BIM for facilities management

Capturing operational efficiencies and cost savings NOW

© EcoDomus, Inc. 2011

By Neil Parker
Agenda

Item 1: Who Is EcoDomus

Item 2: The Future of Facility Management

Item 3: Lack of Information leads to a lifetime of inefficiency

Item 4: Real Life Case studies

Item 5: Revised Data Collection and Usage/COBie

Item 6: Final Thoughts
About EcoDomus

• Software and consulting firm with headquarters in San Francisco, with regional offices in Washington DC, Chicago and New York
• Focus on BIM and Lean for Building Lifecycle Management
• Some of our clients:
Excerpts from

BIM SURVEY
The Future for Facilities Management

Francisco Forns-Samso, graduate student in the Construction Program at UNM in collaboration with BIM Workx conducted a research study in the area of Building Information modeling and Facilities management. Some of the preliminary results of that study follow.
The Future for Facilities Management

- Over 50% of the respondents manage campus type facilities in excess of 1 M gsf, and 35% over 5 M gsf
- Respondents were a good cross section of Education, Office, Government, Laboratory
- The majority handled over 30,000 work orders per year
Respondents were asked to view a video about Building Information Modeling (BIM)

After viewing, they were asked how often they would use BIM if they could access information as shown in the video?

- 63% said they would use it often or all the time
- 39% could see a possible savings between 20-40% per work order
The Future for Facilities Management

Owner

- Researchers
- General Manager
- BIM Managers
- Architects/Contractors
- GIS/CAD Techs
- Craftsmen
- Operations & Maintenance
- Facilities Engineers
- Facilities Managers

© EcoDomus, Inc. 2011
The Future for Facilities Management

**Type of Facility**
- Campus with multiple buildings: 55%
- Individual buildings in multiple locations: 18%
- Multiple campuses with multiple buildings: 9%
- Other: 6%
- 1 building in a single location: 12%

**Size of Facility**
- Over 5 million sf: 34%
- 1 million to 5 million sf: 21%
- 100,000 to 500,000 sf: 14%
- Under 100,000 sf: 14%
- 500,000 to 1 million sf: 8%
- Don't know: 9%

© EcoDomus, Inc. 2011
The Future for Facilities Management

Accuracy of As-Built Drawings

- **Perfect** - always use, information as provided is 100% accurate (0%)
- **Above Average** - often use and trust information shown but incomplete (23%)
- **Average** - use occasionally and trust information shown (35%)
- **Below Average** - will use but do not trust fully (30%)
- **Poor** - rarely use, do not trust information (12%)
Current accessibility to O&M information

© EcoDomus, Inc. 2011
Birgitta Foster (BSME, MBA) of Sandia National Labs conducted a “straw man” survey of her operation

- Studied 24,000 work orders out of over 32,000 annually
- Average labor per work order 5 hours
- Time spent by technician researching 2 hrs
- Finding and reviewing O&M manuals
- Finding and reviewing other documents
- Finding work object within the building
- Locating access point to work object
- Does not include locating parts or other material
The Future for Facilities Management
Sandia “straw man” survey - FINDINGS

- 40% of the work order is lost labor
- Labor cost is $50.00
- Sandia completes over 32,000 work orders per year
- If research labor could be reduced 1 hour
  - 32,000 WO * 1 hr * $50.00/hr = $1,600,000.00
- Reducing research to 5 minutes
  - 32,000 WO * 1.97 hr * $50.00/hr = $3,066,720.00
The Future for Facilities Management

National Institute of Standard and Technology
Study GCR 04-867, Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities

© EcoDomus, Inc. 2011
Lack of Information - a lifetime of inefficiencies

At the financial completion of a project the construction manager typically delivers a truck-full of boxes of paper (or CD's containing e-paper) to the facility manager.

It is assumed that this information can assist the Facility Manager to maintain, operate, and track assets within the building.

More often than not this information is delivered months or years after the building has been occupied.
Lack of Information - a lifetime of inefficiencies

When it is delivered, it is ultimately placed in a storage room (or if it’s electronic in a drawer) where it is never used.

Typical close out documents are:
- As Built drawings (design data remains, or partially replaced)
- Air Balance reports
- Commissioning reports
- O & M Manuals

© EcoDomus, Inc. 2011
Lack of Information - a lifetime of inefficiencies

By one estimate a 50,000 sq.ft. office building would require over 2000 man hours (that is 1 man 1 year) to enter component data into a CMMS application.

This assumes that all data was properly collected and formatted from the designers, contractors, and commissioning agents.

The cost of data entry for the owner is over $80,000.

That is on top of what the designer, contractor, and commissioning agent spent to collect the data in the first place.
Solution
Integrate BIM with FM/O&M Applications

Compare “As Designed” with “As Operated” and “As Maintained” for intelligent decision making

BIM Model (Revit, other)

GIS Apps (ESRI, Google Earth)

CMMS
Maximo, TMA, AssetWorks, FAMIS, other FM software

Lifecycle Building Support Provider

BAS, EMS, LS
Honeywell, Siemens, Johnson Controls, automated systems

© EcoDomus, Inc. 2011
Real Life Case Studies

1. Maintenance Work Order Management
2. Emergency Service Request / Disaster Recovery
3. Energy Systems Analysis / “Greening” of Facilities
4. Visual Work Orders
5. Leasing Presentations and Analysis
6. Visual Inventorying / Assets Reconciliation
7. Facility Condition Assessment
8. Life Safety Assets Inspections
FM Workflow 1: Maintenance Work Orders

Step 1 – Work Order is received in CMMS. You can review the work order instantly and formulate a plan of action. Click the Link to the O & M Portal to view the equipment that needs servicing.
Step 2 – The O & M Portal opens a 3D view of the equipment that should be serviced. Equipment properties are displayed automatically.
FM Workflow 1: Maintenance Work Orders

Step 3 – The equipment’s corresponding documents are attached, and can be accessed immediately.
Given: Major water pipe burst. No time to lose – an immediate response is required. Technicians are looking for the shut off valve.

