Smart Buildings empowered through Microsoft Technology

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Microsoft

Outline

Smart Buildings

- Case
- Vision
- Implementation Approach

Microsoft

Case

Why are we having this conversation?

We have data from everything

Digital feedback is now available from all objects in our environment – buildings, infrastructure, utilities, vehicles, people

We can use this data to improve operations

What's different from the past is the extent and quantity of data – creating a digital feedback loop supporting improving how we do things

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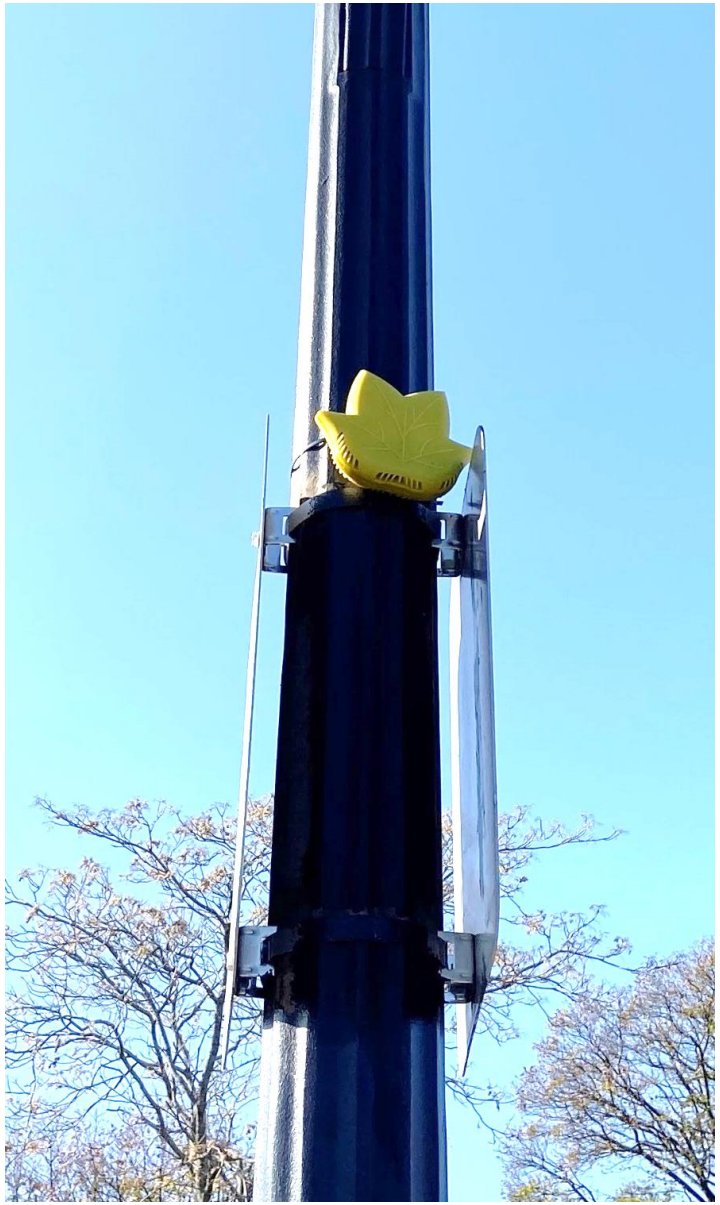


Our commitments to sustainability

Carbon

Carbon negative by 2030

Ecosystems

Planetary Computer

Waste

Zero waste by 2030

Water

Water positive by 2030

Demand for Smart Buildings is growing due to several trends and the availability of new technologies

Trends	
More productive Workplace	Shared and open workspaces require new approaches to building design and productivity features
Pressure to minimize costs	Companies are looking to reduce costs associated with operating real estate assets
Sustainability initiatives	Corporate initiatives to reduce energy consumption and manage energy costs
New Experiences	Attract and retain talents thanks to brand new user experiences, impress visiting partners and customers
Enabling technologies	
Internet of Things	Better, cost-effective sensors and connectivity; open and standardized building system protocols
Intelligent Cloud	More cost-effective and accessible IoT, Digital Twins, Big Data, Cognitive Services and Machine Learning

