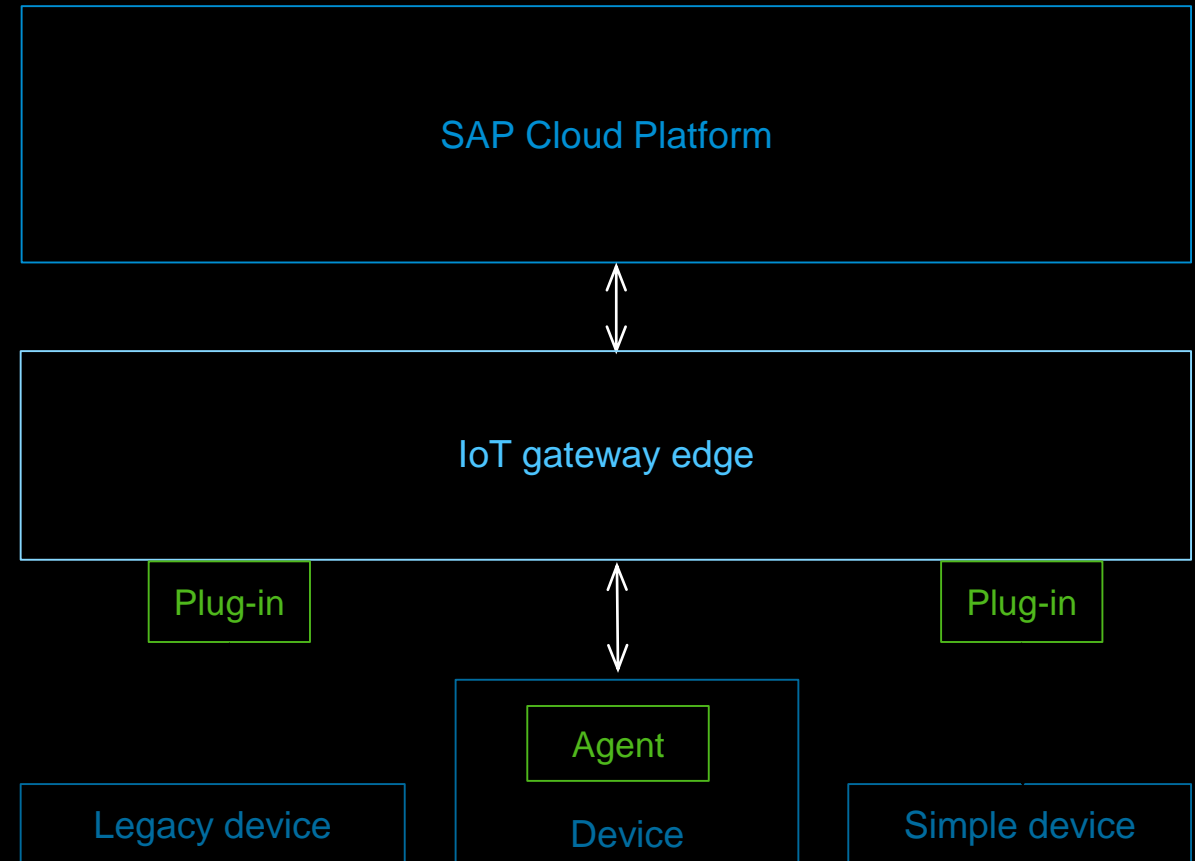
### Device data transmission

- Assured delivery: edge to cloud
- Time series data compression
- Buffering when not connected
- Scheduled, on-demand, batched delivery

### Remote upgrades

- Gateway, plug-in software upgrades
- Device firmware upgrades for devices that support it

### Store-and-forward for remote device commands



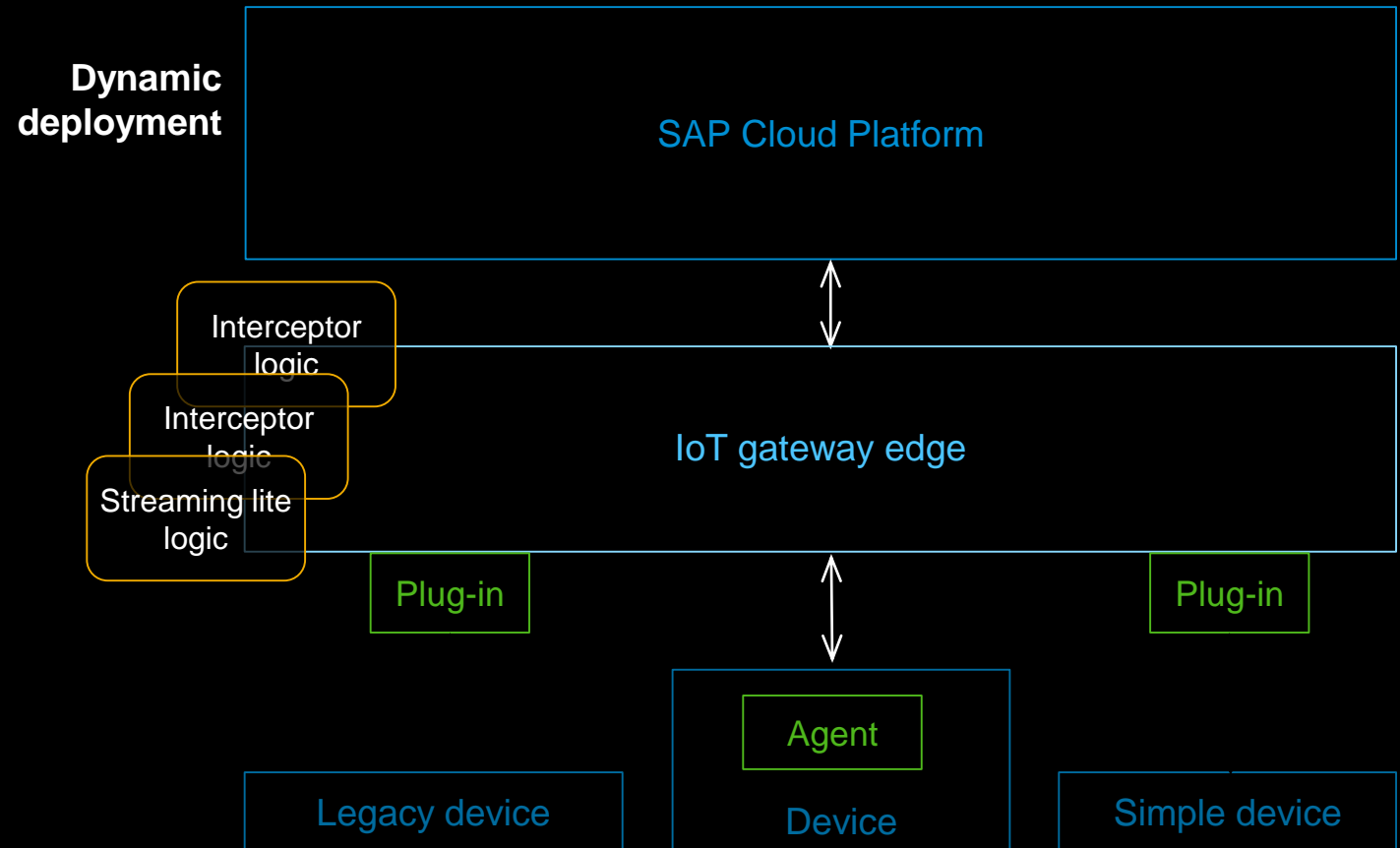
# SAP Cloud Platform Internet of Things – gateway edge Processing

