Lean Project Delivery

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

Lean Project Delivery

Time + $$ + Quality

Construct Canada 2012

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
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Service and Ops

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>95%</td>
<td>Design/Construction</td>
</tr>
<tr>
<td>5%</td>
<td>FM, Asset Operation</td>
</tr>
<tr>
<td></td>
<td>Operations</td>
</tr>
</tbody>
</table>

Why Industry is Looking

- Adversarial
  - “Contracts from hell”
  - Reverse auctions
- Risk transfer without incentive/reward
- Lack of satisfaction
- Low profitability
- Focus on lowest price

Underperforming

30? 50?
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Integrated Teams
Longer Term Relationships
Share Risk and Reward
Innovation – R and D

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Ceramic rods used as solar screen

Lowest 10 rows of ceramic rods providing solar shading had to be removed because of NYC human orangeland!

Plywood protecting laminated glass canopy

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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

Shift in Risks

Design Bid Build

RFP’s and Contracts “From Hell” – increasingly adversarial
"Induced" Adversarial Relationship

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Design Build

Owner

Design Builder

Design Build

Owner

Design Builder

Designer

Design Assist: Getting Contractors Involved Early

September 15, 2015

Strategic Project Delivery

Design

Owner

Design

Design Build

Owner

Design Builder

Legal Insight

K&L GATES

Design-Assist: Getting Contractors Involved Early

By: Gregory K. Andre

Design assist is a project delivery method in which the owner is responsible for selecting the design and construction team. The design consultant is part of the owner's team and works to ensure that the building is completed on time and within budget. The design consultant is also responsible for managing the construction process and ensuring that the project is completed on time and within budget.

A. What is Design-Assist?

1. Definition: Design assist is a project delivery method in which the owner is responsible for selecting the design and construction team. The design consultant is part of the owner's team and works to ensure that the building is completed on time and within budget. The design consultant is also responsible for managing the construction process and ensuring that the project is completed on time and within budget.

Under the traditional design-bid-build delivery method, the contractor does not have the same responsibilities as under a design-assist arrangement. Under a design-assist arrangement, the contractor is responsible for the design and construction of the project, and the owner's project team is responsible for overseeing the project. This allows the contractor to work more closely with the owner and to ensure that the project is completed on time and within budget.

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PIPS
• Performance Information Procurement System
  – Contractors submit spreadsheet re best past performance – master matrix
  – Bid with risk assessment plan > “A Team”
  – Rated on ‘best value’
  – Leading contractor > QC plan
  – Stip Sum, weekly report re upcoming risks
  – Evaluated at end for performance
• VOR / Performance Evaluation

Performance Contracting
Balance Risk and Reward
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Project Alliance

$ 3

Gain

Pain

1
Direct Proj Cost

2
Proj OH

3
Corp OH

Profit

Project Cost and OH guaranteed
Profit and Corp OH at risk (pain)
Potential Gain if improve on “targets”

UNDERSTANDING PUBLIC PRIVATE PARTNERSHIPS IN CANADA

Public Private Partnerships

Advisors — Public Owner
Consortium

Contractor — F/M — Equipment/IT — Operators
Designers — Energy
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Integrated Project Delivery

Project = Shared Goal
Shared Risk and Reward

Integrated Project Delivery

IPD – Input Early

Impact of decisions vs. Cost of changes

IPD – Greater Design Investment

SHARED
• vision
• objective
  – the best project outcome
• risk
• ... and reward
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IPD, then “Layer On Lean”

“Way of thinking and behaving that focuses on the customer or client to add value and eliminate waste.”

Lean IPD Opportunities
• Design the building and how to build it at the same time – decisions at the right 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

Evidence …
• Labour efficiency savings 11 to 16%
• Schedule enhancement 5 to 15%
• Safety enhancement 30%
• Quality achievement ratings 95%
• Client satisfaction 95%
• Change orders …
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LEAN P D

• Define “Value” for Client
• “Waste” = resources that don’t build value
• “Make only what the customer ordered”
• Time + Money + Quality – all three!
• Team
• Share Risk and Reward – target value
• “Pull Planning” – make project run seamlessly
  – Designing, planning, managing, building
• "Last Planner"

Schedule Challenges

The traditional "push" schedule says:

- P and E Rough
- Slab on Grade
- Wall studs
- M, E, P Rough

But what REALLY happens ...

