Microsoft Azure

Build end-to-end IoT solutions

Transforming your business with IoT

Pamela Cortez
Azure IoT

Build end-to-end IoT solutions – Workshop Series

https://aka.ms/IoT-online-workshop

Transform your business with IoT

Devices and device communication

Device provisioning at scale

Messaging processing, analytics, and business integration

Work with Azure IoT Edge

Transform your business with IoT

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- Create an Azure dashboard and resource group.
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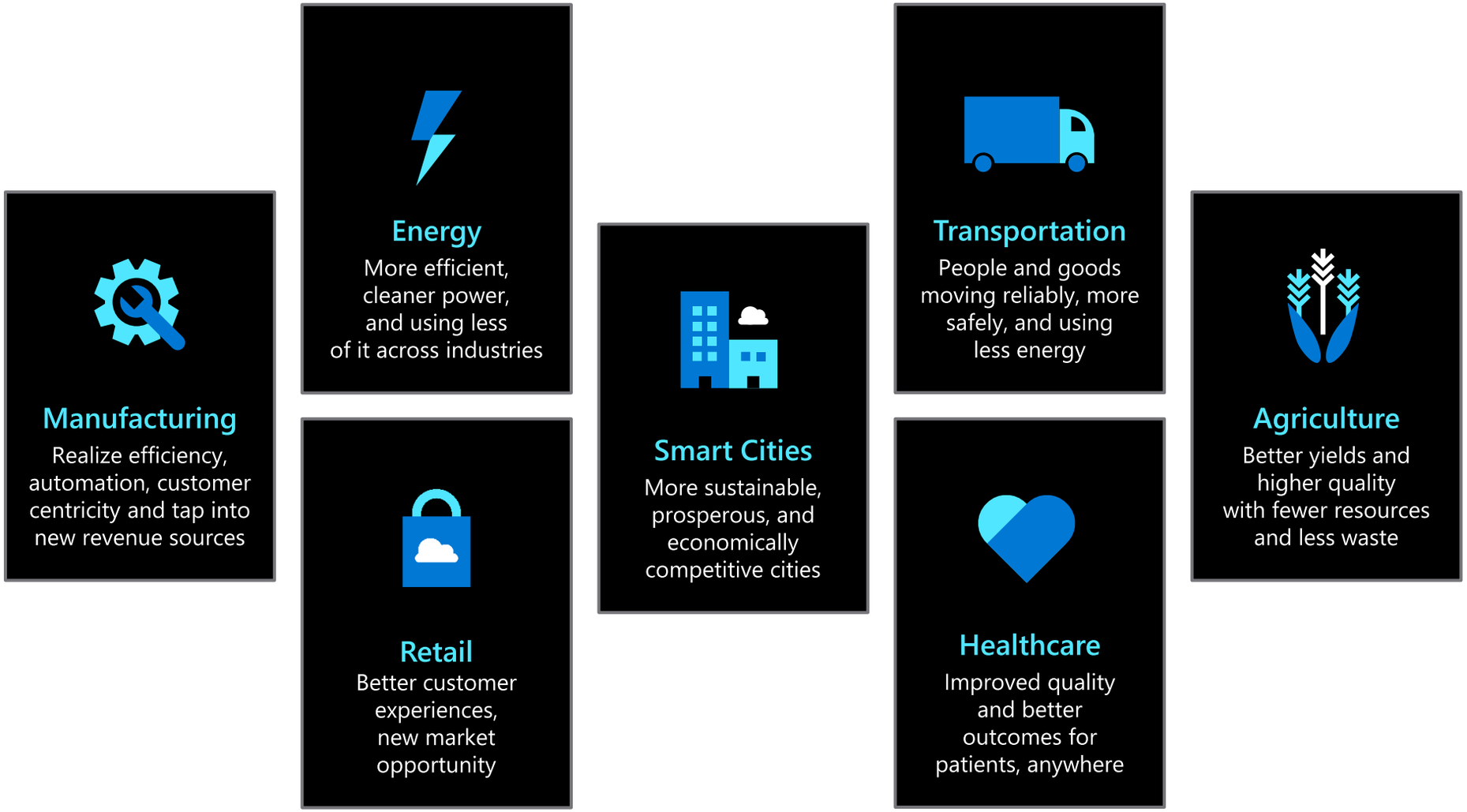
Developer Resources


Things
Insights
Actions

The new era of digitization across industries



IoT in Healthcare

IoT is enabling more agile, preventative and personalized care

89% of health organizations are adopting IoT

85% see IoT as critical to overall success

78% want to apply more IoT to their business

IoT Signals Report: Health Spotlight, Microsoft, February 2020

Top benefits for health organizations that adopt IoT:

Reduce chances for human error

Lower Hospital Readmissions

Help care teams be more productive

Improve traceability of equipment, supplies & inventory

Unlock cost savings & increase revenue

Ensure regulatory compliance consistency and patient privacy

Top use-cases in healthcare

Continuous Patient Monitoring

Extend patient care beyond the hospital walls, reduce re-admissions, and manage chronic diseases.

Inventory Management for Medical Supplies

Track inventory along your supply chain to detect theft, prevent outages and develop agile operations.

Smart Hospital Equipment

Gain insights from your hospital equipment monitor and manage equipment

Healthcare Manufacturing

Ensure medical devices and products maintain the highest levels of quality and comply with industry standards along the supply chain

Smart Hospital Building

Optimize operations for care teams, patients, and their support networks

Cold-chain supply tracking

Build a transparent, secure, and climate-controlled supply chain for your pharmaceuticals

Industry Partners:

Schneider Electric
ThoughtWire
sensoria HEALTH
wipro
GOJO

Industry Customers:

SWEDISH MEDICAL CENTER
stryker
Keck School of Medicine of USC

RANCHO LOS AMIGOS
NATIONAL REHABILITATION CENTER

Customer:
Rancho Los Amigos National Rehabilitation Center

Industry:
Health Provider

Size:
1,000-9,999 employees

Country:
United States

Products and services:
Microsoft Azure
Azure IoT Central
Azure API for FHIR

Microsoft

"What if you could take the best of wearable technology, the best of prosthetics and orthotics, and the best in cloud computing and create a solution that allows physicians to work on a treatment with their patients, rather than forcing it on them? That's what we've set out to do at Rancho Los Amigos with Sensoria Health and Microsoft Azure."

—Dr. David Armstrong, Dr. David Armstrong, Cofounder of the Southwestern Academic Limb Salvage Alliance (SALSA) at Rancho Los Amigos National Rehabilitation Center and University of Southern California (USC), Coeditor of the American Diabetes Association's *Clinical Care of the Diabetic Foot*, and Professor of Surgery at Keck School of Medicine, USC

Situation:

Every 20 seconds, someone has a leg or foot amputated due to diabetes-related complications.. Once the amputation takes place, five-year mortality is between 50 and 75 percent. Doctors and software specialists set out to address this with a wearable, cloud-connected orthotic device.

Solution:

Using a combination of Internet of Things (IoT) sensors, medical devices, Microsoft Azure IoT Central, and Azure API for FHIR, the team created the Optima Molliter Motus Smart connected boot. Doctors and patients alike receive data from the boot to help them improve healing.

Impact:

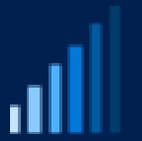
This new data-driven approach results in stronger doctor-patient relationships and more proactive care. The data can be shared easily and highly securely across multiple clinicians while helping them maintain compliance with relevant privacy laws.

IoT in Manufacturing

IoT is driving the fourth industrial revolution in manufacturing

92% of manufacturers consider IoT critical to the success of their company

87% of IoT decision makers in manufacturing have adopted IoT



96% of manufacturers are satisfied with the value IoT adds to their company

IoT Signals Report: Manufacturing Spotlight, Microsoft, July 2020

Azure IoT value prop for industrial organizations:

Unify your business data to **scale quickly across the enterprise** with common data models

Avoid vendor lock-in with open source and open industrial interoperability standards

Leading industry-specific **compliance and end-to-end security** from the device to the cloud

Reduce time-to-value with seamless integration with platforms from leading industrial IoT partners with Azure IoT

Top use-cases in manufacturing

Continuous-based Monitoring

Monitor key parameters of equipment to avoid premature and expensive equipment maintenance costs, extend the lifespan of your machinery, and avert critical downtime.

Predictive Maintenance

Mitigate disruptions by applying advanced analytics and machine learning to your production to ensure uptime through automatic alerts trigged by manufacturing data.

Overall Equipment Effectiveness

Generate critical insights of how well your plant is performing relative to its designed capacity by measuring availability, performance, and quality of your production.

Intelligent Supply Chain

Ensure the quality and authenticity of in-transit products by tracking materials and monitoring resource consumption with IoT sensors connected throughout the supply chain.

Facility Management

Optimize energy consumption, space utilization, and workforce productivity within the factory. Increase worker safety and save money by efficiently managing the plant.

Asset Tracking

Avoid expensive equipment loss, minimize operational downtime, and enhance the productivity of first-line workers by tagging assets, equipment, and tools.

Industry Partners:

ptc

SAP

Schneider Electric

Rockwell Automation

SIEMENS

ABB

OPEN MANUFACTURING PLATFORM

Industry Customers:

Weidmüller

BÜHLER

GRUNDFOS

BASF

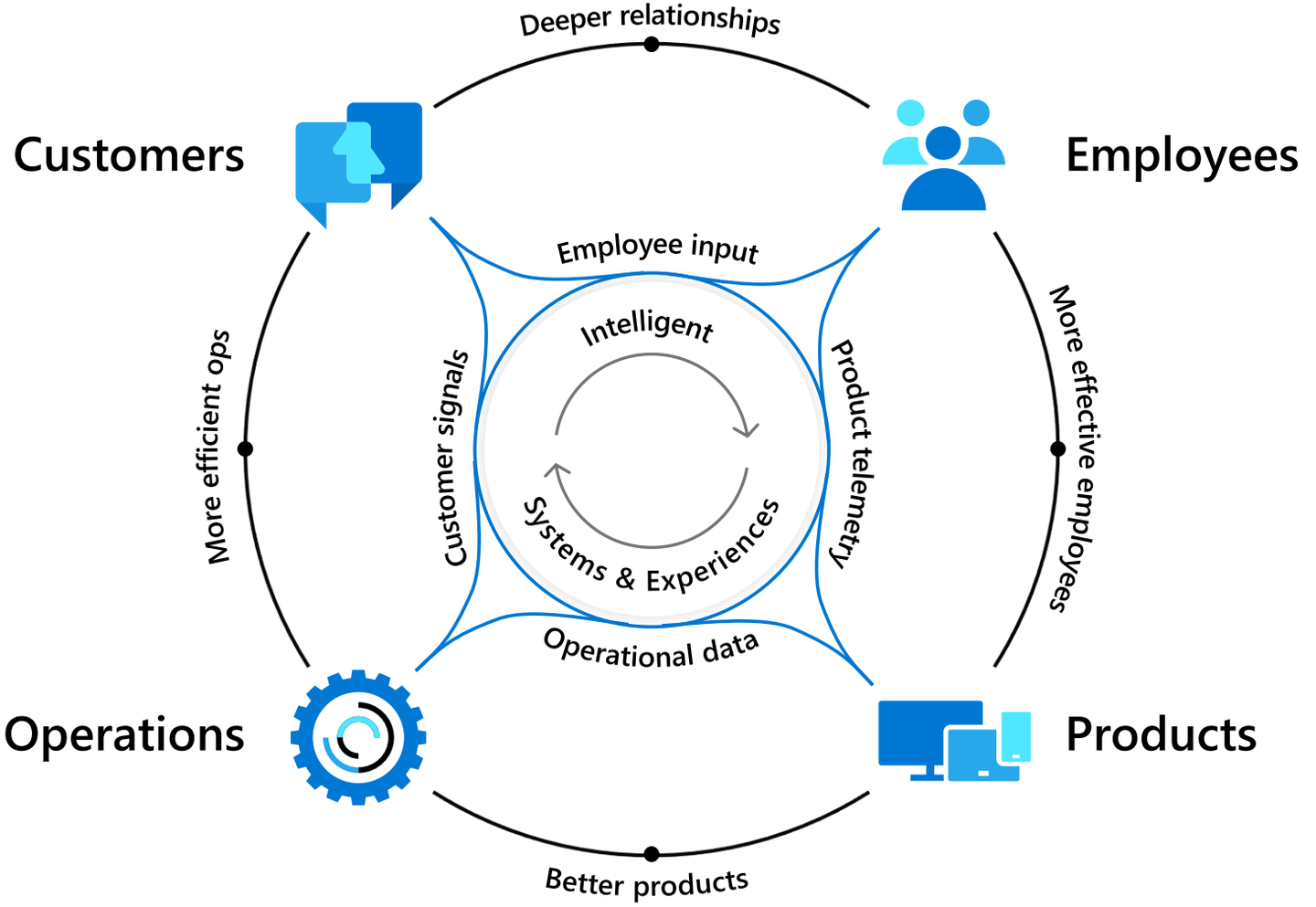
BMW

SANDVIK Coromant

FESTO

Enabling a digital feedback loop

1. Data: Capture digital signal across business
2. Insight: Connect and synthesize data
3. Action: Improve business outcomes



Fueling opportunities

$267 billion

Predicted USD spend on IoT by manufacturers by 2020[1]

+$100 million

Average increase operating income among the more digitally transformed enterprises[2]

94%

Percentage of businesses projected to be using IoT by the end of 2021[3]

80B

Connected “things” by 2025 generating 180ZB of data

$130B

New monetization avenues due to IoT-related services

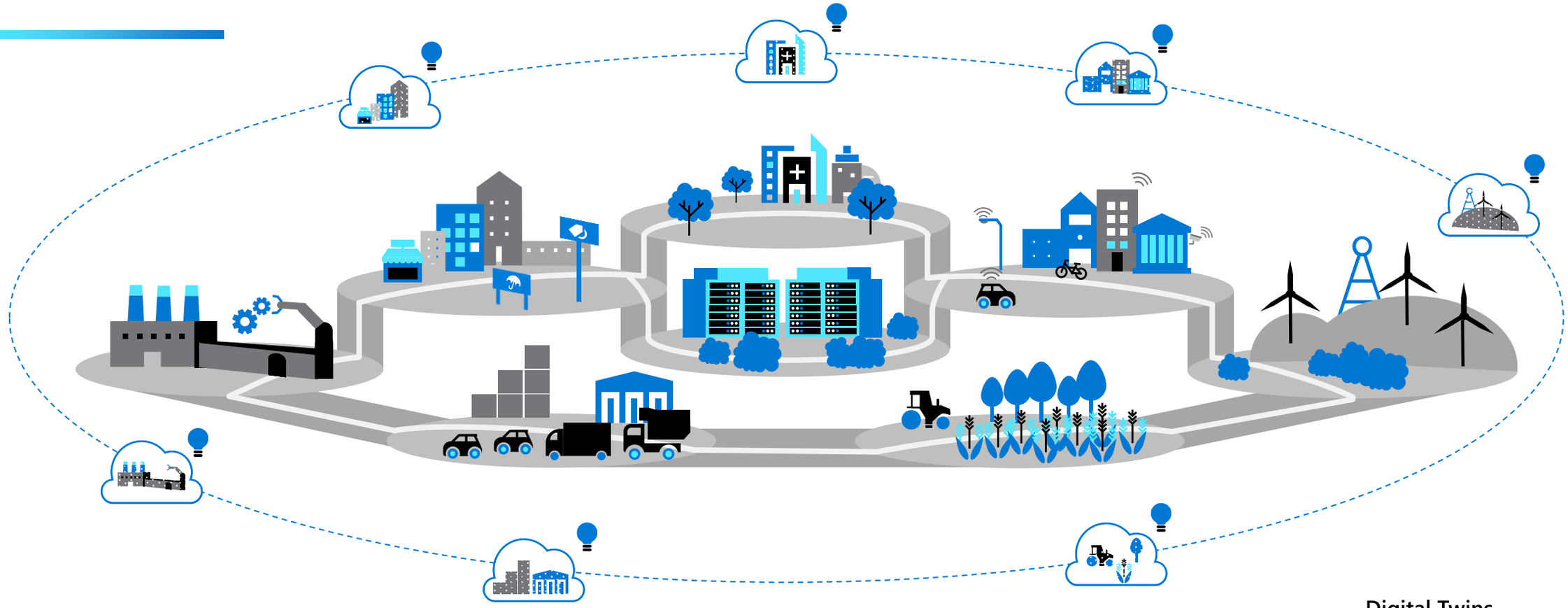
80%

Companies that increased revenue as a result of IoT implementation

$100M

Average increase in operating income (avg. 8%) among the most digitally transformed enterprises

Innovations enabling new opportunities



Cloud
Globally available, unlimited compute resources

IoT
Harnessing signals from sensors and devices, managed centrally by the cloud

Edge
Intelligence offloaded from the cloud to IoT devices

AI
Breakthrough intelligence capabilities, in the cloud and on the edge

Digital Twins
Create living replicas of any physical environment, track the past and predict the future

Microsoft IoT

Innovations in IoT from cloud to edge

Simplifying IoT operations

Preconfigured solutions to accelerate the most common IoT scenarios

Securing IoT endpoints

Proactively monitor IoT devices to implement security best practices

Bringing AI to the edge

Real-time intelligence running where the data resides

Delivering spatial intelligence at scale

Manage physical world with digital models across smart spaces

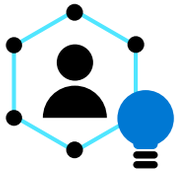
Largest and fastest-growing partner ecosystem from intelligent edge to intelligent cloud

Azure

We're dedicated to improving every facet of IoT for business, and we're investing **$5 billion** to do it.

