Our Journey Today

• The BAS Promise
• Where are we now?
• Where do we need to go?
• Keys to making it happen
• Focus on Visibility
• Integration to the Enterprise
• Dashboards
• Real world examples
• Summary
What is the Automation Promise

- Buildings that are:
  - Comfortable
  - Safe
    - Occupants
    - Assets
  - Efficient (Productive)
    - Energy
    - Equipment
    - Enterprise
  - Sustainable
Building Management
Where do we stand?

- For the most part our building control systems are standalone and not integrated
- Our systems are under-instrumented
- Our control systems are over-distributed
- We are wasteful ($14 billion powering and cooling data centers in N.A. and only 30% of the energy ever touches a computer)
- We do not follow the process: Plan, instrument, measure, manage, improve
  You can’t manage what you don’t measure
THE most cost effective solution …

• **Resource efficient buildings that:**
  
  – Reduce energy use
  – Reduce use of Water and creation of Wastewater
  – Reduce \( \text{CO}_2 \) production
  – Increase use of renewable energy
  – Reduce consumption of other natural resources
  – Reduce generation of pollution
  
  – Create healthy environments and occupants

*a.k.a. = A Healthy, Technology Driven, High Performance Green Building*
Convergence of Intelligent and Green Buildings

**Green**
- Air & Energy
  - Reduce GHG emissions
  - Improve IAQ
  - Improve Energy Efficiency
- Waste to Energy
- Water
  - Reduce wastewater discharge
  - Lower contaminant release
- Waste & Remediation
  - Reuse and recycle products
  - Reduce waste disposal
  - More brown fields instead of green fields Green architecture

**Intelligent**
- Converged Networks
  - Data collection, measurement & verification,
    diagnostics, sensors, control, monitoring,
    remote monitoring etc.
- Integrated Controls
  - HVAC, lighting, energy,
    AV, security, energy,
    fire & life safety, etc.
- Infrastructure
  - Structured cabling
    solution, wireless systems, unified
    communication system
- Water Management
  - Monitoring and metering

**Bright Green**
- Energy Management
- Asset management
- Space utilization
- Integrated design process
- Sustainability- easier to maintain and built to last
- Renewable energy
- Healthy and comfortable environment (IEQ)
  - “Green” loans
  - Higher resale or lease rates

Source: Frost & Sullivan
Technology applied to deliver.....

- Compatibility
- Mobility
- Connectivity
- Scalability
- Security
- Interoperability
- Efficiency
- Longevity
- Flexibility
- Reliability
Key Concepts – Applied Technology
Building Management

1. VISIBILITY
   Enhanced User Experience

2. EFFICIENCY
   Energy & Plant Applications

3. FLEXIBILITY
   Hardware & Software Platforms

4. CONNECTIVITY
   Including Enhanced Wireless Capabilities

5. SECURITY
   Security & Fire Safety

6. SUSTAINABILITY
   Programs
Where We are Headed
Thinking with the End in Mind – Left to Right Transformation

Followers Think
Technology
Tasks
Building
Data

Leaders Think
Applications
Outcomes
Enterprise
Information

The Difference
Automation ----- Optimization
The Enterprise Real Lifecycle Cost Model

Integrated Design, Build, Operate (Optimization Model)

Performance

Existing Practices

Perpetual Commissioning

Auto Commission

First Occupancy

Design Service Live

Minimum Acceptable Performance

Optimum “As Built” Peak Performance

Time

Performance

Actual Service Live

Proprietary & Confidential
Data transformed = Information
Information needs to be:
Tailored
Focused
Actionable

Visibility is the key
Because even the best Information is useless if it’s invisible
Information Visibility Elements

- Device Level Interfaces
- Tailored Summaries
- Advanced Reporting
- Graphical displays
- Mashups
- Dashboards
- Mobile Access
Device Level Interfaces

- Configurable
- Usable
- Secure
- Intuitive
- Efficient
# Tailored Summaries

## Available Tailored Summaries

- Monitoring - Corp Center VAVs
  - Configuration - Corp Center VAV Flow
  - Configuration - N2 Controllers