- P and E Rough
  - Under-slab rough-in completed on time
- Slab on Grade
- Wall studs
- M, E, P Rough

- Granular base not ready on time so concrete delayed
- Drywall contractor showed up but couldn’t work... Sorted materials in the trailer then left
  ... then came back but had to leave for another job... then came back but smaller crew ...
- M, E, P arrived, couldn’t do much ...
- Result is it all drags out ...

The LEAN Key

• Manage the trades more efficiently
• Use “pull” planning ... When will work be at the point where the next trade can arrive and work productively? i.e. "hand-off"
• Commitments to those dates because everyone has “skin in the game” – sharing the incentive $$ ... or sharing the pain!
• "Last Planner" in LEAN planning
  – Actual trades are involved in planning

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The LEAN Key – Planning!

• Master Scheduling
  – set milestones
• Phase Scheduling ("Pull")
  – Define hand-offs and satisfaction metrics
• Look Ahead Planning
  – Break down tasks (trades!)
  – Design operational plan
  – Identify and eliminate constraints
  – Analyse tasks made ready, tasks anticipated

The LEAN Key – Planning!

• Look Ahead Planning
  – IMPORTANT! – act on reasons for failure
  – PDCA – Plan Do Check Adjust
• Weekly Work Planning
  – Realistic commitments from all form a network
  of commitments to each other
• Learning
  – Maintain a constant cycle of measure, analyse,
  learn ...
  – Then design and execute solutions

LEAN Risk Management

• Risk is fairly shared ... Risk managed by the party(ies) best able to manage it
• In traditional delivery we try to imagine all
  the risks up front, then build robust contract
  provisions hoping to shift the risk
• In LEAN and Integrated Project Delivery, we
  minimize overall risk by reducing unknowns
  working together through the project

Characteristics of LEAN and IPD

Design
• Design what owner values
• Draw only for deliverables
• Budget used as a critical design criterion
• With trades involved from outset, real-time, realistic costing – “target value design”
• “Pull plan” information exchanges
• Delay decisions until you really need to decide

Construction
• Teams formed early
• Core group (with skin in the game) manages
• Target Value Design continues
• “Pull plan” delivery
• Built in safety and quality management plans
• Integration of trades to create “flow”
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LEAN P D
• Target Value Design
  – Determine “usual cost” of project, commit to reduce by %age – that’s the incentive envelope
• Manage one contingency
  – Rather than all parties, trades, suppliers, etc. each carrying their own, with no central management
• Save labour through efficiency
  – Savings shared among that core group with “skin in the game”

Key Point ... Contingency
• In lump sum construction contract, all in the supply chain carry a contingency
• Designers build contingency into their budgets
• Owner carries a contingency
• All separately “managed”, “secret”
• If a trade works more efficiently, it keeps the benefits to itself

Key Point – Sharing Benefits
• Meantime, no incentive for others to enable that trade to work more efficiently and productively
• In LEAN IPD benefits are shared by all of the parties with ‘skin in the game’
• Core group is managing for mutual benefit, best project outcome

For instance ...
• Two storey high-end industrial building with lots of plumbing from below-grade to 1st and 2nd floor and through roof
• Plumber and structural devise a scheme where plumber can prefab stacks off-site and erect in coordination with structural steel
  – Major $$ savings on plumbing
  – a bit extra $ on structural
  – Whole team shares the savings!

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Illustration ...

- Budget $10,000,000
  - Labour $3,500,000
  - Materials $3,500,000
  - FFE $600,000
  - Design/PM $1,000,000
  - Permits, Bonds, Misc $400,000
  - Contingency $1,000,000

Illustration ...

- Target Cost $10,000,000 $8,300,000
  - Labour $3,500,000 $2,800,000
  - Materials $3,500,000 $3,500,000
  - FFE $600,000 $600,000
  - Design/PM $1,000,000 $1,000,000
  - Permits, Misc $400,000 $400,000
  - Contingency $1,000,000 $0

(iimprove labour productivity 20% +
manage without contingency = 17% less)

Ah, but who benefits??

- Traditional stip sum delivery ...
  - That 20% increase in productivity in labour,
even though others have contributed innovative
ideas, to a large degree enabled the savings,
would all go to the labour component ... While
the real cost of the labour has been reduced
by $700K, labour still gets paid the full amount
... and pockets all of those savings

Ah, but who benefits??

