Microsoft

IoT in Action

#IoTinActionMS

Microsoft

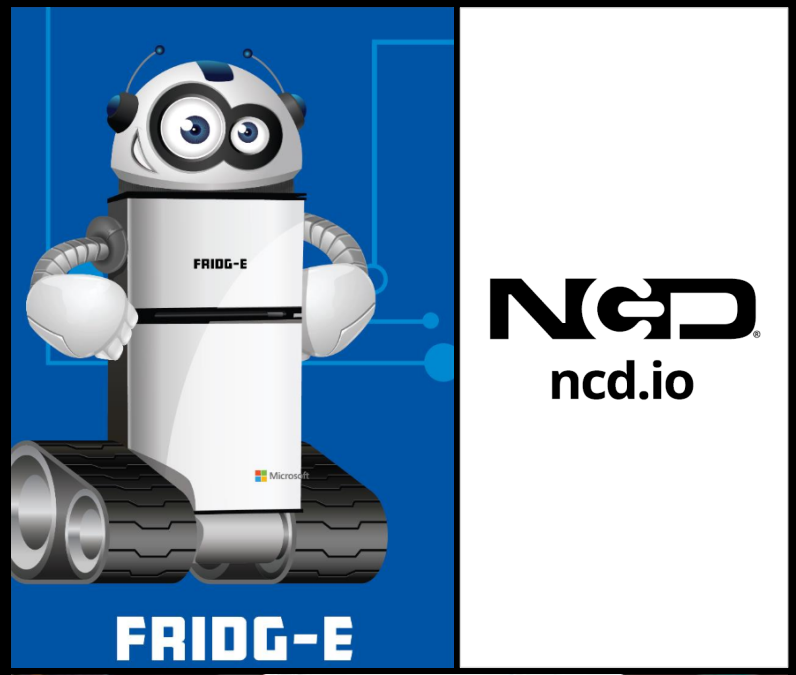
Architecting the Intelligent Edge

Carl Coken
GM, IoT Innovation, Microsoft

Maarten Struys
Sr. IoT Solution Architect, Microsoft

IoT in Action

The Evolution of IoT in Action



ncd.io

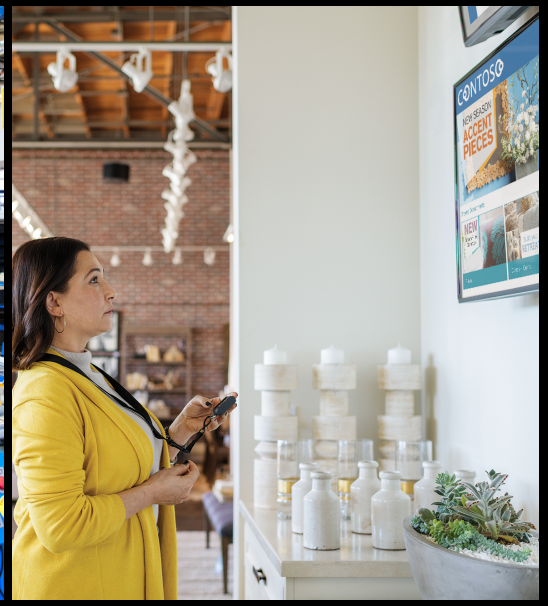
Year 1 2017

The Evolution of IoT in Action

Insight

Year 2 2018

The Evolution of IoT in Action

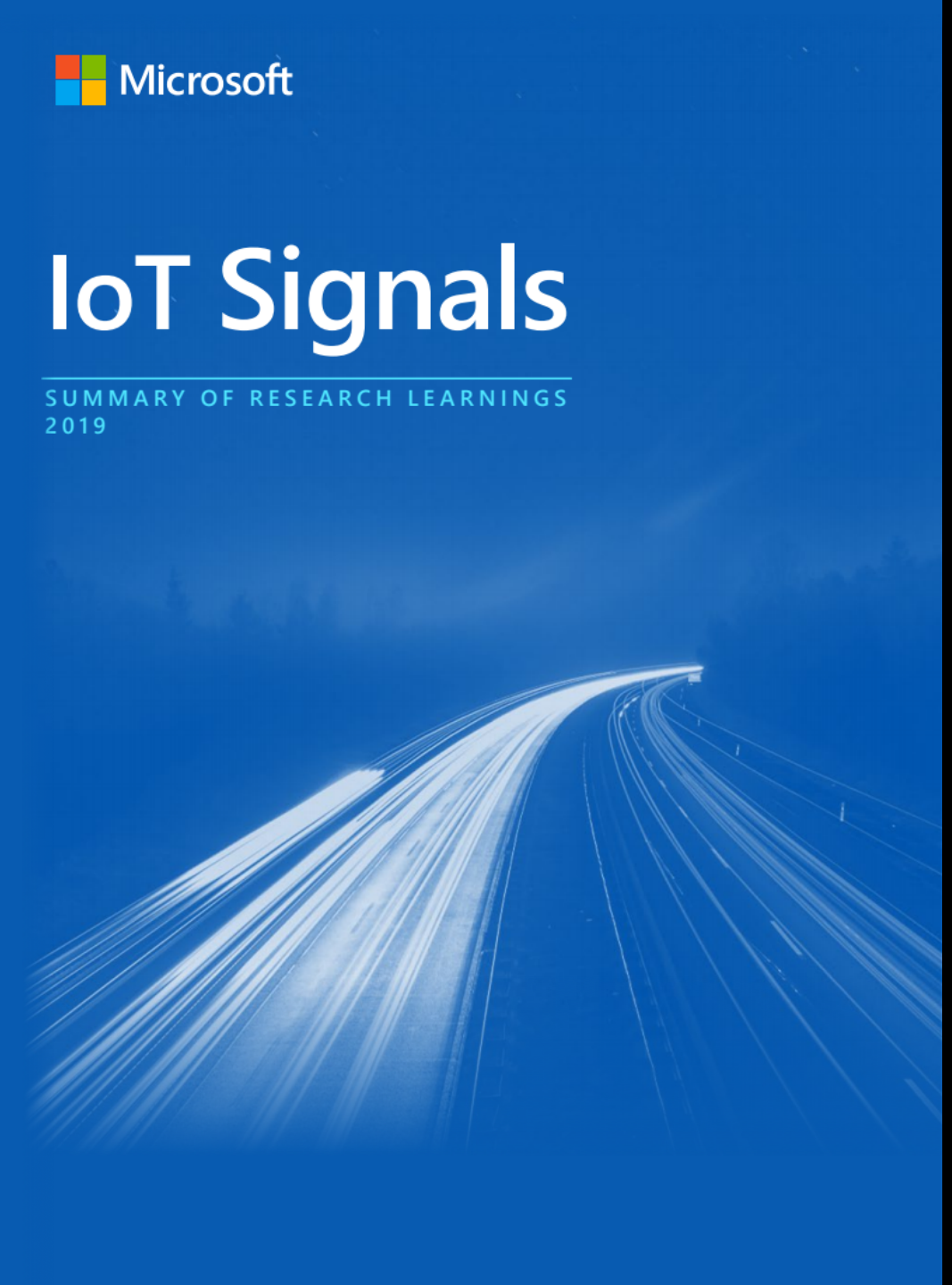


Year 3 2019

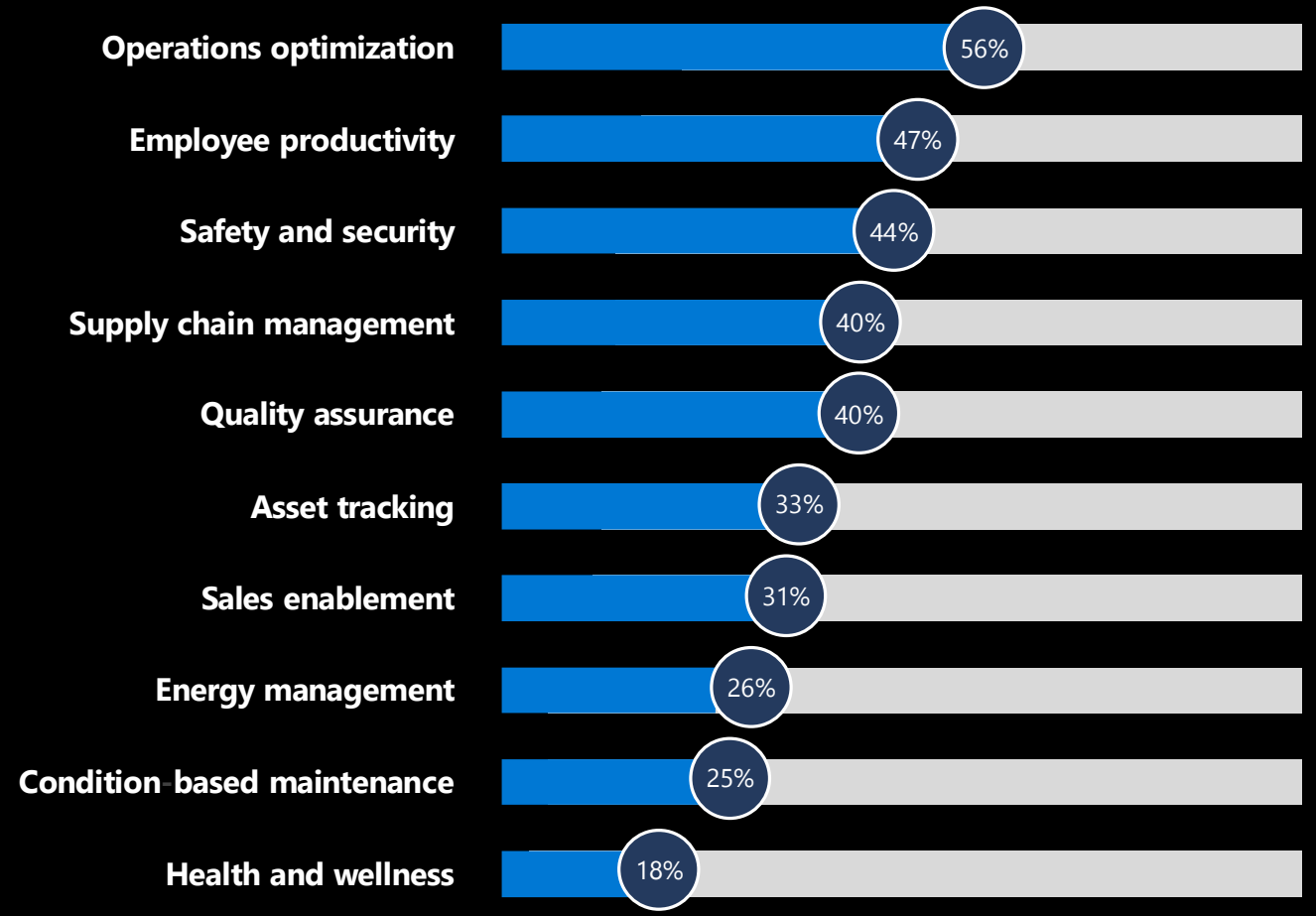
Microsoft

IoT Signals

SUMMARY OF RESEARCH LEARNINGS
2019



Reasons for IoT adoption



Microsoft

IoT Signals

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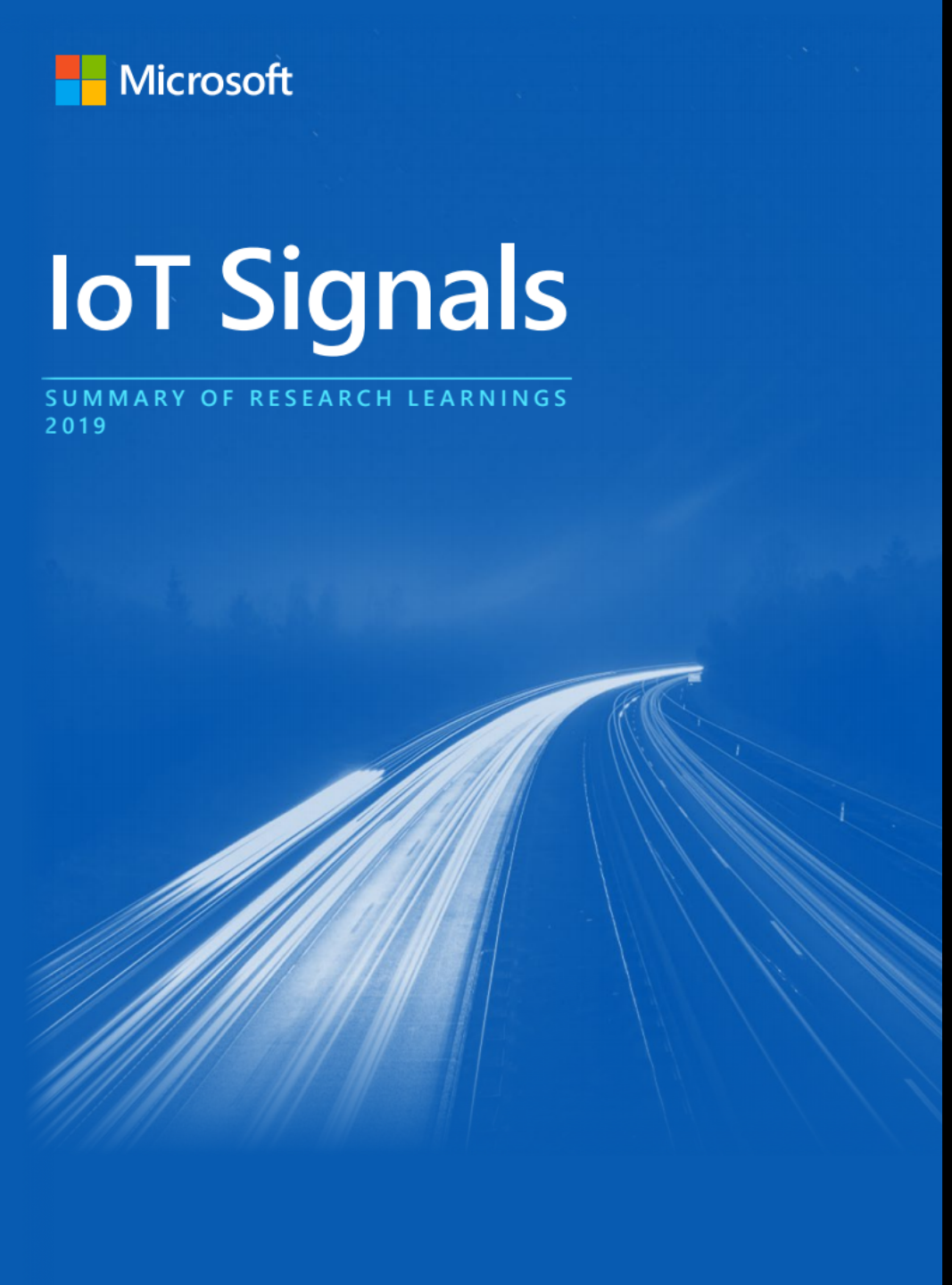


