Microsoft

Azure IoT Cloud Expert Workshop

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Agenda

09h00 - 09h30	**Accueil et Introduction**
09h30 - 11h00	IoT Architecture de Référence Tour d'horizon d'Azure IoT Hub (Télémétrie et Device management) Demo (Raspberry PI online + SDK Device Management) Device Provisioning Service

11H00 – 12H30	Break
	
	Lab1 -IoT Hub Hands-on Part 1 : https://github.com/rangv/azureiotlabs
	    • Module 2: PIOnline
	    • Module 3: TSI
	    • Module 4: Event Grid

12H30 – 13H30	Déjeuner

13h30 - 14h30	Lab1 -IoT Hub Hands-on Part 2:
	    • Module 5: Cold Path Storage
	    • Module 6: Hot Path Analytics

14h30 - 16h00	Présentation de l'offre SaaS IoT Central Introduction IoT Plug and Play
16h00 - 17h00	Break Lab2- IoT Central https://github.com/rangv/MarchWorkshop/tree/master/AzureIoTCentral
17h00 - 17h15	Q&A, conclusion/Jour

AZURE IoT Introduction

Microsoft

MICROSOFT WILL INVEST $5 BILLION IN IoT

Our goal is to give every customer the ability to transform their businesses, and the world at large, with connected solutions
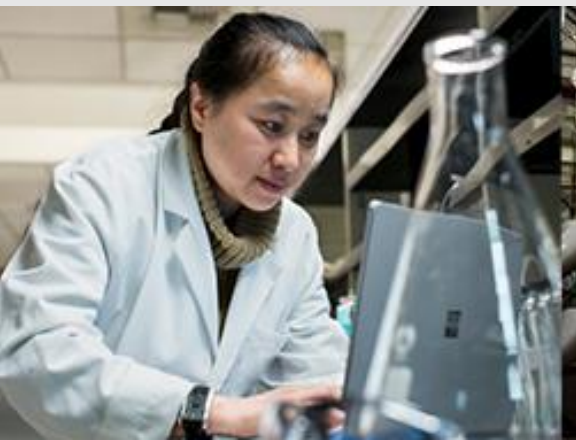
Microsoft

Improving product offering and driving innovation

Drone Works uses Azure IoT Hub to build a safe flight platform for industrial drones

"I see a drone as an IoT device, so I'd already made the connection between Microsoft Azure solutions and what it could do for IoT concerns."

—*Hironobu Imamura, CEO*

Japanese company DroneWorks is supporting the expanding use of commercial and industrial drones with a management system that can predict maintenance needs and malfunctions to protect public safety. The secure, scalable solution combines Azure IoT Hub and Azure IoT Edge to collect and process flight data, with Azure Stream Analytics and Azure Machine Learning enabling predictive analysis.

DroneWorks

Products and Services		**Organization Size**	**Industry**	**Country**	**Business Need**
Azure IoT Hub	Azure Table storage	Small	Industrial Drones	Japan	Data management
Azure IoT Gateway SKK	Power BI Embedded				Predictive analytics
Azure Event Hubs	Azure Machine				
Azure Stream Analytics	Learning				

Microsoft

Increasing safety and reducing data costs with IoT edge

Oil and gas experts use machine learning to deploy predictive analytics at the edge

For companies with connected assets distributed across a country or around the world, edge analytics makes remote asset management easier by putting application logic on-site. However, some businesses may have remote assets without easy access to the cloud, and they may be reluctant to send data outside their own networks. Schneider Electric is out to solve that challenge for the oil and gas industry. The company has pushed edge solutions into new, predictive realms with the help of Azure Machine Learning and Azure IoT Edge.

Schneider Electric

Products and Services	Organization Size	Industry	Country	Business Need
Azure Machine Learning	Corporate	Discrete manufacturing	France	Predictive Analytics
Azure IoT Edge				

# Renault-Nissan-Mitsubishi lance l'Alliance Intelligent Cloud sur Microsoft Azure

20/03/2019 | Juliette Francaix

L'Alliance Intelligent Cloud, déployée sur Microsoft Azure, permettra la mise en place des derniers services connectés de l'Alliance.

La première alliance automobile mondiale utilisera l'Alliance Intelligent Cloud pour créer une infrastructure connectée sur la quasi-totalité des 200 marchés de Renault, Nissan et Mitsubishi.