Intercept processing on incoming measures independent of protocol

Dynamically deploy any number of interceptors into IoT Gateway Edge

Examples of use:

- Perform local streaming analytics and send only aggregated measures over specified time windows
- Perform local evaluation of a rule and trigger an immediate local command
- Aggregate data in local storage as part of a distributed storage strategy
- Send only aggregated data from local storage



# SAP Cloud Platform Internet of Things

Representing the digital identity with X.509 digital certificates

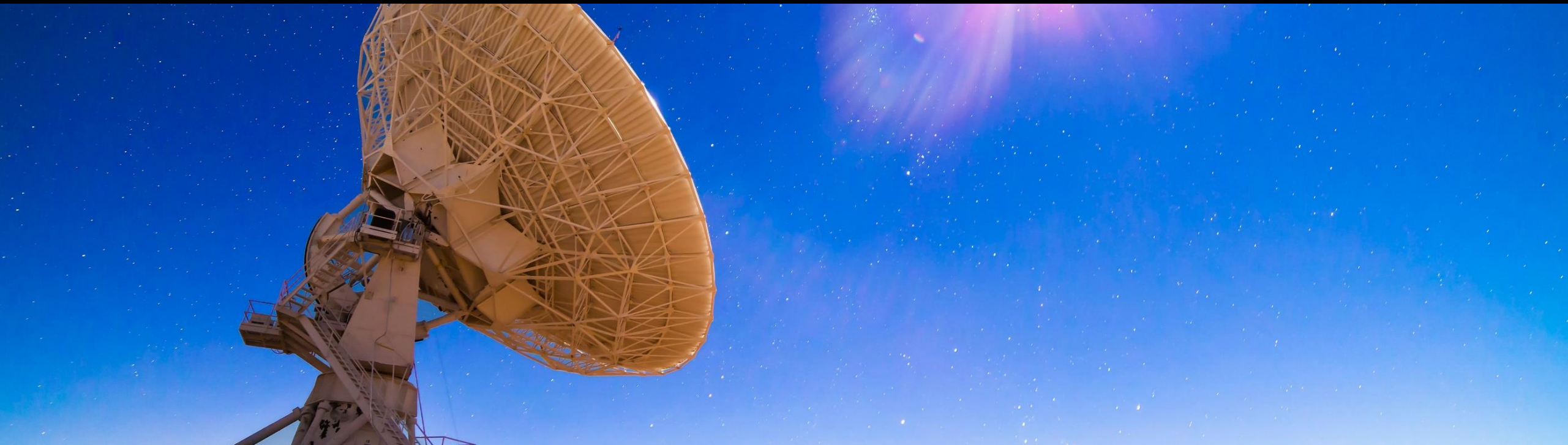
- X.509 digital certificates as the foundation
  - Certificate authorities manage the lifecycle of digital certificates and the corresponding cryptographic keys.
  - Digital certificates have been established as a proven security standard for nearly 30 years.
- Security capabilities of digital certificates in IoT scenarios:
  - Authentication: prove the identity of a device that is accessing the IoT cloud service
  - Encryption: use the cryptographic keys of digital certificates to ensure confidentiality of IoT data
  - Digital signature: ensure integrity of data





# SAP Cloud Platform IoT

## Demo



# SAP Cloud Platform Internet of Things

Customer use case: remote monitoring and management of coolers

## Business insights

- Does the fridge really stand in the store?
- Is the temperature in the fridge optimal?
- Do customers find the drinks quickly?
- When do most customers purchase drinks?

