

PLAN IS DEAD: TO BIM, OR NOT TO BIM, THAT IS THE QUESTION.

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Abstract. Drawing, modeling and the explicit abstraction embedded in the traditions and conventions of visual communication through composition and representation are fundamental to the how, why and what of architectural design. BIM presents simulation as an anti-abstract means of visual communication that seeks to displace the discreet representation of plan, section and elevation with the intelligent object model. If plan is dead, the implication is that the value of abstraction is dead or dying as well. How can architectural education prepare students for digital practice with such an assault on the underlying role of abstract representation of formal and spatial constructs that constitute architecture? This paper explores a possible path for engaging digital media in education that explores the gap between design theory and digital practice. The investigation centers on ways of exploring architecture by developing teaching methods that reprioritize ways of seeing, thinking and making spatial design. Digital architectural education has great opportunity and risk in how it comes to terms with reconceptualizing design education as the profession struggles to redefine the media and methods of architectural deliverables in the age of BIM.

1. Introduction - Plan is Dead

"To be, or not to be, that is the question. Whether 'tis nobler in the mind to suffer the slings and arrows of outrageous fortune, or to take arms against a sea of troubles, and by opposing end them? To die: to sleep; no more; and, by a sleep to say we end the heartache and the thousand natural shocks that flesh is heir to, 'tis a consummation devoutly to be wish'd."

-William Shakespeare

Building Information Modeling (BIM) has the potential to radically transform the way in which architectural education engages issues of design

and representation and creates opportunities to question the roles and rules of the traditional architectural conventions of visual communication. The ubiquitous two-dimensional, orthogonal projections that today constitute the traditions and conventions of visual communication that contemporary architects take for granted took root in the fifteenth century (Lonna, 1997) as architects found geometry and geometric projections increasingly useful to convey architectural intent and meaning in spite of the inherent abstraction in the two-dimensional portrayal of three-dimensional form and space. This foundation in geometry was acutely revealed in the development of most CAD applications as programmers solved the problems of describing and drawing geometry digitally (Ibrahim, 2004) in order to replicate drawing in the form of plan, section and elevation, the conventions of visual communication. To the extent that architecture and its graphic representation is understood in terms of its communicative potential as a language (Holtzman, 1994) of sorts, it can be seen as a purely abstract system. Architects, at their essence, construct abstract representations of ideas and those ideas constitute buildings. Architects deal in abstract representational means of communication, drawings, to convey the intentions, ideas and meanings of their designs. This is the fundamental position that leads to the traditional conventions of plan, section and elevation as means of communication that abstract form and space through a process of fragmentation and isolation of discreet representations of the whole through descriptions of its parts.

Building Information Modeling presents an object oriented, intelligent component/database synergistic promise of virtual assemblage through simulation. BIM has the potential to remarkably alter the conception and production of architectural design and representation for the first time since the fifteenth century. Building Information Modeling obfuscates the role of composition, scale and abstraction by displacing the primacy of abstract representation with literal re-presentation while simultaneously clarifying the holistic relationships in the architectural design of form and space. Plans (and sections and elevations, etc.) are merely representations of ideas composed in distorted two-dimensional abstractions of three-dimensional space. Plans and sections, the traditional conventions of architectural communication, are not literally the space, or a literal assembly of forms, they are simply the representation of such. They are a linguistic system, a visual, graphic language, and as such they are inherently an abstract system of symbolic representation. Lines drawn in a particular configuration mean 'wall' in another configuration they mean 'window' the context sets the definition. Orthographic, axonometric and perspective projections are each profoundly distorted, abstract ways to communicate architectural ideas and intentions. Yet, this is how architects imagine buildings, through abstraction. Architects have been educated to represent their ideas through a series of

representational processes that lead to increasingly abstract and distorted forms of communication. Architectural education currently is a process of acculturation that privileges the abstract, privileges representation rather than re-presentation. This culture is maintained by the profession at the expense of creativity, creativity that is now encouraged by the promise of BIM. Creativity that can emerge now from an imagination stirred by a confrontation and convergence between, and of, abstraction and the literal, representation and simulation. BIM offers the double-edged promise of displacing abstraction with simulation. There are profound conceptual differences between the translation of ideas and the transcription of ideas (Lonna, 3) and how architecture exists between the common forms of representation and to that to which they refer. The virtual building model is the thing as well as the representation of the thing. There is no abstraction. The building is literally (virtually) constructed, the space is the space, and the forms are the forms. The plans, sections, and elevations, the traditional conventions of representation are an illusion. Plan is dead.

2. To BIM, or Not to BIM

“The only true wisdom is knowing you know nothing.”

