Table Set Up

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Please move to a table where you do not know anyone.

Introduce yourself to others at your table.
Choose a **Facilitator** to todays presentation
Also, choose a **timekeeper**.

5 Min

Icebreaker

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Table discussion:

Individually define COLLABORATION in less than 10 words.

Introduce yourself to the others at your table and discuss collaboration

10 Min

Introduction to Lean in the Design Phase

#LCIDesign25

Michael Williams, Principal, Stantec Architecture

Dave Hagan, Executive Director of Continuous Improvement, Devenney Group

LCI Design Forum

30 April 2025

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LCI Course:
Introduction to Lean in the Design Phase
4 CEU

Sign the sign-in sheet for credit

AIA Approved Continuing Education

Agenda

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1:00 PM – Introductions

1:10 PM – Set Up

1:45 PM – Lean

2:15 PM – Lean Operating System

3:05 PM – People

3:30 PM – Practices

3:50 PM – Target Value Delivery

4:15 PM – Other Tools

4:45 PM – Final Report Out

5:00 PM – Adjourn

Who's Here Today?

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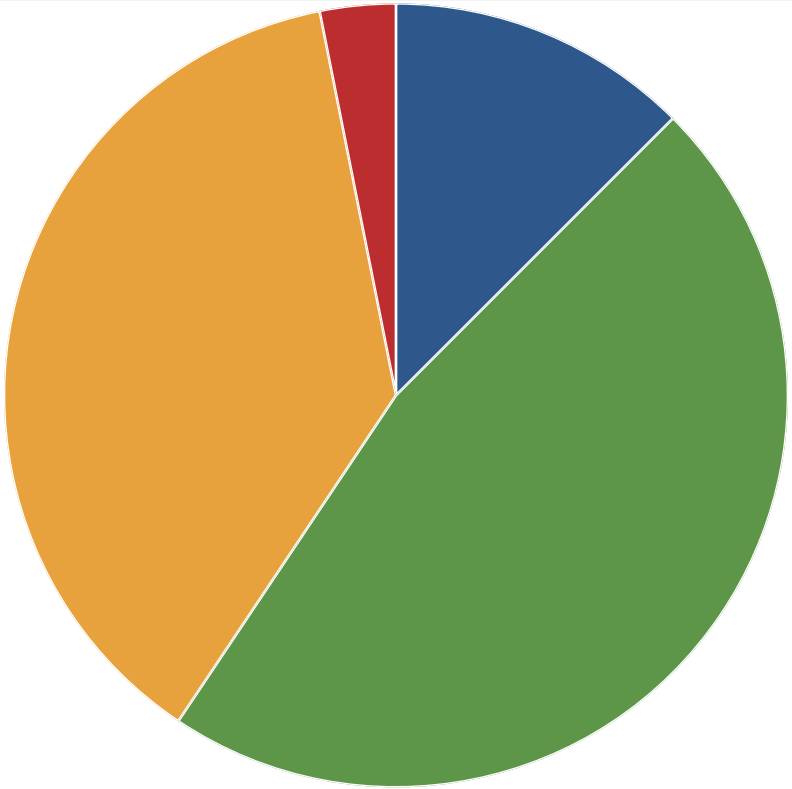

Set Up

Lean Journey to Mastery

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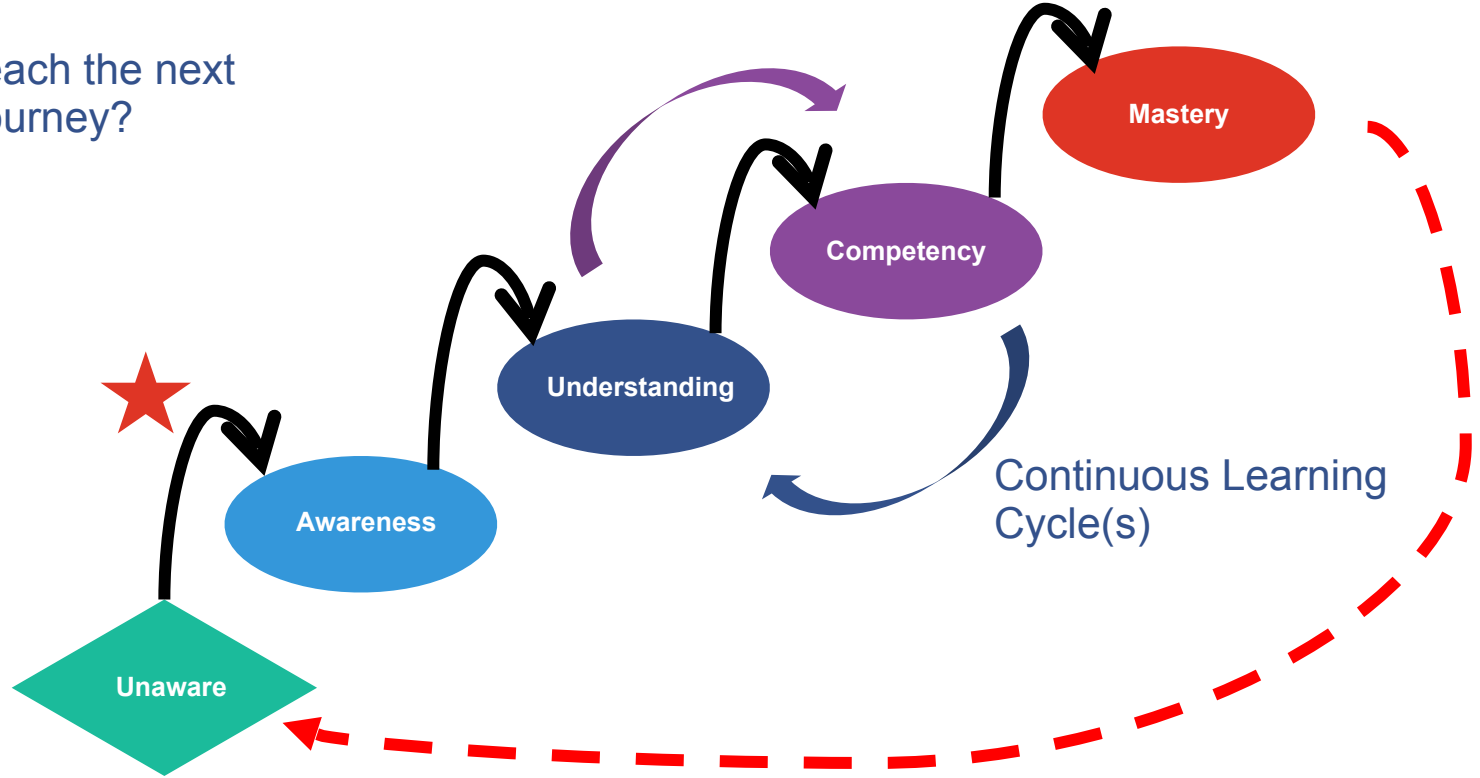
How will you reach the next level on your journey?



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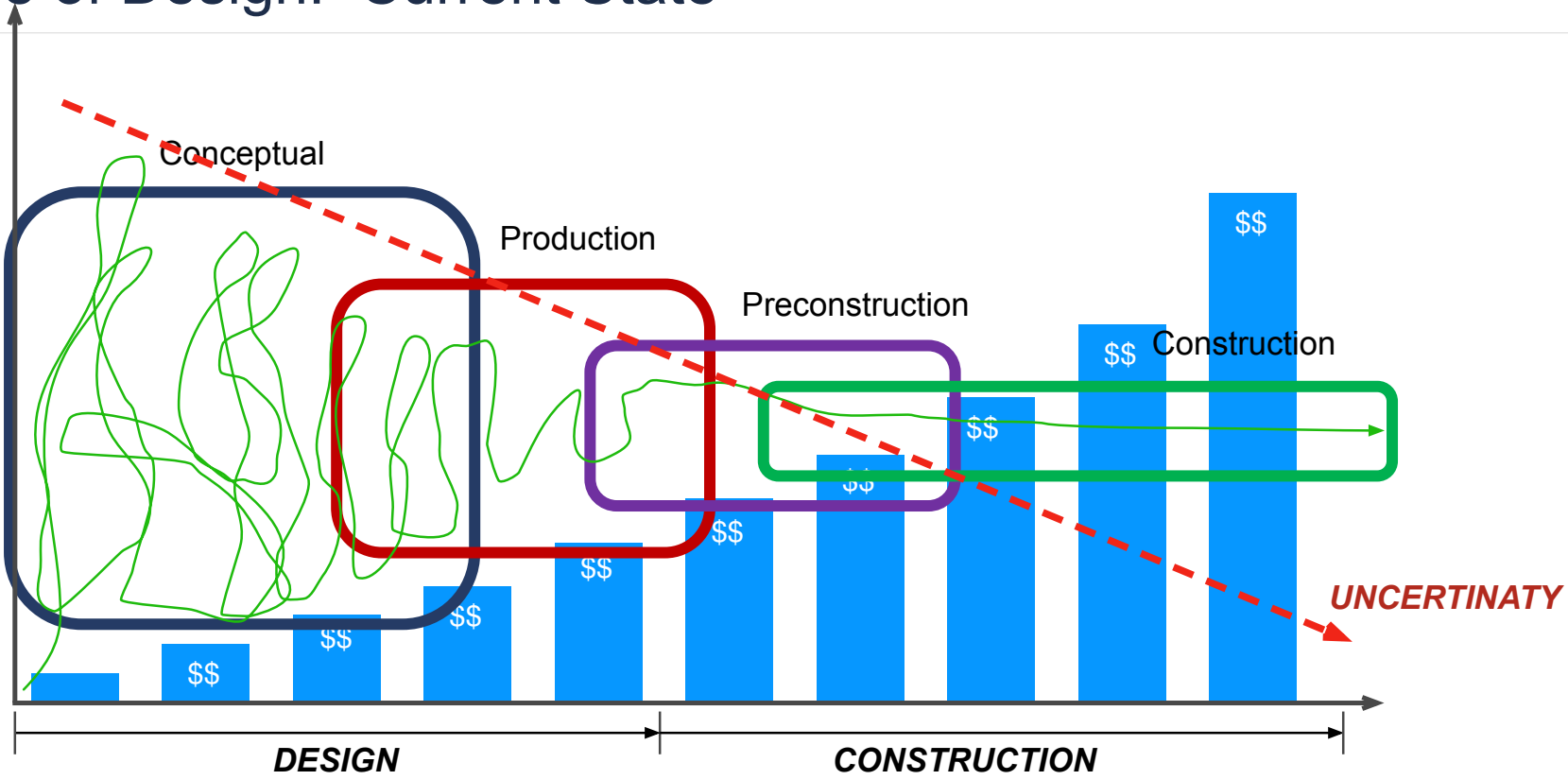
Nature of Design: Current State



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Traditional Delivery Outcomes…

Risk is high.

72% of projects are delivered late.

73% of projects are over budget.

Rework and waste is high.

Teamwork is unreliable.

Customers are not satisfied.

Profit margins are shrinking.

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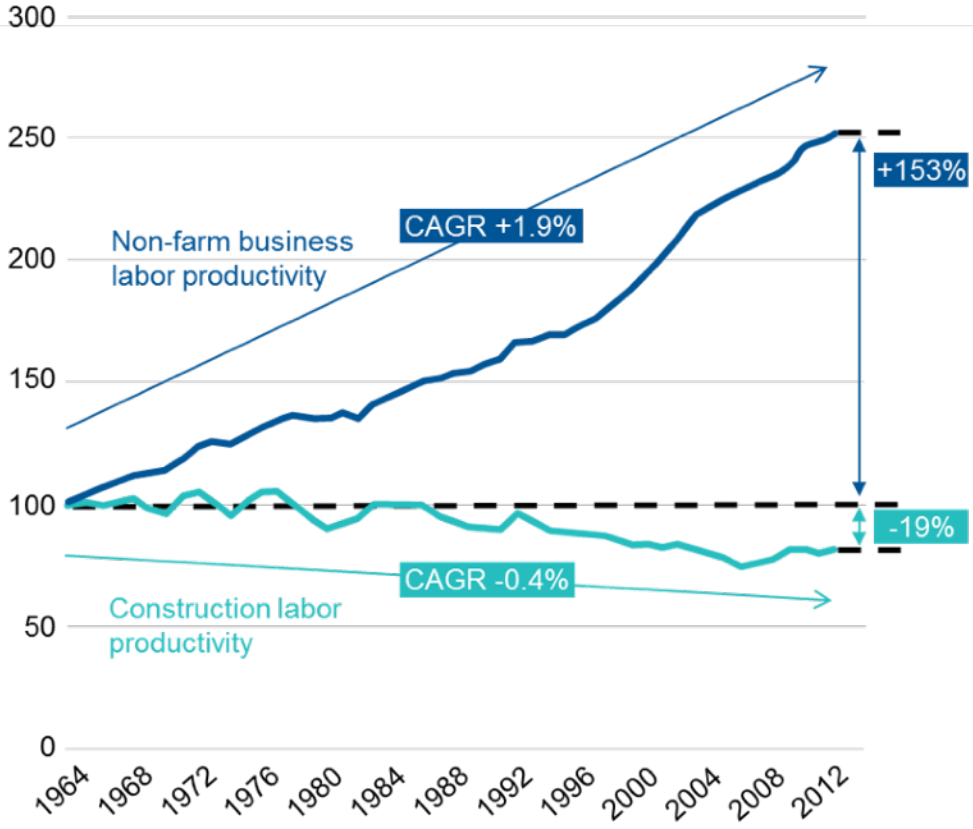
The Reality…

Construction Industry labor productivity has decreased 19% overall since 1964 while all other tracked industries have increased productivity an average of 153%.



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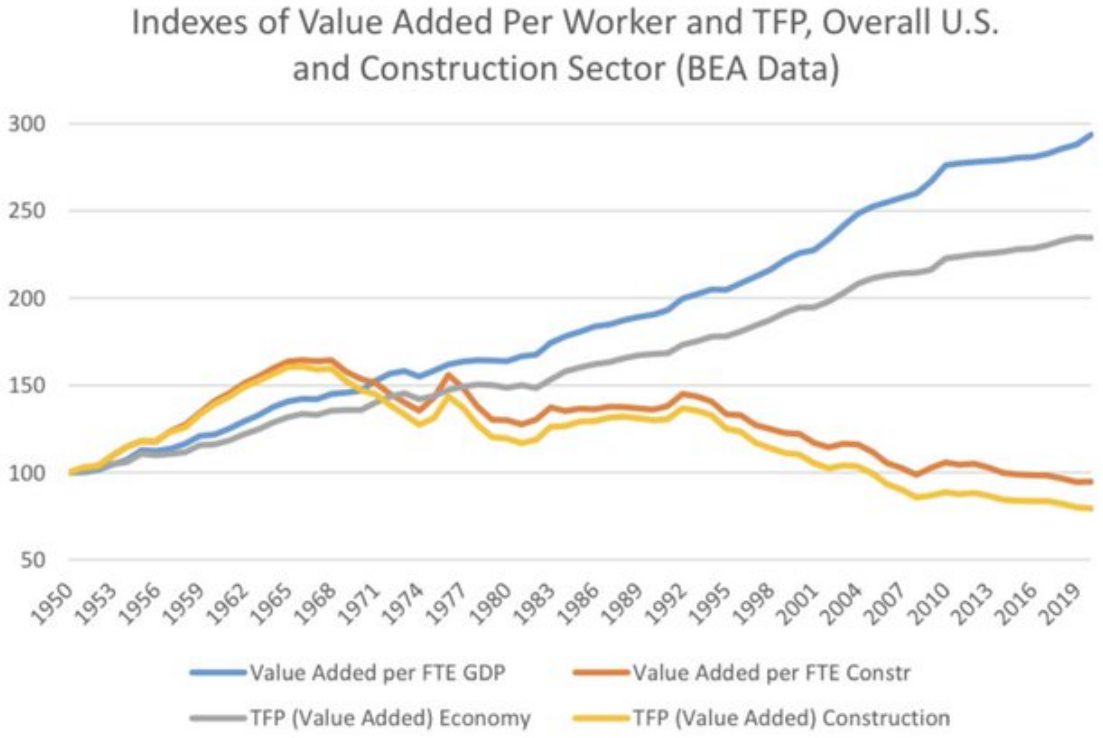
The Reality…

Value added per FTE and as a whole is on a 60 year downward trend!



