Last Planner System 2.0

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William Kay: Haley & Aldrich, Inc.
Henry Nutt, III.: Southland Industries
Digby Christian: Sutter Health

OVERCOMING OUR INDUSTRY CHALLENGES WITH LEAN SOLUTIONS

16 October 2019
What’s New in 2.0?

LPS 1.0

1. Started with phase planning
2. No instruction provided for applying Last Planner in design
3. No work structure specified
4. Metrics were for improving the planning system, not for managing the project
5. No process/roles and responsibilities provided for Learning from Breakdowns

LPS 2.0

1. Starts in Project Definition with planning the entire project
2. Instructions are provided for applying Last Planner in design
3. Location based work structures are specified
4. Metrics are for managing the project and improving the planning system
5. Process for learning from breakdowns is provided, with roles and responsibilities
LPS 2.0 – Presentation Structure

1. Project Execution Planning
2. LPS in Design
3. LPS and Location Based Work Structures
4. New Metrics for LPS
5. LPS and Learning from Breakdowns
6. When will LPS 2.0 Benchmark be Published
Project Execution Planning

Main Team:
Glenn Ballard: University of California Berkeley – Team Leader
Hajnalka Vaagen: Norwegian University of Science and Technology
William Kay: Haley & Aldrich, Inc.
Bill Stevens: Robins & Morton
Mauricio Pereira: U.C. Berkeley

Other Contributors:
Dan Fauchier: The Realignment Group
Jennifer Lacy Robins & Morton
Seulkee Lee: Genentech
Steve Long: Dome Construction
Chris Maslyk: Skanska USA Building, Inc.
Bill Proctor: Lean Project Management Planning
Jeff Loeb: CH2M Hill
Alex Gururajan: Haley & Aldrich, Inc.
Project Execution Planning Process

- Client project stakeholders are aligned on what's wanted and conditions of satisfaction
- Pull Master Schedule, create logic network & check against budget
- Identify risks & opportunities:
  - To be avoided
  - To be buffered
  - To be hedged
  - To be exploited
- Revise budgets and schedules accordingly
- Develop mitigation strategies
- Explore possible changes
- Submit for validation
- Revise/abandon project
- Fund project

Okay?  YES  NO

Repair

Okay?  NO

NO

DRAFT
A weakness in current project planning is providing only a single pathway to objectives.
Another weakness is over reliance on buffers
Durations and Costs for Alternative Strategies for Managing Uncertainty

Figure 3: Comparison of subproject durations to overall project durations for cases i-iii.

Figure 4: Comparison of subproject costs to overall project costs for cases i-iii.
Risk Mitigation that increases Project Resilience

**Case Study 1: The Risk Exposure Index**

<table>
<thead>
<tr>
<th>Tier 2+</th>
<th>Tier 1</th>
<th>Distribution</th>
<th>Assembly</th>
<th>Customers</th>
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<tbody>
<tr>
<td>$300M</td>
<td>$2.5B</td>
<td>Contract Manufacturer</td>
<td>US Port</td>
<td>Stores</td>
</tr>
<tr>
<td>$400M</td>
<td>$100M</td>
<td>$100M</td>
<td>$1.5B</td>
<td></td>
</tr>
<tr>
<td>Raw Material Suppliers</td>
<td>US Suppliers</td>
<td>Assembly Plants</td>
<td>DLT</td>
<td>Distributors</td>
</tr>
</tbody>
</table>

**The Benefits of using the Risk Exposure Index**

- It provides a $ measure of risk;
- It is based on the entire network;
- It avoids the need to forecast the unknown-unknown;
- It forces a discussion to understand why Time-to-Recovery for similar facilities or suppliers is different;
- It forces a process to reduce Time-to-Recovery in various stages of the supply chain;
- It makes sure you have a good understanding of supply chain dependencies.