## Insight to action

- Inform business users in case of deviations
- Allow business users to decide on necessary follow-up activities

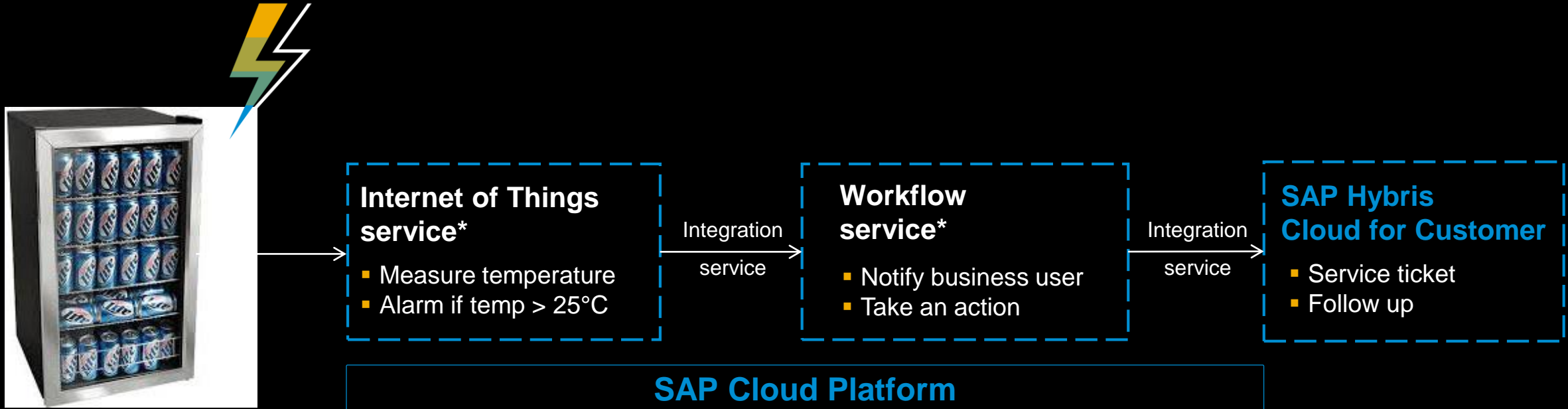


Vendor-branded cooler with sensors



# Connecting things, people, and applications

Empowered by services of SAP Cloud Platform



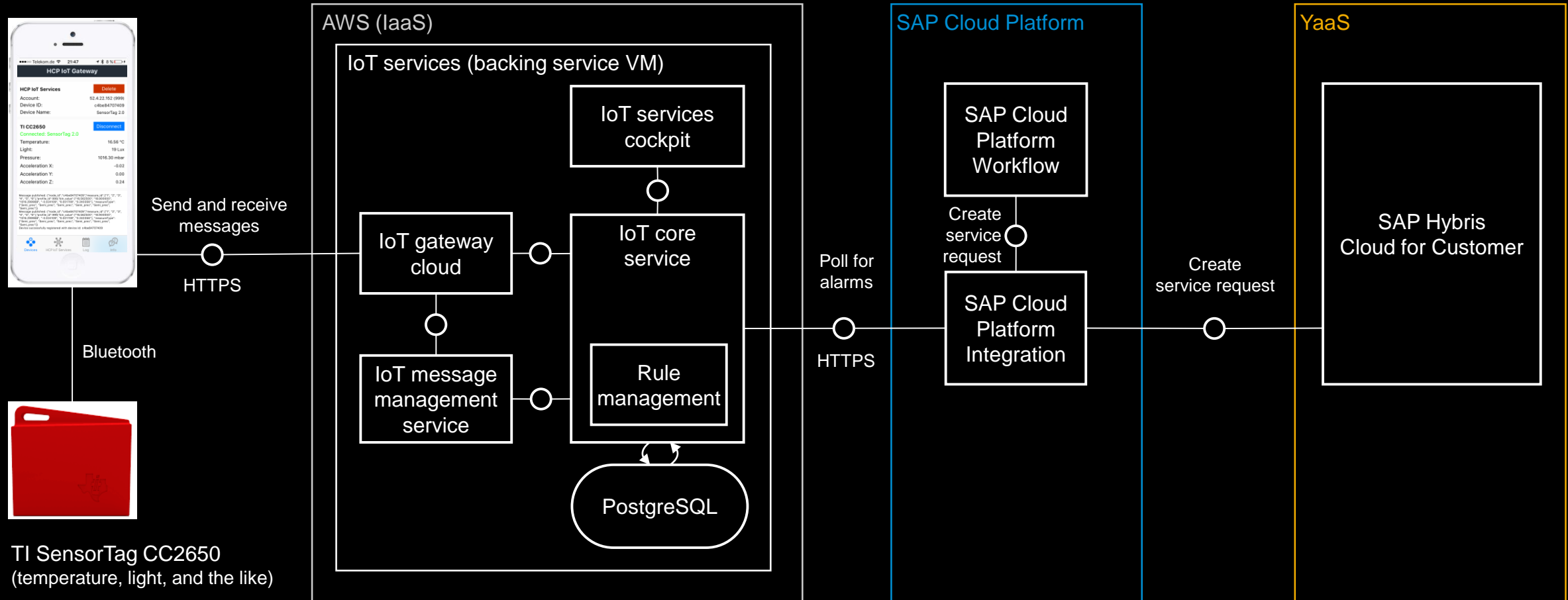
Vendor-branded cooler  
with sensors

\*Planned service (beta)

