Welcome!

LEAN Applications in Healthcare Design and Construction

Wed, June 24, 2015 1:00 PM - 2:15 PM EDT

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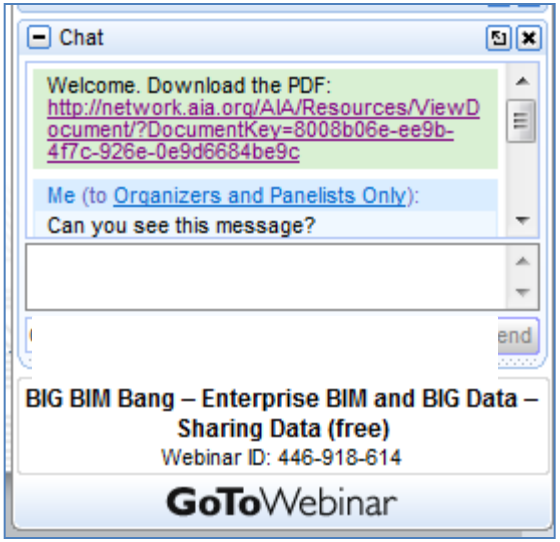
Questions?

Submit a question to the moderator via the chat box.

Content-related questions will be answered during the Q&A portion as time allows.



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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Introduction

David B. Richards, AIA

David B. Richards, AIA, LEED AP, PMP

ROSSETTI

Chief Operating Officer and Principal

Chairman of the AIA Best Practices Committee

Editor of the Practice Management Digest

PMKC Advisory Group

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David Barkin, AIA

Chief Architect

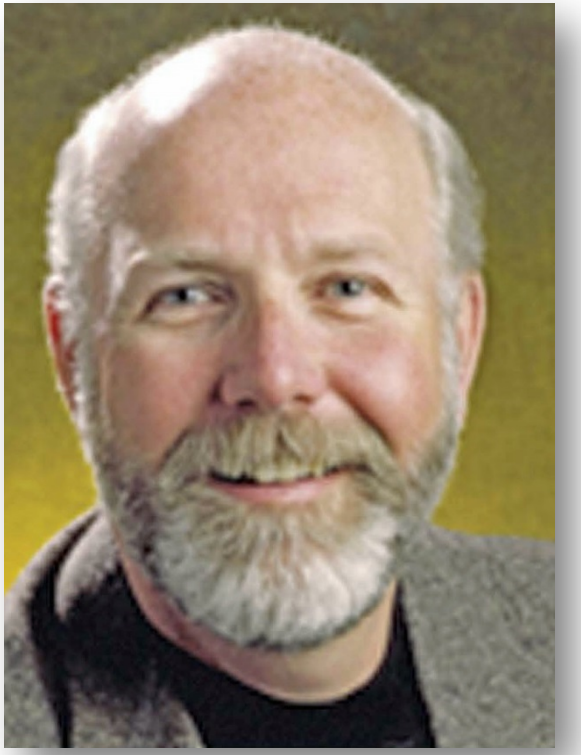
State of Connecticut

DAS / Division of Construction Services

PMKC Advisory Group (retired)

Connecticut Architectural Licensing Board

Speaker



Ed Boudreau, MD

Ed Boudreau, MD

Una Vita, Inc.

Master black belt

Physician

Lean Consultant

Chief Medical Officer

Speaker

Mark Vaughan, AIA, ACHA

Mark Vaughan, AIA, ACHA

Senior Medical Planner

WHR Architects

Principal-In-Charge - Dallas Office

Speaker

Mark Linenberger

Mark Linenberger

Linbeck

Worth Division General Manager

Board of Directors,Lean Construction Institute

ASHE (American Society of Hospital

Engineering).

KSU CNS Advisory Council.

Course Description

The goal of LEAN is to provide the desired amount of product or service at the right time and at the highest possible level of quality with zero waste. Understanding and applying the philosophy of LEAN, architects can design efficient healthcare spaces, departments, and buildings which are aligned with ideal staffing and operational processes. Implementing LEAN thinking in both design and construction ultimately maximizes value for clients throughout the life of a project.

Learning Objectives

1. Acquire an understanding of LEAN and its application to design and construction.
2. Identify the various forms of waste involving people, process, and design.
3. Learn that ideal design solutions are based upon the alignment of future state processes.
4. Understand the concept of flow, its relationship to construction sequencing, and the effectiveness of implementing a pull schedule.

And now for our presentation:

LEAN Applications in Healthcare Design and Construction

Presentation Agenda

What Is LEAN?	10 minutes
Eight types of Waste	5 minutes
Why is it Important to Architectural Firms?	7 minutes
Design Case Studies at Three Scales	10 minutes
How is LEAN Applied Within Construction?	13 minutes
Last Planner System	5 minutes
Question and Answer	15 minutes

Where did the term "LEAN" originate?

James Womack, Daniel Jones, and Daniel Roos coined the term **"LEAN"** in their 1990 book The Machine that Changed the World to describe the manufacturing paradigm (often referred to as the Toyota Production System) developed by the Toyota Motor Company based on principles pioneered by Henry Ford.

Employing Lean Thinking Requires Buy-In at the Highest Level

"Sweep the stairs from the top down"

Quality specialists in organizations where improvement projects are made the sole responsibility of the "quality" department are routinely frustrated because it is difficult to implement improvements and change from the ground up.

Objective is to deliver VALUE to the customer.

Components are:

PEOPLE

PROCESS

DESIGN

Lean philosophy leads to a set of **PRINCIPLES**:

1. VALUE – as defined by the customer
2. Focus on the VALUE STREAM
3. Create PULL SYSTEMS
4. Focus on FLOW
5. Ongoing IMPROVEMENT

Eight Types of Waste

Why is LEAN important to our practice?

1. It is important to our clients
2. The design and construction industry has room for quality improvement
3. Can provide the best information & credibility for ideal design solutions.
4. Enhances productivity, efficiency, and value to all involved
5. Replacement is always around the corner

Eradicating Waste in Design Process

1. Common examples of WASTE during design

   a. **WAITING** on client or consultant information for task completion

Eradicating Waste in Design Process

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   b. OVERPRODUCING design detail before needed

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Eradicating Waste in Design Process

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   a. WAITING on client or consultant information for task completion

   b. OVERPRODUCING design detail before needed

   c. PROCESS: not standardizing toward business processes, details drawings, and RFI's

   d. REWORK of documents due to mis coordination, bad &/or untimely information

Eradicating Waste in Design Process

1. Common examples of waste during design

   e. **INTELLECT:** lack of quality reviews before issuing documents; lack of sensitivity regarding cost & practical considerations

Eradicating Waste in Design Process

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   f. MOTION: spending energy but client design decisions are not moving forward; lack of meeting preparation

Eradicating Waste in Design Process

1. Common examples of waste during design

   e. INTELLECT: lack of quality reviews before issuing documents; lack of sensitivity regarding cost & practical considerations

   f. MOTION: spending energy but client design decisions are not moving forward; lack of meeting preparation

   g. TRANSPORTATION: unnecessary meetings; not leveraging technology for meetings; timely review of shop drawings and RFI's

Eradicating Waste in Design Process

2. Successful design process depends on every team member doing their job well (firm & individual)

3. Everything hinges on EFFECTIVE COMMUNICATION

   a. listening to our client and other customers

   b insure understanding of task assignment

   c. confirming responsibilities

   d. managing schedule

   e. follow through and accountability

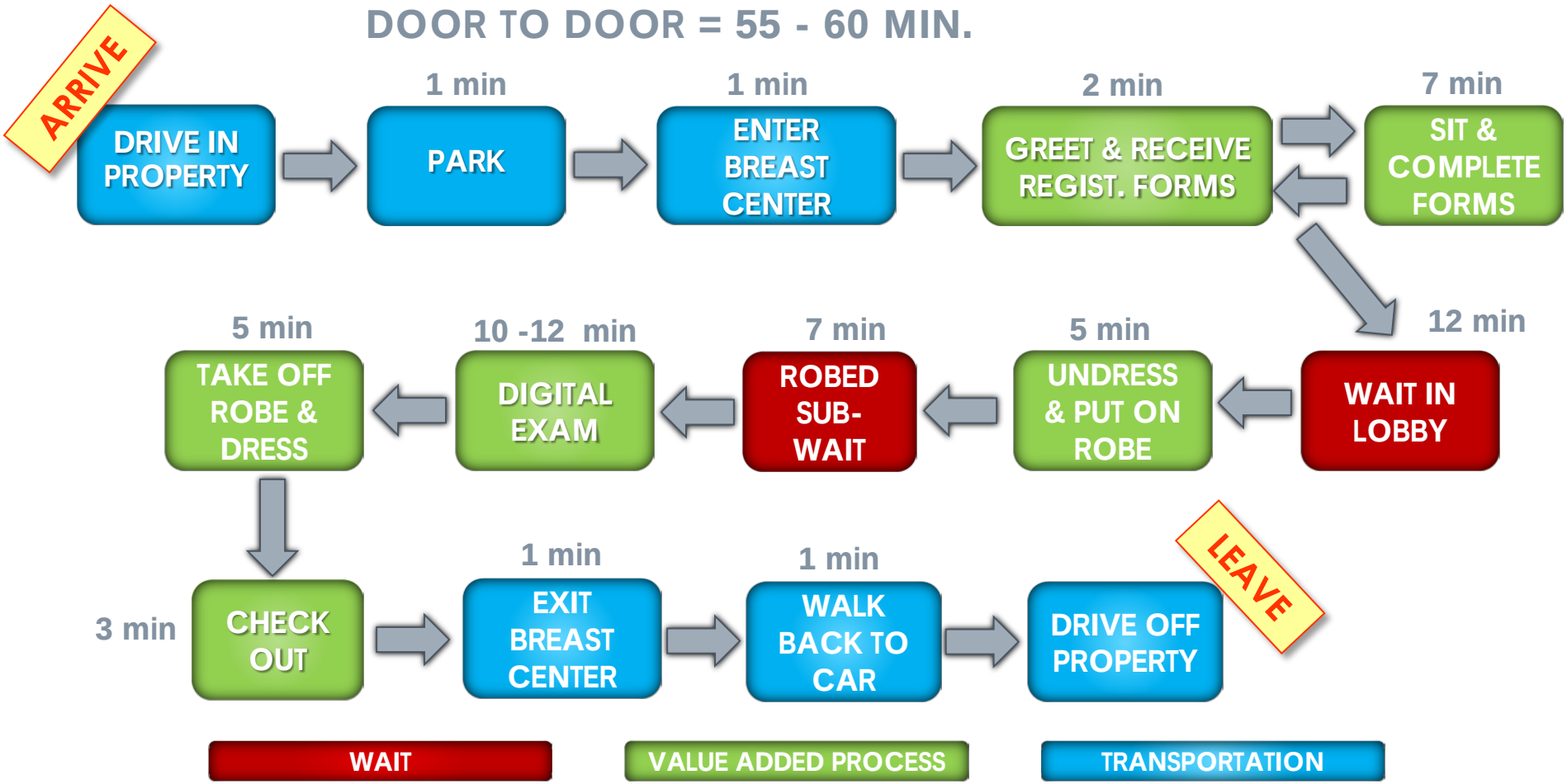
SOME LEAN THINKING TOOLS USED DURING DESIGN

- Observation (Gemba)
- Current State Processes
- Value Stream Mapping
- Eliminate Waste (Muda)
- Fetching Distance Studies
- Benchmarking Quality Indicators
- Ideal Future State Processes & P2 Events
- Continuous Improvement (Kaizen)
- Standardization

