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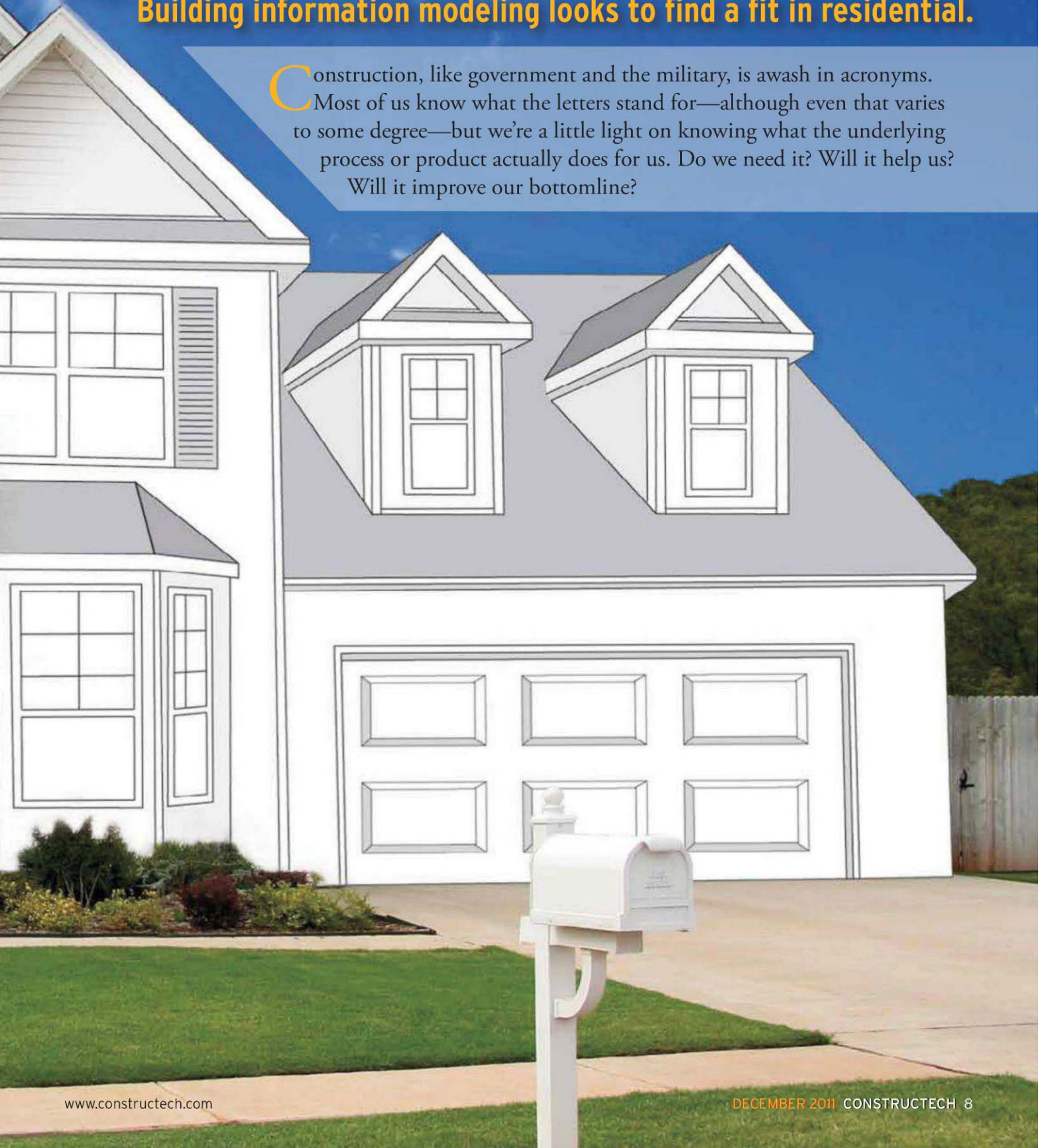
and the winners are ...

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Construction, like government and the military, is awash in acronyms. Most of us know what the letters stand for—although even that varies to some degree—but we're a little light on knowing what the underlying process or product actually does for us. Do we need it? Will it help us? Will it improve our bottomline?



The topic gets even more muddled when one technology is an evolution of another. Do we need both or will the later iteration suffice? Is there a migration path? Can the legacy system coexist with the newer technology? Enquiring minds want to know!

Let's first recap a bit of history and look at a case that helps illustrate these points. CAD (computer-aided design) has been around for a long time. Patrick Hanratty, often called the "Father of CAD" for his pioneering in the field, was one of the people at General Motors in charge of developing DAC (design automated by computer), the first production interactive graphics manufacturing system back in 1960. The first computer program used simple algorithms to display patterns of lines in two dimensions.

The next significant attempt to create a commercial CAD system was by the now-defunct Control Data Corp.'s Digigraphics division. The computer system cost half a million dollars and few were sold. Another early attempt at CAD, by professor Charles Eastman at Carnegie-Mellon University, was called the building description system and created a library of several hundred thousand architectural elements, which could be assembled and drawn on screen into a complete design concept. Thus, CAD and construction came together.