Additional top use case by industry

RETAIL/ WHOLESALE

Supply chain optimization	64%
Inventory optimization	59%
Surveillance and security	48%
Loss prevention	44%
Energy optimization	40%

TRANSPORTATION

Fleet management	56%
Security, surveillance, and safety	51%
Manufacturing operations efficiency	40%
Vehicle telematics and infotainment	38%
Predictive maintenance	33%

GOVERNMENT

Public Safety	48%
Infrastructure and facilities management	40%
Regulations and compliance management	38%
Fleet and asset management	37%
Incident response	29%

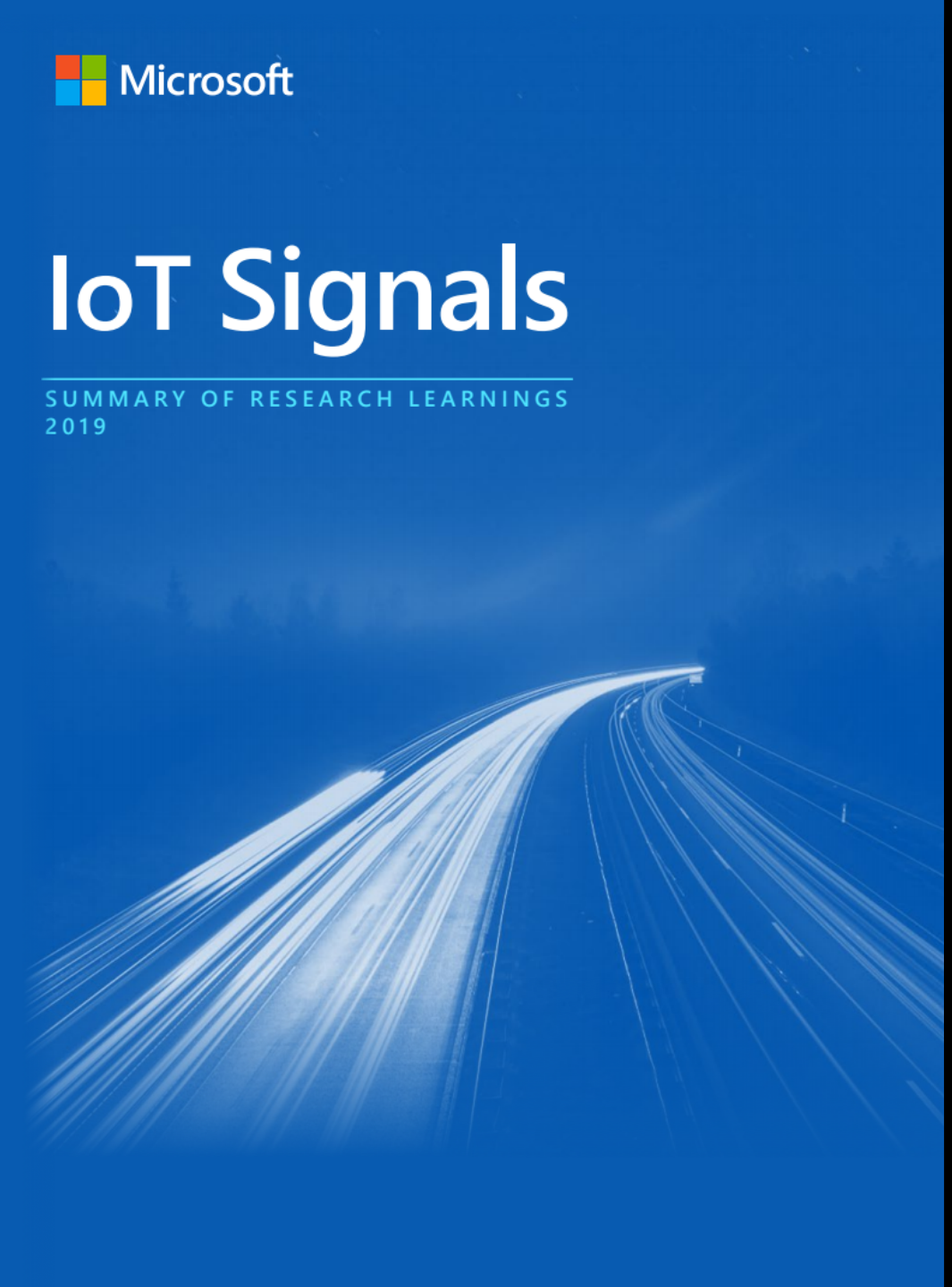
HEALTHCARE

Tracking patient, staff, and inventory	66%
Remote device monitoring and service	57%
Remote health monitoring and assistance	55%
Safety, security, and compliance	53%
Facilities management	42%

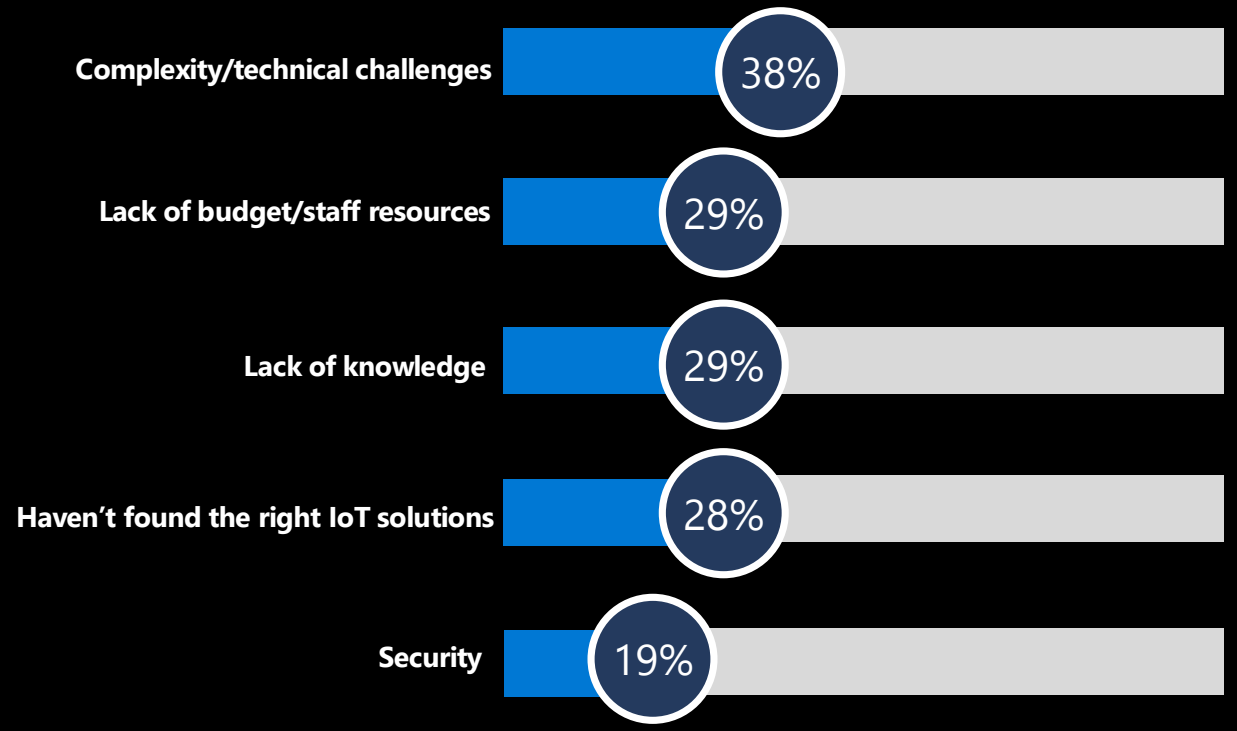
Microsoft

IoT Signals

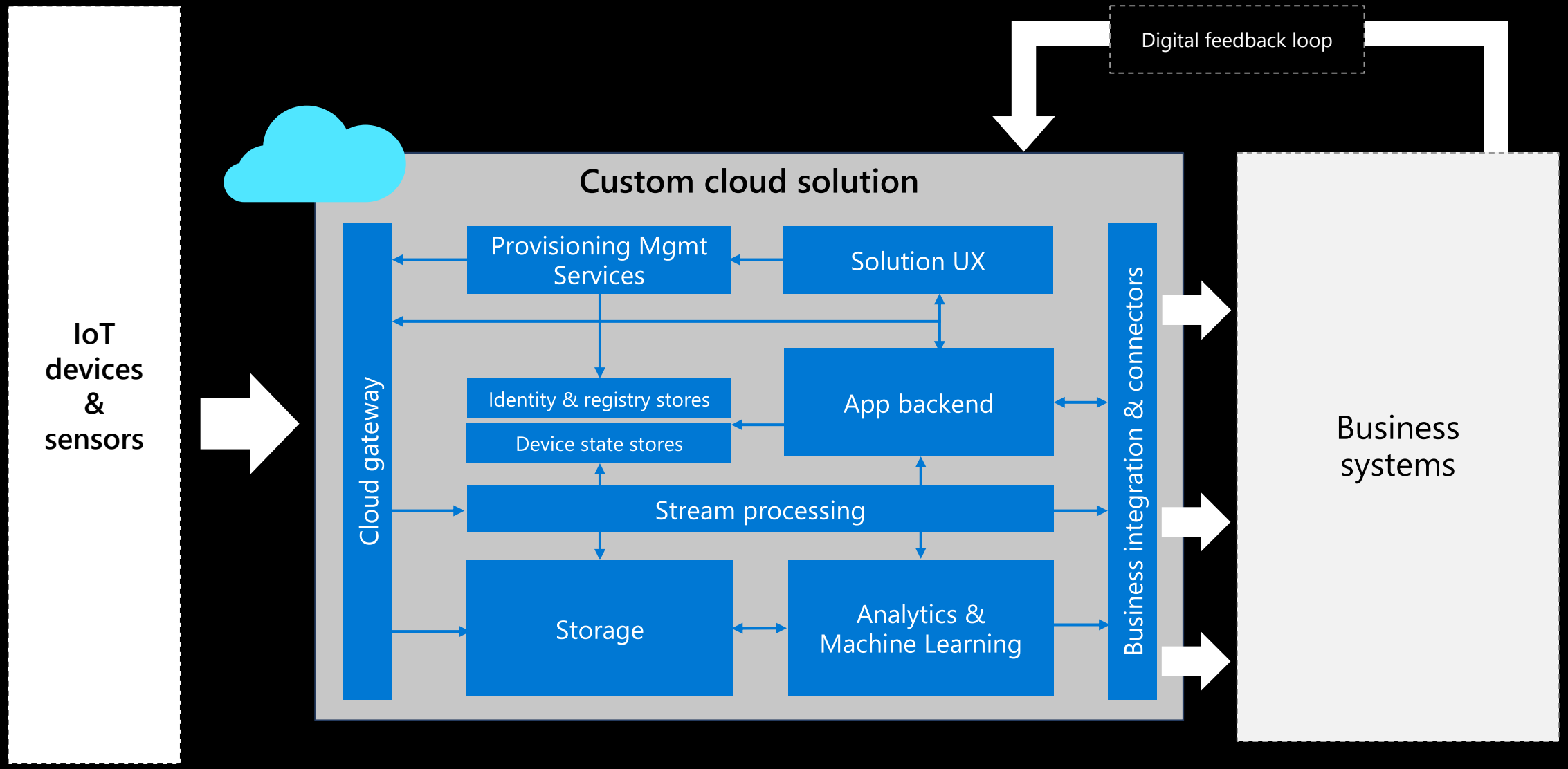
SUMMARY OF RESEARCH LEARNINGS
2019



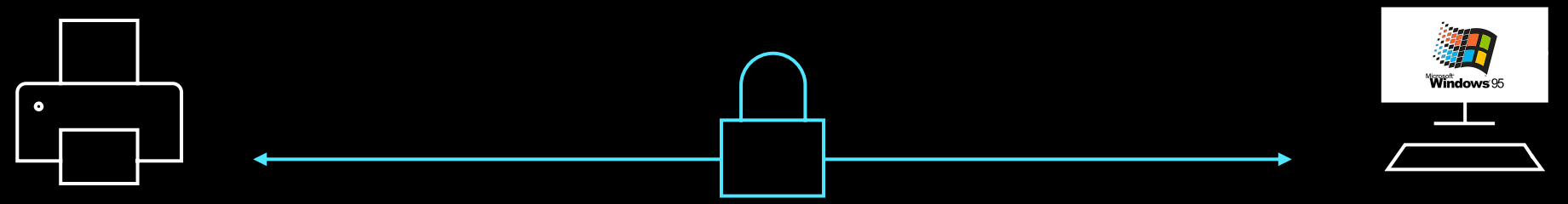
Top challenges



Solution architecture—DIY



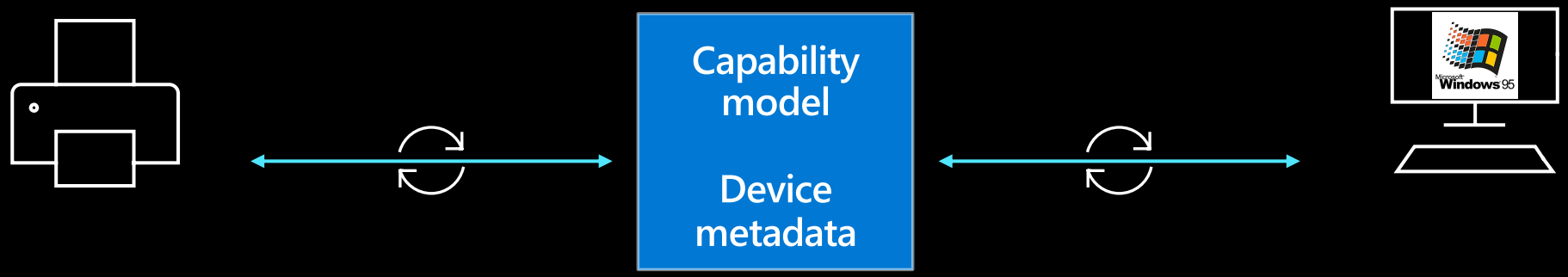
We had a similar challenge in the past…



Peripherals

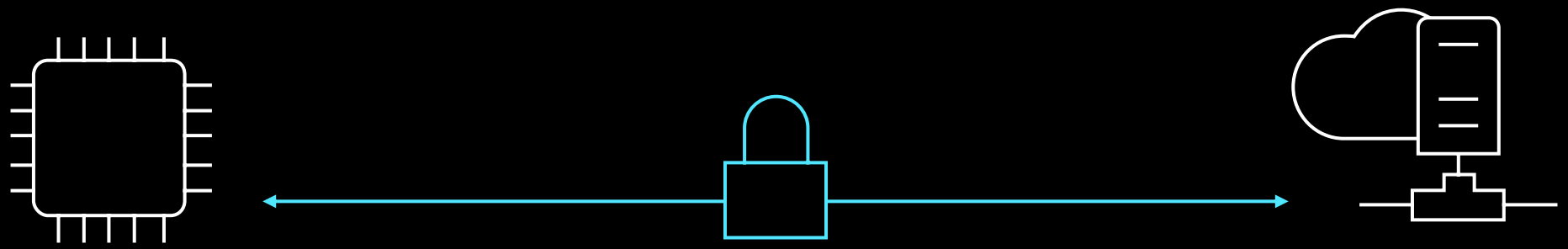
Windows OS

That was solved with Windows Plug and Play



Devices published their capability models and adhered to them
Windows used the capability model to know how to interact with them

