Can FM be spelled with BIM?

Leveraging Integrated Project Information to Manage the FM Delivery Processes

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Todd Barrett, Choate Construction
Introduction

An examination of Owner BIM+FM projects

Owner as BIM & project information consumer

How are consulting professionals impacted by the use of Owner defined BIM Requirements

Discussion topics

Facility Planning

Evaluate

Operate

Move In

Build

Design

Program

Plan

Move In
Introduction

Clients
Introduction

Goals

• O&M Department able to obtain beneficial Operations & Planning documentation at 70% construction completion

• Take current manual methodology and have an automated process from beginning to end resulting in significant savings
Introduction

Over $15 billion dollars per year is being spent

The issue

- Inefficient processes supporting lack of information exchanges
- No interoperability in the facility life cycle.

NIST 2004 Report
Introduction

BIM tools
Introduction

Strategy & tactics

Operations & Maintenance

BIM
Introduction

Data Loss: building information within normal project delivery method.

*Drives a likely outcome*
Case Studies
Case Studies

Developed the colleges’ ability to validate building information modeling throughout the project cycle. Created Georgia Tech’s first BIM guideline that is now being adopted by architects, engineers, and professional consultants that will produce BIM for Georgia Tech.
Case Studies

Capital planning, space management, design, construction, utilities, maintenance, sustainability, grounds, and IT will benefit from BIM interoperability to their facilities management system AssetWorks.

Consulted with departmental leadership to map business, operations, data, controls and physical devices to a BIM based, open standards process.

Developed processes and systems based in interoperability, open standards, COBie and FSU standards will seek an appropriate approach for AEC, and internal FM teams to produce capable and organized BIM information to be consumed by the university’s future information exchange systems.
Case Studies

Program Manager for the IDIQ task order. Developed the integrated processes for the energy analysis of the Rodino Federal Building. Managed process, technical requirements and communication between IES, LAS Architects, SSRCx, BECK Technologies and GSA's Central Office. Project scope was to validate energy benchmarking sought by KlingStubbins. Three additional workflows developed will offer insight and content to the GSA Design Guide 05, BIM for Energy Analysis.
Case Studies

University of Alabama Phase IV Science and Engineering Complex

Developed a BIM approach for design team to deliver a project with a level of proficiency that accommodated the owner's agent, HOAR PM, with models and project information for bidding. Facilitated collaborative stakeholder discussions with owner to produce the BIM use case for driving the project execution plan strategy. Engagement included seminars, software sales and training across five teams in three states. Constant communication and clash detection services provided during design were key aspects of project success.
Case Studies

Provided BIM to O&M services. Developed a 3-D laser scanning approach and subsequent BIM Modeling objectives guideline for the owner. Graphics and data were reconciled and validated with the owners existing databases for migration into information exchange. COBie and OmniClass data was mapped to the owner’s integrated workplace management systems (Archibus).
Case Studies

Developed strategies to create and integrate database systems that collectively brought together four separate technologies: BIM, Computerized Maintenance Management System (IBM Maximo), Geo-Spatial Systems, Building Automation System/Energy Management System, and Integration to eSmart.
BIM & FM

Preparing BIM Models

Defining Requirements for BIM Objects:
  – Space & Equipment

Defining Requirements for Documentation

Scheduling Quality Control Actions

Mapping BIM Data with FM Data Structure:
  – Product Data, As-built Layout, Tag & Serial No, Warranties & Spares
BIM & FM

Concept

Enterprise
Composed of
• Floors
• Rooms/Spaces
• Components

Served by
• Building Systems
• Product types

Described by
• Models
• Documents

Operated by
• Job Plans
  • Work Orders

Constrained by
• Resources
BIM & FM

BIM to operations & maintenance

- Facility data
- Floor data
- Space data
- Component data
- System data
- O&M
BIM uses

- Maintenance & Scheduling
- Building Systems Analysis
- Asset Management
- Space Management/Tracking
- Disaster Planning
- Record Model

- Site Utilization Planning

- Operating:
  - Maintenance & Scheduling
  - Building Systems Analysis
  - Asset Management
  - Space Management/Tracking
  - Disaster Planning
  - Record Model

- Design:

- Plan:

- Existing Conditions Modeling
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**COBie & OmniClass**

