Integrated Project Delivery:
Optimizing Project Performance

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1. The Value Proposition

Projects are undertaken because they provide value to the organization. Project value might be lowest first cost, lowest life cycle cost, improved operations, enhanced user effectiveness, or other measures. Regardless of which value, or blend of values, is most important to the owner and end users, the project delivery system should reliably maximize value.

By this standard, current project delivery systems are woefully inadequate. They occasionally deliver good results, but often are contentious, late, over budget and plagued with disputes. Estimates of waste in design and construction exceed 50% and projects, especially large projects, routinely exceed schedule and budget. (Miller, Strombom, Iammarino, & Black, 2009) A recent study of large oil and gas projects found that only 22% could reasonably be called successful,¹ even using a relatively lax standard for success, although there were occasional successes (Merrow, 2012) Another historical study of large projects found that nine out of ten projects had cost overruns, cost overruns of 50 to 100 percent were common, and overruns above 100 percent were not uncommon. (Flyvbjerg, 2005) Clearly, traditional project delivery is not optimal or reliable.

We should not be surprised. Traditional project delivery incentivizes uncoordinated behavior by tying firm compensation to the firm’s performance, rather than project outcome. In addition, traditional structures allow the individual firms to profit by transferring risk and blame to other parties. In this framework, it is more advantageous—at the individual firm level—to blame others for a problem than it is to expend the effort to avoid or solve the problem. Although local optimizations is economically rational for the many individual firms that engage in design and construction, but these local optimizations are expensive for the owner that has to pay the bills. Each one of these local optimizations reduces value and places the project at risk. Thus, it can be that traditional project delivery, not IPD, is the risky approach to delivering complex projects.

2. Ideal Project Delivery

An owner has four paths to changing project outcomes: It can change the people executing the project, the processes being used, the product being created, and the structure in which people and processes work. Integrated Project Delivery, IPD, focuses on people, processes and structure. This article focuses on the IPD structure and how it influences project success. But a complete IPD implementation includes choosing the right people and implementing the right processes.²

¹ A project was a “failure” in this study if it failed on anyone of five measures. But key measures such as cost and schedule, were still “successful” if they only overran by less than 25%.

² A 2011 study sponsored by the Construction Industry Institute examined what an optimal project delivery method would be—if you had no pre-conceptions—and conclude that it was a Lean project supported by IPD. (Ballard, Kim, Myers, Rodgers, Strickland, Taylor & Voll, 2011)
The IPD structure affects two primary project characteristics: value and reliability.

Reliability is gained by having a system that is homeostatic, i.e., a system that responds to problems by solving them and returning to the project goals. In traditional project delivery, project members try to escape from a problem through change orders, claims, and litigation (Figure 1). In an integrated project, change orders, claims, and litigation are proscribed or severely limited (Figure 2). Moreover, the parties economic fates are linked. Thus, they must solve problems together because they have no other option and failure to do so hurts each of them in proportion. In an integrated project, the participants agree to common goals and tie their individual profits to project performance. Alignment on goals is transformed into aligned action.

The result is a project structure that is efficient, innovative, agile, replicable and reliable. It is designed to improve value through aligned action and to create a structure where problems must be solved within a closed system. Empowerment and accountability are increased.

3. Structure

The IPD structure can be divided into a business model and a contract structure. When we create IPD projects, we begin by identifying the key values and goals, then develop a business model that supports these values and incentivizes the goals.
There are many different business models and each of which is designed to emphasize particular values. In some instances, the value may be cost, schedule, or sustainability. In other instances, quality or community involvement may be paramount. And in most instances there is a mix of values and constraints that need to be considered when creating the business model. Once the business model is developed, it can be incorporated into an IPD agreement that binds the parties to their shared goals and values. In this process, the IPD agreement documents the business model rather than imposes it.

a. The New Business Model

Although the IPD business model is tuned to a specific project, we have found that a few principles are important to project success. These principles reflect a new balance between the parties and create a system where the structure and inherent incentives keep the project centered on the agreed goals.

**Fixed Profit.** Profit in traditional projects is related to the amount of work done. Fees are based on the cost of the work and lower tier work is marked-up by the prime. For designers, profit is embedded in each hour billed. Profits grow as work increases, which incentivizes inefficiency. In an IPD project, the parties agree to a fixed prospective profit that is not linked to the actual labor, materials, or project cost.³

A fixed profit creates an incentive to reduce the variable costs to increase each parties margin. Because variable costs (labor, material, and equipment) account for most of a project's cost, reducing these costs directly benefits the owner. Moreover, because adjustments in scope do not affect the fixed profit,⁴ work may be easily transferred between parties. For example, if one party can efficiently install all the hangers needed for electrical, mechanical, plumbing, and fire protection, then the work can be shifted to that party. No one needs to fight for scope in order to

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³ The fixed profit may be initially based on projections of how much work needs to be accomplished, but it is converted into a fixed amount before work proceeds.

⁴ Major scope swaps may require adjustment of the profit between parties. Day to day scope swaps, however, do not.
maintain their profit. This allows the project team to look at what resources the project needs, remove duplications, and improve efficiency.

