Lean Project Delivery

Time + $$ + Quality – You CAN Have all Three!

Game Plan

- Context and Background
- WHY?
- RISK
- Evolution in Project Delivery
- Drill Down into Lean and Integrated Project Delivery – the mechanics
- Case Studies
Why Owners are Looking

• Disappointment, frustration, anger with ‘traditional’
  – Cost
  – Schedule
  – Lack of predictability of cost/schedule
  – Build Quality
  – Defects, Deficiencies
  – Performance – design and build

Why Owners are Looking (cont’d)

  – Adversarial
  – Durability/maintenance/LCC
  – Lack of innovation
  – Change orders
  – Lack of accountability, “finger pointing”
    • throughout the supply chain
  – All problems become Owner’s problems
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Service and Ops

Why Industry is Looking

- Adversarial
  - “Contracts from hell”
  - Reverse auctions
- Risk transfer without incentive/reward
- Lack of satisfaction
- Low profitability
- Focus on lowest price
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Underperforming

Underperforming

30? 50?
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Integrated Teams
Longer Term Relationships
Share Risk and Reward
Innovation – R and D

RISK
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

So, TRANSFER what risks???

- Schedule *
- Budget *
- Finance
- Owner’s consultant’s liabilities
- Accuracy of site info.
- User/owner changes
- Changes in law, codes
- "Fitness for purpose"
- Maintenance

- Subsoils
- Environmental
- Operational
- Innovation
- Energy Performance and Energy Costs
- LCC and performance
- ...

Risk Shifts in Traditional DBB

Owner

Designer

Contractor

STRATEGIES 4 IMPACT

IIDEX September 20, 2012
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Shift in Risks

RFP's and Contracts "From Hell" – increasingly adversarial

"Induced" Adversarial Relationship

Design Bid Build

IIDEX September 20, 2012
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Design Build

Owner

Design Builder

Design Build

Owner

Design Builder

Designer

IIDEX September 20, 2012
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Balance
Risk and Reward

IIDEX September 20, 2012
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Performance Contracting

- **Maximum Incentive**
  - Beat the target
  - Target
  - Base Fee

- **Maximum Penalty**
  - Miss the target

Metric (e.g. Annual Cost of Energy)

Project Alliance

- **Gain**
  - 3

- **Pain**
  - 1

- **Direct Proj Cost**
- **Proj OH**
- **Corp OH**
- **Profit**

Project Cost and OH guaranteed
Profit and Corp OH at risk (*pain*)
Potential *Gain* if improve on "targets"
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

UNDERSTANDING
PUBLIC PRIVATE PARTNERSHIPS
IN CANADA

Public Private Partnerships

Advisors ↘ Public Owner

Consortium

Contractor  F/M  Equipment/IT  Operators

Designers  Energy
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Integrated Project Delivery

Project = Shared Goal
Shared Risk and Reward

IPD – Input Early

Impact of decisions
Cost of changes
Project life cycle
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

IPD – Greater Design Investment

- Impact of decisions
- Cost of changes
- Potential
- Usual
- Project life cycle to commissioning

SHARED

- vision
- objective
  - the best project outcome
- risk
- ... and reward
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

BIM

Layer on LEAN

Maximize value

Minimize waste
Lean Project Delivery
Time + $ + Quality – You CAN Have all Three!

RISK & RECOVERY IN DESIGN & CONSTRUCTION

THREE OPPORTUNITIES OF LEAN

• Impeccable coordination
• Project as a Production System
• Project as a Collective Enterprise
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

**FIVE OPPORTUNITIES OF IPD**

- Design the building and how to build it at the same time
- The people who install the systems find them, analyze them, choose them, design and install them
- The people doing the work, plan the work
- Everyone benefits from project savings
- The contract model is collaborative and relational, not draconian and siloed

**CURRENT PROJECT MANAGEMENT**

- Determine client requirements including quality, time and budget limits. Design to meet them.
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

CURRENT PROJECT MANAGEMENT

- We negotiate contracts to purchase and sell risk, almost always passing on risk to the next player

CURRENT PROJECT MANAGEMENT

- The money, the time, the work, the insurance and all the risk are apportioned . . .