IoT today

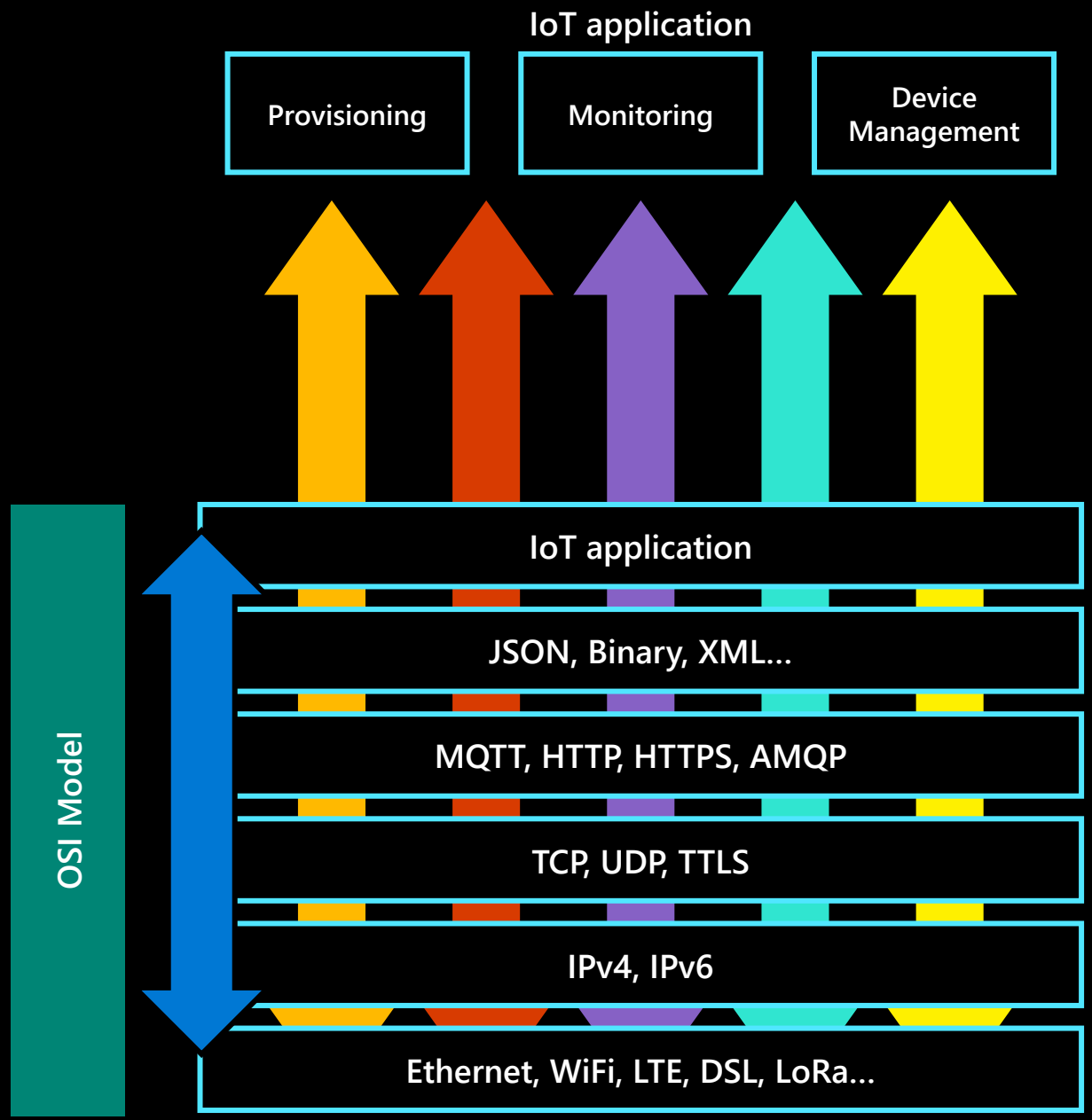


Tight coupling between software on device and IoT solution in the cloud

IoT Plug and Play + Azure IoT Central

Connecting hardware is very "hard"

Provisioning
Configuration
Device management
Deployment
Monitoring

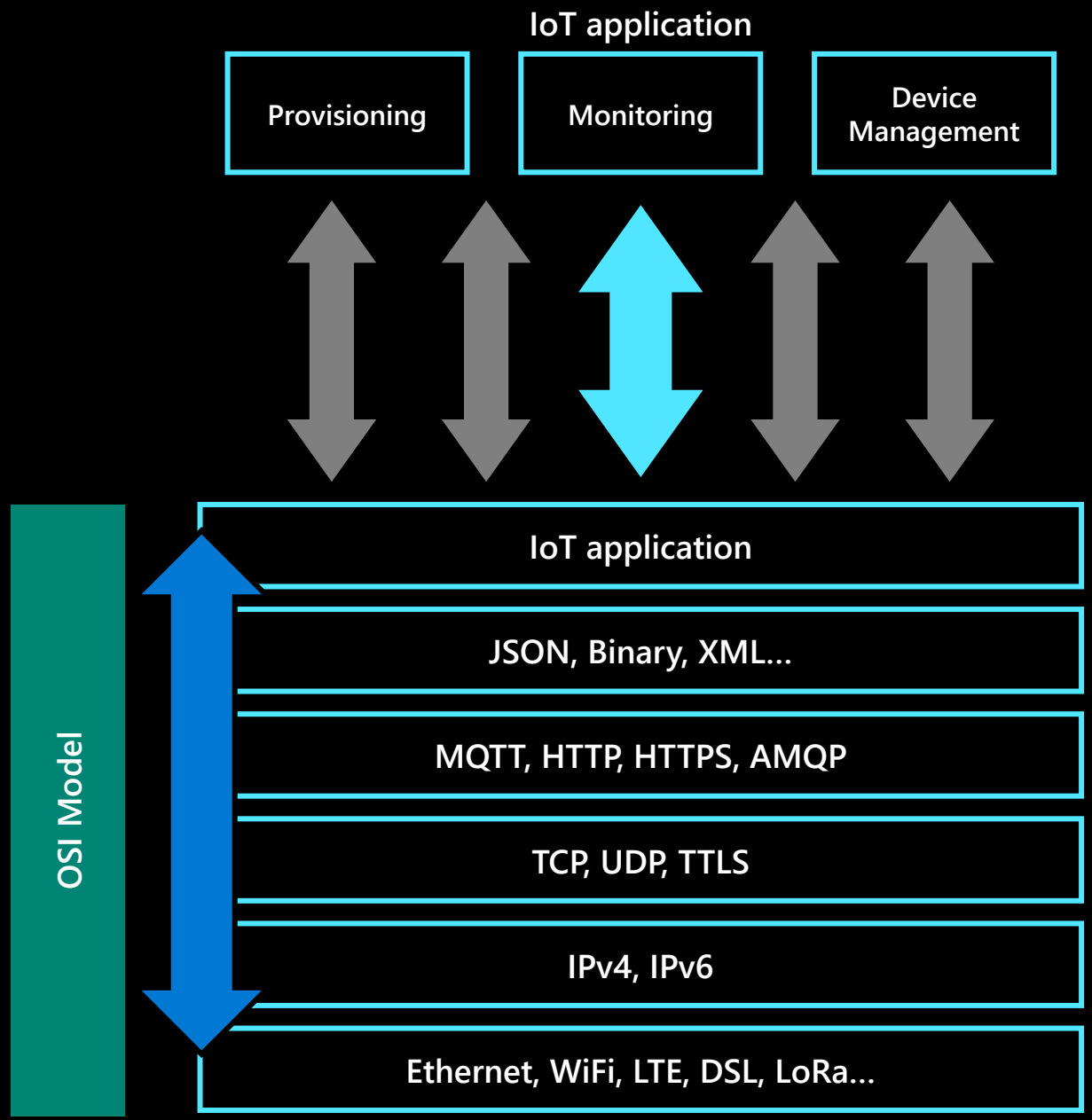


IoT Plug and Play defines common language

A platform feature to describe models and capabilities to Cloud

Based on Digital Twin definition language

Open source based on open standards (JSON-LD, RDF)



Benefits

Solution developers

Dramatically reduces the effort needed to build software on devices

Customers and partners

Large ecosystem of devices that just work with Azure IoT solutions, without any development required

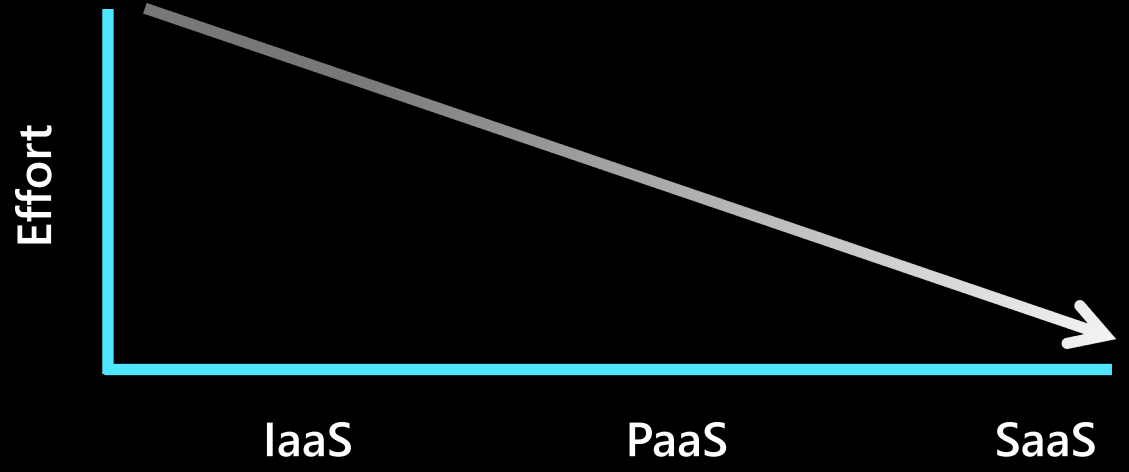
Device builders

Certify your device for IoT Plug and Play and it can be used with thousands of Azure IoT solutions

In public preview

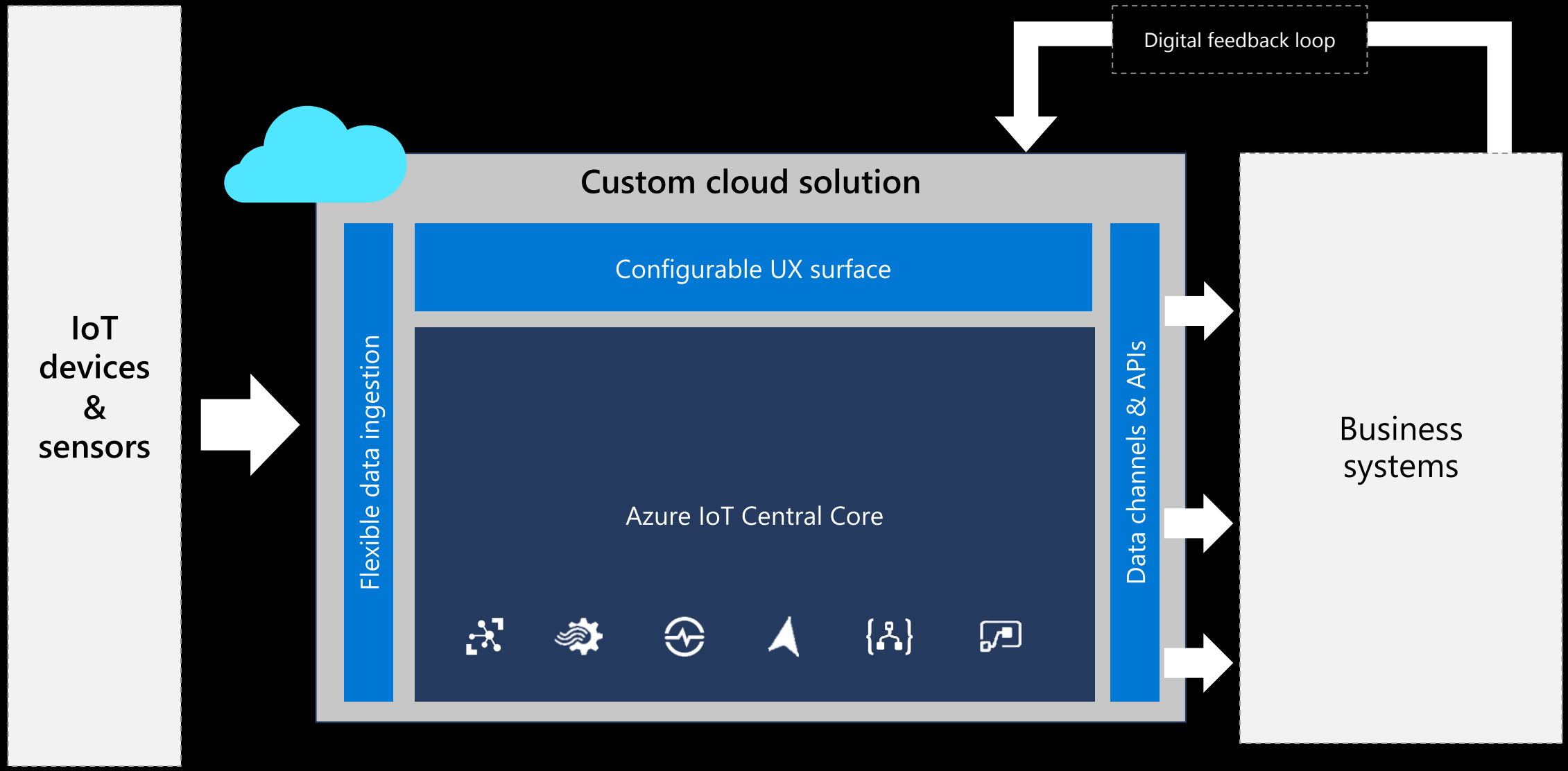
http://aka.ms/IoTPlugandPlay

Making IoT seamless



The total effort to build and operate an IoT Solution is rapidly decreasing

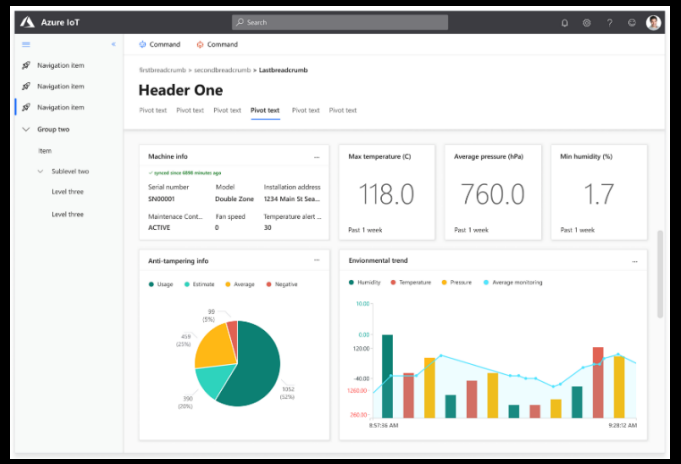
Solution architecture—IoT Central



Azure IoT Central

IoT app platform with security, global scale, high availability, disaster recovery built in