-Socrates

BIM presents simulation as an anti-abstract means of visual communication that seeks to displace the discreet representation of plan, section and elevation with the intelligent object model. Building Information Modeling obfuscates the role of composition, scale and abstraction by displacing the primacy of representation while simultaneously clarifying the holistic relationships in the architectural design of form and space. The evolution of the *'intelligent'* CAD objects in BIM and their associated pedagogies are transforming the way in which architectural education engages issues of design and representation and creates opportunities to question the roles and rules of the traditional conventions. The research examines the relationship between the scale of design (or lack there of) and the scale of representation (or lack there of) and how this relationship undermines the primacy of abstract representation in architectural design. The future of architectural production vis-à-vis architectural representation in practice and concept is at a crossroads between Parametric Modeling (PM) and Building Information Modeling (BIM) as the profession moves beyond traditional practice and its drawing-centric model into a dynamic process/component oriented model for digital practice and the subsequent re-definition of professional services and contractual deliverables. The profession and academy will come to terms with these new modes of thinking and making constituted by PM and

BIM solutions in different ways and at different paces. As the cultural shift from traditional practice to digital practice takes place there will be numerous and varied hybrid relationships of the two technologies undoubtedly yet to evolve. The convergence of these two technologies point to a new conceptual foundation for architectural thought and production that focuses on a fluid relationship between design, construction and maintenance in which data is the medium (Risen, 2005). It is in this spirit that BIM is discussed here, one that presumes a convergence of best-of-class technologies that leverages data management and knowledge production as the prevue of the architect and the true goal of the design process. The greatest potential BIM promises is the opportunity to re-invigorate and re-center contemporary practice and education simultaneously on ways of exploring architecture by developing and exposing design processes and methodologies that reprioritize ways of seeing, thinking and making in the design process.

If truly, "...the medium is the message" as Marshall McLuhan (1999) stated, now more than 30 years ago, then digital practice with BIM as a shift from traditional practice clearly harkens in the era of a new message. The building information model represents a fundamentally altered medium from the traditional representation in contemporary practice of the constructed image. What is the new message? That answer is unclear at present precisely because the discipline at large has not absorbed or acknowledged the underlying premise of BIM; a cultural shift is required in the profession and academy to completely and beneficially realize the potential that BIM has to offer. BIM affords the opportunity (or obligation) to model a project down to the bolts, washers, and nuts of every connection and detail. In digital practice with BIM it is completely possible to have extremely high levels of detail in the model that in traditional practice would require and enforced abstraction (Schodek, 219) in translation of the model to representation. However, in true digital practice with BIM the subsequent translation is unnecessary and affords the designer additional time and resources to focus on design. The primary question is, does the education of the digital practitioner still require representational abstraction in the era of BIM? And if not what is the reciprocal knowledge that the academy should now address to enable the digital design process? Abstraction and representation have been about fragmentation and isolation of the parts from the whole. The educational models for the contemporary education of an architect presume this relationship of the *parts to the whole*. The BIM process is much more of a context driven anti-fragmentation, anti-isolation design process that is dependant on contextual relationships in the modeling environment and data to fundamentally re-conceive the relationship of the *whole through the parts*. To BIM, or not to BIM, that is the question. And the answer on both counts is yes. It is not a choice. The future resides in both sides of the choice,

abstract representation and literal simulation. How one walks that line has yet to be seen but the professional, cultural, and pedagogical consequences will be vast and substantial.

3. The Profession and BIM

“I have often conceived of projects in the mind that seem quite commendable at the time; but when I translated them into drawings, I found several errors in the very parts that delighted me most.”

- Leon Battista Alberti

The conventional practice of architecture today assumes a traditional set of orthographic projections, at varied scales and levels of detail, that when taken in concert signifies a whole, complete idea of a building. Contemporary architectural practice assumes a simple one-to-one correspondence between design intent and interpretation, between the representation of ideas (Lonna, 1997) and the interpretation of the design of buildings. Contemporary construction documents reveal this assumption, these abstract, fragmented representations of the building and its components rely on reductive syntactic connections (Lonna, 1997) where by each abstraction is part of a dissected whole and when taken as a summation these fragments exceed their individual abstraction and constitute a literal description of the complete building. BIM conversely begins with the virtual construction (simulation) of the whole, which is then viewed as a series of isolated assemblies of constituent components. Is there an inherent value in the translation of ideas into abstract representation or is there a greater value a transcription of ideas in to a simulated construction?

