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Challenges of implementing new technologies in the world of BIM – Case study from construction engineering industry in Finland

Risto Tulenheimo*

A-Insinöörit Oy, 33210, Tampere, Finland

Abstract

In the world of building information modeling (BIM), effective usage of available technology is an asset. Due to general complexity of information technology implementations, difficulties occur. To choose a technology for company's next spearhead tool, the road is usually long and rocky. This paper aims on introducing and analyzing the wide range of obstacles generated by customers, company's own organization, social behavior and immature technologies in Finnish construction engineering industry. As a result of this study, 23 different key challenges were identified that can alone stop a successful implementation of a BIM technology. This study serves as a base study for future tool creation to manage better BIM technology implementations.

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Keywords: BIM; ICT; digitalization; technology implementation.

1. Introduction – The world of BIM

In the era of Building Information Modeling (BIM), construction processes have taken a similar leap what was encountered in the 1990s when engineers and architects started utilizing computer aided design (CAD) and computers for designing instead of using pen and paper. New property and construction modeling aims to support a design and construction lifecycle process that is of high quality, efficient, safe and in compliance of sustainable development (Henttinen 2012). One outcome of this process is a building information model, which is an as-it-is

* Corresponding author. Tel.: +358 207 911 532.
E-mail address: risto.tulenheimo@ains.fi

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representation in 3D environment of the structure to be constructed, including all disciplinary designs as well as lifecycle and product information. BIM models are utilized throughout the building or other construction's lifecycle, starting from initial design and continuing during use and facility management after the construction project has concluded (Henttinen 2012). BIM processes and products are not static ideas but dynamic and they are constantly developed hand-in-hand with information and communication technologies (ICT). Most of new technological innovations in construction business can be proclaimed as part of BIM. This could be, however, highly arguable but not discussed in this study.

The concepts, approaches and methodologies that we now identify as BIM can be dated back nearly forty years to 1970s, while the terminology of the "Building Information Modeling" has been circulating for at least fifteen years (Eastman et al. 2011). BIM theory has evolved along with ICT but the basic principles have always been the same. However, before 21st century BIM based project delivery was practically non-existent due to immature technologies and lack of will. Consequently, there has been a considerable time lag between the emerge of visionary expectations of building information models transformative potential in the architecture, engineering and construction industry, and the deployment of the technology in the industry's daily practice (Linderoth 2010).

Currently in Finland, governmental bodies and local authorities as well as industry are seriously starting to understand the possibilities of BIM. The Common BIM Requirements 2012 handbook was compiled for the growing need of standardization and common rules. As the first mandate was merely compiled for buildings, common BIM requirements will be announced for infrastructure projects in 2015. Similar promotion of BIM on governmental level has been encountered in many countries across the world. One of the biggest investors on this new process is United Kingdom, where local government has declared that all public sector's centrally procured construction projects will be delivered using as minimum Level 2 BIM by 2016 (HM Government 2014, BIM Task Group 2014).

BIM maturity model describes levels of maturity with regards to the ability of the construction supply chain to operate and exchange information. Organization may claim to be operating at Level 2 but still it may have a number of projects that are only able to operate at Level 1. This is perfectly normal and expected as different organizations will mature on different timescales depending on a number of factors. (BIM Task Group 2014) According to Fig.1, the levels vary from 0 to 4 where first level project is being delivered with unmanaged computer aided design including 2D drawings. On the other end, data is managed through federated BIM models including all discipline information. Data may also include construction sequencing, cost information and ultimately project lifecycle information.

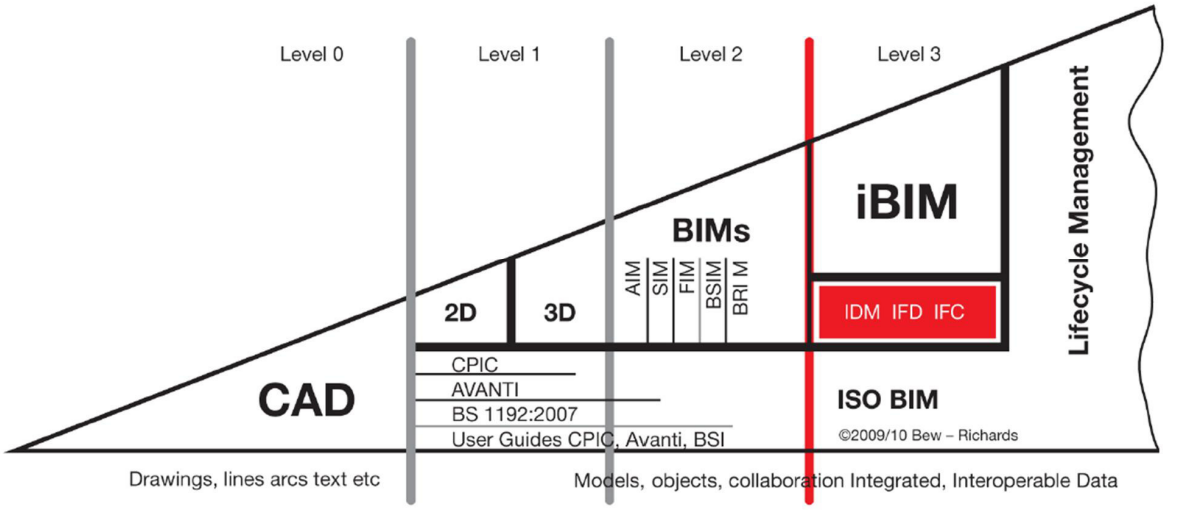

Fig. 1. BIM Maturity Model. (Applecore Designs 2014)