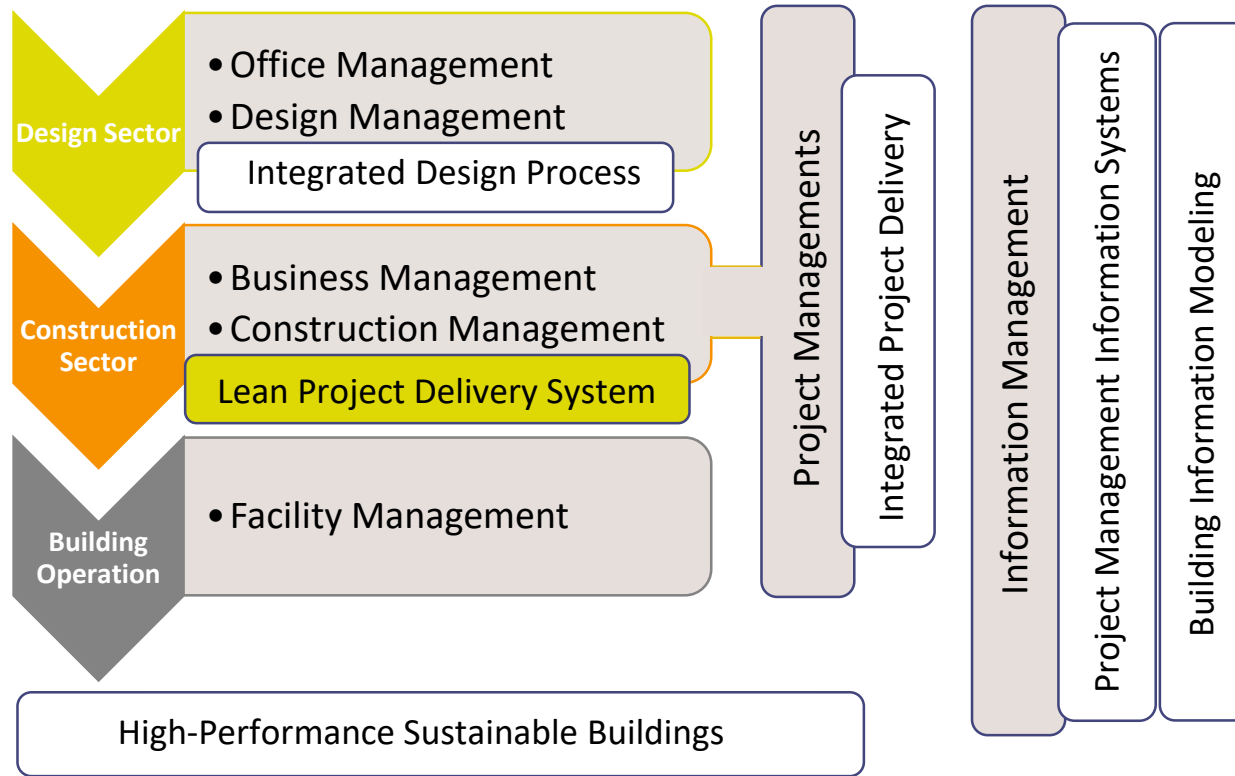




Advanced Design & Construction Management Techniques- LEAN Project Delivery

جلسه سیزدهم- خرداد ماه 1398- مدیریت پروژه

By: Hoda Homayouni Ph.D.



