Turning data into action: framing BAS data for end-users

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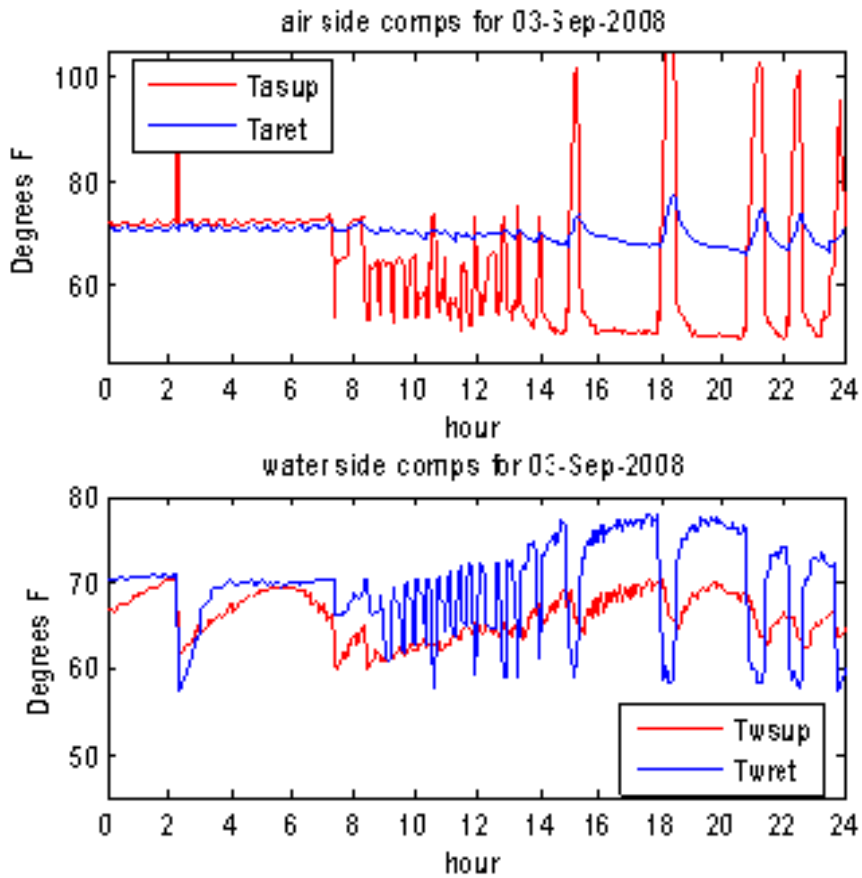
- Acquiring and using data from large BAS: the case at MIT
- Managing and extracting information
- Some useful outputs
- Where things can go

Data, Data, Everywhere

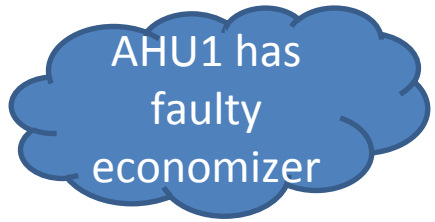
- Many measurements in today's BAS
- More coming with required PMV and FDD
- More complex systems, more things to manage, less time for analysis

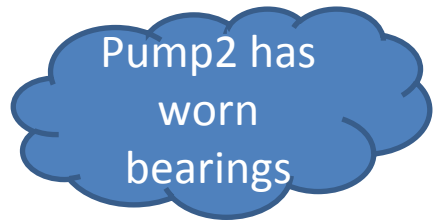
Time series for a water cooled heat pump

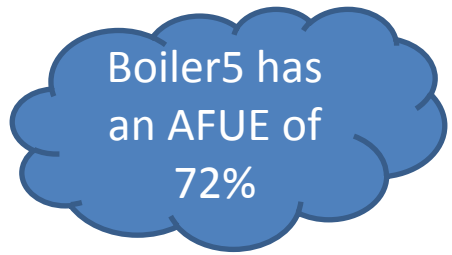


Less Data, More Information

- Convert data into tangible and useful information
- Communicate information to enable action
- Provide tools to fix problems; not an engineer in a box