- Device connectivity and management
- Telemetry ingestion and command and control
- Monitoring rules & triggered actions
- User roles and permissions
- Dashboards, visualization and insights
- Fully hosted and managed by Microsoft



- Maps, location telemetry and geofencing
- Device Bridge
  Ingest data from other clouds
- Continuous Data Export
  Bring data into downstream business applications

- White labeling
  Your SaaS – Your Brand
- IoT Plug-and-Play
  Public Preview
- IoT Edge support
  Incl. Module Management
- Multi-tenancy & RBAC
- Extensibility
  APIs
- Solution Builder App Templates

IoT Central App Templates

App templates for Priority Industry Verticals

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

Challenge #1

Getting connected

Challenge #2

Making it easier to combine services to “do something”

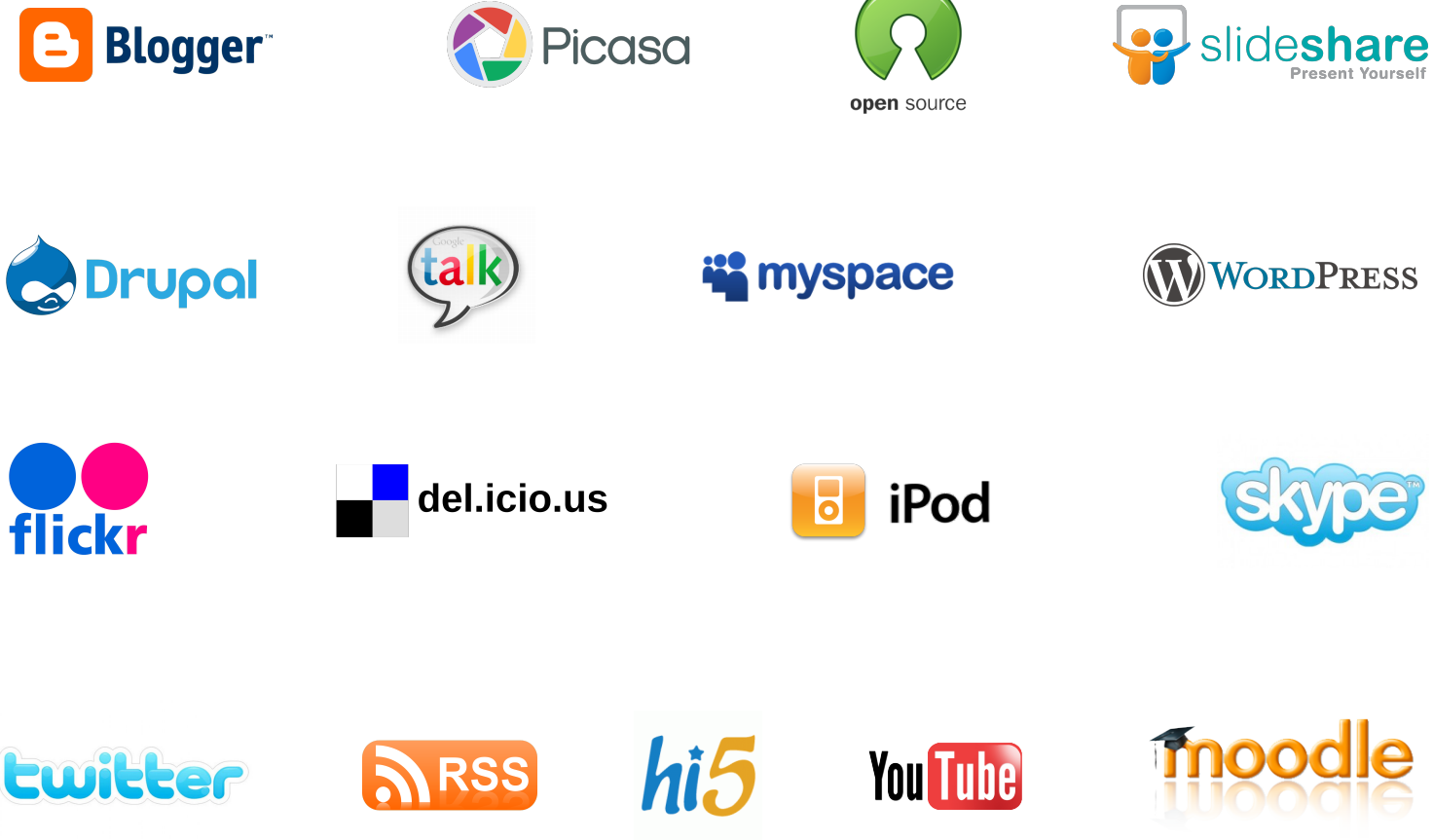
Challenge #3

Making it easier to use the data; it’s massive

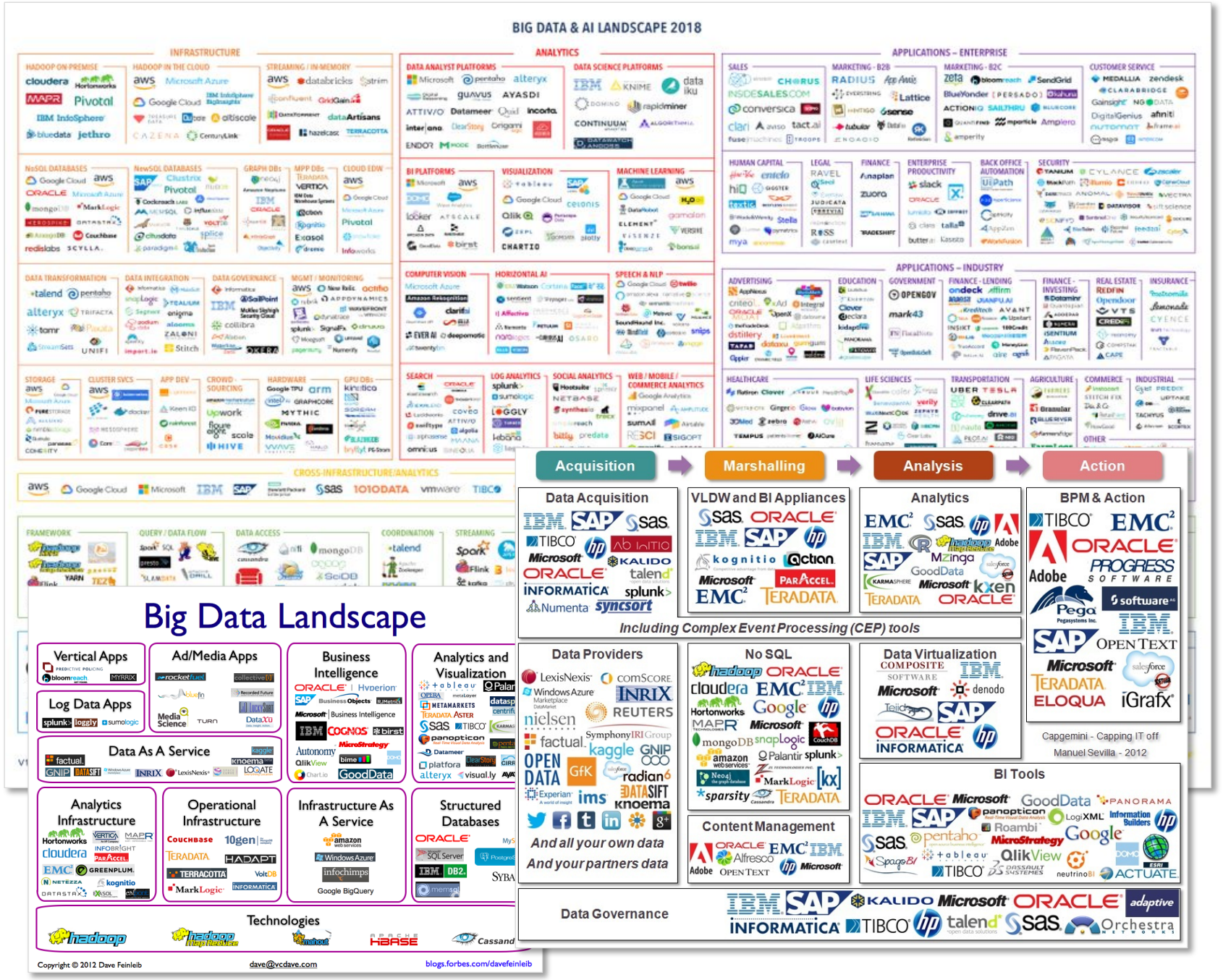
“We’ve been here before”

“Big Data” started with Web 2.0

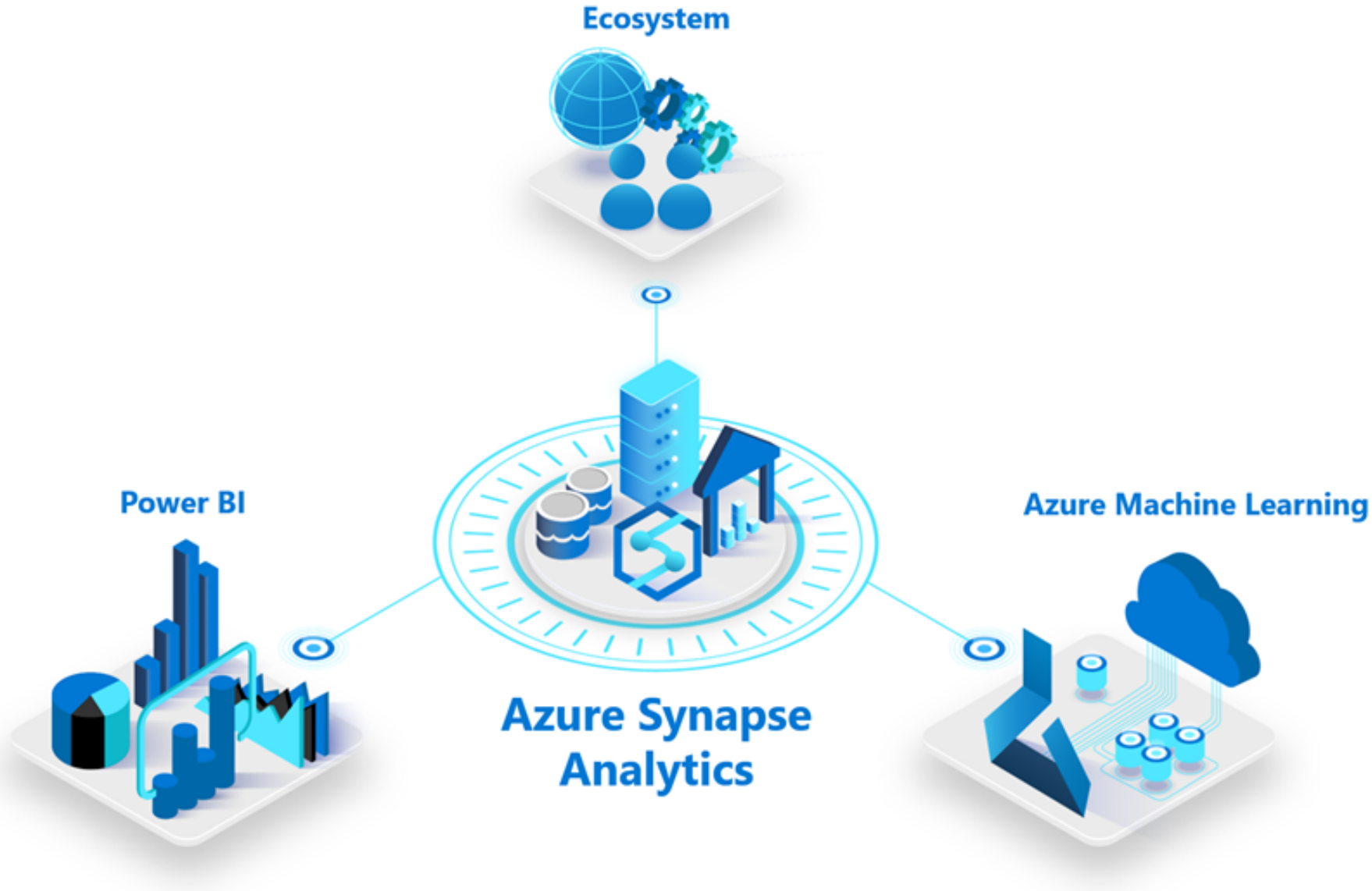
Web 2.0 technologies



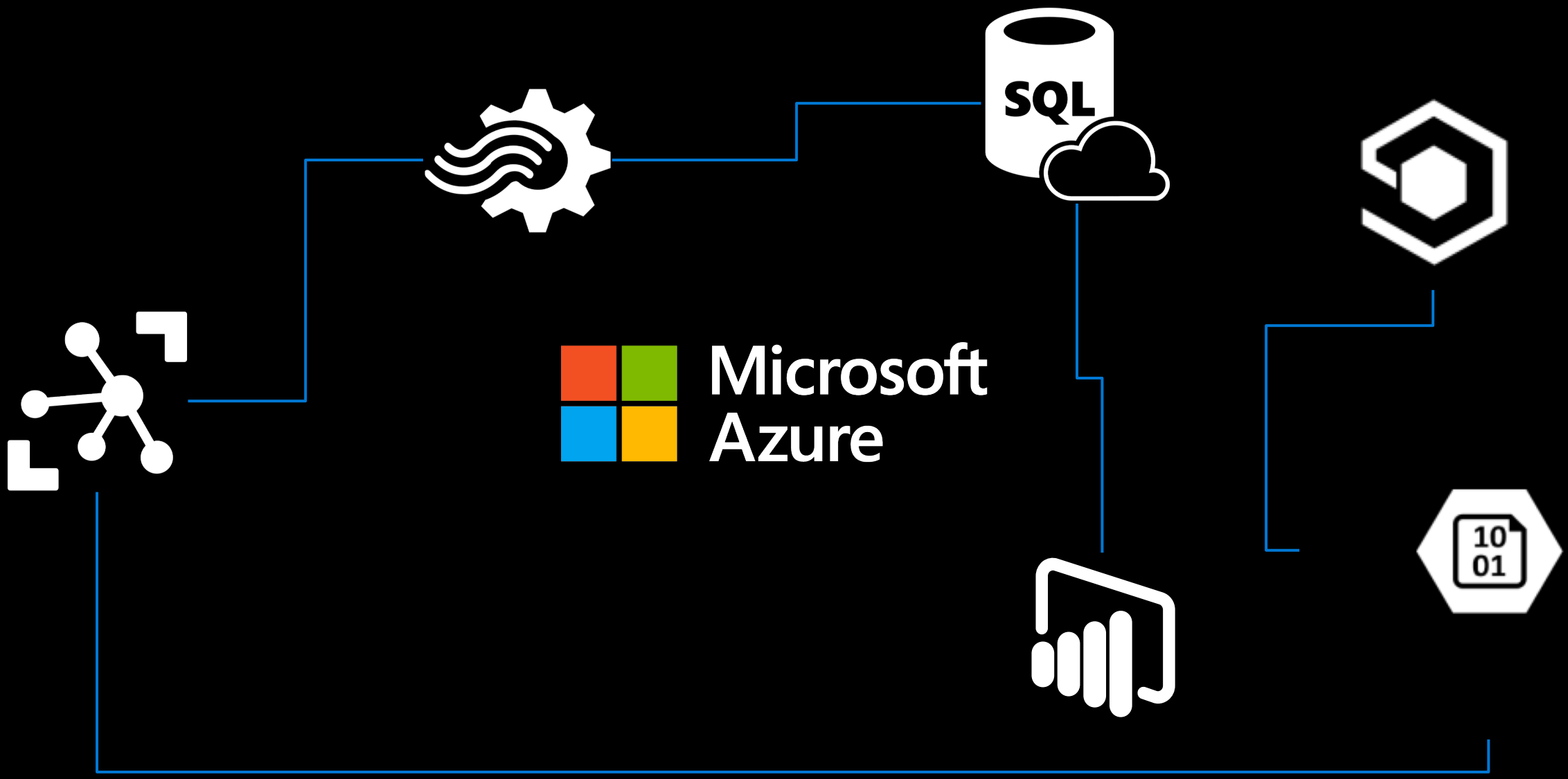
Remember these?



