Chapter 28
Building Lifecycle Information Management Case Studies

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ABSTRACT

A number of industries in other sectors have experienced substantial improvements in productivity due to the implementation of new technologies and associated working practices. In the industry of the built environment these new technologies and working practices are helping to bring about global "construction industry transformation." Very large and complex three dimensional design and construction information databases can now be aggregated and managed collaboratively over the internet by large project teams working remotely from each other. Whilst person to person meetings are still essential for project teams, a certain amount of remote working can be accommodated. In the past, construction projects experienced many problems resulting from incompletely coordinated and two dimensional construction information that often contained inaccuracies and inconsistencies. The improved quality of design and construction information that is being produced now is making it possible to deliver better quality buildings. By reducing abortive works on site, buildings can be delivered on time and with reduced post construction claims and penalties. Accelerated and enhanced innovation is being enabled by connecting state of the art modelling and simulation technologies directly to the three dimensional design and construction databases. This is making it possible to deliver previously impossible designs. Affordable mass customization and the potential for industry supply chain integration is being enabled by the application of automation to design and construction information management. Additional improvements in efficiency and innovative design, delivery and facilities management are being made possible by this integration of all aspects of the supply chain (i.e. industry supply chain integration). In addition, substantial improvements to the everyday quality of life throughout the world will be brought about by the growing application of parametric generative computer-aided design, virtual prototyping, and lifecycle analysis and simulation.

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1 INTRODUCTION

Over the past three decades, new information technologies and working practices have been increasingly adopted in industries such as aerospace and automobile production. This implementation of new ways of working has steadily increased, resulting in improved effectiveness and efficiency in these industries. Two dimensional paper-based processes result in more mistakes and abortive works that have a negative effect on the overall design quality and production efficiency of the resulting -mass produced- products. Increasingly, the reduction, and even complete removal of two dimensional, paper-driven processes from design and production, is making -increased efficiency, quality and safety- possible in numerous industries throughout the world.

These same new technologies and working practices are now beginning to deliver similar value to the industry of the built environment as is being realized in other industries. This chapter will introduce a number of large design and construction projects which are demonstrating this trend. The value and process innovation that is already being achieved is demonstrated by the virtual pre-coordination, analysis and simulation of the life cycles of these substantial design and construction projects. Ever increasing improvements in value, quality and safety enhancements to the industry as a whole, are being made possible by the growing trend towards the "virtualization" of the design and lifecycle information management process.

2 THE ADVANTAGES OF VIRTUAL PRE-COORDINATION

Description of the Virtual Building Lifecycle Management Process

The implementation of new technologies and working practices is pervasive throughout the entire lifecycle of building. From preliminary design, through coordination, procurement, construction and into to facilities management, the trend is towards validating building design, construction and management in advance. What initially began as "Building Information Modeling" (BIM) has now evolved into Building Lifecycle Information Management (BLM). BIM contains the 3 dimensional geometric information about the building, including all of its associated 2D data such as quantity, cost and engineering information. BLM goes beyond that, to include the integration of all of the data relating to the fabrication, construction process and facilities management phases.

BLM begins at the preliminary design stage, when the basic information about the project is analyzed and integrated into one 3 dimensional database. The building lifecycle information model is likely to include the project brief, pro forma and business model, site geometry, existing services, cost information, zoning information, the structure of the project consultant team and, increasingly, specialized "captured project knowledge," which passes from project to project. An experienced construction advisor from a contracting firm is always beneficial to a project team at the preliminary stage.

As the project moves further into the design phase, all the information about the project continues to be added to the one Building Information Model. Fully automated, internet-based, 3 dimensional submissions for code compliance review and the issuing of building permits may soon be required by regulatory authorities throughout the world. Submissions to regulatory authorities are likely to be made over the internet via standardized formats such as (for example) Industry Foundation Classes (IFC) compliant '3 dimensional data exchange'. This will enable efficient and automated code compliance checking (and the issuance of building permits) over the internet. The way sophisticated 3 dimensional spatial relationships and building information is shared across the industry is steadily being evolved through standards such