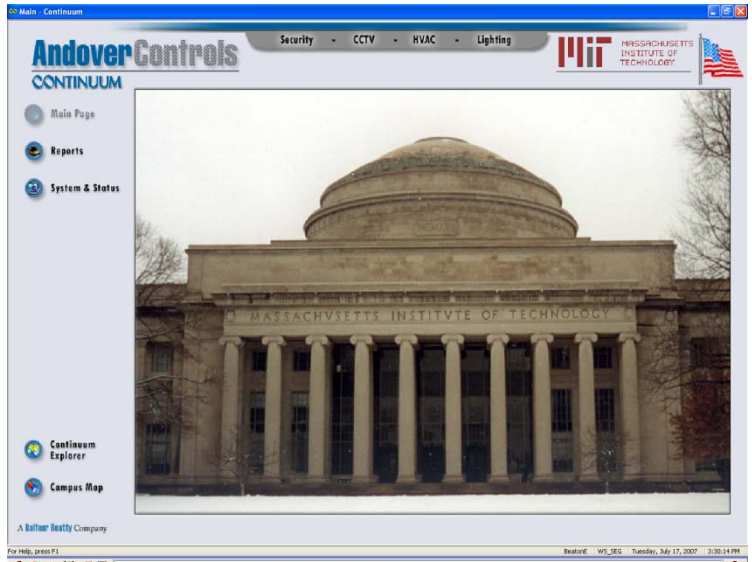


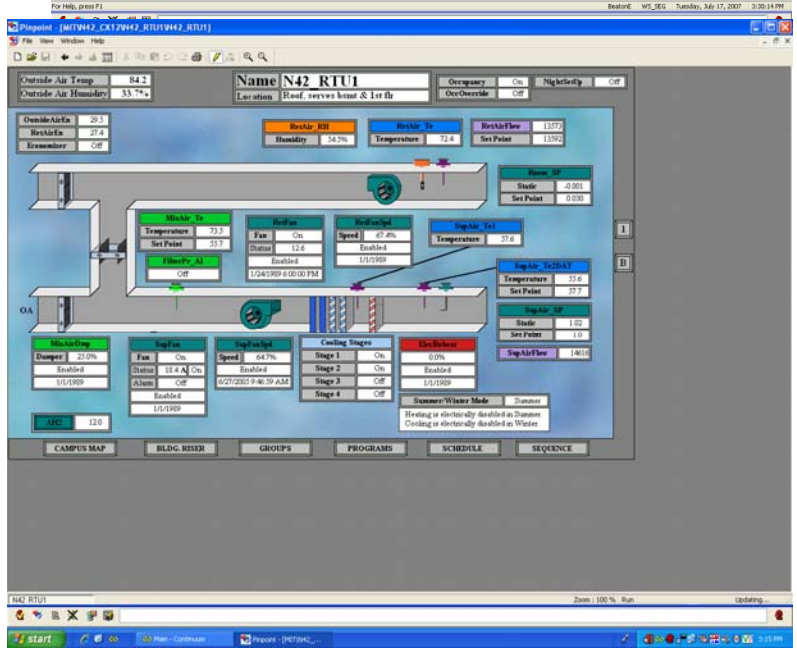




Case Study

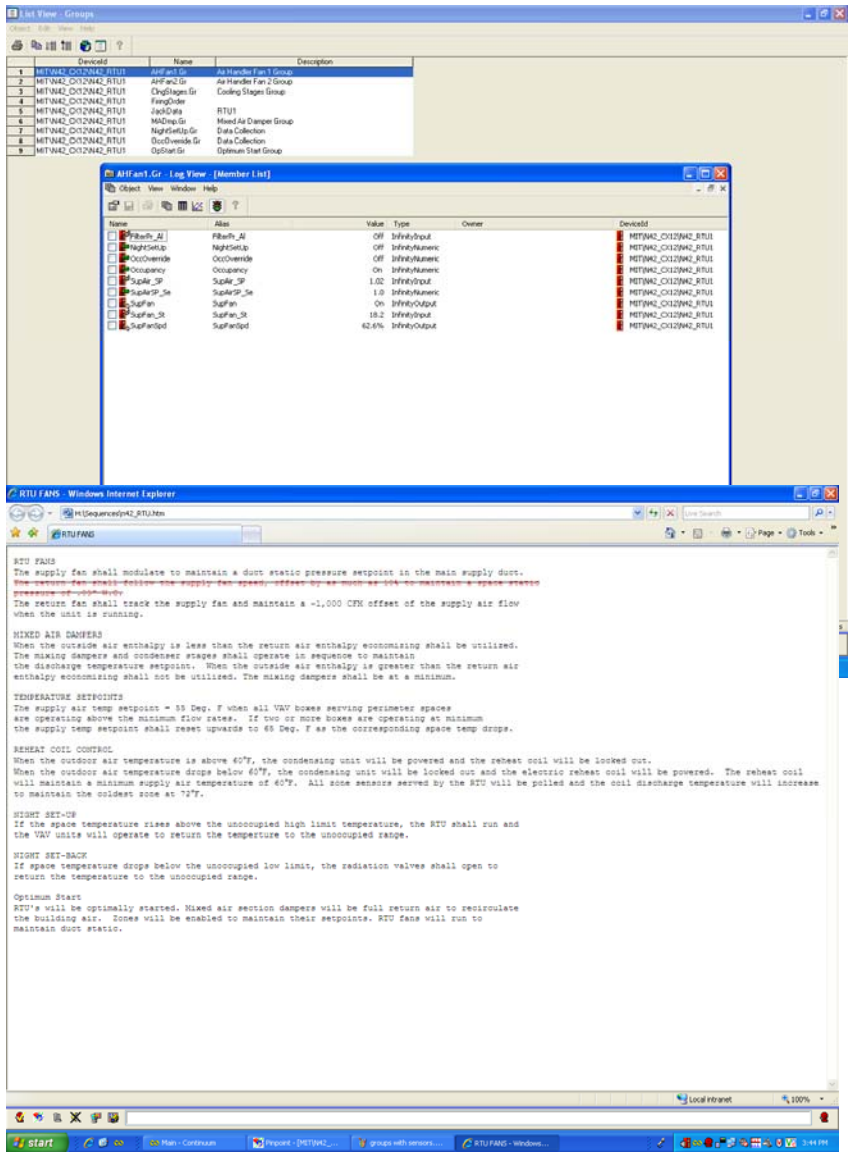
- Case studies at MIT on getting, using and managing BAS data
- 100,000+ devices over 2 Msf; largest of its kind from Schneider Electric (TAC)
- Typical BAS measurements