“Big Data” challenge 2.0

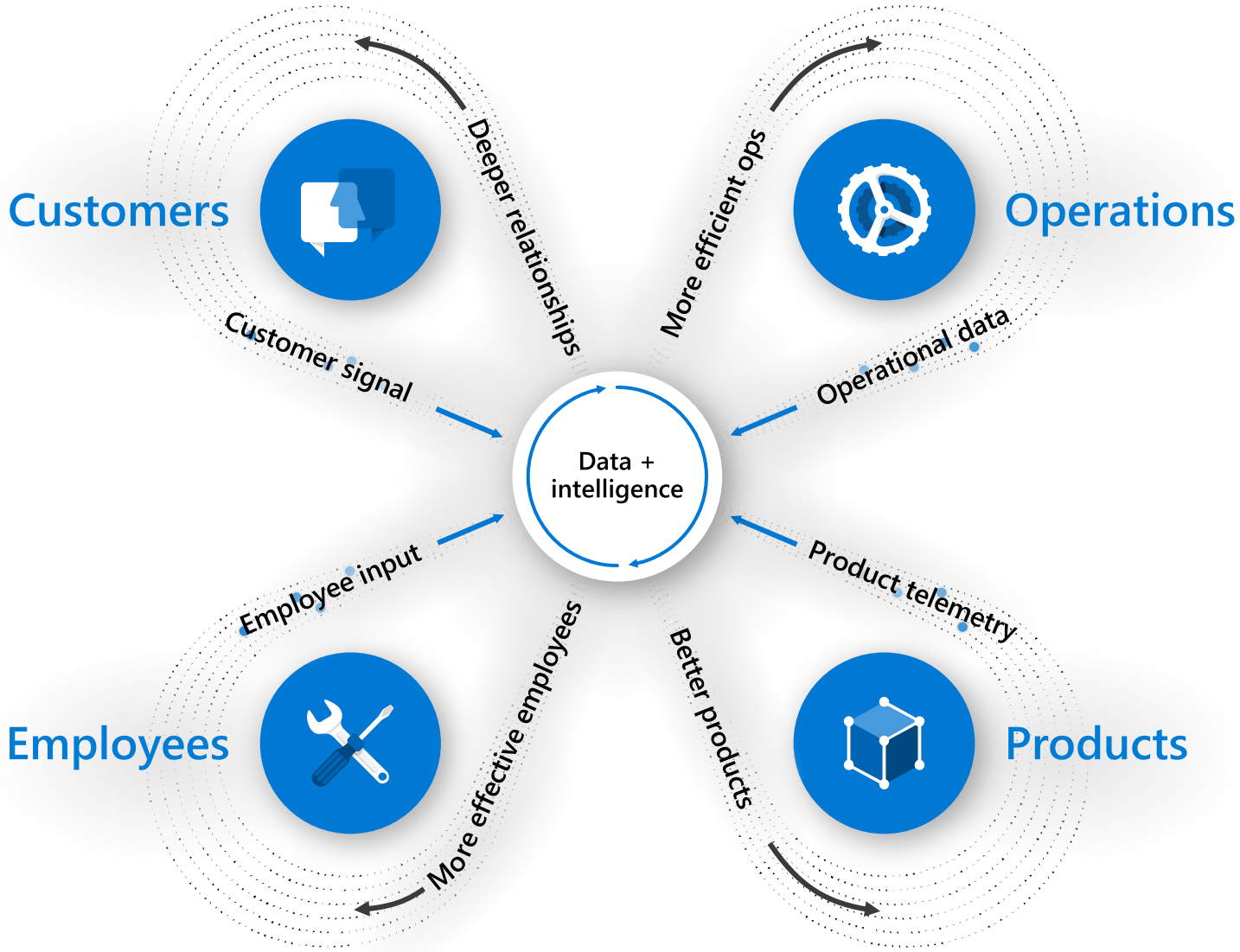

Ecosystem
Power BI
Azure Machine Learning
Azure Synapse Analytics


Microsoft
Azure


SQL
Microsoft
Azure
10
01

The digital feedback loop

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



What is confidential computing?

The ability to store, transport, **and act** on compute workloads without compromising privacy of data and intellectual property

Why confidential computing in IoT

Intelligent edge computing creates the need to protect code and data in use in addition to protection in storage and transit

Code and data confidentiality

Proprietary code and algorithms

Sensitive data like patient information and ML models

Actions from insights

Safe actions from insights out of intelligent edge processing

Trustworthy I/O for command and control of critical infrastructure

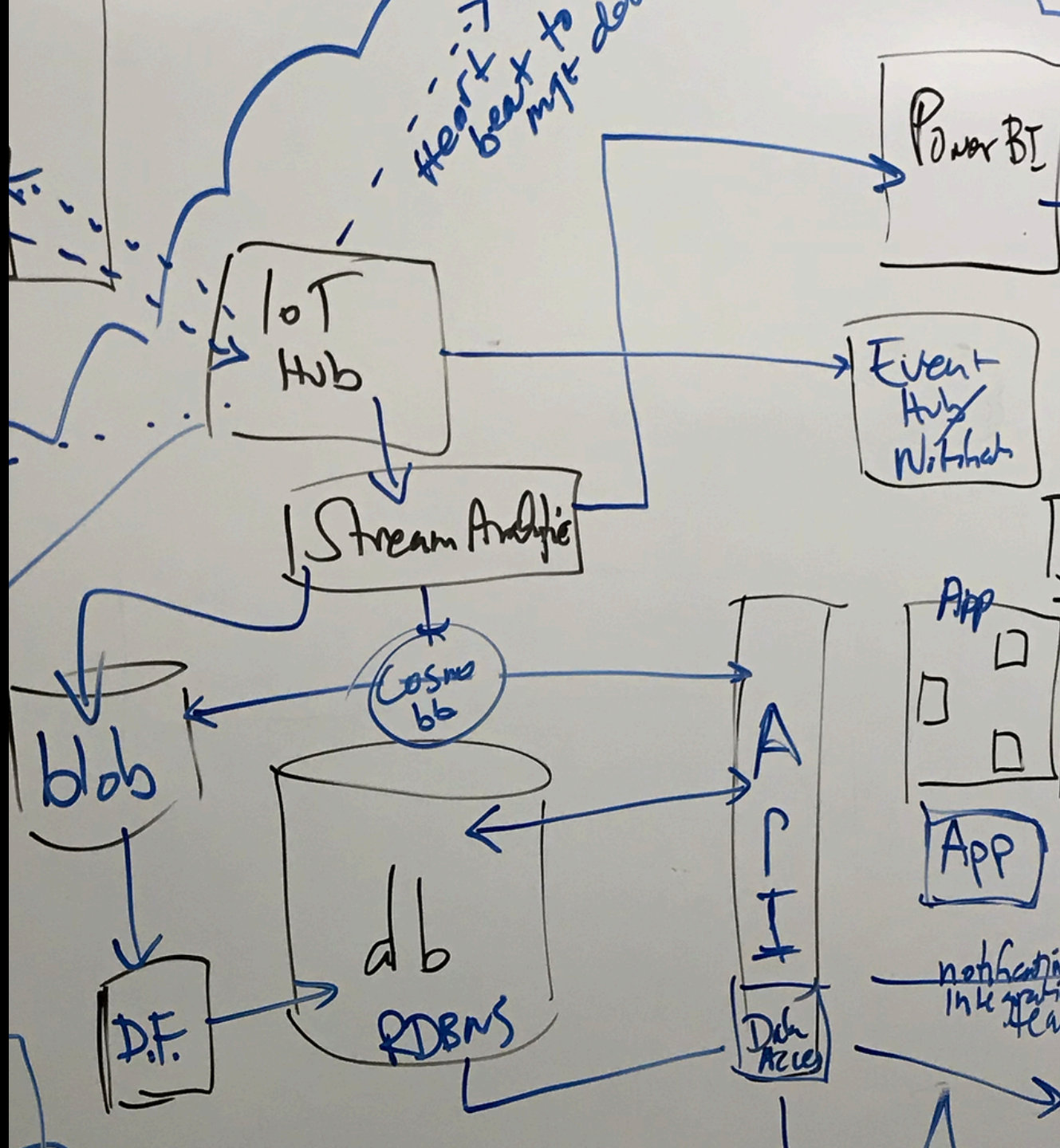
Valued transactions

Metering actions for billing

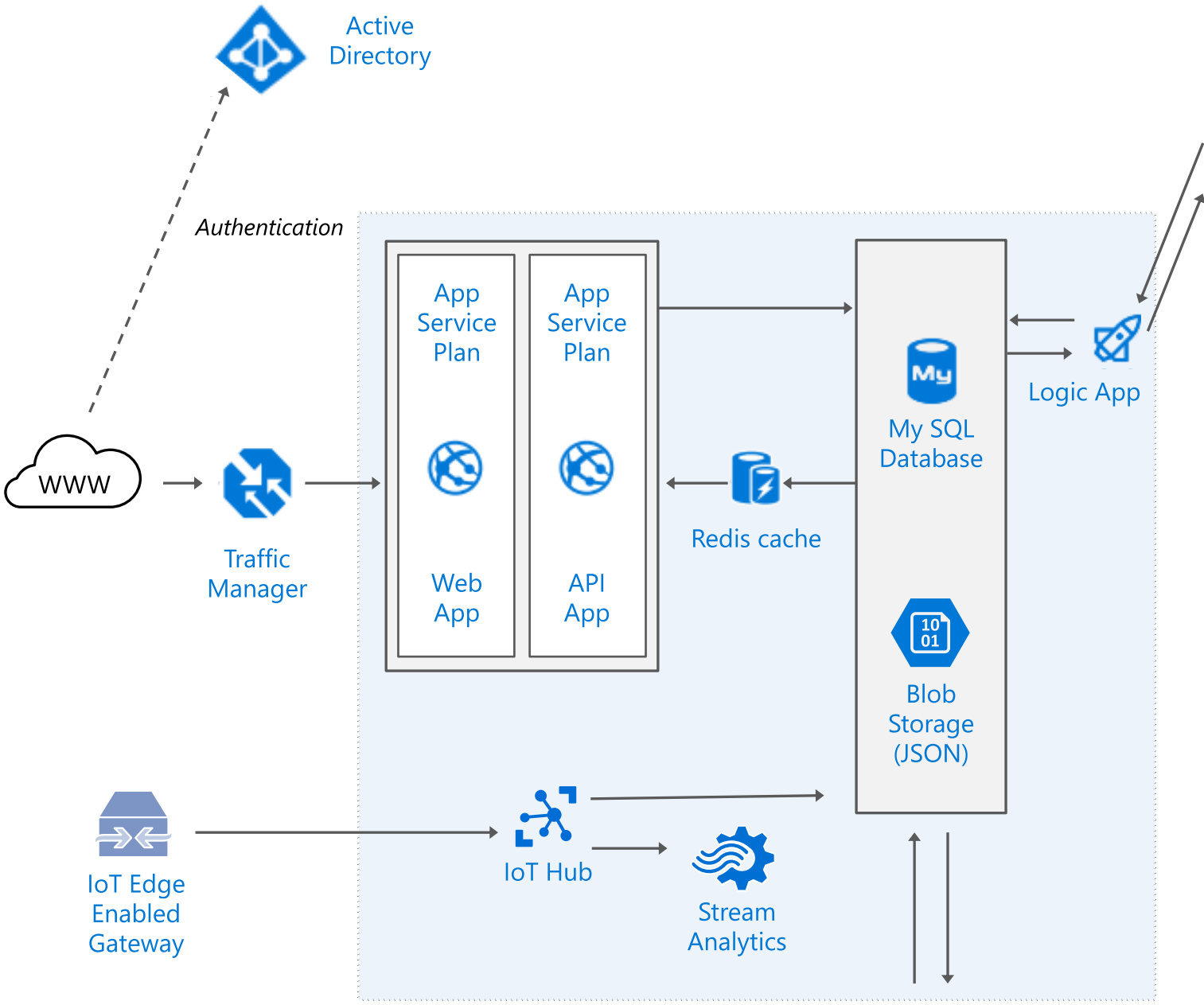
Events tracking e.g., violations for warranty management

Partners make more possible

The anatomy of the architectural design session



The output


Active Directory
Authentication
WWW
Traffic Manager
App Service Plan
Web App
App Service Plan
API App
Redis cache
My SQL Database
Logic App
Blob Storage (JSON)
IoT Edge Enabled Gateway
IoT Hub
Stream Analytics

Mark Carlton

Solutions Architect IoT & Edge

Losses in the supply chain

22.8 billion

global shipments are damaged, delayed, or lost every year[2]

30%

of perishable goods spoil before they reach their destination[3]

$60 billion

in goods are stolen each year worldwide; $35 billion in the U.S. alone[5]


intel
ARROW
Microsoft

Intel® Connected Logistics Platform

Automate shipment tracking and gain visibility into the logistics chain*

Edge connectivity
Multifunction IoT tags measure a variety of conditions

Continuous communication
A mesh sensor network helps ensure comprehensive asset visibility

