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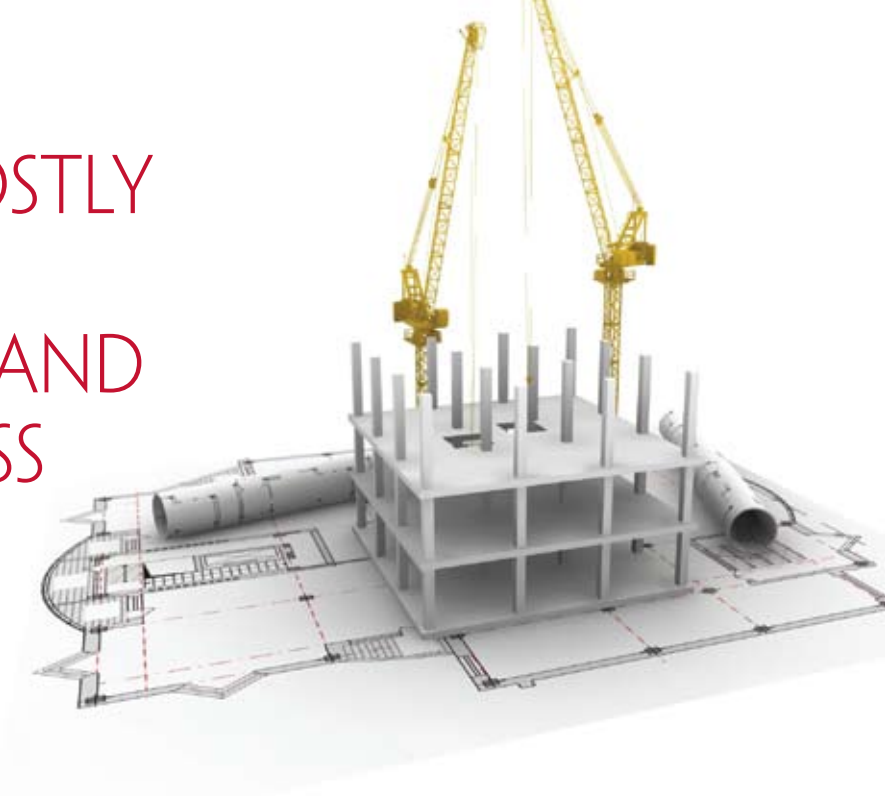
CLOSING THE COSTLY GAP BETWEEN BUILDING PLANS AND ACTUAL PROGRESS

By Michael Laurie



Centuries ago, Plato and Aristotle debated various ideas regarding the ways in which art imitates life, and today it is clear that high-tech digital representation is doing a spectacular job of mimicking reality. The potential this holds for the building industry is phenomenal. Modern buildings have sensors and monitors to make them smarter and more efficient, and architects produce amazingly realistic looking models and drawings. Unfortunately, however, much of this technological innovation does nothing to practically advance design concepts or improve the actual hands-on process of controlling costs and erecting or managing buildings. A costly gap still persists between the architect's drawing board and the nuts-and-bolts world of the construction site or budget conscious building management team.

What is to blame is a missing link that exists between old-fashioned 2-D drawings and plans and the wonderfully futuristic digital renderings and computerized building systems of today. Even when generated by a computer, a 2-D line drawing remains severely limited in its usefulness. It may be a visually sophisticated and attractive representation, but its relationship to reality only skims the surface like an image in a mirror.

BIM as a Bridge to the Future

To address those profound limitations, PLANiT offers an affordable Building-Information Modeling (BIM) solution that takes an exponential technological leap forward from conventional CAD drawings by bridging the gap between the industry's stagnant past and parametric future.

BIM is a software platform that represents a building as a fully three-dimensional computer model with an associated database. Instead of only providing symbolic lines that must be interpreted by people to add a depth of knowledge, the model is based on objects – solid shapes or voids with their own intrinsic value-added properties. The model is also flexible and interactive, based on the interdependent relationships between represented objects. Increase the width of the windows in the building model, for example, and the BIM software automatically adjusts the thickness of surrounding walls to compensate.

One powerful advantage of BIM software is that it immediately detects incongruent geometry, incompatible measurements and similar design errors – whereas with 2-D drawings, inconsistencies are often hard to identify. BIM virtually eliminates mistakes like, for example, a structural engineer's supportive beam winding up in the same space already occupied by a mechanical engineer's ductwork or a void needed to run plumbing pipes.

Even when such design errors or spatial conflicts are detected, they typically become noticed only after construction has already started, and add as much as five percent to cost overruns. BIM, however, clarifies the process from concept to creation, facilitating coordination and communication between multiple teams or participants. Changes made by one contributor to the model are instantly conveyed to everyone else and reflected in the model in real time. Meanwhile, the user retains the convenient option of being able to generate both 3-D views and traditional 2-D drawings from the model.

Simulation Stimulates Savings

BIM also becomes a digital simulator. Factors such as energy consumption, temperature fluctuation, the influence of solar orientation, the cost of local utilities or revenue potential from rooftop leasing of cellular tower space can all be experimented with, analyzed, and precisely calculated and reported.

Two-dimensional plans are dependent upon the reader of those plans for deeper interpretation. Study them, for instance, to determine which lines represent windows or stairs. But the symbolic 2-D representation of a wall conveys no information about its materials or history. The 2-D format is smart, in other words, while a BIM platform is extremely intelligent and has a photographic memory.

The BIM platform, for example, lets the user click on the line that represents the wall and instantly gain access to a deeper archive of

data. Click on that line and notes, photographs, document files and virtually any other type of digital data that might be helpful and appropriate pops open.

Click on a drawing of a wall, for example, and a notation can pop into view that describes that it is a 4-inch wall constructed in 1986 with drywall and R-15 fiberglass insulation. The note reveals that there is also electrical wiring and plumbing pipe inside the wall – and it gives the wiring capacity and describes that it is a hot water pipe. Another feature lets the user click on an HVAC vent that penetrates that wall, take it out, rotate it around in 3-D and examine it in detail while also easily retrieving the service warranty and manufacturer specs.

Then there is the issue of change. Decide to enlarge a window and it becomes necessary to rebuild the wall around it to accommodate that change. But there may be thousands of changes over the course of a single project. To accurately reflect these in the drawings through constant redrawing costs time and money. The production of drawings traditionally accounts for a large percentage of the architect's fees, and if the shape of a building is altered late in the game that necessitates a lot of expensive redrawing. Plus the architects have to maintain an updated schedule of materials as the design progresses, so cost projections calculated prior to those changes become obsolete – as does the entire construction schedule.

The advantages are numerous and obvious to users including the United States government's General Services Administration (GSA), a federal agency with public building oversight. Back in 2007, for example, the GSA mandated BIM on all of its own projects after running a pilot program that saved unprecedented amounts of time and money.

Affordable and Adaptable Applications

Until recently, the cost of BIM was prohibitive, and it was only used in industries like aerospace or automotive manufacturing. But within the past few years, the futuristic technology has finally become available at affordable prices that do not require any special computer infrastructure. Implementation of BIM within the commercial building industry typically amounts to a small fraction of the return on investment, especially now that it is so valuable in predicting construction costs and reducing energy consumption through more efficient designs or retrofits.

BIM is also a powerful tool for building management, maintenance and marketing, and it facilitates the creative innovation and imagination of designers and architects. They can use a BIM platform to test practically unlimited ideas and concepts without causing significant expenses or delays.

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