

What is Leonardo IoT and how does it integrate?

Frank Rambo, Product Management SAP Leonardo IoT & SAP Edge Services
November 14th, 2019

PUBLIC

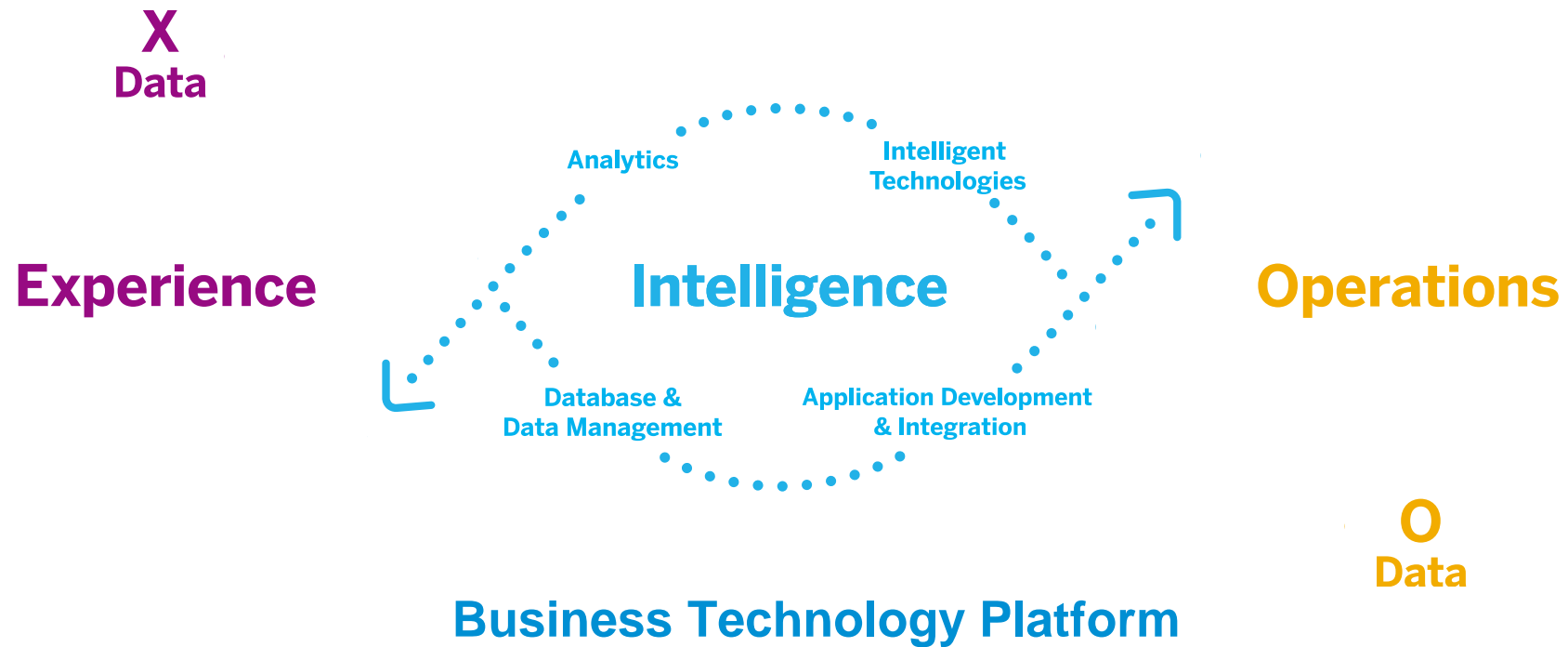
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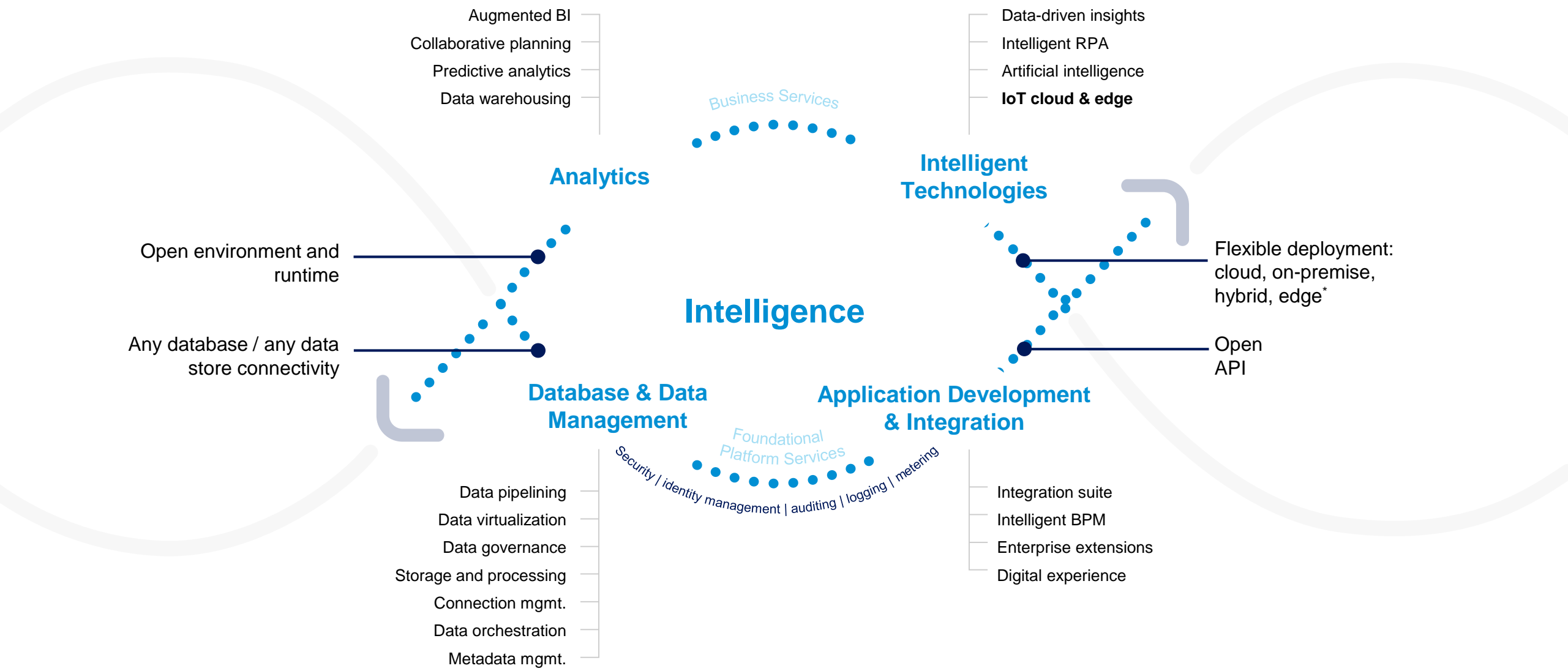
Intelligent Enterprise