Gateway interface
Gateways efficiently send aggregated data to the cloud via Wi-Fi or cellular connections

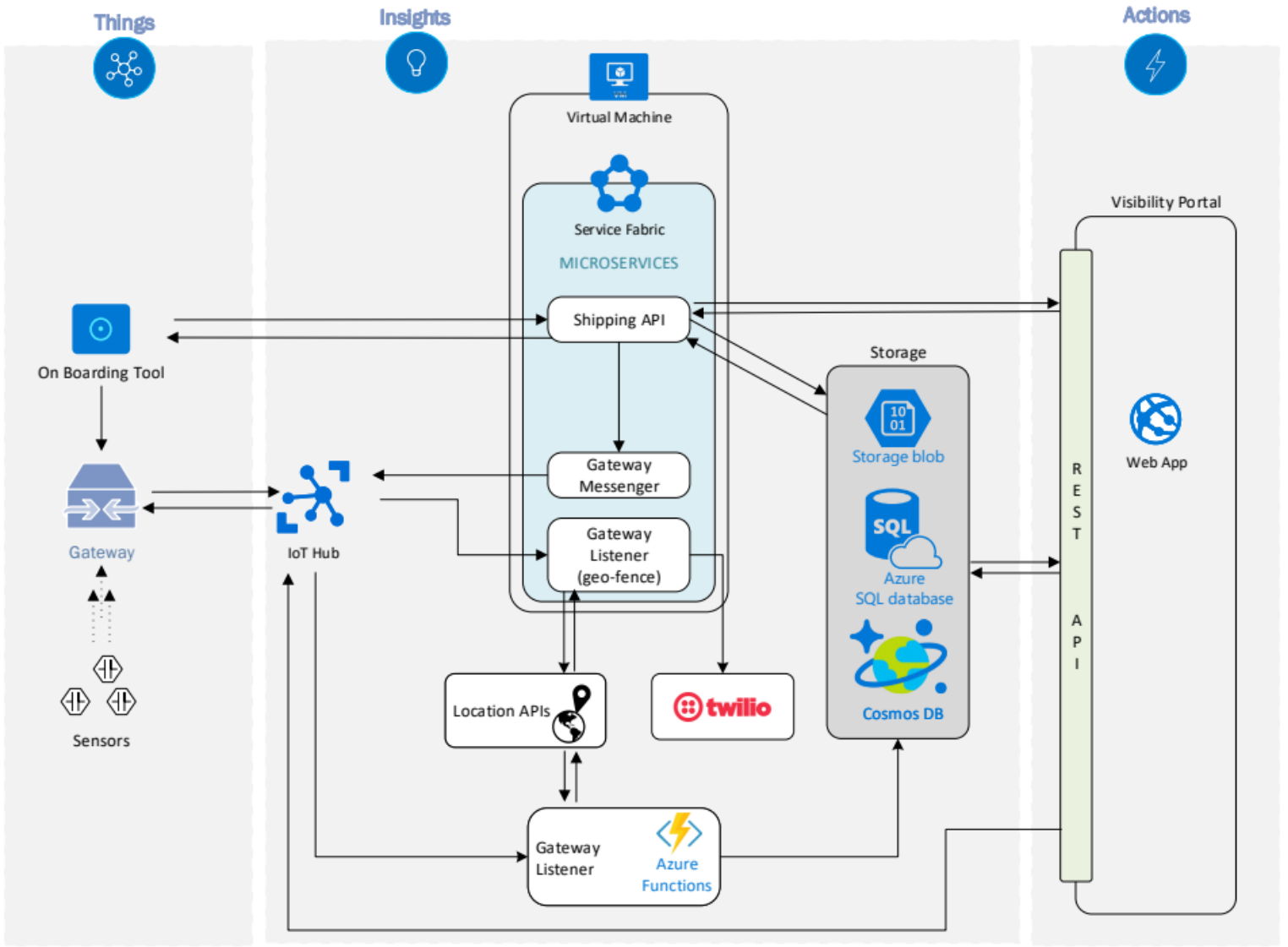
Powerful cloud
Microsoft Azure connects, monitors, authenticates and automates data transmission

Meaningful insights
Insights are visualized and delivered through mobile apps or online dashboards

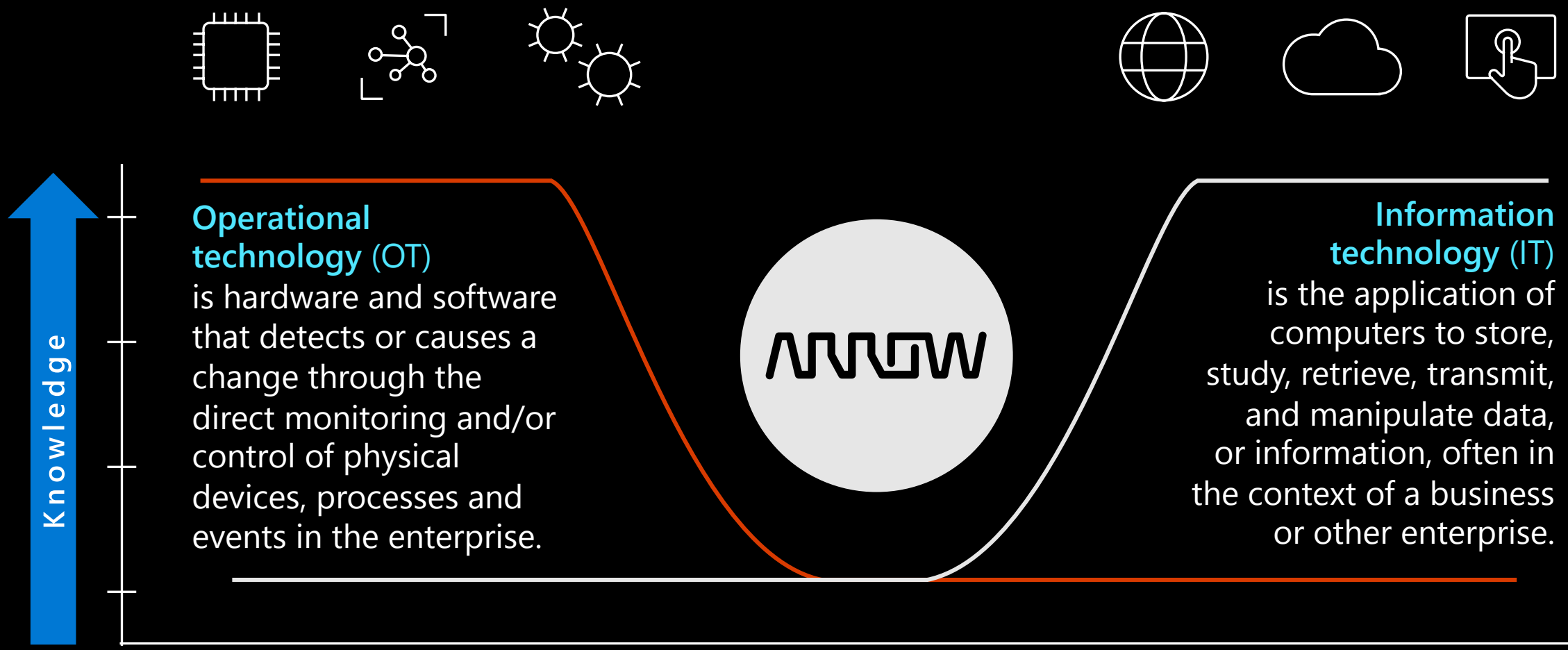
*The Intel® Connected Logistics Platform is fully implemented with the help of an experienced Microsoft Systems Integrator


Demo

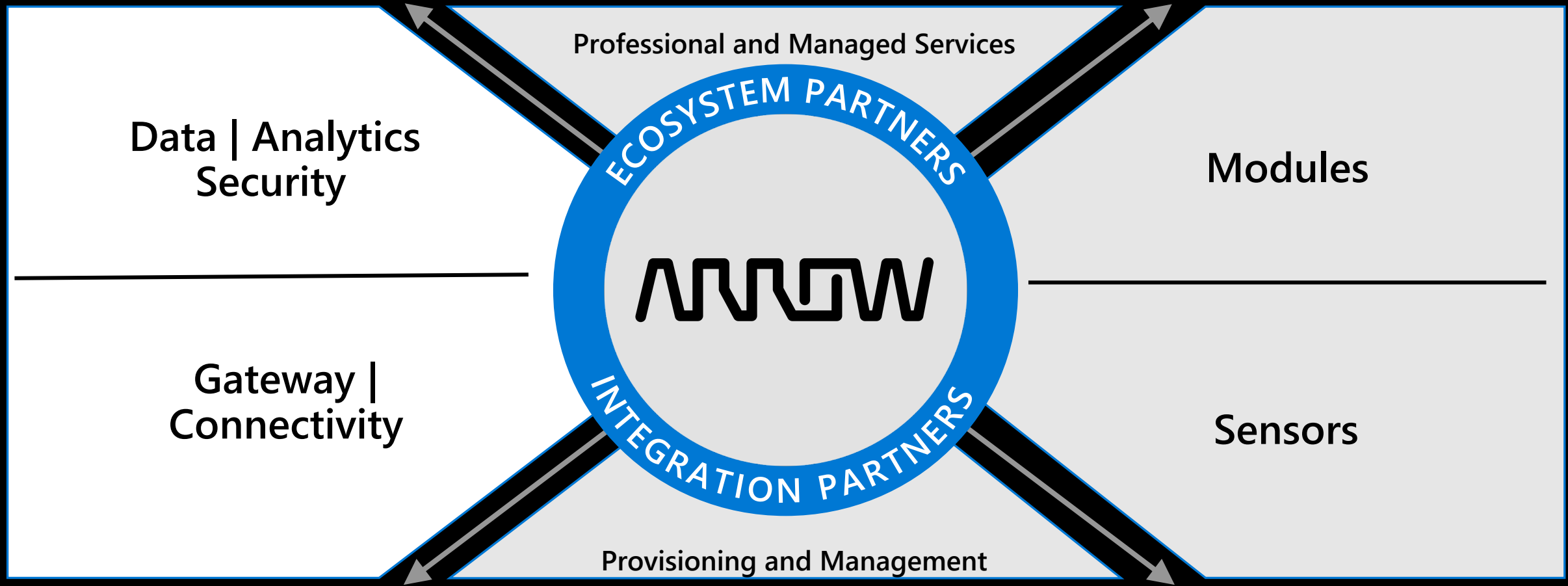
Reference architecture



Digital transformation requires partnerships



Our partnerships scale digital transformation projects



Next steps

- We'll connect you with the Arrow team to find out how easy it is to adopt the Intel Connected Logistics Platform iot@arrow.com
- Learn more about the Intel Connected Logistics Platform at https://www.arrow.com/en/campaigns/iot-intel-connected-logistics-platform
- Learn more about Microsoft Azure at azure.microsoft.com

