

Will small and medium sized enterprises within the United Kingdom’s West Midlands region meet the challenge of implementing Building Information Modelling by 2016?

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Abstract

The construction sector in the United Kingdom (UK) plays a major part within the overall UK economy, representing typically between 7-10% of GDP around £110bn per annum of expenditure, with 40% of this being in the public sector, with central Government being the industry’s biggest customer.

Building Information Modelling (BIM) was introduced into the United Kingdom in the 1970’s. Whilst primarily adopted by a few major practitioners, BIM participation and use has been extraordinarily slow. BIM has recently hit the construction news headlines, and for a very good reason. In May 2011 The UK Government under the guidance of its Chief Construction Adviser, published ‘The Construction Strategy’ which addressed the use of Building Information Modelling within the UK. The Government UK stating it will require full collaborative 3D BIM (with all project and asset information, documentation and data being electronic) as a minimum by 2016.

This paper will investigate this challenge at both strategic and operational levels and will evaluate through semi-structured interviews how small and medium enterprises’ in the UK conurbation of the West Midlands will meet the challenge of implementing BIM 2016.

Keywords

Building Information Modelling, Construction Strategy, Small and Medium enterprises

1. Introduction

The construction sector in the United Kingdom (UK) is a major contributor to the UK economy. It represents some 7% of gross domestic product worth £110bn per annum of expenditure, with some 40% of this being in the public sector, with UK’s central Government being the industry’s biggest customer (Cabinet Office, 2011).

Various Government and institutional reports over a number of years have recognised the need for improvement, development and change in delivery of UK construction projects, in order to maximise value for money for the public purse. The first landmark report was that of the Simon Committee Report (Placing and Management of Building Contracts) in 1944. It is suggested by Langford and Murray that *so* little has changed that some of the report could have been written today (Langford, 2003). Other reports followed, most recently Latham’s 1994 Constructing the Team; and Sir John Egan’s 1998 Report Rethinking Construction.

Just over a decade from the Egan Report, Wolstenholme, 2009 reviewed the progress made since the Egan Report was first published and his report concludes that although both the Latham and Egan Reports did have some impact on the industry, it was comparatively less than what was anticipated (Wolstenholme, 2009).

From each of these reports emerged a key trend, namely that the construction industry is not adverse to adopting new trends and initiatives to improve construction project performance and in 2008 Martha Blastow wryly stated that popular trends often are viewed as 'new wave', therefore Building Information Modelling in the construction industry is to be viewed as an imminent tsunami (Blastow, 2008).

2 LITERATURE REVIEW

2.1 What is Building Information Modelling (BIM)?

The National BIM Standards Committee in the United States (US) comments ironically that there are currently almost as many definitions for BIM as there are people implementing them (NBIMS, 2007).

Building information modelling has been described by Eastman et al, (2008) as one of the most promising developments in architecture, engineering and construction industries. Kuhns (2009) points out that BIM is not a product or software but rather a process built on coordinated, reliable information about a project from conceptual design all the way through to construction of a building and even extending into operations. The British Standards Institution (BSi) has defined BIM as a form of shared digital representation of physical and functional characteristics of any built object (including buildings, bridges, roads, etc.) which forms a reliable basis for decisions (BSi, 2010). Smith, 2011 proposed a definition of BIM for the UK construction industry, as a digital representation of physical and functional characteristics of a building creating a shared knowledge resource for information about it forming a reliable basis for decisions during its life cycle, from earliest conception to demolition (Smith, 2011).

Since 2002 BIM has been seen in use around the world with early adopters of BIM (Juhola, 2011) being Scandinavia and The United States of America (US). In Finland there has been heavy public investment since the 1970's, and since 2001 Senate Properties, a Finnish government owned company, has carried out a number of pilot projects to develop and study the use of BIM in construction. The same can be said of Norway's public works which require the use of BIM on all its projects. In the US, BIM has been rolled out by Government bodies since 2003 and it has also been adopted by private companies such as General Motors, Lucas Film and Walt Disney Imagineering.

According to Smith and Tardif (2009) in December 2002, Jerry Laiserin, an industry analyst, was credited as publishing the first weighted debate over a new term or acronym to describe the newly emerging design technology then poised to replace computer-aided design (CAD). That article marks the first point at which the term Building Information Modelling (BIM) came into popular use.

There are many potential benefits for all parties involved in BIM projects. Fishking (2009) confirmed that many construction issues can be resolved in a digital world rather than in the field, where modifications currently squander time and money. Lane (2011) confirmed that compulsory use of Building Information Modelling on all public sector projects could help rejuvenate the industry and that by using design information collaboratively cost savings of up to 10% can be made and these savings could make the difference between surviving and going bust in today's economic environment.

2.2 Implementation of BIM

The UK Government has clearly stated under guidance from its Chief Construction Adviser, Paul Morrell, that they will require full collaborative 3D BIM (with all project and asset information, documentation

and data being electronic) as a minimum by 2016 on government funded projects worth over five million pounds (Cabinet Office, 2011). In 2012 David Philp Head of BIM implementation at the Cabinet Office suggested that BIM has become a metaphor for change (Philp, 2012).

