

# **BIM for FM Case Studies**

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# About EcoDomus

Software and consulting firm with several offices in the USA, subsidiary in Asia Pacific (Sydney and Hong Kong), and partners around the world.

#1 Provider of BIM for Facility Management.

#1 COBie-certified provider.

Clients include the leading facility owners.



# What Our Clients Say

Fortune 100 Firm

# Top 3 U.S. University



## **BIM for FM**

"After evaluating all available software on the market we found that EcoDomus was the most advanced BIM for Facility Management tool."

## Description

"EcoDomus-based separation of graphics and data provides real value to our construction model troubleshooting and commissioning process."

## **Description**

*"EcoDomus interface is very intuitive. We like that our technicians use COBie and don't even know it.* 



## Large Laboratory

## **Description**

"We chose to partner with EcoDomus and made it clear to our contractors and FM providers that they will work in the EcoDomus BIM environment."



# What is BIM?

## **Building Information Modeling**

Collaborative *process* of creating 3D geometry, connecting objects, and entering required information.



### **Building Information Model**

Digital representation of a building. It may consist of one or more <u>files</u> in different formats and linked documentation.



#### **Building Information Management**

Utilization and maintenance of models for optimization of building performance and streamlining of related workflows.

# Facility Lifecycle and BIM



## Design

- BIM is created for visualization
- Feedback from contractors and FM
- **Design-intent attributes** \_

## Renovation

- Planning renovations in 3D BIM -
- Enhanced condition assessment
- Maintaining as-built models

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- Construction
- BIM is updated to 3D as-built
- Installation attributes
- Linked documents to BIM

## Maintenance

- BIM for energy analysis
- 3D visualization for work orders
- Space optimization
- Shutdown planning
- Risk management
- Improved spare parts procurement -
- Business process visualization -
- Tenants comfort management -

# EcoDomus PM software app for:

• COBie Management & Handover

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- BIM Data Quality Control
- Converting CAD to BIM
- Documents Link to BIM
- Energy M&V
- Field BIM Data Entry

# --- Data Collection & Quality Control

# Data Maintenance & -----Analytics

# EcoDomus FM software app for:

- Easy Access to BIM for Everyone
- BIM for Work Orders
- Energy Simulation vs. Actual
- BIM/GIS Integration
- Maintain Up-to-date As-Builts
- Assets Linked to Laser Scans

# **EcoDomus BIM Interface**



Each object has any kind of data associated with it: properties, documents, what building systems it is a part of, what other assets and locations this object is affecting, related work orders, etc.

See the real-time and historical values from the corresponding sensors.

Jump to any location within the building using viewpoints.

Search for locations and assets and see through the walls (use object transparency).

# EcoDomus Mobile BIM

Access BIMs anywhere you go: Tablet PC such as iPad, Surface, or Android pads offer full 3D view and finger-friendly interface.

All your digital documents library at the tip of your fingers.

Optimize experience by limiting features: field access needs simple interface.

Split responsibilities between field personnel and back office staff.



# Mobile Work Orders and Barcoding













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# Smartphones for BIM





## Mobile BIM

Tablet PCs have more screen space, but not always at hand.

Smartphone fits well in a pocket.

3D BIM engine helps locating assets quickly.





## **Work Orders**

Work order is pushed to smartphone.

All asset information is in the palm of your hand.

All documents are easily viewable.

# Laser Scanning and FM





## **Point Cloud Benefits**

- 1) Cheaper and faster than BIM.
- 2) Highly realistic view.
- 3) Ability to measure distances.

## **BIM Benefits**

1) Ability to generate drawings.

- 2) Can isolate (hide / show) objects.
- 3) Better navigation.
- 4) Less manual work.

# **BIM Guidelines Development**



## Roadmap

Macro-level approach to defining how BIM will help organization to address its strategic challenges.

## **Guidelines**

Detailed set of requirements specifying how BIM will be created, validated and maintained for Lifecycle BIM. Includes requirements for design, construction, handover, operation and maintenance.



## **Use Cases**

Business workflow scenarios explaining how BIM will be utilized.

# BIM Roadmap Example

3. Management -

**Facility Based Execution** 

Integrated Data Management

rules for systems of record

Applying BIM information for

continuous commissioning

Define data distribution

across the enterprise

Smart Buildings

of facilities

## Must Do

Enterprise Based Execution	
M Communication Plan	

 Establish messaging for KP's BIM vision

R

#### Standards and Objectives

- Establish clear BIM processes and deliverables
- Project BIM Standards
- Lifecycle Data Standards

2. Implementation – Project Based Execution

#### Allocation of funds

 Allocate funds throughout AEC process to support changes caused by BIM

#### BIM based Quality Control

 Develop BIM based quality control for design, procurement, equipment and management