Challenges of data and application silos

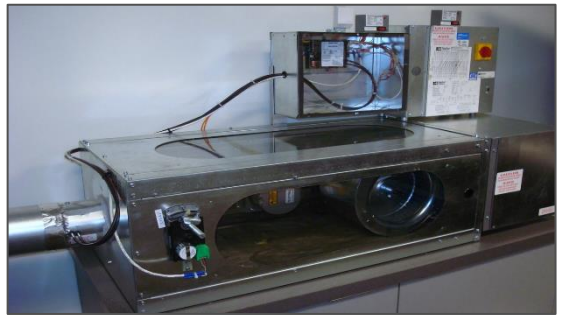
Incompatible systems, limited insights and access to data

Opportunity to drive value by analyzing data from disparate systems

- BMS + Occupancy + Scheduling: reducing room heating when no one is scheduled to use the space
- BMS + Water: fixing leaks in hot water coils causing chilled water system to turn on early
- BMS + Air Quality Index + Weather: using outside air for cooling only when AQI in good range

Preventing BMS overloading from multiple systems requesting the same sensor data

Preventing actuator problems from multiple systems controlling the same devices






Microsoft Worldwide Portfolio

Puget Sound

Sq. ft.	15.5M
Buildings	129
Owned	70%
Leased	30%
People	48,000

EMEA

Sq. ft.	6.6M
Buildings	193
Owned	12%
Leased	88%
People	31,400
Countries	71

Retail Stores

Sq. ft.	530K
Stores	98
Countries	4
People	3,155

Global

Sq. ft.	38.4M
Buildings	770
Owned	49%
Leased	51%
People	~148,000
Countries	112

Building Intelligent Solutions

Americas

Sq. ft.	5.6M
Buildings	172
Owned	19%
Leased	81%
People	21,900
Countries	21

Asia

Sq. ft.	6.0M
Buildings	93
Owned	63%
Leased	37%
People	31,100
Countries	20

LinkedIn

Sq. ft.	4.2M
Buildings	85
People	12,800

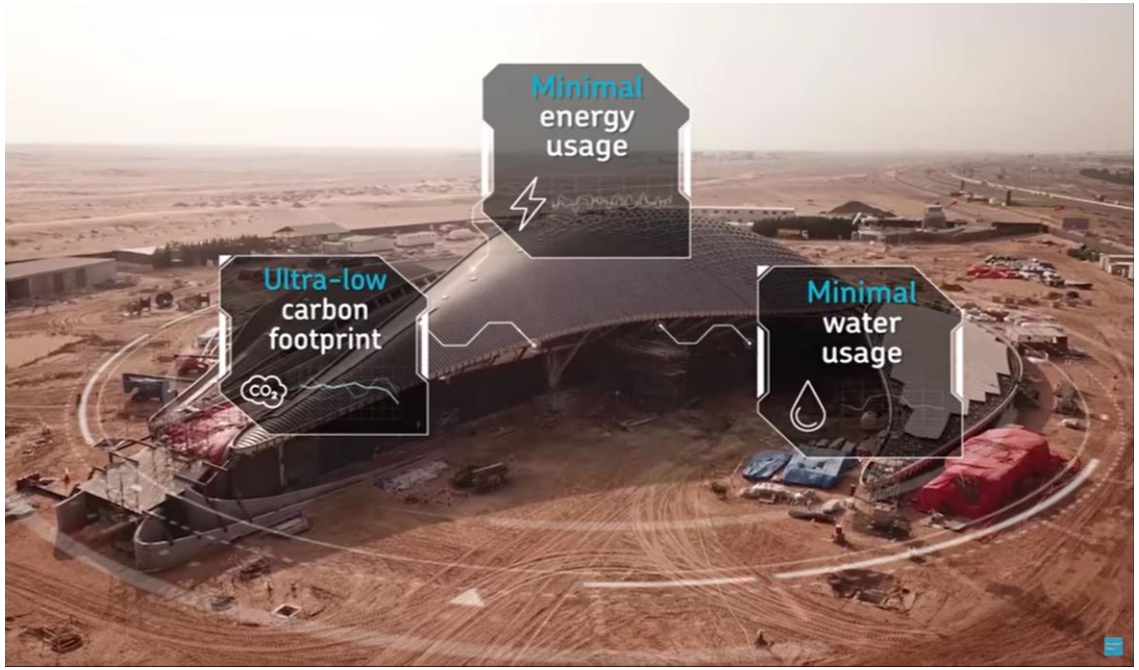
Vision

Create Digital Feedback Loops for Buildings

Our vision: to enable any organization to create digital feedback loops for all aspects of their business