The implementation of BIM however is being scheduled at a time when countries are finding the present economic climate very problematic. It is recognised by Insider, 2012 that the European Union expects the 17-nation Eurozone economy to suffer a 'modest' recession overall, with some member countries suffering worse than others. The US currently has a huge national debt of over 15 trillion dollars (Scribd, 2012) and has also been in the grip of recession. Specifically for the UK, it has been in recession since the late 2008. Green, 2011 suggests that this is no ordinary recession but a serious depression, the end of which still looks to be at least a couple of years away and possibly a lot further.

Within the UK, The West Midlands region has been particularly hard hit in the recent economic downturn with O'Brien, 2012, stating that the West Midlands construction sector will continue to shrink at an average rate of 1.1 per cent every year until 2016.

The UK Government's plan, Department of Business (2011), is that if BIM succeeds in the UK it would certainly go a long way to help to strengthen the UK's economy and to succeed BIM will need to be implemented by small and medium enterprises (SMEs). Stockwood, 2011 indicate SMEs make up 99.9% of the total number of businesses in the UK; SMEs provide 59.1% of all private sector jobs; SMEs generate 48.7% of total private sector turnover in the UK of which construction accounts for 20% of all UK enterprises.

However the take up of BIM has been seen as mixed, with results published from the NBS's National BIM report, 2012 showing awareness and use of BIM had improved from 13% in 2010 to 31% in 2011 and those neither aware or using BIM had fallen from 43% in 2010 to 21% in 2011. However these findings are contradictory to the results found by BCIS' BIM survey, which found that in 2011, 60% of Chartered Surveyors seem to know virtually nothing about BIM (Index, 2011).

With the current state of the global economy being volatile, and with the UK Government being the construction industry's biggest customer, the UK Government has chosen BIM implementation to reduce the UK Government's construction costs by up to 20% by the end of this Parliament (Philp, 2012). While voluntary take-up of BIM has resulted in some progress in the UK, it is thought that mandatory use by the UK Government will embed BIM into UK construction companies at a more rapid rate. By adopting BIM, it is hoped by the Government, to create more jobs, as the need for extra staff will create a sub industry within construction training, and this will be focussed on small and medium enterprises as SMEs make up a huge percentage of all businesses within the UK and generate almost half of all private sector turnover (Stockwood, 2011).

3 RESEARCH

3.1 Link to literature review

Having undertaken a literature review into BIM, its definition, use and adoption, further research will consider the impact and implications of adopting BIM by SME's specifically within the UK conurbation of the West Midlands, and what these organisations are doing to prepare themselves for the collaborative challenge of using BIM on all public projects over the value of five million UK pounds by 2016.

Following the research process suggested by Bryman and Cramer (1990), a qualitative approach has been selected for this further research, due to its attitude measurement, based upon opinions, views and perception measurement. Fellows and Liu, 2008 suggests that the word 'qualitative' is used to describe research which emerges from observation of participants with Naoum (2010) stating that qualitative research is rich and deep.

To achieve this outcome a series of semi structured interviews will be undertaken with a number of strategically placed SME's within the West Midlands Built Environment Sector. In total eight semi structured interviews were completed. Selection of the persons to be interviewed was chosen by carefully selecting a mix of sectors from the construction industry as well as a varying perceived level of the understanding and usage of BIM. All interviewees work with or provide services to the public sector.

Areas to be investigated, identified from the literature review, were for the interviewees to identify:

- 1) A definition of BIM;
- 2) The SME perception of BIM;
- 3) Drivers behind BIM;
- 4) Current BIM position; and the
- 5) Implementation of BIM and reaching the 2016 target;
- 6) Things SMEs could do better.

3.2 Research findings

Interviewees were asked to give five words to describe BIM. In no way was this question intended to be difficult or be used as a tool to trip people up, but it revealed some unusual results. Out of an expected forty responses, only thirty one were given. Out of the thirty one responses given, only twenty six were able to give single word answers as requested. The words given are shown in Figure 1. The larger the font used for the word below, indicates it was used more frequently.



Figure 1 Words from Interviewees to describe BIM

SME's Perception of BIM

The interviewees were asked to talk about their perception of BIM and Table 1 shows their perception of BIM ranging from clear and well defined (in the minority) to basic and less understanding – in the majority.

Interviewee	No clear	Slight	Basic	Clear	Clear & defined
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Number	understanding	understanding	understanding	Understanding	understanding
1		•			
2				•	
3					•
4	•				
5		•			
6	•				
7			•		
8					•

Table 1 SME perception of BIM

Drivers behind BIM

Looking at the main drivers SME's feel are behind adoption, only one interviewee claimed it was to comply with Government plans and two suggested it was to be innovative. This is a strange response as BIM has been available for many years but adoption in the UK has been slow. But by far, the most mentioned driver (40%) was finance. Finance was discussed in two ways. Firstly, it was all about the cost of BIM to the organization, i.e. the cost of training and software. Secondly, it was all about how cost savings could be made. These comments came from the same interviewees that have a better understanding of what BIM is.