Grâce à l'Alliance Intelligent Cloud, les nouvelles Renault Clio et Nissan Leaf seront équipées de services connectés, en Europe et au Japon, et cela d'ici la fin de l'année.
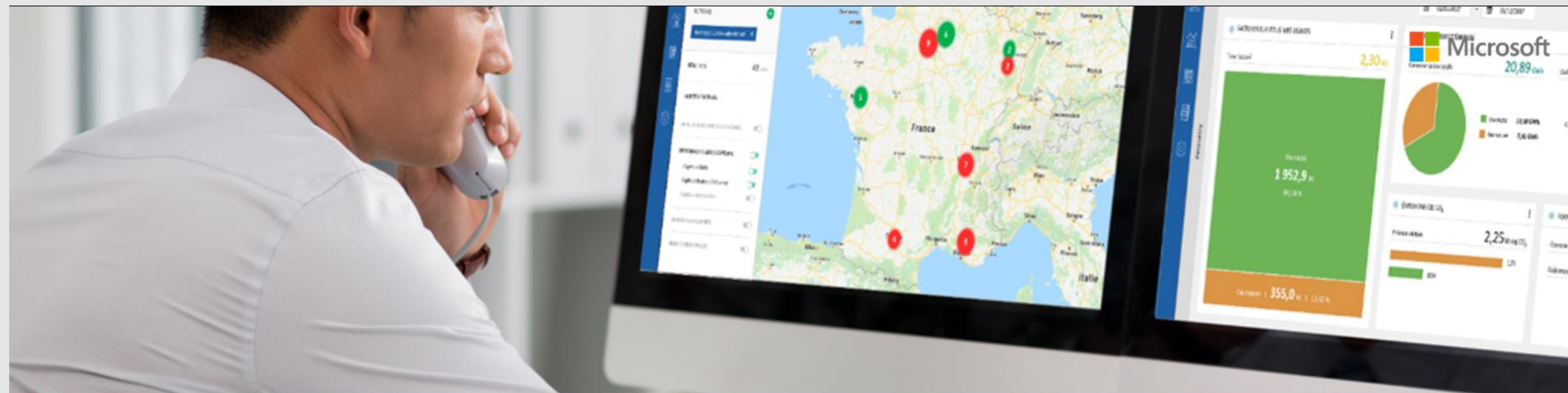
Energisme optimizes enterprise energy performance

30% reduction in energy costs, 70% in staff efficiency gains, deployed in four weeks

In an energy environment of change and complexity, the French energy services provider Energisme uses Microsoft Azure IoT Hub and other Microsoft services to power the Energisme energy management platform and help enterprise energy consumers optimize their energy profiles.

With Energisme and Azure, local authorities, large manufacturers, and independent energy suppliers can make better decisions, take faster action, and reduce their energy consumption, impacts, and costs—while Energisme can serve a wide range of customers at any scale.

PRODUCTS AND SERVICES
Azure IoT Hub
Azure Machine Learning
Power BI

ORGANIZATION SIZE
100 Employees

INDUSTRY
Partner Professional Services

COUNTRY
France

Legrand unlocks smart-building innovation with open IoT cloud

Legrand, a longtime global leader in electrical and building infrastructure products, is making a big commitment to connect thousands of its diverse products to customers and third-party products through a program called Eliot. And it's using Microsoft Azure Internet of Things services to do so. By using Azure to build and host the Legrand Cloud, Legrand quickly got this new program to market and provided product groups with a single interoperability standard so they can rapidly deliver innovative smart-home products.

Shell invests in safety with Azure, IoT, IoT Edge, AI, to better protect customers and service champions

In the energy industry, Shell manages everything from wells to retail gas stations—44,000 of them. The company works hard to ensure the safety of service champions and customers at its retail sites. Shell is piloting a new cloud-based, deep learning solution built on Microsoft Azure. The solution uses closed-circuit camera footage and Edge Internet of Things technology to automatically identify safety hazards and alert service champions so they can quickly respond and eliminate potential problems.

https://customers.microsoft.com/en-au/story/shell-mining-oil-gas-azure-databricks

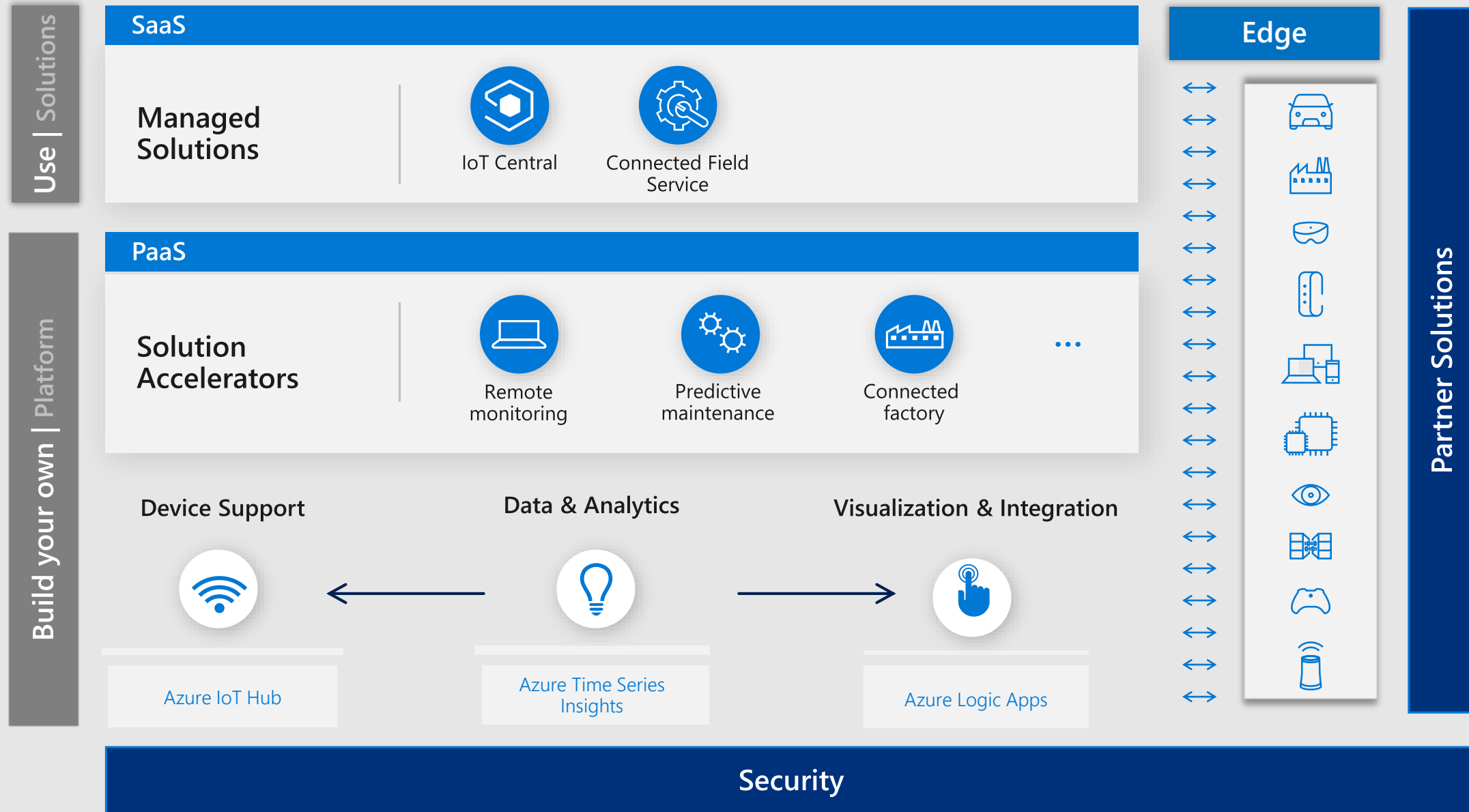| **Products and Services**	**Organization Size**	**Industry**	**Country**
Microsoft Azure Azure Databricks Azure IoT Edge Azure IoT Hub	86,000 employees	Mining, Oil and Gas	The Netherlands