More recently, 3D CAD has become available—as well as "regular" 2D CAD—on personal computers. No longer do drafters have to rent time on mainframe computers or have access to high-powered minicomputers. Every desk today is home to a computer with capabilities unheard of in the 1960s.

Now we come to the evolutionary extension of CAD in the construction industry, BIM (building information modeling). In 1986, Graphisoft, www.graphisoft.com, Newton, Mass., introduced its "Virtual Building Solution," which allowed architects to create a three-dimensional representation of a construction project instead of the two-dimensional objects found in CAD programs of the time.



BIM incorporates CAD and adds database capabilities. Any changes made directly to the model will result in a change to the data set associated with the model. This underlying data resource differentiates BIM from standard CAD.

Since BIM software is based on parametric modeling, geometric consistency and integrity are maintained regardless of any changes or modifications that may be made to the model. A parametric object consists of a series of geometric definitions and their associated data and rules. Therefore, any changes made directly to the model will result in an equal change to the data set associated with the model. It is this underlying data resource—the major characteristic of BIM—that differentiates BIM from standard CAD. In effect, BIM is CAD with a retrievable database of information embedded within its structures.

According to Richard Boothman, AEC (architecture, engineering, and construction) industry consultant, Ameri-CAD, www.visionrez.com, Allen, Texas, "In CAD

drawings, there's really no data hidden below the surface. They start with attributes that you can use to tie some information to an object, some basic information such as name or manufacturer, but that is up to each and every user and most of them didn't bother with it. With BIM, a lot of data is under the hood because all the objects that we put in have that information in plain view, in elevation, or in a perspective, and then we can get all that data out and use it in reports."

BIM incorporates CAD and then adds database capabilities that can be used easily. So far, so good. But what benefits does BIM provide the home-builder that aren't readily available in CAD? And how can builders get into BIM while maintaining the benefits of the legacy CAD system they've been using for years?

BIM'S BANG

"BIM uses real information. Each item is set up as a component in BIM. No flying by the seat of your pants," says Brad Blissit, president, Integrated Structural Concepts, www.integratedstructural.com, Phoenix, Ariz.

He explains, "There's 'construction-ready' BIM that has all the information correctly in the model. This is a fully coordinated model, which was collaborated upon early in the process. The framing matches the architectural drawing; wall panel diagrams and truss components (shop

drawings) are included in the model; real rough openings were used to frame the windows. The model is 98% correct to what will actually get built in the field and this model will be around for the lifecycle of the building.”

Getting it right from the start has exponential benefits—time, money, risk avoidance, peace of mind, less supervision, and fewer headaches. BIM can streamline the processes, bring people together, and add efficiency. The byproducts are accurate models, better plans, greater quality, and what we can consider to be the ultimate due diligence in the construction process. But BIM needs to be integrated with the various trades involved in the project. The trades and vendors, not a computer program, are the ones who know what real-world building is all about.

Paul Salmonson, executive vice president, The Contrado Group, www.thecontradogroup.com, Phoenix, Ariz., discusses the team approach BIM fosters. “We have developed what’s called an integrated process-management system

where we put a team together for the design of a home that involves both the design person—an architect or an in-house person—with the structural engineer, HVAC (heating, ventilation, and air conditioning) designer, energy rater, and ourselves. It’s a results-based process, so when we use BIM it allows us to do multiple processes at a time. BIM has a 3D component that allows us to use that 3D-modeling application for renderings and also to build interactive floor plans for builders. That information allows us to streamline the process and run parallel processes, which reduces cycle times.”

He continues, “BIM will play a much greater part for builders in the future because it will allow integration of building material to be synced with their procurement department and then will facilitate more efficiency in the supply chain. In other words, many of our builders are relying on trades to do takeoffs and relying on bids. Part of our integrated process management is that we actually do costing analysis way up front, (and) we do energy analysis way up front, which BIM helps us do.”

In BIM, the 3D model is created first. You create the computer model with intelligent objects—walls, doors, windows, the roof, the trim, the slab, the floor—and then your 2D documentation is generated from that 3D model. As Boothman says, “You’re not drawing elevations

anymore and you’re not drawing floor plans. You’re making a model, an information model first, and one of the byproducts of that model is the 2D documentation. Another of the byproducts of that model is a takeoff or bill of materials.”

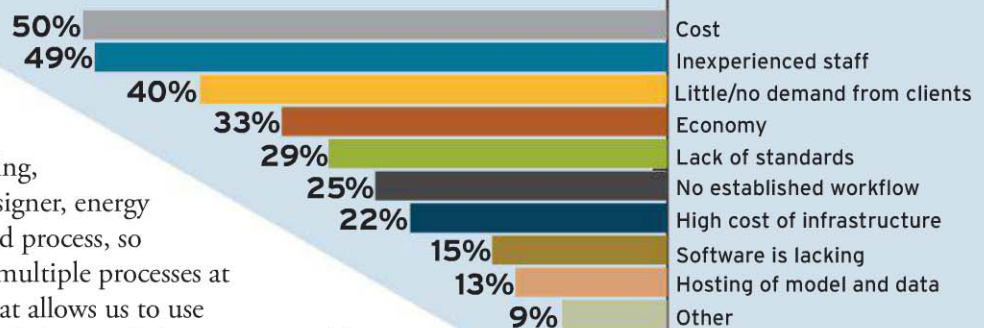
And it doesn’t have to be costly. “Technology is advancing in such a way that BIM becomes obtainable via better-performing hardware at less cost,” claims Blissit of Integrated Structural Concepts. “Software vendors understand that getting the programs into the hands of as many users as possible is the key and they are exploring several alternative methods to decrease the upfront costs.”

