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

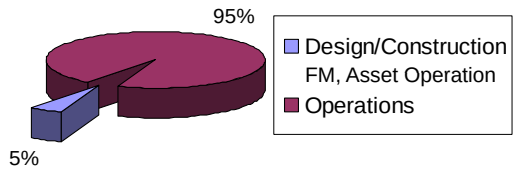
Why Owners are Looking

- 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

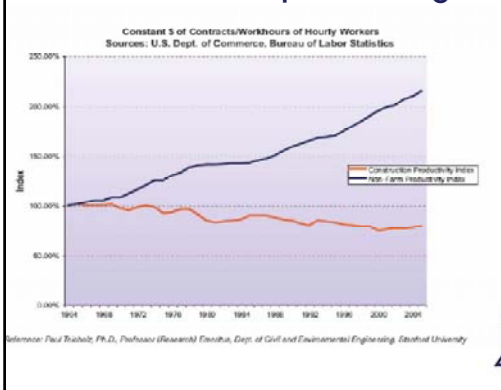
Service and Ops



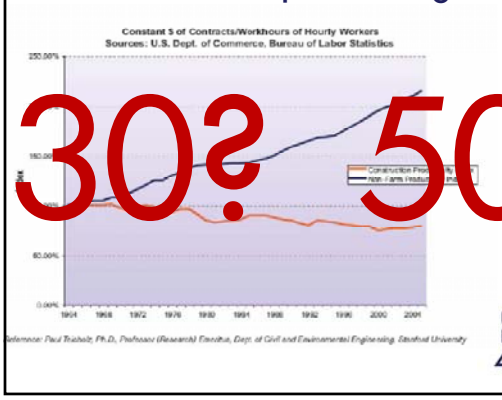
Why Industry is Looking

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

Underperforming



Underperforming



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

RETHINKING CONSTRUCTION

THE REPORT OF THE CONSTRUCTION TASK FORCE

Integrated Teams

Longer Term Relationships

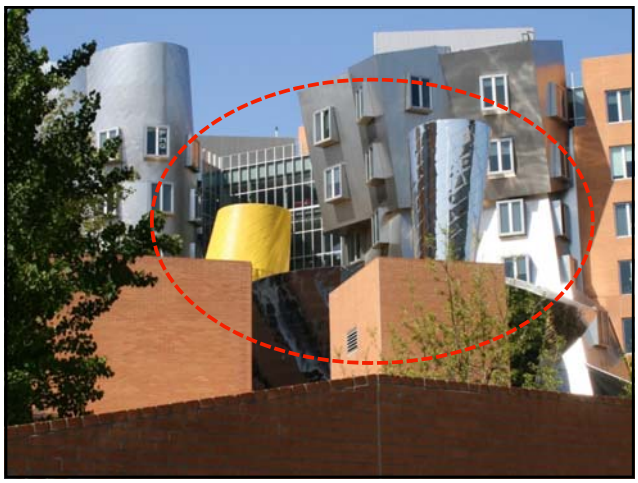
Share Risk and Reward

Innovation – R and D

STRATEGIES 4IMPACT! Professional Service Firm Inc.

RISK

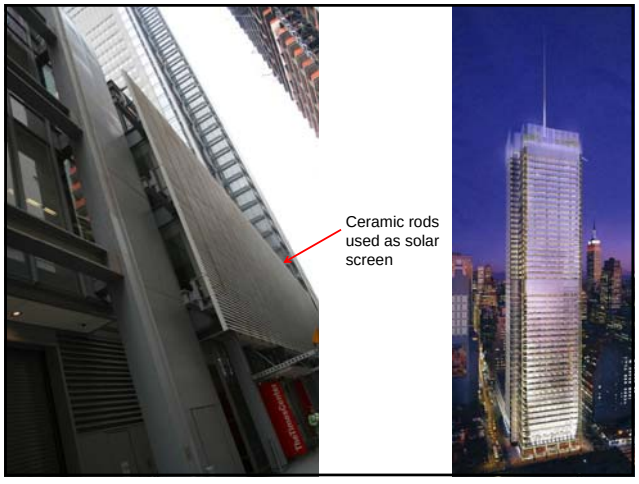
STRATEGIES 4IMPACT! Professional Service Firm Inc.



