LA Community of Practice - Monthly Meeting Agenda
April 1, 2015

• 4:30 – 5:15 – Networking & Appetizers

• 5:15 – 5:30 – Introductions & Lean Thinking

• 5:30 – 6:45 – Presentation & Questions

• 6:45 – 7:00 – Takeaways & Plus/Delta

LCI Los Angeles CoP Board

1. Eric Ahlstrom  
   Amgen
2. Frank Antonides  
   Disney
3. Dave Fabulich  
   Taft Electric
4. Jose Felsmann  
   Southland Industries
5. Jason Herrera (Vice-Chair)  
   DPR
6. Kris Manning (Chairman)  
   Clark Construction
7. AJ Omar  
   Lionakis
8. Shaun Sleeth  
   McCarthy
LCI’s Mission

We serve as a catalyst for transforming the design and construction industry to deliver value using Lean principles & practices

LCI LA CoP’s Objective

Educate, train, communicate and advance current Lean knowledge within Planning, Design and Construction Principles.
Who is Here?

• Attending for 1\textsuperscript{st} time? 2\textsuperscript{nd} time?

• How many of you are:
  o Owners?
  o Contractors?
  o Architects / Design Professionals?
  o Trade Partners?
  o CM/PM?
  o Students?

Join LCI

\textbf{Annual Membership Costs}

• Corporate: $7,500 (National)/ $5,000 (Regional with <50 employees)
• Research Sponsor: $15,000
• Law Firm: $3,000
• Individual: $250 per year
• Academic: $75 (Faculty)/ $50 (Student)

\textbf{Benefits}

• \textbf{Listing} on LCI website with contact information and link to member site
• \textbf{Access} to Members-Only Website for materials, forms, training materials etc.
• \textbf{Reduced fees} for LCI Seminars, Workshops and Research Meetings.
• For additional information and to sign up - visit \url{www.leanconstruction.org}
Lean Thinking

On April 1, 2025 (10 years from now), what will be the most improved aspect in the design & construction of a project?

An architect’s take on lean for design and architecture

Lean for designers?

Romano N.A. Nickerson, AIA

2015.04.01 | LCI C of P – Los Angeles
An agenda for the afternoon

• From cars to design

• The current state of lean construction

• Some examples of lean at an architectural firm

• The lean value proposition

Survival was at stake!

Jap Cars Shown

These first products of Japan's postwar automotive industry, recently displayed in Tokyo, don't mean that Nippon's citizens will abandon their walking habits. The entire output of the Toyota Motor Co., at Nagoya, is only some 20 cars and 200 trucks a month. These will be sold to hospitals, to government agencies, and to business firms.

The passenger car, seating four, has a 21-hp, four-cylinder engine, a speed of 84 m.p.h., and will average 40 miles to the gallon. The one-half-ton trucks have the same power plant, but a different gear ratio and will do about 30 miles on a gallon. The cars will sell for $260,000 yen ($3,200), and the trucks for the equivalent of $3,200.
Two gentlemen paved the way

W. Edwards Deming

Taiichi Ohno

Do you remember how it was in the 80's?
Lean goes mainstream “ish”

Some others took notice. . .

Lauri Koskela  Gregory Howell  H. Glenn Bailard  Iris Tommelein
But what is it?

• Lean Construction is a combination of original research and practical development in design and construction manifested as an adaption of lean manufacturing principles and practices to the design and construction process.

• Lean construction is concerned with the impeccable alignment and holistic pursuit of concurrent and continuous improvements in all dimensions of the built and natural environment: design, construction, activation, maintenance, salvaging, and recycling (Abdelhamid 2007, Abdelhamid et al. 2008).

• The lean construction approach tries to manage and improve construction processes while reducing cost and maximizing value by considering customer needs (Koskela et al. 2002).

And that means what, exactly?

