Understanding Your Facilities Information Needs and the Potential of BIM to Your Organization

Post-Occupancy BIM Study

April 2011
What is your role within the organization as it relates to facilities and facilities management?

- I am the leader of my company’s facilities function (17%)
- I am a facilities management professional in my organization (33%)
- I am involved in the planning, design & construction of facilities within my organization (40%)
- Other (10%)
How many **in-house facilities services employees** does your organization have?

- **77%** More than 10 Employees
- **9%** 6 to 10 Employees
- **14%** 3 to 5 Employees
What are the **Significant FM Challenges** Facing Owners?

1. Funding and Staffing Shortages

2. Effective Documentation of As-Builts, Equipment Data, etc.  
   (Both the initial collection and the ongoing maintenance of documentation)

3. Development and Management of Maintenance Processes

4. Renovation and Maintenance of Existing (Older) Buildings

5. Achieving Sustainability and Energy Savings Goals
What are the **Significant FM Challenges** Facing Owners?

“*Funding* for operations that meet customer expectations.”

“*Time, funding and technical training of the front line staff. System operations understanding.*”

“*Maintaining accurate as-built drawings* to provide to designers and contractors so scope and budget match. We often find surprises that increase the cost of the project significantly.”

“*Achieving energy savings* while renovating *older structures* quickly and cheaply.”

“*Achieving sustainability* goals on energy, water and greenhouse gases.”
What are the Significant FM Challenges Facing Owners?

Broader Sampling of Responses:

**Funding**

“Funding for operations that meet customer expectations.”
“Finding dollars to meet maintenance demands.”
“Getting the funds to perform the work that may have a longer ROI.”

**Time / Staffing**

“Time, funding and technical training of the front line staff. System operations understanding.”

**Documentation**

“Maintaining accurate as-built drawings to provide to designers and contractors so scope and budget match. We often find surprises that increase the cost of the project significantly.”
“Getting up-to-date information on the building and the assets.”
“Having usable as-built information to maintain and expand the facilities.”
“Collecting and maintaining equipment data information.”
“Standardizing information, better communication.”

**Maintenance of Existing / Older Buildings**

“Our biggest challenge is the up-keep of a building that is hard to maintain because designers don’t listen to the people that are responsible for that job. We have four buildings now that we can’t get equipment into to change lights because the width of the door is too narrow. We were told that it wouldn’t look good with wider doors and we didn’t know what we were talking about.”
“Old facilities, constant change, new facilities coming online with more complicated systems.”

**Maintenance and Management**

“Bringing a new asset management system online in concert with a major capital improvement project.”
“Day-to-day management of the building HVAC and controls system.”
“Facility occupancy buy-in of our efforts to maintain systems.”
“Assisting ownership with anticipated maintenance schedules and life cycle costs.”

**Sustainability/Energy Savings**

“Achieving energy savings while renovating older structures quickly and cheaply.”
“Achieving sustainability goals on energy, water and greenhouse gases.”
Please rank the following **common facilities goals** in terms of their **importance to your organization**

*(1= Least Important, 8 = Most Important)*

<table>
<thead>
<tr>
<th>Facilities Goal</th>
<th>Average Rating</th>
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<tbody>
<tr>
<td>Reducing energy costs and achieving greater energy efficiency</td>
<td>7</td>
</tr>
<tr>
<td>Reducing repair and maintenance costs</td>
<td>6</td>
</tr>
<tr>
<td>Finding ways to extend the life of existing facilities</td>
<td>6</td>
</tr>
<tr>
<td>Achieving green or sustainability goals with regards to facilities</td>
<td>4</td>
</tr>
<tr>
<td>Efficiently managing major facilities projects (new facilities, renovations, system upgrades, etc.)</td>
<td>4</td>
</tr>
<tr>
<td>Security, safety and assessing facility vulnerabilities in these areas</td>
<td>3</td>
</tr>
<tr>
<td>Matching existing facilities assets to current needs of the company</td>
<td>3</td>
</tr>
<tr>
<td>Preparing and implementing a disaster recovery plan</td>
<td>2</td>
</tr>
</tbody>
</table>
What’s **Currently Missing** to Effectively Manage Your Facility?

1. Accurate and Complete As-Builts and O&M’s
2. Effective Dissemination and Communication of the Information
3. Real-Time Performance Data for Measuring Energy Usage
4. Development of a Long-Term Capital Planning and Asset Management Plan
“The actual population in our buildings. Energy use in our systems.”

“Life Cycle Costs (as opposed to initial cost) of equipment installed as part of a capital improvement.”

 “[The Master Plan] should be updated annually to see if the organization is following the plan and if not it needs to reflect those changes and communicated out so everyone is on the same page.”