## Key Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>5757_1-1</td>
<td>Online</td>
</tr>
<tr>
<td>5757_1-1.DA-T</td>
<td>60 deg F</td>
</tr>
<tr>
<td>5757_1-1.SF-S</td>
<td>On</td>
</tr>
<tr>
<td>5757_1-1.MA-T</td>
<td>55 deg F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Controller</th>
<th>Description</th>
<th>Zone Temp</th>
<th>Setpoint</th>
<th>Discharge Temp</th>
<th>Htg Output</th>
<th>Flow</th>
<th>Flow Setpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAV-1-01</td>
<td>Multipurpose 106N</td>
<td>71 deg F</td>
<td>72 deg F</td>
<td>62 deg F</td>
<td>0 %</td>
<td>1,544 cfm</td>
<td>1,520 cfm</td>
</tr>
<tr>
<td>VAV-1-02</td>
<td>NE Conference 109</td>
<td>72 deg F</td>
<td>72 deg F</td>
<td>87 deg F</td>
<td>0 %</td>
<td>467 cfm</td>
<td>470 cfm</td>
</tr>
<tr>
<td>VAV-1-10</td>
<td>Multipurpose 106S</td>
<td>73 deg F</td>
<td>73 deg F</td>
<td>62 deg F</td>
<td>0 %</td>
<td>329 cfm</td>
<td>320 cfm</td>
</tr>
<tr>
<td>VAV-1-11</td>
<td>Women 107</td>
<td>68 deg F</td>
<td>68 deg F</td>
<td>60 deg F</td>
<td>0 %</td>
<td>183 cfm</td>
<td>179 cfm</td>
</tr>
<tr>
<td>VAV-1-12</td>
<td>Men's Vest 105A</td>
<td>72 deg F</td>
<td>72 deg F</td>
<td>61 deg F</td>
<td>0 %</td>
<td>90 cfm</td>
<td>90 cfm</td>
</tr>
<tr>
<td>VAV-1-13</td>
<td>AV Closet 104</td>
<td>73 deg F</td>
<td>72 deg F</td>
<td>---</td>
<td>---</td>
<td>18 cfm</td>
<td>28 cfm</td>
</tr>
<tr>
<td>VAV-1-14</td>
<td>5757,VAV-1-14</td>
<td>71 deg F</td>
<td>70 deg F</td>
<td>---</td>
<td>---</td>
<td>119 cfm</td>
<td>131 cfm</td>
</tr>
<tr>
<td>VAV-1-16</td>
<td>Conference 111</td>
<td>66 deg F</td>
<td>64 deg F</td>
<td>61 deg F</td>
<td>0 %</td>
<td>796 cfm</td>
<td>840 cfm</td>
</tr>
<tr>
<td>VAV-1-17</td>
<td>Pantry 114</td>
<td>72 deg F</td>
<td>72 deg F</td>
<td>68 deg F</td>
<td>23 %</td>
<td>781 cfm</td>
<td>790 cfm</td>
</tr>
<tr>
<td>VAV-1-18</td>
<td>Interview Rm 113</td>
<td>68 deg F</td>
<td>68 deg F</td>
<td>62 deg F</td>
<td>0 %</td>
<td>255 cfm</td>
<td>255 cfm</td>
</tr>
<tr>
<td>VAV-1-19</td>
<td>Interview Rm 118</td>
<td>73 deg F</td>
<td>72 deg F</td>
<td>62 deg F</td>
<td>0 %</td>
<td>347 cfm</td>
<td>360 cfm</td>
</tr>
<tr>
<td>VAV-1-20</td>
<td>Waiting 122</td>
<td>73 deg F</td>
<td>73 deg F</td>
<td>61 deg F</td>
<td>0 %</td>
<td>1,339 cfm</td>
<td>1,244 cfm</td>
</tr>
<tr>
<td>VAV-1-21</td>
<td>Lobby 101</td>
<td>73 deg F</td>
<td>73 deg F</td>
<td>62 deg F</td>
<td>0 %</td>
<td>927 cfm</td>
<td>885 cfm</td>
</tr>
<tr>
<td>VAV-1-22</td>
<td>Corridor / Stor 112W/102</td>
<td>71 deg F</td>
<td>72 deg F</td>
<td>62 deg F</td>
<td>0 %</td>
<td>318 cfm</td>
<td>315 cfm</td>
</tr>
<tr>
<td>VAV-2-1</td>
<td>Corr 218</td>
<td>72 deg F</td>
<td>72 deg F</td>
<td>63 deg F</td>
<td>0 %</td>
<td>138 cfm</td>
<td>135 cfm</td>
</tr>
<tr>
<td>VAV-2-2</td>
<td>Stand Alone Radiation</td>
<td>73.5 deg F</td>
<td>65 deg F</td>
<td>---</td>
<td>---</td>
<td>302 cfm</td>
<td>300 cfm</td>
</tr>
<tr>
<td>VAV-2-10</td>
<td>Office 223</td>
<td>72 deg F</td>
<td>72 deg F</td>
<td>64 deg F</td>
<td>---</td>
<td>443 cfm</td>
<td>436 cfm</td>
</tr>
<tr>
<td>VAV-2-11</td>
<td>Office 224</td>
<td>71 deg F</td>
<td>71 deg F</td>
<td>269 deg F</td>
<td>0 %</td>
<td>443 cfm</td>
<td>436 cfm</td>
</tr>
</tbody>
</table>

