Lifecycle BIM
What is Lifecycle BIM

- Application of Building Information Modeling to the whole lifecycle of facilities and related infrastructure
- Includes use cases: BIM for Maintenance, Energy Efficiency, Cost Management, Life Safety, Risk Management, etc.
- Lifecycle BIM (“visual database”) is the data foundation platform – it is the most complete information about your facility.
Financial Benefits of Integrated Lifecycle BIM

- Design & Construction is a small part (~20%) of total building Lifecycle costs
- ~ $0.25 per square foot is lost every year due to interoperability issues

Use Cases for Lifecycle BIM

1. FM Labor Utilization Savings (Shorter Work Order Time)
2. Utility Costs Reduction (Energy Efficiency)
3. Risk Management (Quick Reaction)
4. Fuel and Material Savings (Less Travel & Waste)
5. Comfort Management (Improved Productivity)
6. Data Accuracy (No Need to Re-Survey for As-Builts)
7. Regulations Compliance (Auto-Checking Codes)
8. Space Optimization (Smart Algorithms)
9. Improved Inventory Management (Spare Parts)
10. Configuration Management (Impact/Functional Conflicts)

Building owners/managers need it all!
One focus area (even as popular as energy efficiency) may not provide sufficient ROI.
Example: Work Order Workflow Comparison

Goal is to show time savings and reduced impact on operations when using Lifecycle BIM-driven environment. Data collected by the FAA.

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<tr>
<td>1</td>
<td>Creates a SR and assign to a technician.</td>
<td>10 min</td>
<td>Facility Manager tries to call the technician, not reaching him at first. The Technician calls back and receives the SR.</td>
<td>Create a service request (SR) in TMA CMMS and assign to a technician.</td>
<td>3 min</td>
<td>The SRs is in the system linked to location information.</td>
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<tr>
<td>2</td>
<td>Since the technician is not on site, the technician must travel to the site in order to go to Room 130 and evaluate the room temperature.</td>
<td>1 hr</td>
<td>We assume that the technician is available immediately to go to the site. Usually they are busy with other work so they cannot</td>
<td>The Technician receives a notification (text message) and logs into the CMMS system on his computer to see the SR, and opens the EcoDomus FM application via an external link from the CMMS, which</td>
<td>5 min</td>
<td>The Technician can review the SR while still finishing another job. Preparation can start</td>
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Total time spent on the SR: 5 hrs & 40 min

Savings through BIM driven workflow: 5 hours

Minimized impact since all activities are done virtually, quickly.

Impact on Operations

Potential impact on operations is high as it takes much longer, introduces human errors and on site presence is undesirable.
Example: ROI

Cost and Time Savings

<table>
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<tr>
<th>Lifecycle Facility Management</th>
<th>Current (hrs)</th>
<th>BIM (hrs)</th>
<th>Savings (hrs)</th>
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<tbody>
<tr>
<td>Operations &amp; Maintenance (Remotely Diagnosable Issue)</td>
<td>&gt; 5</td>
<td>0.5</td>
<td>4.5</td>
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<tr>
<td>Operations &amp; Maintenance (On-site Service)</td>
<td>&gt; 9</td>
<td>3</td>
<td>6</td>
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Savings (hrs) > 60% using BIM vs. 2-D

Average # of service hours on a typical tower facility (1 yr period) = 168 hrs
Savings (hrs) using BIM (1 yr period) = 100 hrs
Total number of facilities in the ESA ~ 1100
Cost Savings (1 yr Period) = $6,600,000 ~ 6.5 M

Projected Cost Savings (10 Yrs) ~ 65M

Data is based on the service hours from an Eastern Service Area FAA Tower facility and its workflows applied to the Proof of Concept project.
Begin with the End in Mind

Current State of Affairs:

- Non-integrated FM Software and Hardware Solutions
- Multiple Stakeholders (Capital Projects, FM Services, Real Estate, Energy, HR, Procurement, etc.)

What’s Needed:

- Decisions should be made on complete information from all these systems working together
- Interests of all stakeholders should be considered and matched
You Need Complete Information

Lifecycle Building Support Provider

Building Information Model (BIM)

Computerized Maintenance Management System (CMMS)

Computer Aided Facility Management (CAFM)

Geographical Information System (GIS)

Building Automation System (BAS)

DCIM (Data Center Info Management)

Enterprise Resource Planning (ERP)

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Most of the “BIM projects” only do 3D clash detection. Data is not well prepared: different file formats (owners are not able to open some of the files delivered “as built”), assets’ names are cryptic, building systems are not defined (nobody knows how assets are connected), geometry is not optimized for FM (i.e. duplicate assets exist in models, surfaces overlap, etc.).