“Not too many gaps, but information is spread across a wide array of media and is held by different people and groups, making it inefficient to access or share.”
What’s **Currently Missing** to Effectively Manage Your Facility?

**Broader Sampling of Responses:**

- Electronic drawings (AutoCAD and pdf) are lacking.
- Not really . . . we have plenty of information; presented in compelling ways.
- Costs of system replacements in current and future dollars.
- Need to develop a long-term capital planning and asset management plan for our facility.
- In our case, multiple RFIs and CORs didn’t make it into a complete set of as-builts. I would recommend more follow through on the back end with document updates as the project adjustments happen.
- The actual population in our buildings. Energy use in our systems.
- Life Cycle Costs (as opposed to initial cost) of equipment installed as part of a capital improvement.
- None
- I look forward to receiving the BIM drawings for new library. We have moved to having our information online.
- We have a Master Plan that was performed by a third party for the entire system. This plan should be updated annually to see if the organization is following the plan and if not it needs to reflect those changes and communicated out so everyone is on the same page.
- Not too many gaps, but information is spread across a wide array of media and is held by different people and groups, making it inefficient to access or share.
- Code changes, especially healthcare.
- Yes, equipment info doesn’t get to our O&M group very quickly -- if ever -- after construction.
- Current utility lines.
- Complete drawings and O&Ms on the plan site.
- Lack of complete and/or organized operations and maintenance information on equipment and systems.
- Facility performance data
- Accurate / maintained as-build info
- Life cycle costs
- Specific equipment data
- Old drawings not updated
- Yes, better information transfer from design to construction and then onto operations
- Construction progress photos tied to as-build databases
Who has **primary responsibility** for maintaining and servicing your facilities management tool(s)?

- **76%** In-House Staff
- **12%** Software Vendor
- **6%** Outsourced Facilities Management Team
- **6%** Other
Which of the following statements most closely matches your familiarity with BIM?

- 63% I am somewhat familiar with BIM but I have more to learn
- 37% I am familiar with BIM
What is the **Current Role of BIM** in Facilities Management?

The primary role of BIM is for **planning and construction**. BIM does not currently play a significant role in the management of respondents’ facilities. However, there is significant interest for finding ways to leverage the information in the near future.
What is the **Current Role of BIM** in Facilities Management?

“We are looking for ways to extend our BIM's into **post-occupancy tools**, as all our projects utilize BIM.”

“No role at present. We are in the process of requiring designers to use BIM on current and future projects. We expect it to help inform decisions and improve operations after occupancy.”

“Very little, if any, after a new construction project is constructed and turned over.”

“Primary role for new construction in delivering building and equipment data. That information is linkable and usable with our FM software.”
What is the **Current Role of BIM** in Facilities Management?

**Broader Sampling of Responses:**

- We use it in planning and construction of new buildings
- Plays no role
- Primary role for new construction in delivering building and equipment data. That information is linkable and usable with our FM software.
- Our information provides a closer look at how our mechanical systems are positioned within the facility, but unfortunately doesn't provide a complete / actual positioning. The linking of the as-built information is a good idea.
- Very little, if any, after a new construction project is constructed and turned over.
- We have GIS, automation, graphics, and overall extensive computerized systems for reporting and analysis.
- No role at present. We are in the process of requiring designers to use BIM on current and future projects. We expect it to help inform decisions and improve operations after occupancy.
- We are just on the edge of use. The library that we just finished is our first building.
- We are transitioning into BIM. All new projects are being done in Revit.
- Information transfer, speeding info to maintenance staff, decreased construction cost (change orders specifically) better coordination
- We are looking for ways to extend our BIM's into post-occupancy tools, as all our projects utilize BIM.
- BIM is not used.
- None
- Limited at this time but as more projects use BIM, we will certainly take advantage of the information
- None at this time, but it could provide valuable historical facilities construction information
Based on your current knowledge, what is the value or potential value of BIM information to your organization?

(1 = Not very valuable, 10 = Extremely valuable)
What **Value** does BIM bring to your Organization?

**Primary**

1. Clash Detection and coordination during construction
2. Accurate as-built information
3. Equipment data

**Secondary**

1. Riser diagrams
2. Commissioning data
3. Asset inventory and space management
What **Value** does BIM bring to your Organization?

“**Most value during construction.** Information provided in an intuitive way to the facilities staff in a format that is easy to access and use.”

“**Accurate as-built information**”

“**Equipment data** from commissioning process”

“**Accurate riser diagrams** for plumbing, mechanical, and electrical installations”

“**Integration with BAS and CMMS**, moves and asset inventory as well as finish and material data”

“**Historical as-built information for underground infrastructure**”
What **Value** does BIM bring to your Organization?

