

# marketer

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## The Interoperable Future

BY CRAIG PARK, FSMPS, ASSOCIATE AIA

Sometimes the technology you need isn't the latest client relationship management database or presentation graphics program, but a technology your firm needs to adopt if it is going to stay competitive. There is a sea change going on today in our industry so great that it stands to revolutionize the practice of architecture, engineering, and construction, while having a dynamic impact on how you compete, who you team with, and how you will succeed with clients.

*Building information modeling (BIM)* is **the** buzzword. This new design-and-documentation process is sweeping the industry and is on the must-have list of most of the major firms in the country. A quick scan shows *3-D*, *4-D*, and *interoperability* dominating the conversations at every recent American Institute of Architects (AIA), American Council of Engineering Companies, and Associated General Contractors meeting. Products like **Bentley Architecture** (based on MicroStation V8 XM), **Graphisoft's Archicad 10**, **Nemetschek North America's Vectorworks 12.5**, and **Autodesk's Revit 9.1** are being implemented and evaluated in firms large and small.

For the novice, a building information model is a digital representation of the physical and functional characteristics of a building. BIM takes traditional two-dimensional architectural drawings and specifications to new levels of inter-related information including three-dimensional (multi-faceted visualization), four-dimensional (time), and five-dimensional (cost) virtual modeling of buildings.

And BIM has the capability to be much more. Regardless of the particular software platform used, effectively implemented, BIM provides a common platform for improved communication, collaboration, and interoperability between all parties involved in the development, design, construction, operations, and maintenance of a facility.

Imagine being able to do an MRI or CAT scan of a building and see all the inter-relationships between every system including skin, structure, walls, ceilings, doors, furniture, mechanical, electrical, plumbing, IT, etc., allowing the designers and

constructors to identify conflicts—and avoid them—before the building is built. Further, each element contains all the data about that component (dimensions, cost, warranty, maintenance procedures, etc.), giving contractors the ability to enable *just-in-time* ordering and giving the owners and facilities operations staff all the information they need to properly maintain the building.

### What is BIM?

The basic premise of BIM is to enable and improve the collaboration among different stakeholders (owners, architects, engineers, constructors, fabricators, maintenance staff, etc.) at different phases during the development and operation of a facility. It allows for updating, modification, or extraction of information in the BIM to support the needs of that stakeholder. The data set, in the form of three-dimensional drawings and an integrated relational database, serves as a shared knowledge resource for information about a facility, forming a basis for decisions during design and construction and throughout its operational life cycle.

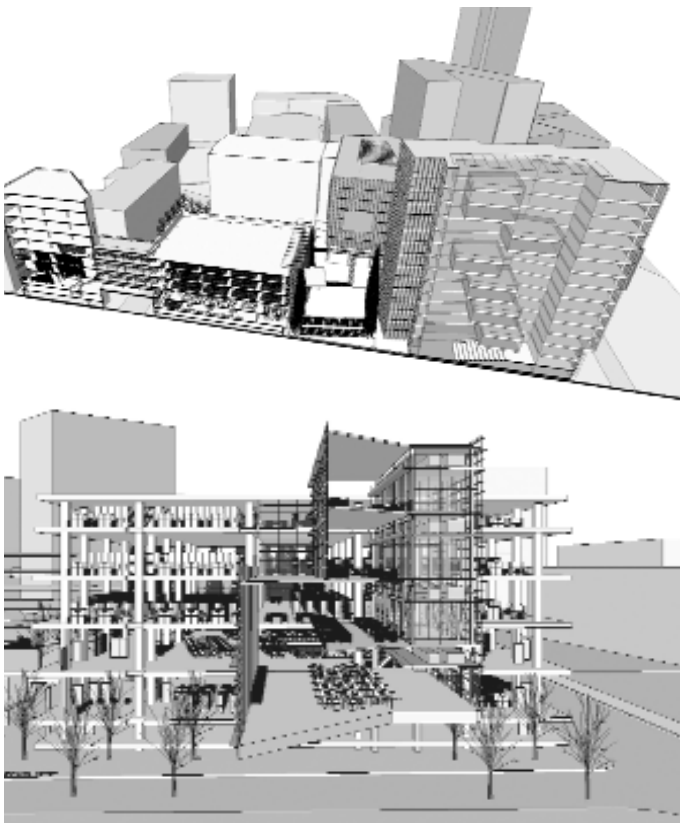
Fundamentally, BIM is a shared digital representation founded on open standards for interoperability. BIM was developed from the tools used for 3-D modeling and visualization. As its adaptation has increased, its value has increased based on the ability for all parties in the design, construction, and operation to access all pertinent graphic and non-graphic information about a facility as an integrated resource.

The primary goal of BIM is to eliminate wasteful gathering and reformatting of facility information that comes from different team members using different data collection and documentation schema. BIM standards have many objectives but one of the most important is to improve business functioning so that collection, use, and maintenance of facility information are a part of doing business by the authoritative source (the architects, engineers, and contractors) and not a separate activity.

## Real-world applications

To illustrate BIM on a real application, let's look at a recent project. In 2006 my firm, LEO A DALY, received one of the 2nd annual AIA Technology in Practice BIM awards for our work on the *Georgia State University Library* project. Our work included the design of the renovation of the main University Library building, including a three-level enclosed bridge crossing over to an adjacent library extension building (see figures). We also produced conceptual design studies and phasing/constructability/cost proposals for two new replacement buildings near the library, as well as the re-design of a series of exterior landscaped plazas on various levels interconnecting these buildings.