Total Row Count: 38
My Site
Last Month's Energy Usage

General
Report Generated By: Ed, Energy Manager
Report Generation Date/Time: Thursday, December 03, 2009 11:50 AM
Time Zone: Central Standard Time
Report Path: Standard Reports\Energy Essentials Reports\Big Picture Energy\Energy Types:
Categories: Building Energy Use, Other, Outdoor Energy Use, Process Energy Use
Subcategories: Domestic Hot Water, Lighting, Multiple, Other, Plug Loads, Snow Melt
Duration: 11/1/2009 12:00:00 AM - 11/30/2009 12:59:59 PM
Functional Area (no units): N/A
Locations: College of Engineering, Jefferson Dorm, Toner Hall
Items: Electricity, Natural Gas, Steam, Water Dist., LP Gas
By Billing Period: Not Included

Weather Data
<table>
<thead>
<tr>
<th>Current Period</th>
<th>Previous Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Air Temp Avg (deg F)</td>
<td>70.13</td>
</tr>
<tr>
<td>Outdoor Air Temp High</td>
<td>79.99</td>
</tr>
<tr>
<td>Outdoor Air Enthalpy Avg (Btu/lb dry air)</td>
<td>35.91</td>
</tr>
<tr>
<td>Outdoor Air Enthalpy High</td>
<td>69.08</td>
</tr>
<tr>
<td>Outdoor Air Humidity Avg (%RH)</td>
<td>65.26</td>
</tr>
<tr>
<td>Outdoor Air Humidity High</td>
<td>78.42</td>
</tr>
<tr>
<td>Heating Degree Days (75.00deg F)</td>
<td>150</td>
</tr>
<tr>
<td>Cooling Degree Days (55.00deg F)</td>
<td>450</td>
</tr>
</tbody>
</table>

Sample Data Quality
| Total Sample Count | 61,068 |
| % Unreliable | 4.65 |
| Missing Samples | 2,940 |

