Microsoft

Unlocking IoT's Potential

James Lockyer
EMEA IoT Partner Lead
Device Experience Team
Microsoft

IoT in Action

Fueling opportunities

$267 billion

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

Boston Consulting Group, 2017

+$100 million

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

Keystone Strategy, 2018

94%

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

Hypothesis, 2019

80B

Connected "things" by 2025 generating 180ZB of data

$130B

New monetization avenues due to IoT-related services
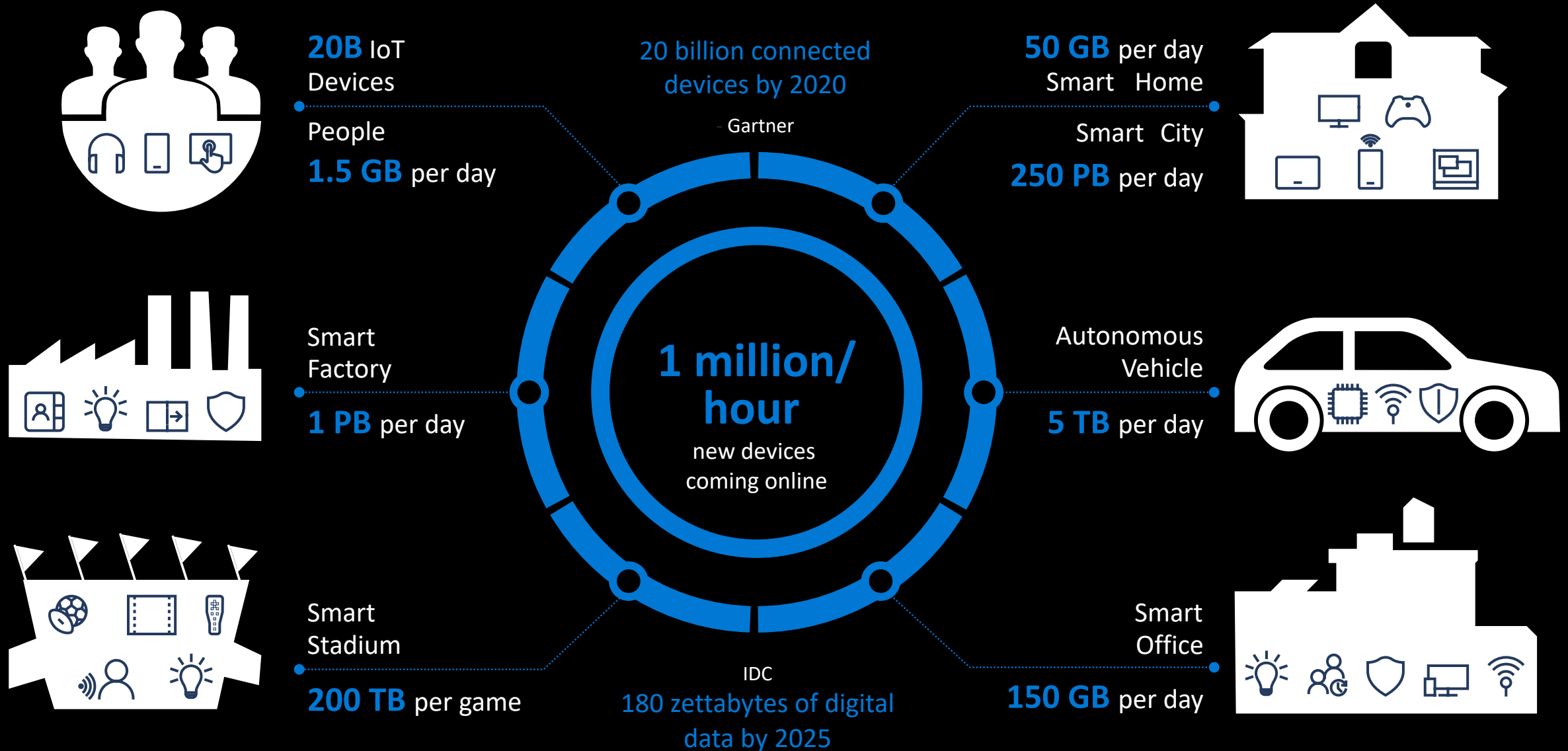
80%

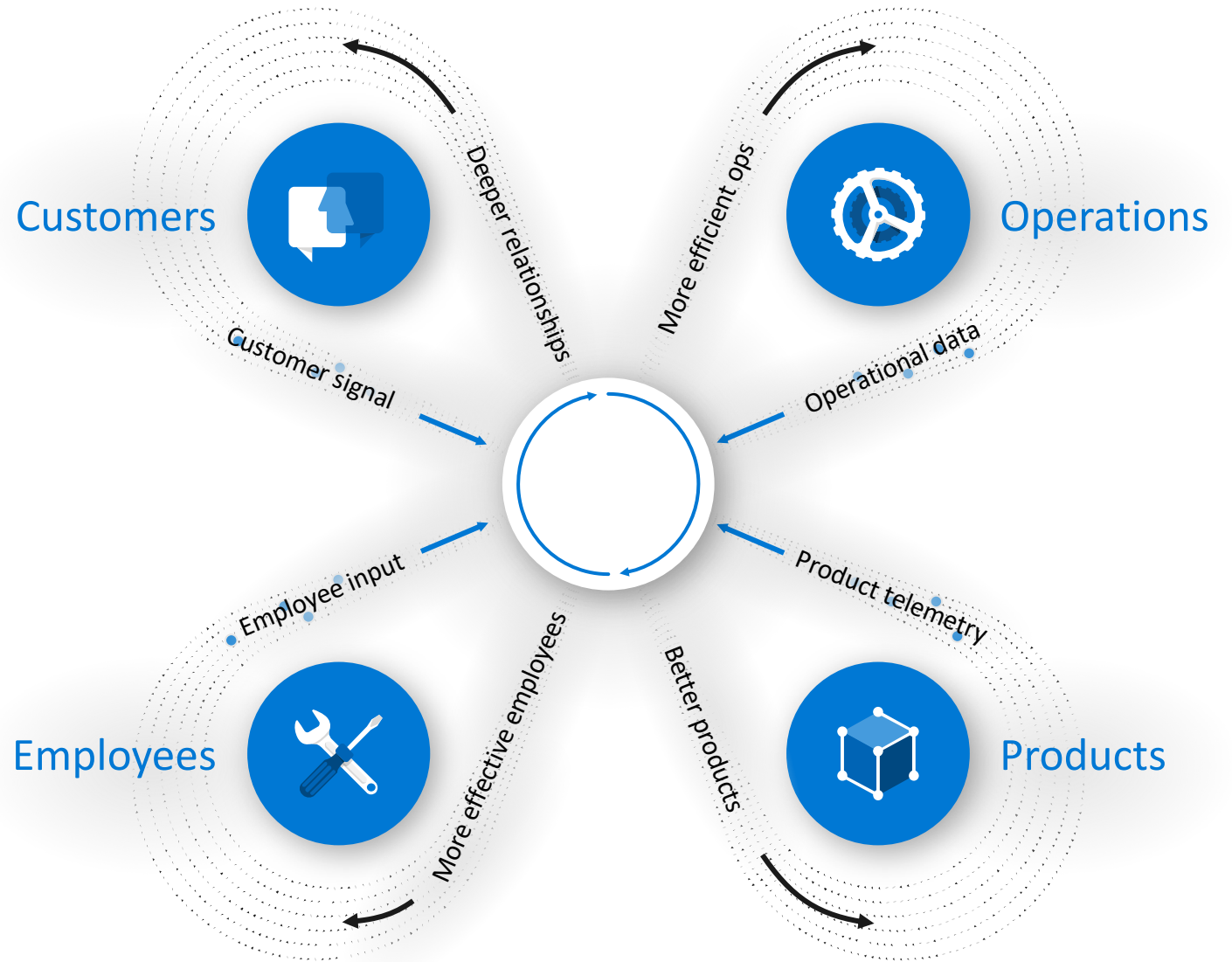Companies that increased revenue as a result of IoT implementation