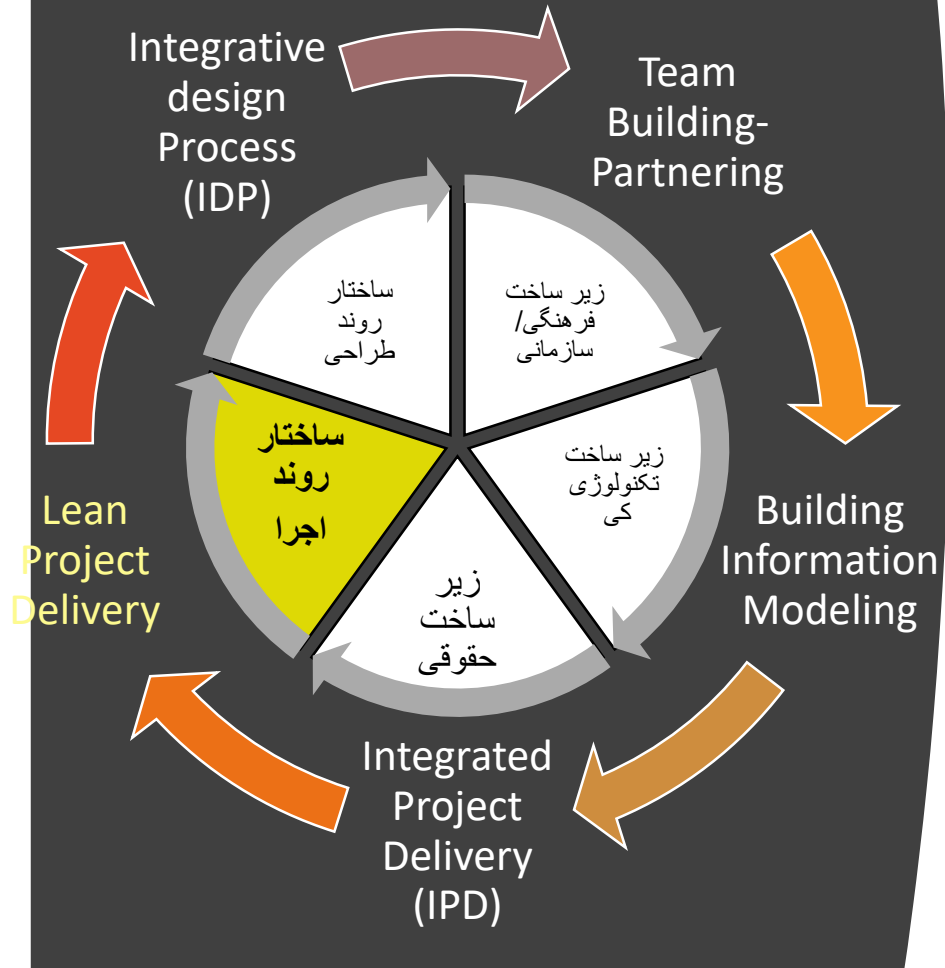
Introduction

Lean Process

Case Study throughout the presentation: Akron Children's Hospital- Ohio



Lean Processes



Lean Philosophy



Premises



History

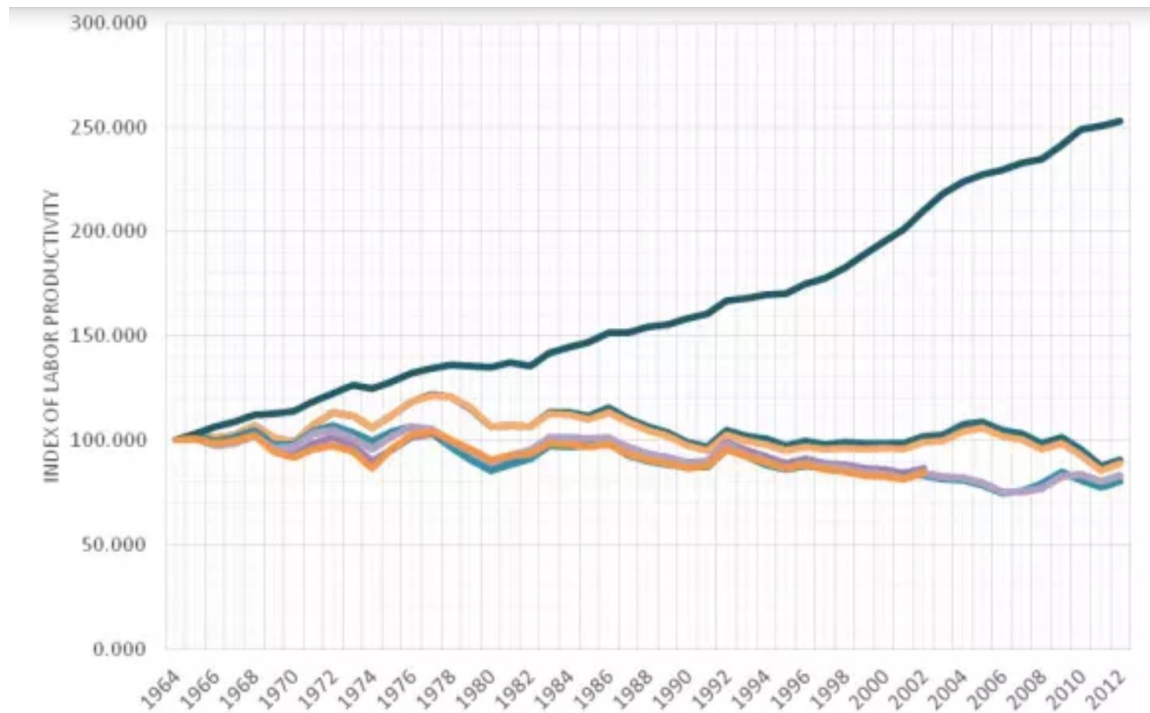


How it works



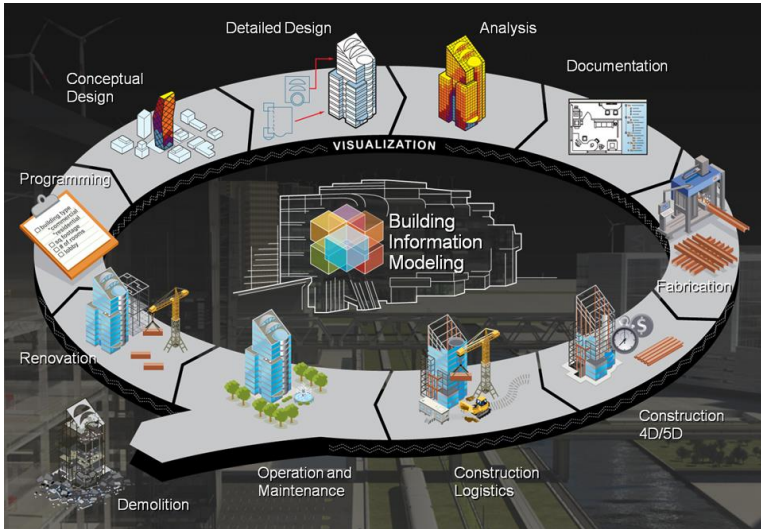
Internal Culture Building

Lean Philosophy

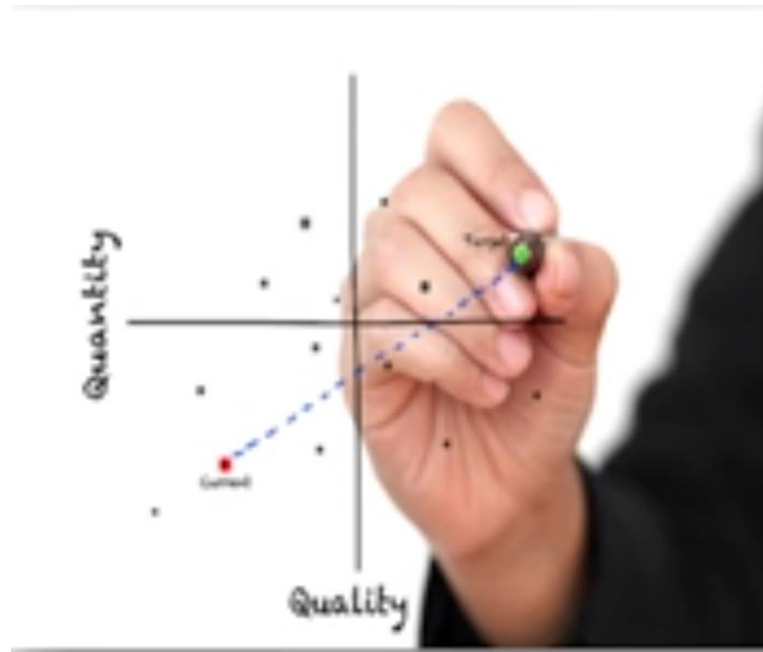


Index of Construction Labor Productivity, 1964-2012
based on various deflators
in comparison to labor productivity in all nonfarm industries

- C30 deflated by annual construction labor cost index, 1964=100
- C30 deflated by annual consumer price index, 1964=100
- C30 deflated by annual construction value in place index, 1964=100
- C30 deflated by house price index, 1987=100
- C30 deflated by price index of new one-family house under construction, 1964=100
- C30 deflated by price index of new one-family house under construction, 1964=100
- All non-farm industries
- C30 deflated by annual building value in place index, 1964=100



Technology 



Workforce Productivity 



Safety 

How is this possible?