SAP Cloud Platform as a key pillar

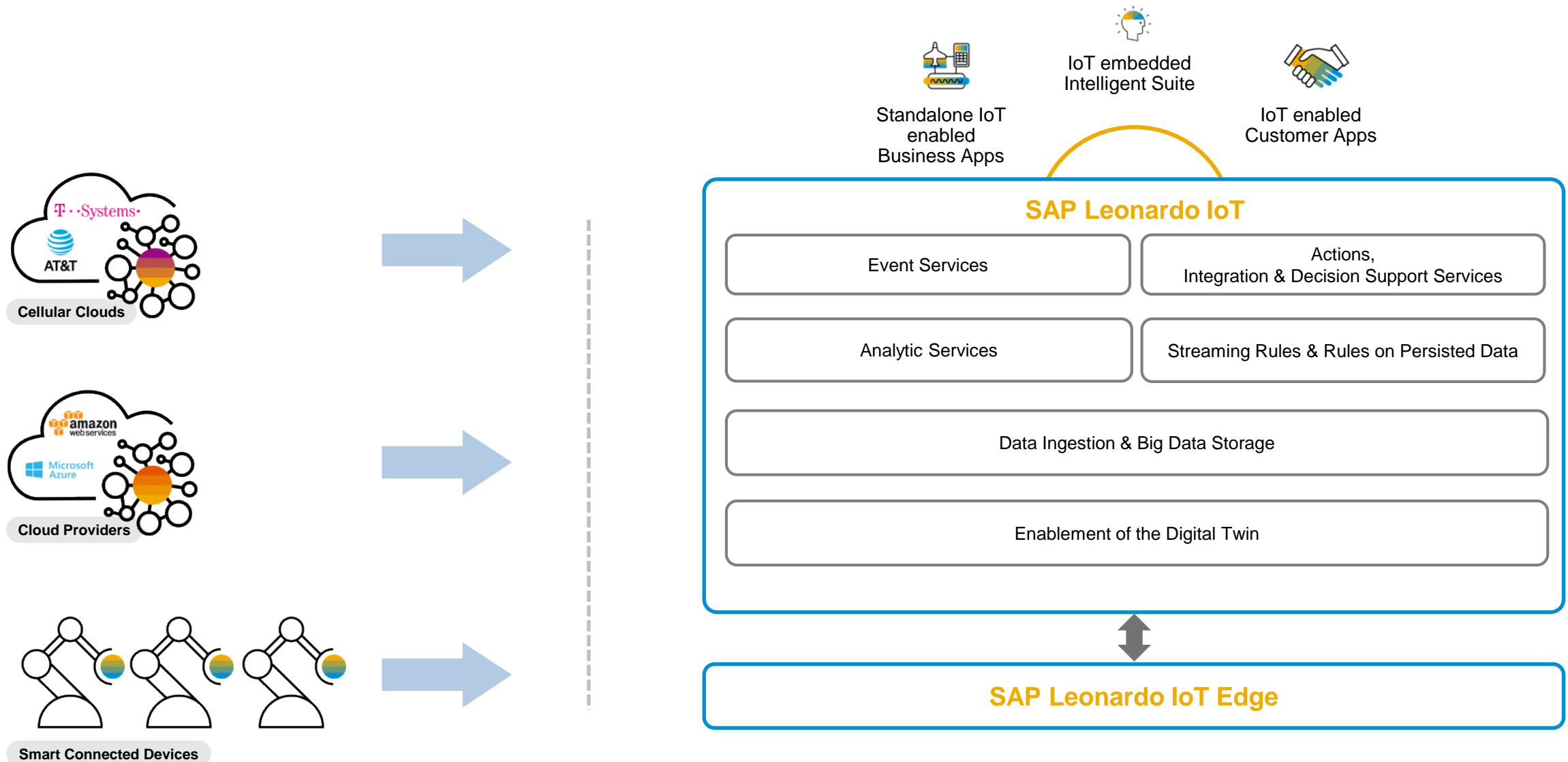


Business Technology Platform

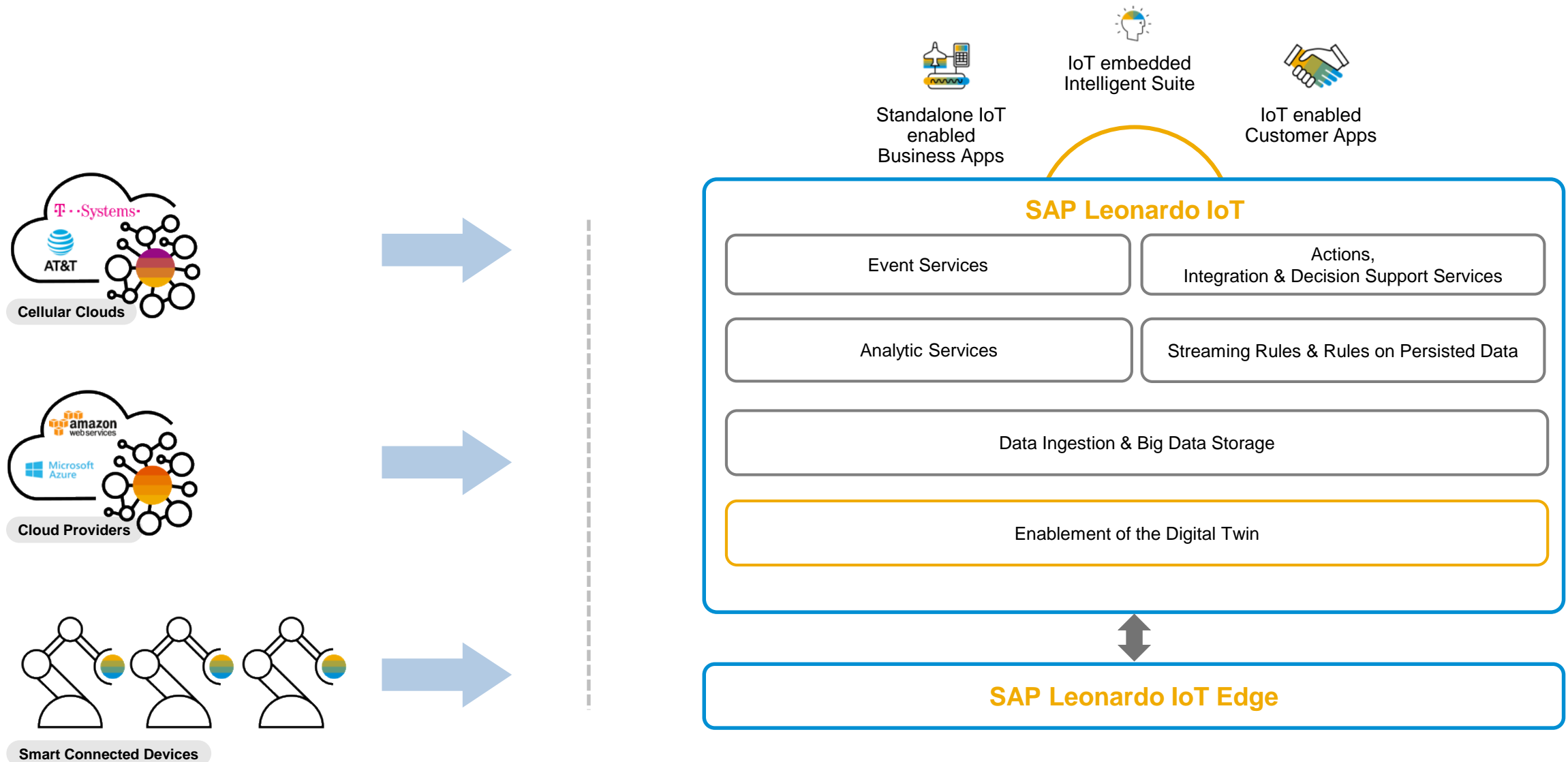
SAP Leonardo IoT as key enabler of the intelligent enterprise