Acutely aware of the impending cultural shift that BIM represents to the profession some leading practitioners, such as Paul Seletsky of Skidmore Owings and Merrill, have mused about the opportunities and consequences for the transition from traditional practice to digital practice with BIM. As Seletsky (2005, 2) has said, “Properly ignored, the results [of BIM] may very well promote Construction Managers into a lead decision-making role...” presumably out pacing architects ability to leverage the profession’s knowledge base to regain lost ground. Architects can perhaps re-gain lost territory taken by the contractors, construction managers, interior designers, facilities managers, and others. BIM affords architects the opportunity to ‘deal themselves back in’ to the knowledge management (Zigo, 2005) of a project from beginning to end and beyond. BIM shifts the focus away from representational development (drawings) and towards formal and spatial development (ideas) through the development of the three-dimensional model. At the current time too much attention is being paid to the ‘quick’

extraction of two-dimensional drawing/representational information. The profession has been leading the BIM charge and in the initial enthusiasm of the movement has not reflected on the potential changes in deliverables and continues to dumb down the building information model to the lowest common denominator, the drawn sheet set. The reasons for this are vast. From legal contractual and liability issues, to procedural and cultural issues this technology is outpacing the discipline's ability to respond. It is this gap between design theory and digital practice that exposes a possible path for engaging digital design media in education that explores how fundamentally BIM might reshape the design process and conceptually shift to production of architectural ideas and objects like nothing has since orthographic and perspective projection in the fifteenth and sixteenth centuries (White, 121).

4. Academia and BIM

“How can teaching proceed within a framework that demands its own subversion?”
- Marc Angéilil, “Inchoate,” 2004

The academy must seek out new methodologies for exploring architecture that reflect the pedagogical shift represented in BIM by developing teaching methods that reprioritize ways of seeing, thinking and making in the design process. What are the skills and ideas that contemporary architectural education must employ to prepare students for this new digital practice that is based on a modeled construction of architectural assemblages that transcends previous definitions of convention in design and construction representation? The expanded use of digital design represented by BIM technology exposes the relationship between the scale of design (or lack there of) and the scale of representation (or lack there of) and how this relationship undermines the primacy of abstract representation in architectural design. When and if BIM supplants the need for drawn representation in two-dimensions how might/should the education of an architect be affected with regard to issues of scale usually addressed in the production of drawn representation? Does the continued prolonged use of the ‘scroll wheel’ scale-less place of the BIM environment present any advantage or disadvantage to the designer (especially the young) or is the ability to continually scale and scroll a drawing simply a new ‘convention’ of the new traditions yet to emerge from BIM?

Digital architectural education has great opportunity and risk in how it comes to terms with re-conceptualizing design education as the profession struggles to redefine the media and methods of architectural deliverables in the age of BIM. Building Information Modeling has the potential to radically transform the way in which architectural education engages issues of design and representation and creates opportunities to question the roles and rules

of the traditional architectural conventions of visual communication. BIM so fundamentally shifts the priority away from abstraction to simulation and is at its foundation based on a component/assemblage mindset that the academy will have to subvert its own canons (Angélil, 2004) to find new direction in its fundamental suppositions and foundations. How the academy might prepare students of architecture for a digital practice in this period of transformation is the focus of this paper. The promise of BIM to the professional practice of architecture is profound. The cultural shift just emerging in digital practice has been grossly underexposed in the contemporary discourse. As firms move from a CAD-centric view of practice where architects and consultants compose ideas through drawings to communicate design intent to the new BIM-centric view of practice where the virtual simulation of assembled building components and systems a critical tipping point will be reached where architects will no longer compose abstract drawings that represent the design of a building they will instead construct a virtual replica of that building that is increasingly less an abstract representation and increasingly a literal re-presentation of constructed components.

Newly focused on the virtual building model simulation as the primary means of communication and representation the academy must take pause to critically engage and reconceive educational models and pedagogical positions relative to this fundamental shift away from abstraction as the *modus operandi* embedded in the traditional projected conventions of plan, section, and elevation. The foundation issues of composition, depth and flatness, space, scale and size, shape, line, movement, light, color, intent and interpretation all need to be reconceived. BIM represents a design process that does not prioritize abstract representation or fragmented conventions of communication but instead privileges the contextual construction of a formal/spatial systemic '*intelligent*' simulation. The conceptual and practical advantages and consequences of BIM provides both the profession and academy a unique moment filled with great potential for the critical analysis of the professional architectural design process and how architectural design is fundamentally conceived and taught. The associated pedagogies are transforming the way in which architectural education engages issues of design and representation and creates opportunities to question the roles and rules of the traditional conventions of communication.

5. Conclusion

Academia must seek out new methodologies for exploring architecture that reflect the pedagogical shift represented in BIM by developing teaching methods that reprioritize ways to reconcile the traditions of abstraction and

the new potentials of synergetic simulation. The opportunity to question and re-position the role of abstraction in terms of visual communication and the growing need for systems integration and simulated visualization can only be met if the profession and academy look forward together.

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