## University of Virginia Case Study on Mining & Leveraging Big Data

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Scott Martin Systems Integration & Development Manager



- I 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



Jefferson' Rotunda - currently under renovation



#### Genesis

• "Home-Grown" systems for trending, reporting, billing

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- Interests in:
  - Modernizing
  - Visualization

- UtilityPro application Meter Reading Form
- New University Financial Model (RCM)
- Central Alarm Management, Scheduling
- BAS Overlay potential



#### Process

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

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# **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

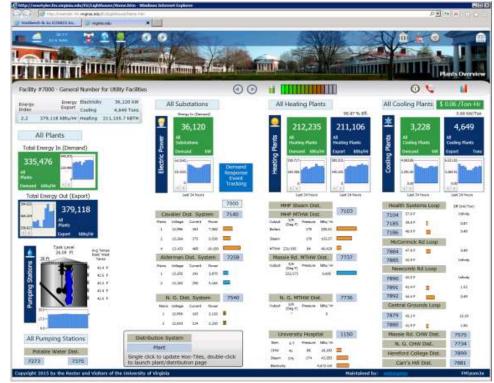
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"Lighthouse" – CHW Plant info



## 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

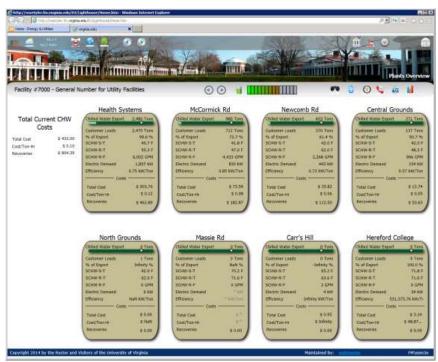


#### • Live Demo



# **Project Results - Examples**

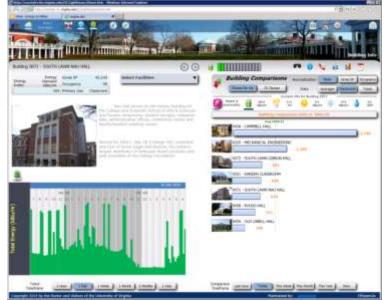
- Finding anomalies
  - Multiplier Errors
  - Sensor Issues
  - Time-base Errors for Totalization
  - Missing Data
  - BAS Programming issues
  - Billing Issues
  - Zero-value Offset Issues
  - Controls Issues



"Lighthouse" - Chilled water plant info



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



"Lighthouse" – Detecting anomalies



### Takeaways

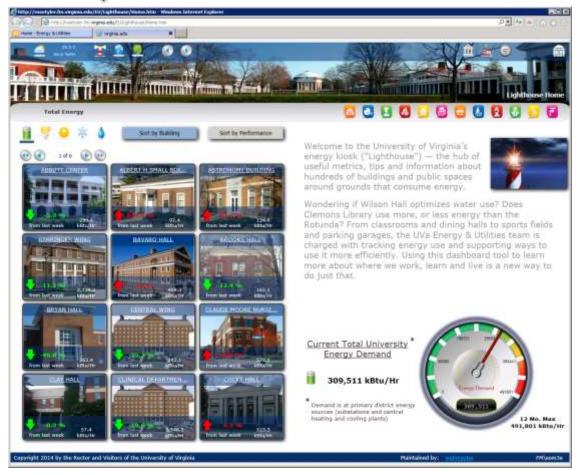
- System Choices
- You need a "Champion"
- Determine what value means for you
- Plan for different audiences
- See what's out there and make your own "Best of Breed"
- Prepare for surprises!
- "Big Data" is here Use it!