STRATEGIES 4IMPACT! Professional Service Firm Inc.

www.strategies4impact.com


The New York Times

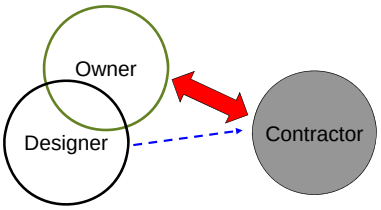

Ceramic rods used as solar screen


Lowest 10 rows of ceramic rods providing solar shading had to be removed because of NYC human orangutans!
Plywood protecting laminated glass canopy
STRATEGIES 4IMPACT!

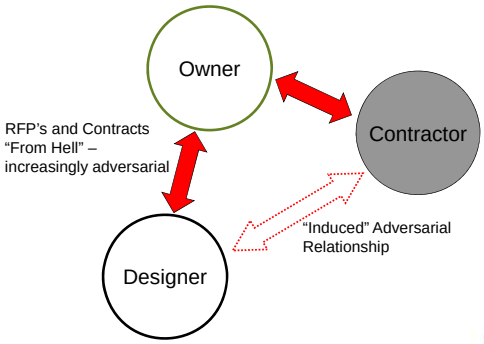
So, TRANSFER what risks???

- 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
- ...

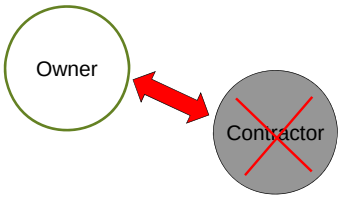
Risk Shifts in Traditional DBB

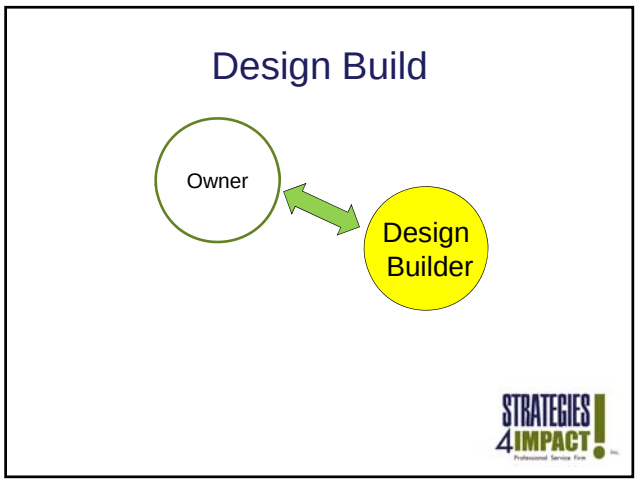


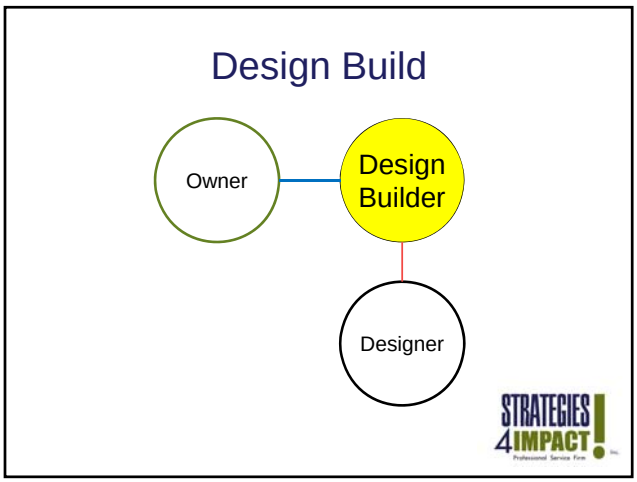
Shift in Risks

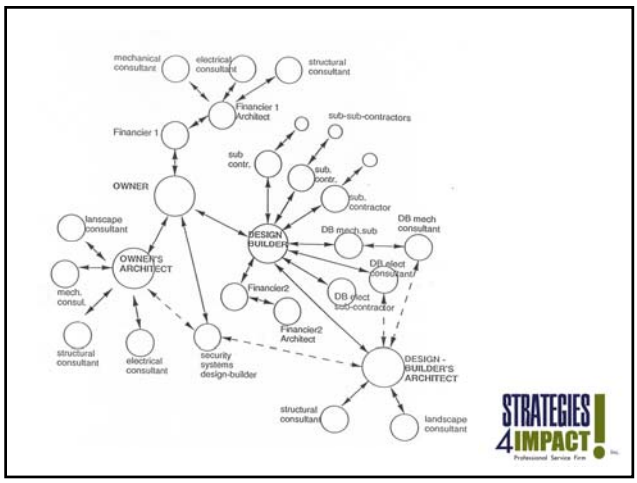


Design ~~Bid~~ Build










Legal Insight

K&L GATES

September 19, 2012

Practice Group:

Construction & Engineering

Energy

Real Estate Investment, Development, and Finance

Design-Assist: Getting Contractors Involved Early

By Gregory R. Andre

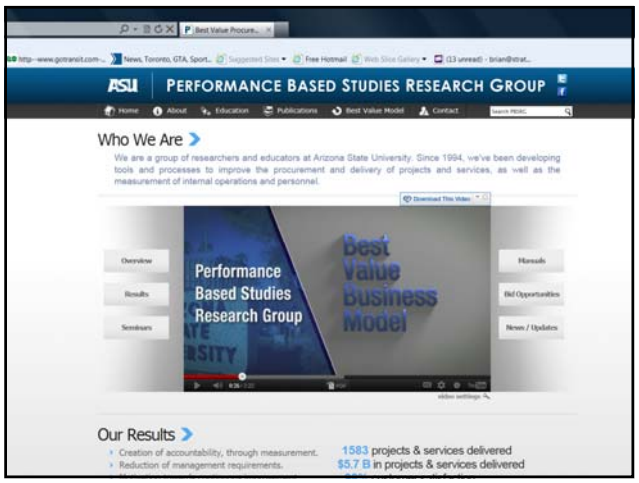
Innovation in construction delivery methodology is clearly trending toward collaborative, teamwork approaches. Design-assist is one such approach that requires taking only a small step away from traditional delivery methods and avoids the leap required by integrated project delivery. Its potential advantages are reduced time and cost for construction, improved constructability and added value.

[A] What Is Design-Assist?

1. **Overview.** Design-assist is a project delivery method in which the construction team is engaged by the owner to collaborate with the architect or engineer during the design phase. It is intended to reduce the cost and time for construction, improve constructability and add value. Design-assist is part of the recent trend in delivery methods toward teamwork approaches to design and construction.

Under the traditional design-bid-build delivery method, the contractor does not see the plans and specifications until they have been completed by the architect or engineer and are ready for bids. Any suggestions or concerns that the construction team might have with respect to them arise at a point in the process when it might be difficult, very expensive or too late to address them. For example, the curtainwall subcontractor might have an idea for improving the fastening system that could save time and money or the plumbing subcontractor might have a concern with constructability that could result in a change order that will add cost and time to the project.

It has long been common for owners to hire the construction manager or the pre-selected general contractor prior to the completion of the design to provide "pre-construction services." These services typically consist of reviewing the draft plans, commenting on constructability and providing cost estimating and scheduling services, but may also include providing advice on materials, systems and equipment, labor and material availability, procurement timing and alternative designs. Trade subcontractors are usually not involved, so the services lack the benefit of their specialized expertise.

