

WHAT COULD BE DONE TO SIMPLIFY CONSTRUCTION?

A LITERAL CRITIQUE TO A COMPLEX QUESTION.

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Becoming

In this essay I will discuss whether BIM is the answer to simplifying construction.

In 1977, with Metalwork and Drama qualifications, I began a craft apprenticeship in Light Industrial Engineering. The first year was spent “off the job” at Technical College. Under the guidance of a Master Craftsman, the pupil’s first task was to manufacture an engineer’s square. Two pieces of steel, a vice and some hand tools were at the apprentice’s disposal. As the class set to work, the Master Craftsman checked on individual progress. On occasion, he would take from his top pocket the article we hoped to create. Holding the attempt below his comparator, he looked into the light. “It’s not square lad!” he would bellow, setting the work in progress onto the bench for you to continue making decisions. What part of the material to remove next? My journey from youngster to here straddles engineering, model making, architecture, design, computation, urbanism and teaching. This mixture generates a stammer when asked what I do. The reply is now contextually framed. Responding here, I am a Designer/Craftsman whose position is guided by what Donald Schon refers to as the ‘Reflective Turn’ (*Schon, D. (Ed) 91*).

On the 10th of December 2013, thirty seven years after drawing a file across metal, I found myself sitting in the debating chamber at the Cambridge Union (<https://www.cus.org/>). A motion had been put forward by Edge Committee. This “*virtual institution*” is a body of multidisciplinary academics and practitioners forming a think-tank. They debate topics embedded in the landscape of our built environment (<http://www.edgedebate.com/?p=2194>). Their motion stated:

“This house believes that BIM is the answer”

I took my seat on the opposition benches with the IDBE cohort (<http://www.idbe.arct.cam.ac.uk/>). This Master of Studies course also centres on how the built environment can be bettered together. Lengthy debate and a filing through ‘aye’ or ‘nay’ doors produced a result. We had failed to dissuade the majority of the assembly to vote against the motion. More metal needed removing. ‘*What could be done to simplify construction?*’ affords the opportunity.

Journeyman

As a journeyman, who stumbled upon design late, I believe that to prove you have a mind, you must be prepared to change it. This was partly gleaned by studying proclamations of the Viennese architect Adolf Loos, who said:

“Changes in the traditional way of building are only permitted if they are an improvement? Otherwise stay with what is traditional, for truth, even if it be hundreds of years old has a stronger inner bond with us than the lie that walks by our side”.

Both Edge and IDBE advocate innovation rather than reinvention. Still, my stance on Edge’s proposition remains. With only one change of emphasis would I cross the floor. That change is centred on meaning. Another Austrian, Ludwig Wittgenstein, in his time, shook Cambridge to its philosophic core. Debates rage about his legacy but one enduring statement has gained traction:

“Meaning is Use” (Wittgenstein, L. 1922).

I stood up in the Cambridge Union and said:

"The motion is inappropriate as Edge's term 'BIM' is poorly defined. When I first encountered it, 20 years back, the 'M' was the first letter of 'management', not 'model'. A model is an abstraction of the real thing. The morphology of the tools name, from 'management' to 'model', is a shift in BIM's meaning that has inherent dangers. BIM becoming a noun and not a verb is a hegemonic manoeuvre that must be resisted."

This argument fell on deaf ears. Motion carried. BIM is the answer. But to why, what and who remains elusive to me.

Praxis

'Whereof one cannot speak, thereof one must remain silent' (Proposition 7 from Tractatus Logico-Philosophicus: Ludwig Wittgenstein 1922).

Bertrand Russell's introduction to Wittgenstein's major work, the Tractatus, warns us that:

'Philosophical discussion is a mistake' (Wittgenstein, L. 22: Pg.10).

I take this to mean that philosophy is real only when active. Designer/Craftsmen learn to delimit mistakes as a matter of course. Philosophising is better left to the likes of Wittgenstein and his nemesis Karl Popper, although both have craftsman-like beginnings. For the former, philosophy was there to resolve puzzles. His formative years began in Aeronautics and Mechanics. The latter used philosophy to grapple with more pressing issues, political hegemonic rights (Popper, K. 1962). His beginning started as a cabinet maker's apprentice (Edmonds, D & Eidinow, J. 2001). The attraction to philosophical underpinnings of design proposals, the art of construction, is often too great for the simple Designer/Craftsman to resist. He or she is philosophising without utterances. The detail does the talking.

Wittgenstein's career depended on the word; written, spoken and in thought. To him the world could only be understood through the word. Popper disagreed somewhat, but was a prolific wordsmith. His concerns were anti-totalitarianism, belief in open societies and the rigor required to separate fact from pseudo-science and metaphysical theory.