The Azure Portfolio for IoT

Azure main services for IoT

END USERS

IoT Central
Experience SaaS for IoT, with no cloud expertise required

IoT solution accelerators
Capture and analyze untapped data to improve business results

ANALYTICS

Time Series Insights
Instantly explore and analyze time-series data

Stream Analytics
Real-time data stream processing from millions of IoT devices

Azure Maps
Simple and secure location APIs provide geospatial context to data

CORE IOT

IoT Hub Device Provisioning Service
Zero-touch, just-in-time provisioning for Azure IoT Hub

IoT Hub
Connect, monitor, and control billions of IoT assets

Azure Digital Twins
Create digital replicas of spaces and infrastructure

EDGE

Azure Sphere
Create highly secured, connected MCU-powered devices

IoT Edge
Extend intelligence from the cloud to edge devices

Data Box Edge physical device with storage and compute. Use this device when you intend to analyze, transform, or filter your data as it moves to Azure.

Azure Intelligent Edge + Cloud Taxonomy

MCU	MCU, CPU	CPU ARM32, AMD64	CPU XEON / FPGA (ML)		

Arm® Cortex™-A7 processor
4MB SRAM

STM32
1024 KB Flash
256 KB SRAM

Intel Celeron N3350 dual core
4 GB Memory
64G SATA storage

2x10 core Intel Xeon
Scalable Processor
128 GB RAM
12T SSD storage

Azure Sphere

IoT Devices

Azure IoT Edge

Azure Data Box Edge

Azure Stack

Hyperscale Cloud

- Highly-secured, connected MCU
- Azure Sphere Linux OS for modern MCUs

- 1000+ devices and 250+ partners certified
- Azure IoT SDK

- Runtime on Windows10 or Linux
- Azure Services in : AI, AzureML, Azure Stream Analytics and more

- AI-Enabled, Storage and compute
- Data Box: Offline, ruggedized data transport, 100 TB – 1 PB

- On-Prem Cloud
- Disconnected Scenarios
- Regulatory Requirements

- Full Range Hyperscale Cloud Services
- Security, Compliance,

expresslogic

Windows IoT

Azure IoT Device SDK

- C, C#, Java, Python, NodeJS, iOS SDKs to connect any device to Azure
- Robust and validated connectivity, retry logic, security, device management and latest IoT Hub features

Azure IoT
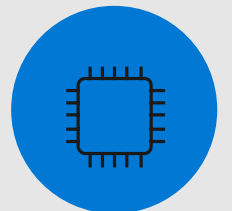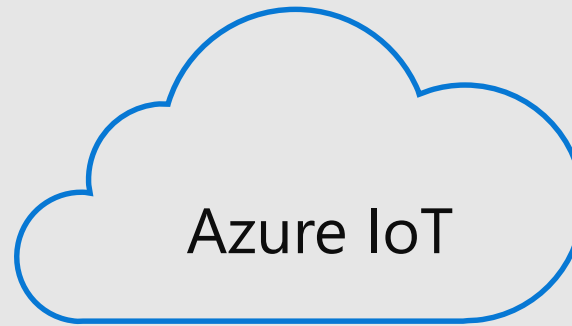
and more…..

Azure Sphere is an end-to-end solution for securing MCU powered devices

The **Azure Sphere OS** with ongoing updates creates a **Microsoft-secured software platform**

Azure Sphere certified MCUs, from our silicon partners, with built-in Microsoft **hardware root of trust**.