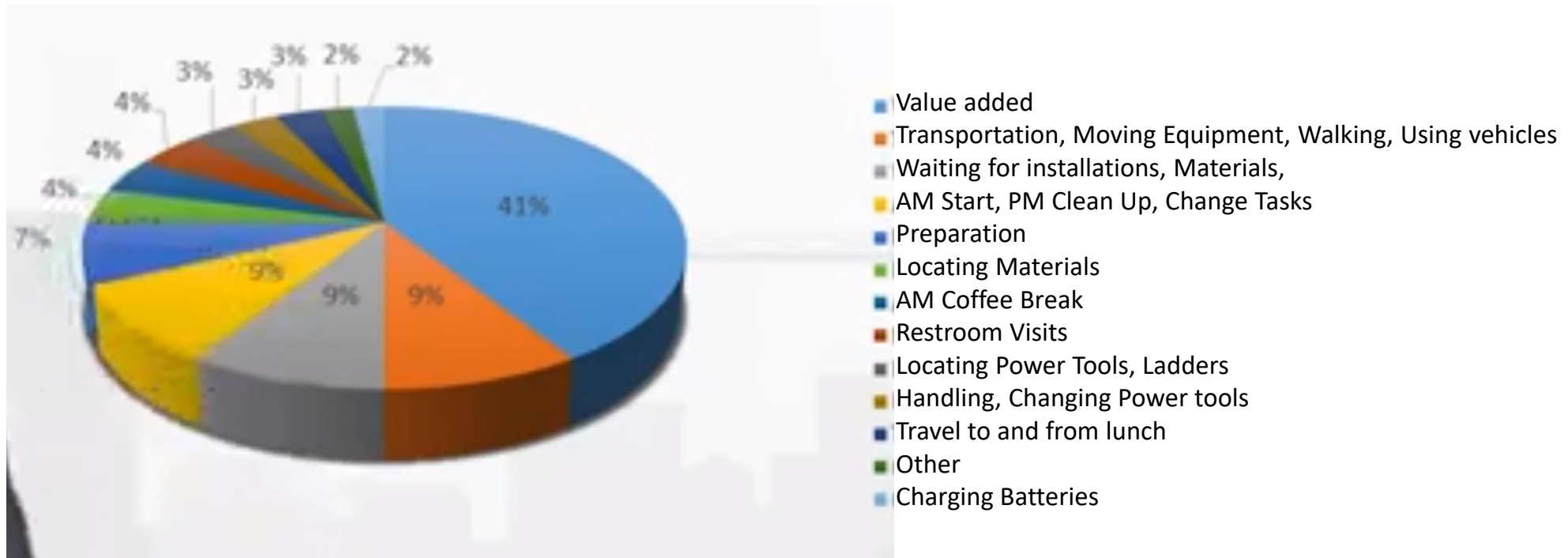


Lean Construction Institute (LCI)

- A non-profit organization Founded in 1997
- Vision: To transform the design and Construction industry supply chain to provide value and enable other industries through lean and integrated approaches.

