Smart Buildings

Creating Intelligent Spaces

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Industry Innovation,
Enterprise Commercial Business, Microsoft

#Azure
#Buildings
#ConnectedFieldService
#DigitalTransformation
#IntelligentCloud
#IntelligentEdge
#IoT
#MicrosoftDigital
#SmartBuildings
#SmartCities

Microsoft

Why are we having this conversation?

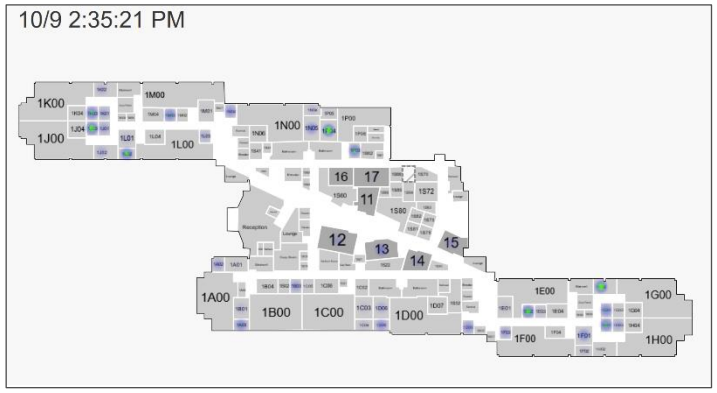
Whom are we trying to help?

Building owners, occupants

Operators

Where are we having an impact?

Facilities Management

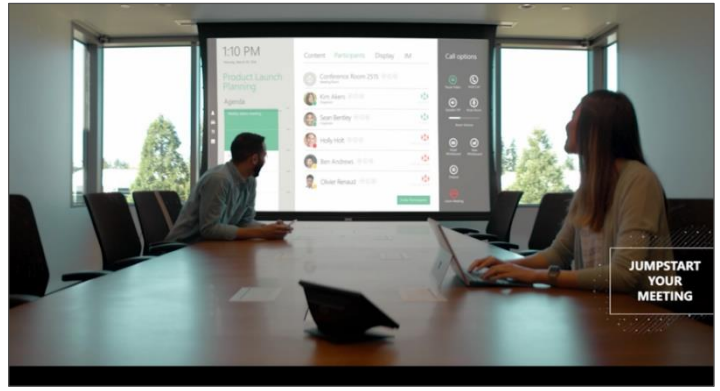


Space utilization

Health and wellness

Travel and transportation

Safety



Workplace experience

Facilities management

Use cases

Facilities management
Space utilization
Health and wellness
Travel and transportation
Safety
Workplace experience
Learnings

Operating expense reduction
Sustainability/energy conservation
Tenant experience improvement

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

Space utilization

Use cases

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Learnings

Reduction in square footage leased/owned
Space configuration

MS Puget Sound
10,232 Rooms
55,000 tenants

Health and wellness

Use cases

Facilities management
Space utilization
Health and wellness
Travel and transportation
Safety
Workplace experience
Learnings

Wellness scenarios for workplace

Travel and transportation

Use cases

Facilities management
Space utilization
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Travel and transportation
Safety
Workplace experience
Learnings

Transportation and parking optimization
Building access
Visitor registration

MS Puget Sound
94 buses, 213 shuttles
7,000 daily shuttle passengers
103 Lobby Desks
522k guests checked in

Safety

Use cases

Facilities management
Space utilization
Health and wellness
Travel and transportation
Safety
Workplace experience
Learnings

Jobsite accident reduction
Safety violation identification
Emergency response

Industry statistics
$58B cost to businesses from workplace injuries
5K workplace deaths due to accidents

Workplace experience

Use cases

Facilities management
Space utilization
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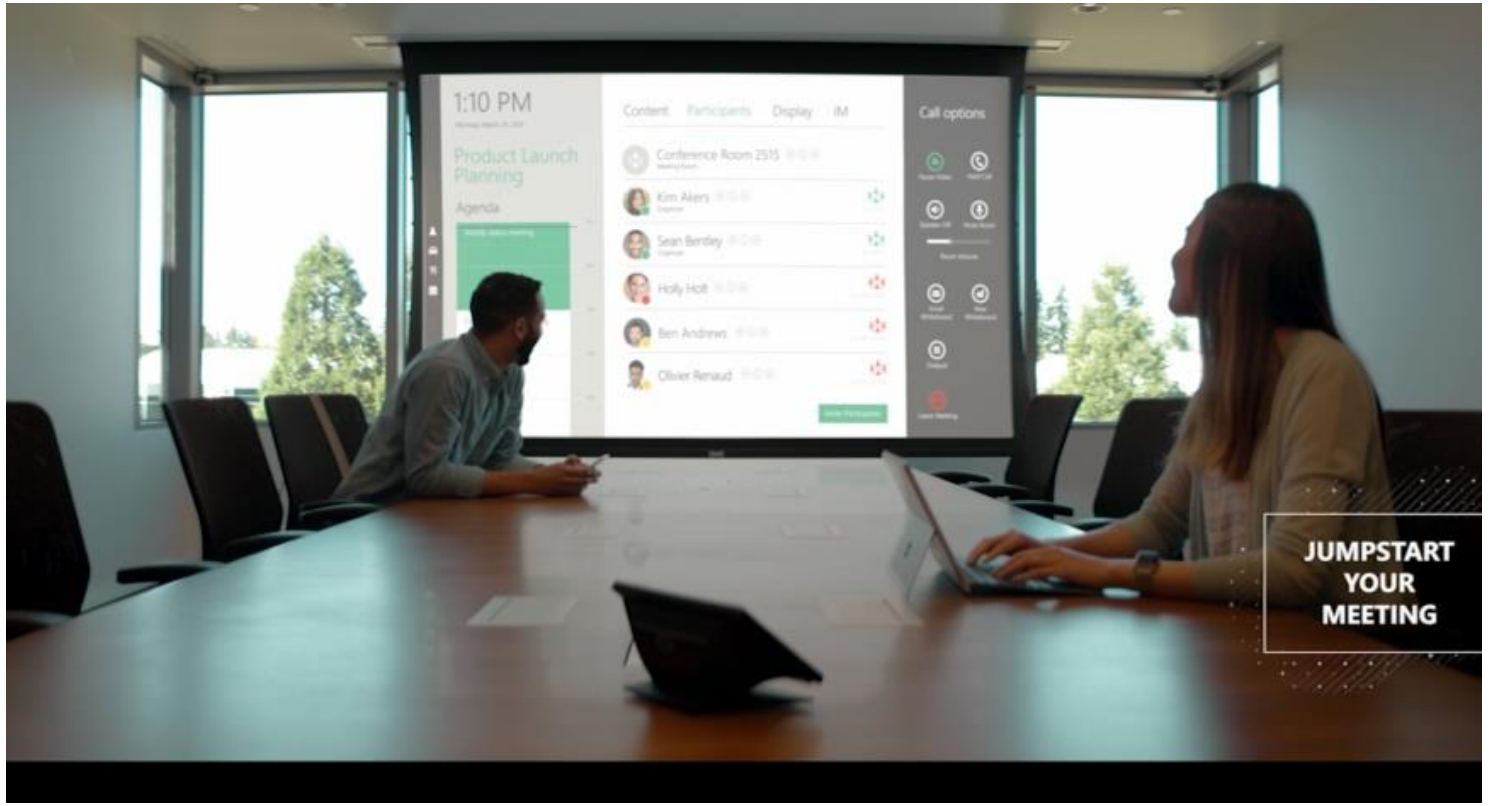
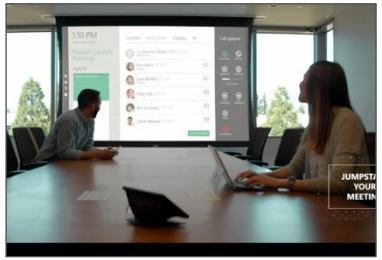
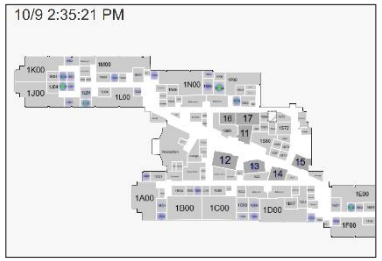
Workplace experience
Learnings



Tenant productivity improvement - room availability, comfort
Indoor navigation
Personalized experiences

MS Puget Sound
10,232 Rooms
55,000 tenants

Lesson learned

Level		Requests	Use cases
Top *(Level 3)* Ambient intelligence	People Centric	Identify people Know my preferences Know my schedule Adapt to me	 Workplace experience
Middle *(Level 2)* Moving objects		Count people Know activity Adjust activity	 Space utilization  Transportation  Health & wellness
Base *(Level 1)* Fixed assets	Facilities Centric	Measure performance Optimize performance Reduce costs	 Facilities management

The deck which we're dealt

What can I do with my existing building(s)?

The built environment – diversity, volume

Buildings

125 buildings
10,232 rooms

Fixtures & equipment

30,679 AHU
20,357 FCU
4,287 chillers
3,324 generators

Sensors & actuators

456,000 BACnet objects

Field controllers

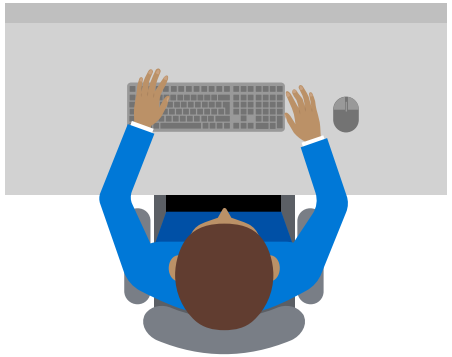
17,700 BACnet devices

IP enabled global controllers

35 Foreign devices
125 BBMDs

All monitored and managed independently

The costly trap of multiple non-communicating systems



And bringing some challenging engineering issues

Software can't overcome all problems

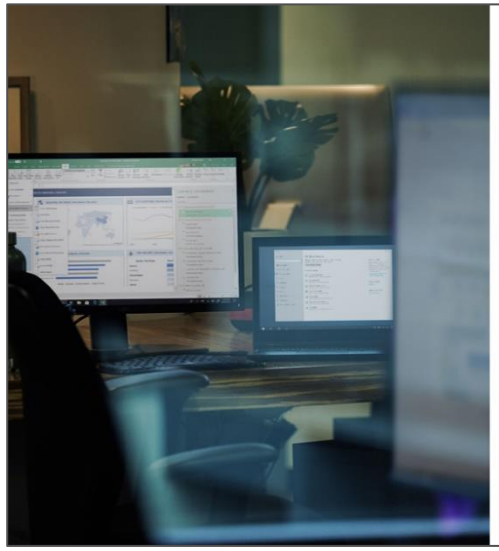
Images courtesy of DB Engineering from customer engagements

Central Plant Multiple VFD Installations	Install VFDs on cooling tower fans, condenser water pumps; adjust control logic to reduce speed based on load conditions. This item also requires the completion of items #9, #10 and #12.
Chiller VFD Installation	Install VFD on lead chillers for N5 and N6, and reprogram the central plant to perform condenser water relief.
Heating Plant VFD Installation	Install VFDs on heating water pumps, and use differential pressure to control them.
Production AHU VFD Installation	Install VFDs on all production AHUs and control them based on load in the space.
Multiple Equipment VFD Installations	Install VFDs on PAH, EF, and AHU equipment of sufficient size, and reprogram system to control based on cooling or heating output requirements.