A comprehensive digital model that includes products & operations

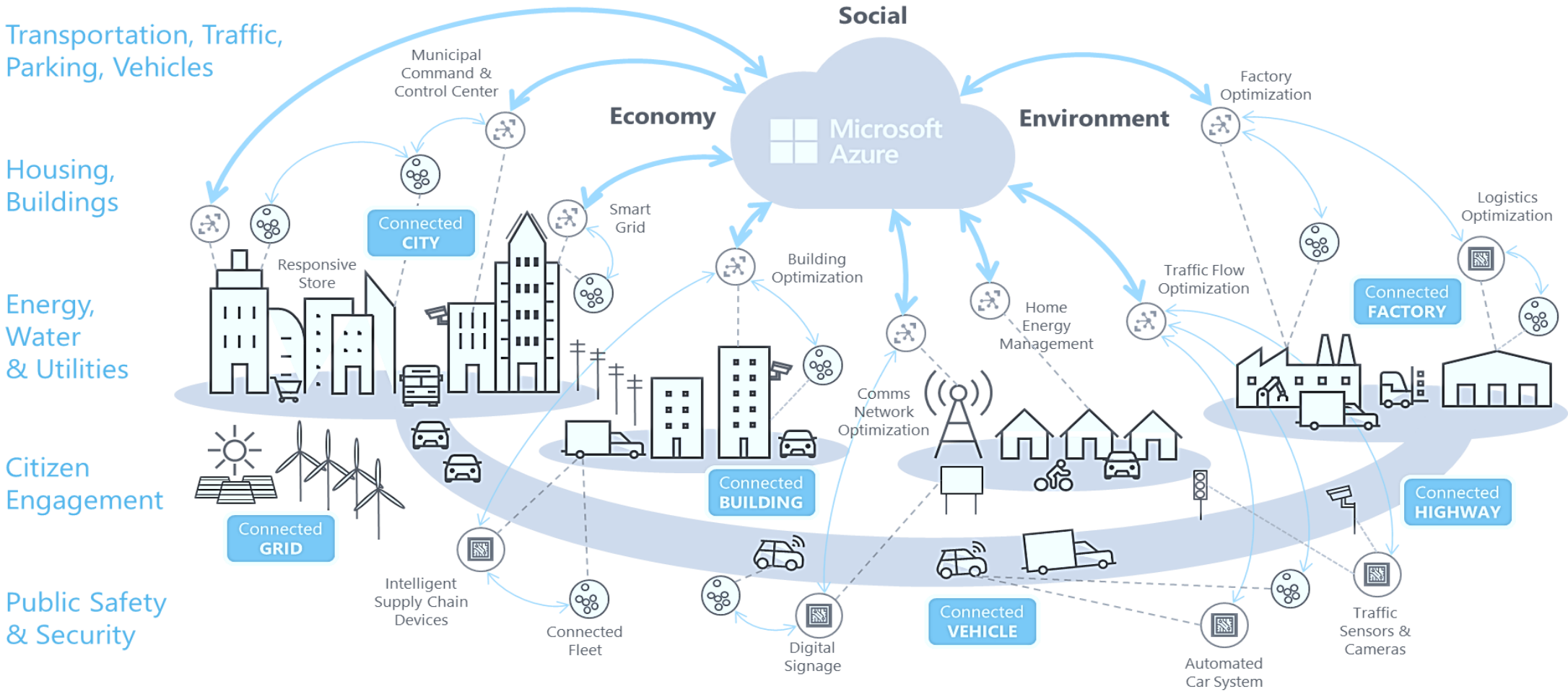
- Including people, places, things and processes
- The ability to track, optimize, simulate and predict the future



