BIM : Double-Edged Sword

Survive **| Thrive**

> *"In tough times the idea of innovation creeps up the agenda. The sense that we have to start doing things differently rises along with the mounting panic".* (Sweet, 2010 - CRI)

The concept of survival began to reawaken the industry when the 2008 banking collapse put the writing on the wall for the economy as a whole, not merely the construction industry. With public sector projects cut due to diversion of funding, the industry had to hunt harder and farther for its daily bread. Some larger practices sought much of their work abroad. Small and Medium Enterprises gathered what work they could find, many smaller commissions required to plug the cash flow gap of a larger project. Many construction firms, suppliers and practices did not survive.

Those that did should now be looking to re-establish themselves and BIM presents a great opportunity to do this. A possibility to prototype; to model and entire building, its site, fabric and systems, to monitor in advance and make changes before a spade hits the ground. This simple concept is something that the construction industry has uniquely lacked, unlike any other. To embrace BIM and the paradigm shift that it requires could bring hope and prospect for the profession. Not merely to survive, but to once again thrive.

In an attempt, perhaps to re-invigorate the construction industry, but foremost to address an economic concern, the Cabinet Office (2011, p14) set out that:

> *"Government will require a fully collaborative 3D BIM (with all project and asset information, documentation and data being electronic) as a minimum by 2016."*

It is this ambitious statement to which this essay responds, considering the future of construction contract management in the digital age.

BIM for all | all for BIM?

Briefly assessing the wider context of the industry and moving on to explore the issues arising from the wider adoption of BIM. The essay considers if the prescriptive measures of 'BIM for all' will be mirrored by an industry approach of 'all for BIM' Will the costs, complexities and fear of the unknown cultivate a two-tier industry (Light, 2011); of those who BIM and those who do not?

To expand on the issues it is important to become acquainted with the concept and characteristics of BIM. Put bluntly, *"What is BIM and should we care?"* (Gould, 2010). The basic principles have been in existence for over thirty years, yet Winston (2010a) cites Hamil (2010) as having revealed 'an alarming lack of awareness' of BIM from construction industry professionals. Building Information Modelling is defined jointly by RIBA, CPIC and Building Smart (2011, cited in CIS briefing 2011) as:

> *"…digital representation of physical and functional characteristics of a facility creating a shared knowledge resource for information about it forming a reliable basis for decisions during its life cycle, from earliest conception to demolition."*

Matters arising from the use of a shared model include interoperability, ownership and responsibility for information.

In the drive for a more efficient industry the *Government Construction Strategy* (Cabinet Office, 2011) reiterates the ideas of Latham (1994) and Egan (1998). The Government Construction Clients Group (2011) concentrated their recommendations on two key variables, Whole Life Cost and Carbon Performance. This focused change agenda, in a time of economic melt-down, could advance a revolution in the construction industry. Placing emphasis on integration and collaboration how will the architectural profession need to evolve to fit a new model?

Big spender **| Big spend**

Accounting for nearly 40% of the construction industry's workload (ONS, 2008 cited by Cabinet Office, 2011) the public sector is a key investor in our industry which in turn contributes around 8% of GDP. Yet time and again our fragmented industry, of over 300,000 businesses is deemed to underperform; wasteful and inefficient. When Egan reported the *Need to Improve* (1998) he described the construction industry as: *"one of the pillars of the domestic economy... simply too important to be allowed to stagnate."*

The proposed mandatory use of BIM is a challenge to the industry and an endeavour by the government to improve upon the status quo. In Wolstenholme's review (2009) of *Rethinking Construction* (Egan, 1998) client's are encouraged to seek best value, not simply lowest price. The government's move toward BIM will undoubtedly offer merits. The Cabinet Office (2011, p3) recognises that:

> *"The right model for public sector construction procurement in the UK is one in which... there is an alignment of interest between those who design and construct a facility and those who subsequently occupy and manage it."*

However, a procurement model with consideration of capital and operational expenditure has been seen before. Private Finance Initiatives enabled a surge of public sector projects, following their introduction in 1992. Yet PFI is now often cited as lacking integration and criticised for being expensive, not best value (Lupton, 2007 p49).