• Optimize the whole to make work flow reliable

• Structured toward value generation

• Downstream stakeholders involved in planning via cross functional teams

• Pull techniques govern the flow of materials and information through networks of cooperating specialists

• Feedback loops included to make rapid system adjustments

• Seeks to mitigate variation in every aspect

• Strives for continuous improvements in the process, workflows, and product

• Decision making distributed in production control systems

• Increases transparency between stakeholders, managers, and laborers
It usually involves some form of Last Planner®

- Last Planner was developed by Howell and Ballard
- Relies on the premise that the people who put the work in place are the most qualified to plan the work
- Composed of schedules and work plans at varying levels of detail
  - Major Milestone Schedule
  - Phase Plan
  - Look-Ahead Plan
  - Work Plan
- Performance is measured
  - Planned Percent Complete (PPC)
  - Tasks Made Ready (TMR)
  - Tasks Anticipated (TA)
  - Variance Tracking
- Projects are seen as networks of commitments
- System is a method of production planning and control for design and construction

Owners* interested in lean:

- Sutter Health – Northern California
- UHS – national
- Parkland Hospital – Dallas, Texas
- Carolina Health System – North Carolina
- Kaiser – national
- UC San Francisco – San Francisco, California
- Stanford University – Palo Alto, California
- Theta Care – Appleton, Wisconsin
- Cook Children’s Hospital – Fort Worth, Texas
- MD Anderson – Houston, Texas
- Methodist Health System – DFW, Texas
- Hoag Hospital – Southern California
- Virginia Mason – Seattle, Washington
- Denver Health – Denver, Colorado
- Clinica Campesina – Northern Colorado
- Mayo Health System – Midwest
- University of Iowa Health System – Iowa

* ABSOLUTELY not exhaustive and drawing only from within the healthcare sector
Lean as manifested by the Lean Construction Institute
The Structure of Scientific Revolutions

• **Accurate** - empirically adequate with experimentation and observation
• **Consistent** - internally consistent, but also externally consistent with other theories
• **Broad Scope** - a theory's consequences should extend beyond that which it was initially designed to explain
• **Simple** - the simplest explanation, principally similar to Occam's razor
• **Fruitful** - a theory should disclose new phenomena or new relationships among phenomena
Historical Paradigms in Tension

<table>
<thead>
<tr>
<th>Normal Science</th>
<th>Revolutionary Science</th>
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</thead>
<tbody>
<tr>
<td>Hylomorphism</td>
<td>Atomism</td>
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<td>Ptolemaic</td>
<td>Copernican</td>
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<td>Kepler</td>
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<td>Galileo</td>
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<td>General Relativity</td>
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<td>General Relativity</td>
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<td>String Theory?</td>
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<td>v.</td>
<td>Brane Theory?</td>
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<td>Traditional Design / Bid / Build</td>
<td>IPD / Lean</td>
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Can lean help us to be revolutionary designers?
What is this new paradigm?

- **Consummate Professionalism** - we work and produce in a manner that competes with anyone, anywhere, anytime

- **Impeccable Reliability** - we say what we will do and then we do it

- **Innovative Spirit** - we must always seek a better way

- **Empowerment of Doers** - we celebrate and leverage the skills of the individual worker

- **Quality Driven via Standard Processes** - we focus not only on what we produce, but also on the manner in which we produce it

- **Management through the Demming Cycle** - we measure so that we can effectively affect change
What is Last Planner?

- Last Planner is a production planning and control system
- Comprised of four (or five) components
  - Major Milestone Schedule
  - Phase Plan
  - 6-Week Look-Ahead Plan
  - Weekly Work Plan
    - Team
    - Individual
- These elements interact and are interdependent
- Activities migrate between levels through pull and completion
- Specific elements are monitored and measured
  - Planned Percent Complete (PPC)
  - Tasks Anticipated (TA)
  - Variance

What is Last Planner?

- production - production uses resources to create a good or service that is suitable for use or exchange in a market economy. It includes the quantity of the good or service produced, the form of the good or service created, and the temporal and spatial distribution of the good or service produced.

- control - control can be defined as a systematic effort to compare performance to predetermined standards, plans, or objectives in order to determine whether performance is in line with these standards and to take any remedial action required to see that resources are being used in the most effective and efficient way possible.
What is Last Planner?

- **production** - production uses resources to create a good or service that is suitable for use or exchange in a market economy. It includes the quantity of the good or service produced, the form of the good or service created, and the temporal and spatial distribution of the good or service produced.