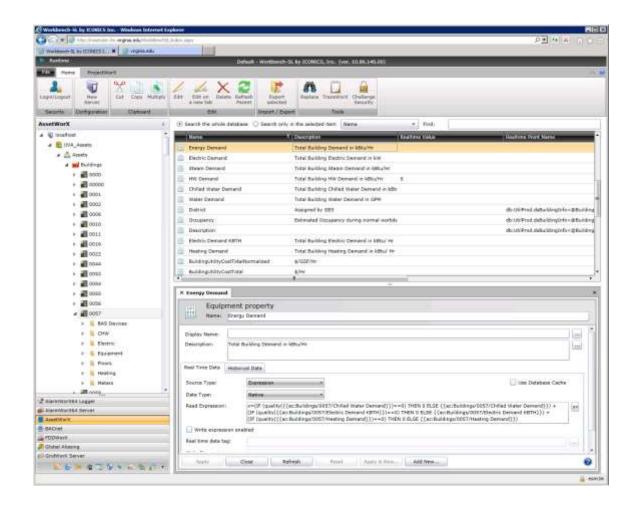
# Next Steps

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





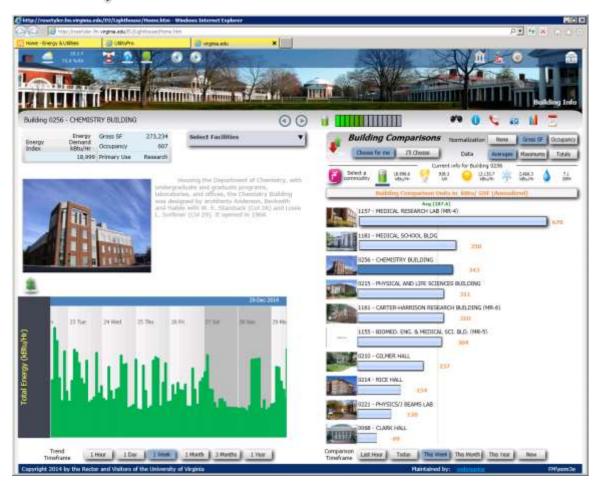
• UVa's "Lighthouse" Application.



Energy Asset Structure



• Basic Building Info



• Basic Building Info



#### Cost info has been added



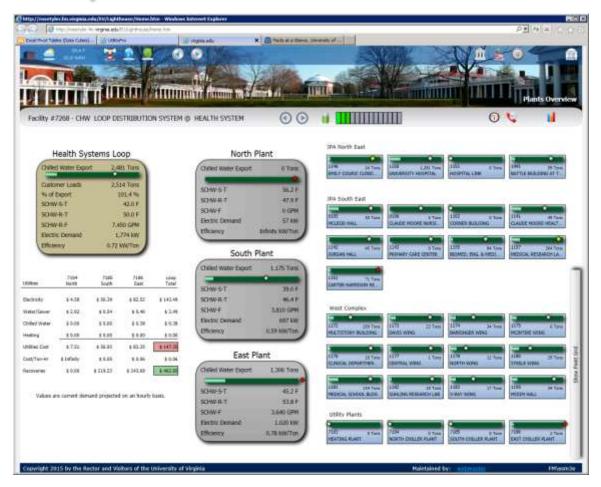
• Isolating problems



Plant/distribution systems status



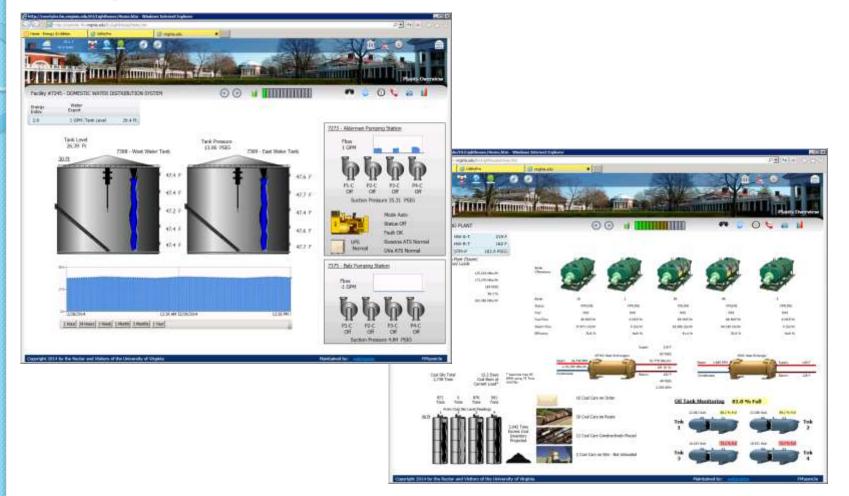
• Real-time Plant Reconciliation and Costs example



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



• Real-time reconciliation for a Substation



• Traditional SCADA.

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• Separate Monthly Totals for Comparison.