Big Data to Benchmarking...

Enjoy the Journey!

Laurie Gilmer, PE, CFM, SFP, LEED AP, CxA

Facility Engineering Associates
Meet Our Presenter:

• Lead FEA’s Facility Services division
• SME for IFMA’s Measurement, Monitoring & Reporting task group
• IFMA Instructor and serves as Chair of IFMA’s Scheme Committee for the SFP credential
• Co-authored the second manual in the sustainability “How-to Guide” series, EPA’s ENERGY STAR Portfolio Manager
Learning Objectives

• Better understand how to use data in decision making
• What questions to ask to choose services/products
• How to better communicate accomplishments and future opportunities using benchmark data
• Select the right metrics and KPIs which make sense for your organization
How to tell your story

1. Gather Data
2. Interpret Data
3. Utilize Data
Definitions

• **Big Data**
  – Extensive amounts of complex data about your organization pulled from many sources

• **Key Performance Indicators**
  – Critical metrics that can be measured against to determine success of core processes in an organization

• **Balanced Score Card**
  – Aligns and monitors performance in comparison to core business values

• **Benchmarking**
  – Comparison of metrics against “targets”
Gathering Data

- Surveys
- Sensors
- Orders
- Alarms
- Databases
- Software
- Customer expectations
Information sources

- FM Information System
- Staff
- Internal Surveys
- Utility Companies
- Service Companies
- Vendors
- Building Automation System
- Energy Management System
- Other Internal Systems
FM Software: An Alphabet Soup

- CMMS: Computerized maintenance management system
- CPS: Capital planning system
- BAS: Building automation system
- GIS: Geographical information system
- BIM: Building information modeling
- ERP: Enterprise resource planning
- IWMS: Integrated work management system
- DMS: Document management system
- CAFM: Computer aided facility management

- BIM
- GIS
- ERP
- IWMS
- DMS
- CAFM
CMMS Opportunity: COBie

COBie: Construction Operations Building Information Exchange
Standard method to exchange information between systems to drive down cost

Design and Construction Data

Facility Management

http://thelinkbetween.wordpress.com/2011/02/16/bridge-building/
What is Included in COBie

- Number and names of floors
- Room numbers and names
- Occupancy classification
- Contact information
- Spare part information
- Preventive maintenance procedures
- Closeout submittals, O&M manuals, product data
BIM: An Abundance of Data

Responsibilities of the FM team:

• Define what data you need and why
• Determine process changes to realize benefits of increased data availability

Tip: Integration can be expensive, start by defining processes.

Tip: Answer these questions: 1) What data do you need? 2) Why?
Starting from the Inside Out

1. Why is data needed?
2. How will the data be used?
3. What data is available?
Interpreting Data

• Analytics: Discovering and communicating meaningful data
• Select metrics KPIs
• Follow your Strategic Plan
Say “yes” to data gathering if it will help...

1. Determine how money/resources are spent (financial)
2. Demonstrate alignment/meeting strategic goals (organizational)
3. Improve the operation of buildings or organization (operational)
**Measurement vs. Metric**

**Measurement**: Value read from a sensor or meter

Examples: Watts, CFM, GPM, CO₂

**Metric**: Unit of measure that can be used to assess performance

Examples: W/SF, kWh/SF
Opportunity: The Value of Data

- Support quick, compelling decisions
- Communicate value to a broad audience
- **Past accomplishments**: Organizational impact, such as demonstrating success
- **Future opportunity**: Potential opportunity to make an impact

**Tip:** Nearly any metric can be equated to dollars.... Although soft costs can be hard to quantify

**Tip:** Collecting the right data can be expensive. To optimize your investment, understand why specific data is being collected. Ask: How will the data be used?
Two Questions:

1. How does your organization make decisions?
2. How do you measure success?
“The problem is that most companies collect and report a vast amount of everything that is easy to measure and as a consequence their managers end up drowning in data while thirsting for insights...In order to identify the right KPIs for any business it is important to be clear about the objectives and strategic directions”

- Bernard Marr, *The 75 KPIs Every Manager Needs To Know*
Measurement – Balanced Scorecard

**Financial Perspective**
How do we look to our financial stakeholders?

**Customer Perspective**
How do our customers see us?

**Process Perspective**
What must we excel at?

**Employee Perspective**
Can our employees continue to improve and create value?

**Strategy**
MISSION

“To provide the facilities and operational support required to fulfill the mission, vision and values of M. D. Anderson Cancer Center.”