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The Reality…

98%
of mega-projects >$1 Billion experience cost overruns
Source: B. Bechtel

95%
of all projects FAIL to meet one or more of their business objectives
Source: CII

70%
of all projects are not completed within 10% of budgeted cost or schedule
Source: CII

41%
of project capital is WASTED ON TRANSACTIONS
Source: CII/NTNU

PROCORE

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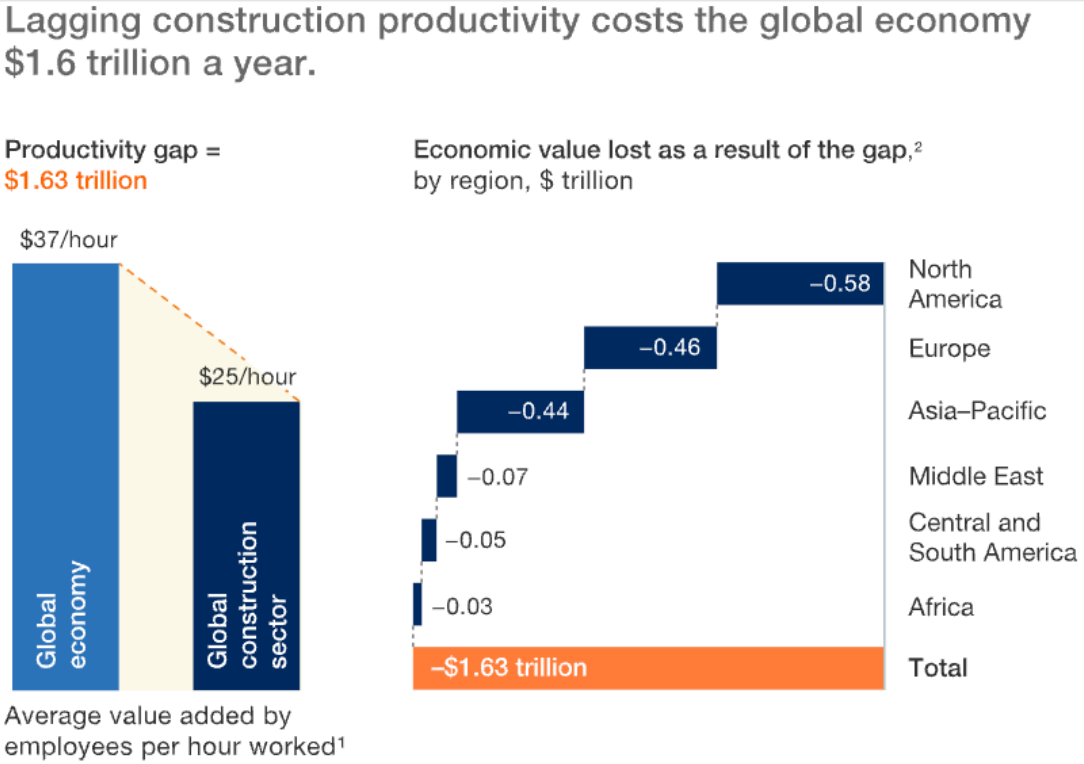
The Reality…

What's the cost of our lack of increase in productivity?

A lot!…



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Root Causes

- The 10 root causes for improving industry productivity.
- Ranked by industry player from 10 to 1
- *"Design Processes and investment are inadequate"* ranked number one!

Productivity impact

	Root cause	Aligned / Misaligned	Rankings: Overall	Contractor	Owner	Supplier
External forces	Increasing project and site complexities	Aligned	4	3	4	3
	Extensive regulation, land fragmentation, and the cyclical nature of public investment		8	8	8	7
	Informality and potential for corruption distort the market		10	10	10	8
Industry dynamics	Construction is opaque and highly fragmented		9	9	9	9
	Contractual structures and incentives are misaligned	Misaligned	2	1	5	1
	Bespoke or suboptimal owner requirements		6	5	6	10
Firm-level operational factors	Design processes and investment are inadequate	Aligned	1	2	2	4
	Poor project management and execution basics	Misaligned	5	6	1	6
	Insufficiently skilled labor at frontline and supervisory levels		3	4	3	5
	Industry underinvests in digitization, innovation, and capital	Misaligned	7	7	7	2

Rankings: 1 (Highest) — 10 (Lowest)

SOURCE: McKinsey Global Institute analysis

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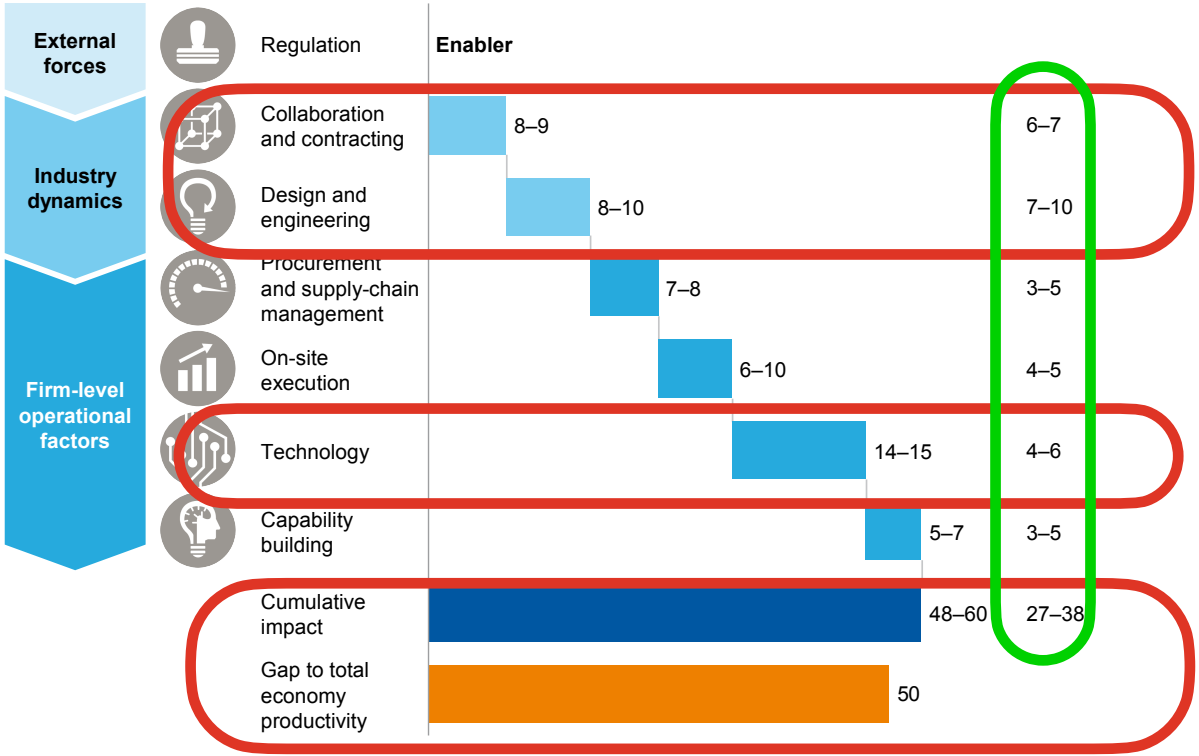
How Do We Improve Productivity?

- Where is the potential for improvement?
- Collaboration, Design/ Engineering
- Use of Technology

Total Gap to average economy productivity is -50%

Cumulative impact is 48-60%



The Opportunity…

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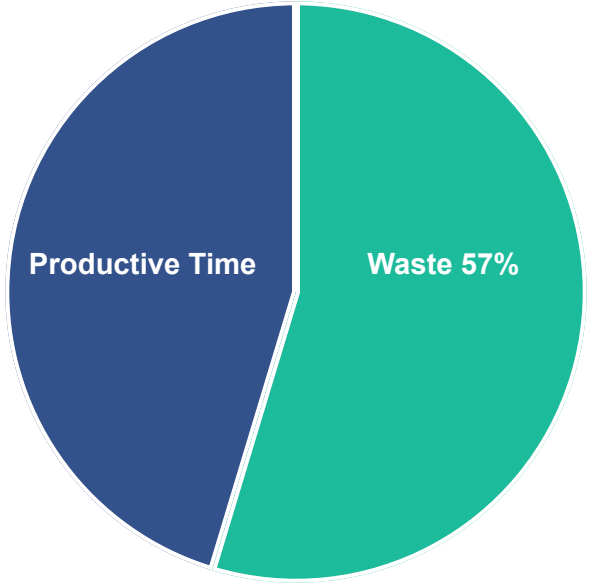
MANUFACTURING

DESIGN/ CONSTRUCTION



Productive Waste

2004 study by the Construction Industry Institute

Discussion Question: Box #2

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What are ***your*** dissatisfactions with the way projects are currently delivered?

Individually list at least 3 dissatisfactions on a post-it note. Table facilitator to allow for 8 minutes for discussion and then create a list of the 3 that have consensus in Box #2

CREATE ANSWERS 10 MINUTES:
REPORT OUT 5 MINUTES

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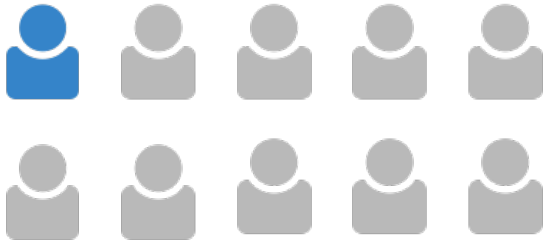
Owner Dissatisfaction

less than one in ten owners (9% to be exact) believe they are achieving a high level of excellence in total project performance.

9%



2018 CURT Owner Study
Continuum Advisory Group

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Excellence

OWNERS

WHAT SETS HIGH EXCELLENCE A/E/C PARTNERS APART?

- Integrity
- honesty regarding team-member experience
- Long term partnerships
- Understanding the customer (end user) needs and striving to meet them.
- Proactive problem solving
- Transparency when something goes off the rails
- Knowledge of owner systems/processes/facilities - not having to repeat the learning curve
- Listening and reacting appropriately.
- Other

A/E/C PARTNERS

WHAT SETS HIGH EXCELLENCE OWNER CLIENTS APART?

- Strong culture and values.
- Trust is instantly there
- Transparency
- Shared success mindset (“we/the team” not “us and them”
- Rapid decision making capability
- The right attitude - trusting that your A/E/C partners are the experts in what they do
- Experience

2018 CURT Owner Study
Continuum Advisory Group

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Dissatisfaction

IF YOU COULD CHANGE ONE THING ABOUT YOUR PROJECT PARTNERS, WHAT WOULD IT BE?

WHAT OWNERS WANT TO CHANGE ABOUT THEIR CONTRACTORS			WHAT AEC'S WANT TO CHANGE ABOUT THEIR OWNERS		
1.	Trust and Transparency	22%	1.	Contracting Approach	46%
2	Alignment	17%	2	Collaboration	38%
3.	Innovation	17%	3.	Other	16%
4.	Contracting Approach	17%			
5.	Relationships	17%			
6.	Other	10%			

2018 CURT Owner Study
Continuum Advisory Group

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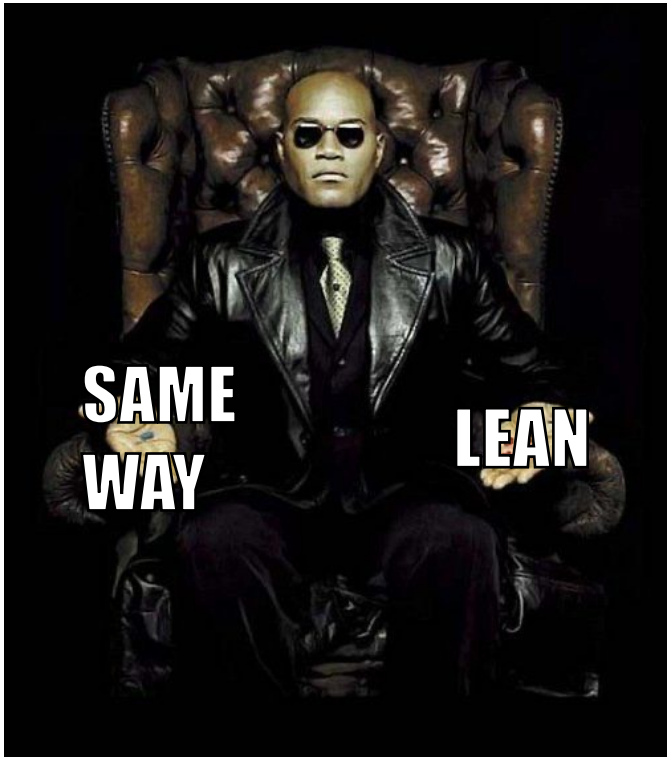
Let's try something new…..



We are now in a world where the risk of trying something new is actually much lower than the cost of sticking to what has worked in the past.

Bill Taylor, Fast Company

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Change

Customer defines ***Quality*** from actual experience with the product or service.

Create efficient processes ***back from the customer*** to the creation of the product or service.

Scientifically approach process. ***Theory-Question-Improve***

Workers, given the opportunity, will change and improve the processes.

Steve Jobs in 1993 as CEO of NeXT Computer

Lean

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Definition of Lean

What is Lean?

A *management system* and *culture of respect* designed as a way we work by *adding value for our customers* and *eliminating waste.*

Every person associated with the delivery of the good or service is empowered to improve their processes.

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Definition

What is Lean Project Delivery?

A structured application of the *Lean philosophy* facilitated with specific *tools* and *processes* to enhance and align the *flow* of information and *eliminate the waste* inherent in the legacy project delivery system.

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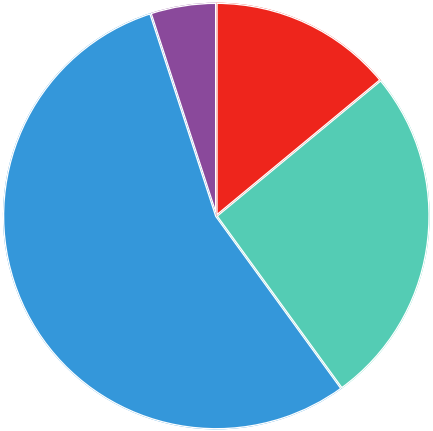
Overcoming Industry Inertia

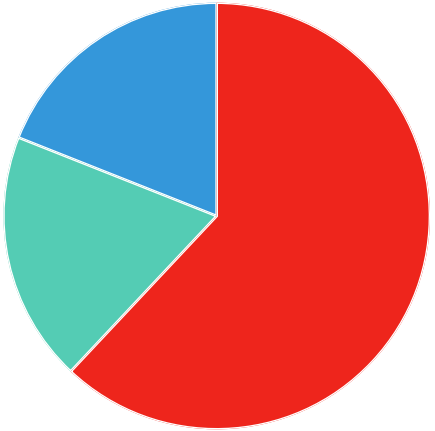
Efficiency of Construction Processes in the Industry
(By Level of Lean Engagement)

- Inefficient/Highly Inefficient
- Neutral
- Efficient/Highly Efficient
- Not Sure

Non-Lean Practitioners



Lean Practitioners



McGRAW HILL CONSTRUCTION

Goals of Lean Project Delivery

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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.

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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.
- Minimizing waste and rework.
- Team-wide reliability.
- Higher customer satisfaction.
- Fair profits for providers.

Do Lean Practices Help?