What we learned from customers in our IoT Signals survey

88% See IoT as critical to business success



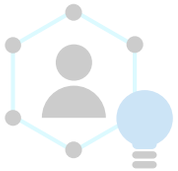
48% Cite lack of skilled workers for IoT solutions

97% Security is top of mind

Source: IoT Signals
https://azure.microsoft.com/en-us/iot/signals/

What we learned from customers in our IoT Signals survey

88% See IoT as critical to business success → The need for comprehensive IoT services



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Source: IoT Signals
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Microsoft IoT

Broadest portfolio

Industry Solutions

Manufacturing | Retail | Agriculture | Energy | Smart Cities | Healthcare | Transportation

IoT app services

Azure IoT Central

Dynamics Connected Field Service

IoT core services (PaaS)

Azure IoT Hub

Azure Digital Twins

Azure Time Series Insights

Azure IoT Hub Device Provisioning Service

Azure Maps

Azure Security Center for IoT

IoT Edge offerings

Azure IoT Edge

Azure Sphere

Azure RTOS

Windows IoT

Microsoft Azure

Infrastructure | Data | AI | App Dev

Microsoft's comprehensive IoT product portfolio

Azure Security Center for IoT

Azure IoT Priority Verticals

Manufacturing | Retail | Agriculture | Energy | Smart Cities | Healthcare | Transportation

Azure IoT Solutions

- Azure IoT Central (SaaS)
- Azure IoT Reference Architecture
- Dynamics Connected Field Service (SaaS)

Azure Services for IoT

- Azure IoT Hub
- Azure IoT Hub Device Provisioning Service
- Azure Digital Twins
- Azure Time Series Insights
- Azure Maps
- Azure Stream Analytics
- Azure Cosmos DB
- Azure AI
- Azure Cognitive Services
- Azure ML
- Azure Logic Apps
- Azure Active Directory
- Azure Monitor
- Azure DevOps
- Power BI
- Azure Data Share
- Azure Spatial Anchors

IoT & Edge Device Support

- Azure RTOS
- Azure Sphere
- Azure IoT Device SDK
- Azure IoT Edge
- Data Box Edge
- Windows IoT
- Azure Certified for IoT—Device Catalog
- Azure Stream Analytics
- Azure Storage
- Azure ML
- Azure SQL
- Azure Functions
- Azure Cognitive Services

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Developer Resources

Architecture of an IoT solution

A More Realistic View…

Fault tolerance

Data storage

Deployment

Enterprise integration

Cloud-to-device commands

Business process integration

Cold path analytics

Device recovery

Solution scale

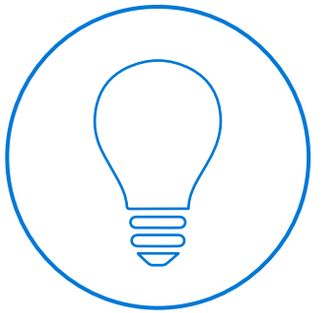
Operations monitoring

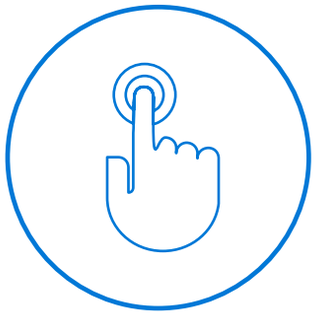
Cost management

Internationalization

High availability

Updating devices





Provisioning devices

Transport protocols

Device lifecycle

Warm path analytics

Things

Disaster recovery

Insights

Hot path analytics

Actions

Drivers

Device updates

Data ownership

< ---- End-to-End Security ---- >

On device analytics

Data visualization

Industry and government compliance

HW certification

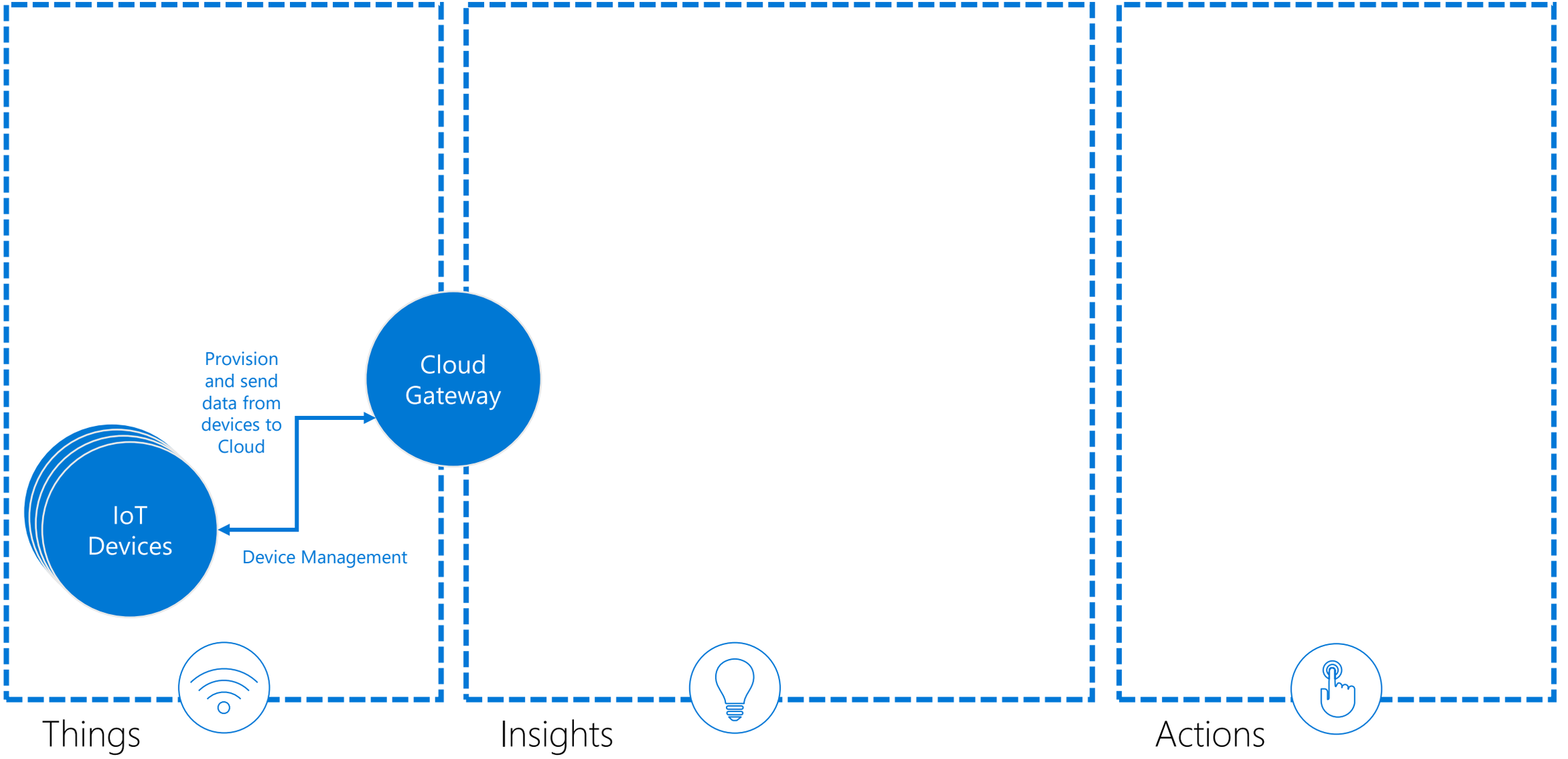
Manufacturing scale

Device commercialization

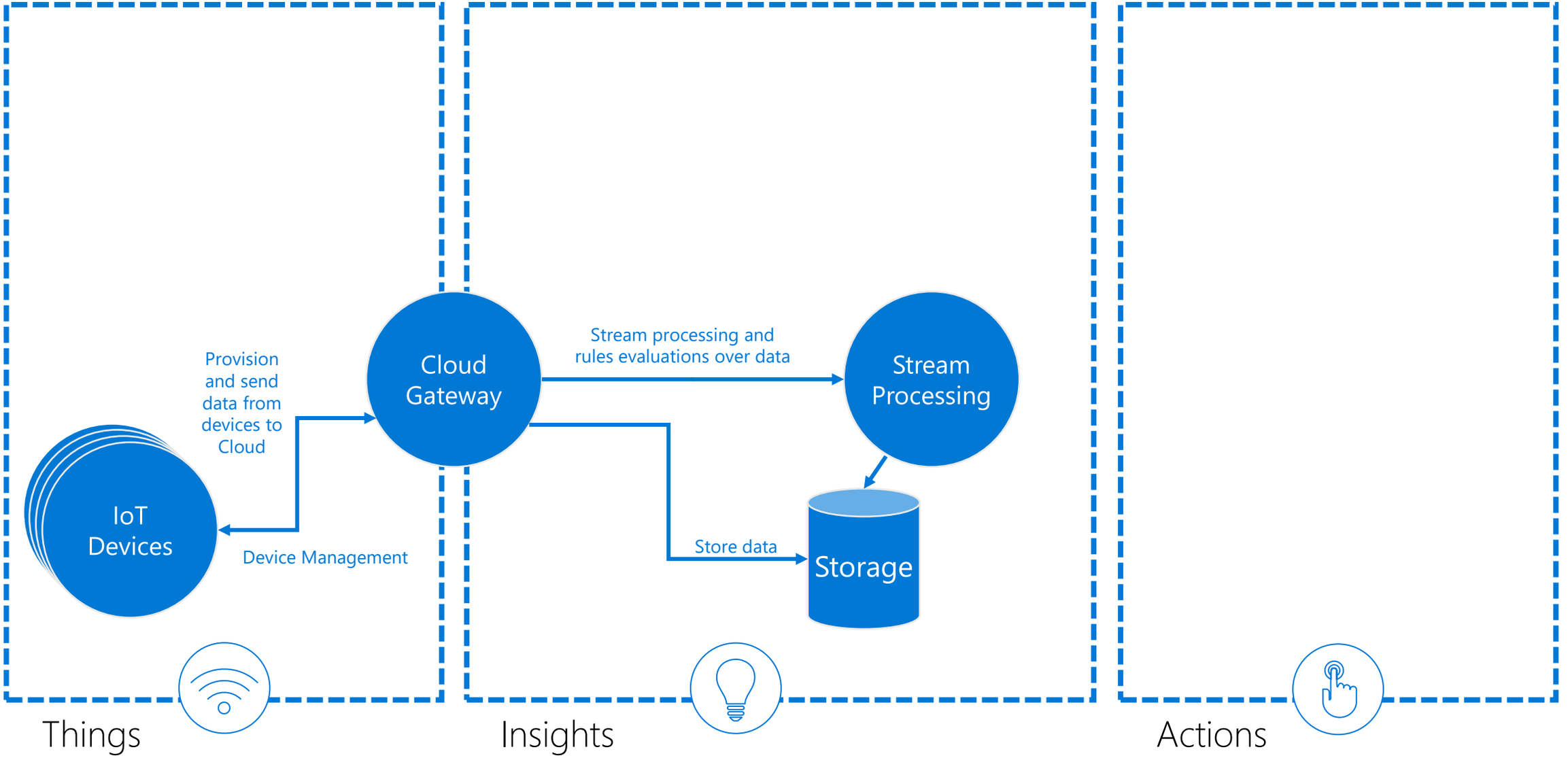
Securing data

… and why IoT needs simplifying

High-level IoT Architecture



High-level IoT Architecture



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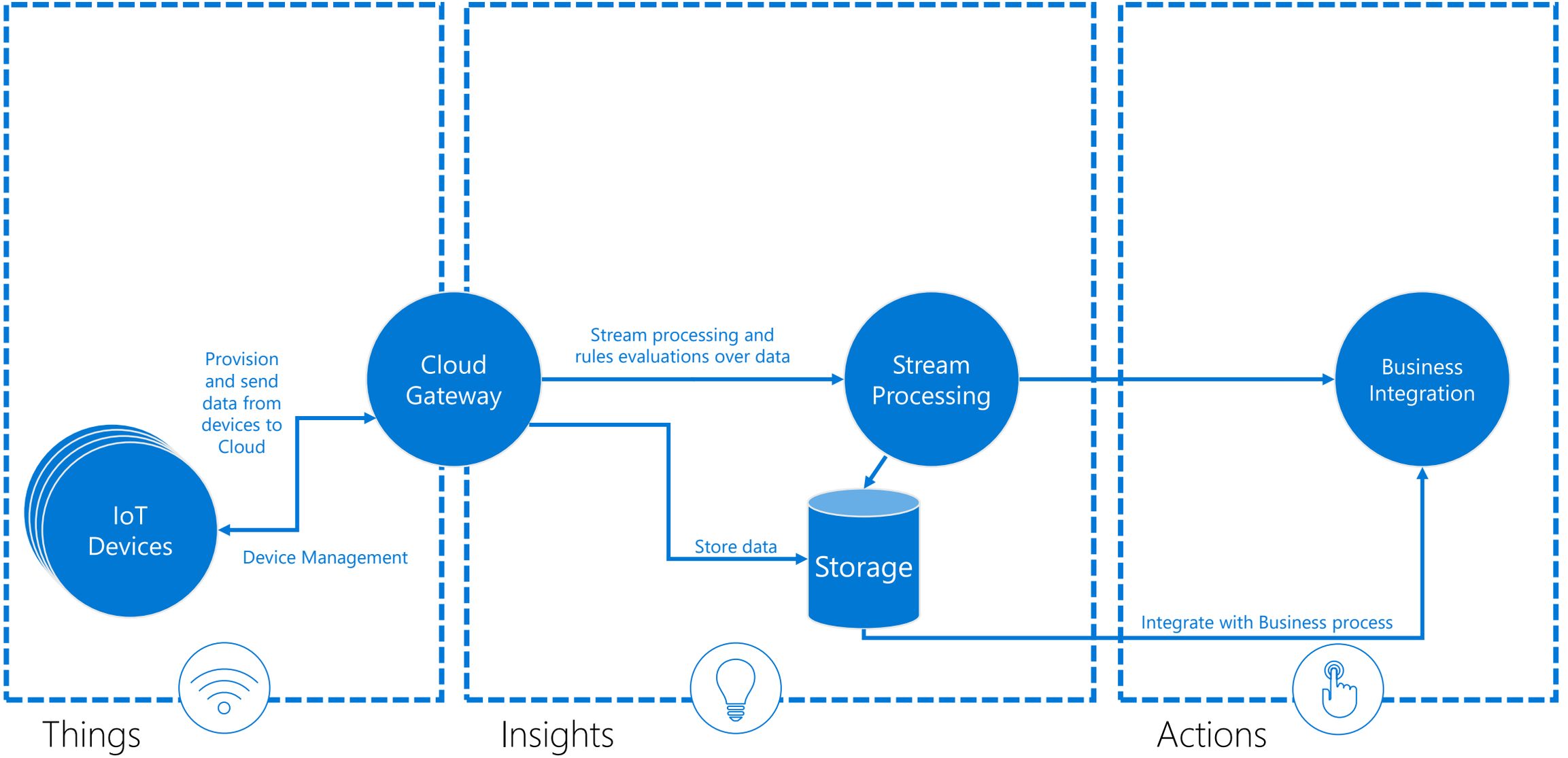

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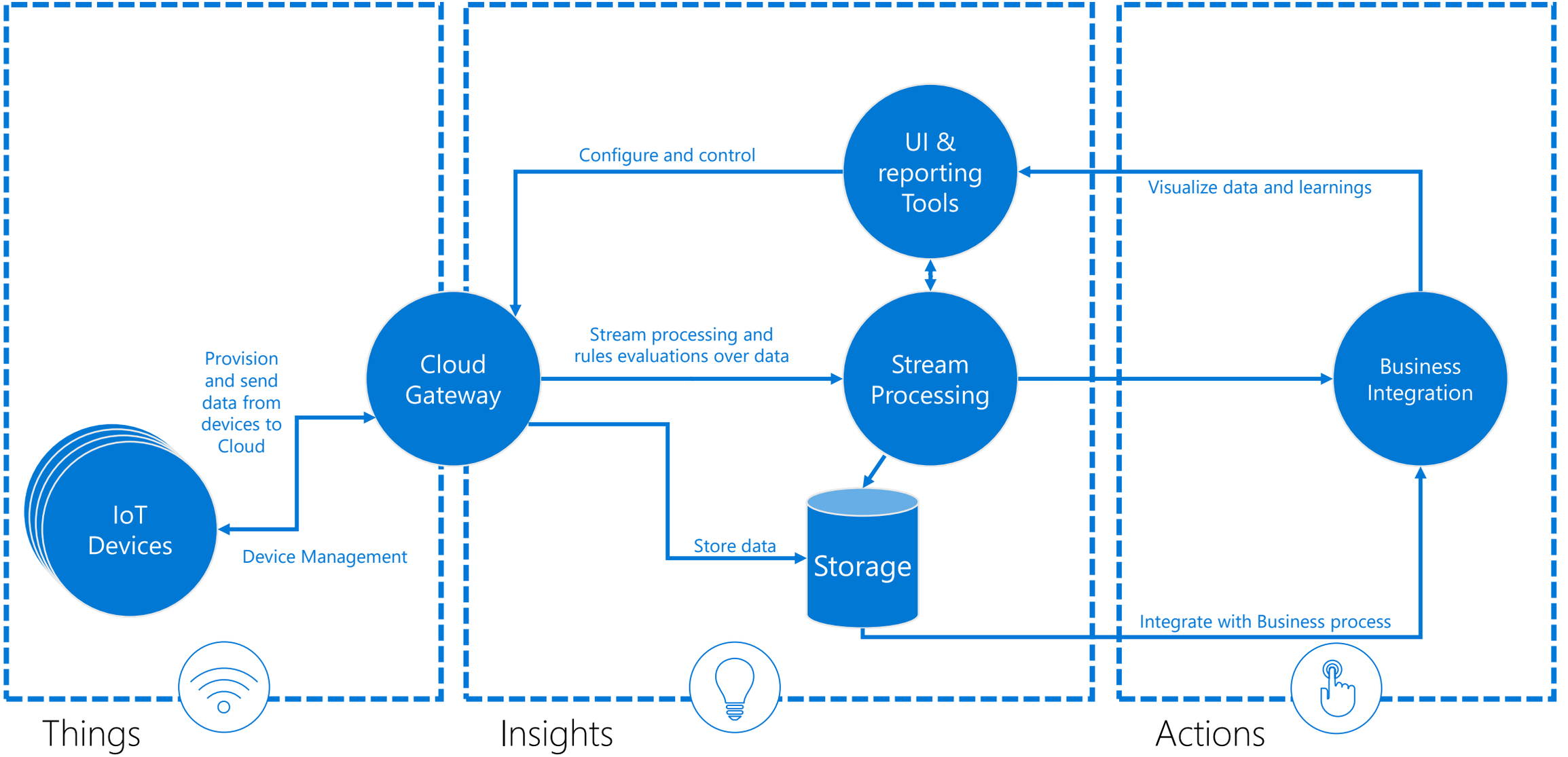

