BIM-FM: Why, What and How?

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Agenda

- Introduction
- Why?
- What?
- How?
- Case Studies
- Recommendations

What are we going to talk about?
"Building Information Modeling is a digital representation of physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life cycle from inception onward."

National BIM Standards (NBIMS)
Building Lifecycle

Operate
- Renovations
- Space Management
- Asset Management
- Commissioning Handover

Design
- Schematic Design
- Design Development
- Construction Documents
- Pre-con

Build
- Construction

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Data Curation

**Data curation** is the organization and integration of *data collected* from various sources. It involves annotation, publication and presentation of the data such that the value of the data is maintained over time, and the data remains available for reuse and preservation.

*Wikipedia*
**BIM-FM** is the process of data curation from Building Information Models for the purpose of Facilities Management.
FM Data Collection: The Traditional Way

- As Built Drawings
  - Hard Copy Prints
  - PDFs
  - 2D CAD

- Operations & Maintenance Manuals
  - Hard Copy Binders
  - PDFs
FM Data Collection: The BIM Way

- O & M Manuals
- Field Data
- Submittals
- Design Models
- Const. Models

**FM- BIM Model**

*CMMS: Computerized Maintenance Management System*
Utopia Versus Reality!

Life before the digital era

Life after the digital era
What Is The Way Forward?

Answer three key questions:

▪ **Why** do we collect FM data?
▪ **What** FM data do we collect?
▪ **How** do we collect FM data?
Why Do We Collect FM Data?

Four reasons:

- Space Management
- Renovations
- Building Maintenance (Reactive)
- Building Maintenance (Preventive)
1. Space Management

- Area calculations
- Space inventory: occupied vs available
- Control and supervision of the physical spaces
- Space could be a single floor, multiple floors within a building, or multiple floors within multiple buildings
2. Renovation

- Selective demolition
- Addition
- Reconfiguration of space
- Building systems upgrade
3. Building Maintenance (Preventive)

- Equipment management
- Preventive maintenance tasks
- Preventive maintenance schedule
- Safety plans
- Warranty information
4. Building Maintenance (Reactive)

- Building occupant comfort
- Building Automation System (BAS)
- Workorder management
- Spare parts inventory
What FM Data Do We Collect?

**Four types:**

- Geometric Data
- Parametric Data
- Field Data
- Operation & Maintenance Submittal Data
1. Geometric Data

- 2D vs 3D
- File format (native model authoring software/model viewing software/.ifc/.pdf)
- Required for space management and renovation
- As designed vs as built
2. Parametric Data

- Physical attributes (properties)
- Key parameter: location of assets
- Needed for building maintenance (preventive and reactive)
- Classification management
- Nomenclature standards
3. Field Data

- Commissioning data
- Barcoding/ asset tagging
- Physical location vs virtual location
- Software: consider connectivity in field
- Hardware: consider mobility in field
4. Operations & Maintenance Submittal Data

- Needed for preventive maintenance
- Safety plans
- Warranty information
- Mostly non standard PDFs
- Consider how will the data be populated in the CMMS
How Do We Collect FM Data?

Four ways:

- BIM Authoring Software
- Custom Spreadsheets
- COBie
- FM Cloud Software
1. BIM Authoring Software

- Management of different data types
  - Great for geometric data
  - Good for parametric data
  - OK for field data
  - Not so good for submittal data

- Other considerations
  - Design models versus construction models
  - Final deliverable file format (rvt/dwg/nwd/ifc)
  - Level of development for as built
2. Custom Spreadsheets

- Management of different data types
  - Not so good for geometric data
  - Great for parametric data
  - Good for field data
  - OK for submittal data

- Other considerations
  - Customization versus standardization
  - Responsibilities and data integrity
  - Example: eOMSI workbook by NAVFAC
3. COBie (Construction Operations Building Information Exchange)

- Management of different data types
  - Not so good for geometric data
  - Great for parametric data
  - Good for field data
  - OK for submittal data

- Other considerations
  - Industry standard so not much customization possible
  - Many software can import/export COBie directly *(with proper data formatting)*
  - COBie is becoming the norm for FM data curation
4. FM Cloud Software

- Management of different data types
  - OK for geometric data
  - Good for parametric data
  - Great for field data
  - OK for submittal data

- Other considerations
  - Software cost
  - Software interoperability
  - Data encryption
  - Overlapping functionality with other project management software
### FM Data Collection: Summary

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<th>Software</th>
<th>Geometric Data</th>
<th>Parametric Data</th>
<th>Field Data</th>
<th>Submittal Data</th>
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Case Study: Kansas City International Airport, Missouri

- 1.5 B $, 2023 completion
- Organization vs project BIM standards
- Construction Models to FM Models
- Geometric and parametric data from BIM authoring software
- Field data from FM cloud software
- COBie requirements
Case Study: East County Detention Center, Indio, CA

- 275 M $, 2019 completion
- Construction models to FM models
- Parametric and O&M data linked in model viewing software
- Field data from FM cloud software
- Custom spreadsheets
Recommendations

- Clearly **define deliverables** early
- Clearly **define assets and attributes** early
- Establish **LOD definitions** for all required assets early
- Define **roles and responsibilities** of various stakeholders
- Data **deliverable requirements** dictate data collection workflows
- Start with the **end in mind**
- Consider **software interoperability** (or lack of!)
- Do **not wait till the end** for data collection
Thanks!

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