Simchi et al., 2005
Last Planner in Design

Main Team:
Stan Chiu: HGA – Team Leader
Digby Christian: Sutter Health
Bruce Cousins, AIA: Sword Integrated Building Solutions
Romano Nickerson: Boulder Associates
Susan Reinhardt: Project Lean, Inc.
Kristin Hill: Lean Construction Institute
Mauricio Pereira: U.C. Berkeley

Other Contributors:
Felipe Engineer-Manriquez: McCarthy Holdings, Inc.
Akanksha Pande: Cannon Design
Bernita Beikmann: HKS
Sam Spata: Method Lean
Matthew Jogan: Ghafari Associates
LPS Use Design Phase – Research Strategy

- Establish the Current State / LPS 2.0 Improvements
- 21 Experienced Practitioners:
  - Designers
  - Owners
  - Builders
  - Lean Coaches/Consultants
- Diverse project types, size, geographies
- Core group distilled improvements from findings

“We need more value from you”
LPS in Design

REPORTED TIME

SHOULD - 40%

CAN 25%

WILL 30%

DID 5%

Our recommendations

• Two types of design work
• Milestones as deliverables
• Reliable Promising
• Onboarding
• Clarifying Design Process

We are good at making assumptions that are close but may not be there.

--Tim Tsukamoto, Miyamoto Engineers
# Last Planner 2.0 - Acknowledges Unique Phases of Design

## Ideation
- Research
- Owner/User Needs
- Value Definition
- Ideation
- Parti.
- Innovation
- Research
- Materials
- Work flow

## Design Production
- Story Telling
- Written – Visual
- Rapid Prototyping

## Production
- Document Production
- Design Development
- Written – Visual
- Rapid Prototyping
- Outline Specifications

## Construction
- Document Delivery
- Contract Docs
- 2D 3D 4D Specs & Assembly
- Instructions
- Specifications

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**MAXIMIZE INNOVATION**

**MINIMIZE WASTE**
Proposed LPS 2 Improvements – 1. Milestone Definition

Decisions vs. Deliverables?

IDEATION
- **Decisions** that Release Knowledge
- Flexibility to adjust as needed (Agile)

PRODUCTION & CONSTRUCTION
- **Deliverables** that Releases Work
Proposed LPS 2 Improvements - 2. Clear Design Process

<table>
<thead>
<tr>
<th>Event</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>LAIBS Submittal &amp; Permitting</td>
<td>10/31/13</td>
</tr>
<tr>
<td>Preliminary Soil Report</td>
<td>11/15/13</td>
</tr>
<tr>
<td>Final Soil Report</td>
<td>1/10/14</td>
</tr>
<tr>
<td>Concept Structure for H1 and H3</td>
<td>12/26/13</td>
</tr>
<tr>
<td>Shoring Design submit to LAIBS</td>
<td>12/2/13</td>
</tr>
<tr>
<td>Excavation Design submit to LAIBS</td>
<td>12/2/13</td>
</tr>
<tr>
<td>Andy/Srini submit to CBC2010 &amp; AMC2013</td>
<td>12/23/13</td>
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</tbody>
</table>

Design Phase Milestones:

<table>
<thead>
<tr>
<th>SD</th>
<th>DO</th>
<th>CA</th>
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<tbody>
<tr>
<td>92</td>
<td>92</td>
<td>853</td>
</tr>
<tr>
<td>11/26/13</td>
<td>2/3/14</td>
<td>3/14/14</td>
</tr>
</tbody>
</table>

Architectural Design Schedule:

<table>
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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Parking and Podium</td>
<td>Design completed</td>
<td>Design completed</td>
<td>Design completed</td>
<td>Design completed</td>
<td>Design completed</td>
<td>Design completed</td>
<td>Design completed</td>
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<tr>
<td>Lock</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Design Decisions:

Permits
Supply Chain
LPS Improvements: 3. Reliable Promising in the Design Phase

- What
- When
- Receptive to Counter Offer

- Yes
- No
- Counter Offer
- Promise to respond

- Predictable results
- Reduced risk
- PPC learning
- Increased innovation
LPS Improves: 4. Onboarding & Team Building

LPS Align’s Values and Creates Champions, Removes Traditional Silos, creates a common set of Conditions of Satisfaction

Characteristics of Highly Collaborative Teams

- Shared Purpose & Vision
- Clear Goals & Plan
- Team Engagement
For smaller projects we combine milestone plan/phase/weekly/(ppc) into one thing for all phases

--Bryan Wahl, Bostwick Partnership
Location Based Work Structures

Main Team:
Klas Berghede: Boldt – Team Co-Leader
Henry Nutt III: Southland Industries – Team Co-Leader
Glenn Ballard: University of California Berkeley
Mauricio Pereira: U.C. Berkeley

