THE [illegible]
A PUBLICATION OF THE STRUCTURAL ENGINEERS ASSOCIATION OF TEXAS

BIM AND STRUCTURAL ENGINEERS

By William Ikerd, P.E., C.W.I.
SEAoT State IT / BIM Committee Chair

Building Information Modeling (BIM) is the "hot new topic" among architects and engineers. Slatted to fundamentally change the way that projects are built, BIM is a new generation, model based, database driven technology designed to make information on every aspect of a building available electronically.

There are sound reasons why structural engineers should take a sober and measured look at Building Information Modeling (BIM). These models have intelligent building objects, which ostensibly facilitate Electronic Data Interchange (EDI) with other BIM's and analysis applications, and could provide great promise for our profession. However, this modeling method also brings many new challenges and misconceptions. In the author s opinion, BIM and EDI represent a paradigm shift for structural engineering unlike anything that the profession has experienced before. This change is very different from the shift from board drafting to CAD. New developments in BIM authoring applications, such as Graphisoft s ArchiCAD Bentley Systems' Bentley Structural, and Autodesk's Revit Structure have started the process of creating functional parametric modeling environments for structural engineers. These developments, along with some of the media hype associated with BIM, reminds one of an article by AIA Associate Michael Tardif who wrote the following about the shift to CAD in the architecture profession:

"*Since personal computer technology first became widely available in the early 1980s, followed shortly thereafter by software applications for the building design and construction industry, the real capabilities of that technology have rarely kept pace with the hyperbole that quickly grew around it. At times, the hype has evolved into a belief system bearing little or no relationship to the daily reality of design and construction in architecture, engineering, and construction firms.*

Early enthusiasts of computer-aided design (CAD) technology may recall discussions or claims related to the "multiplier factor," in which the value of this or that CAD application was ostensibly measured by whether using it was two, three, or four times faster than manual drafting. As the difficulties of harnessing CAD technology became evident, and the apparent lack of any multiplier benefit became clear, the "multiplier factor" and many other claims related to increased productivity and business process reform were quietly excised from AEC technologists' vocabulary."

About the Author:
W.F. Ikerd, P.E., C.W.I., is Director of INTERTECH Design, Inc.'s department of Advanced Building Design (ABD) focused o n B I M in structural engineering. Mr. Ikerd is currently on the National BIM Standards committee and has also been appointed Chair of SEAoT's State IT Committee on BIM in Structural Engineering. He is invited to speak and author articles on BIM & EDI related topics in various venues and sits on the advisory board for the University of North Texas' Construction Engineering Department where he teaches one of the first classes in the country to incorporate BIM into their undergraduate and graduate structural design and construction curriculum. He may be contacted at . W I k e r d @ I D I s e . com

BIM technology in its purest form, will radically transform the way designs are created, communicated and constructed. It will increase the ability to control and manipulate data information in an interoperative format. While it clearly offers advancements to structural design, these advantages must be tempered with moderation particularly during these early stages.

Advantages
Project Management and task integration.
The structural BIM database provides a range of new services, such as cost estimating, scheduling, and clash detection. However, not everyone sees this "complete integration" as an advantage.

BIM AND STRUCTURAL ENGINEERS (continued)

By William Ikerd, P.E., SEAoT State IT / BIM Committee Chair

"**Leading Edge" of Technology:** There is a sense of pride and possibly a competitive advantage for companies seen to be embracing the latest technologically.

Better Coordination of Structural Items: Coordination is much easier than with 2D drawings.

Increased Productivity
It is envisioned that BIM will lead to fewer man-hours per structural design, which in turn may result in "lower development costs." Some argue that this will translate into fewer billable hours, but since these hours will be performed by more highly trained professionals, the actual cost per hour may be higher.

Control of project information: The BIM database, when used correctly and to its full potential by trained professionals, will become the central source for all structural engineering information.

Better quality design and detailing: More time spent on structural design and less time spent on drafting will free up professionals to concentrate on design and design-related challenges

Educational for young engineers: Some users feel that the BIM technology will help educate young structural engineers on how structures are put together.

Challenges
You're on your own: Most structural engineers are probably not yet using the full potential of BIM software. They may be purchasing BIM software as part of CAD upgrade packages, but owning BIM software and maximizing its use are two very different things.

"The Bleeding Edge" of Technology: There are many actual and hidden costs associated with the technology. These costs include:

- Initial cost of the software as well as "add on" structural analysis packages that 'talk' to the BIM-software.
- New or upgraded computer hardware and backup systems with the power and features to run the software.
- Employee training and lost billable hours while employees learn the new system.

Software is not yet complete: Some software packages do not include the full complement of structural engineering tools required to fully implement BIM

Difficultly hiring trained staff: It may be difficult to find new employees who are both trained on BIM software and who also understand structural engineering.

Professional trainers may lack engineering knowledge: The author has found that the staff at firms that implement BIM may rapidly exceed the skills of their professional trainers. The latter may lack the knowledge to speak intelligently about linking the BIM software to structural analysis applications.

For example, at one training session, the 'expert, a former drafter, was trying to teach an engineering audience about the structural software links to the BIM-software. It soon became apparent that the speaker did not know the difference between a simple and full moment connection.

Long transition period: There is likely to be a long transition period within the construction industry - possibly a decade or more before the full advantages of BIM are realized.

Even with the uncertainties of BIM, firms should pay attention to this paradigm shift as it emerges. Firms with the financial resources should do their homework, then make reasonable investments to keep up with the technology. They must also look to recruit and retain structural engineers who are able to work well in teams, have a grounded understanding of structural systems and a knack for analysis and design software applications.

***