BIM Interoperability and Collaboration

There Is No "I" in Team
BIM: Sustainable Design and Management for Building Owners

By Terence Alcorn, AIA and Phil Wirdzek, with contributions from Deke Smith, FAIA and Igor Starkov

For hundreds of years, designers, contractors and owners have used 2-dimensional drawings to facilitate the construction of buildings. Today, we have the ability to design and visualize a building in 3-dimension, and also add time and experience (the building model in 4-dimension), as we observe daylighting studies, scheduling and construction sequencing.

Building owners of laboratories and high-tech facilities can benefit greatly by using a BIM model that instructs and reinforces operations and management of their facilities, especially in achieving sustainable performance. In fact, the high-technology building sector (e.g., laboratories, data centers, cleanrooms and hospitals) is at the forefront of the BIM effort because of the increased complexities, substantial capital investments, significant life-cycle benefits and economic value derived from their creation. Early adopters will not only encourage the industry's use and value of BIM in design and construction, but help guide its future application for owners. Furthermore, stimulating BIM's application in this market will establish benefits that will reverberate throughout the building sector.

BIM in Operations and Management

Through partnership agreements, individuals from the National Institute of Building Sciences buildingSMART alliance®, the International Institute for Sustainable Laboratories (FSL®) and the Research and Development Council at the International Facility Management Association (IFMA) initiated a program based on a framework conceived by Virginia Polytechnic and State University. The purpose: to research and build support for BIM as a facility operations and management platform. The initial requirement of the framework was to assess the level of knowledge of BIM in owners and operators. To do so, the group developed and conducted a 2012 survey that was organized with a series of educational packets followed by questions relating to the information. This survey was sent to approximately 30,000 individuals through each of the above-noted organizations' newsletters, and responses were received from more than 250 individuals representing owners, designers, construction managers and others associated with building operations. The survey results for high-tech building owners revealed the following facts and statistics.

- With respect to the current use of BIM among high-tech building owners:
  - 1/3 of the owners are requiring BIM for all new projects;
  - 1/3 are doing pilot projects with BIM; and
  - 1/3 are not sure if they are getting it right, or have never heard of BIM.

- For owners expecting a future with BIM:
  - 82 percent expect BIM to impact their future; and
  - 75 percent feel they need basic knowledge of BIM and the usefulness of it for their organization.

- The "I" in BIM is for information, and the information exchange among the various facility life-cycle stakeholders is enabled by Construction Operations Building Information exchange (COBie). Unfortunately, 50 percent of high-tech building owners have not heard of COBie.

2012 Survey: BIM as a Facility Operations and Management Platform

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<th>Will BIM impact your work in the future?</th>
<th>How many high-tech building owners are using BIM?</th>
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<tbody>
<tr>
<td>Yes 83%</td>
<td>Using BIM for New Projects 39%</td>
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<td></td>
<td>Doing BIM Pilot Projects 33%</td>
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<tr>
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<td>Never Heard of BIM/Not Sure We’re Getting BIM 39%</td>
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More than 250 survey responses from owners, designers, construction managers and others point to BIM recognition and use in facility operations and management.
BIM for Energy and Comfort Control

- High-tech building owners are currently using BIM 36 percent of the time for their facilities post-construction,
- For managing expenses:
  - 16 percent use it for energy management; and
  - 19 percent use it for improving work management.
- For managing processes, 13 to 27 percent use it for scheduling, space management, cost estimating and equipment inventorying.
- Eighty-one (81) percent believe BIM would be most useful in addressing continuous commissioning.
- Sixty (60) to 70 percent use BIM for energy monitoring.
- Only 20 percent feel their building information is very accurate.
- In delivering and maintaining BIM for the owner:
  - Sixty-six (66) percent felt either the architect or contractor should provide the final BIM deliverable;
  - Fifty-three (53) percent felt either a supervisor or the commissioning agent should verify the building information and model; and
  - Sixty-five (65) percent felt either a technician or supervisor should maintain the building information and model over time.

Moving Forward
The most effective way to influence an entire emerging market is to have the market "come to us," and then provide the mechanism for the market to show...

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case itself and present its ever-changing landscape. This "pulling" of information is best accomplished with the development of an educational outreach program through the various partners' channels. It also is an appropriate mechanism to distribute this information to the broader user base that is seeking accurate information.

How well are our high-tech buildings, or for that matter any building, designed to optimize building efficiency? How well are these facilities performing after they are commissioned? How well are they operating over time for the owner? The high-tech building type is a very complicated assembly, with thousands of objects and processes that influence performance, including user health and safety, energy, water, security, contamination and chemical and hazardous materials management, to name a few. Furthermore, by their very mission, the users of high-tech buildings greatly affect the performance of their buildings.

BIM is a platform that can provide a comprehensive and interactive assembly of the components in a building to create a new type of operational model. As we add more information into BIM for each individual part of the building, the model becomes increasingly closer to matching its real-world counterpart. An example would be an energy-efficiency model that could tell us the most efficient array of pump sizes, water heater sizes, etc., based on building occupancy fluctuations throughout a day. Better data will translate to better designs, ensuring more functionally effective buildings. (See "BIM for Energy and Comfort Control," page 15).

Some high-tech building owners currently require that their buildings' energy models be maintained and updated throughout construction and building commissioning. As BIM further expands into building operations, we must be able to measure and monitor performance. Often, the adage, "if you don't have the right information, then you can't make the right decision," has never been more true. Measuring and monitoring building performance provides operators and users with the tools to improve their buildings' continued purpose and value.

Several manufacturers currently have ad campaigns touting how they are creating smart machines. Cars are smart; we can even purchase smart refrigerators. Increasingly, we will see smart products in our buildings, too. BIM is the ideal platform to visualize and use the information that is and will become available to us.

[Authors' Note: The authors and their collaborating organizations will continue to lead the implementation of the BIM roadmap. Individuals interested in sharing their expertise to help direct the evolution of BIM are encouraged to contact any of the authors.

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