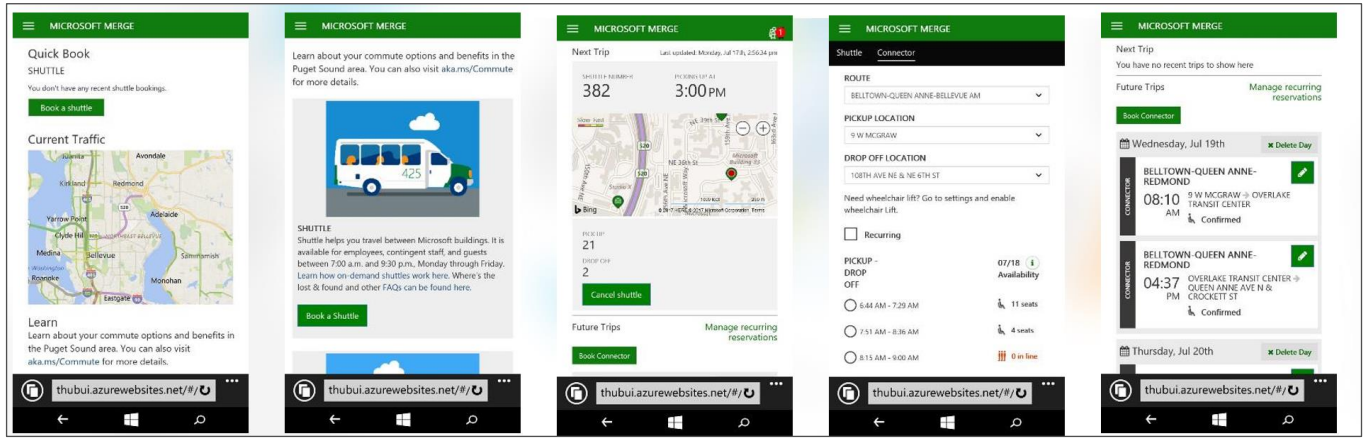
Learnings – hierarchy of needs, data, and infrastructure

Level		Requests	Scenarios
Top *(Level 3)* Ambient intelligence	People Centric	Adapt to me Find me what I need Make me comfortable Make me productive	 Navigation  Meetings  Security
Middle *(Level 2)* Physical layout, signage		Improve the facilities Improve the workplace Improve sustainability	 Space utilization  Parking  Workplace
Base *(Level 1)* Power, Air, water	Facilities Centric	Reduce utility spend Reduce labor costs Reduce complaints	 Energy consumption  Facilities management  Predictive maintenance

