
Lean Construction Institute
Immersive Education Program
Introduction to
Lean Project Delivery
Virtual Learning Course
David MacNeel, On Point Lean Consulting
Lauren Simone, W.M. Jordan Company
October 19, 2020
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Lean Construction Institute
Provider Number H561
LCI Course:
Introduction to Lean Project Delivery
LCIV.ILPD
Presenter name
date

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- VIRTUAL

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Contact Julia Shellhouse at Jshellhouse@leanconstruction.org

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Course Description

Most project teams seek ways to add more value for their clients while meeting schedule and budget requirements. By focusing on value and recognizing the various types of waste in project delivery processes, productivity can be increased by implementing the Lean approaches taught in *Introduction to Lean Project Delivery*. In this course, you will gain insight to Lean Project Delivery by understanding how Lean connects people, principles and practices to optimize results by shifting both thinking and behaviors. This course, which includes real-life design and construction examples will be an important step on your journey to becoming a Lean Thinker. The event will include small breakout discussions throughout to support a more intimate learning experience in the virtual space.

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Learning Objectives

01.

At the end of this presentation, participants will have gained an understanding of the breakdowns with current project delivery methods, discover the goals and benefits of implementing Lean.

02.

At the end of this presentation, participants will understand the Foundation of Lean as Six Tenets and identify the Eight Wastes as relevant to design and construction.

03.

At the end of this presentation, participants will be able to recognize that Lean is a shift in thinking and behaviors leading to high-performing teams.

04.

At the end of this presentation, participants will have discovered key Lean practices and tools which result in increased collaboration and improved project outcomes.

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Instructor Introductions

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Lean Journey to Mastery

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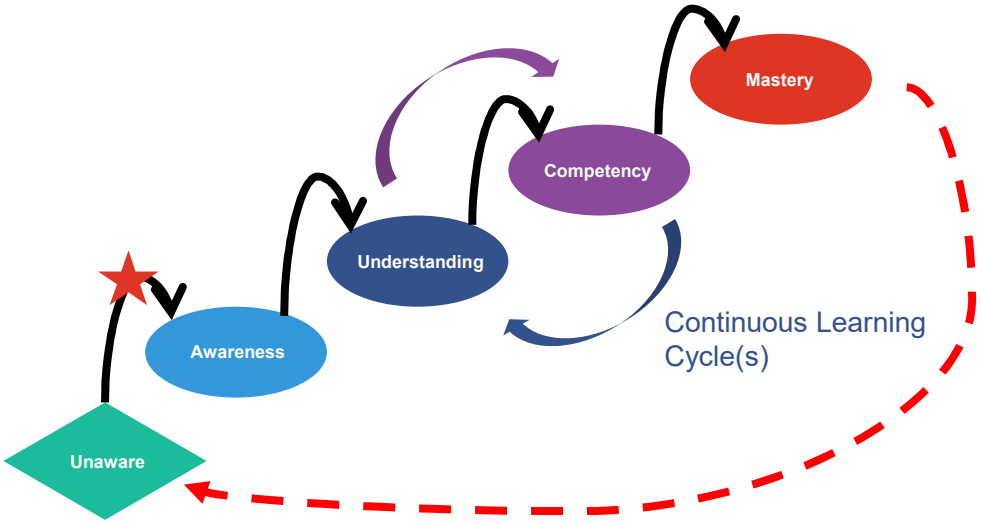

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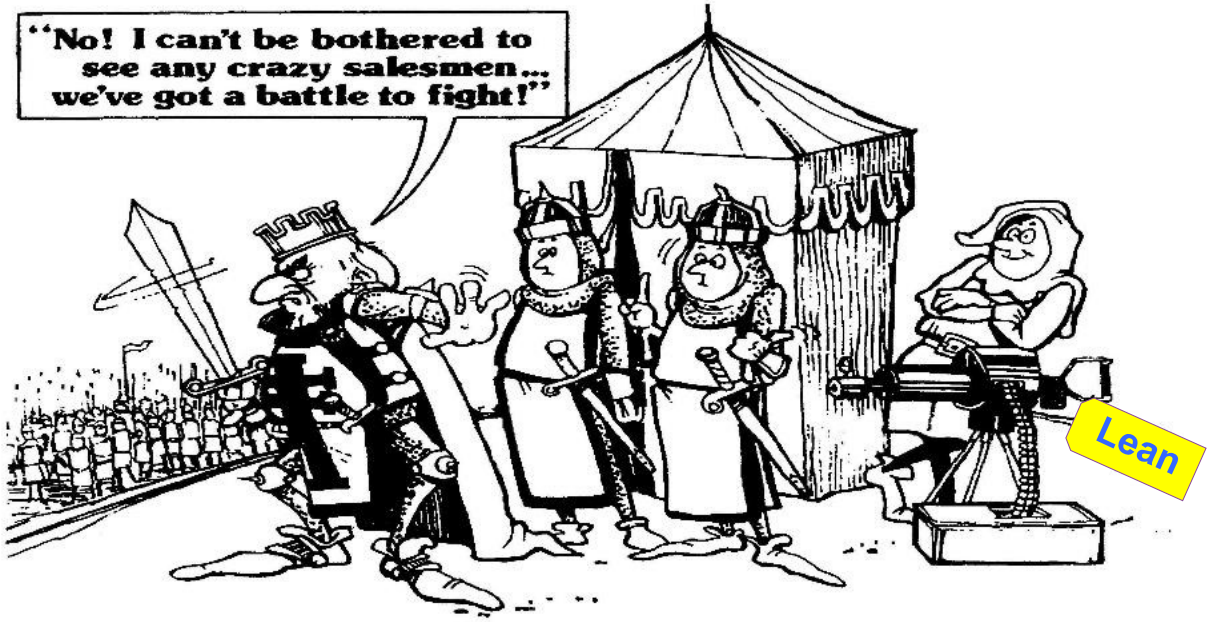

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Definitions

Lean Construction Institute
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Lean:

Culture of respect and continuous improvement aimed at creating more value for the customer while identifying and eliminating waste.