SAP Leonardo IoT – From Internet of Things Data to Business Outcomes



SAP Leonardo IoT – From Internet of Things Data to Business Outcomes



The business context of an IoT enabled asset

Example: The business context of a silo



Sensor Measurements

- Distance
- Temperature
- Humidity
- Pressure



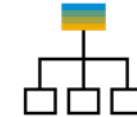
Geographical Location

- Postal address
- Latitude / Longitude
- Altitude



Material stored in Silo

- Types of Grains
- Types of Cement
- Food Ingredients
- Types of Animal Feed



Organizational Structure

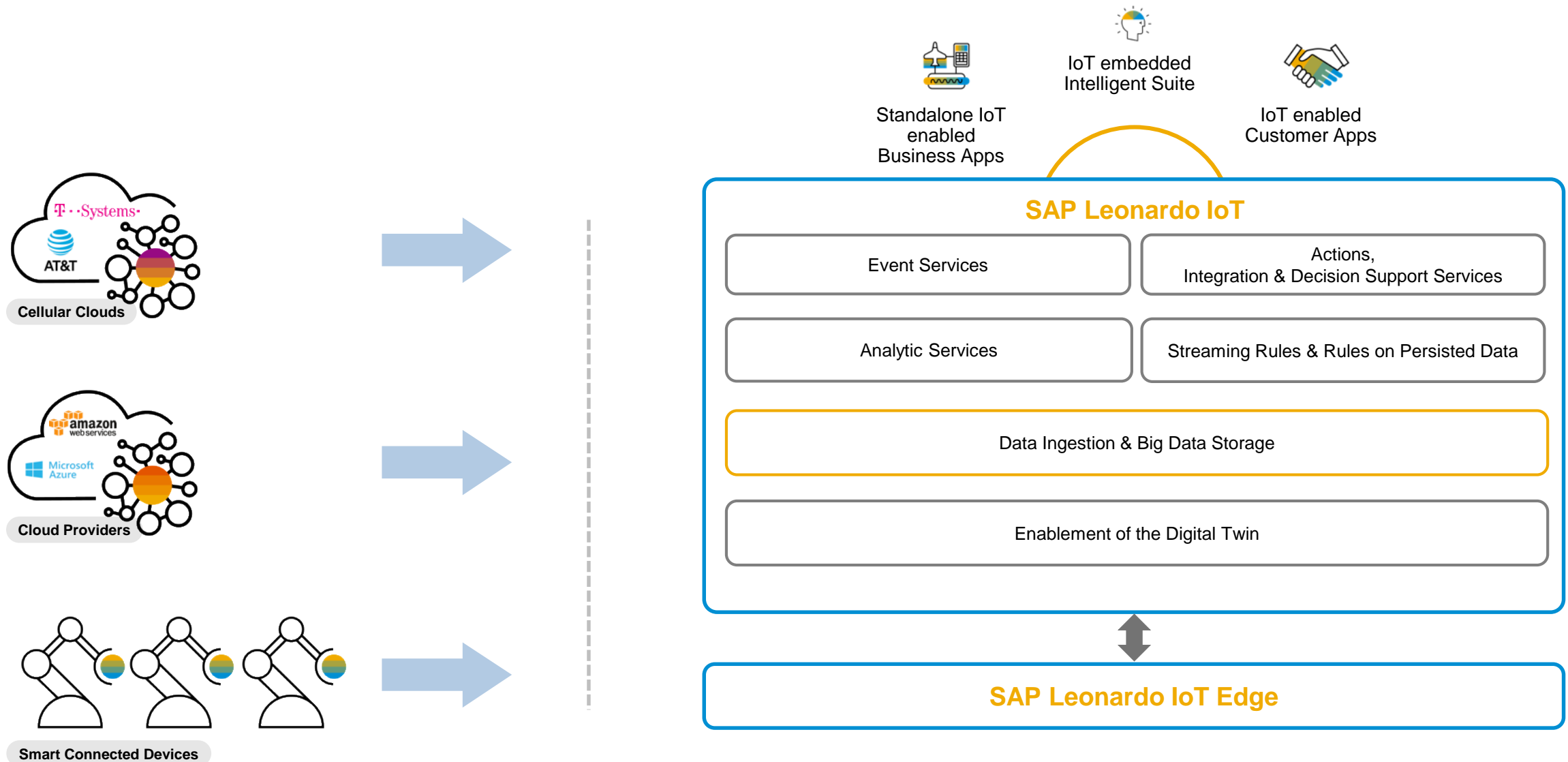
- Company Code
- Plants
- Storage Locations