How we are using technology to have an impact

Data acquisition

Ingestion & enrichment of data



Analytics

Use case specific strategies

- Facilities management
- Occupancy/space utilization
- Transportation/journey management
- Workplace safety
- Workplace experience

Presentation

Universal and domain-specific

- Azure Maps
- ICONICS GraphWorX
- Power BI
- Time Series Insights (TSI)

Remediation

Field service strategy

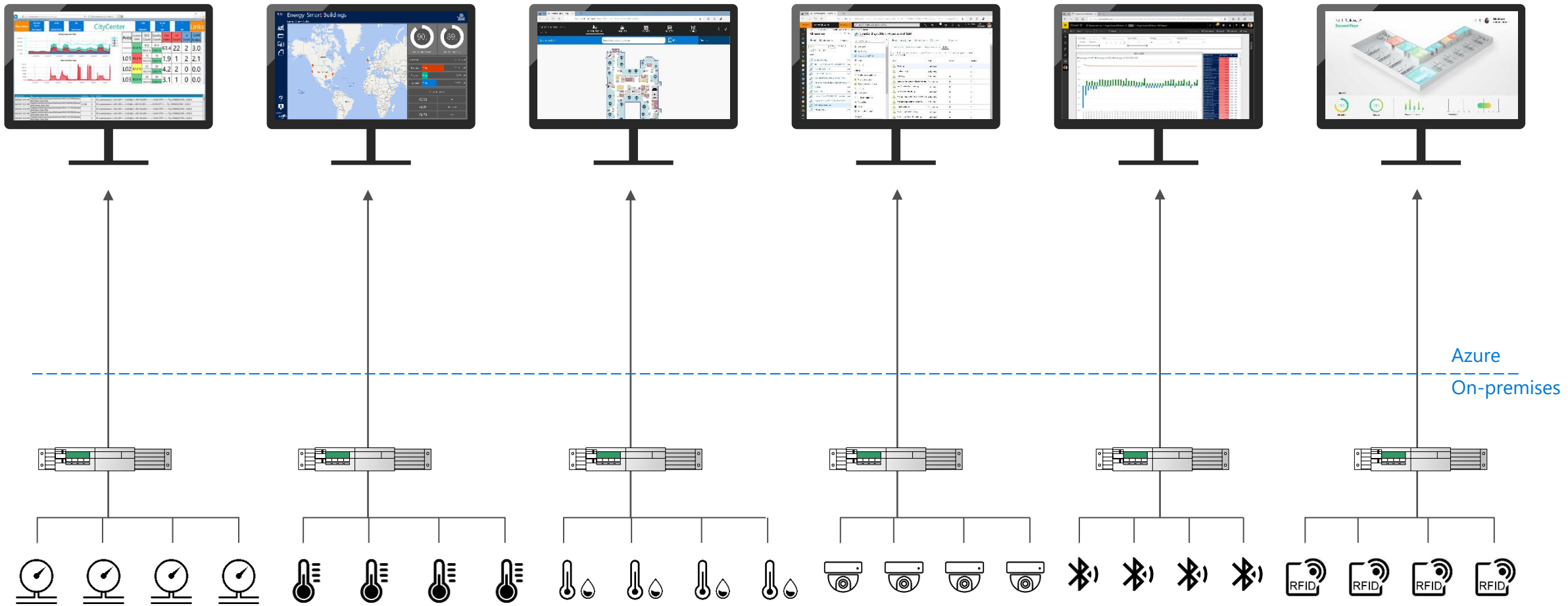
Data acquisition

Strategy

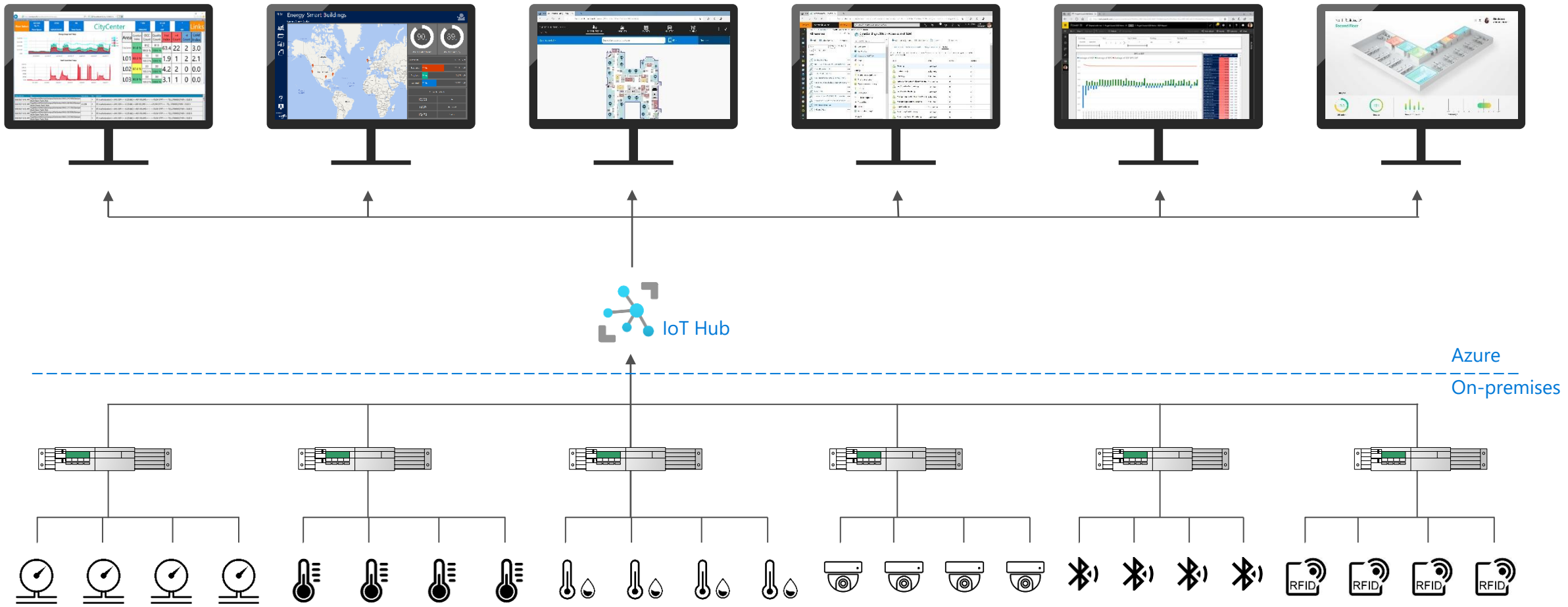
Network and data consolidation, normalization

Reduces operating costs
Increases security
Shortens time to test and deploy new applications

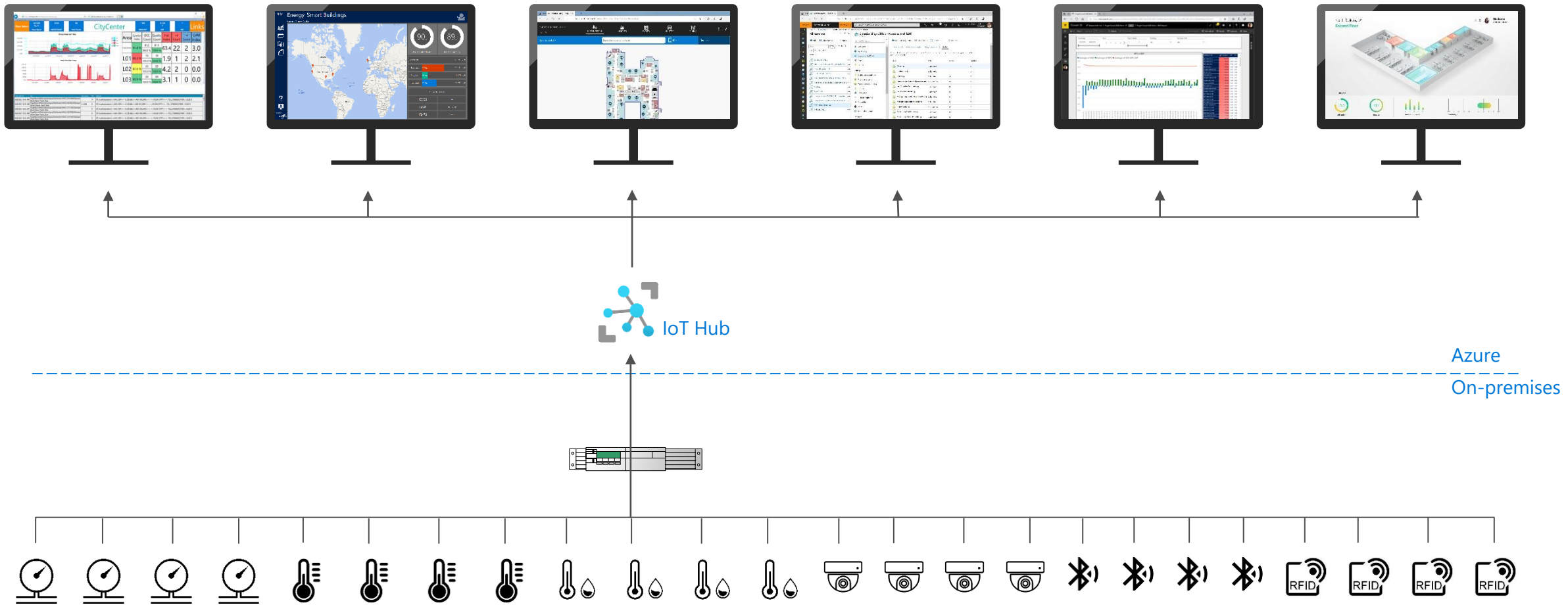
A common starting point – network anarchy