Beyond the UK government much of the funding for construction comes from EU sources. In line with the EC Public Sector Directive 2004, the Public Contracts Regulations 2006 implement measures to regulate the award of public sector contracts above a certain threshold (Speaight and Stone, 2010 p142). Advertising such tenders in the OJEU supplement allows for open competition across the EU. With this wider market in mind, the UK construction industry has an opportunity to embrace BIM and demonstrate its capability of delivering best value and minimising waste.

> *"To place the UK in a very strong position and to lead the world market [with a]... BIM enabled construction economy."* (GCCG, 2011).

The government's proposal is ambitious, but where is the incentive for the industry other than simply improving its image? Whilst the public sector holds the influence, and clout in mandating such specific measures, who will fund the changes for the industry?

In March 2011 the BIM Industry Working Group produced a Strategy Paper for the Government Construction Client Group to make recommendations which informed the *Government Construction Strategy*. With an aim for the Government to have an estate that is "smarter and better, equipped to face a low carbon economy" (2011). There is a body of evidence which indicates that the process of designing, constructing and operating buildings can bring substantial benefits, in financial terms, to those adopting BIM principles (GCCG, 2011). Yet, not all are convinced of the strategy for the widespread implementation of BIM - Robert Klaschka, architect and self confessed BIM advocate commented on Winston's article (2010b):

> *"To be talking about the use of BIM models in the context of lifetime asset management, when most trials don't go beyond drawing production and basic scheduling, indicates just how far Morrell's vision is adrift from the general industry ambition. The detailed grain of the problems that a project runs up against remains unexplored."*

Lean thinking **| Green thinking**

One of the positive things arising out of the adoption of a BIM mentality is the focus on working together right from the outset of a project. The paramount considerations of carbon performance should become ever more measureable with a BIM approach, throughout design and operation post construction.

'Lean thinking' is a term coined in the US and brought to the UK construction industry in Egan's *Rethinking Construction* (1998). The objective of minimising waste both in terms of human resource and production is in many ways synonymous with the aspiration for the adoption of BIM. In creating a virtual prototype of a building and testing its performance the final product should see much less waste involved (Light, 2010). Comparative analysis and the increased use of key performance indicators will allow lessons to be learned in advance of starting on site. For design

teams and contractors this could offer improved profit margins. For clients the consideration of whole life performance will reflect in whole life cost – offering better value. The supply chain, currently in its own sphere, could become more integrated in the design process to better understand and inform designers of the solutions they can offer.

In addition to the benefits for the organisations involved, the process should become more streamlined and see less material waste go to landfill. In integrating design of operational systems from the outset we can aim for lower emissions and a reduced carbon footprint. In essence then, green thinking is lean thinking and BIM is a vehicle to help us mutually achieve.

Collaborate **| Integrate |** Wait?

BIM is described by many as a step-change as big as the introduction of CAD (Murray 2010), yet looking around today that brings a certain inevitability to the matter. There is no doubt that in time; architects will make the jump into 3D integrated modelling, if they have not already. To make comparison to progress in other countries, *''only 10% of projects in the UK deploy BIM, compared to 60% in the US"* (Day, 2010),

The bigger issue, beyond the wonders of technology, is how the ethos of the industry will shift. In an industry renowned for its blame culture, BIM aims to draw all parties together in creating one model, rich with information. Responsibility for this collective contribution will be difficult to allocate to individuals, contractual relationships will become blurred. Within a traditional procurement model, complex agreements will be required to establish which of the collaborators will take ownership of what. Joining forces suddenly becomes a lot more onerous than simply shared decision making. In most high profile cases surrounding the industry liability is often the subject of debate. When Harding (2010) makes commentary on our industry he is in some senses right:

> *"Construction is the only industry in the world where the producers (in our case the principle contractors who sign the contract with the employer) have no authority over the design, specification or value of their own products, yet total responsibility for the quality and performance of them. "*

Yet, in many ways his view is remote from modern day practice. Certainly moving forward, the *Construction Strategy* champions procurement models based upon delivery by integrated project teams, away from the traditional separation of design and construction.

