



# MACC 2019 Exploiting Disruptive Technologies

## DIGITAL TWINS

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# THE EVOLUTION OF IOT

- We are seeing the beginning of a new trend in IoT solutions
- Customers want to **model a physical environment first**, and then keep the model up to date with IoT data
- Provides a much more natural approach for IoT solutions



# A HISTORY OF DIGITAL TWINS

R&D & ENGINEERING

MANUFACTURING OPERATIONS, SERVICES

NEW SERVICES DRIVEN BUSINESS MODELS

## Information mirroring\* model

- Powerful modeling and analysis
- R&D and engineering focus

## Simulation and 3D printing

- Digital design, virtual assembly, and simulation
- 3D printing mainstream

## Connected IoT assets

- Unified physical and virtual data
- Rapid feedback across design, manufacturing, and operations

## Model any physical environment

- Humans and device collaboration
- Spatial awareness and intelligence
- Mixed Reality experience

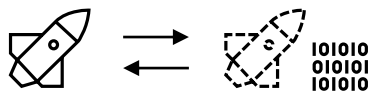
1985-2002  
(18 years)

2003-2014  
(12 years)

2015-2017  
(3 years)

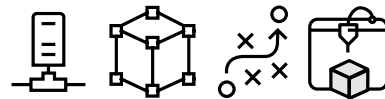
2018 - ...  
(the future is now)

Digital Twin evolution



Real Object

Virtual Object



Remote Monitoring  
Predictive Maintenance

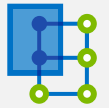


Enable any organization to create digital feedback loops for all aspects of their business



# Demonstration

# AZURE DIGITAL TWINS



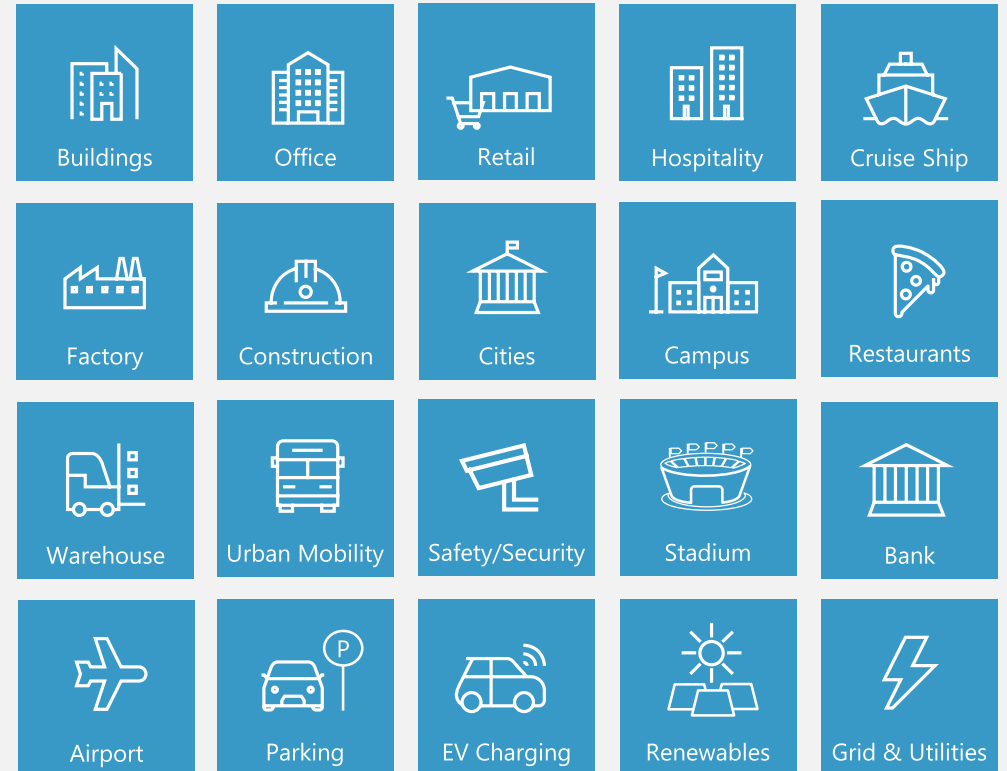
Enables customers and partners to create a comprehensive digital model of any physical environment, including the people, and places, things, and the relationships that bind them.