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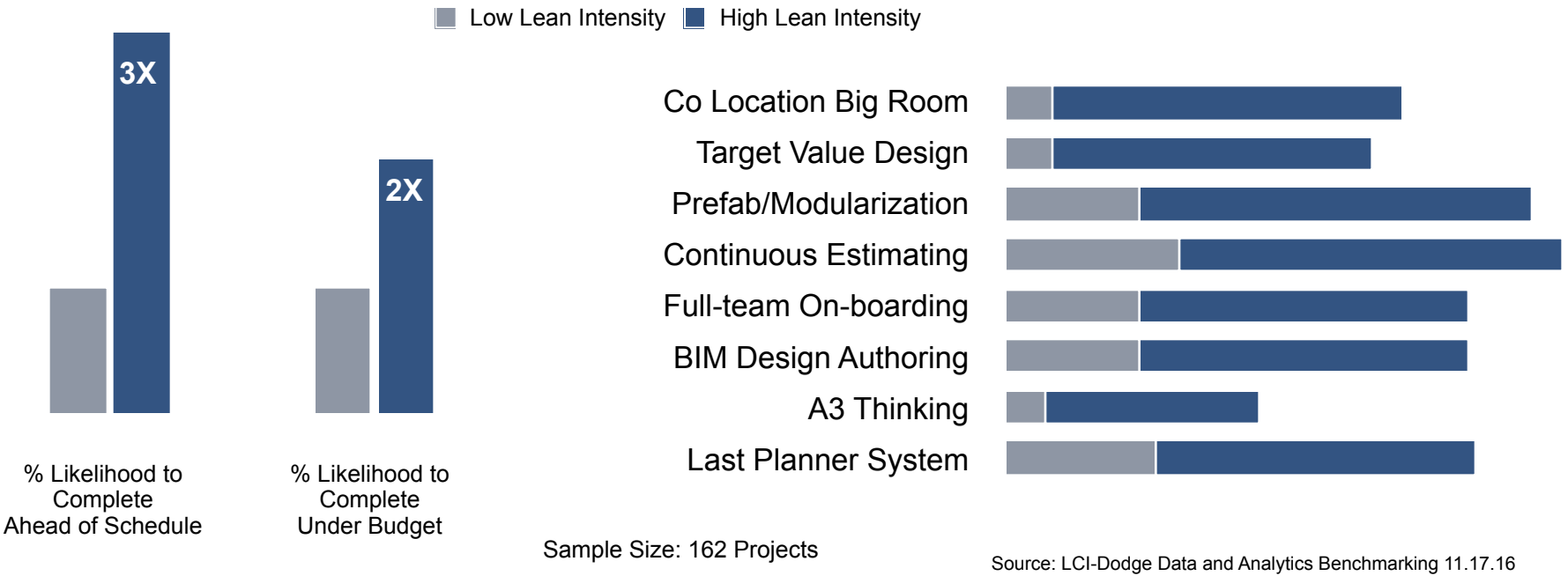
Correlation of lean intensity to outcomes (% likelihood on best projects)



Sample Size: 162 Projects

Source: LCI-Dodge Data and Analytics Benchmarking 11.17.16

Discussion Question: Box #3

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Individually list what 3 things would you change to create better project outcomes and a more sustainable Design and Construction industry?

Table facilitator to allow for 10 minutes for discussion and then create a list of the 3 that have consensus in Box #3

CREATE ANSWERS 10 MINUTES:
REPORT OUT 5 MINUTES

Lean as an Operating System

Project Elements

Lean Teams organize as a single entity across all project delivery disciplines.

Lean can be implemented regardless of commercial terms:

The degree of implementation varies with the terms.

A Lean Operating System is an organized implementation of Lean Principles and Tools combined to allow a team to operate in unison to create flow.

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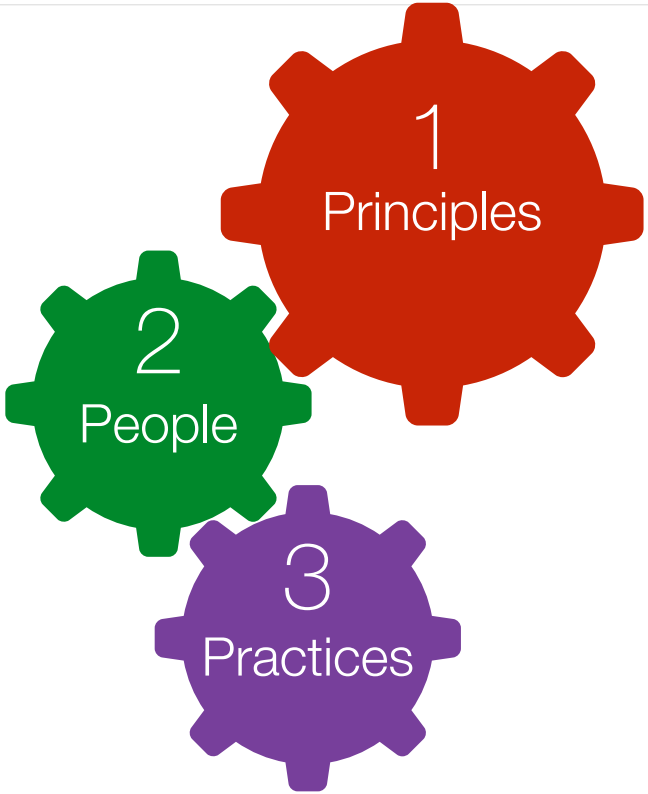
Lean Operating System

Components Include:

- Principles
- People
- Practices



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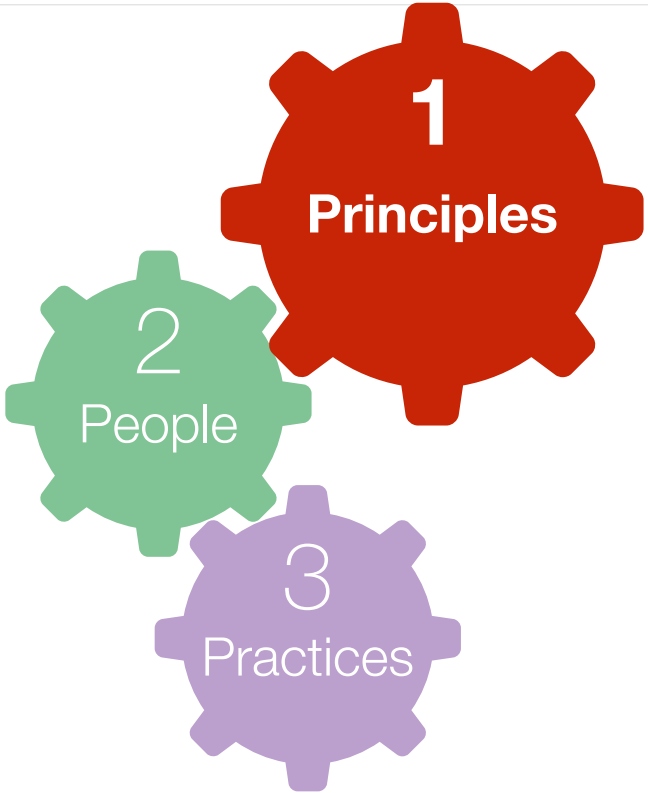
Lean Operating System

Principles

- LCI Six Tenets
- Creating uniform flow
- Continuous Improvement



Six Tenets of Lean

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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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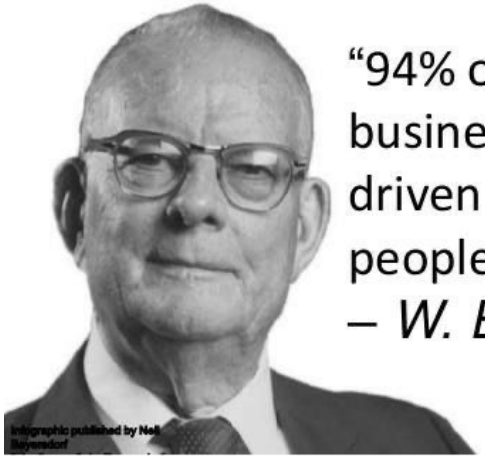
Respect for People



"94% of problems in business are systems driven and only 6% are people driven."
– *W. Edwards Deming*

1 RESPECT FOR PEOPLE

People transform ideas and materials into value. People are essential to Lean project delivery so they must collaborate within and across teams using foundational Lean principles with the goal of optimizing overall value.

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Optimize the Whole

2 OPTIMIZE THE WHOLE

Lean approaches focus on optimizing the whole of the project. Looking beyond the local and individual efforts to study the overall outcome to determine where value is added and waste can be eliminated.

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Generate Value

3 GENERATE VALUE

Team members have the ability to understand and refine the definition of value from the customers' point of view, and this definition becomes increasingly clear through the life of the project.

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

Eight Types of Waste

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Waste is any activity that requires time or resources but does not create value for the customer.

DEFECTS

Waste from a product or service failure to meet customer expectations

OVERPRODUCTION

Waste from making more product than customers demand

WAITING

Waste from time spent waiting for the next process step to occur

UNUSED TALENT

Wastes due to underutilization of people's talents, skills, and knowledge

TRANSPORTATION

Wasted time, resources, and costs when unnecessarily moving products and materials

INVENTORY

Wastes resulting from excess products and materials that aren't processed

MOTION

Wasted time and effort related to unnecessary movements by people

EXTRA-PROCESSING

Wastes related to more work or higher quality than is required

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Focus on Flow

5 FOCUS ON FLOW

Project team members collaboratively find ways to eliminate steps that have no value which shortens the process, all while focusing on flow efficiency.

Flow and Smaller Batch Sizes

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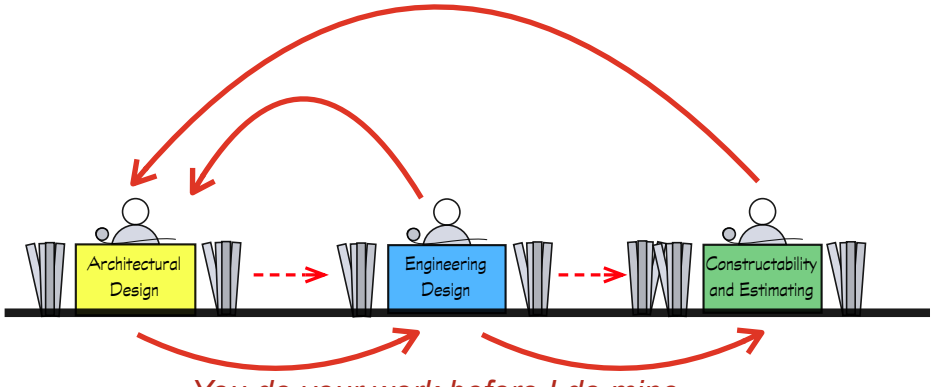
Design Coordination or re-design to reduce costs.

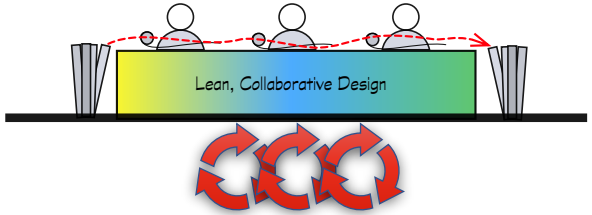


You do your work before I do mine.

Typical Design Process	1	2	3	4	5	6	7	8	9
Architectural Design									
Engineering Design									
Constructability/Estimating									

Waiting

Smaller Batch Sizes



Lean, Collaborative Design	1	2	3	4	5	6	7	8	9
Architectural Design									
Engineering Design									
Constructability/Estimating									

Less waiting

Continuous Improvement (PDCA or PDSA)

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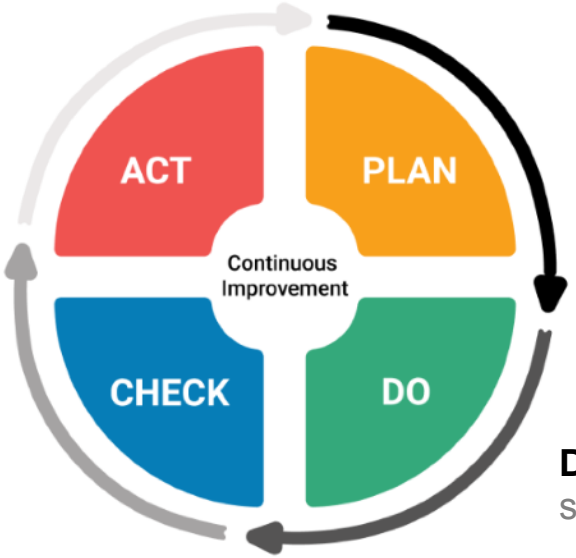
Act (Adjust) – take action based on the learning.



Plan (Predict) – identify the opportunity and plan a change based on a hypothesis

Check (Study) – review the outcome, analyze the results, identify what was learned

Do – test the change at a small scale

Lean thinking demands a mindset of continuous improvement.

Discussion Question: Box #4

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Discuss the following question:

- Why are project outcomes not predictable (cost/schedule)?

Table facilitator to allow for 10 minutes for discussion and then create a list of the 3 that have consensus in Box #4

TOTAL TIME 15 MINUTES:

10 Minute Break

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People

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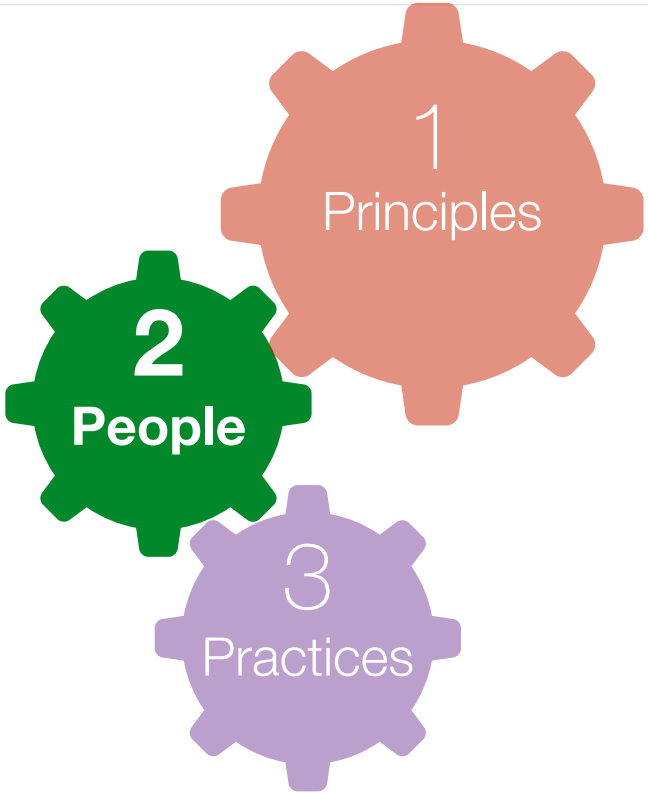
Lean Operating System

People

- High Performing Team
- Project as a Promise
- Trust
- Conditions of Satisfaction
- Respect



Characteristics of High Performing Teams

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1. A high performing team is built on a strong foundation of trust and transparency among all members.

2. There is a culture of respect that enables members to effectively delivery against CoS.

3. High performing teams break down barriers through innovation and continuous improvement.

4. They break down traditional silos to maximize skills and optimize performance.

Innovation

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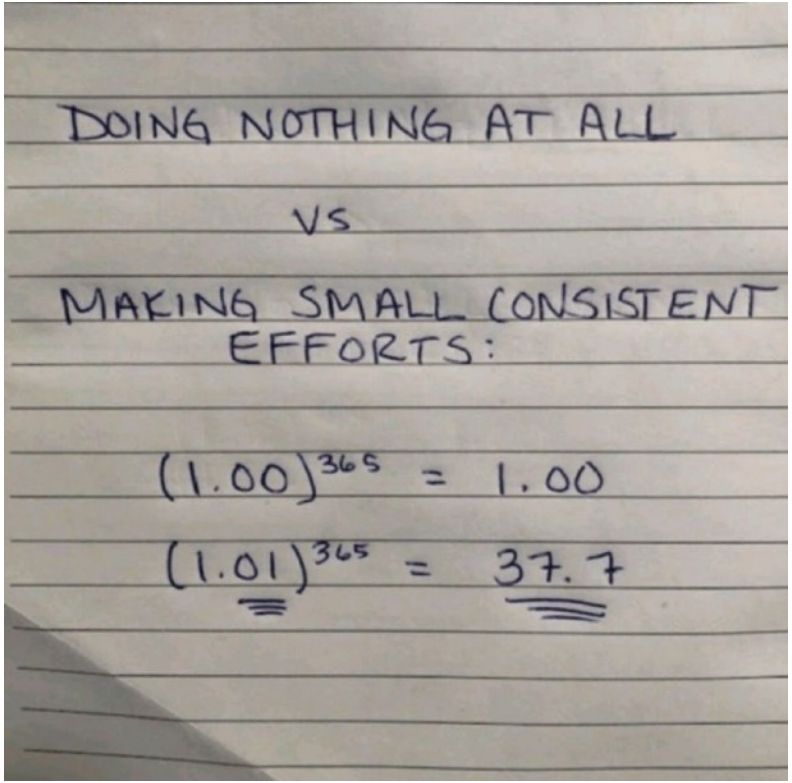
High performing teams allow for small and incremental FAILURES… to allow for learning, advancement and INNOVATION!



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What is Innovation?

Anything that moves the team toward providing additional value to the owner.

