Smart Buildings
Empowering The Residents To Achieve More

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Director, IoT & Smart Buildings
Applied Innovation, Microsoft
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<td>The Parts Of a Smart Building</td>
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<td>5</td>
<td>Thank You</td>
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Microsoft’s mission

Empower every person and every organization on the planet to achieve more
The Way People Work in a Building is Changing!
The Way People Work in a building is Changing!

The Building of today is not an office with Walls & Windows

A Laboratory
A Sandbox
A Spring Board

The Space in a Building challenges, inspires the world’s smartest, most creative people to do what’s never been done before

Smart Building
We Achieve this by creating A Smart Building
## Smart Building - Drivers

### Forces

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Sustainability initiatives</strong></td>
<td>Corporate initiatives to reduce resource consumption and manage resource costs</td>
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<tr>
<td><strong>Pressure to minimize costs</strong></td>
<td>Companies are looking to reduce costs associated with operating real estate assets</td>
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<tr>
<td><strong>Workplace trends</strong></td>
<td>Shared and open workspaces require new approaches to building design and productivity features</td>
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<tr>
<td><strong>Lease accounting rules</strong></td>
<td>Compliance and reporting of leased space on companies’ financial statements/balance sheets</td>
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### Enabling technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Cloud computing</strong></td>
<td>More cost-effective and accessible big data, data analytics, and machine learning</td>
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</table>
| **Internet of Things** | • Better, cost-effective sensors and connectivity  
                           • Open and standardized building system protocols |
The Parts of A Smart Building Smart

**Smart Building Capabilities**

- **Top (Level 3)**
  - Ambient intelligence

- **Middle (Level 2)**
  - Egress, Signage, Security, Presence

- **Base (Level 1)**
  - Power, Air, water, data

**People Centric**

- **Customer Needs**
  - Adapt to me
  - Find what I need
  - Onsite Services
  - Space utilization
  - Ease of access
  - Energy management
  - Equipment management

**Facilities Centric**

**Solutions**

- Workplace 2.0 Productivity and Collaboration
- Productivity Analytics
- Image Recognition & Processing
- Adaptive Content Services
- Spatial Analytics
- Smart Lobby/Find Me
- Predictive Energy
- Energy Management
- Predictive Maintenance
- Fault Detection

**Enterprise IoT Management**

**360 Security Assessment**
Our Smart Building Journey
# SMART BUILDING ECOSYSTEM

## Forces

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<td>📈 Lease accounting rules</td>
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## Audiences

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<tbody>
<tr>
<td>Owners</td>
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<tr>
<td>Operators</td>
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<tr>
<td>Occupants</td>
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## Scenario Focus

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<th>Focus</th>
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<tr>
<td>Energy</td>
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<tr>
<td>Space</td>
<td></td>
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<tr>
<td>Productivity</td>
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## Partners

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<th>Partner</th>
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<tr>
<td>Infrastructure</td>
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<tr>
<td>Facility Management</td>
<td></td>
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<tr>
<td>Occupant Experiences</td>
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88 ACRES
ENERGY SMART BUILDINGS


How Microsoft Quietly Built the City of the Future

- Analyzed and compiled through Advanced Analytics Dashboards
- Assimilating information from 30,000 Pieces of equipment
- 164 Structures
- 420,000 data points polled every 5 minutes
- 200,000,000 transactions added daily to event database
- Communicated through an array of different Protocols, Hardware, and Interfaces
- Transforming raw data into Actionable information

- 30,000 faults per day surfaced
- 48% of faults corrected within 60 Seconds
- Energy savings of 10%+ per year with implementation payback in less than 18 months
- Improves technician efficiency with 32,300 Work Orders per quarter
Microsoft's energy smart buildings environment

Business challenges:
- Disparate applications and systems
- No ability to holistically manage our infrastructure & prioritize maintenance activities
- Labor-intensive reporting
- $60 million estimated cost to retrofit to integrated equipment

- 145 structures
- 58,400 housed heads
- 15M Sqf office & lab space
- 50-55 megawatt hour average
- Multiple building systems
- $55M annual utility spend
- 2M connection points
- 500M transactions per day
Microsoft’s energy smart buildings benefits

**Easier system coordination:**
- Improved technician efficiency with 32,300 work orders per quarter
- 48% of faults are corrected within 60 seconds

**Lower energy consumption:**
- Forecasted energy savings of 10 -11% per year

**Cost reduction:**
- $56M saved by aggregating data from sensors vs. retrofitting equipment
- Energy savings of $2 million in its first year. 2 years ROI
Key scenarios for smart buildings

- Energy management
- Building occupancy
- Space Utilization
- Predictive Maintenance
- Meetings
- Parking
- Security
- Navigation

✓ Scenarios done or near completion
Where & How Do you start?
GETTING STARTED ... OVERWHELMING?
# A GROWING PORTFOLIO OF OPTIONS

<table>
<thead>
<tr>
<th><strong>Microsoft IoT Central</strong></th>
<th><strong>SaaS</strong></th>
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<td>Easy onboarding of devices, manage them in the cloud through a streamlined user experience and consolidated billing</td>
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<th><strong>Azure IoT Suite</strong></th>
<th><strong>PaaS</strong></th>
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<td>Pre-Configured Solutions (PCS) deployed in your Azure Subscription: Remote Monitoring, Predictive Maintenance, Connect Factory,...</td>
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https://blogs.microsoft.com/iot/2017/04/20/microsoft-simplifies-iot-further/
BUILD YOUR IOT SOLUTIONS TODAY

**Device Connectivity & Management**
- RTOS, Linux, Windows, Android, iOS
- Field Gateway
- Protocol Adaptation

**Analytics & Operationalized Insights**
- Cloud Gateway
- IoT Hub
- Cold Analytics
  - Find insights over historical data
  - Bi-directional device-cloud
  - Telemetry ingestion
  - Command & Control
  - Device Registry & Identity
  - Device Mgmt
  - HTTP, AMQP, MQTT
- Warm Analytics
  - Time series data storage and analytics
- Graph / Topology Storage & Analytics
  - Storage and analytics of the ‘things, people, places’ graph
- Hot Analytics
  - Real-time monitoring
- Graph API (incubation)

**Presentation & Business Connectivity**
- Manage
  - View and manage solutions
  - Power BI
  - API Apps
  - Search
- Business Integration
  - Connect to Business Processes
  - BizTalk Services
  - Logic Apps
  - Notification Hubs
  - Office 365

**Presentation & Business Connectivity**
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Come join us in Empowering People by making Buildings Smarter and enabling them to Achieve More.
Thank You