Lean Project Delivery:

An organized implementation of Lean principles and tools combined to allow a team to operate in unison to create flow.

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Origins of Lean

- **Scientific Management** 1880-1930
- **Assembly Lines** 1903-1914
- **World War II** 1939-1945
- **Lean Manufacturing** 1945 - present

  Toyota Production System (TPS)

TOYOTA

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Meals Per Hour Video

- Super Storm Sandy

25TH ANNIVERSARY • ALWAYS BETTER
TSSC
Toyota Production System Support Center, Inc.
SHARING, LEARNING, IMPROVING

TOYOTA

Toyota Meals per hour - https://youtu.be/wz28yMcDvVM

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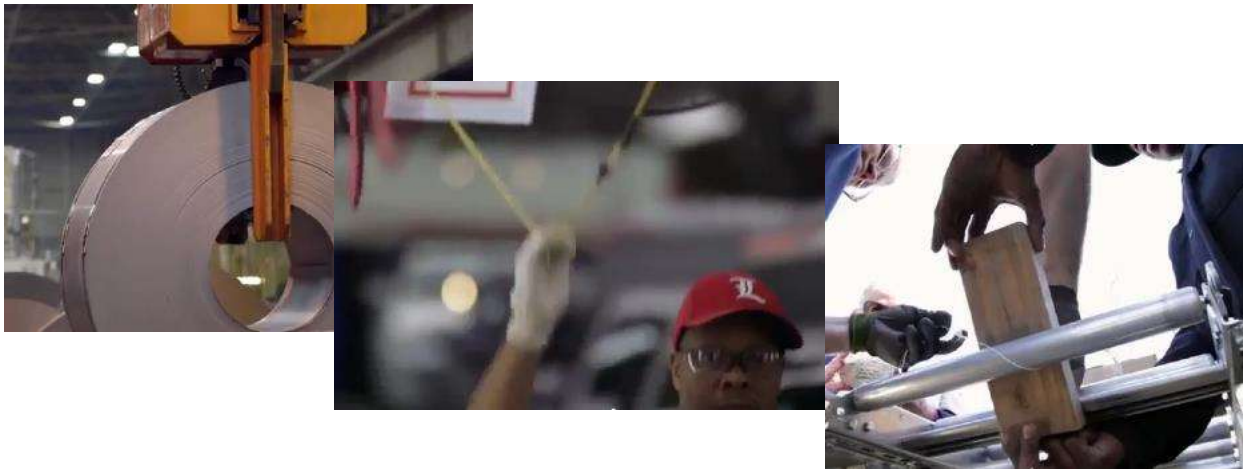
Toyota Video Debrief



Toyota Meals per hour - https://youtu.be/wz28yMcDvVM

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Two Non-Negotiables

- Respect for people
- Continuous improvement

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Traditional Delivery Outcomes…

- Risk is high
- ~70% of projects are delivered late
- ~70% of projects are over budget
- ~70% of public projects end in litigation
- Teamwork is unreliable
- Customers are not satisfied
- Profit margins are shrinking
- Rework and waste is high

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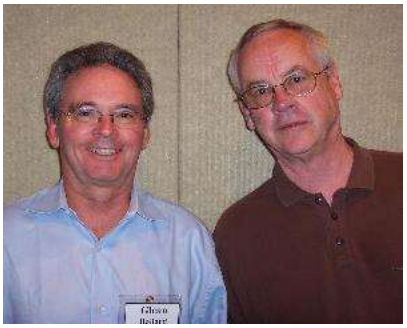
Brief History : Lean in Design & Construction

- Early 1990's: Glenn Ballard & Greg Howell – productivity experts
- Refinery in Venezuela
- Surveyed ~475 Superintendents and foremen and asked,
- **"What do you intend to complete next week?"**



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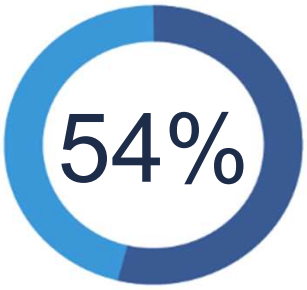
Brief History : Lean in Design & Construction



Discovery: on average, only 54% of planned work was completed by the end of the week.

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Lean Project Delivery Enables

- Risk to be collaboratively managed
- Projects to be delivered on time
- Projects to be delivered within the budget
- Less waste and rework
- Team-wide reliability
- Higher customer satisfaction
- Fair profits for providers

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Goals of Lean Design & Construction

1. Achieve reliable workflow
2. Maximize value to the customer
3. Minimize waste
4. Optimize the whole, not the parts
5. Develop a discipline of learning and continuous improvement

Photo Courtesy of W.M. Jordan

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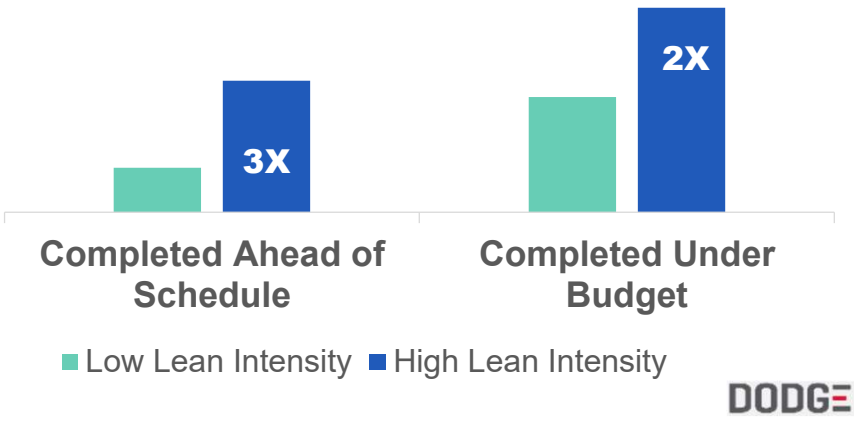
Correlation of Lean

Correlation of lean intensity to outcomes (% likelihood on best projects)