Parallel design and construction
Shortening schedules
Working differently
Releasing work or information
Designing less to do more
…

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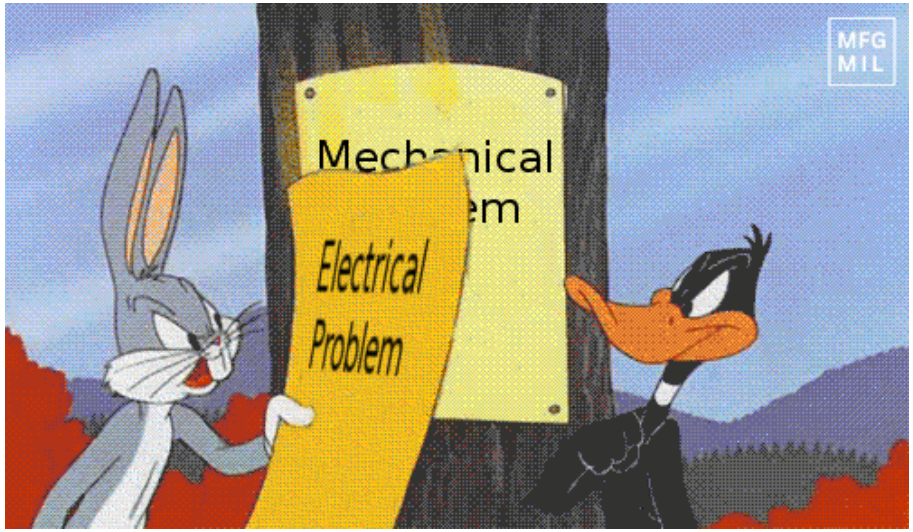
Behaviors

- Test the team “health” often.
- Allow for “tough” discussions.
- Use structured conflict resolution and root cause analysis processes.
- Integrate teams as much as possible.



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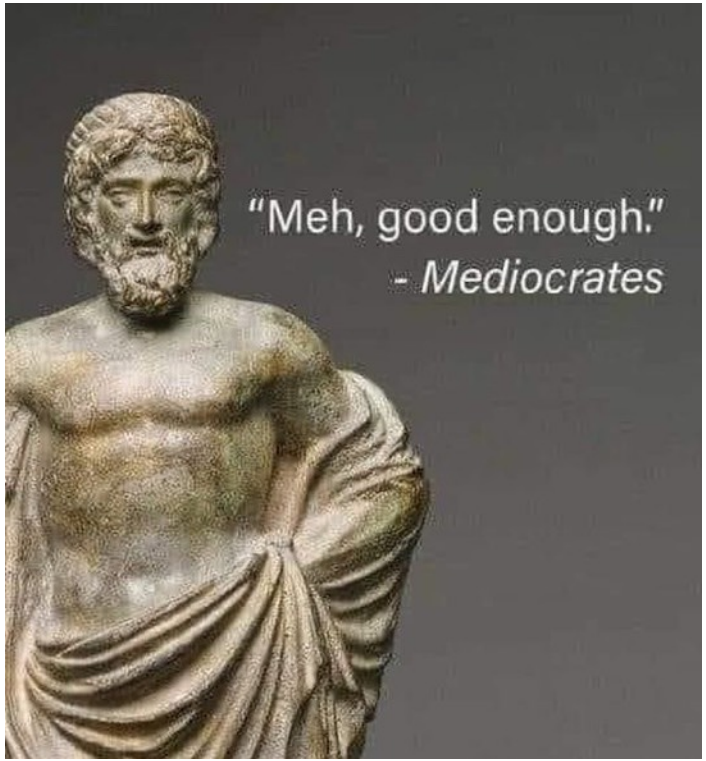
Trust and how to get past “Meh”… to Best!

- Trust is the foundation of a high performing team.
- Decades of poor relations have led to structural distrust in our industry.
- “Your risk…My reward” mindset



… how do we build real trust on a team that may or may not have worked together before?

Trust

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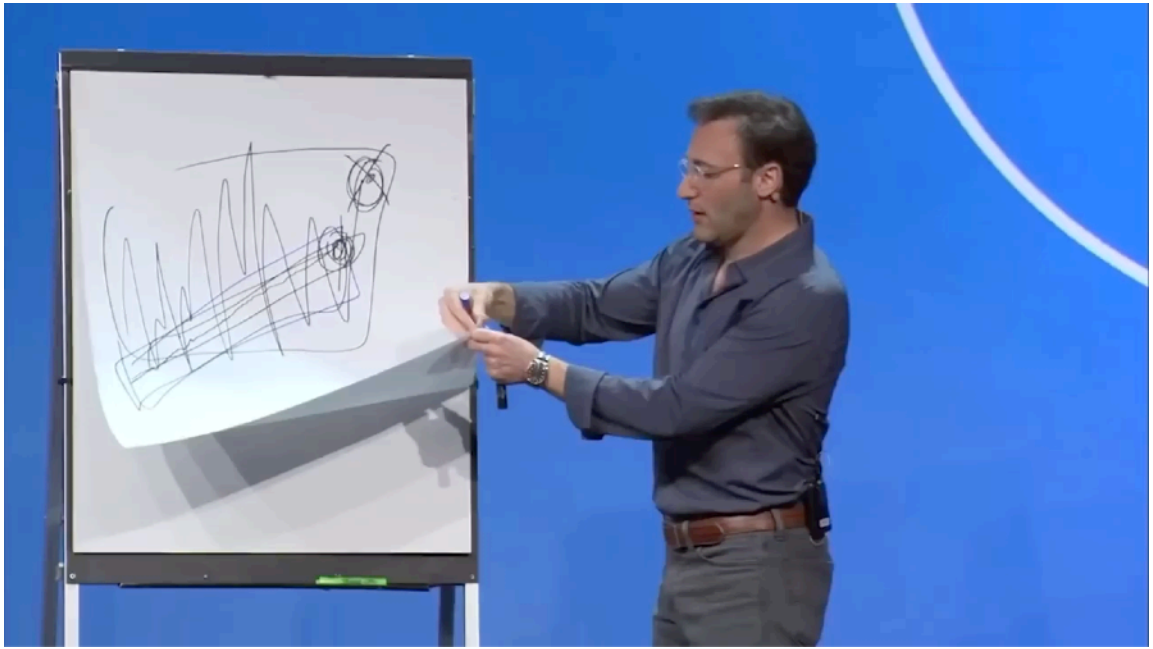
How important is trust?



Team Building

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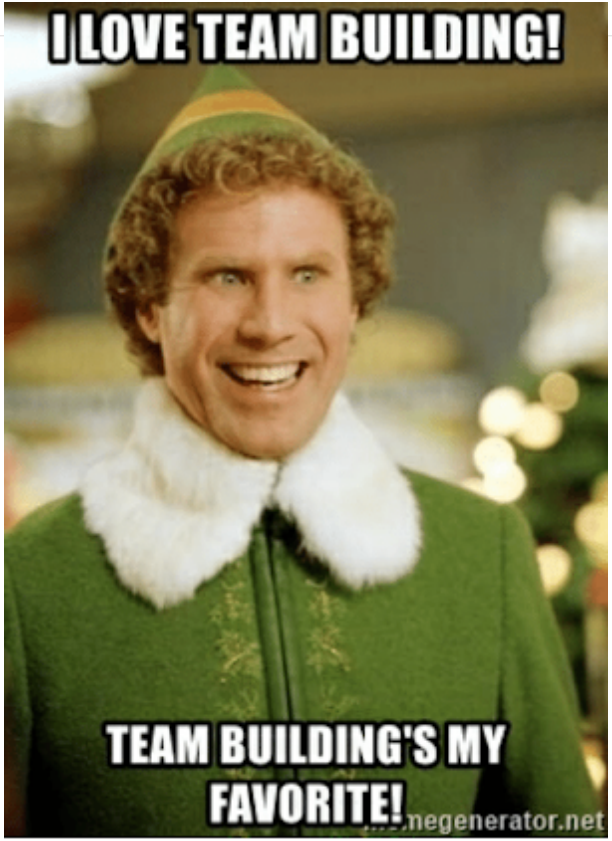
- Get to know one another!
- Work together and get together away from work.
- Deploy team building exercises on a regular basis.
- None of the Lean Strategy or Tactics work without Team Building, Accountability and Trust.



Project is a Promise

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A project is a very big promise delivered by people in an ever changing network of promises.

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Project as a Promise

- Public Commitments
- Active Engagements
- Voluntary Participation
- Explicit Expectations
- Mission Based.

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Conditions of Satisfaction (CoS)

- Developed by the team and informed by the Value Definition Statements.
- Defines the processes and criteria to support the owner's **Value Proposition**.
- COS should be measurable and specific.
- Should be used as the foundation of all project or teaming related decisions.

SMART Conditions of Satisfaction

CoS Example

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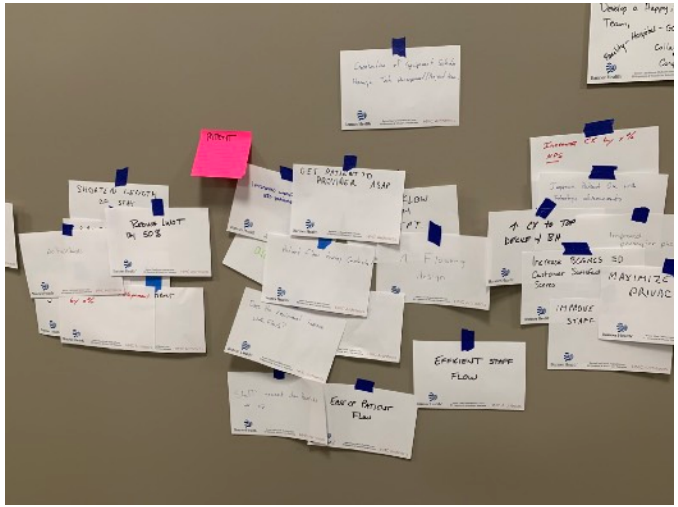
- Gather criteria from all stakeholders.
- Assemble into clear statements of value.
- Use as the basis for decisions and guiding the process.



CONDITIONS OF SATISFACTION

1. IMPROVE THE PATIENT SATISFACTION SURVEY SCORE BY __%.
2. IMPROVE THE AVERAGE DOOR TO DISCHARGE TIME BY __ MINUTES.
3. DECREASE THE NUMBER OF FALLS FOR THE EMERGENCY DEPARTMENT BY __%.
4. UTILIZE THE LAST PLANNER SYSTEM TO TRACK AND MANAGE CONSTRAINTS WITH A 75% OR GREATER PPC.
5. BIM COORDINATION TO BE DONE THROUGH CONSTRUCTION DOCUMENT DEVELOPMENT.
6. EXCELLENCE IN SAFETY: 95% EXCELLENT RATINGS AND ZERO LOST TIME INCIDENTS.
7. EXCELLENCE IN HOUSEKEEPING: 90% EXCELLENT RATING OR HIGHER.
8. INNOVATION BY PREFABRICATION
9. ALL TEAM MEMBERS WILL GO THROUGH ONBOARDING.

TEAM FUSION

Respect

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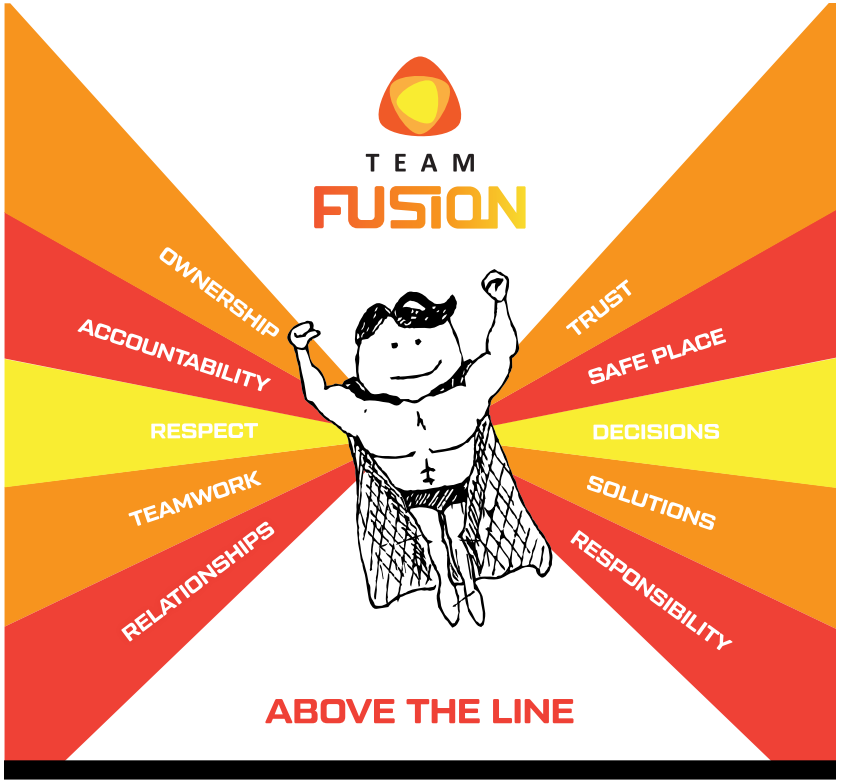


BELOW THE LINE

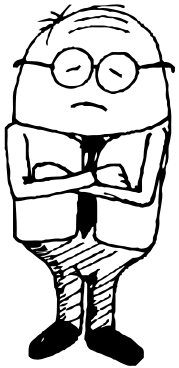
TITLES

BLAME

CONFUSION

"CYA"

SECRETS



DENY

LYING

EXCUSES

IGNORE

FAULT

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Respect

ENOUGH
LET'S
MOVE
ON

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Facilitation and Leadership

- Distribute Leadership
- Avoid “Titles” and typical project hierarchies.
- In IPD projects champions should change as the project moves from one phase to another.
- Build “new” leaders….create the next project’s leadership.

Discussion Question: Box #5

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Propose solutions or ways to mitigate one of the 3 top reasons listed in Box #4

Pick one of the proposed reasons in Box #4 and propose 3 actionable solutions to report out. Place tags for the top 3 in Box #5
Discuss for 8 minutes.

TOTAL TIME 10 MINUTES:

Practices

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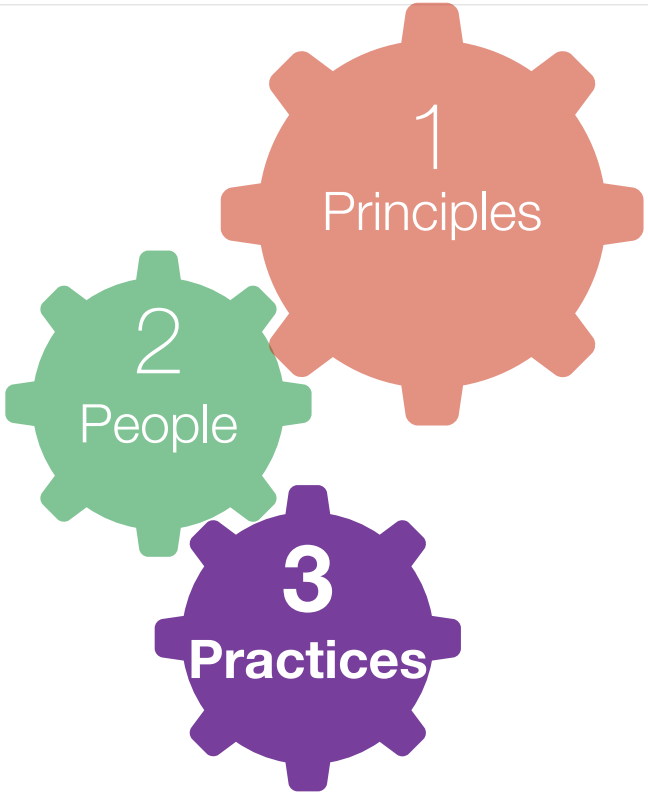
Lean Operating System

Practices

- Team Organization
- Big Room Mindset
- Collaborative Planning
- Target Value Delivery



Traditional Project Delivery

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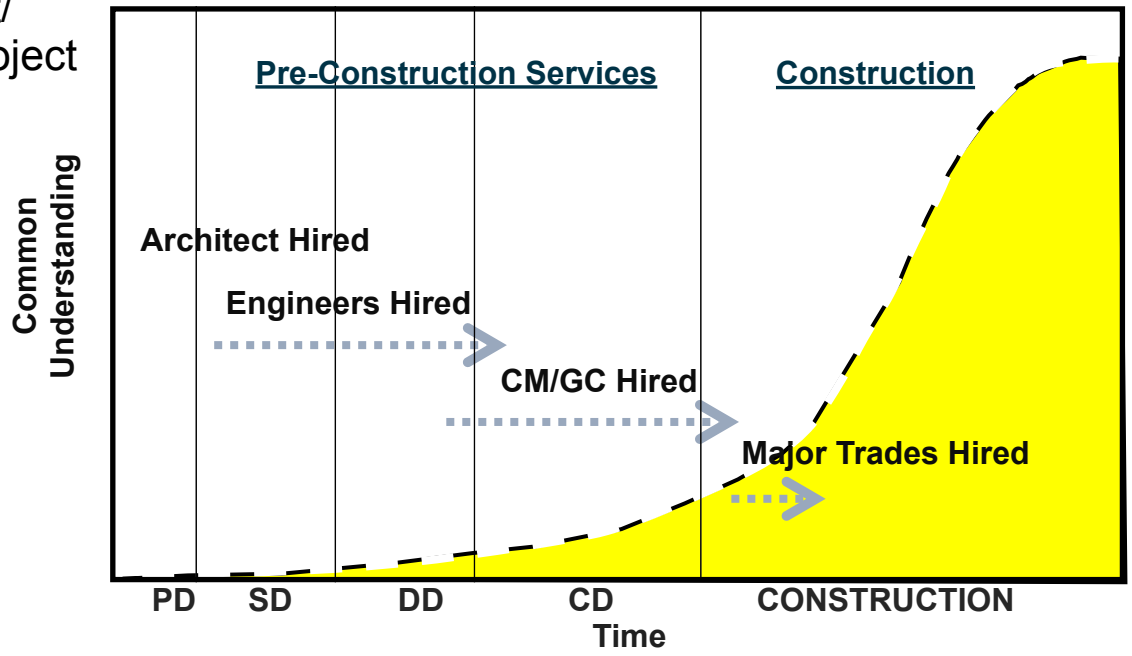
= Opportunity for alignment/ collaboration between project partners.



