

Chapter 7

A CAD–Based Interface Management System using Building Information Modeling in Construction

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ABSTRACT

Many interface events and problems occur in Architecture/Engineering/Construction (A/E/C) projects during the construction phase. Identifying and controlling related interface events and problems are essential to construction management. Interface management (IM) has become the most important project-management strategy in construction management. Interface management is the systematic control of all communications that support an operational process. Construction IM affects cost, scheduling, and quality directly and indirectly. Despite many academic studies and considerable discussion regarding IM, information about systematic approaches for managing interface events and problems during the construction phase is lacking. Interface or changed events can be identified and traced in IM such that participants can improve construction processes, minimize mistaken rework, and reduce total duration. This study presents a novel practical methodology for tracking and managing interfaces using Building Information Modeling (BIM). When using BIM, users can obtain an overview of previous and current interfaces in a given project and implement appropriate advanced control strategies and manage interfaces and problems in A/E/C projects. This pilot study utilizes BIMs for IM to the construction/mechanical/electrical interfaces in a building project and develops a construction CAD-based Interface Management (CBIM) system for project participants. The CBIM system is applied to a case study of a construction building project in Taiwan to verify the proposed methodology and demonstrate the effectiveness of IM.

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1 INTRODUCTION

Architecture/Engineering/Construction (A/E/C) projects typically involve various participants. Information regarding the needs and process status of each project participant are typically not transmitted properly from one service provider to the next, or properly exchanged among service providers. Building Information Modeling (BIM) can be regarded as an effective information-sharing environment for information retrieval for all construction project participants (Gould and Joyce, 2008). BIM has been implemented by numerous A/E/C firms to increase productivity and acquire long-term benefits of current construction practices (Goedert and Meadati, 2008). Typical paper-based drawings generated by the architectural firm are only marginally useful for general contractors and subcontractors in terms of information sharing. Numerous interface problems usually exist in construction projects. Additionally, participants usually execute their own work and rarely share information with others especially in interfaces. However, no appropriate platforms that assist project participants in exchanging and sharing interface information during the construction phase. The primary purpose of this study is to develop a web-based platform for communicating interfaces among all project participants using BIMs during the construction phase. The general constructor and subcontractors can organize and manage the interface and change information in the central database. Furthermore, BIM can retrieve interface information established by the general constructor or subcontractors during the construction phase. The definition of “interface information” in the study refers to all information related people, events, time, location description of project interfaces during the construction process. Through the BIM central database, users can obtain an overview of previous and current interfaces for a given project and implement advanced control and management for changes in A/E/C projects. Furthermore, this study applies IM in construc-

tion/mechanical/electrical interfaces in a building project and proposes a novel construction CAD-based Interface Management (CBIM) system integrated into BIM for project participants. The proposed CBIM system is applied to a case study of a construction building project in Taiwan to verify the efficacy of the proposed methodology and demonstrate IM effectiveness.

2 BACKGROUND

Construction projects are characterized by extreme complexity and non-standardized production. Unlike manufacturing, each project differs as it is designed and executed to meet owner needs. Thus, effectively managing project interfaces is essential to construction management. The complex nature of the construction industry makes it well suited to IM, particularly for interface information sharing among participants. Without IM, poorly coordinated and controlled boundary conditions among project participants can cause interface problems such as design errors, mismatched parts, system performance failures, coordination difficulties and construction conflicts (Chen et al., 2007). Effectively tracking and managing interfaces can improve construction IM during the construction phase, thereby avoiding unnecessary mistakes. Traditional interface communication methods include face-to-face meetings and telephone calls. Normal communication between participants helps prevent delays in the progress of solving interface among participants (Al-Hammand 1993, 2000). Effective information sharing for interfaces enables project participants to identify existing interfaces and solve interface problems. However, a typical problem in traditional communication is that discussions cannot be recorded and shared with others. In the construction management, interface information can serve as a reference for enhancing interface management.

According to questionnaire survey results from 16 senior managers and engineers specialized in

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