# SAP Cloud Platform Internet of Things

## Demo flow

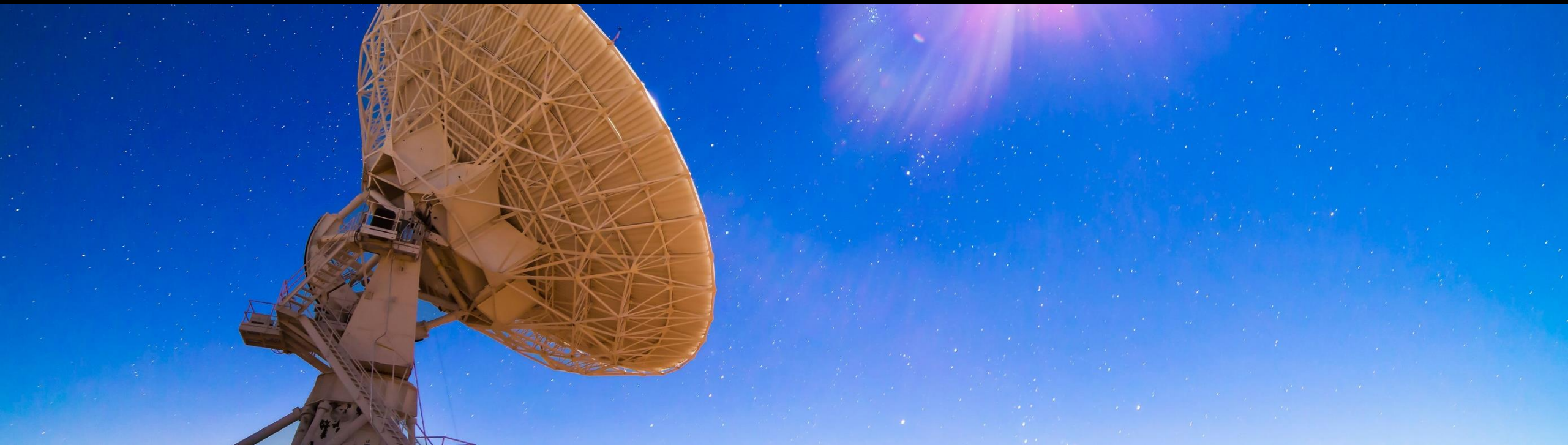
SAP Cloud Platform IoT: gateway app (iOS)



TI SensorTag CC2650  
(temperature, light, and the like)

# SAP Cloud Platform IoT

## Customer and Partner Examples



# Out-of-the-box connectivity



**SAP Cloud Platform**

**IoT**

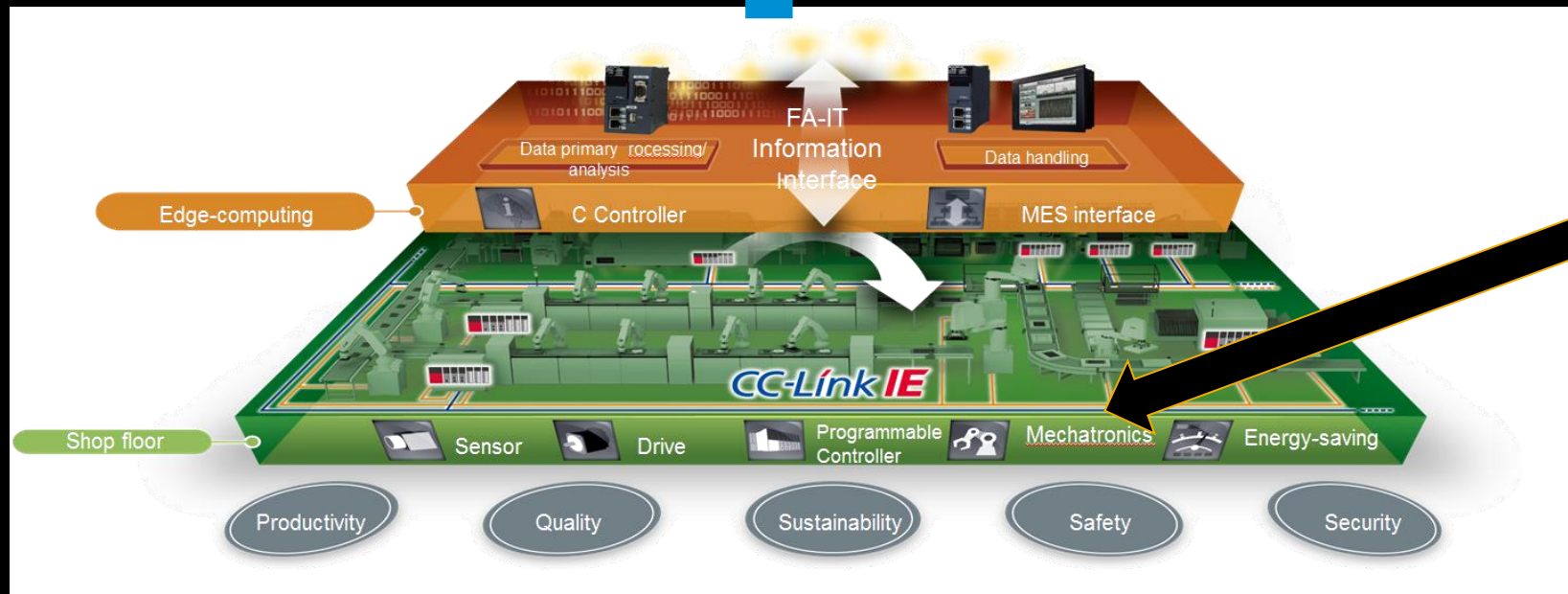


Out-of-the-box integration of the Mitsubishi Electric solution into SAP Cloud Platform

Device connectivity and analytics

Collecting and performing processing of sensor data from the device or centrally from the cloud

Lifecycle and rules management for devices, from onboarding to disposal





# The showcase



# Added value from new business models “out-of-the-box”

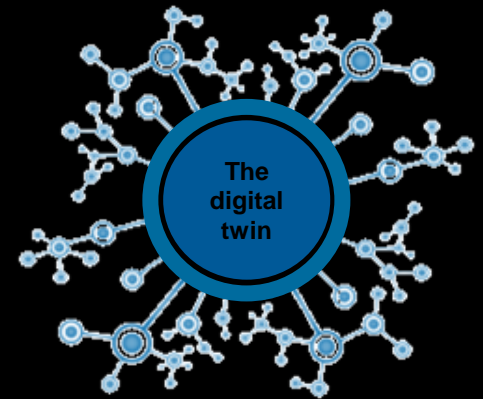
Remote status monitoring of the system and predictive maintenance