Current BIM Position

Current SME BIM positions are varied. However, the majority (five from eight) have made little progress, with one interviewee stating that as a business they were "naive". Conversely, three have made progress. Table 2 shows current BIM progress as follows:

Interviewee Number	No progress made	Back ground researched	Implementation started	Some usage	Full usage
1			•		
2				•	
3	•				
4	•				
5		•			
6	•				
7		•			
8					•

Table 2 Current BIM Progress

Implementation of BIM

Interviewees were split evenly as to the optimum way to implement BIM, with equal responses for; by external training, by use of software, to no intention of using BIM and having no conception or thoughts currently on BIM implementation.

Achieving the 2016 implementation date

When asked if the interviewees thought their businesses would be able to meet the targets set by the Government to achieve BIM usage on all publicly funded projects by 2016, only one thought they wouldn't. This shows huge optimism considering the current position; albeit a larger percentage (50%) did answer 'maybe' they would meet it rather than an equivocal yes (37%).

Things SME's could do better

When questioned about whether there were things SME' could do better, only two were able to talk from experience, the others are still at the beginning of the adoption process but still feel that they could learn from what they have done so far. There is an impression given that some SMEs feel as if they "have missed the boat", on the other hand one interviewee (from an architect's practice) wished he'd "done it 5 years ago"; due to the success it has brought the practice. See Table 3 for things SMEs could do better.

Interviewee Number	Invest in training	Invest in software	Invest in hardware	More research	Earlier adoption	No answer
1	•					
2	•	•	•			
3						•
4	•					
5				•		
6				•		
7				•		
8					•	

Table 3 Things SME's could do better

4 CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

It may be construed that the validity of the analysis is limited due to only a small number of interviews being carried out but although only eight SME's were asked their views on BIM, these were from organisations which need to be dealing with BIM.

As the literature review shows there are many definitions, elements, processes and reasons for adoption that make up the BIM process. Research from users within the construction field of SMEs in the West Midlands has shown that no one definition can be ascertained and there is huge variety of what BIM means. The perception is that not all elements of BIM are needed by all sectors of the industry. There are no clear guide lines for SMEs to follow and the perception is that larger companies will have the resources that allow a full investigative approach to be undertaken, whilst in contrast SMEs are currently struggling to remain operational and have very little in the way of resources to throw at such a project.

There is an element of a collaborative approach beginning to emerge, with SMEs talking to each other and regional organisations such as West Midlands Centre for Constructing Excellence helping to spread that knowledge throughout the region. It's further evident that BIM has a long way to go before fulfilling its full potential as it is in its early stages of adoption but, the signs for wider use are promising.

The UK Government will continue to push the adoption of BIM. A cynical view would be to say it was only for financial reasons, such as cut backs to Government expenditure. However, an optimistic view would say the ability to manage all of the Government's buildings using BIM and facilities management, would open up additional work to a shrinking economy. Either view shows a cost saving for the Government, so for them it a win-win situation. For an SME there will be an initial financial outlay and currently there is no funding available from Government to help. It is therefore seen by SMEs that they are taking all the risk for Government gain.

When looking at if the SMEs within the conurbation of the West Midlands require an increased level of knowledge and understanding, most SMEs will require help of some kind, if they are to meet the target of 2016. However, that help does not seem to be available from Government. Nevertheless, as shown in the

results from the semi structured interviews, optimism is high, and with some hard work over the next few years, and maybe a little help there is no reason why the target can't be achieved.

When considering if the current economic climate has slowed the take-up of BIM within the conurbation of the West Midlands, it is harder to assess. When looking at the drivers of the SME's, finance was the most common, double that of the next highest. Then again, when looking deeper into the question and seeing that those with an increased knowledge of BIM mentioning finance in a more positive way. This could lead one to believe that the current economic climate has not slowed up the take-up of BIM, purely a lack of knowledge has. However, the current economic climate is causing an impact on decision making and investment, as established previously the West Midlands has been one of the hardest hit areas and the take-up of BIM has been affected by the current economic climate. Businesses cannot afford to take the risk on investing in BIM without seeing the advantages or with the feeling it going to be a white elephant.

4.2 Recommendations

When researching how SME's within the conurbation of the West Midlands / UK will meet the challenge of BIM 2016, a number of recommendations have been identified:

1. Produce a definitive guide that clearly defines BIM for SMEs. The guide should highlight a path to take, opportunities available and stress the lessons learnt by early adopters. Within the guide should be a section on software;
2. Ensure software companies selling software within the UK safeguard an open interoperable platform format guaranteeing no one software takes precedence and resources are wasted;
3. Make grants available from Government, this would help increase the rate of adoption. It would also go a long way to showing that the Government truly believes in BIM. It could also be seen, as the first step in a collaborative approach, so that the Government's stated strategy of requiring a fully collaborative 3D BIM (with all project and asset information, documentation and data being electronic) as a minimum by 2016 on government funded projects over five million pounds in value can be met.

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