**Variable Costs without a Cap.** A lump sum, Guaranteed Maximum Price (GMP), or Not to Exceed (NTE) contract transfers—at least on paper—the risk of a project overrun to the contracting parties. If this really worked, then you would never see change orders or litigation on these types of projects, except for true owner’s elective changes. What actually occurs is that the contracting parties insert contingencies into their prices to protect against a cost overrun and they use change order and claims provisions to escape the constraints of the lump sum, NTE or GMP. Worse yet, this padding is inserted into each sub-tier contract because the fixed price cap is imposed on these parties, too. This results in multiple (and in aggregate, excessive) contingencies and the possibility that the owner will pay for this risk twice—through change orders and claims.

In the IPD business model, the owner agrees to pay for the variable costs (not the profit) without any cap. Thus, there is no need for the excessive contingencies carried in most projects. Moreover, because IPD projects generally use a design-to-cost-target approach, design contingencies are not required, either. The result is that the owner only pays for what the project actually costs, not for the parties excessive perception of their risk. Although the absence of a contractual cost cap may seem bold, it is balanced by strict limitations on change orders and the ability to use party profit as a buffer against overruns. And as mentioned above, lump sum and GMP do not prevent cost overruns and claims.

**Profit Based on Project Outcome.** The fixed profit is contingent on project outcome. If the goals are not met, project profit is reduced or even eliminated. If the project performs better than the goals, the project profit is increased. Each party shares in the increase or decrease based on their percentage of the project profit. The profit should be 100% at risk. This increases the buffer against overruns and maintains the division between profit and variable costs. Alignment among the participants is strengthened because individual profit can only be preserved, or increased, by improving overall project performance with respect to the agreed goals.

The most common performance metric is project cost. In the simplest model, the parties agree to a target cost and a fixed at-risk profit. Figure 4. The parties are paid their actual costs (without profit) and if those costs are equal to the target cost, the parties receive the agreed profit. If they can deliver for less than the target cost, their profit is increased; if the costs are greater than the target cost, the profit is reduced—potentially to nothing. In that case the owner remains responsible for costs—without profit—until completion.5

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5 In a truly disastrous project, the owner could terminate for convenience. However, in 53 plus IPD projects, we have never seen an exhaustion of the profit layer. Thus, this is a possible, but highly unlikely, occurrence.
In many instances, an owner is more interested in maximizing the value achieved for a specific budget. In this instance, a model might be chosen, similar to Figure 4 that incentivizes increased value during the design/pre-construction phase and smooth execution during construction. In order to set a target early to gain the maximum benefit from target value design, a model might be chosen, like Figure 6 that allows for a dead band between the at-risk target and the shared savings target. Models can also be chosen to focus on sustainability, perceived quality, performance, or combinations of all of these goals. The essential point is that the model that is used should be designed to align with the owner and team goals.

Limited Change Orders. Many IPD projects have a zero change order goal and most have far fewer change orders than conventional projects. The business model combined with joint project management leads to a rebalancing of budget in response to change rather than issuance of change orders. Moreover, properly crafted, the IPD agreement should limit change orders to a few specific reasons, such as an owner's elective change or differing site conditions. Design errors and omissions, a fertile ground for claims in traditional projects, should not be a basis for a change order because design errors are a team risk to be managed and mitigated by the team. Similarly, contractor delay is not a reason for designers receiving augmented construction administration fees. The limits on change orders force the team to plan thoroughly, coordinate closely, and react swiftly when problems arise.

b. The New Contract Model

The IPD business model aligns the parties to the common goal and encourages the team to focus on optimizing project outcome. The IPD agreement extends this by creating the closed system that requires the parties to solve problems rather than deflect them.

Although you can theoretically create an IPD project from a series of interlocking contracts\(^6\), it is much easier to accomplish in a single agreement. These take two general forms, a multi-party agreement between owner, prime contractor, and prime designer and a poly-party form that includes all risk/reward team members in a single agreement.

\(^6\) Interlocking agreements may be necessary when trying to create public IPD agreements because of limitations applicable to many governmental owners.
Figure 7 - Multi and Poly-Party IPD Structures

In the multi-party form, the risk/reward team members are engaged through specialized subcontracts and consulting agreements with the prime contractor and prime designer. In the poly-party form, the risk/reward team members all sign the original IPD agreement. If risk/reward team members are added to the project after the IPD agreement is signed, they are included through joining agreements that bind them into the IPD agreement. The multi-party approach is more common, because it reduces the owner's effort to manage the many relationships in the poly-party form, but each has its advantages and the poly-party approach may be the better fit for a specific owner, project, and team.

Although there are many aspects to an IPD agreement, we believe that 5 factors are particularly important. These factors, shown in the rectangles in Figure 8 have a direct influence on project outcome.

*Early Involvement of Key Participants.* Early involvement of key participants-defined as those who have the greatest influence on project success-is the most important IPD element. One of the key studies on project delivery noted that the most successful projects assembled their teams before design was 20% complete. (Konchar & Sanvido, 1996) Identification of key participants is specific to a given project, but-in addition to the owner, designer, and builder-key participants generally include the mechanical, electrical and plumbing designers, and contractors because their knowledge strongly affects design and these parties must cooperate closely for the project to proceed smoothly. Depending upon the project, steel erectors, framers, curtain wall contractors, major equipment vendors, and others may similarly be key participants.

