University of Virginia Case Study on Mining & Leveraging Big Data

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Systems Integration & Development Manager
- 1 Main Heating Plant and 2 Satellite Plants
  - Steam and MTHW service
- 8 Chilled Water Loops (14 plants)
- 3 Primary Electric Substations
- Over 2,800 Meters
Genesis

- “Home-Grown” systems for trending, reporting, billing

- Interests in:
  - Modernizing
  - Visualization

- New University Financial Model (RCM)
- Central Alarm Management, Scheduling
- BAS Overlay potential
Process

- Project budget $300K
- Procurement - RFP
- Collaborative Internal Process
- Proposals
- Pilot project
Decision-making

- System toolset
- Connectivity
- Microsoft platform
- Technology
- Ongoing development
- Cost and costing model

“Lighthouse” – Building info
Decision-making

- Architecture
- Staff capabilities
- Scope of Existing Systems
- Communications
- Vendor Options
- Information Audiences
- What defines value?
- Monitor vs Control

“Lighthouse” – CHW Plant info
Implementation

- Preliminary Work
- Pilot project
- Planning
- Development

Go!

“Lighthouse” – District Energy Summary
Issues

- BACnet Architecture
- BACnet Standards
- External accounts
- Vendor Options

“Lighthouse” – Potable water info
Project Results

- Live Demo

Jefferson's Rotunda

South Chiller Plant
Project Results - Examples

- Finding anomalies
  - Multiplier Errors
  - Sensor Issues
  - Time-base Errors for Totalization
  - Missing Data
  - BAS Programming issues
  - Billing Issues
  - Zero-value Offset Issues
  - Controls Issues

"Lighthouse" – Chilled water plant info
Project Results

- Enterprise Data Historian
- Energy Asset Structure
- Visualization Tools
- BACnet
- Identified Issues
- Generated Interest
- Accelerated Improvements
- Improved Understanding

“Lighthouse” – Detecting anomalies
Takeaways

• System Choices
• You need a “Champion”
• Determine what value means for you
• Plan for different audiences
• See what’s out there and make your own “Best of Breed”
• Prepare for surprises!
• “Big Data” is here – Use it!
Next Steps

- External Account Data
- Central Scheduling
- Fault Detection and Diagnostics
- Central Alarms/ Notification
- Forecasting
- Customer Pages
- Additional Analytics
QUESTIONS?
Project Results

- UVa’s “Lighthouse” Application.
Project Results

- Energy Asset Structure
Project Results

- Basic Building Info
Project Results

- Basic Building Info
Project Results

- Cost info has been added
Project Results

- Isolating problems
Project Results

- Plant/distribution systems status
Project Results

- Real-time Plant Reconciliation and Costs example
Project Results

- Real-time reconciliation for a specific district cooling loop (system).
Project Results

- Real-time reconciliation for a Substation
• Traditional SCADA.
Project Results

- Separate Monthly Totals for Comparison.