$100M

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

IoT fuels digital transformation

20B IoT Devices

People
1.5 GB per day

Smart Factory
1 PB per day

Smart Stadium
200 TB per game

20 billion connected devices by 2020
- Gartner

1 million/ hour
new devices coming online

IDC
180 zettabytes of digital data by 2025

50 GB per day Smart Home

Smart City
250 PB per day

Autonomous Vehicle
5 TB per day

Smart Office
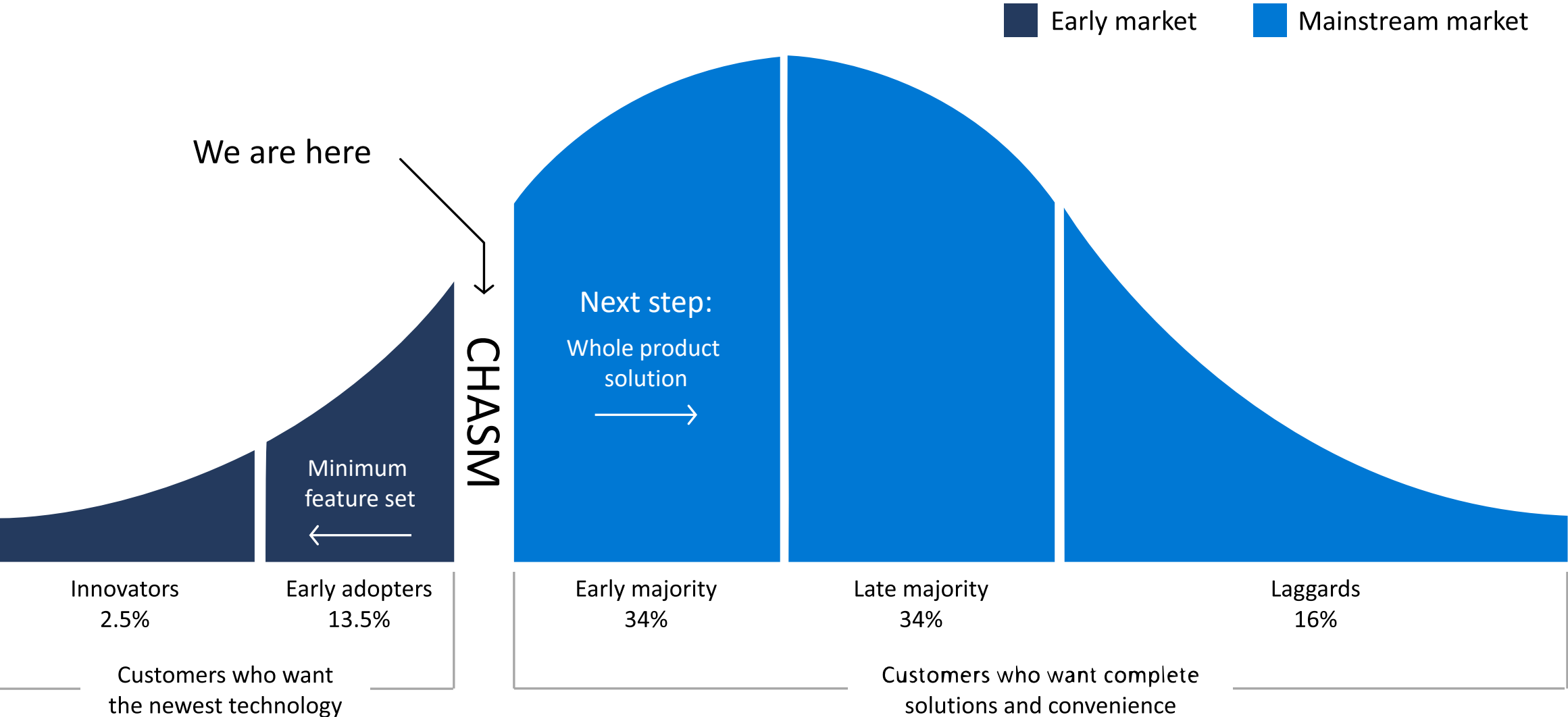**150 GB** per day

IoT innovations enable a Digital Feedback Loop

1 Data: Capture digital signal across business

2 Insight: Connect and synthesize data

3 Action: Improve business outcomes

Customers

Operations

Employees

Products

Deeper relationships

Customer signal

More efficient ops

Operational data

Employee input

More effective employees

Product telemetry

Better products

How can I quickly generate business insights from sensor values?