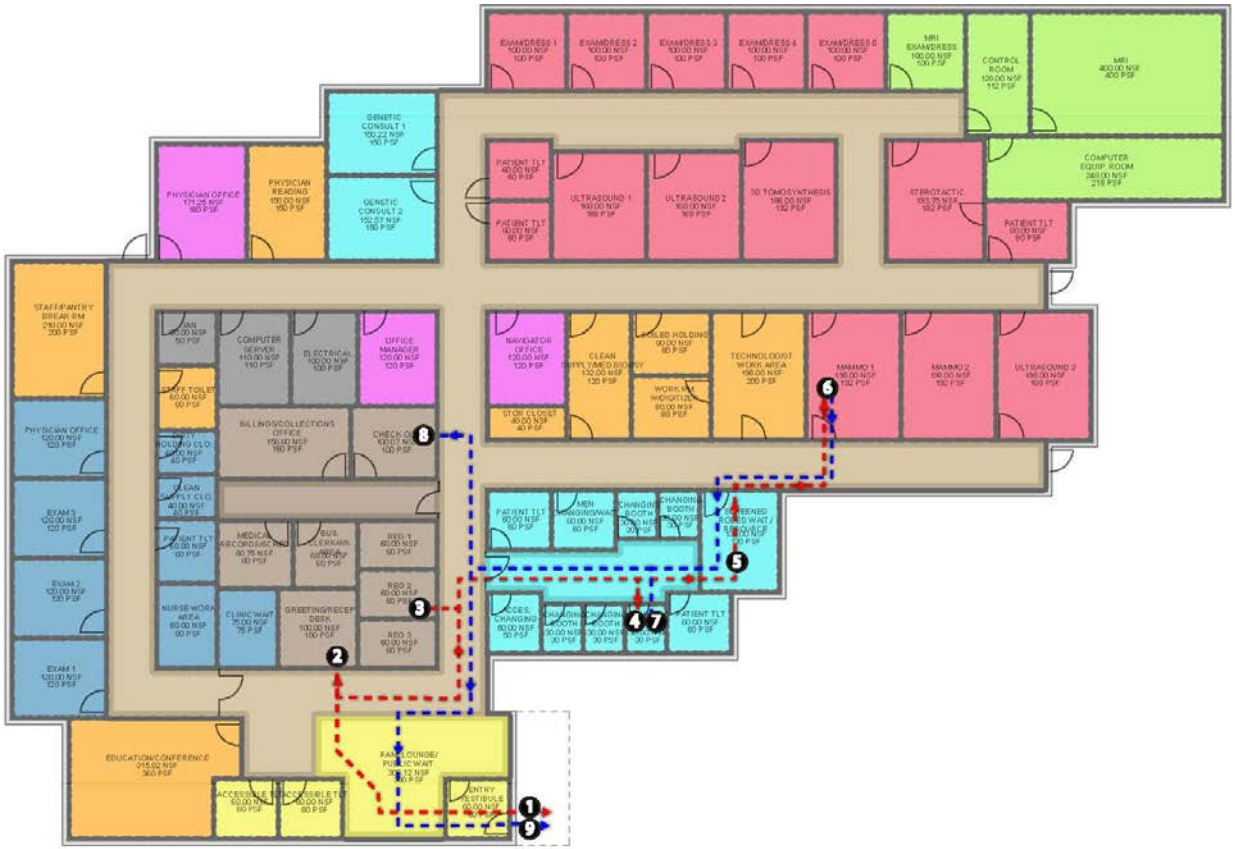
Aligning Design with Ideal Processes & Customer Expectations

TYPICAL STATE VSM: SCREENED PATIENT

DOOR TO DOOR = 55 - 60 MIN.



OPTIMIZING WORKFLOW – SCHEME 1



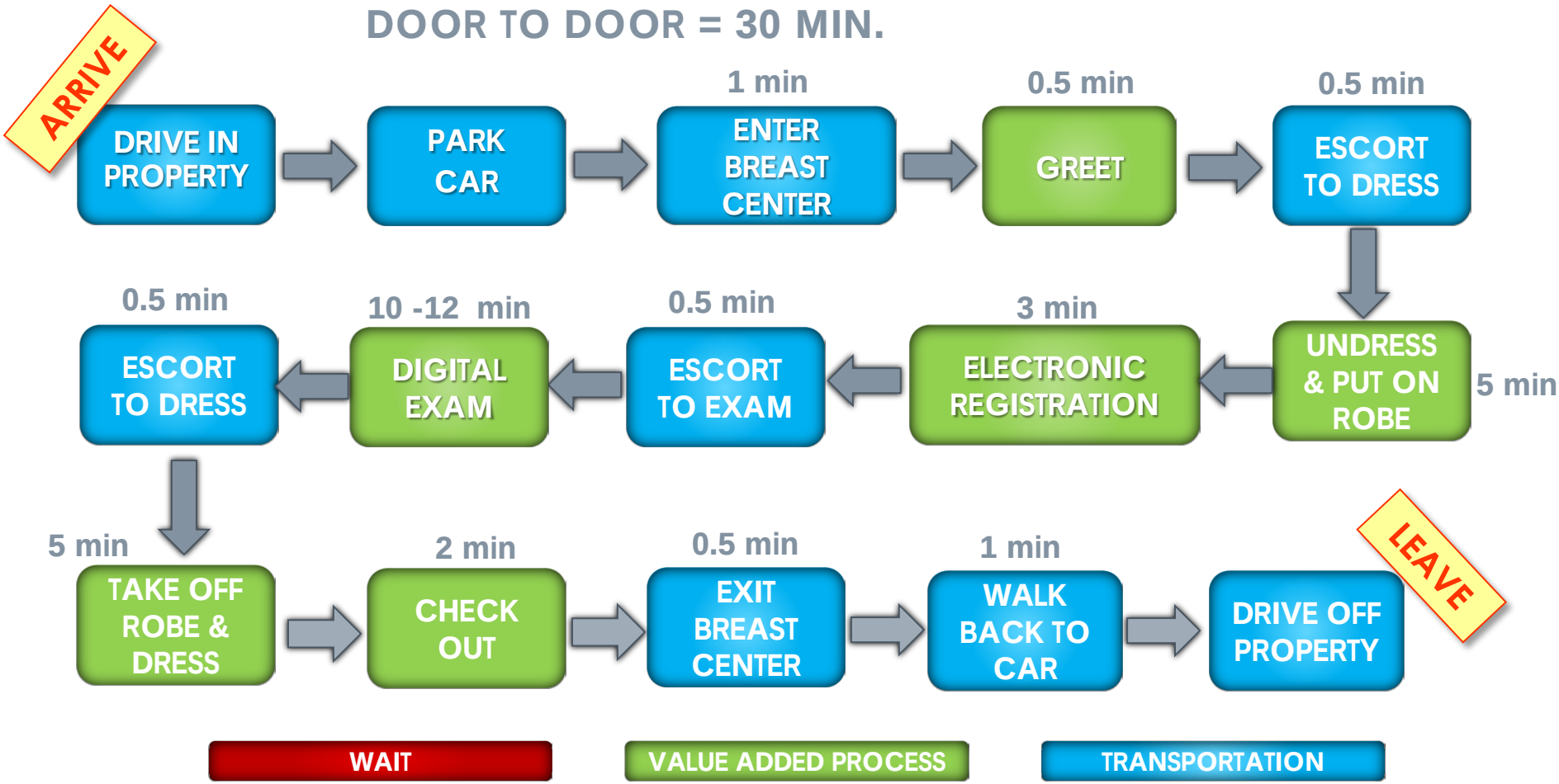
SCREENED PATIENT FLOW DIAGRAM

1 ENTRANCE
2 GREETING/RECEPTION DESK
3 PRIVATE REGISTRATION/
4 CHECK DRESS/LOCKERS
5 SCREENED WAITING
6 DIAGNOSTIC ROOM
7 DRESS/LOCKERS
8 CHECK-OUT
9 EXIT

BALANCES STAFF NEEDS AND PATIENT SATISFACTION

IDEAL STATE VSM: SCREENED PATIENT

DOOR TO DOOR = 30 MIN.



OPTIMIZING WORKFLOW – SCHEME 2

SCREENED PATIENT FLOW DIAGRAM

1 ENTRANCE

2 GREETING/RECEPTION DESK

3 PRIVATE REGISTRATION/
CHECK DRESS/LOCKERS

4 DIAGNOSTIC ROOM

5 DRESS/LOCKERS
CHECK-OUT

6 EXIT

BALANCES STAFF NEEDS AND PATIENT SATISFACTION

REGISTRATION / DRESS / CONSULT

MAMMOGRAPHY EXAM ROOM

A-PHONE REGISTRATION

A1-REFERRING DOC CALLS CAB
A2-REFERRING DOC CALL PAT WITH APPT.
A3-PREREGISTRATION CALL WITH PATIENT
A4-DIRECTIONS
A5-PREVIOUS ONLINE PATIENT MED HISTORY

0:25

B-ARRIVAL

B1-VALET PARKING
B2-GREETER AT LOBBY
B3-DIRECTED TO ELEVATOR LOBBY
B4-ARRIVAL ON CLINIC FLOOR
B5-GREETED

0:05

C-CHECK-IN

C1-INSURANCE VERIFICATION
C2-CO-PAYMENT
C3-COMPETE REG. FORMS AT WAITING
C4-BRING FORMS BACK TO REGISTRATION
C5-ADDITIONAL SPECIALTY FORMS TO BE FILLED PRIOR TO APPOINTMENT
C6-SPECIALTY CLINIC ALERTED THAT PATIENT IS IN QUEUE

0:10

D-DIRECTED TO SPECIALTY CLINIC

D1-CHECK IN DIRECTS PATIENT TO SPECIALTY WAITING AREA
D1A-PATIENT GIVEN EXAM ROOM PASS
D2-
D3-
D4-PATIENT FILLS OUT SPECIALTY FORMS

0:05

WHAT IF THE PATIENT SITS DOWN IN THE WRONG AREA AND CANNOT BE FOUND?

TO HELP PATIENT ARRIVE IN THE CORRECT SUBSPECIALTY WAITING AREA:
PATIENT GIVEN SMART EXAM ROOM PASS (CODED TO SPECIALTY WITH COLOR AND GPS)

