Lean Design and Construction FAQs

- **When did Lean Construction begin?**
  LC began with an insight that the current planning system was unable to produce predictable workflow. This was in the mid-1980s. A more formal start could be identified as the first meeting of the International Group for Lean Construction in 1993.

- **Is Lean Construction just applying Lean Production in construction?**
  No. The word "just" makes it sound as if Lean production itself were something limited. Lean Construction started as an attempt to reform the way work in projects is managed. Once it was understood that work moves between specialists in construction by the administrative act of making an assignment, it was possible to adapt principles and practices direct from Toyota.

- **What is Lean Construction?**
  Lean Construction is a different way to see, understand and act in the world. For example, waste in current practice is normally understood as labor utilization. Learning to see contingency as waste is the big step we need if we are to make a major change in construction, one commensurate with managing inventory just in time. Lean Construction is also a philosophy - a comprehensive system of ideas leading to the flawless delivery of the built environment. This philosophy is practiced using the Lean Project Delivery System, which continues to evolve as more is learned from practice and research. Lean Construction is something that people do – an orientation of sorts.

- **What makes a Lean Construction project different?**
  Lean works because the work on the project is designed and managed by those who do it. Lean Construction designs and activates the network of commitments necessary to deliver the project. The individually rational decision is often destructive to the overall project. The local optimization driven by labor utilization versus system optimization that is driven by throughput. So work on Lean Construction projects is deliberately and systematically organized to maximize the project and not the pieces. Commercial terms are adjusted to align interests, and promote improvement/minimize risk to the involved parties.

  Another difference is that the construction process, building operations and maintenance, and recycling/salvage needs are inputs to the design, not outputs of it; inputs needed to start the work are made available, and issues (e.g. waste) that prevent finishing started work are eliminated; problem-solving and learning is the job of those involved in the project and not just part of the job. Where possible, materials are brought to the site in the same way concrete is; the aim is for a zero punchlist and not to zero-out the punchlist.

- **Building Information Modeling (BIM) aims to build a collaborative relationship between designers and constructors, so how is that different from LC?**
BIM is technology. It doesn't aim; it does make possible different conversations. LC structures those conversations and connects design, logistics and installation. LC designs and activates the network of commitments necessary to deliver the project.

- **Is Lean Construction like LEED where you have to commit to a certain level of compliance and the project is checked against that?**
  No. Lean is a way to manage and improve work. LEED and GREEN are value propositions - an end. Lean Construction is the means to better arrive at that end.

- **What percentage of the US construction industry is adopting it?**
  At this time there is no way of knowing. Many hospitals, suppliers, etc. are on board. But there is still ample time to be an early adopter.

- **Is Lean Construction accepted more in other countries than in the US?**
  We have no way of making a well-grounded assessment. There is significant implementation in Germany, the UK, Denmark (the longest running with strong Union support), Sweden, Brazil, Chile and Peru. It is not possible to say the US is ahead.

- **What is the primary difference between Lean Production and Lean Construction?**
  Lean production is the inspiration for lean construction, but cannot be grafted onto construction. Production and construction are different; construction is more like ship or airplane-building, where the workers move and the product is stationary instead of the product moving between stationary workers like in production. In production, typically the same part is produced in mass volume. This is not the same as construction, unless major generalizations are made (e.g., a wall is a wall, even if made of different material and on different projects). So, lean construction focuses heavily on the similarity in the process of constructing more so than on the product of construction.

  Sven Bertelsen holds that we need to move from construction to project production in general because he sees the project as the basic form of production where mass production is just the simplified version. Toyota and Shingo showed us new thoughts, but we have to establish our own thinking. Lean Production primarily focuses on the reduction of the time (from order to delivery) of any transaction, be it assembly, billing, supply, etc. This reduction of time is achieved by the elimination of waste (the unproductive use of resources) that is captured in “downtime”. Respect for people and continuous improvement guides the reduction of waste.

  Lean Construction has been inspired by this, but also by other paradigms. Production in construction is conceptualized as a transformation of inputs to outputs through a flow process of materials and information that is directed at maximizing value to the client. Lean Production is not about maximizing value to the client, otherwise, we would have had the Cadillac for the price of the Chevy, the Lexus for the price of the Camry, etc. Lean Construction also draws on new theories regarding project management, as well as social
science, and complexity theory. A construction project is really a project-based production system.

- **Can the concept of heijunka be used in construction? Why?**

Heijunka is production leveling. Production leveling for a manufacturing plant relies on being able to “create” stable demand, so that the Takt time for the plant is constant. Toyota Production System (TPS) does this through its marketing and sales division. The TPS is not always perfect, but they strive for this stability, especially with tactics such as mixed-model production.

In construction, we are project-based and we know what needs to be done for a project – the quantities are known, within time and budget constraints. What we need is stability and reliability in the workflow so that we are not going in fits and stops. We achieve this using the Look-ahead and weekly work planning processes with a constraint screening process, and not just an FYI coordination meeting. The act of keeping a workable backlog is designed to keep work flowing and progressing.