DODGE DATA & ANALYTICS

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Benefits of Lean

1. **Safer work environment: fewer incidents & injuries**
2. **Increased cost & schedule certainty**
3. **Increased productivity**
4. **High stakeholder satisfaction**
5. **Less stress on participants**

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Photo Courtesy of On Point Lean

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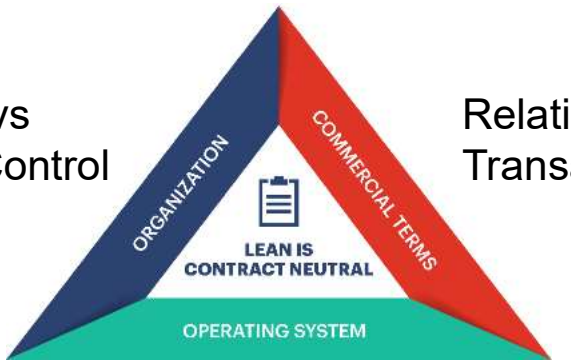
Project Elements

Collaboration vs
Command & Control



Relational vs
Transactional

Flow & Reliability focus vs CPM (Push) Scheduling

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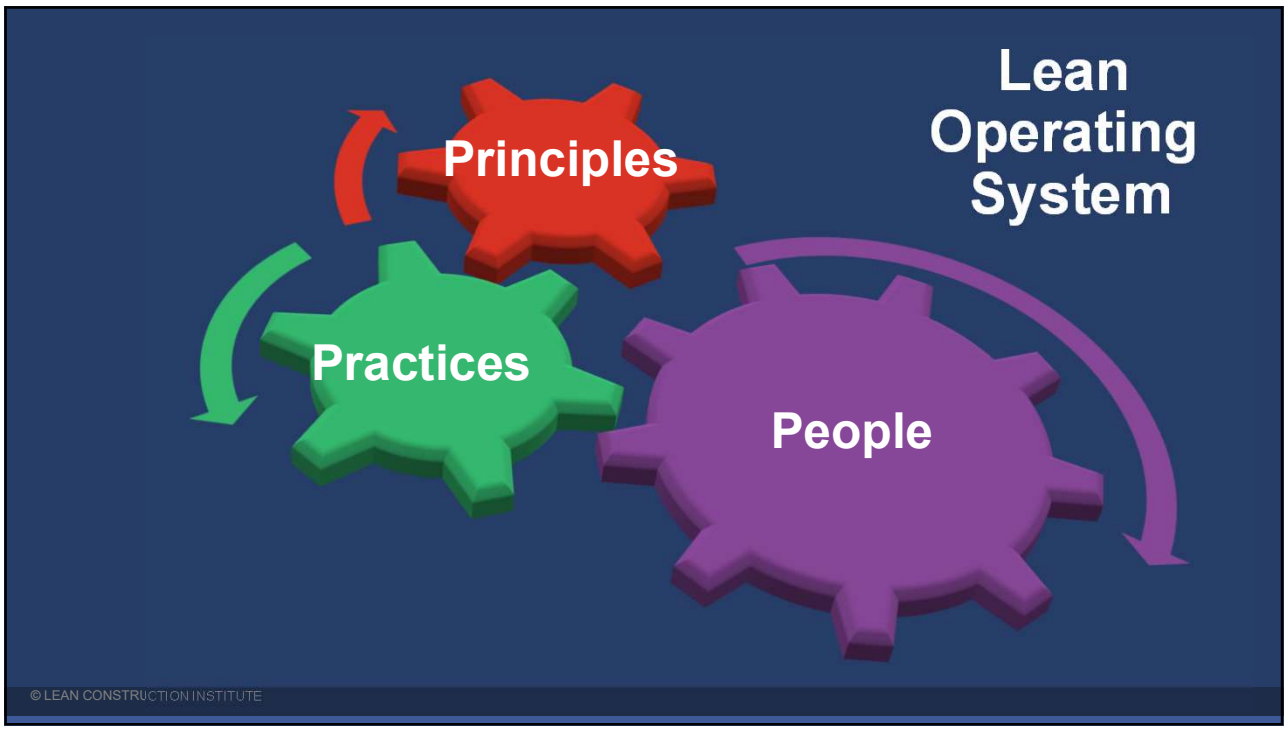

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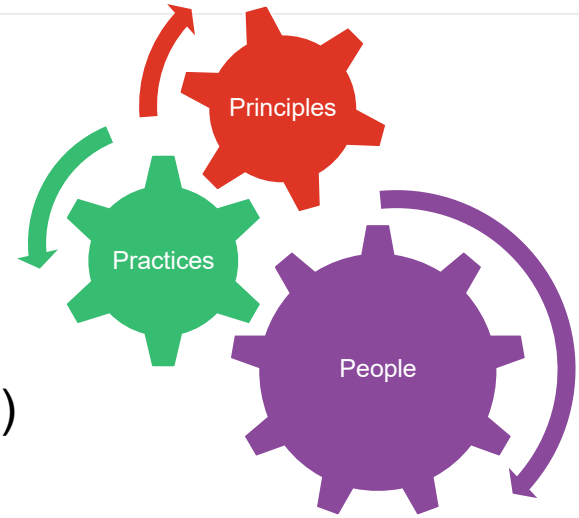
Principles

- LCI Six Tenets of Lean
- Eight Wastes
- Plan-Do-Check-Act (PDCA)



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Six Tenets of Lean

1. Respect for people
2. Optimize the Whole
3. Generate Value
4. Eliminate Waste
5. Focus on Flow
6. Continuous Improvement