Smart Buildings in the connected and intelligent world



Mobility scenarios



Uses

Commute optimization
Shuttle dispatch and routing
Parking

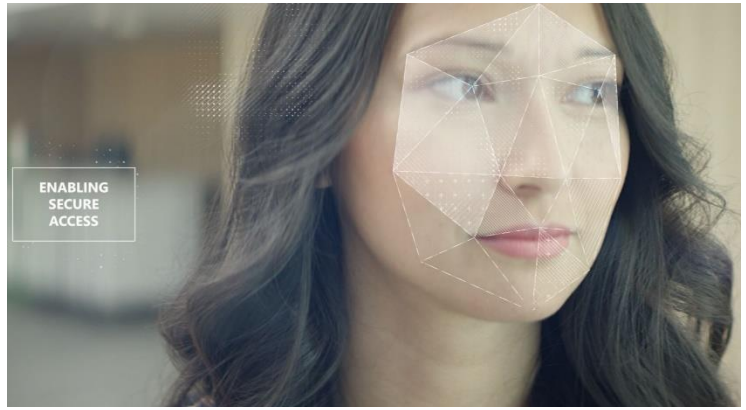
Uses data from

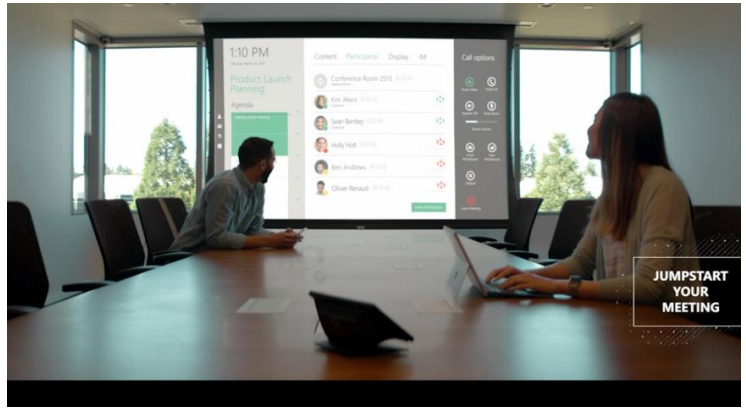
User input
GPS
Geolocation sensors

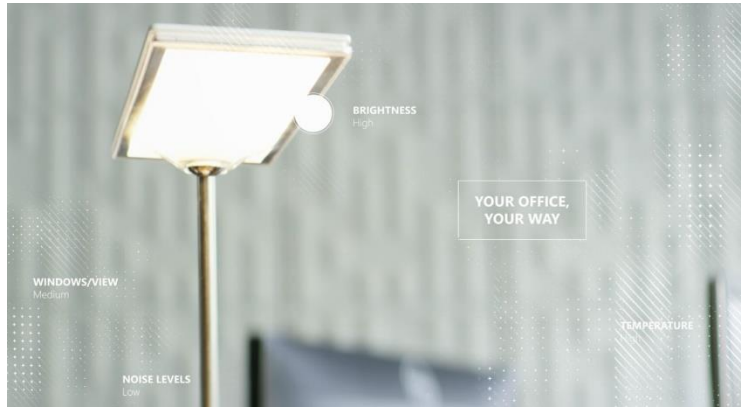
MS HQ

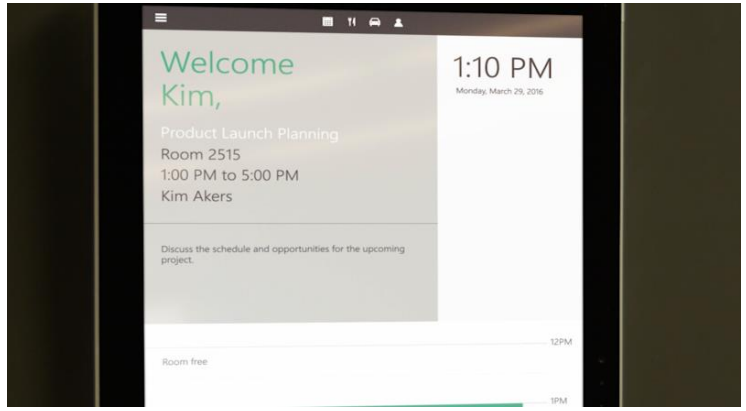
- 94 buses
- 213 Shuttle vehicles
- 7M Connector trips
- 4,500 daily Connector passengers
- 7,000 daily Shuttle passengers

Meeting & workplace experience scenarios









Uses

Indoor navigation
Elevator dispatch
Meeting productivity

Uses data from

Presence detection sensors
User profiles

Data science and ML/AI enhancements

Building scenarios using IoT data

Chiller optimization
Predictive maintenance
Understanding space utilization over time
Monitoring real time occupancy
Planning evacuation routes
Changing evacuation routes in real time
Updating digital signage in real time in emergencies

Evacuation simulation for Redwest B

Facilities Management scenarios

Uses

Operating expense reduction
Energy conservation
Tenant experience improvement

Uses data from

Equipment sensors
Environmental sensors
External systems (weather)

MS HQ

550,000+ data points polled
160M+ sensor readings/day
7,000 active issues

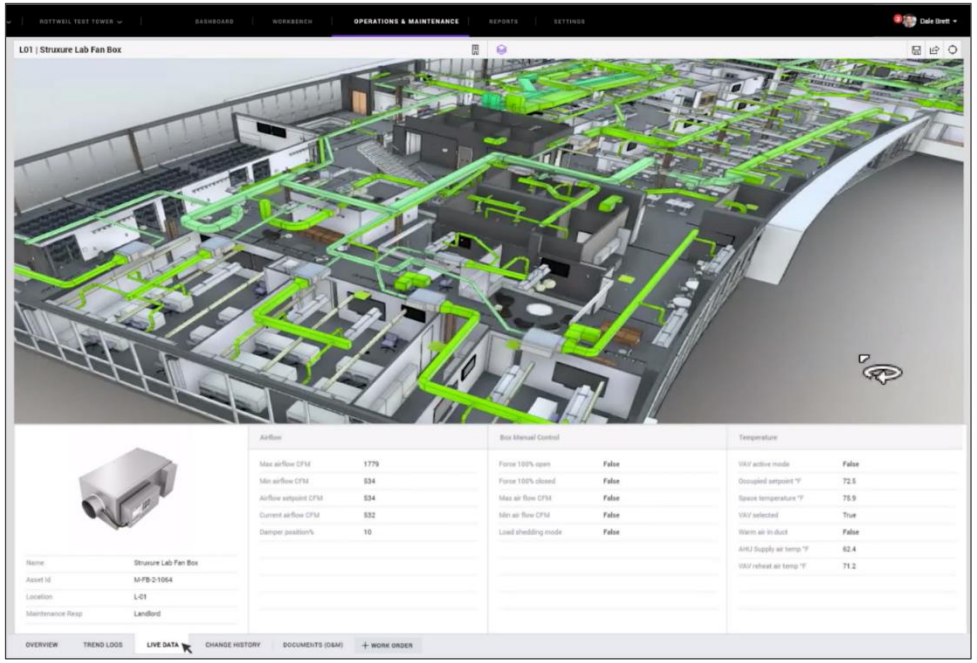
BIM integration and 3D modeling with Willow viewer

