A GIS-BASED VISUAL INFORMATION MODEL FOR BUILDING CONSTRUCTION PROJECT MANAGEMENT

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Abstract

Computer technologies have great potential to improve management practices in the construction industry. However, the exchange of information during the construction phases of a facility is still primarily paper-based. This paper presents a GIS-based integrated visual database model that allows for effective use of computer technologies for communication, project documentation, and knowledge sharing throughout the life-cycle of a facility. The model allows for (1) accessing and retrieving construction information related to a certain construction element; (2) reporting and providing feedback from the field on the work progress, quality assurance, and inspection; and (3) evaluating the performance of the construction crews and generating cost and historical data for future reference. The proposed model is built using GIS as the base platform, and uses the 2D visual representation of the construction element as the least common denominator. The paper also reports the results of an initial evaluation of the model on a construction project.

Keywords

GIS, building construction management, information models, integrated databases

INTRODUCTION

Building construction depends heavily on a complex documentation process where the design intent is communicated via (a) a graphical representation of the building (which includes 2D floor-plans, elevations and cross-sections, and possibly 3D CAD models); (b) a set of specifications that dictate the quality of the components and finishes of the building; and (c) a legal document that highlights the project expectations. These three components constitute what is referred to as construction documents (CDs). Based on the provided CDs, the construction management team is able to gather information about the building (such as design information, geometric properties, etc.), add information related to constructability, resources, sequence of work, schedule, and responsibilities (this is a dynamic model, as the construction team itself is fragmented and information is generated from multiple users’ inputs), and document the construction process in fulfilment of the requirements of the legal contract. As a result, throughout the stages of the project, many different types and formats of information are gathered, documented, and shared. With current practices, in part due to the variations of the level of technological sophistication of the different participants, and in part due to the legal constraints of the process, communication is