



IoT in Action

#IoTinActionMS



Architecting the Intelligent Edge

Kevin Hilscher

IoT Solution Architect, Microsoft

Chad Lich

IoT Solution Architect, Microsoft

IoT in Action



The evolution of **IoT** in Action



Year 1 2017

The evolution of **IoT** in Action



Year 2 2018

The Evolution of **IoT** in Action



Year 3 2020

IoT Signals

SUMMARY OF RESEARCH LEARNINGS
2019

Reasons for IoT adoption



IoT Signals

SUMMARY OF RESEARCH LEARNINGS
2019

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%

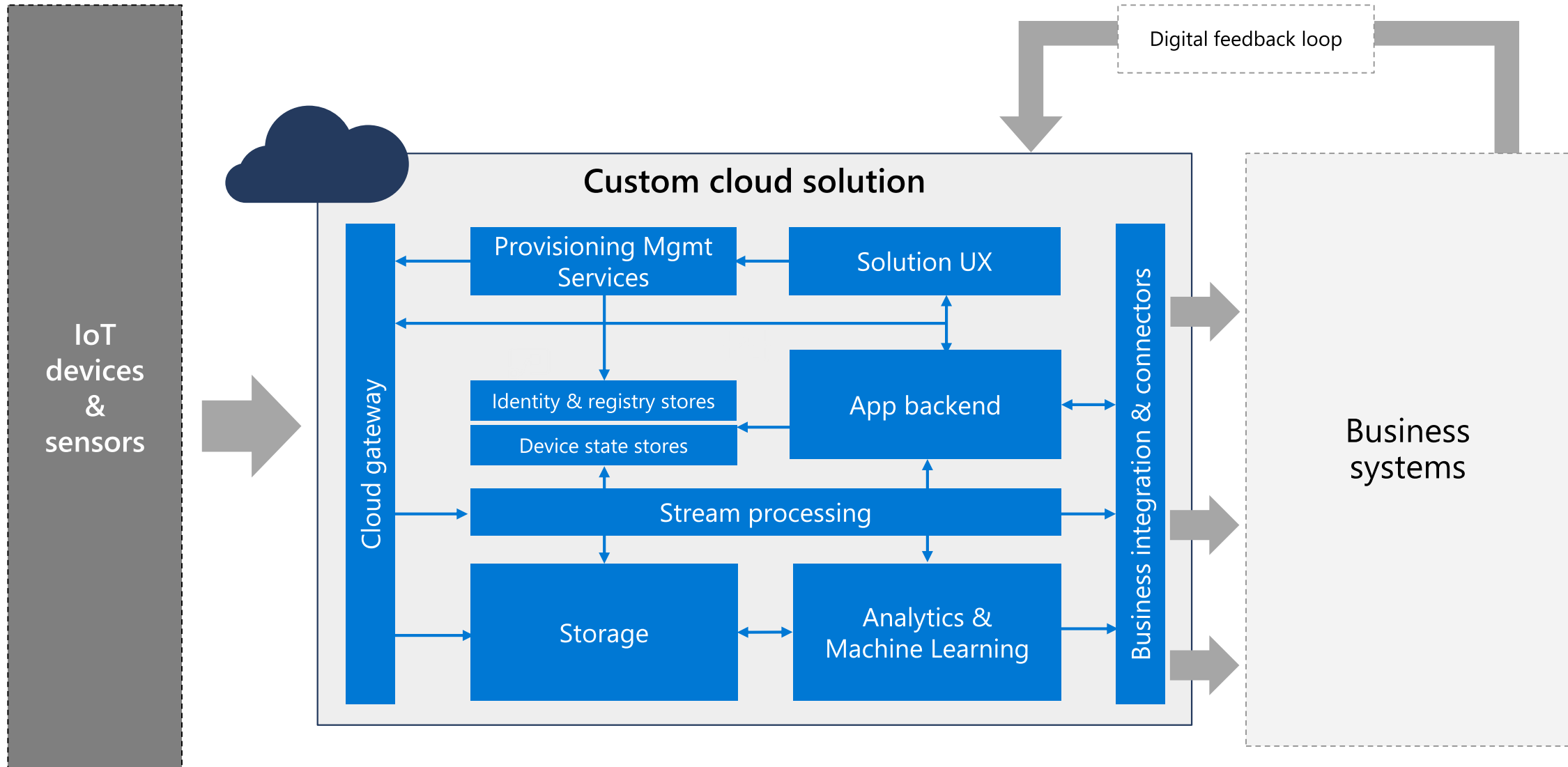
IoT Signals

SUMMARY OF RESEARCH LEARNINGS
2019

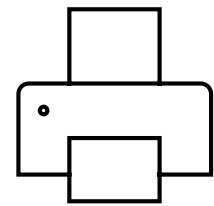
Top challenges



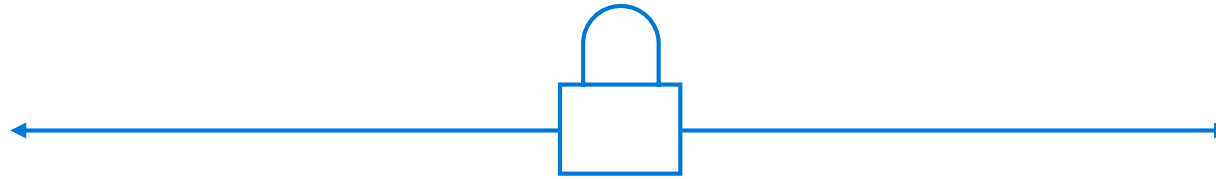
Solution architecture—DIY



We had a similar challenge in the past...

