

# RTEM: Gaps & Solutions

Building Performance Lab

CUNY Institute for Urban Systems



# Sponsorship

- An ambitious effort by NYSERDA to incentivize the buildings market to move towards advanced, information-enabled controls
- Broadly supported by NYC DEM to accelerate building efficiency through enhanced operations

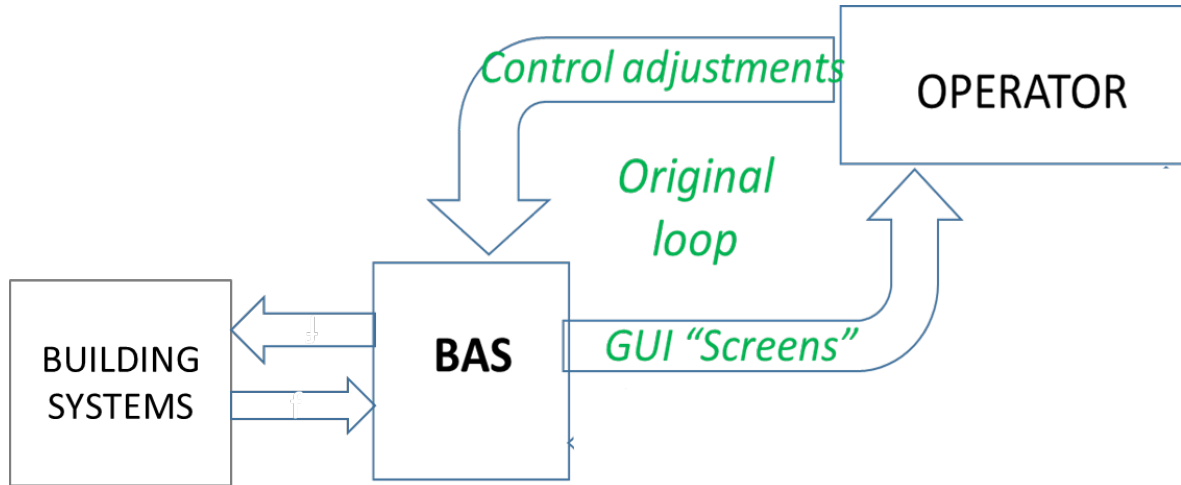


# The Critical Questions

Thinking of upgrading your BAS?

- How do I make this decision?
- What should I expect in the end?

# The Vision – Emerging Capabilities



BAS:  
Building  
Automation  
System

**FIGURE 1** BAS INFORMATION FLOWS – ORIGINAL AND EMERGING

# GAPS

Various “GAPS” inhibit market decisions

- GAP-1: What can the existing BAS do? What upgrades are needed?
- GAP-2: What should the new application do? What should I expect from a vendor when they are all telling me slightly different stories?
- GAP-3: What if I don't have a BAS to build on?

# Addressing the GAPS

CUNY BPL does applied research with focus on:

- Energy efficiency in building operations
- Building Automation Systems and derived analytics, dashboards
- Operator decision-making

Research has led to solutions that address the RTEM  
GAPS

# Gap-1/Solution-1

## What Can My BAS Do?

Building Automation System Assessment Tool BASAT – the starting point

- Captures the building systems connected and their sensors
- BASAT assesses a BAS for the functionality it provides: can it support Building Re-tuning? Demand Response? Does it provide information needed for Local Law 87 retro-commissioning and energy audits?

# BASAT – Input Example



## BASAT

## BUILDING AUTOMATION SYSTEM ASSESSMENT TOOL

### AIR HANDLER UNITS

Unit ID: AHU-1,2,3,4,5,6

Generate Results

Reset Selections

Menu

Please indicate if the following points are available from the BAS or additional sensors/meters. When finished, click "generate results"

file:///Users/PaulReale/Download:

TEMPERATURES	
Mixed Air Temperature	<input checked="" type="radio"/> Yes <input type="radio"/> No
Supply Air Temperature	<input checked="" type="radio"/> Yes <input type="radio"/> No
Supply Air Temperature Setpoint	<input checked="" type="radio"/> Yes <input type="radio"/> No
Exhaust Air Temperature	<input checked="" type="radio"/> Yes <input type="radio"/> No
Return Air Temperature	<input checked="" type="radio"/> Yes <input type="radio"/> No
Supply Air Relative Humidity	<input type="radio"/> Yes <input checked="" type="radio"/> No

DAMPER POSITIONS	
Outside Air Damper Position	<input checked="" type="radio"/> Yes <input type="radio"/> No
Return Air Damper Position	<input checked="" type="radio"/> Yes <input type="radio"/> No
Exhaust Air Damper Position	<input checked="" type="radio"/> Yes <input type="radio"/> No