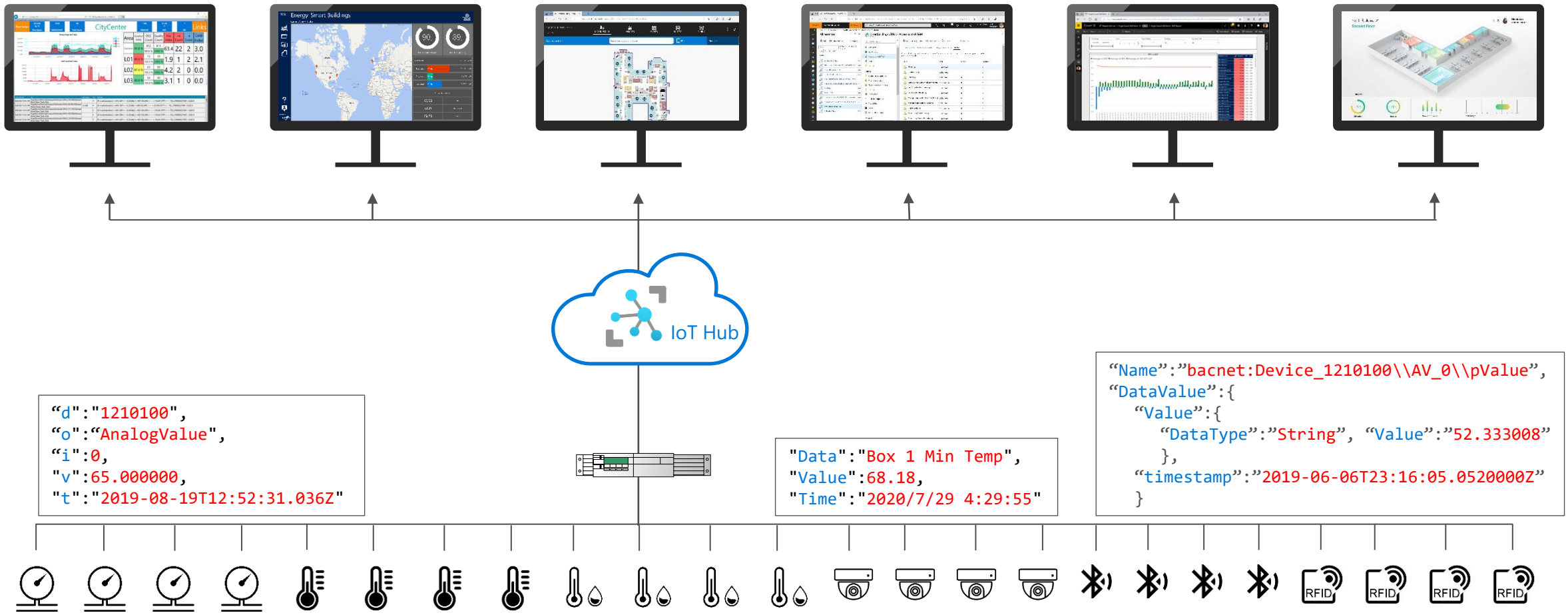
Network consolidation



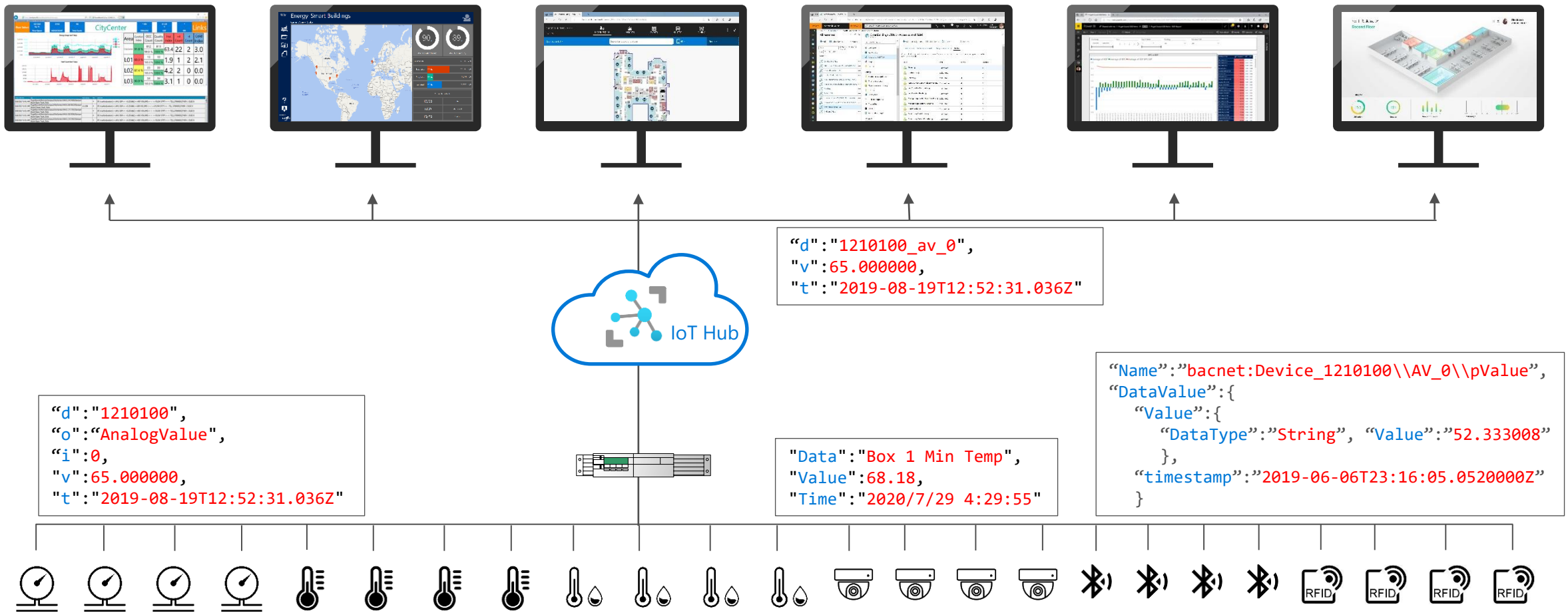
Better network consolidation



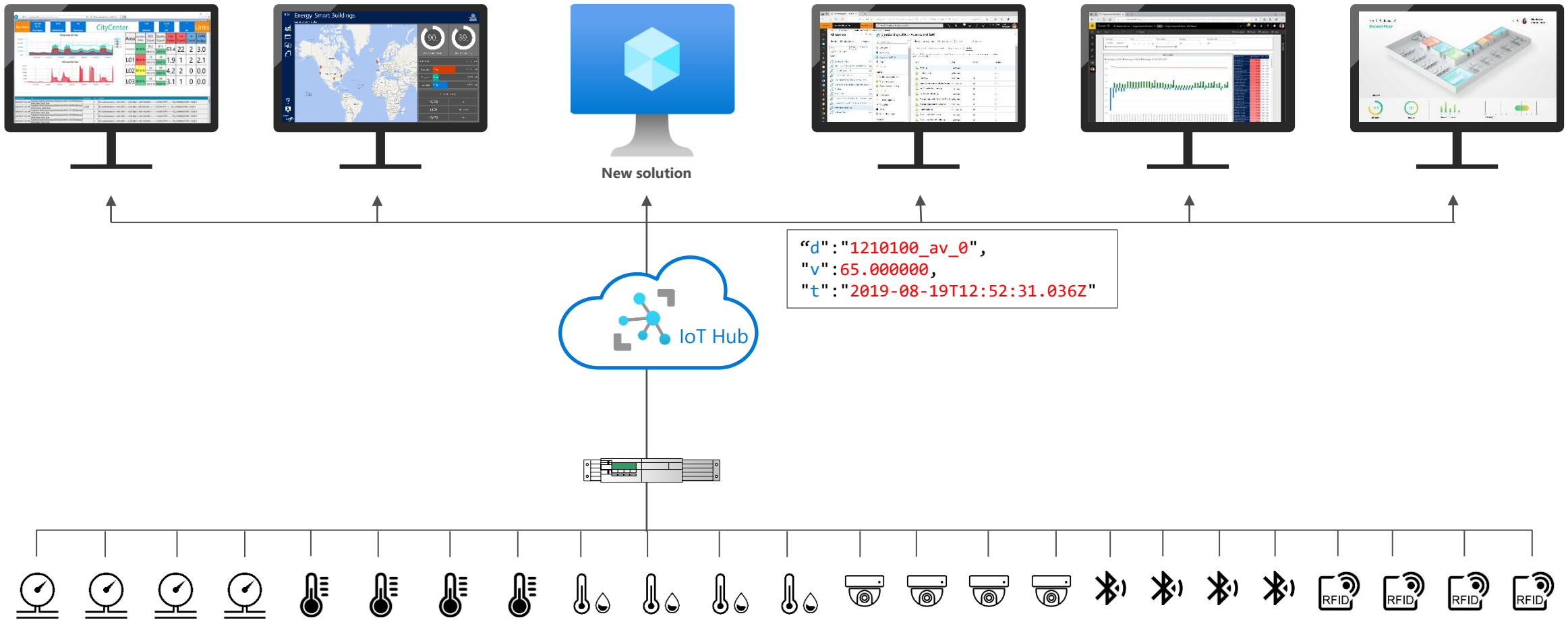
Data anarchy



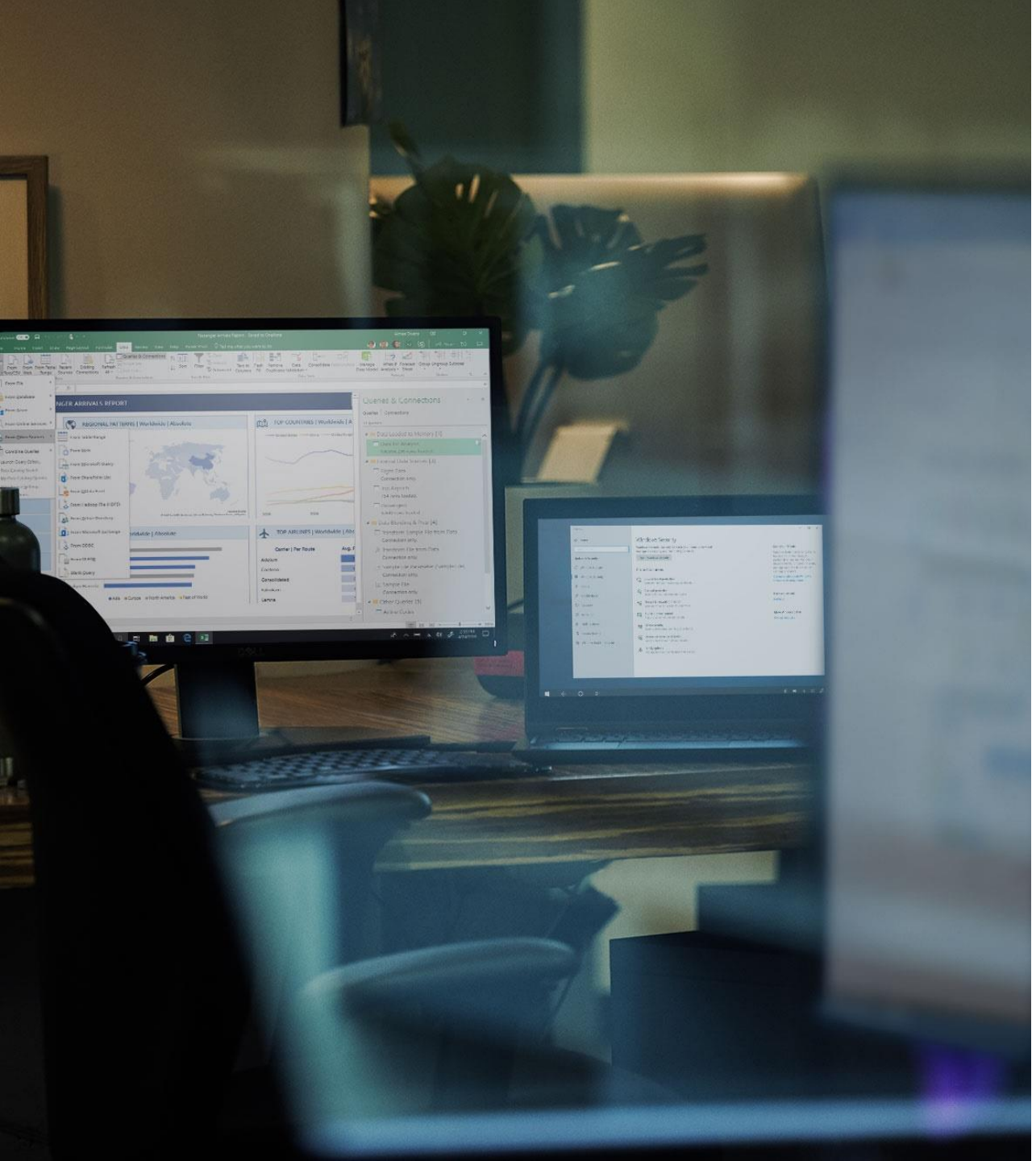
Data normalization



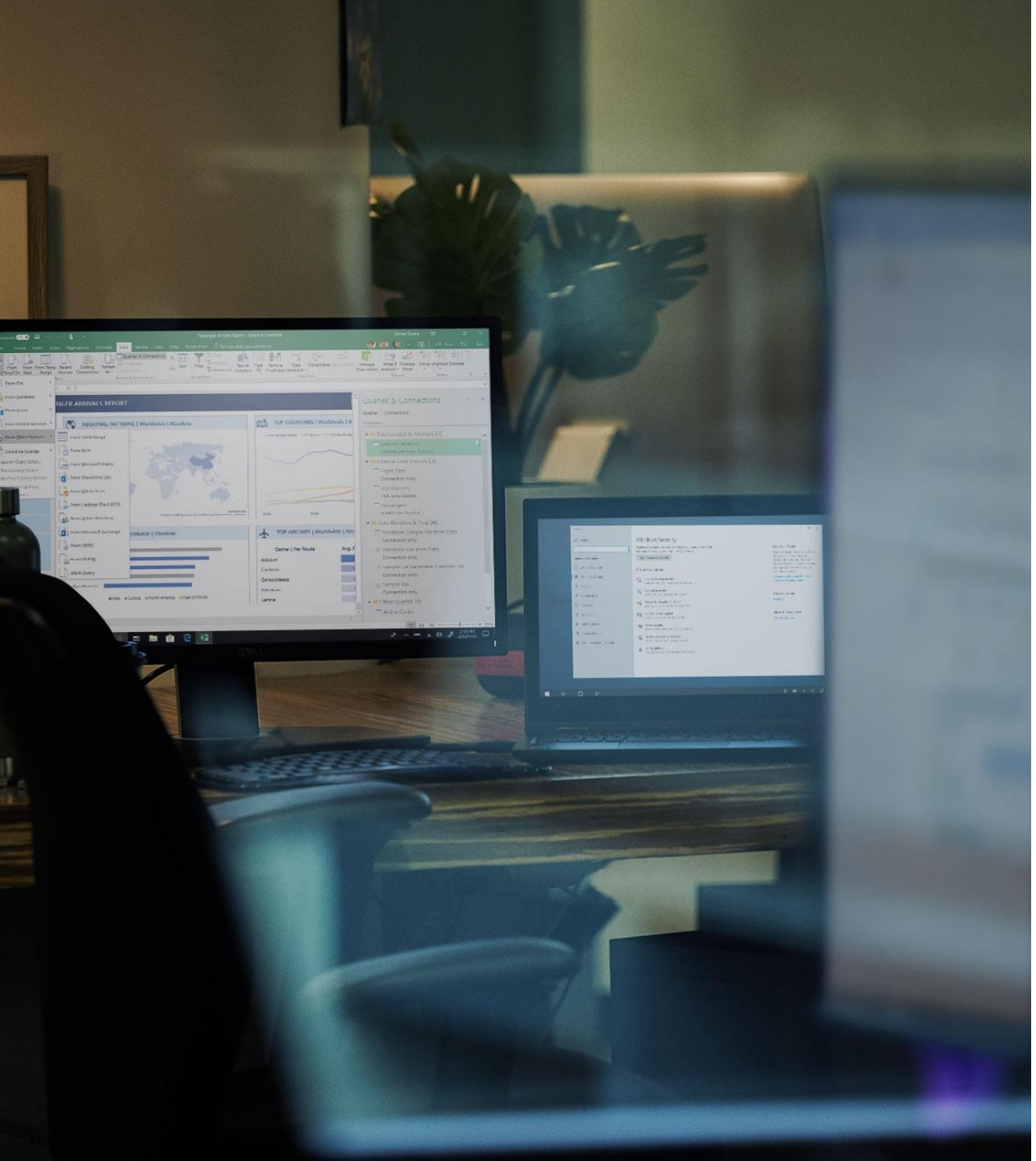