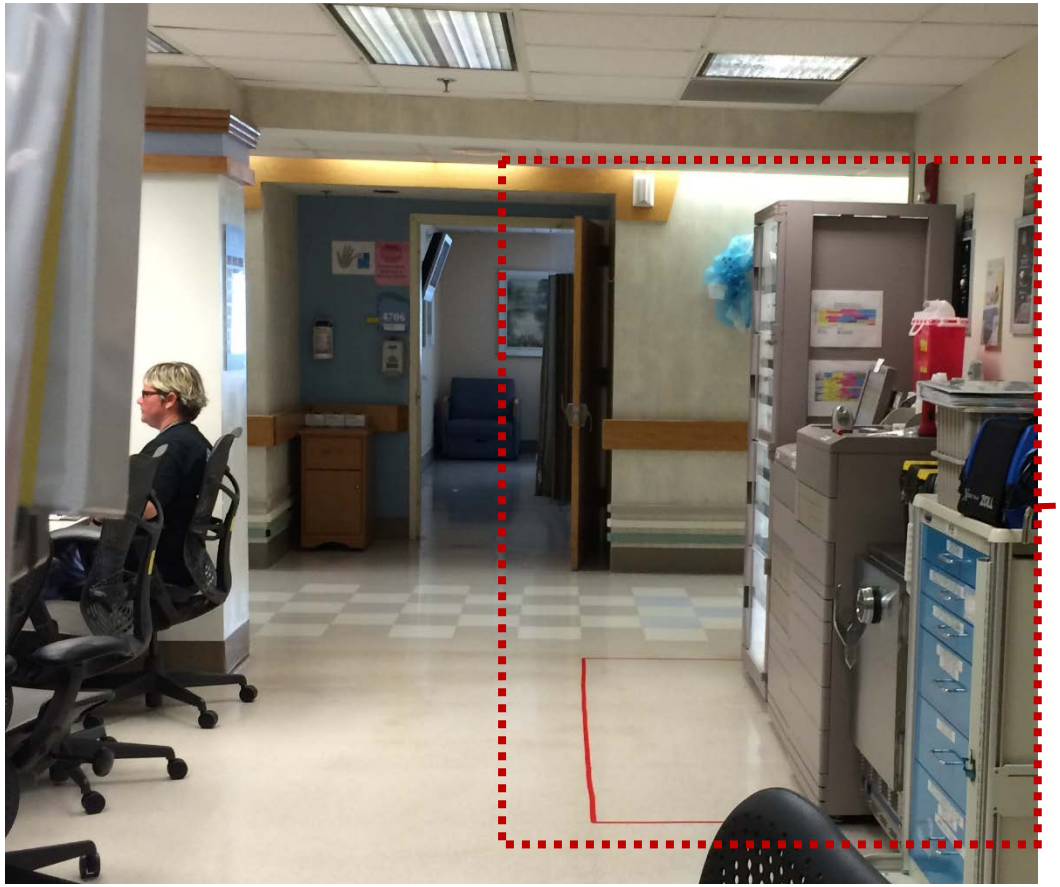
1. PLASTIC COLOR CARD
2. SAME WITH CHIP
3. iPAD WITH SELF ROOMING

A1 STAFF ACTIONS

B5 PATIENT ACTIONS

VALUE ADDED

NON VALUE ADDED

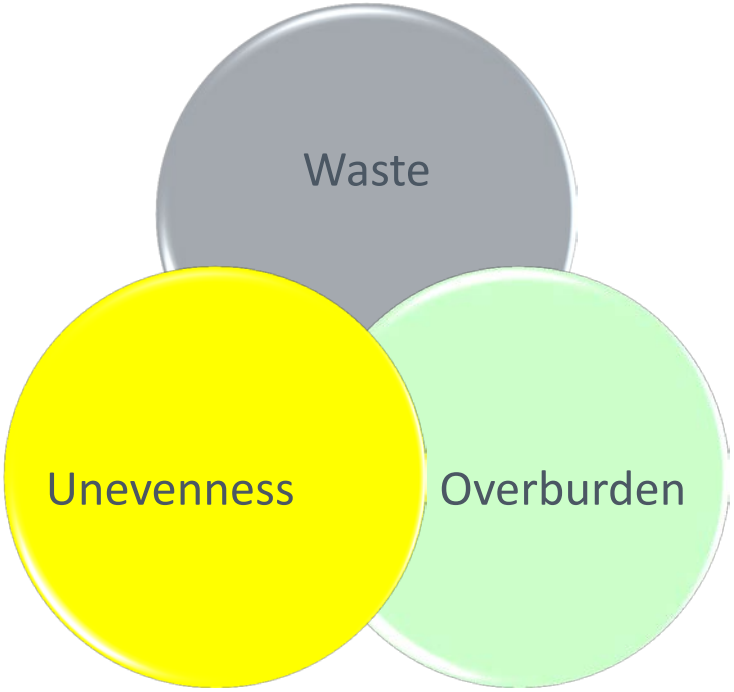


MEDICATION DISPENSING

CLINICAL DOCUMENTATION

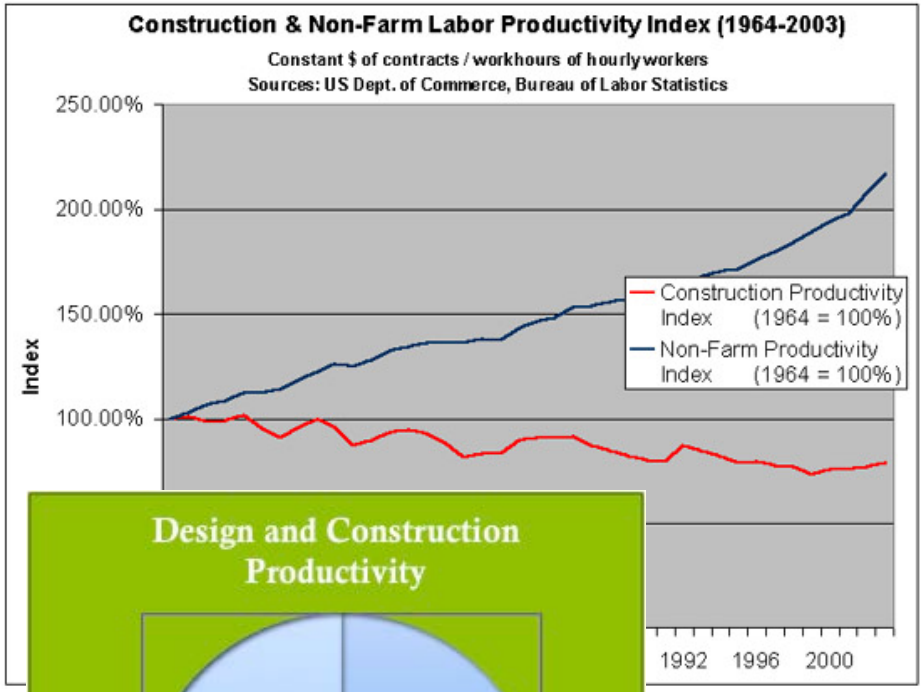
Project Lean Daily Work Life

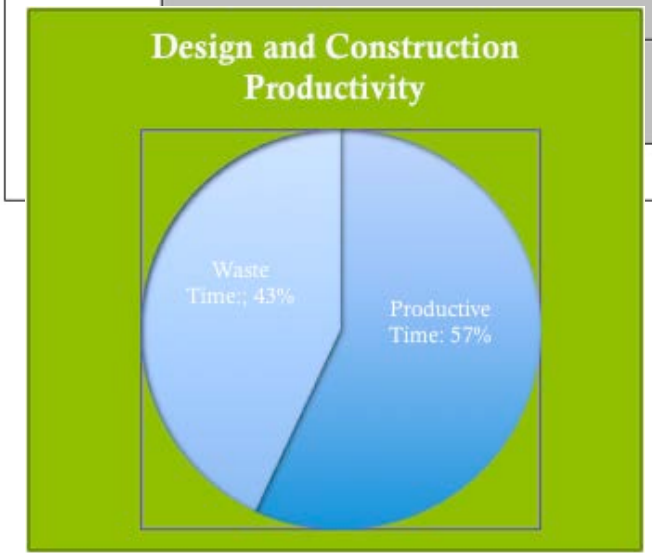
- Know Thy Enemy – its not the client, architect, design consultant, or contractor
- Know Thy Enemy – Waste, Overburden, Unevenness



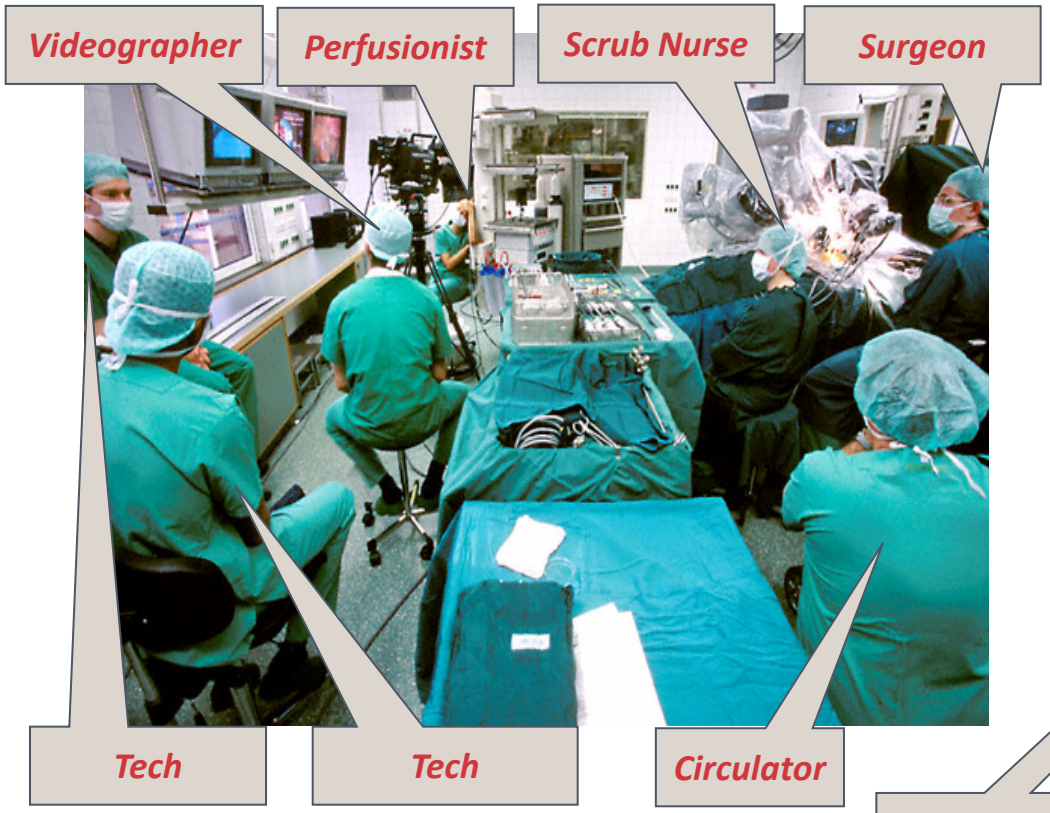
Why Lean?

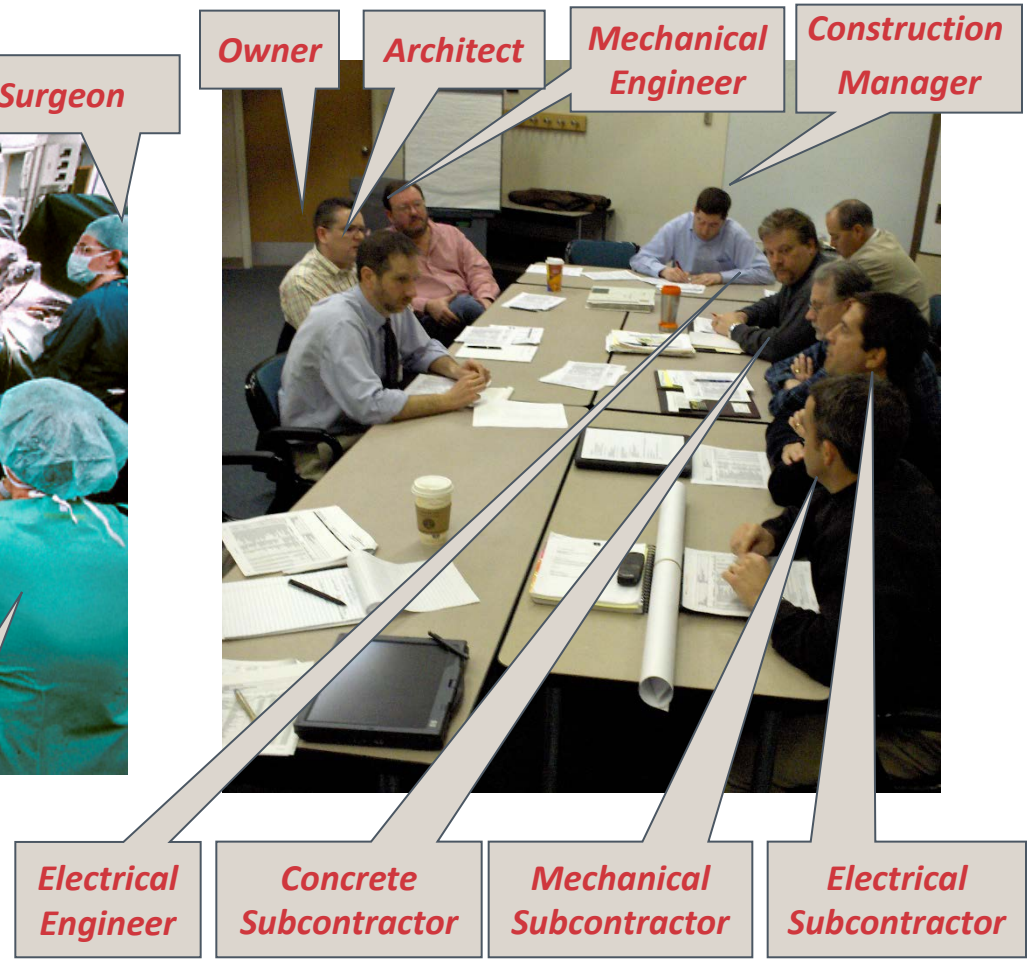
- 30 years of declining productivity, increasing costs, and disproportionate waste
- Unattractive attitude that long hours, conflict, and re-work are to be expected.
- Need new approach to attract/retain professionals, improve the quality of our work life, be more productive.



