



# Building Information Modeling:

## The Challenges and Opportunities for Building Owners

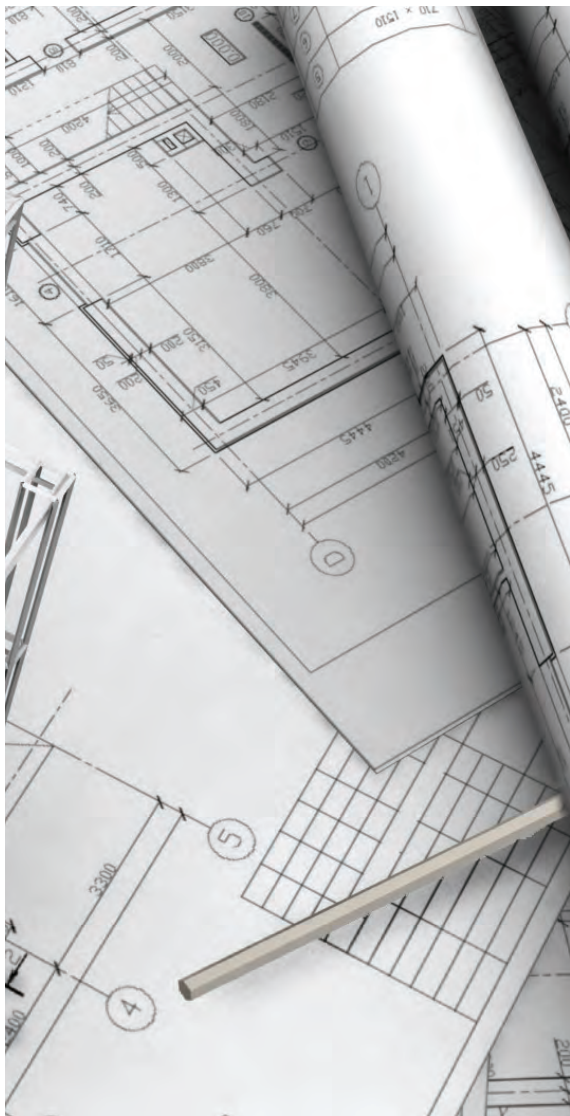
By Michael Tardif

The frequent refrain at building industry conferences for building design professionals and contractors is that building owners need to “take the lead” in the deployment and integration of building information modeling (BIM) technology in the building industry. What is overlooked by professionals on the AEC side of the industry is that building owners, at best, have an arms-length relationship to BIM technology and only a cursory understanding of how it might benefit them. However, though the position of the AEC community might be perceived by building owners as “passing the buck,” there is actually a very simple and logical reason behind it: the power of the supply/demand equation to drive innovation. If building owners, as consumers of AEC services, create the demand for BIM technology, then the suppliers of those services will adapt quickly to supply it. The problem

for building owners is that they will only “demand” something that has demonstrable value, and they need to understand BIM in order to assess its value.

Architects and engineers have had nearly ten years to adapt to BIM. Even for very small design firms, finding one that is not “BIM-enabled” is now rare. In the construction industry, many general contractors and trade subcontractors have acquired BIM technology over the last five years and developed substantial expertise in using it to streamline and improve the construction process. But while BIM-enabled construction is a routine business process for some, the construction industry as a whole still has a long way to go before BIM can be considered “standard operating procedure” across the industry.

The historical timeline for the



adoption of BIM technology, first among design professionals and then among contractors, makes perfect sense. Contractors could not begin to use BIM effectively until a substantial body of BIM design data from design professionals became available. To be sure, some early adopters of BIM in construction implemented BIM in their organizations without waiting for their A/E business partners to get onboard. But for most contractors, who are traditionally on the receiving end of design data, acquiring and using BIM for construction solo was neither practical nor cost-effective. Building owners, as the ultimate recipients of building information at the end of construction, face the same dilemma. Only now, as more contractors become proficient using BIM for construction and increasingly able to deliver as-built record information in BIM format, can building owners begin to plan strategically for implementing BIM in their organizations. It should be noted, as well, that the adoption of BIM technology by different segments of the building industry is closely tied to the

development of BIM technology. The first BIM applications were design tools. These were followed by specialized BIM applications specifically designed for contractors and trade subcontractors. To date, there are very few BIM applications designed specifically for building owners. For building owner BIM applications to become more widely available, the software industry has to overcome the same “chicken and egg” dilemma that existed before “construction BIM applications” became widely available: the market (building owners) won’t buy BIM applications until they have a sufficient volume of BIM data to manage, but the software industry won’t invest in developing building owner BIM tools until there is sufficient potential market demand. It took about five years for the construction BIM tools to develop after the introduction of the design BIM tools, so only now are we beginning to see the development of building owner BIM tools.

Despite these challenges, there are significant opportunities available now to building owners to strategically leverage BIM technology to their advantage long before they need to invest in BIM software or develop BIM expertise internally. And there are very useful resources available to building owners to help them do that. If building owners take these initial steps they will, as AEC professionals claim, help accelerate innovation across the industry.