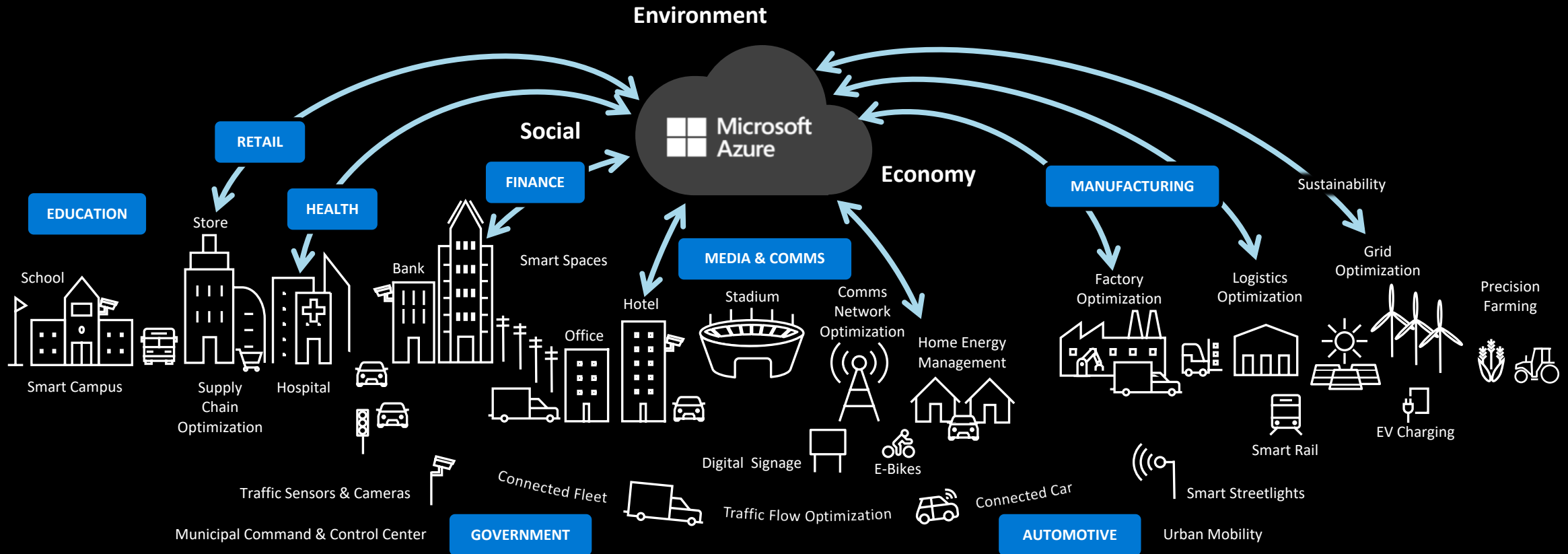# Preparing for mainstream market customer needs

Technology adoption lifecycle

Early market | **Mainstream market**

We are here

CHASM

Next step:

Whole product solution

Minimum feature set

Innovators
2.5%

Early adopters
13.5%

Early majority
34%

Late majority
34%

Laggards
16%

Customers who want
the newest technology

Customers who want complete
solutions and convenience

Accelerating IoT adoption

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

Digital Twins
Auto ML
Data modeling

Plug and play
IoT central
IoT connectivity

IoT hub
IoT edge
IoT services

Business integration

Platform services

Simplifying IoT

Total Effort

IaaS

Azure IoT
Platform

Azure IoT Platform +
IoT Plug and Play

Azure IoT
Central

Azure IoT Central +
IoT Plug and Play
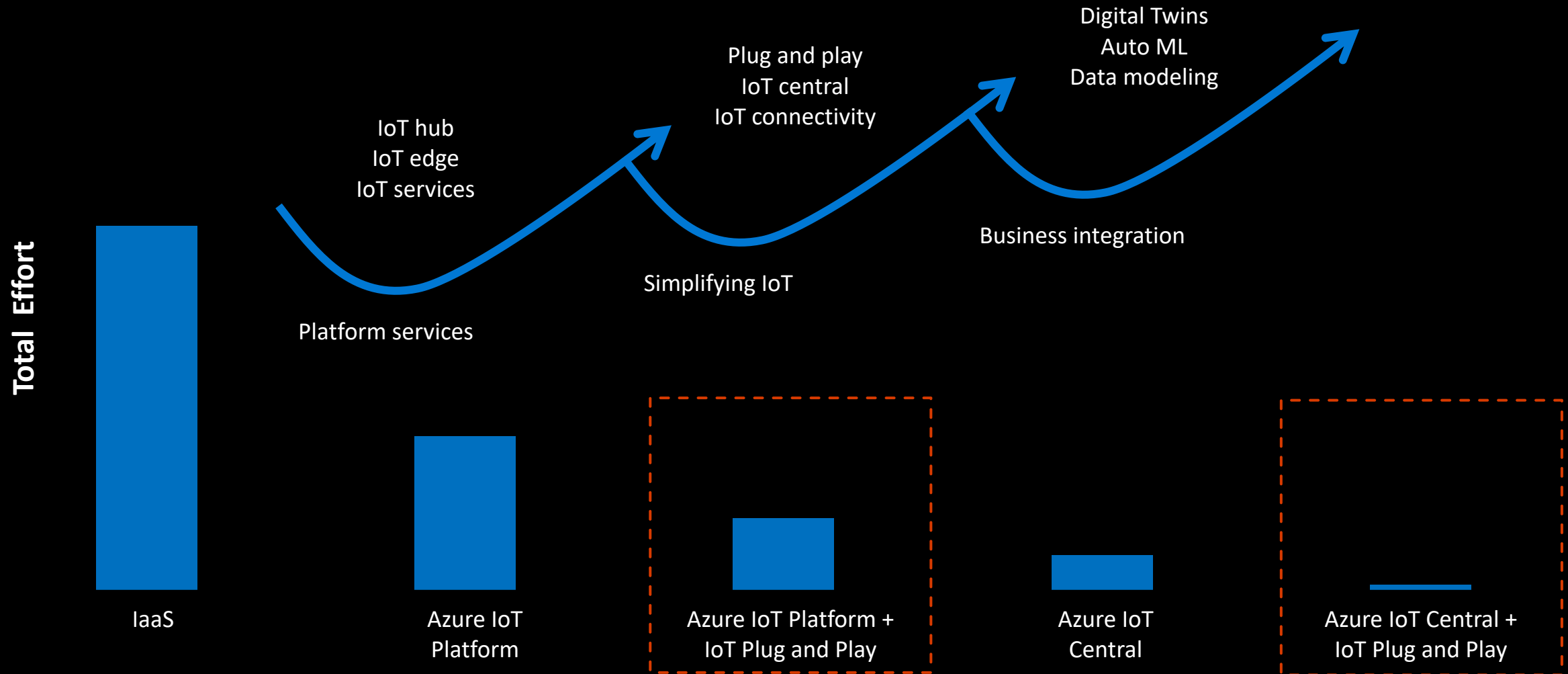
Microsoft invests $5 billion in IoT

