Optimization of the BIM Authoring Tool in Architectural Practice:
A Case Study Approach

Paul Coates, University of Salford, UK
Yusuf Arayici, University of Salford, UK

ABSTRACT

Construction companies are facing barriers and challenges in Building Information Modelling (BIM) adoption as there is no clear guidance or best practice studies from which they can learn and build up their capacity for BIM use to increase productivity, efficiency, and quality. One of the key challenges in the BIM adoption is the ability of optimisation of a selected BIM authoring tool according to a company’s needs and requirements. This paper explains the approach for the optimisation of BIM technology selected in a Knowledge Transfer Partnership (KTP) project, undertaken between the University of Salford and John McCall Architects. The BIM implementation approach in the KTP used a socio-technical view that considered both the implementation of technology and its socio-cultural environment. The adoption and optimisation used the action research oriented qualitative and quantitative research for discovery, comparison, and experimentation it provided for “learning by doing.”

Keywords: Architectural Practice, Building Information Modelling (BIM), Implementation, Learning by Doing, Optimisation, Process and Technology

1. INTRODUCTION

Building Information Modelling (BIM) is seen as a new way of working methodology as it is promising more efficiency in processes and effectiveness in product quality than 2D or 3D CAD in the construction sector, leading to attain competitive advantages in the construction business (Smith & Tardif, 2009).

Software vendors are introducing their BIM tools such as ArchiCAD, Revit, Bentley Architecture and so on. Although BIM enables collaboration, information sharing and exchange, and integration across the supply chain, its current implementation is highly limited to modelling and automated documentation of design and construction information at company level (Arayici, Khosrowshahi, Ponting, & Mihindu, 2009; Coates, Arayici, Koskela, Kagioglou, Usher, & O’Reilly, 2010).
Therefore, this paper aims to provide a systematic approach to optimise the BIM systems for effective and efficient modelling and documentation at company level: If the technological infrastructure and BIM enabled company processes and practices are well established at individual company level, these individual companies will already have the capacity building to progress towards collaboration and integration across the supply chain.

2. THE CASE STUDY COMPANY: JOHN MCCALL ARCHITECTS

John McCall Architects (JMA) in Liverpool focuses primarily on social housing and regeneration, private housing and single homes and large extensions. JMA works with many stakeholders from design through to construction process and the associated information is very fragmented. Projects in which JMA are involved include many stakeholders, need considerable interoperability and information exchange.

Historically JMA used a 2D CAD tool for two decades. The company also had its own procedures and templates to optimize its practice. However, the existing practice with this 2D CAD tool brings about some inefficiencies such as timescales, deadline pressures, duplications, lengthy lead times, lack of continuity in the supply chain, over processing, reworking, overproduction, distractive parallel tasks, lack of reliability of data and plan predictability, lack of rigorous design process, lack of effective design management and communication. Hence, the company need to improve its capacity for i) greater integration and collaboration with other disciplines in the production process, ii) adopting technology change to provide a more effective business process, iii) effective intelligent real time response, iv) moving into related building sectors.

At the strategic level, lean principles (Koskela, 2003; Liker, 2003) which are: i) eliminate waste, ii) increase feedback, iii) delay decision, iv) deliver fast, v) build-in integrity, vi) empower the team, and vii) see the whole were utilized and formed the seven pillars of the BIM implementation strategy. There was no practical understanding and awareness of BIM in the company at the outset. Yet, senior managers of the company had some visionary understanding of BIM for investment to attain competitive advantage and better position in market place and provide sustainable green design solutions in the future.

BIM implementation strategy for JMA was the action research oriented qualitative and quantitative research for discovery, comparison, and experimentation to create an environment for “learning by doing” for the company staff.

3. OPTIMISATION OF THE BIM SYSTEM

Optimisation after the deployment of the BIM authoring tool can be conducted in two stages: i) the optimisation according to the tasks and explicit user requirements, and ii) optimisation according to the implicit (tacit) requirements of the end users undertaking the tasks. These two stages are equally important and necessary to achieve successful optimisation of the BIM authoring tool for the company, where stage 1 of the optimisation process was carried out within a defined timeframe whereas stage 2 was seen as an ongoing activity since the user requirements are dynamically changing and evolving overtime since more and more explicit and tacit requirements are explored throughout the BIM implementation process. On the other hand, little documentation and guidance exists about this issue in the literature even though firms can gain significant competitive advantages from such optimisation.

While some advocate changing the way they think about their work to be able use computers, interface experts tend to disagree with this opinion. As quoted from Norman (1992) that “Make the task dominate; make the tools invisible”, it is important to distinguish between thinking differently to do better for efficiency.
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