The **Azure Sphere Security Service** guards every Azure Sphere device. It **brokers trust**, **detects emerging threats,** and **renews device security.**

Windows IoT editions

Windows 10 IoT Core
- 400 MHz x86, x64 or ARM CPU
- 256MB RAM (512MB with display)
- 2 GB storage

Small-footprint smart edge devices
- Universal Windows Platform (UWP) app experience
- Optimized for devices with and without displays
- No OS-shell UX
- Familiar Windows security, tools, apps & manageability
- No operating system royalty,
- Windows 10 IoT Core Services subscription available

Windows 10 IoT Enterprise
- 1GHz x86 or x64 CPU
- 1 GB RAM (2 GB for 64-bit)
- 16 GB Storage (20 GB for 64-bit)

Powerful smart devices
- A rich user experience with Win32 and UWP apps
- Same deployment, manageability and servicing as desktops
- Familiar interface with lockdown features to control user experience
- Rich peripheral and in-box camera barcode support
- Identical to Windows 10 Enterprise, but sold through the OEM channel instead of volume licensing

Windows Server IoT 2019
- 1.4GHz x64 CPU
- 512 MB RAM (2 GB for desktop)
- 32GB Storage

Advanced data analysis and storage
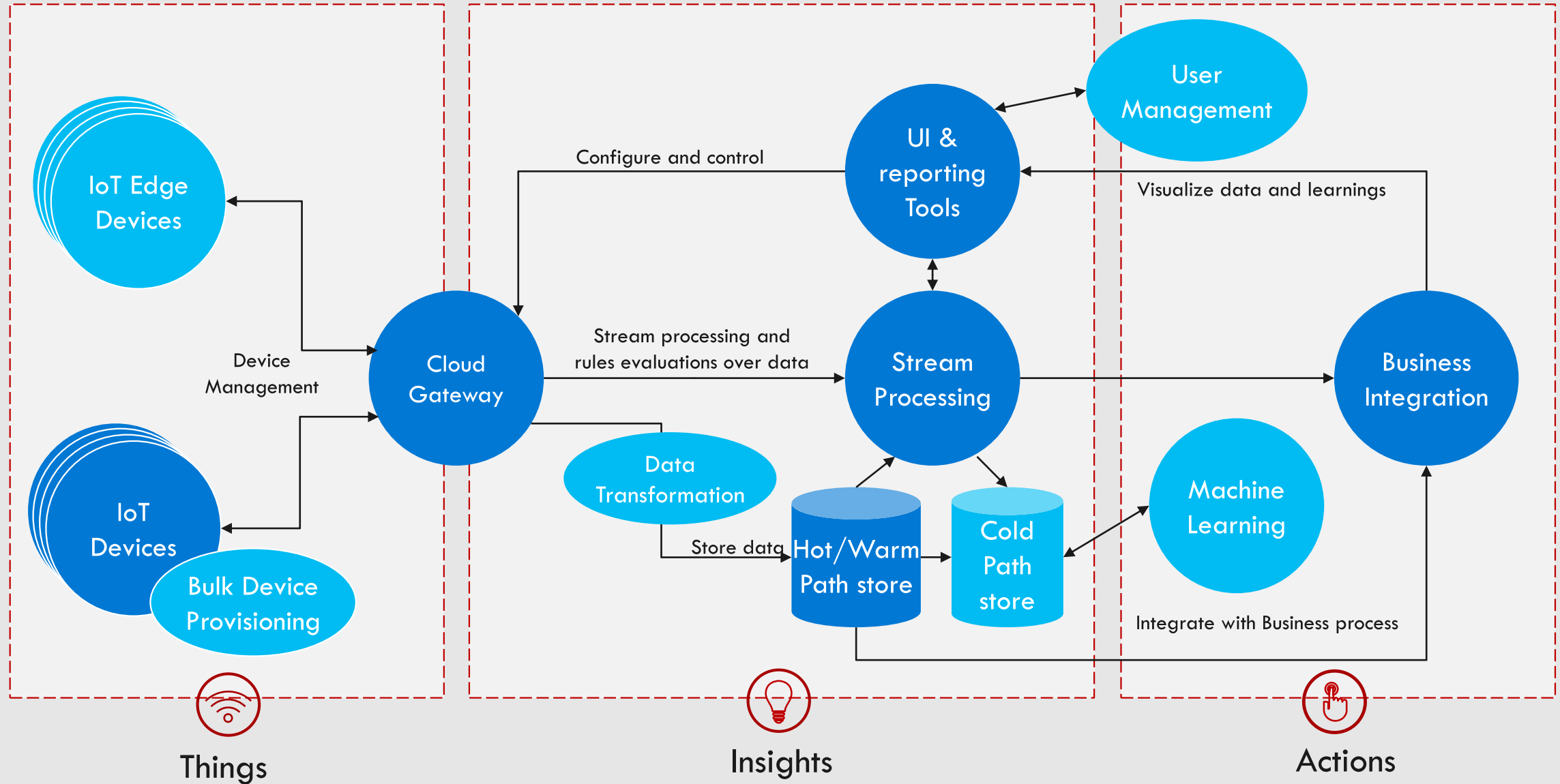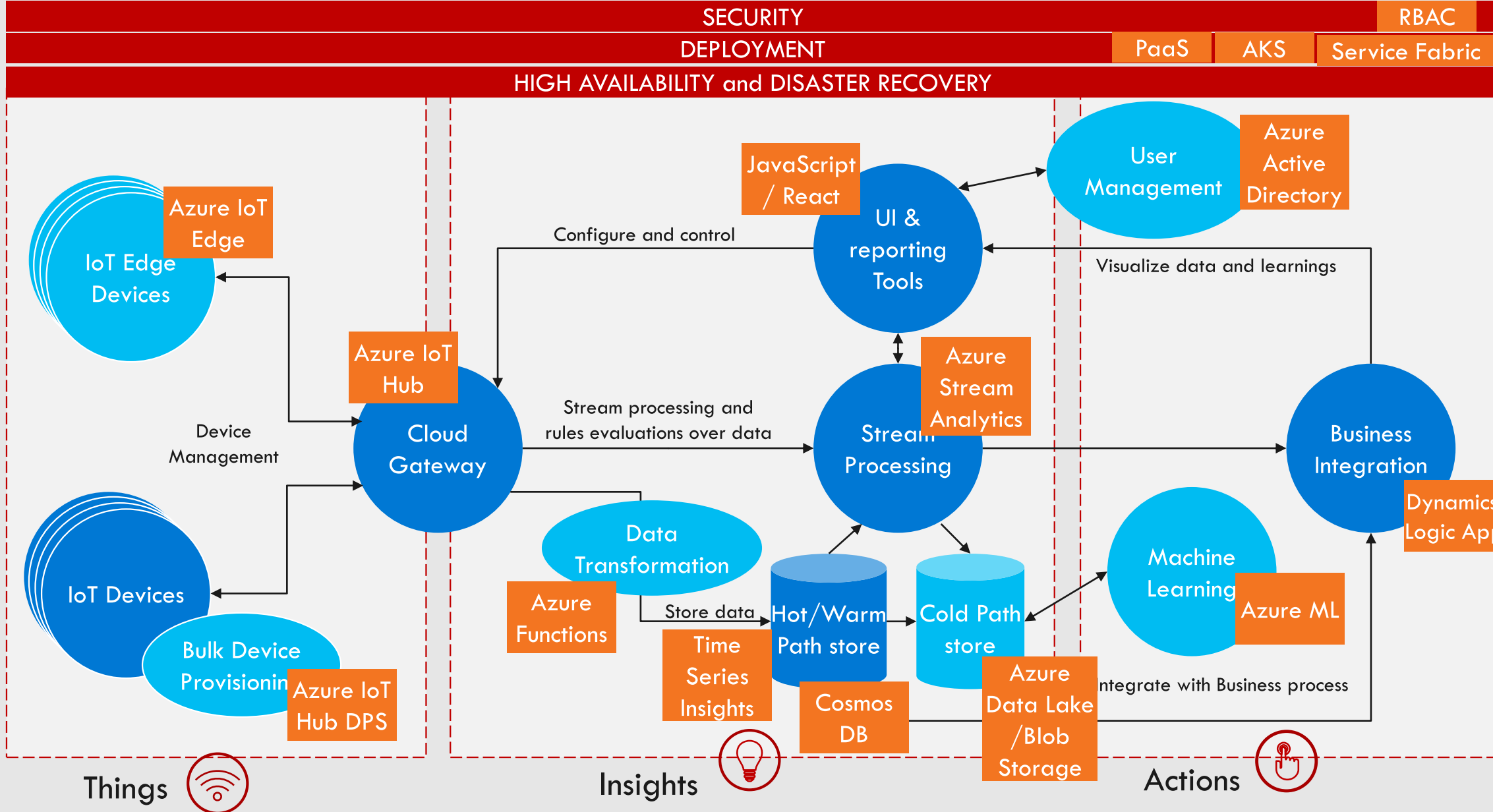- Enhanced security capabilities
- Unique hybrid platform – Integrate your on-premise and cloud infrastructures
- Improved container support with Azure IoT Edge management
- CAL-less option available