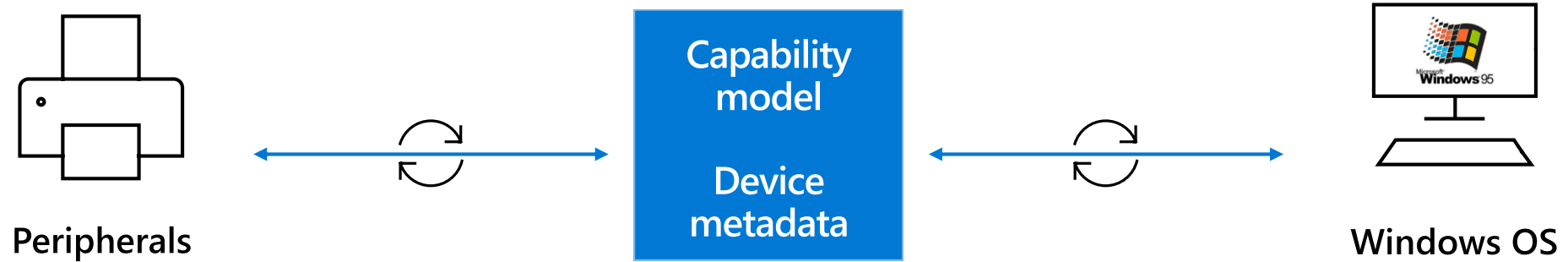


Peripherals



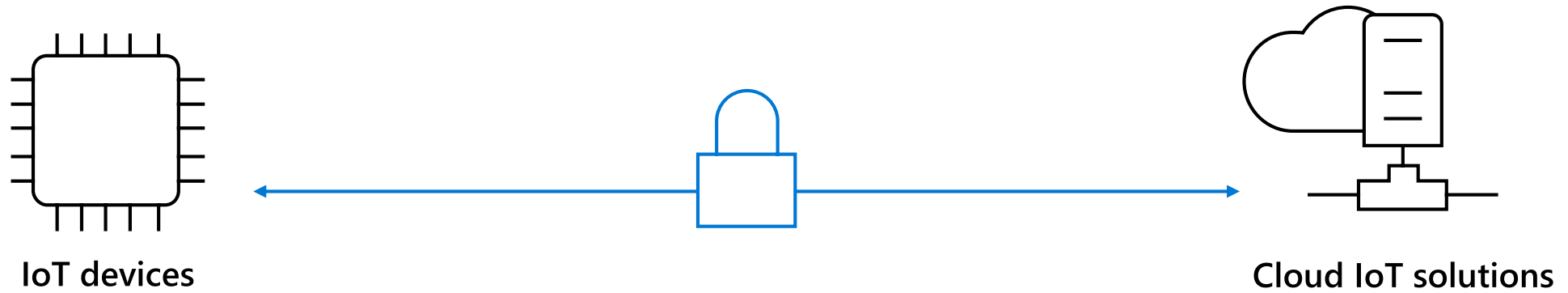
Windows OS

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



Daisuke Nakahara

Principal IoT Solution Architect,
Microsoft

IoT in Action



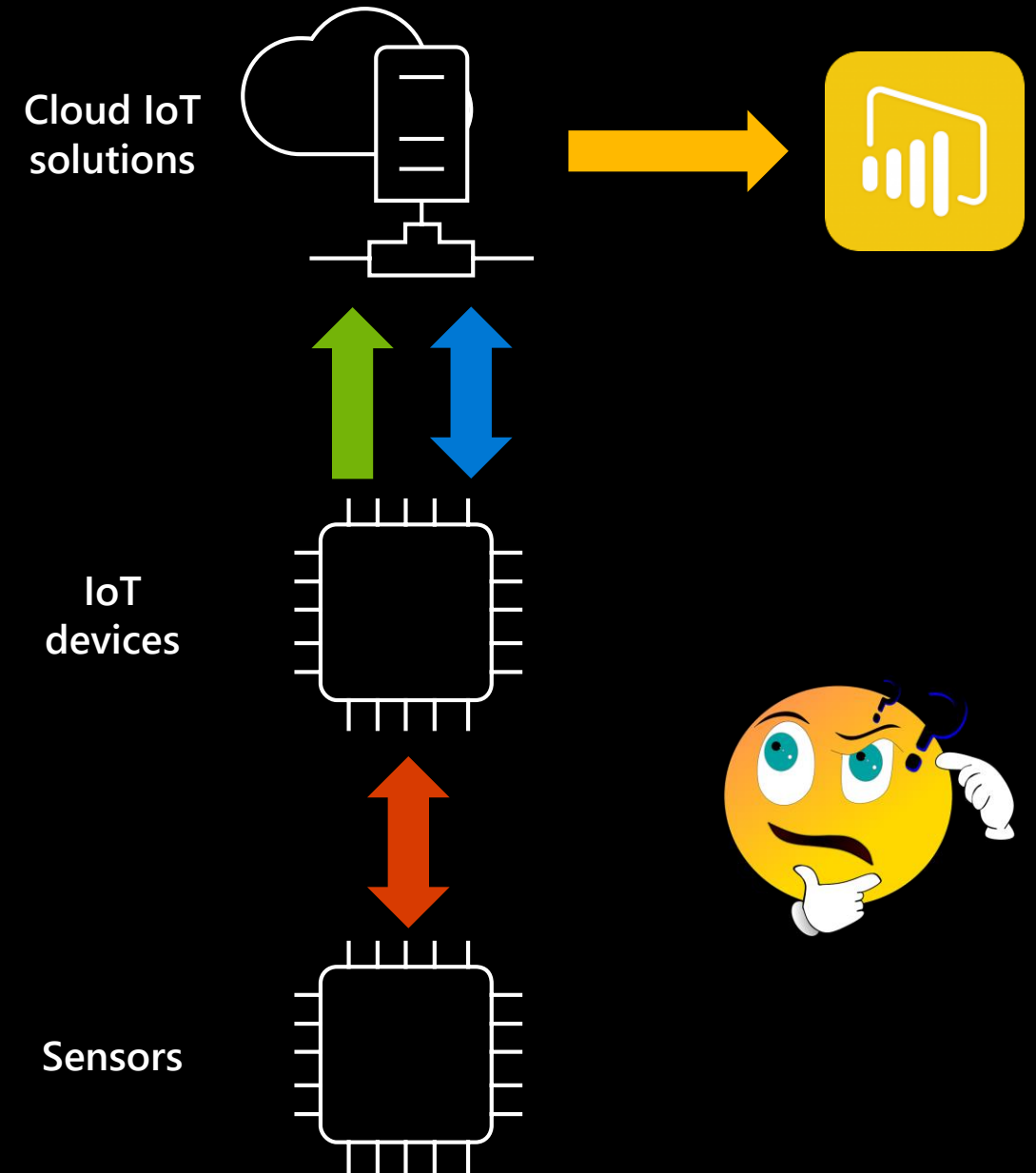
Connecting hardware is very “hard”

Collect data

Send data

Consume data

Provision & Manage device



Evolution in Personal Computer world

With PC

- Define industry standards
 - USB, PCI, OSI,
- Define software model
 - Windows Driver Model,
- Define data model
 - File format, Protocol,

IoT Plug and Play

- Digital Twin Definition Language
- Device Capability Model
 - Interface, model definition.....
- Follow IoT standards
 - MQTT, HTTPS, AMQP.....



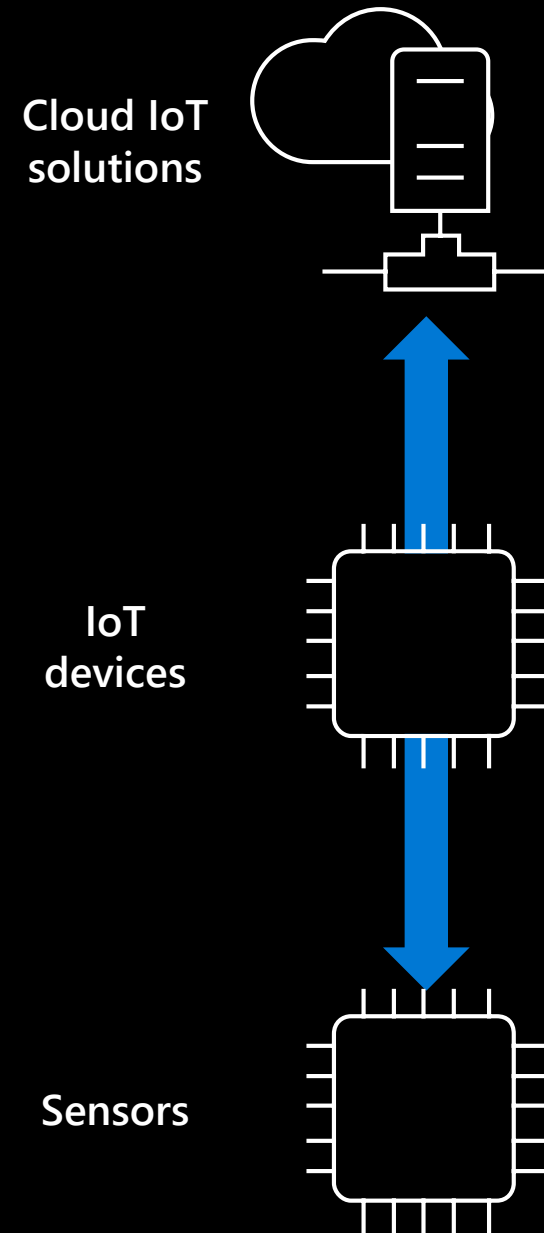
Common Language to simplify IoT

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

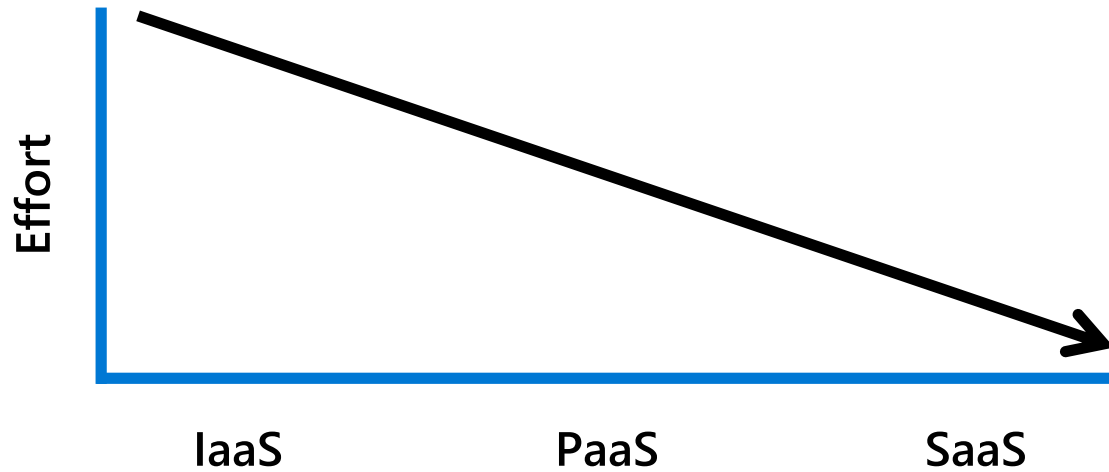
Certify your device for IoT Plug and Play and it can be used with thousands of Azure IoT solutions

In public preview

<http://aka.ms/IoTPlugandPlay>



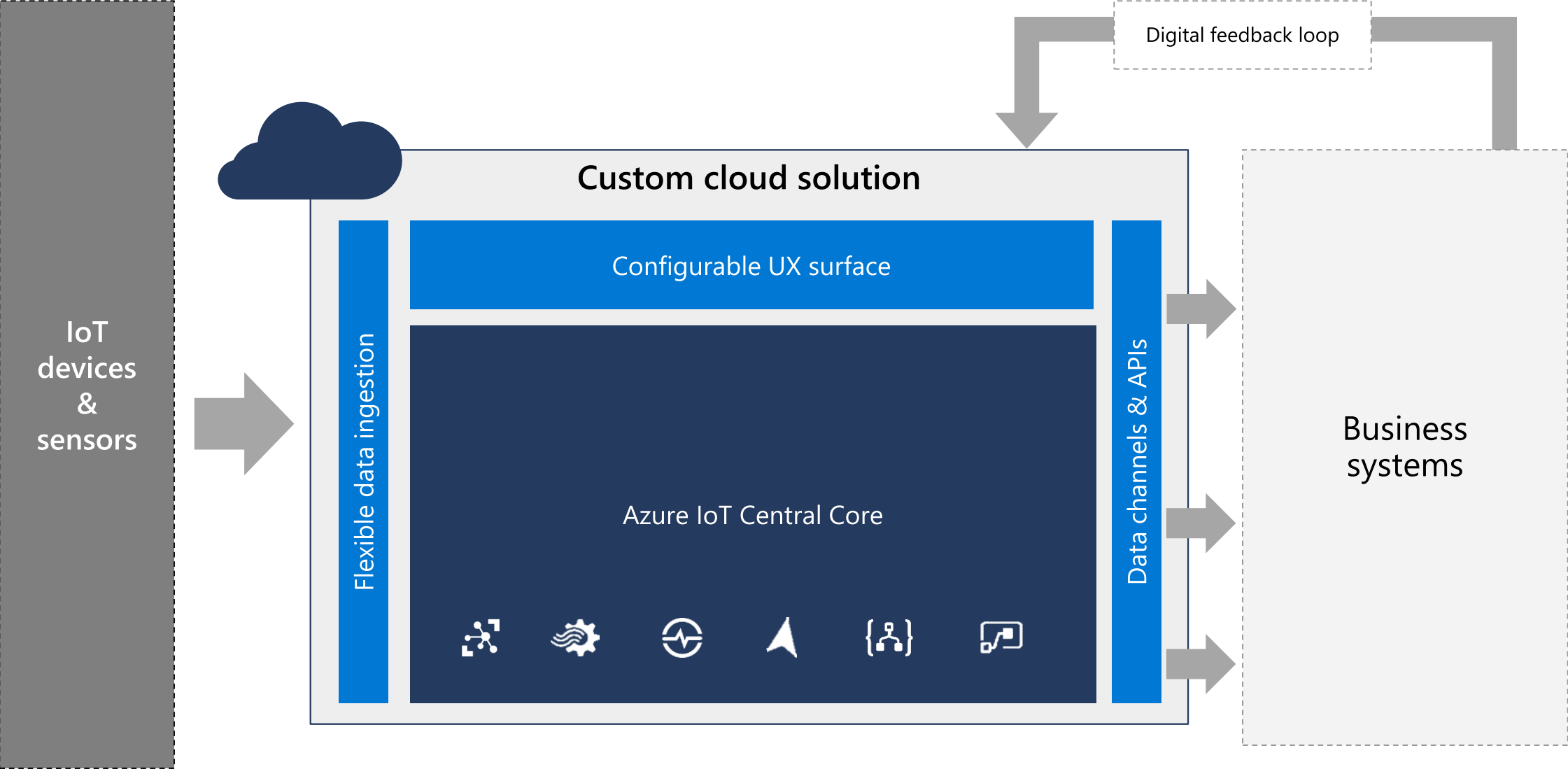
Making IoT seamless



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



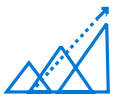
Telemetry ingestion and
command and control



