RTEM: Gaps & Solutions

Building Performance Lab

CUNY Institute for Urban Systems

CUNY The City University of New York

BPL BUILDING performance LAB

CIUS

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

energyNYC

nyserda
Energy. Innovation. Solutions.

DEM: DCAS Energy Management

The Critical Questions

Thinking of upgrading your BAS?

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Thinking of upgrading your BAS?

- How do I make this decision?

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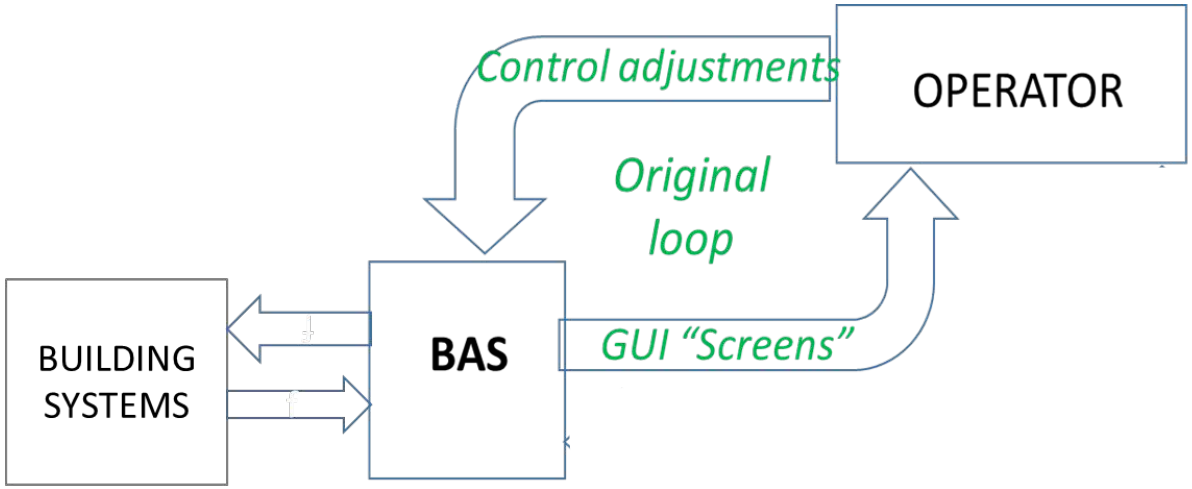
- How do I make this decision?
- What should I expect in the end?

