

# Smart Buildings

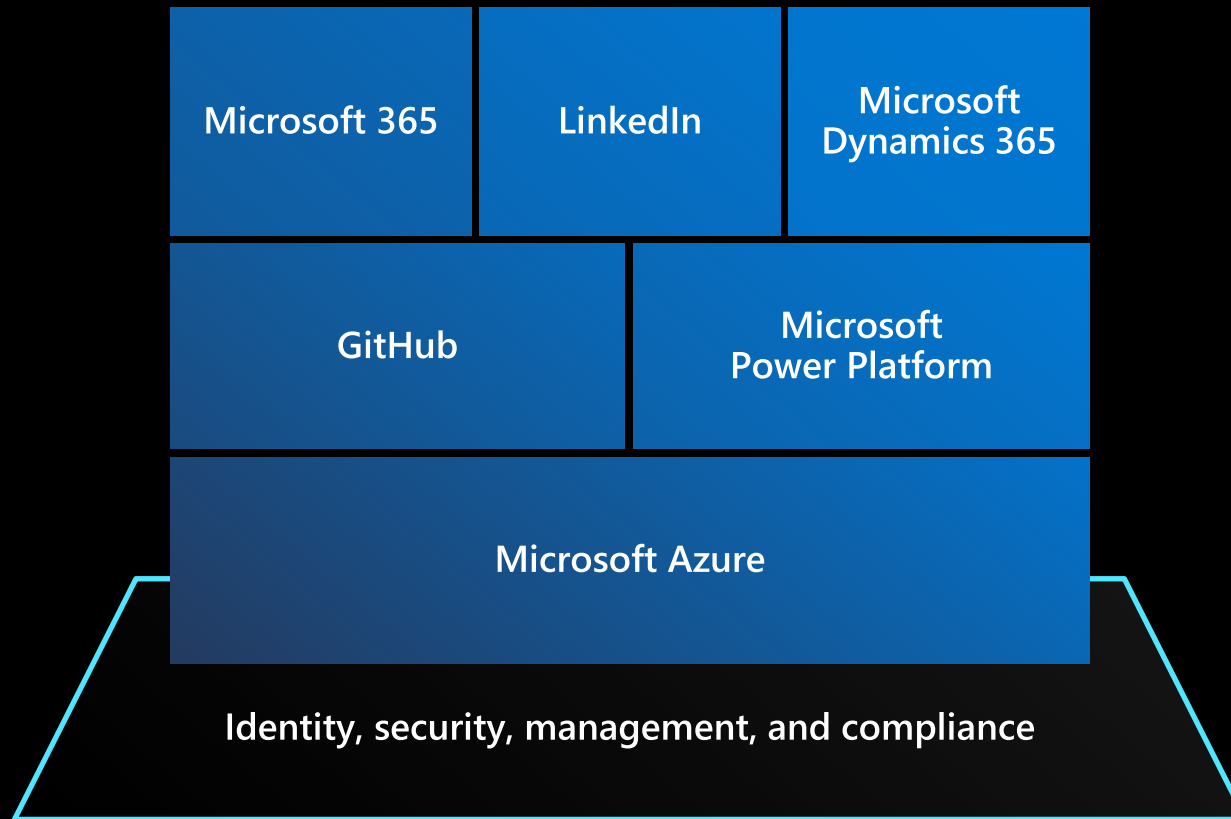
Creating smarter buildings for owners  
and occupants

Yousef Elnono  
Internet of Things Solution Specialist

IoT Customer Industry Team, EMEA



# Microsoft Cloud





# Global



**60+** Azure regions

Largest geographical footprint of any cloud provider with more than **60+** Azure regions

# Secure



Microsoft Cyber Defense Operations Center

**>3,500** full-time security professionals

**6.5 trillion** global signals daily

**\$1 billion** annual cybersecurity investment

# Compliant

**91** Compliance offerings

## GLOBAL

- ISO 27001:2013
- ISO 27017:2015
- ISO 27018:2014
- ISO 22301:2012
- ISO 9001:2015
- ISO 20000-1:2011
- SOC 1 Type 2
- SOC 2 Type 2
- SOC 3
- CIS Benchmark
- CSA STAR Certification
- CSA STAR Attestation
- CSA STAR Self-Assessment
- WCAG 2.0 (ISO 40500:2012)

## U.S. GOVT

- FedRAMP High
- FedRAMP Moderate
- EAR
- ITAR
- DoD DISA SRG Level 5
- DoD DISA SRG Level 4
- DoD DISA SRG Level 2
- DFARS
- DoE 10 CFR Part 810
- NIST SP 800-171
- NIST CSF
- Section 508 VPATs
- FIPS 140-2
- CJIS
- IRS 1075
- CNSSI 1253

## INDUSTRY

- PCI DSS Level 1
- GLBA (US)
- FFIEC (US)
- Shared Assessments (US)
- SEC 17a-4 (US)
- CFTC 1.31 (US)
- FINRA 4511 (US)
- SOX (US)
- 23 NYCRR 500 (US)
- OSFI (Canada)
- FCA + PRA (UK)
- APRA (Australia)
- FINMA (Switzerland)
- FSA (Denmark)
- RBI + IRDAI (India)
- MAS + ABS (Singapore)
- NBB + FSMA (Belgium)
- AFM + DNB (Netherlands)
- AMF + ACPR (France)
- KNF (Poland)
- European Banking Authority (EBA)
- FISC (Japan)
- HIPAA BAA (US)
- HITRUST Certification
- GxP (FDA 21 CFR Part 11)
- MARS-E (US)
- NHS IG Toolkit (UK)
- NEN 7510:2011 (Netherlands)
- FERPA (US)
- CDSA
- MPAA (US)
- FACT (UK)
- DPP (UK)