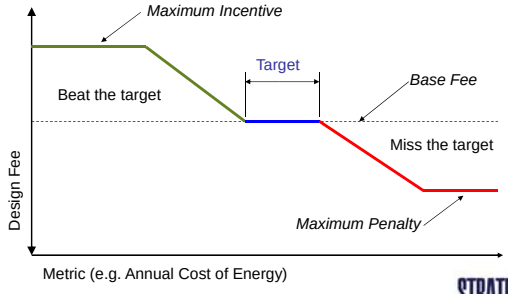


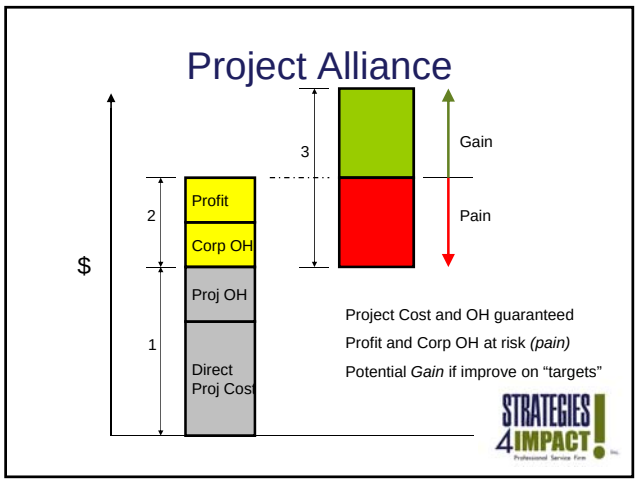
PIPS

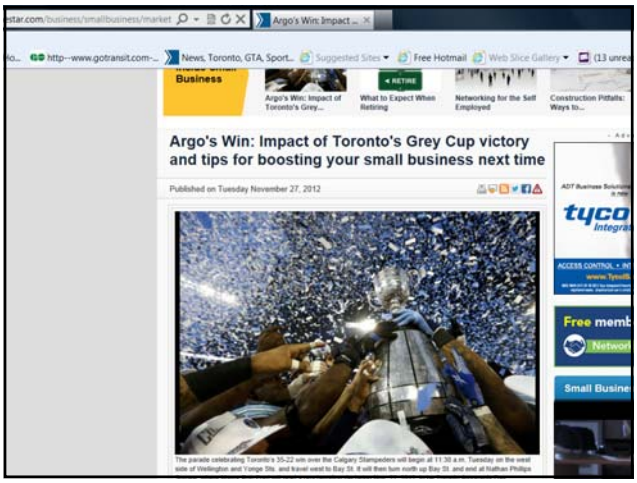
- Performance Information Procurement System
  - Contractors submit spreadsheet re best past performance – master matrix
  - Bid with risk assessment plan > "A Team"
  - Rated on 'best value'
  - Leading contractor > QC plan
  - Stip Sum, weekly report re upcoming risks
  - Evaluated at end for performance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