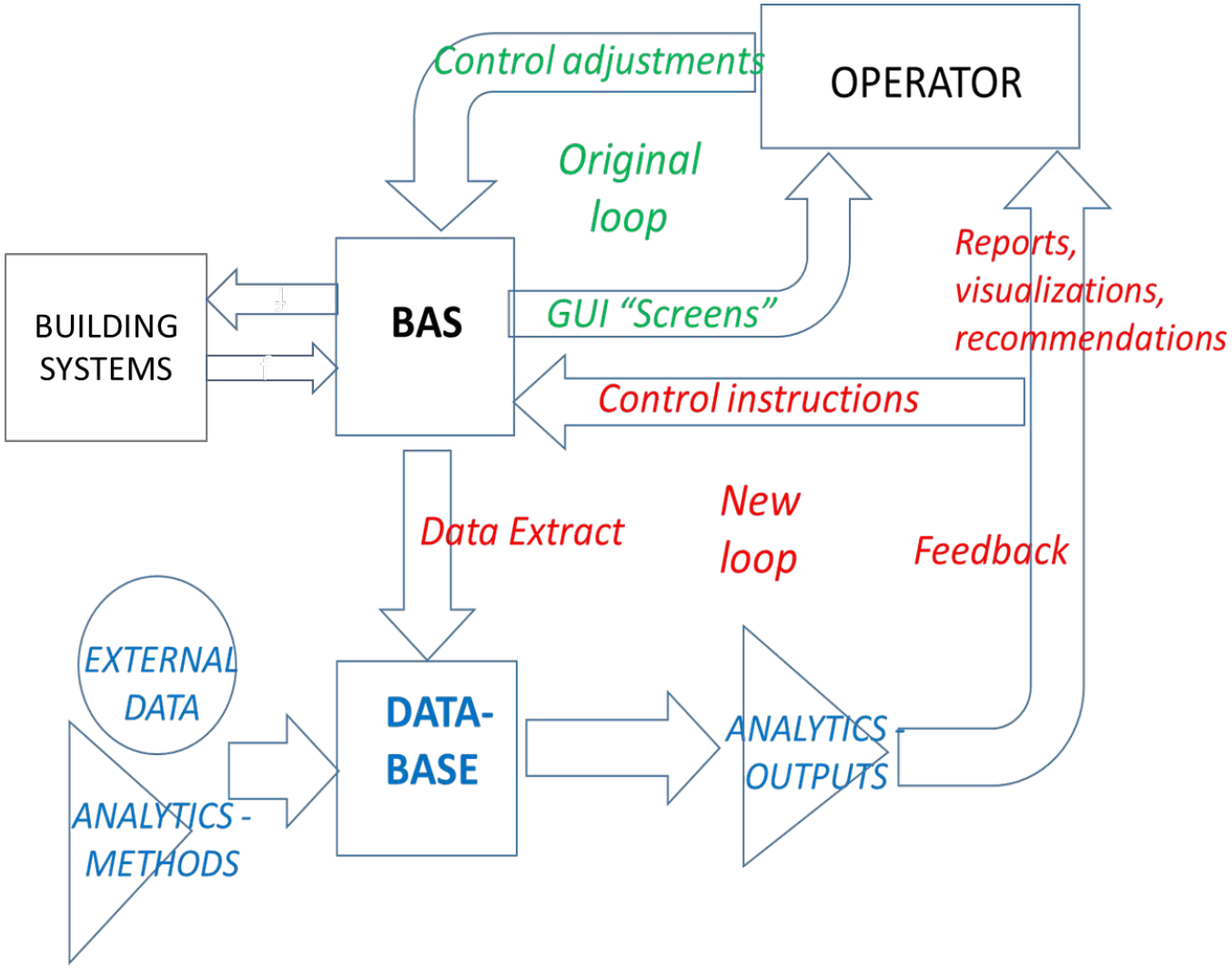
The Vision – Emerging Capabilities



BAS:
Building
Automation
System

FIGURE 1 BAS INFORMATION FLOWS – ORIGINAL AND EMERGING

The Vision – Emerging Capabilities



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BAS: Building Automation System

GAPS

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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

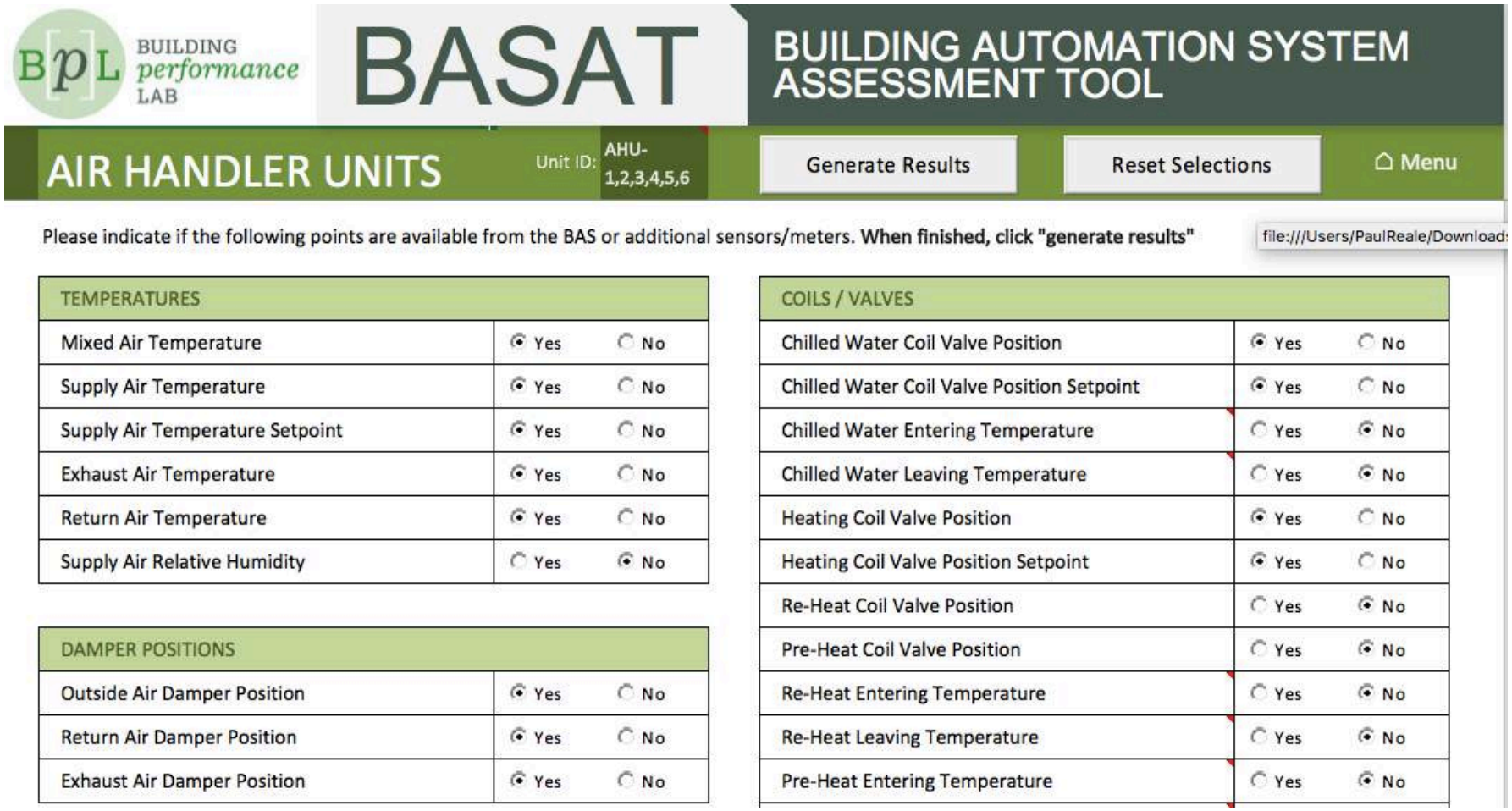
Research has led to solutions that address the RTEM GAPS

