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From BIM to Facility Lifecycle Management – Best Practices and Opportunities

Mark Handy - BSA LifeStructures

Class Code: FM2298

Class Description: Over 70% of the cost of a facility is incurred during its occupied lifecycle, well after design and construction. Building owners who want to lower operating expenses can use BIM to improve how they document new spaces and maintain facility documentation and to create a streamlined collaboration channel for facilities and design firms. Facilities that have a Building Information Modeling (BIM)-based facility management system can expect improved coordination, efficient facility documentation, and accessible energy audit information. This class discusses the move from design to facility lifecycle management and explores the processes and best practices developed at Memorial Epworth Hospital, St. Vincent Fishers Hospital, Indiana University Health's Riley Hospital for Children. Memorial Epworth Hospital is a 1990's behavioral health facility totaling approximately 90,000 sf that was recently added to the client's portfolio of buildings and needed current accurate documentation for maintenance and regulatory compliance. St. Vincent Fishers Hospital recently completed a 125,000-square-foot expansion that integrates with the existing facility and its management plan. Riley Hospital for Children Simon Family Tower is an integrated project delivery (IPD) driven project comprising 675,000 sf which is currently in the final sequence of construction.

Learning Objectives

At the end of this class, you will be able to:

1. Identify the benefits that using BIM for facility management can create for facility directors and their bottom line.
    - The Journey is the Destination
    - A Walk in the Woods (A Lot Like)

2. Understand the differences between using BIM and CAD for facility management
    - Within Space Management applications
    - Explore how to pull regulatory compliance assets out of BIM and into a FM / CMMS system.

3. Recognize the strategy, best practices, and processes used at Memorial Epworth Hospital, St. Vincent Fishers Hospital, and Riley Hospital for Children that guided these projects from the design and construction phases into successful facility management implementation.
    - Memorial Epworth Hospital: Why create a Revit model of an existing building?
    - St Vincent Fishers: Can a new addition to an existing building provide enough benefit to justify creating a Revit model?
    - Riley SFT: Discover how to address a new project done in Revit and blend it into the existing building established in CAD format.

About the Speaker

Mark Handy is and architect and Director of the multidisciplinary Facilities Management Practice at BSA LifeStructures. He has been with the firm since 1985 and applies his depth of design and project management experience to his focus on facility life cycle knowledge management. He leads the firm's efforts from the construction and design phases into the facility lifecycle phase, by employing design software such as Autodesk® Revit®, Autodesk® Navisworks®, Autodesk® BIM 360 Glue®, and AutoCAD® MEP – allowing his team to add value to their clients by strategically aligning physical assets to organizational business plans. Mark's healthcare background and familiarity with the Joint Commission and other regulatory agencies drives the creation of flexible and robust data repositories that prepare his

clients for audits and inspections. Mark has conducted FM services for more than 22 million square feet of facilities for multiple Midwestern clients since 1996.
mhandy@bsalifestructures.com

1-Identify the benefits that using BIM for Facility Management can create for facility directors and their bottom line (uses and benefits)

The Journey is the Destination
What are you going to need?

- ***Time***
  - How many hours are available? What are the due dates?
- ***Tools***
  - What tools (specifically technology tools) are needed to complete the project?
- ***Team***
  - Who is included on the work team? Is anyone missing?

Repurposing & Reusing the Models Leads To and Supports… FM BEST PRACTICES

- Space Assignments & Tracking
- Warranty & Maintenance - O&M information retrieval
- Regulatory Compliance - Assessment & Documentation
- Energy Use Analysis & Optimization – Age & Condition
- Reuse of information structures for future projects
- Blending future models

Current State of BIM Use
70% is the estimated portion of Total Life Cycle Cost for a facility that is incurred during its occupancy, well after the design and construction phases. Having a set of tools that allow proactive facility management based on all of the available information is just good business and good management. Migrating the data and drawings from design and construction Revit models to facilities management makes good financial sense.

BIM Takes FM into New Dimensions – perpetual use of the model

- An improved method to document new & existing space for building owners
- A better way to maintain accurate documentation of space over the long term
- A streamlined collaboration channel for facilities and design firms in addition to building owners
- Inside Out – Outside In
- 3D plus transparency

As an improved method to document new & existing space for building owners, BIM allows a better way to maintain accurate documentation of space over the long term

BIM is the process of capturing flat information and creating 3D containers for it.
By compiling multiple sources of information, multiple users, and multiple views of facilities, information much more powerful and efficient results are easily achievable than using past traditional methods.

