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Architectural Modeling, Design and Process: How BIM Outsmarted CAD

This article explains what BIM is, examines its evolution to CAD, outlines BIM's barriers and benefits and considers the architect's viewpoint.

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BIM Technologies

In more recent times, CAD (computer-aided design) software effectively replaced manual drafting with an automated process that is now a standard tool in the fields of architecture, construction, engineering and others. Both two-dimensional and three-dimensional, 3-D CAD invariably offers benefits over traditional 2-D CAD, principally in visualizing design concepts and modeling. Nevertheless, to attain a superlative level of project modeling and management, many architects and related industry professionals are relinquishing CAD and adopting Building Information Modeling (BIM).

BIM is a fully realized digital rendering of a building, its life cycle and the relationships between a building's various components: spaces, systems, specifications, materials and objects. Much more than a new version of 3-D CAD, BIM allows for the capture of all design information related to a building, improving the overall process of design, construction and building management.

BIM is a collaborative way of working that uses "information modeling and information management, [creating] value from the combined efforts of people, process and technology." [1] Rather than a piece of software - it isn't wrapped in a neat box - BIM is about processes that are technology-enabled, increasing insight to and assimilation of a project and facilitating better communication with and among people - architects, structural engineers, construction workers, clients and the public at large.



Edward Williams Architects 2015



In a recent National BIM Report published by a British institute, the [National Building Specification](#) (NBS), [ii] it was found that awareness of BIM (in the U.K.) is almost universal among design professionals, and many are regularly using BIM. Moreover, BIM is expected to become the de facto standard for design processes within three years. The NBS National BIM Report highlighted existing barriers to BIM adoption, including: a lack of confidence in BIM, the absence of in-house expertise, a deficiency in training, a shortage of client demand and higher costs.

With its intelligent capabilities, BIM does have its champions. The National BIM Report suggests those design professionals adopting BIM are eager to make its benefits clear, including improved cost efficiencies, better client outcomes, straightforward coordination, increased speed of delivery and better information retrieval.

Elizabeth Blundell, architect at [Edward Williams Architects](#) considers the advantages of BIM within architectural practice to be numerous, with many relating to saving time and facilitating coordination of a project. She explains: "The integrated nature of a 3-D model reduces the capacity for errors within the building model file. [With BIM processes] coordination of a project between consultants allows the design team to mitigate the majority of clashes before a building goes on site, thus reducing potential delays and avoiding undue costs."

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Chester Balmore Residential Scheme. Here the original 2-D CAD design was developed into an integrated 3-D BIM model

Adolfo Mendoza Avilés, architect at [DAROstudio](#), believes that BIM is helping the profession to be more accurate about building procedures and costs, though he doesn't think it has yet eclipsed CAD. He suggests, "I think architects are tending toward BIM because we don't have accurate skills around logistics, budgets and administration [areas that BIM can help with]." Elizabeth Blundell explains that "BIM refers to a process of generating and managing building data. Three-dimensional data-rich modeling offers the capacity to embed a range of information within a modeled element. For example, a window could contain cost information, manufacturer details and solar performance." Extrapolated across a project, Blundell believes BIM processes offer a significant time-saving benefit.

Elrond Burrell, associate at architectural practice [Architype](#), notes, "While CAD is a powerful design and communication tool, it is limited in how intelligent it can be. Even in 3-D it essentially remains a drafting tool. BIM adds virtual construction and intelligence to everything CAD offers. It also shifts the focus from drafting to designing and constructing." Burrell is also persuaded by the time-saving capability of BIM, saying, "BIM is efficient, freeing more time to design or undertake other activities that often get lost when project time scales are tight." Jeremiah Russell, principal and architect at [Rogue Architecture](#), would agree. He uses a BIM-capable software called Vectorworks for historic preservation projects. Russell observes, "I can layer a 3-D model in such a way as to track the evolution of a building over time. This is incredibly helpful and relatively easy with BIM, whereas a traditional 2-D CAD software would make it a time-consuming endeavor."

A number of architects and designers will, on occasion, refrain from using BIM-capable software or CAD, choosing instead the dependable and trustworthy pencil. On this point Jeremiah Russell says, "In my opinion, both CAD and BIM are simply a very sophisticated pencil, T-square and triangle. There is an immediate and a visceral connection between a pencil and the brain that is unique to how architects and designers think: this is something a computer will never be able to emulate." Elrond Burrell expects CAD to persist, believing that "it's easier and simpler in some ways, and people resist change." He adds, "Just as some architects continue to use drawing boards and sketch by hand, some will always want to use CAD."

To maintain the status quo is to perhaps keep alive those erstwhile techniques that were once the pride of every architect. It is indisputable that CAD and now BIM have enabled significant advances in architectural practice and in relations across the industry. Yet the pencil, T-square and triangle will doubtless endure as reliable, tactile and honest tools of the trade.

References:

[i] NBS. 2015. What is BIM? [Online]. [Accessed 26 May 2015]. Available from: <http://www.thenbs.com>

[ii] NBS. 2015. NBS National BIM Report 2015. [Online]. [Accessed 26 May 2015]. Available from: <http://www.thenbs.com/>



By Gerard McGuickin

Gerard McGuickin is a freelance design writer and a blogger for his online zine, Walnut Grey Design. He writes intelligently about 'good' modern contemporary and midcentury design, from the viewpoint of interiors, architecture, objects and lifestyle. With a background in psychology, Gerard is particularly interested in how we foster an emotional connection with design and how we can use design to curate our lives.

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