

Integrated Project Delivery Improves Efficiency, Streamlines Construction

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Lean Management Approach Eliminates Waste and Enhances Project Outcome

Published July 16 2008

Integrated project delivery (IPD) is emerging as the way to organize project teams to achieve lean construction at a time when the industry is searching for ways to eliminate waste, cut costs, improve productivity, and create positive outcomes. This approach to project delivery does just as the name implies by integrating all team members--owner, architect, construction manager, engineers, and subcontractors--to form a collaborative effort. IPD uses a three-pronged platform with the owner as one entity, the architects and engineers as the second, and the contractors or builders as the third. The owner, architect, and contractor act as the core group to manage the integrated project delivery process.

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“The owners want to be very involved and want everybody to have an equal voice, so they are designing a new process, which is labeled integrated project delivery,” says Eric Lamb, executive vice president of DPR Construction Inc., a commercial contractor based in Redwood City, Calif. “With IPD, all of the major players are brought on board at the same time, unlike the traditional process of hiring the architect, then bringing in the engineers and the construction manager/general contractor, with the major trades not being brought on board until much later.”

The IPD process leverages the experience, talent, and input of all team members in order to obtain the best results and increase value for the owner by reducing waste and maximizing efficiency throughout the life cycle of the project from design and fabrication to the completion of construction. As a result, IPD produces shorter delivery times than traditional practices, such as design-bid-build. The integrated approach is well-suited for projects being done in the private sector or for non-profit institutions. However, public entities in most states, such as educational institutions, cannot use IPD due to the state-legislated bidding process.

In addition to being highly collaborative and seeking input from project team members at the onset of the project, IPD allows member companies to leverage Building Information Modeling (BIM) by creating a virtual design of every element of a construction project's process.

Case Study

Biographies

Click here for biographies of Eric Lamb and Dean Reed.

For more information

Click here to contact Eric Lamb and Dean Reed.

Resources

Click here for information on ConsensusDOCS 300.

Fig. 4



Integrated Project Team

The Integrated Project Delivery approach integrates all team

BIM can play a valuable role in IPD by enhancing communication between parties in the architectural, engineering, and construction industries. Using IPD, digital images are created to precisely depict every aspect of a construction project and to simulate real-world performance and operation of a facility.

DPR served as the general contractor for the construction of the Camino Medical Group Mountain View Medical Center, a \$98-million medical office building with a surgery center and urgent care clinic, for Sutter Health in Northern California. BIM facilitated lean project delivery by integrating the design and input from the architect, engineers, and participating trades. Creating a comprehensive virtual model of the project and gathering input from all parties made it easier to coordinate the installation of necessary building systems.

The extensive coordination and communication enabled specialty contractors to manufacture a significant amount of their work in fabrication facilities off the job site. For example, the mechanical systems were assembled at the mechanical contractor's plant and brought to the project site in sections. Prefabrication results in less waste, less expense, and a quicker installation time. This also makes for a safer job site because more work is done in a better organized and controlled workspace.

It is estimated that using BIM and the IPD approach helped Sutter save approximately \$9 million and the project was completed six months earlier than it would have been using the design-bid-build process.

The use of IPD and BIM is advancing the overall construction industry by making it easier to not only predict, but also to achieve high-quality outcomes. Laser scanning is still in its infancy relevant to BIM, but can be used to determine the true condition of an existing space that will be included in the model. In the future, companies may be able to input data about all of a building's systems into the model to calculate how much energy would be used.

BIM is facilitating IPD throughout the industry today and creating the opportunity for improved teamwork. This greater level of integration requires the key players to collaborate and share information much earlier in the process than was necessary in the past. With traditional project delivery, subcontractors are selected after the design, documentation, and agency review is completed—just prior to construction. With integrated delivery, the subcontractors are selected at the project conceptualization phase. In order to meet the demand for increased teamwork, construction managers, architects, engineers, contractors, and subcontractors are forming alliances prior to responding to owner Request for Proposals.

Relational Contracts

Integrated project delivery is supported with the use of relational contracts, or one agreement that is signed by the owner, architect, and contractor. These joint agreements are already common in the U.K. and Australia, but are just gaining momentum in the U.S. construction industry. Trade contractors can also be parties to the contract, which is sometimes called an integrated form of agreement or tri-party collaborative agreement.