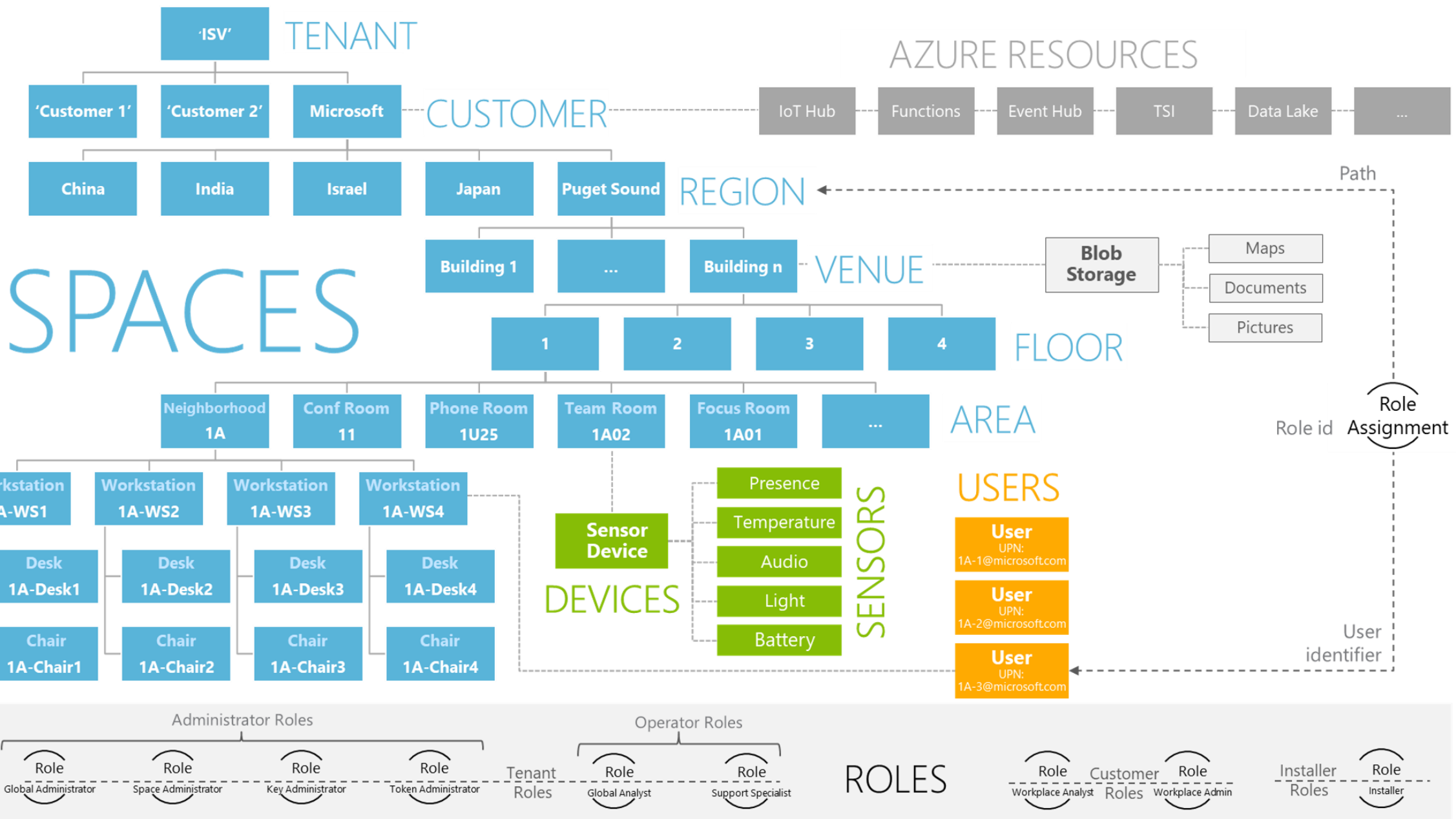
Virtually represent the physical world with a digital twin that models the relationships between people, places and devices.

Leverage predefined and extensible Twin Object Models to build contextually-aware solutions uniquely attuned to your industry domain.

Automate actions in a space with custom functions that send events and /or notifications to endpoints based on incoming telemetry.

Securely replicate solutions across multiple tenants through built-in multi- and nested-tenancy.





# USE-CASES



## Design and build

Increase the efficiency of the building and design process by modeling physical environments.



## Building management

Build solutions to manage building operations more efficiently.



## Space occupancy and usage

Generate insights to optimize the use of spaces and reduce costs through facility analytics.



## Occupant experience

Improve employee and occupant satisfaction and morale with spatial intelligence solutions that increase productivity and comfort within a space.



## Energy management

Develop solutions that generate insights and optimize energy resources.