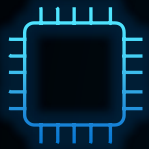
## REGIONAL

- Argentina PDPA
- Australia IRAP Unclassified
- Australia IRAP PROTECTED
- Canada Privacy Laws
- China GB 18030:2005
- China DJCP (MLPS) Level 3
- China TRUCS / CCCPPF
- EU EN 301 549
- EU ENISA IAF
- EU Model Clauses
- EU – US Privacy Shield
- GDPR
- Germany CS
- Germany IT-Grundschutz workbook
- India MeitY
- Japan CS Mark Gold
- Japan My Number Act
- Netherlands BIR 2012
- New Zealand Gov CIO Framework
- Singapore MTCS Level 3
- Spain ENS High
- Spain DPA
- UK Cyber Essentials Plus
- UK G-Cloud
- UK PASF

# Azure from Cloud to Edge

Intelligent Edge

Intelligent Cloud



## CONNECTED DEVICES

Azure Sphere  
Azure RTOS

## OPERATIONS ON THE EDGE

Azure IoT Edge  
Azure Percept  
Windows IoT

## DATACENTER

Azure Edge Zones  
Azure Stack Family  
Windows Server  
SQL Server

## CLOUD

Azure IoT Hub  
Azure IoT Central  
Azure Digital Twins  
Azure Defender for IoT  
Azure Maps

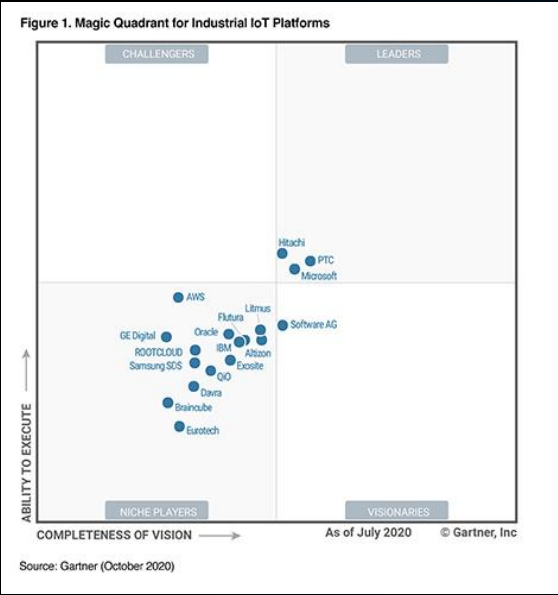
Azure Arc

Consistent security, identity, management, connectivity, and developer experience