No matter what the contract is called, it calls for the formation of an integrated project delivery team that shares decision making, pools contingencies, and provides incentives for team performance. Having such contracts in place creates an environment where all team members share risks and rewards based on reaching targets.

"We're trying to move from win-lose to win-win or lose-lose as a team," says Dean Reed, lean coordinator at DPR. "In Australia, they have been working with the alliance model for about 15 years on major infrastructure projects, so we are not inventing this. They have realized the benefits of win-win or lose-lose, and that's what we're trying to set up with relational contracts. It has gone as far as eliminating the trade Guaranteed Maximum Price (GMP) contracts and the project GMP."

members, including the owner, architect, construction manager, engineers, and subcontractors, to form a collaborative effort. The core group consists of the owner, the architects and engineers, and the contractors.

Fig. 5



Delivery Systems

The IPD process seeks input from all team members at the beginning of a project. Leveraging the experience, talent, and input from all team members produces the best results and increases value for the owner by reducing waste and maximizing efficiency.

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The ConsensusDOCS 300 contract, supported by the Associated General Contractors, is an example of a relational agreement. Just like other relational agreements, it is intended to give all parties a vote in the final contract terms and to avoid disputes in the future.

Relational contracts often include an incentive clause based upon the notion that potential savings would be shared among the IPD team, or the designers and contractors, and then shared between them and the owner. An incentive pool could be established strictly with money that is saved on contingency and/or labor costs.

“You set up your incentive pool at the beginning and that is put at risk,” notes Lamb. “It is made up of the profits of the IPD contingency or a percentage of the profits for the IPD team, the designers, the contractors, and the major MEP contractors. The pool is the maximum amount that parties are at risk for. If you save money, you can increase your profits and the amount in the pool would get bigger. If you lose money on a job or if your drywall or mechanical contractor depletes the pool, you all go down together. You don’t go down as independent companies, so that’s the integrated part. If you have a \$1 million pool, that’s the maximum amount at risk and once you hit that amount, the owner pays beyond that.”

Having the right contractual framework in place is important to the IPD approach, but the project team must be armed with the most innovative tools in order to achieve success.

IPD Tools

Target Value Design plays an integral role in IPD. First, the integrated team verifies that a particular facility can be built with available funds working within market constraints. The IPD team then establishes a target cost based on innovative thinking and best practices, and designs to that target.

“We work from what’s in the piggy bank, the allowable cost and expected cost,” says Reed. “However, what we’re trying to do, instead of cost the design, is switching that equation around so that nothing is set in design until there has been a cost analysis.”

The cardinal rule of Target Value Design is that the target cost of a facility can never be exceeded. Teams composed of architects, engineers, and contractors design to a specific target cost. The target costs are established for all relevant areas of a project, including the building envelope, interior/finishes, vertical transportation, material handling, site improvements, structure, and mechanical, electrical, and plumbing. The targets are adjusted up and down to maintain the project target cost. If any savings result, it is shared by the team and the owner.

When using relational contracts, the team sets the target cost very early and designs to that goal. The team’s incentives are based on the estimated maximum price or the GMP.

“You are pointing people to the number you need to achieve. You’re setting up this dynamic where you can all share in the cost of work savings and contingency preservation, but you’re targeting a number and designing to that number,” notes Reed. “That’s how the rest of the world develops products and now our industry is moving in that direction.”

The Last Planner System is also an innovative tool that works well on integrated delivery projects to create reliable work flow. This is achieved by pulling work, not pushing it based on a predetermined schedule. That is, the team members plan and produce only what is needed for delivery of the product at every point. Production is also shielded from uncertainty by putting only activities on the weekly work plan that team members know are ready and can be completed as planned.

“This is a terrific tool for integrated project delivery and for design,” says Reed. “Don’t think of this as a construction tool, which is a mistake that people

make.”

The Last Planner System utilizes various levels of planning, controlling, and correcting. Milestones and long leads are identified during strategic planning. Detailed planning continues until reliable promises are made and work assignments are given. The system helps team members gauge their achievements and learn from plan failures.

“One thing we’re doing is keeping score of people’s commitments. We call it Plan Percent Complete,” says Lamb. “We’re trying to be very disciplined by getting promises from people and then recording those every week. We’re trying to see how people do through this network of commitments and it has been a very lean sort of activity. You’re going to have a hard time with integrated project delivery if you’re mandated to do design-bid-build, but you can use the Last Planner System.”

By Tracy Carbasho