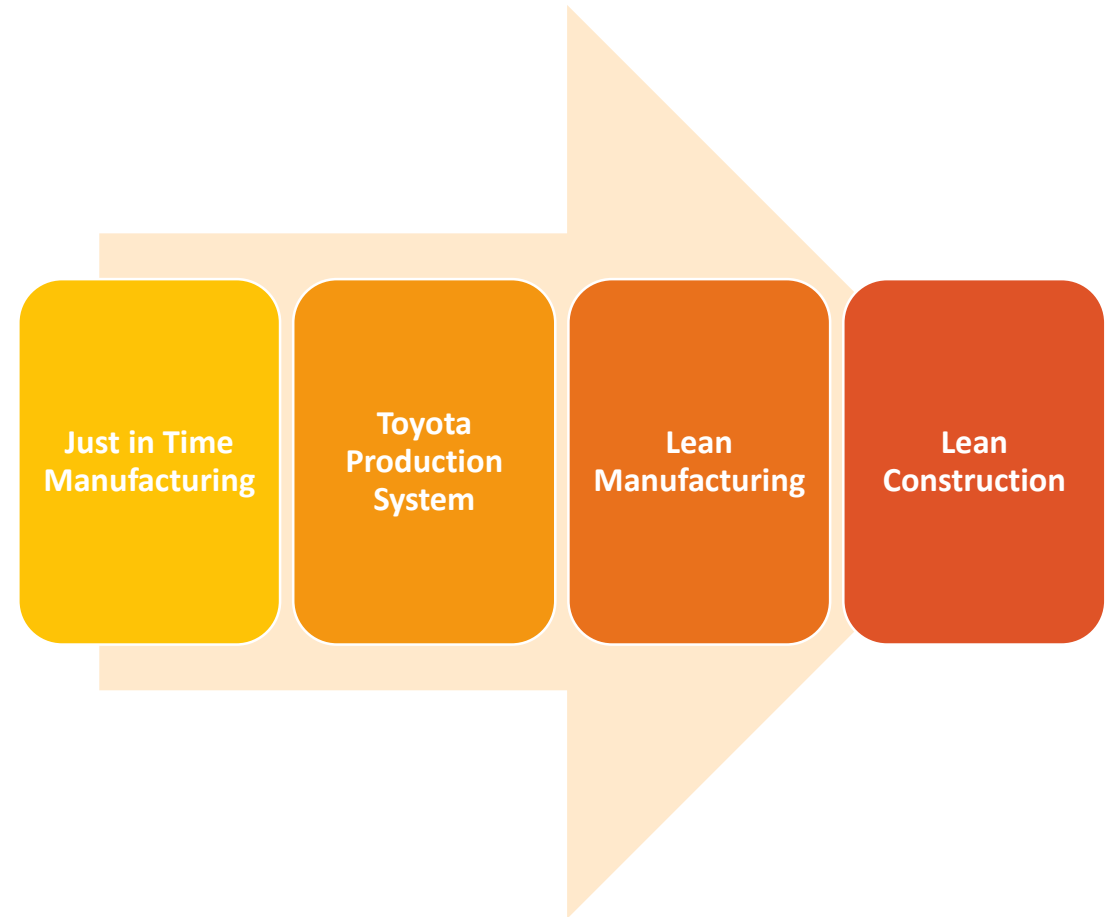
LCI Study of hundreds of projects in US

- A comprehensive study of hundreds of projects in US show that only 40% of the average construction workers day was value added.



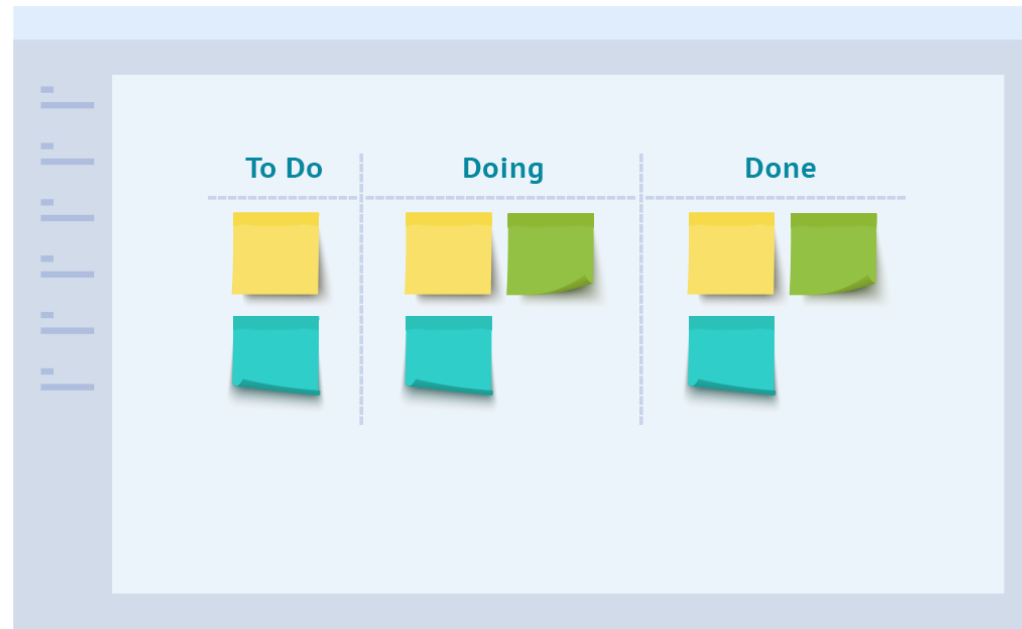
Lean Construction has its roots in Industry

- 1945: Toyota, traditionally a sewing machine manufacturer, makes foray into Automobile segment, Japanese labor productivity was 10% of their American counterparts. Toyota implements Toyota Production system (TPS).
- 1955: Toyota labor productivity eclipsed American Auto Manufacturers.
- Today: Toyota is one of the World's largest auto manufacturer. It's facilities are some of the most efficient facilities in the world.



Just-In Time Delivery (Kanban-pull system)

- **Just-in-time** (JIT) manufacturing, is a methodology aimed primarily at reducing **times** within production system as well as response **times** from suppliers and to customers.
- Advantages: Saving resources by streamlining your production systems; reducing the capital you have tied up in stock; dispensing with the need for inventory operations.



Just-In Time Delivery (Kanban-pull system)

Engage all employments to suggest improvements (Not just management)

Knowledge Sharing
Allow documentation and knowledge sharing



Sustain Improvement
Create Standard process to sustain improvements.

Engaged Culture
100% Engaged Culture of Continuous Improvement

Understand Waste

- Defects- Do it right the first time
- Overproduction- Make what you need...Nothing more
- Waiting- Create flow to eliminate waiting
- Not Utilizing Human resources- Use everyone's talents to its fullest
- Transportation- Minimize the amount and distance you and material travel
- Inventory- Only stock what you need. Just in-time deliveries.
- Motion- Have what you need at your side
- Excess processing- Only do what is requiring... Nothing more.