COILS / VALVES	
Chilled Water Coil Valve Position	<input checked="" type="radio"/> Yes <input type="radio"/> No
Chilled Water Coil Valve Position Setpoint	<input checked="" type="radio"/> Yes <input type="radio"/> No
Chilled Water Entering Temperature	<input type="radio"/> Yes <input checked="" type="radio"/> No
Chilled Water Leaving Temperature	<input type="radio"/> Yes <input checked="" type="radio"/> No
Heating Coil Valve Position	<input checked="" type="radio"/> Yes <input type="radio"/> No
Heating Coil Valve Position Setpoint	<input checked="" type="radio"/> Yes <input type="radio"/> No
Re-Heat Coil Valve Position	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pre-Heat Coil Valve Position	<input type="radio"/> Yes <input checked="" type="radio"/> No
Re-Heat Entering Temperature	<input type="radio"/> Yes <input checked="" type="radio"/> No
Re-Heat Leaving Temperature	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pre-Heat Entering Temperature	<input type="radio"/> Yes <input checked="" type="radio"/> No



# BASAT – Output Example



## BASAT

## BUILDING AUTOMATION SYSTEM ASSESSMENT TOOL

BRT

Results apply to the following:

AHU-1,2,3,4,5,6, CH-1,2,3, BLR-1,2,3

Generate Results

Update Cooling Plant

Update AHU

Update Heating Plant

Menu

To see the capability of the BAS to implement and monitor BRT - related control strategies, click on "Generate Results"

Metasys/5.2.18.0400 BAS has 28 out of 33 BRT trends available

Building & BAS:	TRENDS TO LOOK FOR:	Available?	Points needed:	Points to Trend:	
<b>BUILDING:</b>	<b>AHU DISCHARGE - AIR TEMP CONTROL</b>	Is reset being used to control the discharge-air set point?	Yes		Supply Air Temperature; Supply Air Temperature Setpoint
		Is the discharge-air meeting set point, or do deviations occur?	Yes		Supply Air Temperature; Supply Air Temperature Setpoint
		Are set points too high or too low; discharge-air temperature too warm or too cold?	No	Terminal Unit Reheat Valve Position	
		Do the discharge-air temperatures remain relatively stable?	Yes		Supply Air Temperature; Supply Air Temperature Setpoint
<b>CONTROL SYSTEM:</b> Johnson Controls					
<b>DATA POINTS AVAILABLE NOW:</b>	<b>AHU H COOL</b>	Are outdoor-air temperature lockout set points for heating and cooling reasonable, do they overlap?	Yes		Outside Air Temperature; Chilled Water Coil Valve Position; Heating Coil Valve Position

# Gap-2/Solution-2

## What Should the New Application Do?

“Minimum Standard of Care” – MSOC

- What minimum functionality should an owner should expect from an updated BAS?
- **Focus on the fundamentals** to manage energy e.g. KPIs, data capacities, inter-operability, external data sources
- Potentially evolve to third-party labeling
- We want industry input! ...Focus group participants from vendors / integrators, etc.

# Gap-3/Solution-3

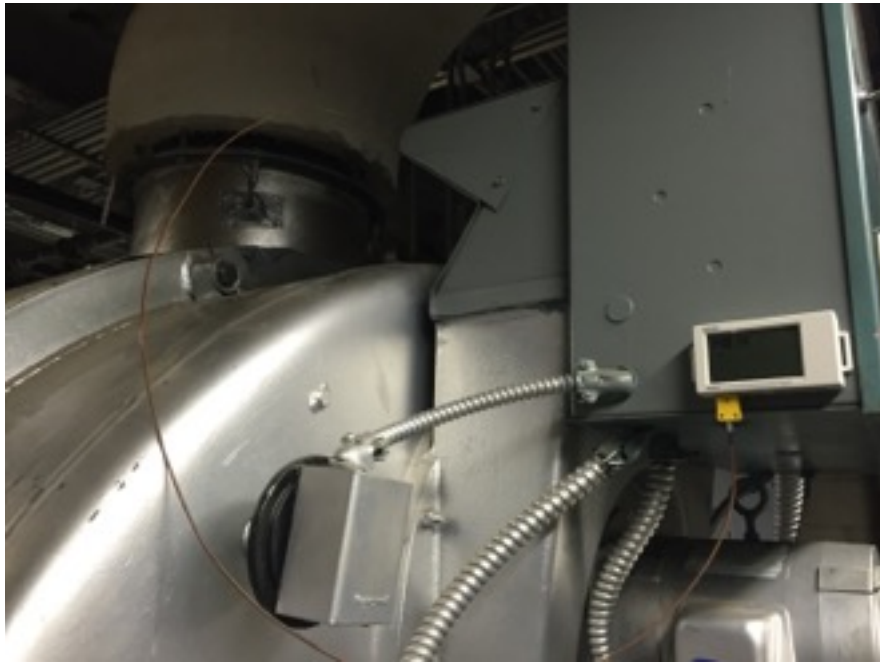
## What If I Don't Have a BAS?