**Broader Sampling of Responses:**

- In the construction and renovation
- Space management, maintenance management
- Equipment data from commissioning process.
- Multi-dimensional views of MEP.
- Equipment location and configuration.
- Effective and efficient operations and recording of history of operations, costs and performance
- Accurate riser diagrams for plumbing, mechanical, and electrical installations
- Integration with BAS and CMMS, moves and asset inventory as well as finish and material data
- The visual aspect that it will give to our hvac system and maintaining our buildings.
- Coordination between disciplines
- The current programs such as Revit do not have the capability yet to provide useful design tools to us to properly use the "I" portion of BIM. We currently model in 3D, but there just isn't enough capability or information for us to justify the expense of trying to use the fledgling design capabilities.
- Complete 3D as built information
- Construction to ops transfer of data, models
- All data is important in some respect. We attach very little useless data. Most important might be quantification and costing data, as well as keynote construction data.
- Equipment data
- Historical as-built information for underground infrastructure
- Accurate as-built information
What would make BIM more valuable to your organization in the future?

1. Integration with existing CMMS, FMS and EMMS systems
2. Database links between building components and design information
3. Development of an easier to use BIM software or interface to facilitate mass implementation across the various organizations.
What would make **BIM more valuable** to your organization in the future?

“**Seamless transfer from construction into our EMMS and FMS**”

“**Easy viewers** that don’t require full versions of the original software.”

“**CMMS systems getting up to speed** with the integration of BIM data”

“**Accessible on mobile devices**”

“First and foremost would be to have **BIM a little easier to use** with updating of O&M manuals for equipment. There is an excel spreadsheet that is required to make the connection, and it complicates the process. There should be more of a "**point, click, upload, complete"** approach.”

“The potential of having **convenient access to embedded or linked information** for building components, materials and equipment as well as design information.”
What would make **BIM** more valuable to your organization in the future?

**Broader Sampling of Responses:**

- We don’t have the personnel, nor space for the personnel, nor the computer capacity to utilize [BIM] in our organization.
- Accessible on mobile devices
- Ability to track ROI of BIM implementation
- Thanks for asking. First and foremost would be to have BIM a little more easier to use with updating of O&M manuals for equipment. There is an excel spreadsheet that is required to make the connection, and it complicates the process. There should be more of a "point, click, upload, complete" approach. We had to make decisions on program content and detail based upon dollars available. As a result, we didn’t get everything we wanted. I would recommend a full product without barriers to your desired outcome.
- Coordinating the BIM identification nomenclature with our other systems like ATG & TMS.
- Accuracy
- CMMS systems getting up to speed with the integration of BIM data
- Having all our building drawn in BIM
- If Revit or any other program evolved to include the information management capabilities, such as easy to use panelboard schedules, integration with design programs such as SKM, or the capabilities to size feeders. These tools exist in a very rudimentary form right now.
- Use 3D model as a central location to collect all as-built information, and keep the model updated as repair/modifications are made.
- One-stop shopping for data transfer and development, improve Autodesk’s packages
- Interoperability with a variety of packages
- Seamless transfer from construction into our EMMS and FMS
- Do not know, so far this is an untapped resource.
- Easy viewers that don’t require full versions of the original software.
How many of your organization’s new construction or remodeling projects have utilized BIM?

76%

Have utilized BIM on at least 2 Projects
What do you see as the primary obstacles that may keep BIM from becoming a more useful ongoing facilities management tool?

- Cost of BIM
- Lack of Relevance to Operations & Maintenance Procedures
- BIM Not Needed (Current Facilities Management Tools are Adequate)
- Lack of BIM Training for Facilities Management Personnel
- Incomplete or Inaccurate Information in BIM
- User Interface
- Interoperability Between BIM and FM Software
- Other *

* Information modeling is borderline useless to us right now in its current implementation
Are you familiar with Construction Operations Building Information Exchange (COBie)?

- Yes: 33%
- No: 67%
What do you see as the primary purpose of end-of-project BIM deliverables?

- Facilities / Asset Management: 41%
- Record Documents / As-Builts: 59%
Have you completed a project in which an end-of-project BIM deliverable was provided?

- Yes: 38%
- No: 53%
- I Don’t Know: 9%
What was the **BIM deliverable(s) provided** to you at the end of the project?

88% Of BIM deliverables involved some form of **Navisworks**

47% Of BIM deliverables involved some form of **Revit, Bentley, or ArchiCAD**
How did you originally intend to utilize the BIM deliverable?