Testing, deploying new solutions



Demo



Analytics



Strategy

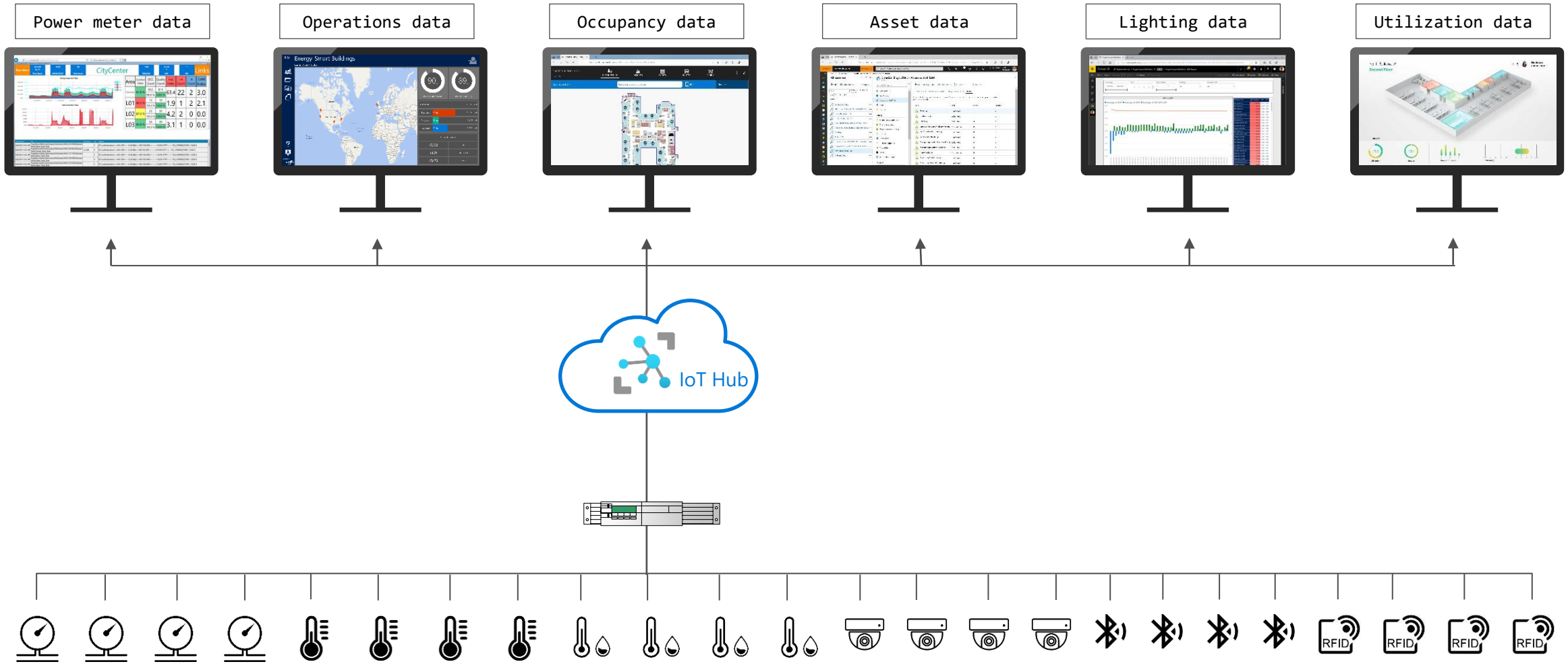
Use Azure IoT Hub as source of data

Require interoperability

Increases the number of solutions you can run
Supports cross-domain queries for additional value
Reduces operating costs