Individual customer service portal for easy access to plant information  
(keyword: digital twin or administration shell)

Efficient support for maintenance and service with the use of new technologies (machine learning, mobile app, augmented reality app)

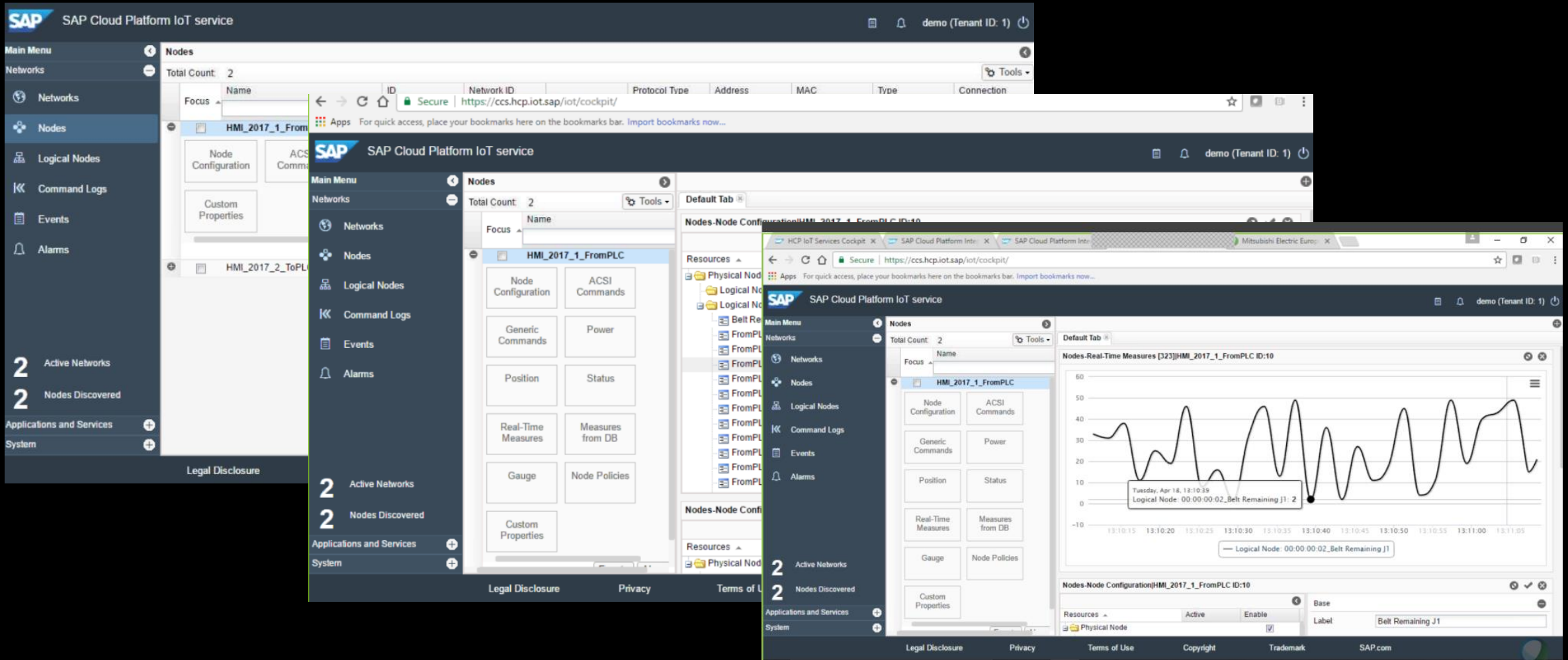
Equipment as a service: provision of equipment by the manufacturer with usage-dependent calculation