Integrated Project Delivery

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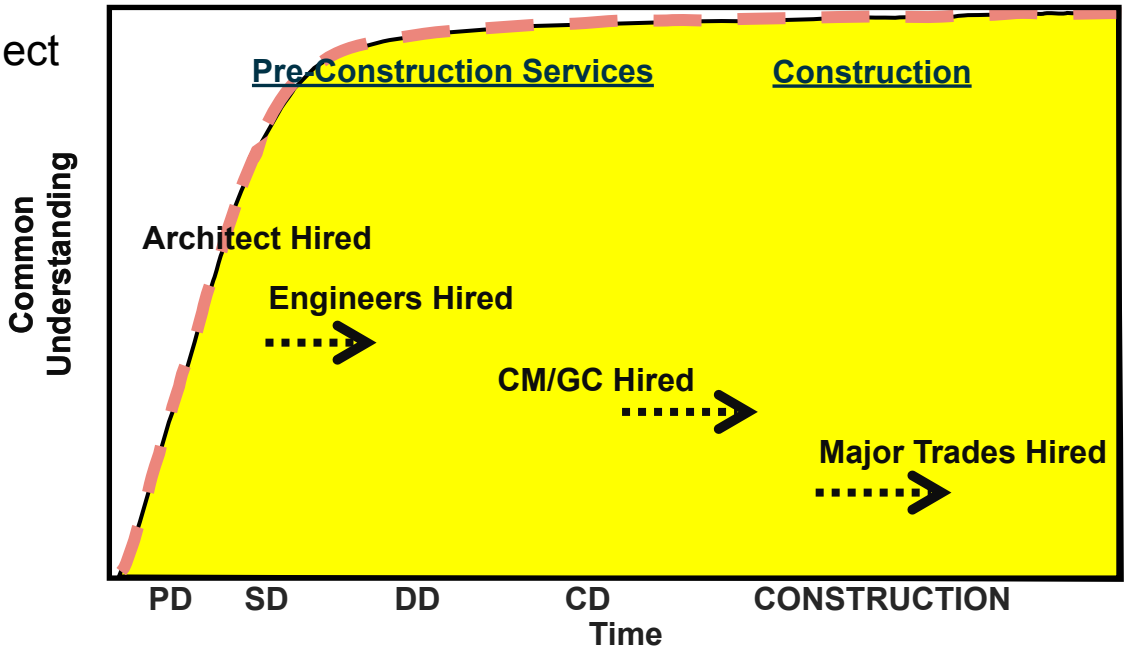
= Opportunity for alignment/ collaboration between project partners.

Builders at the table during formative design phases.

Opportunity for true “Target Value Delivery”



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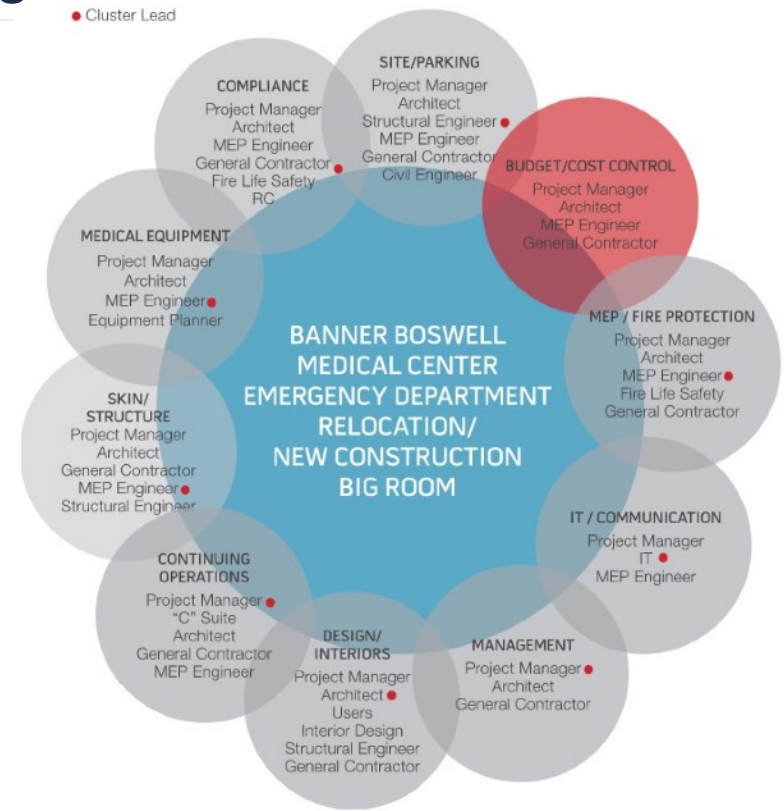
Team Organization - Cluster Groups

Work Clusters:

- Distinct portions of the work
- Cluster led by a “Champion”
- Cross discipline(Trades, Designers, Owner/ Stakeholders)
- Meet 1-2 times a week
- Work collaboratively (BIM & Lean Tools)
- Report out weekly

Management:

- Not involved in day-to-day of team
- Resolve conflicts
- Make Decisions



Big Room is……

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- A verb… not a noun
- Mindset of intense focus on advancing work.
- A place that enables cross-functional team collaboration.
- The collaborative behavior of a team and the work they are producing.

Big Room

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Small Project
1X Weekly
Big Room

Large Project
100% Co-location
Big Room

Medium Project
2X Weekly
Big Room

Last Planner System® in Design

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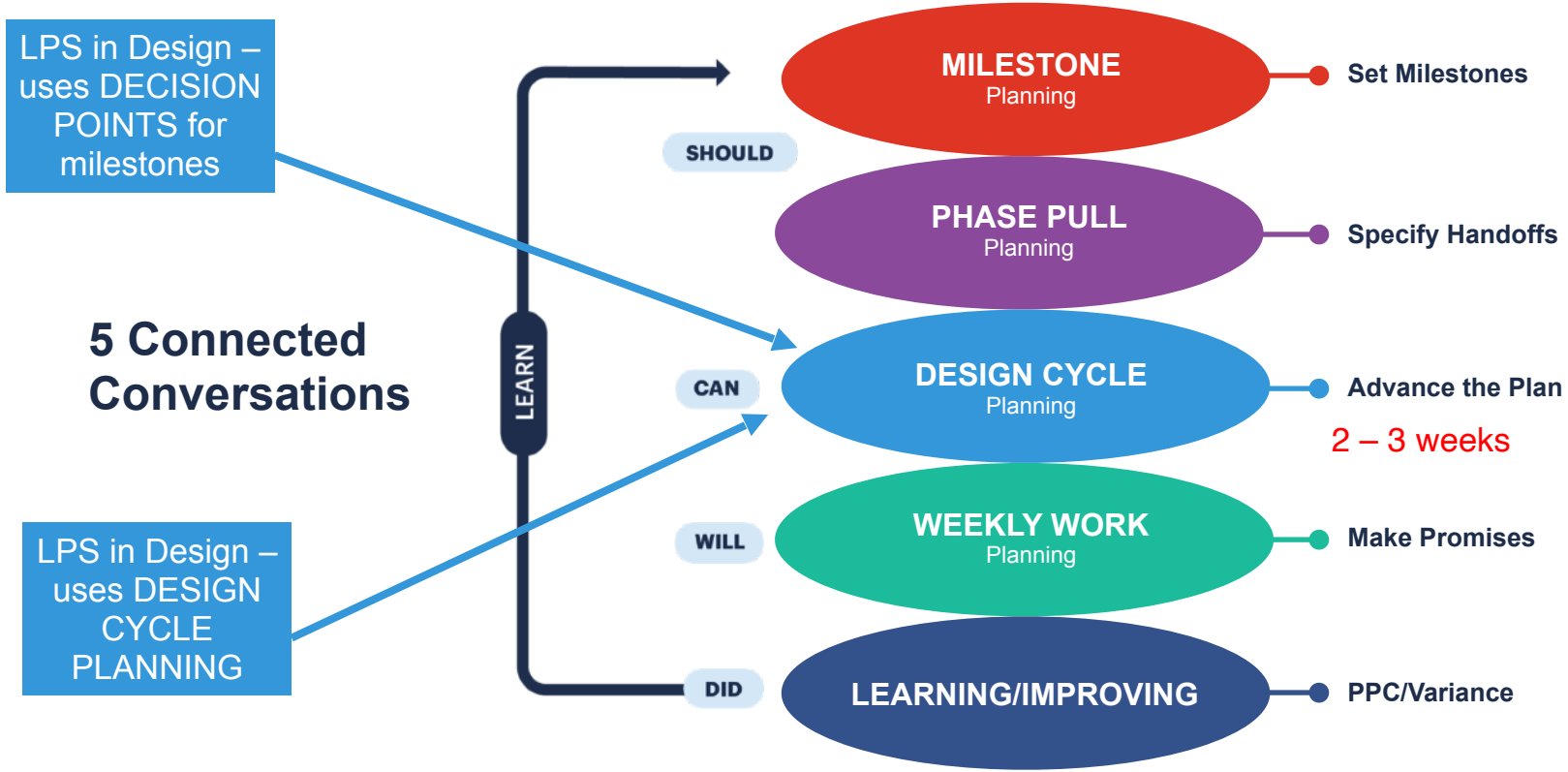

Last Planner System®:

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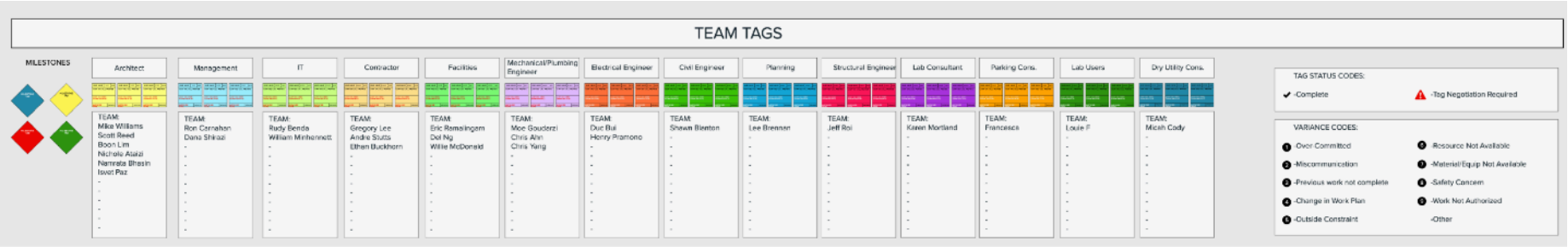
LPS in Design focuses on the transfer of information or “release of information”.

Typical project delivery (SD, DD, CD etc.) should not be used as a basis for LPS in Design.

LPS in Design is a person to person (not driven by the Project Managers) exchange of information.

YOUR NAME	# DAYS	DATE
WHAT YOU WILL PROVIDE		
WHAT YOU NEED		
PROVIDER NAME	VARIANCE	



Milestone Planning Example

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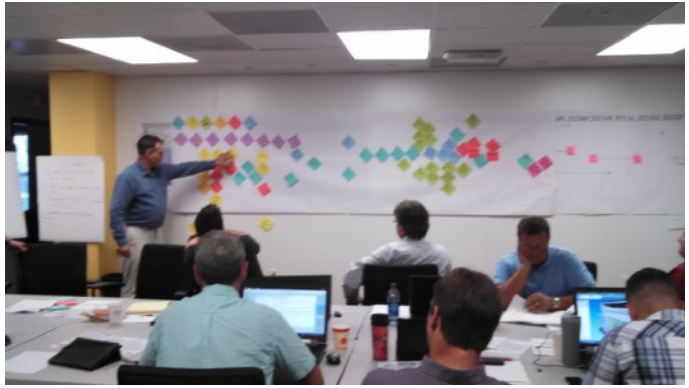
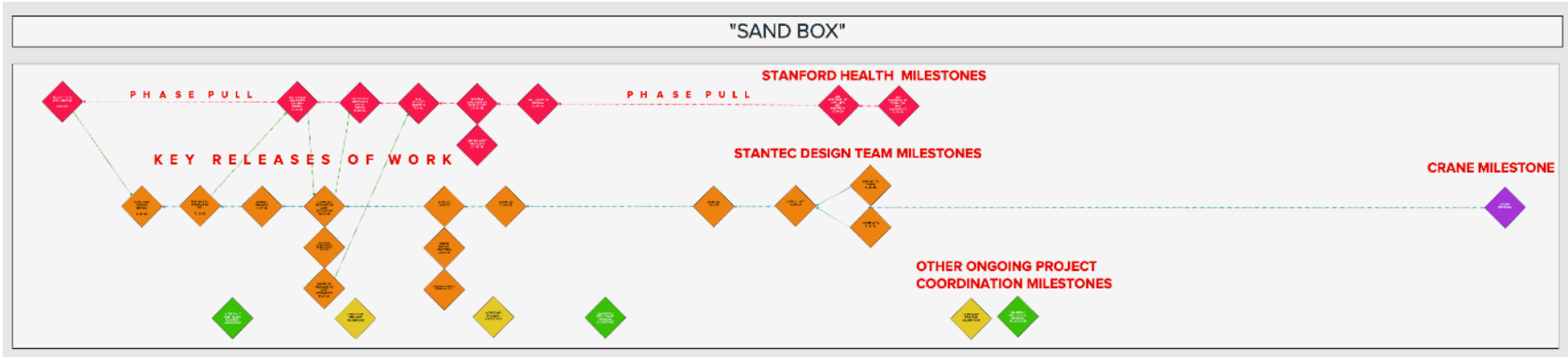
Milestones should represent decision points and large transfers of information…. not drawing sets!