Monitoring rules
and triggered actions



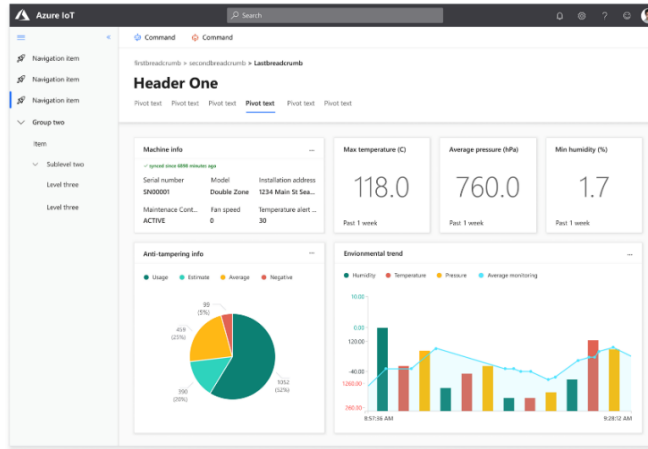
User roles and
permissions



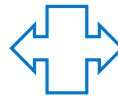
Dashboards, visualization
and insights



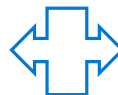
Fully hosted and managed
by Microsoft



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

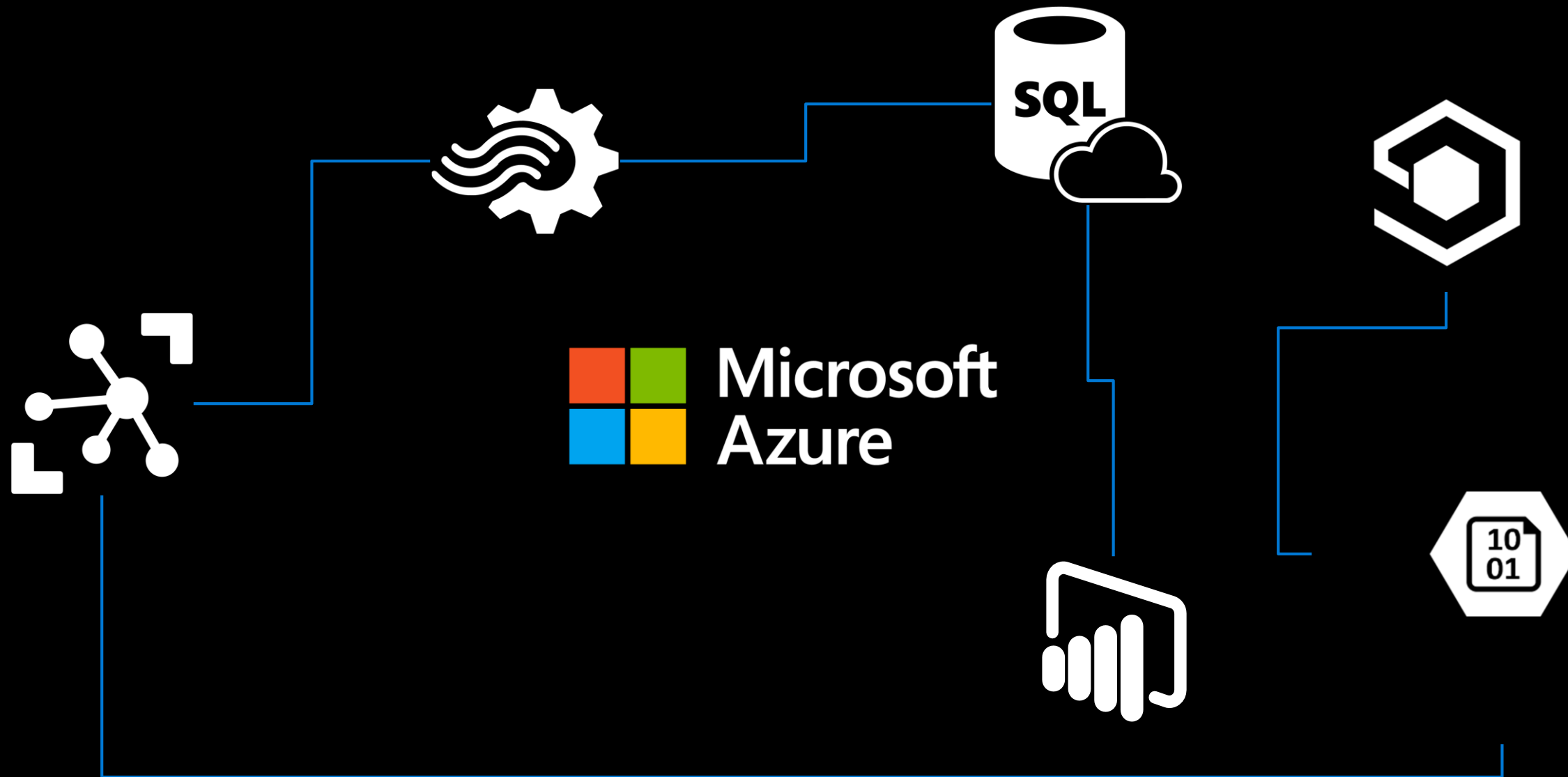
Web 2.0 technologies

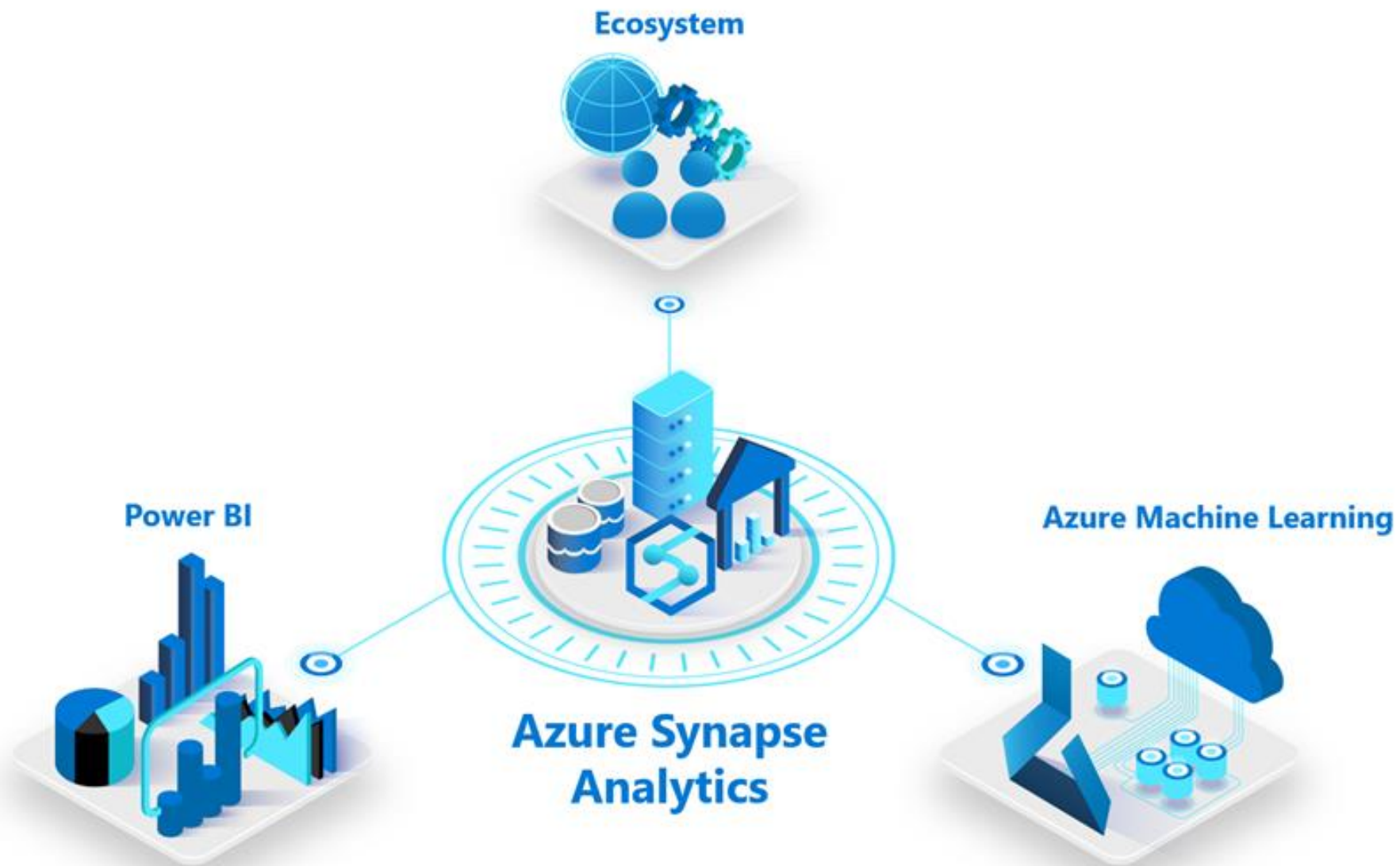


“Big Data” challenge 2.0



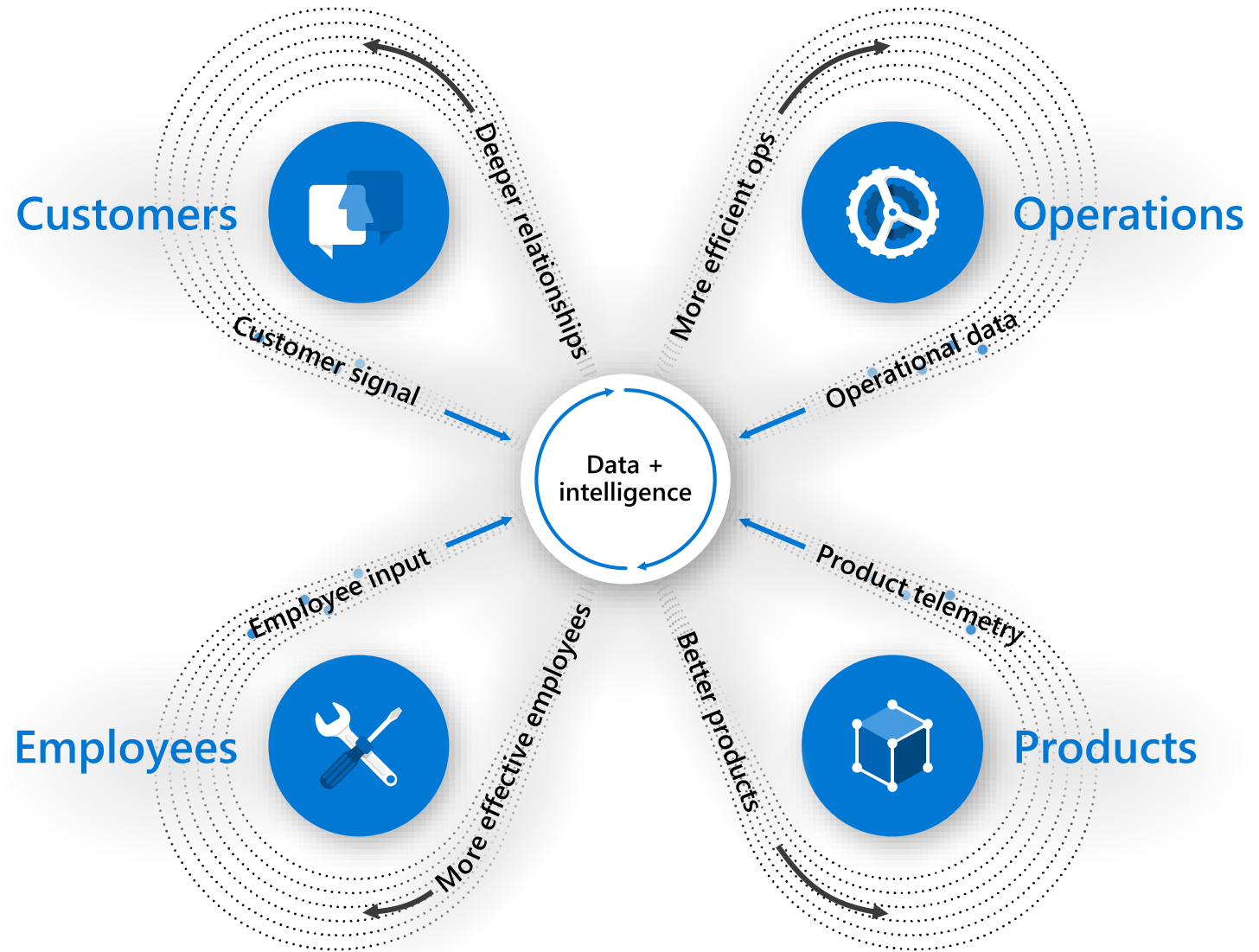






The digital feedback loop

- 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

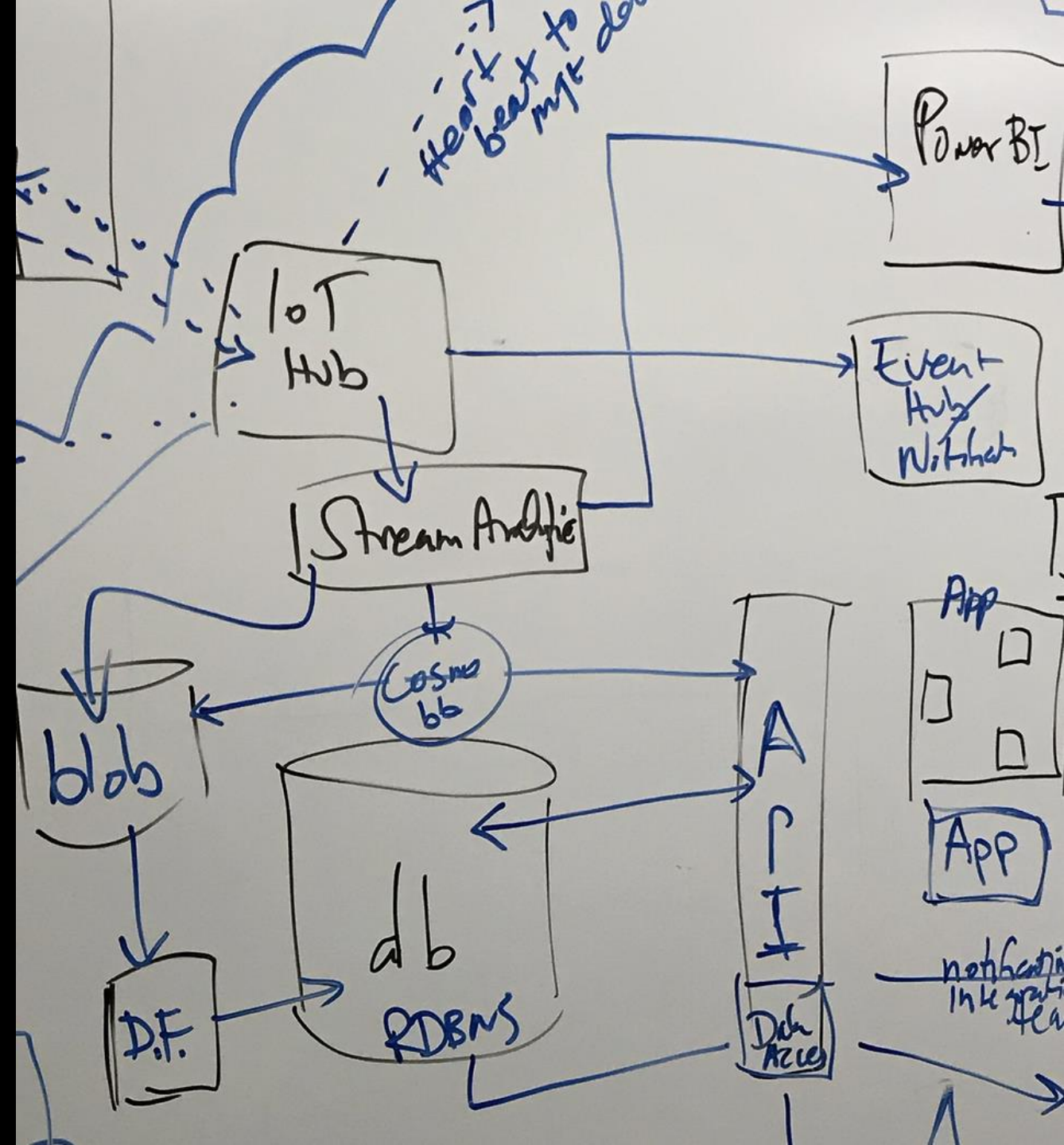
Events tracking e.g., violations for warranty management