# Gartner, Forrester and IDC all recognize Microsoft's leadership in IoT



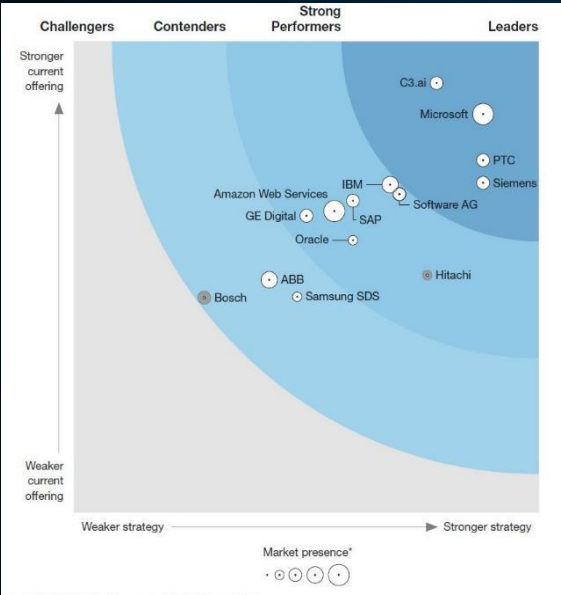
Manufacturing



Gartner



Manufacturing



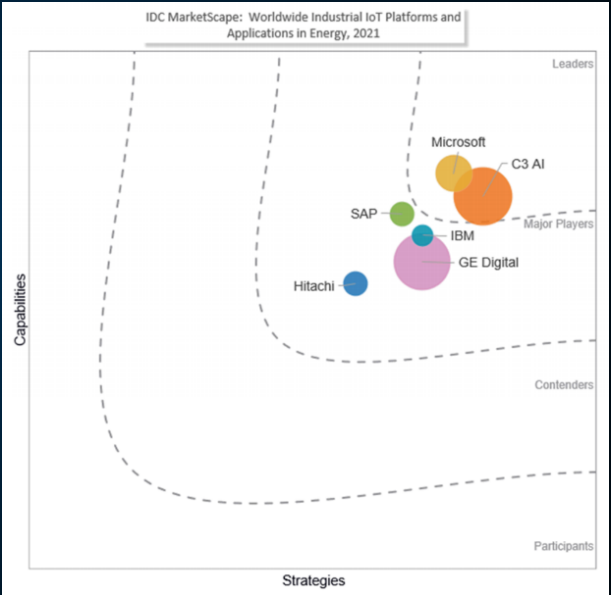
Forrester



Manufacturing



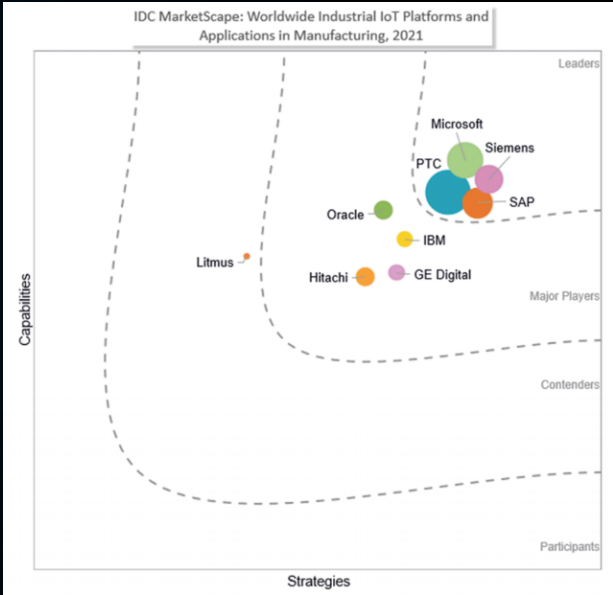
Energy



IDC

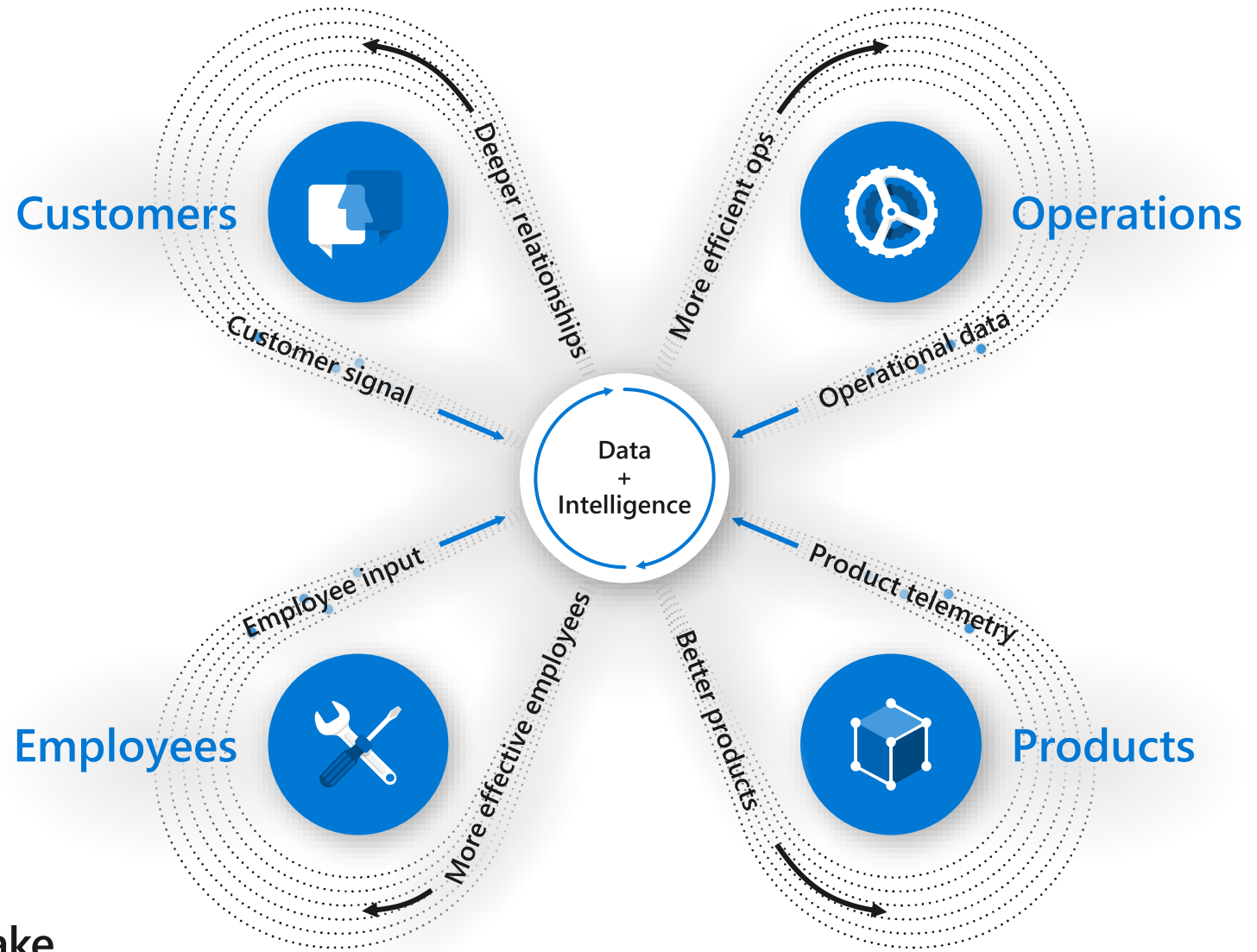


Manufacturing



# IoT enables the digital feedback loop

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



Our vision is to help businesses take advantage of the digital feedback loop



# Microsoft is its own best case study

From our largest campus in Redmond, Washington, USA to our many regional offices, Microsoft has a widely varied real estate portfolio

Our in-house Real Estate & Security team is responsible for the smart management of the global real estate portfolio

The diversity of our real estate portfolio means we know what it takes to manage commercial real estate on a global scale.