#### O&M Data Collection & Handover

 Establish criteria for O&M data selection, collection, quality control and delivery

## **Description**

Kaiser Permanente hired EcoDomus to help identify the BIM Roadmap, and the workgroup has made recommendations to Sr. Leadership to proceed with key elements to move the program forward. Presented by KP at BIM Healthcare Consortium

## Should Do

1. Program-wide – Enterprise Based Execution	2. Implementation – Project Based Execution	3. Management – Facility Based Execution
<ul><li>BIM Templates</li><li>Smart Objects</li><li>Design Templates</li><li>Sustainable Design</li></ul>	<ul> <li>Project AEC Team Qualifying</li> <li>Project Success Metrics Development</li> <li>Project Commissioning</li> </ul>	Conversion of Legacy data to BIM

## **Description**

KP believes that investment in a comprehensive BIM strategy will transform how KP manages infrastructure data and critical processes delivering better, smarter, greener facilities for less money.  Systems must be named correctly, connected with correct flow directions and design data such as CFM for diffusers. (figure4)



#### 16. MEP systems should not be undefined or have disconnects. (figure5)

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# **BIM Guidelines**



#### **Be Clear**

Guidelines should be unambiguous: all data and geometry requirements clearly defined, provide examples.



#### **Focus on Lifecycle**

Think about BIM implementation for all phases of facility lifecycle: not only design and construction, but O&M and FM as well.



#### **Use Open Standards**

Apply open standards where it makes sense. Don't blindly go with it just because it's free: calculate total ROI.

17. Rooftop units should have a room object in architecture and a similar space in MEP. (figure 6)

# **BIM Use Cases / Scenarios**



#### APPENDIX A. MPA BIM USES

#### 8.6 - BUILDING AUTOMATION SYSTEMS BAS INTEGRATION

#### • Description:

Integration of mobile BIM graphics (2D & 3D) with building automation systems is in its early phases. BIM provides spatial location points for building systems and components. It integrates sensor data for real time displays of system activities. This integration provides better management of systems and work orders. Integrated lifecycle BIM also enables the use of visual work orders by mechanical engineers and others.

#### • Responsibility:

MPA facility managers, the DTIG Manager will work with the building system consultants to integrate project BIM data with building systems.

#### • Model Elements:

Building systems and components from model. MPA equipment naming conventions and room numbering.

#### O Deliverables:

Model integrated into the Building Automation system. Mobile tablet download.

#### • Software:

Revit Suite, EcoDomus, software managing building systems, mobile tablet system

# How to Select Use Cases

- Identify stakeholders: facility managers, technicians, planners, energy managers, IT group, procurement, etc.
- Each stakeholder reviews personal needs for facility data and provides feedback.
- Consultants analyze the use case description and come up with a set that includes deliverables, naming conventions, software, etc.

#### **FM Business Need**

A business need - Use Case - "pulls" required information from the providers. For example, Preventative Maintenance procedure for a Heating Unit requires to "Check fan RPM and compare to specification".



# **BIM** Attributes

#### Handover

FM Data Manager adds "Fan Speed" attribute to the handover deliverables specification.

Cap	oital	I P	ro	ects

Construction Manager ensures that "Fan Speed" attribute is collected for a Heating Unit.



## Contractor & Architect

Providers request that Manufacturer provides "Fan Speed" attribute values. Renames the field name as needed.

Model No.	RS-385SHV-14140RD	
Rated voltage	24VDC	
No Load	Speed(RPM)	8800
	Current(A)	0.06
	Speed(RPM)	7554
	Current(A)	0.36
At Max Efficiency	Torque(mNm)	6.94
	Output(W)	5.49
	Eff.(%)	63
At atall	Torque(mNm)	49
ALSIAN	Current(A)	2.2

# **BIM Objects Relationship**



# **Systems**

Systems are groups of components that, when connected, provide specific building services. Subsystems, if required, may be identified using parent-child relationship ("nested").

# **Affects**

Objects can be identified as *affecting* each other. For example, Valve 111 is not only on a Hot Water system, but it also affects Boiler 1. A VAV box may affect rooms 101 and 102, etc.