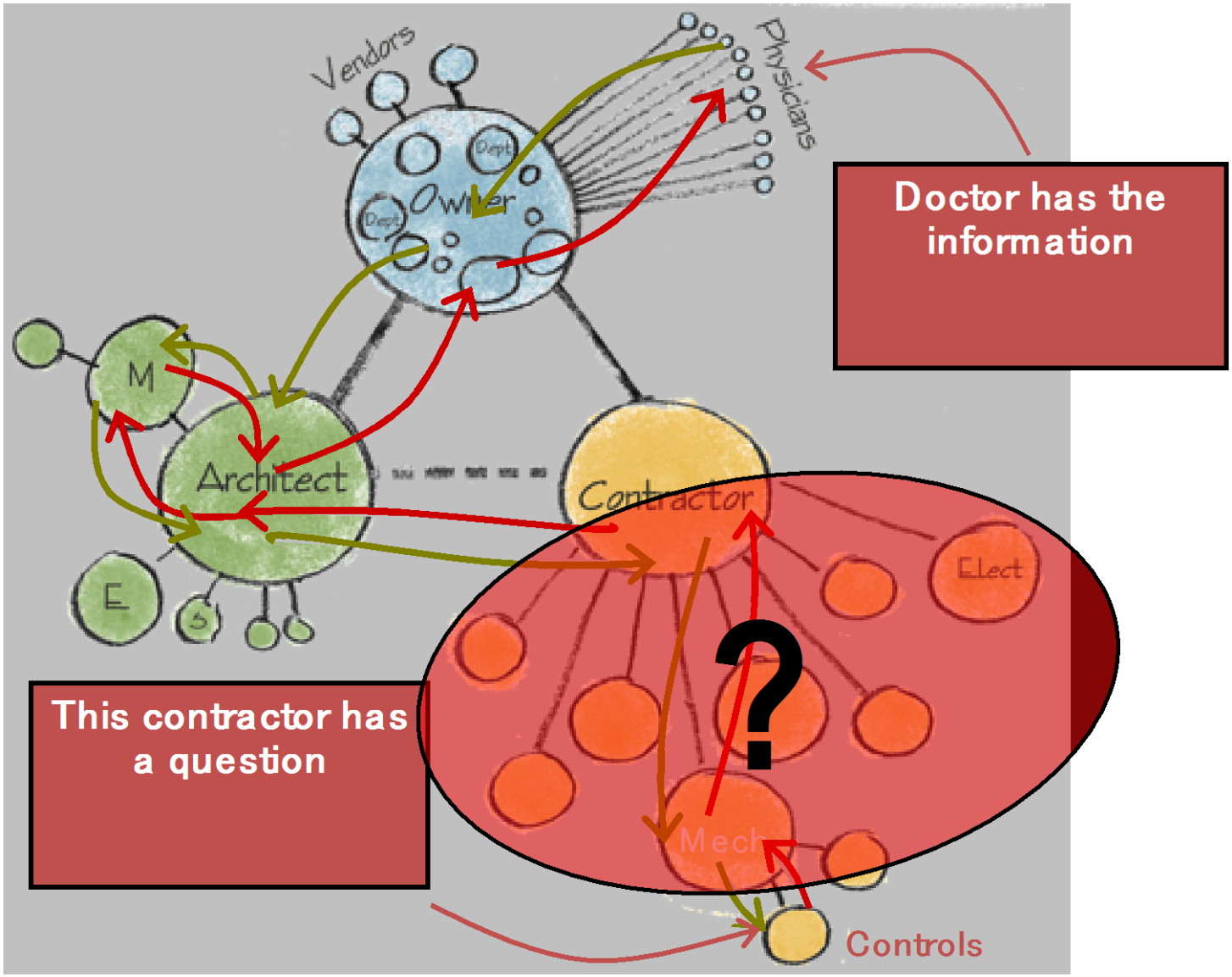


No one person can optimize all aspects of a modern building

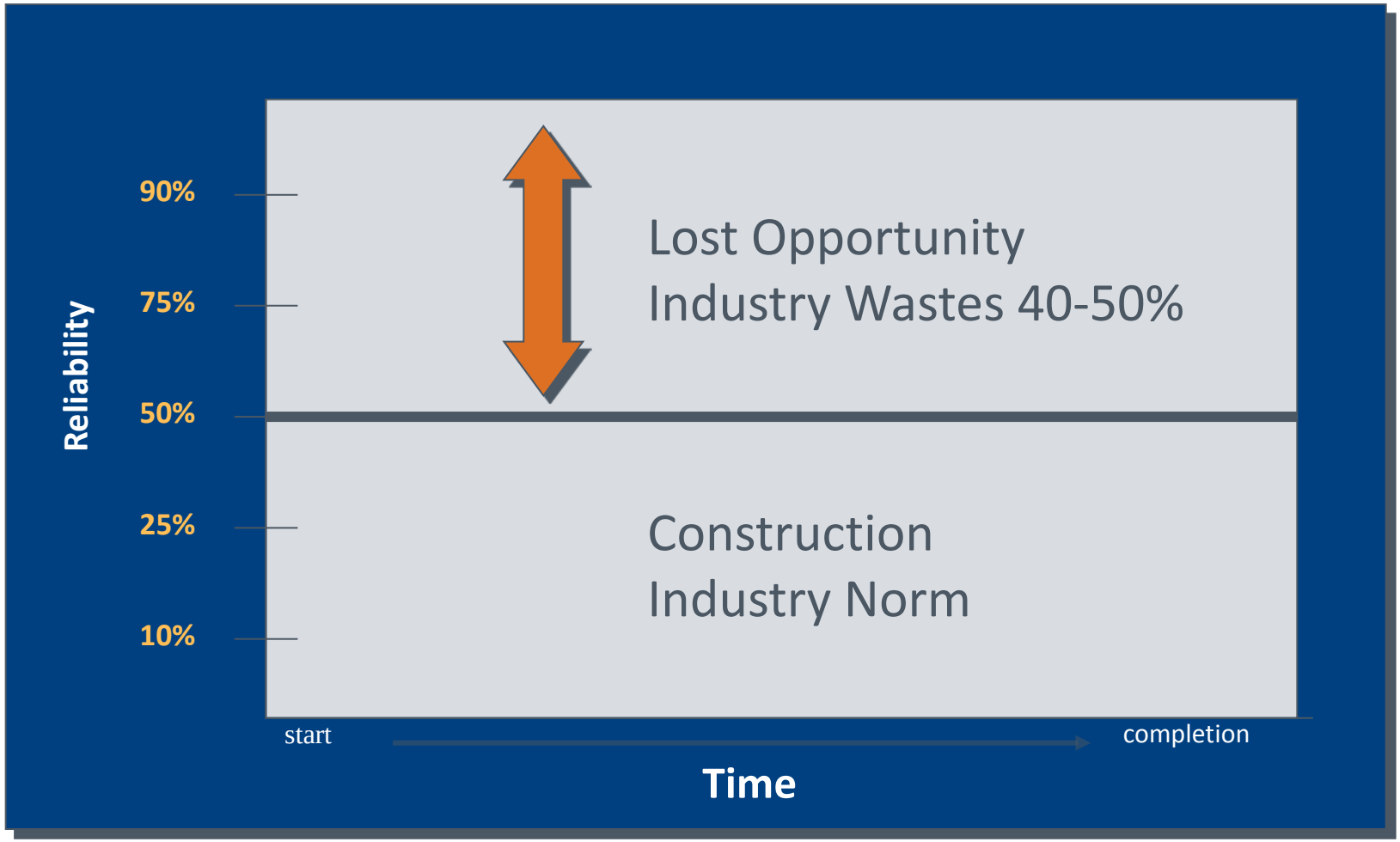




Applying LEAN in a Complex Environment (not a factory)

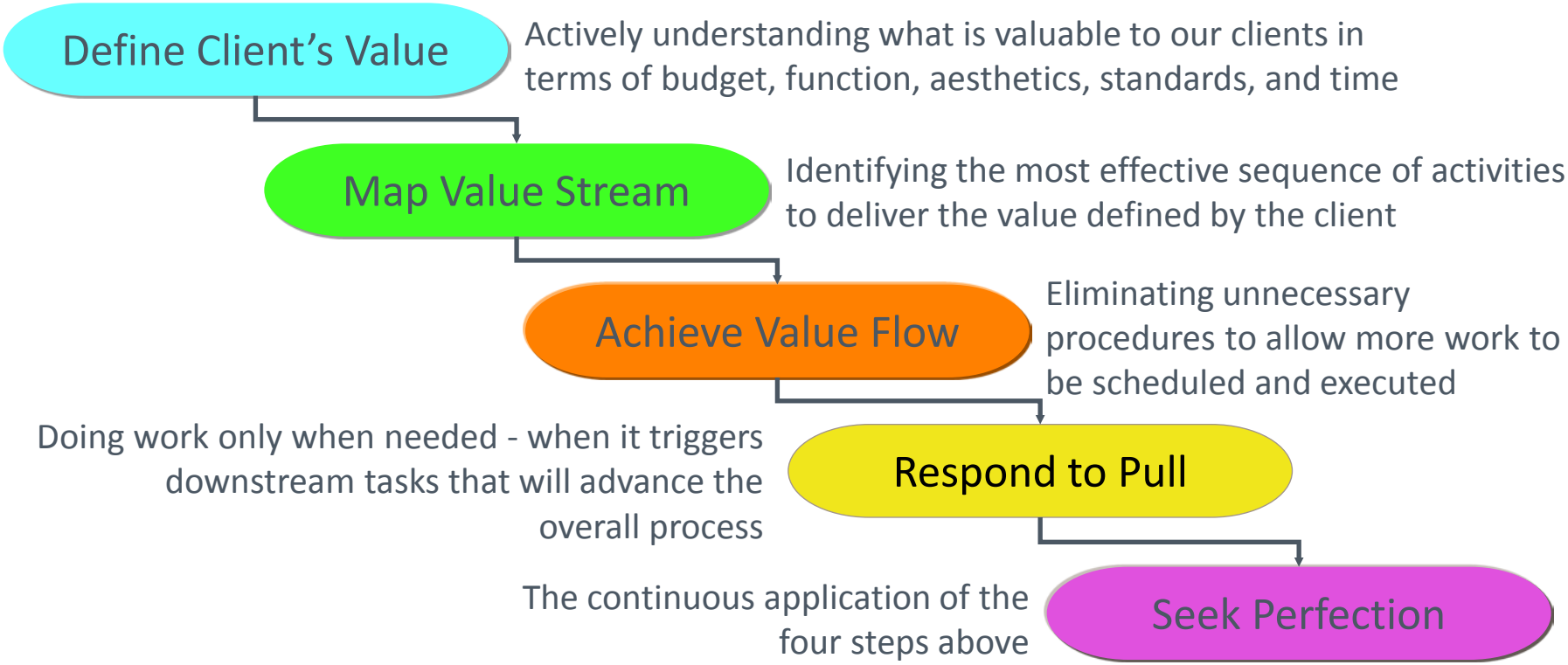


Industry Reliability Model – The Reality



Lean Principles

Lean Thinking seeks to eliminate waste in both schedule and budget, so projects are delivered faster - and more cost-effectively.