For details see https://docs.microsoft.com/windows-hardware/design/minimum/minimum-hardware-requirements-overview

IoT Reference Architecture http://aka.ms/iotrefarchitecture

Azure components

Microsoft's Role in Device Connectivity

LAN/PAN (between devices)	WWAN (to cloud)

LAN/PAN column:
FOUNDATION
OPC UA
Modbus
PROFI BUS
HART COMMUNICATION PROTOCOL
CAN

Backnet
OCF

5G
Weightless
LoRa
TV White Space
Wifi
BT/BLE
Zigbee
ANT
RFID
Ethernet

WWAN column:
MQTT.ORG
AMQP Advanced Message Queuing Protocol
https://
(satellite)
5G
2G/3G/ 4G/LTE
WEIGHTLESS
LoRa
Wi Fi
Ethernet

Zero Touch Provisioning
- Making it easier for users to deploy devices – the plumber can install a coffee machine
- Ensuring there is single source of security right up the chain from SIM to cloud

Azure IoT Edge as a protocol server and bridge
- Allow for local Edge networks to communicate with the best local connectivity, aggregate data/perform intelligence, then back haul up to the Cloud
  - Example: Recent partnership with Inmarsat.
    For Ag use case – local network of Lora devices
    Connect into an Intelligent Edge Device
    Data Aggregated and Intelligence run on it then sent via Satellite up to Azure IoT Central

Private LTE/5G networks
- We see that this is a trend that will start to take off for Buildings/Campus/Factories/Cities

Working with Ecosystem to abstract complexity of connectivity
- Integrations with Azure IoT so partners and customers can focus on other areas rather than the plumbing

Azure IoT Connectivity and PaaS components

DEVICES

Devices: RTOS, Linux, Windows, Android, iOS

1 Protocol libraries (REST, AMQP, MQTT)

2 **IoT SDK**
- Open Source, MIT License
- Full features
- Long term Support
- Any OS, any Language

3 **LPWAN**
Public or Private:
- Device provisioning
- D2C telemetry
- C2D commands

sigfox
LoRa
NB-IoT

4 Protocol Adaptation

5 **Azure IoT Edge**
Edge Modules:
- Protocol Adaptation
- Functions
- Stream Analytics
- Machine Learning
- AI