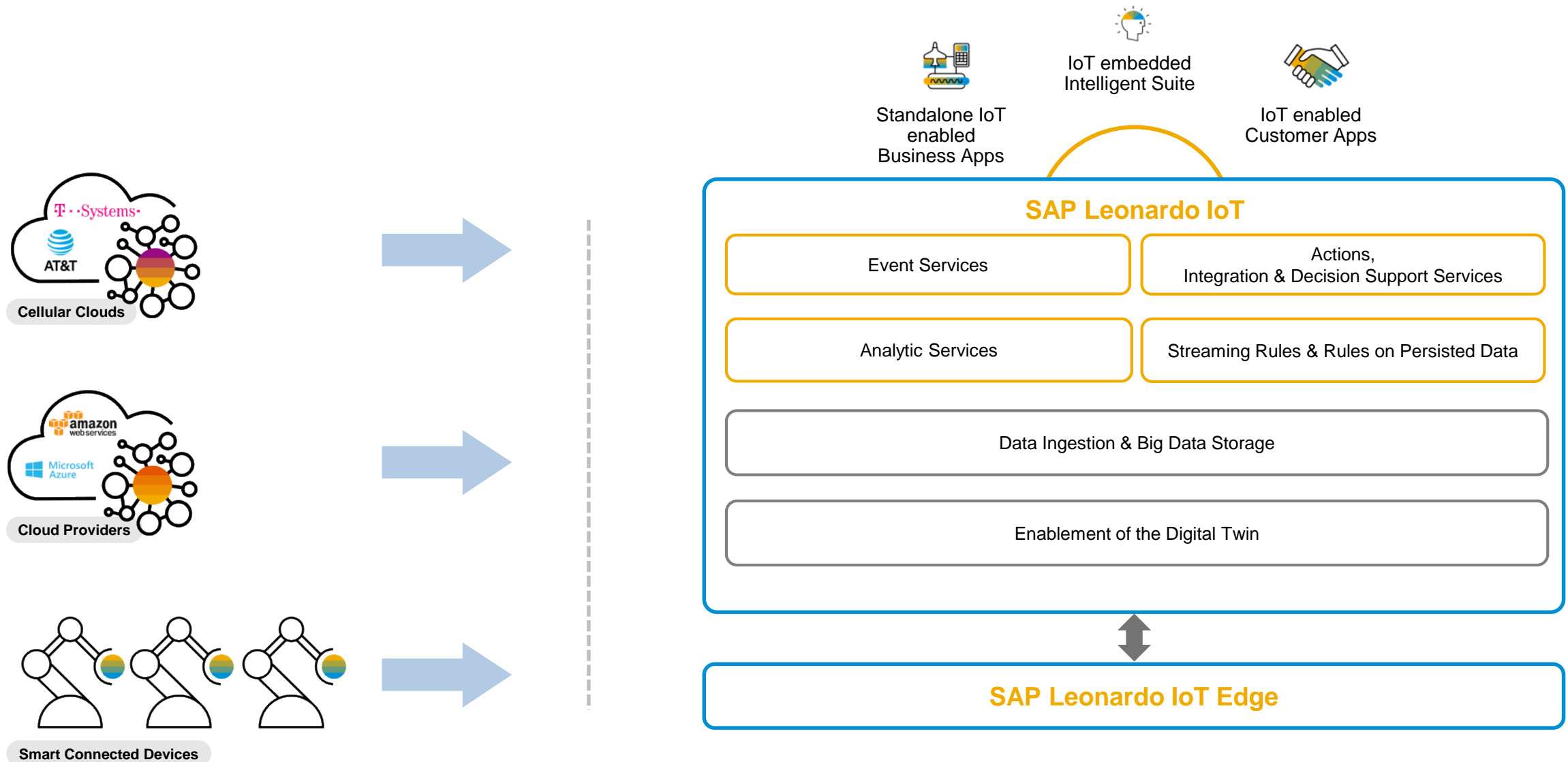
Asset Tag

- Material Master in S/4
- SLAs, Warranties

SAP Leonardo IoT – From Internet of Things Data to Business Outcomes



SAP Leonardo IoT – From Internet of Things Data to Business Outcomes



All Power Tools

Overview

0

Actions

5

Locations

5

Equipments

Overview

1

Active

4

Inactive

0

Maintenance

0

Alert



Current Temperature °C

PowerDrill01 - 75

PowerDrill02 - 83

PowerDrill03 - 81

PowerDrill04 - 77

PowerDrill05 - 81

Current BatteryLevel %

PowerDrill01 - 73

PowerDrill02 - 100

PowerDrill03 - 83

PowerDrill04 - 29

PowerDrill05 - 100



DE

UK

USA

IND



0 Actions Today

Overview

0

Actions

5

Locations

5

Equipments

Overview

1

Active

4

Inactive

0

Maintenance

0

Alert



Current Temperature °C

PowerDrill01 - 75

PowerDrill02 - 83

PowerDrill03 - 81

PowerDrill04 - 77

PowerDrill05 - 81

Current BatteryLevel %

PowerDrill01 - 73

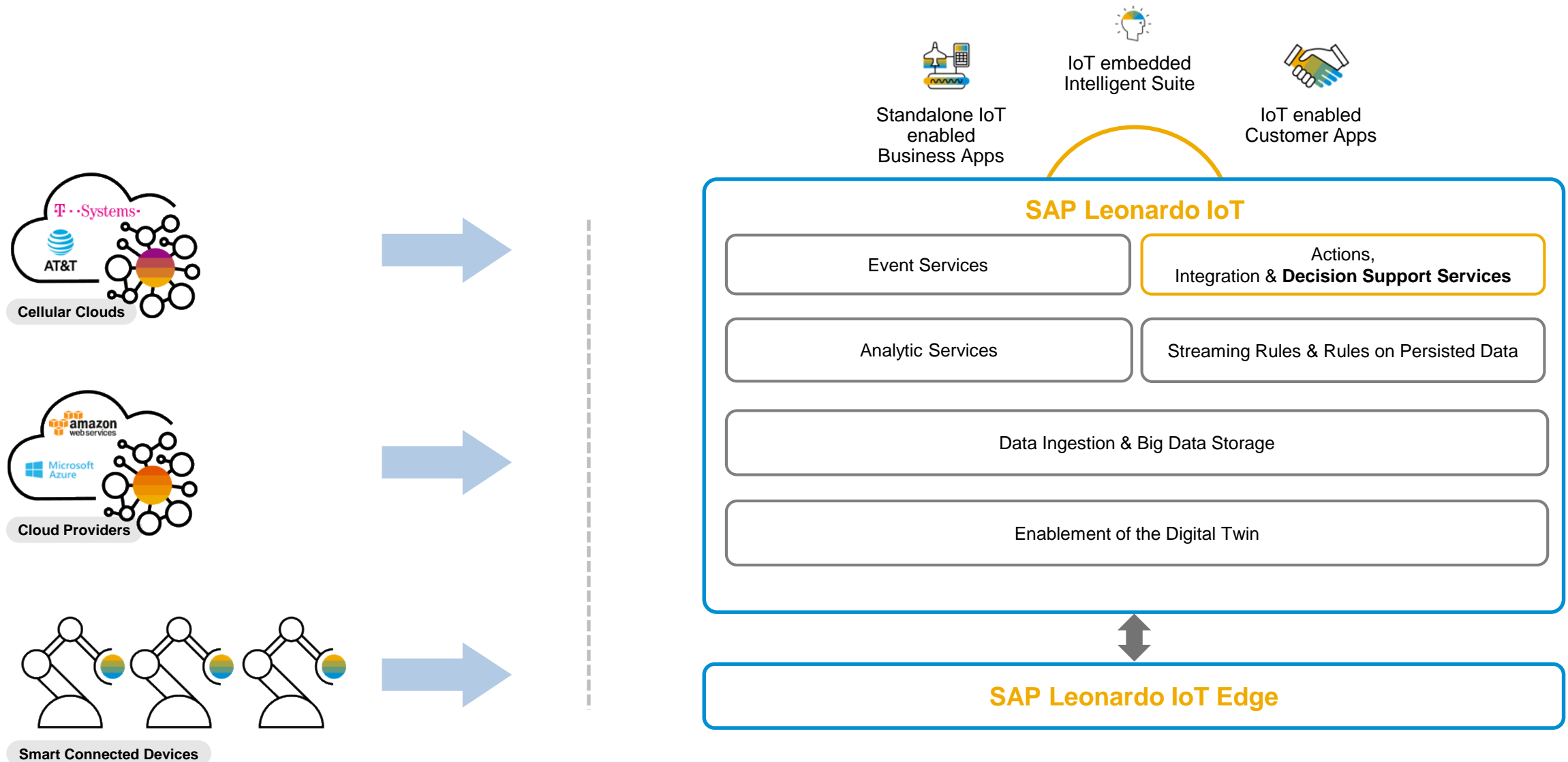
PowerDrill02 - 100

PowerDrill03 - 83

PowerDrill04 - 29

PowerDrill05 - 100

SAP Leonardo IoT – From Internet of Things Data to Business Outcomes



Recent Innovation: Decision Support Service

Sensors



Sensor data from
smart flow meter

SAP Leonardo IoT



Rule based
monitoring
of sensor data



Anomaly event
detected
Human decision
taking required



Decision Support
instance generated
incl. business context



Business user takes
informed decision and
executes
recommended action

Business Layer

A



Create maintenance
work order in S4

B



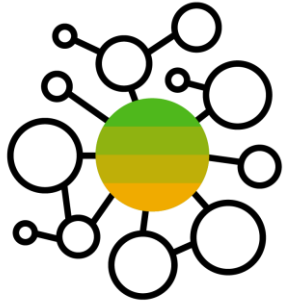
Create service ticket
in SAP Cloud for
Customer

C



Launch partner flow
meter application

Main Components of the Decision Support Service



1 Runtime

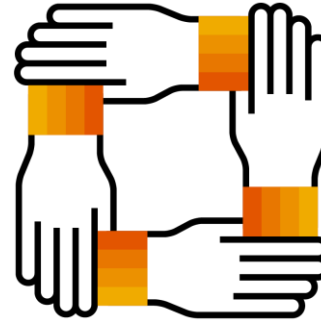
Business Service generates recommended actions out of IoT sensor data and business context.



2 UI Template

Preconfigured Fiori Smart Element based UI building block offered through Web IDE to easily consume business service (e.g., developer can add UI building block to any S/4 object detail page)

Direct consumption of service is welcome (e.g., API based consumption outside of Fiori)



3 Configuration App

Configuration App to be used by administrators or key users to configure invoked backend services such as S/4 Stock Transfer, S/4 Purchase Order Create, S/4 Inbound Delivery Cancellation, C/4 Service Ticket Creation



4 Connectivity Component

- ABAP add-on component to securely consume the decision support business service in SAP business applications
- S/4 Situation Handling Framework can securely consume the decision support business service.