# DESIGN AND BUILD

Increase the efficiency of the building and design process by modeling physical environments



PCL Construction uses Azure IoT to revolutionize the construction industry



PCL uses data from Azure IoT sensors and advanced analytics to increase safety, enhance productivity, and focus their efforts on improving customer satisfaction.

[Learn more](#)



# BUILDING MANAGEMENT



Build solution to manage building operations more efficiently



Willow and thyssenkrupp lay the foundation for intelligent buildings with Azure Digital Twins technology



At its Innovation Test Tower in Rottweil, Germany, thyssenkrupp Elevator is using Willow Twin to revolutionize the way buildings are maintained and to enhance the experience of tenants and visitors.

[Learn more](#)

# SPACE OCCUPANCY AND USAGE



Generate insights to optimize the use of spaces and reduce costs through usage analytics

North Building 01

Second Floor

Steelcase  
Workplace Advisor



Steelcase used Azure IoT to make furniture smart, analyzing how, when and why people use space

Insights



Utilization



Spaces



Number of Events



Peak Usage

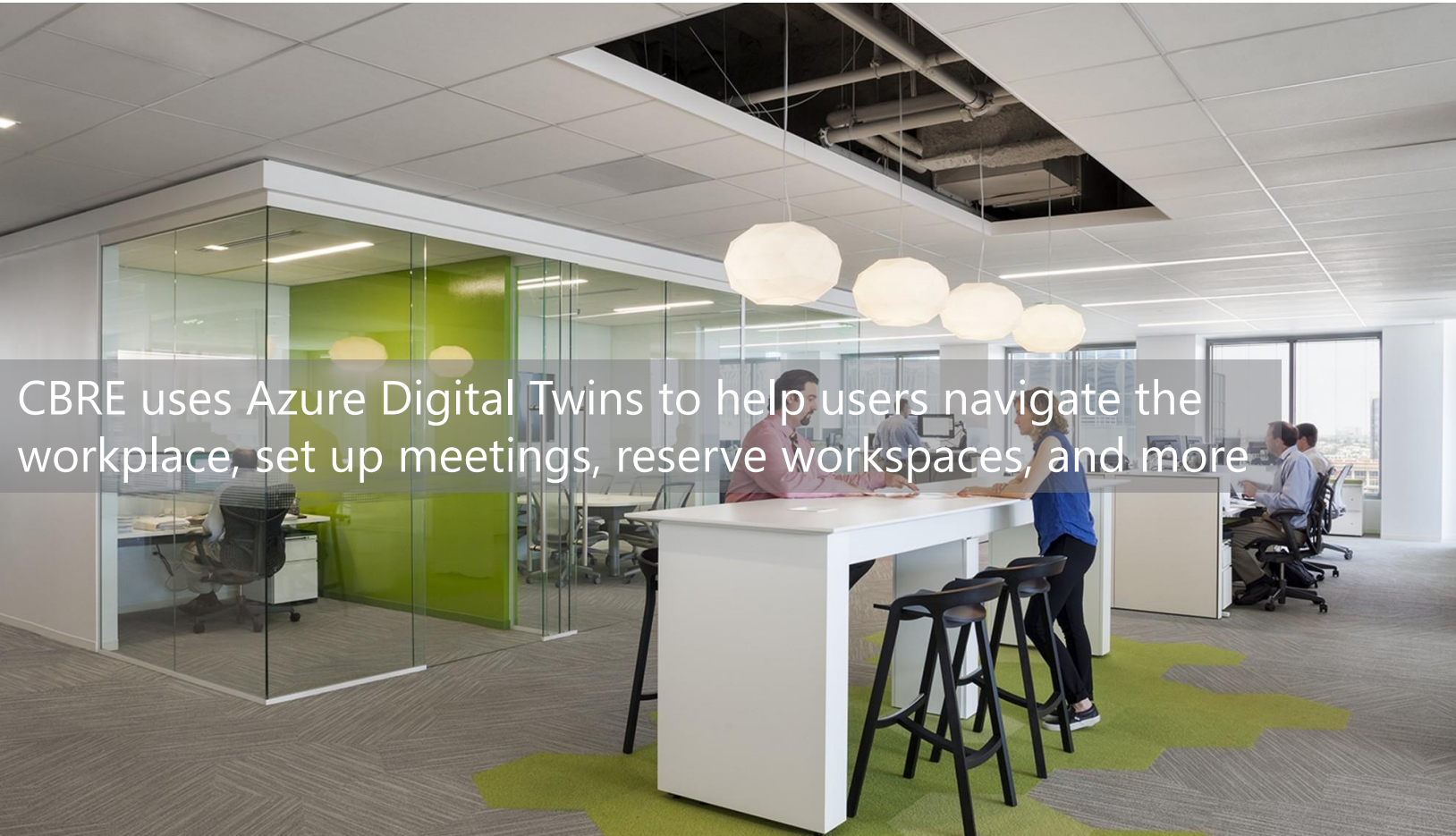
## Steelcase

A network of IoT sensors on furniture allowed Steelcase to revolutionize the value their solutions bring to customers through real-time usage statistics and insights