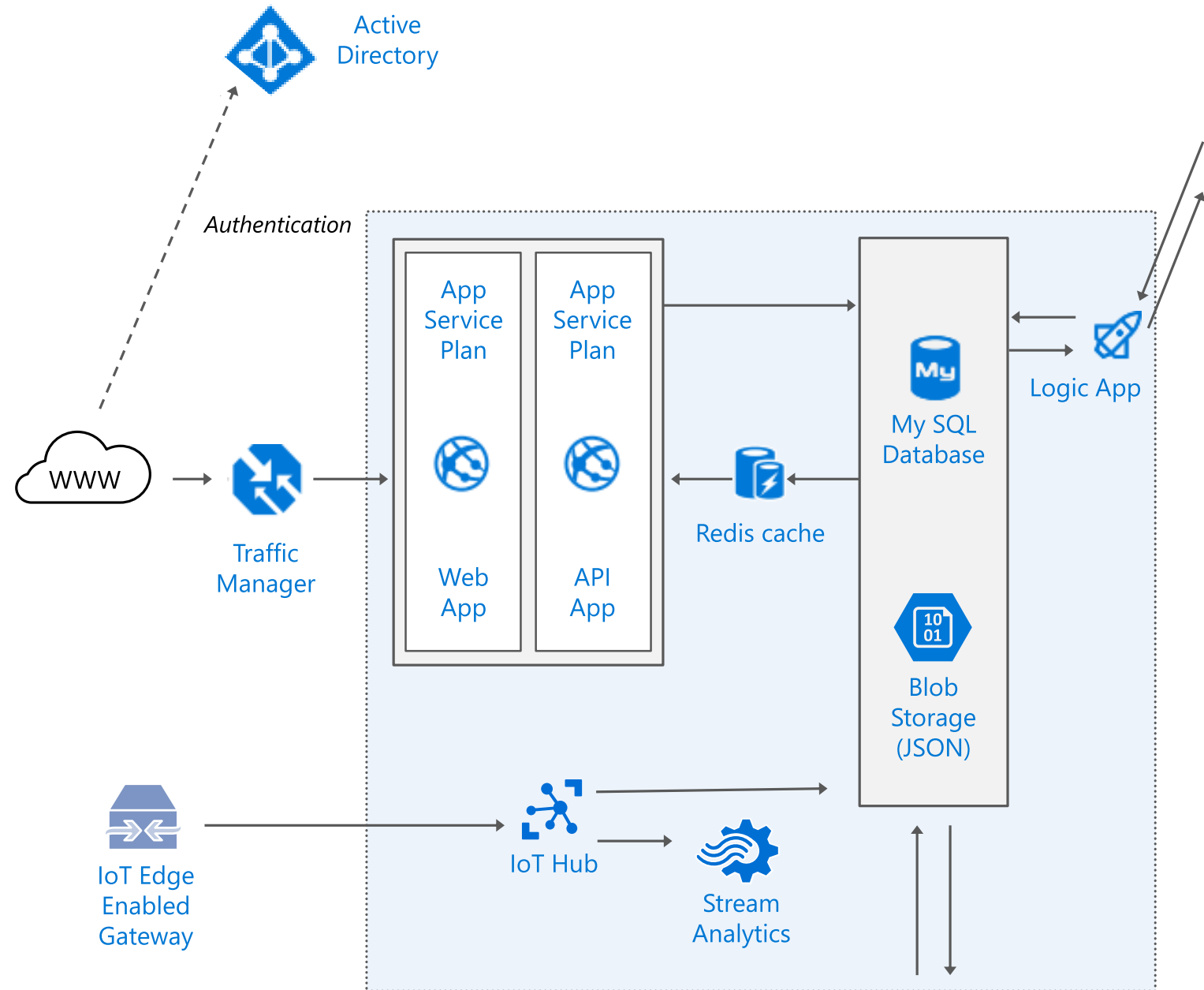
Partners make **more** possible



The anatomy of the architectural design session



The output



IoT in Action

Ben Kotvis
Chief Architect, IoT



Enter: the Super Solution Integrator

(n.) a single team with expertise across all aspects of modern IT solutions to architect, manage and execute initiatives from end-to-end

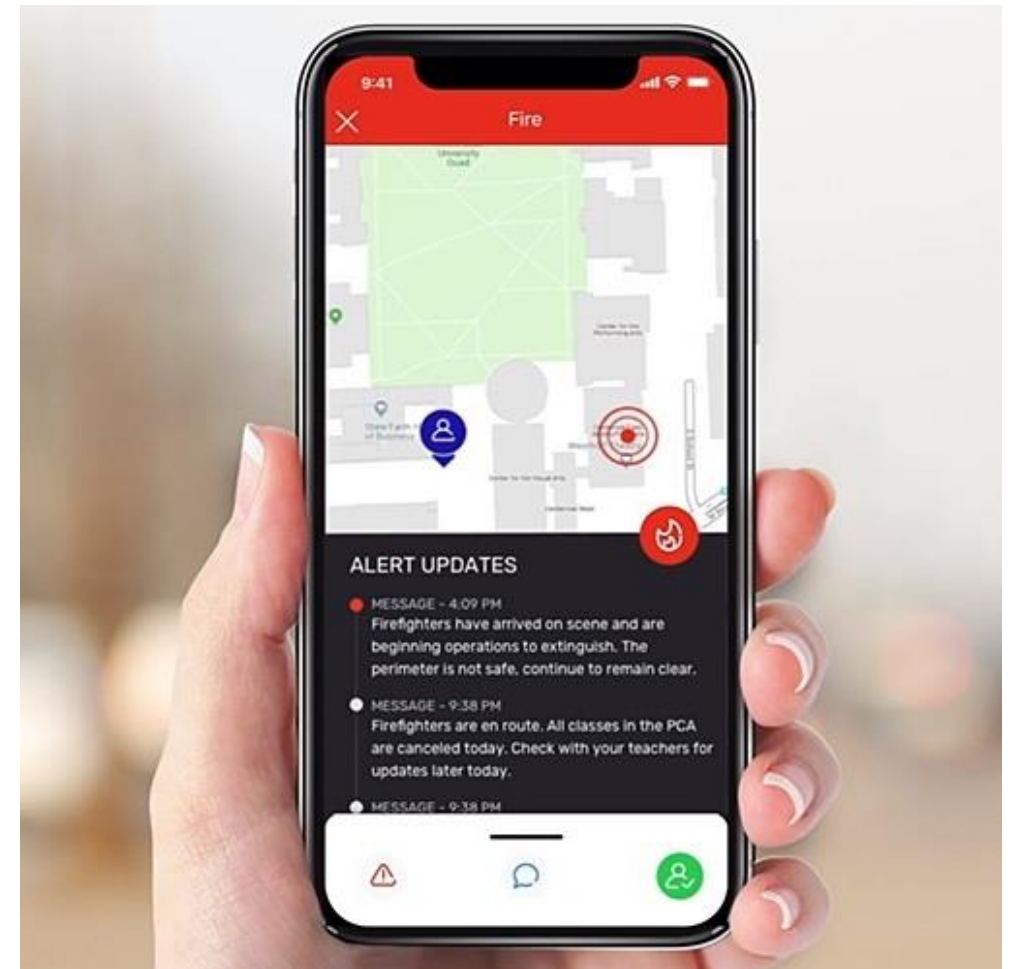
Insight Connected Safety

Emergency IoT notification system piloted in Houston's Aldine School District

Connects students, staff and first responders with a variety of devices, sensors, alerts and interactive floorplans

Lead with Digital Innovation's digital strategy capabilities to uncover pain points and develop solutions

Engaged with BeSafe Technologies and Microsoft, leveraging the strength of our deep partner relationships



How can these devices be used in other ways?

How can we scale this into a broad and
repeatable solution?