Benefits

- Improved project coordination
- Teams can collaborate in real-time
- Improved planning and estimating is possible
- Minimize re-work
- Efficient project documentation
- Synchronization of information improves organization
- Readily accessible audit information - put information in facility director's hands

Early Adopters Will Improve Their Strategic Position…

Qualify & Quantify: Document positive financial purpose and process

- Proactive Space Management - Space Assignments and ongoing Move Management
- Managing Warranties and Maintenance – Preventative and On Demand
- Regulatory Compliance Documentation
- Energy Usage Analysis and Optimization
- Repurposing and Reusing model data in future projects

All of these topics are opportunities for saving time, effort, and money.

Thoughts on BIM and FM Use: A Walk in the Woods

Similar to planning a hike –> "Plan your Walk and then Walk your Plan"

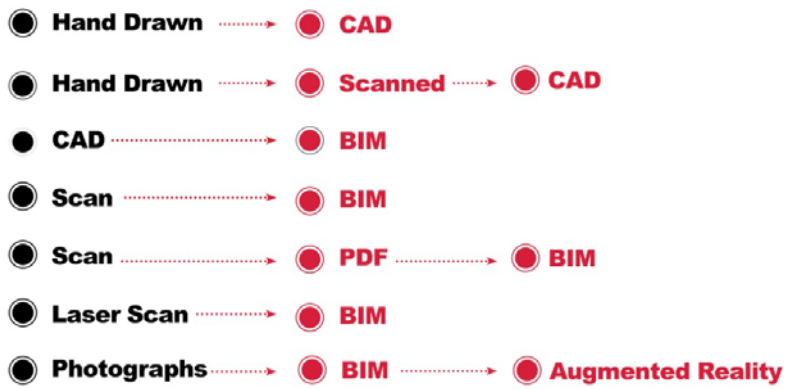
- Map the process
- Establish the team
- Provision the journey
- Set benchmarks for time and progress
- Take the journey

Afterwards - assess and report the best practices and lessons learned

---which brings us here today

2-Understand the differences between using BIM and CAD for Facility Management

Process Considerations for Facility Documentation



There are many paths to achieve facility documentation. The technology has evolved to improve how we go about the task of documenting facility information. Different approaches will apply to different situations. Determining what information is available to start from is the first step.

BIM is a Database
How does that help Facility Management?

> ***For Past, Current, and Future:*** After the model is established many graphical changes can be made by just adjusting the data. A historical archive of the building can be stored within the model to understand what led up to the current conditions. A visual representation of the data allows fact finding and troubleshooting.
>
> ***BIM aids Facility Operations by allowing iterative processes.*** What to do if…? Where is the information? How do you find it and restrict to it? To get this information from the model it has to first be available in it. Then, a "View" needs to be defined to filter the display and reporting to be restricted as needed.
>
> ***BIM allows Computational Graphic Thinking.*** For over twenty five years, architects and designers have used "Graphic Thinking" (processes described in a book by Paul Laseau) in the design process. Sketches, renderings, and technical drawings have all been a part of this. BIM provides a container for building information in a digital graphical format. We can look at results from multiple perspectives and points of view. Let the data do the drawing.

What is the BIM Used for? (The answer to this question brings more questions)

- How do the building, the equipment, and the people function within the defined spaces?
- Is it a Building or Machine? By considering the building as a machine many industrial best practices can be applied. Knowing how a facility functions helps to keep it running. Lean Initiatives and High Performance are goals.
- What is the anticipated facility life cycle? Pay attention to the anticipated useful life of the building components. Work to the seasonal and annual adjustments that must be made.
- Can you quantify its wellness? Check the vital signs… Resolve issues and problems by continuous assessments
- Assets are part of the model or the "vehicle" that is created. Are specific components maintained and used for maintenance management purposes? How many of them are for regulatory compliance reporting?

- The model is dynamic and can be set in fluctuating real world conditions. Can we use the model for signage / wayfinding / evacuation maps?

BIM 2 FM

- Sift "As-Constructed BIM" information for valuable nuggets to pass forward
- Backfill gaps as they are identified – linkages & references
- Use Phases
- Separate "Buildings"
- Maintain as-built archives and current master documentation as models

The most prevalent method of obtaining facility management models is to transition them from construction documentation to operations models. It is important to determine what information can be removed from the model.