Two other exponents of the philosophical word are Umberto Eco and Gilles Deleuze. Both play major influences in design thinking and therefore its manifestations. Eco's *'The Open Work'* offers a poetic enquiry into semiotics and meaning. He argues that limiting writing's potential to a single line is the least rewarding (Eco, U. 89). The most active use of words is in the spaces and improvisations of the sounds. Deleuze's *'A Thousand Plateaus'* moves beyond this, into emergent potentialities to be sensed in everything we engage with symbiotically (Frichot, H & Loo, S (Ed) 2013).

Gathering all this into a theoretical alloy is the Designer/Craftsman's meditation. Thus, *'What could be done to simplify construction?'* becomes a field of meaning, internally and psychologically engaging. BIM, as a noun, is a closed domain. The most active use of BIM is as a verb, between engaged societies, real stuff. The tools needed to simplify construction are not simply lexical, but grammatical, operating in the context of utterances, from continually deferred gratifications, a play between expectation and fulfilment of the details' meaning (Eco, U 89, Deleuze G 87).

This plays back into the Craftsman's hands, the toolmaker as opposed to the BIM coordinator. To him, meaning is embedded in constructional speculation, translated to the contractor in realistic context. Feedback between the two is akin to the wood cutters hand-eye coordination (*Bateson, G, 72*). The stammering actions are adjustments in the process of felling, paralleling the development of the 'wet behind the ears' apprentice sitting in a debating chamber. Along the way the hand and eye are coupled, symbiotically learning to learn. This lesson comes from the world of second order cybernetics, a branch of mathematics that searches out negative probabilities, reasoning why the things you don't see didn't come about. As a mode of enquiry, it is holistic and reductionist simultaneously. A referee between Popper and Wittgenstein. And Eco and Deleuze would be utterly lost without it (*Frichot, H & Loo, S (Ed) 2013 Pg.136/137*).

Cybernetics emerges from servo-mechanics. It searches out meaning in patterns of information, playing a significant role in the development of the computer processor, without which BIM would not exist (*Bell, D (Ed) 2006*). In this context, simplifying construction is map-able across the discipline of 'limits and fits'. To mechanical engineers, these are protocols, governing micro measurements to agree the coming together of disparate parts. Nominal sizes are negotiated to manage construction. The BIM operator may think of this as the clash detector, an algorithm employing parametric adjustment to coordinate the model. Terms such as 'tolerance', 'loose', 'friction' and 'interference' are used in this applied science and by craftsmen filing away at bits of metal (*Amstead, B.H. Ostwald, P. F. Begeman, M.L 79. Pg. 291*).

The action of applying 'limits and fits' to the term 'simplification of construction' points towards heuristic answers. The cybernetic stance looks at negative redundancies. The opposite of simplification becomes complexity. Complexifying construction may appear perverse, in the same way that BIM being a noun is perverse to me. But complexity affords systematisation of sub-assemblies prior to simplification. The nub of the problem reveals itself when the context of the assembly reappears. Two positions are taken. Male components meeting female ones, loose or frictional, general or specific, macro or micro.

Coming together creates the assembly. A third position emerges, the meso, the middle, the design. The utterance of the detail takes on meaning. It needs the sentence to make any sense. The action of doing BIM is a verb, to 'manage', not a noun, the 'model'. Deep artisanal mysteries are translated via the details meaning, underpinned with a knowledge of 'limits and fits' of society, the mind and life itself. A consensual domain drags us back towards context demanding negotiated boundaries, requiring accommodations on both sides of the argument.

Edge of Thesis

In summary, Edge see BIM as a thing in itself, whilst others see it as an action. Philosophers are either puzzle solvers or real world problems solvers. Words gain meaning in use. What is meant by this thing called BIM walking by our side? Although this essay is not limited to national borders, let's take UK Plc as a potential client and see how they perceive it.

The Building Information Modelling (BIM) Task Group are in place to deliver the objectives of the UK Government Construction Strategy, at least to strengthen the public sector's capability in BIM implementation. They demand, as a minimum, collaborative Level 2 BIM by 2016 (<http://www.bimtaskgroup.org/>).

Their *'hypothesis'* is that *'significant improvement in cost, value and carbon performance can be achieved through the use of open sharable asset information.... helping the supply chain unlock more efficient and collaborative ways of working.... end to end'*. Neither, Edge or IDBE argue against this, but the operative statement is *'open, sharable, asset information'*.

The Task Group acknowledge *'tensions'* between commercial cultures and open access to new entrants, *'locking out competition and innovation'*. The central platform of the hypothesis is that a barrier exists, restricting growth. *'This barrier is to be found in a lack of industrial integration, compounded by a lack of standardisation and repetition. This has led to a procurement process that reinforces barriers, calling for reform of procurement and for greater efficiency in the operation of that process'*. They tell us, *'Values need to be converted into standards...to be passed to suppliers as part of the brief'*.