Building Re-Tuning for buildings w/o a BAS: noBAS BRT

- A DEM-funded project to develop protocols to investigate building system performance
- A “kit-based” version of "Building Re-tuning”
- Includes a training component to teach the operators how to execute the process independently

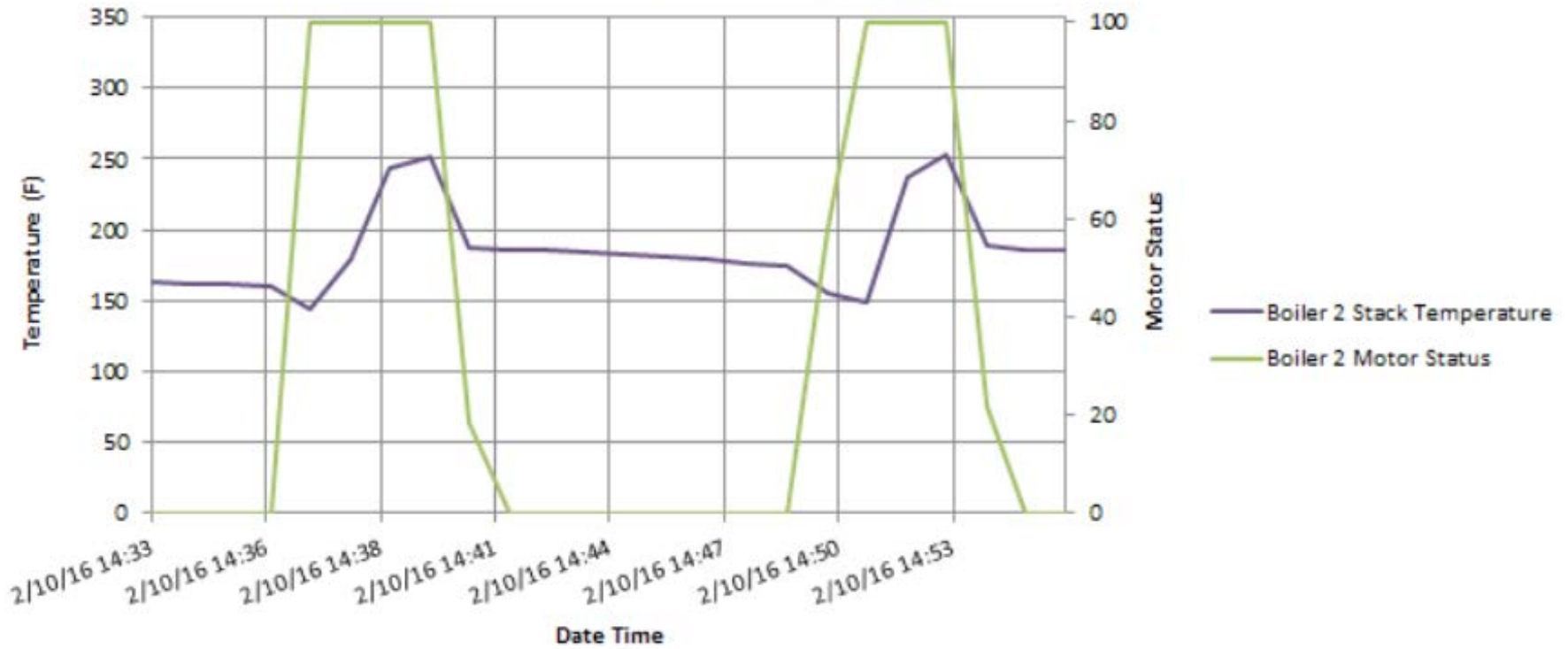
# noBAS BRT Example Installation

How is the boiler cycling, and what is the stack temperature?



# noBAS BRT Example Output

## Boiler 2 Cycling



# Conclusion

- CUNY BPL is interested in your decision-process and is prepared to help as possible
- VERY interested in your thoughts about the MSOC concept – building focus groups
- Able to help you and your staff with energy efficiency training