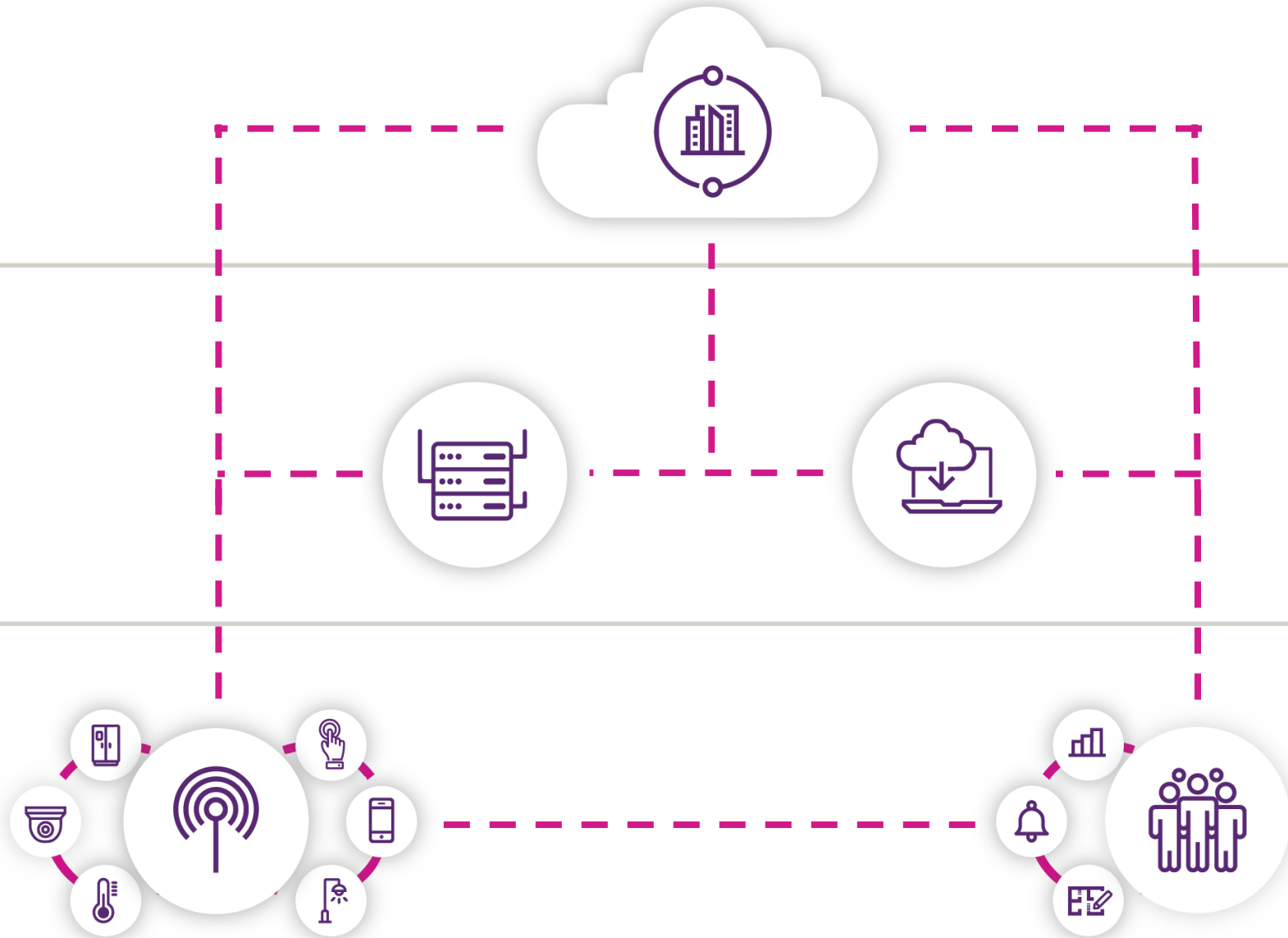
Insight Connected Platform

The journey to a repeatable, scalable solution

Cloud

Edge

Devices
& People



Secure, scalable & flexible

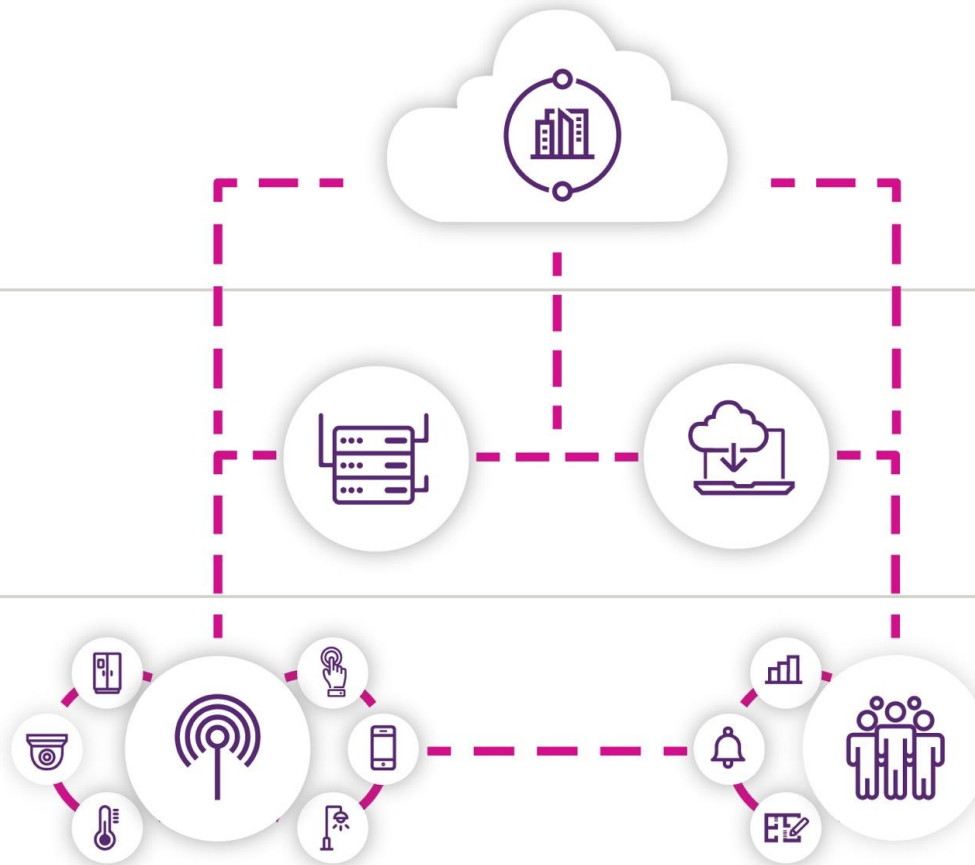
Insight Connected Platform

Platform High Level Architecture

Cloud

Edge

Devices & People



Platform Functionality



Mobile friendly



Identity management



Roles & Permissions



Branding / White label



HW Device Integrations



SW App Integrations



Device & Data Management



Alerts & Notifications



Mapping engine



Rules engine



Automated workflows



Communications service



Data analytics

Insight Connected Platform

Visualizes and triggers workflows from any IoT data source

Empowers real time, persona based, operational control through a single pane of glass

Utilizes cloud AI models deployed to the edge for true business insights

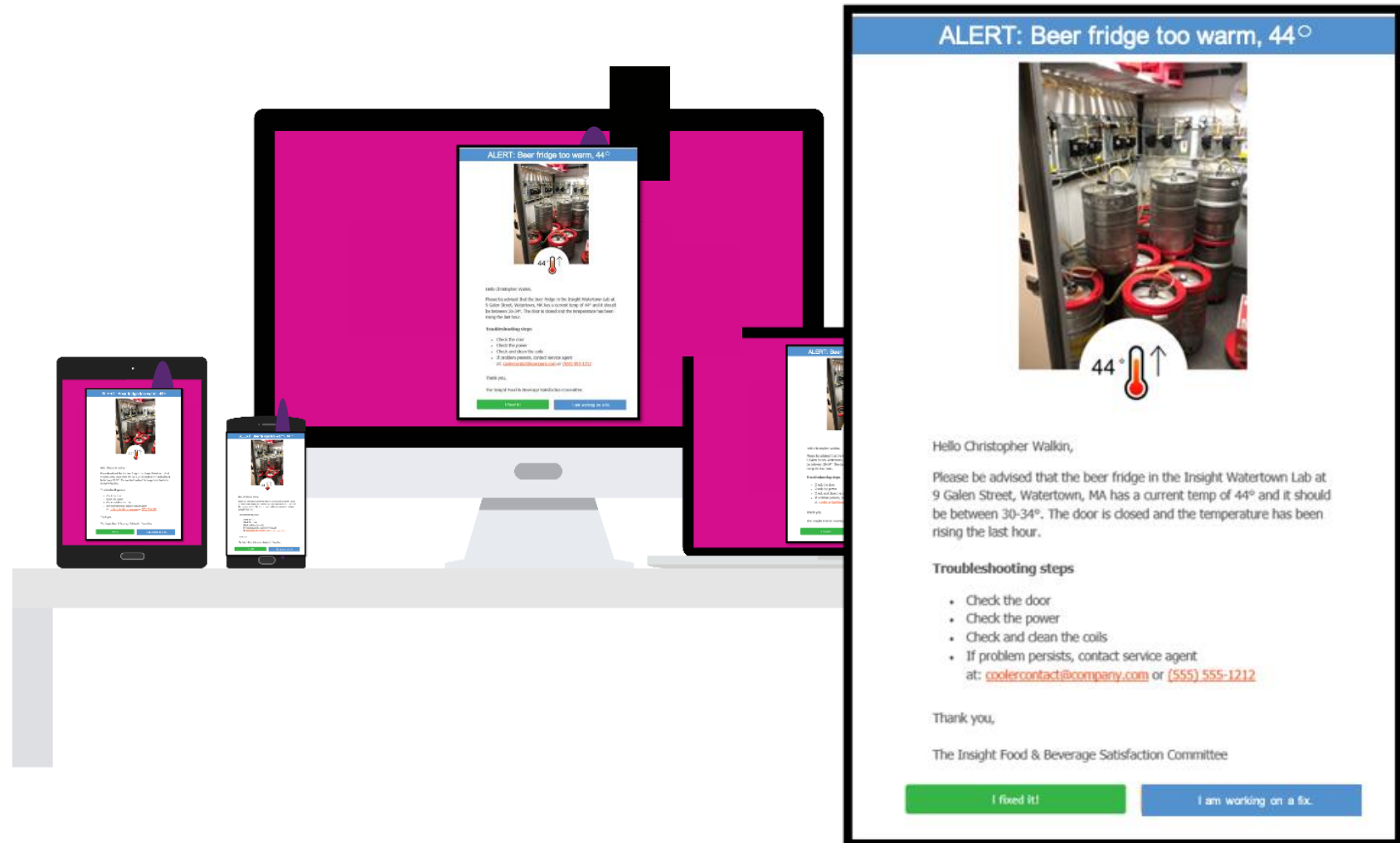





Key business outcomes for manufacturing

Smart manufacturing	Inventory & asset insight	Predictive maintenance & field service	Employee safety
<p>Improve quality & productivity.</p> <p>Increase throughput.</p>	<p>Increase quality & restaurant conditions.</p> <p>Increase throughput.</p> <p>Minimize costs.</p>	<p>Minimize equipment downtime.</p> <p>Optimize spare parts inventory.</p> <p>Improve service delivery and customer satisfaction.</p>	<p>Improve situational awareness.</p> <p>Reduce response times.</p> <p>Enhance communications and coordination.</p>

Connected Platform demo



ALERT: Beer fridge too warm, 44°



44°

Hello Christopher Walkin,

Please be advised that the beer fridge in the Insight Watertown Lab at 9 Galen Street, Watertown, MA has a current temp of 44° and it should be between 30-34°. The door is closed and the temperature has been rising the last hour.

Troubleshooting steps

- Check the door
- Check the power
- Check and clean the coils
- If problem persists, contact service agent at: coolercontact@company.com or (555) 555-1212