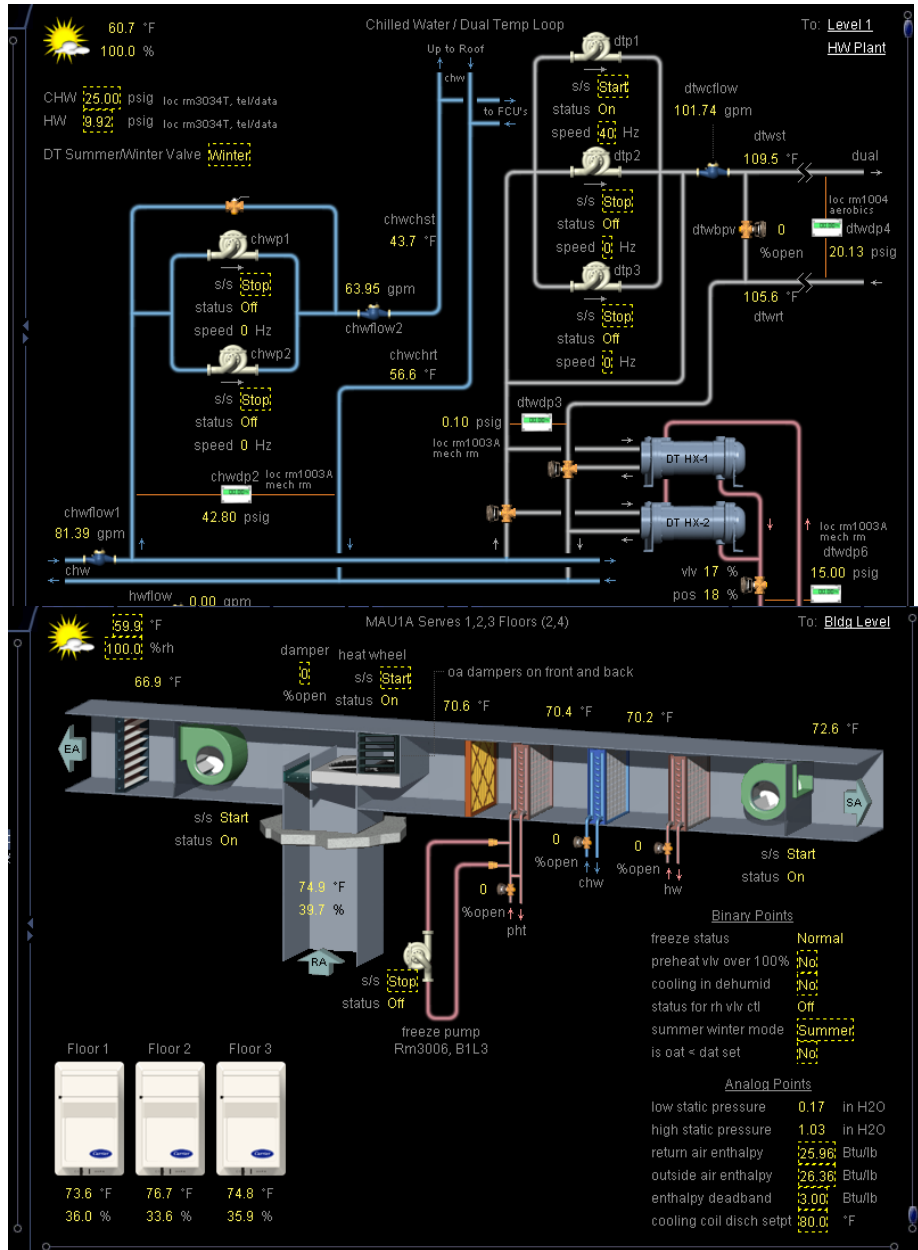
Extraction from MIT BAS

- Data logging through Continuum software
- 1 minute polling on preset groups of points
- Scheduled daily task for report compilation
- Extraction via email or workstation login