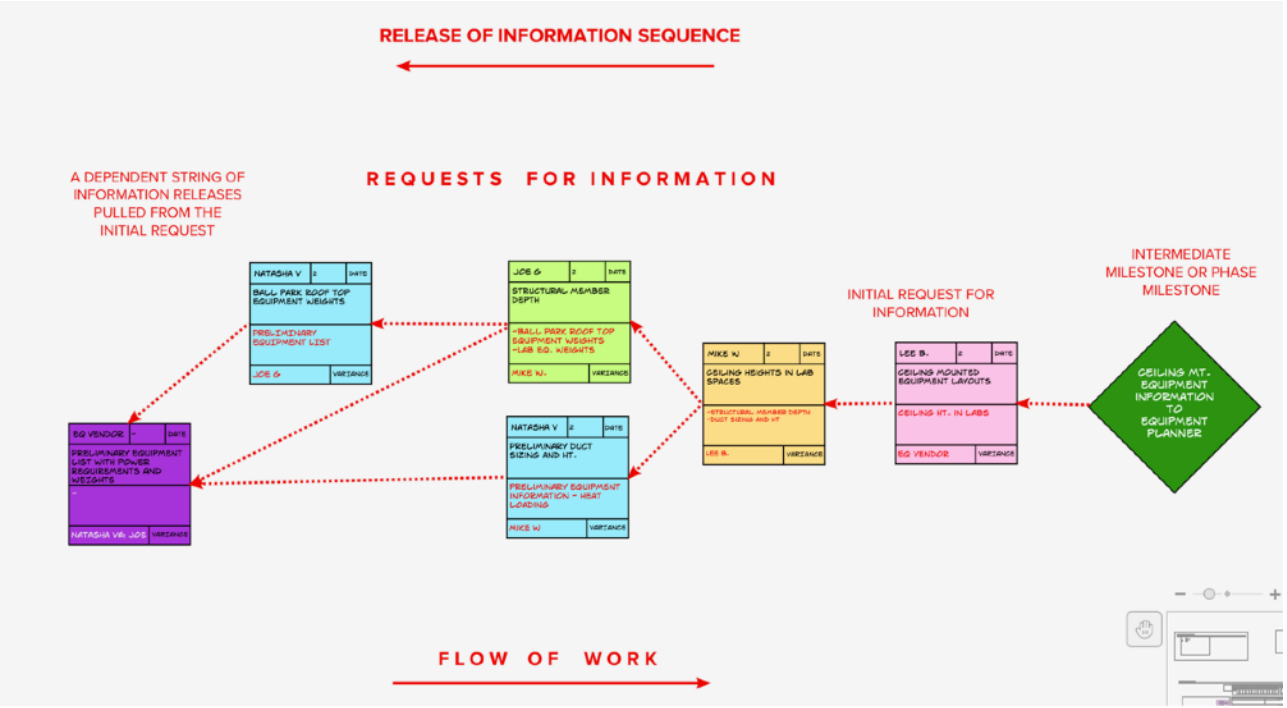
Milestone planning should be used to work out the logic in a design delivery.





Pull-Creating Flow

Requests for information are “pulled” from a milestone to the left. Information is released in a flow to the right.



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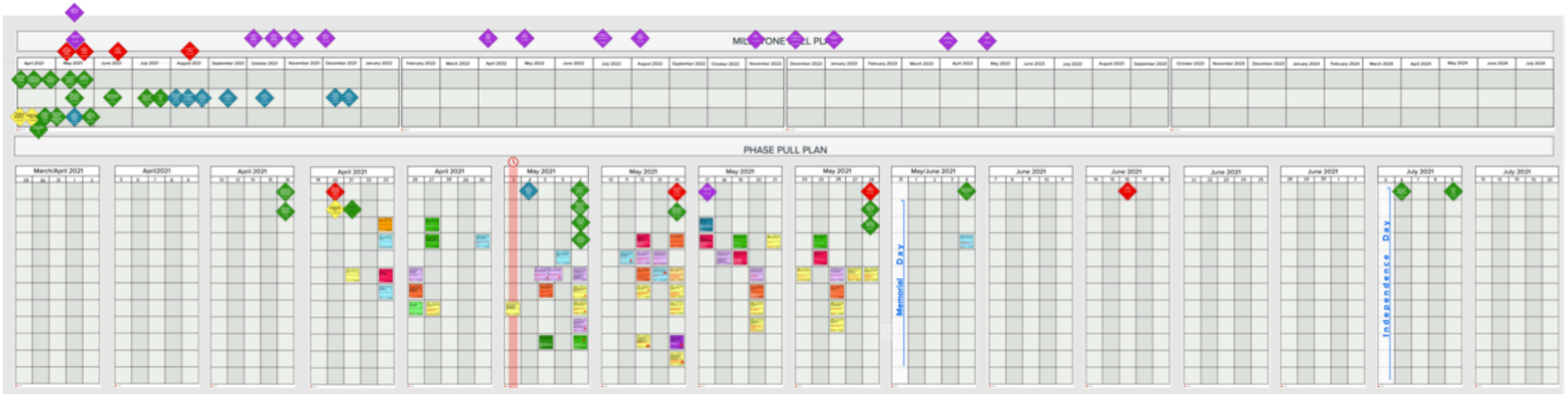
Putting It Together

Weekly (or more frequent) planning sessions.

2 to 4 week “look ahead” planning is typical.



Target Value Delivery

Target Value Delivery

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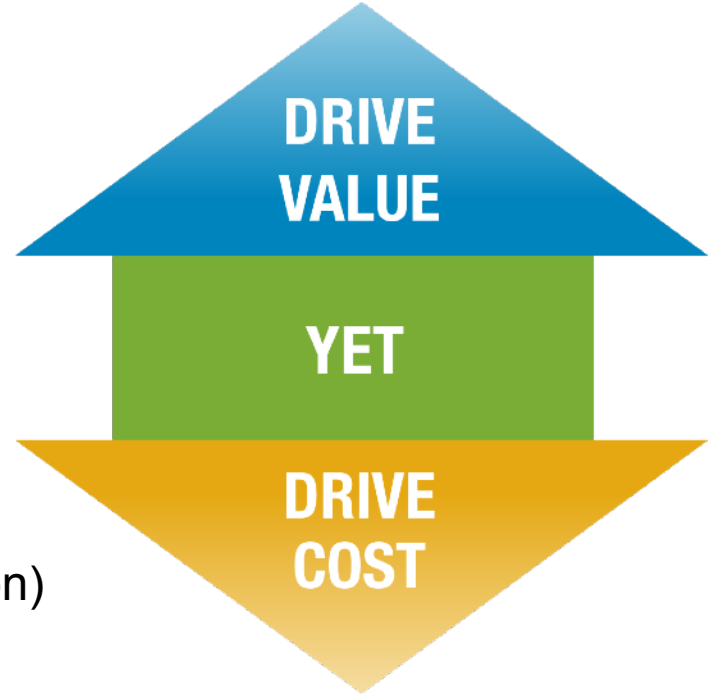
- TVD is a management practice to be used throughout the project to ensure that the project meets the operational needs and the allowable budget.
- Promises innovation
- Reduces waste
- Increases value



- The term YET comes directly from Toyota “YET” puts conflicting ideas into tension (creative tension) which drives innovation.

Traditional vs. Target Value Delivery

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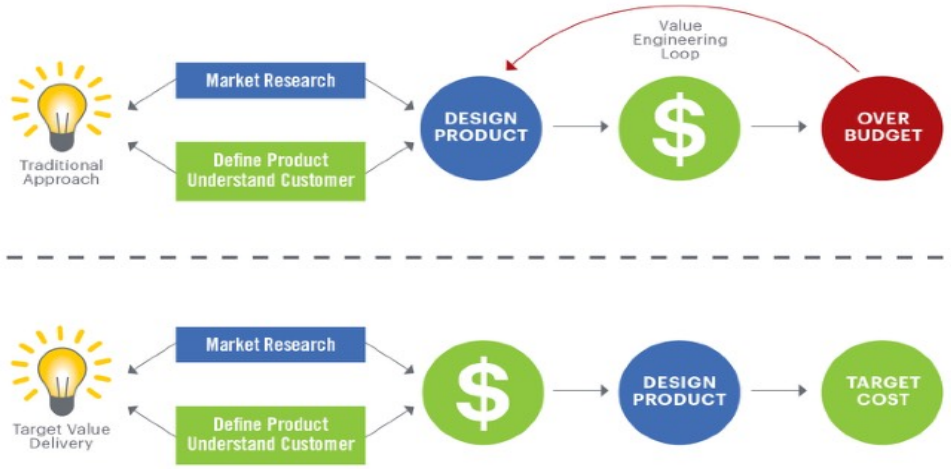
The goal of TVD is to minimize the waste produced by the design-estimate-redesign cycle(s) of the traditional value engineering approach.

Design to an estimate rather than estimate a design.

Cost is an *output* of design



Cost is an *input* of design

Courtesy of HKS Architects

Target Value Delivery

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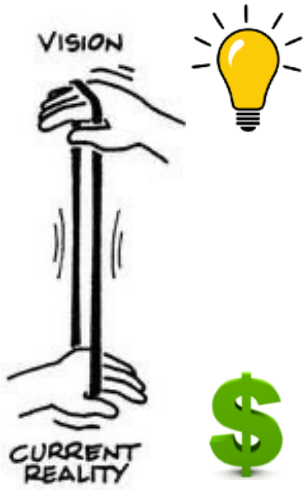
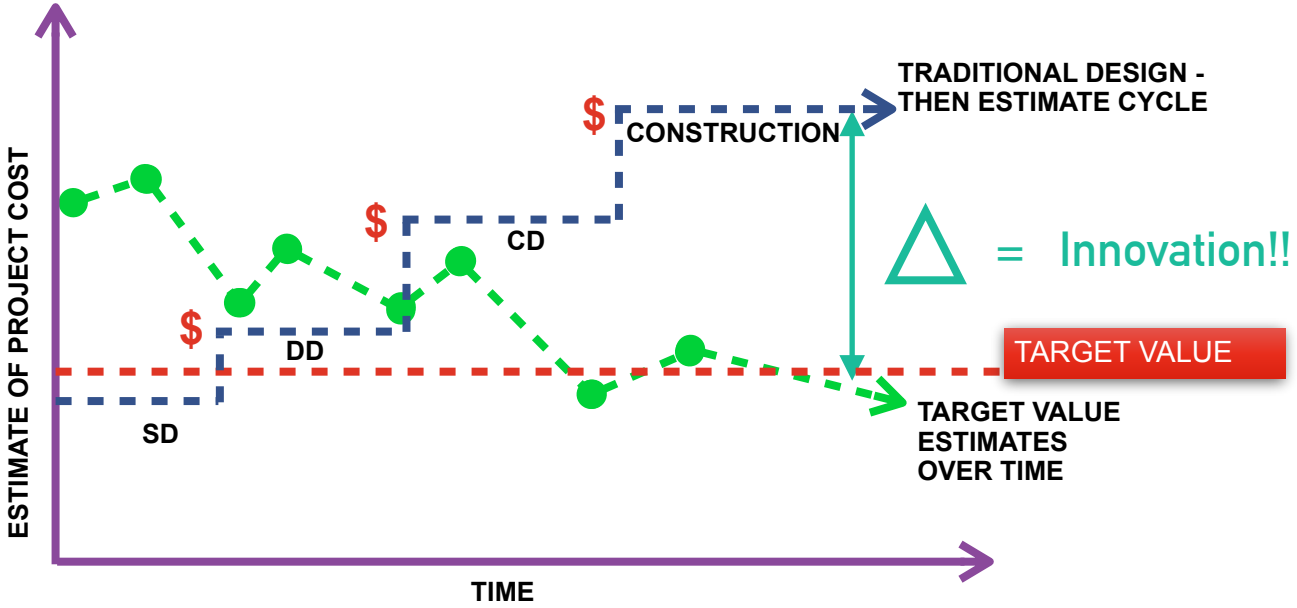
It is an application of Taiichi Ohno's practice of
self-imposing necessity as a means for continuous improvement (Ballard, 2009)



Creative Tension



TVD & Cost Modeling

- Model of the cost components & systems of a project.
- Derived from a market analysis.
- Create benchmarks based on quality levels.
- Cost Model must be in a format that is “consumable” by designers.
- Structured to allow the costs to be continually updated.
- Provides the team with a constantly up to date cost model.
- Should allow for projecting ‘what-if’ scenarios based on value decisions that have yet to be made.

Business case is tied to Project Controls

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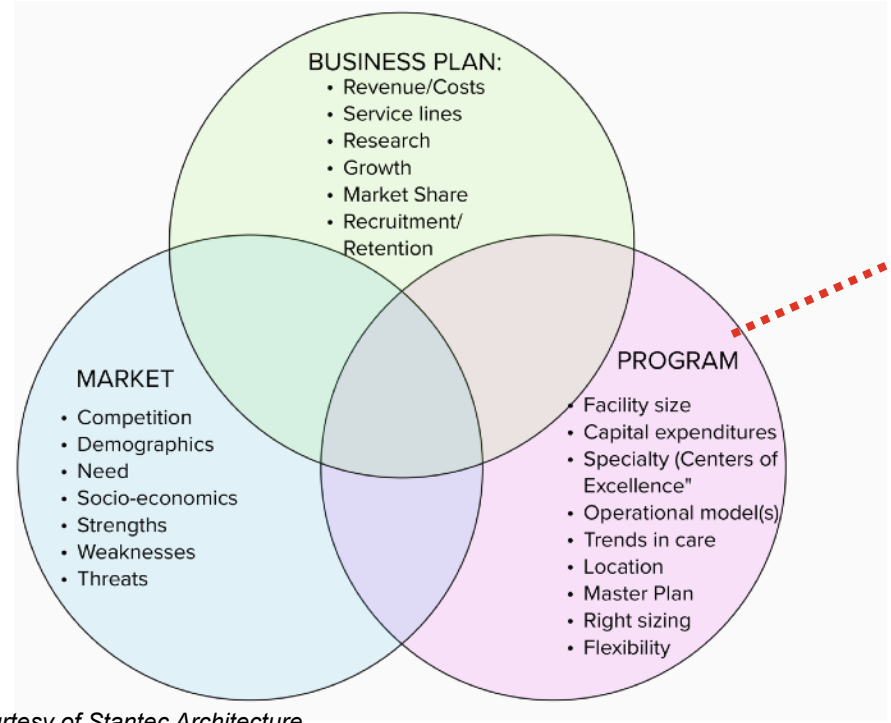
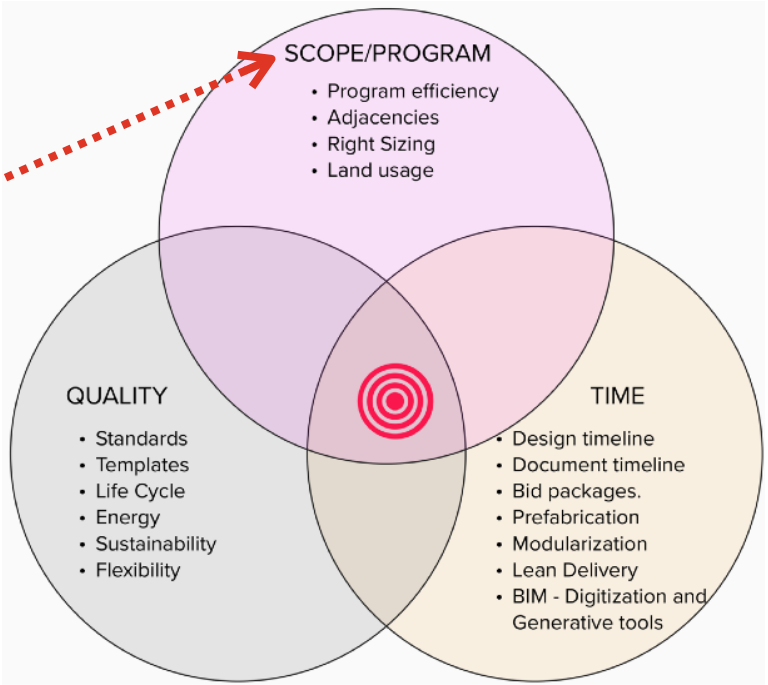
"ESSENTIAL RELATIONSHIP"



TVD PROJECT CONTROLS



Courtesy of Stantec Architecture

Discussion Question: Box #6

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List 3 ways or processes to implement ONE of the 3 solutions listed in box #5

As a group choose one of the 3 items in Box #5. Each person at the table suggest 1 or 2 possible ways to implement the chosen solution from Box #5. Then, as a group gain consensus on the top 2 or 3 and post in Box #6

TOTAL TIME 15 MINUTES:

Other Tools

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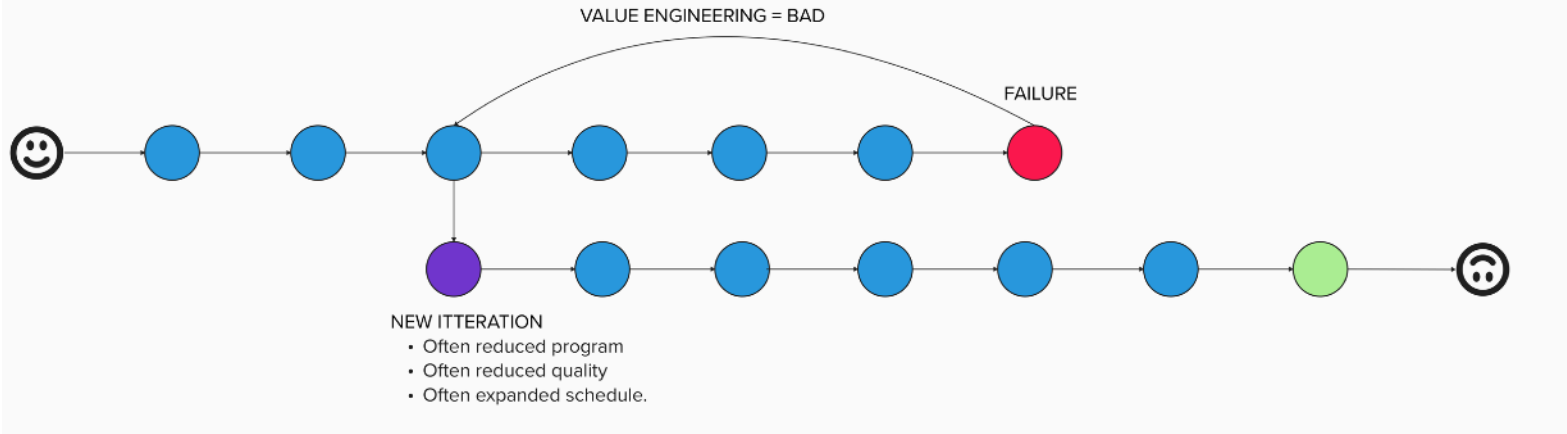
Set Based Design



- Single, or 2 options created initially by a very narrow group (Arch/Owner/Users)
- Design pushed forward without input from other design/construction partners.
- Design fails (budget, program or constructibility) and often results in VE the single option.