6 BACnet
CoAP
Modbus
OPC UA
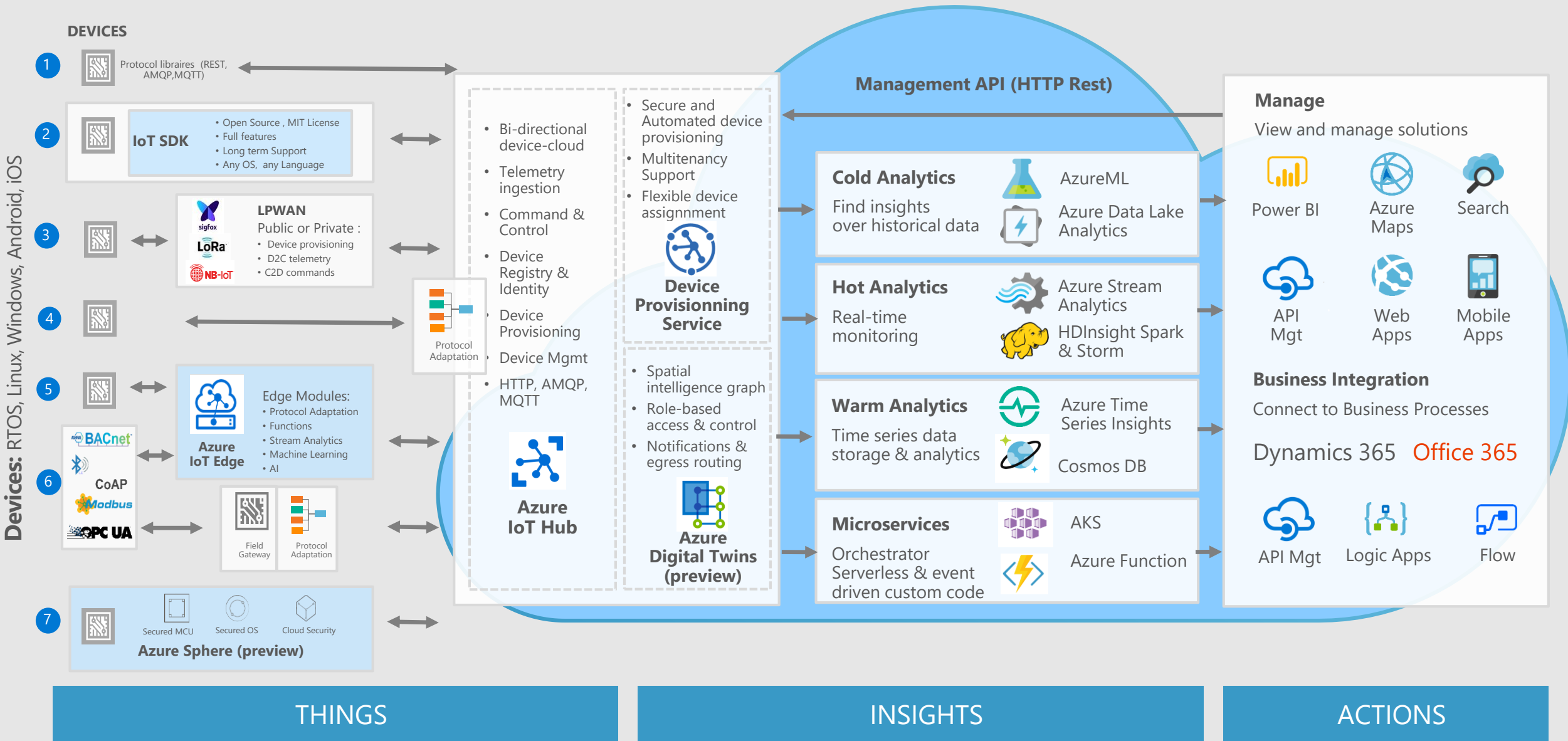
Field Gateway   Protocol Adaptation

7 Secured MCU   Secured OS   Cloud Security
Azure Sphere (preview)

Azure IoT Hub
- Bi-directional device-cloud
- Telemetry ingestion
- Command & Control
- Device Registry & Identity
- Device Provisioning
- Device Mgmt
- HTTP, AMQP, MQTT

Device Provisionning Service
- Secure and Automated device provisioning
- Multitenancy Support
- Flexible device assignment

Azure Digital Twins (preview)
- Spatial intelligence graph
- Role-based access & control
- Notifications & egress routing

Management API (HTTP Rest)

Cold Analytics
Find insights over historical data
- AzureML
- Azure Data Lake Analytics

Hot Analytics
Real-time monitoring
- Azure Stream Analytics
- HDInsight Spark & Storm

Warm Analytics
Time series data storage & analytics
- Azure Time Series Insights
- Cosmos DB

Microservices
Orchestrator Serverless & event driven custom code
- AKS
- Azure Function

Manage
View and manage solutions

Power BI   Azure Maps   Search

API Mgt   Web Apps   Mobile Apps

Business Integration
Connect to Business Processes

Dynamics 365   Office 365

API Mgt   Logic Apps   Flow

| THINGS | INSIGHTS | ACTIONS |

End to End Security with Azure IoT

Securely connect millions of devices...

...over a secure internet connection...