- < My Tenants
- i Tenant Information
- Members
- Device Management
- Devices**
- Sensors
- Sensor Types
- Capabilities
- Component Management
- Gateways
- Processing
- Configurations
- Selectors

My Tenants / Tenant: rc-poc-t1 / Devices / ReeferDevice

ReeferDevice

ID: a5cae592-35d5-49e7-b6e4-cc5bb42dd02d

[Sensors](#) [Data Visualization](#) [Certificate](#) [Custom Properties](#)

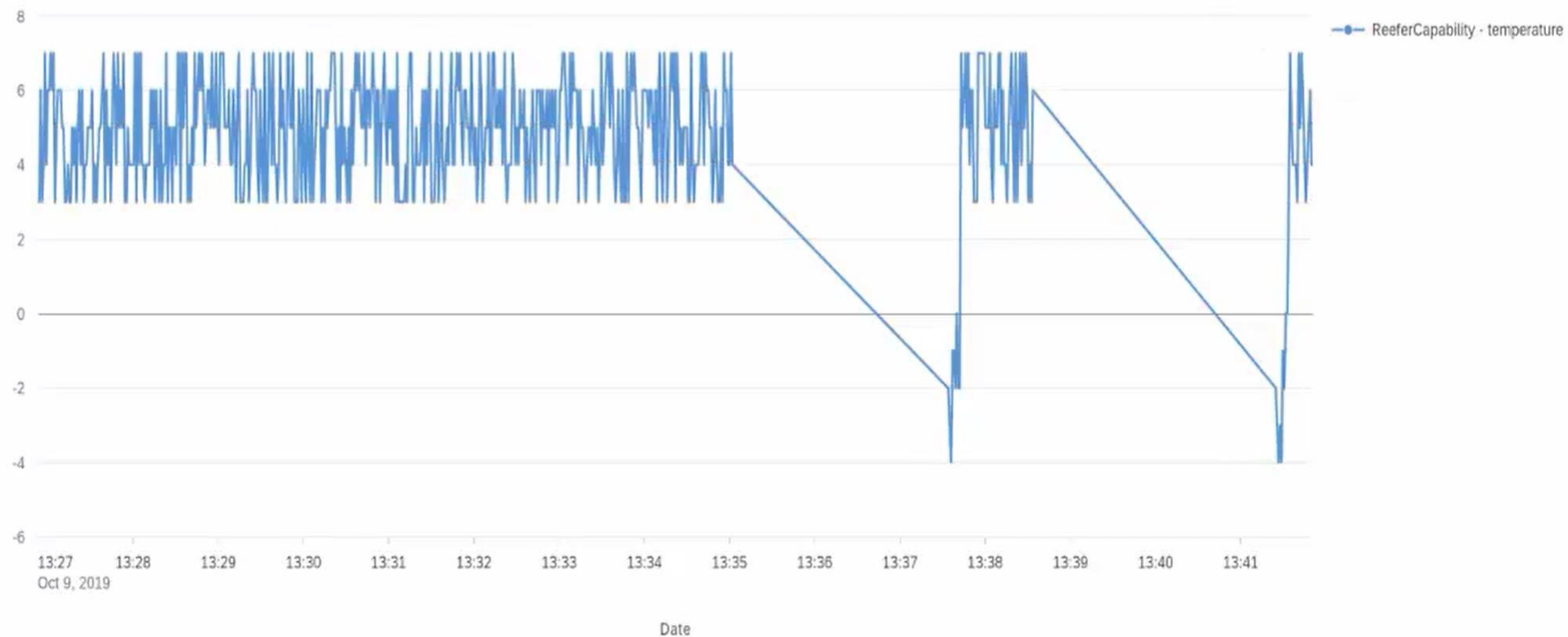
Data Visualization

ReeferSensor

ReeferCapability

Properties (ReeferCapability - temperature)

(Last 15 Minutes)



 Delivery Disruption of VJ_GEN01 Material due to High Temperature; Sales Order 0002991190/00010 impacted.

[Set to Complete](#)[Context](#)[Action Options](#)[Execution Result](#)

Reefer Details

Reefer Number:
M90D4C02000

Reefer Description:
10 ft ISO Reefer Container

Product:
VJ_GEN01

Product Description:
VJ_GEN01 Material

Failure Information

Current Temperature:
12

Minimum Temperature:
5

Maximum Temperature:
10

Delivery Number:
0080095530/00010

Sales Order Number:
0002991190/00010

Customer:
Customer Sum1 Name

Action Options

Inform Customer about the Delivery Disruption

Send Email Notification to Customer informing of Delivery Disruption of 10 ft ISO Reefer Container of Sales Order 0002991190/00010

RECOMMENDED

Create a Rush Order for Replacement

Create a Sales Order for Material VJ_GEN01 Material

Execution Result

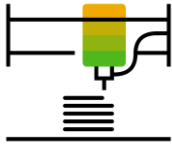
SAP Leonardo IoT Business Outcomes

SAP Leonardo IoT brings intelligence to the enterprise by offering multiple paths to innovation, accompanied by a comprehensive set of industry-specific business services and IoT capabilities:

1. **EMBED**: Embed telemetry data into SAP LoB applications, like S/4 HANA, C/4HANA or Digital Supply Chain, for an IoT enabled Intelligent Enterprise Suite.
2. **EXTEND**: Enable developers to extend existing SAP business processes by gaining information and insights from previously unconnected devices (e.g. machines, products, assets), thereby extending the value of existing SAP applications and processes.
3. **TRANSFORM**: Empower partners and customers to pursue open innovation and create new IoT enabled business models, in the context of SAP business systems, while keeping core business processes stable.
4. **ENABLE BUSINESS PROCESSES AT THE EDGE**: Provides intelligent data processing at the Edge orchestrated from the cloud. SAP Leonardo IoT runs business transactions correlated with device data, close to the source of IoT data, at the Edge.

Manufacturer of access control and time recording solutions

Industry



Discrete Manufacturing

Devices



Access Control
Devices

Business Drivers

Transform by complementing physical products with innovative digital services



Digital offering for access control and time recording tightly integrated to SAP Success Factors and Employee Central.



The solution is based on SAP Cloud Platform and the SAP Leonardo IoT.

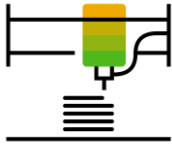


Customers will benefit from a best-in-class solution – fully integrated into the HR backend.



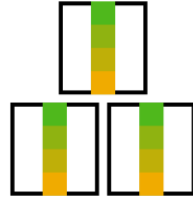
Manufacturer of of stainless steel containers

Industry



Discrete Manufacturing

Devices



Steel Containers



Business Drivers

Transform by complementing physical products with innovative digital services



Enable their customers to control conditions of their containers like fill level, temperature, geo location, etc.



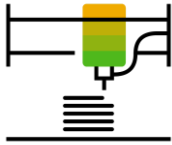
Customers can monitor the status of their tanks and integrate this data into their business processes.



Customers have better control and can secure appropriate transportation conditions for their customers

Manufacturer of flow meters used in process industry

Industry



Discrete Manufacturing

Devices



Flow Meters



Business Drivers

Transform by complementing physical products with innovative digital services



Platform to make technology more accessible to customers



Unlock the wealth of information in sensors and connect this information to business processes