Mark Carlton

Solutions Architect IoT & Edge


mark.carlton@arrow.com

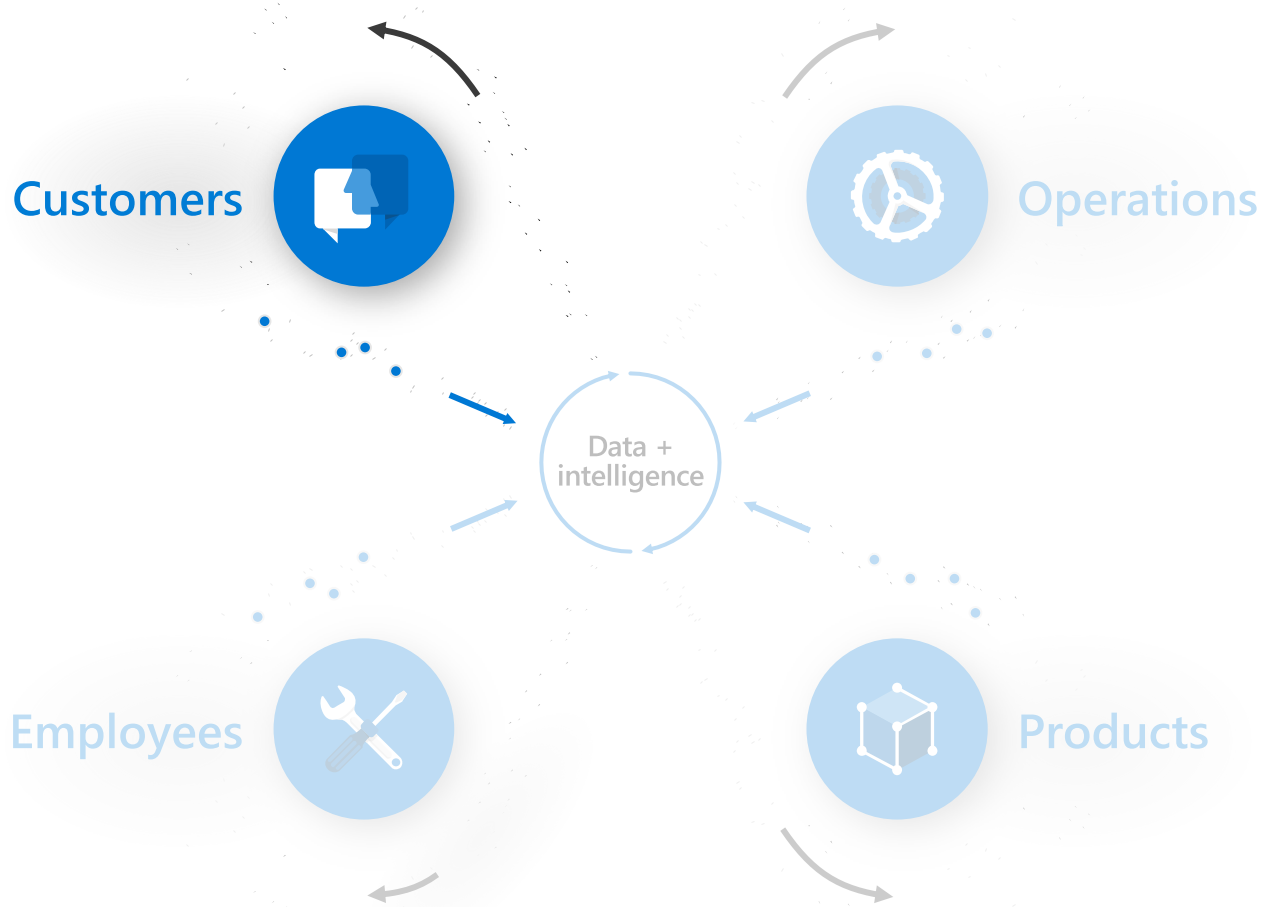

/Mark Carlton


@mcarlton1983

We iterate on it with our partners

This is what we mean by our greatest strength is our ecosystem

We can help create the better process this way together



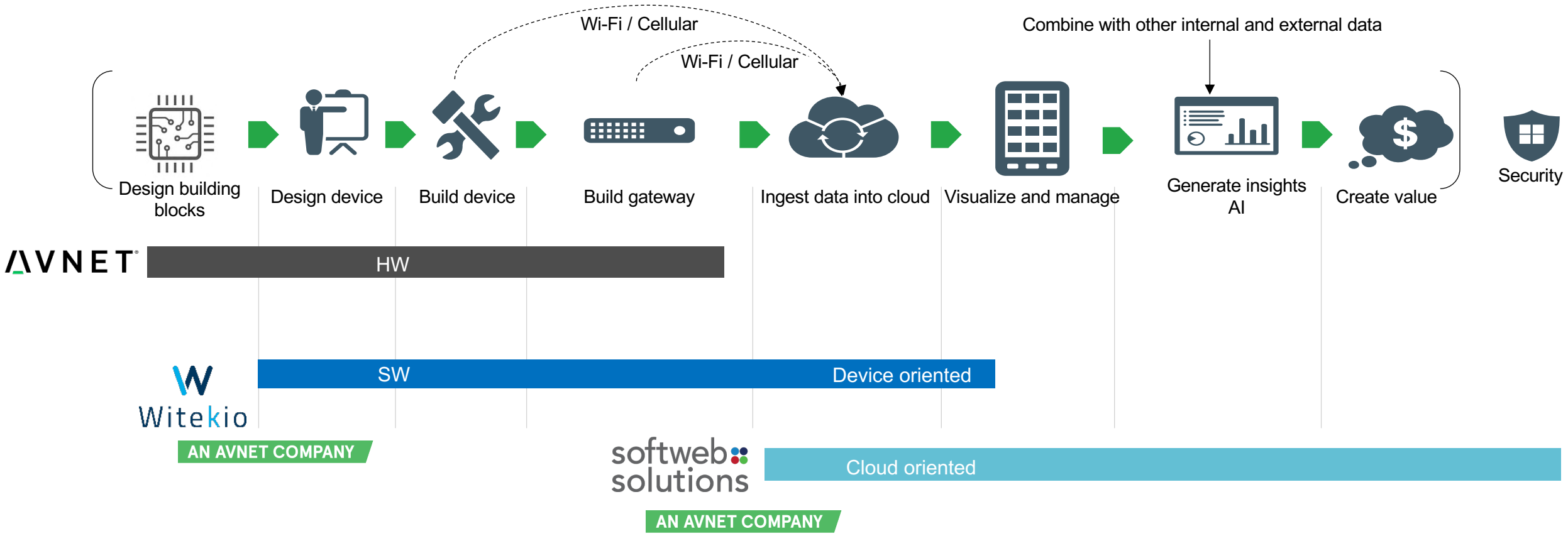
AVNET®
Reach Further™

Martin Grossen

Supplier Business Manager Microsoft IoT at AVNET EMG Silica

Martin Grossen is responsible for driving the Microsoft Embedded / IoT channel for AVNET Silica in Europe.
He is supporting hundreds of industrial device and solution OEMs in the embedded / IoT / cloud space to bring their solution to market.
As an active Microsoft MVP (Most Valuable Professional), technical and licensing specialist, Mr. Grossen is one of the leading drivers of the Microsoft Embedded / IoT ecosystem.

The Avnet Value Proposition – Helping Businesses “See the Future”



We offer end to end capabilities to deliver real return on investment on IoT

AVNET

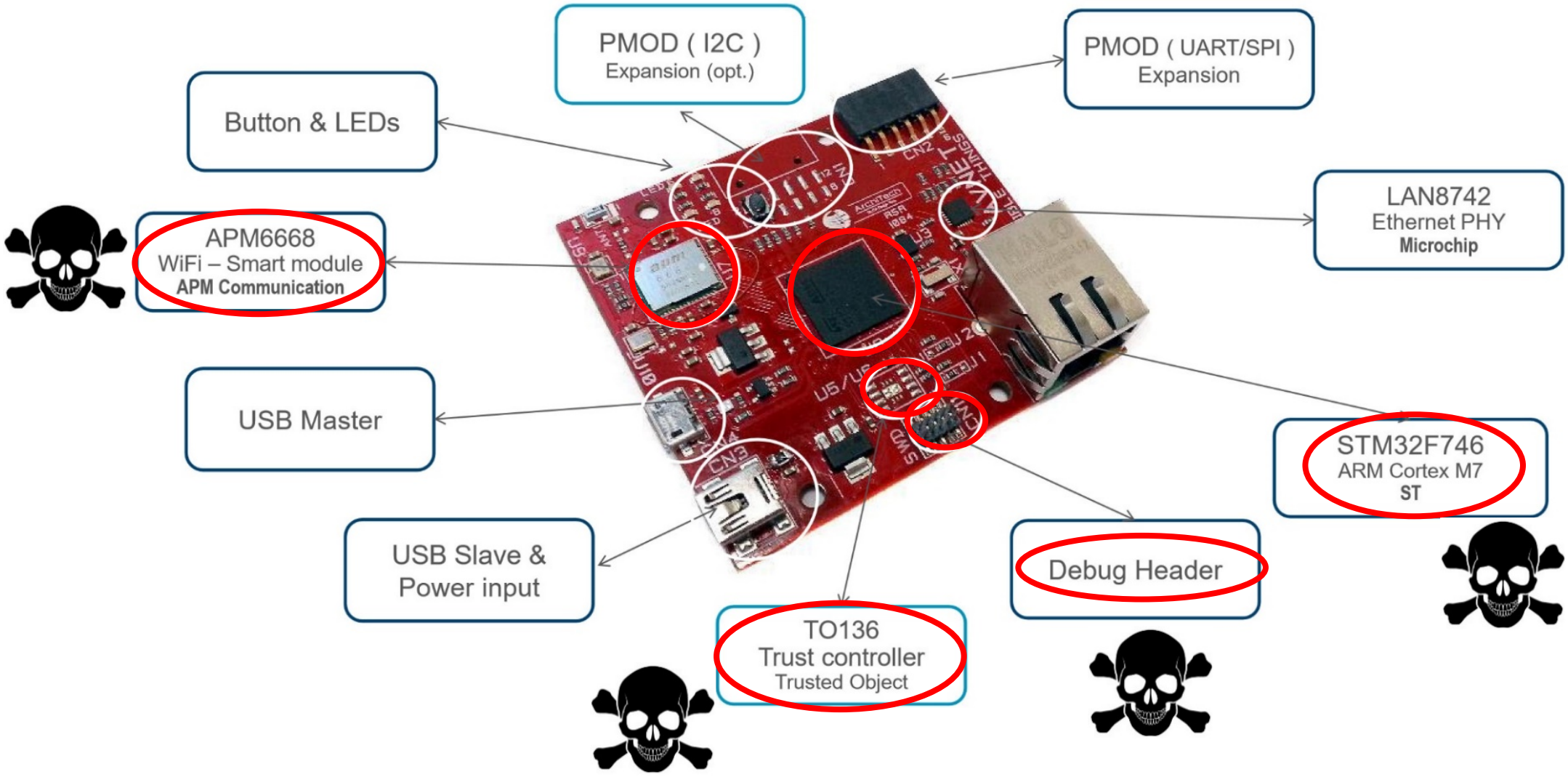
The #1 Challenge for IoT = IoT Security

"By 2020, more than **25% of identified attacks** in enterprises will involve **IoT.**" – Gartner IoT Survey 2016

"Over **50%** of CIO's and CTO's have identified **IoT Security** as the **#1 barrier/challenge** to IoT success." – Gartner IoT Survey 2017

AVNET

2016: AVNET Silica: Design help for a secure IoT platform



AVNET

Highly-Secured Connected Devices require 7 Properties

Hardware Root of Trust

Is your device's identity and software integrity secured by hardware?

Defense in Depth

Does your device remain protected if a security mechanism is defeated?

Small Trusted Computing Base

Is your device's TCB protected from bugs in other code?

Dynamic Compartments

Can your device's security protections improve after deployment?

Certificate-Based Authentication

Does your device use certificates instead of passwords for authentication?

Failure Reporting

Does your device report back about failures and anomalies?

Renewable Security

Does your device's software update automatically?

 = Silicon support required

 = OS support required

 = Cloud Service support required

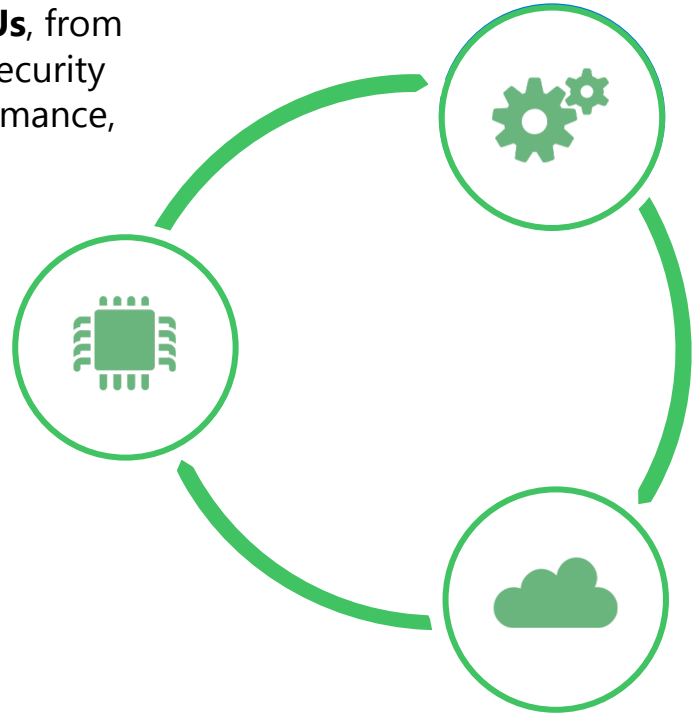
http://aka.ms/7properties

AVNET

The Security Solution - Azure Sphere

Secured **MCUs**

A new class of crossover **Azure Sphere MCUs**, from our silicon partners, with built-in Microsoft security technology provide connectivity, high performance, and a secured hardware root of trust.



Secured **Operating System**

The highly-secured **Azure Sphere IoT OS** combines the best of Microsoft and OSS technologies to create **a trustworthy platform** for new IoT experiences

Secured by our **Cloud Service**

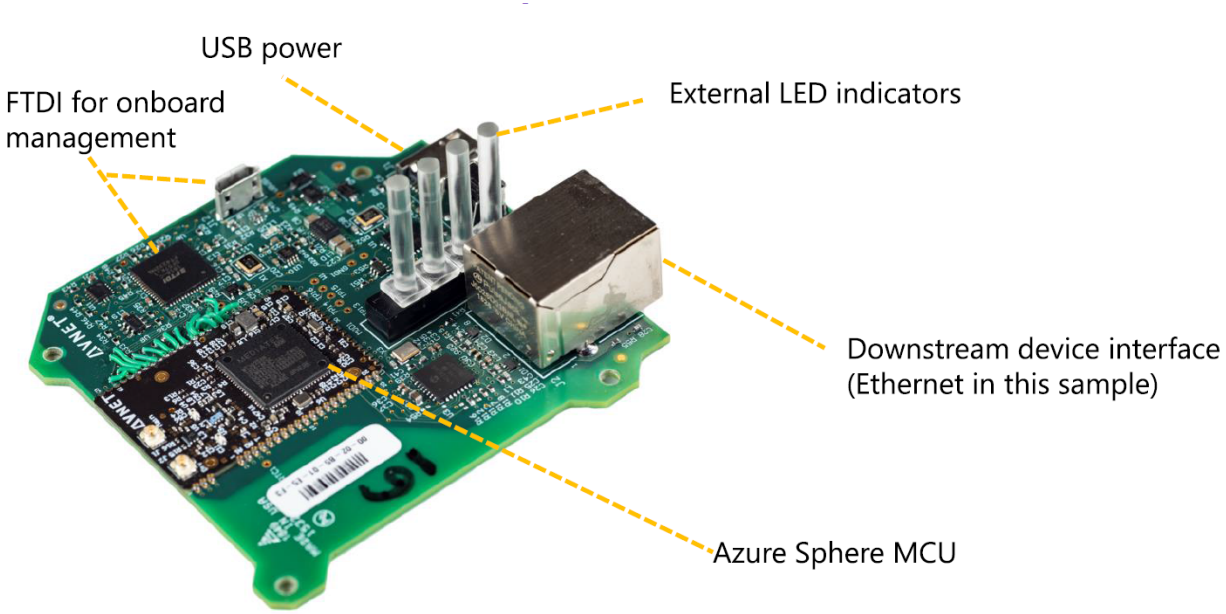
The **Azure Sphere Security Service** guards every Azure Sphere device; it **protects** your devices and customers, **detects** emerging threats, and proactively **responds**.