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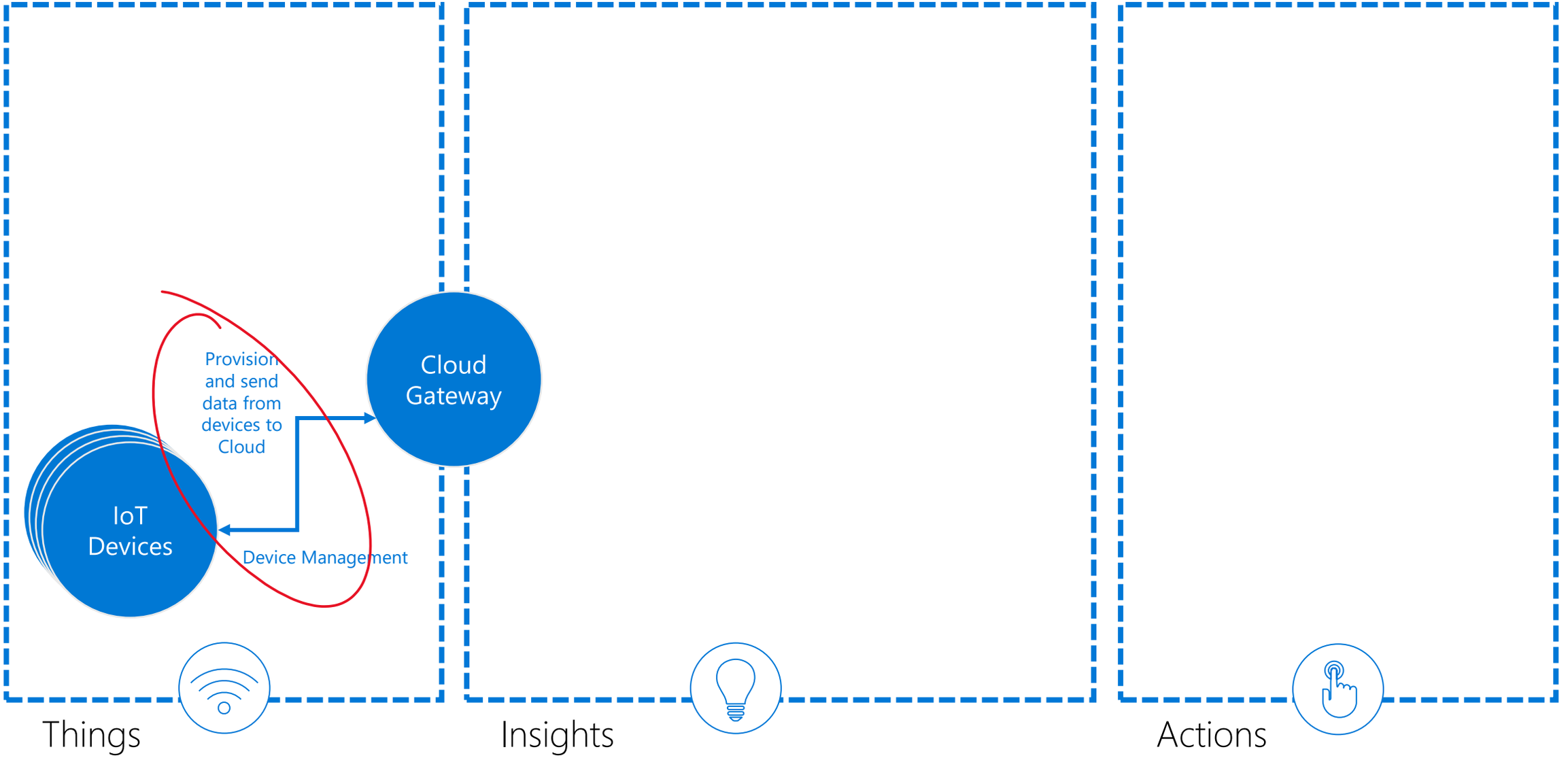


Azure IoT Hub

Platform as a Service (PaaS)

Establish bi-directional communication with billions of IoT devices

Enhance security with per device authentication

Provision devices at scale with IoT Hub Device Provisioning Service

Manage devices at scale with device management

Multi-language and open source SDKs

Easily integration with other Azure services

Connect, manage and monitor millions of devices at scale

Rockwell Automation

Rolls-Royce

ECOLAB

Schneider Electric

MAERSK

Honeywell

BÜHLER

CRESTRON

IoT Hub and Device Provisioning Service

Azure IoT Hub

Bi-directional communication

Millions of Devices

Multi-language, open source SDKs

HTTPS/AMQPS/MQTTS

Send Telemetry

Receive Commands

Device Management

Device Twins

Queries & Jobs

Enterprise scale & integration

Billions of messages

Scale up and down

Declarative Message Routes

File Upload

WebSockets & Multiplexing

Azure Monitor

Azure Resource Health

Configuration Management

End-to-end security

Per Device Certificates

Per Device Enable/Disable

TLS Security

X.509 Support

IP Whitelisting/Blacklisting

Shared Access Polices

Firmware/Software Updates

Azure Security Center Support

Device Provisioning Service

IoT-scale automated provisioning

Zero-touch provisioning

Centralize your provisioning workflow

Load balance across multiple IoT Hubs

Re-provisioning support

Supports TPM + X.509

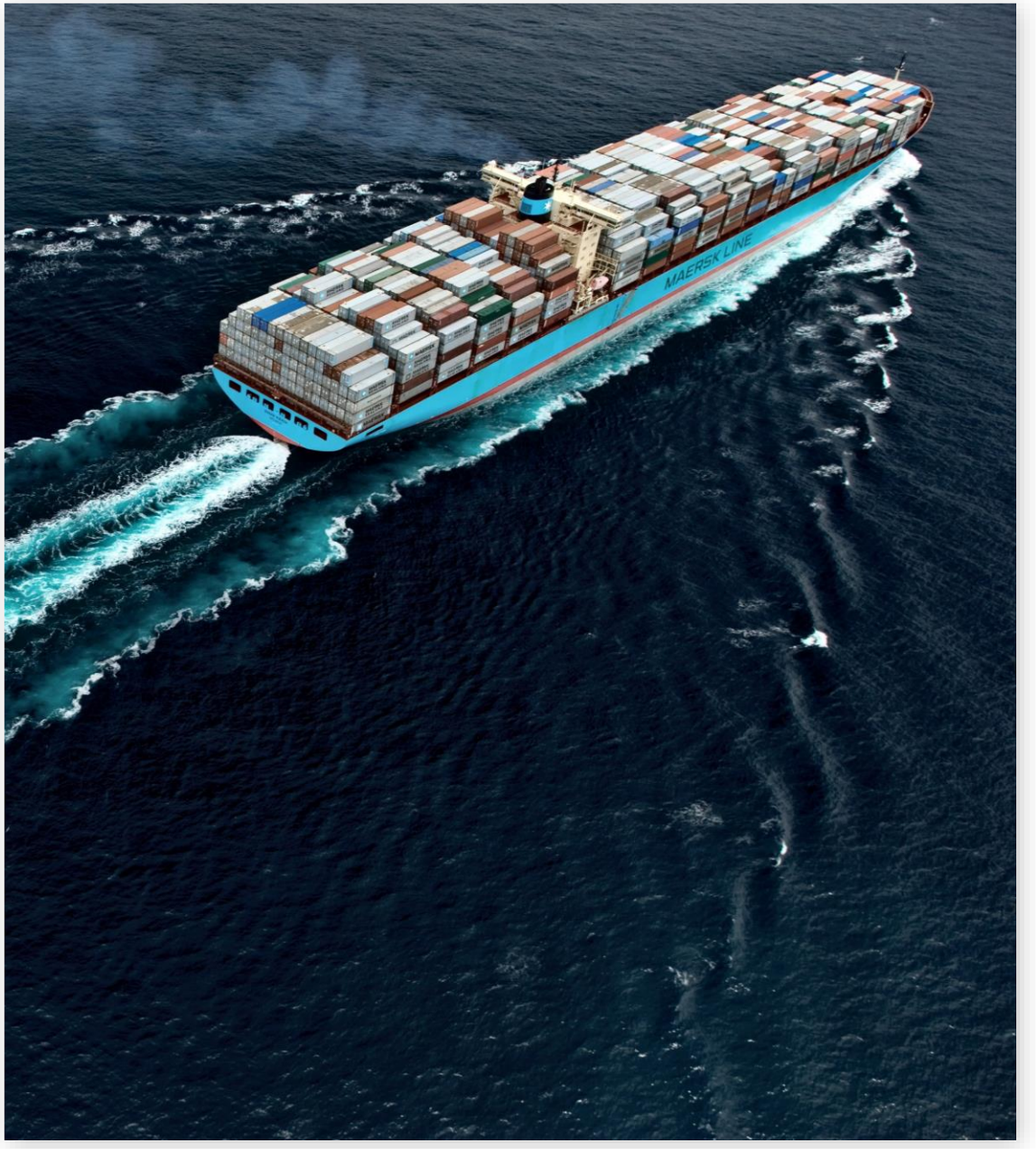
MAERSK

With Azure IoT Hub, Maersk provides near real-time updates to their customers about the state of their products in transit, no matter where on the planet it is.

"With Azure IoT Hub, we have seamless two-way communication between our IoT platform and devices."

"Being able to set up Azure IoT Hub globally in different locations and regionalize data ingestion opens up many future options for us."

-Siddhartha Kulkarni, Digital Solutions Enabler, A.P. Moller - Maersk



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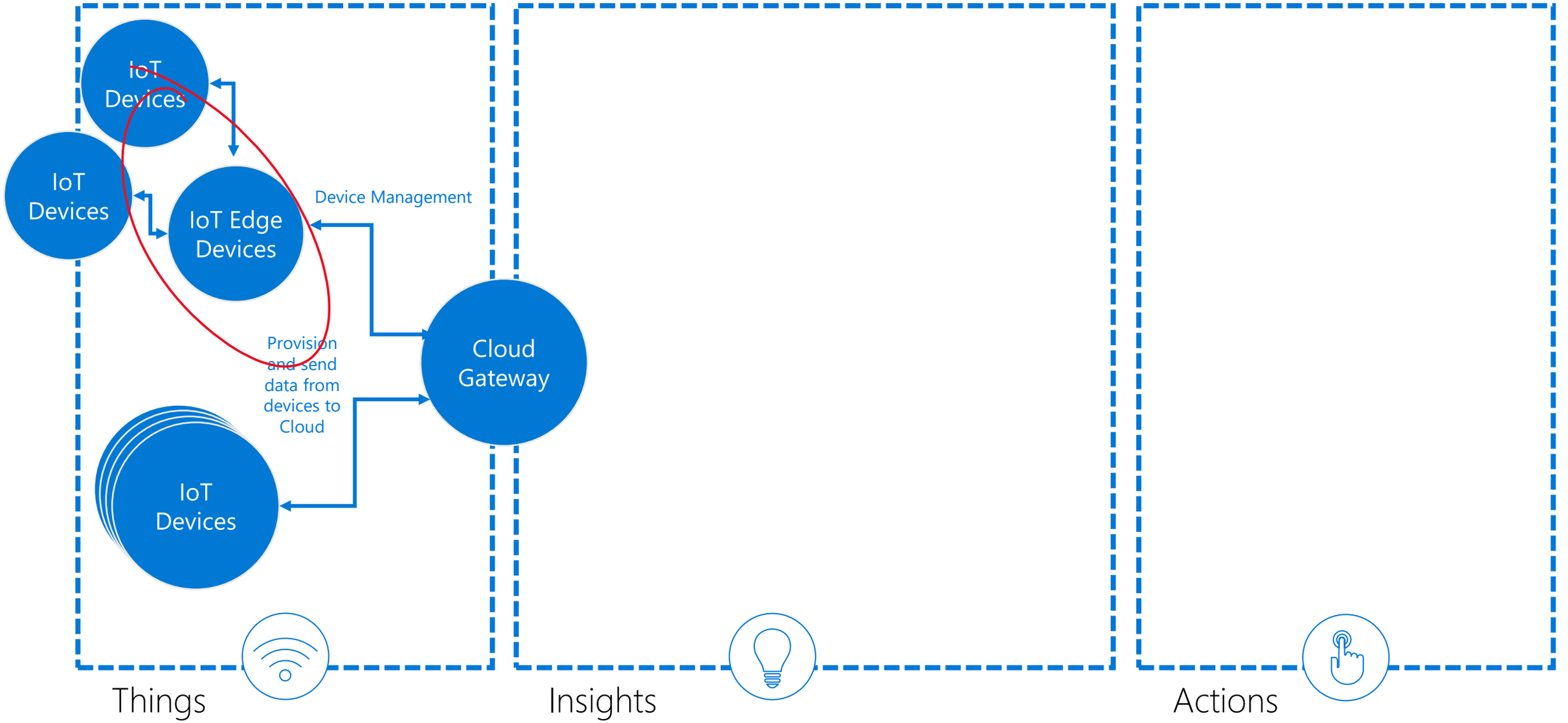
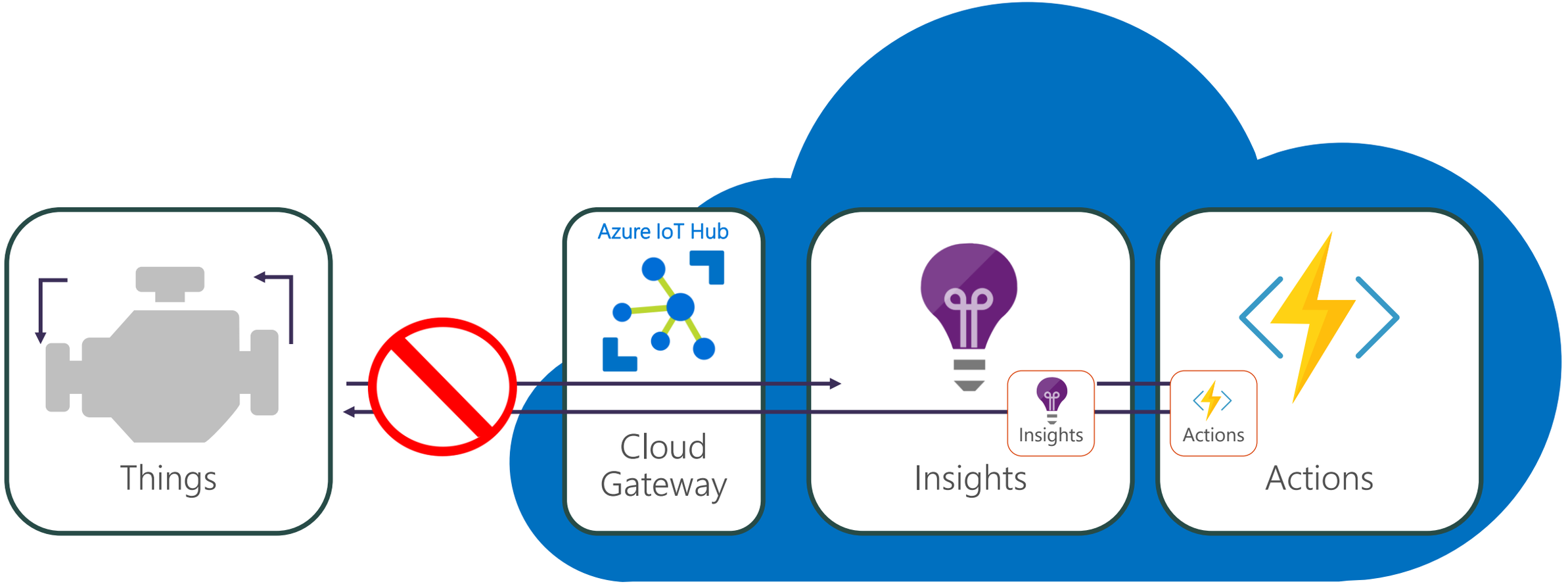
https://aka.ms/IntroAzureIoTLearningPath

Developer Resources

High-level IoT Architecture



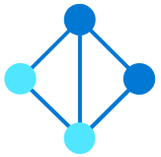
IoT application pattern + edge intelligence



IoT Edge

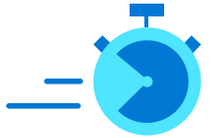
Run Azure AI, Azure Services and Custom Services directly on IoT devices

Offload AI and analytics workloads to the edge



Operate offline or with intermittent connectivity

Respond in real time since analytics happen at the edge



Open source, cross platform, container-based edge runtime

Simplify development using language skills you already have

Cloud intelligence deployed locally on IoT Edge devices

KOMATSU

NUVOCO

NEWCREST MINING LIMITED

BRIDGESTONE

ExxonMobil

PCL

NEWCREST
MINING LIMITED

Newcrest Mining Limited—an international mining company based in Australia— partnered with Microsoft to develop an intelligent IoT solution, enabling the company to manage operations with greater insight, efficiency, and precision.

By using an Azure IoT solution to collect data and push AI workloads to the edge, Newcrest optimizes operational performance and predictive maintenance—thereby reducing unplanned downtime and delivering quantifiable financial value.

"Azure IoT Edge has enabled Newcrest to build and deploy new machine learning models to the edge in a matter of days instead of months"

Newcrest customer story and video

Windows for IoT

The foundation for your intelligent edge

Smart

Easily run AI/ML at the edge with Windows ML and support for Azure IoT Edge

Secure

Keep devices secure for the long term with turnkey platform security

Fast

Quickly get IoT devices to market with out-of-the-box Operating System

Built on the foundation of 900M active Windows 10 devices

ADVANTECH

IDEX FIRE & SAFETY

Rockwell Automation

REDBACK TECHNOLOGIES

Keith & Koep

XOGO DECISION SIGNAGE

Johnson Controls

ActionPoint

TREKSTOR DEINE TECHNIK

Windows for IoT – Scalable Solution Platform

Windows 10 IoT Core and Services

For small-footprint, smart devices

Prototype and commercialize lower cost devices

Windows 10 IoT Enterprise

For fixed-function, smart devices

Locked down, full edition of Windows 10

Windows Server IoT 2019

For the most demanding edge computing workloads

SQL Server IoT 2019

For embedded solutions requiring the full power of SQL Server

10 years of support, security and manageability

Dover uses Microsoft IoT to deliver personalized experiences and targeted advertising right at the pump

Microsoft Partner Dover Fueling Solutions (DFS) has created a groundbreaking Internet of Things solution to inject fun, personality, and more profits into the mundane task of fueling up the car. The solution, iSenseTM remote monitoring, enables fuel pumps to connect with a customer, remembering past purchases so the dispenser video can highlight relevant products inside for purchase. That makes a customer feel special – and brings more income to the station's bottom line. It's a "virtual handshake" between the station manager and the customer.

Fueling station owners have long wanted to better connect with customers, as well as to boost store sales. The DFS iSense remote monitoring helps Country Corner, near Austin, Texas, do all of that – making what had been a chore, fueling up the vehicle, a fun, personalized experience. The solution connects fuel pumps with the customer's past purchases, and video preferences at the dispenser and more. That means happier customers, and more profits for the station.

"The DFS solution will present the customer with relevant and customized information, videos, news, and music, making that experience fast, simple, relevant, friendly, and fun."