The use of the line of balance (linear scheduling, flow lines) is a nice tool to visualize the production rates of different activities and avoid the interruption of work (as well as the problem of overproduction). However, in Lean Construction we don’t want to see one crew finish too fast or too slow. Crew balancing is not an example of heijunka. Crew balancing may lead us to locally optimize at the expense of the system throughput.

- **Contrast “Lean work structuring” with “work breakdown structure”**.

A WBS should not be used as the sole planning tool for a project. It is a great brainstorming tool to understand the project. It is probably the best scheme to develop a MASTER schedule. The problem is that we use it for more than what it is capable of. We can’t determine project cost and project duration by simply working the WBS. The WBS is looking at activities in an independent fashion in support of transformational thinking. The WBS assumes that optimizing the part will optimize the whole – reduce the part cost and duration and you will reduce the cost and the duration of the whole. Get the lowest price and the shortest time for drywall separate from electrical and plumbing and you find on site that the work of these three trades is so intertwined that the improved cost and duration you received for drywall was a pipe dream. A WBS is simply a tool to use in Lean Work Structuring (LWS). LWS is thinking production, operation, maintenance, and recyclability during design. It also focuses on work package (not trade or contract packages), i.e. the wall, or the ceiling.

- **What are the differences between project control and production control?**

Project control monitors progress using lagging indicators such as schedule and cost variance. It is sometimes too late to do anything about the project going off-track or it takes too much to get it back on track. So, project control is reactive. Think of the stock market. The Dow Jones Industrial Average only tells you what has happened to the market after the fact. It’s like taking the temperature of a patient – it tells you whether the person has a fever but not why. We need to practice production control such that we make things happen to
prevent the project from having a fever. Production control is pro-active in the sense that you are doing all that you can to make work happen by removing the constraints that you know about.

- **Is Value Stream Mapping (VSM) a tool for construction?**
  
  VSM has a place in construction. In fact, it is probably being implemented but we just don’t know about it. And this applies to many other tools and techniques that are being used to enable the Lean Construction ideals, but we don’t know about them. The Last Planner System® is one example. VSM provides a big picture view of the flow problems in whatever system you are studying. It’s a *flow improvement* tool and not a *process improvement* tool, and a great bottleneck finder.

  VSM has been applied to reduce the time for processing specialty contractor payment applications (from 40 days to 5 or so – see IGLC11 conference proceedings for a paper by Mastroianni). An architecture office also is using it for streamlining the submittal and show drawings review and approval process because of delays and complaints by contractors. An example for application on a construction site is that of a construction company that specializes in suspended ceiling and drywall installation. They used VSM to identify time that drywall sheets and tiles spend before being put in place. They used the results to justify the cost of using a temporary warehouse (supermarket) close to the site and deploying a pull delivery system (the best they could do). The result, using the same installation process, was less time per SQFT because material handling was almost down to single touch – from the truck to the installation location.

  In Brazil, VSM is being used mostly by academics. As with any other tool developed for manufacturing, it needs some adaptation in order to become useful for construction. Some colleagues at the University of Campinas (UNICAMP) have developed some innovative applications of VSM for administrative and design processes and also as part of production system design of construction projects. They too have published a few papers in previous IGLC conferences.

- **Is Integrated Project Delivery (IPD) the same as Lean Construction?**
  
  No. In fact, the ideals of Lean Construction are enabled by using the Integrated Project Delivery approach. IPD is necessary but not sufficient. In other words, just having an IPD will not guarantee that we realize the full benefits of Lean Construction techniques.

  IPD is a “Relational Contracting” technique that aligns project objectives with the interests of key participants through a team-based approach. The primary team members would include the architect, key technical consultants, a general contractor, and major subcontractors. It creates an organization able to apply the principles and practices of the Lean Project Delivery System.] (Matthews and Howell 2005). IPD is further defined at

  [http://www.leanconstruction.org/training/glossary/](http://www.leanconstruction.org/training/glossary/). For more information see also
  [http://www.leanconstruction.org/media/docs/lcj/V2_N1/LCJ_05_003.pdf](http://www.leanconstruction.org/media/docs/lcj/V2_N1/LCJ_05_003.pdf). (IPD is a registered business mark.)
What is Integrated Lean Project Delivery?

Integrated Lean Project Delivery (ILPD) is a process trademarked by The Boldt Group. It was created and is practiced by The Boldt Group's subsidiary, The Boldt Company. The process aims to eliminate waste across the construction value chain, through evaluation of initial planning and design, and examination of construction processes to predict where and when waste will occur. Waste is then eliminated through the use of Lean tools in the IPD process. An ILPD contract is a multi-party agreement that specifies the use of Lean practices as conceived in the Lean Project Delivery System. This distinction is needed because Integrated Project Delivery (IPD) is now only referring to the multi-party contract agreement regardless of what practices are used. This has been called “IPD-lite” or “IPD-ish.”

Provided courtesy of the Lean Construction Institute