  *What if you don’t know what the good or service is?*

- **control** - control can be defined as a systematic effort to compare performance to predetermined standards, plans, or objectives in order to determine whether performance is in line with these standards and to take any remedial action required to see that resources are being used in the most effective and efficient way possible.

  *What if there are no standards, plans, or objectives?*

What is Last Planner?

- **production** - the act of studying and exploring issues that arise through iterative testing and application of design criteria. These studies may use familiar means of architectural representation (plan, section, elevation), but are in fact complex, multi-faceted ideas that can be difficult to convey. These ideas are shaped by established standards (building code, ergonomics, taste).

- **control** – the observation of the working group to assure alignment with the design criteria and reasonable measurement to ensure the team fulfills commitments that will advance the project. In addition to project specific items, these criteria include reliability, forward-looking planning, seeking continuous improvement, and all manner of team and personal dynamics (level work load, vocational advancement, work-life balance).
What is Design?

- **design** – pre-construction, producing blueprints, anything the architect does before construction starts, drawing the building, etc.

- **Design** – roadmap or a strategic approach for someone to achieve a unique expectation. It defines the specifications, plans, parameters, costs, activities, processes and how and what to do within legal, political, social, environmental, safety and economic constraints in achieving that objective.
What is Design?

Rational Model  Action-Centric Model

What is Design?

Rational Model  Action-Centric Model
What is Design?

1. That which is known
2. That which is unknown, but is knowable
3. That which is unknown and is unknowable
What is Design?

1. That which is known

2. That which is unknown, but is knowable through reasonable design study

3. That which is unknown and is unknowable until it is discovered through the process of design

What is it like for the designer?

• A designer seeks to understand how something should work and then must define what it actually is before being able to describe how it should or could be built.

• A designer knows that this process usually works reliably and is even sometimes brilliant, but is also occasionally catastrophic.

• A designer also knows that even on a similar project, that they will never have a complete picture of the end until they get there.

• A designer must come to terms with the fact that no design is ever perfect and no design is ever truly complete.
Last Planner works for designers because . . .

- A designer can improve over time – this implies a process, a refinement of process over time, a process that can be observed, a process that can likely be standardized to an extent, and a process that can be taught to others.

- A designer must work within constraints – this implies an underlying lattice of temporal structure (schedule) with clear points of progress (milestones) and requested design output to the rest of the project team (commitments), all anchored by a limited number of hours that will allow a project to be profitable for the firm.

There are important differences from current Last Planner:

- The frequency of planning is highly variable and fluid.

- Promising language often differs from production or construction and descriptive precision is very important.

- Re-sequencing and re-prioritizing of design work and staff resources will be frequent, if not constant.

- Though the next milestone is ever present, discussion of relevant pull should be frequent and common.

- Documentation of process should be highly visible and rigorous where appropriate, but always value based.
There are important differences from current Last Planner

The frequency of planning is highly variable and fluid

- Team work planning should occur based on the needs of the team relative to the phase of design
- Weekly work planning is only a starting point
- As design deadlines approach, frequency of planning should increase, but become much more streamlined
- Planning can be monthly, weekly, daily, or hourly

There are important differences from current Last Planner

Promising language often differs from production or construction and descriptive precision is very important

- Don’t fall into the trap of describing the output as opposed to describing the need to resolve the specific issue(s) at hand

BAD

Elevations

- Issue 50% Elevations

This is arbitrary

GOOD

Elevation Studies

- Study façade patterning
- Study window pattern alternatives

This is defined by pull
There are important differences from current Last Planner

Re-sequencing and re-prioritizing of design work and staff resources will be frequent, if not constant

Elevations

- Study façade pattern
- Define window spacing
- Study neighboring adjacencies
- Define proper massing
- Determine material ratios
- Select glazing material
- Format sheets for printing
- Study neighboring adjacencies
- Determine proper massing
- Select glazing material
- Format sheets for printing
- Study façade pattern
- Define window spacing
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- Define proper massing
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There are important differences from current Last Planner

Re-sequence and re-prioritize design work and staff resources will be frequent, if not constant

Though the next milestone is ever present, discussion of relevant pull should be frequent and common

- It is still important to meet the deliverables for the next milestone
- It is still important to reliably hand off materials to others within the project team
- It is very important to elevate things like **design intent** and **owner requirements** to the level of pull and to constantly discuss the pull these concepts exert on the planning process
There are important differences from current Last Planner

Documentation of process should be highly visible and rigorous where appropriate, but always value based

• There will be times when it is a waste to document every single design move

• The sweet spot will likely be somewhere between what the work plan operator wants and what the designer is initially willing to do

• Monitor for success in promising as it pertains to milestones, work product, and team dynamics and apply tools as needed

Once upon a time in Sacramento...