They suggest that construction has generally *'lagged behind other industries in the adoption of the full potential offered by digital technology'*. They argue that a lack of compatible protocols stifle the process, *'but if team members work from the 'same data' the implications of alternative design proposals can be evaluated with comparative ease'*.

What is meant by *'data'*? Cybernetics searches for it, to be translated into information, and this is the epicentre of this essay's critique. Translation between trades, craftsmen, designers, BIM operators, technologists and philosophers' alike needs to be clearly managed, voiced, and not simply named. Accents matter in this respect.

The Task Group assumes that modelling in three dimensions *'eliminates coordination errors... [and] expensive changes'*. They *'[recognise] the direct link to digital information's translation to machine tools, creating a link between design and manufacture and eliminating unnecessary intermediaries'*.

The link between design and digitisation, known as CAD/CAM, to my knowledge is at least 60 years long. Man-machine-design coupling emanated from Bauhaus in the 1920s, and copying machines are at least 250 years old. James Watts' later experiments with replicating sculpture are remarkable (<http://www.sciencemuseum.org.uk/>).

'[Lazlo] Moholy [Nagy] wants the Master of Craft to be active on a larger and livelier scale, and the people leaving the workshops to have the broader skills, through the deliberate employment of machines' (Droste, M. 1990, Pg.60).

"Generally speaking, almost any machine or process can be made automatic." (Amstead, B.H. Ostwald, P.F. Begeman, M.L 79. Pg. 11).

The Task Group's comment, *'eliminating unnecessary intermediaries'*, needs careful explanation. Are we scrimping on basic skills, bypassing rudimentary coordination and preliminary setting-out? What fills the middle, in the 'end to end'? Potential negation of many analogue and digital mysteries can lead to significant evaporations on design and construction thinking. We may all champion innovation, but short-circuiting *'unnecessary intermediaries'* bypasses a rich source of information. This is not about exchange values, but the diminution of knowledge through over specialisation. A deep understanding of limits, fits, tolerance and constructional expertise evaporates if BIM is nothing more than a noun. Loos, the epitome of modernism yearned for simplification, but not if the spectre of what walked by his side was not an improvement (Loos, A. 1910). Popper refuted Marx's historic predictions, but not until he had accepted his words as being rigorous enough to discredit it as a science, only to remain as a theory, not an ideology (Popper K.R 1963).

To speak meaningfully about this thing called BIM requires that a Designer/Craftsman's speculations are alloyed with a builder's knowledge of connections. This is imperative. Thinking is the key to this question of simplification of construction and the crystallisation of this argument.

Constructive Conclusion

Popper and Eco sought openness. Wittgenstein said meaning was use and remained silent on the unspeakable. Designers are enamoured by Deleuze, who borrowed heavily from Bateson and second order cybernetics. This branch of mathematics recognises the phenomena of learning to learn. It is the catalyst of all things digital, cyber cultural, especially BIM, the verb.

At TEDX East London, a video was played of last year's TED award winner. Dr. Sugata Mitra was handed over \$1 million to spend on making his dream of SOLE a reality. SOLE stands for 'Self Organised Learning Environment' (http://www.ted.com/talks/sugata_mitra_build_a_school_in_the_cloud.html). Mitra is an educational researcher. His "Hole in the Wall" computers show children, motivated by curiosity alone and completely unsupervised, teaching themselves the most mind bogglingly complex stuff. His experiments demonstrate that even in the absence of any direct input from above:

'an environment that stimulates curiosity can cause learning through self-instruction and peer-shared knowledge'.

It is termed:

"Minimally invasive education."

I urge the Task Group to watch it carefully. Its findings are heart-warming. Young minds grasping complex problems through open access and generous praise, from what Mitra refers to as an army of 'Grannies'.

The mandatory stance from the Government on entry level to public works should be spelled out. Creating a culture of openness, encouraging end to end thinking along the lines of *"minimally invasive education"* should be championed. This means open access to the physical and mental tools used in realising public places and spaces. BIM plays a role, but is secondary to the process of learning your craft.

My final reflective turn, one I wished I'd voiced in the Cambridge Union, is this. When I first drew a file over a piece of metal to make it square, I could never have dreamt of the world I inhabit today. I never set out to win prizes, but in my study is a certificate from 'Architecture for Humanity' that four young design students and I share. This is for an initiative we offered the people of Christchurch, immediately after the 2011 earthquake that befell the city (<http://openarchitecturenetwork.org/projects/11324>). Simplifying construction in this instance, did not need BIM the noun. We needed to act. In this case BIM was not the answer. Thinking openly was.

WORD COUNT 2500 (NOT INCLUDING BIBLIOGRAPHY)

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