...to Microsoft Azure – built with security from the ground up
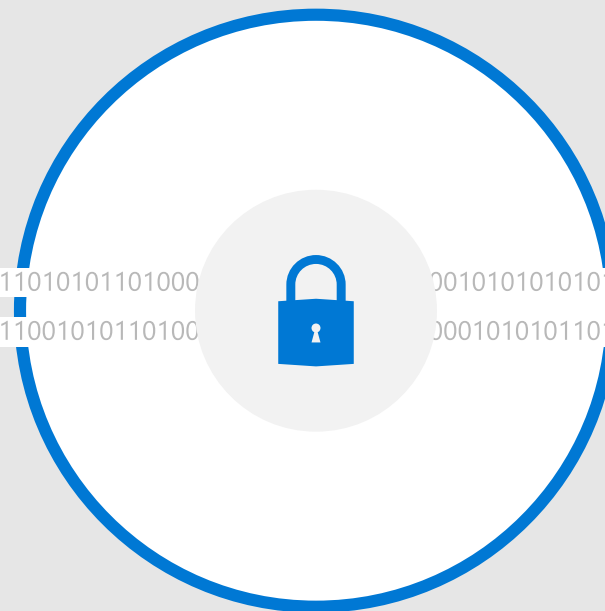
Device Security

X.509 Certificate Based Identity and Attestation

Device Provisioning, Authorization & Management

Support for Diverse Hardware Secure Modules
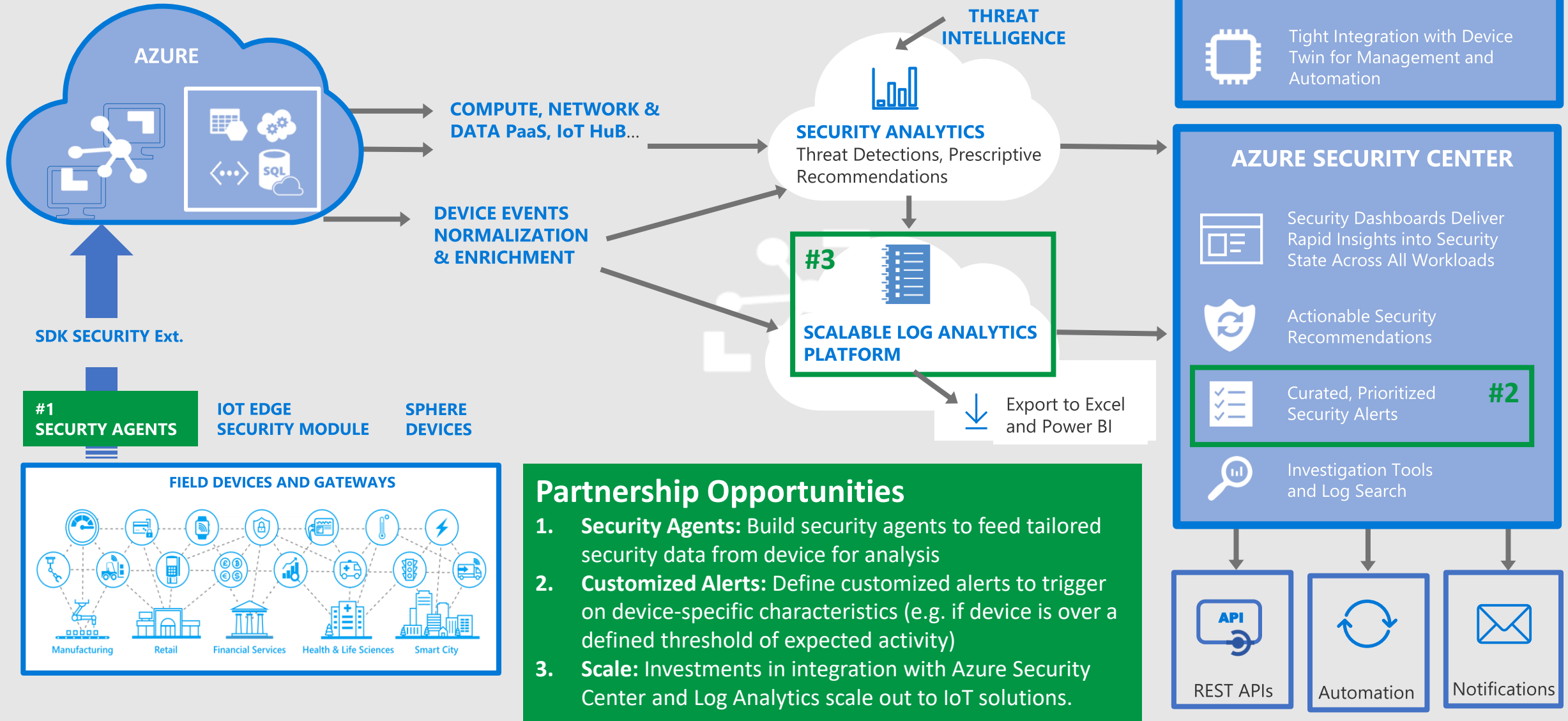
Connection Security