• These eight people were the original “lean team” at Boulder Associates
• The team was comprised of five architects (one architect and four architectural interns) and three interior designers
• The team billed time to 31 projects during the study period
• Interior designers had specific project assignments while the architects worked on all projects
• On March 17th, 2008, the team began individual and team weekly work planning
• The study period included ten weeks leading up to the March 17th start of planning and two subsequent ten-week periods
Once upon a time in Sacramento... Ten weeks prior to 2008.03.17

- The team averaged more than 44 hours of OT per week, or 17% of all hours worked
- Most people were in the office both Saturday and Sunday
- People were frazzled and disgruntled

The first ten weeks

- The team reduced overtime by 34%, averaging 29 hours of OT per week, or 11% of all hours worked
- Fewer people were in the office Saturday and Sunday
- People were happier and felt empowered and in control
Once upon a time in Sacramento... 

Ten weeks prior to 2008.03.17
- The team averaged more than 44 hours of OT per week, or 17% of all hours worked
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The first ten weeks
- The team reduced overtime by 34%, averaging 29 hours of OT per week, or 11% of all hours worked
- Fewer people were in the office Saturday and Sunday
- People were happier and felt empowered and in control

The second ten weeks
- The team took on more work and delivered on deadlines, but still reduced overtime by 21%, yielding 23 OT hours per week, or 10% of all hours worked
- No one from the team worked on 15 days of the 210 day sample. 14 of those days came after March 17


1. Identify the current week's priorities and tasks.
2. Categorize tasks into high-, medium-, and low-priority.
3. Schedule each task in order of priority.
4. Plan daily work assignments.
5. Monitor progress and adjust as needed.
Standard Process – Measuring and Metrics

Historical 2008-2012: Average Tasks per Person per Week

Historical 2008-2012: FRC and TA per Week
Tools and Methods – Process Simulation

The formula for mistake-proofing in design

parametric-based visualization + standard process-driven data utilization = high potential for mistake-proofing
Four specific recommendations for mistake-proofing in design

- Make quality and the ability to check a visible component of an active process from inception to completion
- Develop processes in a manner that make it difficult to make mistakes
- Quality systems must be dynamic and visible at all times
- Seek sound technical solutions and processes to eliminate the possibility of human error
- If a different process would be easier to check, then change the process

Architects start in Venice...
Do you recognize where this is?

Architects start in Venice...
Architects start in Venice...
Architects start in Venice...
Architects start in Venice. . .
Architects start in Venice...

Parametric visualization: visual management of work process
Architectural RCP as figure ground

Back of House

- Areas that can be designed based on professional best practice
- Requires neither input from users nor special attention from the interior designers

Architectural RCP as figure ground

Group A

- Patient Rooms
- Waiting Areas
- Fewer than a dozen unique spaces, but which repeat throughout
Architectural RCP as figure ground

Group B

- ORs / C-Sections
- Nursery
- Diagnostic Imaging rooms

Architectural RCP as figure ground

Group C

- Corridors
- Nurse Stations
Architectural RCP as figure ground

Group D

- Elevator Lobbies
- Main Lobby / Cafeteria
- Public armatures
Architectural RCP as figure ground
Architectural RCP as figure ground
An ongoing experiment in door hardware

- Legacy hardware approach
  - Start with a door on the first floor plan
  - Write the hardware group and call it HW-1
  - Keep going until you are done with all the doors
- Mistake-prone activity
- Information existed in multiple places in the documents
An ongoing experiment in door hardware

WWKWD?