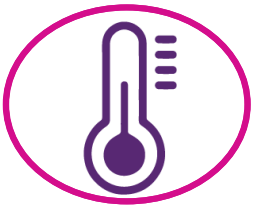
Thank you,

The Insight Food & Beverage Satisfaction Committee

IoT integrations

Building blocks for any scalable solution

Smart manufacturing, predictive maintenance



Temperature
sensors



PLCs



RFID tags
& readers



Cameras



Other data
sources



GPS/Location
Tracking



Visual
displays



Interactive
floorplans

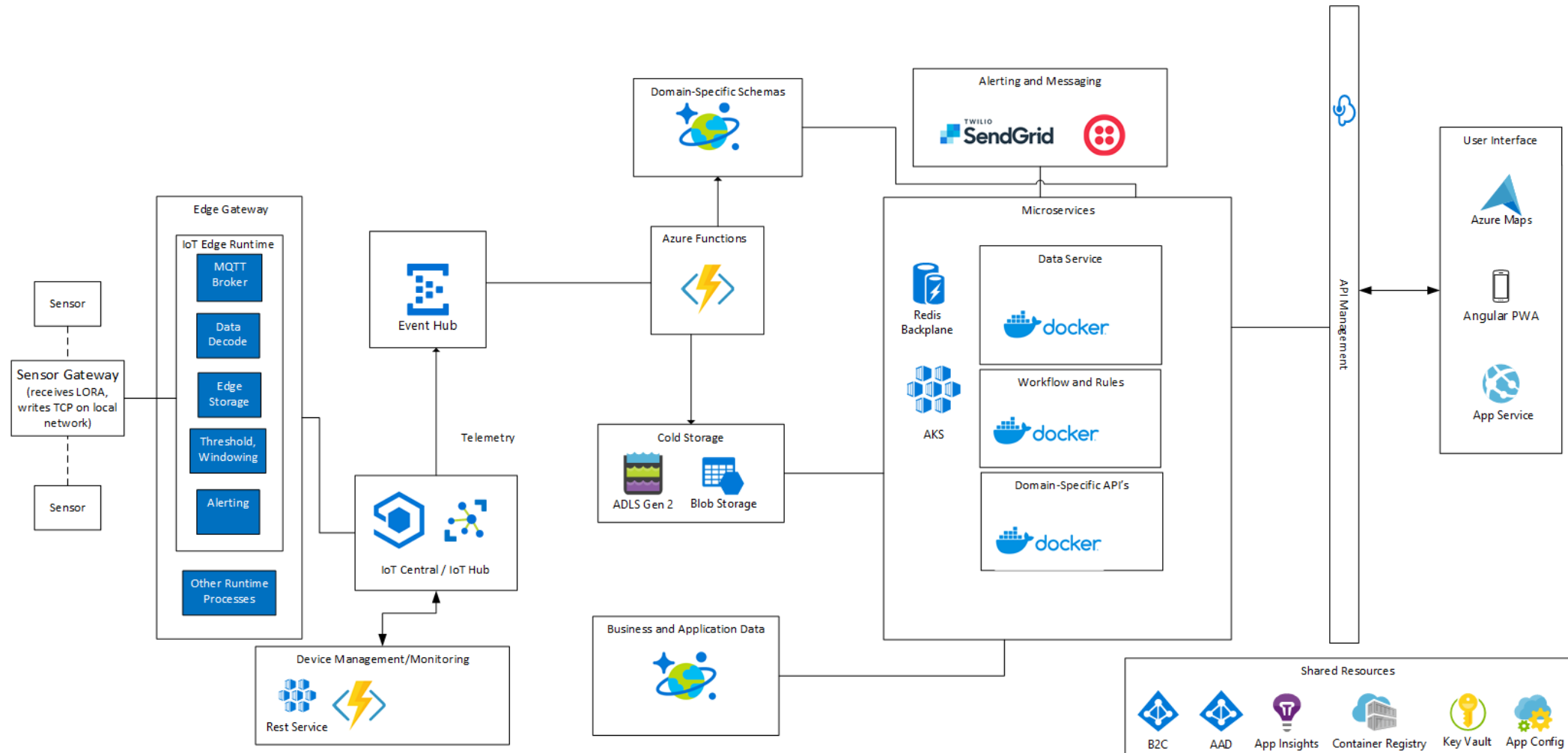


Vibration
sensors

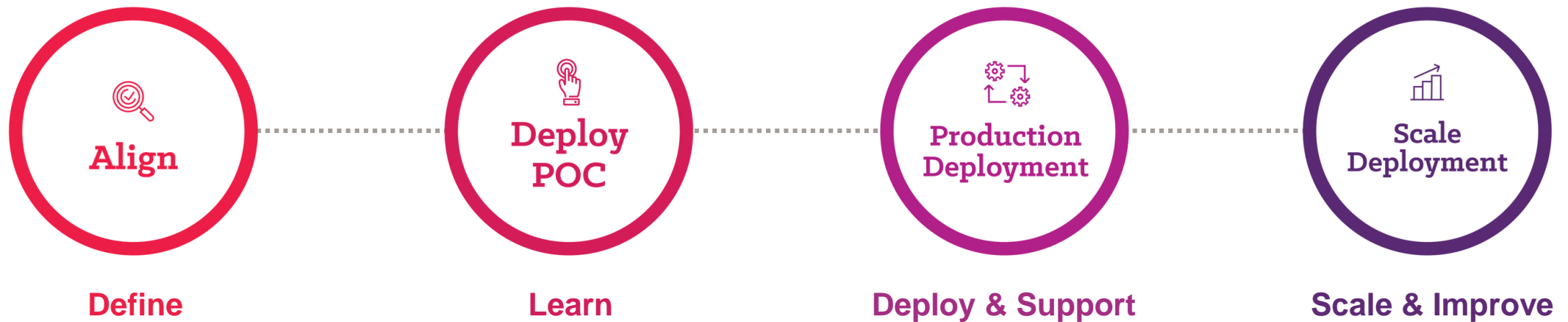


Smart
buttons

Insight Connected Platform architecture



Repeatable, enterprise-wide deployment model



Thank you.

Contact connectedsolutions@insight.com
to learn more.



 **Insight** | Digital
Innovation



Chad Dirks
Director, IoT Americas



Smart Asset Monitoring

Increase industrial ROI with remote monitoring of IoT-enabled assets



Managing the operational expense of machinery and equipment is of paramount importance for asset-intensive industries, such as manufacturing, oil & gas, logistics & transportation and equipment rental. Avnet's Smart Asset Monitoring solution, built on Microsoft Azure, uses sensors, mobile apps and cloud-based analytics to help you monitor machine performance, better manage inventory, and improve productivity.

INSTANT ASSET LOCATION

Supervisors can see which tools are in use by a particular department or employee at any given time.

PREDICTIVE MAINTENANCE

Push notifications alert managers to potential issues so they can take action to prevent breakdowns and production loss.

DEEPER INSIGHTS

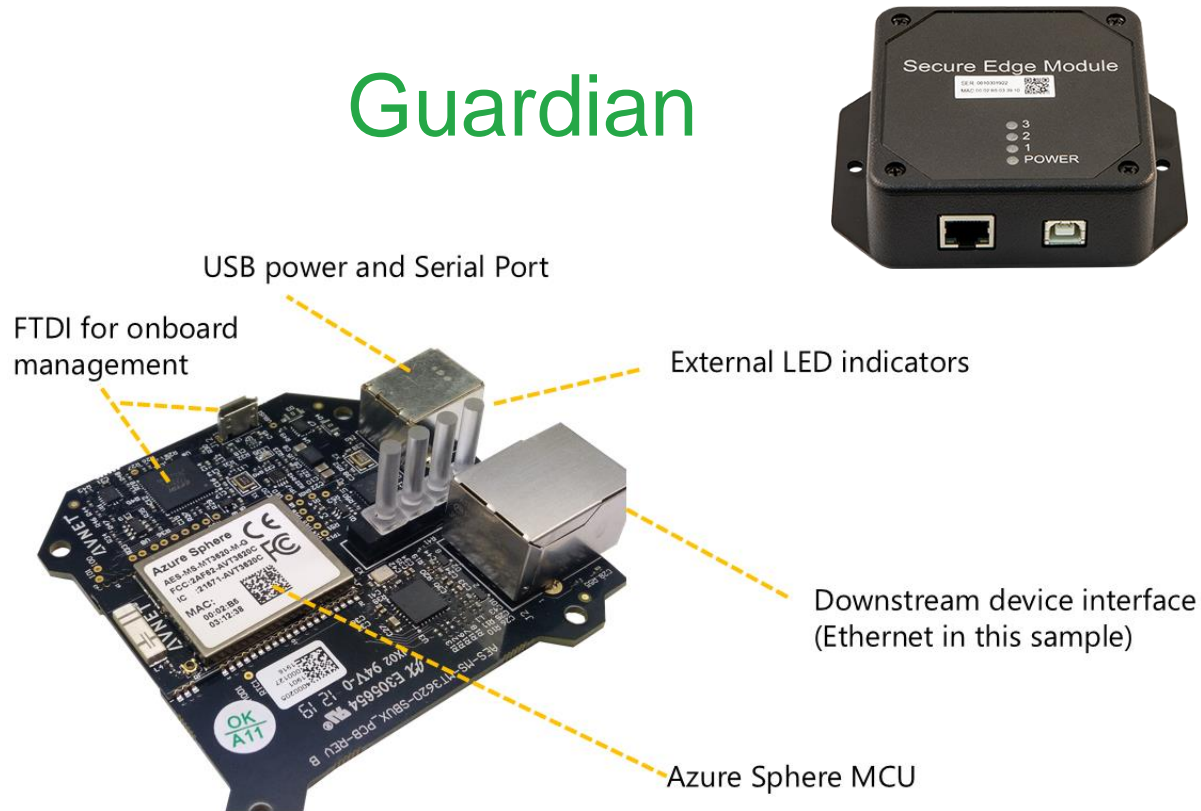
An interactive dashboard shows usage history and other metrics with the ability to generate detailed, customizable reports.

EMPLOYEE TIME SAVED

Employees can use a mobile app to quickly obtain and return equipment, freeing up time for more critical tasks.

Azure Sphere for Brownfield IoT

Guardian



Powered by Microsoft Azure

Built on Azure services, IoTConnect includes the enterprise-grade security, connectivity and powerful analytics needed for a best-in-class IoT solution.



