

Chapter 27

Lean Enabled Structural Information Modeling

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ABSTRACT

Lean production revolution started in manufacturing with origin in the Toyota Production System (TPS). Since Womack, Jones, and Roos (1990) announced this concept as a new production paradigm, various industries including the Architecture, Engineering and Construction (AEC) Industry have paid attention to its possible applications. While design, engineering and building practices in AEC are substantially different from manufacturing, the ideas drawn from Lean Production can be tailored for the AEC environment. The synthesis of lean production principles and techniques applied in AEC form the basis for a Lean Project Delivery System™ (LPDS). The principles of LPDS and Building Information Modeling (BIM) technologies offer new approaches and opportunities to improve the quality, cost, schedule and productivity of building products in a highly fragmented multi-disciplinary sector. The case study presented in this chapter provides an overview of the synergy between the principles and tools of LPDS with BIM technologies used at the California Pacific Medical Center's (CPMC) Cathedral Hill Hospital (CHH) project in San Francisco, California.

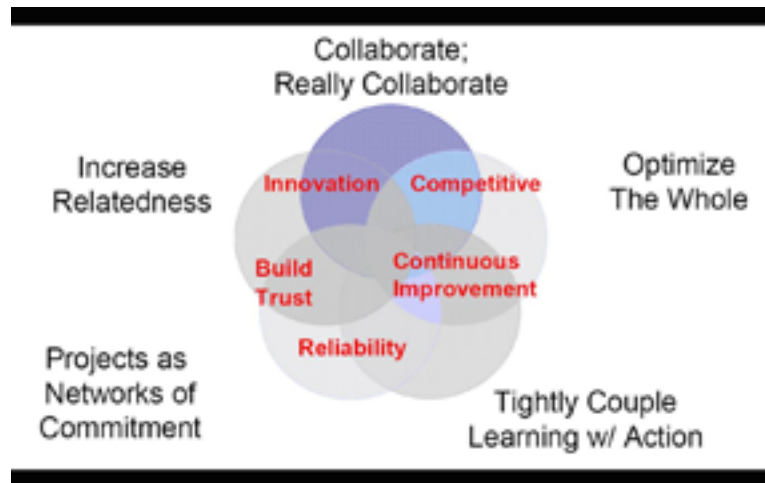
1 INTRODUCTION

AEC industry is one of the largest and most complex industries in the world. Yet, it has lagged behind many other sectors in embracing new technologies that add more value to all the parties who participate

in the process. The traditional tools and techniques of information flow (2D drawings, Gantt charts, spreadsheets, tables, etc.) fail to engage the critical players (stakeholders) who need to analyze opportunities to improve the project design and execution from multiple perspectives in a timely manner. As a result, the project development process is often not efficient nor effective. Opportunities to improve

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Figure 1. Five Big Ideas



the constructability and usability of the design are missed, and the seeds for process inefficiencies such as overproduction, rework, and poor allocation of resources are sown.

This chapter explores the current state of Structural Information Modeling (SIM) practices in LPDS. The “Lean enabled SIM” processes described here are the best practices adopted by the “structural cluster” to enhance the collaboration between the design team and trade partners at the CHH project.

CHH is a new Acute Care and Women’s and Children’s hospital in San Francisco, California with 1,113,249 Building Gross Square Feet. The parcel size comprises approximately 105,800 square feet measuring 385 feet by 275 feet. The Preconstruction phase, including a Validation Phase, Design Phase and Construction Documents phase, began in 2007. Construction is scheduled to begin in 2010 and complete by the end of 2014.

Sutter Health, one of northern California’s largest health-care providers, is committed to “lean practices” as a new design and construction philosophy to execute major capital projects. As a part of this lean implementation, Sutter Health intends to reform the way buildings are designed, engineered, and constructed. Sutter Health em-

phasizes the following “Five Big Ideas” with its project delivery teams:

1. Collaborate, Really Collaborate
2. Manage as a Network of Commitments
3. Increase the Relatedness of the Project Participants
4. Tightly Couple Learning with Action
5. Optimize the Project as the Whole

This chapter focuses on LPDS techniques that are tailored for the effective use of SIM technologies to optimize design and planning during preconstruction phase. Design professionals and trade partners must embrace “Lean enabled SIM” processes and ideas to find the innovative approaches that maximize the value in the project.

2 BACKGROUND

The AEC industry is on the verge of a major transformation in terms of tools, processes and relationships precipitated by the advent of two major developments: LPDS and Building Information Modeling (BIM).

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