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BIM for FM
Introduction
LOD
Data Export to FM
BIM in FM Aspects
  - Building Commissioning
  - Facilities Records
  - Space Management
  - Building Efficiency
  - Existing Building Certification
  - Asset Management
  - Access Control
  - Communication
  - Communication BIM and BAS

Preventive Maintenance
What does it mean for FM?
Involved Cost and Return of Investment
“Off shelf” Products for BIMFM and BIMPM
Example
Introduction
BIM is still very new in Ireland.

Main focus on Construction phase of Life Cycle.

BIM model is Owner’s problem.

How to structure EIR (Employers Information Requirements) to suit FM

Is COBie the right way? (Construction Operations Building Information Exchange)?
Majority of LC relates costs are after construction Stage (~90%)

(ref. FM Systems)
Level of Development (LOD)
## LOD Requirement

<table>
<thead>
<tr>
<th>LOD 100</th>
<th>LOD 200</th>
<th>LOD 300</th>
<th>400 Detailed</th>
<th>500 As built</th>
<th>LOD 600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual</td>
<td>Generic Placeholders</td>
<td>Specific Assemblies</td>
<td>Assemblies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Graphic Representation can be generic</td>
<td>1. Graphic Representation can be generic object,</td>
<td>1. Graphically represented objects within the Model as a specific system, object or assembly.</td>
<td>1. Graphically represented objects within the Model as a specific system, object or assembly.</td>
<td>1. Field-verified representation in terms of size, shape, location, quantity, and orientation.</td>
<td>1. LOD 500 + FM Data</td>
</tr>
<tr>
<td>2. Some data present however not detailed as LOD 200</td>
<td>2. Data included: approximate quantities, size, shape, location, and orientation.</td>
<td>2. Accuracy in terms of quantity, size, shape, location, and orientation.</td>
<td>2. Accuracy in terms of quantity, size, shape, location, and orientation with detailing, fabrication, assembly, and installation information.</td>
<td>2. Non-graphic information may also be attached to the Model Elements</td>
<td></td>
</tr>
<tr>
<td>3. Non-graphic information may also be attached</td>
<td></td>
<td>3. Non-graphic information may also be attached.</td>
<td>3. Non-graphic information may also be attached.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Analysis, cost estimating and scheduling | Analysis, cost estimating and scheduling | Construction, analysis, cost estimating and scheduling | Construction, analysis, cost estimating and scheduling | Approved used for FM | LIVE AIM Model |
LOD Explained

LOD 100

LOD 200

LOD 300

LOD 400

LOD 500
LOD & LOI

LoD  Level of Development  LOI  Level of Information

Level of Detail +

vir: arhiv KošorokGartner
Data Export to FM System
1. Revit generated schedules (txt).
2. COBie export.
3. Other Dynamo or through Revit API generated links.
Issues for Asset Management
Issues with Data

1. What to export from BIM?

2. What file type (or link) is needed for FM or AMS?

3. Mapping of exported file with destination system.

4. Difference of naming convention between FM and Model

5. Mapping details and parameters required need to be addressed in EIR (for existing buildings) or after construction phase when all building and management systems are fully specified!
# Examples with COBie

<table>
<thead>
<tr>
<th>Parameter type</th>
<th>COBie</th>
<th>Revit</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>N/A</td>
<td>Project Description</td>
<td>Created in Design Phase</td>
</tr>
<tr>
<td>Asset Description</td>
<td>COBie.Type.Description</td>
<td>__________</td>
<td>Created when mapping to COBie</td>
</tr>
<tr>
<td>Warranty Expiry</td>
<td>Cobie.Component.WarrantyStartDate Cobie.Type.Expectedlife Cobie.Component.WarrantyDurationUnit</td>
<td>__________</td>
<td>No direct mapping</td>
</tr>
<tr>
<td>System</td>
<td>COBie.Type.Description</td>
<td>__________</td>
<td>Created in Design Phase</td>
</tr>
<tr>
<td>Operation Status</td>
<td>__________</td>
<td>__________</td>
<td>Manual input to FMS or Revit defined parameter</td>
</tr>
</tbody>
</table>
BIM Benefits - Building Commissioning
Building Commissioning

Classical (OLD) method

1. Difficult to Access
2. Impossible to Analyze
3. Hard to Update

Live Information Systems
Facilities Records
1. Managing and accessing drawings vs models is a simplification of the process; provides three dimensional aspects of buildings and tracks comprehensive data regarding equipment assets. BIM itself without any additional platform give a centralized information platform, the level of information (ie. during design process) will decide on the information available in operation stage.
Space & Change Management
Internal Fit out Alternative Scenarios to maximise space utilisation

Phasing - allow owners to track their assets through renovations or space reallocations, and if needed, assist with insurance issues or dispute resolution.
Building Efficiency
1. BIM and its ability to analyze information, which can include power usage.
2. Energy savings and predictive analysis using add-on solutions can also provide analyses for sustainability and code compliance.