# Systems





# Affects



Locations	_						
Asset Data	C	OMPONENTS				+ 🖉 × a	Search Text
iscipline		Asset Name	Location	Description	Туре	System	Facility
Architectural		23 gal Wessel	140	23 gal Wessel	Boiler Expansion Tank	Sanitary, Domestic Hot Wate	1215CR
Ivil		AC-1	<u>2XS1</u>	AC-1	AC Rooftop Unit 75 ton	Supply Air AC-1, Mechanical	1215CR
ire Protection		<u>AC-2</u>	2XS1	AC-2	AC Rooftop Unit 70 ton	Supply Air AC-2, Mechanical	1215CR
nteriors Asistemanas		<u>AC-3</u>	<u>2XS1</u>	AC-3	AC Rooftop Unit 3 ton	Mechanical Supply Air	1215CR
lechanical		Air Vent-MetraflexMetrave	1L3D	Air_Vent-MetraflexMetrave	Automatic Air Vent	Domestic Hot Water, Hydron	1215CR
Medical and Lab		Air Vent-MetraflexMetrave	2XS1	Air_Vent-MetraflexMetrave	Automatic Air Vent	Domestic Hot Water, Hydron	1215CR
Plumbing		AV Angle Valve 2 Inch Main	1Z0	AV Angle Valve 2 Inch Main	AV Angle Valve 2 Inch	Fire Protection Wet	1215CR
specialty		<u>B-1</u>	2XS1	B-1	Boiler	Domestic Hot Water	1215CR
mponents		<u>B-2</u>	2XS1	B-2	Boiler	Domestic Hot Water	1215CR
stems		Baby Changing Station (1)	1D3	Baby Changing Station	Baby Changing Station		1215CR
Des		Baby Changing Station (2)	1X2	Baby Changing Station	Baby Changing Station		1215CR
nes		Baby Changing Station (3)	1X0	Baby Changing Station	Baby Changing Station		1215CR
oors		Baby Changing Station (4)	1D4	Baby Changing Station	Baby Changing Station		1215CR
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# **BIM and BAS Integration**



## **BIM and BAS**

- Sensors and "Internet of Things" analytics need BIM to provide more data about the facility.
- 2) Cost of BIM and BAS integration is now affordable.
- EcoDomus uses open standards and proprietary APIs to establish integrations and analysis.

# COBie



All of the above can be Described by Attributes

# About COBie

- <u>Construction</u> <u>Operation</u> <u>Building</u> <u>information</u> <u>exchange</u>
- Open IFC-based international standard
- Major facility owners require it
- EcoDomus PM was the first middleware to get COBie-compliant (2009)
- Looks easy to do at first glance ("we'll just fill out that Excel spreadsheet") – later becomes a four-letter word at some organizations

# **COBie Setup Questions**



## How

How is the data collected: exported from BIM, entered by subs online, on mobile devices or on paper?

# What

What data is required: asset types, attributes, document categories, system levels, zone types?

# **COBie Data Collection Example**





# **EcoDomus COBie Benefits**

## Create Useful BIM

EcoDomus BIM and Data experts have unmatched experience in preparing models and datasets for the successful handover. BIM for FM modeling has unique requirements that most modelers do not know, and as a result, most socalled BIMs have limited value for FM.

## Information Reuse

EcoDomus Product Library allows storing standard product information for reusing across projects and properties. No need to re-enter data that is already available.



Organization Profile	Products Contacts	Projects Document Type
Add Product		
Manufacturer: Lo	ren Cook Company	
Model Number *	Product Name	Description
ACE-B 150C5B	ACE-B 150C5B	Downblast Centrifugal Exhaust Ventilator
ACE-8 195C98	ACE-B 195C9B	Downblast Centrifugal Exhaust Ventilator
ACE-D 120C15D	ACE-D 120C15D	Downblast Cetrifugal Exhaust Ventilator
\$150	ACE-D 150C15D	Downblast Centrifugal Exhaust Ventilator
5DH	ACE-D 90C15H	Downblast Centrifugal Exhaust Ventilator



#### PM > Projects > ABC Demo > Import/Export

Consiliant and	
Facility:	ABC Facility X
Organizations	
E Contractor	
ABC Constr	uction
+ Designer	
Only Major Types	
Use Attribute Templ	late
Generate COBie Fil	e Export Documents

# **Quality Control**

EcoDomus PM's automated guality control features allow for checking attributes and documents for compliance with facility owner's requirements.

## Optimization

03

EcoDomus PM and BIM Connector help filter data to reduce unnecessary data collection, focusing attention on the required data.

# **Decision is Yours**

## **Free COBie Toolkit**

- > Load Revit with unnecessary information:
  - Added cost of modeling
  - No data access security
  - No attributes versioning
  - Increased file size
  - Slow, non-collaborative process
- > Use Excel export from Revit:
  - Introduce typos
  - Limited data validation
  - Cumbersome and costly quality control
- > No bi-directional data exchange
- > No lightweight 3D-based data editing
- No support

## Total Cost: High

## **EcoDomus PM**

- Collaborative process where data is entered at the place of origination: lower cost per entry
- Simpler interface: adjusted per provider
- Higher quality of data: less rework and additional costs
- Roles/permissions-based secure environment
- Unique software features allow for better BIM 3D experience
- Advanced filtering helps optimize data
- Bi-directional exchange with Revit. Works with AutoCAD, Bentley, Navisworks, IFC
- High-quality support from EcoDomus

## **Total Cost: Lower**

# **Contact Us**



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