-Scott Negley | Director of Dispenser ProductsDover Fueling Solutions (DFS)

Solution leverages Windows 10 IoT Enterprise, Azure IoT Hub, and Stream Analytics

Azure RTOS

Enabling new intelligent capabilities

Reliable, real-time performance for resource-constrained devices

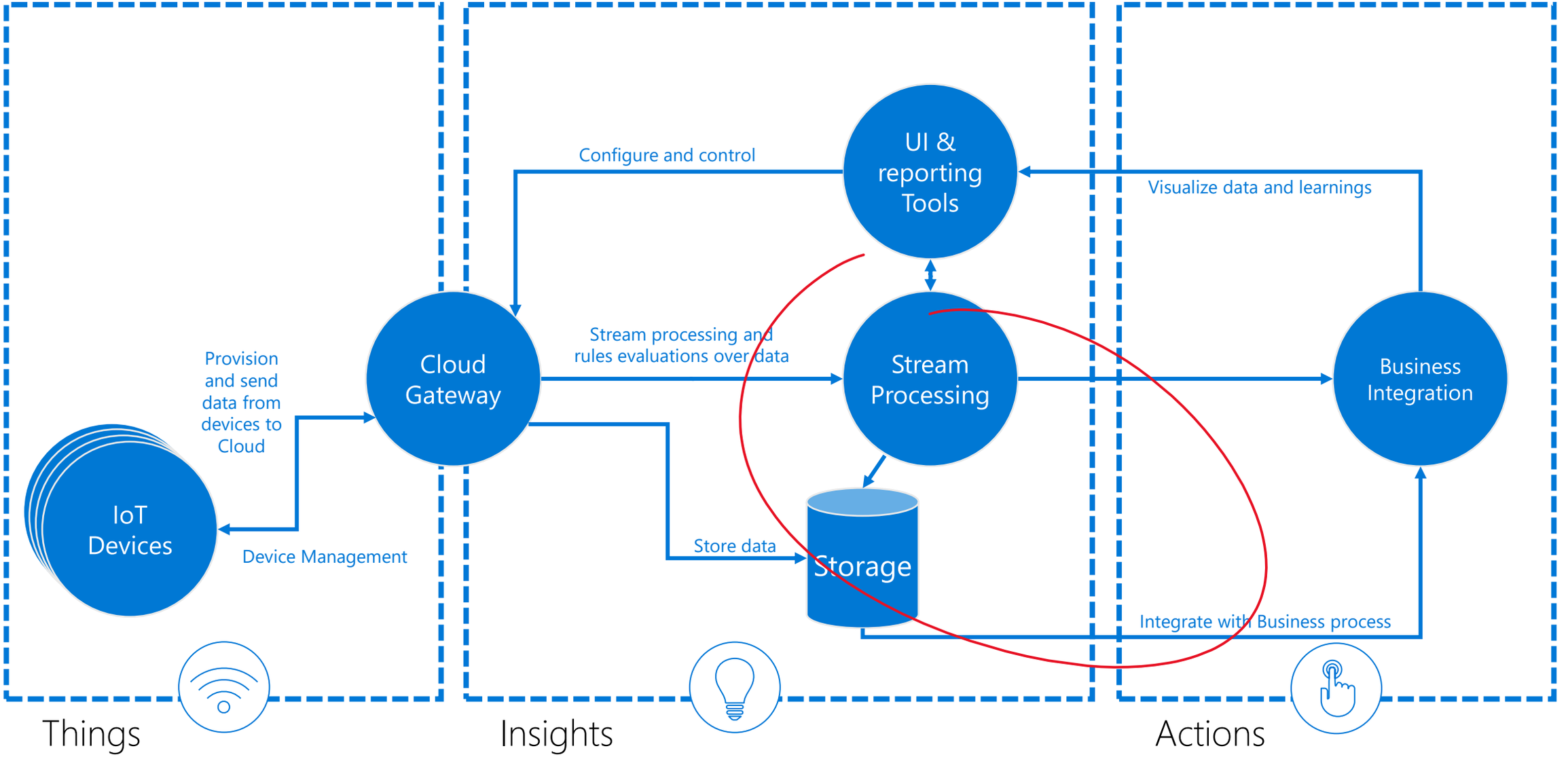
Easy-to-use solution that enables faster time to market

Access to the power of Azure IoT

Over 6.2 billion deployments, making it one of the most deployed RTOS in the world

MICROCHIP NXP RENESAS

High-level IoT Architecture



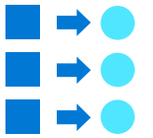
Azure Time Series Insights

IoT analytics solution giving you real-time insights

Ingest and process IoT data without extra coding or data preparation

Warm and cold data analytics for quick interactions with stream and historical data

Powerful visualization of IoT data for real time analysis



Contextualization of data based on your custom model

Turn data into actionable insights in seconds

ABB

ExxonMobil
Energy lives here™

Fonterra
Dairy for life

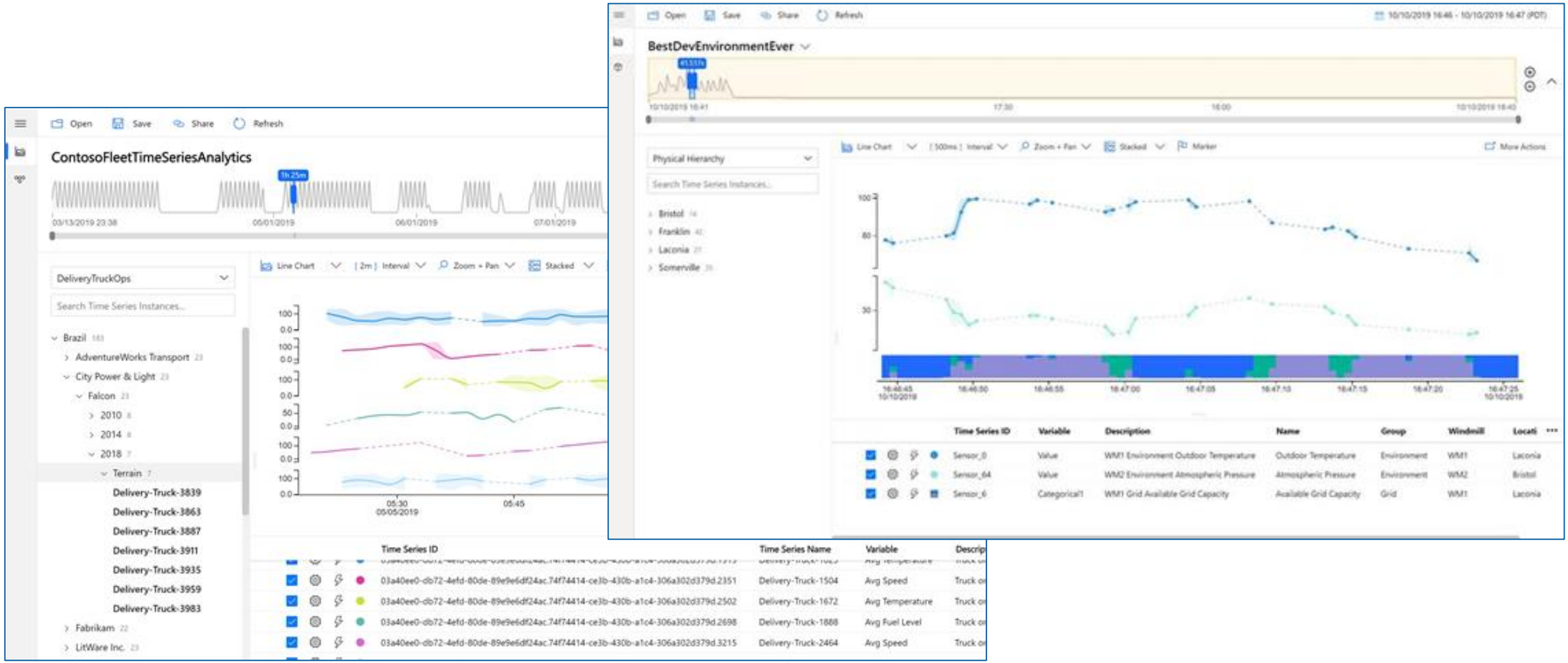
Chevron

ENGIE

ActionPoint

Azure Time Series Insights

IoT analytics solution giving you real-time insights



ActionPoint

ActionPoint partnered with Microsoft and Dell Technologies to develop IoT-PREDICT, an industrial IoT solution for predictive maintenance that incorporates machine learning, data analytics, and other advanced capabilities

"IoT-PREDICT exposes your industrial data to the Azure IoT stack, so you can explore the data using Time Series Insights, you can use Stream Analytics to take action with the data by setting up queries and alerts based on various performance thresholds, and you can report on the data using Power BI and share it with other applications."

-Ivan O'Connor: Head of IoT

ActionPoint customer story

A platform of geospatial APIs for the enterprise

AzureMaps

Maps
Render maps and satellite imagery across many geographies in several styles

SDKs
Web and Android SDKs to integrate Azure Maps into applications

Routing
Multi-algorithmic routing, batch routing and matrix routing

Search
Find addresses, points of interest, landmarks, using a multitude of search algorithms or in batch

Spatial Operations
Create Geofences, measure great circle distance, closest point and point in polygon

Traffic
Real-time traffic flow and incident detail, measuring distance to back or front of the line

Time Zones
Obtain time zone and current time information from any location

Geolocation
Query for the location of an IP address

Mobility
(Public Transit)
Get real time intelligence on public transit services

Data Storage
Host your private map data in Azure Maps

NEW

capabilities

Weather services
Historical, Current and Predicted Weather Services with Radar and Satellite maps

Power BI integration
Integration with Power BI w/ rich data service and more powerful capabilities

Gov Cloud support
Azure Maps services availability through Azure Government Cloud

Azure Maps

Geospatial APIs to add maps, spatial analytics, and mobility solutions to your apps

Get world-class location and mobility technology

Build location intelligence solutions for IoT and AI

Create rich data visualizations for your web and mobile apps

Use Azure Maps with open source and other familiar map controls

Put location intelligence to work for your enterprise

tagdat

AIRMAP

Beca

TRANSPORTATION & PUBLIC FACILITIES • STATE OF ALASKA •

if...

A platform of geospatial APIs for the enterprise

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NEW

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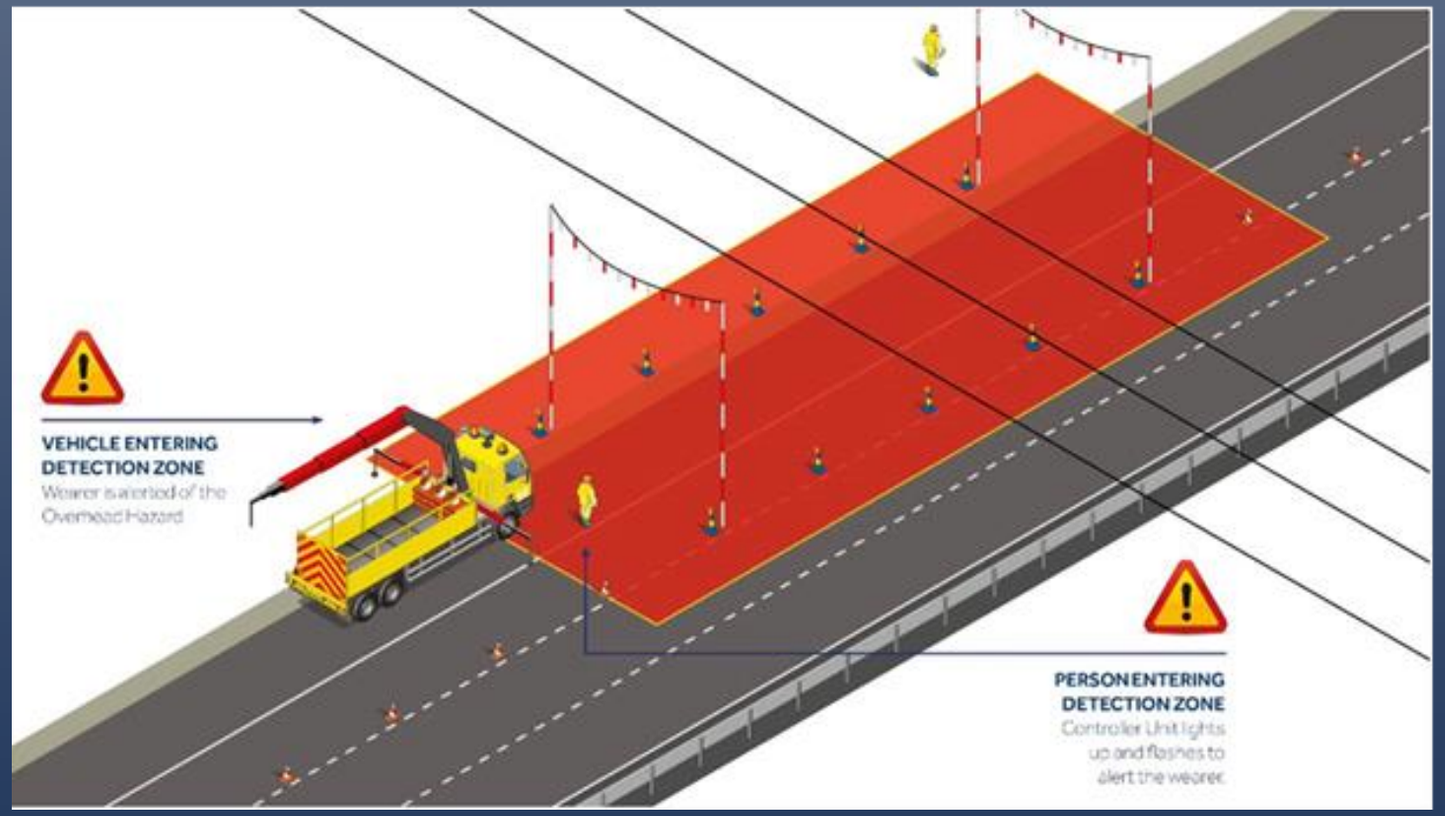
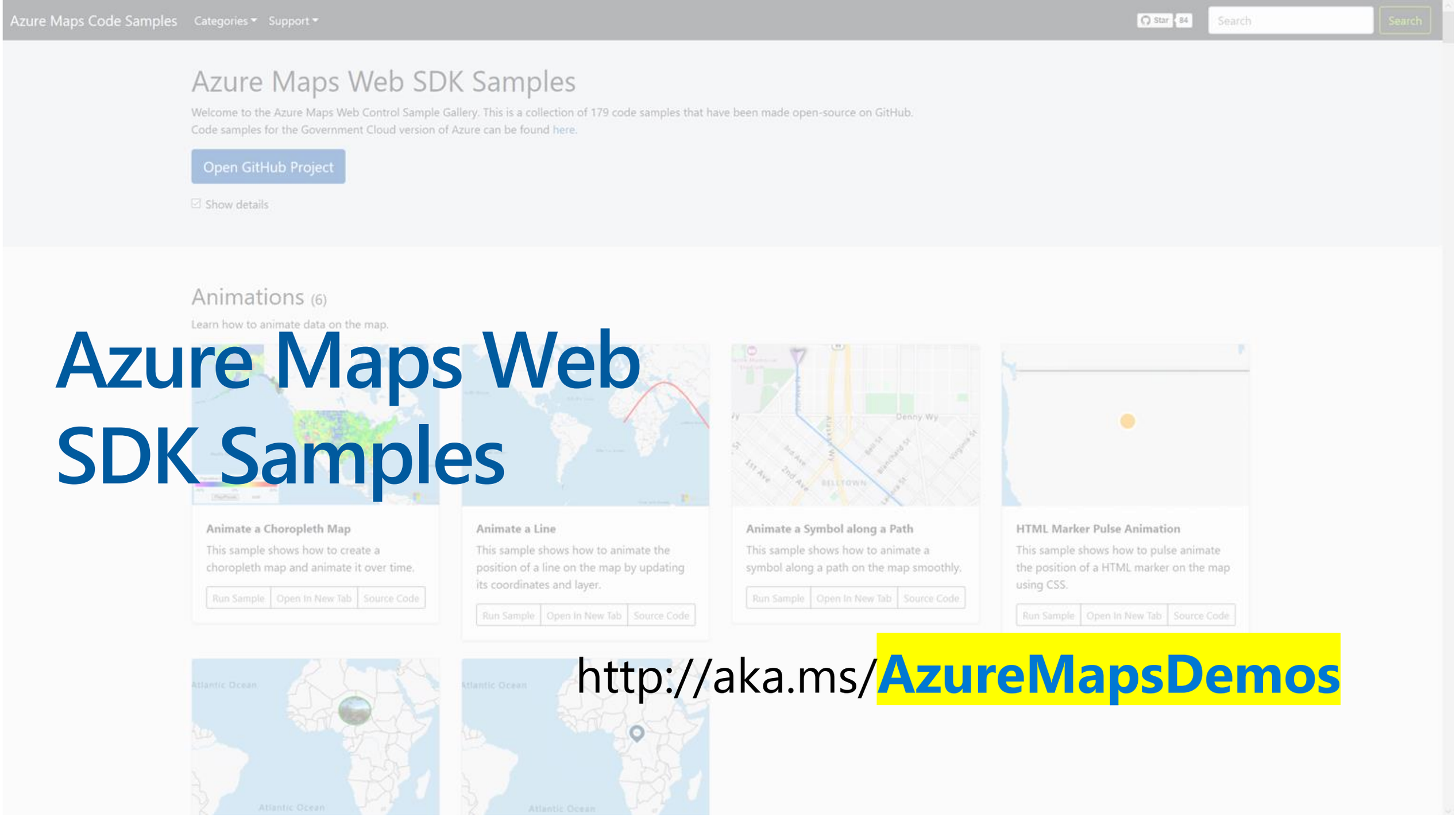
Azure Maps services availability through Azure Government Cloud

Worker Safety Using Geofencing

- Track Equipment & Workers in Mines & Construction Sites
- Geofence Dangerous Areas
- Trigger Warnings when workers enter a danger zone



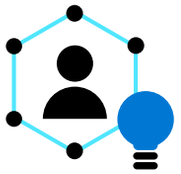


Azure Maps Web SDK Samples

http://aka.ms/**AzureMapsDemos**

What we learned from customers in our IoT Signals survey

88% See IoT as critical to business success



48% Cite lack of skilled workers for IoT solutions → The need for solutions that enable rapid application development without cloud development skills

97% Security is top of mind

Source: IoT Signals
https://azure.microsoft.com/en-us/iot/signals/

Microsoft IoT

Broadest portfolio

Industry Solutions

Manufacturing | Retail | Agriculture | Energy | Smart Cities | Healthcare | Transportation

IoT app services

Azure IoT Central

Dynamics Connected Field Service

IoT core services

Azure IoT Hub | Azure Digital Twins | Azure Time Series Insights | Azure Security Center for IoT | Azure Maps