Asset name = W-1080-08. What does it mean?

Systems are not specified

Hundreds of warnings / errors of modeling
EcoDomus Solutions for Lifecycle BIM

EcoDomus PM™
Data Collection & Validation

EcoDomus FM™
Data Maintenance & Analytics

COBie Management
BIM Data Quality Control
3D As-Built (CAD to BIM)
Commissioning & Handover
Energy Modeling
Field BIM (iPad/Windows8)

BIM for Work Orders
Energy Management
BIM/GIS Integration
3D/2D BIM Dashboard
Up-to-date As-Built

DATA BASE
Energy Management & Continuous Commissioning

• Create a calibrated energy model that would provide a way to compare an ideal, simulated building performance vs. actual performance to identify areas of concern.

• Energy model is created using BIM and EnergyPlus and integrated into EcoDomus database.

• Building zones / rooms are sorted based on their performance’ proximity to the simulated results. The chart below shows simulated values and actual data from sensors.
Mobile Work Orders

- CMMS application generates a work order. Push notification is sent to iPad.
- Technician opens EcoDomus BIM viewer to find the equipment that needs servicing, and attaches it to the work order.
- The equipment’s corresponding documents are reviewed.
Facility Activation and BIM-based Punch List

- Mobile device (Tablet PC) is used with BIM to identify areas of concern or non-compliance.
- It works even when Internet is not available and then syncs with the online application.
BIM and GIS Integration

- Quickly find the assets and facilities via web portal, then drill down into the data using BIM interface
Visual Inventory Audit

- Connect your existing assets database with 3D
- Map asset records to their visual equivalents
- Perform field inspection to confirm that “what you see is what you have”
- Adjust inventory information to improve compliance reports
Step 1: Creating BIM

CAD to BIM conversion

Laser Scanning

Building Information Model (BIM): Autodesk Revit or similar

CAD is used as the baseline, confirmed and augmented by the laser scan data
Step 2: Getting BIM into EcoDomus

Original BIM is filtered, data is split from geometry, and data is pushed to the web.
Currently most of BIMs are created only for 3D visualization and design coordination, not for data management. Optimized ways of collecting data and quality control are not enforced by owners. Without standards-based quality control enabled process, all the BIM efforts will go to waste – the resulting BIM is not much better than old CAD models.
Step 4: Integrating BIM with FM

CMMS/CAFM/IWMS
- IBM maximo
- TMA Systems
- Archibus
- TRIRIGA
- Accruent
- AssetWorks
- Four Rivers

BAS/EMS
- OPC
- BACnet
- Honeywell
- Schneider Electric

Portals
- Microsoft SharePoint
- GIS
- Google Earth

EcoDomus is an official partner of most of the above companies
Using COBie and OmniClass for Lifecycle BIM

- COBie is an open industry standard for collecting project data once it becomes available and storing it in a normalized, common dataset.
- Enables Data Quality Control due to standardized datasets.
- Quick upload of handover data into CMMS/CAFM (minutes vs. months).
- Owners learn how to run the facility before moving in.

EcoDomus is the leading provider of COBie-compliant software. EcoDomus was the first construction software to get COBie certified in 2009.
Owners provide detailed project requirements based on existing Facility Management Program and BIM Guidelines. A/E’s, FM technology consultants, and Contractors help set up a program if it doesn’t exist.

A/E/C project team members create a detailed BIM/COBie Execution Plan based on owner’s project requirements.

Continuously collect and check quality of entered data and documents throughout the project in the appropriate software: EcoDomus PM.

Final acceptance of data handover as a COBie spread sheet or, preferably, as a dataset imported into CMMS/CAFM and integrated with EcoDomus FM.

Continuous improvement of a Facility Management Program feeds future projects’ requirements.
Three Things to Remember!

1. BIM acts as a platform enabling integration of all facility systems – BAS, CMMS, CAFM, GIS, ERP, etc. providing significant savings via improved data flow and analytics.

2. Creating BIM requires well thought out data collection rules and stringent Quality Control – otherwise it’s all just nice 3D pictures, no business value.

3. Use Open Standards (COBie, OmniClass, IFC) to reduce costs, ensure continuity and future-proof your investments.
Thank you!

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