# Take Control of your Control System---Federal Sector Case Studies

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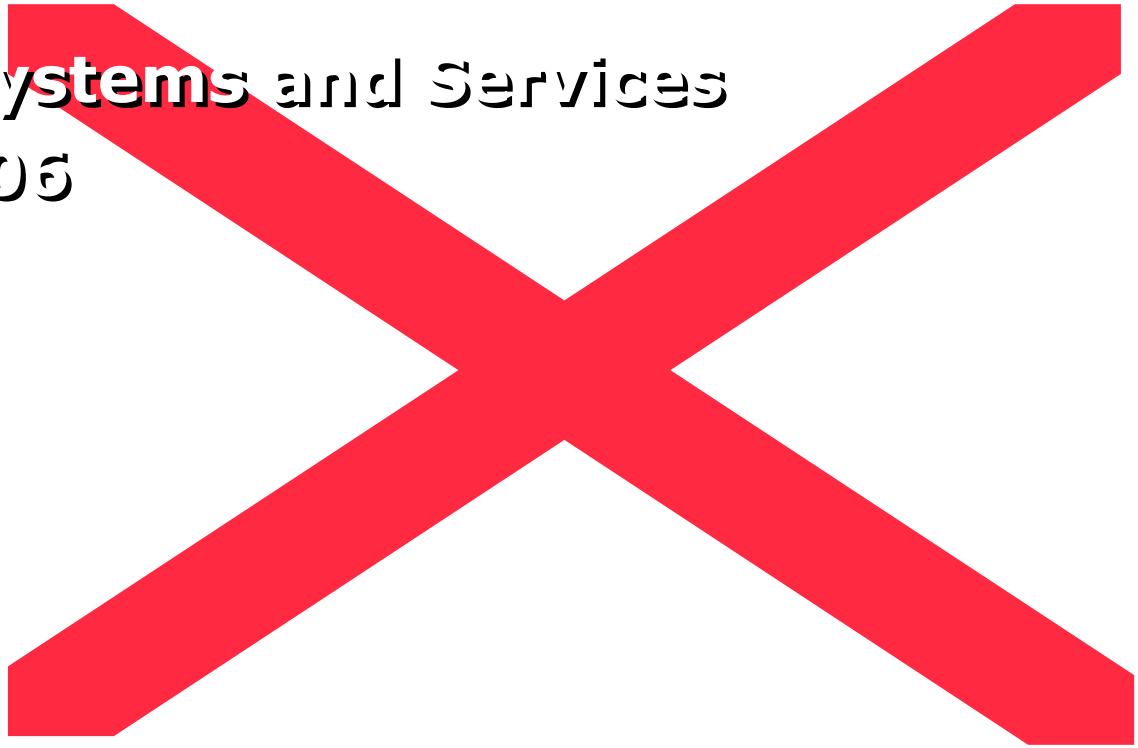


**Under the Hood: Operations and Maintenance**

- VA Medical Center
- Decatur, GA (Atlanta)

- Project: Integrate Multiple Control Systems into a Common User Interface and incorporate energy saving routines

- Energy Savings Performance Contract

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- Project Timeline

- Contract Awarded: Sept. 2003
- First BacNet Panel On-line: Feb. 2004
- Project Completed: Aug. 2004

# Outline

Under the Hood: Operations and Maintenanc e

- VA Medical Center; Atlanta, GA
- What we'll review
  - Original Conditions
  - Customer Needs/Wants
  - Obstacles
  - Implementation
  - Commissioning Results
  - Making system their own
  - Keeping it going

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Original Conditions:
- (3) Separate Control Systems
- (3) Separate User Interfaces
- Systems Include: DOS, Windows Application and Browser Based System

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Original DDC System between (3) Systems:

- (69) Air Handlers
- (810) Digital VAV Boxes
- (8) Chillers with pumps, etc..
- (9) Steam – HW Heat Exchangers
- Laboratories, Operating Rooms, Etc..

