THE SIMPLE FRAMEWORK FOR INTEGRATING PROJECT DELIVERY

Dean Reed, DPR Construction
LCI Los Angeles / Orange County CoP • Los Angeles, CA • June 27, 2018
AGENDA
The Simple Framework for Integrating Project Delivery

- Greetings | Profound Knowledge
- Lean Construction Tools
- Integrating Project Delivery
- The Simple Framework
- Virtual Design & Construction
- Where Do Your Tools Fit?
If you can't explain it simply, you don't understand it well enough.

Albert Einstein
FISH DID NOT DISCOVER WATER

We are unaware of what we are completely immersed in

Marshall McCluhan
LEAN CONSTRUCTION TOOLS
LEAN CONSTRUCTION INSTITUTE
3 Connected Opportunities

CHANGE
• The Operating System
• Organizational Structures
• Commercial Terms
LEAN & INTEGRATED PROJECT DELIVERY

Several Useful Books on Methods & Practices
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# TRANSFORMING DESIGN AND CONSTRUCTION

William R. (Bill) Seed, Executive Editor

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RESOURCES

- Target Value Design (LCI)
- Target Value Delivery (LCI)
- Transforming Design and Construction (LCI)  
  https://www.leanconstruction.org/learning/publications/
- Lean Project Delivery  
  https://www.amazon.com
- Integrating Project Delivery  
  https://www.amazon.com
- A Guide to the Book Integrating Project Delivery  
  https://www.dpr.com
- Integrated Project Delivery: An Action Guide for Leaders  
  http://www.pankowfoundation.org
TOP 10 LEAN CONSTRUCTION TOOLS
Together at your table

- Brainstorm for 5 – 10 minutes
- List as many as you want
- Try for at least 10
- Rank them by impact
- Write the name and number of the top 5 on a sticky
INTEGRATING PROJECT DELIVERY
A Strategic Model for Project Integration

Theory and Practice • 450 pages
• 50 Projects • 123 Examples
• Textbook published by Wiley 2017

21 page summary published by DPR Construction in 2017
INTEGRATING PROJECT DELIVERY

Take-aways

• Our big idea is integration is imperative and a strategy.
• Value of the physical product is the starting / ending point.
• Integration requires flow and is the final stage of Lean.
• Cost / resource efficiency focus leads to fragmentation.
• Simplicity goal forced us look at strategy and enablers, beyond Lean methods, practices and behaviors.
• VDC is the most powerful system methodology for integration.
ECONOMICS OF PROJECT DELIVERY
Enabling value delivery for / by our customers

Image adapted from Dr. Martin Fischer, CIFE IAB, 2011
MACLEAMY CURVE
Traditional vs. Integrated Approach

- **Traditional**
  - Predesign
  - Schematic Design
  - Design Development
  - Construction Documents
  - Agency Permit/Bidding
  - Construction

- **Integrated**
  - Conceptualization
  - Criteria Design
  - Detailed Design
  - Implementation Documents
  - Agency Coord/Final Buyout
  - Construction

**Time/Schedule**
- Ability to impact cost and functional capabilities

**Design Effort/Effect**
- Integrated project delivery process
- Traditional design process

**Cost of design changes**
VALUE SIMPLIFIED
Value = Ration of Quality to Cost

1. where quality and price intersect
2. Trader Joe’s
LEAN THINKING
Making value flow at the pull of the customer

1. Identifying Value
2. Mapping the Value Stream
3. Making Value Creating Steps Flow
4. Using the Pull of the Customer
5. Striving for Perfection
LEAN: MAKING VALUE FLOW
Maximize value-adding work and eliminate waste

Work to achieve customers Conditions of Satisfaction

Points of Release: work accepted by next / final customer
A HIGH PERFORMING BUILDING

Usable  Sustainable
Buildable  Operable
A HIGH PERFORMING BUILDING

Usable

Safe
Peaceful
Functional
Beautiful
Light/Open
Comfortable
Flexible
Adaptable
UCSF Medical Center at San Francisco Mission Bay