## Global Building Portfolio

M<sup>2</sup>

**3.56M**

Leased

**51%**

Buildings

**770**

People

**~148,000**

Owned

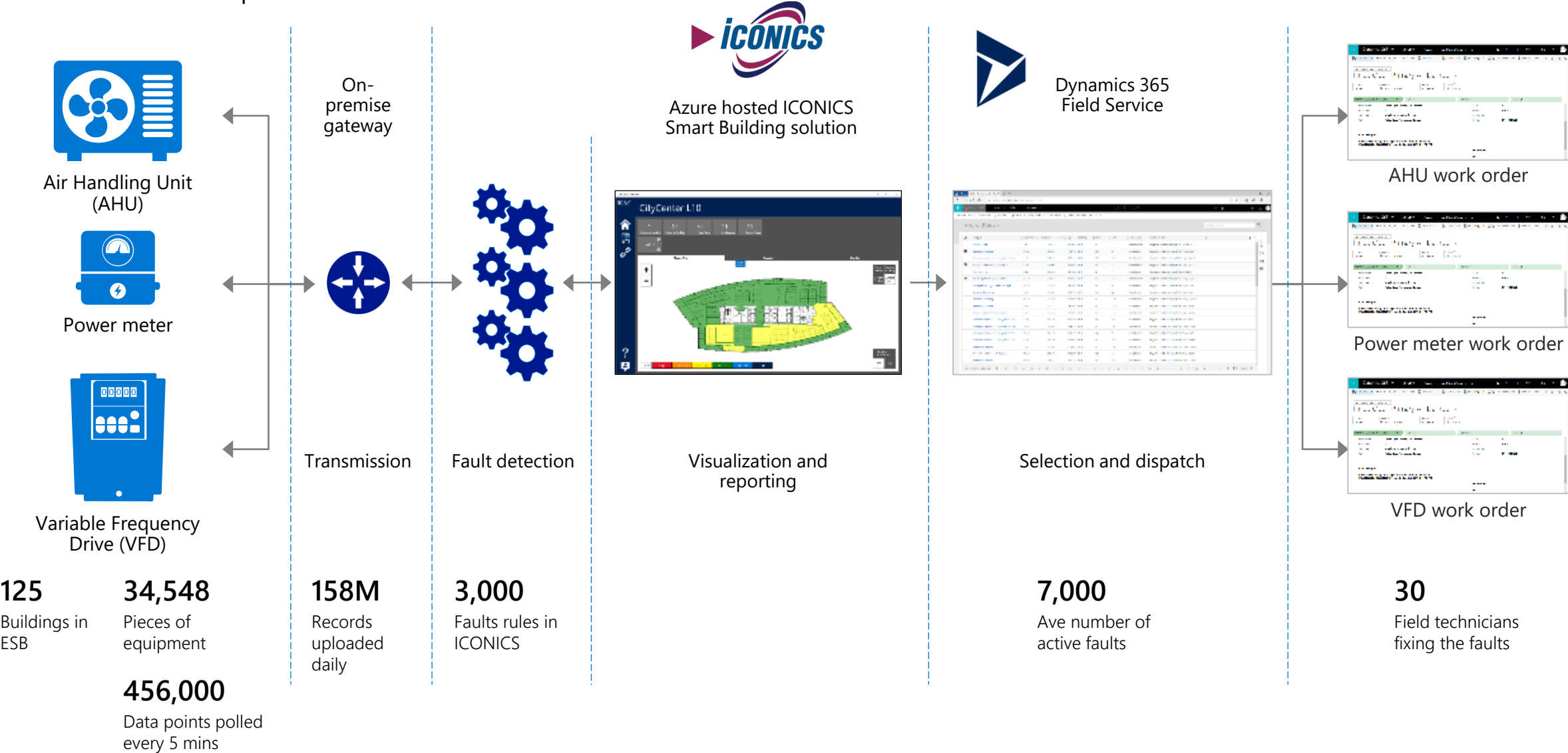
**49%**

Countries

**112**

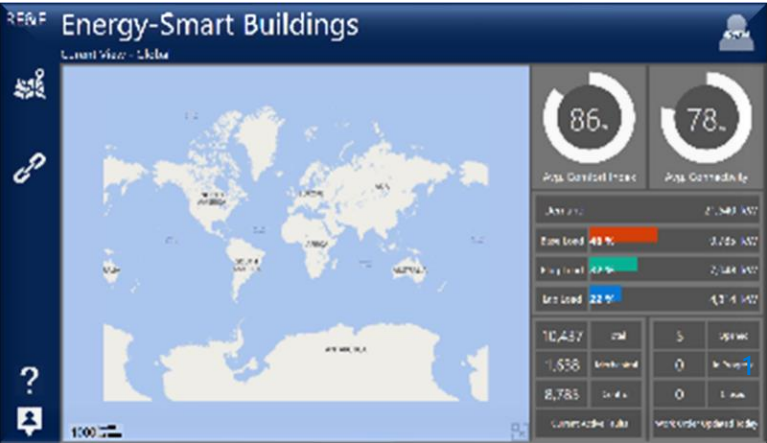
# Puget Sound - Energy Smart Buildings Metrics