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

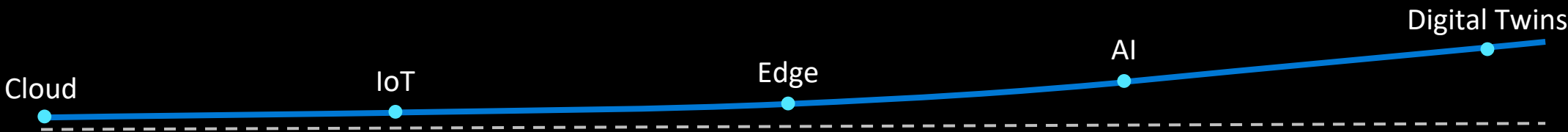Microsoft IoT platform innovations last year

>100

Partner provided co-sell ready solutions

>1,200

Ecosystem partners

>10,000

Microsoft's comprehensive IoT portfolio

Cloud — IoT — Edge — AI — Digital Twins

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 & Accelerators (PaaS)

Dynamics Connected Field Service (SaaS)

Azure Services for IoT

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

IoT & Edge Device Support

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

IoT vertical focus

Manufacturing

Field Service

Safety & Security

Process & Quality

Factory Automation

Retail

Space & Assortment

Inventory Mgmt.

Personalization

Healthcare

Patient Monitoring

Research

Supply Chain

Operation Efficiency

Energy

Oil & Gas

Utilities

Power Plants

Environment Sensors
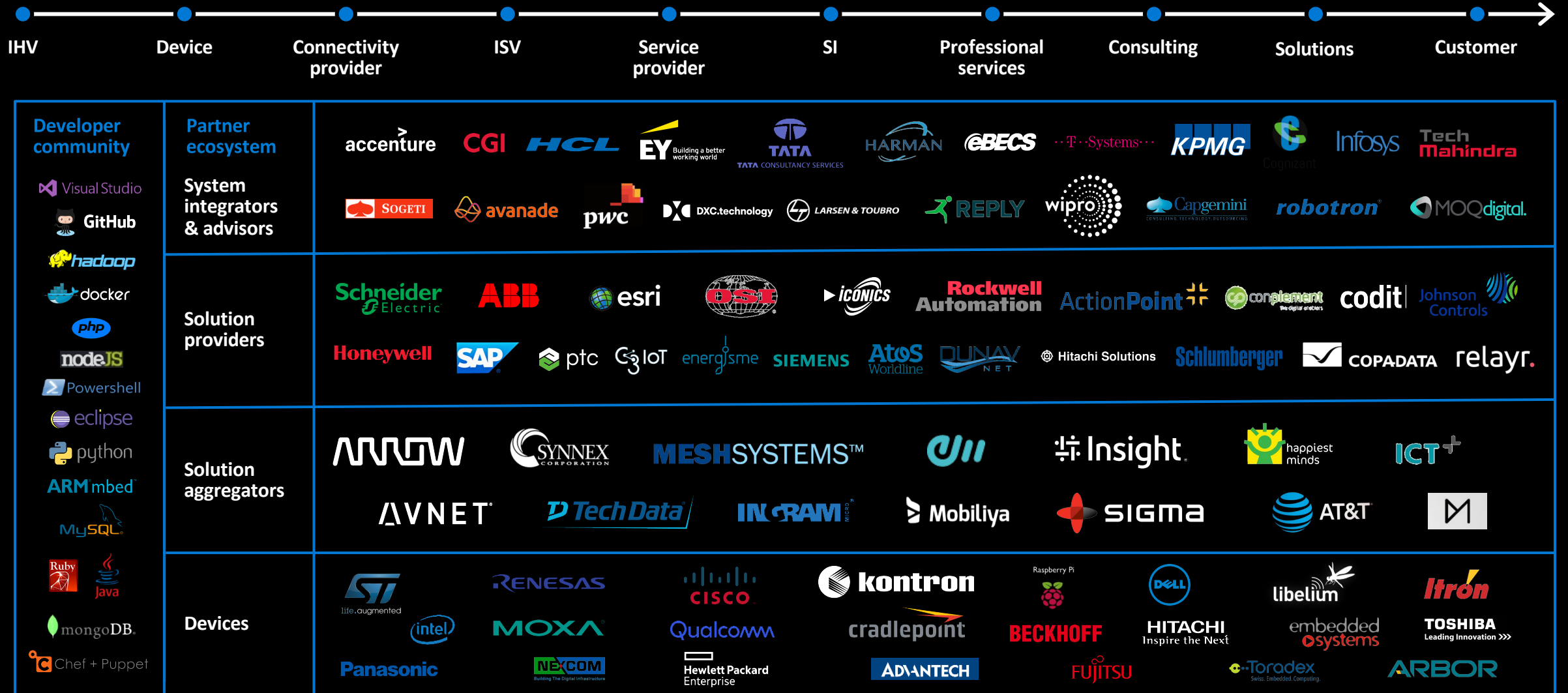
Smart City/ Buildings / Infrastructure

Security & Surveillance

Monitoring & Safety

Energy Mgmt.

Agriculture

Soil Sensors

Livestock

Equipment

Supply Chain

Connectivity

Ecosystem momentum

IHV — Device — Connectivity provider — ISV — Service provider — SI — Professional services — Consulting — Solutions — Customer

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 Building a better working world · 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 · ABB · esri · OSI · ICONICS · Rockwell Automation · ActionPoint · conplement · codit · Johnson Controls

Honeywell · SAP · ptc · C3 IoT · energisme · SIEMENS · Atos Worldline · DUNAV NET · Hitachi Solutions · Schlumberger · COPA-DATA · relayr.

Solution aggregators

ARROW · SYNNEX CORPORATION · MESH SYSTEMS™ · 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 Leading Innovation

Panasonic · NEXCOM · Hewlett Packard Enterprise · ADVANTECH · FUJITSU · Toradex · ARBOR