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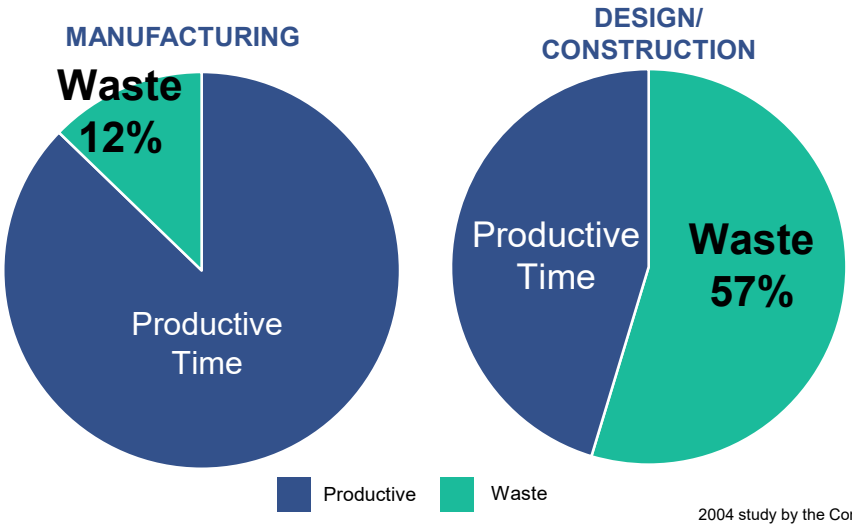
The Opportunity…



2004 study by the Construction Industry Institute

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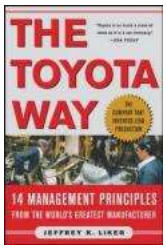
Generating Value

*"If it is not something the client is **willing to pay for**, it is non-value added.*

*Everything else **is waste**, and therefore should be eliminated, simplified or reduced."*

— *The Toyota Way*, by J. Liker



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The 8 Wastes

T ransportation - Unnecessary movement of "things"

I nventory – Excess materials

M otion – Unnecessary movement by people

T alent – underutilizing the creativity and skills of the team

W aiting – Workers waiting for work OR Work waiting for workers

O ver-production - Producing more than is needed

O ver-processing – Spending more time or expense required

D efects – Rework due to poor quality or out-of-sequence work

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Finding Waste

- Ohno Circles
- *Gemba* Walks
- Waste Walks

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Plan – Do – Check - Act (PDCA)

Improve the process

Predict

Study the Results

Take Action, Try it Out

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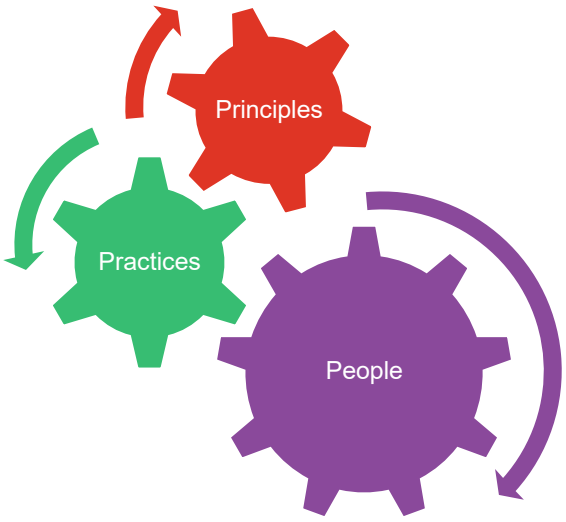
People

- Project as a Promise
- Basic Action Workflow
- Conditions of Satisfaction



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Project as a Promise

- View projects as a ***network of commitments*** *(aka, promises)*, whether done well or poorly.
- The goal is to understand how to ***improve the quality of commitments***

- Lean is about ***taking responsibility*** for ***actively managing commitments***
- The **Last Planner® System** is a planning system based on developing a *network of commitments*, then delivering on the commitments.

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Basic Action Workflow

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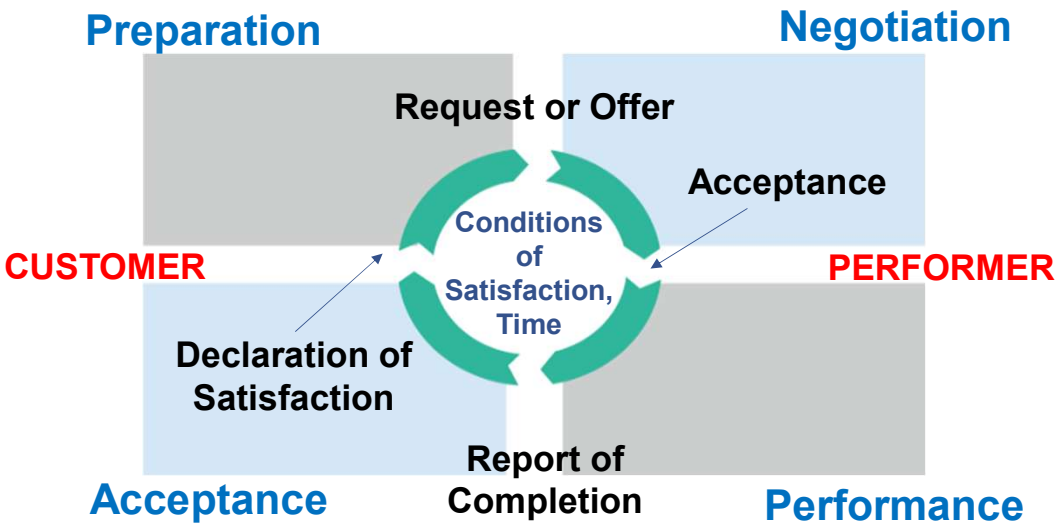

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Credit: Dr. Fernando Flores

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Project Conditions of Satisfaction (CoS):

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- Similar to a Project or Team Charter
- *Value Definition Statements* developed by the team – OAC & key trade partners
- Determines which *tests a project must pass* to be accepted as a success.
- Inform the *decision-making process* of the team.