Improve Continuously (Kaizen)

- Know where you want to go: Create a target condition
- Make small improvements that moves you toward the target



Sokkia Total Station

Continuous improvement

- Attacking fundamental problems - anything that does not add value to the product.
- Devising systems to identify problems.
- Striving for simplicity - simpler systems may be easier to understand, easier to manage and less likely to go wrong.
- A product oriented layout - produces less time spent moving of materials and parts.
- Quality control at source - each worker is responsible for the quality of their own output.
- Poka-yoke - 'foolproof' tools, methods, jigs etc. prevent mistakes
- Preventative maintenance, Total productive maintenance - ensuring machinery and equipment functions perfectly when it is required, and continually improving it.

Sustain the improved process

- Once you make an improvement incorporate that to your standard process
- Never forget to celebrate your teams success!



Case Study- Concrete Forming Cycle

- Using two tower cranes with full capacity to cast concrete structure
- Continuous improvement culture: We challenged the crew to work faster
- No initial strategy from the crew!

Step 1:

- Game tape analyses: Kaizen process



Case study

Step 2:

- Looked at two processes:
 - 1- top cycle: casting
 - 2-bottom cycle: feeding the cranes
- ⇒ The top crew is the one that is holding up the cycle (a lot of variability in their cycle (8-40 min) signals an issue)

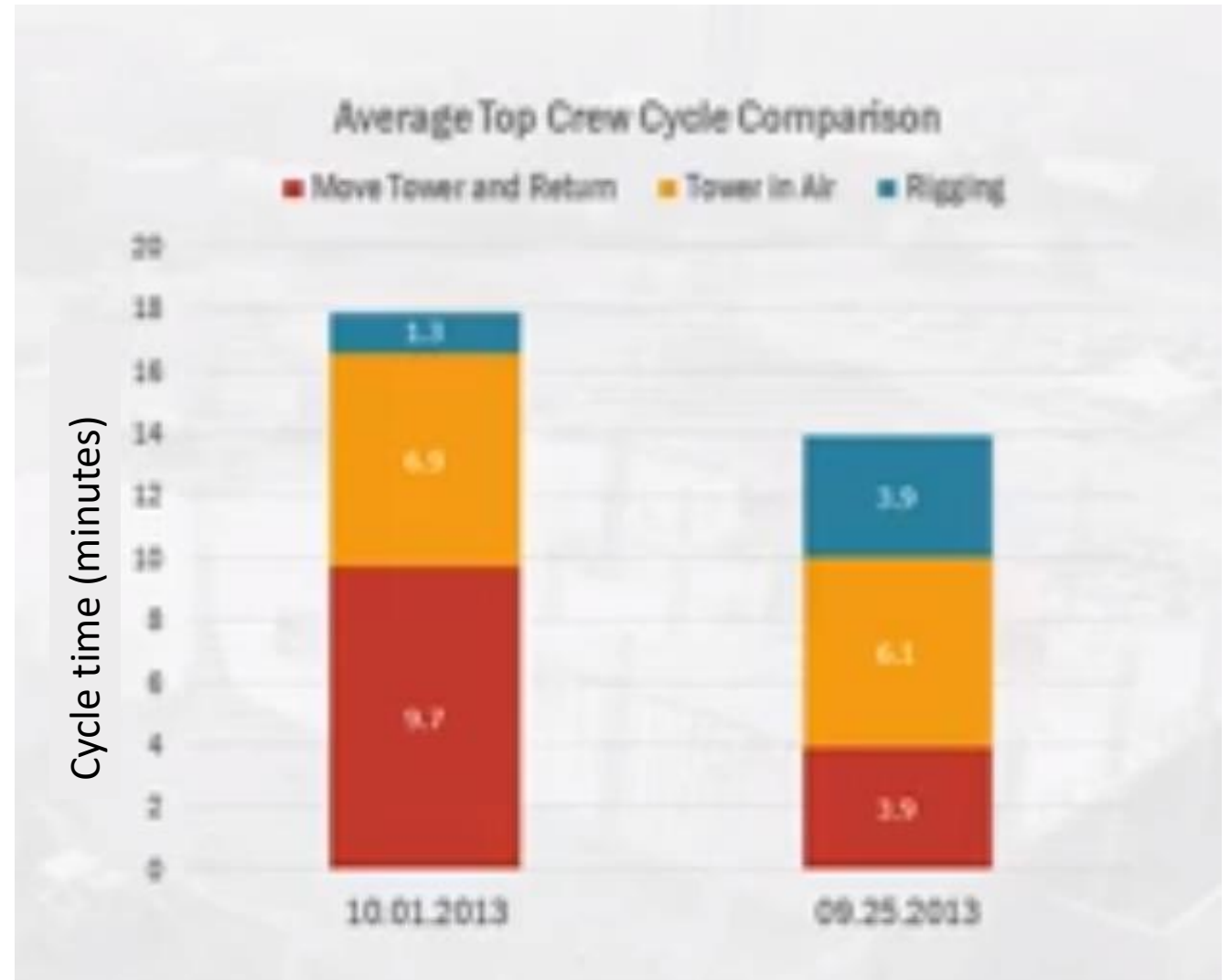
Step 3:

- Brought the crew in over pizza and watched the tape together
- Together came up with a strategy

Case Study

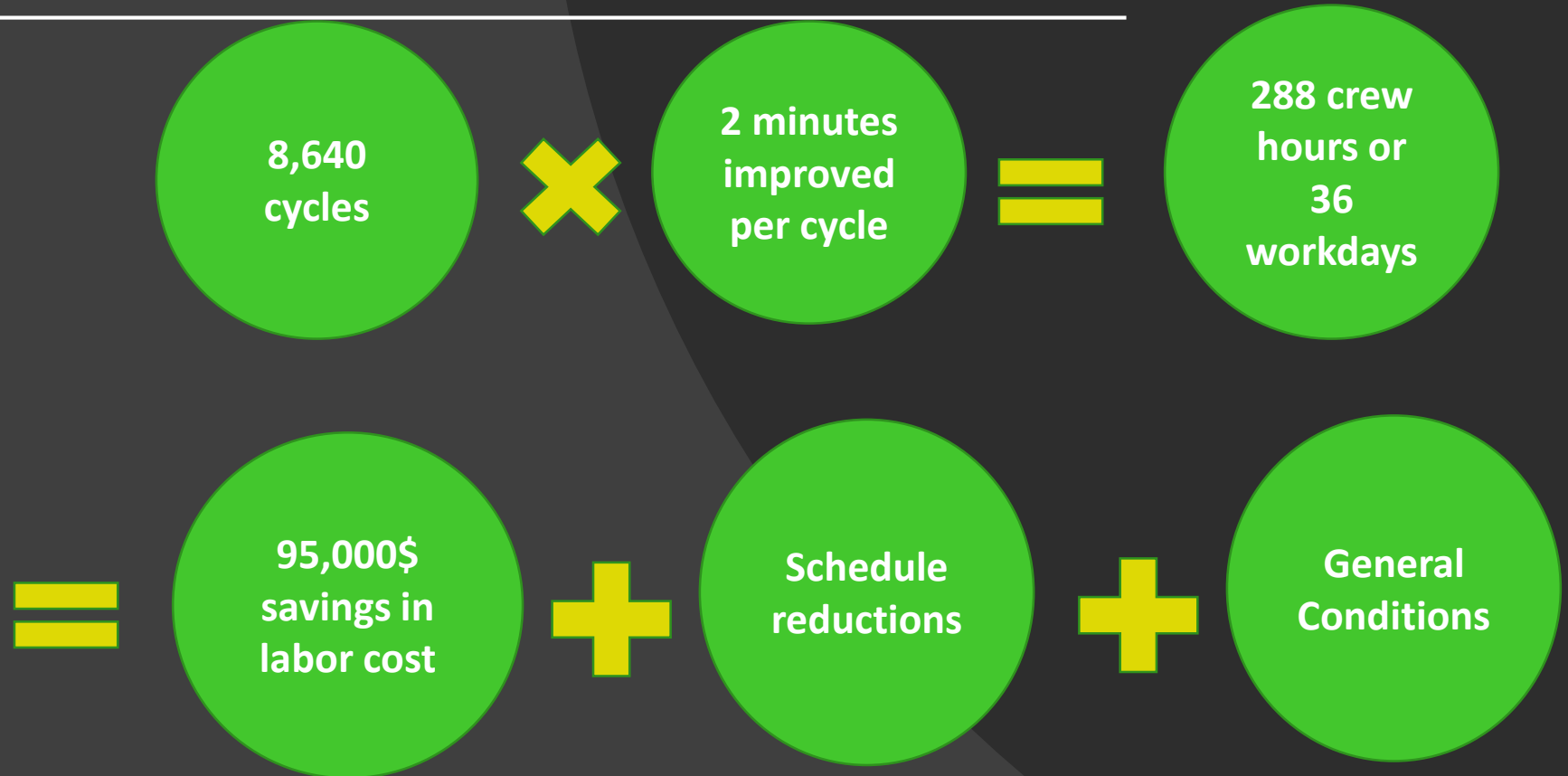
Step 4:

Implemented the strategy



Case Study

Step 5: Sustain



Key Concepts in Improving Construction Industry

Safety

Safety First &
Foremost

Lean

Lean Building
Science



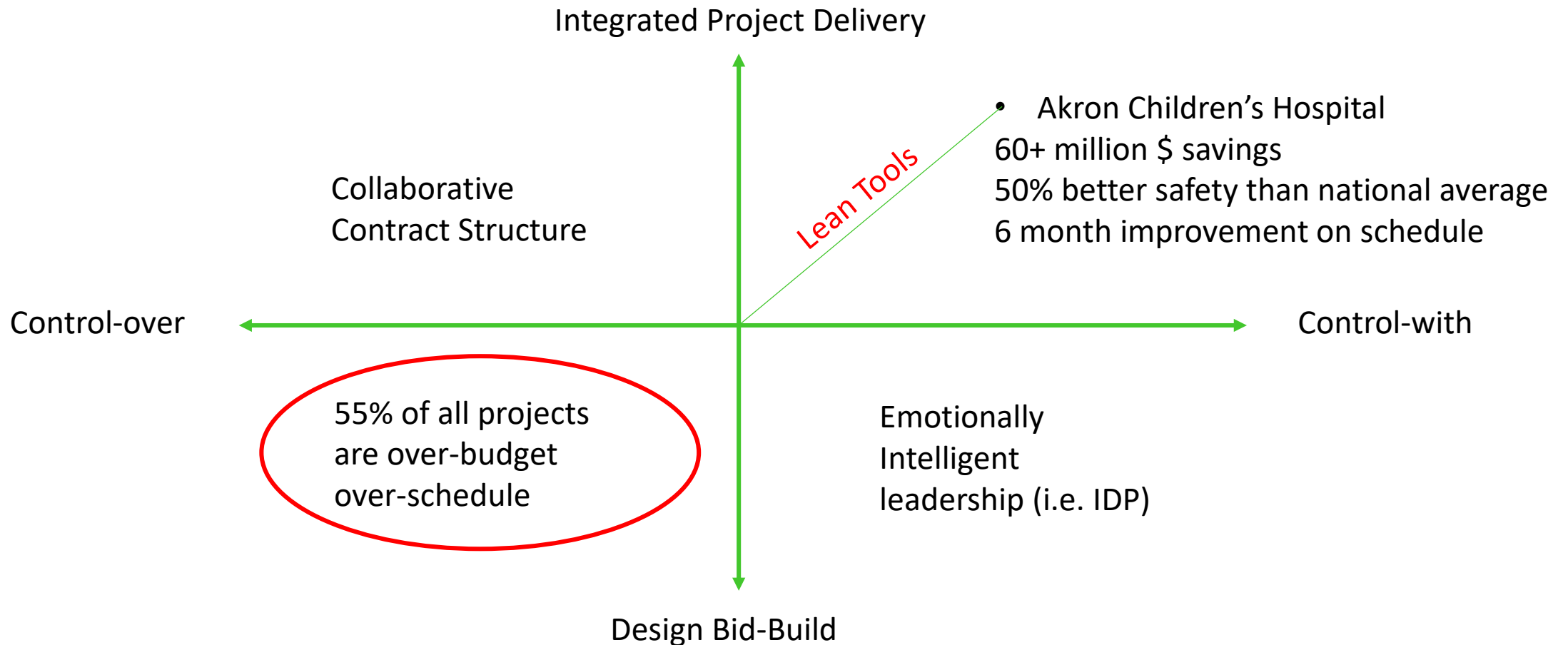
IPD

Relational Contract
Structure

Leadership

Emotionally
intelligent
Leadership

Relational Contracts- Intelligent Leadership- Lean Tools



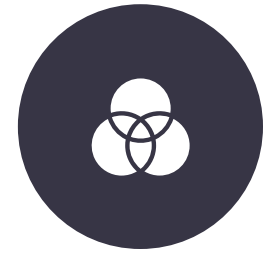
Sample Questions for writing your Reflections



EXPLAIN HOW
KANBAN SYSTEM
HELP IN
MANAGING
PROJECTS?



HOW DOES USING
BIM HELP IN
ACHIEVING LEAN?



HOW DOES USING
LEAN HELP IN
ACHIEVING
GREEN/SUSTAINA
BLE DESIGN?