Intelligent cloud

IoT Hub – Most Mature, Scalable, Secure Cloud Platform

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 and integration

Billions of messages

Scale up and down

Declarative message routes

File upload

WebSockets and 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
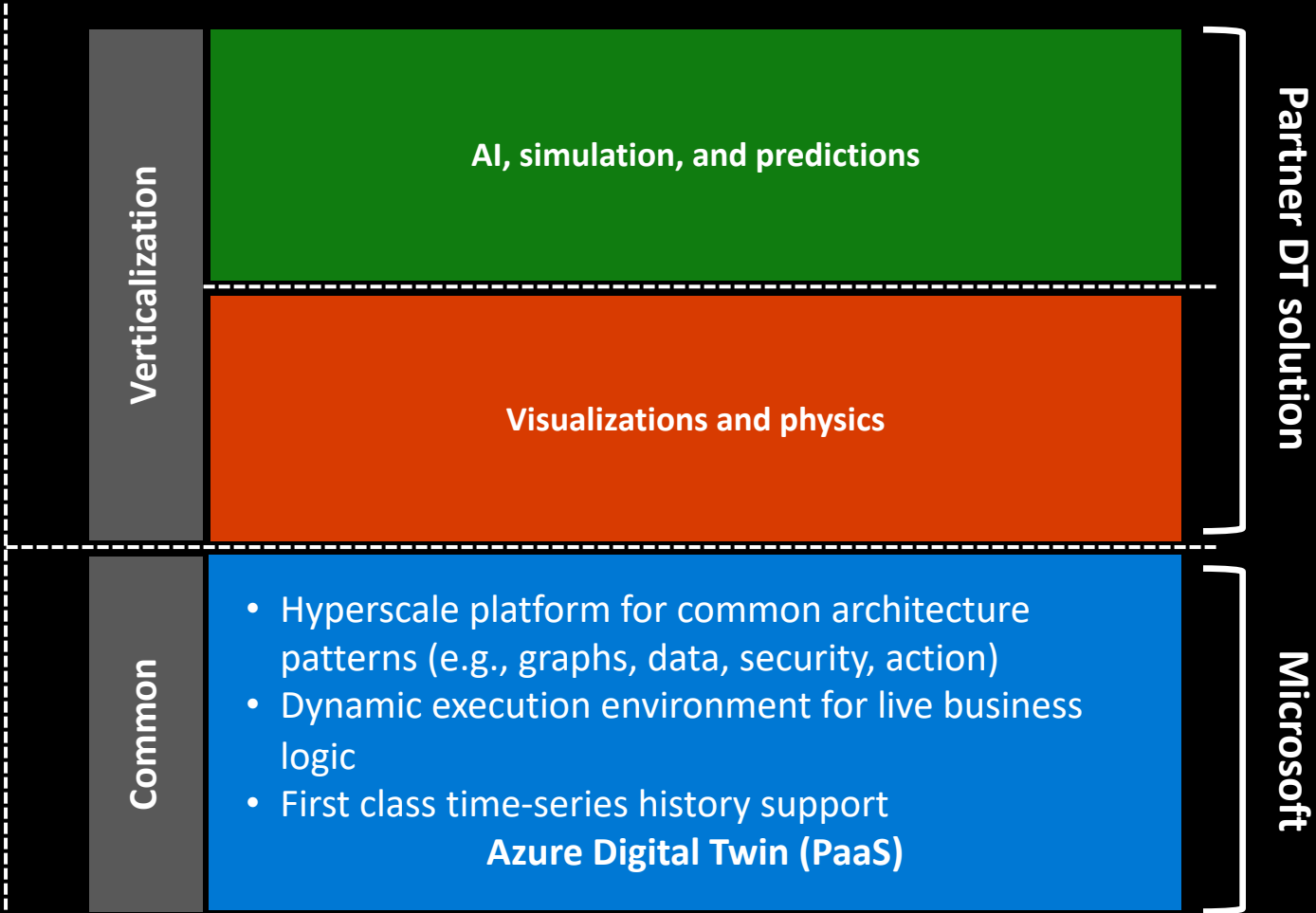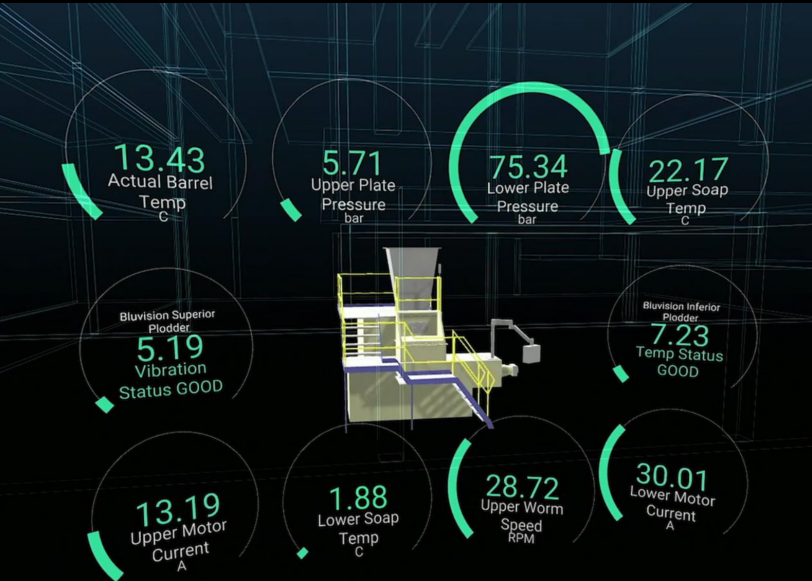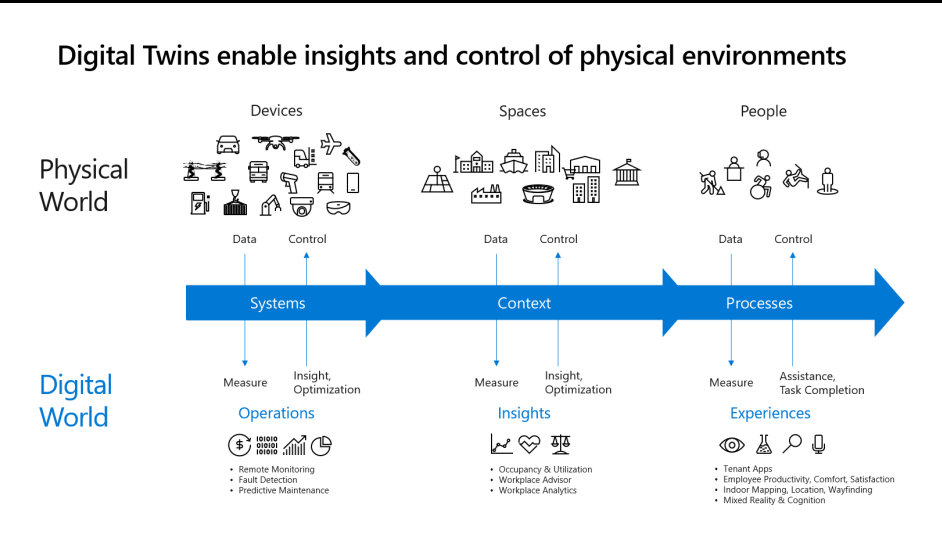
Firmware/Software updates