BIM 4 FM

- Start with legacy information – paper, CAD, 3D point cloud scans, photographs – but with the end in mind
- Build a model that is "close enough" so that fixed and movable assets can be placed in the spaces and simulated
- Identify the "what if's" before they occur – Facility Life Cycle Analysis & Retro-Commissioning

What we are seeing now is that many existing buildings are being considered in terms of creating a BIM. With this approach it is important to consider how much to include in the model initially knowing that more can be added or linked later.

2x4 Theory: BIM and FM

- The value and benefit of multiplication over time
- Recurring payback
- Facility Life Cycle Management

Where we are currently is that we need both approaches. Also, we still need to work with information that is still in CAD or paper format to do the tasks of facility management.

Unlike CAD

- BIM integrates directly with many information systems- potentially through a web interface.
- More information is currently kept in multiple locations.
- Multiple facilities operation systems are now providing more opportunities for tracking and coordination

Are there threats? Downsides?

- Security issues
    - Is there information that should be less public?
    - What is the process for providing access to the information
- Viewing & Accessing the information without changing it
    - Consider allowing most users to just reference artifacts of the model
    - Navisworks and Glue are products
    - Tablet and other Mobile applications & Access to Information
- Unauthorized access to potentially sensitive materials
    - Be careful
    - Allow IT to add technology security
- Change Management
    - Control the perceptions
    - Improving the process
- Fear itself – just get started!
    - The biggest threat we have seen is the resistance to accepting BIM as a primary critical information system
    - The next threat is getting staff and clients up to speed with the technology
    - Find ways to educate and train all types of BIM users

Memorial Epworth Hospital

Space Management
This facility was added to the client's portfolio of hospitals and is their first building to be documented in BIM format.

Regulatory Compliance
Critical equipment and rated doors were modeled and linked to maintenance systems for continuous monitoring and improvement per JCAHO requirements. Maintenance Inspection Zones were established and reported through BIM.

St Vincent Fishers Hospital

Conceptual Modeling

BIM was used as a visualization design tool.

Space Management

This facility was added to the client's portfolio of hospitals and is the first building among their properties to be documented in BIM format. Connectors used in ARCHIBUS then exports were done to DWFx format (drawing with embedded data and viewability).

Maintenance Management

The model was used to determine equipment codes and schematics for the CMMS system. Upcoming additions include adding regulatory compliance maintenance management to the system. Currently we are exploring the concept of establishing & maintaining infection control zones, including permitting.

Riley Hospital for Children at Indiana University Health – Simon Family Tower

Plan your Work and then Work your Plan
Upfront planning is necessary to improve project success. Create a **BIM Execution Plan** for every modeling endeavor. It is critical to know where you are heading before you start. BIM Execution Plans are critical to the success of projects. Establish the workflow and the "chains" of responsibilities before there is a problem. This project was done under an IPD contract. Think ahead – start with the end in mind

Space Management
This facility was added to the clients' portfolio of hospitals and is the first entire building to be done in BIM format. It is the fifth building on a campus of interconnected buildings that have all been done in CAD. Initially, CAD files were exported from the BIM, but over time the model – expanded to include the other adjacent buildings - will become the source for space management.

Regulatory Compliance
Critical equipment and rated doors were modeled and linked to maintenance systems for continuous monitoring and improvement per JCAHO requirements. Life Safety and Infection Control are the critical aspects.

MEP System Diagrammatics – Systems Models
All of the design team and the contractors worked on the models simultaneously and collaboratively. The drawings of the systems also serve as functional diagrams for continuing operations.

Maintenance Management
The model was used to determine equipment codes and schematics for the CMMS system. Additional graphic displays of 3D models of each floor are connected to the system.

In summation:

Challenges

- Only had access to periodic downloads of model when updates or changes occurred
- Many changes in client organizations, management, and people during the course of the projects
- Requirements and schedule for contractor as-built drawings, record documents, and resulting facility drawings were not clear – even with the BIM Implementation Plans
- Documentation format standards changed – but improved during the process
- The need to be flexible and go with the flow – determining how to use information after it was created – how to apply new techniques to old problems

Lessons learned so far

Still a People Business…

- Building Relationships
- How is the human element considered?
- How will everyone learn to use BIM?
- What do you need to do your job and then some?

Use technology to communicate…

- Email
- Collaboration sites
- Revit Server

HAPPY TRAILS TO YOU!