Use of plant status and usage data for marketing and sales promotion



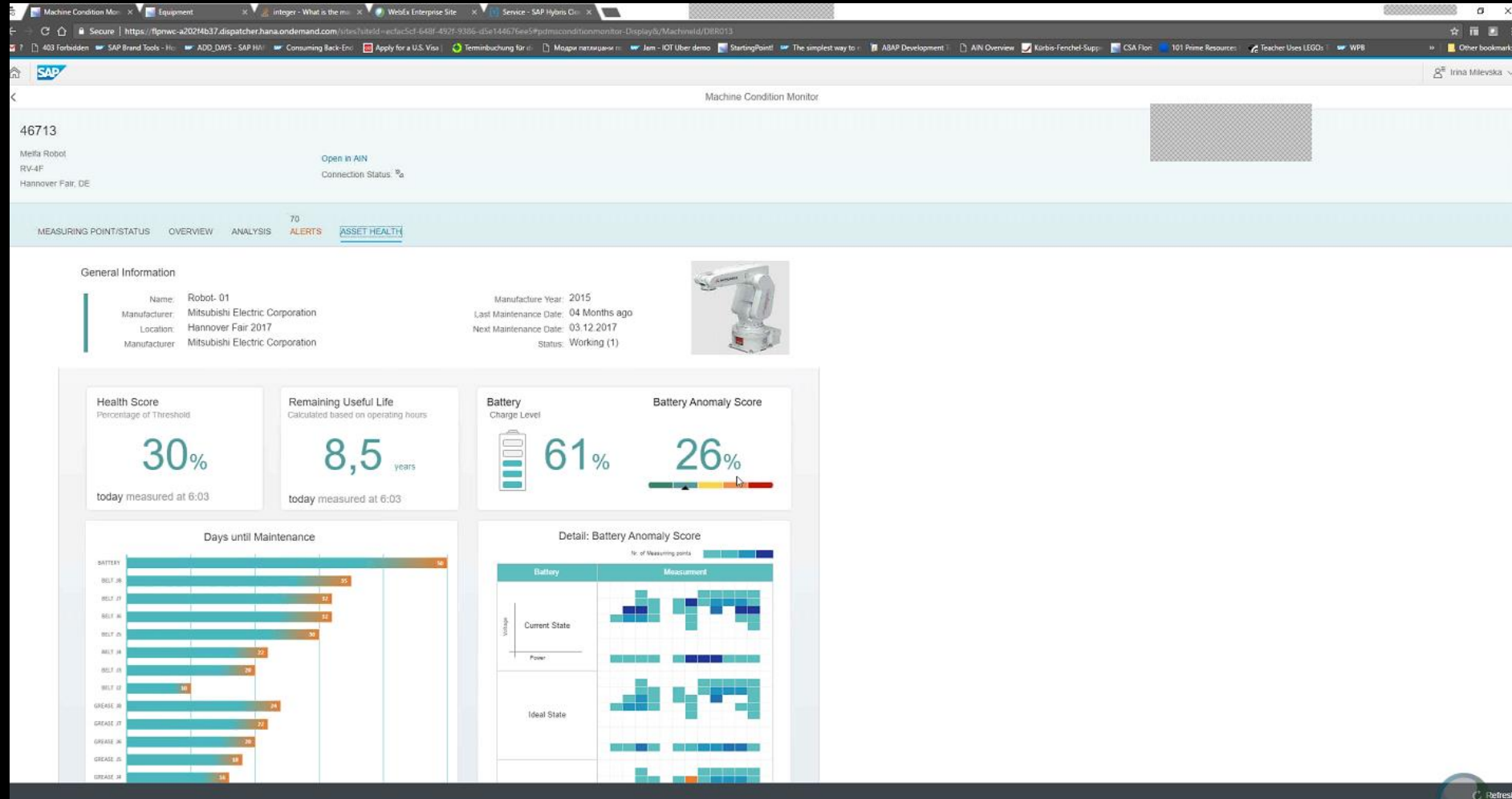
# Example

## Remote status monitoring of the system and predictive maintenance





# Analytics



# Example

Individual customer service portal for easy access to plant information (keyword: digital twin or administration shell)

The image displays three overlapping screenshots of the SAP Leonardo Live customer service portal interface.

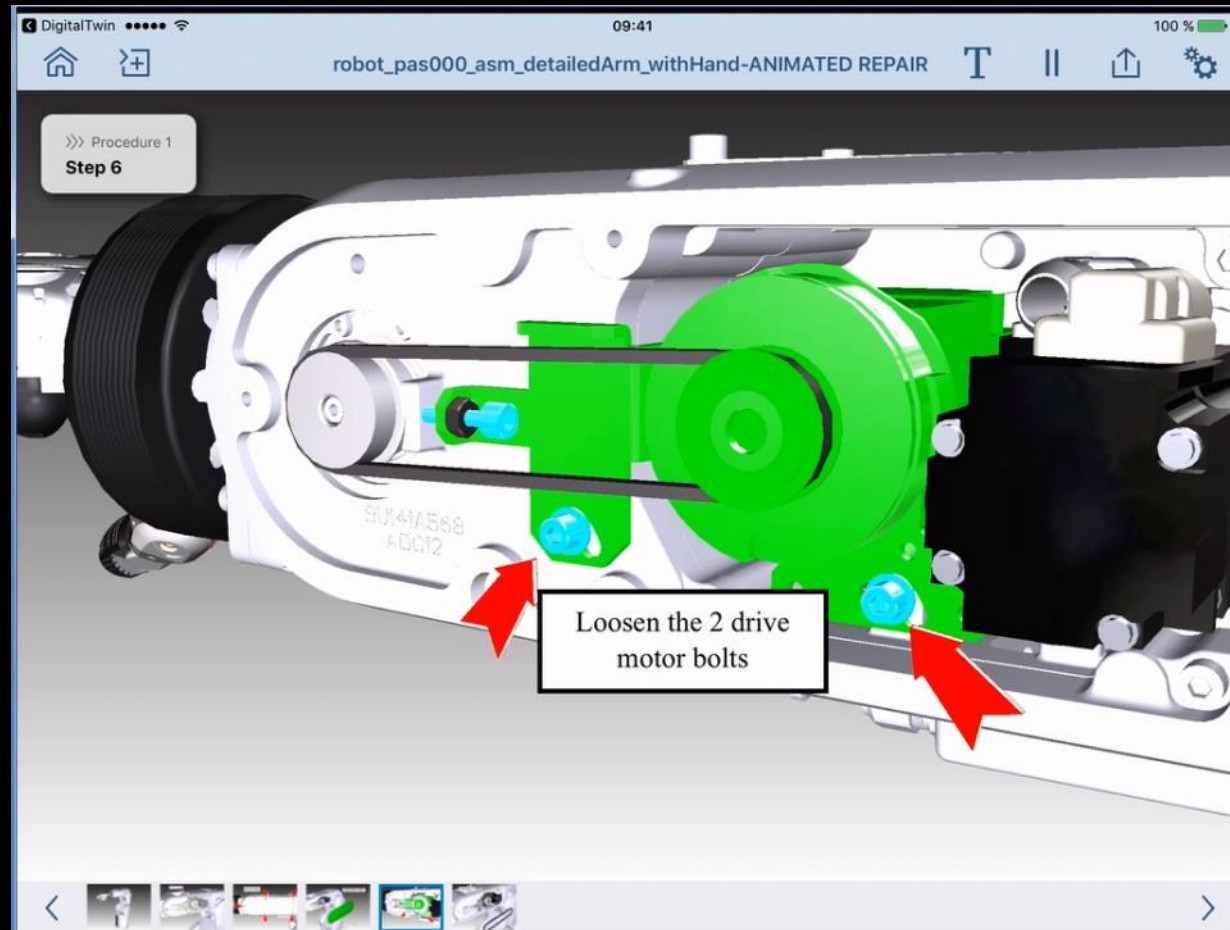
**Left Screenshot:** Shows the 'MEASURING POINT/STATUS' overview for a specific asset (ID 46713, Media Robot, Rev 40, Hannover Fab, DE). It includes a bar chart representing data over time, with a '1 Hour' filter selected. The chart shows a series of peaks and troughs, indicating varying levels of activity or status over a period of 28 days.