Safe
Peaceful
Functional
Beautiful
Light/Open
Comfortable
Flexible
Adaptable

Voices of Mission Bay

Dr. Nalin Gupta
Chief of Pediatric Neurosurgery

Dr. Lena Kim
Perinatologist

Dr. Mort Cowan
Chief of Allergy, Immunology and BMT

Dr. Madhulika Varma
Chief of Colorectal Surgery
A HIGH PERFORMING BUILDING

Safe
Peaceful
Functional
Beautiful
Light/Open
Comfortable
Flexible
Adaptable
Constructible
No Injuries
High Quality
On-time Delivery
Lowest Total Cost
A HIGH PERFORMING BUILDING

- Safe
- Peaceful
- Functional
- Beautiful
- Light / Open
- Comfortable
- Flexible
- Adaptable

- Constructible
- No Injuries
- High Quality
- On-time Delivery
- Lowest Total Cost

Usable

Buildable

Operable

- Safe
- Easy to Clean
- Simple to Maintain
- Energy / Water Neutral
UCSF Medical Center at San Francisco Mission Bay

Safe
Easy to Clean
Simple to Maintain
Energy / Water Neutral
A HIGH PERFORMING BUILDING

- Economically
- Equitably
- Environmentally
- Usable
- Buildable
- Operable
- Sustainable
- Safe
- Peaceful
- Functional
- Beautiful
- Light/Open
- Comfortable
- Flexible
- Adaptable
- Constructible
- No Injuries
- High Quality
- On-time Delivery
- Lowest Total Cost
- Easy to Clean
- Simple to Maintain
- Energy/Water Neutral
Sustainability

TARGET: LEED GOLD

ENERGY CONSERVATION
Use 50% less energy than average US hospital

CARBON FOOTPRINT
PV panels would reduce CO2 output by 320 tons per year

HEALTHY MATERIALS
Assessment of all patient & exam room finishes to reduce toxins

GREEN ROOFS & GARDENS
60,000 sf of roof gardens is among most of any US urban hospital

LIGHT AND AIR
Extensive daylight and 100% fresh air in all patient rooms

WATER
Save 2-4M gallons per year 75% of rainwater kept on-site

Economically Equitably Environmentally
VALUE IN THE SIMPLE FRAMEWORK
Ratio of Performance to Cost

VALUE = \frac{\text{High Performance}}{\text{Total Cost (First & Lifecycle)}}
THE SIMPLE FRAMEWORK
for Integrating Project Delivery

- Measurable Value
- Production Management
- Collaboration Co-Location
- Visualization Simulation
- High Performing Building
- Integrated Systems
- Process Integration
- Integrated Organization
- Integrated Information

Agreement / Framework
THE SIMPLE FRAMEWORK
for Integrating Project Delivery

Integrated Systems

High Performing Building

Measurable Value

Production Management

Collaboration Co-Location

Visualization Simulation

Process Integration

Integrated Organization

Integrated Information

Agreement / Framework
INTEGRATING SYSTEMS
Required for a High Performing Building
STRATEGY
Bioclimatic

END RESULT
Value | High Performance
THE SIMPLE FRAMEWORK for Integrating Project Delivery

Measurable Value  | Production Management  | Collaboration Co-Location  | Visualization Simulation
Integrated Systems  | Integrated Organization  | Integrated Information
High Performing Building

Process Integration

Agreement / Framework
INTEGRATING PROCESS KNOWLEDGE
To Design a High Performing Building
INTEGRATING PROCESS KNOWLEDGE
Collaborative Design Review Using BIM
THE SIMPLE FRAMEWORK
for Integrating Project Delivery

- Measurable Value
- Production Management
- Collaboration Co-location
- Visualization Simulation
- Process Integration
- Integrated Organization
- Integrated Information
- Agreement / Framework
- Integrated Organization
- High Performing Building
- Integrated Systems