Overview

Energy Usage

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Electric (kWh)</th>
<th>Nat. Gas (thrm)</th>
<th>Steam (lbm)</th>
<th>Oil</th>
<th>Water Dist. (MBtu)</th>
<th>LP Gas (Gal)</th>
<th>Coal</th>
<th>Water Cons. (kBTU)</th>
<th>Source Energy (kBTU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Building Energy Use</td>
<td>188,958</td>
<td>15,954</td>
<td>2,846</td>
<td>7,655.3</td>
<td>97.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Energy Use</td>
<td>Domestic Hot Water</td>
<td>19,954</td>
<td>2,846</td>
<td>5,511.9</td>
<td>24.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lighting</td>
<td>106,450</td>
<td>1,213.1</td>
<td>67.62</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multiple</td>
<td>10,496</td>
<td>119,597</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plug Loads</td>
<td>72,022</td>
<td>820,797</td>
<td>.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Outdoor Energy Use</td>
<td>754,527</td>
<td>8,599.0</td>
<td>04.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdoor Energy Use</td>
<td>Lighting</td>
<td>754,527</td>
<td>8,599.0</td>
<td>4.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Process Energy Use</td>
<td>267,303</td>
<td>24,142</td>
<td>2,012.8</td>
<td>88.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Energy Use</td>
<td>Multiple</td>
<td>267,303</td>
<td>418,206</td>
<td>71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Snow Melt</td>
<td>24,142</td>
<td>2,154.6</td>
<td>79.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Facility Energy Use</td>
<td>943,465</td>
<td>15,954</td>
<td>267,303</td>
<td>2,846</td>
<td>24,142</td>
<td>18,877</td>
<td>292.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source Energy Equivalent (kBTU)</td>
<td>10,752,479.56</td>
<td>383.16</td>
<td>418.20</td>
<td>8.71</td>
<td>3,841,941.29</td>
<td>2,194.44</td>
<td>18,877</td>
<td>292.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Advanced Reporting

Usage by Location with Energy Type

- **Toner Hall**
  - Electricity
  - LP Gas
  - Steam
  - Natural Gas

- **Jefferson Dorm**
  - Electricity
  - LP Gas
  - Water Dist.
  - Natural Gas

- **College of Engi...**
  - Electricity
  - LP Gas
  - Steam
  - Natural Gas
Graphical Displays
Graphical Displays/Mashups

Graphic: CHWSYS

- Chiller 2 Command: Enable
- Outside Air Temp: 74.3 deg F
- CHW Supply Temp: 41.4 deg F
- CHW Ret Temp: 41.4 deg F
- Chiller 1 Status: Off
- CW Return Temp: 68.3 deg F
- CW Bypass Valve: 24.5%
- CW Supply Temp: 62.9 deg F
- CW Isolation Valve: Open
- Chiller 2 Status: On
- CW Return Temp: 68.3 deg F
- CT 1 Status: On
- CT 2 Status: Off

Status:
- CT 1: On
- CT 2: Off

Command:
- CT 1: Enable
- CT 2: Enable

CW Pump 1:
- Status: On
- Command: Enable

CW Pump 2:
- Status: On
- Command: Enable
Graphical Displays/Mashups
### Graphical Displays/Mashups/KPIs

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7F4_HRS.MAX_HOUR</td>
<td>672 hours</td>
<td>DAY OF MONTH X 24 HRS</td>
</tr>
<tr>
<td>B7F4_HRS.7402</td>
<td>242 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7403</td>
<td>242 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7404</td>
<td>242 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7405</td>
<td>232 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7407</td>
<td>265 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7409</td>
<td>226 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7410</td>
<td>242 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7411</td>
<td>244 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7412</td>
<td>253 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7413</td>
<td>242 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7414</td>
<td>279 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7415</td>
<td>246 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7416</td>
<td>255 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
<tr>
<td>B7F4_HRS.7417</td>
<td>244 hours</td>
<td># HOURS ON THIS MONTH</td>
</tr>
</tbody>
</table>
Enterprise Integration, Information Dashboards

