

What is Lean Construction? Start Here.



- David MacKay. Feb 17, 2022

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A wonderful thing about things that are true, they tend to simple. Lean is simple. Not simplistic, simple. But, while simple, Lean is not easy. Why? As the book *Lean Thinking* pointed out in 1996, it “requires a complete rearrangement of your mental furniture”. It is very different from the way we typically think about how work gets done. But once the light bulb goes on, it changes the way you see. You never look at a construction site, design process, or team the same way again. And you never want to go back. You wonder why we didn’t always do it this way. So, what is Lean, or more specifically, Lean Construction?

It starts with the most basic question: How do we create value? Virtually any endeavor has a customer that wants or needs something. It has a producer to meet that need. And there is a production process. Lean is about how we produce value. Here’s how:

Pull value to the customer with the least waste by flow efficiency and do it better and better

You may have noticed that there is no mention of construction. That is because lean thinking is universal. It is not specific to any industry. So, what differentiates “Lean Construction” from any other “Lean”? It differs in how the principles are applied, in the methods and tools we use to meet the specific needs of our industry. Simply put, Lean Construction is:

Lean thinking, methods, and tools that meet the specific needs of the construction industry

Let’s break down the key concepts of Lean, then look at some methods and tools applied specifically to design and construction, and finally, identify the critical attributes needed in teams and organizations to make it work.

KEY PRINCIPLES OF LEAN

Lean is based on the concept of flow efficiency. Everyone wants to be efficient. But instead of a focus on resource efficiency, Lean is focused on flow efficiency. What do we mean?

Flow Efficiency. It is the core idea of Lean. Instead of optimizing individual resources or steps, we optimize the whole. We want work to flow continuously without stops and starts, waiting, or rework. Everyone wants to be efficient and traditionally we look at efficient use of our labor, tools, time. These are all important, but a key insight of Lean is to focus primarily on efficient flow.

We look at flow from the point of view of the work. Imagine a project as a canoe flowing down the river. Now put several people in the canoe and give them paddles. Our goal is not for each paddler to be efficient. Our goal is to move the canoe, the work, the project, as efficiently as possible. We want continuous flow. This is one reason Lean Construction so heavily emphasizes collaborative, integrated teams. If all the paddlers are focused on themselves what happens to the canoe? It zigs and zags, hitting rocks and getting caught in the branches as it stops and starts down the river. On the other hand, if everyone works together, focused on the flow of the canoe, doesn't the canoe move faster and smoother? Are the paddlers working harder? No. Actually, there is less strain and no wasted effort. By focusing on the efficient flow of work, we improved the efficiency of our resources. Lean thinking achieves better results with less effort. And that is the key insight of Lean Construction. Make work flow efficiently.

Customer. The reason for the work is to transform something to meet a customer request. It is impossible to define value without the customer. Success is based on satisfying the customer need.

Value. Value is defined by the customer. It is what the customer wants. A project may first need to help a customer define value. Once defined, it is the job of the producer to deliver what has been agreed. From the point of view of the customer, that is why the producer exists. Once value is defined, the goal of the producer is to move the work through all the value adding steps as efficiently as possible. This is the **value stream**. And the ideal is continuous flow.

Waste. Anything that is not value. Paddling the canoe into a rock is effort that does not produce value. The canoe, or work, is not moving forward. That is waste. In our work, on our projects, that might include redoing work because of a defect, transporting materials several times around a jobsite, RFI's waiting to be answered, meetings that cover the same issues over and over. Waste includes any variation from the plan, overburden of people and equipment, and the eight wastes of over-production, inventory, waiting, defects, motion, transportation, over-processing, and unused talent. We want to eliminate waste. This is a never-ending effort to have the least possible waste.

Pull. Produce in response to a demand. If there is no demand, why produce? Instead of pushing work, producing in anticipation of a need, we produce the right thing, at the right time, in the right quantity.

Better and better. Continuously improve the what and the how, the product, the people, the process, and flow of value. There is always something to improve, always waste to eliminate. We aim for perfection even though we will never reach it.

