

Integrated Project Delivery: Lean Times Call for Lean Methods in California Public School Construction

FAC 13 -- Saturday, April 17, 2010
1:45 – 2:45 p.m.

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This report has been prepared by the CASBO State Facilities Professional Council.
It has not been reviewed by State CASBO for approval,
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Fairmont Elementary School Vacaville, California



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Things We Are Planning to Discuss:

- What is “Integrated Project Delivery”?
- What is “Lean Project Management”?
- Our Contract Structure
- Our Approach to Risk Allocation
- How this approach requires different behaviors from everyone on the team
- What we accomplished
- What we learned

First, a pop quiz

- True or False: public contract code mandated “hard bid” is the cheapest and best way to buy construction?

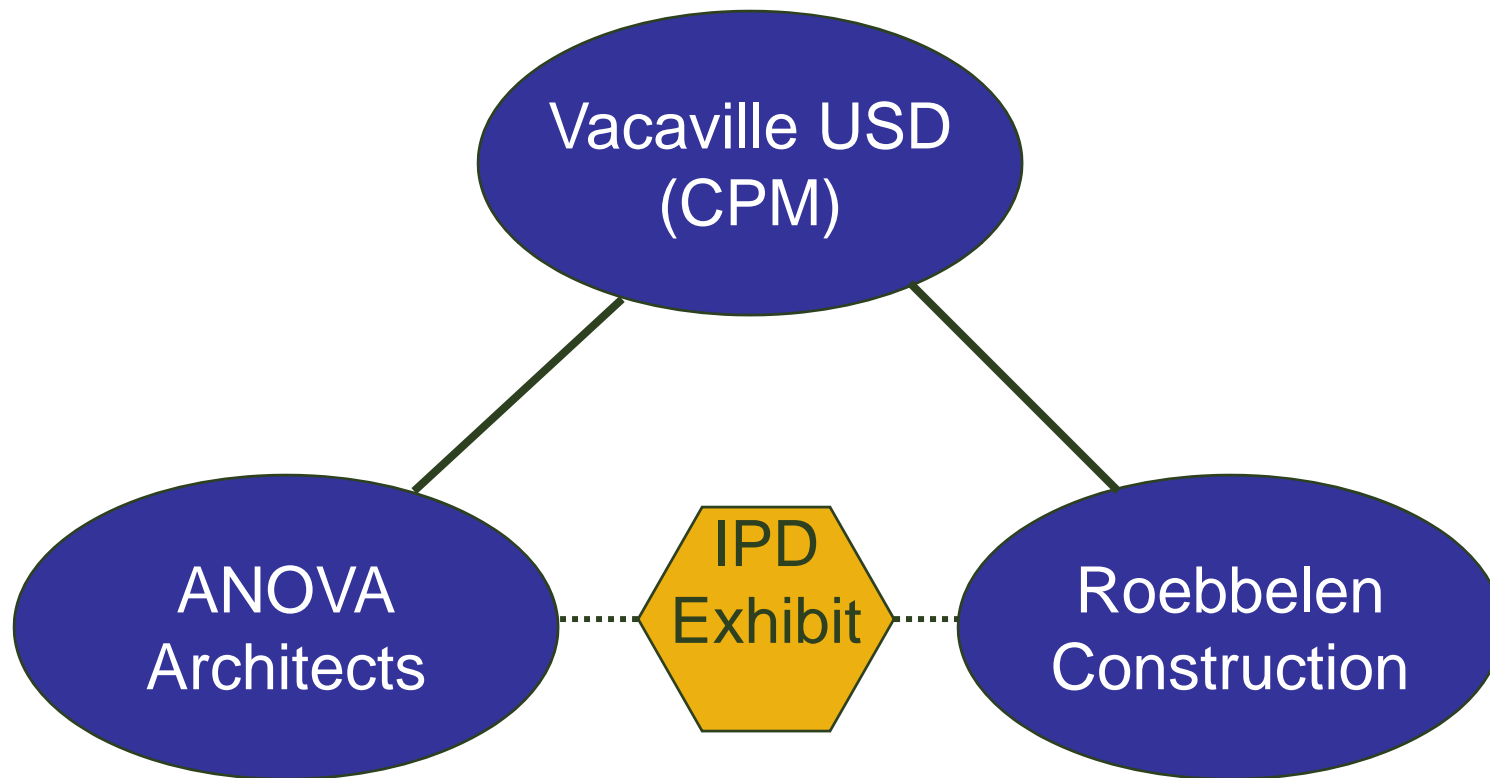
What is “Integrated Project Delivery”?