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Percent of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record models</td>
<td><img src="chart.png" alt="Bar Chart" /></td>
</tr>
<tr>
<td>Training of Facilities Engineers and End Users</td>
<td><img src="chart.png" alt="Bar Chart" /></td>
</tr>
<tr>
<td>Reference O&amp;M data via Navisworks model</td>
<td><img src="chart.png" alt="Bar Chart" /></td>
</tr>
<tr>
<td>Connecting the BIM model to your CMMS, BAS and/or EMS</td>
<td><img src="chart.png" alt="Bar Chart" /></td>
</tr>
<tr>
<td>Life Safety/Emergency Procedure Planning</td>
<td><img src="chart.png" alt="Bar Chart" /></td>
</tr>
<tr>
<td>Other</td>
<td><img src="chart.png" alt="Bar Chart" /></td>
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</tbody>
</table>

*Other Mentioned: Coordination*
Are you using the BIM deliverable as you originally intended?

Yes: 44%
No: 55%
How often is the BIM Information Referenced or Utilized on a Regular Basis?

- Never: 50%
- Quarterly: 10%
- Monthly: 10%
- Weekly: 20%
- Daily: 10%
Which aspect of the BIM deliverable did you find most valuable?

- Visualization of the facility: 55%
- Information contained within the model: 36%
- Both are equally valuable: 9%

Which aspect of the BIM deliverable did you find most valuable?
How valuable have you found the BIM deliverable tool for this project?

*Scale of 1 (not very valuable) to 10 (extremely valuable)*

- **Extremely Valuable** (Responses 8 through 10): 25%
- **Somewhat Valuable** (Responses 4 through 7): 42%
- **Not Very Valuable** (Responses 1 through 3): 33%
What factors have limited the value of the BIM deliverable?

The most limiting factor is the lack of training, hardware and software to fully realize the benefits of BIM to FM. The complex BIM software user interface requires regular use to maintain familiarity with the tool. A narrow focus on visualization also hinders organizations’ ability to comprehend the far-reaching value of BIM.
What factors have **limited the value** of the BIM deliverable?

“Lack of training for facilities management personnel, User interface, Fighting the mindset by some that BIM is not needed.”

“**Visualization in 3D.** People get too caught up in it and misleads real users to notion that 3D is the end in mind. It’s nice to have, but not really needed to serve its most useful purposes: Information and data.”

“A complete account of equipment [location]. We have had three major add-ons since initial occupancy and those areas are not included. This makes the system less attractive to use on a regular basis. Good for remodel work.”
What factors have limited the value of the BIM deliverable?

Broader Sampling of Responses:

- Not having staff to utilize it as a tool
- Visualization in 3D. People get too caught up in it and misleads real users to notion that 3D is the end in mind. It's nice to have, but not really needed to serve its most useful purposes: Information and data.
- A complete account of equipment positioning. We have had three major add-ons since initial occupancy and those areas are not included. This makes the system less attractive to use on a regular basis. Good for remodel work.
- Not all facilities staff have a computer and they are not trained to use the BIM data.
- Complexity and training required for a person that cannot use it every day to be able to use it infrequently
- Management
  - (Number 1 reason) lack of training for Facilities management personnel, (2) User interface, (3) Fighting the mindset by some that BIM is not needed.
- BIM is not accurate, or hard to review
- Linking models with FM software with double pass potential
Do you plan to request a BIM deliverable on your future projects?

85% Yes
15% No
What changes would you make to the BIM deliverable to make it even more valuable?

The overwhelming response is the level of accuracy in the model during design all the way through construction. Building components need to represent real world conditions during design and be coordinated/updated during construction to reflect the true as-built condition. The final deliverable must reflect the real world conditions.
What changes would you make to the BIM deliverable to make it even more valuable?

“Align design, construction and commissioning teams for a common deliverable package for the whole project that can more easily integrate with FM/CMMS software.”

“More affordable. Priced way to high. Needs more follow-through on the back end with updates during the warranty period. Equipment layout must be coordinated with as-built conditions, not drawings. It doesn't make sense to have a final product that isn't based upon where the equipment, duct, conduit or pipes actually are positioned.”

“Include as much detail as possible on all materials, equipment, and locations in an integrated way in the model.”

“Building ACCURATE and COMPLETE model with ALL elements BEFORE construction takes place, and COPY the virtual model into the real world. If BIM model is NOT accurate and does NOT represent ALL elements, it will have no value.”
What changes would you make to the BIM deliverable to make it even more valuable?

Broader Sampling of Responses:

- Align design, construction and commissioning teams for a common deliverable package for the whole project that can more easily integrate with FM/CMMS software.
- More affordable. Priced way too high. Needs more follow-through on the back end with updates during the warranty period. Equipment layout must be coordinated with as-built conditions, not drawings. It doesn't make sense to have a final product that isn't based upon where the equipment, duct, conduit or pipes actually are positioned.
- Include as much detail as possible on all materials, equipment, and locations in an integrated way in the model.
- Not sure
- Don't know yet
- Building ACCURATE and COMPLETE model with ALL elements BEFORE construction takes place, and COPY the virtual model into the real world. If BIM model is NOT accurate and does NOT represent ALL elements, it will have no value.
- Good contracting tools