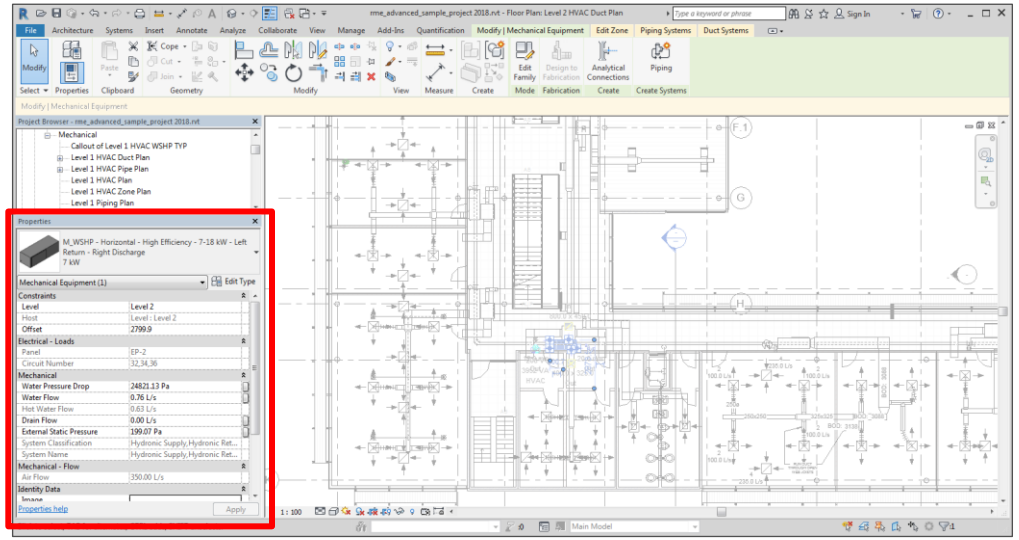
Adding insights

Detection of faults in vertical sections

Analysis of data compared to equipment capacity

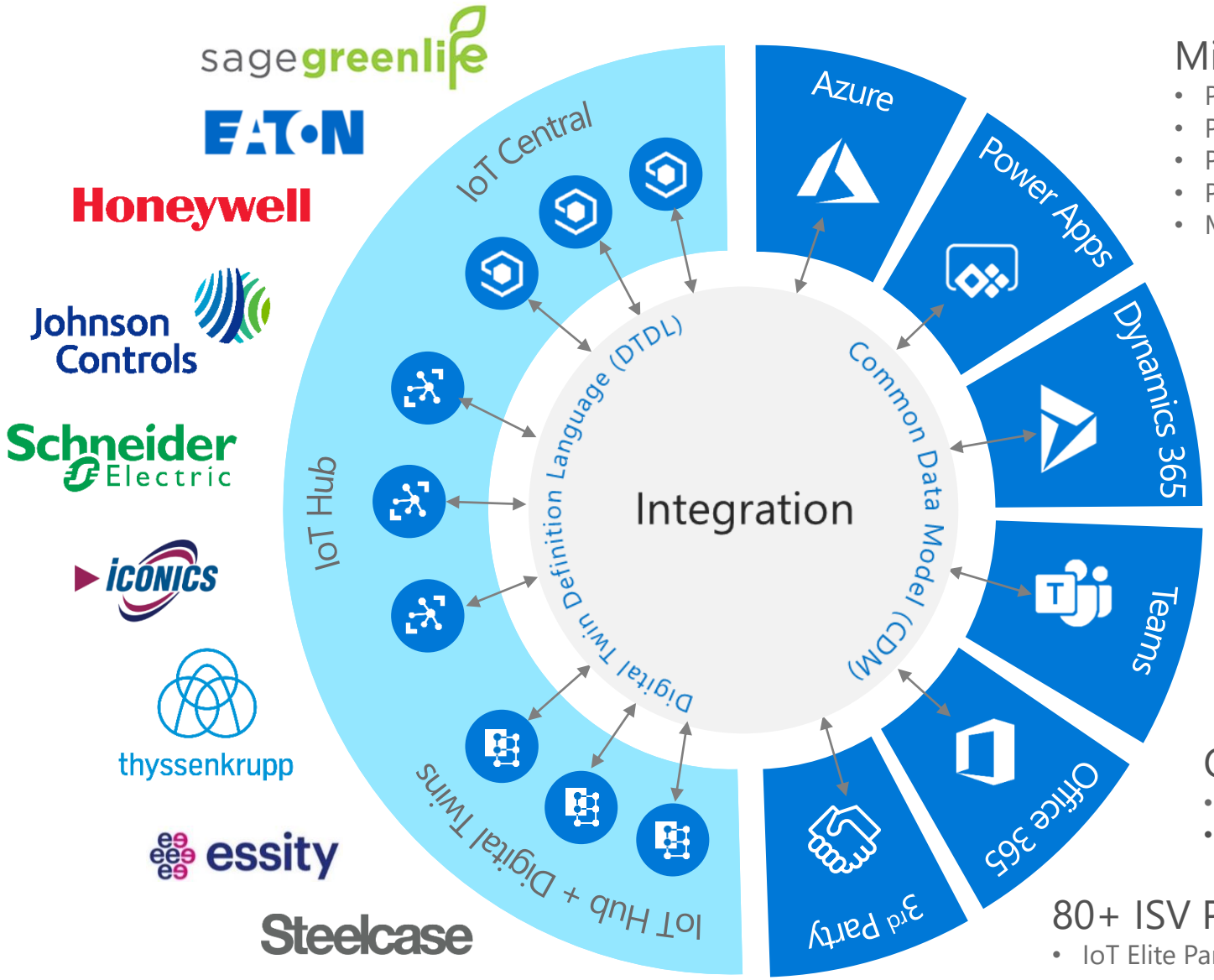
Willow thyssenkrupp Elevator https://www.youtube.com/watch?v=78yc36A58uQ





Implementation Approach

Smart Buildings Ecosystem – not without our Partner



Microsoft Power Platform

- Power BI
- Power Apps
- Power Automate
- Power Virtual Agent
- Mixed Reality

Microsoft Dynamics 365

- Field Service
- Remote Assist
- Finance and Operations
- Customer Engagement
- Customer Insights
- Customer Service
- Customer Service Insights
- Product Insights