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



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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	(•) Yes	( ) No
Supply Air Temperature	(•) Yes	( ) No
Supply Air Temperature Setpoint	(•) Yes	( ) No
Exhaust Air Temperature	(•) Yes	( ) No
Return Air Temperature	(•) Yes	( ) No
Supply Air Relative Humidity	( ) Yes	(•) No

DAMPER POSITIONS		
Outside Air Damper Position	(•) Yes	( ) No
Return Air Damper Position	(•) Yes	( ) No
Exhaust Air Damper Position	(•) Yes	( ) No

COILS / VALVES		
Chilled Water Coil Valve Position	(•) Yes	( ) No
Chilled Water Coil Valve Position Setpoint	(•) Yes	( ) No
Chilled Water Entering Temperature	( ) Yes	(•) No
Chilled Water Leaving Temperature	( ) Yes	(•) No
Heating Coil Valve Position	(•) Yes	( ) No
Heating Coil Valve Position Setpoint	(•) Yes	( ) No
Re-Heat Coil Valve Position	( ) Yes	(•) No
Pre-Heat Coil Valve Position	( ) Yes	(•) No
Re-Heat Entering Temperature	( ) Yes	(•) No
Re-Heat Leaving Temperature	( ) Yes	(•) No
Pre-Heat Entering Temperature	( ) Yes	(•) No

BASAT – Output Example

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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:
BUILDING:	AHU DISCHARGE - AIR TEMP CONTROL	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	
CONTROL SYSTEM: Johnson Controls		Do the discharge-air temperatures remain relatively stable?	Yes		Supply Air Temperature; Supply Air Temperature Setpoint
DATA POINTS AVAILABLE NOW:	AHU COOL	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.

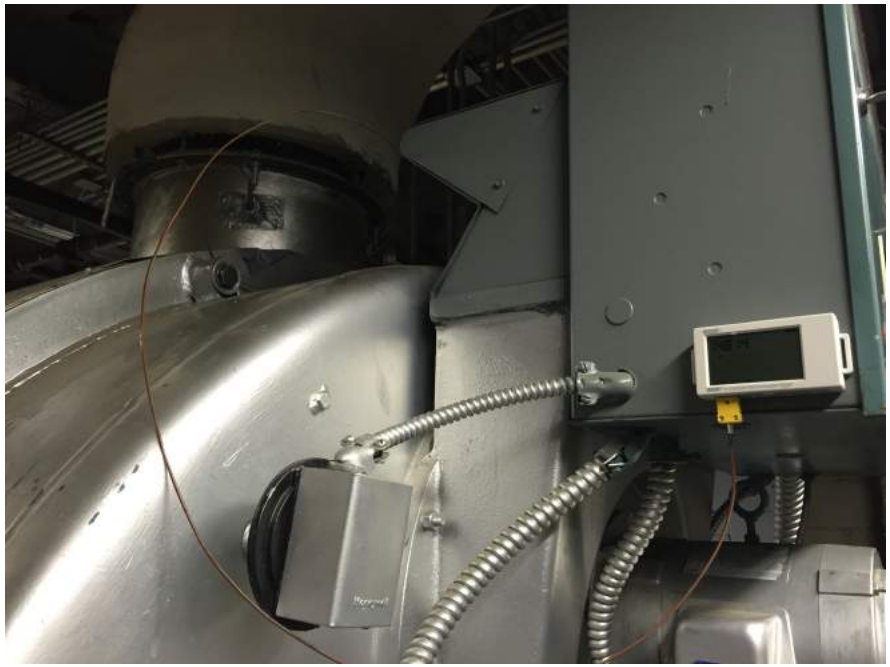
Gap-3/Solution-3
What If I Don't Have a BAS?