X.509/TLS-Based Handshake and Encryption

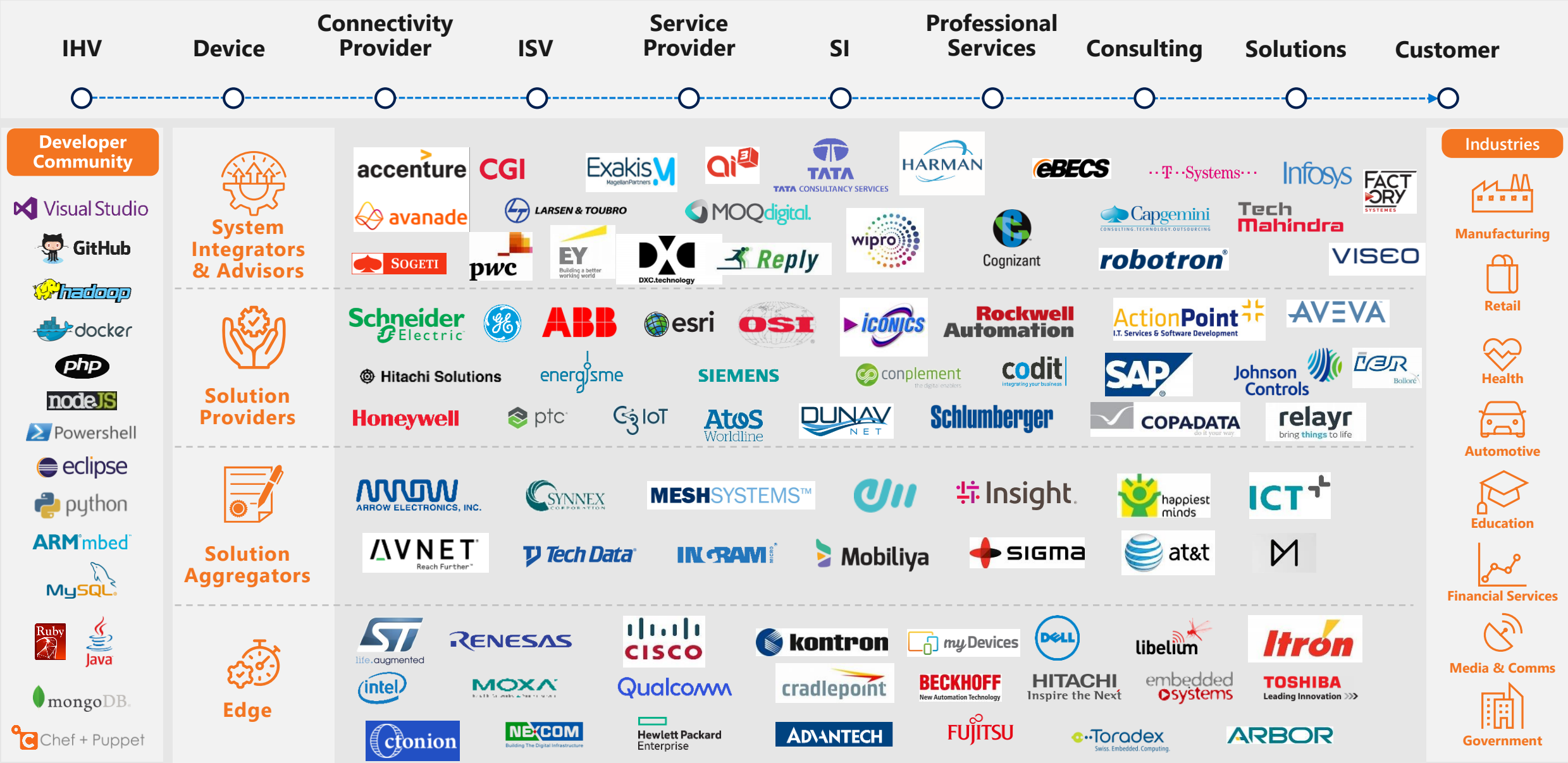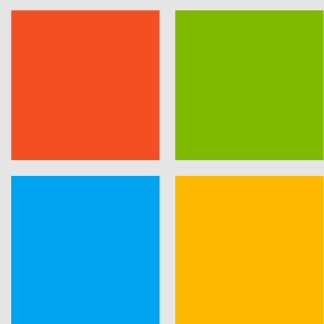## Cloud Security

Azure Security Center | Azure Active Directory

Key Vault | Policy-Based Access Control

Azure Security Center for IoT

AZURE

COMPUTE, NETWORK & DATA PaaS, IoT HuB...

DEVICE EVENTS NORMALIZATION & ENRICHMENT

SDK SECURITY Ext.

#1 SECURTY AGENTS

IOT EDGE SECURITY MODULE

SPHERE DEVICES

FIELD DEVICES AND GATEWAYS

Manufacturing · Retail · Financial Services · Health & Life Sciences · Smart City

THREAT INTELLIGENCE

SECURITY ANALYTICS
Threat Detections, Prescriptive Recommendations

#3

SCALABLE LOG ANALYTICS PLATFORM

Export to Excel and Power BI

IOT SECURITY

Solution-Wide Security Dashboard Centered at IoT Hub

Tight Integration with Device Twin for Management and Automation

AZURE SECURITY CENTER

Security Dashboards Deliver Rapid Insights into Security State Across All Workloads

Actionable Security Recommendations

Curated, Prioritized Security Alerts **#2**

Investigation Tools and Log Search

API REST APIs

Automation

Notifications

Partnership Opportunities

1. **Security Agents:** Build security agents to feed tailored security data from device for analysis
2. **Customized Alerts:** Define customized alerts to trigger on device-specific characteristics (e.g. if device is over a defined threshold of expected activity)
3. **Scale:** Investments in integration with Azure Security Center and Log Analytics scale out to IoT solutions.

Building an IoT Fabric with the Largest, Most Diverse IoT Ecosystem