BIM and Facility Management
From Theory to Practice
Michael Schley, CEO and Founder
FM:Systems
October 2014
mschley@fmsystems.com
About Michael Schley
• Began career as registered architect.
• Founded FM:Systems in 1984
• Served on the IFMA Foundation Board of Trustees
• Serve on FM Advisory Councils for Georgia Tech and Cornell

About FM:Systems
• Develop CAFM/Integrated Workplace Management (IWMS) Software
• Autodesk Preferred Industry Partner for BIM and FM
• Headquartered in the US, Customers Worldwide
• Represented in Singapore and Southeast Asia by Crown Systems
BIM & FM Discussions
IFMA Foundation Knowledge Management Committee

The Need to Share Experience

Eric Teicholz
Mike Schley
Chuck Eastman
Paul Teicholz
Facility Management Benefits

1. Integration with Maintenance Management
Facility Management Benefits

2. The “Electronic Owner’s Manual”
Replacing 3-Ring Binders with a live information system
Facility Management Benefits

3. Improved Space Management
Facility Management Benefits

4. Building Performance Analysis
Facility Management Benefits

5. Change Management
90% of the costs of a building occur after construction.
Technology Issues

1. Integration with Facility Management Systems

BIM Authoring Tools

- COBie Import/export
  - Compatible with many systems
  - Data validation challenges

Middleware

- Compatible with major systems
  - Some data validation challenges
  - Version support

Direct Revit Integration

- Real-time Updating
- Bi-directional information
  - Support for only some systems

Facility Management System
Technology Issues

2. Access by Web Browser and Mobile Devices
Technology Issues

3. Cloud-based Computing

- Cloud-based Systems Facilitate FM Collaboration
Challenge

Deciding what to track and how to ask for it.

- Information is not free
- Criteria
  - Health or Life Safety Requirements
  - Regulatory Requirements
  - Business Justification
  - Cost to Track/ Risk of Not Tracking
  - How Dynamic is the Information?
  - How Difficult is it to Keep Updated?
Located in Cincinnati, Ohio, USA
70 buildings,
200,000 square meters- all in BIM

Objective- Use BIM to budget lifecycle replacement costs.
Room finish information from design and construction phases....
Is linked to lifecycle data (expected life, replacement cost) in the facility management system.
Xavier’s Results

- Modeled entire campus in BIM
- Producing 10 Year Comprehensive Facilities Plan
- Increased O&M Budget from $750,000 to $10 Million/year

Office of Physical Plant

10 YEAR COMPREHENSIVE FACILITIES PLAN - OVERVIEW

Background
The purpose of this report is to provide a 10 year comprehensive facilities plan that strategically incorporates the components of new construction, reduction of deferred maintenance, and ongoing renewal and replacement of Xavier’s Plant. The schedule and cost for all new construction was derived from the 2011 update to the Campus Master Plan. The renewal and replacement financial requirements as well as the deferred maintenance financial requirements were derived from the facilities assessment system database.

The Plan is in the form of a spreadsheet detailing necessary and new facilities for the next 10 years, along with...
Case Study - MathWorks, Massachusetts, USA

- 4 story 18,000 square meter corporate headquarters
- Objective: Work with architects, engineers, and contractors to incorporate facility BIM data during design and construction.
Case Study - MathWorks, Massachusetts, USA

- Detailed BIM Deliverable Requirements
- Lessons Learned
  - Work with A/E’s on BIM modeling standards
  - Lean modeling is better

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Case Study: Singapore BCA Academy
BIM-FM Pilot Project

Objectives

• Test-bed conversion from as-built BIM model to FM model.
• Test-bed an FM platform
• Deliver report to guide development of Singapore BIM-FM Guide
Case Study: Singapore BCA Academy
BIM-FM Pilot Project

- Amazon Web Services
- Web Server – FM:Systems Software
- Database
- Autodesk A360 Large Model Viewer
- BIM Models: Autodesk Revit
- Mobile Access: FM:Mobile by FM:Systems

Space Management

Maintenance

Autodesk A360 Large Model Viewer
Case Study: Singapore BCA Academy
BIM-FM Pilot Project Report

SINGAPORE BIM FM GUIDE
Version 1

Images Courtesy of Singapore Building Construction Authority

October 2014
Case Study: Singapore BCA Academy

BIM Model Migration

**BIM Design Models**
Developed by the design team with a level of development to relay design intent and generate documentation and details used during construction.

**BIM Construction Models**
Contains a high level of detail used before and during actual construction to reduce uncertainty, improve safety, eliminate conflicts and simulate real world outcomes.

**BIM As-Built Model**
Contains both construction and fabrication data with detailed geometry and multiple disciplines that facilitates turnover from AEC to owners.

**BIM FM Model**
Is derived from the BIM As-Built model removing details, sheets, and other extraneous information, and defining rooms, spaces, assets by unique identifiers. The BIM FM model is then linked with the facility management system for ongoing management.

Figure 1 – BIM Models from Design through Facility Management
Case Study: Singapore BCA Academy
BIM Model Migration

Figure 2 – Floor plan in an As-Built BIM Model with annotation and dimensions.

Figure 3 – Floor plan in a BIM FM Model without annotation but with space definition.
Case Study: Singapore BCA Academy

BIM FM Model

Figure 6- Example of rooms and spaces.
Figure 8 - Type and instance properties for pumps in a building.
Case Study: Singapore BCA Academy
BIM FM System Integration
“Authoritative Source” Concept

BIM Model
- Building Structure
- Walls, Windows, Doors
- Mechanical Systems
- Electrical Systems
- Rooms
- Materials
- Equipment

Facility Management System
- Real Estate Information
- Leases
- Occupants
- Occupancy
- Move Management
- Work Orders
- Service Agreements
- Repair History
- Capital Budgeting

Case Study: Singapore BCA Academy
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### Case Study: Singapore BCA Academy

#### BIM FM Model

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Case Study: Singapore BCA Academy

Technology Integration- 3D Viewer on iPad

Integration of:

• Autodesk Revit BIM Model
• FM:Interact by FM:Systems
• Autodesk A360 Large Model Viewer
• iOS or Android Tablet
In Closing

• We need to manage building lifecycles better.
• BIM is an essential technology.
• We need to work together to define new practices.
Thank You

mschley@fmsystems.com