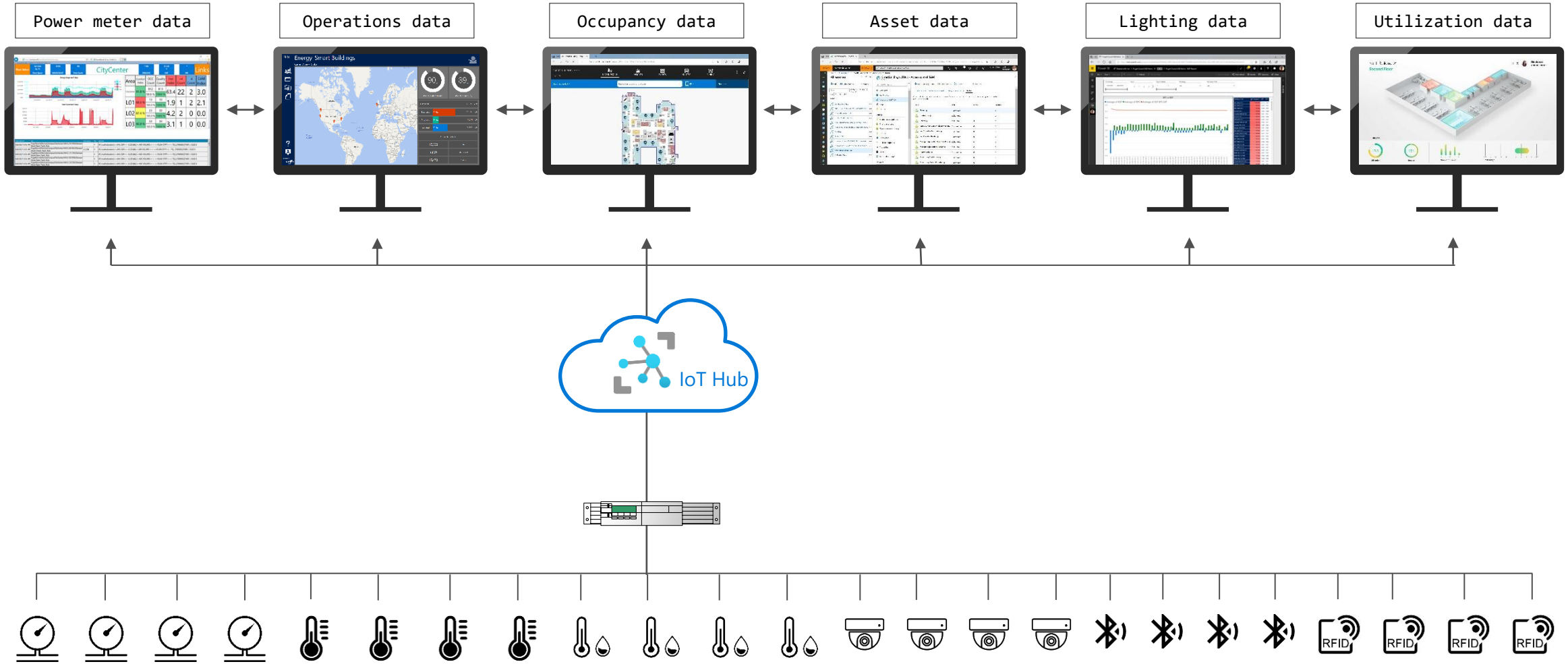
Application isolationism

The costly trap of multiple non-communicating systems



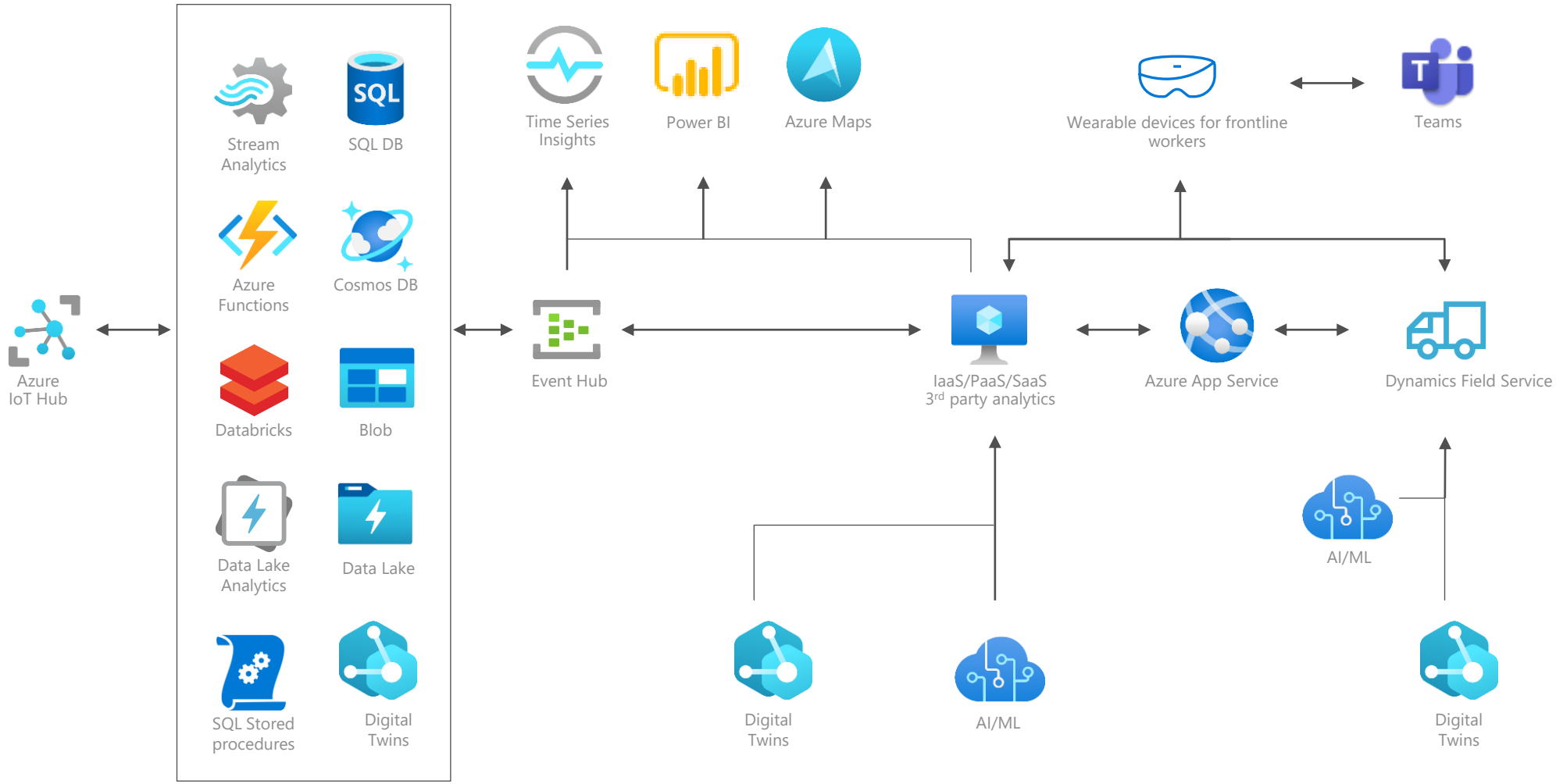
Application interoperability

Supports analyses using data and insights from disparate applications



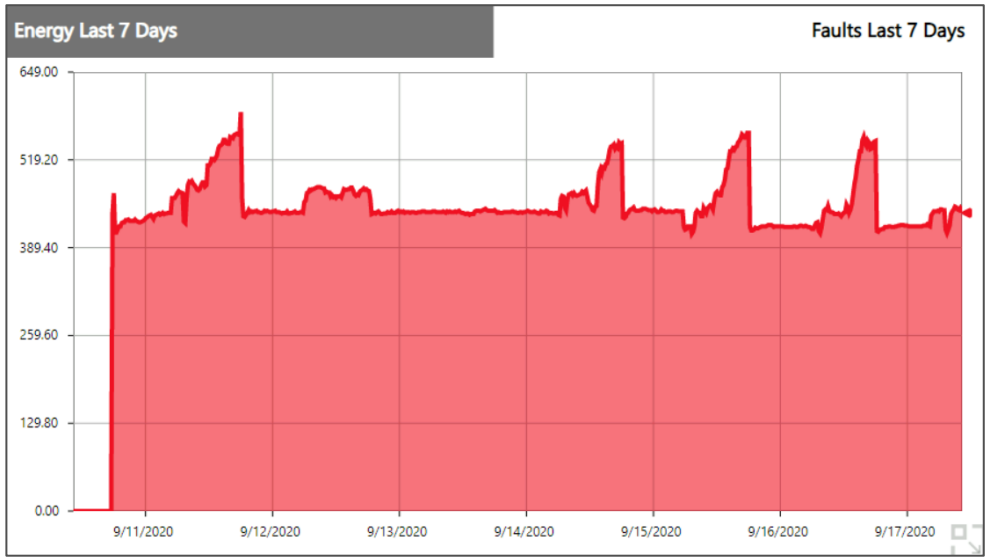
Infrastructure interoperability

Supports using the right tool for the job

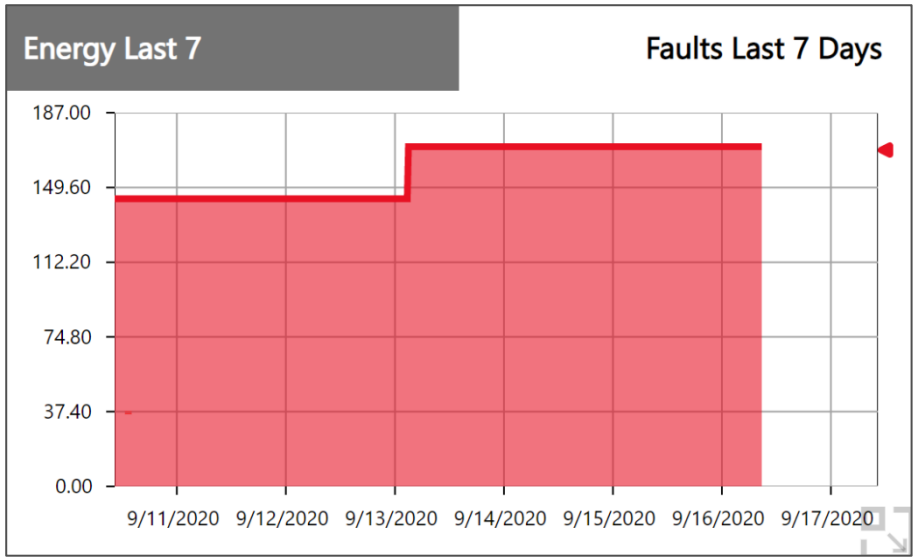


IT dominance

OT expertise needed determine how useful insights will be



400-550 faults/day based upon fault rule set



150-175 faults/day based upon different fault rule set

- Larger number of faults – maybe more informative, but maybe too many to prioritize, too many false positives, too much noise
- Smaller number of faults – easier to prioritize, maybe missing important data
- Regardless, fault rules only as good as the engineering knowledge used to create them. *Today*. (Trying to change)