Microsoft Teams

for Frontline Workers

Office 365

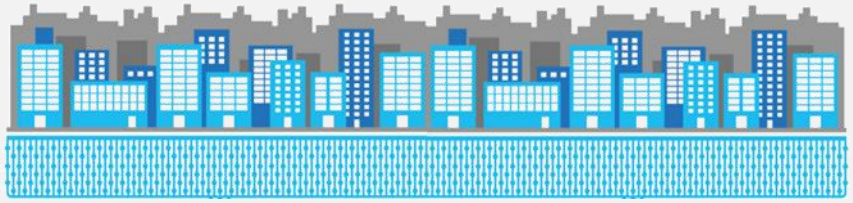
- Modern Workplace
- Microsoft Workplace Analytics

80+ ISV Partners

CBRE | host MacDonald-Miller FACILITY SOLUTIONS

- IoT Elite Partners, include InfoSys, L&T. Accenture

Smart Campus & Intelligent Cloud



Sensors

Actuators

Building controllers

Field gateways

Azure

Aggregators

- Azure Cloud Services – Worker Role
- Azure IoT Hub
- Azure Event Hub

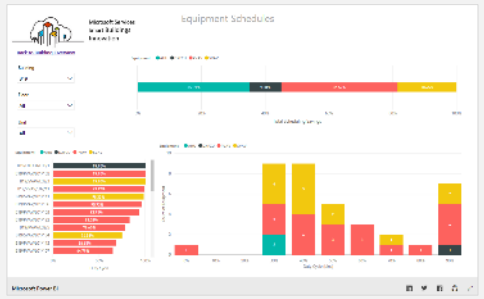
Storage

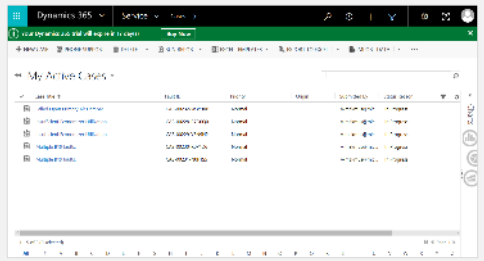
- Azure Storage – Blob
- Azure SQL Database
- Azure Cosmos DB
- Azure Data Lake