**Customer Perspective**
Deliver products that our customers need and value. Our customers recognize us as their provider of choice.

**Process Perspective**
Products that are produced and delivered by continually enhanced processes, efficiently, and seamlessly.

**Learning and Growth Perspective**
A Facilities Management organization whose people possess the latest skills and knowledge, and are recognized for their contributions to the institution.

**Financial Perspective**
Optimally used resources that provide the best value when compared to other providers and which are utilized in total alignment with the strategic goals & mission of the institution.

**CORE VALUES**
Caring, Integrity, Discovery
MISSION

“To provide the facilities and operational support required to fulfill the mission, vision and values of M. D. Anderson Cancer Center.”

1. Establish a proactive customer service program
2. Develop partnerships with customers for mutual success
3. Implement effective customer service feedback and measurement system
4. Simplify and streamline processes
5. Improve the delivery of service
6. Integrate technology to improve services
7. Adopt best practices to improve services
8. Provide appropriate training for our employees
9. Formalize a program for career development
10. Prepare and encourage employees to implement new techniques
11. Establish a high level of accountability
12. Align department priorities with institutional requirements
13. Benchmark performance
14. Maximize asset utilization

Figure 3
<table>
<thead>
<tr>
<th>Customer Perspective</th>
<th>Objectives</th>
<th>Measurements</th>
<th>Targets</th>
</tr>
</thead>
</table>
| Establish a proactive customer service program | a. Custodial QA Inspection Hits  
b. Emergency Response Times  
c. Percent of Rework (call backs) | a. < 5 per Inspection  
b. < 15 min. for Priority 1  
c. < 3 % |
| Develop partnerships with customers for mutual success | a. On-Site Supervisor Time  
b. Annual Customer Expectations  
c. Manager Contacts w/ Customers | a. > 65 %  
b. APPA Level 1 or 2 Scores  
c. > 1 per quarter |
| Implement effective customer service feedback and measurement system | a. Customer Satisfaction  
b. Percent WO w/ Customer Feedback  
c. Top Ten WO Trouble Codes | a. > 95 %  
b. > 15 %  
c. # & type |
### Internal Process Perspective

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Measurements</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplify and streamline processes</td>
<td>a. Workforce Productivity</td>
<td>a. &gt; 60 %</td>
</tr>
<tr>
<td></td>
<td>b. WOs Initiated by Staff vs. Customer</td>
<td>b. Trend</td>
</tr>
<tr>
<td></td>
<td>c. Hours Spent on Unscheduled WOs</td>
<td>c. &lt; 10 %</td>
</tr>
<tr>
<td></td>
<td>d. Materials On-Time Delivery</td>
<td>d. &gt; 97 %</td>
</tr>
<tr>
<td>Improve the delivery of service</td>
<td>a. PM Schedule Completion Rate</td>
<td>a. &gt; 95 %</td>
</tr>
<tr>
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<td>b. Unscheduled Downtime</td>
<td>b. &lt; 2 %</td>
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<td></td>
<td>c. Temperature/Relative Humidity</td>
<td>c. Time in Specified Range</td>
</tr>
<tr>
<td></td>
<td>d. Elevator Traps per Bldg per Month</td>
<td>d. &lt; 1 per month</td>
</tr>
<tr>
<td></td>
<td>e. WO Completion Targets</td>
<td>e. Meets standard times by priority</td>
</tr>
<tr>
<td>Integrate technology to improve services</td>
<td>a. PT&amp;I Completion Rates to Schedule</td>
<td>a. PT&amp;I completion rate &gt; 90%</td>
</tr>
<tr>
<td></td>
<td>b. Labor Costs Charged to Work Orders</td>
<td>b. &gt; 95 %</td>
</tr>
<tr>
<td></td>
<td>c. Material Costs Charged to WOs</td>
<td>c. &gt; 95 %</td>
</tr>
<tr>
<td>Adopt best practices to improve services</td>
<td>a. PM to CM Ratio</td>
<td>a. 80 % (PM) to 20 % (CM)</td>
</tr>
<tr>
<td></td>
<td>b. Materials/Stockroom Turns per Year</td>
<td>b. 2 to 3 Turns per Year</td>
</tr>
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<td></td>
<td>c. PM Compliance for Critical Systems</td>
<td>c. 100 %</td>
</tr>
<tr>
<td>Learning &amp; Growth Perspective</td>
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<td>Measurements</td>
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</tbody>
</table>
| Provide appropriate training for our employees | - | a. Increased employee satisfaction  
b. Annual staff training hours  
c. Facility Center training compliance | a. Employee satisfaction > 95%  
b. > 40 hours annually  
c. >95% |
| Formalize a program for career development | - | a. Decreased staff turnover  
b. Staffing needs and gap analysis  
c. Number of CFM or EFP certifications  
d. Number of trades credentialing | a. < 10%  
b. < 10%  
c. > 5 per year  
d. > 10 per year |
| Prepare and encourage employees to implement new techniques | - | a. Root Cause Analyses  
b. Number of preventable breakdowns  
c. Staff innovations | a. > 75%  
b. < 2%  
c. TBD |
### M. D. Anderson Facilities Division Balanced Scorecard