Creation of new IoT-enabled service offerings to customers

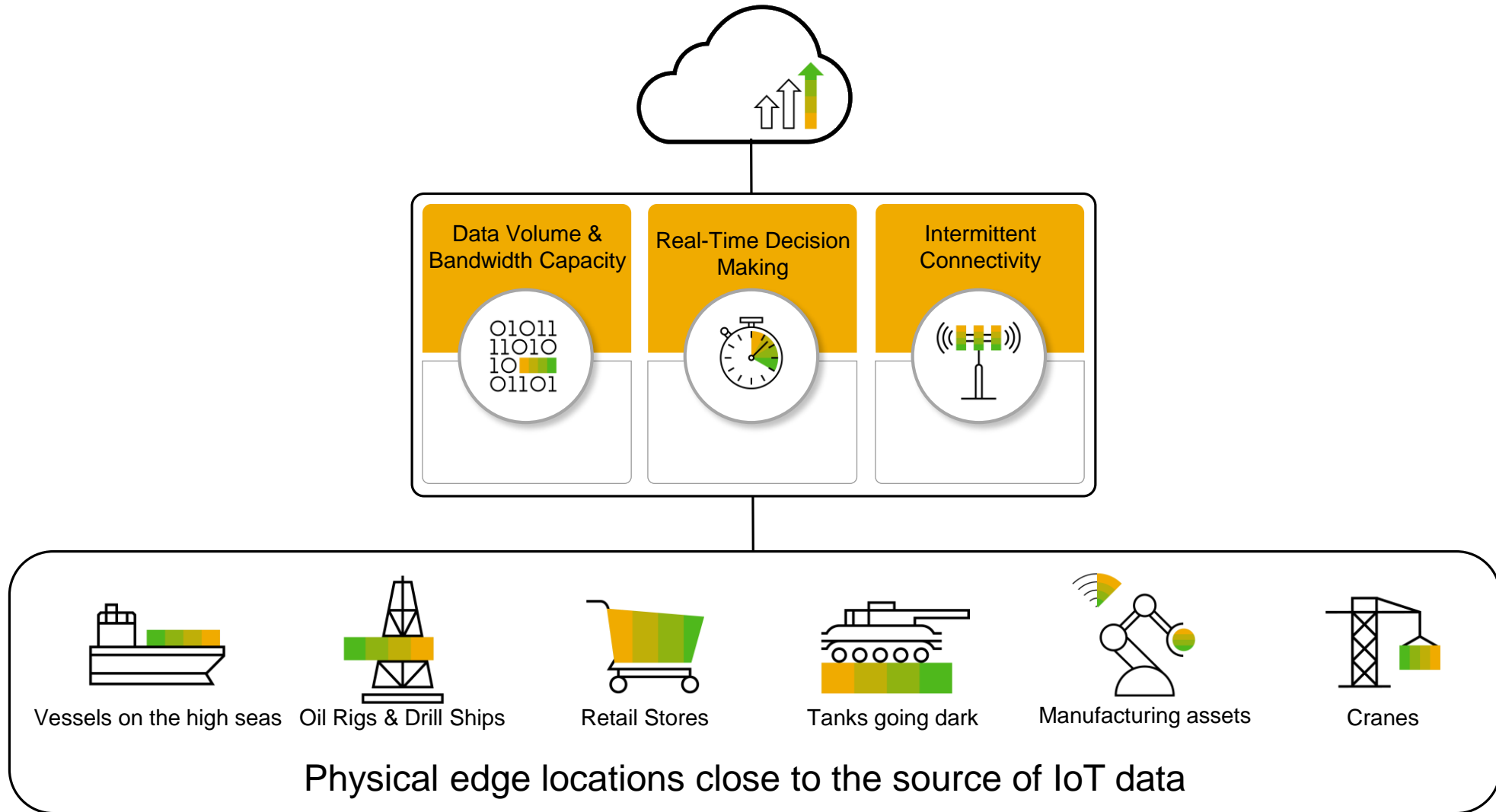
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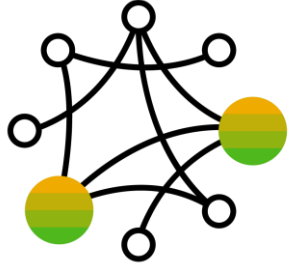
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Extend the Intelligent Enterprise to the edge with SAP Edge Services

Drivers for edge computing



How Big is Edge Computing?



40+%



of organizations' cloud
deployments will include
edge computing
by 2022 ¹



25%



of endpoint devices and
systems will execute AI
algorithms
by 2022 ¹



25B



Connected Things
by 2021 ²

Sources:

1. IDC FutureScape: Worldwide IT Industry 2019 Predictions (Oct 2018)
2. Gartner Identifies Top 10 Strategic IoT Technologies and Trends (November 7, 2018)

SAP Leonardo IoT Edge

Brings together local compute, persistency, and business transactions at the Edge

SAP Edge Services enables powerful **microservices** to be deployed at the edge of computing devices to **extend the processing power** of the cloud to the edge



Policy Service

- Deployment and lifecycle management of edge services



Essential Business Functions Service

- Provides business context (data and processes) at the edge



Streaming Service

- Analyze IoT data streams in real-time based on business logic



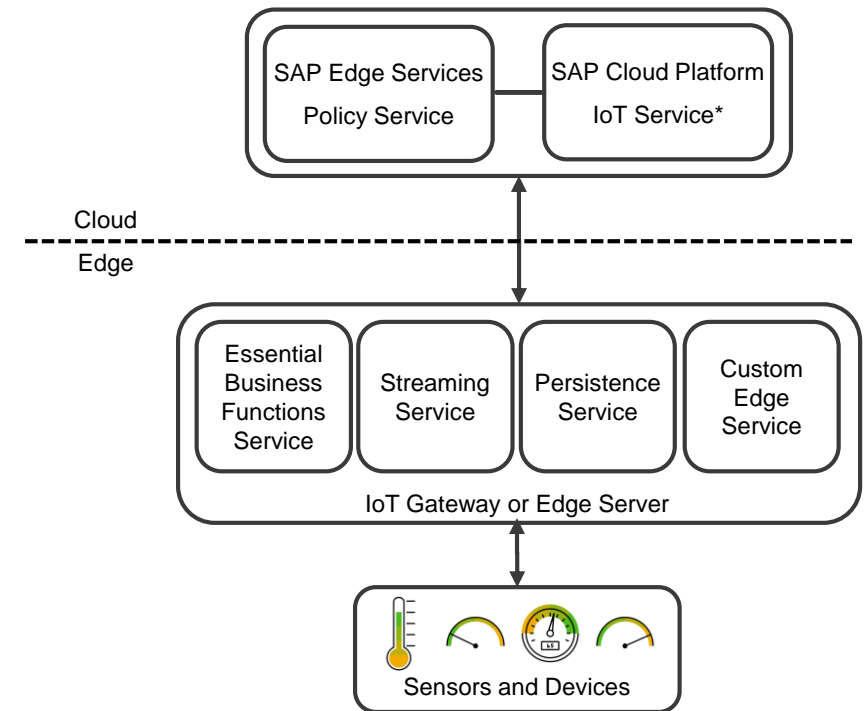
Persistence Service

- Locally store IoT data on IoT gateways



Custom Edge Services

- Deploy, execute, and update custom edge services at the edge, e.g. predictive analytical models



* SAP Cloud Platform Internet of Things for the Cloud Foundry Environment

SAP Edge Services

Essential Business Functions Service for ERP, S/4HANA and C/4HANA

Essential Business Functions Service provides business context data and transactions at the edge from ERP, S/4HANA and C/4HANA

Extend business functional areas to the edge:



SAP ERP and S/4 HANA

- Plant Maintenance (PM)
- Inventory Management (IM)
- Materials Management (MM)
- Environment, Health, and Safety Management (EHS)