Azure Security Center Support

Device Provisioning Service

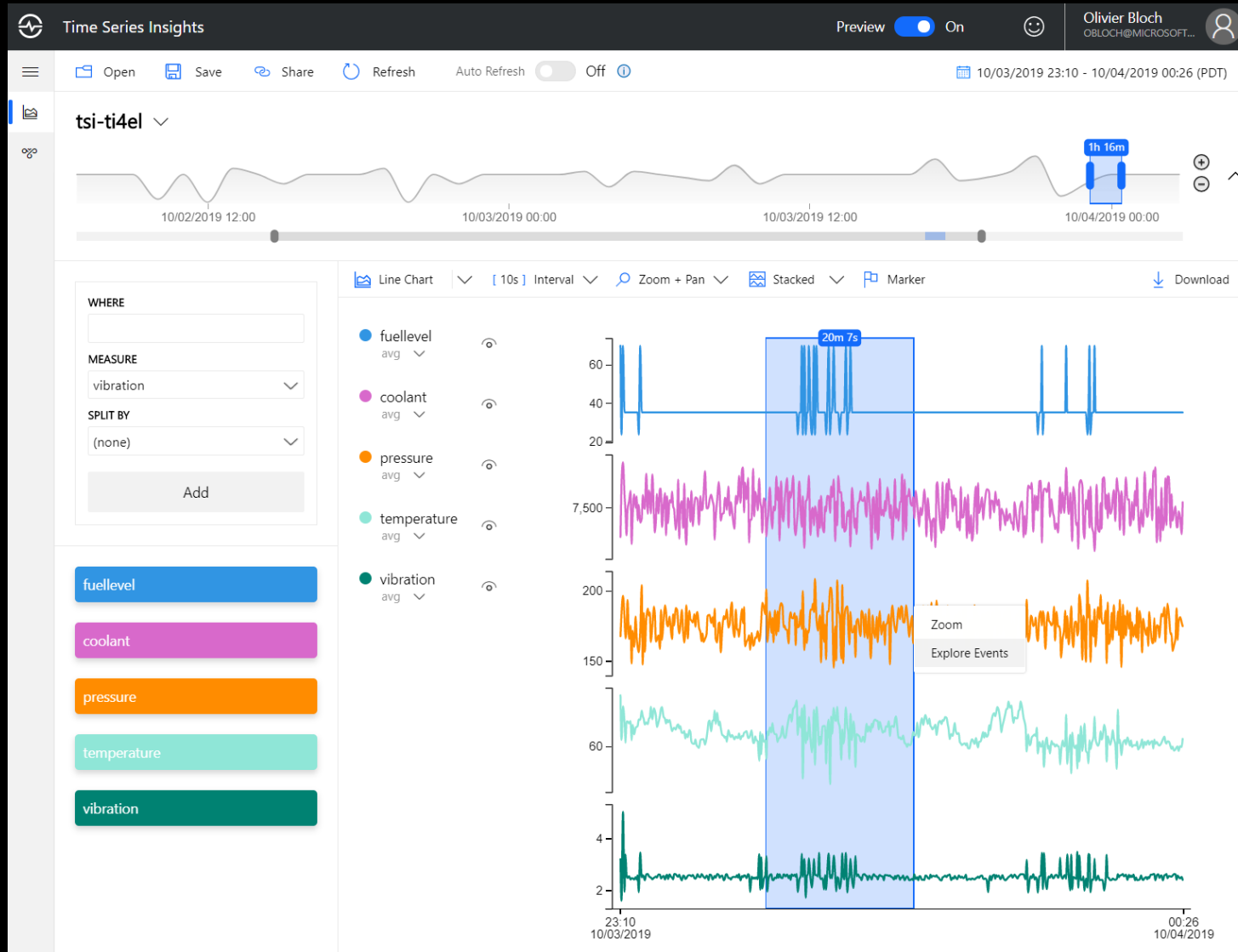### IoT-scale automated provisioning

Zero-touch provisioning

Centralize your provisioning workflow

Load balance across multiple IoT Hubs

Re-provisioning support

Supports TPM + X.509

Digital Twins

Digital Twins enable insights and control of physical environments

Verticalization

AI, simulation, and predictions

Visualizations and physics

Common

- Hyperscale platform for common architecture patterns (e.g., graphs, data, security, action)
- Dynamic execution environment for live business logic
- First class time-series history support
  Azure Digital Twin (PaaS)

Microsoft

Modular Azure architecture for better scale
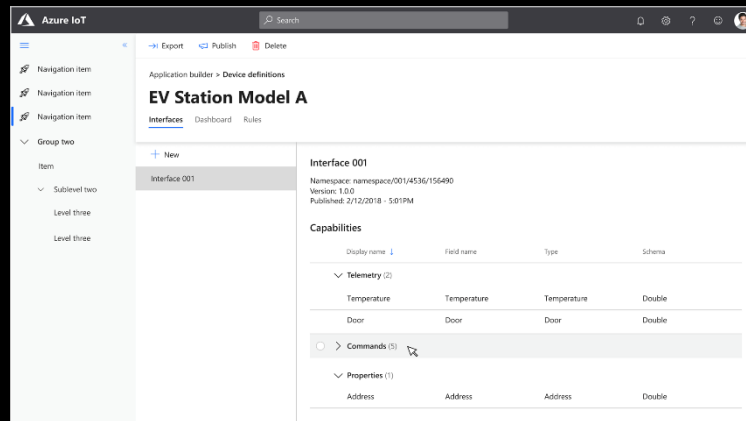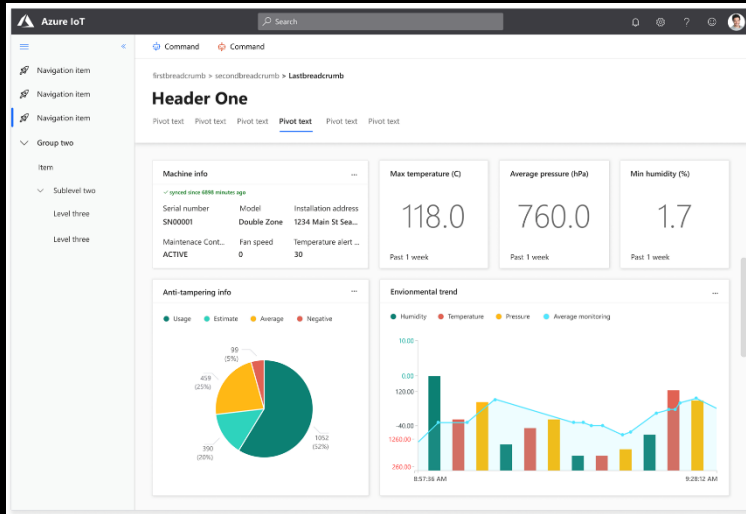
Time Series Insights