IoT Edge offerings

Azure IoT Edge | Azure Sphere | Azure RTOS | Windows IoT

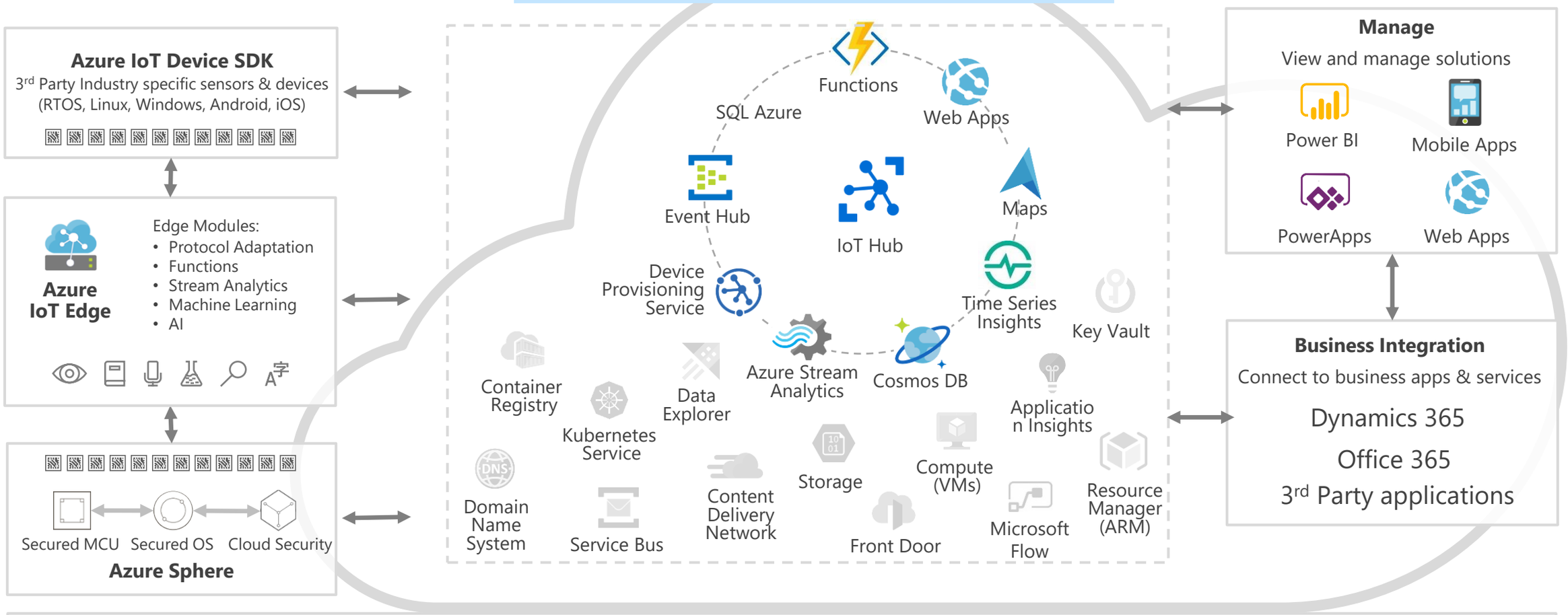
Microsoft Azure

Infrastructure | Data | AI | App Dev

Your options for building IoT solutions

1. Build from the ground up

The issue: Designing, integrating and maintaining dozens of individual services requires extensive expertise, time and financial investment

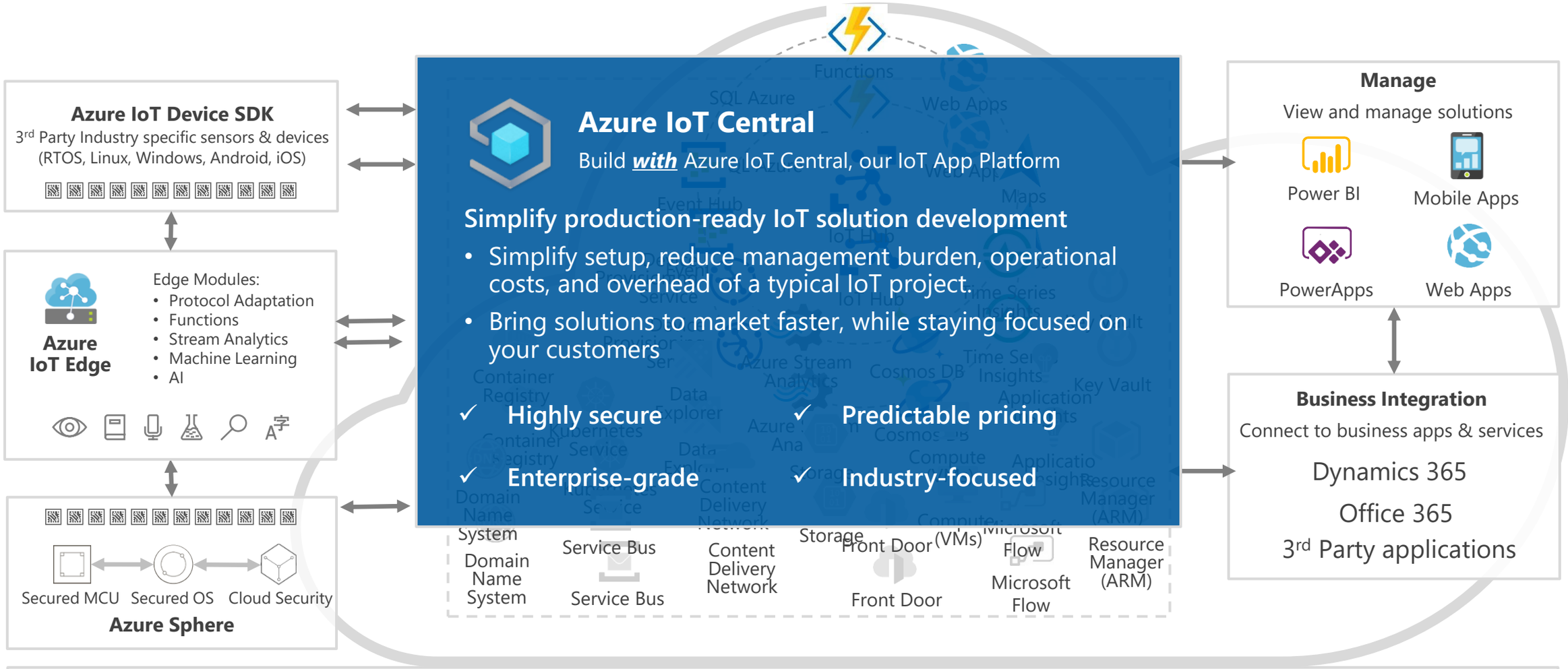


Azure Security Center for IoT

- Integrated view for CISO & SecOps personas to review enterprise security posture, including IoT solutions.
- Holistic view of IoT solution security posture for DevOps and IoT solution managers to review and manage day to day security status

Your options for building IoT solutions

2. Build with a fully managed IoT app platform



Azure Security Center for IoT

- Integrated view for CISO & SecOps personas to review enterprise security posture, including IoT solutions.
- Holistic view of IoT solution security posture for DevOps and IoT solution managers to review and manage day to day security status

PaaS vs. Managed App Platform:

FINDING THE RIGHT IOT SOLUTION FOR YOUR BUSINESS

Platform Services

Azure IoT Hub and Azure Digital Twins provide the building blocks for companies to construct customized IoT solutions

Managed App Platform

Azure IoT Central enables companies to get started quickly building IoT applications with a fully-managed IoT solution offering

1. Management: Where do you want to spend your time and resources?

I want full control over the underlying service of services of my solution, including taking ownership for managing and scaling to meet my needs, leveraging my in-house or partner-driven expertise to onboard devices and services to drive the solution.

I want to take advantage of an app platform that will handle with scale, security, and management of my IoT applications and devices.

2. Control: What elements of my solution do I want to customize?

My business requires total customization and control over solution architecture

I want to customize branding, dashboard structure, user roles, devices and own my telemetry, but I don't want to handle underlying IoT system management or overhead

3. Pricing: What structure best fits your needs?

I want to fine-tune services to control my overall cost

I need a simple, predictable pricing structure

*The right fit for businesses with **cloud solution and device expertise** (in-house or through partnerships) who want to **fine-tune their services** with a **high degree of control and customization***

Platform Services

Azure IoT platform (IoT Hub, Azure Digital Twins)

Customizable solutions for complex IoT scenarios

Managed App Platform

*The right fit for businesses that **do not wish to dedicate extensive resources to system architecture** and want to select a solution that provides **predictable pricing** and the ability to customize branding, device types, data management and user roles.*

Azure IoT Central

Fully-managed IoT app platform

IoT Central - Capabilities

White labeling your SaaS – your brand

App templates for Industry Verticals

Azure IoT Edge support

Multitenancy Support

API Support

IoT Plug and Play Support

New 2-tiered pricing model announced, based on message volume

App Templates for Industries

Retail

- Digital distribution center
- In-store analytics
- Checkout, Condition monitoring
- Connected logistics
- Smart inventory management

Healthcare

- Continuous patient monitoring

Energy

- Smart meter analytics
- Solar power monitoring

Government

- Water quality monitoring
- Water consumption monitoring
- Connected waste management

Benefits and outcomes

- 11 Industry-focused app templates across retail, healthcare, energy, and smart city for kickstarting solution builders
- Seamless device connectivity: Introducing Edge device management within IoT Central
- Extensibility to business applications to bring IoT insights to where decisions are made
- Scale: Connect millions of devices and manage ingress/egress of data from IoT Central

What is an IoT Central app template?

App templates are tools to help solution builders kickstart their IoT solution development

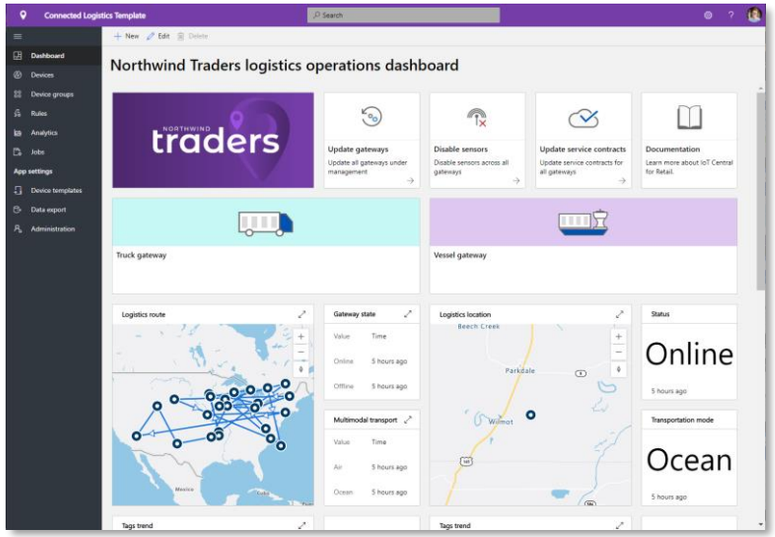
They consist of:

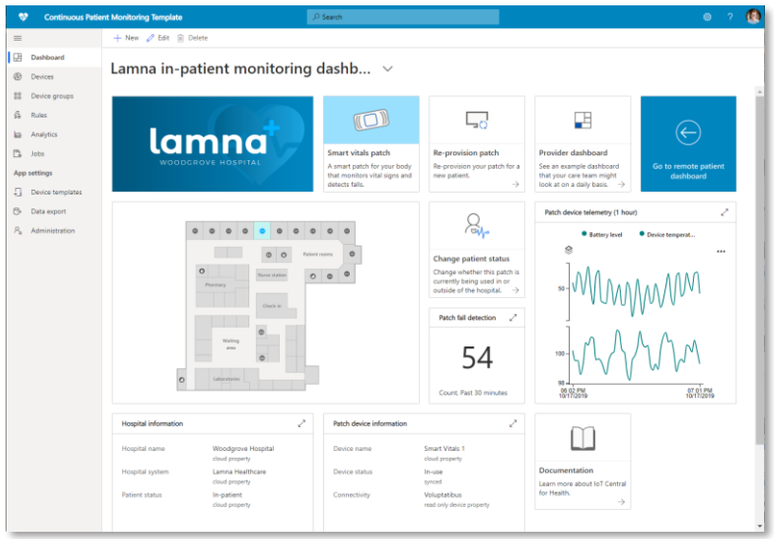
- Sample operator dashboards
- Sample device templates
- Simulated devices
- Pre-configured rules and jobs
- Rich documentation including tutorials

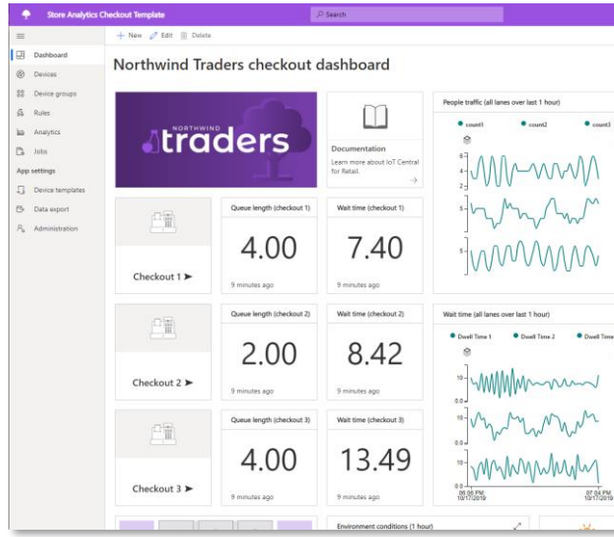
Brand templates using the white labeling feature

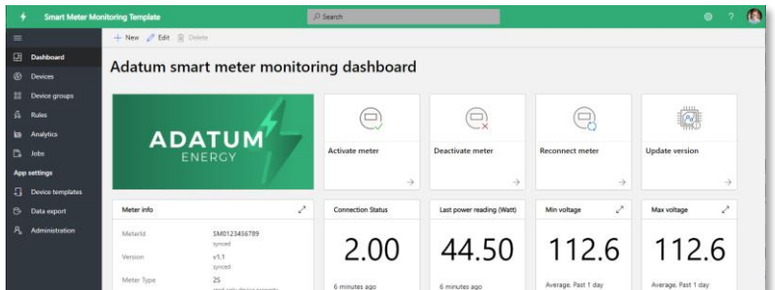
Sell to customers directly or through AppSource

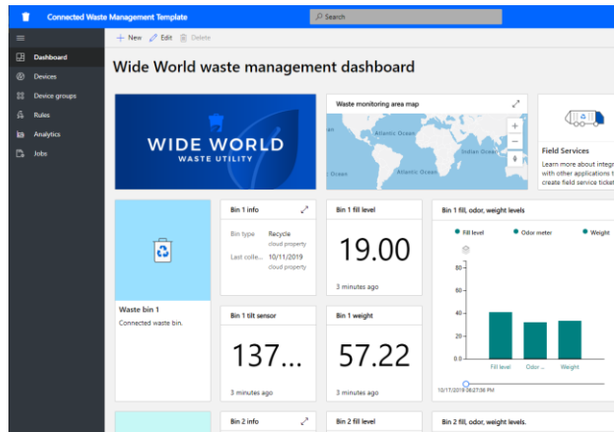
Your brand, your SaaS



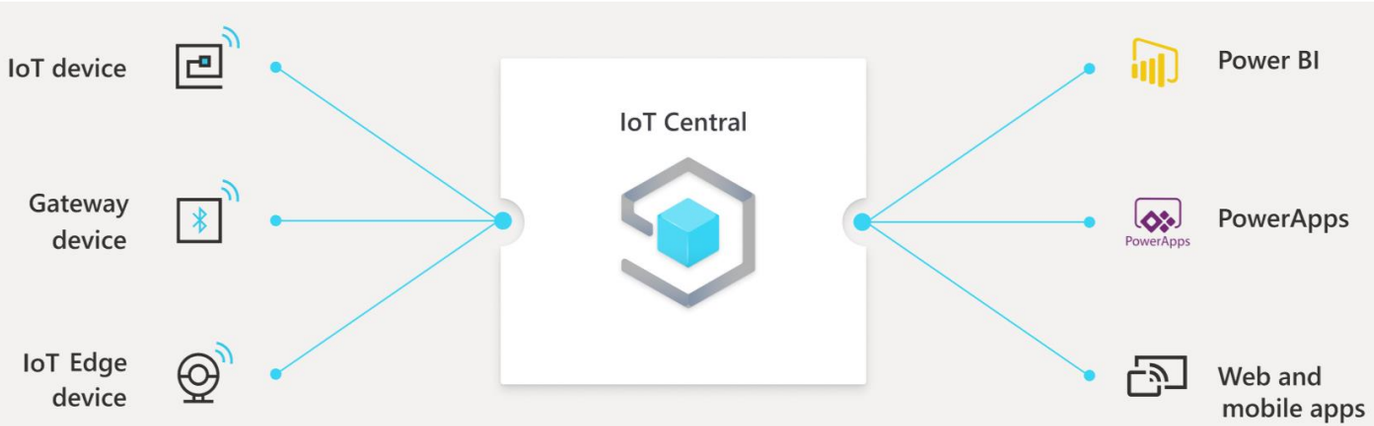








How do I build with IoT Central?