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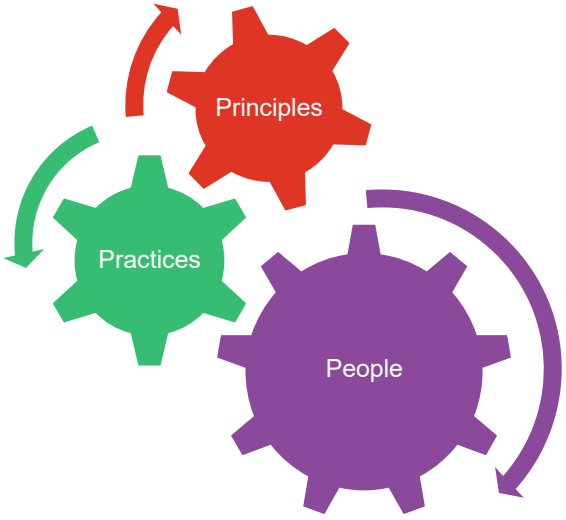
Practices

- Integrated Project Delivery
- Big Room Mindset
- Target Value Delivery
- Last Planner® System
- Other Lean Tools



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Integrated Project Delivery (IPD)

Definition: a project delivery approach that **contractually** integrates people, systems, business structures and practices into a process that collaboratively harnesses the insights of all participants to reduce waste and optimize efficiency.

What about IPD-Lite or IPD-ish?

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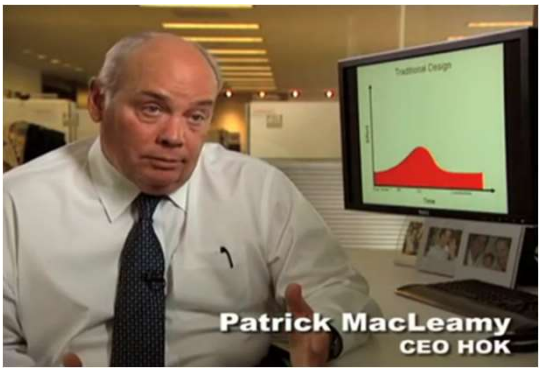
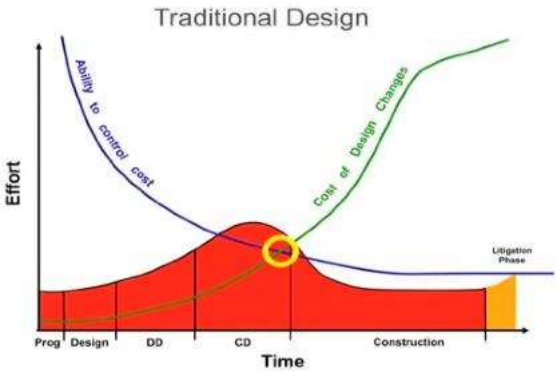
MacLeamy Curve Video





https://youtu.be/oHHY7CxI2_Y

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Big Room

A project approach of bringing key individuals together to:

- Speed communication
- Improve decision-making
- Reduce 'siloed' thinking or approaches.
- **Advance work**

Big Room is a commitment to a project, the team, and to working together!

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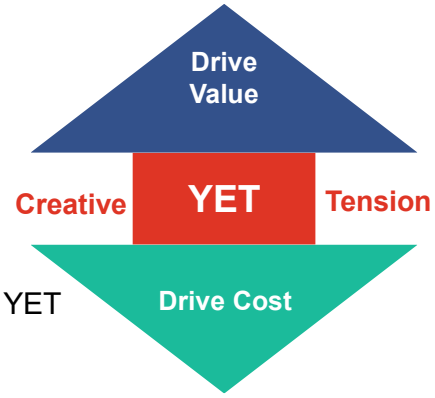
Traditional Delivery vs Target Value Delivery

Traditional Delivery:

- Work performed in silos – low visibility
- Design, then determine cost, then Value Engineer
- Early commitment to design solutions
- "Finish your work before I start mine" mentality



Target Value Delivery:

- Generates a creative tension between driving value up YET driving cost down
- Information is shared early and often
- Sets of solutions are carried and optimized holistically
- Continuous estimating and cost modeling based on concepts

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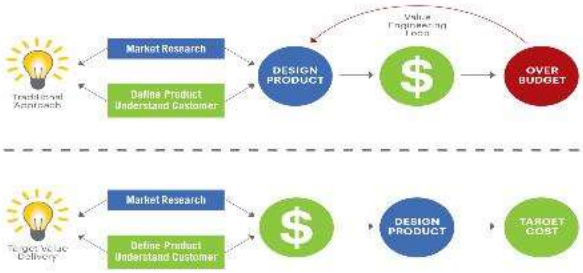
Traditional vs. Target Value Delivery

The goal of TVD is to minimize the waste inherent in the design-estimate-redesign cycle(s) of the traditional approach.

Traditional: Cost is an *OUTPUT* of design



TVD: Cost is an *INPUT* of design

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Choosing by Advantages (CBA)

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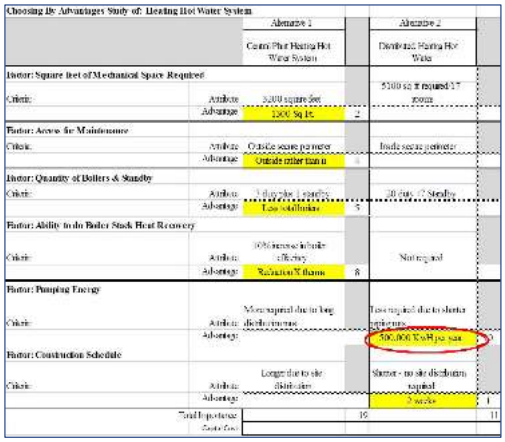
A **sound** decision-making system for determining the **best decision** by looking at the **importance of the advantages** of each alternative.