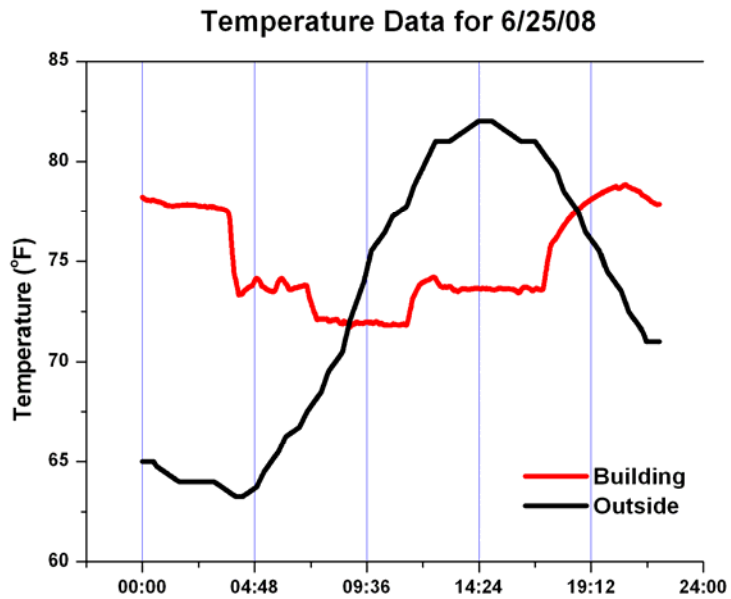
Notes on Extraction

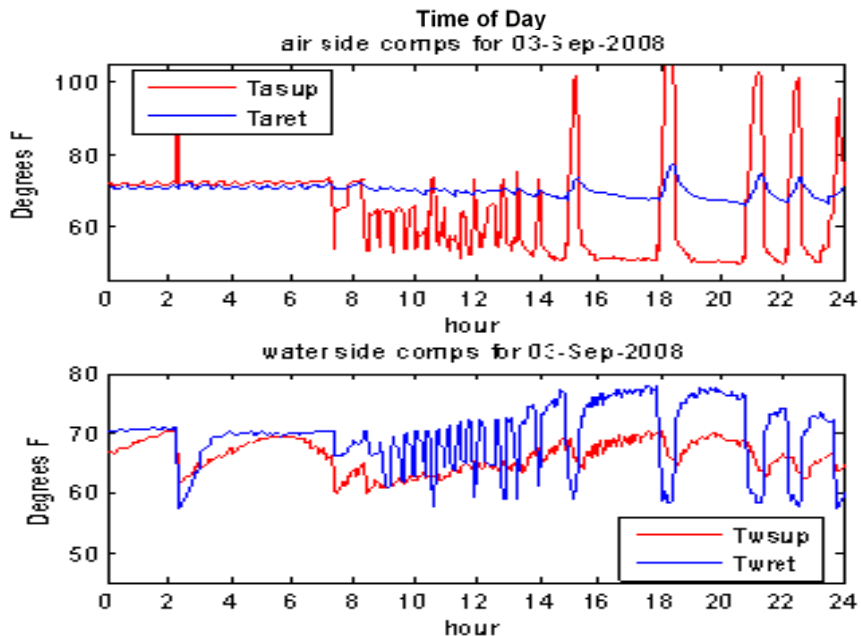
- Web-based “scraping” from any web interface, e.g. Carrier’s I-Vu
- Multi-source input, stored in standard XLS format, per day
- 3rd party polling programs can drag a network down!