CAD? BIM? BOTH?

If you replace your CAD system with a BIM system you can still use your legacy data to trace and create a new BIM model. A lot of builders have standard details for wall sections, corners, and connections, for example, and they continue to use those same 2D sections they have

DON'T LET THESE FACTORS HOLD YOU BACK

What is holding back widespread adoption of BIM? Cost is still the No. 1 reason.



multiple answers applied

Source: Constructech magazine

used for years. With BIM, they can use the data in those detail sheets and then generate the floorplan’s elevations from the model. CAD becomes the basis to launch a BIM model and some of it can be reused in your new process.

Tim Beckman, partner, CG Visions, www.cgvisions.com, Lafayette, Ind., explains, “What we have experienced is that many builders are initially moving to BIM to seek efficiency gains in construction documents. Many have seen those productivity gains achieved, but many others have not. Based upon skill level, experience, and technical competency, it may take longer to create a set of documents using BIM compared to traditional methods. If builders are stopping there and only using construction documents as their point of reference, then BIM is a harder sell.”

However, the progressive builder steps back and looks at the bigger picture of what they could do now with a “virtual as-built” model in regards to reduction of field change orders, for example, or better coordination with trades on material usage while reducing waste, knowing the impact of options to a base plan, and they will see the extra time spent to BIM up front will pay itself back many times over by the end of the project. Unfortunately, many builders fail to look at the “big picture” and focus on the short-term gain, which results in a long-term loss.

What is the quickest benefit the homebuilder will see from BIM? Beckman believes it is detailed material takeoffs. He says, “Even if a model is not created to an extremely high level of detail, it can still provide material validation for major cost drivers with little effort. It is unfortunate that some contractors want the BIM to provide every last bit and piece the estimator needs and if it can’t, the initiative fails or is deemed too expensive

“The fact that you can generate a rendering faster and sell the product faster could be beneficial to a small builder.”

– Tony Tersigni, Great Gulf Homes

for it to be viable. Builders need to balance a pragmatic approach to a reasonable level of detail to be supported within the BIM.”

By no means is BIM only for large builders—many success stories have come from smaller production builders and even custom builders. For a custom builder every house is a prototype, so they have one chance to get it right. A BIM process allows them to validate design much earlier and prevent costly field change orders. “One custom builder was showing a savings of 28 days reduction in his construction cycle,” recalls Beckman. “With smaller production builders they do not have such a large infrastructure and company mindset to change, or red tape to cut through to get a project approved.”

IN-HOUSE OR OUTSOURCE

There are outsource companies that provide BIM services that do not require the smaller builder to carry the overhead of a BIM staff, or the hardware and software costs. This model works very well for the smaller builder to mitigate its risk and start to test the benefits of BIM.

Just be sure you pick an experienced consulting firm that not just understands BIM, but is willing to listen to your pain points.

Take Tony Tersigni, manager of the design division of Great Gulf Homes, www.greatgulfhomes.com, Scarborough, Ont., as an example. Tersigni remembers, “Once we got into BIM and we followed our product down the line, we found that what our final product looked like became closer to what our designers were designing. Before, we’d have carpenters making assumptions, and now with BIM a lot of that has gone away. We’ve found a lot of mistakes early on, which sometimes we wouldn’t know until after construction started.”

When asked what he believed was the biggest benefit of building information modeling to Great Gulf Homes, Tersigni says, “This is kind of ironic because we’re not using it yet, but I would say the takeoffs. We’re looking into that now and I think being able to do the takeoffs very early on in the design stage and get a budget of exactly what that house is going to cost is a huge benefit.”

Tersigni continues, “One of the benefits for the custom homebuilder would be the fact that you can generate a perspective, or a 3D rendering of the building, a lot easier than you could in the past, and you can sell it to your clients a lot easier.

People generally do not have the visual perspective to envision the final product. The fact that you can generate a rendering faster and sell the product faster could be beneficial to a small builder.”

Beckman summarizes the nontechnical problems of BIM, “Builders need to be ready to make a mindset change in the way they perceive CAD within their organization. No longer is it simply ‘black lines on paper;’ no longer is it a function of solely the design/architecture department, or the final deliverable of scale drawings in a FedEx tube.

“It is a fundamental change in the way they look at design through construction. The answer is not in the software technology itself, but in the change of habits and in how they want to do business. A new tool with all the latest features, coupled with a stale attitude, will result in the same bad results. The power of software can really catapult the building industry into a brave new world, but it is not a panacea.”

Tom Inglesby is a contributing writer for Constructech.