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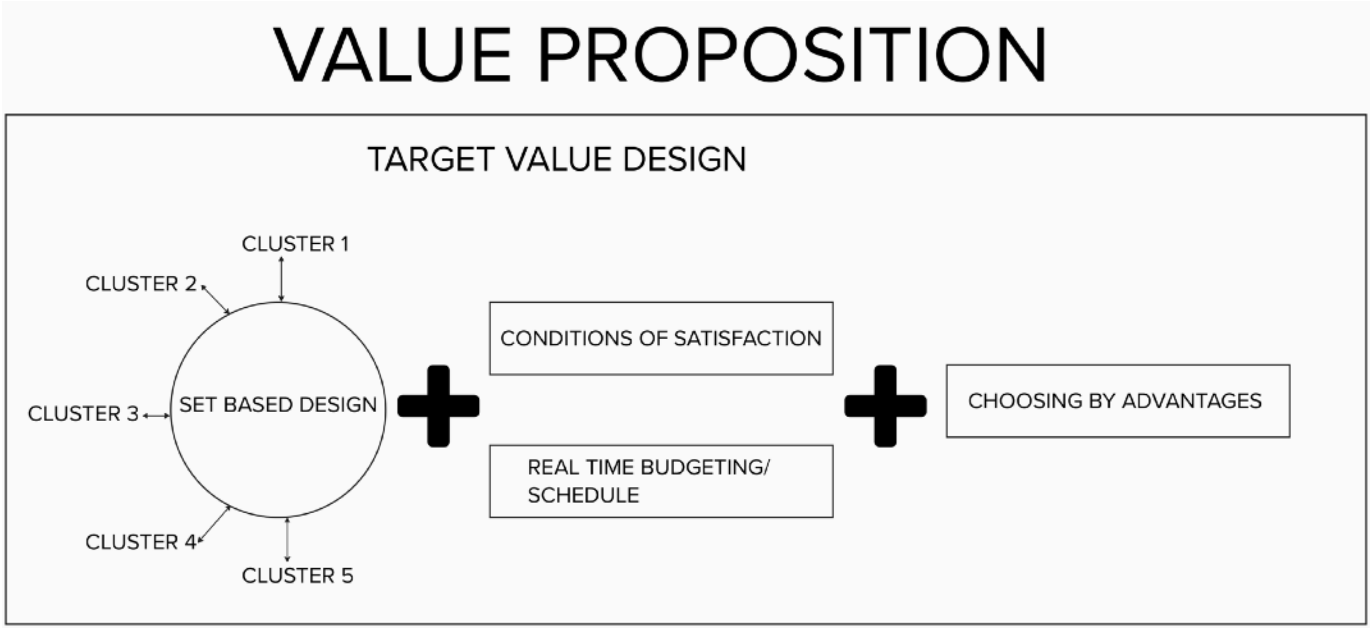
Set Based Design

- Set based design is focused on the Value Proposition
- Typically used with a TVD approach.



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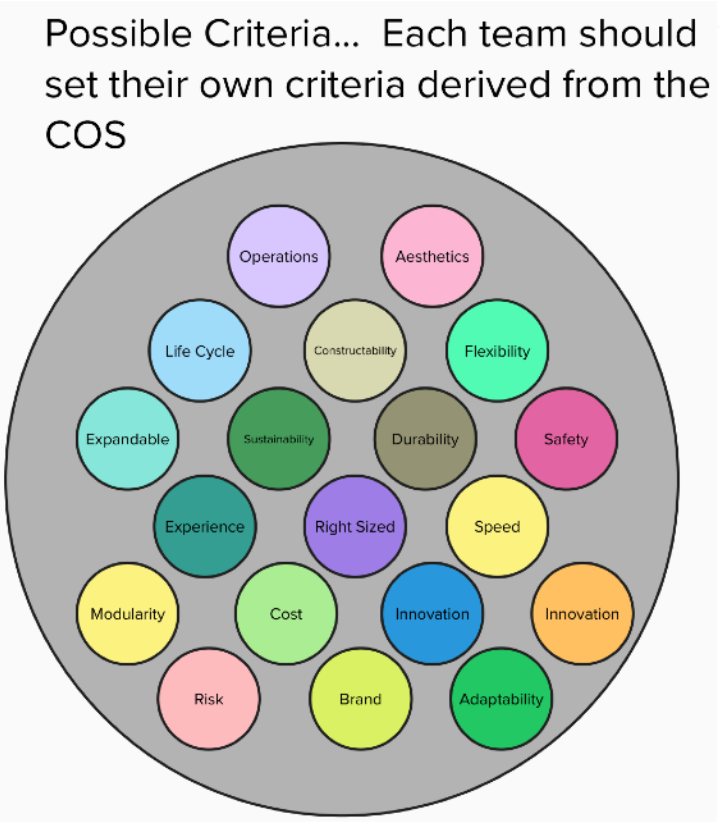
Set Based Design

- Establish decision criteria before starting the design sets.
- Criteria should support the CoS for the project.
- Criteria can connect to the use of CBA for decisions.



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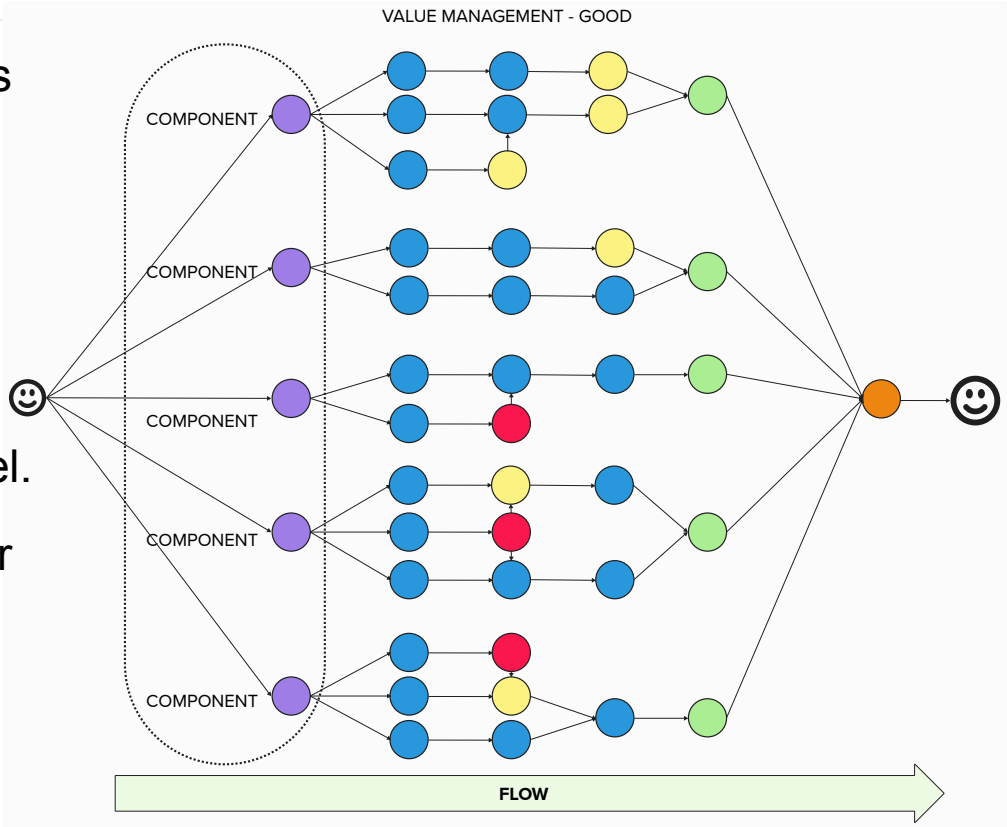
Set Based Design

- An integrated team with many members across multiple disciplines will work design sets in parallel time lines
- Design, constructibility, life cycle, cost, schedule impact etc. all explored simultaneously for each component/ option
- Multiple components explored in parallel.
- All components could be part of a larger assembly - skin system, structural system, site arrangement…
- Components are defined by the team.



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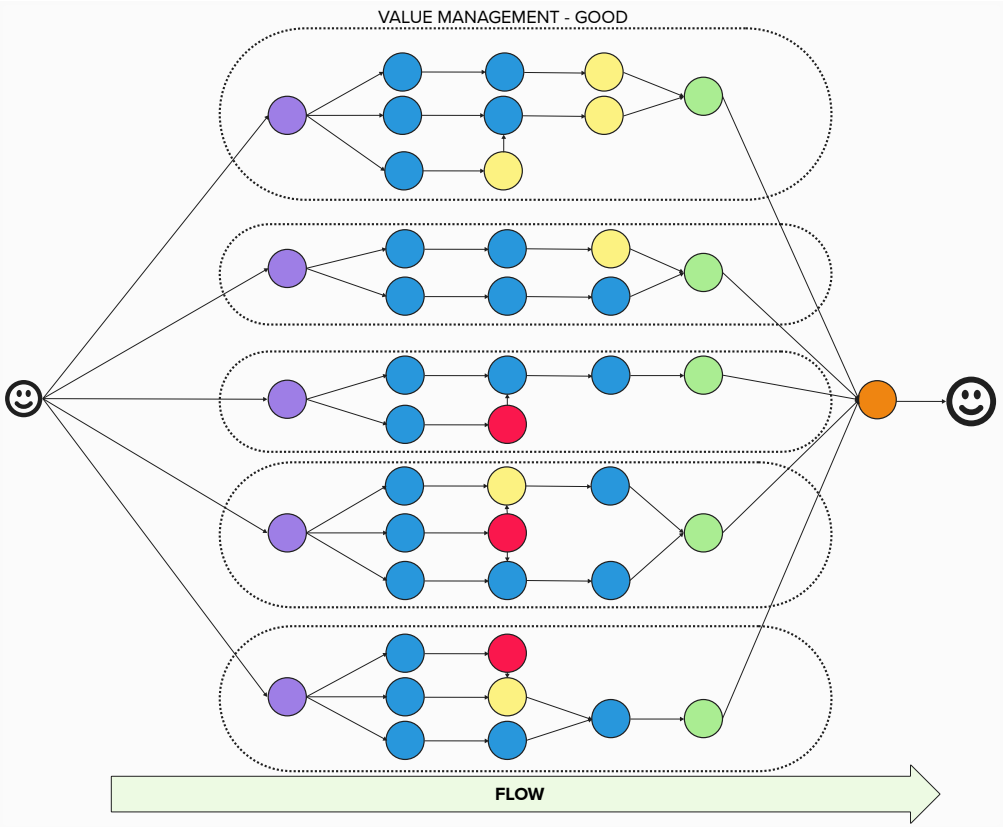
Set Based Design

- Each component design has multiple options.
- Each option is carried forward until it fails. The good parts are incorporated in the other options.
- Options are tested against the CoS, cost and other value statements.
- CBA can be useful in larger and more complex component evaluations.
- Each individual component option is incorporated into the final design.



Prototyping

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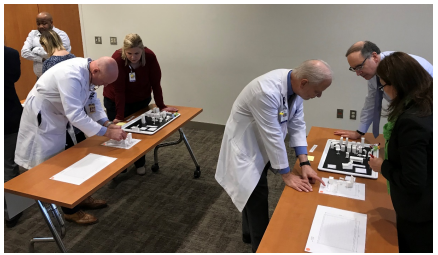
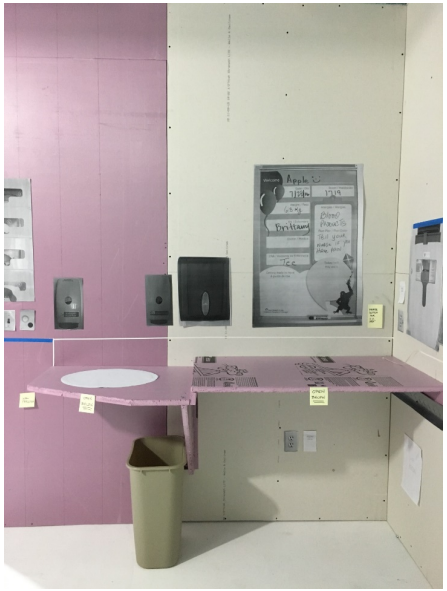
Prototyping is creating a demo of what is being designed or built. It is essential for clarifying required information. A prototype is generally a mock-up of what you intend to build.





Images Courtesy of Stantec Architecture

P3 Prototyping

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McGough

HTG architects

CLARK ENGINEERING

Image courtesy of McGough Construction – St. Paul, MN

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A3 Thinking Structure

Title: Describes the problem	Collaborators: List
Background: Provides the context	**Proposal/Recommendation** Propose countermeasure(s)
Current State Describes what is currently known	**Implementation Plan:** Indicates the actions/outcomes, time table and responsibilities
Future/Target State: Identifies the desired outcome	
Analysis: Analyze the situation for root cause creating the gap between current condition and target condition	**Follow-up** Creates a follow-up / review process

Discussion Question: Box #7

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List one take-away from today's discussion that you can implement on your current project.

Each person make a tag for the one thing they can implement in Box #7. Table facilitator to allow for 5 minutes for each table to finish.