Experience in Using Data

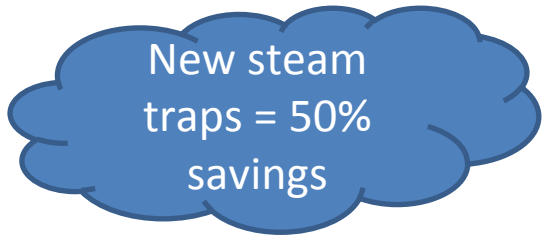
- Lots of data clean up
- Data is only as useful as the information it provides
- Value of analysis is the utility of information
- Decision makers don't care about *raw* or *interesting* data

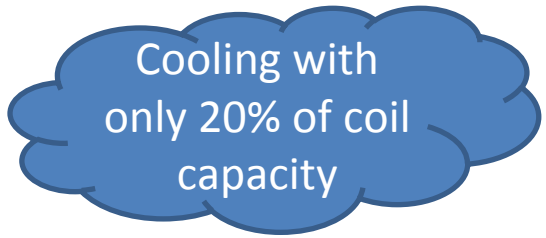


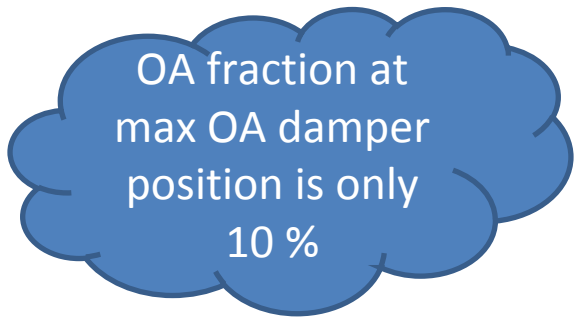


Making Data Useful

- Assume we can organize lots of data into one manageable structure
- What do decision makers want to know?
- What would engineers like to know?