- Team is assembled at start of design and includes owner, designers, and constructors
- Risk is reasonably shared, and high performance is incentivized
- Deep collaboration is expected
- Problems are addressed using expertise of entire team
- Disagreements are resolved fairly, in real time

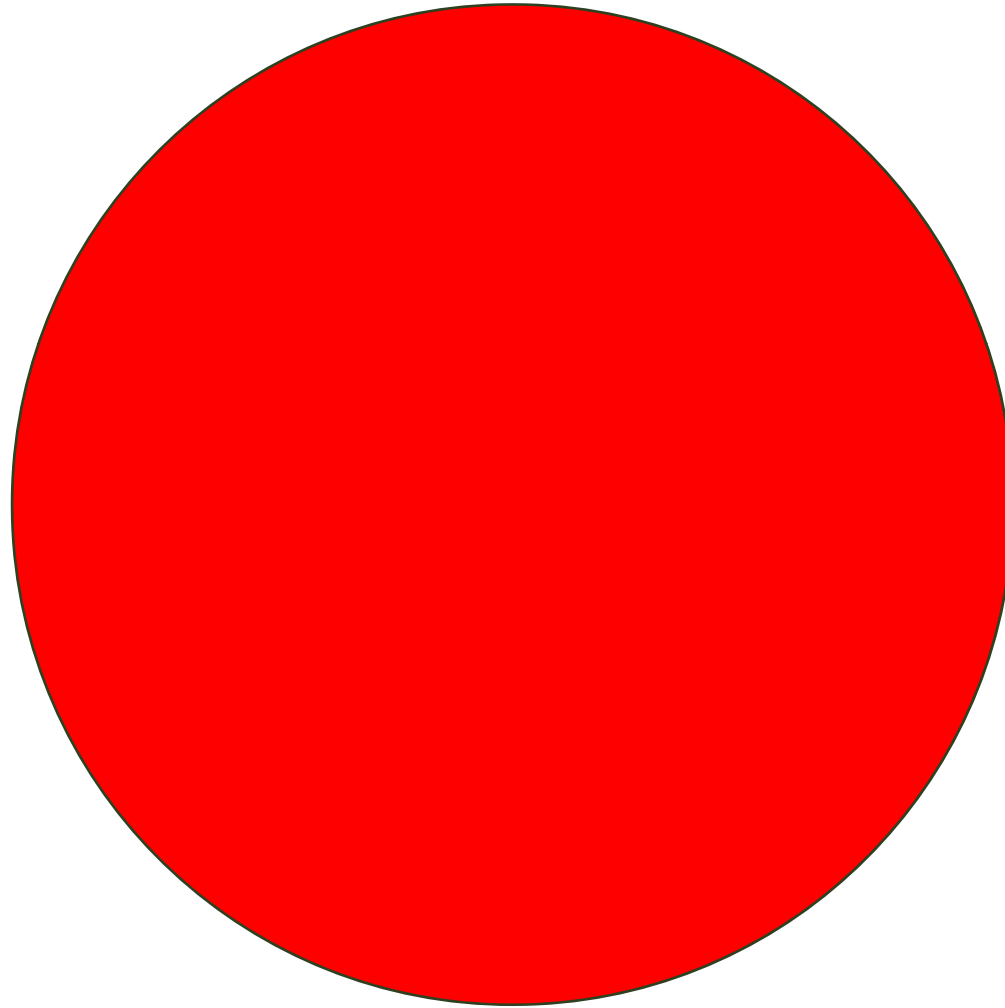
What is “Lean Project Management”?