Data current as of April 2021



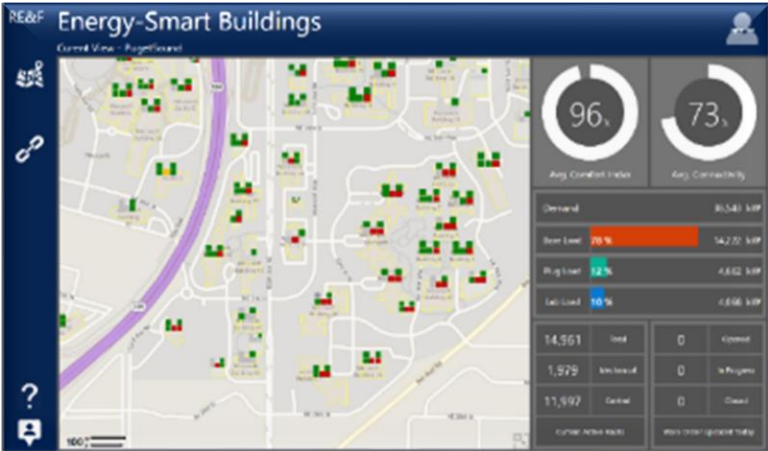


# Microsoft Puget Sound on a Single Pane of Glass



## 1. Home page

- View of all facilities worldwide
- Touch-enabled zoom to individual locations



## 2. Puget Sound campus view

- View of all buildings in Puget Sound
- Touch-enabled zoom to individual buildings



## 3. Building view (City Center)

- View of one building in Puget Sound
- Touch-enabled zoom to individual floor



## 4. Floor plan (10th floor)

- View of one floor in City Center
- Supports multiple views of systems and issues

# How we digitally review our campus spaces



## Do we have enough space?

Understanding the relationship between attendance and what type of spaces are needed allows us to program for efficiency



## Is it over- or underutilized?

Knowing the total and peak number of people accessing the building daily gives better insight to utilization



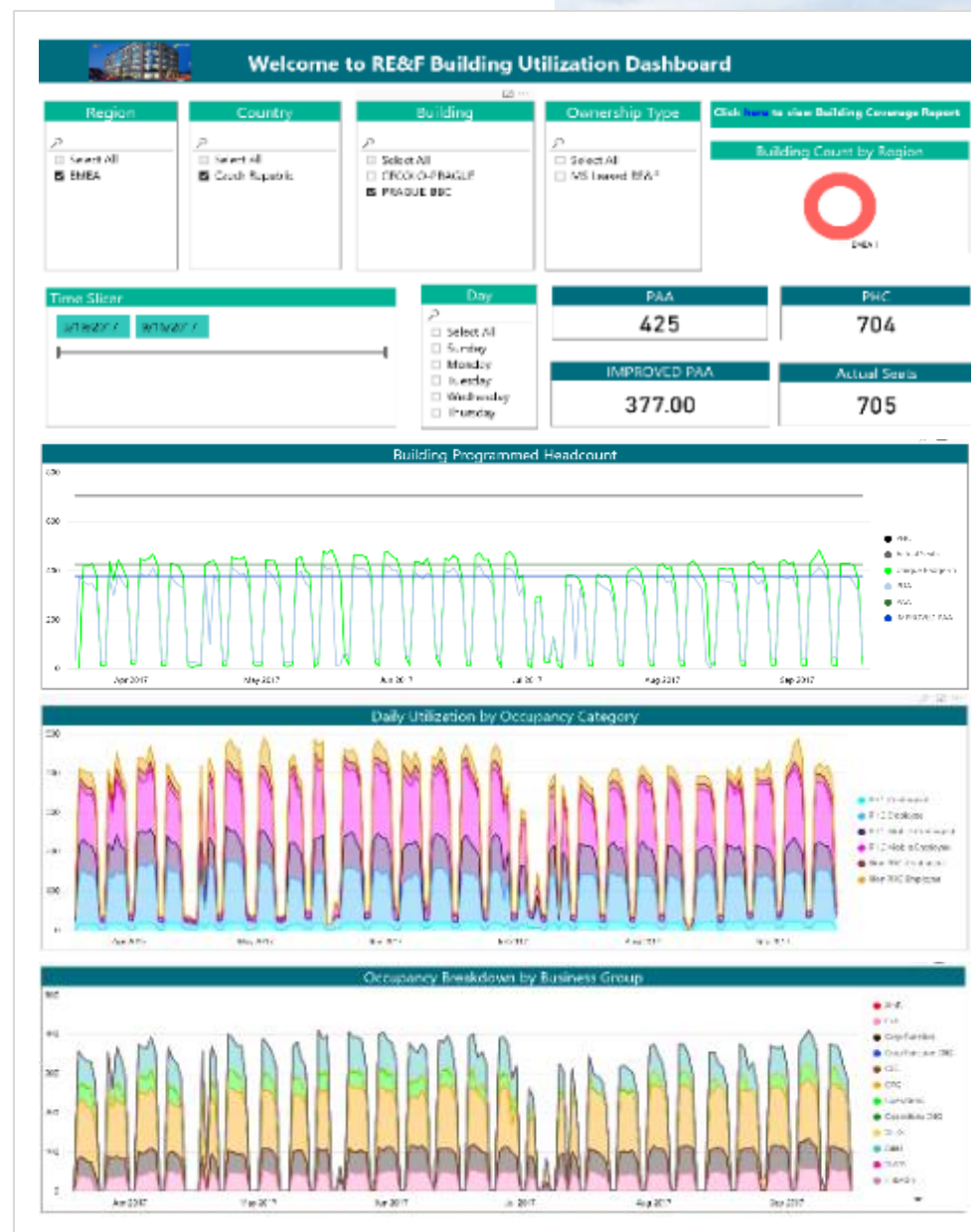
## Who uses it?