Waste Categories: Discrete, Synergistic, Systemic

Discrete Waste

Production:
- Under
- Over
- Untimely

Performance:
- Non
- Under
- Over
- Untimely

Change:
- Scope
- Conditions
- Errors
- External

Synergistic Waste (Affecting stockholders)

Owner

Designers

Contractor

Trade Partners

Systemic Waste

- Project Delivery System – Contracts
- Systemic nature of the industry
- Project Breakdown
- Litigation (shift of value)
- Devalued Market
- National Debt

First Principle – Defining Value

Actively understanding what is valuable to our clients in terms of budget, function, aesthetics, standards, and time

Reliability - Capital Cost Budgeting

Speed – Time to Market

Uptime - Patient Care Areas

Customer Satisfaction - Maximizing Positive Patient Outcomes

Controlling Infection – Safe Environment for Healthcare

Cost – Leveraging Market Knowledge, Community Reputation & Fairness

Quality - Focusing on Long Term Facility Management,

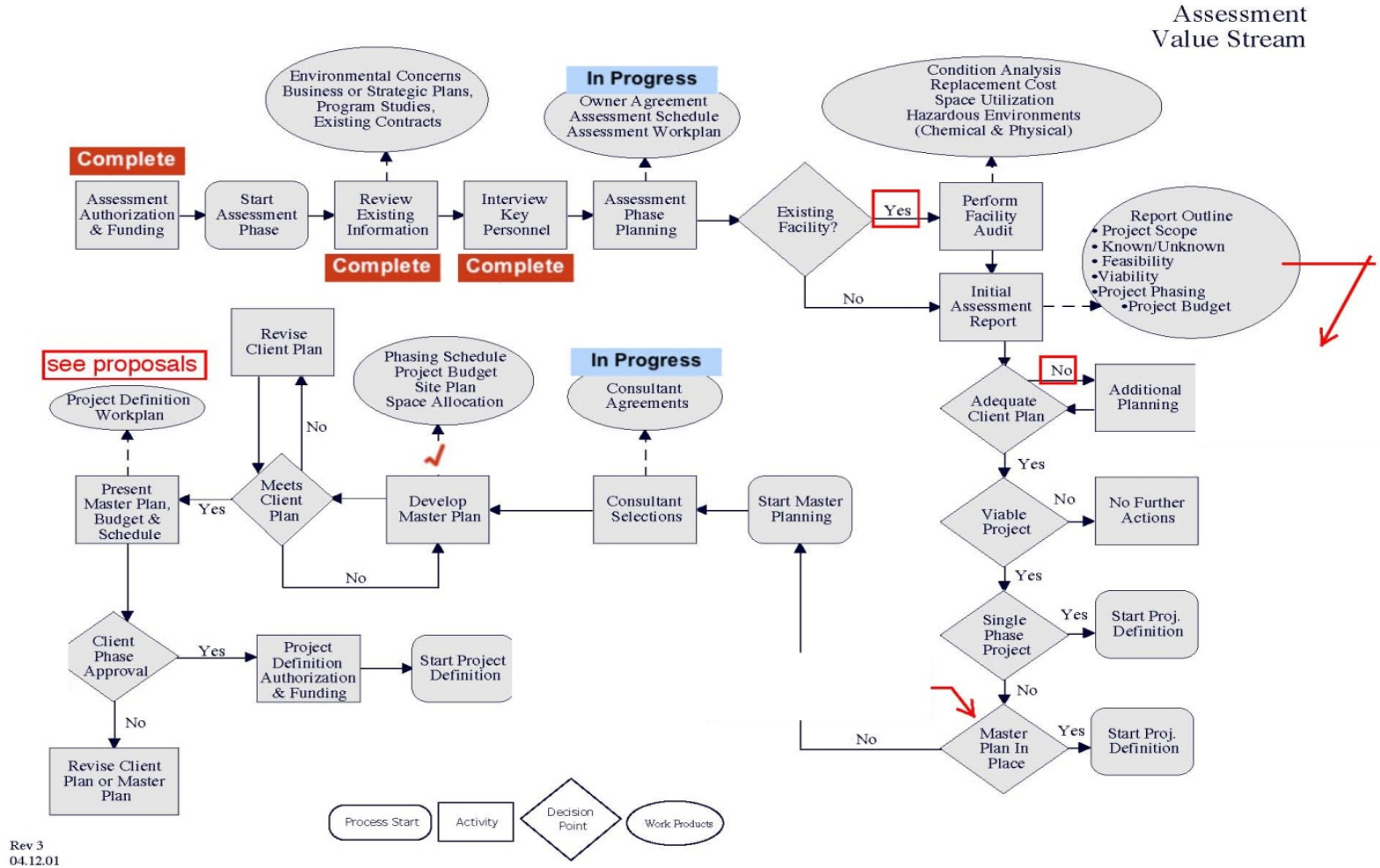
Operations & Maintenance at Lower Cost

Community Service – Support Client community mission

Second Principle – Map the Value Stream

Identifying the most effective sequence of activities to deliver the value defined by the client

L I N B E C K



CCMC 2008 Master Plan Projects - Assessment Phase Tracking

Third Principle – Achieving Flow

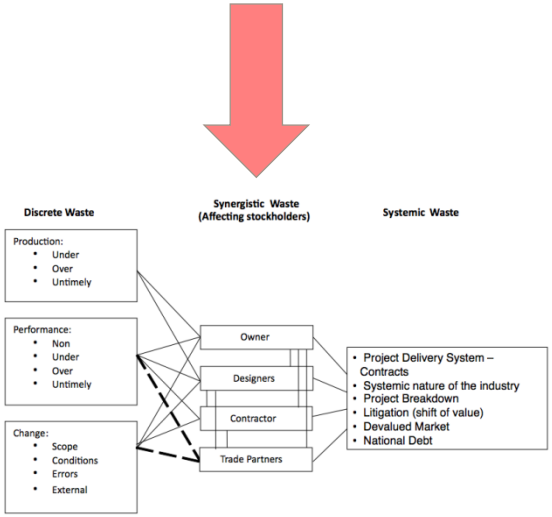
Eliminating unnecessary procedures to allow more work to be scheduled and executed

Achieve flow by removing **synergistic waste** creating reliability with organization that addresses product needs

Synergy means the **whole is greater than the sum of its parts**. It means the relationship (positive synergy) between the parts (people) is greater than the sum total of the individuals on the team.

.

The **essence of synergy in teams comes from valuing the differences** — the mental, emotional and psychological differences between people, in addition to very basic differences in technical disciplines. The key to valuing those differences is to realize that all people see the world, not as it is, but as they are and thus simply from their perspective.



Fourth Principle - Responding to Pull

Doing work only when needed - when it triggers downstream tasks that will advance the overall process

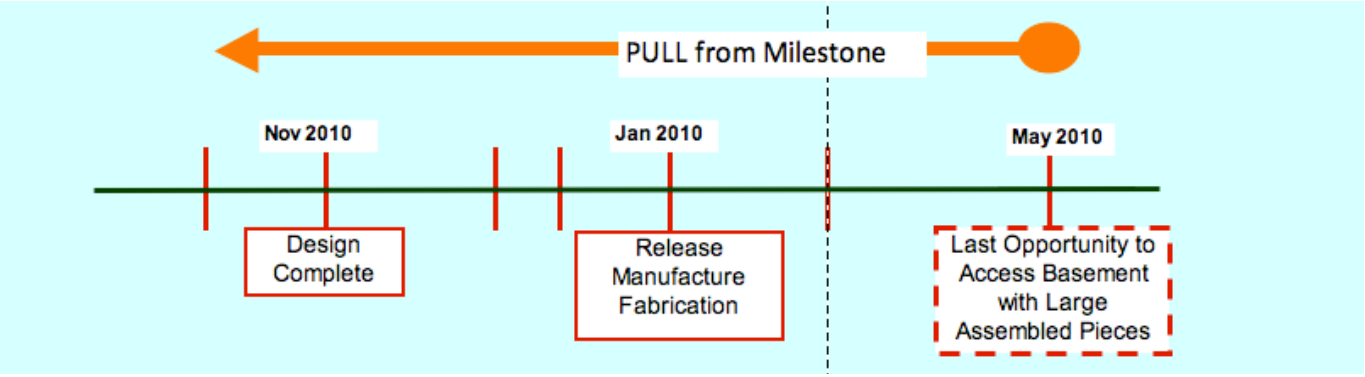
- Respond to pull by doing work at the last responsible moment
- Pull driven approach
  - Define what is needed
  - Create what is defined
  - Not more
  - Execute flawlessly

Example - Responding to Pull

Below Grade Access
"Last Opportunity"

Shipped in "Larger" Sections
"Shrink Wrapped"

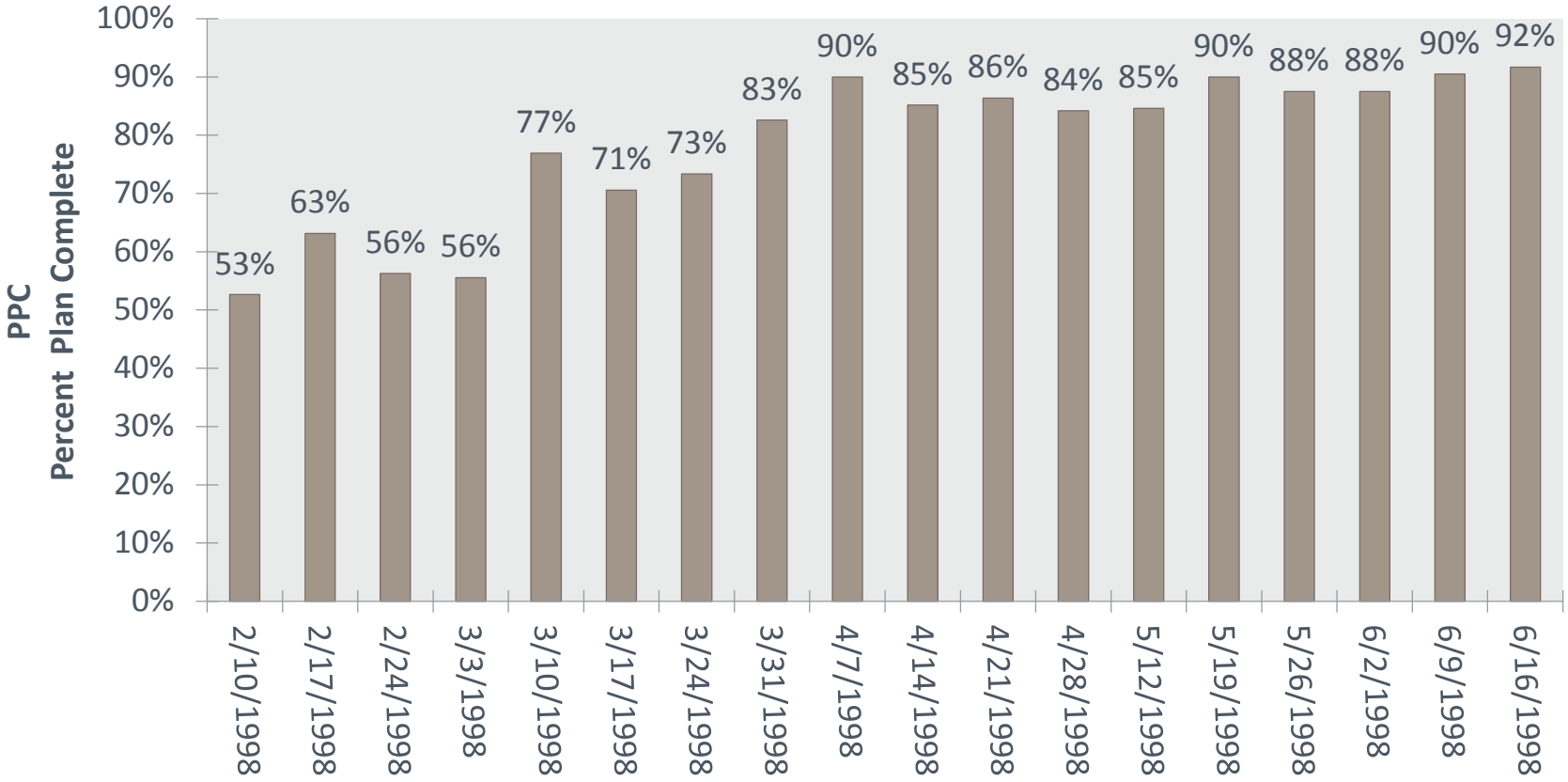
"Stored" in Location in Assembled
Sections-Protected