- 13,000 BacNet Points, 25 Gateways

- Approx. 700 Pneumatic VAV's remain

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Original System Obstacles:
- (User Interface)

- Real-time data questionable
- No alarming to warn of possible problems with the system
- No historical data for reviewing what happened when
- Staff unable to use different systems effectively

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- Original System Obstacles:
- (Energy Savings)

- Equipment Schedules unreliable
- Equipment Setpoint Reset routines not functioning

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Initial Review
- Where's the problem?
  - In the interface?
  - In the field?
- In this case the problem was in the interface….. Why…….?

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- While the control system interface was out of control
- The facilities department was definitely under control
  - Valves Connected
  - Dampers Connected
  - VFD's in Auto (Really?)

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Strategy:
- Ethernet Solution using in-place infrastructure
- Re-Use existing Digital controls with new interfaces for BacNet

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Obstacles to the Strategy:

- Review with Facility IT on using Intranet as a communication path
  - This requires support from the owner, COTR, sponsor, etc.. – without that – Don’t waste your time.
  - Alternate: Dedicated Ethernet network – this can be costly and not necessary if proper security measures are put in place.

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Obstacles to the Strategy:

- Getting other vendor contractors "on-board" with adding BacNet interfaces to current hardware.
  - Not really an obstacle other than just having to deal with the "technical jargon"

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Implementation:
- You can't spend enough time pre-planning for network connectivity
- (especially coming on the end of the budget year)

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Customer Wants:
- Single Interface easy enough for both the mechanics and operators
  - Floorplans, Accurate piping and flow diagrams
- Powerful enough to do ALL day to day operations with
  - Normally no need for another interface

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Customer Wants:
- Equipment Start/Stop Scheduling
- Equipment Setpoint Reset schedules based on Outside Air Temperature conditions

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Customer Wants:
- Alarming that warns when equipment fails or variables get out of range
  - He wants to know before the tenant
  - Adjustable alarm limits and time delays – NO NUISSANCE ALARMS

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Customer Wants:

- Data – Data – Data
  - Ability to review historical data to see when the happened
  - Ability to see when an alarm happened and sequence of events
  - Reports for common errors/conditions
  - Summary pages for extra important areas

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Implementation:
- Integrating multiple systems into a common system takes time
- Communication upfront with detailed objectives
- Knowledge is key –
  - Been there / done that

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- Once the System is On-line:
- Commissioning
  - When integrating an existing system commissioning should be a requirement not an alternate
    - Third party vs. Installing Contractor vs. Self commissioning

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Commissioning – What we saw
- When system was first brought on-line we did a spot-check of what was/was not working

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- Commissioning
- - What we saw next

- Third party commissioning provided detailed report on what was/wasn't working

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- Commissioning
- - What we found

- The third party commissioning report didn’t include some of the items that we found

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Commissioning
- - What we found next

- As we checked behind the commissioning agent still some items they identified were no longer issues

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Commissioning
- - So what was going on?
- Checked with customer
- Customer was using the system and making repairs in parallel to the commissioning

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- As I said before
- System was out of control
- But, the facilities department was in control

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Prior to us providing deficiency report
- Customer used system to make repairs with a brand new system – prior to training!
- Did I mention ease of use was a customer requirement?

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- Turning the system over

- Training
- Follow-up
- Training
- Follow-up
- Training
- Follow-up, Follow-up, Follow-up

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Training
- Three Parts
- Part One
- Initial Training (Overview)
- Short – Basic system use – get a feel for using the system

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Training

- Part Two
- Detailed Application Training
- The real nuts and bolts covering everything
  - Requires outline
  - Preferably Off-Site to minimize disruptions

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- Training
- Part Three
- Several Months Later
- Review of some of the details of using the system
  - Focus on day to day short-cuts
  - Problem areas

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Making it their system
- Obstacles
  - Specifications?
  - Pre-set alarm limits?
  - Owner input - required

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- Simple things make it their system
- Such as
  - Change what areas are labeled
  - Creating summary pages specific to their needs
  - Create reports showing items important to them

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Summary reports
- Such as specific areas though in separate parts of the building grouped together
- Freezers/refrigerators across the facility
- Common systems from separate parts of the building on a single page

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenanc e**

- Summary report (Freezers/Refrigerators)