[Learn more](#)

# OCCUPANT EXPERIENCE

Improve employee and occupant satisfaction and morale with spatial intelligence solutions that increase productivity and comfort within a space



CBRE uses Azure Digital Twins to help users navigate the workplace, set up meetings, reserve workspaces, and more

## CBRE

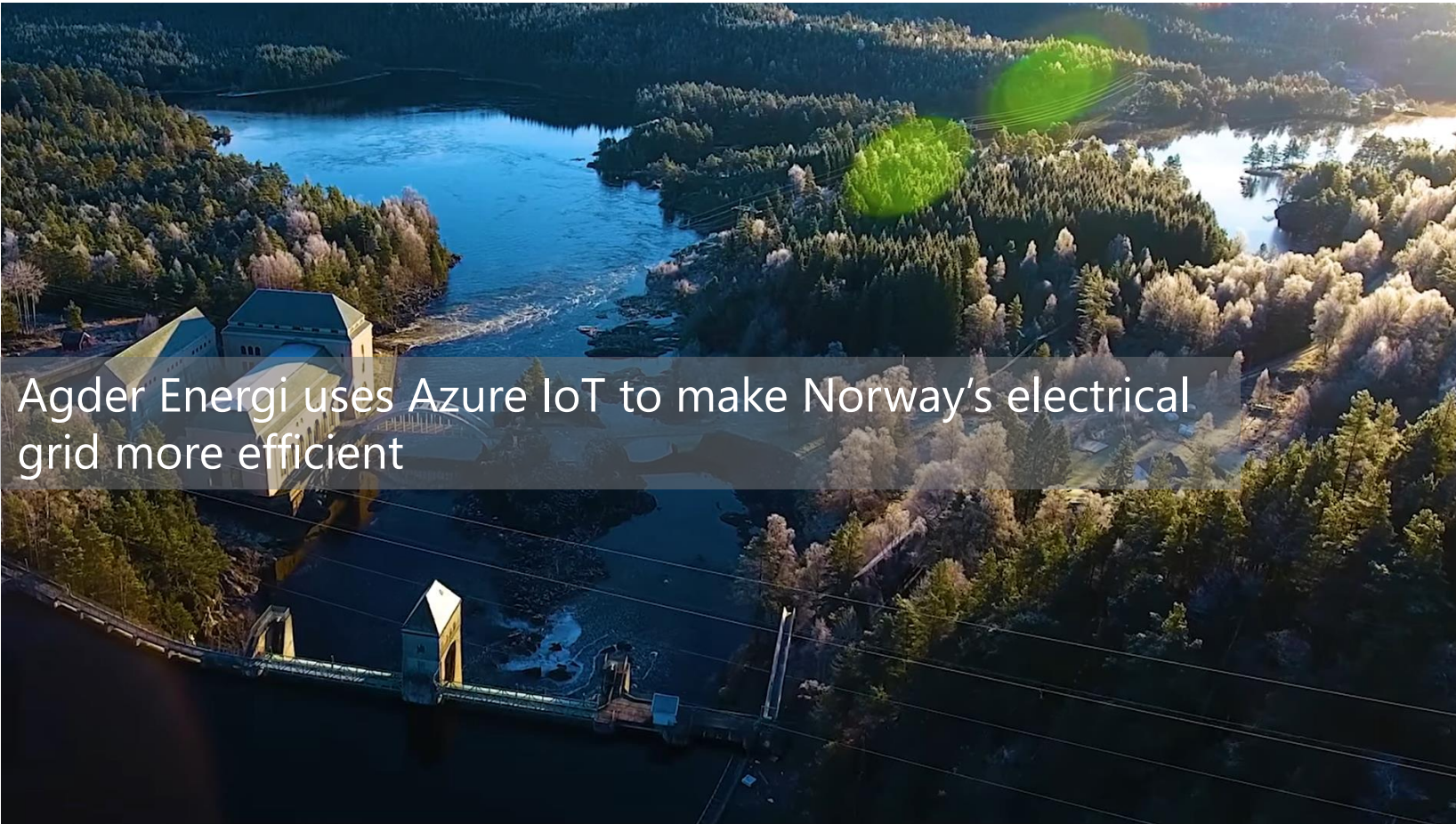
CBRE, the world's largest commercial real estate services firm, built their CBRE 360 experience platform leveraging Azure Digital Twins for analysis, to see how the space it manages is used and optimize it to better serve people's needs.