Analytics

- Azure Time Series Insights
- Azure Stream Analytics
- Azure Machine Learning
- Azure Data Lake Analytics

Power BI





Dynamics 365

User Dashboards

26,000
faults surfaced per day

Sensors or existing building management systems

125
Buildings in Puget Sound ESB

34,000
pieces of equipment

On-premise edge

520,000
data points collected every 5 minutes

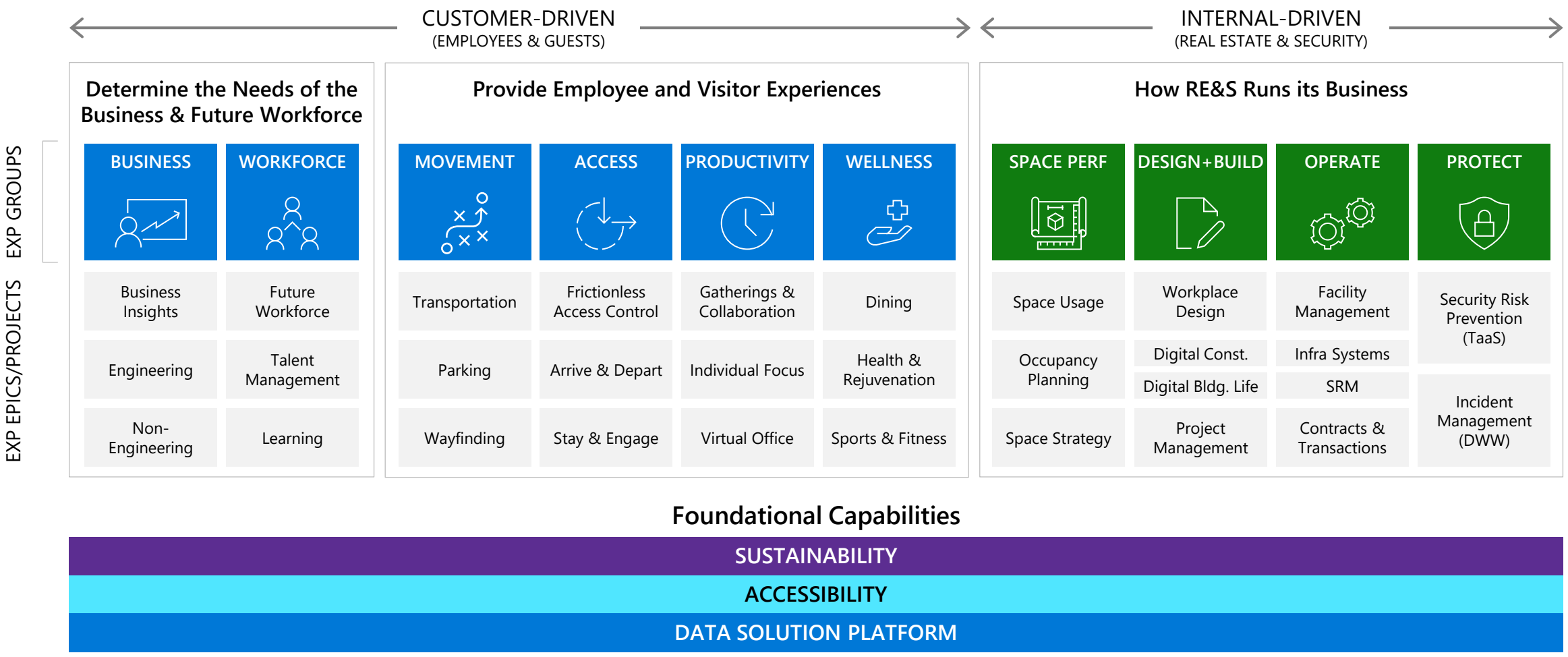
Microsoft cloud-based energy solution

50,000,000
transactions added daily to event database

20% – 25% Reduction

Transformation Framework

Focus of Scenarios for all Microsoft Buildings



Thank You.

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