AVNET

Two Types of Customer Implementations

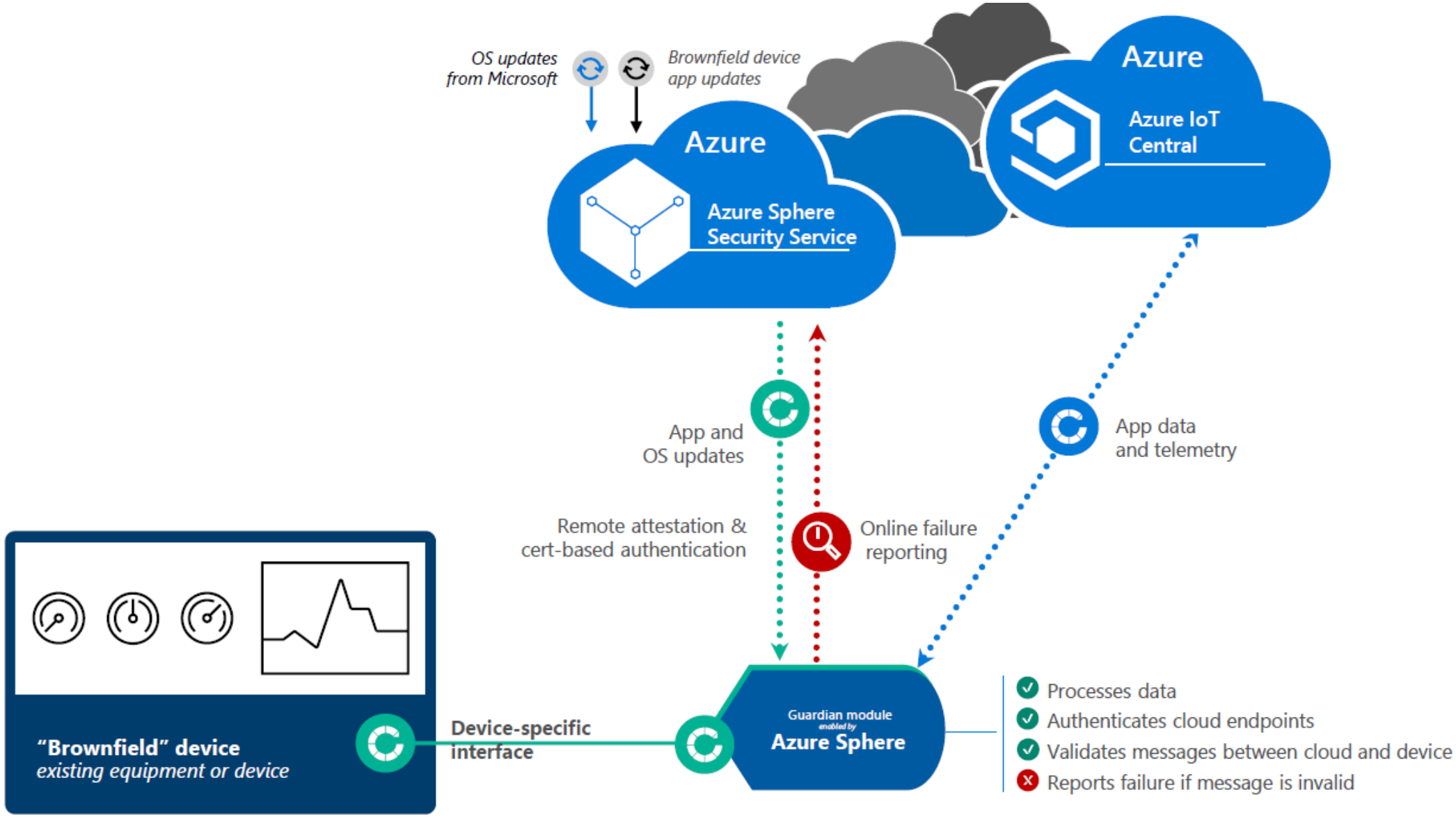
Azure Sphere for Brownfield

Guardian



DESIGNED BY AVNET

Securing Brownfield Devices with Guardian

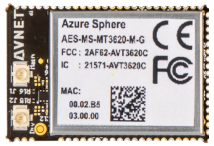


STARBUCKS

Azure Sphere enables Starbucks to put their Business Transformation Strategy into rapid gear.

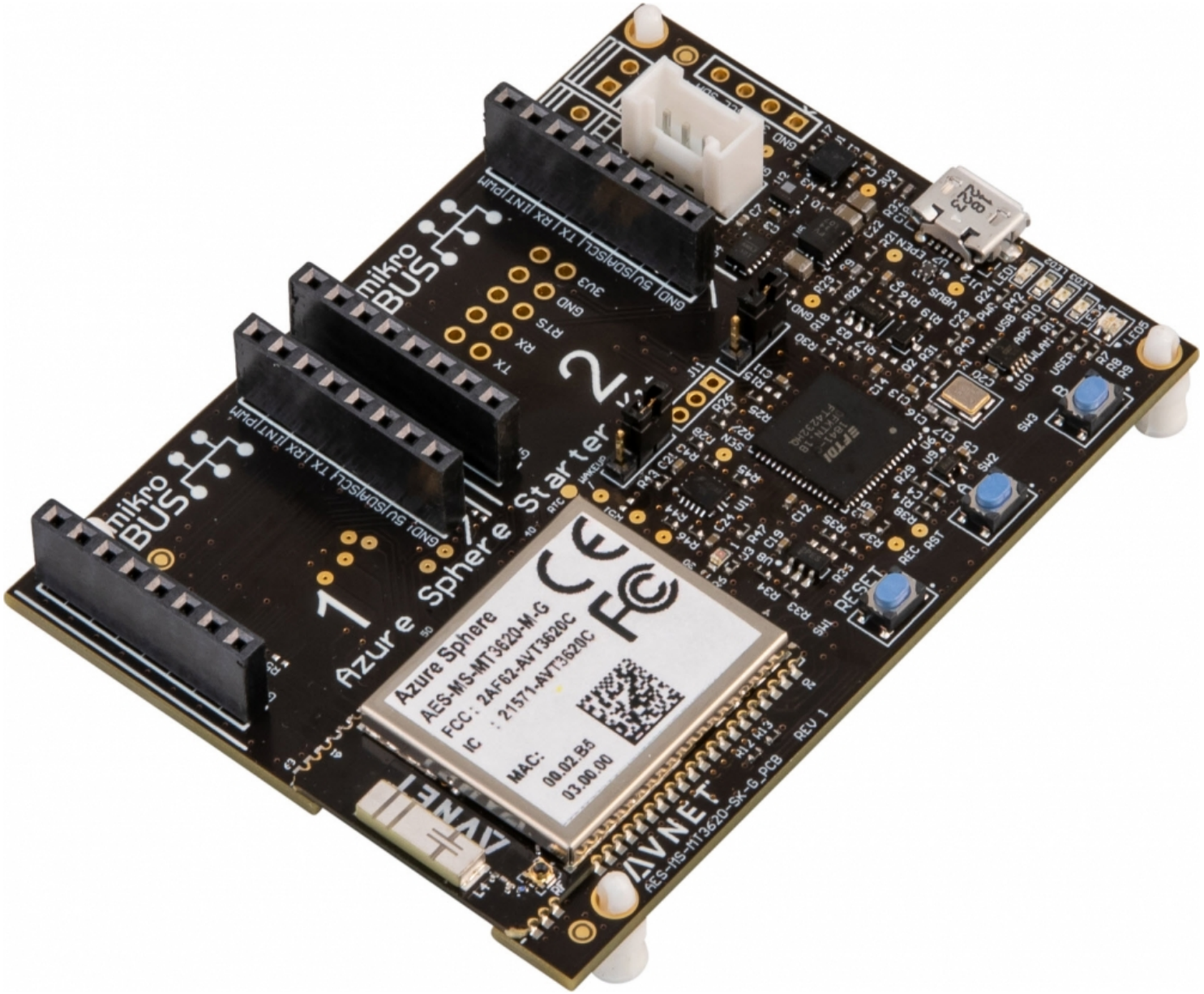
- Cost savings: Reduce unnecessary maintenance truck rolls
- Customer experience: Deliver the perfect pour every time
- Operational efficiency: Download seasonal recipes directly to machines

Avnet's Sphere Product Roadmap

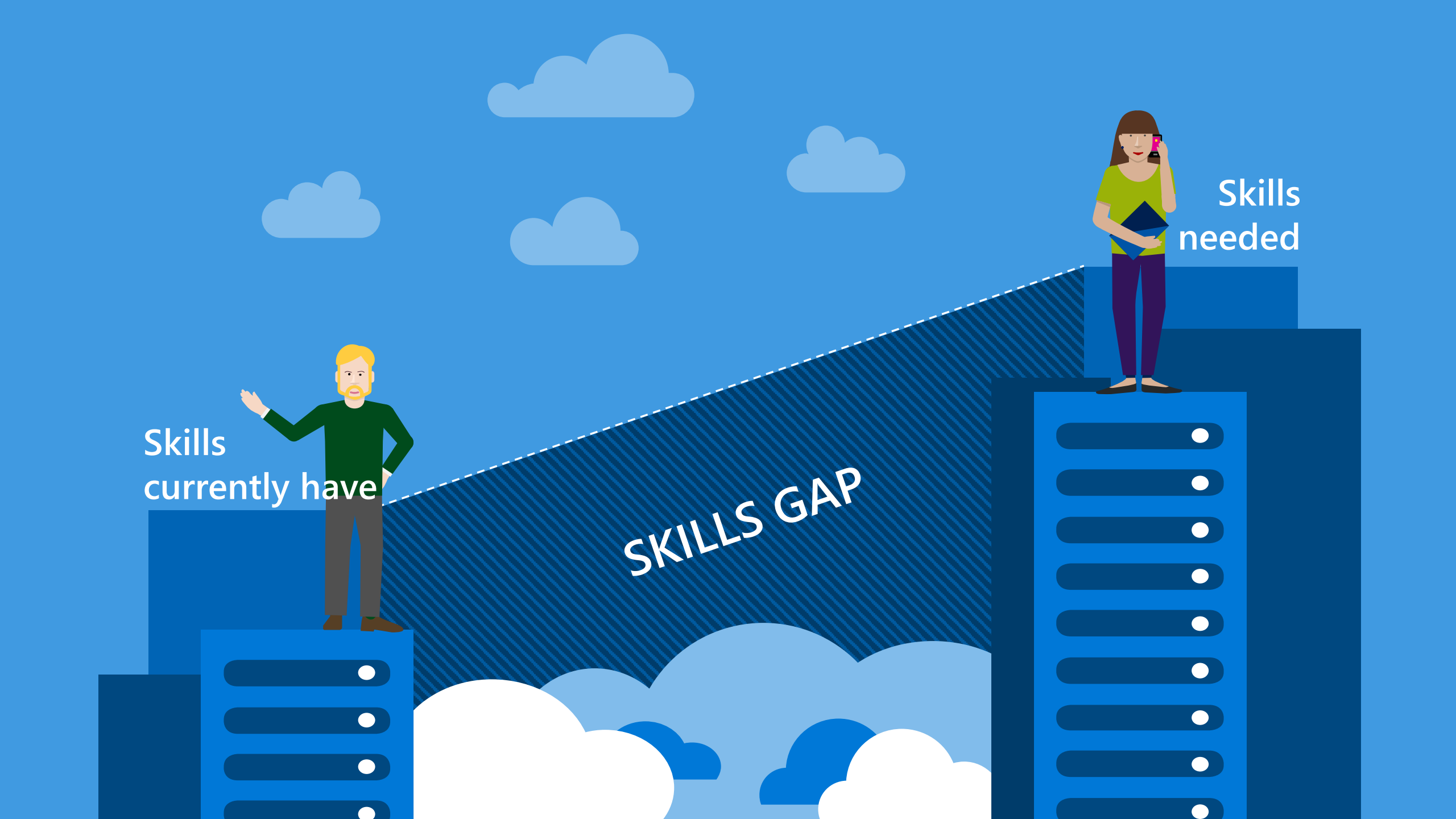
Chip	Module	Starter Kit	Guardian	
Targeting higher volume (>50K) applications	Certified and production ready for quick time to market	Eases prototyping and PoC development with expansion and add-ons	Production ready, Sphere-based system with enclosure for quick deployment. Off-the-shelf or customizable to meet exact application needs.	Target Applications
Available Now  **MT3620 Sphere MCU** - Arm Cortex A7 MPU with 4MB SRAM - Dual M4F MCUs with 64KB SRAM each - Dual band a/b/g/n WiFi - Up to 5 ISU interfaces configurable as UART, I2C, or SPI ports - Up to 72 GPIOs - PWM, I2S, ADC, RTC	Available Now  **Chip Antenna Module** - Based on the MT3620 - Dual band a/b/g/n WiFi - Chip antenna - Three ISU interfaces - 33 x 22 x 3 mm	Available Now  **MT3620 Starter Kit** - Based on the MT3620 Chip Antenna Module - Two MikroE Click Board expansion slots - Five on-board sensors - Optional OLED port - I2C Grove connector - User push buttons - User LEDs - USB powered	 Sampling Now **Guardian-I** - WiFi Uplink - Ethernet Up or Downstream - USB-UART Downstream	- Machine monitoring/control - Asset monitoring
	Available Now  **External U.FL Antenna** - Based on the MT3620 - Dual band a/b/g/n WiFi - TX/RX ant. Diversity - U.FL connectors - Three ISU interfaces - 33 x 22 x 3 mm		Under Development Coming November **Guardian-Ic** - WiFi Uplink - Ethernet Up or Downstream - USB-UART Downstream - Separate Program Cable - Compact size - Lower cost	- Machine monitoring/control - Asset monitoring
Coming 2H '20 Under Development **NXP Sphere MCU** - i.mx8 based			Under Development Coming November **Guardian-II** - WiFi Uplink - BLE/802.15.4 Downstream - UART/SPI/I2C Expansion - USB Mass Storage	- Secure gateway - Machine monitoring/control - Asset monitoring - Mesh network gateway - Remote patient monitoring

AVNET

AVNET Azure Sphere Starter Kit



AVNET


Skills needed
Skills currently have
SKILLS GAP

Welcome to Microsoft Learn

Microsoft.com/learn

Time investment expectation

Microsoft.com/learn

12300 XP

Azure fundamentals

8 hr 17 min remaining • Learning Path • 1 of 12 modules completed

Beginner | Developer | Solution Architect | Administrator | AI Engineer | Business Analyst | Business User | Data Engineer | Data Scientist | Azure | Azure Portal | Azure Resource Manager | Storage | Virtual Machines

Interested in the cloud, but aren't quite sure what it can do for you? This path is the place to start.

In this learning path, you will:

- Learn cloud concepts such as High Availability, Scalability, Elasticity, Agility, Fault Tolerance, and Disaster Recovery
- Understand the benefits of cloud computing in Azure and how it can save you time and money
- Compare and contrast basic strategies for transitioning to the Azure cloud
- Explore the breadth of services available in Azure including compute, network, storage and security

Once you complete this learning path, you will have the necessary knowledge to take the AZ900 Microsoft Azure Fundamentals Exam.

Prerequisites
None

Modules in this learning path

Cloud Concepts - Principles of cloud computing

1100 XP

1 hr 2 min • Module • 10 Units

★★★★★ 4.8 (23350)

Explore the core concepts of cloud computing and how it can help your business.

Overview

Microsoft.com/learn

Azure fundamentals

12300 XP

8 hr 17 min remaining • Learning Path • 1 of 12 modules completed

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Total XP= 12,300

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1100 XP

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Microsoft.com/learn

12300 XP

Azure fundamentals

8 hr 17 min remaining • Learning Path • 1 of 12 modules completed

Beginner | Developer | Solution Architect | Administrator | AI Engineer | Business Analyst | Business User | Data Engineer | Data Scientist | Azure | Azure Portal | Azure Resource Manager | Storage | Virtual Machines

Interested in the cloud, but aren't quite sure what it can do for you? This path is the place to start.

In this learning path, you will:

- Learn cloud concepts such as High Availability, Scalability, Elasticity, Agility, Fault Tolerance, and Disaster Recovery
- Understand the benefits of cloud computing in Azure and how it can save you time and money
- Compare and contrast basic strategies for transitioning to the Azure cloud
- Explore the breadth of services available in Azure including compute, network, storage and security

Once you complete this learning path, you will have the necessary knowledge to take the AZ900 Microsoft Azure Fundamentals Exam.

Prerequisites
None

Modules in this learning path

Cloud Concepts - Principles of cloud computing

1100 XP

1 hr 2 min • Module • 10 Units

★★★★★ 4.8 (23350)

Explore the core concepts of cloud computing and how it can help your business.

Overview

Module XP= 1,100

Leveling up your Azure skillz with Microsoft Learn

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Top Challenges

Complexity
- IoT PnP, IoT Central

Knowledge
- MS Learn

Security
- Confidential Computing

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