#### Financial Perspective

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<th>Objectives</th>
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</table>
| **Establish a high level of accountability** | a. Reduced lost time accidents  
b. Reduced overtime usage  
c. Actual O&M expenses to budget  
d. % Planned WOs covered by estimate | a. < 50 per year  
b. < 10%  
c. + or - 4%  
d. > 90% |
| **Align department priorities with institutional requirements** | a. Priority project completion rate  
b. Increased Energy Savings  
c. Sustainable FM score | a. TBD  
b. TBD  
c. Sustainability Radar Chart |
| **Benchmark performance** | a. Facility Condition Index (FCI)  
b. Facility Operating Index (FOI)  
c. Minimize TCO  
d. Capital reserve funding  
e. Change in GSF maintained | a. < 0.05  
b. < $7.55 per s.f.  
c. < $18.50 per sf  
d. > 2% of CRV  
e. < 2% increase |
| **Maximize asset utilization** | a. Cost of breakdown repairs  
b. Mhrs spent on emergency repairs  
c. Space Utilization Index (SUI)  
d. System lifecycle performance | a. < 2 %  
b. < 3 %  
c. > 92 %  
d. > 10% EUL (design life) |
Selecting Meaningful KPIs

- Focus
- Validity
- Connectivity
- Integration
Selecting Meaningful Metrics & KPIs

• Mission
• Vision
• Values
## Selecting Meaningful KPI

### Balanced Scorecard Perspective

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Targets</th>
<th>Information Provided</th>
<th>Input / Data Required</th>
<th>CMMS Priority</th>
<th>Type Metric</th>
<th>KPI Level</th>
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<tr>
<td>Customer Awareness, Response, and Feedback</td>
<td>G Y R</td>
<td>Customer satisfaction surveys</td>
<td>No internal data</td>
<td></td>
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<tr>
<td>Top Ten VO Trouble Codes</td>
<td>R Y</td>
<td>Trouble ticket resolution</td>
<td>No Trouble ticket</td>
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<td>Work Distribution by Type</td>
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<td>Open Work Orders (VO) by Type</td>
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CMMS: Top 10 Supporting Metrics

1. PM-PdM/CM ratio
2. PM-PdM compliance
3. PM-PdM effectiveness
4. Uptime, also called reliability
5. Rework
6. Work order type distribution
7. Work order aging
8. Overall equipment efficiency (OEE)
9. Overall craft effectiveness (OCE)
10. Top 10 problem codes

Tip: Multiple metrics are important

Story: PM compliance is not enough
CAFM: Supporting Metrics

- Total cost of ownership
- Space utilization rate
- Cost per assignable square foot
- Cost per non-assignable square foot
BAS: Supporting Metrics

• **Building or campus level**
  - Energy: kWh/SF/year
  - Energy: % energy consumption by fuel type
  - Labs: CFM/SF