- Approach is based on Toyota’s “Lean Manufacturing” principles
- Focus is on removing waste from all processes
- Engages the individuals at the “workface”
- Views a project as a network of commitments
- Drives value into the project early instead of VE after bid
- Is being adopted on major healthcare projects throughout the US, along with many other project types throughout the world

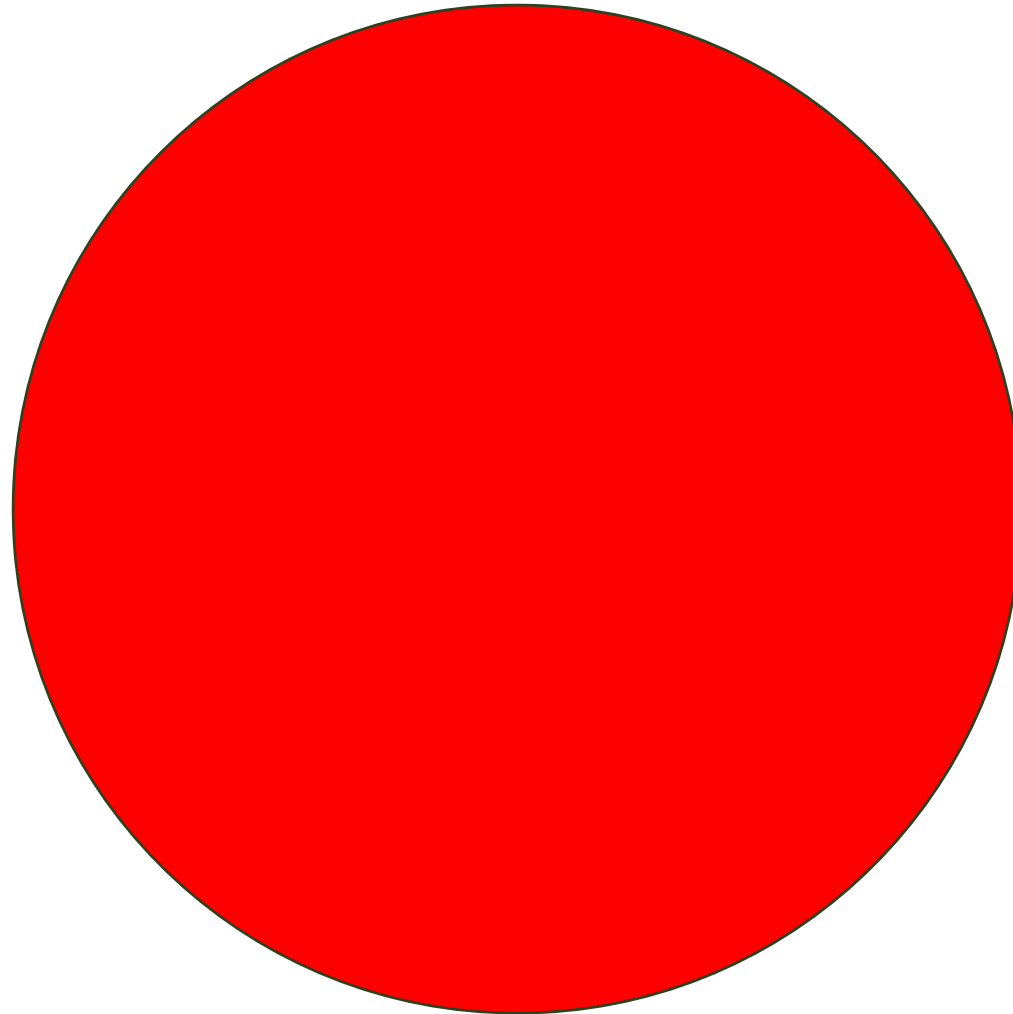
Our Contract Structure



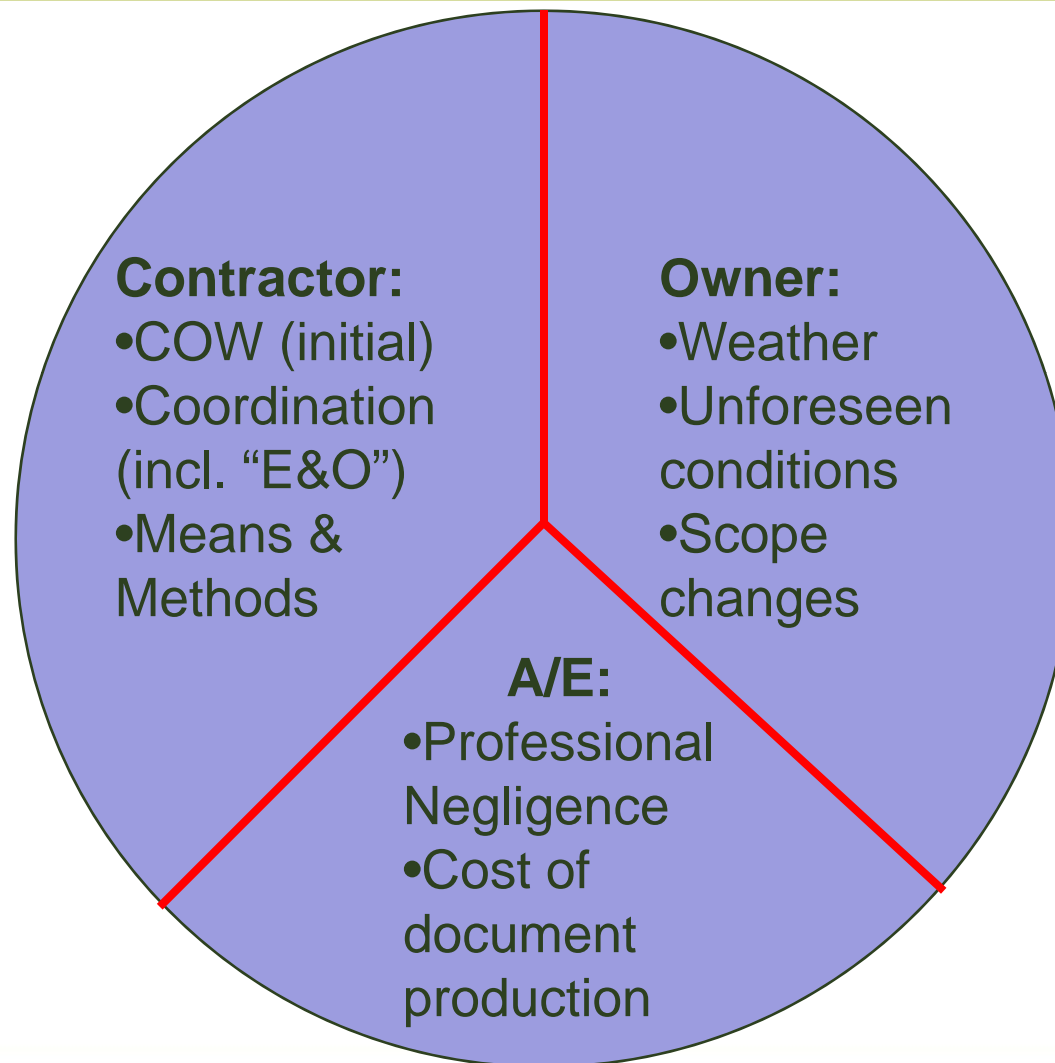
Total Amount of Risk in Project:



Total Amount of Risk Owner pays for:



Who can reasonably assume what risks?



Owners



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Are you prepared to be a different “you”?

- Changing your relationships with other team members
- Demonstrating trust, and good and honest intentions
- Taking a reasonable approach to risk & incentives
- Agreeing on common goals
- Obtaining competent legal & PM representation
- Educating Boards, Oversight Committees, and your community

Designers



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Are you *really* ready for cooperation?

- Changing relationships with contractors
- Trusting the collaborative process
- Opening up “mystery” of design process
- Commitment of staff resources
- Accountability to commitments
- BIM changes everything

Contractors



Is your team (& organization) ready for this?

- Exposing all (hidden) contingencies
- Commitment of team for duration
- Adopting an analytical approach to risks and incentives
- Understanding of designer's dilemma
- Focus on benefiting project rather than your contract/profit



What Did We Accomplish?