. . . before we ever hire the people who will actually do the work
**CURRENT PROJECT MANAGEMENT**

- Break project into activities, estimating duration and resource requirements for each activity and placing them in a logical order with CPM

Demolition
Grade & Fill
Foundations

**PROBLEM OF PRODUCTIVITY**

What our schedule tells us . . .

Concrete
MEP Rough
Framing
Wall rough
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

PROBLEM OF PRODUCTIVITY

What really happens

Concrete

Not timely

MEP Rough

Timely but waits for work

Framing

Early, leaves, comes back late

Wall rough

How do we manage projects now?

• Assign or contract each activity, give start notice and monitor safety, quality, time and cost standards. Act on negative variance from standards

IIDEX September 20, 2012
Lean Project Delivery
Time + $\$ + Quality – You CAN Have all Three!

CURRENT PROJECT MANAGEMENT
• Coordinate with master schedule and weekly meetings

CURRENT PROJECT MANAGEMENT
• Reduce cost by productivity improvement

• Reduce duration by speeding each piece or changing logic

• Result? We slow down the rest of the Project
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

**CURRENT PROJECT MANAGEMENT**

- Improve quality and safety with inspection and enforcement

**CHANGING OUR VIEW**

- Low Bid Oboist
- Violins for Crescendo
- Where’s the brass section?
- Violin for Solo
- Timpanist making do
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

CHANGING OUR VIEW
Organization Operating System Commercial

- Command & Control
- Activity Centered (CPM)
- Transactional

CHANGING OUR VIEW
Organization Operating System Commercial

- Collaborative
- Flow Centered
- Relational
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

RISK MANAGEMENT

- Structure contracts to manage risk not sell it
- Increase knowledge as early as possible
- Manage project work with Owner and Contractor
- Help develop sensible, efficient, cost-effective insurance programs

RISK MANAGEMENT

<table>
<thead>
<tr>
<th>Known</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>What we assume/ what we predict</td>
<td></td>
</tr>
</tbody>
</table>
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

RISK MANAGEMENT
Understanding the Work: Traditional Process

- Pre-Construction Services
- Construction

Owner
Architect Hired
Engineers Hired
CM/GC Hired
Major Trades Hired

SD DD CD

RISK MANAGEMENT
Known Unknown
What we assume/ what we predict

IIDEX September 20, 2012
Lean Project Delivery

Time + $$ + Quality – You CAN Have all Three!

RISK MANAGEMENT

Known

Unknown

What we assume/what we predict

RISK MANAGEMENT

Understanding the Work: Lean Project

Time

Common Understanding

Owner

Architect Hired

CM/GC Hired

Engineers Hired

Major Trades Hired

Pre-Construction Services

Construction

Valid

Concept

Design

Implementation

100%
Lean Project Delivery
Time + $$$ + Quality – You CAN Have all Three!

**RISK MANAGEMENT**

<table>
<thead>
<tr>
<th>Known</th>
<th>Risk</th>
</tr>
</thead>
</table>

**Core Group Risk Management**

**Inspection**

**COMPETITION VS IPD**

**Impeccable Coordination:** Understanding the Project

<table>
<thead>
<tr>
<th>Hard Bid Build/GMax</th>
<th>Costs</th>
<th>IPD Model</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Bid Cost</td>
<td>$990,000</td>
<td>Expected Cost</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Changes</td>
<td>$100,000</td>
<td>Target cost</td>
<td>900,000</td>
</tr>
<tr>
<td>Delay costs</td>
<td>$50,000</td>
<td>Changes</td>
<td>$0</td>
</tr>
<tr>
<td>Claims</td>
<td>$100,000</td>
<td>Delay costs</td>
<td>$0</td>
</tr>
<tr>
<td>Total cost:</td>
<td>$1,240,000</td>
<td>Claims</td>
<td>$0</td>
</tr>
<tr>
<td>Total Value:</td>
<td>$1,000,000</td>
<td>Actual Cost</td>
<td>$800,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shared Savings to Owner</td>
<td>$50,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total cost:</td>
<td>$750,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total value</td>
<td>$1,000,000</td>
</tr>
</tbody>
</table>
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Integrated Project Delivery