Performed collaboratively with all stakeholders



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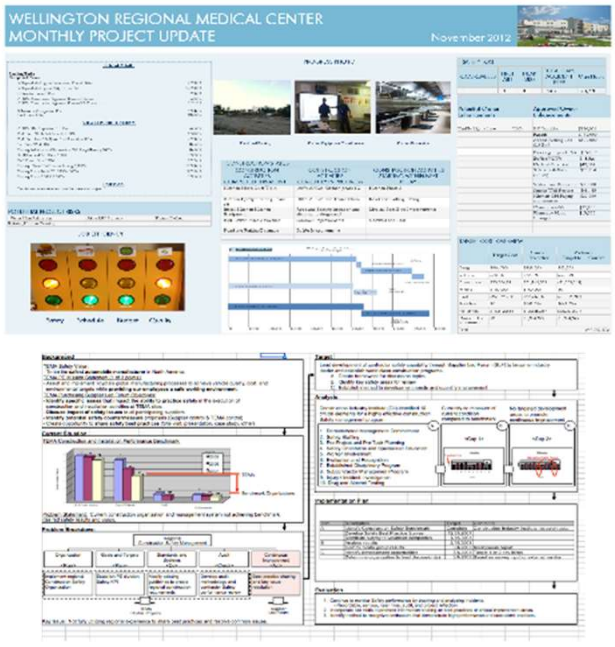
A3 Thinking

- Pioneered by Toyota
- Disciplined and highly collaborative approach to Plan-Do-Check-Act
- **A3** Applications:
  - Problem Solving
  - Policy Deployment
  - Reporting
  - Capturing CBA Decisions



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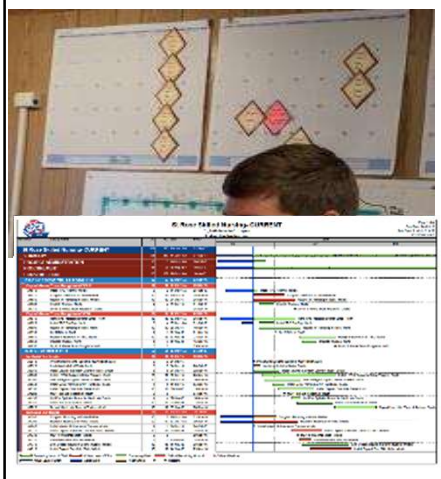
Last Planner® System – 5 Connected Conversations



MILESTONE Planning — Set Milestones

PHASE PULL Planning — Specify Handoffs

LOOKAHEAD Planning — Make Work Ready

WEEKLY WORK Planning

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Photo Courtesy of W.M. Jordan & ASKM & Assoc

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Make-Ready Planning (6 weeks+)

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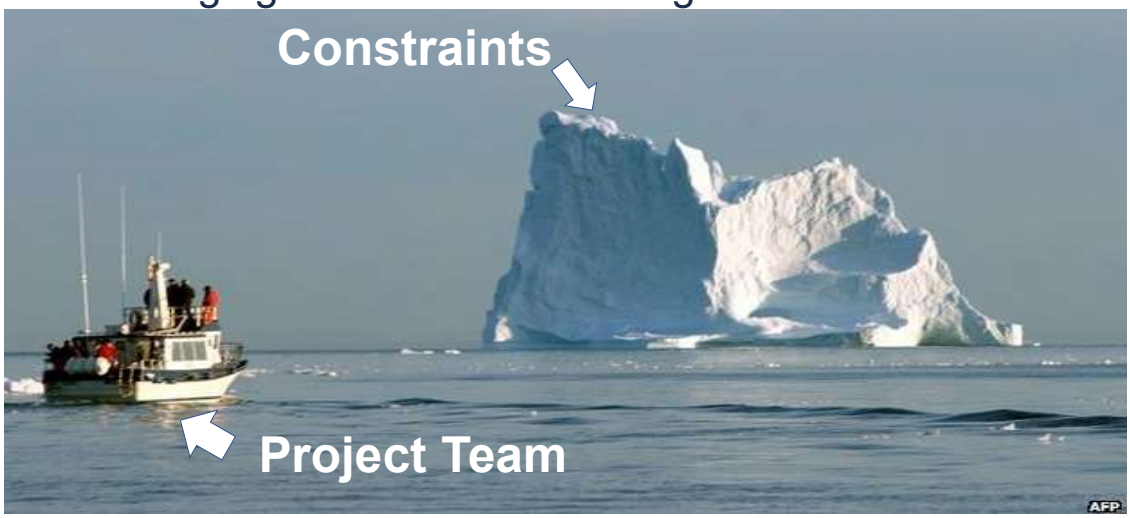
"Pinging the water" for Icebergs



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Make Ready Example

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1950 vs 2013 Pit Stops

https://youtu.be/RRy_73ivcms

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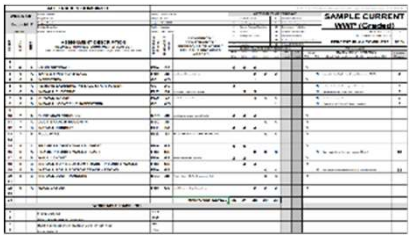
Last Planner® System – 5 Connected Conversations



MILESTONE Planning — **Set Milestones**

PHASE PULL Planning — **Specify Handoffs**

LOOKAHEAD Planning — **Make Work Ready**

WEEKLY WORK Planning — **Make Promises**

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ALL TRADES COMBINED

WEEK OF 10-Jul-2017 MONDAY

Project Owner: Project Owner NAME
Project Name: Project NAME
Project Number: Project NUMBER
Project Location: Project Location
Project Lean Champion: Project Lean Champ

CATEGORIES OF VARIANCE

1	Safety Concern	8	Incorrect Duration
2	Info/Design Question	9	Submittals/Approvals
3	Owner Change/Decision	10	Equipment / Hoisting
4	Weather	11	Unforseen Condition
5	Prerequisite Work	12	Inspection/Permit
6	Labor	13	Lack of Coord / Change of Plan
7	Materials	14	Other (DESCRIBE)

SAMPLE CURRENT WWP (Graded)