**Refrigerators & Freezers**

| Room # | Temp | High Limit | Low Limit |
|---|---|---|---|
| Dairy Refrig., Rm# GC110E | 39.7 °F | 45.0 °F | 30.0 °F |
| Nourish. Refrig., Rm# GC111A | 37.9 °F | 45.0 °F | 30.0 °F |
| Meat Refrig., Rm# GC111F | 37.0 °F | 45.0 °F | 30.0 °F |
| Produce Refrig., Rm# GC111G | 33.6 °F | 45.0 °F | 30.0 °F |
| Cook's Refrig., Rm# GC111P | 33.8 °F | 45.0 °F | 30.0 °F |
| Freezer, Rm# GC117 | -3.7 °F | 10.0 °F | -10.0 °F |
| Mortuary Refrigerator, Morgue | 42.2 °F | 45.0 °F | 30.0 °F |
| Cooler Rm# 4A126 | 40.0 °F | 45.0 °F | 30.0 °F |
| Cooler Rm# 4A132A | 37.4 °F | 45.0 °F | 30.0 °F |
| Cooler Rm# 4A189B | 38.1 °F | 45.0 °F | 30.0 °F |
| Cooler Rm# 5A136 | 40.0 °F | 45.0 °F | 30.0 °F |
| Cooler Rm# 5A150 | 39.7 °F | 45.0 °F | 30.0 °F |
| Cooler Rm# 5A180 | 37.3 °F | 45.0 °F | 30.0 °F |
| Plasma Freezer, Rm 2B160 | -19.3 °F | -4.0 °F | -40.0 °F |
| Cooler Rm# 2B188 | 43.7 °F | 45.0 °F | 30.0 °F |

**Blood Banks**

| Room # | Temp | High Limit | Low Limit |
|---|---|---|---|
| Room 2C214 | 38.9 °F | 45.0 °F | 30.0 °F |
| Room 2C225A | 39.7 °F | 45.0 °F | 30.0 °F |
| Room 2C225B | 40.2 °F | 45.0 °F | 30.0 °F |
| Room 2C266 | 38.8 °F | 45.0 °F | 30.0 °F |
| Room 2B168(1) | 38.3 °F | 42.5 °F | 30.0 °F |
| Room 2B168(2) | 38.3 °F | 42.5 °F | 30.0 °F |
| MICU, Rm 2A128 | 34.9 °F | 45.0 °F | 30.0 °F |

**Incubators**

| Room # | Temp | High Limit | Low Limit |
|---|---|---|---|
| Room 2B184 (1) | 96.3 °F | 105.0 °F | 85.0 °F |
| Room 2B184 (2) | 96.5 °F | 105.0 °F | 85.0 °F |
| Room 2B184 (3) | 68.0 °F | 105.0 °F | 60.0 °F |

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Status Report (Setpoints Overridden)