The key participants' diverse viewpoints improve project performance in many ways. Studies of creativity in commercial contexts note that teams with diverse backgrounds are more creative. (Robbins, 2008; Amabile, 1998) The broad experience of the diverse team also benefits target value design. Designers provided with information concerning effectiveness and constructability of alternative concepts can more accurately choose systems and layouts that efficiently achieve...
the project goals. Moreover, the key specialty contractors can provide pricing information that is current and accurate, leading to better price control and fewer surprises. Finally, when parties are engaged in developing the project design, they develop a commitment to the overall project, not just to their individual component.

The timing of key participant involvement is also important. Key participants should become engaged when their participation will benefit the project. This is almost always earlier than traditional design and construction practice, and the reference to "early" is meant to highlight this change in practice. It does not imply that all key participants commence simultaneously, and in most projects, the core team will be augmented by additional key participants as the project progresses.

**Shared Risk/Reward Based on Project Outcome.** IPD agreements tie compensation to achievement of project objectives. Although formulations vary, the participants' profit is placed at risk and may increase if project performance is met or exceeded. Individual profit is not a function of the amount of work performed, or of individual productivity, but is proportionate to overall project success. As noted in the discussion of the business model, the risk/reward plan should be tuned to the goals being sought and should extend to all key IPD participants, not just the owner, contractor, and designer.

**Joint Project Control.** Joint project control reinforces the communal nature of the undertaking. It is not "their project;" it is "our project." In addition, joint project control balances the interests of the parties and provides a check against favoring the interests of one party over the other. It also reflects a fundamental fairness. Parties that accept risk based on project outcome should certainly have a voice in decisions that affect those risks. Moreover, joint project control affects the perception of risk, as well as risk itself. (Slovic, 1987) Risks that a party cannot influence are feared more than those it can control, leading to defensive behavior and excessive contingencies.

Joint project control also places decision making at the level with greatest access to information. Moreover, decisions made in well managed teams are more accurate than those made individually (Robins & Judge, 2012).

**Reduced Liability.** IPD thrives on a diversity of backgrounds, experience, and opinions. Direct communication and vigorous discussion are positively correlated to higher creativity and efficiency is improved when participants know what the others will be doing and can plan accordingly. A key goal in many IPD projects is to drastically reduce latency, i.e., the time required to transfer information, such as a response to a question. The direct and continuous communication that is the lifeblood of IPD is discouraged or prohibited in traditional project delivery because of liability concerns. By reducing risk through contractual liability waivers, liability concerns are reduced and communications is enhanced.

**Jointly Developed/Validated Targets.** Jointly developed targets document the parties agreement and confirm that the objectives are achievable. In addition, the targets serve as metrics for compensation adjustment and as goals for target value design. Because they are jointly developed, each party owns the objectives and is committed to their achievement. The owner must lead this process because its goals and financial and other constraints establish the project framework.
4. Five Characteristics of Successful IPD Owners

*What drives value into the program is owner engagement. — William Seed, Universal Health Services.*

IPD enhances an owner's opportunity to influence project outcomes. But this opportunity can only be realized if the owner is actively engaged in the project and process. We recently interviewed a group of experienced owners about IPD and have summarized their thoughts in a whitepaper, *Integrated Project Delivery: The Owner's Perspective.* (Ashcraft, 2013) These interviews reinforced the critical role of the owner in IPD and highlighted the following 5 characteristics of successful IPD owners.

**Clarity.** The owner must be able to define what it wants and what the IPD team must achieve. It must explain the need that justifies the project in order to strategically engage the team in developing solutions to the need, not just to a programming statement.

**Commitment.** IPD requires difficult changes in behavior and processes. Under time and budget pressure, team members will be tempted to revert to what they know—even if they realize that better outcomes cannot be achieved by repeating old behaviors. The owner must remain steady during difficulty and doubt, providing a light for others to follow.

**Engagement.** IPD provides the owner with an opportunity to be engaged in all of the key decisions that affect project value. But the owner must dedicate the time and resources to use this opportunity and will gain most when it is actively engaged.

**Leadership.** The owner has a unique leadership role in IPD. It sets the agenda, and models the collaborative behavior it is seeking. The owner does not make all of the decisions, but does create the environment in which decisions will be made. By taking the first steps forward, the owner enables the team to follow.

**Integrity.** IPD participants must learn to trust each other, and trust is built from competence, reliability, and integrity. If an owner does not meet its commitments, hides information, or does not speak truthfully, it can hardly expect different behavior from the team.

5. Conclusion

Integrated Project Delivery removes impediments to effective project performance, aligns the parties to common goals, and encourages action that benefits the project. It is not a panacea. It increases the likelihood of success, but requires rethinking project management and increases project planning efforts. It is a framework that supports effective implementation of Building Information Modeling and is especially powerful when combined with Lean principles and effective, team based, management. Owners considering complex projects should evaluate whether IPD is the appropriate process for their projects and organization.
References