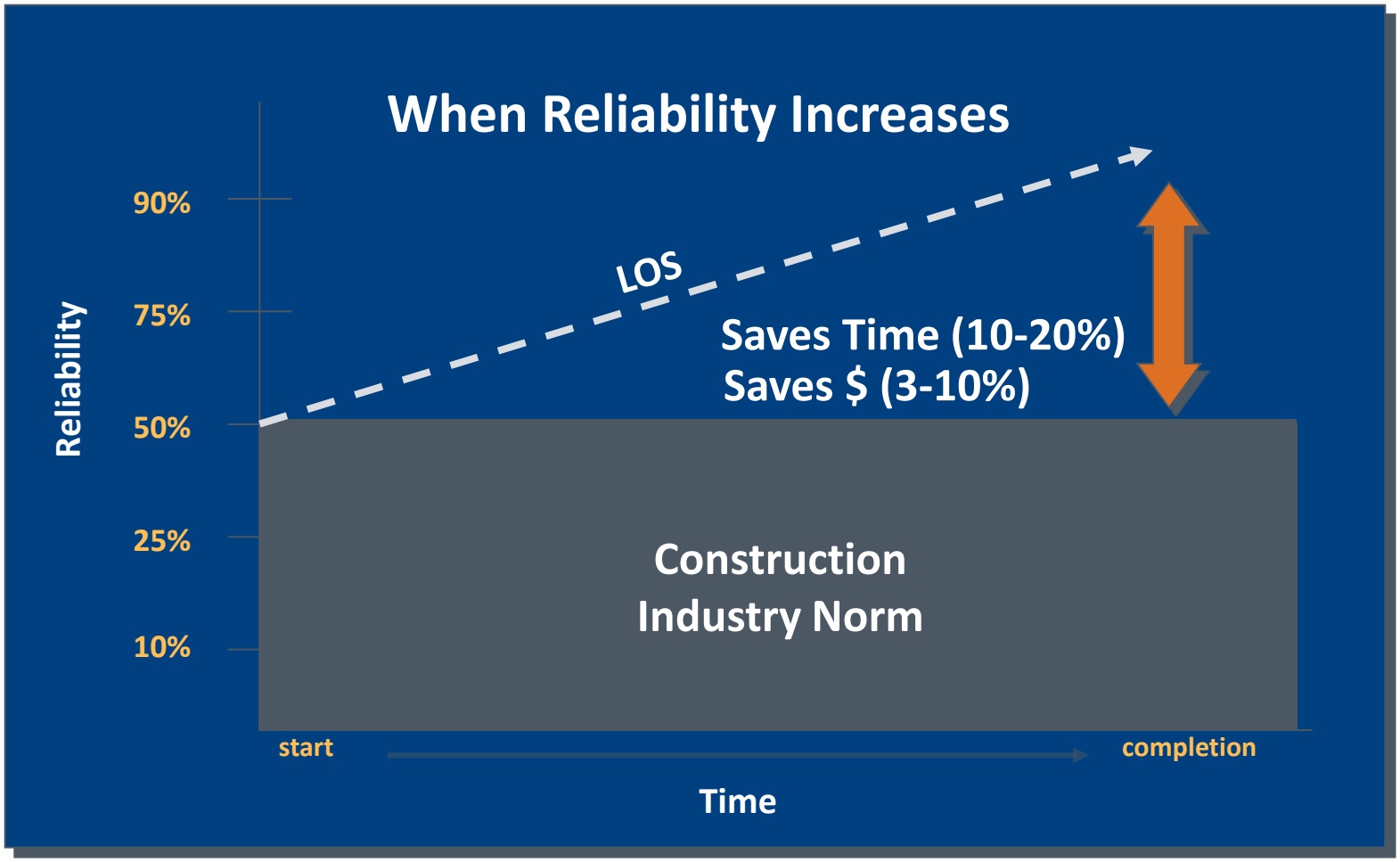
Fifth Principle - Seeking Perfection

The continuous application of the first four principles

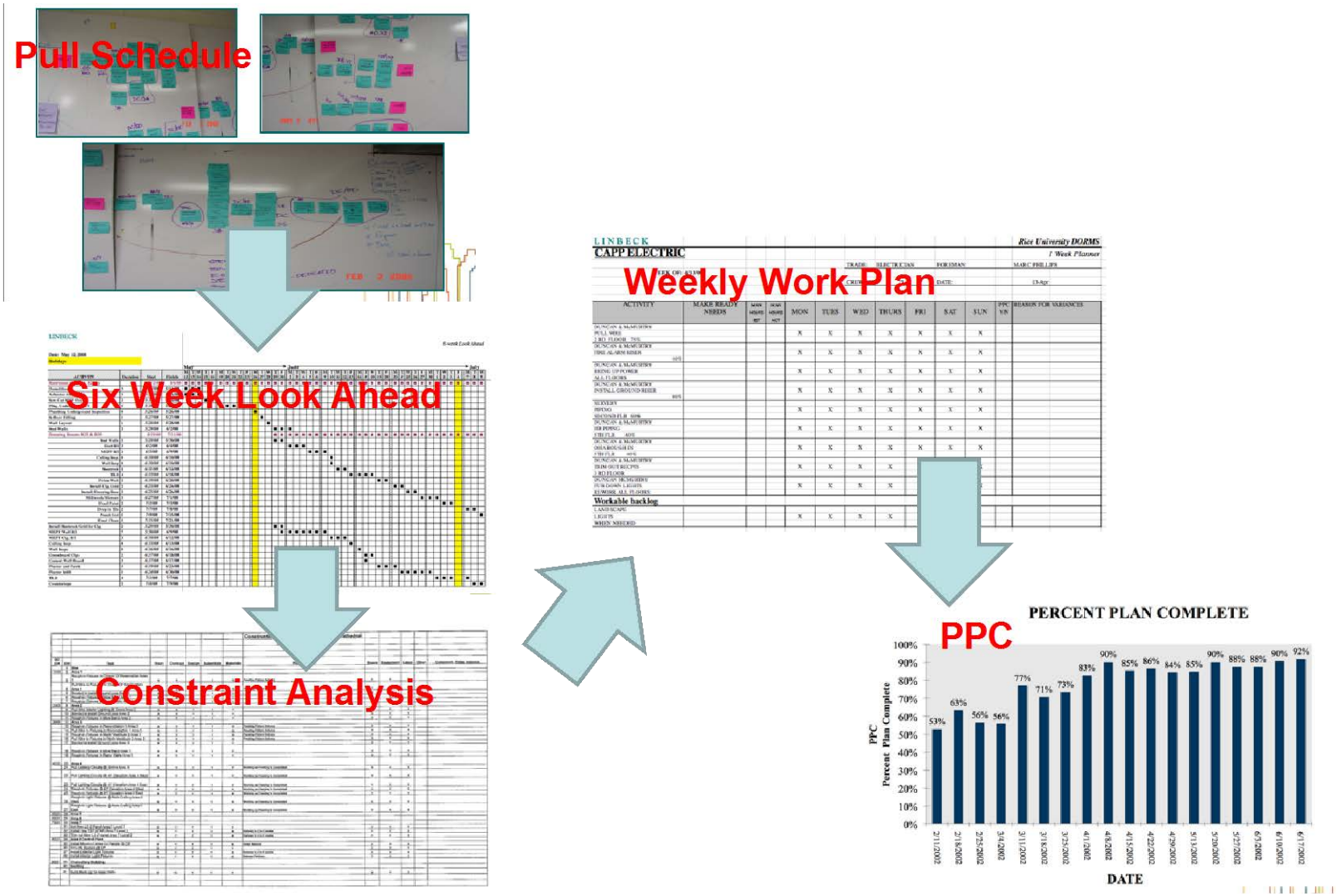
PERCENT PLAN COMPLETE



Using Lean Tools – What do we expect?



Last Planner System



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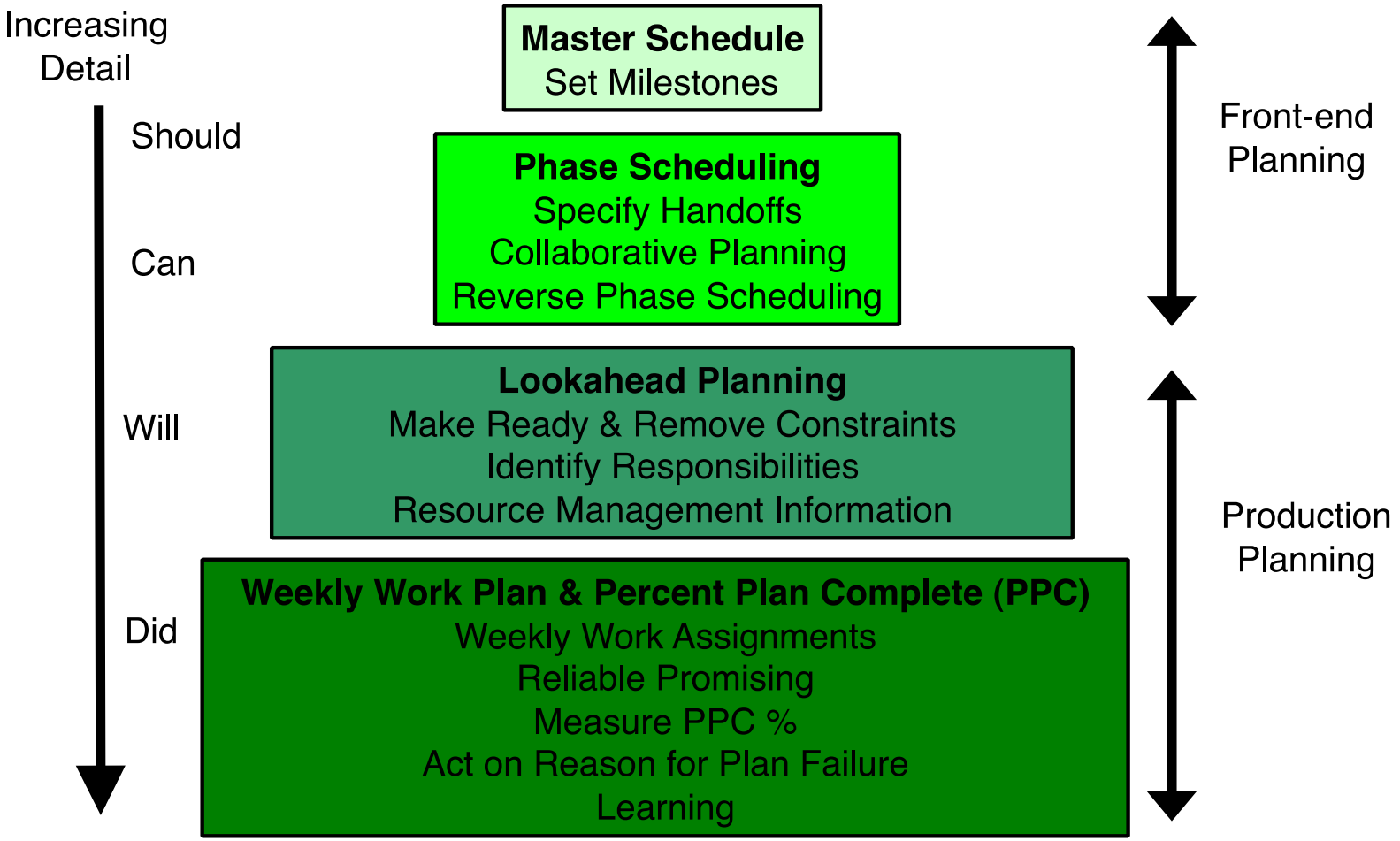