Industrial IoT data characteristics
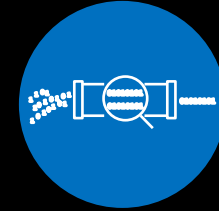
IoT data lacks structural consistency

IoT data needs contextualization

IoT data is used with other data from first or third party sources

IoT data is characterized by infinite retention

IoT Central

- 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
- White labeling

- Plug and Play
- Extensibility and customization
- Location telemetry and geofence
- Industry solution templates (coming soon)
- Edge support (coming soon)

Bringing Plug and Play to IoT

Benefits

DEVELOPERS

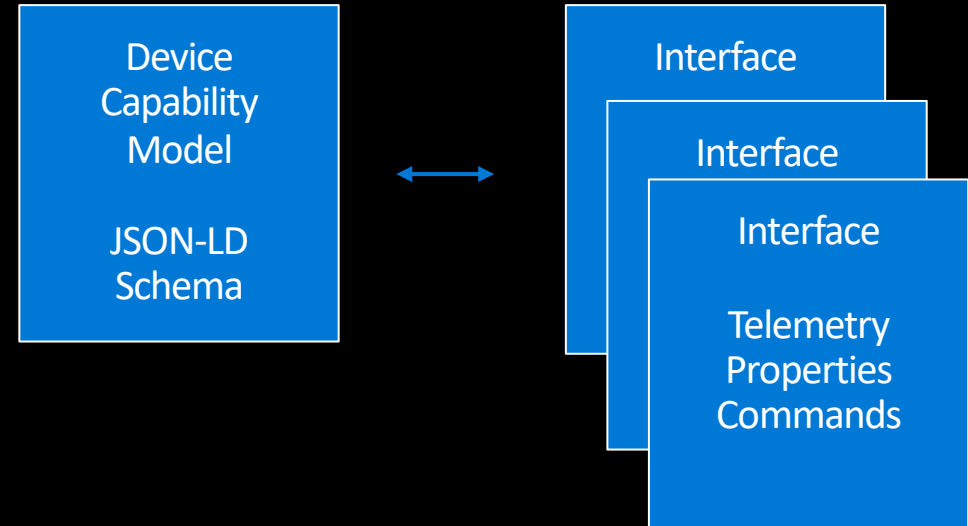Dramatically reduces the effort needed
to build software on devices

CUSTOMERS & PARTNERS

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

DEVICE PROVIDERS

Certify your device for IoT Plug and Play
and it can be used with any Azure IoT solutions
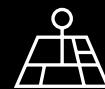
Open source and using open standards

Device
Capability
Model

JSON-LD
Schema

Interface

Interface

Interface

Telemetry
Properties
Commands

Azure Maps

A platform of geospatial APIs for the enterprise

Maps
Render maps and satellite imagery across many geographies

Map control
Integrate rich mapping visualizations into applications

Routing
Calculate routes from N to N points

Search and geocoding
Convert places and addresses to coordinates

Traffic
Show real time traffic information

Time zones
Obtain time zone and current time information

Geolocation
Obtain IP-based location information

Spatial operations
Perform common geospatial operations, including geofencing, buffers, and closest point functions
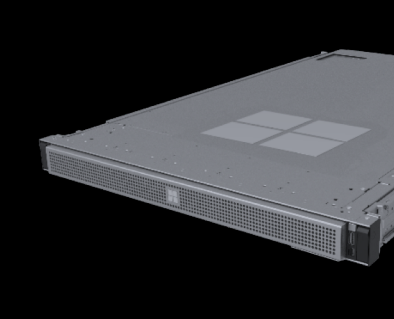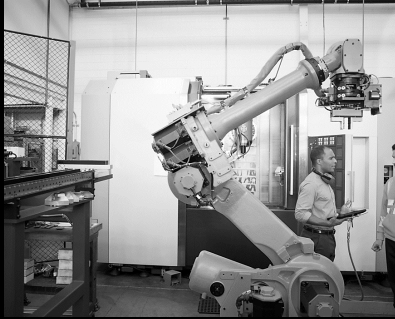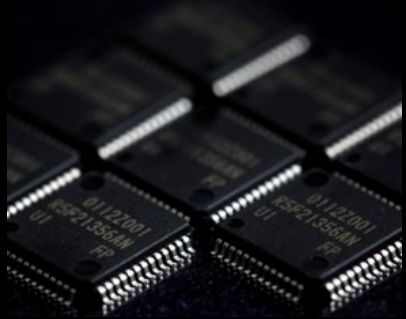
Mobility (transit)
Access real-time intelligence for transit stops and routes

Intelligent Edge

Intelligent Edge

The most comprehensive IoT and Edge offerings in the market

Devices + Sensors	Sensors to interactive	Integrated platform	Global scale processing

IoT devices
Azure IoT Device SDK

Endpoint devices such as appliances, vehicles, or factory machines that connect, interact, and exchange data

1,300+ devices, 300+ partners—all certified to work great with Azure IoT Services

Cross-platform and open source: Windows IoT, Linux, RTOSs, ThreadX and more

Device security
Azure Sphere

Integrated hardware, software, and cloud services work seamlessly together to deliver security by default

Deployment options to securely connect existing equipment and build security into new edge devices

Over 10 Years of security and OS updates delivered directly to each device by Microsoft

Edge devices
Azure IoT Edge

Devices that aggregate, process, and provide gateway capabilities for IoT endpoints

Deploy and manage Azure Services in containers on any IoT device

AI, Azure ML, Azure Stream Analytics, and more

Cross-platform and open source: Windows IoT, Linux

Edge appliances
Azure Data Box Edge

Integrated appliances that provide a subset of cloud edge roles, such as ML-inferencing

Data Box Edge: AI-enabled, storage, and compute Azure Edge appliance

Data Box: Offline, ruggedized data transport, 100 TB–1 PB

On-premises platform
Azure Stack

Scalable solutions that provide a full cloud stack, including IaaS and PaaS capabilities

Edge and disconnected scenarios

Regulatory requirements

Cloud app model on-premises

Hyperscale cloud
Edge Regions

First-party cloud regions

Full range hyperscale cloud services

Tiered service availability: Heroes > Hubs > Satellites

Open source-based services and tools

Most specialization   Full spectrum of Cloud + Edge form factors   Fewest form factors

Fewest services   Intentional and appropriate Azure service availability   Most services

IoT attacks put businesses at risk

Devices bricked or held for ransom

Devices are used for malicious purposes

Data and IP theft

Data polluted and compromised

Devices used to attack networks

The cost of IoT attacks

Stolen IP and other highly valuable data

Brand impact (loss of trust)