- Hang the door
- Latch the door
- Stop the door
- Close the door
- Seal the door
- Protect the door

An ongoing experiment in door hardware

35W-124-00-000

- Digits are arranged in a logical order
- Columns one through six represent a hardware category
- Each digit represents a hardware component
- System captures most of the door hardware at STL
- Using alpha and numeric, unique hardware allows thousands of special conditions
An ongoing experiment in door hardware
Mistake-Proofing: door hardware check

Mistake-Proofing: code check
Mistake-Proofing: furniture procurement

Mistake-Proofing: multiple room names and numbers

IN ONE SINGLE RIM OBJECT, PLACE MULTIPLE ATTRIBUTES
Mistake-Proofing: multiple room names and numbers

Predefined Design Module

- Predefined design criteria is needed before modeling start.
- Build design module and provide flexibility to be applied in various condition – stretchable casework.
- Start populating module.

Mistake-Proofing: casework typology
Mistake-Proofing: casework typology

Adjustable casework family

Casework tag per Showroom number and then tagged on architectural plans
Five specific recommendations for mistake-proofing in design

- Make quality and the ability to check a visible component of an active process from inception to completion
- Develop processes in a manner that make it difficult to make mistakes
- Quality systems must be dynamic and visible at all times
- Seek sound technical solutions and processes to eliminate the possibility of human error
- If a different process would be easier to check, then change the process

The big picture for Boulder Associates

- Lean initiative was a response to the impact of the recession
- Work planning was mandated by the Board of Directors
- We have reaped the benefit of strong financial growth
  - Gross revenue has increased 50%
  - Net revenue has increased 45%
  - Profit margin has doubled
- All this while the number of staff have increased by 33%
- Culture has transformed
Impact on work / life balance

- Work planning has consistently reduced overtime hours.
- The impact is almost immediate and has proven to be sustainable.
- Staff report a feeling of greater control over their work life.
- The overtime percentage in 2013 and 2014 has increased in part due to the lag in bringing on staff while the firm continues to grow.

![Monthly overtime percentage graph](image)

Improvement in staff efficiency

- Work planning has helped staff work on the right things, in the right way, at the right time.
- We are accomplishing more work of higher quality in less time.
- Our current effort focuses on standard process in Revit production.

![Net Billing per Direct Labor Hour graph](image)
3 LU Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

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Course Description

Boulder Associates Architects seeks to lead a transformation of the design process by reliably delivering Owner’s expectations within their own market sector. By incorporating methods of production planning and control targeted at seeking value and removing waste, the firm has uncovered ways to reliably produce consistent outcomes in client satisfaction, quality work product, and competitive fees that deliver high profits. In order to compete in this market, project teams (including the broader design community) needs to be nimble, creative, collaborative, and more efficient, Boulder Associates will discuss the design processes that are being implemented at their firm and show current case studies on how they deliver projects while striving to meet those goals.

Learning Objectives

At the end of the this course, participants will be able to:

1. Production Planning in Design - Participants will learn the benefits of using pull planning during the design process, and how to integrate on their projects.

2. Reliable Promising within a Network of Commitments - At the end of this presentation, participants will understand, or will learn how to use Reliable Promising during the design process and how to share their day-to-day work with their partners and other designers.

3. Lean Tools Available During Design - At the end of this course, participants will develop an understanding of Lean tools available during the design process that will design out waste from the start.

4. The Cost of Lean in Design - At the end of this course, participants will develop an insight of the cost of Lean practices employed during the design phase.
This concludes The American Institute of Architects Continuing Education Systems Course

Lean Construction Institute info@leanconstruction.org

Questions?

Raise Hands
Recommended Readings

1. **The Toyota Way**  
   by: Jeffrey K. Liker

2. **The Goal**  
   by: Eliyahu Goldratt

3. **2 Second Lean**  
   by: Paul Akers

4. **Lean Thinking**  
   by: James Womack

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- **Reduced fees** for LCI Seminars, Workshops and Research Meetings.
- For additional information and to sign up - visit [www.leanconstruction.org](http://www.leanconstruction.org)
Takeaways & Plus / Delta

Thank You for Coming!

Please drive safely!!!

Please Join LCI & LCI-LA on LinkedIn