Steps:
1. Establish and validate expected cost
2. Establish a “Target Cost”
3. Use Target Value Design to get to Target Cost
4. Share Savings below Target Cost
5. Put fee at risk above Target Cost
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

TYPICAL MODEL

COLLECTIVE ENTERPRISE
Collective Enterprise: Maximize the whole, not the pieces
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

MANAGING THE CONTINGENCY

Collective Enterprise: Maximize the whole, not the pieces
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Integrated Project Delivery

Current Results
September, 2012

Expected Results
Based on reported usages by various companies around the country, IPD teams can expect:

- Labor efficiency savings: 11-16%
- Schedule enhancement: 5-15%
- Safety enhancement: 30%
- Quality achievement: 95%
- Client satisfaction: 95%
- Change orders: less than 5% of contract
- RFIs: less than 100
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Case Studies

- Seattle Children’s Hospital, Bellevue, WA
- St. Clare’s Hospital, St. Louis, MO
- Encircle Health Center, Appleton, WI
- Cardinal Glennon Childrens, St. Louis
- Sutter Medical Office Building, Fairfield, CA
- Chilled Water Plants, Orlando, FL
Case Studies

- UHS Projects:
  - Fairmont, Horsham Comparison
  - Springwoods BH, Fayetteville, AK
  - Cumberland Hall, Hopkinsville, KY
- GPIC HUB Energy Renovation Project, Philadelphia, PA*
- Toronto Office Tenant Finish, Toronto, ON*
  * In progress

Seattle Children’s

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Planned or Expected</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>110,000 Square Feet</td>
<td>79,000 Square Feet with same program</td>
</tr>
<tr>
<td>Budget</td>
<td>$110,000,000</td>
<td>$79,000,000</td>
</tr>
<tr>
<td>Schedule</td>
<td>18 months</td>
<td>14.5 months</td>
</tr>
<tr>
<td>Change Orders as %</td>
<td>8.3%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Quantity of Owner Change Requests</td>
<td>102</td>
<td>18</td>
</tr>
<tr>
<td>Quantity of Requests For Information</td>
<td>608</td>
<td>78</td>
</tr>
</tbody>
</table>
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

St. Clare (154 bed hospital)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Planned or Expected</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>430,000 Square Feet</td>
<td>430,000 Square Feet</td>
</tr>
<tr>
<td>Budget</td>
<td>$148,300,000</td>
<td>$148,300,000</td>
</tr>
<tr>
<td>Schedule</td>
<td>41 months</td>
<td>44 months (delay to accommodate switch to electronic medical records)</td>
</tr>
<tr>
<td>Change Orders as %</td>
<td>10%</td>
<td>0</td>
</tr>
<tr>
<td>Quantity of Owner Change Requests</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Quantity of Requests For Information</td>
<td>750</td>
<td>278</td>
</tr>
</tbody>
</table>

Encircle Health Center

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Planned or Expected</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>150,000 Square Feet</td>
<td>157,000 square feet</td>
</tr>
<tr>
<td>Budget</td>
<td>$37,878,475</td>
<td>$38,594,048 (more than $800k savings with Change Orders)</td>
</tr>
<tr>
<td>Schedule</td>
<td>38 months</td>
<td>41 months (included 5 month delay for Physician's business plan)</td>
</tr>
<tr>
<td>Change Orders as %</td>
<td>10%</td>
<td>$1,514,911 (4%)</td>
</tr>
<tr>
<td>Quantity of Owner Change Requests</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Quantity of Requests For Information</td>
<td>750</td>
<td>0</td>
</tr>
</tbody>
</table>
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

### Cardinal Glennon Surgery & NICU Expansion

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Planned or Expected</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>138,000 Square Feet</td>
<td>138,000</td>
</tr>
<tr>
<td>Budget</td>
<td>$45,572,449</td>
<td>$45,572,449</td>
</tr>
<tr>
<td>Schedule</td>
<td>26 months</td>
<td>24 months</td>
</tr>
<tr>
<td>Change Orders as %</td>
<td>10%</td>
<td>0</td>
</tr>
<tr>
<td>Quantity of Owner Change Requests</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Quantity of Requests For Information</td>
<td>750</td>
<td>63</td>
</tr>
</tbody>
</table>