Benefit/ Value
Reduced CAPEX and OPEX

Operation Maintenance Compliance Efficiency

Enterprise Applications

Data Normalization
EnNET Enterprise Integration Middleware

Physical Convergence
Common IP Infrastructure

Building Control Systems

22
**Site Rankings**

### Site Consumption

<table>
<thead>
<tr>
<th>Month</th>
<th>Total kWh</th>
<th>MMBTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 2009</td>
<td>473,899</td>
<td>33.38</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>629,360</td>
<td>46.66</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>800,160</td>
<td>60.00</td>
</tr>
<tr>
<td>Mar 2009</td>
<td>919,076</td>
<td>70.00</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>988,498</td>
<td>74.00</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>1,051,200</td>
<td>80.00</td>
</tr>
<tr>
<td>Mar 2009</td>
<td>1,083,680</td>
<td>80.00</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>1,093,520</td>
<td>80.00</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>1,240,200</td>
<td>96.00</td>
</tr>
<tr>
<td>Mar 2009</td>
<td>1,313,200</td>
<td>98.00</td>
</tr>
</tbody>
</table>

### Site Economic Impact

<table>
<thead>
<tr>
<th>Month</th>
<th>Total kWh</th>
<th>Cost (kWh)</th>
<th>CO2 (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 2009</td>
<td>32,310</td>
<td>160.18</td>
<td>319 t</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>50,874</td>
<td>254.40</td>
<td>291 t</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>51,400</td>
<td>257.00</td>
<td>374 t</td>
</tr>
<tr>
<td>Mar 2009</td>
<td>57,197</td>
<td>267.52</td>
<td>425 t</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>57,771</td>
<td>267.52</td>
<td>457 t</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>61,501</td>
<td>289.24</td>
<td>486 t</td>
</tr>
<tr>
<td>Mar 2009</td>
<td>68,118</td>
<td>313.07</td>
<td>501 t</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>68,837</td>
<td>313.07</td>
<td>510 t</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>71,390</td>
<td>328.00</td>
<td>573 t</td>
</tr>
<tr>
<td>Mar 2009</td>
<td>74,171</td>
<td>336.00</td>
<td>609 t</td>
</tr>
</tbody>
</table>

### Site Environmental Impact (Estimated)

<table>
<thead>
<tr>
<th>Month</th>
<th>CO2 (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 2009</td>
<td>319 t</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>291 t</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>374 t</td>
</tr>
<tr>
<td>Mar 2009</td>
<td>425 t</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>457 t</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>486 t</td>
</tr>
<tr>
<td>Mar 2009</td>
<td>501 t</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>510 t</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>573 t</td>
</tr>
<tr>
<td>Mar 2009</td>
<td>609 t</td>
</tr>
</tbody>
</table>

**Rank By:** Electric (kWh)  Natural Gas (MMBTU)  Normalization: Relative (No Normalization)  per sf  per Person  per Degree Day Heating  per Degree Day Cooling

**Help**

**Administration**

**Energy Analyzer**

**Time Series/Event Analysis**
Total cost avoided: $406,673.31. Positive numbers represent an avoidance, negative numbers extra expense.
Mobile Access/UI convergence

Mobility
Visibility: Summary & Direction

• “We are headed, inexorably, toward an image based culture dominated by the visual language…”
  Futurists, 1970

• We will not type, but rather touch, pinch, swoosh, tilt, shake and caress.
  (Wired Magazine 05/2010)
Vision
A more comfortable, safe and sustainable world.
Case Study: State of Missouri
Enterprise Solution

Dave Mosby, National Solutions Business Development Director
OVERVIEW

• Vision
• Solution
• Results
• Lessons Learned
• Questions
Enterprise Solution

Building Blocks of the Enterprise Solution

- Enterprise Energy Management
- Utility Bill Management
- Business Process Management
- Facilities Communications Infrastructure
- Computer Aided Facilities Management

Global Access Facilities Portal
Multiple Data sources are leveraged in a distributed data environment – This is the fuel to drive the data through into cloud computing and continuous data commissioning. Leading to action – the action is what leads to savings.
At an Executive Level an Enterprise Solution provides:

**Visibility** - a window into real estate, energy, operating, capital programs

**Transparency** – data availability to all with the click of a mouse

**Accountability** – independent measurement & verification ‘managed’ by internal staff
The State Network is monitored from Network 24 hours a day / 7 days a week with full visibility of platform status and any issues state-wide.

162 Sites, 1000 + buildings
The Global Access Portal gives **controlled access and security** to a full system of applications for the total management of the State’s portfolio of facilities.