Connectivity



Scalability



**Powerful
analytics**



**Artificial
intelligence**



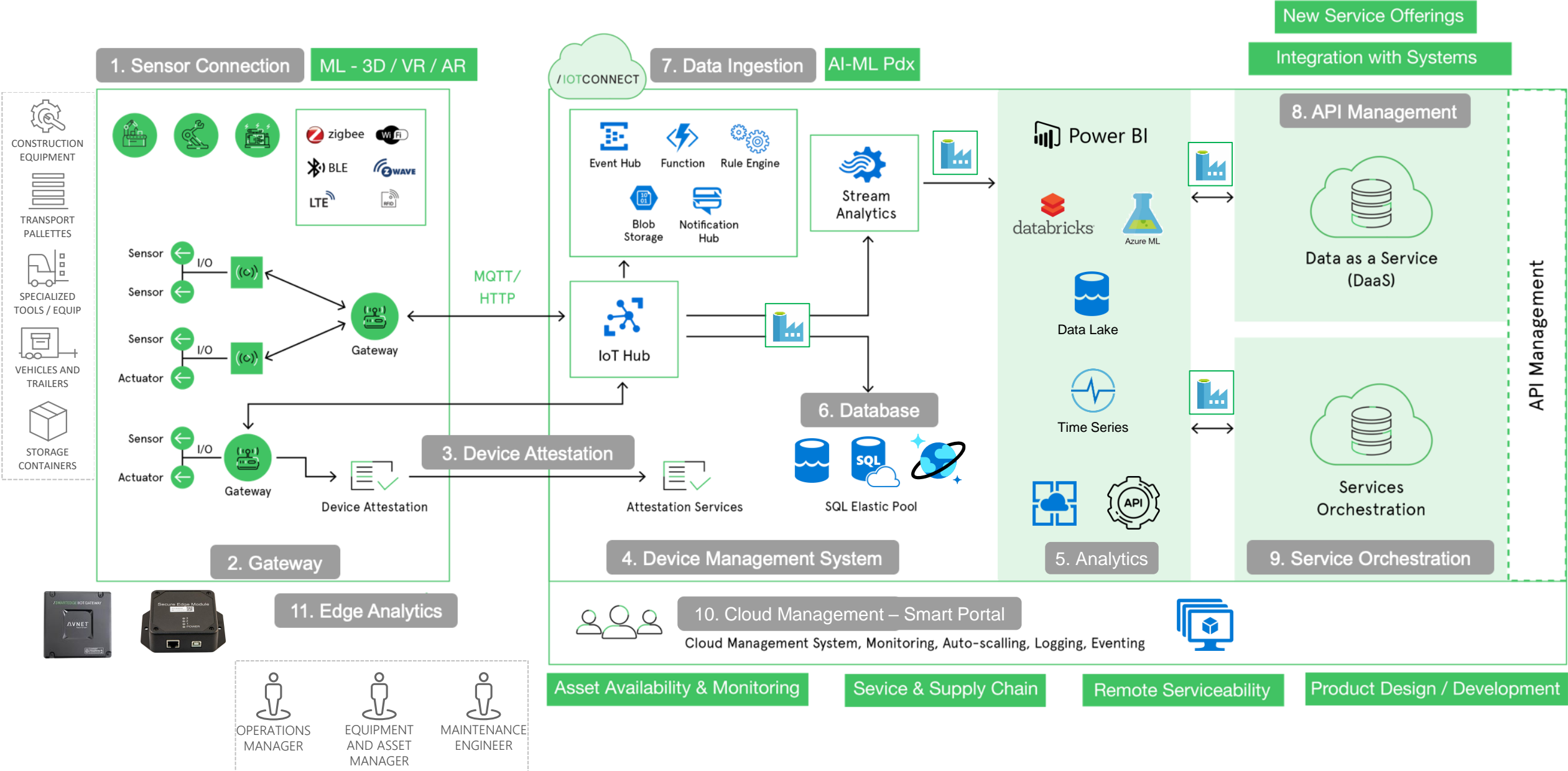
**Security and
management**



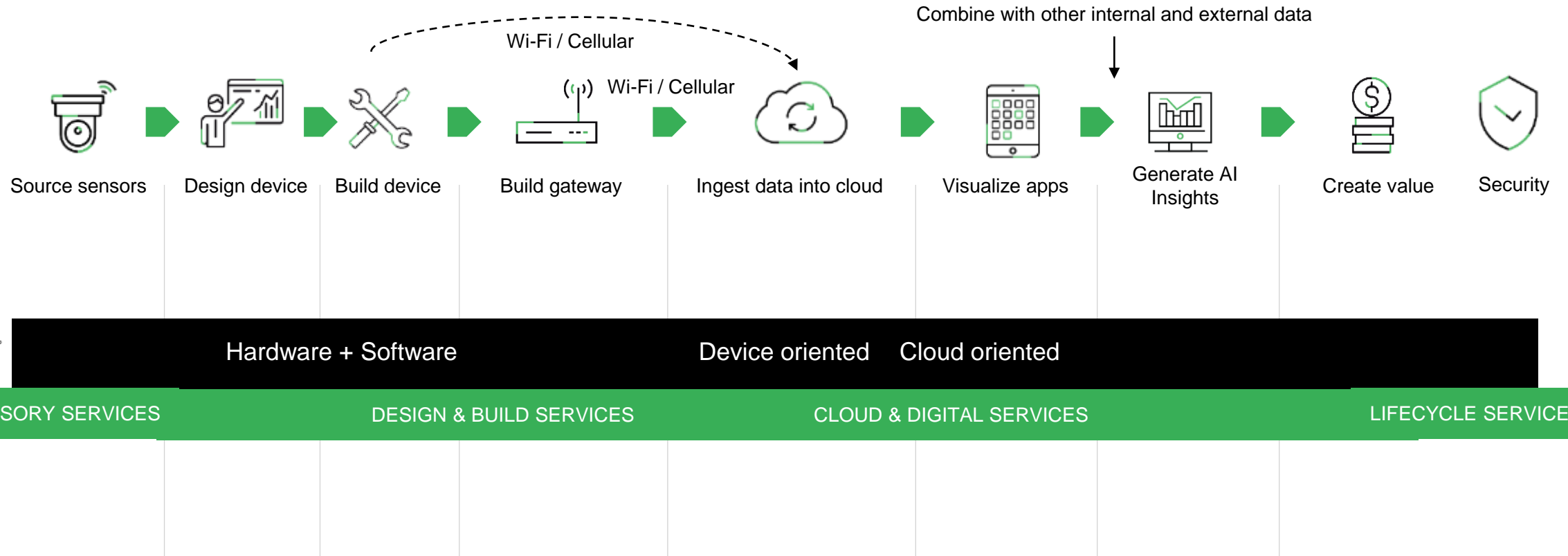
Industrial Motor Pumpjack Demo

*powered by Smart Asset Monitoring Solution, IoTConnect
and Avnet's Guardian enabled by Azure Sphere*

Reference Architecture – End to End Common Fabric



Navigate the complex landscape with a partner



End-to-end capabilities to help you realize business outcomes from your solution initiatives faster.

Avnet IoT Partner Program

A program that enables partners to build and scale their IoT solution businesses by leveraging Avnet's IoTConnect Platform and our ecosystem of experts.



Avnet IoT Marketplace

Access trusted and certified IoT devices and Smart Applications through a curated experience. Developers can write to and sell from our Marketplace.

*Coming spring 2020

AVNET[®]
Reach Further[™]

Next steps

See the demo in action today and connect with us!

Contact the Avnet team to learn more about the IoTConnect platform, Guardian and how we can help – iot@avnet.com

Learn more about our IoT solutions and partner program

[Avnet.com/iot](https://www.avnet.com/iot)

[Avnet.com/iotpartnerprogram](https://www.avnet.com/iotpartnerprogram)

Chad Dirks

Director IoT Americas

Let's connect

chad.dirks@softwebsolutions.com

LinkedIn: [linkedin.com/in/chaddirks/](https://www.linkedin.com/in/chaddirks/)



Skills
currently have



SKILLS GAP

Skills
needed




Welcome to Microsoft Learn

[Microsoft.com/learn](https://microsoft.com/learn)



Microsoft.com/learn

Time
investment
expectation



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

12300 XP

Modules in this learning path



Cloud Concepts - Principles of cloud computing

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 ▾

1100 XP

Microsoft.com/learn



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

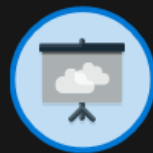
Once you complete this learning path, you will have the necessary knowledge to take the [AZ900 Microsoft Azure Fundamentals Exam](#).

Prerequisites
None

12300 XP

Total XP=
12,300

Modules in this learning path



Cloud Concepts - Principles of cloud computing

1 hr 2 min • Module • 10 Units

★★★★★ 4.8 (23350)

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

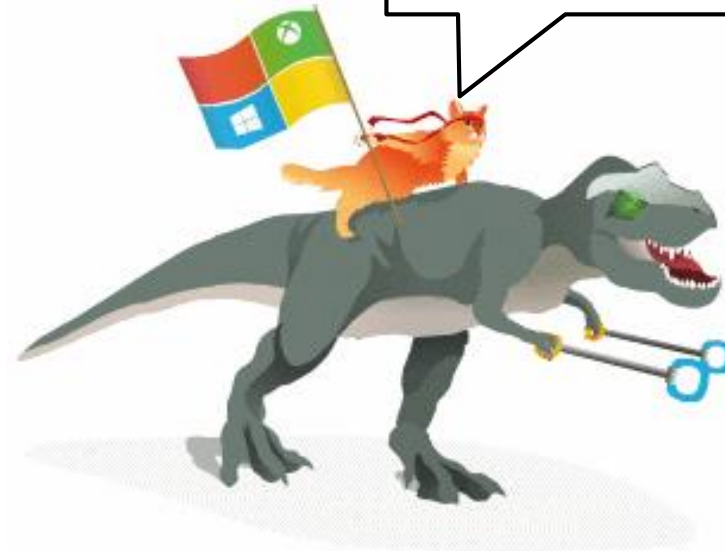
Overview ▾

✓ 1100 XP

Leveling up your Azure skillz with Microsoft Learn



I can haz **ALL**
the badgez!



ANNOUNCEMENT!

Microsoft Certified: Azure IoT Developer Specialty



Exam AZ-220: Microsoft Azure IoT Developer

Top challenges

Complexity

IoT PnP, IoT Central

Knowledge

MS Learn

Security

Confidential Computing

Solution == Partners



Project 15 from Microsoft

An Animal Conservation Initiative



IoT in Action

#IoTinActionMS