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

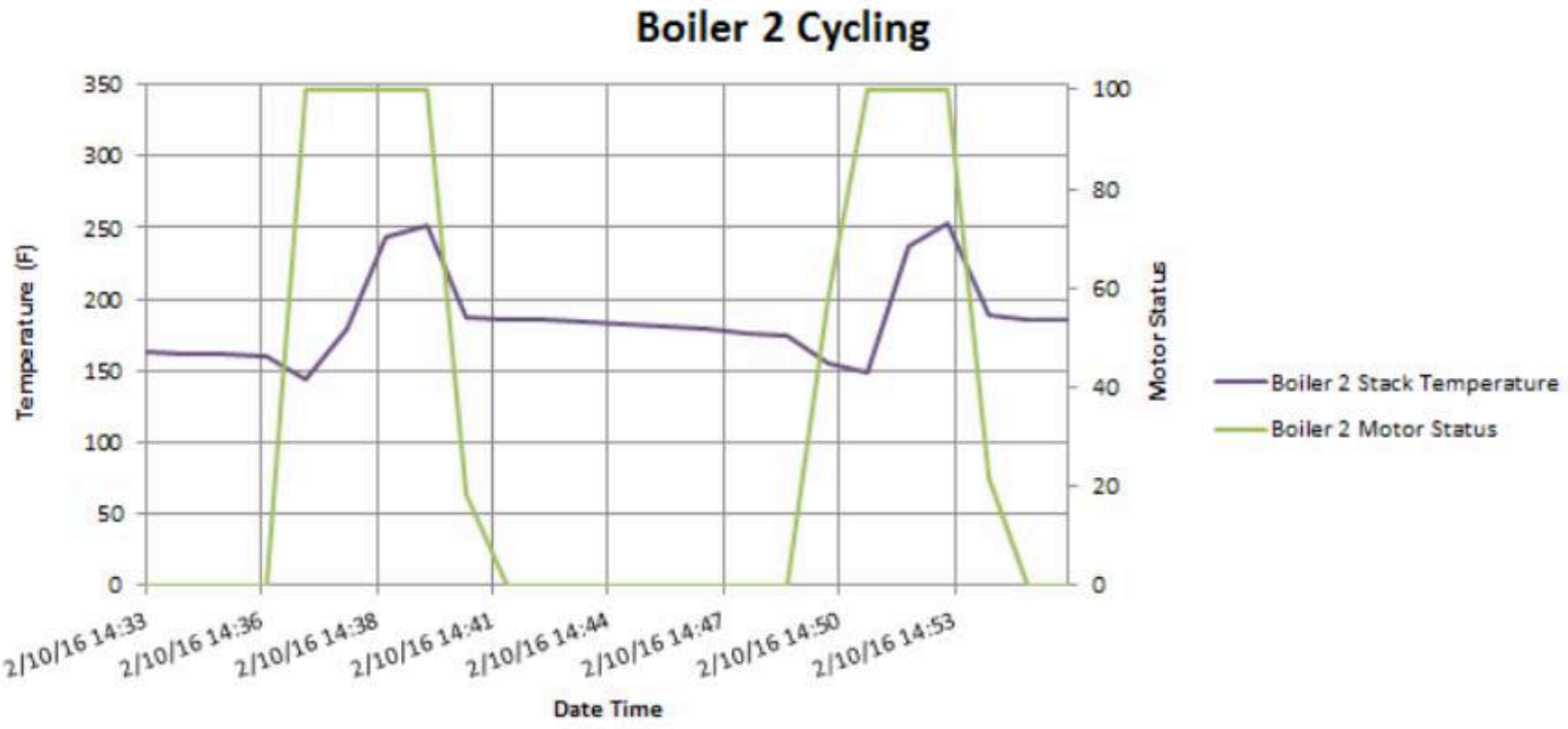
- A DEM-funded project to develop protocols to investigate building system performance
- A "kit-based" version of "Building Re-tuning"
- Includes a training component to teach the operators how to execute the process independently

noBAS BRT Example Installation

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



noBAS BRT Example Output



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