TOTAL ACTIVITIES: 18
ACTIVITIES COMPLETED: 11
PERCENT PLAN COMPLETE: 61%

ITEM #	LEVEL	AREA	ASSIGNMENT DESCRIPTION (RELIABLE PROMISES (COMMITMENTS) MUST BE : Safe - Defined - Sound - Proper Sequence - Right Size - Able to Learn)	RESPONSIBLE Company	RESPONSIBLE Person	COMMENTS * CONSTRAINTS * PREREQUISITE WORK * RELIABLE PROMISES NEEDED	ENTER PLANNED CREW SIZE BY DAY MON 10/26	TUE 11/26	WED 12/26	THU 13/26	FRI 14/26	SAT 15/26	SUN 16/26	DONE? YES	DONE? NO	PPC ANALYSIS REASONS FOR VARIANCE (Track Daily at afternoon huddle - complete on FRI)	Variance Category
1																	
2	6	A	HANG DRYWALL	FRA	BS		6	6	6					Y			
3	6	A	TAPE & FINISH DRYWALL	FRA	JD	need conditioned air on			2	2	2				N	humidity too high - mud would not cure 100%	4
4	6	A	INSPECTION	GC	WG				1					Y			
5	6	A	REMOVE LADDERS, INSTALL STAIR TOWER	GC	WG		4								N	material didn't show up until Friday	7
6	6	B	IN-WALL ELECTRIC	ELE	SA	need stair tower for access		5	5						N	no access - stair tower not complete	5
7	6	B	IN-WALL WATER	PLU	JJ	need stair tower for access			4	4	4				N	Elect not complete -	5
8	6	B	IN-WALL / COVER UP INSPECTION	GC	WG						1				N	Pushed to MON - MEPs not complete	5
9																	
10	7	A	DUCT MAIN ROUGH-IN	MEC	JD	need studs moved out of E side	4	4	4					Y			
11	7	A	DUCT BRANCH ROUGH-IN	MEC	JD					4	4			Y			
12	7	B	INSTALL CONDUIT	ELE	SA		4	4	4					Y			
13	7	B	PULL WIRE	ELE	SA	NEED INSPECTION ON FRIDAY PM				4	4			Y			
14																	
15	8	A	FRAME PRIORITY WALLS - WEST	FRA	GS		6	6						Y			
16	8	A	FRAME PRIORITY WALLS - EAST	FRA	GS				6	6	6				N	Saw went down (get new one on Thurs)	10
17	8	B	WALL LAYOUT	FRA	GS	door dimensions needed	2	2						Y			
18	8	B	INSTALL TOP & BOTTOM TRACK - PRIORITY WALLS	FRA	GS			4	4					Y			
19	8	B	INSTALL TOP & BOTTOM TRACK - ROOMS	FRA	GS					4	4				N	didn't get bottom track because duct in rooms	13
20	8	B	INSTALL DUCT HANGERS	MEC	JD	Need scissor lift for 2 hours on Fri				3	3			Y			
21																	
22	9	A	WALL LAYOUT	FRA	GS	need fireproofing cleaned up			2	2	2			Y			
23																	
24						MANPOWER LEVEL?	26	31	38	29	30						

WORKABLE BACKLOG

1			Frame walls L9	FRA		
2			Wire transformers in basement	ELE		
3			Build Y connections in laydown yard for 12th floor	MEC		
4			Layout Walls 9B	FRA		

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Last Planner® System – 5 Connected Conversations

Daily Huddles:
production
check-ins

PPC =
Tasks Completed
Tasks Planned

MILESTONE Planning	**Set Milestones**
PHASE PULL Planning	**Specify Handoffs**
LOOKAHEAD Planning	**Make Work Ready**
WEEKLY WORK Planning	**Make Promises**
LEARNING & IMPROVING	**Percent Plan Complete & Variances**

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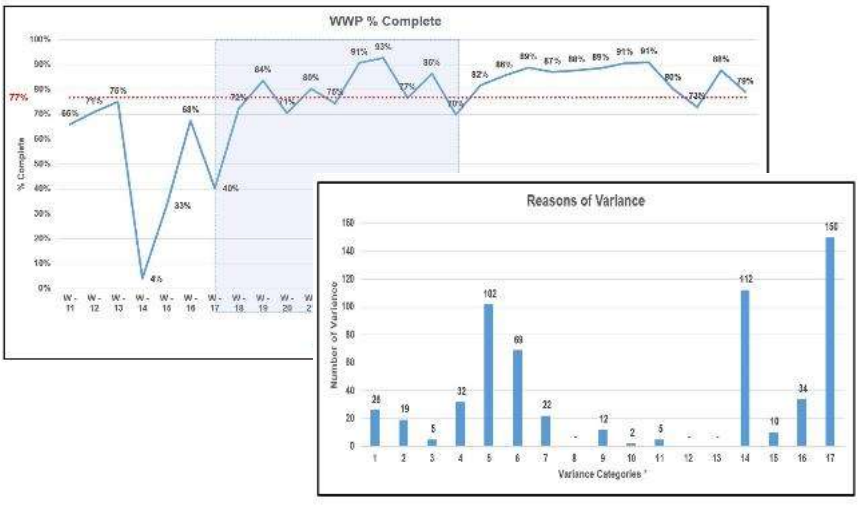
Percent Plan Complete (PPC) & Variances



(*) Variance Categories	
1	Coordination
2	Engineering / Design
3	Owner's Decision
4	Weather
5	Prerequisite Work
6	Labor
7	Materials
8	Contracts/Change Orders
9	Submittals
10	Approvals
11	Equipment
12	RFIs
13	Overtime (OT) Approval
14	Site Conditions
15	Inspections
16	Other
17	Covid-19