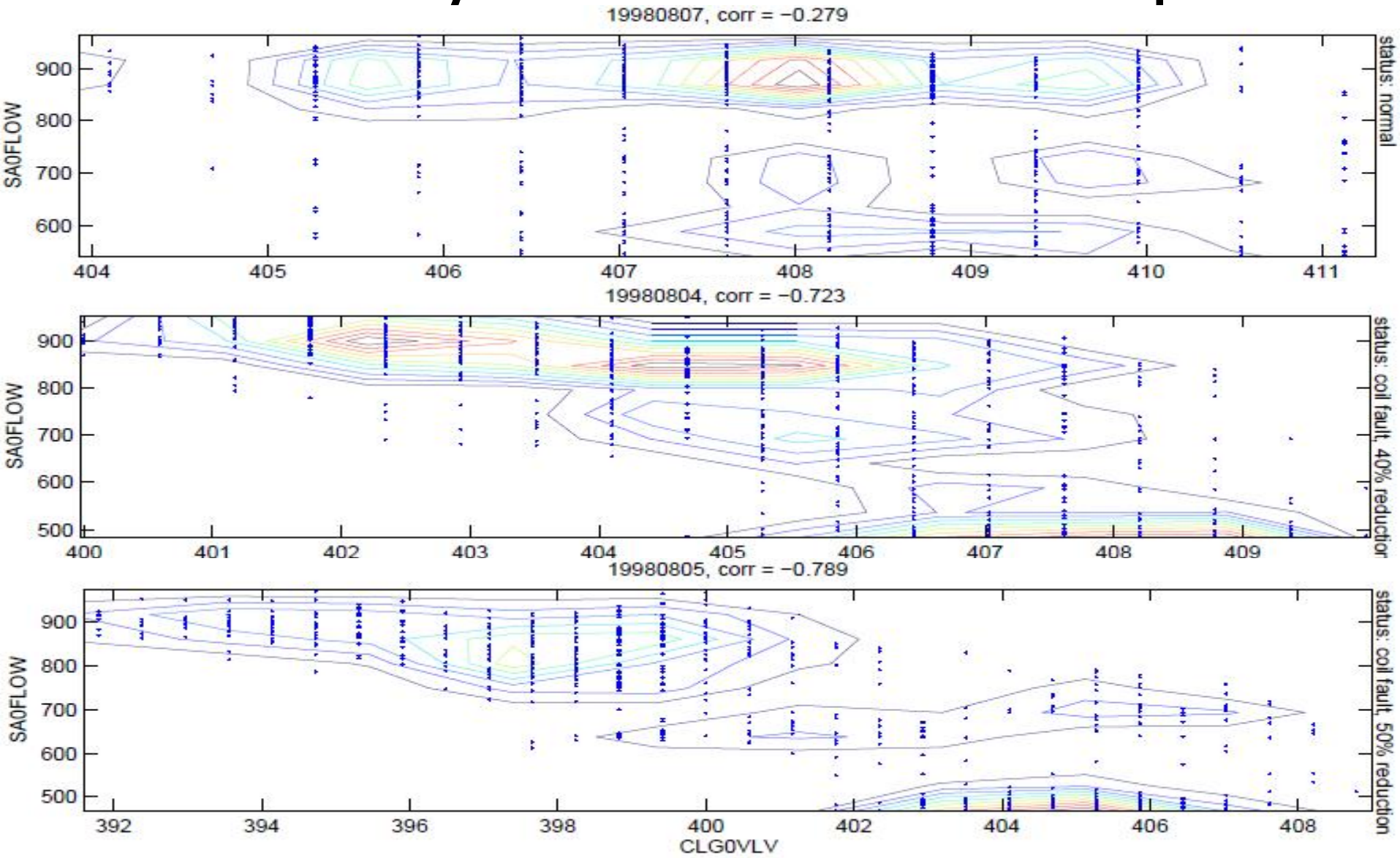




Accounting for Uncertainty

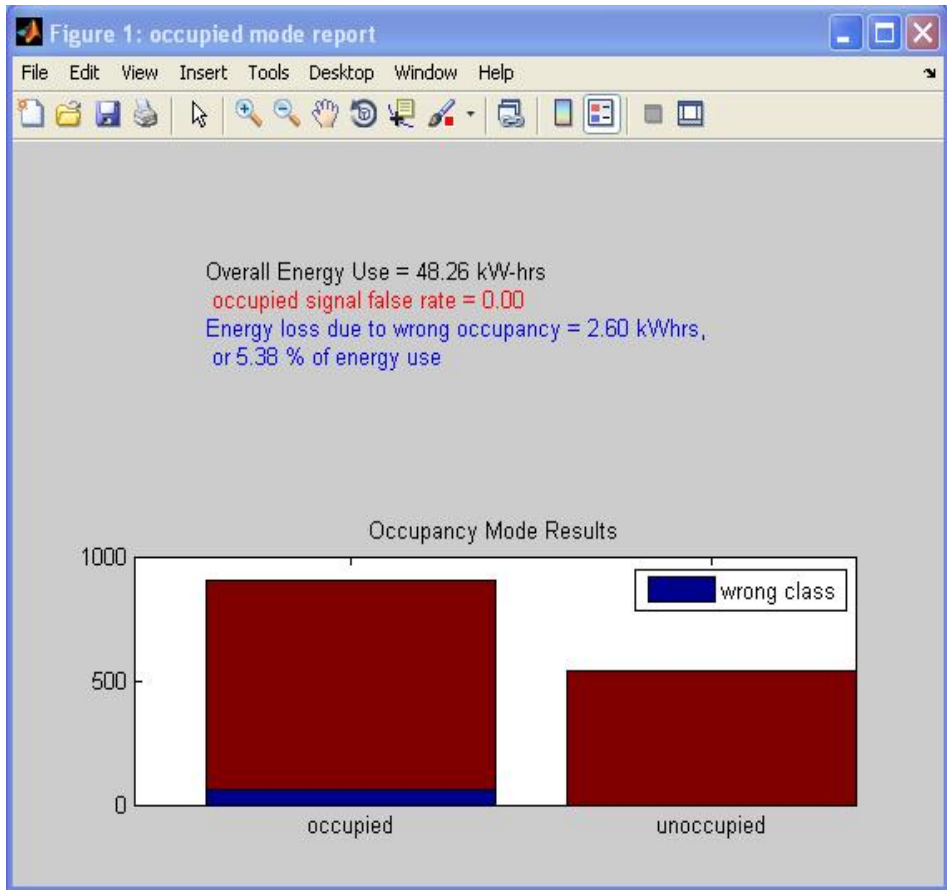
- Uncertainties from sensor placement, measurement, fault state etc
- Uncertainties about system status
- Raw data can come from anything…
- **Need robust, yet simple models: not everything to everyone**