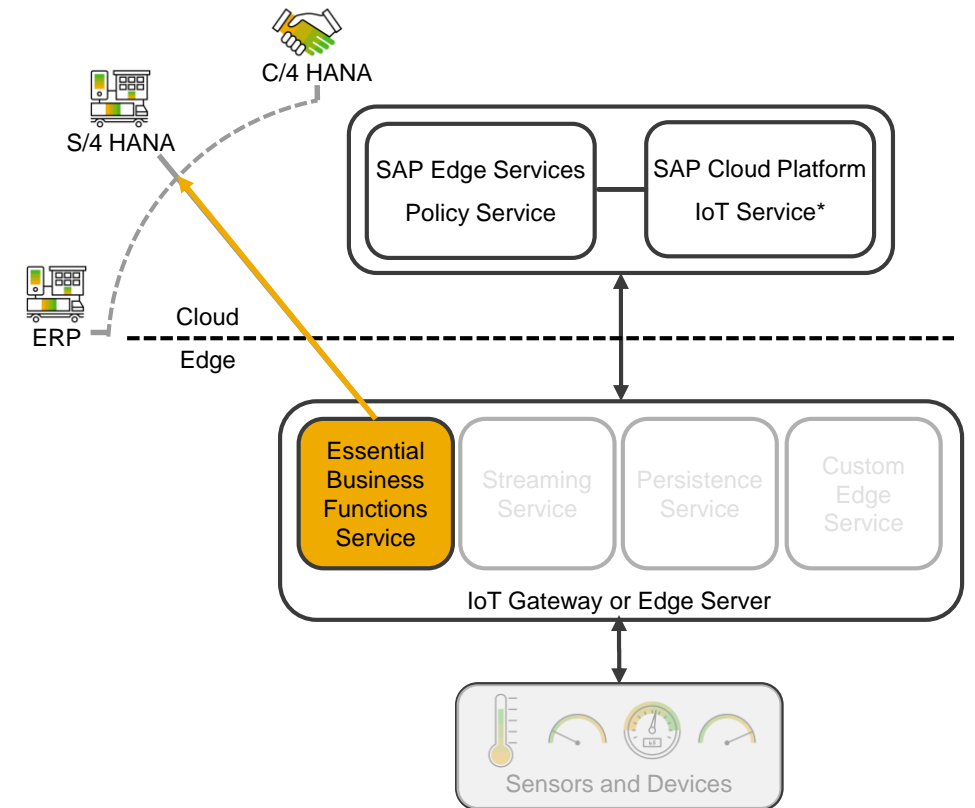
C/4 HANA

- Field Service Management (FSM)



Extensibility

- Repeatable architectural foundation and methodology to extend other SAP and non-SAP functional areas to the edge



* SAP Cloud Platform Internet of Things for the Cloud Foundry Environment

SAP Edge Services C/4HANA Field Service Management (FSM) Demo

Automatically trigger field service call at Edge

Personas



Lisa, Equipment Operator at **Silicon Valley Power**

Monitor all equipment onsite, and ensure equipment operational issues are resolved by service provider in a timely manner



Eric, Edge Services Citizen Developer at **Alpha Boiler Inc.**

As a service provider, configure Edge Services for his customers, so that when abnormal conditions are detected, service call will be automatically generated



Rita, Planning and Dispatching Agent at **Alpha Boiler Inc.**

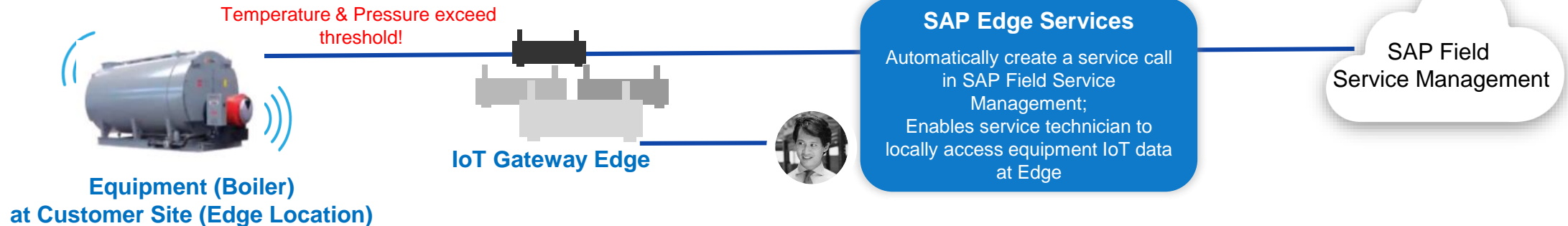
Dispatch service calls to appropriate technicians using SAP FSM app.



John, Service technician at **Alpha Boiler Inc.**

Accept a service call assigned to him and travel to customer site to provide repair, maintenance service

Business Scenario



Value Drivers

1

Turn service call generation from a manual process triggered by customer self-reporting to an automatic process driven by SAP Edge Services

2

Enrich Service Call with relevant IoT context to help dispatching agent quickly assess the nature of the issue

3

Enable Service Technician to locally access IoT data stored at Edge to more effectively start an investigation



Edge Services
Management



Edge Designer



Settings



SAP Edge Services

SAP Leonardo IoT Edge Interoperability with Hyperscaler*

Enable customers to run business processes on hyperscaler edge infrastructure

Deploy and run Essential Business Functions service on hyperscaler's edge

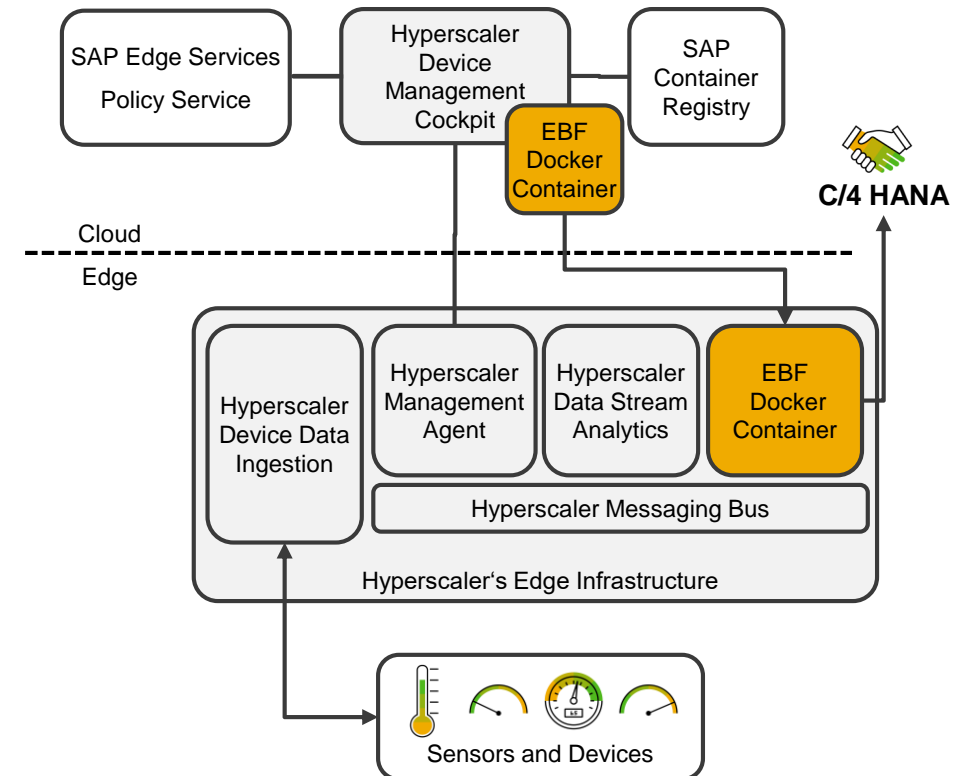


Integration of SAP and hyperscaler's cloud components

- A hyperscaler's edge customer subscribing to SAP Edge Services can get the docker container for Essential Business Functions Service from SAP Container Registry.
- The Policy Service retrieves existing IoT edge device topology from Hyperscaler's device management cockpit.