Balance Risk and Reward

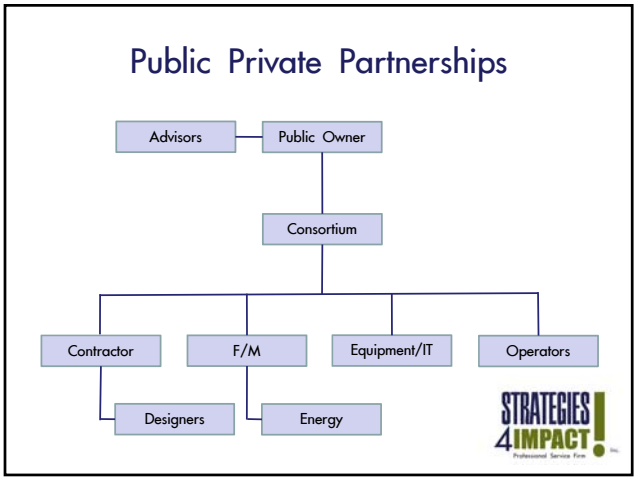
Performance Contracting



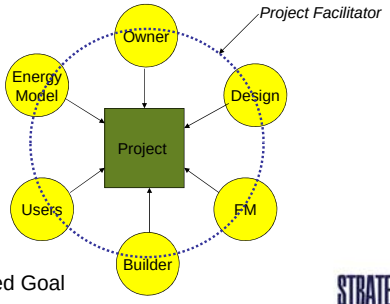

Project Alliance
$
2
1
3
Profit
Corp OH
Proj OH
Direct
Proj Cost
Gain
Pain
Project Cost and OH guaranteed
Profit and Corp OH at risk (pain)
Potential Gain if improve on "targets"
STRATEGIES 4IMPACT!


Argo's Win: Impact of Toronto's Grey Cup victory and tips for boosting your small business next time
Published on Tuesday November 27, 2012


UNDERSTANDING
PUBLIC PRIVATE PARTNERSHIPS
IN CANADA
STRATEGIES 4IMPACT!


Public Private Partnerships
Advisors
Public Owner
Consortium
Contractor
F/M
Equipment/IT
Operators
Designers
Energy
STRATEGIES 4IMPACT!

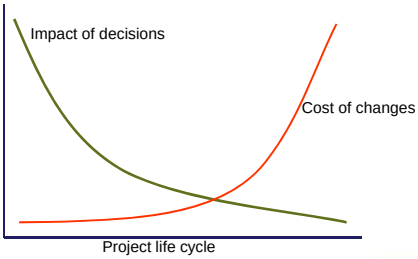
Integrated Project Delivery



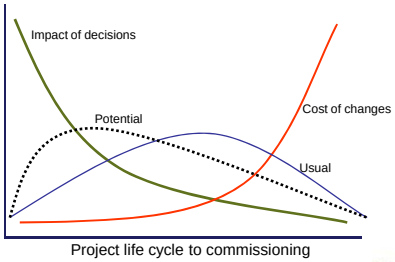
Project = Shared Goal

Shared Risk and Reward

IPD – Input Early



IPD – Greater Design Investment



SHARED

- vision
- objective
  - *the best project outcome*
- risk
- … **and reward**

BIM

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 ...

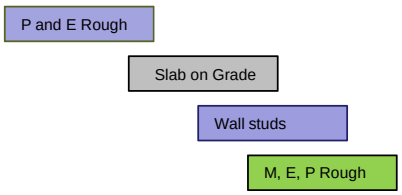
- Labour efficiency savings 11 to 16%
- Schedule enhancement 5 to 15%
- Safety enhancement 30%
- Quality achievement ratings 95%
- Client satisfaction 95%
- Change orders ...

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"

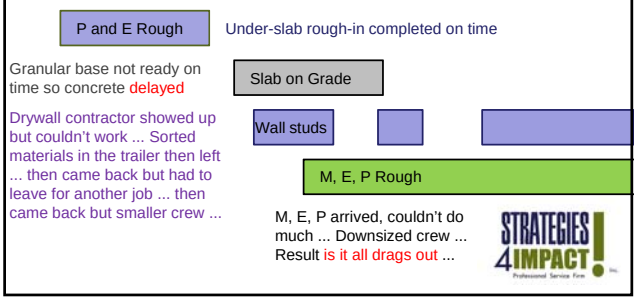
Schedule Challenges

The traditional "push" schedule says:



Schedule Challenges

But what REALLY happens ...



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

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"

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!

