

# BIM, LEAN Construction, and a Common Data Environment (CDE)... Who Needs Them?

Peter Cholakis, Four BT, LLC

Luca Moscardi, Lemsys Srl

## Introduction

Recently I was asked by a customer what benefits brings the use of a **Common Data Environment (CDE)** and who needs to use it.

A CDE is a strategic tool for sharing information and managing a team within a BIM / LEAN Construction Delivery environment.

This paper focuses upon the roles and responsibilities of team members, with respect to CDE, throughout the life-cycle of a built structure... from Planning, to Design, Project Delivery, Operations & Maintenance, to Decommissioning/Recycling, and its integral relationship with LEAN Construction Delivery methodology.



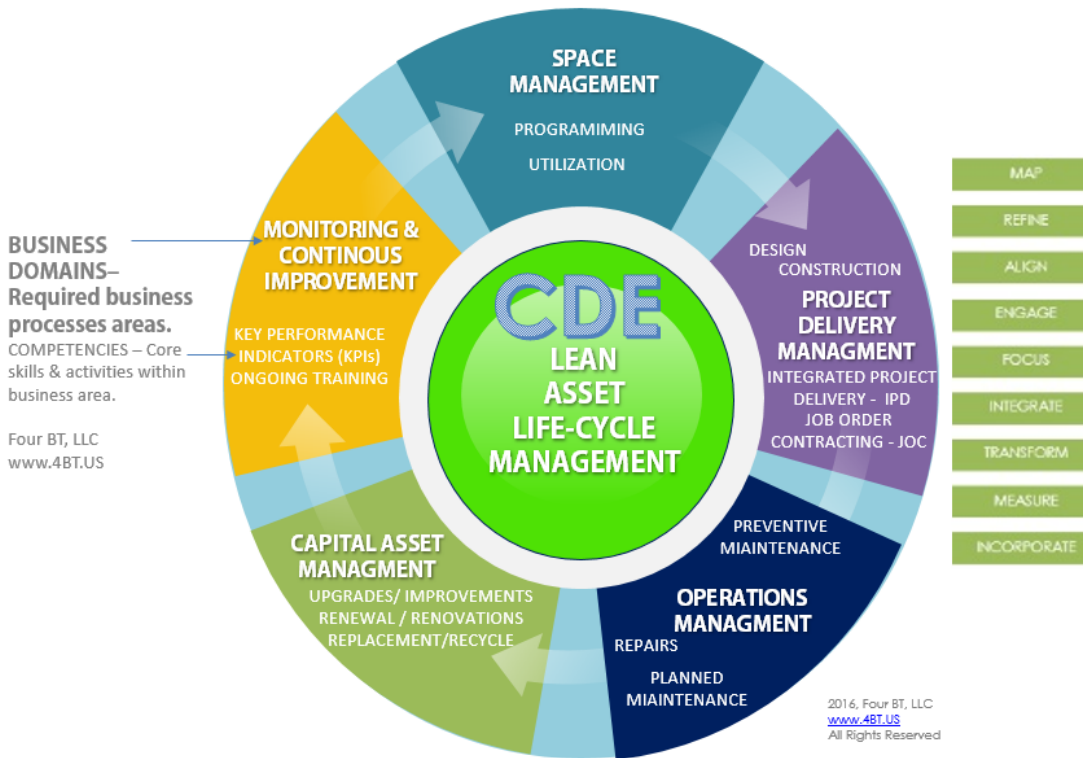
## From Big Data to CDE, BIM, and LEAN Construction Delivery

“Big Data” has discussed a lot, however, data must be in easily understood, common formats, in order to be assessed and leveraged for the benefit of an organization. In today’s world, the issue not the lack of volume of data, but the lack of actionable information in support of greater efficiency.

BIM<sup>1</sup> is the efficient life-cycle management of the built environment supported by digital technology. It can deliver huge benefits to all stakeholders. It can do so, however, only if a Common Data Environment is present, in addition to LEAN best management practices and supporting technology. The interrelationship of BIM, LEAN Construction Delivery, and CDE is demonstrated in the below graphic.

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<sup>1</sup> BIM is not a single vendor software tool. BIM is the life-cycle management of the built environment supported by digital technology, and includes models, modelling, and management using shared, common, and transparent data leveraged by LEAN construction best management practices.



A Common Data Environment is critical to delivering quality renovation, repair, maintenance, and new construction outcomes on-time and on-budget.

### Current Status

Research shows that only 2% of construction projects globally are delivered on-time, on-budget, and to the satisfaction of all participants and users.<sup>2</sup> To flip this traditionally negative outcome upside down, and consistently drive 98% satisfaction levels requires that timely and accurate information be shared transparently and as quickly as possible, without interruption, throughout all asset life-cycle activities.