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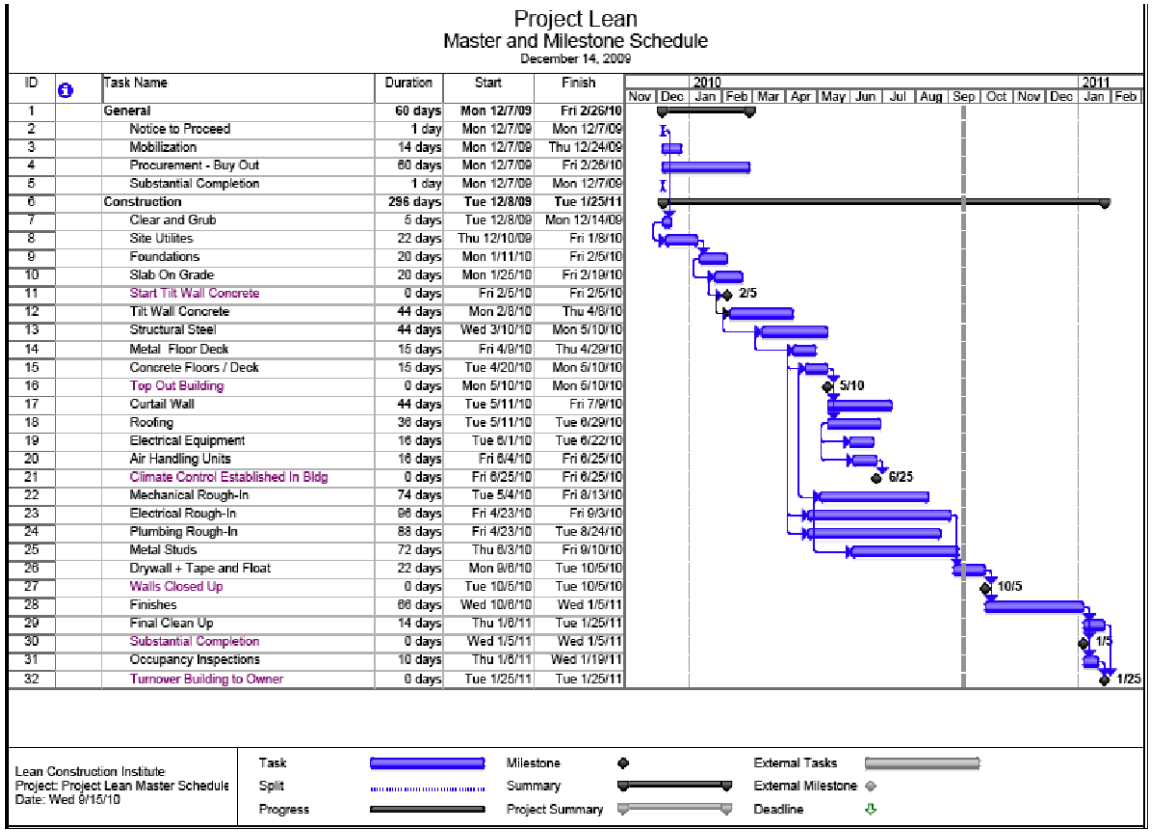


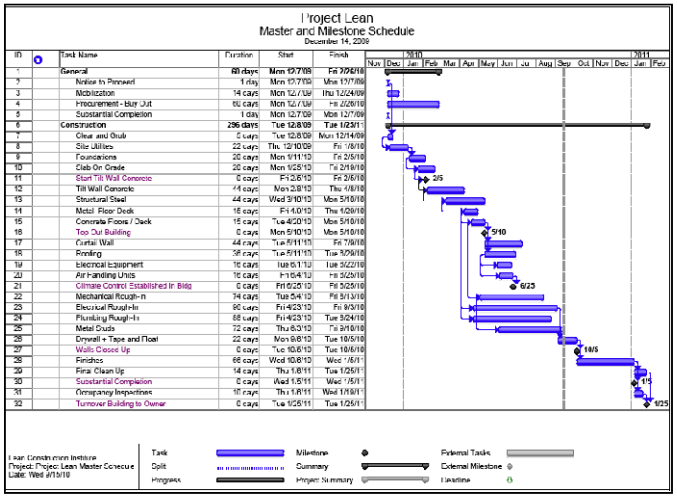
Project Lean
Master and Milestone Schedule
December 14, 2009

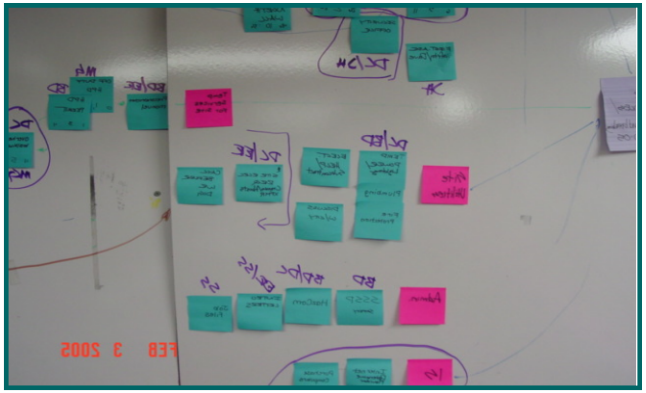
ID		Task Name	Duration	Start	Finish
1		**General**	**60 days**	**Mon 12/7/09**	**Fri 2/26/10**
2		Notice to Proceed	1 day	Mon 12/7/09	Mon 12/7/09
3		Mobilization	14 days	Mon 12/7/09	Thu 12/24/09
4		Procurement - Buy Out	60 days	Mon 12/7/09	Fri 2/26/10
5		Substantial Completion	1 day	Mon 12/7/09	Mon 12/7/09
6		**Construction**	**296 days**	**Tue 12/8/09**	**Tue 1/25/11**
7		Clear and Grub	5 days	Tue 12/8/09	Mon 12/14/09
8		Site Utilites	22 days	Thu 12/10/09	Fri 1/8/10
9		Foundations	20 days	Mon 1/11/10	Fri 2/5/10
10		Slab On Grade	20 days	Mon 1/25/10	Fri 2/19/10
11		Start Tilt Wall Concrete	0 days	Fri 2/5/10	Fri 2/5/10
12		Tilt Wall Concrete	44 days	Mon 2/8/10	Thu 4/8/10
13		Structural Steel	44 days	Wed 3/10/10	Mon 5/10/10
14		Metal Floor Deck	15 days	Fri 4/9/10	Thu 4/29/10
15		Concrete Floors / Deck	15 days	Tue 4/20/10	Mon 5/10/10
16		Top Out Building	0 days	Mon 5/10/10	Mon 5/10/10
17		Curtail Wall	44 days	Tue 5/11/10	Fri 7/9/10
18		Roofing	36 days	Tue 5/11/10	Tue 6/29/10
19		Electrical Equipment	16 days	Tue 6/1/10	Tue 6/22/10
20		Air Handling Units	16 days	Fri 6/4/10	Fri 6/25/10
21		Climate Control Established In Bldg	0 days	Fri 6/25/10	Fri 6/25/10
22		Mechanical Rough-In	74 days	Tue 5/4/10	Fri 8/13/10
23		Electrical Rough-In	96 days	Fri 4/23/10	Fri 9/3/10
24		Plumbing Rough-In	88 days	Fri 4/23/10	Tue 8/24/10
25		Metal Studs	72 days	Thu 6/3/10	Fri 9/10/10
26		Drywall + Tape and Float	22 days	Mon 9/6/10	Tue 10/5/10
27		Walls Closed Up	0 days	Tue 10/5/10	Tue 10/5/10
28		Finishes	66 days	Wed 10/6/10	Wed 1/5/11
29		Final Clean Up	14 days	Thu 1/6/11	Tue 1/25/11
30		Substantial Completion	0 days	Wed 1/5/11	Wed 1/5/11
31		Occupancy Inspections	10 days	Thu 1/6/11	Wed 1/19/11
32		Turnover Building to Owner	0 days	Tue 1/25/11	Tue 1/25/11

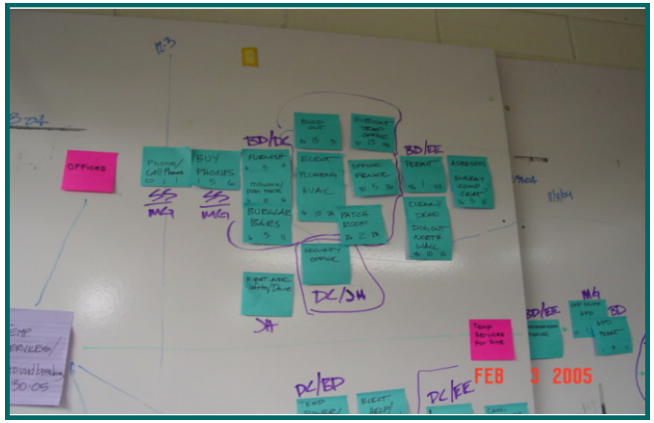
Lean Construction Institute
Project: Project Lean Master Schedule
Date: Wed 8/15/10

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

Last Planner System







Last Planner System

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ACH Child & Family Services
Six Week Look Ahead

Master Schedule Milestones

Milestone	Date	Milestone	Date	Milestone	Date

ID#	Task	Week 1 October 25, 2010							Week 2 November 1, 2010							Week 3 November 8, 2010							Week 4 November 15, 2010							Week 5 November 22, 2010							Week 6 November 29, 2010							CONSTRAINTS
		Mon	Tue	Wed	Th	Fri	Sat	Sun	Mon	Tue	Wed	Th	Fri	Sat	Sun	Mon	Tue	Wed	Th	Fri	Sat	Sun	Mon	Tue	Wed	Th	Fri	Sat	Sun	Mon	Tue	Wed	Th	Fri	Sat	Sun	Mon	Tue	Wed	Th	Fri	Sat	Sun	
	Welcome Center																																												
	Concrete structural arches															X	X	X	X	X			X	X	X	X	X																		
	Erect emaining pieces of structural steel															X	X	X	X	X			X	X	X	X	X																		
	Wood framing erection	X	X	X	X	X			X	X	X	X	X			X	X	X	X	X			X	X	X	X	X																		
	Electrical rough-in	X	X	X	X	X			X	X	X	X	X			X	X	X	X	X			X	X	X	X	X			X	X	X	X	X											
	Plumbing rough-in															X	X	X	X	X			X	X	X	X	X			X	X	X	X	X			X	X	X	X	X				
	Mechanical rough-in																						X	X	X	X	X			X	X	X	X	X			X	X	X	X	X				
	Waterproofing / flashing															X	X	X	X	X			X	X	X	X	X																		
	Split face stone installation																						X	X	X	X	X			X	X	X	X	X											
	Brick / Cast stone																													X	X	X	X	X			X	X	X	X	X				
	Roofing															X	X	X	X	X			X	X	X	X	X			X	X	X	X	X											
	Site Utilities																																												
	Install FDC line to the Admin bldg								X	X	X	X	X																																
	Install 6" water line to Admin bldg															X	X	X	X	X																									
	Install 6" water lines to Dillard & Training																						X	X	X	X	X																		
	Install FDC lines to Dillard & Training Center																													X	X	X	X	X											
	Ornamental Fence @ Wichita St.																																												
	Metal panel install & paint																						X	X	X	X	X			X	X	X	X	X			X	X	X	X	X				
	Install Gates																																												
	Site Work																																												
	Pour light pole piers			X	X				X																																			
	West chapel parking & sidewalks	X	X	X	X	X			X	X	X	X	X			X	X	X	X	X																									
	Backfill islands in east chapel parking			X	X				X																																				
	Chapel parking lot North sidewalks															X	X	X	X	X			X	X	X	X	X																		
	Welcome center east paver foundation																						X	X	X	X	X																		
	South retaining wall @ Welcome Center																						X	X	X	X	X			X	X	X	X	X											
	North retaining wall @ Welcome Center																																					X	X	X	X	X			
	Install conduits for site lighting			X	X	X			X	X	X	X	X			X	X	X	X	X			X	X	X	X	X																		
	Install light poles																													X	X	X	X	X			X	X	X	X	X				
	Transformer pad																													X	X	X	X	X											