**Status Summary**

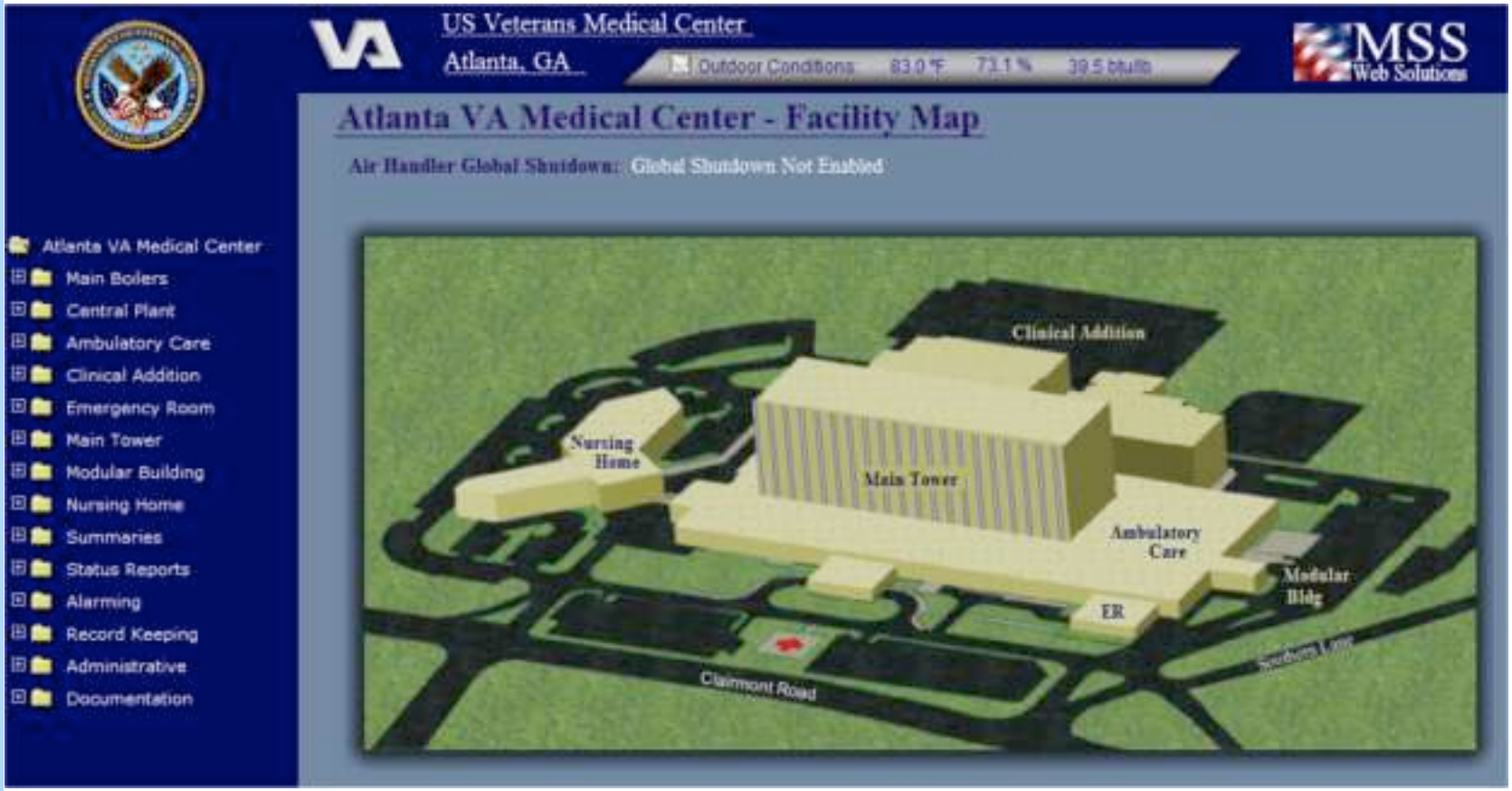
**Generated on 25 July 2006 at 11:14**

| Swid | Status | Summary |
|---|---|---|
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_2_37 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_2_46 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_12 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_18 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_19 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_2 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_22 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_23 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_24 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_25 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_3 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_4 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_6 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_7 | {ok} | Remote |
| /ATLVA/BACnet/BCU_12_Room_1A147/VAV_5_8 | {ok} | Remote |
| /ATLVA/BACnet/BCU_13_Room_1A209/VAV_4_13 | {ok} | Remote |
| /ATLVA/BACnet/BCU_13_Room_1A209/VAV_4_15 | {ok} | Remote |
| /ATLVA/BACnet/BCU_13_Room_1A209/VAV_6_11 | {ok} | Remote |
| /ATLVA/BACnet/BCU_13_Room_1A209/VAV_6_24 | {ok} | Remote |
| /ATLVA/BACnet/BCU_13_Room_1A209/VAV_6_29 | {ok} | Remote |