Using people data to aggregate by department allows us to profile attendance by business groups



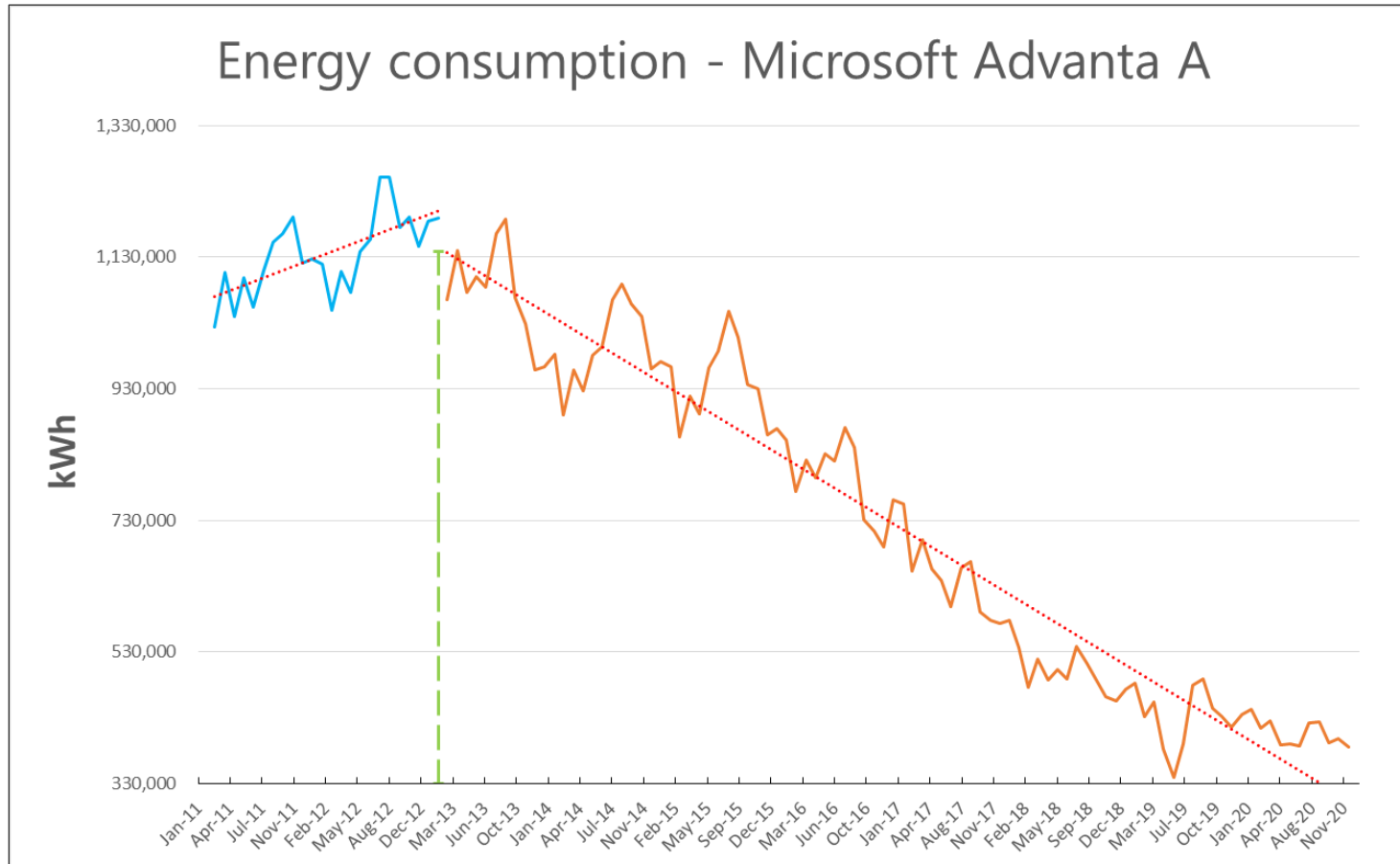
## How often?