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Project Name

Constraints Analysis Form

COMPANY:
PREPARED BY:
DATE:

Item	Activity Description	Planned Start	Resp Party	Contract CCs	Contract PIA	Design AE Complete	Design Submittals	Design RFI's	Material	Labor	Equip	Prereq Work	Space	Planned Inspection	Comments

Last Planner System

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***ACH Child & Family Services** Phase 1B - Part 1*

Weekly Work Plan

Company:Waddell Excavating
Prepared:Barclay
CRE 6
DAT 11/02//2010

PPC: Why task is not complete

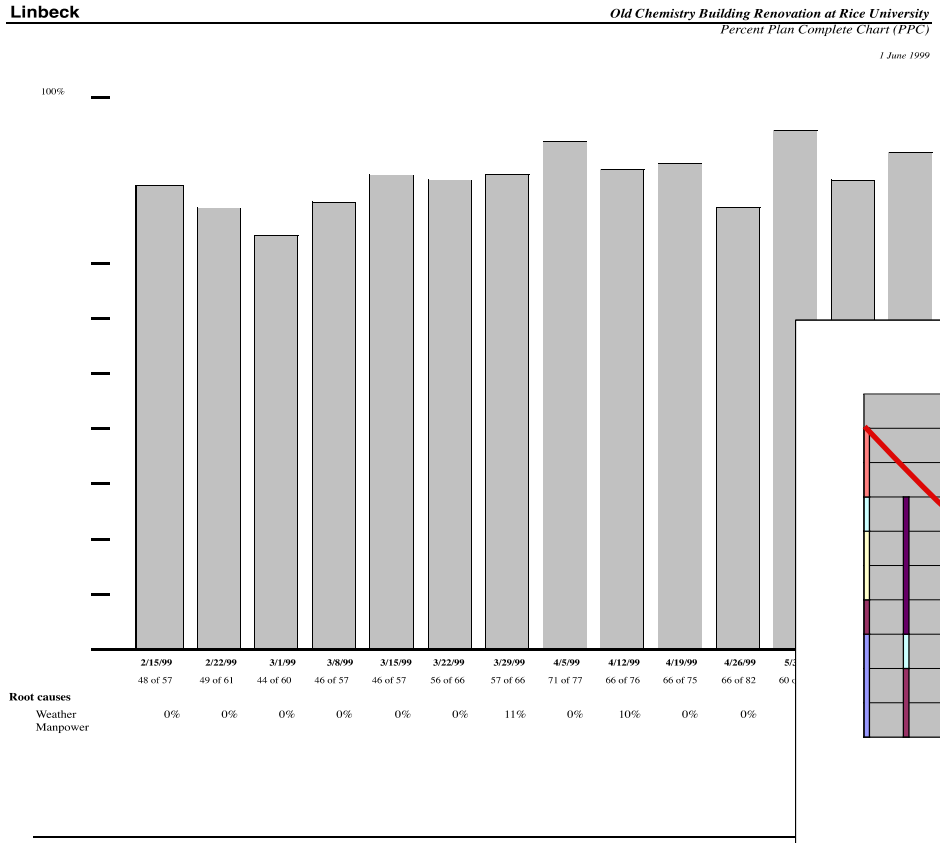
1 Enviromental (Mother Nature, job site limitations, unforeseen conditions)
2 Manpower (Availability of the necessary number, skills, etc.)
3 Machine (Availability and/or working capability of Cranes, Equipment, Tools, Computers)
4 Methods (Schedule Logic & Accuracy, coordination including design, Safety process / Tasks, etc.)
5 Make ready (Another's Required Handoff is not ready on time due to rework or another cause)
6 Materials (Availability of Raw, Semi finished, Consumables, etc.)

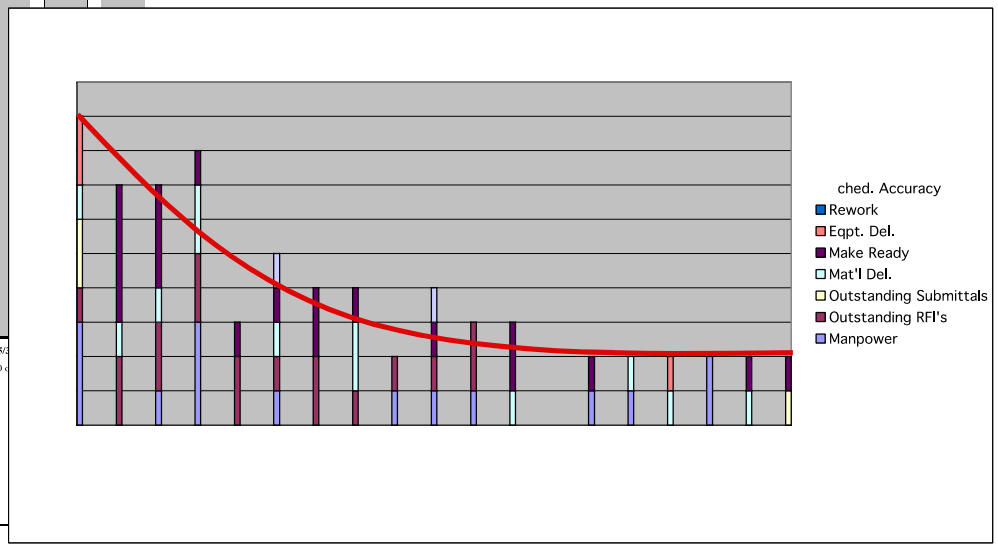
Milestones

		PPC	PPC	Week 1 week of							Week 2 week of							
No.	TASKS	%	#	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Constraints
	GUARD ENTRANCE																	
	Wreck forms			X														
	Demo and dispose concrete/binder				X													Electrical Sleeves
	Grade and install forms					X	X											
	Pour curbs							X										
	Install binder										X							
	Install topping											X						
	Backfill Islands												X					Relocation of fence
	Demo and excavate carton forms @ BLDG													X	X			
	ARCHES																	
	Submittal approval forms and steel			X	X	X	X	X										
	Form columns							X			X	X	X					
	Install Steel										X	X	X					
	Inspect and pour columns													X	X			

Workable Backlog	
Rear Drive	7 low clearance,and 13 remaining(Utility relocation)
Light poles	

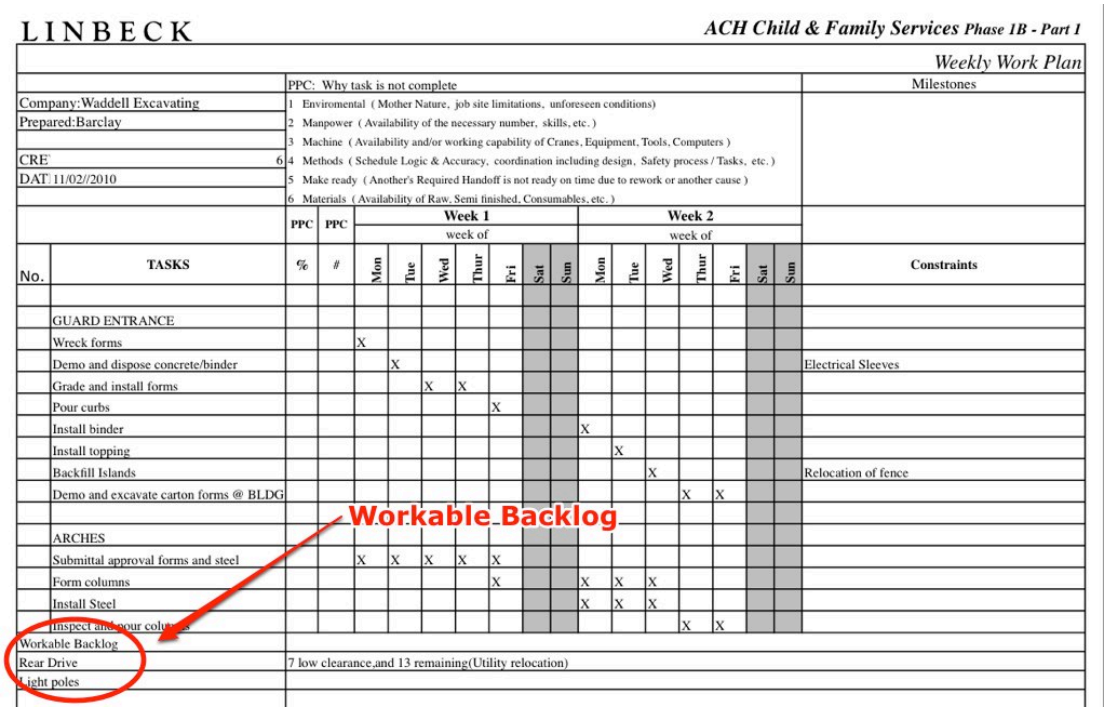
Last Planner System





Last Planner System

- Workable Backlog – the key to absorbing imperfection
  - Pre-identified work tasks that can be implemented in the event of a constraint or exceeding target work goals
  - By definition, these items do not create out of sequence flow or rework for others



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ACH Child & Family Services Phase 1B - Part 1

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Company:Waddell Excavating
Prepared:Barclay
CRE 6
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	Wreck forms			X														
	Demo and dispose concrete/binder				X													Electrical Sleeves
	Grade and install forms					X	X											
	Pour curbs							X										
	Install binder										X							
	Install topping											X						
	Backfill Islands												X					Relocation of fence
	Demo and excavate carton forms @ BLDG													X	X			
	ARCHES																	
	Submittal approval forms and steel			X	X	X	X	X										
	Form columns							X			X	X	X					
	Install Steel										X	X	X					
	Inspect and pour columns													X	X			
Workable Backlog																		
Rear Drive		7 low clearance,and 13 remaining(Utility relocation)																
Light poles																		

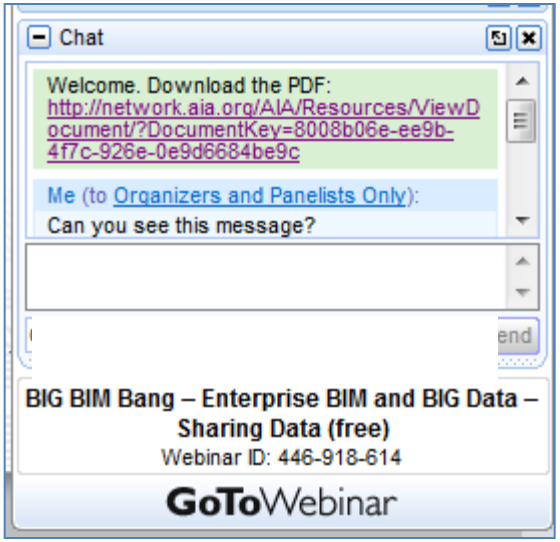
Workable Backlog

WE control the future of our AEC industry!
Who will design and build our future?

Questions?

Submit a question to the moderator via the chat box.

Content-related questions will be answered during the Q&A portion as time allows.



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