Put it all together. Flow efficiency is at the core of “how” we produce value for our customers. Anything that does not produce value, such as waiting and rework, we want to eliminate. We build in to our processes the ability to constantly improve and remove waste.

METHODS AND TOOLS

How do we take the principles of Lean and make them the way we work? Methods operationalize the principles. Then we use the right tool for the job. Lean Construction includes methods and tools either adapted from other industries, such as 5S and Set Based Design, or have been created specifically for Construction, such as the Last Planner System®.

Consider ways the **Last Planner System** helps teams achieve flow efficiency. One of the biggest problems in design and construction is fragmentation. Instead of one organization working under one roof, our projects include dozens of organizations specializing in various aspects of the project. This creates **waste** from a lack of coordination and poor communication. It is like everyone in the canoe paddling their own way. LPS helps bring everyone together to **focus on flow**. Using tools such as sticky notes and planning boards, or sometimes digital tools, work becomes visible. By **pull planning** backwards from a milestone, teams come to understand what each trade needs for smooth hand-offs. They identify and clear potential roadblocks that could impede the flow of work. They optimize the whole. Weekly, they reflect on their past week performance. If there are misses, they identify the root cause and adjust, **continuously improving**. There is much more to LPS, but this illustrates how methods and tools operationalize lean principles.

What other methods and tools are used in Lean Construction? For learning and problem solving we might use Study Action Teams, Plan-do-check-adjust, 5 Whys, Fishbone diagrams, A3's, and Kaizen events. Project teams may use Integrated Project Delivery, Big Rooms, Integrated Form of Agreement (IFOA) contracts, or Kanban boards. In the field 5S is an especially effective method. In the office, Value Stream Mapping helps us see how work flows through our organization. So many of these are interrelated and overlap, which makes sense since they are all built from the same foundation.

ATTRIBUTES OF A LEAN ORGANIZATION

There is a close relationship between principles, process, and people. Good processes, built on lean principles, can drive the right behavior. Similarly, people who are lean thinkers drive continuous improvement. What are the critical organizational attributes needed to pull value to our customers with the least waste by flow efficiency and do it better and better?

Lean organizations are often referred to as **learning** organizations. If you are not learning, you are not solving problems, you are not becoming better at your craft, you are not innovating or continuously improving. A learning organization is reflected in both the people and processes that allow and encourage learning to take place. There must be a means to turn an idea into standard work.

Additionally, to make work flow involves interaction between people. Because there is more than one person in the canoe, we need to recognize the significant role each person plays in achieving a flow efficient project. This is **respect for people**. Closely related is **collaboration**. Without collaboration we impede flow. Key to working together is trust. It is like oil to an engine. Trustworthy people are the basis for trust. It matters who is on the team. And **discipline** is vital, yet often overlooked. Without directed, focused, diligent, consistent effort, we will diminish our ability to create value.

Another Key attribute is **awareness or clarity**. It is seeing everything all the time. It is seeing things for what they really are. Bad information leads to bad decisions. We can't manage what we can't see. An important aspect of this is visual management. Likewise, we need to know where we are going. Lean organizations have specific short- and long-term goals and are **focused** on achieving those goals.

The extent to which these attributes exist in our organization is directly related to our ability to implement Lean principles. This is especially true in design and construction because we are so heavily people and information driven.

WHERE DO YOU GO FROM HERE?

This article, and the rest of Lean Construction 101, help you build a foundation and point you in the right direction. Do not forget the core principles of Lean. It will help you see and appreciate the why and how of implementing and practicing various lean methods. Never assume you are an expert. Keep reading. Keep learning. Just as important is to start doing. A caution though, do not create waste by doing more than you or your team are ready for. Pull value by implementing what you can use. For many, their first efforts are around the Last Planner System. For others it is a Study Action Team. For a specialty trade, 5S may be the best starting point. Step by step we become a lean organization. And those small wins will grow to big results.