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

(improve 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

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

What it looks like …

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

INTEGRATED PROJECT DELIVERY

Current Results
September, 2012

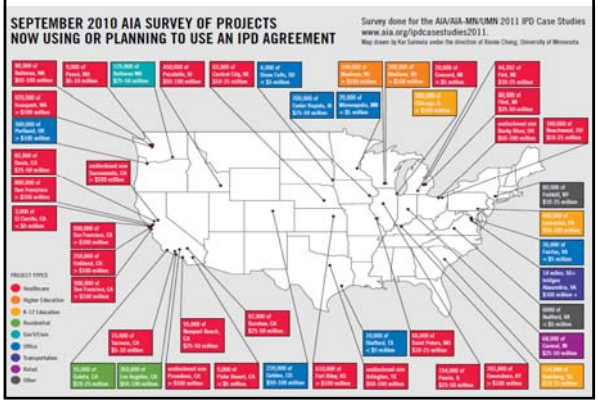
The AIAlignment Group, Ltd.

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

IPD Programs in the United States



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

Attribute	Planned or Expected	Actual
Size	110,000 Square Feet	79,000 Square Feet with same program
Budget	$110,000,000	$79,000,0000
Schedule	18 months	14.5 months
Change Orders as %	8.3%	4.2%
Quantity of Owner Change Requests	102	18
Quantity of Requests For Information	608	78

St. Clare (154 bed hospital)

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

Encircle Health Center

Attribute	Planned or Expected	Actual
Size	150,000 Square Feet	157,000 square feet
Budget	$37,878,475	$38,594,048 (more than $800k savings with Change Orders)
Schedule	38 months	41 months (included 5 month delay for Physician's business plan)
Change Orders as %	10%	$1,514,911 (4%)
Quantity of Owner Change Requests	15	3
Quantity of Requests For Information	750	0

Cardinal Glennon Surgery & NICU Expansion

Attribute	Planned or Expected	Actual
Size	138,000 Square Feet	138,000
Budget	$45,572,449	$45,572,449
Schedule	26 months	24 months
Change Orders as %	10%	0
Quantity of Owner Change Requests	15	0
Quantity of Requests For Information	750	63

Sutter Fairfield

Attribute	Planned or Expected	Actual
Size	67,106 square feet	69,948 square feet
Budget	$19,573,035	$19,462,103
Schedule	15 months	15 months, including 3 month delay for program revision
Change Orders as %	N/A	N/A
Quantity of Owner Change Requests	N/A	N/A
Quantity of Requests For Information	N/A	N/A

City of Orlando, Chilled Water Plant

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

Toronto Office TI (in progress)

Attribute	Planned or Expected	Target
Size	90,000	90,000
Budget	$125/sq ft ($11.25M)	$117/sq ft ($10.53M)
Schedule	10 months (project lops over into holidays so move-in is later)	8 months (to allow for move prior to holidays)
Target Value Design		To date, the team has driven the committed cost to $117/sq foot
Purpose of Project		To be used for the next 40 floors of planned tenant finish

Tale of two projects

Same time, same city, same architect, different contractor, different delivery method

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

Tale of two other projects

Same time, same city, same architect, different contractor, different delivery method

Springwoods BH, Fayetteville, AK	Cumberland Hall, Hopkinsville, KY
80 beds/58,000 SF	100 beds/68,000 SF
$213/SF construction cost	$184/SF construction cost
$279/sf all in cost	$250/sf all in cost
$205k per bed	$171k per bed
$249/sf if built in KY	$184/sf built in KY
$231k per bed	$171k per bed

GPIC HUB (in progress)

Attribute	Planned or Expected	Target
Size	45,000	50,000
Budget	$30,000,000	$30,000,000 (project goal is to spend entire budget and increase program)
Schedule	24 months	16 months
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

- http://hga.com/sites/default/files/downloads/resources/ipd_casestudies_aiacc_final_010410_0.pdf
- http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aiab093702.pdf
- http://leanconstruction.org/wpapers/congress201010/Congress/2010-10-20-LCI-Congress-01-Giuzio.pdf