The first and most simple step is not to require BIM deliverables of your AEC teams, but to require your design and construction teams to use BIM technology on your design and construction projects. Significant benefits can accrue to an owner from BIM-enabled projects, even if the owner is not yet ready to receive BIM deliverables at the end of construction projects. Three are worth examining in detail:

**Significantly enhanced visualization of building information.** When buildings are modeled in BIM instead of drawn in CAD, the 3D visualization (perspectives, walk-throughs, and photorealistic renderings) are a by-product of the modeling process. For very little additional effort, your design teams will be able to generate detailed visualizations from the model that can be used to communicate with stakeholders, lenders, tenants, and other parties. In the CAD era, this type of visualization was an extra, costly, and often cost-prohibitive step. Simply requiring design teams to generate all contract deliverables from BIM applications instead of CAD applications will produce this benefit.

**Significantly improved design and construction coordination.** Among the biggest problems in design and construction is uncoordinated design or installation drawings, which results in field delays to resolve interferences or, in the worst cases, rework of building components already installed. Even when design and construction teams do their best to produce “coordinated” drawings, the need to resolve interference problems on construction projects is routine. When buildings are modeled in BIM instead of drawn in CAD, it is possible to identify and resolve physical interferences virtually before they are discovered physically. The first step in the process, identifying the conflicts, is called “clash detection,” while the second step, resolving the conflicts, is called “spatial coordination.” Specifically requiring design and construction teams to use BIM for clash detection and spatial coordination will result in fewer conflicts, a more reliable, increased prefabrication of building systems, and a more streamlined construction schedule. Design and construction teams also routinely report that their BIM-enabled projects are cleaner, quieter, and safer, because they are able

## Feature

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to manage the logistics of equipment, material and labor more effectively. Those three benefits, of course, accrue to the owner as well, and often result in the additional benefits of lower space requirements for contractor parking and lay-down areas.

**Improved information flow and workflow.** For project teams to use BIM effectively, they need to share information. That may seem obvious, but it runs counter to the prevailing culture in the building industry. By contractually requiring design and construction teams to share their

BIM work products with each other, building owners can substantially improve the degree of coordination and collaboration among all project team members. For design and construction professionals who are new to BIM, this will raise significant questions regarding liability and responsibility for design information. Design and construction professionals experienced in BIM, however, no longer understand those questions. Most are finding that the intensive collaboration allows them to maintain stewardship of the information for which they are

traditionally responsible, as well as detailed oversight of the activities of all other project team members. Many design professionals report that the intensive collaboration that is fostered by BIM inherently reduces, rather than increases, their professional liability risk, because problems that may have previously resulted in professional errors and omissions claims are identified and resolved early and virtually, long before they could result in a claim.

There are many other benefits of BIM to owners, and fortunately there are readily-available and inexpensive



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(or free) resources available to help owners identify those benefits and plan for the strategic implementation of BIM in their organizations. The first, and most important, is the BIM Project Execution Planning Guide, published by the Computer Integrated Construction Research Program of Penn State University, and available at no cost online. (The Web address is too lengthy to remember, but if you simply Google “BIM Project Execution Planning Guide,” it will take you directly to the Web site.) Don’t be put off by the length of this document, which includes detailed business process maps for BIM-enabled projects. It is intended to be comprehensive, and to address all of the possible information flows and workflows of any design and construction project. Most project teams need to address only a subset of the possibilities. The Guide, then, serves as a useful reference manual from which project teams can develop project-specific BIM Project Execution Plans. The Guide includes a “BIM Project Execution Plan” template,

so that no project team need develop this document from scratch. Building owners can require their design and construction teams to create a BIM Project Execution Plan for their projects. The process of developing that plan includes systematically identifying and selecting all of the desired benefits of BIM for that project, including the three listed above.

Other resources include BIM-related contract documents that can be appended to Owner/Architect or Owner/Contractor agreements. Two that every owner should evaluate are AIA Document E202, “BIM Protocol Exhibit,” and ConsensusDOCS 301, “BIM Addendum.” While these two documents address similar issues, they are not identical, and are both worth evaluating. AIA E202 includes a table that enables project teams to define the level of detail (LOD) and model element author (MEA) for every building element at every stage of a BIM project. ConsensusDOCS 301 defines the relationships, roles, and responsibilities of the project team members. Together, both documents

can help building owners tremendously in clearing up a lot of questions and ambiguities about integrating BIM into their projects.

A final resource for building owners who are planning ahead to receive as-built BIM information for operations, maintenance, and facility management purposes, is the Construction Operations Building Information Exchange (COBIE), a component of the Whole Building Design Guide. (Again, the quickest way to find it is to Google “COBIE.”) COBIE addresses the fact that most building information needed for O&M and FM purposes is not the building’s geometry, but consists of text. It provides a framework for building owners to specify the content and scope of electronic as-built record deliverables.

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