[Learn more](#)

# ENERGY GRID MANAGEMENT



Develop solutions that generate insights and optimize energy resources



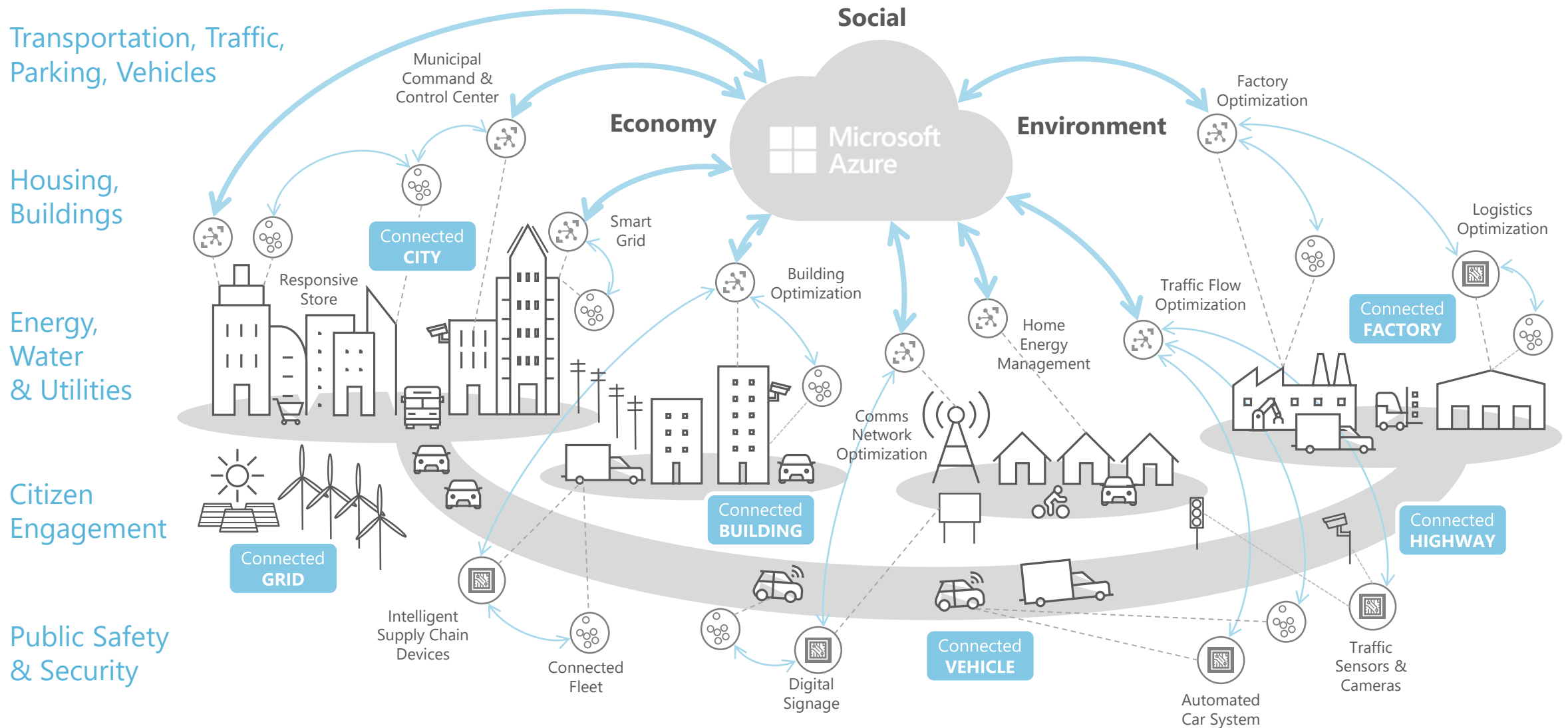
Agder Energi uses Azure IoT to make Norway's electrical grid more efficient

agder energi

Norwegian utility Agder Energi is creating a cutting-edge smart grid solution to prepare the grid for greater renewable integration and help keep pace with growing energy consumption

[Learn more](#)

# BROAD APPLICABILITY





**Thank You**

**PJ Johnson, Principal Architect  
Microsoft Corporation**