- LEAN/IPD
  - Those savings are shared among the core team
according to the formula negotiated at the
outset of the project
  - PLUS ... by avoiding multiple contingencies,
without central management (central control)
AND by agreeing to exclude the contingency
from the budget, the core team also can share
in savings from contingencies

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Note re Contingencies

• Not to suggest that there won’t be additional costs – it’s still a construction project, after all! ... The difference is that the target of the core team is to minimize those additional costs through:
  – Improved planning and execution
  – Innovation
  – Greater efficiency and productivity
  – Collaborative problem-solving

What it looks like ...

1. Owner and advisors prepare business case
2. Programming and design sufficient to prepare global estimates
3. Core Team assembled ... Owner, Design Team, Construction Team, Major Trades
• They collocate to facilitate collaboration
4. Design continues to establish Preliminary Cost
5. Major suppliers added to process
6. Validate Expected Cost (under traditional process)
7. Target Value Design process continues to identify achievable Target Cost
8. Construction underway ... Core Team collaborates to protect maximum savings between Target Cost and Final Cost
9. Core Team shares savings

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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

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, St. Louis
- 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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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

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<table>
<thead>
<tr>
<th>St. Clare (154 bed hospital)</th>
<th>Encircle Health Center</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attribute</strong></td>
<td><strong>Planned or Expected</strong></td>
</tr>
<tr>
<td>Size</td>
<td>430,000 Square Feet</td>
</tr>
<tr>
<td>Budget</td>
<td>$148,300,000</td>
</tr>
<tr>
<td>Schedule</td>
<td>41 months</td>
</tr>
<tr>
<td>Change Orders as %</td>
<td>10%</td>
</tr>
<tr>
<td>Quantity of Owner Change Requests</td>
<td>N/A</td>
</tr>
<tr>
<td>Quantity of Requests For Information</td>
<td>750</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cardinal Glennon Surgery &amp; NICU Expansion</th>
<th>Sutter Fairfield</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attribute</strong></td>
<td><strong>Planned or Expected</strong></td>
</tr>
<tr>
<td>Size</td>
<td>138,000 Square Feet</td>
</tr>
<tr>
<td>Budget</td>
<td>$45,572,449</td>
</tr>
<tr>
<td>Schedule</td>
<td>26 months</td>
</tr>
<tr>
<td>Change Orders as %</td>
<td>10%</td>
</tr>
<tr>
<td>Quantity of Owner Change Requests</td>
<td>15</td>
</tr>
<tr>
<td>Quantity of Requests For Information</td>
<td>750</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>City of Orlando, Chilled Water Plant</th>
<th>Toronto Office TI (in progress)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attribute</strong></td>
<td><strong>Planned or Expected</strong></td>
</tr>
<tr>
<td>Size</td>
<td>$6,000,000</td>
</tr>
<tr>
<td>Budget</td>
<td>$125/sq ft ($11.25M)</td>
</tr>
<tr>
<td>Schedule</td>
<td>12 months</td>
</tr>
<tr>
<td>Change Orders as %</td>
<td>N/A</td>
</tr>
<tr>
<td>Quantity of Owner Change Requests</td>
<td>N/A</td>
</tr>
<tr>
<td>Quantity of Requests For Information</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Purpose of Project**
- To be used for the next 40 floors of planned tenant finish

**Target Value Design**
- To date, the team has driven the committed cost to $117/sq foot

**Schedule**
- 10 months (project tops over into holidays so move-in is later)
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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>100 beds/68,000 SF</td>
<td></td>
</tr>
<tr>
<td>$213/SF construction cost</td>
<td>$184/SF construction cost</td>
<td></td>
</tr>
<tr>
<td>$279/sf all in cost</td>
<td>$250/sf all in cost</td>
<td></td>
</tr>
<tr>
<td>$205k per bed</td>
<td>$171k per bed</td>
<td></td>
</tr>
<tr>
<td>$249/sf if built in KY</td>
<td>$184/sf built in KY</td>
<td></td>
</tr>
<tr>
<td>$231k per bed</td>
<td>$171k per bed</td>
<td></td>
</tr>
</tbody>
</table>

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>
<tr>
<td>Target Value Design</td>
<td>Removed $2.3M in redundant or wasteful systems and added back in $680,000 of value adds in a 2 day TVD workshop</td>
<td></td>
</tr>
</tbody>
</table>

Sources