Demo

Presentation

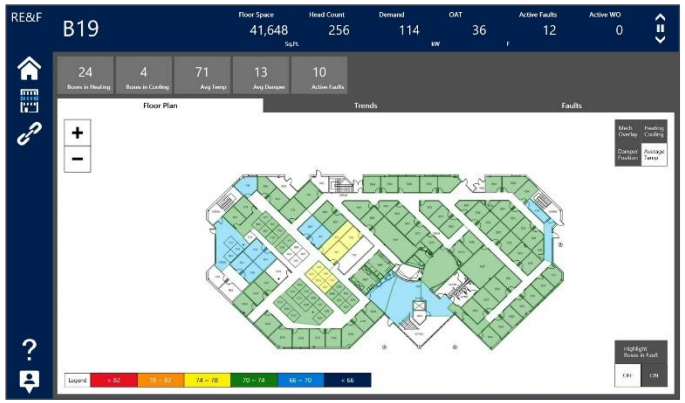
Strategy

Use best of breed graphics platforms
Integrate data from different sources

Supports better UX for different audiences

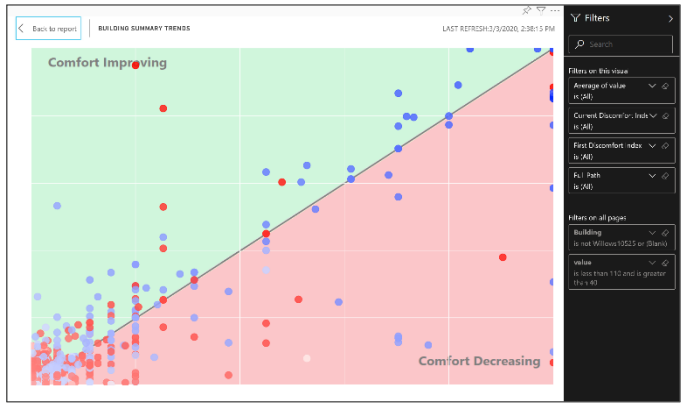
Real estate disputes

Interoperability increases options

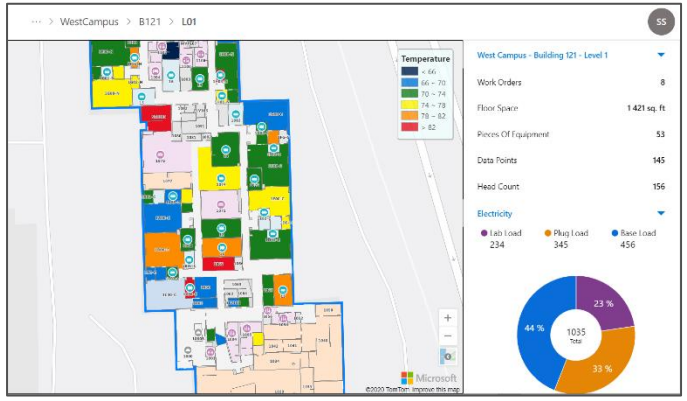


ICONICS

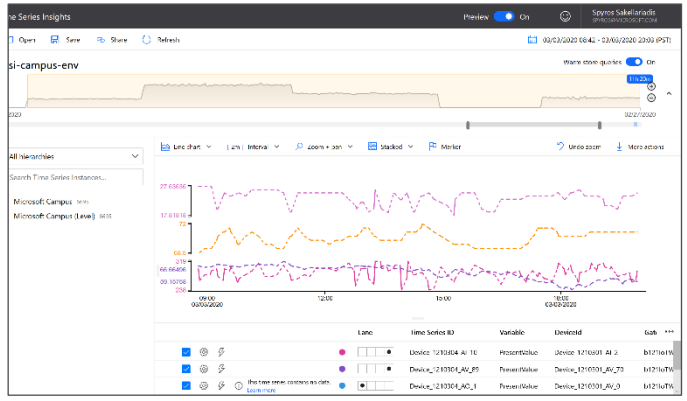
Willow



Power BI



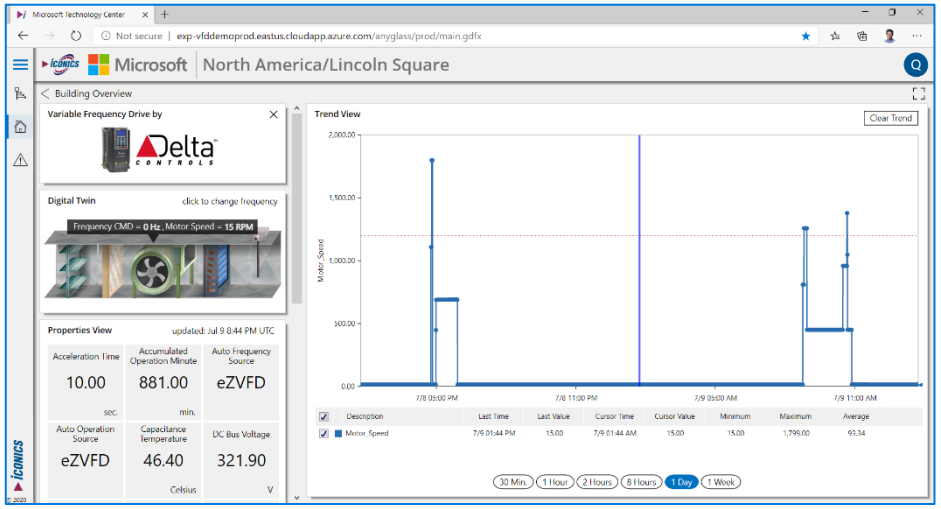
Azure Maps



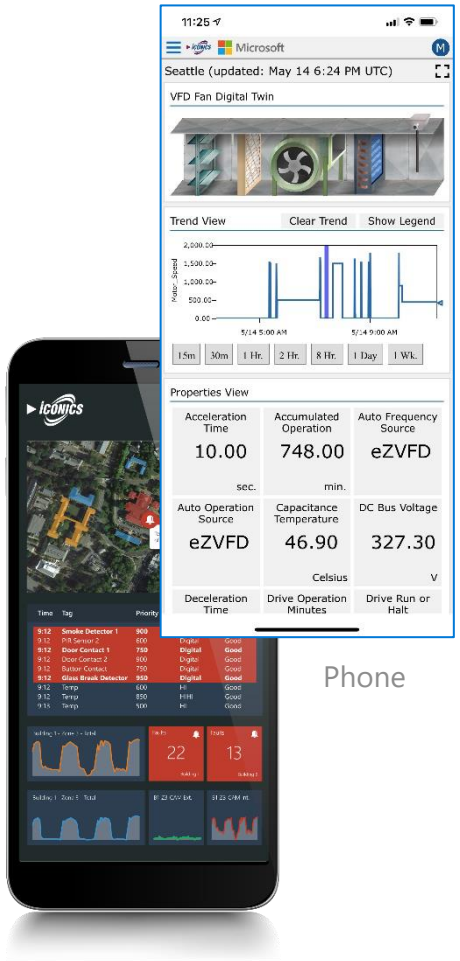
Time Series Insights

Use all the form factors that work for your audience

Many options can use the same data sources



Web



Phone

Wearable

Demo

Remediation

Field service strategy

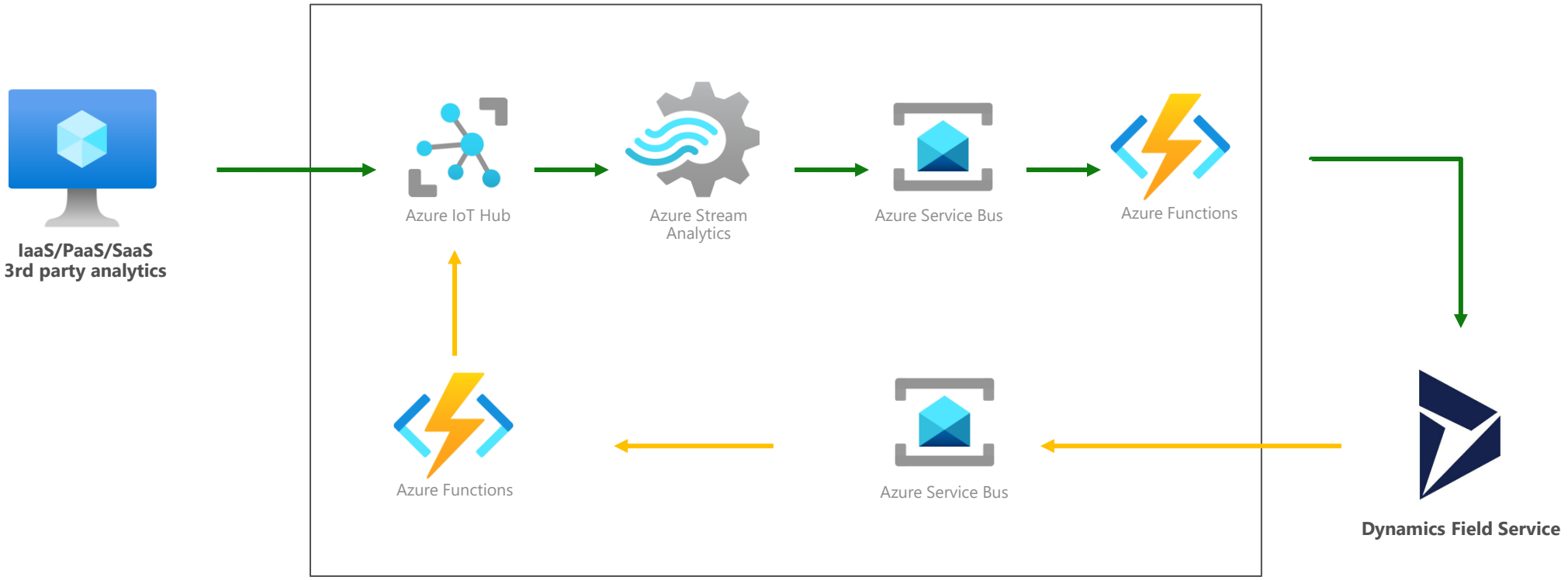
Strategy

Use Dynamics 365 Field Service Integrate with insights from analytics solutions

Fixing problems before they become critical
Better scheduling of workforce
Fixing problems with the first visit