**COBie 2.0 Sheets Requirements**

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Maintainable items
### BIM & FM

#### COBie development

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<th>COBie Fields</th>
<th>Information exchange authors/ consumers</th>
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**Data authoring source:** BIM/COBie

**Information exchange authors/consumers:**
- AE
- GC/CM
- Cx

**COBie Fields:**
- Component
- Type
- Facility
- Floor
- Component
- Type
- Component
- Type
Design

Validate design with Program

- Financial objectives
- Strategic planning
- Leasing Strategy
- Space Identification
- Area classifications
- Departmental zoning
- Emergency response planning

Areas can be quantified by
- Department, Function, Occupant, Use, Space Type

- Objects can be linked for external data sources
Design

Space validation

Owner Program

• Leasing Strategy
• Life Safety
• BOMA measurement
• Facility information capture
• Gross/NET SF
• Rent Rates

3D Model
• Analysis
• Construct

• Marketing Material
• Asset gathering
• Products & Specifications
• Wayfinding
Design

Validate design with program

BOMA

Space can be quantified by
- Common Floor Area
- Major Vertical Penetrations
- Space Type
- Other Designations

- Assets
- FF+E
- Departments
- Life Safety
- COBIE
Design

Building systems

Building Systems

Core, services & distribution

Foundations and utilities coordination

Whole Model

Building Systems

Section thru Lobby and Core
Design

Space & components
Program managers, architects and engineers are advancing BIM usage and proficiency in anticipation of owner requirements.

GCs & subs are increasingly using BIM during all construction phases

- 4D, 5D, 6D

- Owners are developing BIM graphics and information requirements for operations and maintenance
Digital Document Sets allow all project team members to easily access project information.

Hyperlinked PDF drawings sets, used on the jobsite for coordination, are updated with layers of information as the project progresses.

This same data set is then passed to the owner for continued use and reference for operations.
Build

BIM in the field

Details

Floor Plans

Shop Drawings

Pictures & Videos

As-Built Information
Build

**BIM Coordination**

design models → to → construction models
Constructability models allow the entire project team to analyze, visualize, and understand complex construction driven by specific programmatic needs of the owner.
Laser Scanning for Existing Conditions

**As-Built Coordination**
- Defines existing conditions to $< \frac{1}{256}$
- Accurate, low cost, and complete as-builds
- Reduce costly “return visits” to the site
- Topographic analysis
- Rapid 3D model creation

**Scan To BIM**
Detected and creates:
- Wall surfaces
- Pipe runs
- Topo surfaces
- Floor flatness
Build

Laser scanning
Build

Hyperlinked PDF Documents

+ Coordination Models

+ Submittal Documents

+ Web Interface

= Robust FM tool for Facility Managers
Operate
Operate

Preparing BIM Model

Defining Requirements for BIM Object

Defining Requirements for Documentation

Scheduling Quality Control Actions

Mapping BIM Data with FM Data Structure

Exporting and Importing Data

Required BIM

Owner BIM Implementation Plan

Owner BIM/ O&M Requirements (RFP)

BIM Execution Planning

New Construction

Existing Buildings
### OmniClass Table 23

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### E202 Level of Development

#### Information exchange

- COBie to AiM
- OmniClass Table 23
- AssetWORKS

#### Component Classification
Operate

Integrated model state

Dashboard access and business intelligence applications for Business insight.

Business input requirements for design, engineering and construction.

A.R.T. Accurate, Relevant, and Timely information for the Project Management team to sustain throughout the lifecycle.

Project Management team will manage and collaborate with design and construction teams to sustain project information requirements.
Operate

Owner as BIM consumer

1. Data Specification, BIM Requirements
2. Data Survey
3. Process Planning
4. Data Extraction
5. Validation
6. Data Integration
Operate

Accurate, relevant & timely

Core Data

Business Intel
Financial Services

Sustainability

Utilities

Design & Construction

Information Technology

Space Management

Maintenance

Planning

ART

Core Data

BIM files
• Native BIMs
• IFC, DWG, DXF, etc.
• Laser scans

Other project information
• COBie files
• Environmental criteria
• Energy model reports
• Cost/quantity reports
• Warranties
• O&M manuals
• Spare parts list
• Preventative maintenance schedule
• Digitized drawings
• Other relevant documents
Q&A