Implementing Smart Hospital Systems

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III. Smart Operations
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PLANNING & STRATEGY
DEFINITIONS

SMART BUILDING

- Use of technology and process to create a building that is safer and more productive for its occupants and more operationally efficient for its owners.

SMART OPERATIONS

- Use of technology and process to create an operational environment that utilizes the smart systems for a continuous improvement strategy that effects capital planning, facility operations and staff training to meet the facility objectives.
NEW FACILITY VS. EXISTING FACILITY

NEW FACILITY

- Use of intelligent building systems is common place although intelligent operations may not always be adequately planned.

EXISTING FACILITY

- A plan needs to be developed to:
  - Evaluate current conditions (both systems and operations),
  - Identify a roadmap for system upgrades, integrations and replacements,
  - Execute an implementation plan for meeting the objectives,
  - Prepare an operational continuous improvement process
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September 23, 2014

INFORMED OPERATIONS

Planning and Strategy
SMART BUILDING TEAM

• Visionary
• System Architect
• Optimization Engineer
• Internal
  • Champion (PM)
  • Facilities
  • IT
  • Maintenance
SMART HOSPITAL VISIONING

• Evaluate processes for improved efficiency opportunities.
• Evaluate systems for automation and integration capabilities.
• Determine operation strategy for optimization.
• Determine energy improvement opportunities (large and small)
• Master plan for system implementation & optimization
SMART HOSPITAL BUDGETING

• Capital Expenses
• Operational Expenses
• Training Expenses
• ROI strategy
• Long term planning
IMPLEMENTATION
Implementation

STEPS

• Evaluation of Facility O&M Changes

• HVAC Systems Assessment

• Controls Scope Definition & RFP Development

• Contractor Selection

• System Implementation & Retro-commissioning
EVALUATION OF FACILITY O&M CHANGES

• O&M Process Evaluation

• Training
HVAC SYSTEMS ASSESSMENT

• Controls Sequence Review & Optimization
  • Air handling units / exhaust fans
    • Duct static pressure reset
    • Outside air control
  • Terminal unit controls

• Air Distribution Assessment
  • Current facility requirements
  • Airflows and setbacks
AIR DISTRIBUTION ASSESSMENT

- Variable volume vs constant volume, or CV/2-position
- Air change rates & pressurization requirements
  - FGI
  - Other codes/standards
- Unoccupied setbacks
  - Airflow and/or temperature
  - Assign setback schedules
AIR DISTRIBUTION ASSESSMENT - EXAMPLE

• Existing conditions:
  • Procedure rooms & prep/holding areas
  • Air change rate ~ 20
  • Constant volume
  • No automatic control of room return airflow
  • Occupied Mon-Fri 9am-5pm

• Assessment:
  • Perform cooling load → Reduce ACH to 15 per FGI
  • Change to CV/2-position terminal unit control
  • Implement occupied/unoccupied schedule
  • Requires minimum airflow balance / pressure map
Implementation

RFP DEVELOPMENT

• General system architecture

• Scope definition
  • As-buils
  • Additions/changes
  • Pneumatic-to-digital conversions

• Measurement & Monitoring Plan
CONTRACTOR SELECTION

• Qualifications
• Manpower – regional & local
• Products and graphics
• First cost
• Service costs
  • Labor
  • Fixed unit pricing
• Migration plan
• Owner training assistance
SYSTEM IMPLEMENTATION & RETROCOMMISSIONING

- Implement controls installation & new sequences
- Pressure mapping Before & After
- Validate proper functionality of AHUs and terminal units
  - Identify issues Repair or Replace
- Validate balancing & pressure relationships
- Validate controls graphics
SUMMARY

• Integrated approach
• Constant, open communication
• Detailed scheduling / phasing
• Proper budgeting plan for fixing issues
• Develop standards for future work
• Owner training is key
SMART (SUSTAINABLE) OPERATIONS
HEALTHCARE OPERATIONS “HOT TOPICS”

• Benchmarking
• Lean Operations
• Energy Footprint
• Metrics
• Big Data / Analytics

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PROGRAM GOALS

Implement an operations and energy management program geared towards:

1. Minimizing building system energy and water waste
2. Delivering measurable results in a cost-effective manner
3. Improving indoor environmental performance
4. Realizing long-term operations and maintenance cost reductions
SMART OPERATIONS PROGRAM

Step 1: Measurement & Monitoring
Step 2: Operations Dashboard
Step 3: Building Analytics
Step 4: Predictive Maintenance
Step 5: Ongoing Commissioning
Step 6: Reporting

MEASUREMENT & MONITORING

• Define System Inventory
• Define Measurements for Trending
• Define Metrics, Tolerances, and Trend Intervals
• Select, Install & Integrate Measurement Devices
• Data Tagging / Project Haystack
OPERATIONS DASHBOARD

- Data Visualization
- Customizable
- Real-Time
- Trending
- Web Accessible

http://www.periscopedashboard.com/overview/what-is-periscope
BUILDING ANALYTICS

- Smart Devices
- Database Overlay
- Real-Time
- Automated Fault Detection & Diagnosis
  - Performance Degradation
  - Operational Faults
  - Component Failure

http://allterrain.net/blog/how-we-use-big-data-to-create-customer-experiences/
PREDICTIVE MAINTENANCE

- Data-Driven
- Proactive
- Reduce
  - FTEs
  - Downtime
  - Energy Cost
  - Material Cost
- Link to Facilities Management Software

http://www.dglogik.com/products/dglux/editions/skyspark
ONGOING COMMISSIONING

• Data-Driven Optimization
• Device Calibration
• Technical Retrocommissioning
• Sustained Performance
• Systems Training

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Smart Operations

REPORTING

INTELLIGENT BUILDING PLATFORM

INFORMATION SERVICES CIO
MARKETING CMO
FINANCE CFO
OPERATIONS COO
BOARD OF DIRECTORS CEO

INTERNET
MOBILE DEVICES

BUILDING AUTOMATION SYSTEMS

ONGOING MONITORING, MAINTENANCE AND OPTIMIZATION
PUBLIC DASHBOARDS
FACILITY MANAGEMENT WORKSTATIONS
ENERGY MANAGER ENERGY STAR
FACILITIES MANAGEMENT
HUMAN RESOURCES

REPORTING AND USER DASHBOARDS