# Atlanta VA Medical Center

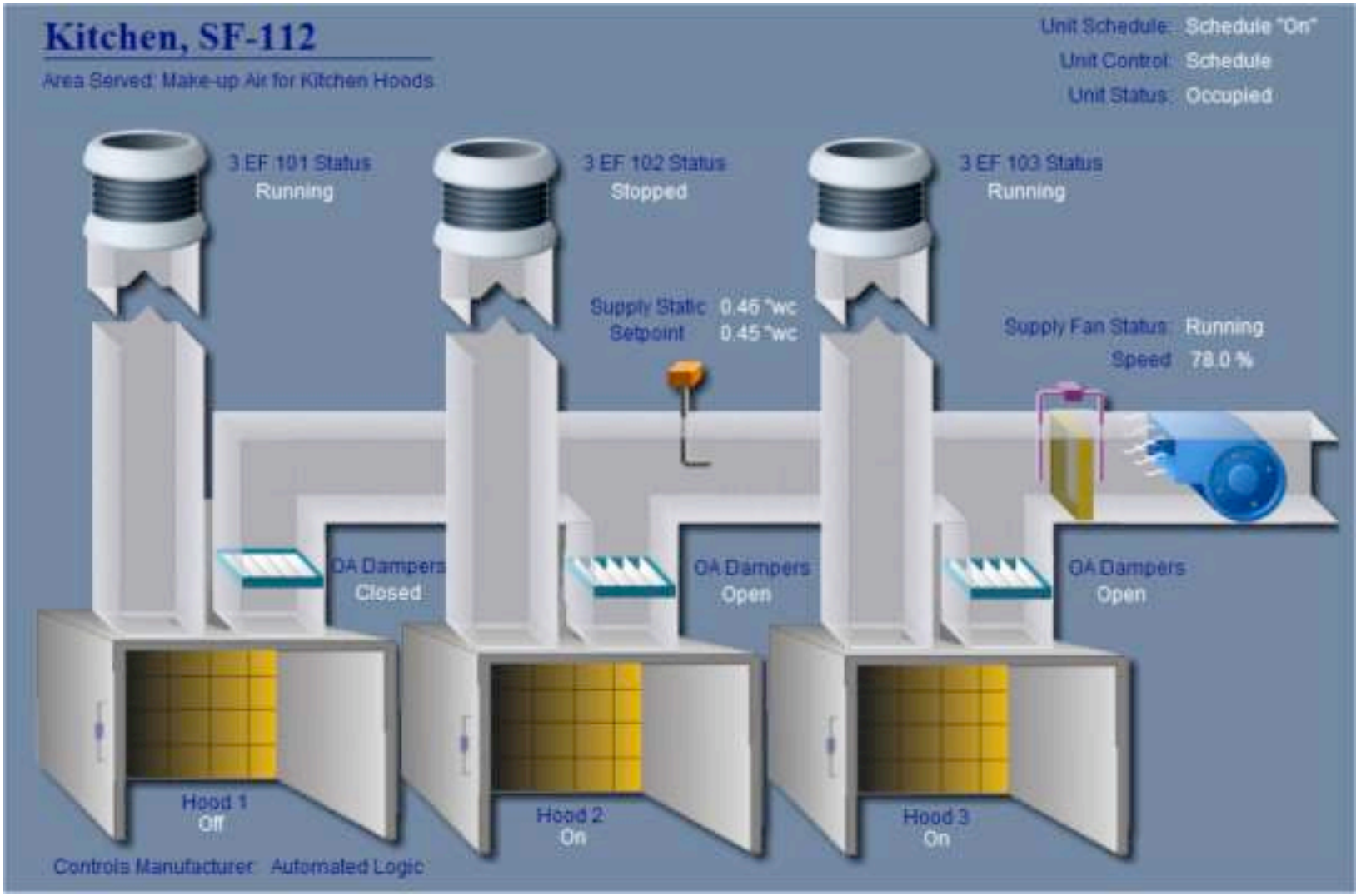
**Under the Hood: Operations and Maintenanc e**