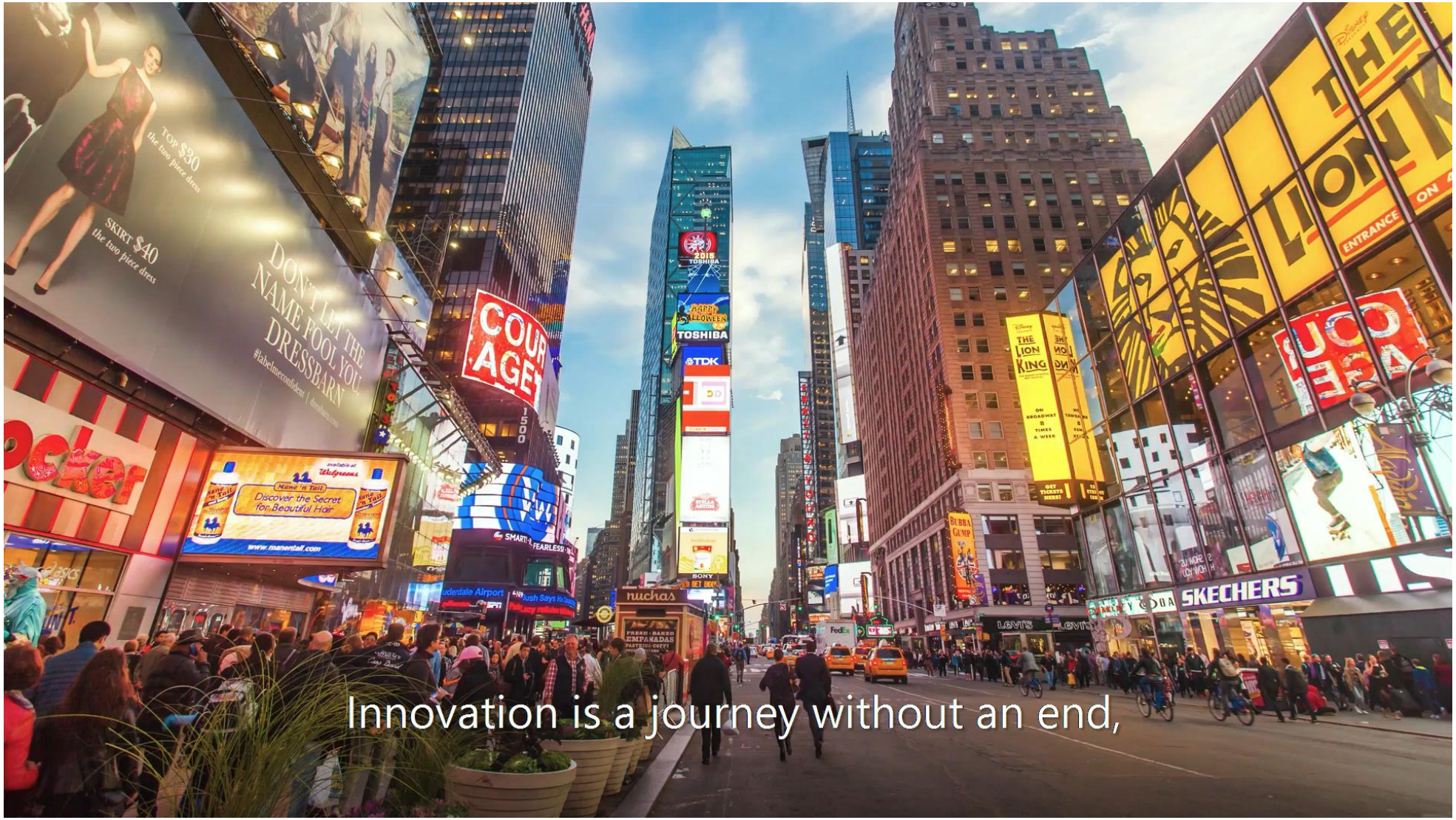
Uncoupled workforce management

System integration can improve efficiency



Demo

What is the Microsoft Smart Building vision?



Smart Spaces video with subtitles

spyros@Microsoft.com

Facilities management

Use cases

Facilities management

Space utilization

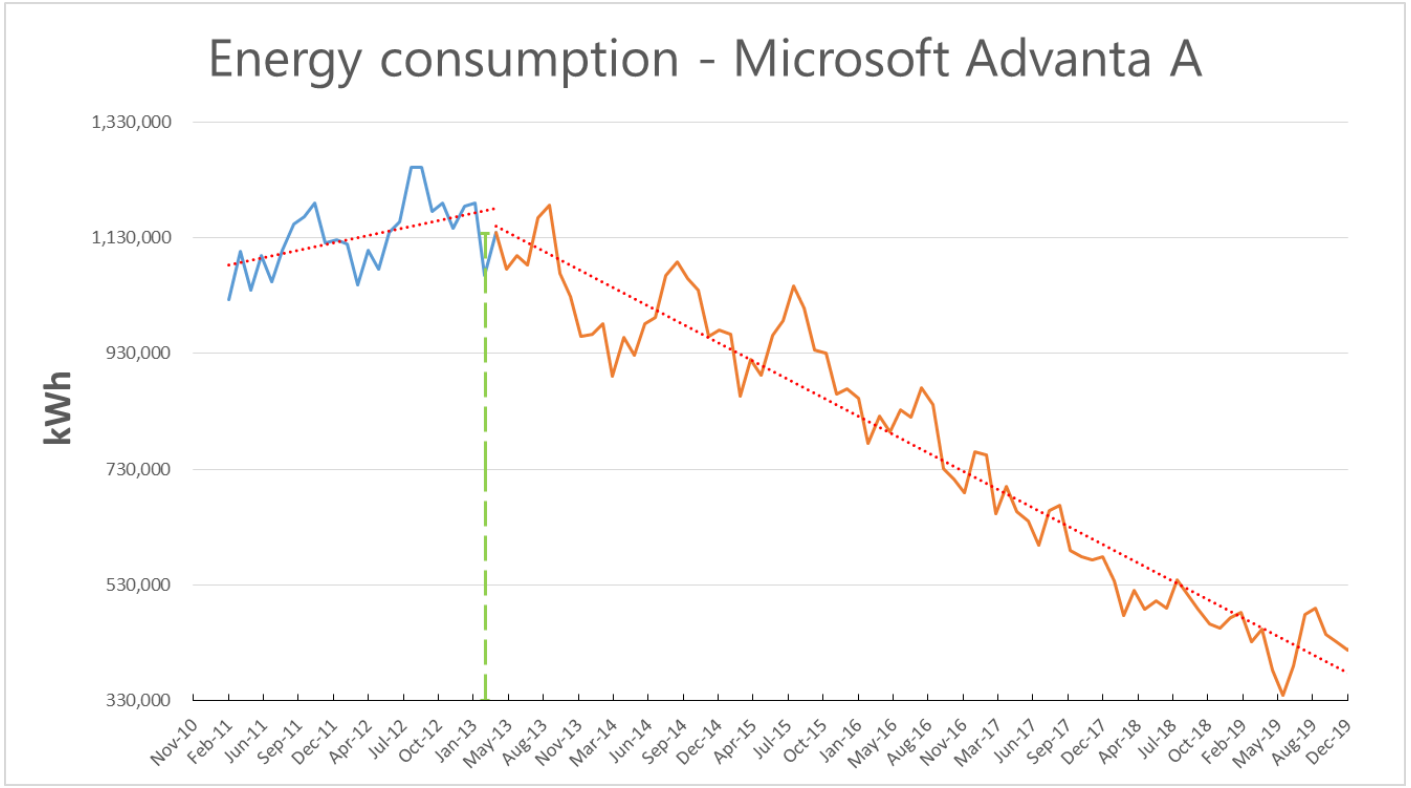
Health and wellness

Travel and transportation

Safety

Workplace experience

Learnings



	Baseline	1st year	2nd year	3rd year	4th year	5th year
# bldgs with baseline + 5 years of data	59	59	59	59	59	59
Square footage metered	11.7M	11.7M	11.7M	11.7M	11.7M	11.7M
kWh consumed	505.0M	484.9M	449.7M	414.0M	383.4M	350.7M
Savings (kWh)		20.1M	55.3M	91.1M	121.6M	154.3M
Savings (%)		4.0%	11.0%	18.0%	24.1%	30.6%

Buildings onboarded 5+ years ago
30% reduction in kWh consumption

Space utilization

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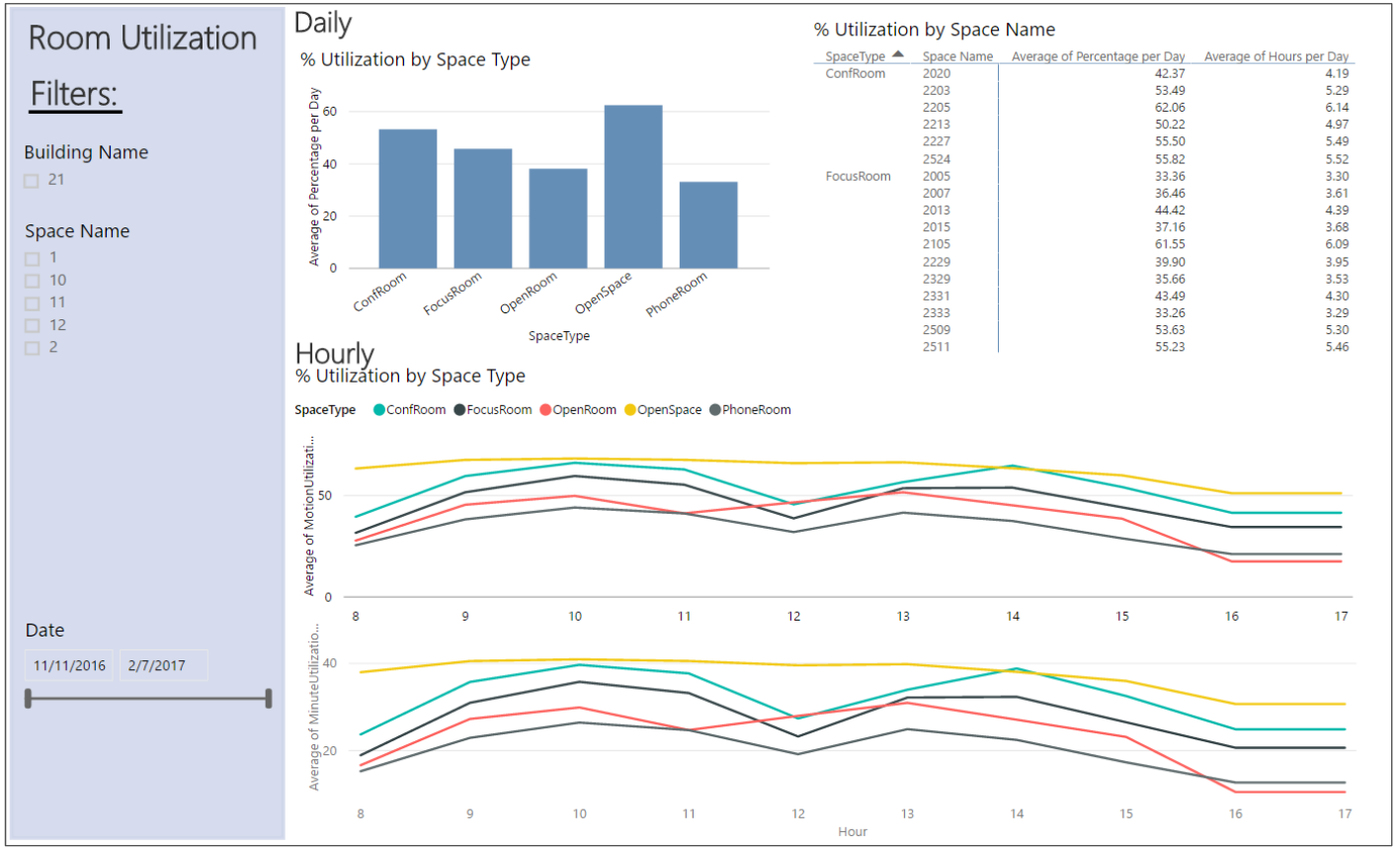