Variability in SA flow vs. VLV pos



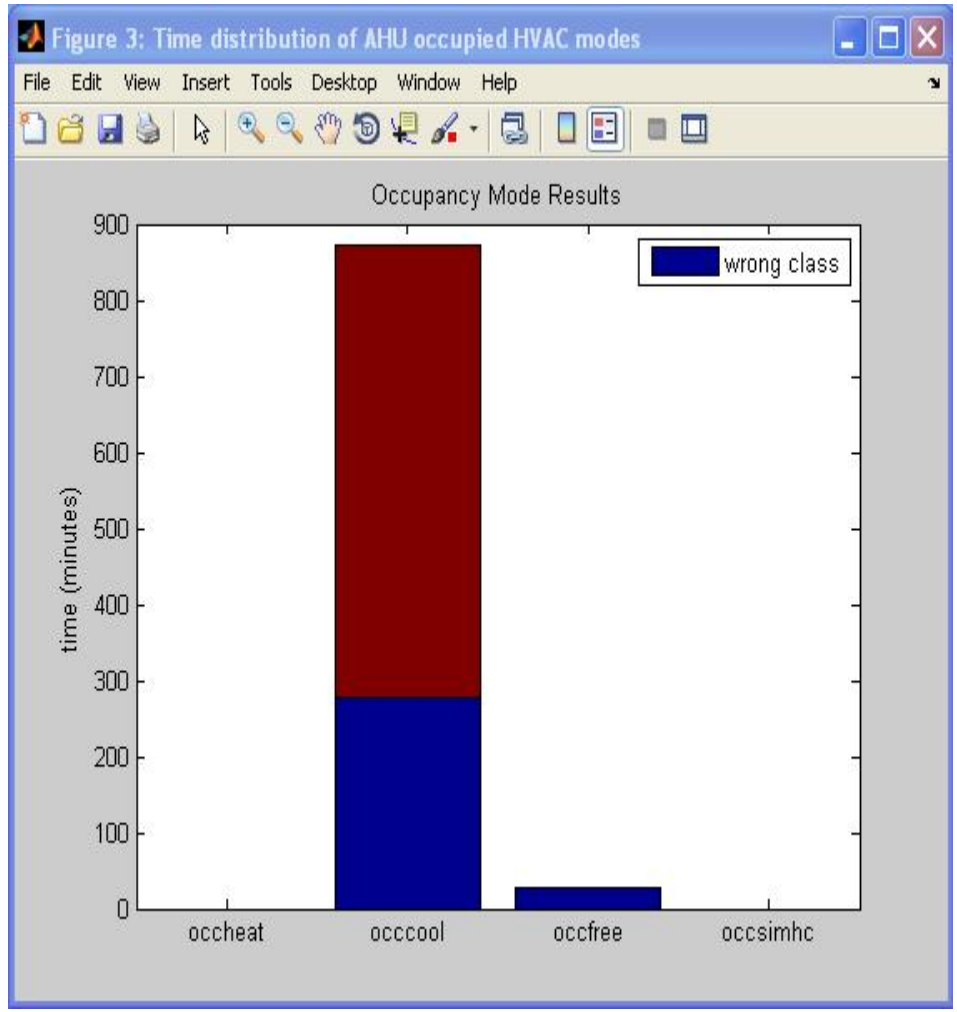
How We've Made It Work

- MIT's engineers just needed a few tools:
- What does the AHU do all day?
- Anything important I should know?



Simple, Useful, Actionable

- Equipment only does certain jobs
- How often does it do them?
- How often *it should not* be doing them?



Philosophy at MIT

- People fix buildings – not computers or networks
- Machines outperform people on quality control measurement for diverse equipment operations
- People can use quality control tools to streamline operations and save money

Where things can go

- Plenty of technology for getting and storing volumes of data from many disparate sources
- Intelligent systems that help define what you want from data, and then find it for you
- Robust analytical tools that deliver actionable information to help you get things done