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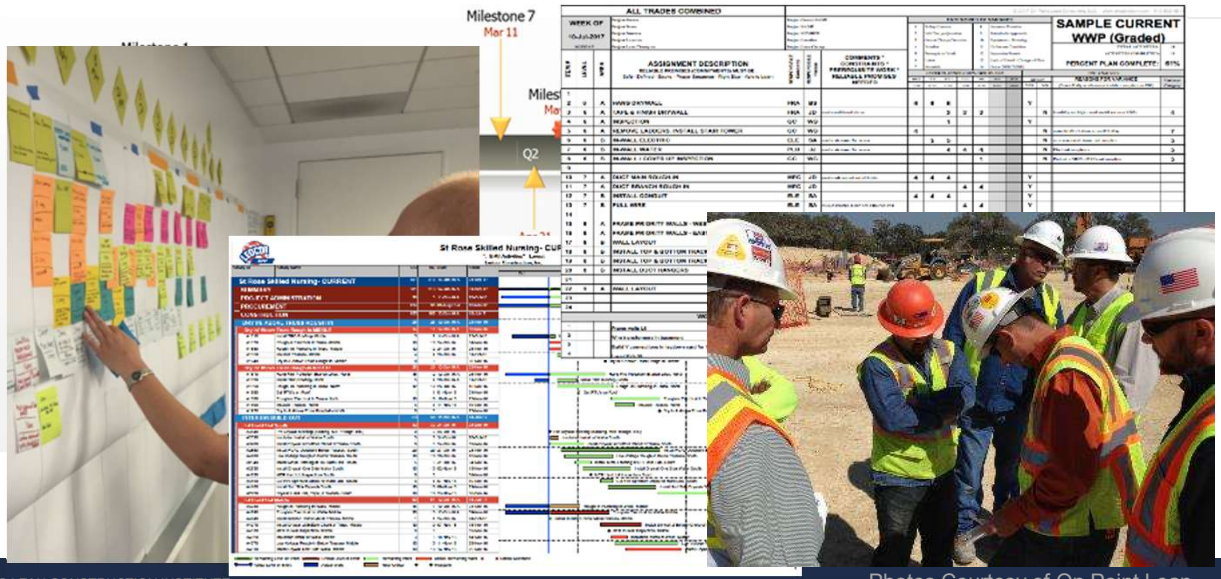
Last Planner® System - Summary



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Photos Courtesy of On Point Lean

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5 S Implementation

A disciplined approach to **maintaining order** in the workplace, using **visual controls**, to eliminate waste.

5S can be implemented in almost any situation.

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The 5S Examples





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Prototyping - Production Preparation Process (3P)

Creating a **mock-up** of what is being designed or built.

- **Conduct with end users**
- **Clarifies requirements**
- **Gains agreement**




Photos Courtesy of Cone Health

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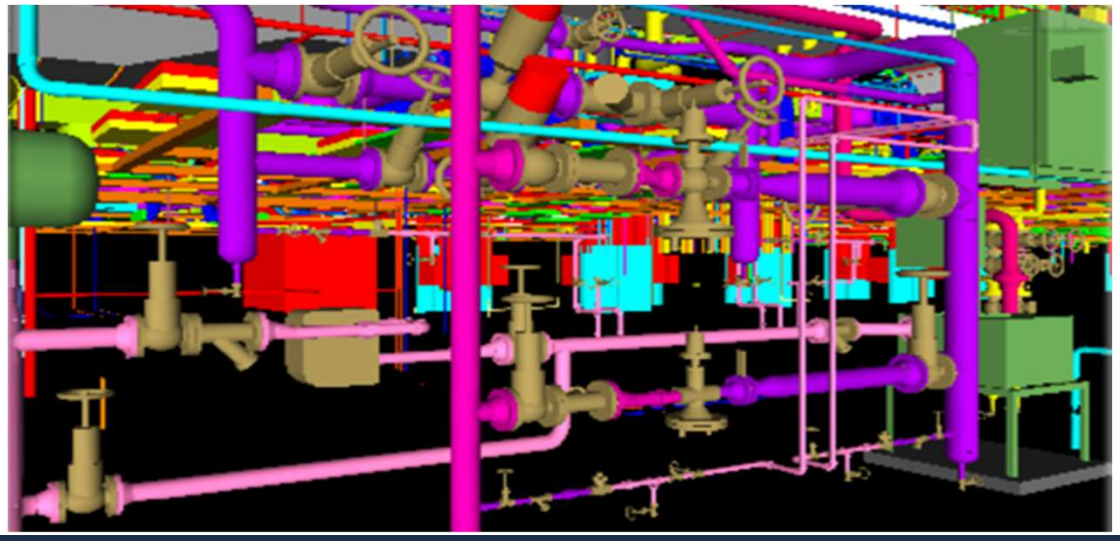
4D/5D Building Information Modeling (BIM)



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Prefabrication – Headwalls, Plumbing, Bathrooms

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Lean Journey to Mastery

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How will you reach the next level on your journey?

Target Value Delivery: Classroom & eLearning
Lean in the Design Phase: Classroom & eLearning
Mindset of an Effective Big Room: Classroom & eLearning
Last Planner® System in Design: Classroom & eLearning
Conducting Gemba Walks: Classroom

Introduction to Lean Project Delivery: Classroom, eLearning & Webinar
Introduction to Last Planner® System: Classroom & eLearning
Lean in the Design Phase: Classroom & eLearning
Introduction to Lean in Design-Build: Classroom
The Business Case for Learn: Classroom

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More on Learning

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Books:

Events:
- Local Community of Practice
- Congress (October)
- Design Forum (May)

eLearning:
Learn on your own time without taking time off project work.

Start learning now:
www.LeanConstruction.org

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eLearning Courses

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- Introduction to the Last Planner System®
- Introduction to Lean Project Delivery
- Lean in the Design Phase
- Effective Big Room
- Target Value Delivery
- Last Planner System® in Design

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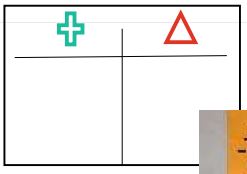
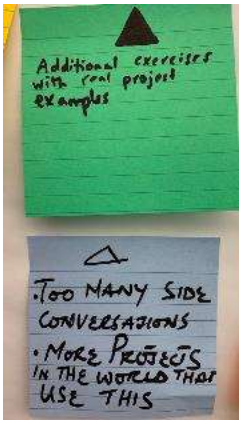
Conduct Plus/Delta

Capture on a flip chart or white board, or use **Sticky Notes**



Plus: What produced <u>value</u> during the session?
"I LIKED…"

Delta: What could we <u>change to improve</u> the process or outcome?
"I WISH…"



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This concludes The American Institute of Architects Continuing Education Systems Course

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