Take Action

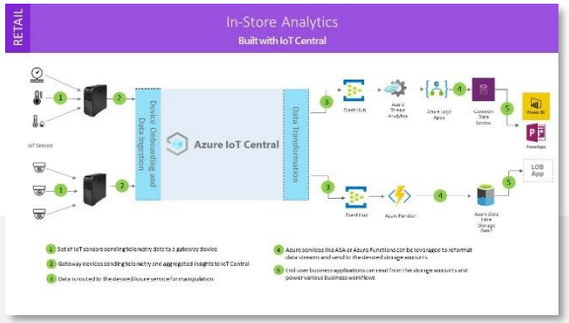
- No-code/Low-code actions with Microsoft Flow and Logic Apps

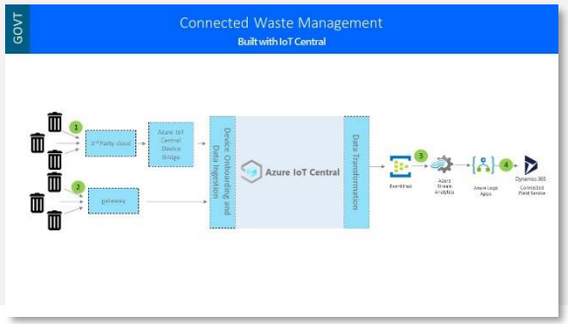
Integrate IoT Insights

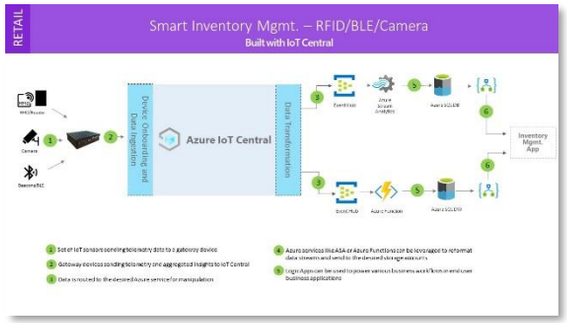
- Continuous IoT data routing through Event Hub and Service Bus
  - Build data pipelines using the breadth of Azure Services

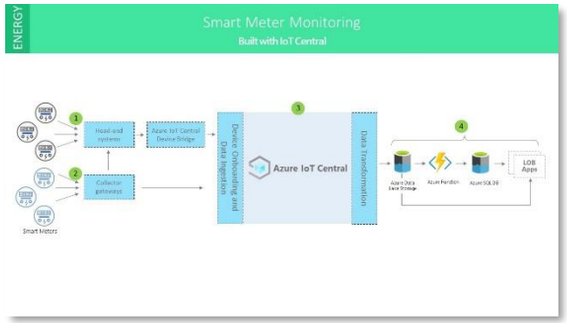
Build Solutions

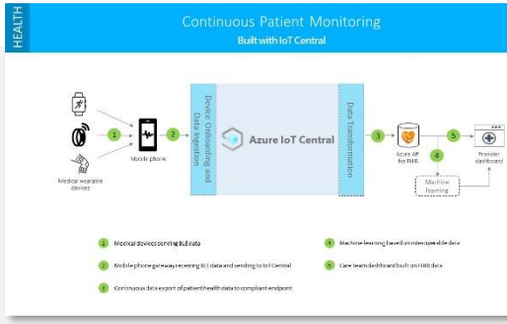
- IoT Central public APIs for device modeling, provisioning, lifecycle management, operations (updating/commanding), and data querying

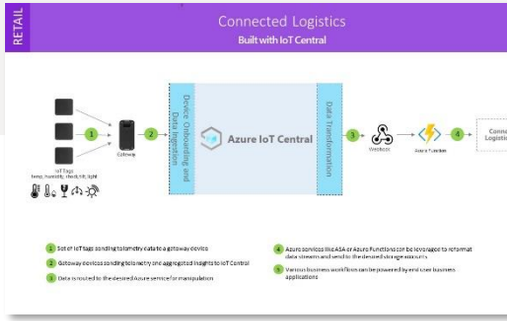


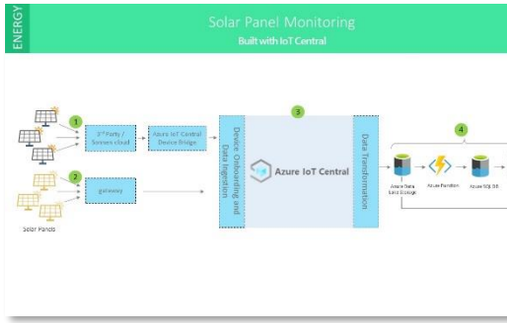












What we learned from customers in our IoT Signals survey

88% See IoT as critical to business success

48% Cite lack of skilled workers for IoT solutions

97% **Security is top of mind**

→ The need for turnkey IoT security solutions

Source: IoT Signals
https://azure.microsoft.com/en-us/iot/signals/

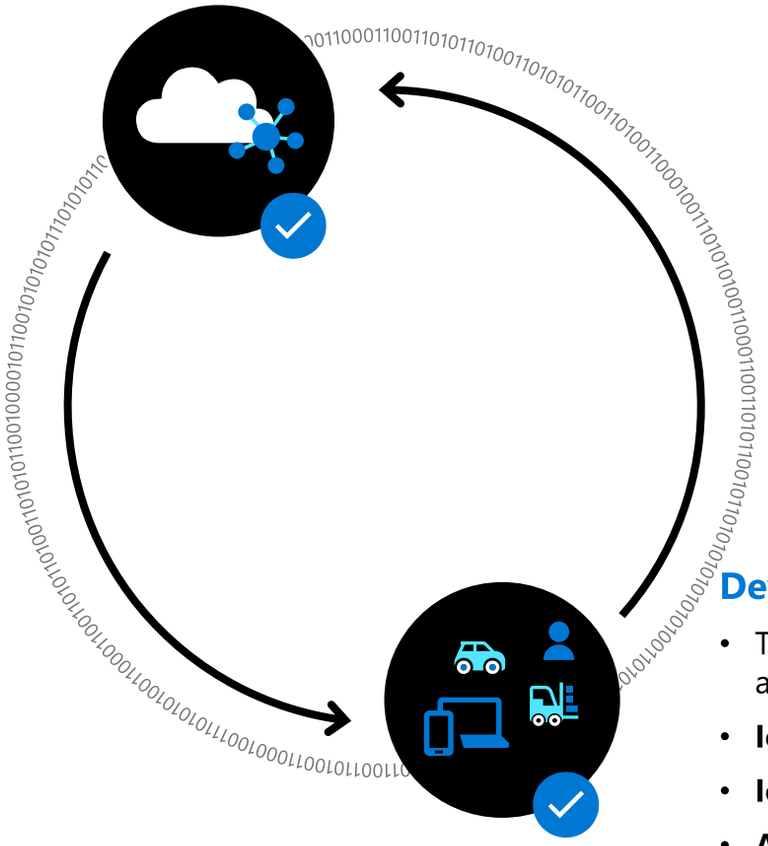
Protect all your IoT assets from threats

Azure Security Center for IoT:

Security posture and monitoring, alerts, and response

IoT Services

- Security by design in **IoT Hub** and **IoT Central**
- Scalable, policy-based access control
- Standards-based mutual authentication
- Industry-leading reliability and resilience

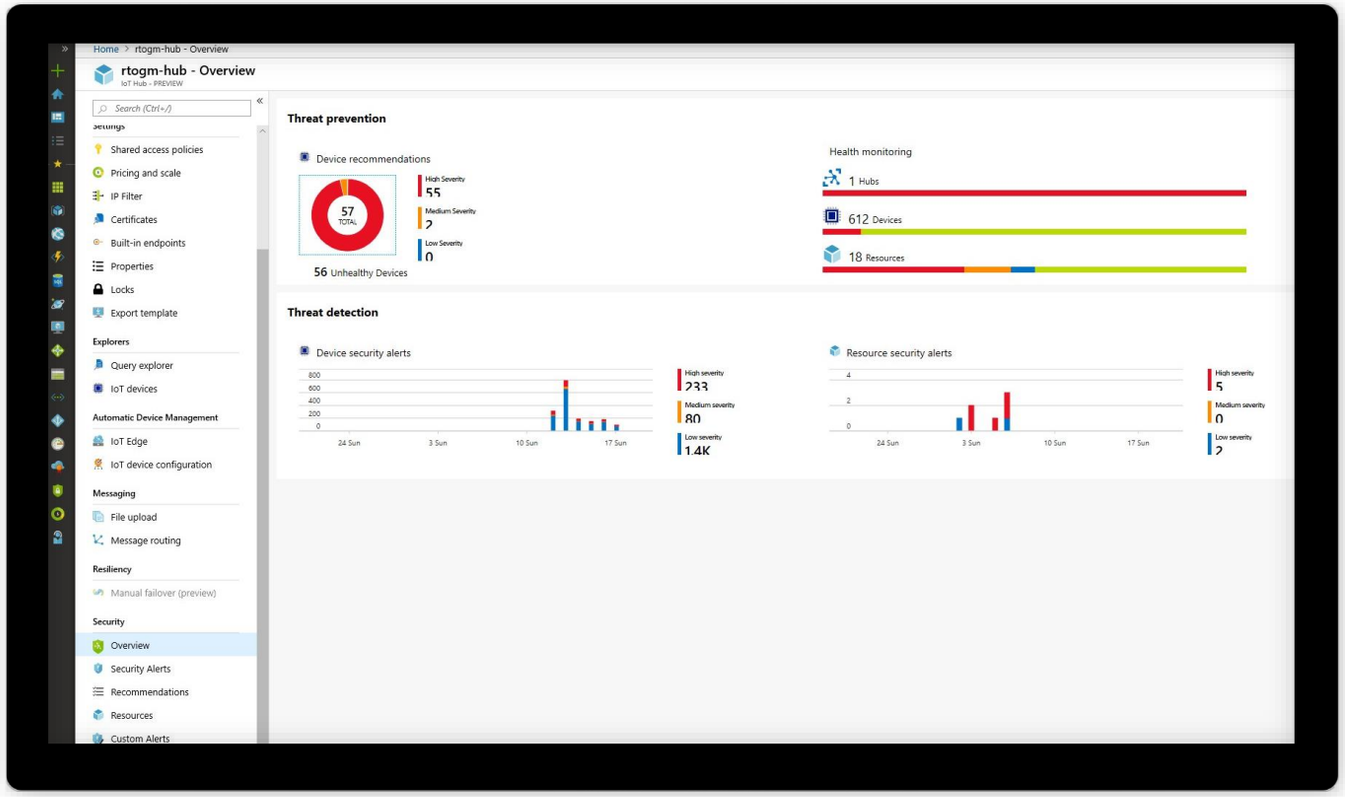


Devices

- Threat monitoring and mitigation across devices
- **IoT Devices**
- **IoT Edge devices and workloads**
- **Azure Sphere**

Azure Security Center for IoT

- ✓ **Visibility into security posture** and state of your **IoT Solution**
- ✓ **Single pane of glass** to manage IoT and hybrid cloud security infrastructure
- ✓ **Actionable, prioritized alerts** to respond to any potential compromises of your IoT solution
- ✓ **Integrate with Azure Sentinel** or other SIEMs to streamline threat mitigation
- ✓ **Define custom alerts** based on advanced queries



Ecosystem momentum

Developer Community

Visual Studio, GitHub, hadoop, docker, php, nodeJS, Powershell, eclipse, python, ARM mbed, MySQL, Ruby, Java, mongoDB, Chef + Puppet

Partner Ecosystem	
System Integrators & Advisors	accenture, CGI, HCL, EY, TATA CONSULTANCY SERVICES, HARMAN, eBECS, T-Systems, KPMG, Cognizant, Infosys, Tech Mahindra, SOGETI, avanade, pwc, DXC.technology, LARSEN & TOUBRO, Reply, wipro, Capgemini, robotron, MOQdigital
Solution Providers	Schneider Electric, GE, ABB, esri, OSI, ICONICS, Rockwell Automation, ActionPoint, conplement, codit, Johnson Controls, Honeywell, SAP, ptc, IoT, energisme, SIEMENS, Atos Worldline, DUNAV NET, Hitachi Solutions, Schlumberger, COPA-DATA, relayr
Solution Aggregators	ARROW ELECTRONICS, INC., SYNNEX, MESHSYSTEMS, CDW, Insight, happiest minds, ICT, AVNET, Tech Data, INGRAM MICRO, Mobiliya, SIGMA, at&t
Devices	ST life.augmented, RENESAS, CISCO, kontron, Raspberry Pi, DELL, libelium, Itron, intel, MOXA, Qualcomm, cradlepoint, BECKHOFF, HITACHI Inspire the Next, embedded systems, TOSHIBA, Panasonic, NEXCOM, Hewlett Packard Enterprise, ADVANTECH, FUJITSU, Toradex, ARBOR

Transform your business with IoT

Internet of Things Opportunities & Business Transformation Across Industries

Architecture of an IoT Solution

Microsoft IoT Overview & Real-World Scenarios

Lab: Getting started with Azure IoT Basics

- Create an Azure dashboard and resource group.
- Create an IoT hub using the Azure portal.
- Examine features of the Azure IoT Hub service.
- Create a Device Provisioning Service and link it to your IoT hub.

Developer Resources

Learn how to get started with IoT

Building IoT solutions with Azure Developer Guide
https://discover.microsoft.com/azure-iot-building-solutions-dev-guide/

Microsoft Learn learning paths

http://aka.ms/mslearniot

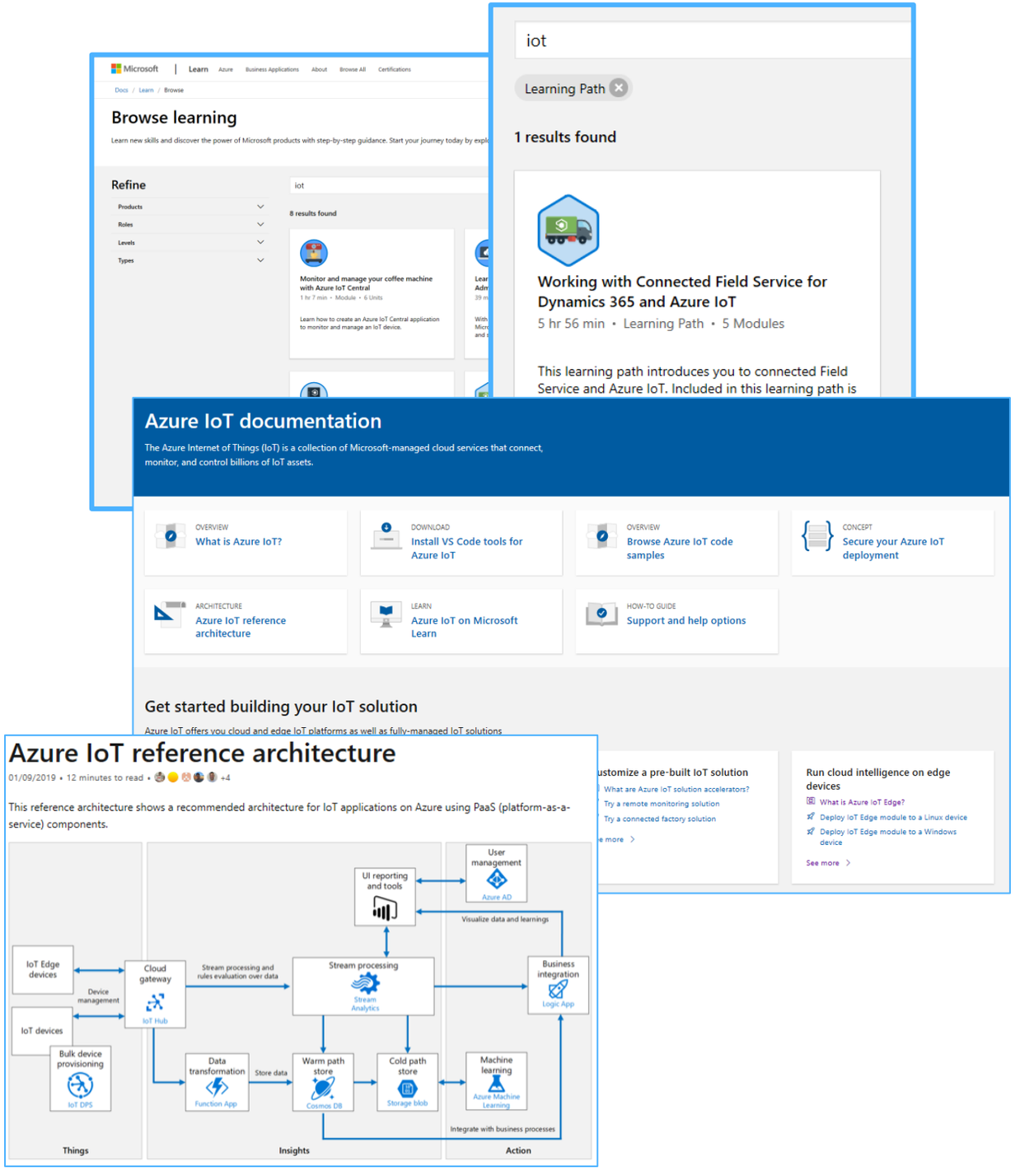
Microsoft Learn is a newer learning platform that offers sandbox online training

Azure IoT Reference Architecture Guide
https://docs.microsoft.com/azure/architecture/reference-architectures/iot/

This reference architecture shows a recommended architecture for IoT applications on Azure using PaaS (platform-as-a-service) components.

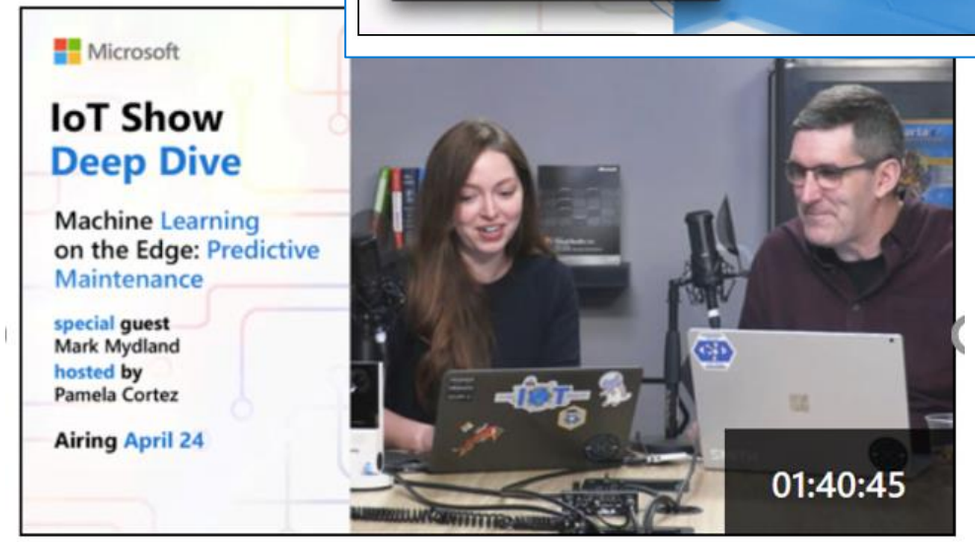
Azure IoT Docs

Getting Started, Tutorials, How-to guides, reference, whitepapers



IoT Show

New video every Monday (Deep Dives on Wednesdays!) Subscribe to stay up-to-date with latest Microsoft IoT announcements, product and features demos, customer and partner spotlights, top industry talks, and technical deep dives with IoT Show! aka.ms/IoTShow



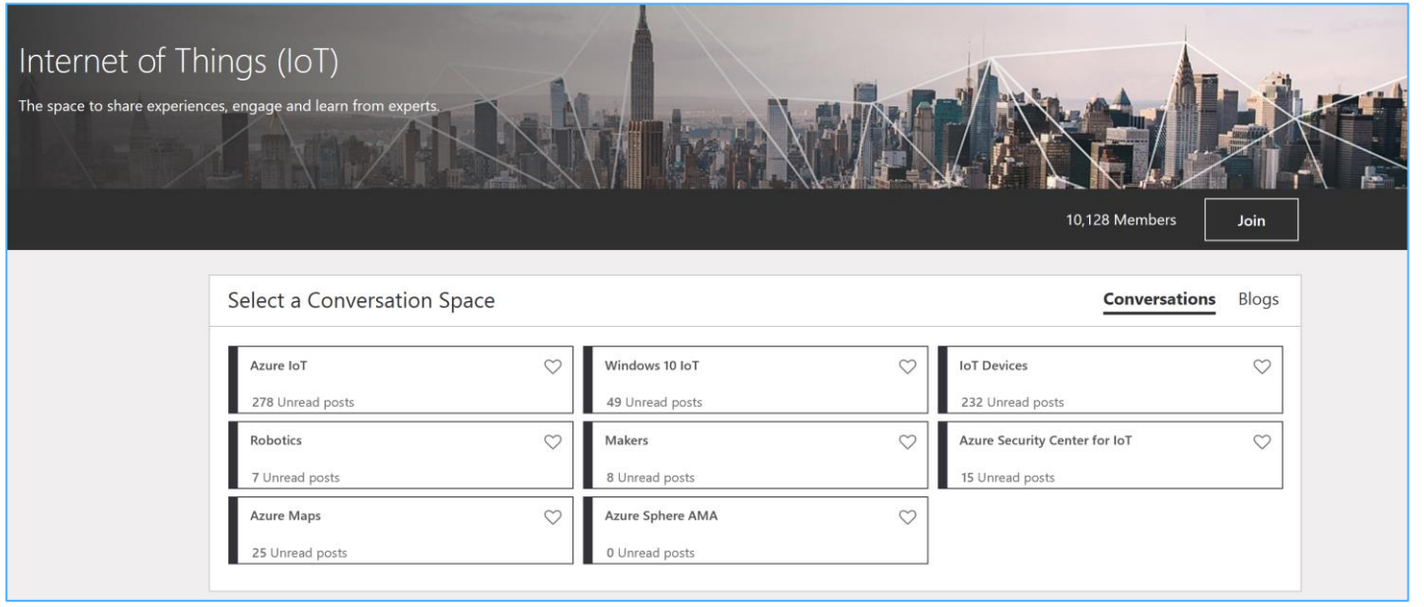
IoT Tech Community

Community forum to stay to update on latest announcements, connect with other developers, share your projects, and ask questions!