### Sutter Fairfield

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Planned or Expected</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>67,106 square feet</td>
<td>69,948 square feet</td>
</tr>
<tr>
<td>Budget</td>
<td>$19,573,035</td>
<td>$19,462,103</td>
</tr>
<tr>
<td>Schedule</td>
<td>15 months</td>
<td>15 months, including 3 month delay for program revision</td>
</tr>
<tr>
<td>Change Orders as %</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Quantity of Owner Change Requests</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Quantity of Requests For Information</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
City of Orlando, Chilled Water Plant

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Planned or Expected</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget</td>
<td>$6,000,000</td>
<td>$5,400,000</td>
</tr>
<tr>
<td>Schedule</td>
<td>12 months</td>
<td>6.5 months (including design review delay of 6 weeks)</td>
</tr>
<tr>
<td>Change Orders as %</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Quantity of Owner Change Requests</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Quantity of Requests For Information</td>
<td>N/A</td>
<td>0</td>
</tr>
</tbody>
</table>

Toronto Office TI (in progress)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Planned or Expected</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>90,000</td>
<td>90,000</td>
</tr>
<tr>
<td>Budget</td>
<td>$125/sq ft ($11.25M)</td>
<td>$117/sq ft ($10.53M)</td>
</tr>
<tr>
<td>Schedule</td>
<td>10 months (project lops over into holidays so move-in is later)</td>
<td>8 months (to allow for move prior to holidays)</td>
</tr>
<tr>
<td>Target Value Design</td>
<td>To date, the team has driven the committed cost to $117/sq foot</td>
<td></td>
</tr>
<tr>
<td>Purpose of Project</td>
<td>To be used for the next 40 floors of planned tenant finish</td>
<td></td>
</tr>
</tbody>
</table>
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

Tale of two projects
Same time, same city, same architect, different contractor, different delivery method

<table>
<thead>
<tr>
<th></th>
<th>Fairmont, 54 Bed Facility</th>
<th>Horsham, 60 Bed Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bid Day</td>
<td>$8,828,677</td>
<td>Target Cost: $8,206,072</td>
</tr>
<tr>
<td>Change Requests</td>
<td>30</td>
<td>Change Requests: 3</td>
</tr>
<tr>
<td>Increased Costs through changes</td>
<td>$677,758</td>
<td>Increased Costs through changes: (36,181)</td>
</tr>
<tr>
<td>Final Cost</td>
<td>$9,500,000</td>
<td>Final Cost: $8,169,891</td>
</tr>
</tbody>
</table>

Tale of two other projects
Same time, same city, same architect, different contractor, different delivery method

<table>
<thead>
<tr>
<th></th>
<th>Springwoods BH, Fayetteville, AK</th>
<th>Cumberland Hall, Hopkinsville, KY</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 beds/58,000 SF</td>
<td></td>
<td>100 beds/68,000 SF</td>
</tr>
<tr>
<td>$213/SF construction cost</td>
<td></td>
<td>$184/SF construction cost</td>
</tr>
<tr>
<td>$279/sf all in cost</td>
<td></td>
<td>$250/sf all in cost</td>
</tr>
<tr>
<td>$205k per bed</td>
<td></td>
<td>$171k per bed</td>
</tr>
<tr>
<td>$249/sf if built in KY</td>
<td></td>
<td>$184/sf built in KY</td>
</tr>
<tr>
<td>$231k per bed</td>
<td></td>
<td>$171k per bed</td>
</tr>
</tbody>
</table>
Lean Project Delivery
Time + $$ + Quality – You CAN Have all Three!

GPIC HUB (in progress)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Planned or Expected</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>45,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Budget</td>
<td>$30,000,000</td>
<td>$30,000,000 (project goal is to spend entire budget and increase program)</td>
</tr>
<tr>
<td>Schedule</td>
<td>24 months</td>
<td>16 months</td>
</tr>
</tbody>
</table>
| Target Value Design    | Removed $2.3M in redundant or wasteful systems and added back in $680,000 of value adds in a 2 day TVD workshop |}

Sources