**Middle Screenshot:** Displays the 'TICKETS' list, showing a table of tickets from the last 7 days. The table has columns for Priority, ID, Subject, Status, and Customer ID. A 'Click to Select' button is visible next to the first ticket (ID 6361).

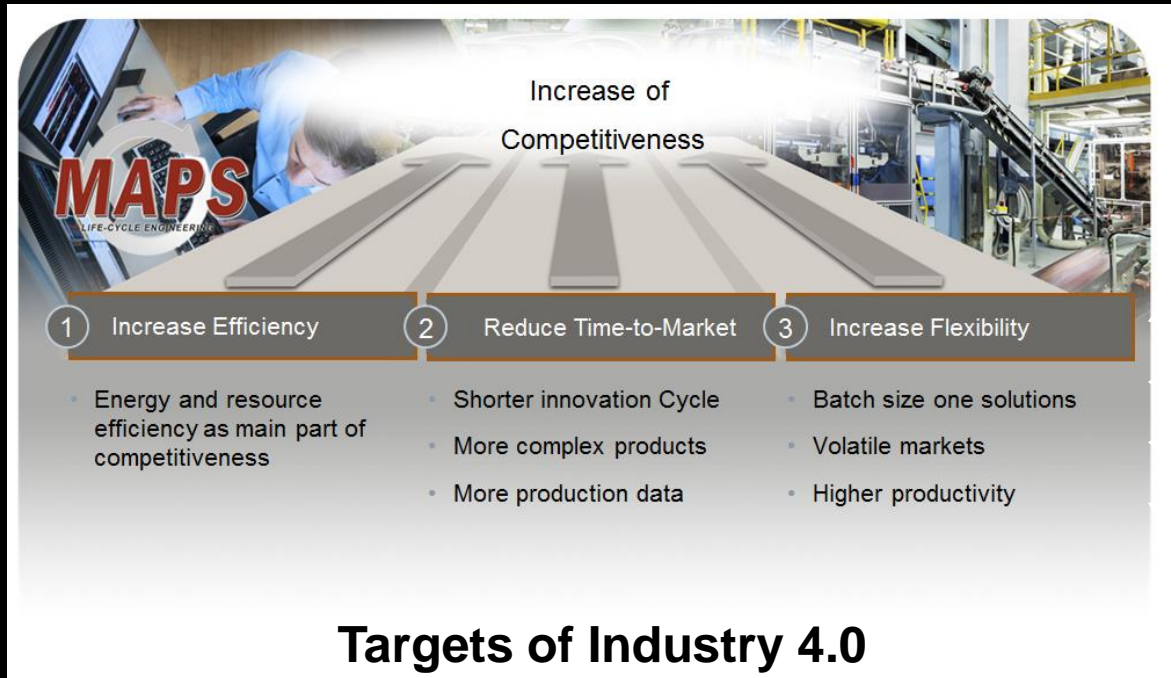
**Right Screenshot:** Shows the detailed view of a specific ticket (ID 6361). The ticket is titled 'C4C Ticket from PMS'. It includes a 'CUSTOMER' section with contact information (Email: tom.penske@siemens.com, Phone: +1 814 244 4003), a 'PRODUCT' section with details (Product: IAC 1000 Industrial Robot Medium Pa, Serial ID: IAC700000001010100), and a 'TIMELINE' section showing the history of interactions, including 'Initial Review', 'Changed By', 'Reported By', and 'Resolved By'.

## Example:

Efficient support for maintenance and service with the use of new technologies (machine learning, mobile app, augmented reality app)



# Summary – the benefit for the customer, SI, OEM, SAP, and Mitsubishi Electric



In less than 3 months, we reached these targets:

- Remote monitoring and predictive maintenance
- Virtual twin (administration shell)
- Machine learning, mobile app, augmented reality app
- Equipment as a service

**“ With the help of SAP Cloud Platform IoT, we can onboard and manage our SPS robots from Mitsubishi Electric in a fast and efficient way. In particular, the immediate visualization of the sensor data without any coding, the secure communication from devices to the cloud, and also tight and smooth integration of relevant data into any back-end application are key advantages of SAP Cloud Platform. ”**

**Thomas Lantermann**

Senior Solution Consultant FA EMEA, Factory Automation, European Business Group, Mitsubishi Electric

**“ The SAP Cloud Platform IoT beta program gave us the opportunity to incredibly speed up the development and deployment of new IoT applications. We’re now able to easily retrieve, model, and configure device data using this robust cutting-edge technology also including standard procedures and services to develop IoT applications. We are looking forward to working with SAP and this exciting SAP Cloud Platform IoT.” ”**