Fast growing vibrant community

One Microsoft IoT voice

http://aka.ms/iottechcommunity



Get Started Now!

https://aka.ms/IntroAzureIoTLearningPath

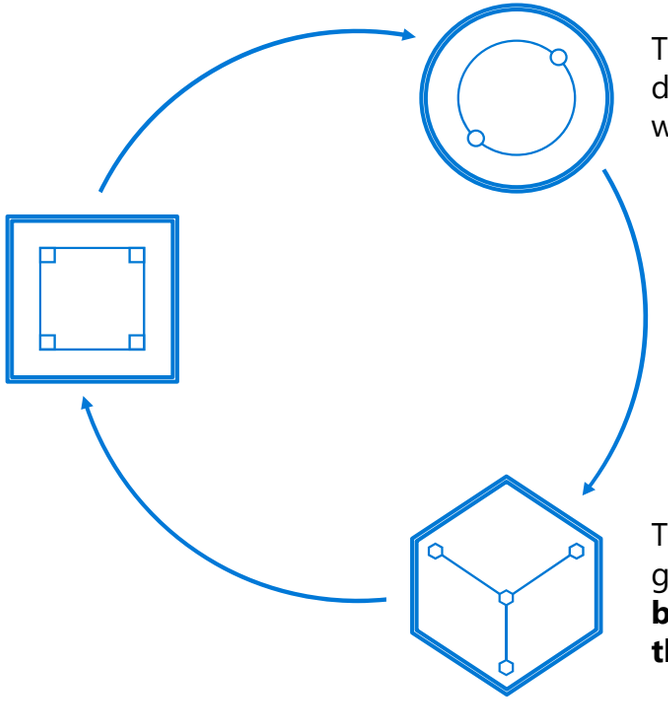
Sign-up for Build end-to-end IoT solutions – Workshop Series

https://aka.ms/IoT-online-workshop

- Transform your business with IoT
- Devices and device communication – *IoT Hub*
- Device provisioning at scale – *Device Provisioning Service*
- Messaging processing, analytics, & business integration – *Time Series Insights, Event Grid, Azure Stream Analytics*
- Work with Azure IoT Edge – *IoT Edge*

Azure Sphere

An end-to-end solution for securing IoT devices. Integrated hardware, software, and cloud services work seamlessly together and deliver active security by default.



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

The **Azure Sphere OS** multi-layer, defense-in-depth operating system with **robust application isolation**

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

Ongoing servicing with over 10 years of security and OS updates delivered directly to each device by Microsoft

Customers

Giving Starbucks the confidence to connect their mission-critical equipment to streamline operations and to deliver quality customer experiences.

Ensuring Gojo's data integrity while monitoring hygiene compliance in hospitals.

Helping Leoni secure their intelligent cable systems that manage energy and data

Azure Sphere

Silicon partners

MEDIATEK

Secured, WiFi-enabled MCU, available in volume today

NXP

Secured crossover application processor; samples available Q4 2020

QUALCOMM®

First cellular-enabled Azure Sphere chip, samples available Q4 2020

Ecosystem partners

AVNET Reach Further™

Wi-Fi Module
MT3620 Starter Kit
Guardian Module

USI®

Dual Band Wi-Fi + Bluetooth Module

AI-Link

Wi-Fi module
Guardian device

seeed studio The IoT Hardware Enabler

MT3630 Dev Board
MT3630 Mini Dev Board

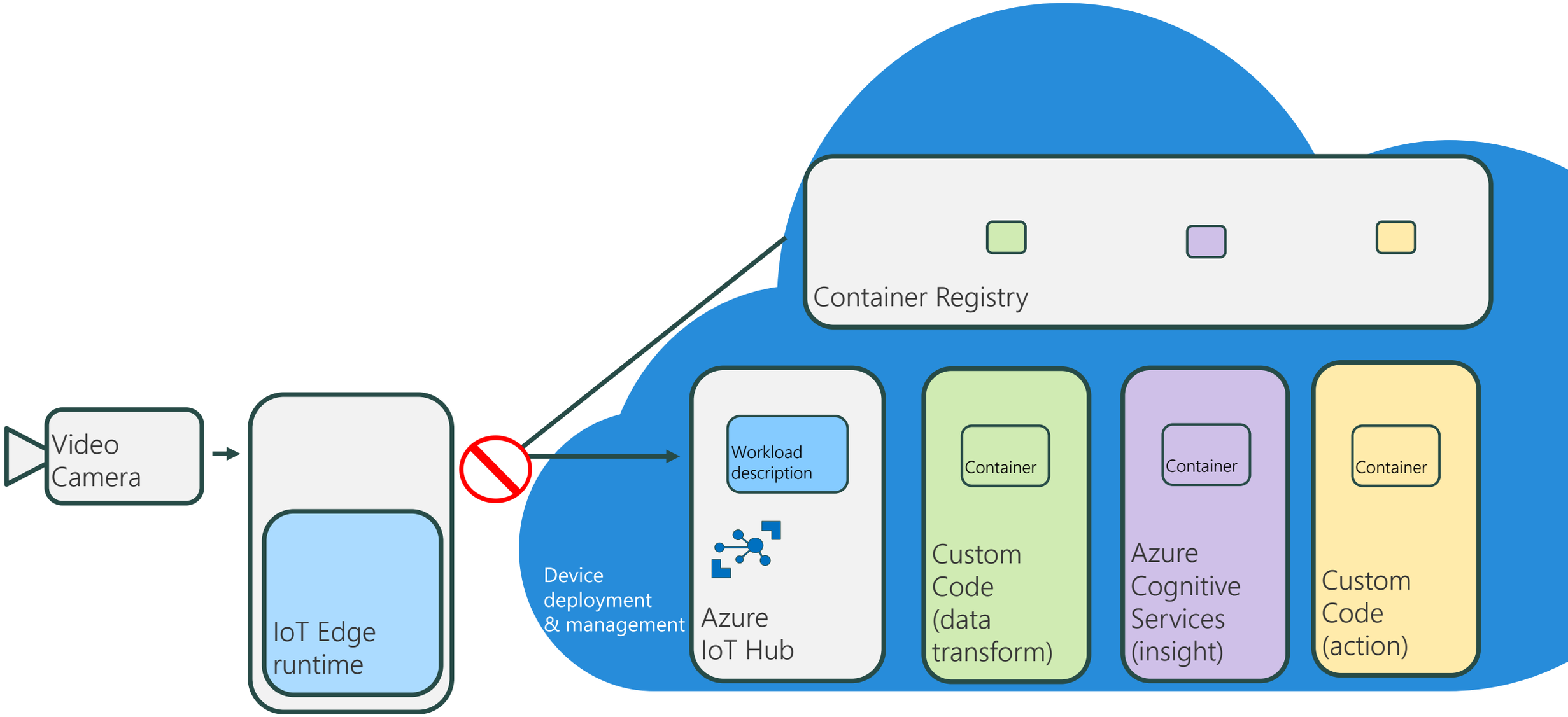
ADVANTECH

Wireless I/O Module

Innovation that delivers durable value

- Growing silicon choice to support customers in the diversity of their use cases
- Enable unlocking value from existing/legacy equipment with guardian modules
- Rich hardware ecosystem with development kits & modules to streamline prototyping and implementation
- Developer tools and integration with Visual Studio to accelerate time to market

Edge intelligence enabled with Azure IoT Edge



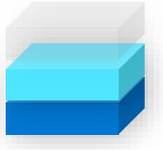
IoT Central

A fully managed IoT app platform

- Highly secure
- Enterprise-grade
- Predictable pricing
- Industry-focused

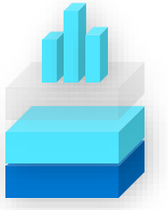
Get connected

Connect IoT devices to the cloud faster than any other platform.



Stay connected

Reconfigure and update devices with centralized device management.



Transform

Bridge the gap with connectors and extensibility APIs.

Existing solution builders

MESHSYSTEMS™ cradlepoint Connect Beyond sagegreenlife flex C.H. ROBINSON imec

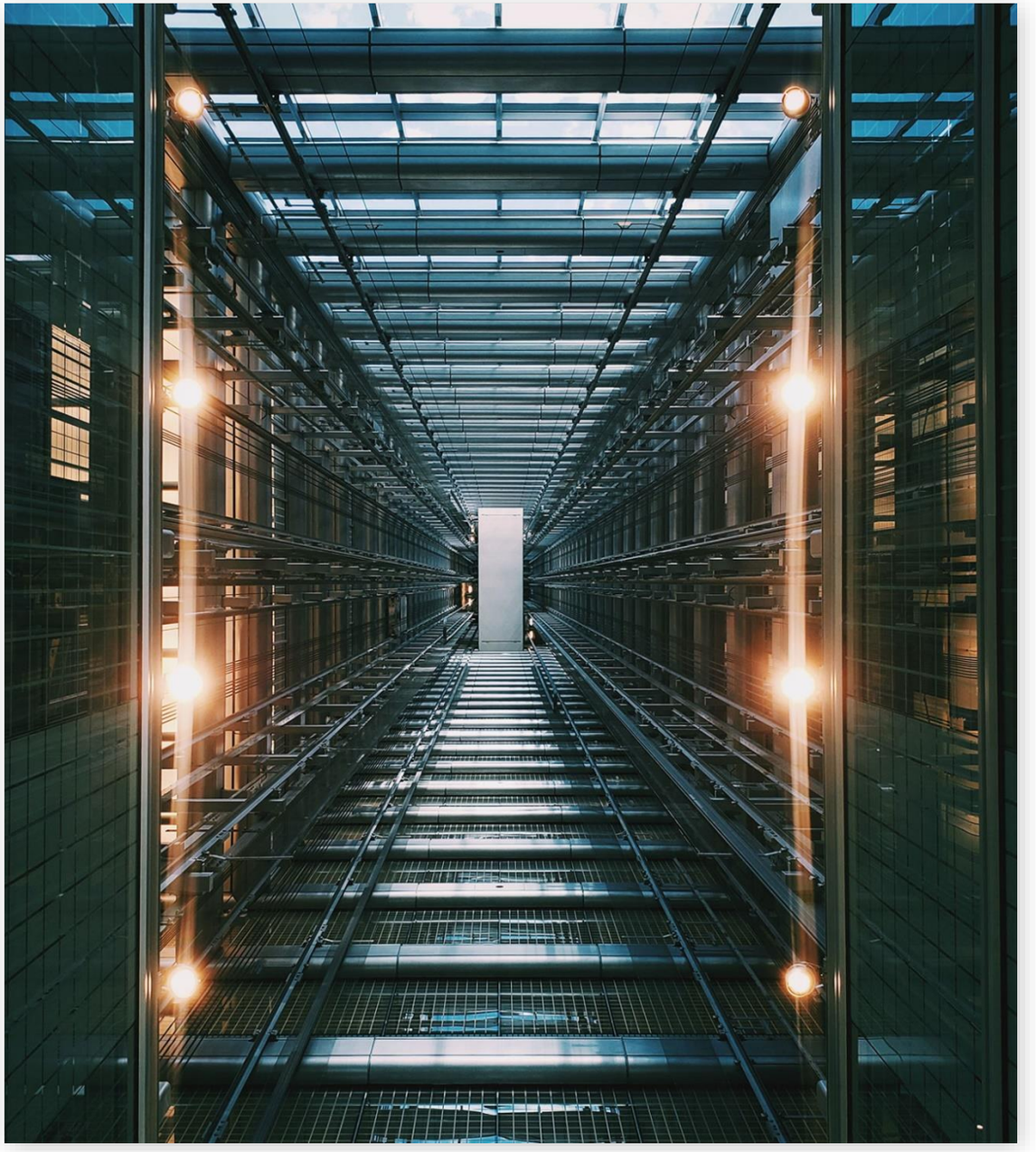
FOOTMARKS Kroger jda. BOSCH QUEST BORN TO ENGINEER

tagdat

By working closely with Microsoft, Tagdat developed a new Internet of Things (IoT) solution using Microsoft Azure Maps and Azure IoT Hub that improves construction site safety and efficiency.

"With Azure Maps, we can set up a proof of concept and prove value faster. From there, we can focus on building a relationship with the customer and confidence in the product."

-James Howe: Head of Software Development



Azure Digital Twins

Build advanced IoT spatial intelligent solutions

Create a digital representation of your physical environment

Simplify and accelerate your deployment with predefined data schema

Build solutions that you can scale securely

Benefit from advanced compute capabilities

Easily integrate with other Azure services

Model the relationship between people, places and devices

CBRE

Steelcase

essity

ICONICS

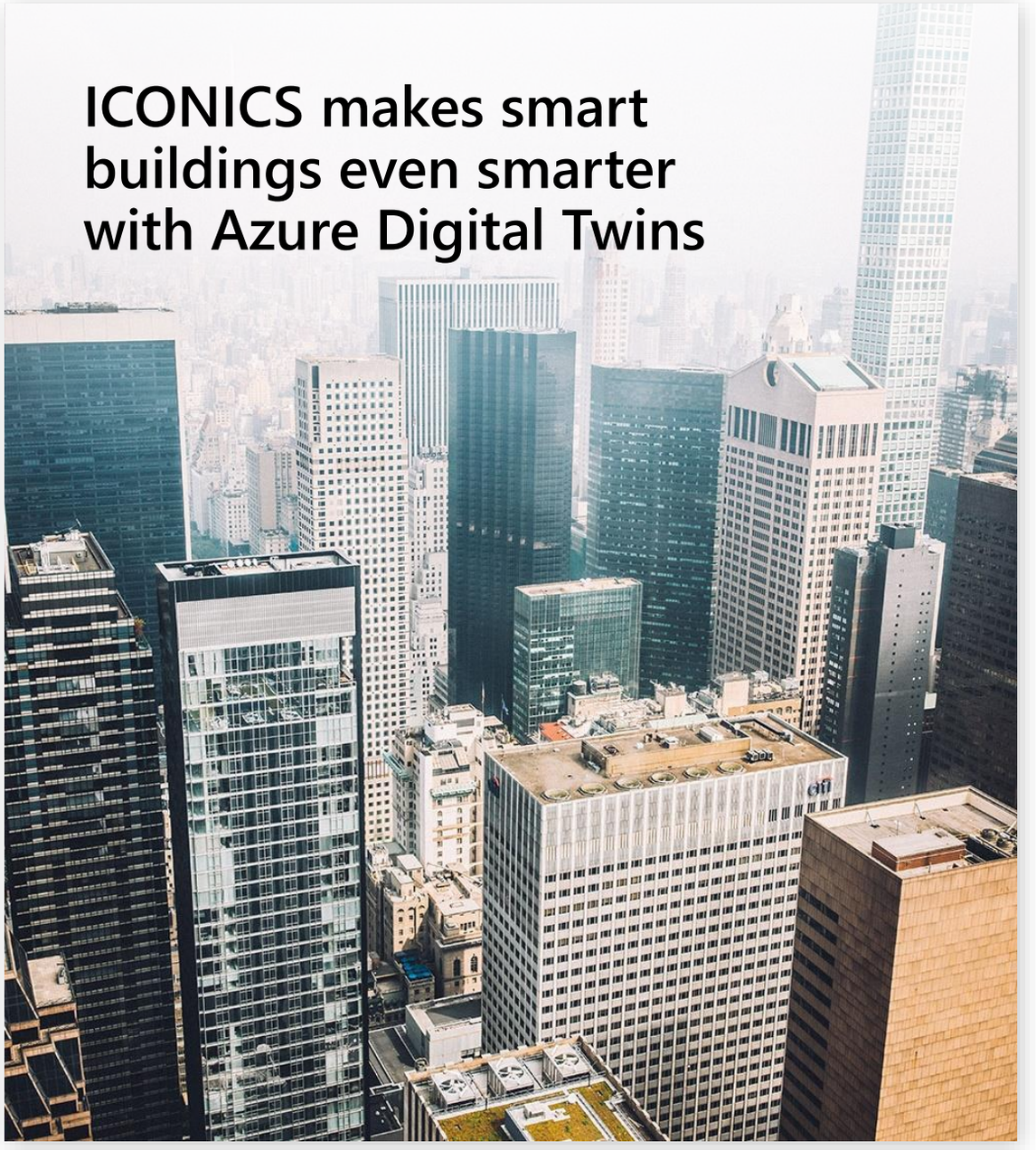
Make the Invisible Visible™

PCL

ICONICS

Make the Invisible Visible™

ICONICS makes smart buildings even smarter with Azure Digital Twins



ICONICS relies on Microsoft Azure Digital Twins to boost software scalability and rapidly deliver innovative capabilities to customers, such as occupancy and spatial analytics.

"How do we grow our company? By leveraging the exciting new Azure Digital Twins platform to build our customers new solutions with unlimited scale, cost-effectiveness, and unprecedented insight."

