Requirements for Model Server Enabled Collaborating on Building Information Models

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ABSTRACT

The application of Building Information Modelling (BIM) has demonstrated enormous potential to deliver consistency in the construction collaboration process. BIM can define an explicit configuration for digitized information exchange; however, the technology to collaborate on models has not yet delivered the industry requirements for BIM collaboration. This research project is intended to provide a fresh review of industry requirements for BIM collaboration and will analyse how these requirements can be supported using a model server as a collaboration platform. This paper presents a review of existing collaboration platforms, with a particular focus to evaluate the research and development efforts on model servers as a collaboration platform. This paper also reports on the findings of three focus group sessions with industry practitioners to identify any problems in the available collaboration systems. The focus group findings identify a number of issues in current collaboration environments which help to understand the main domains of user requirements for BIM collaboration. These requirement domains will be further analysed to identify functional and technical specifications for a model server enabled collaboration platform.

Keywords: Building Information Modes (BIM), Construction Collaboration Progress, Design Collaboration, Model Server, User Requirements

INTRODUCTION

The architectural engineering and construction (AEC) industry has been criticized because of poor coordination and inconsistency in the way that multi-disciplinary practices manage and exchange project information. The application of Building Information Modelling (BIM) can overcome these problems by transforming the established document oriented collaboration practices into integrated model based collaboration of construction information with embedded intelligence. The full potential of BIM requires open standard collaborative working to produce
semantically correct Building Information Models and a collaboration platform to share and exchange design models seamlessly across the various construction disciplines. BIM can deliver an explicit configuration for merging and approving design revisions, however, there lacks a rigorous and testable methodology for capturing the workflows that define the exchange processes in the BIM design collaboration.

The use of project extranets over the last decade has improved the exchange of 2D project data across distributed project teams but the model based information exchange is still limited and experimental. Mostly emails are used to exchange the model data as files which is against the industry collaboration standards, such as BS1192 (2007) which recommends to exchange information using a common data environment (CDE) avoiding the ad-hoc exchange of information. In addition, emails and file based extranets cannot support model collaboration because of much larger file size and requirements of partial data exchanges in case of models. A proposed solution for model centric collaboration is use of model servers coupled with extranets based on open data standards such as Industry Foundation Classes (IFC). Model servers are a type of database systems which host model data and allow multiple users to perform coordination operation on the models or components of models (Jørgensen et al., 2008). There are few model server based collaboration solutions available (EXPRESS Data Manager, http://www.epmtech.jotne.com/; Share a space, http://www.eurostep.com/; Activefacility, http://www.activefacility.com; ArchiCAD Teamwork (Graphisoft, 2012), BIMserve, http://bimserv.org; GTeam, http://www.gteam.com; BIMstroms etc.), yet their BIM collaboration features are either basic or very costly, complex, on-premises (non-collaborative) or support only proprietary BIM data. Another key problem with the existing BIM collaboration systems is that these are developed in isolation with a diverse range of functions which do not integrate with the established work practices in the industry. There are very few studies on how these functions have evolved in the available model collaboration systems and how these correspond to the user requirements and the established industry standards for collaboration (e.g., BS 1192:2007). Therefore, the research will provide a fresh review of Industry requirements for BIM collaboration, the potential of model servers as a collaboration platform and a methodology to manage the BIM collaboration process integrated with the industry collaboration standards using model server as a collaboration platform. This paper presents the preliminary research investigations of the industry requirements for BIM collaboration based on three participatory focus group interview sessions.

REVIEW OF EXISTING COLLABORATION SYSTEMS

In the past 20 years, a number of research and commercial efforts have been initiated to provide model collaboration capabilities based on model servers using STEP and IFC methodologies. For example, IMSvr (Adachi, 2002), was developed to manage the sharing of IFC models but the essential features were missing web support and simple graphical user interface. The SABLE server (SABLE, 2003) was developed to resolve the issue of multiple application interfaces to support IFC model sharing across distributed work environments. Unfortunately these model servers have been discontinued, (Beetz et al., 2010). EDM (Express Data Manager) by Jotne EPM technologies and Share a space by Eurostep are well established model servers which work well for model collaboration, however these are developed on the manufacturing industry’s business model and only suit large companies due to the software cost implications. The user interface in the EDM products is complex and users have to buy several products for full functionality (Taylor et al., 2009). The cost of buying the licences for the full range of products is considerable and restricts widespread use and therefore effective collaboration of SMSs (small and medium enterprises) in the construction
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