Other Contributors:
Sabrina Odah: Boldt
Ron Heise: Southland Industries
Tom Guardino: Herrero Builders
Dan Murphy: Turner Construction
Perry Thompson – Parsons Electric
How Can We Build Better & Safer Structures?
Create a Common Language

- Create key map for design/construction flow
- Identify work structures early in the planning
- Develop ideal flow of work structures for optimal install
Get Your Team Ready

- Educate team prior to implementation
- Integrate key suppliers and vendors
Location Base Work Structures

- Design schedule should pull the construction schedule
- Create timelines/schedules based on these structures
New Metrics: Connecting the Weekly Work Plan to the Master Schedule

Main Team:
Digby Christian: Sutter Health – Team Leader
Mauricio Pereira: U.C. Berkeley

Other Contributors:
James Lindeman: Loqust
William Kay: Haley & Aldrich, Inc.
Chris Maslyk: Skanska USA Building, Inc.
Meeli Linnik: Schedule Consultant
LPS 2.0 Content Not Appearing in this Presentation

All the LPS 2.0 Metrics

- Validation
- Ideation
- Conceptual Design
- Design Development
- Production Design
- Implementation Documents
- Construction
- Commissioning
- Move-in
- Activation

Milestone Variance (MV)
Capacity Buffer (CB)
Commitment Level (CL)
Percent Required Complete (PRC)
Milestone Variance (MV)
Planned Percent Complete (PPC)
Frequency of Plan Failure (FPF)
Capacity Buffer (CB)
Plan Stability (PS)
Commitment Level (CL)
Percent Required Complete (PRC)
Milestone Variance (MV)
Planned Percent Complete (PPC)
Frequency of Plan Failure (FPF)
All the New Defined LPS 2.0 Metrics

- Validation
- Ideation
- Conceptual Design

- Design Development
- Production Design
- Implementation Documents

- Construction
- Commissioning
- Move-in
- Activation

Milestone Variance (MV)
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Percent Required Complete (PRC)
Milestone Variance (MV)
Commitment Level (CL)
Percent Required Complete (PRC)
Milestone Variance (MV)
Requirements of the New Metrics

Ability to Distinguish Between

1. Required Tasks (RT)
   • Any task which if not completed as planned on time will delay the milestone, creating a negative Milestone Variance (MV)

2. Non-Required Tasks (NRT)
   • Workable backlog
   • Work with significant float
The 3 Brand New LPS 2.0 Metrics

1. Commitment Level (CL)
   • Measured when team commits to Weekly Work Plan
   • Percentage of the Required Tasks (RT) team committed to

2. Percent Required Completed (PRC)
   • Measured when team closes out Weekly Work Plan
   • Percentage of Required Tasks team completed

3. Milestone Variance (MV)
   • Measured when team closes out Weekly Work Plan
   • Number of days a milestone is projected to be early or late
OVERCOMING OUR INDUSTRY CHALLENGES WITH LEAN SOLUTIONS

Recap: Coming Soon to Last Planner Near You

1. Commitment Level (CL)
2. Percent Required Completed (PRC)
3. Milestone Variance (MV)
4. Required Task (RT) & Non-Required Task (NRT)

Performance Focused
Connects Weekly Work Plan to Master Schedule
Learning from Breakdowns

Main Team:
Bruce Wilkinson: Haley & Aldrich, Inc. – Team Leader
Patricia Tillman: University of California, San Francisco
Tony Lowe: Southland Industries

Other Contributor:
Mauricio Pereira: U.C. Berkeley
Learning from Breakdowns

Breakdowns = Planning system not working...leads to unplanned outcome

• Six Themes for Improvement:
  • Organizational processes
  • Psychologically safe environments
  • Selection and Investigation
  • Countermeasures
  • Track success or failure
  • Lessons Learned

Common themes:
• Lack of organizational processes
• Create a safe environment
• Ask questions to get to root causes
• Capture and share Lessons Learned
When Will LPS 2.0 Benchmark be Published?

Glenn Ballard, University of California, Berkeley
Thank you for your attention.

We look forward to hearing your comments and questions.