Viewing the data over 180 days allows us to consider seasonal trends, visualize vacation periods, and build trust in the quality of our data

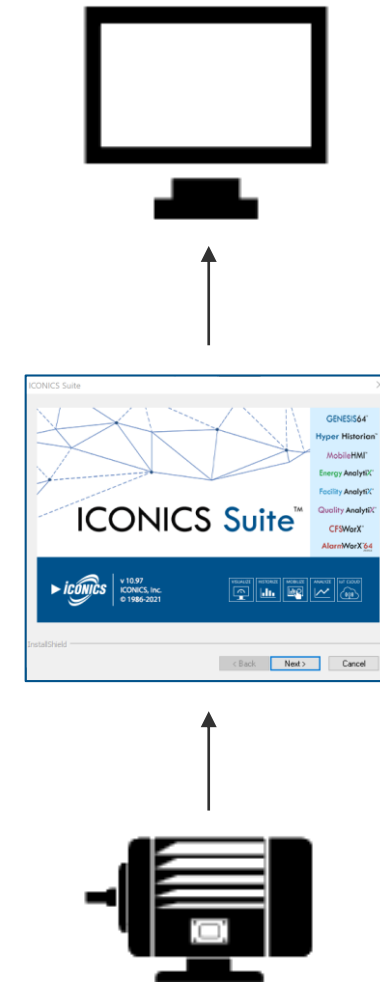




# To reduce operating costs, increase efficiency



Source: Microsoft presentation, IoT Solutions World Congress 2019





# What we achieved by intelligently updating our existing campus



**\$12M**

Project capital cost



**\$30M**

Savings over 10-year lease.  
Hard and avoided costs



**\$18M**

Net savings over 10 years

## Effectiveness

**Tripled**

Customer  
Engagement

**+5%**

Work  
Flexibility

**+8%**

Work Life  
Balance

**+4%**

Productivity  
score

Use of MyAnalytics +  
flexible working +  
-9% less stress

Productivity has strong  
correlation with employee  
engagement

## Efficiency

6 m2 per employee

36% less Space

Desk sharing up to 2,97

Partnership with IWG Spaces

Customer Space 72% of total space

45% decrease in energy consumption

100% Eco-friendly cleaning products



# Building brains for Industrial Control Systems

Combining state-of-the-art techniques in DRL, simulations, and machine teaching

## How does it work?

- Start by specifying optimization goals, variables, constraints, rewards/penalties, and then teach the BRAIN all the strategies that SMEs use today
- Machine Teaching brings transparency to an "AI black box"
- Before going "live", the BRAIN trains and learns in a simulation environment
- The BRAIN is designed using Deep Reinforcement Learning (DRL) models

## Deep reinforcement learning training loop





# Getting Microsoft to carbon negative with the help of cutting edge AI

## Azure Products:

Microsoft Azure Data Factory

Microsoft Azure IoT Hub

Bonsai

## Other Products:

Microsoft Power BI

Partner: ICONICS, CBRE

[Read the case study >](#)



*"The more variables and controllers that are in a system, the harder it is for a human to optimize it. Even with the smartest people working on the problem, the calculus to try every possible scenario and outcome is too time consuming. That's why we wanted to partner with the AI & Innovation team to see if they could help us."*

*Mohan Reddy: Director - Puget Sound Facilities Operations, Microsoft*

## Situation

Buildings already connected to Azure IoT Hub and Digital Twin w. historical data available, and the system has been optimized through rule-based system. To obtain further savings, part of Microsoft's campus in Seattle has 1 centralized plant chiller serving 9 buildings. But how can Microsoft determine the optimal setpoints on the chiller to minimize energy cost while keeping indoor temperature within narrow ranges

## Solution

Created simulation models based on historic data that reflect system dynamics based on different outside air temperature ranges. The team trained a Bonsai Brain that optimizes recommended supervisory setpoints across those temperature ranges.

## Impact

"With Project Bonsai, we uncovered recommended optimizations that we never could have come to on our own. Using this AI, we were able to uncover a new plan for optimization in about 2 weeks, with an expected reducing in energy of about 15%"  
Brendan Bryant, Mechanical Engineer at DB Engineering.





## Intesa Sanpaolo improves real estate and facilities operations, reduces carbon footprint with Azure

### Azure IoT Products:

Microsoft Azure Data Factory  
Microsoft Azure IoT Hub  
Microsoft Azure Machine Learning

### Other Products:

Microsoft Power BI

Partner: ICONICS

Organization size: 42,000 employees

Industry: Banking and Capital Markets

Country: Italy

Business need: IoT Standardization,  
Cost savings, Sustainability

[Read the case study >](#)



*"In the first six months, we demonstrated annual savings with the Azure IoT platform and ICONICS would total 500,000 euros. If we see similar savings in other buildings, we can save about two million euros each year, and the project will pay for itself a year in advance."*

*Giorgio Colosi, Real Estate and Facility Senior Director, Intesa Sanpaolo, Direzione Centrale Immobili e Logistica (DCIL)*

### Situation

Intesa Sanpaolo, Italy's leading bank, needed to get better visibility into energy use in its buildings and other operational variables. It also wanted to streamline the tracking and fixing of faults that wasted energy, resources, and money.