Design Timeline

- 7/12/07: Kickoff meeting with project team: VUSD, CPM, ANOVA and Roebbelen.
- 8/2/07: Roebbelen introduces single building option
- 9/15/07: Charrette with site committee studies four options. Committee prefers the single building option. Roebbelen prepares conceptual estimate.
- 10/3/07: Started weekly IPD Meetings using last planner. Attendees include VUSD, CPM, Roebbelen, ANOVA and CECI (mechanical engineer). Conceptual design is underway.
- 11/13/07: Structural and electrical engineers start attending IPD Meetings.
- 1/22/08: Royal Electric added to the IPD team.
- 1/29/08: Perryman Mechanical added to the IPD team.
- 2/12/08: Reverse phase schedule for construction document production
- 4/1/08: Cost estimate is \$16,183,623, which is less than conceptual estimate.
- 4/15/08: Plans submitted to Division of the State Architect (DSA).

Reverse Phase Schedule



Reverse Phase Schedules

- 2/12/08: Reverse phase schedule to DSA submittal.
 - Target date of 4/11/08 is considered “impossible”
 - Actual submittal was 4/15/08
- 4/22/08: Reverse phase schedule to start of construction
 - Target date for Inc. I TBR Approval: 6/26/08
 - Actual board approval was 7/17/08
- 6/17/09: Reverse phase schedule to completion of slab on grade
 - Roebbelen Mobilize / Start Demolition: Week of 7/21/08
 - Slab on Grade: 10/3/08
- 9/16/08: Reverse phase schedule to completion of building shell
 - Start Built up Roof: 3/16/09
- 3/31/09: Reverse phase schedule to completion of building
 - Turn over to District: 7/24/09

What Did We Learn?

Continuity of Staff was an issue

		Design	Precon	Construction
Owner	PM	█	█	█
	APM	█	█	█
	User rep	█	█	█
General Contractor	PM	█	█	█
	Precon Mgr	█	█	█
	Estimator	█	█	█
	PM			█
	FE			█
	FE			█
	Supt			█
	Asst Supt			█
Design Team	Planner	█	█	█
	Proj. Arch	█	█	█
	SE	█	█	█
	ME	█	█	█
	ME	█	█	█
	EE	█	█	█
	EE	█	█	█
	CE	█	█	█
Mech. Contr.	PIC	█	█	█
	PM			█
	PM			█
	Foreman			█
Elect. Contr.	PM	█	█	█
	PM			█
	Foreman			█

Staying on time and budget was not

- Project was turned over to District for occupancy on originally promised date of July 24, 2009
- Final budget appears to project District savings of over \$100,000

Problems were easy to deal with

Examples:

- Carrier failure to deliver HVAC units as promised
- Late kitchen changes
- Roof curb redesign

But did not all go away

- Not all subcontractors “played well” with process
- Kindergarten teachers not happy with design
- Carrier/Alerton interaction on HVAC control system continues to cause grief

Did we accomplish Lean Goals for Construction Phase?

- Streamline submittal process (and make it collaborative) *yes*
- Eliminate RFI's *no, but significantly reduced*
- Continue weekly IPD meetings using last planner *yes*
- Develop a “lean culture” training process for adding new members *not so much*
- Take advantage of BIM model during construction *yes, but could have done much more*
- Maintain a learning environment *yes*
- Create an efficient progress payment process *yes*
- Eliminate change orders and share savings *pretty much, & yes*
- Make the project inspector part of the IPD team *yes*

Answer to pop quiz:

- True or False: public contract code mandated “hard bid” is the cheapest and best way to buy construction?
- **False**; see, for example:
 - *Selecting Project Delivery Systems* —a Construction Industry Institute funded study by Victor Sanvido and Mark Konchar of the Project Delivery Institute at Penn State University
 - *Building Capital Projects in Tough Times* by John Lynch, State of Washington, published as a joint effort of the National Association of State Facilities Administrators (NASFA) and the Associated General Contractors (AGC)

References for further study

- Lean Construction Institute:
<http://www.leanconstruction.org/>
- Project Production Systems Laboratory P2SL:
<http://p2sl.berkeley.edu/>
- Construction Industry Institute:
<https://www.construction-institute.org/>
- Copies of this presentation & the cited studies:
<http://www.capitalpm.com/resources-tools.html>

*“Ah, but a man's reach should exceed
his grasp, or what's a heaven for?”*



Robert Browning

Major English poet of the Victorian age, noted for his mastery of dramatic monologue and psychological portraiture (1812-1899)

Comments & Questions?