Before Analytics . . .

What to Consider Before Implementing Analytics on Your Building.
Agenda

• Analytics Introduction

• Four Steps Before Implementing Analytics
  • Define Purpose and Goals
  • Information Requirements
  • Maintaining that Information
  • Establish Connectivity

• Q & A
Analytics Intro

- How do I find, acquire and analyze all the data needed
- How do I ensure installation and configuration was done properly
- How is my building performing properly? (Equipment monitoring, energy savings, tenant comfort, safety, etc.)

- Proprietary Systems
- IOT
- Utility data
Example: Energy Management

<table>
<thead>
<tr>
<th>April 2019</th>
<th>Utility bill data is for March 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Monthly EUI</strong></td>
<td><strong>13.81</strong> LBTU/SQFT</td>
</tr>
<tr>
<td><strong>Electric Monthly EUI</strong></td>
<td><strong>6.85</strong> LBTU/SQFT</td>
</tr>
<tr>
<td><strong>Gas Monthly EUI</strong></td>
<td><strong>6.96</strong> KBTU/SQFT</td>
</tr>
</tbody>
</table>

**Total Energy Use**

- Total Energy Use (Actual)
- Total Energy Use (Baseline)
- Total Energy Use (Target)

**Electric Energy Use**

- Electric Use (Actual)
- Electric Use (Baseline)
- Electric Use (Target)

**Gas Energy Use**

- Gas Use (Actual)
- Gas Use (Baseline)
- Gas Use (Target)

$55K
YTD Total Savings
$12K
Target Savings YTD

*Baseline is previous year*
Example: Automated Reports - Comfort

April 2019

% Time Zones Meet Temperature Setpoint

77%

Distribution of Occupied Zone Temperatures

Best Opportunities to Improve Comfort

<table>
<thead>
<tr>
<th>VAV Name</th>
<th>% Time Meeting Temp Setpoint</th>
<th>Average Zone Temp</th>
<th>Cooling Setpoint</th>
<th>Heating Setpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHU-MC-11 VAV-MC11-32 105037</td>
<td>0%</td>
<td>70</td>
<td>76</td>
<td>74</td>
</tr>
<tr>
<td>AHU-MC-16 VAV-MC16-2 151002</td>
<td>0%</td>
<td>78</td>
<td>73</td>
<td>71</td>
</tr>
<tr>
<td>AHU-MC-16 VAV-MC16-34 151034</td>
<td>0%</td>
<td>76</td>
<td>72</td>
<td>70</td>
</tr>
<tr>
<td>AHU-MC-21 VAV-MC21-21 412016</td>
<td>0%</td>
<td>75</td>
<td>69</td>
<td>67</td>
</tr>
<tr>
<td>AHU-OSC-1 VAV 2-30 271030</td>
<td>0%</td>
<td>73</td>
<td>69</td>
<td>67</td>
</tr>
</tbody>
</table>
Example: Safety & Compliance

<table>
<thead>
<tr>
<th>Pressure KPI</th>
<th>% Relative Humidity KPI</th>
<th>Temperature KPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>97%</td>
<td>100%</td>
<td>23%</td>
</tr>
</tbody>
</table>

Distribution of Pressure

Distribution of % Relative Humidity

Distribution of Temperature
Step 1: Define Analytics Purpose and Goals

• Ensure equipment is installed and configured optimally (test all terminal units)

• Establish a baseline and what information to measure

• Identify equipment and data requirements to monitor and compare

• How do I measure and visualize what I’m monitoring

• Design phase: add analytics to Cx contract to increased accuracy and completeness
Step 2: Basic Information Requirements

- Building square footage
- Equipment and point count
- BAS: make, model, and version
- Building diagrams & schematics
- Devices, schedules, weather, utilities
**Step 3: How Will Information be Managed**

**Installed** On-site vs **Hosted** by Partner

- IT requirements for data security and business continuity
- Can server inside the firewall connect with the Internet
- Hardware requirements for analytics platform (installed)
- IT Expertise to install, update and patch on a regular basis
- Will direct access be allowed from inside the firewall (VPN)
Architecture – Hosted as SaaS

Assumptions:
- If BACNet we use a secured VPN methodology (i.e., TelosBox)
- If BAS has an API, we can connect via https call instead of VPN
- BuildingFit owns the license(s)

Definitions:
- Project - a database containing data for a facility(s) or building(s)
- Project Construction - process of getting data flowing and tagged into a project
- Connection - data flowing from a BuildingFit Project to a distinct BAS
- Facility - sub section of a project, can have multiple buildings
- Building - lowest level, houses equipment
Architecture – Installed on Premise

Building Automation System Server / Workstation

- Server
  - BAS Application (may reside on same server as databases or database may be integral)
  - Configuration Database (may reside on same system as BAS Application)
  - Trend Database (if available)

- Workstation (web / dedicated client software)

- Switch

BAS Network - Client

- BuildingFit Server (On-prem)

- Switch

BAS Network - Controllers

- BAS Serial Comms

- Ethernet (CCN over IP, BACnet IP, Modbus TCP)

- Supervisory Controller / Router

- Controller

- Temperature Sensor

- Pressure Sensor

Definitions:
- Project - a database containing data for a facility(s) or building(s)
- BuildingFit Instance - a server that is running the project
- Project Construction - process of getting data flowing and tagged into a project
- Connection - data flowing from a BuildingFit Project to a distinct BAS
- Facility - sub-section of a project, can have multiple buildings
- Building - lowest level, houses equipment

Assumptions:
- Access to create ArcScene connection
- Email access
- Web exceptions from list
- Remote access to local server

Licensing:
- Depending on size of building, Quartersmaster License or Full License
- BuildingFit owns the license
- If client has pre-existing license, they continue to own the license
Step 4: Establish Connectivity

- Can client provide and allow front-end access to BAS
- Can a VPN tunnel be established to connect with BAS
- Is a third-party hardware device required to connect (Tosi-box, example)
- While IT Infrastructure is being built: cell modems coupled with gateways (intermediate solution)
Questions?
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