- Home Page



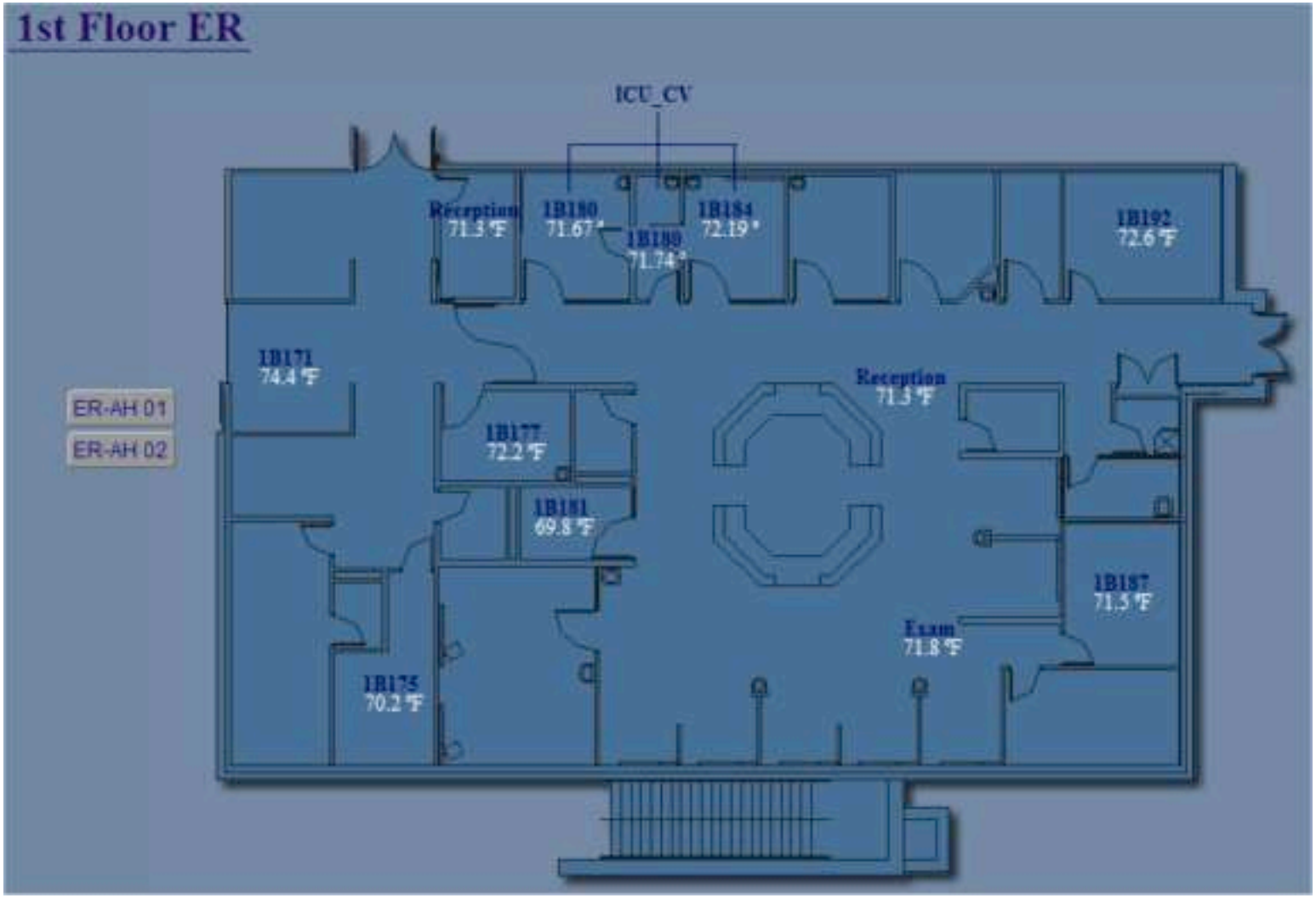
# Atlanta VA Medical Center (accurate flow diagram)

**Under the Hood: Operations and Maintenanc e**



# Atlanta VA Medical Center (floor plan detail)

**Under the Hood: Operations and Maintenanc e**



# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Keeping it going (Benefits)
- Benefits of a BacNet IP system for this facility
  - BacNet IP specifications exist that allow more vendors to bid
    - Before only one or two systems existed that limited bidders
  - More competitive on bid situations
    - Means more projects are in budget!

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Keeping it going (New Projects)
- Division 17
- (Integrator Specific Specifications)
- If you have an integrated system make it a requirement of the new contracts to keep it updated
  - Easy to do when the project is ongoing
  - Tough to come back and do later

# Atlanta VA Medical Center

**Under the Hood: Operations and Maintenance**

- Conclusion

- This was a successful multi-system integration because of:
  - Experienced Integrator
  - Involved Customer
  - Control vendors that performed
  - Customer continues to be involved
  - Integrator continues to support site

Under the Hood: Operations and Maintenance

- Thank You for your time!
- Questions?

- Other types of integrations that help maintain competitive compliance
  - BacNet IP
  - BacNet MSTP
  - LonWorks
  - OPC
  - Wireless?

**Under the Hood: Operations and Maintenanc e**

- Mechanical Systems & Services
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