MS Puget Sound
39% savings in office space needed

Space utilization

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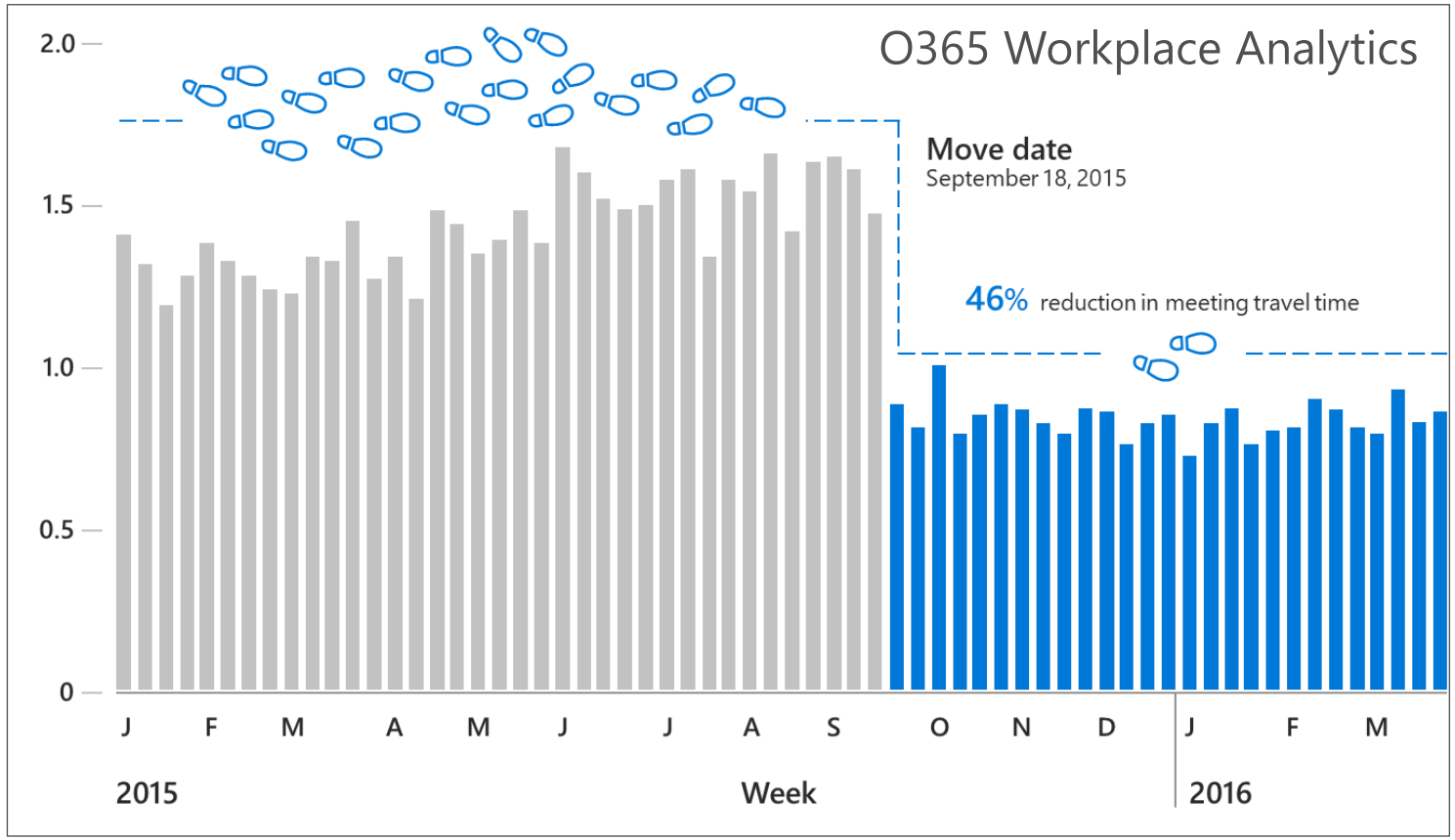

MS Puget Sound
46% reduction in meeting travel time
13% decrease in meeting length

Health and wellness

Use cases

Facilities management
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Workplace experience
Learnings

Dashboard	Solutions
Building Insights	Building Wellness Index
	Air Quality Insights
	Social distancing compliance
	Lobby & Elevator People Counting (CV)
	Facemask detection / compliance
	EBT insights
	Building occupancy & density
	Bathroom occupancy
	Cleaner Tracking
Tenant Insights	Air quality insights
	Social distancing compliance
	Occupancy & density insights
	Restroom cleaning insights
	Community Pulse

Sample Infosys wellness solutions

Travel and transportation

Use cases

Facilities management
Space utilization
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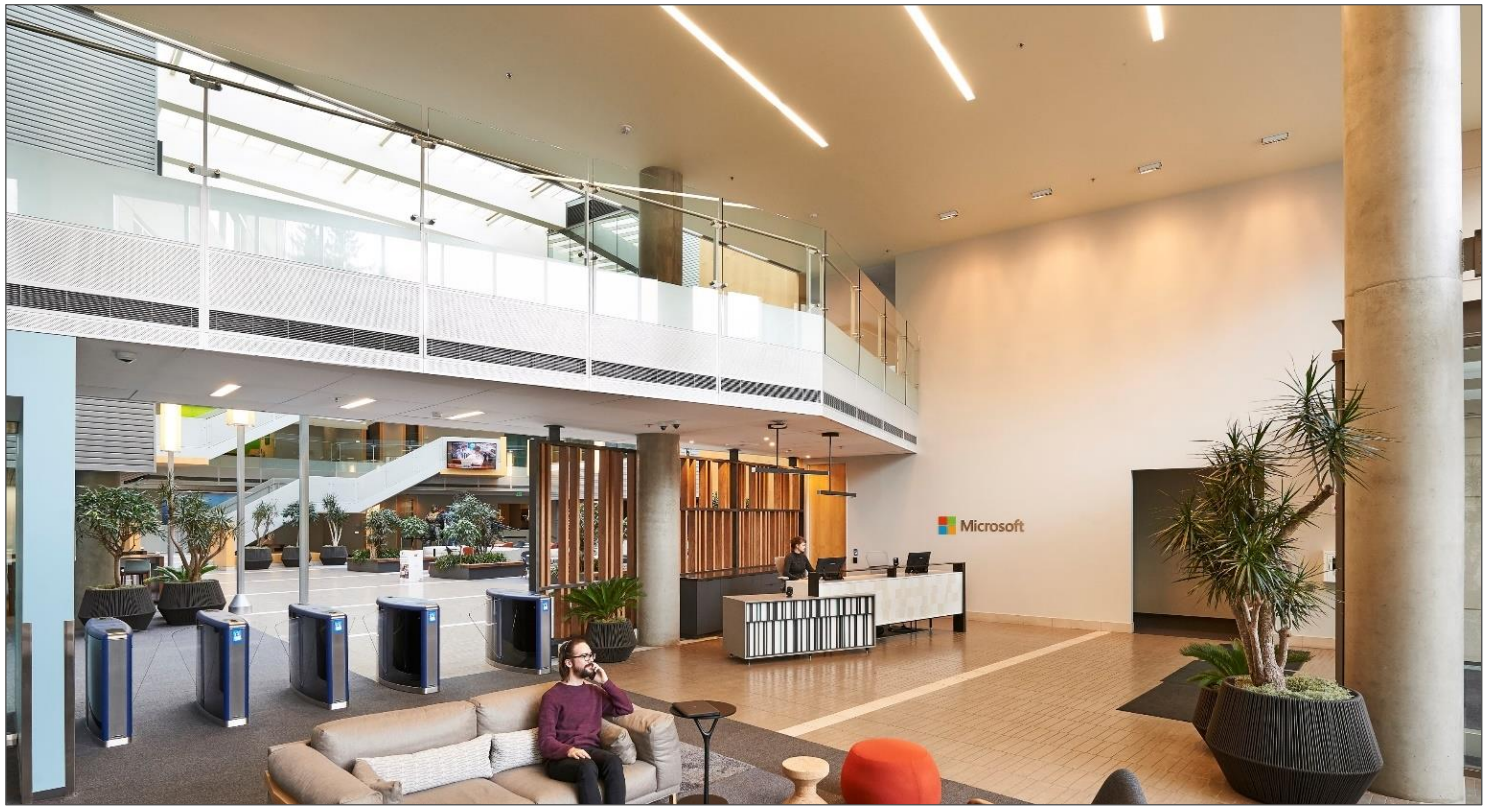

MS Puget Sound
50% reduction in booking time
5 mins average wait time
11 mins average journey duration

Safety

Use cases

Facilities management
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Monitoring pedestrian traffic in the Giralda bell tower, Seville

Safety

Use cases

Facilities management
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Learnings

PCL Construction https://www.youtube.com/watch?v=InUMBj4Ps3U

Industry statistics
% reduction in accidents – tbd
% reduction in lost time – tbd