Example:
- A Facility operates a number of conference/meeting rooms
- An event is to take place for few days
- There will be localised heating (winter) or cooling (summer) required to be provided.
- Based on weather predictions an FM can plan ahead which room to make available based on location/orientation (solar gains, shading, ventilation available) to maximise rooms performance and to minimise loss.
- This could be achieved through software (IES) BIM integration or simply using BIM platform (to extract information about glazing, shading orientation) together with written script (ie. Excel) to estimate energy needed for each scenario.
Building analysis, Sustainability Initiatives, Energy Efficiency
Building analysis, Sustainability Initiatives, Energy Efficiency

In-depth Energy Study using BIM model
Daylight Analysis (ref. www.construction.com)
Existing Building Certification
1. Verification of a Building Efficiency ï In Operation Stage vs Designed
2. Rapid Energy Models
3. All information is stored in a central location to aid LEED process
4. LEED certification for new or existing buildings requires a large amount of calculations (ie. Energy performance, spaces, information about fabrics, day lighting etc.) ï BIM enables easy and fast access to these resources.
Asset Management/Monitoring
BIM integrated with technology like RFID (Radio Frequency Identification) can locate and track assets and location (changes).
Access Control
Access Control

1. Information could be deployed after the construction stage or during operation stage of a facility based on 3D model defining zones/rooms with access matrix.
2. That dimension could later be exported to COBie and used either within Revit Viewer or Maximo or other platforms.
Communication
1. BIM models can be deployed into a local DB or external platform (i.e. cloud based).
2. All information included within BIM models can be accessible by multiple users at the same time (i.e. Drawings, models, manufactures information, warranty, phone numbers etc.)
3. Through additional software plug-ins or cloud based platforms (i.e. GLUE) BIM models can be used as a coordination between processes in any stage of Buildings/Facilities Lifecycle.
Communication

Other benefits:
- Decrease time while searching for information
- Reduce response time and enable facility managers to improve performance and productivity while
- Minimizing misunderstandings
- Increased collaboration between departments.
- Mobile BIM access
Communication BIM and BAS
Preventive Maintenance
1. Organisations through BIM and information accessible for equipment assets, Organizations can track and schedule preventive maintenance using the asset information embedded in BIM.

A complete BIM model can be used as a foundation to monitor maintenance schedules within a facility: BIM objects can contain information about scheduled maintenance. Exported (ie. COBie to Maximo) information can be utilised as a basis of maintenance work requests (orders).
What does it mean for FM?
What Does it mean for FM?

1. The Need for Information Management
   - Information is not free
     - Cost to Collect
     - Cost to Verify
       - If the information can’t be trusted, nothing is more expensive
     - Cost to Maintain

2. Deciding Where to Begin?
   - Technical Buildings
   - Government Buildings etc.
   - New buildings
   - Existing Buildings
     - Level 1 BIM
       - Layouts, Construction
       - Keep it updated
   - Special Purpose BIM
     - For analysis (energy etc.)
   - Point Clouds
What Does it mean for FM?

2. The Changes in Relationships - Collaboration/Communication

- Engineers
- Designers
- PMs
- Contractors
- Maintenance

BIM Data
What Does it mean for FM?

4. Changes in FM Skill set
   - Information Management Skills
     - Writing specifications for information use
     - Managing changes
     - Reviews and coordination (accuracy and level of completion)

5. Changes in FM Practices
   - Commissioning
   - Ongoing Lifecycle Management
     - Capital Improvement Budgeting
     - Building Assessment
Involved Cost and Return of Investment
Cost Involved

1. Initial costs to create BIM models that FM can utilise (incl. training).

2. Initial cost to integrate multiple FM systems, collect data and train staff.

3. Continuing costs to update information and maintain a current "As-Is" information set.
1. Less time is spent collecting data.

2. Less time is spent searching for data.

3. Modification projects benefit from real time availability of accurate information.
   a. In-house dynamic changes can be done during Lifecycle (ie. Gas Networks Road)
   b. Energy efficiency strategic planning
   c. Multiple scenarios assessment

4. Utility expenses are reduced by better performing equipment.

5. According to some sources ROI is less than 2 years (relates to complexity of a facility and processes involved)
“Off shelf” Products for BIMFM and BIMPM
1. Centralised Information Storage

2. Access through variety of devices including mobile.

3. Collaboration and sharing models and files.

4. Mobile apps for mark-ups and viewing
1. Collaboration platform for Design Stage of BIM

2. With additional plug-ins multiple users can work within one model using central file set-up.
Maximo Asset Management

Core
- Asset management
- Work management
- Service management
- Contract management
- Inventory management
- Procurement management

Add on
3D visualization of the building model in context with the imported data.
Improved efficiency of the maintenance work planning and execution process.
Bi-directional connection - the data, with any changes made during operations may be exported to update the model for a renovation project, or for use in other tools.
1. Asset management

2. Online Navigation

3. Laser Scanning Interface

4. BIM and BAS integration

5. Advanced Reports
5D VICO OFFICE BIMPM

1. Platform integrating 3D design (ie. Design stage)

2. 4D - Costing

3. 5- Scheduling

4. Construction Progress Monitoring
Example
Thank You.

QUESTIONS?