

Getting Started with Building Information Modeling

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SUMMARY

Although 2D computer-aided design (CAD) did not significantly change the way architects practiced—it simply computerized existing practice—building information modeling (BIM) has caused many cultural changes for an architecture firm. As the building industry adopts BIM more widely, one particular firm predicts these cultural changes will pervade almost all aspects of practice—from design to staffing assignments, fees, construction administration services, and everything in between.

WHAT IS BIM?

BIM is not as simple to describe as CAD, being more of a process than a drafting tool. BIM is both design process and design tool, with the added benefit that it can create drawings as a by-product of the design process.

Successful BIM is more than 3D renderings, more than electronic versions of paper documents. It is a process of sharing building information through a database recognized as a model. Simply stated, it represents the transition from analog to digital, in which the project is now managed as a complete model.

ASG defines BIM, at its heart, as a database in the visual form of a “virtual building.” However, it is important to distinguish the different varieties of BIM software. They are all object-based, but they allow designers to modify the database (3D model) in different ways. The two basic types are “single-directional” and “bi-directional” (better known as “parametric”). For purposes of this article and the others in this series, BIM refers to parametric BIM, which always has a single, central database file.

STARTING WITH A TEST PROJECT

We first read about BIM technology in 2004 and decided that it had enough promise to warrant a study. We trained two staffers and purchased one license to use on a small project as a test case. We decided to take this project through construction documents and then to evaluate its effectiveness after one year.

What happened in that first year was very different from our thoughtfully conceived plan to use BIM on just one project. Pretty soon architects were lining up, asking to start their new projects in BIM. After one year, almost all of our 40 architects were trained in the new technology, and we decided to start all our projects in BIM. Since then, we’ve seen dramatic improvements in the quantity and quality of our visual images; time savings in many areas; and, most important, an improvement in staff morale. They love working in it.

SETTING UP THE BIM DATABASE

The typical set-up of a BIM database at ASG includes the pre-set development of traditional drawings, like floor plans and sections. While working in the model, a tool box can be set up in another portion of the standard screen so that a simple mouse click will take the user to a traditional-looking drawing. It is easy to flip from working in traditional drawing format to model format. This allows drawing development and coordination to remain similar to that of a CAD system.

The ability to cut sections demonstrates another important characteristic of virtual building. In BIM we are not creating drawings but rather creating hundreds of views of a digital building. It is incredibly easy to cut a horizontal, vertical, or even oblique section at any place in the model to create a building plan. Also, the views of the building are “bi-directional,” which means that a change made in any view is automatically made in all views. Building elevations are created by viewing the model’s exterior. To study the design further, you can move the section cut this way or that in a few seconds with a couple of mouse clicks.

ADVANTAGES OF BIM

In addition to the immediate benefits, BIM will bring more advantages with time and greater acceptance and usage by consultants and contractors. These are the advantages we have seen already:

- **Better coordination.** Coordination is far easier than with 2D drawings. BIM software can highlight interferences in red, immediately.
- **Fewer work hours.** This translates to fewer fee-dollars but also a higher average billing rate because BIM changes the way we staff a project.
- **Greater productivity.** The daily input per hour is of higher quality, so the output is advanced further.
- **Better-quality design and detailing.** More time spent on design and less time spent on drafting means more time to think through design details.
- **Control of project information.** The BIM database, used to its fullest advantage, becomes the central source for all project information.
- **Expansion of markets.** The database that is the model gives rise to new services for architects to offer, such as cost estimating, scheduling, and imaging.
- **Education for young architects.** This one was a complete surprise. Proper input requires the user to understand all parameters of building parts, forcing young architects to find answers immediately.
- **Increased ability to manage change.** More experienced architects can immediately see changes made by younger users.

CHALLENGES OF BIM

The transition to BIM has not been perfect. We have found the following to be significant problems:

- **Training hours.** Like any new technology, there is a learning curve, and necessary time must be spent on training.
- **You're on your own.** Most engineers, contractors, and owners are not using BIM software yet.
- **Software is not yet complete.** Some software packages do not include the full complement of MEP, structural, and civil engineering.
- **Difficult to hire trained staff.** This is changing rapidly, but currently it is difficult to find new employees already trained on BIM software.
- **Trainers are novices themselves.** Our power users quickly exceeded the skills of their professional trainers, leaving further training to us.
- **Lengthy transition period.** Before the full advantages of BIM are seen on construction

sites, the transition period within the construction industry will be closer to a decade than a year.

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RESOURCES

More Best Practices

The following AIA Best Practices provide additional information related to this topic:

10.04.03 How BIM Changes Architectural Practice

10.04.04 BIM Creates Change and Opportunity

10.04.05 BIM: Potential Legal Exposures

For More Information on This Topic

See also "Virtual Design and Construction: New Opportunities for Leadership" by James R. Bedrick, AIA, *The Architect's Handbook of Professional Practice, Update 2006*, p. 33



See also the 14th edition of the *Handbook*, which can be ordered from the AIA Bookstore by calling 800-242-3837 (option 4) or by email at bookstore@aia.org.



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Key Terms

- Practice
- Information management
- Project management automation
- Building information modeling