### Solution

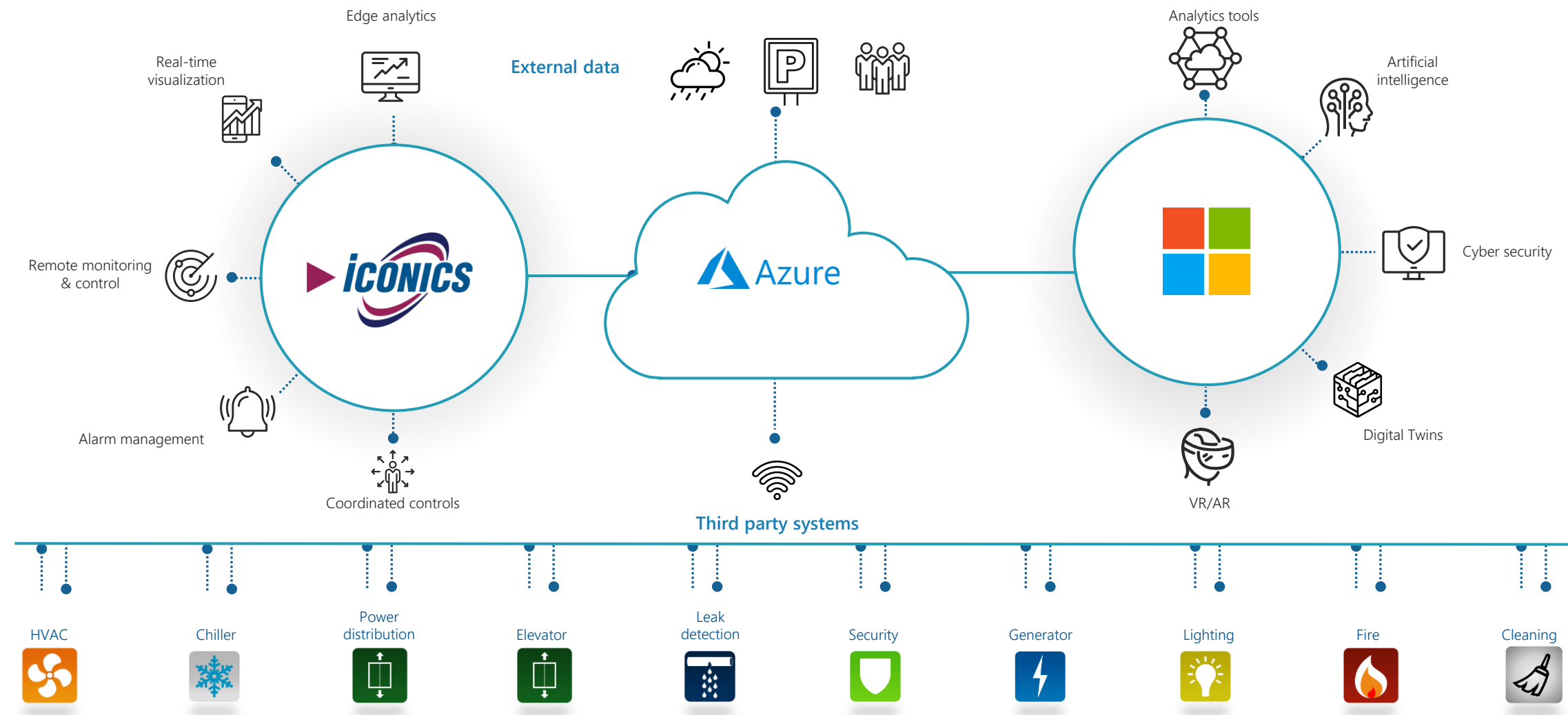
Onsite IoT devices embedded in building management systems connect with Microsoft Azure IoT Hub (for data ingestion), Azure Data Factory (for monitoring and real-time data analysis), and ICONICS (data visualization). Microsoft Power BI is used for reporting.

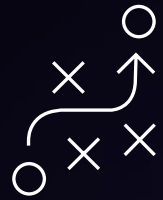
### Impact

The bank reduced its annual energy consumption in three buildings by 15 percent, a savings of 500,000 euros per year. After deploying to additional buildings, the bank expects to save about two million euros each year, accelerating the ROI by one year.

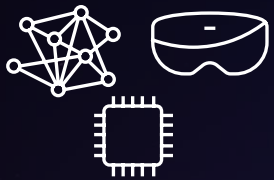
**From reactive to proactive**

# Microsoft augments ICONICS' solutions with new cloud capabilities





**Many use cases and different stakeholders:** today's technologies can help addressing many and different use cases for Real Estate professionals (Opex savings e.g. energy reduction), HR managers (employee productivity and well-being e.g. increased air quality), Marketing and Sales (visitors and customers engagement), and many others >> *What is your target? Many targets? Will you integrate with other stakeholders?*



**Solutions can have complex ROI in medium/long term:** IoT/AI/Cloud technologies provide many solutions with very different costs *and impact* in implementation (Capex) and long-run management (Opex) >> *Who will implement? Who will manage? What are the integration/evolution costs in my timeframe? Will I be able to stay open to new services/technology my customers/users will ask?*



**Cultural shift:** dealing with Smart Building means moving from managing assets into providing services based on data. This is the key challenge to address in every SB program to be effective in the long-run creating proper skills and new capabilities>> *Do I have all the skills and competences needed to maximize the value of my Smart Building program?*



# Q&A

- Mød os på Heptagon standen -