Financial and legal responsibility

Compromised regulatory status or certifications

Recovery costs
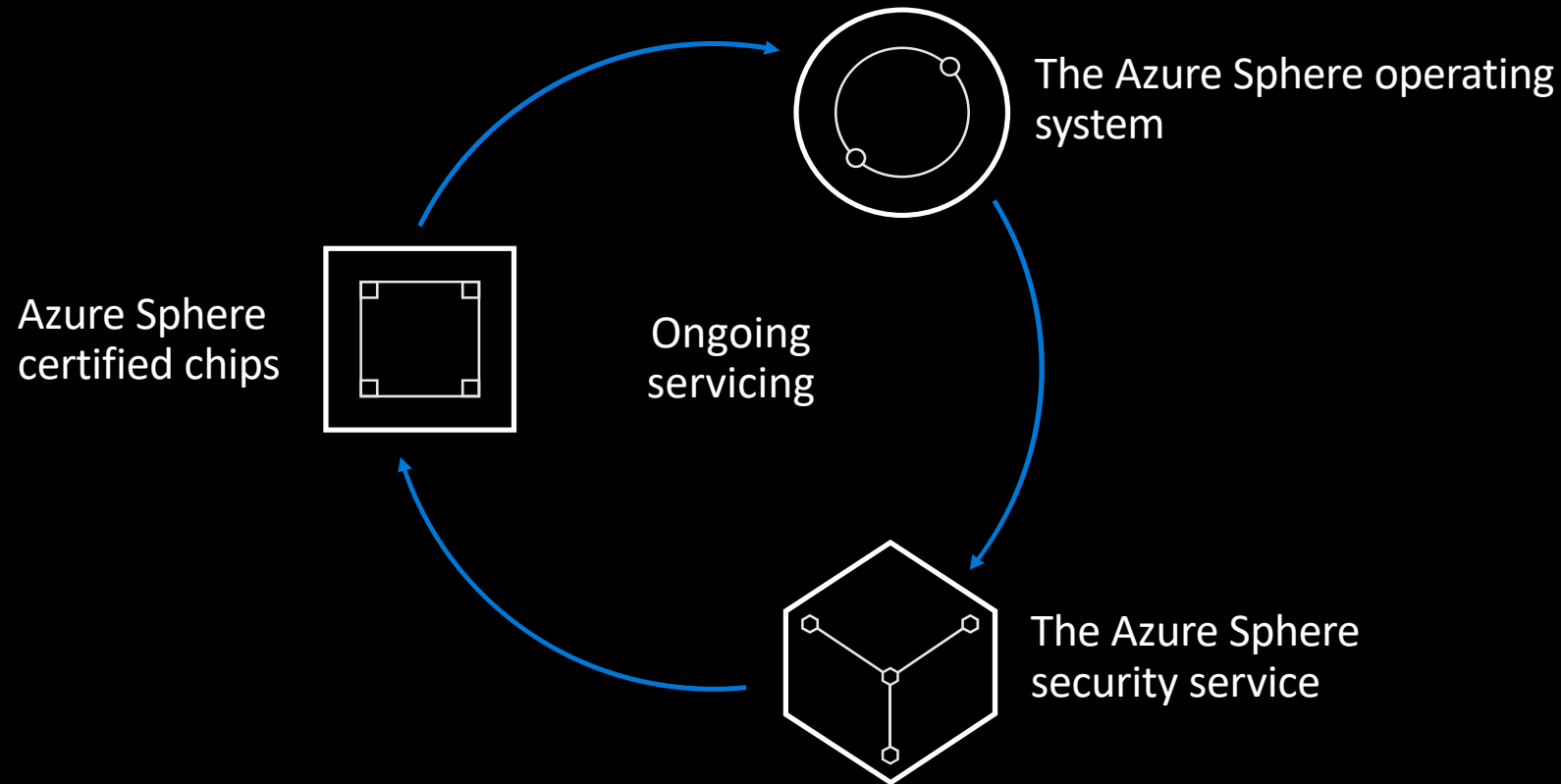
Downtime

Security forensics

Azure Sphere

An end-to-end solution for securely connecting existing equipment and to create new IoT devices with built-in security. Ongoing updates from Microsoft keep your devices secured over time as threats evolve.

The Azure Sphere operating system

Azure Sphere certified chips

Ongoing servicing

The Azure Sphere security service

Over 10 years of security and OS updates delivered directly to each device by Microsoft

Protect your data, privacy, physical safety and infrastructure with Azure Sphere.
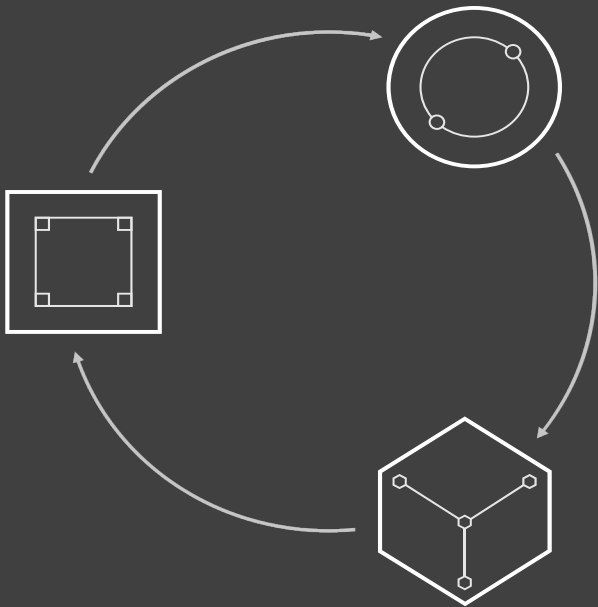
Integrated hardware, software, and cloud services work seamlessly together and deliver active security by default.

Defense in depth provides multiple layers of protection to help guard devices against and respond to threats.

Ongoing security and OS updates from Microsoft keep your devices secured over time.

Implementation options allow you to secure existing equipment and build security into new IoT devices.

Simplified business model with one-time upfront price includes hardware, security service, and full OS update servicing for over a decade.

Intelligent edge devices require a new approach

Time
Many IoT solutions require months to set up

Security & trust
IoT poses unique security, privacy and, compliance challenges

Modernization
Newer technologies like ML/AI require new skill sets

Windows IoT family—fast, safe, smart

Windows 10 IoT Core

For small-footprint, smart devices

Enabling lower cost devices

Windows 10 IoT Enterprise

For fixed-function, smart devices

Locked down, full edition of Windows 10

Windows Server IoT 2019

Advanced data analysis and storage

Enhanced security capabilities

10 years of OS Support, security & manageability

Thank you