Each person will put their tag in Box #7 and we will discuss as a group

TOTAL TIME 10 MINUTES:

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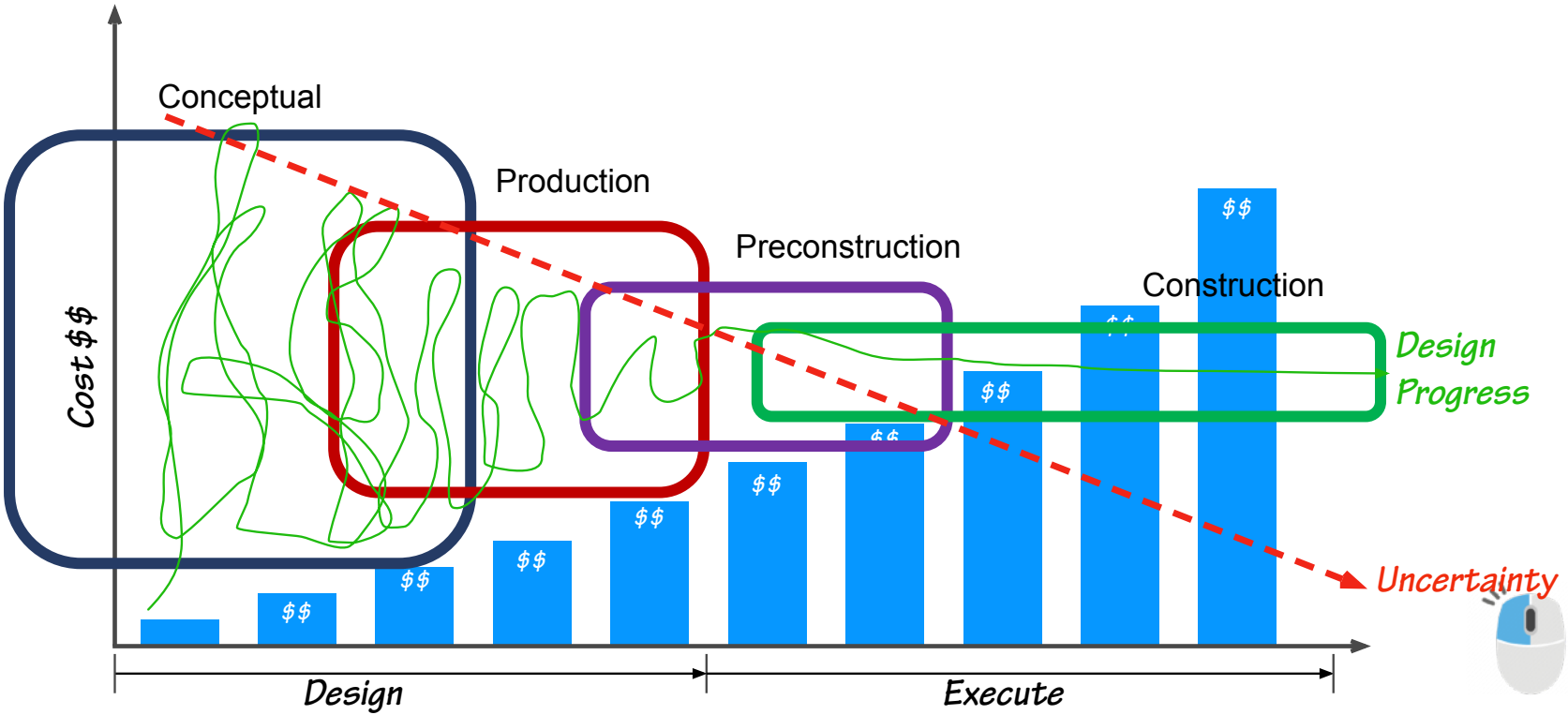
Nature of Design: Current State



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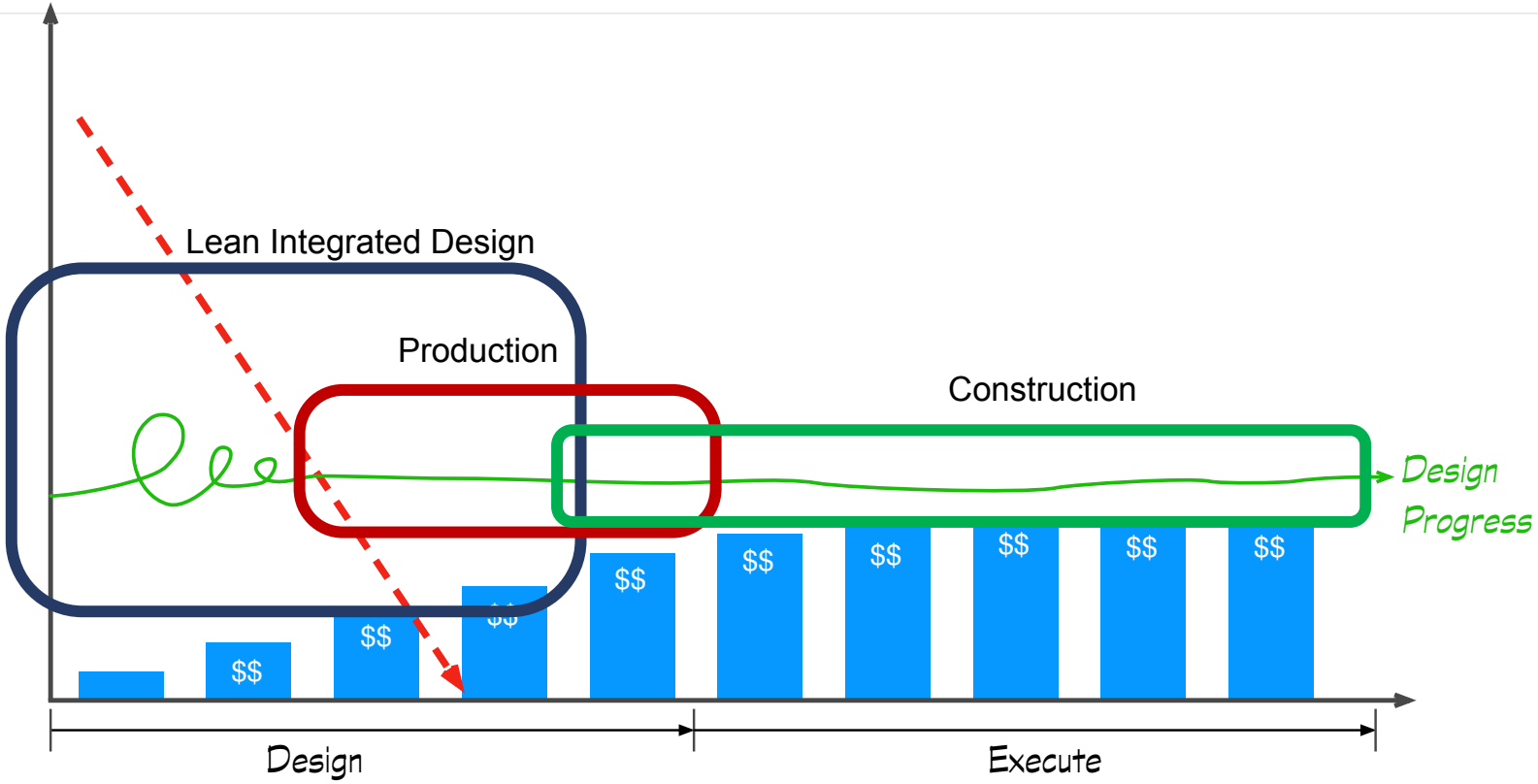
Integrated Lean Project Approach



Learn More

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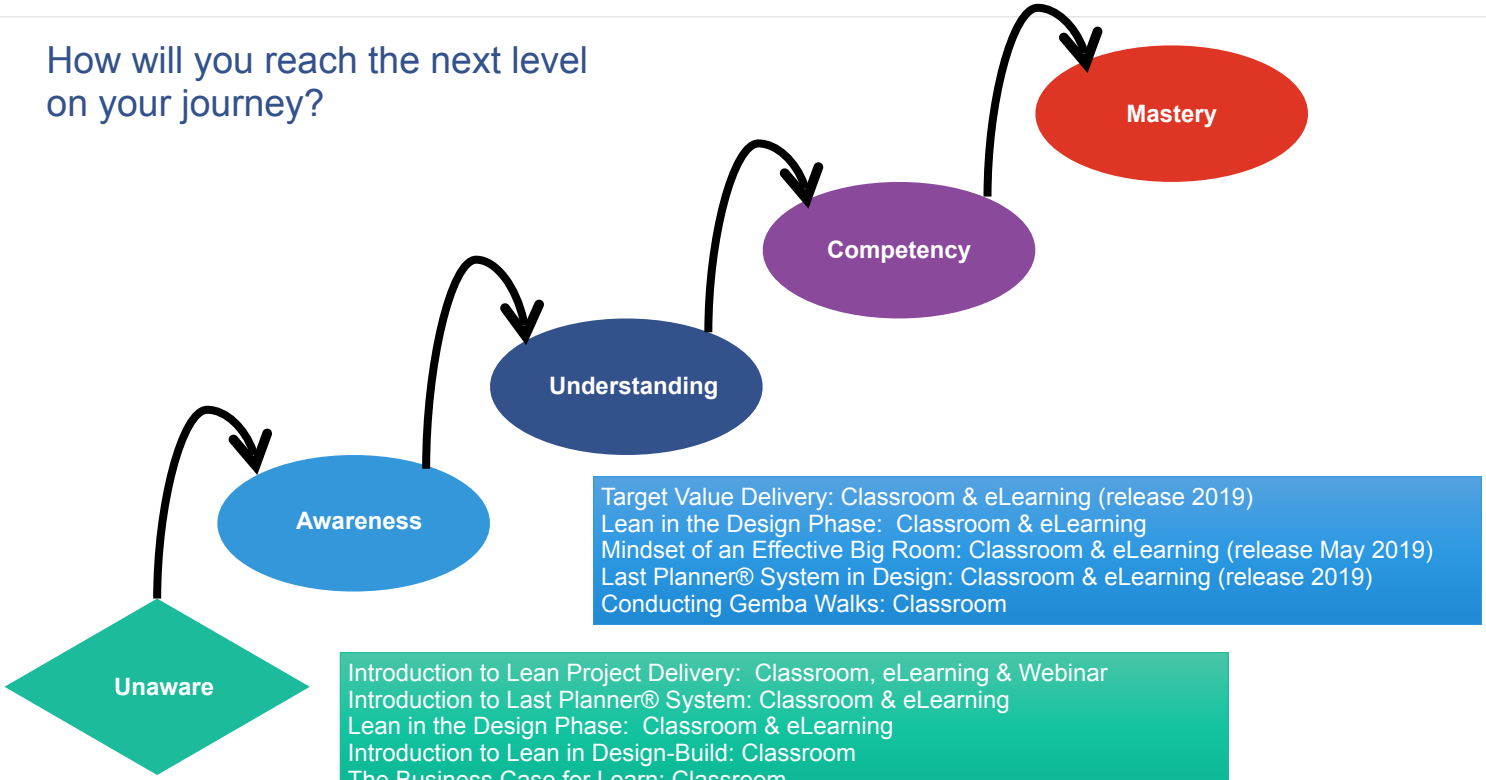
How will you reach the next level on your journey?



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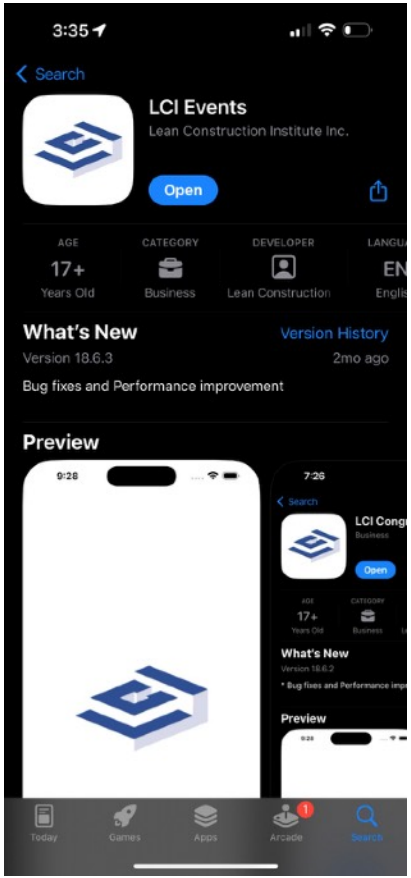

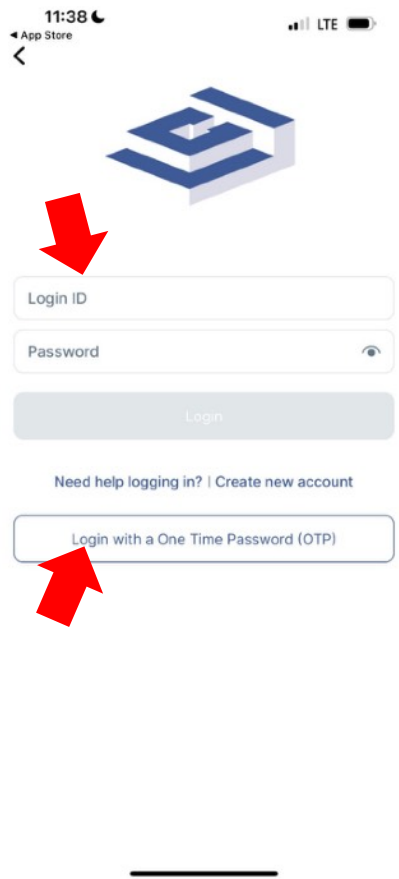

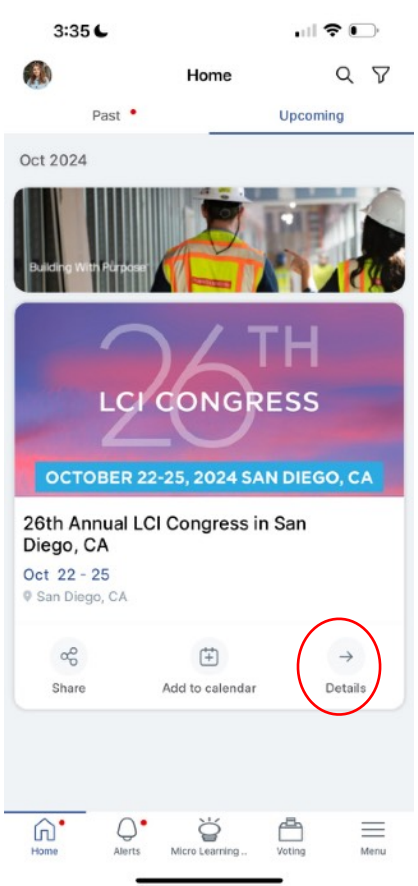

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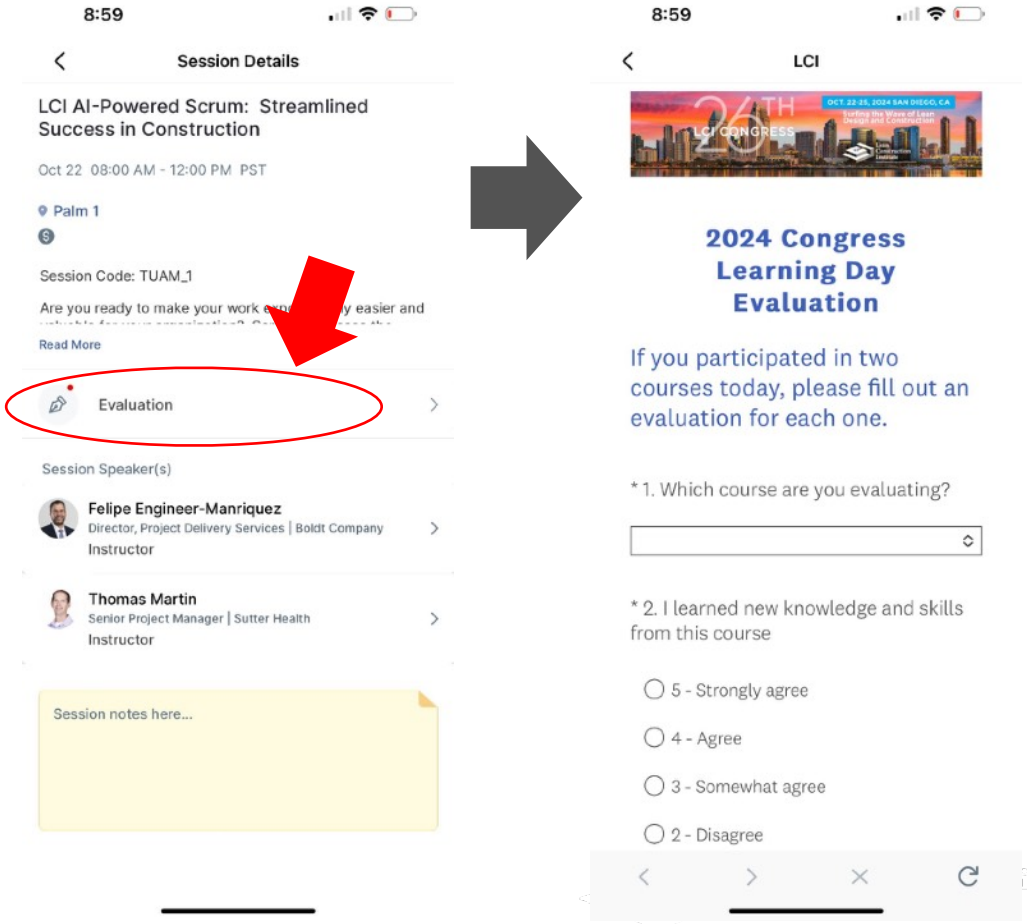

Plus/Delta

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What went well?

What could be better?
Ideas for how?

This concludes The American Institute of Architects Continuing Education Systems Course

Lean Construction Institute info@leanconstruction.org