Integrated Organization
CREATE / MAINTAIN ORGANIZATIONAL HEALTH

Avoid the “Five Dysfunctions of a Team”

Inattention to RESULTS
Avoidance of ACCOUNTABILITY
Lack of COMMITMENT
Fear of CONFLICT
Absence of TRUST

Status and Ego
Low Standards
Ambiguity
Artificial Harmony
Invulnerability

Courtesy of Patrick Lencioni
SUTTER HEALTH’S FIVE BIG IDEAS
For Reshaping the Design and Delivery of Capital Projects.

Collaborate, Really Collaborate

Increase Relatedness

Optimize The Whole

Projects as Networks of Commitment

Tightly Couple Learning w/ Action
ORGANIZATIONS AS NETWORKS OF COMMITMENT
Fernando Flores’ Basic Action Workflow

- Preparation
- Customer
- Declaration of Satisfaction
- Acceptance
- Request or Offer
- Conditions of Satisfaction, Time
- Negotiation
- Acceptance (2 mutual promises)
- Perfromer
- Report of Completion
- Performance
INTEGRATED ORGANIZATION

Clear responsibility • Rapid communication • Sound decisions

Owner / Tenant Organization

NEEDS
Stakeholder Group Leads

SOLUTIONS
Multidisciplinary Teams
“Clusters”

COORDINATION
Team Leads

DECISIONS
Project & Senior Management Teams

Tier 1

Tier 2

Tier 3

PROJECT ORGANIZATION
JOINT GOVERNANCE
Making decisions to drive the project forward
THE SIMPLE FRAMEWORK
for Integrating Project Delivery

Measurable Value
Production Management
Collaboration Co-Location
Visualization Simulation

High Performing Building
Integrated Systems
Process Integration
Integrated Organization

Agreement / Framework
Integrated Information
INTEGRATING PROJECT INFORMATION
Integrate Scope, Quality Cost & Schedule Using BIM
# INTEGRATING PROJECT INFORMATION

Enabling understanding throughout the project team

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<th>Increased Level of Team Engagement</th>
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THE SIMPLE FRAMEWORK
for Integrating Project Delivery

- Measurable Value
- Production Management
- Collaboration Co-Location
- Visualization Simulation

- High Performing Building
- Integrated Systems
- Process Integration
- Integrated Organization
- Integrated Information

- Agreement / Framework
VISUALIZING BUILDING PERFORMANCE
Walk into the Future
INFORMATION + VISUALIZATION IN PRODUCTION

Seeing the wall before building it
SIMULATING BUILDING PERFORMANCE
Computational Fluid Dynamics Model of the DPR Phoenix NZE Building
THE SIMPLE FRAMEWORK
for Integrating Project Delivery

- Collaboration
- Co-Location
- Visualization
- Simulation
- Integrated Information
- Integrated Organization
- Process Integration
- Integrated Systems
- High Performing Building
- Production Management
- Measurable Value
- Agreement / Framework

Integrated Information
COLLABORATION REQUIRED
For working smarter and reviewing constructability
CO-LOCATING TO IMPROVE PERFORMANCE
Better information and faster decisions
THE SIMPLE FRAMEWORK
for Integrating Project Delivery

Production Management

Measurable Value
High Performing Building

Integrated Systems
Integrated Organization
Integrated Information

Co-location
Visualization

Process Integration

Agreement / Framework

Value

Collaboration

Simulation
INTEGRATING PRODUCTION MANAGEMENT
Planning and managing at all levels
INTEGRATED PLANNING TO MAKE VALUE FLOW
Using the Last Planner® System
THE SIMPLE FRAMEWORK
for Integrating Project Delivery

- Measurable Value
- Production Management
- Collaboration Co-Location
- Visualization Simulation
- High Performing Building
- Integrated Systems
- Process Integration
- Integrated Organization
- Integrated Information

Agreement / Framework

Measurable Value
START WITH THE END IN MIND
to Integrated Project Delivery

(Why?)
High Performing Building

Measurable Value
(How?)