-Russ Agrusa: President and CEO

>10000

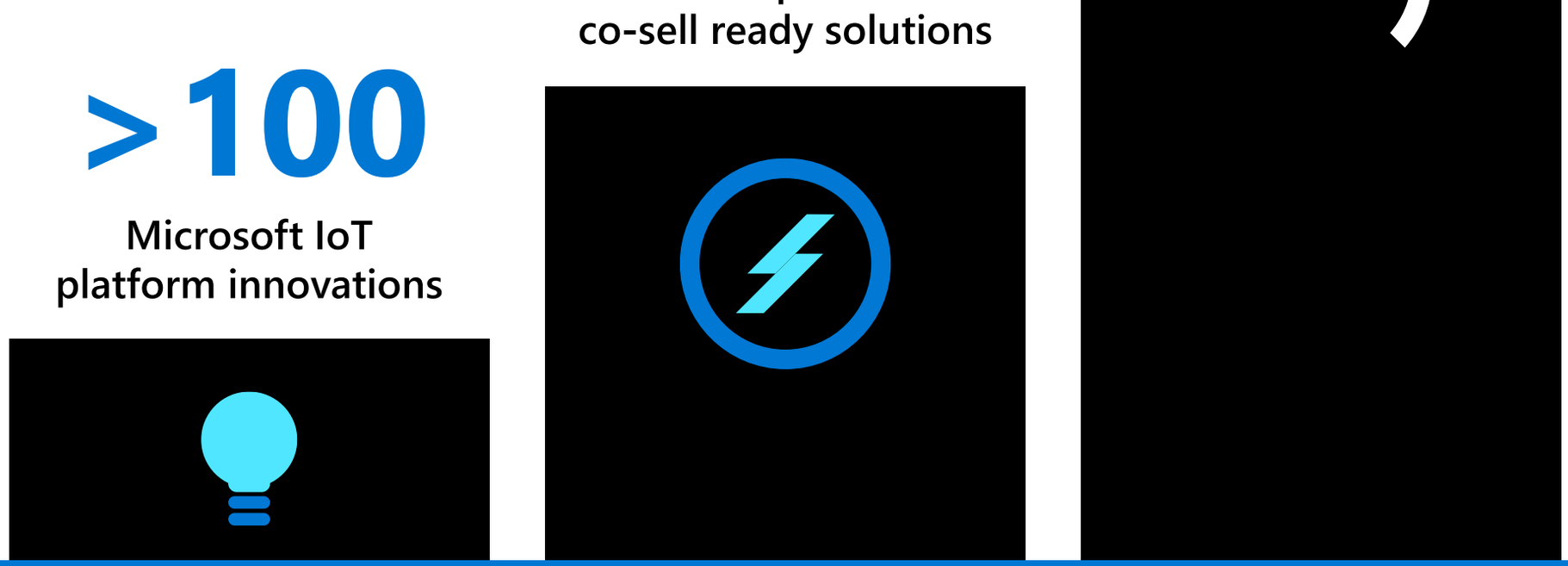
Ecosystem acceleration

>1200

Partner provided
co-sell ready solutions

>100

Microsoft IoT
platform innovations



IoT in Healthcare

IoT is enabling more agile, preventative and personalized care

89% of health organizations are adopting IoT

85% see IoT as critical to overall success

78% want to apply more IoT to their business

IoT Signals Report: Health Spotlight, Microsoft, February 2020

Top benefits for health organizations that adopt IoT:

- Reduce chances for human error
- Lower Hospital Readmissions
- Help care teams be more productive
- Improve traceability of equipment, supplies & inventory
- Unlock cost savings & increase revenue
- Ensure regulatory compliance consistency and patient privacy

Top use-cases in healthcare

Continuous Patient Monitoring

Extend patient care beyond the hospital walls, reduce re-admissions, and manage chronic diseases.

Inventory Management for Medical Supplies

Track inventory along your supply chain to detect theft, prevent outages and develop agile operations.

Smart Hospital Equipment

Gain insights from your hospital equipment monitor and manage equipment

Healthcare Manufacturing

Ensure medical devices and products maintain the highest levels of quality and comply with industry standards along the supply chain

Smart Hospital Building

Optimize operations for care teams, patients, and their support networks

Cold-chain supply tracking

Build a transparent, secure, and climate-controlled supply chain for your pharmaceuticals

Industry Partners:

Schneider Electric
ThoughtWire
sensoria HEALTH
wipro
GOJO

Industry Customers:

SWEDISH MEDICAL CENTER
stryker
Keck School of Medicine of USC

RANCHO LOS AMIGOS
NATIONAL REHABILITATION CENTER

Customer:
Rancho Los Amigos National Rehabilitation Center

Industry:
Health Provider

Size:
1,000-9,999 employees

Country:
United States

Products and services:
Microsoft Azure
Azure IoT Central
Azure API for FHIR

[Read full story here]

Microsoft

"What if you could take the best of wearable technology, the best of prosthetics and orthotics, and the best in cloud computing and create a solution that allows physicians to work on a treatment with their patients, rather than forcing it on them? That's what we've set out to do at Rancho Los Amigos with Sensoria Health and Microsoft Azure."

—Dr. David Armstrong, Dr. David Armstrong, Cofounder of the Southwestern Academic Limb Salvage Alliance (SALSA) at Rancho Los Amigos National Rehabilitation Center and University of Southern California (USC), Coeditor of the American Diabetes Association's *Clinical Care of the Diabetic Foot*, and Professor of Surgery at Keck School of Medicine, USC

Situation:

Every 20 seconds, someone has a leg or foot amputated due to diabetes-related complications.. Once the amputation takes place, five-year mortality is between 50 and 75 percent. Doctors and software specialists set out to address this with a wearable, cloud-connected orthotic device.

Solution:

Using a combination of Internet of Things (IoT) sensors, medical devices, Microsoft Azure IoT Central, and Azure API for FHIR, the team created the Optima Molliter Motus Smart connected boot. Doctors and patients alike receive data from the boot to help them improve healing.

Impact:

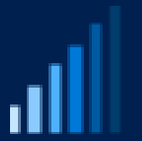
This new data-driven approach results in stronger doctor-patient relationships and more proactive care. The data can be shared easily and highly securely across multiple clinicians while helping them maintain compliance with relevant privacy laws.

IoT in Manufacturing

IoT is driving the fourth industrial revolution in manufacturing

92% of manufacturers consider IoT critical to the success of their company

87% of IoT decision makers in manufacturing have adopted IoT



96% of manufacturers are satisfied with the value IoT adds to their company

IoT Signals Report: Manufacturing Spotlight, Microsoft, July 2020

Azure IoT value prop for industrial organizations:

Unify your business data to **scale quickly across the enterprise** with common data models

Avoid vendor lock-in with open source and open industrial interoperability standards

Leading industry-specific **compliance and end-to-end security** from the device to the cloud

Reduce time-to-value with seamless integration with platforms from leading industrial IoT partners with Azure IoT

Top use-cases in manufacturing

Continuous-based Monitoring

Monitor key parameters of equipment to avoid premature and expensive equipment maintenance costs, extend the lifespan of your machinery, and avert critical downtime.

Predictive Maintenance

Mitigate disruptions by applying advanced analytics and machine learning to your production to ensure uptime through automatic alerts trigged by manufacturing data.

Overall Equipment Effectiveness

Generate critical insights of how well your plant is performing relative to its designed capacity by measuring availability, performance, and quality of your production.

Intelligent Supply Chain

Ensure the quality and authenticity of in-transit products by tracking materials and monitoring resource consumption with IoT sensors connected throughout the supply chain.

Facility Management

Optimize energy consumption, space utilization, and workforce productivity within the factory. Increase worker safety and save money by efficiently managing the plant.

Asset Tracking

Avoid expensive equipment loss, minimize operational downtime, and enhance the productivity of first-line workers by tagging assets, equipment, and tools.

Industry Partners:

ptc

SAP

Schneider Electric

Rockwell Automation

SIEMENS

ABB

OPEN MANUFACTURING PLATFORM

Industry Customers:

Weidmüller

BÜHLER

GRUNDFOS

BASF

BMW

SANDVIK Coromant

FESTO

Schneider Electric

ThoughtWire

Customer:
Schneider Electric
ThoughtWire

Industry:
Energy

Size:
10,000+ employees

Country:
France

Products and services:
Microsoft Azure
Azure IoT Hub
Azure SQL Database
Azure Virtual Machines

[Read full story here]

Microsoft

"Within Azure, we have a comprehensive suite of IoT and cloud services for orchestrating the complex data gathering and analysis necessary to streamline medical facilities' complicated operational processes."

—Chris Roberts, Healthcare Solution Architect, Schneider Electric

Situation:

Schneider Electric and ThoughtWire are built-environment experts with a global customer base. The two companies wanted to work together to deliver a holistic IoT-based medical facilities management solution.

Solution:

They chose to build on Microsoft Azure because of its scalability, global presence, and, most important, its high level of security, privacy, and compliance. Using Azure for their separate portions made it quick and straightforward for the companies to integrate the two in a joint solution.

Impact:

With the joint Digital Hospital solution, customers have unprecedented control over their entire medical facilities, from heating and lighting conference rooms to helping ensure patient safety. They can save money, decrease their carbon footprint, and deliver better, patient-centric care.

Thousands of Azure IoT customers

Microsoft IoT

Broadest portfolio

Industry Solutions

Manufacturing | Retail | Agriculture | Energy | Smart Cities | Healthcare | Transportation

IoT app services

Azure IoT Central

Dynamics Connected Field Service

Azure services for IoT

- Azure IoT Hub
- *Azure IoT Hub Device Provisioning Service*
- Azure Digital Twins
- Azure Time Series Insights
- Azure Maps
- Azure Security Center for IoT
- Azure Stream Analytics
- Azure Cosmos DB
- Azure AI
- Azure Cognitive Services
- Azure ML
- Azure Logic Apps
- Azure Active Directory
- Azure Monitor
- Azure DevOps
- Power BI
- Azure Data Share
- Azure Spatial Anchors

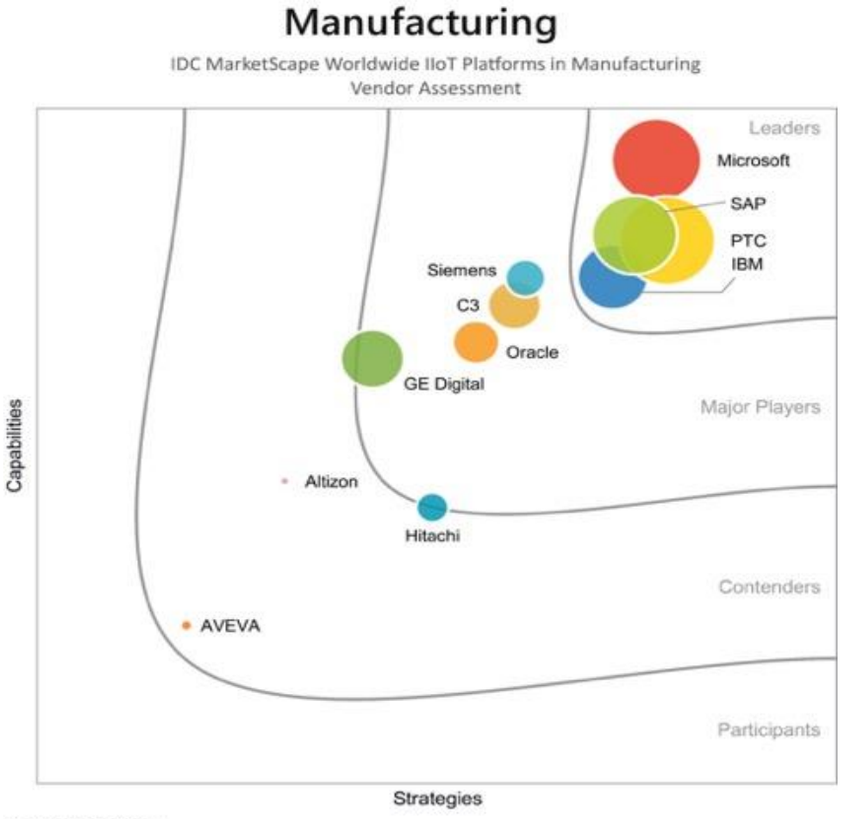
IoT & Edge Device Support

- Azure RTOS
- Azure Sphere
- Azure IoT Device SDK
- Azure IoT Edge
- Azure Stack Edge
- Windows IoT
- Azure Certified for IoT—Device Catalog
- Azure Stream Analytics
- Azure Storage
- Azure ML
- Azure SQL
- Azure Functions
- Azure Cognitive Services

Industry leadership in our hyperscale, horizontal capabilities

Forrester 2019 Wave
Industrial IoT

IDC 2019 MarketScape
Industrial IoT for Manufacturing

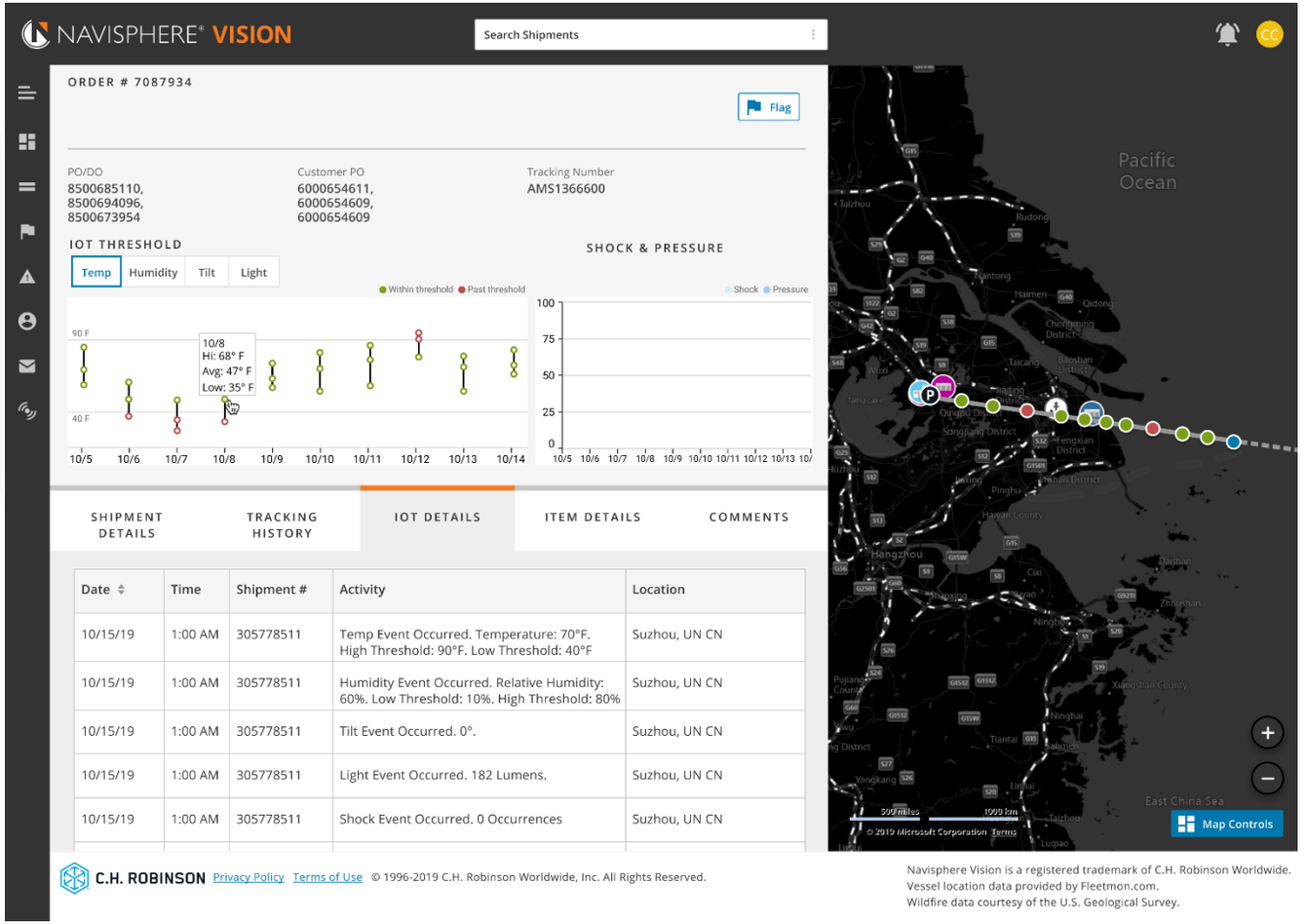


Source: IDC, 2019

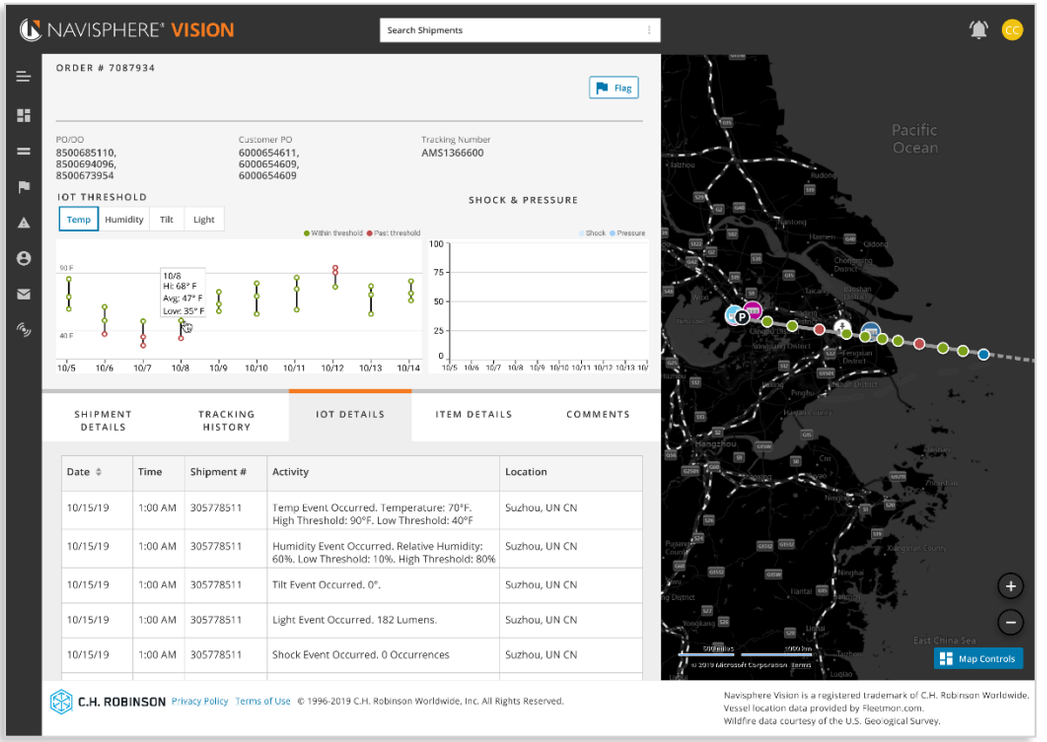
C.H. ROBINSON

Leveraged IoT Central to manage their connected devices across palates for Xbox and Surface and have leveraged IoT Central's extensibility features to extend IoT data from Intel's sensors into C.H. Robinson's applications.

Digital transformation of the logistics industry



C.H. ROBINSON



C.H. Robinson Operational Dashboard built with Azure IoT Central