The client was anxious to meet the immediate needs of the library renovation/expansion as well as to receive guidance on related renovation/redesign of the exterior plazas. As a result, the design team was quickly expanded to include a local contractor acting as CM for comparative cost/phasing analyses and a local structural engineer for analyses of the expanded library bridge.



IMAGES: COURTESY OF LEO A DALY

Sections through the Revit model of the *Georgia State University Library* project, showing the main University Library building, the three-level enclosed bridge crossing over to the adjacent library extension building, and the plazas connecting the library with two new buildings.

## Resources & References

- ✚ Autodesk's Revit 9.1 [www.autodesk.com](http://www.autodesk.com)
- ✚ Bentley Architecture [www.bentley.com](http://www.bentley.com)
- ✚ Graphisoft's Archicad 10 [www.graphisoft.com](http://www.graphisoft.com)
- ✚ National Institute of Building Sciences [www.nibs.org/BIMcommittee.html](http://www.nibs.org/BIMcommittee.html)
- ✚ Nemetschek North America Vectorworks 12.5 [www.nemetschek.com](http://www.nemetschek.com)

The design team utilized BIM from the inception of the project to better meet its programmatic complexities, phasing demands, fast-track scheduling, and other design challenges. In fact, apart from three sketches, the project was exclusively developed using BIM 3-D software (Autodesk's Revit), with no supplemental manual drafting. The structural design also was done with Revit, while the MEP engineer used a Trace 700 load calculator.

BIM was used for all the different components of the project, starting from the plaza studies and urban design, where it was used for 3-D studies of the experiential connectivity of the various plaza levels with the streetscape; integration of the new library entrance with plaza site circulation; analysis of the space-enclosing building walls, both current and proposed, surrounding the plaza levels; implication of the plaza re-design on site circulation patterns; sun studies to examine shade, shadow, and sunlight penetration resulting from the plaza and building modifications; and phasing analyses and cost estimates for the plaza re-designs by the contractor.

Beyond design studies, BIM was used for advanced critical path method planning of the library renovation, the identification of major lead items (steel, HVAC equipment, and glazing options), and the creation of five distinct design packages for optimal constructability. BIM allowed integrated coordination of the library renovation phasing with the designers, CM, and client to meet a highly aggressive construction schedule.

The AIA jury cited the project for its effective use of BIM in analysis and simulation in the advanced use of modeling for evaluating different aspects of the building's performance. I believe LEO A DALY is typical of most mid to large firms that are making a concerted effort to have BIM become the de facto standard for design of all our projects. Judging by the seemingly ever-increasing press and presentations on BIM, we are not alone.

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## People are talking

McGraw-Hill Construction President Norbert W. Young Jr., FAIA, speaking at the 2006 AIA national convention, said, "The way we are doing things now, 'traditionally,' is very different from the way the process could be working. The building information model allows space, form, and time to be represented in a single interoperable model."

On the same program, William P. Tibbett of Johnson & Johnson voiced the owner's perspective, saying, "Change is now, and clients are demanding a new way. They no longer tolerate mistakes, delays, and team members not being able to share their networked information. And it is the architect who best understands both process and results of process, which puts them in a position of having the earliest and longest relation with the owner. So it is architects who should most welcome the opportunity to adopt 3-D modeling to meet these client's demands."


In the future, BIM modeling will expand the information model to include more of the life-cycle phases (e.g., real property commerce, maintenance and operations, environmental simulation, etc.) and standardize life-cycle process definitions and associated exchanges of information. Further, as BIM standards are developed and accepted, information content, meanings, and granularity will become increasingly clear and consistent. The BIM Standards Committee of the National Institute of Building Sciences is working toward that goal.

This expanded scope will make BIM useful to a wider community including real property managers, appraisers, brokers, mortgage bankers, facility assessors, facility managers, maintenance and operations engineers, safety and security personnel as incident responders, landscape architects, infrastructure engineers, and operators. In addition, others associated with new building design and construction, like the manufacturers and fabricators of components and systems, will benefit as well.

Phillip G. Bernstein, FAIA, of Autodesk, shared, "It is not the architect's role that is changing. Instead, it is the pace of change that is increasing and swirling around the profession so fast that architects appear to be in stasis. Building information modeling is a practical, proven means of enabling the architects to keep pace."

## Marketing BIM

As early-adopters, marketing BIM or any technological differentiator can help position your firm as a thought leader in the industry. However, as in the Georgia Tech example above, the proof is in the real-world applications that demonstrate clear and measurable benefits to the owner. Industry studies conclude that there is perhaps a five-year window of opportunity for the architectural profession to embrace this technology if it is to stay relevant to clients. Many engineering firms are already ahead of that curve, and the major general construction firms are hot on their heels.

As a marketer, my advice is to urge your principals to get on board or watch as a new technology changes the world as they know it. AIA Executive Vice President/CEO Norman L. Koonce, FAIA, reminded the AIA audience that "excellence does not come by chance, it comes by choice." 



### ABOUT THE AUTHOR

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