Integrated Systems
(What?)
MANAGING WITH METRICS
To Improve Integrated Team Performance

1. Bricks and Mortar: Projected Estimate progress toward Budget

2. Integrated Process
   - SD PHASE
   - DD PHASE
   - CD PHASE

3. 610 Total PMIs
   - Reduced conduit, wiring, and circuits by 3,000 linear feet, saving $500,000
   - Reduced ductwork by 100,000 pounds and piping by 7,000 linear feet, saving $2M

4. Submittals
   - Incentive Percentage

5. RFIs
   - Incentive Percentage

6. Project PPC
   - UCSF Medical Center at Mission Bay
   - # of Tasks (Minutes)
COORDINATION METRICS
Managing BIM Coordination with Metrics

- 3,000,000 total clashes (90% of CD)
  - 25% inconsequential
- 600,000
  - 80% easily resolved with no impact and per intent
- 300,000
  - 50% little impact
- 150,000
  - 50% solved with A/E
- 75,000
  - 50% solved with trades & designers
- 37,500
- 0

Clashes potentially becoming RFIs

Project currently 99.85% clash free

100% Clash resolution
PRODUCTION METRICS

Studying Results is the Key to Continuous Improvement
A NOTE ON VDC
Virtual Design & Construction
Virtual Design and Construction (VDC) is the use of multidisciplinary performance models of building projects, including their products (facilities), organizations, and work processes for business objectives.

- Lifecycle determined in design & construction
- Leverage computing power
- Find best ways to work
- Include all stakeholders and perspectives
- Integrate the building’s systems
- Deliver exactly the high performing building the owner needs
VDC
Virtual Design & Construction
Virtual Design & Construction

- Measurable Value
- Production Management
- Collaboration Co-Location
- Visualization Simulation
- High Performing Building
- Integrated Systems
- Process Integration
- Integrated Organization
- Integrated Information

Agreement / Framework
## AGREEMENT / STRUCTURE

6 Questions for Organizational Clarity

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<th>How do we behave?</th>
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<th>What do we do?</th>
<th>How will we succeed?</th>
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<th>What is most important, right now?</th>
<th>Who must do what?</th>
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Courtesy of Patrick Lencioni
PREVENT NEW PRACTICES & BEHAVIORS

Current contracts require parties to protect themselves first

Why? Control cost
How? Single-point accountability
What? Notice provisions

Agreement / Framework
SUPPORT NEW PRACTICES & BEHAVIORS

IPD contracts create a foundation

Why? Commitment to trust and collaboration
How? Align interests
What? Agreement on terms to keep everyone together

Agreement / Framework
AGREEMENT / FRAMEWORK INTERCONNECTIONS
to Integrating Process, Organization and Information
USING LEAN TOOLS STRATEGICALLY
PLACING YOUR TOOLS
Where do your tools fit in the Simple Framework?

- Decide as a group where each of your 5 tools fits in the Simple Framework
- Identify where else your tools fit
- Place each of your stickies where they should go on the Simple Framework plot
EVERYTHING IS INTERCONNECTED
THE SIMPLE FRAMEWORK IS A STRATEGY

Delivering greater value predictably

A SYSTEM MODEL

• Based on Lean thinking and creating performance models

• Requires a pivot from a cost focus and fragmentation to value and integration
INTEGRATING PROJECT DELIVERY

Take-aways

• Our big idea is integration is imperative and a strategy.

• Value of the physical product is the starting / ending point.

• Integration requires flow and is the final stage of Lean.

• Cost / resource efficiency focus leads to fragmentation.

• Simplicity goal forced us look at strategy and enablers, beyond Lean methods, practices and behaviors.

• VDC is the most powerful system methodology for integration.