It is easy to agree with Gould (2010) who feels that optimum value can be realised on PFI projects where the contractor is responsible for design, construction and operation. This one-stop-shop approach to procurement loads all the risk and responsibility with one party, but usually at a cost.

In order for the industry to work successfully in a collaborative manner, these questions of increased liability need to be resolved (Klimt 2011). Concentrating on strategic partnering; frameworks - where teams are brought together on a long-term basis, could facilitate trust and understanding and a less adversarial approach. It will be important to balancing strategic partnering with open competition, by some deemed to be diametrically opposed (Smith, 2011).

In an NBS roundtable discussion on BIM (2011), Richard Waterhouse, CEO of RIBA Enterprises maintained that "the industry isn't prepared for BIM as it stands". Whether the *Summary Action Plan* (Cabinet Office, 2011) will ready the industry for its 2016 target will remain to be seen. There are many who would prefer to wait, until concerns surrounding ownership and liability are resolved. The government should take the advice of the Strategy Paper from the BIM Industry Working Group (2011) to invest in a simple enabling structure – developing national standards to ensure compatibility and interoperability.

There will also be those at the smaller end of the scale for whom the transition does not make sense. The level of detail required to gain full advantage of a shared 3D model may be overcomplicating matters. Businesses will take a view on BIM, perhaps proportionate to their involvement in public sector work. Some will integrate and collaborate whilst others will watch and wait.

Team leader | Team led

Both Reed and Brady, RIBA presidents past and present, have been criticised for their message that BIM brings an opportunity for architect's to get back on top (Austin 2011); "our first chance in years to get back the leadership role that architects want" (Brady 2011 cited by Austin 2011.) It is clear that the disparate model of integrated working levels the playing field somewhat. Nevertheless, it is yet to be seen whether architects will take the lead with BIM in a process which requires to be much more team led.

Statistics indicate that 43% of construction professionals are either unaware of or have not used BIM (NBS survey cited by Winston, 2010a). So whilst those who embrace BIM will undoubtedly reap the reward, there are those who may never adopt. Similar instances of such isolation are cited by Wolstenholme (2009) with reference to adoption of Egan's philosophy:

> *"...there is no evidence that the progress made is a small percentage of the industry's activity will ever spread to the rest."*

The implementation of BIM will impact on the role of the architect in presenting both technical and cultural challenges. There is clearly potential for the processes and procedures to inhibit design quality. It is therefore of the utmost importance that architects and architectural education continues to focus on high calibre design. Enabling solutions which respond to a brief, but also delivers added value, (in ways other than financial); to those who procure and utilise a building.

Evolution | Revolution

> *"Whilst the technology steps we recommend are very small, the cultural, procedural and education gaps are significant."* (GCCG, 2011).

A paradigm shift is required to fully embrace what is in essence a new procurement model, a different way of working. For some this will simply enhance an established methodology but for others BIM will present many challenges.

Full implementation of BIM on all public sector projects will take time to evolve from the current norms. The benefit of better value to the client in terms of Whole Life Cost will drive the Government to support this change. Momentum for increased environmental performance and reduction of carbon will continue to be a fundamental issue which all parties must take responsibility for. The impact on the role of the architect, working in a more integrated manner will be positive. However, this will require significant input of time and money to establish skills in new methods and software before reaping the financial rewards.

The dichotomy of long term partnering and open competition must be resolved. The Government have laid down the gauntlet that will incentivise some but strike fear in others. The formation of a two-tier industry is likely, in the short term if not beyond. The transition will be a case of evolution rather than revolution.

Whilst the argument for BIM is strong and well versed there remain those who will oppose until issues of cost, ownership and interoperability have been resolved. Whichever way the evolution impacts on the role of the architect a focus on design quality is paramount. Determining priorities as individuals and reinforcing design as the core principle of the profession must be at the heart of our actions. As this essay has explored, BIM is a double-edged sword with potential to cut the industry in two.

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