Task: How to mitigate the risk ASAP?

Solution: Use the O & M Portal to find the shut off valve for the hot water system within seconds.
Select the Hot Water System in the list of Systems. Review the components of the system. Select a shut off valve from the list. See where the shut off valve is located within the building.
FM Workflow 3: Energy Systems Analysis
FM Workflow 4: Visual Work Orders

Use the Issues function to redline the areas of concern, create a notification that will be emailed to the technician as an image file, and will create a work order in the CMMS.
• Given: Portfolio of properties. Millions of square feet. Hundreds of tenants.

• Task: Present existing properties to future tenants. Explain space properties, furniture and staffing projections. Visual inventory – compare with actual.

• Solution: Virtual facility presentation via FM Portal.
FM Workflow 6: Visual Inventorying
FM Workflow 7: Facility Condition Assessment

- Given: Tens or hundreds of buildings under management.

- Task: How to improve budgeting of repairs and renovations in the most optimal way.

- Solution: BIM-based Facility Condition Assessment for spaces and assets improved by real-time data from sensors.

© EcoDomus, Inc. 2011
FM Workflow 8: Equipment Inspections

- Given: Thousands of life safety assets: sprinklers, fire extinguishers, Exit signs, etc.

- Task: Continuous inspection of life safety assets.

- Solution: BIM-based field inspections, supported by barcoding, and mobile 3D technology.
Framework: COBie and OmniClass

Some Adopters include:
- Department of Veteran Affairs
- NASA
- Department of State
- Texas A&M University
- Indiana University
- GSA
- US Army Corps of Engineers

Space, System & Equipment Layout
Design
Build
Operate

Product Data, As-Built Layout, Tag & Serial No., Warranties & Spares
Data Collection and Usage

**Project Management**
- Design Team
  - Architects
  - Engineers
  - Specifiers
- Contractors
  - Subcontractors
  - Manufacturers
- Fixtures, Furniture & Equipment

**Facilities Management**
- Facility Managers
  - Maintenance Techs
  - Space Planners
  - Building Control Eng.
  - Service Managers
  - Energy Managers
- Maintenance Contractors
COBie Implementation Major Tasks

- Preparing BIM Model for FM Usage
- Defining Requirements for BIM Objects
- Defining Requirements for Documentation
- Scheduling Data Quality Control Actions
- Cleaning Data and Populating New Info
- Mapping BIM Data with FM Data Structure
- Exporting and Importing Data

© EcoDomus, Inc. 2011
Managing COBie Data Entry

- Easy-to-use online EcoDomus PM interface:
  - Edit information online, or upload partial information as Excel files for batch update (Warranty Info, Serial Numbers, etc.)
  - No BIM experience is needed to enter data
- Collaborative process: better than exchanging large Excel files

```
Type Name : AHU-D1:D-1

<table>
<thead>
<tr>
<th>Profile</th>
<th>Attributes</th>
<th>Spares</th>
<th>Jobs</th>
<th>Resources</th>
<th>Components</th>
<th>FAMIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Name:</td>
<td>AHU-D1:D-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OmniClass:</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asset Type:</td>
<td>Fixed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model Number:</td>
<td>null</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warranty Guarantor Parts:</td>
<td>Little Giant Pump Co.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warranty Guarantor Labor:</td>
<td>Jay R Smith Manufacturing Co.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement Cost:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected Life:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uniformat:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Documents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

- Description: Mechanical Equipment
- Manufacturer: ENERGY LABS
- Facility:
- Warranty Duration Parts: 2
- Warranty Duration Labor: 1
- Warranty Description: n/a
- Warranty Duration Unit: n/a
- MasterFormat: 23 36 00 Air Terminal Units

© EcoDomus, Inc. 2011
Validating COBie Data

• Data validation via automated quality control – making sure COBIE rules are followed
• Owner requirements control – making sure right info is provided
  • OmniClass based rules for attributes, naming conventions, documentation

Image: Screenshot of a software interface showing a search bar and tables for validating COBie data. The tables include OmniClass codes and attributes, such as Radiated NC, Tag, Maximum CFM, Manufacturer, Model Number, Discharge NC, Minimum CFM, Branch Pipe Size, Operating Weight, Inlet Size, and others. The interface also highlights missing attributes.
The COBie Sandbox (Virtual FM)

- Learn how to run the facility before you move in: “Virtual Facility Management” (like “Virtual Design & Construction”)
  - Preventive Maintenance jobs created as information about equipment is specified / installed
  - Facility managers are trained to use equipment before they see it
  - Enough time to purchase service parts, materials and tools
  - Enough time to realize wrong equipment is installed

- Serial Number
- Manufacturer

Other fields:
Replacement Cost, Installation Date, Vendor, etc.
Final Thoughts

• BIM for Facilities Management process is applicable to both new and existing buildings.

• Works in 2-D or 3-D

• Make sure contractual language is very detailed and unambiguous if you want to save money

• The most important: *start doing it!* The best learning is acquired on real projects.
EcoDomus
Helping you put the pieces in place for improved efficiency NOW!

Neil Parker
Director of Business Development
847-269-4522
nparker@ecodomus.com

Thank You!