**Pierangelo Barettoni**  
End user support manager at ABO Data SRL

**Luca Muselli**  
Technical group leader at ABO Data SRL

**“ Building on multiple information sources, such as the comprehensive online documentation, tutorials, and weekly alignment sessions, our teams were able to explore the platform and build the use case of one of our customers. We then proceeded with the setup of a secure channel linking PLC data to the SAP software platform. Both this step and the integration of this machine data to the back end were swiftly established. For example, the platform allows to monitor client sensor data without any coding. It was an insightful first experience with the platform, and we are eager to extend our knowledge even further. That is why we are currently looking into exploring the new SAP development tools to build applications on top of the platform. Both the ease of implementation, the strengths of the platform, and the abundant options are powerful arguments in convincing customers to choose this state-of-the-art IoT solution. ”**

**Wouter Roelandts**  
Lead technical IoT development

**Bruno Mommens**  
Chief Architect, Global Head IoT & M2M



**“ SAP’s new SAP Cloud Platform Internet of Things service is the right move to introduce an IoT platform with a wide range of new functionality like edge processing, protocol support, multi-tenancy, API support, and security.**

**Furthermore, the possibility for an easy integration with other SAP Cloud Platform services (such as SAP Cloud Platform Integration and SAP Cloud Platform Workflow services) works perfectly to build up holistic processes, such as remote service management. ”**

**Fabian Lehmann**  
SAP Solution Architect, Sycor Group

**“ The SAP Cloud Platform Internet of Things beta program has created a holistic collaboration environment with multifold benefits:**

- Prepared partners and customers and makes them future ready
- Made sure that SAP innovations are robust and scalable from the beginning on
- Our experience with SAP Cloud Platform Internet of Things empowers us to introduce a new quality of IoT projects to our clients.

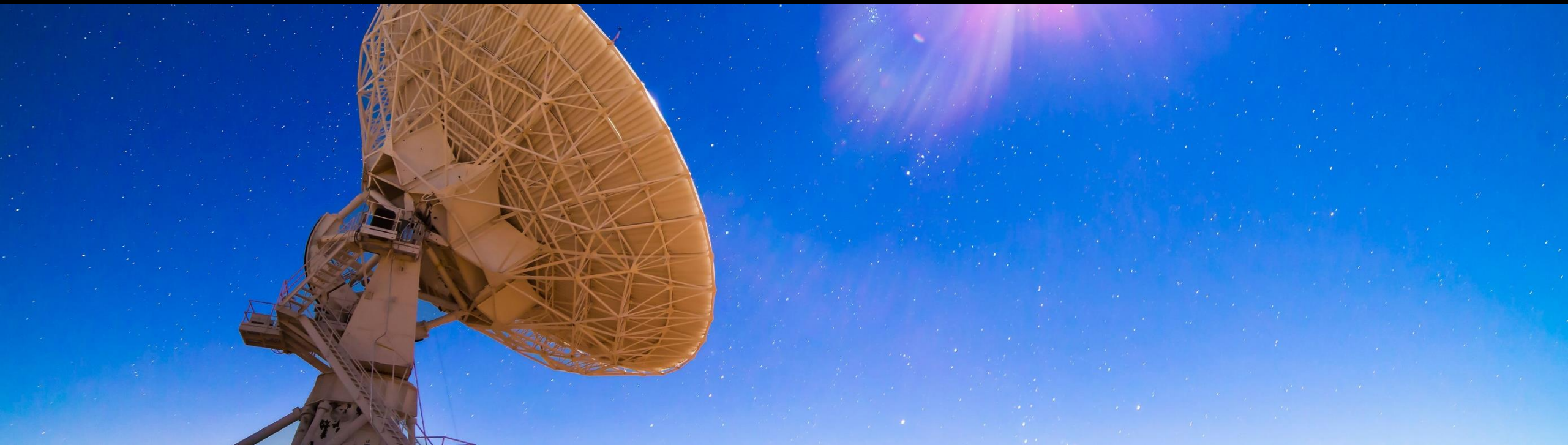
**We did not only benefit from the validation of the many IoT service benefits but also appreciate the progressive and highly interactive collaboration of the beta user group. ”**

**Nithin Simakurti**

Director – Innovation and Products VASPP Technologies

# SAP Cloud Platform IoT

## Additional Information



# SAP Cloud Platform Internet of Things

Further reading

## [Internet of Things Community](#)

Check out the latest blog posts, Q&As, “how to” instructions, tutorials, and a lot of other helpful links

## [SAP Cloud Platform Internet of Things road map](#)

Find innovations and features that you can turn into tangible value for your business

For SAP Cloud Platform Internet of Things, just navigate from the left panel: Product -> Technology Platform -> SAP Cloud Platform Internet of Things for the Cloud Foundry Environment

## [SAP Cloud Platform Internet of Things – documentation](#)

[https://help.sap.com/viewer/p/SAP\\_CP\\_IOT\\_4.0](https://help.sap.com/viewer/p/SAP_CP_IOT_4.0)

## [SAP Leonardo Community](#)

[www.sapLeonardoCommunity.com](http://www.sapLeonardoCommunity.com)





The background of the slide is a composite image. The upper portion shows a clear night sky with the Milky Way galaxy visible as a bright, hazy band of stars stretching across the frame. The lower portion shows a dark, silhouetted landscape with a road that has white dashed lines, receding into the distance towards the horizon.

# Digital is Here and Now

A yellow line graphic consisting of a horizontal line on the left, a vertical line segment in the middle, and another horizontal line on the right, forming a shape similar to a stylized 'L' or a corner bracket.

**Get Ready**



# Thank you

## Contact information:

Udo Paltzer

[udo.paltzer@sap.com](mailto:udo.paltzer@sap.com)



Internet of Things

+



Integration



Dev & ops



Business



User experience



Collaboration



Data & storage



Analytics



Security



Mobile



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