• **System level**
  - Energy: % energy consumption per system type
  - Equipment operation: Hours of operation
  - Air handler energy consumption: Air handler power consumption (kW) vs. OAT
KPIs/Benchmarks/Technology Summary

1. Start w/ the End in Mind
2. Limit Data and Focus Measurements
3. Technology is a Tool
Utilizing Data

BIG DATA

Sort through data

METRICS

Determine critical data

KPIs

Align data with strategic plans

Define Best Practices and industry standards to fine tune KPI

Compare data to targets

Balanced Score Card

Benchmarking
Utilization Tools

• Balanced Score Card
  – Clearly links KPIs to Strategic Plan

• Benchmarking
  – Compares metrics to standards and other organizations
Benchmarking

“It could be seen as a set of numbers, but the real value of benchmarking comes from how this information is used. It has the most impact when it is used to question concerns, or demonstrate the value that good facilities management delivers to the organization” (BIFM, Benchmarking: Effective performance management for FM).
Benchmarking

• Internal vs. External
  – Measure against yourself
  – Measure against other organizations

• “Targets”
  – Best Practices
  – Industry Standards
  – Top Organizations
Internal Benchmarking

• First step in benchmarking
• Takes years to get valid results
• Continuous and on-going process
• Most organizations already do this in some way
External Benchmarking

“In many ways, FMIs at ground level are using benchmarking without appreciating that it is ‘benchmarking’, because measuring performance, setting targets and standards, and making continuous improvements is already an intrinsic part of their job. What they are not doing, however, is comparing this data with other organizations, and that is the next required level to deliver the best benefit” (BIFM, *Benchmarking: Effective performance management for FM*).
External Benchmarking

- Look to industry leaders
- Many benchmarking sources are available
- Circle back to selecting KPIs
- Not just about costs
Benchmarking Sources
Benefits of Benchmarking

- Identify best practices
- Reduce costs
- Help earn a “green” designation
  - Building Certification
  - ENERGY STAR
- Add values to your facilities
Benefits of Benchmarking

• Support business case for change
• Identify strengths and weaknesses
• Justify costs and practices
• Justify energy efficiency improvements
• Conduct trend analysis
Case Study: Facility Maintenance Program

- Multi-year plan for correction of existing deficiencies
- Identify capital projects and deficiencies
- Prioritize projects
- CMMS upload able data

Bottom line:
How much money is needed to maintain facilities?
Nearly 2,000 lines of data...
To understand this:

<table>
<thead>
<tr>
<th>Annual Funding Needs</th>
<th>FCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1</td>
<td>$9.0M</td>
</tr>
<tr>
<td>Building Group 1</td>
<td>$5.4M</td>
</tr>
<tr>
<td>Building Group 2</td>
<td>$3.1M</td>
</tr>
<tr>
<td>Site</td>
<td>$0.5M</td>
</tr>
<tr>
<td>Site 2</td>
<td>$2.3M</td>
</tr>
<tr>
<td>Site 3</td>
<td>$0.3M</td>
</tr>
<tr>
<td>Site 4</td>
<td>$0.9M</td>
</tr>
</tbody>
</table>
And this:

Expenditures Over 20 Year Study Period

- G30 Site Civil / Mechanical Utilities
- A20 Basement Construction
- G20 Site Improvements
- B10 Superstructure
- A10 Foundations
- E10 Equipment
- D20 Plumbing
- F20 Selective Demolition
- D10 Conveying
- D40 Fire Protection
- C10 Interior Construction
- D50 Electrical
- B20 Exterior Enclosure
- B30 Roofing
- D30 Heating, Ventilation, and Air Conditioning
- C20 Interior Finishes

Condition Index
- Green: Excellent
- Blue: Good
- Yellow: Fair
- Orange: Below Average
- Red: Poor
The Future of Data
Summary

• Understand the alignment between your organization and FM
• Utilize metrics that demonstrate performance against strategic goals
• Be selective about how much you measure and manage
• Use the data to make decisions and tell the story of your FM success
Thanks!

Laurie Gilmer, PE CFM, LEEDAP, CxA
Facility Engineering Associates
laurie.gilmer@feapc.com