**Single Sign-On** limits the confusion of multiple passwords.

- Utility Bill Management
- Enterprise Energy Management
- Computer Aided Facilities Management
- Business Process Management
- Energy WIKI
- Vendor Portal
- Steam Star
- VFA

For assistance please call the Portal Help Desk: 1-877-411-2236
Real Estate

Leasing Expenditures: FY06 $55.3 M; FY09 $41.7 M
$20.9 Million Sold in Excess Real Estate
Operations

The State of Missouri created a state of the art facilities management unit. With Blackberry interfaces, touch style kiosks, & ‘one touch’ supplier (Grainger) integration the maintenance staff and supervisors have the tools necessary to effectively manage:

- Purchase Orders
- Work Orders
- Preventative Maintenance
- Inventory (\$500K reduction)
- Resource Loads
Capital

Funding/FCI Report

Project Prioritization

Capital Planning Analyzer

Facilities Maintenance & Repair Fund

Millions
The energy management solution gives executives and building managers access to the necessary data, at all levels of detail, to properly manage and maintain their buildings in the most energy efficient manner possible.
Energy Management – Equipment Operations
Inventory of Utility Accounts Finds Savings

• Boonville Correctional Center

Single Six Inch Water Meter

A water account was found to be billing $425 every month even though no water was being used for last 13 years!!

= $425 * 12 = $5,100 in annual savings for this one account

= $5,100 * 13 = $66,300 spent over 13 years without this visibility

Account # 18960100 was closed immediately!!
SteamStar Savings

“This was the most aggressive and productive trap testing project I have been involved in. The overall payback taking into account trap survey costs, replacement costs and energy losses (not including labor) was about a **26 day payback**.” -- Dir. Of Institutional Markets Armstrong National, Inc.

While the State of Missouri has saved ~ $1M annually by replacing the defective traps, there is ~ $800K left in potential annual savings in the remaining defective steam traps.

### 2007 Steam Trap Statistics

- 3,302 Installed Steam Traps Tested
- 2,981 Steam Traps In Service
- 568 Found Defective
**Lewis and Clark**
- Sq. Ft. – 753,138
- 2800 FTE
- Built in 1983
- PC 2005
- Occupied in FY05, 122,000 sqft, 400 Employees, Cost $17.5 M
- Moving from Excellent to Outstanding Performance FY07 ESP Deployed

**Harry S. Truman**
- Sq. Ft. – 753,138
- 2800 FTE
- Built in 1983
- PC 2005
- FY06 12.1 KWhs/SF
- FY08 11.6 KWhs/SF
- CY10 10.9 KWhs/SF
- 9.0 % Reduction

**Wainwright**
- Size: 234,599 sq. ft.
- Building Population: 693
- Year Built: 1891
- Year Commissioned: 1981
- FY06 25.2 KWhs/SF
- FY08 24.0 KWhs/SF
- CY10 19.3 KWhs/SF
- 23.4 % Reduction
"Gov. Nixon announces 5.6 percent reduction in state energy bill over past year - saving taxpayers more than $3 million."

"In the first year of implementation of EO 09-18, Gov. Nixon's administration achieved the following reductions:

**Electricity:** Decrease of **25 million kWh** (kilowatt-hours), or **5.5 percent**. That's enough to power more than 2,500 Missouri households for an entire year, and it corresponds to 16,250 tons of carbon dioxide not being emitted into the atmosphere.

**Gas (propane and natural gas):** Decrease of **180,000 MMBtu** (1 million Btu), or **9.1 percent**. That's enough to run more than 7,000 residential water heaters in Missouri for an entire year, and it corresponds to almost 11,000 tons of carbon dioxide not being emitted into the atmosphere."

*Governors Office Press release, April 26, 2010.*
Lesson Learned

• Vision, Vision, Vision
• Politics, Power and People
• Leverage the law
• Make Money
• Public, Private Partnerships
• Contact
  – Dave Mosby
  – david.mosby@jci.com
  – 573-979-3052 (c)