Integration of SAP and hyperscaler's edge components

- Hyperscaler IoT Edge provides device connectivity, and device management functionalities.
- Sensor data is analyzed in hyperscaler's data stream analytics component
- SAP Essential Business Functions (EBF) Service runs as a docker container on Hyperscaler edge runtime.
- Once an alert for abnormal device data is raised, EBF Service can trigger the business process locally at edge (e.g. create a Service Call in SAP C/4HANA Field Service Management)



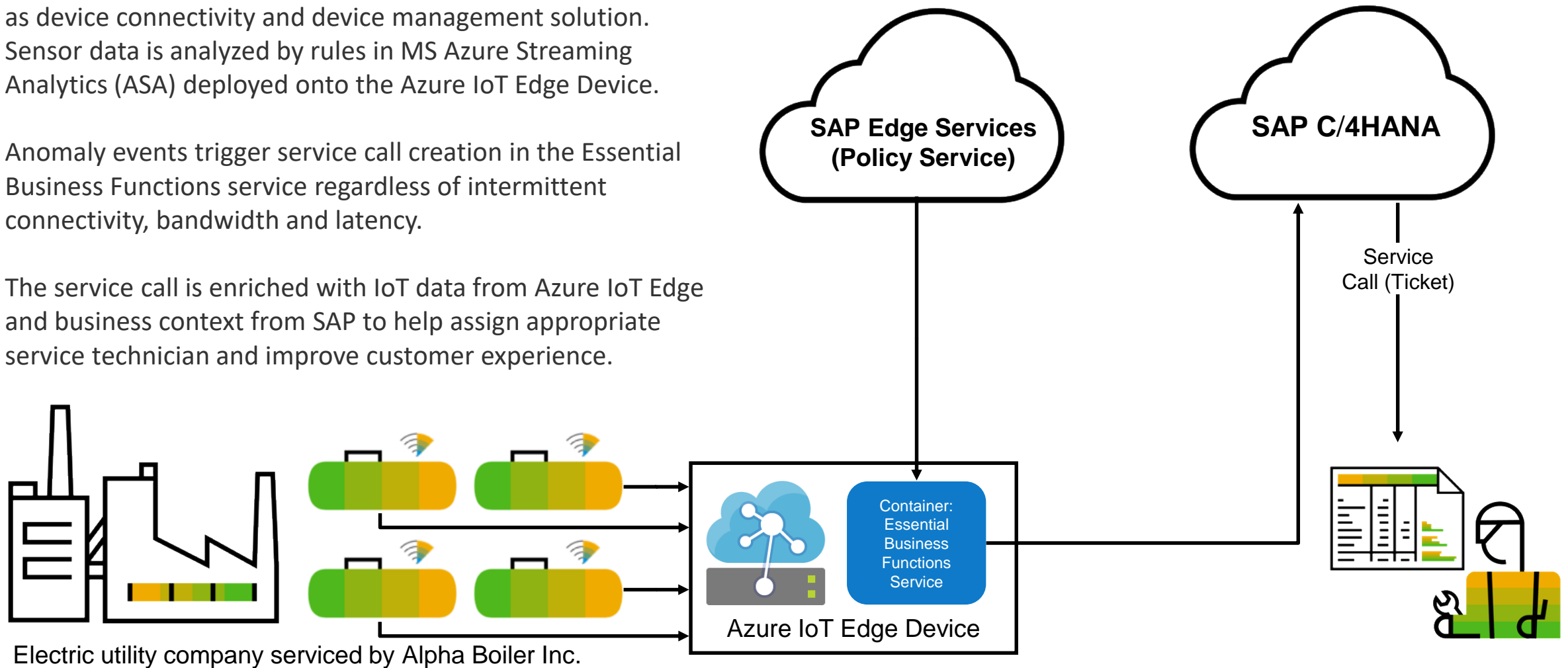
*We are currently working with Microsoft Azure and AWS Greengrass on edge interoperability

SAP Leonardo IoT Edge Interoperability Scenario with Azure IoT Edge

Use Case: Alpha Boiler Inc. operates many customer sites with boilers. Some of their customers have chosen Azure IoT Edge as device connectivity and device management solution. Sensor data is analyzed by rules in MS Azure Streaming Analytics (ASA) deployed onto the Azure IoT Edge Device.

Anomaly events trigger service call creation in the Essential Business Functions service regardless of intermittent connectivity, bandwidth and latency.

The service call is enriched with IoT data from Azure IoT Edge and business context from SAP to help assign appropriate service technician and improve customer experience.



Edge Use Cases & Customer Case Studies

Overview

Example Edge Use Cases



Manufacturing Equipment Analytics



**Continuous Statistical Process Control
Golden Batch**



Plant Maintenance



**Extend EH&S Incident Reporting to the
Edge**



Connected Inventory for Smarter Retailing



**Extend Field Service Management to the
Edge**



Extend AIN to the Edge

Customers across Industries



High Tech



Provider of
Packaging Material Machines



Offshore Drilling Contractor



Top Private Shipping Group



Railway Products &
Steel Forging



Large Retailer



Automotive Parts Manufacturer



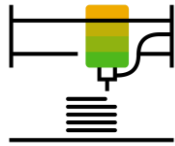
Defense & Security



Akzo Nobel Sailing Team @
Volvo Ocean Race

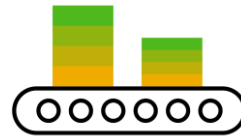
Pregis – Provider of Packaging Material Machines

Industry



Discrete Manufacturing

Devices



Processing and
Packaging Machines



Business Drivers

Transform by complementing physical products with innovative digital services



Improve product consumption visibility and trigger product replenishment



Gain insights on product utilization and usage patterns



Identify anomalies and alert technicians instantly about problematic machines



Increase technician productivity and lower costs via remote configuration of machines

Customer: Large Retailer

Industry



Retail

Devices



3000+ Stores



Business Drivers

Extend SAP Core (ECC) transactions to 3400+ stores at scale, without dependency on latency on connectivity



Get sub-second response time for transactions ranging from product scans, shelf space allocation planning, to ordering and receiving



Achieve scalability with million+ daily synchronizations between 3400+ edge locations (stores) and SAP Core (headquarters)



Operate business transactions uninterrupted, without dependency on connectivity or latency issues.

New Learning Journey Available on SAP Edge Services

12 units recorded in 6h: Positioning, case studies & hands-on installation & configuration

Unit 1: Why Edge Computing?

Unit 2: What is SAP Edge Services?

Unit 3: SAP Edge Services in Action

Unit 4: Where is SAP Edge Services Used?

Unit 5: How to Install SAP Edge Services?

Unit 6: How does the Streaming Service Work?

Unit 7: How does the Policy Service Work?

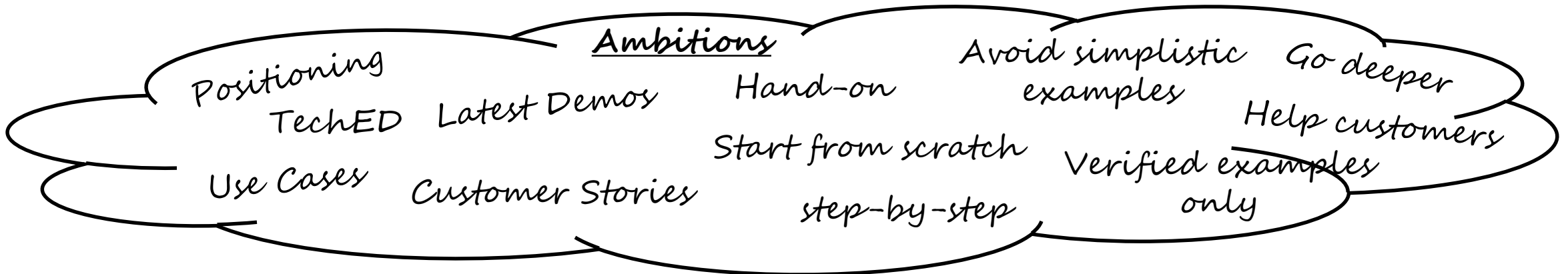
Unit 8: How does the Persistence Service Work?

Unit 9: How does the EBF Service Work?

Unit 10: How does Interoperability with Hyperscalers Work?

Unit 11: How does the Predictive Analytics Service Work?

Unit 12: How does the Edge-Cloud-Hybrid Work?



Purchasing the required subscription for the SAP Learning Hub

Customer and partner access to the new eLearnings on SAP Edge Services

The new eLearning on SAP Edge Services is included in

- SAP Leonardo Internet of Things Learning Journey
- IoT Learning Room.

Please use this [direct link](#) to the eLearning, if you have already a subscription for the SAP Learning Hub.

The content currently is available in both,



SAP Learning Hub professional edition



SAP Learning Hub, solution edition for IoT and Digital Supply Chain

You can purchase these editions at <https://training.sap.com/learninghub>

Thank You.

Contact Information:

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