Construction cost data must be in clear, common terms, which can be aggregated, distributed, updated and modified for all the varied participants, purposes and goals. This information is can only be cost effectively created, stored, and maintained within a CDE. At detailed line item level, an example being the CSI Masterformat data architecture.

The core objective of line item construction cost data is to provide better information, knowledge and wisdom to allow us to make better decisions, and drive higher efficiency. No one wants to change their work process needlessly, fill out the same information multiple times, waste time searching for information, or pay for new technologies where claimed benefits are not clearly defined.

Making the necessary changes within an organization to adopt common data architectures and collaborative work practices is nontrivial. Thus LEAN construction delivery methods such as Job Order Contracting, that can provide major benefits to all participants, are not always well received nor well implemented. New processes naturally lead to higher initial business costs, and requires both an associated learning curve, and specific supporting cultures. Thus, there is an acceptance barrier by many owners, contractors, and AEs when it comes to collaborative methods such as Job Order Contracting or Integrated Project Delivery.

<sup>2</sup> McKinsey Study

Clearly organizations will not shift to requiring a Common Data Environment until overall investment costs in technology and training, and associated benefits can be quantified. That time, however, is now. Objective, best value, and timely line item construction cost data is available. Supporting training and technology is also readily obtainable. There is little reason not to improve productivity for renovation, repair, and construction projects. The world of construction is changing, and those that don't take the path of innovation will be left behind.

## CDE Players

Introducing the Common Data Environment impacts multiple players within the construction value chain:

### “The Owner”

All real property owners who manage renovation, repair, maintenance or new construction projects need a Common Data Environment to develop, store, and distribute all relevant drawings, BIM models, documents, activities, and processes to all the relevant stakeholders.

Owners are becoming increasingly focused on demanding more value. They are aware of the traditional waste and productivity issues and are beginning to demand change.

Technology that embeds LEAN collaborative best management practices for the design and construction industry is available to manage an enormously wide range of complex data, and at the same time, is relatively simple to deploy and to use.

Building Information Modeling software-solutions, including CAFM (computer-aided facility management for space planning), CMMS (computerized maintenance management software for routine maintenance under \$10,000), CPMS (capital planning and management software for physical and functional condition assessment and reinvestment planning/decision-support, LEAN Product Delivery software (Job order contracting and integrated project delivery), and 3D visualization tools can jointly deliver benefits to stakeholders throughout every part of the construction and life-cycle management process.

### “The Designer”

A high level of pressure will be put on architects and other specialist advisors as many clients currently see 3D visualization as the answer to ensuring cost effective construction project delivery. This, of course, must change to BIM. Developing a CDE to run and record the processes between you and your clients that includes all aspects of life-cycle management, especially that of collaborative LEAN project delivery will become mandatory. The designer needs to manage ongoing changes in real time as situations require, and be sure that the document available is current, and all prior changes archived.

Sharing the same information, in appropriate formats, with the Owner with the structural and MEP Engineers is critical for validation of work scope and minimizing errors, omissions, and miscommunications. The latter are all result costly, yet largely avoidable, changes during the construction stage.

### “The Contractor”

Within a BIM execution, the constructor is active part of the proceedings from the earliest planning stages. This enables inclusion of their since their proven field experience and knowledge. This is critical to meeting objectives for quality, timeliness and cost. All stakeholders must offer their contribution and their experience as early as possible.

The importance of using LEAN collaborative construction delivery methods can't be overstated. LEAN methods such as IPD and JOC *require early and ongoing collaboration among project participants.*

The traditional and problematic “transition between the design phase and the construction phase” is eliminated from an informational perspective within a LEAN construction/BIM process. The builder will

already have all the information needed to complete the work per standards and specifications required by the Owner.

Finally, complementing and adding the information in the life-cycle physical asset model is simplified using a CDE. This factor is indispensable in the during the operations management and maintenance phases.

#### **“The Facility Manager”**

The Facility Manager as well as the Energy Manager, and related colleagues, can depend upon a CDE to assure available access to historical, current, and planned operations and maintenance management activities, costs, and impacts.

Within the CDE, a wide range of standardized information can be stored and immediately accessed: locations, buildings, horizontal infrastructure, movable assets (equipment, furniture), major building systems, major equipment, and people (internal, and external). This information is always immediately directly available in the office or in the field.

Real time maintenance management activities can be costed, scheduled, and tracked on demand.

If the information comes from a building information model (see example figure) inside the CDE you may store additional information such as warranty information, building plans, permits, conformity certificates, data sheets, etc... This information allows the operator to increase the utilization of all available resources, while reducing risk and avoidable delays. Space use and energy efficiency can also be monitored locally and enterprise-wide.

#### **In Summary**

The AECOO industry (Architects, Engineers, Contractors, Owners, and Operators) and associated supply chain participants need a Common Data Environment to allow for access of current, standardized and easily understood, and detailed information across all stages of the life-cycle of a built structure.