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INTEGRATED PROJECT DELIVERY:
THE GAME CHANGER

Joseph A. Cleves, Jr.
Dressman Benzinger LaVelle psc
Cincinnati, Ohio

And

Lisa Dal Gallo
Hanson Bridgett LLP
San Francisco, California

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INTEGRATED PROJECT DELIVERY: THE GAME CHANGER

By: Joseph A. Cleves, Jr.[*] and Lisa Dal Gallo[**]

INTRODUCTION

Fragmented. Inefficient. Adversarial. Industry professionals agree that these three words accurately describe the current state of the commercial design and construction industry. In fact, a 2004 study conducted by Dr. Paul Teicholz showed that this industry was the only major industry that was less productive in 2004 than it was in 1964.[1] Other industries, by contrast, had doubled their productivity.[2] One reason was, and still is, that the systems used to manage construction projects have not kept pace with the increasingly complex structures and designs. Indeed, the industry has remained largely unchanged since the early twentieth century.[3]

Fortunately, change is coming to the static commercial construction industry. Industry leaders are introducing dramatic improvements to project delivery methods. These changes are creating significant opportunities for owners to achieve higher levels of quality and to reduce costs by eliminating waste. The seminal shift is occurring through the use of Integrated Project Delivery or IPD. IPD employs methodologies that emphasize collaboration between multiple stakeholders to achieve the owner's objectives. In fostering a team mentality, it stands wholly apart from the separation of design and construction and the adversarial relationships that epitomize traditionally delivered projects. The changes that IPD induces represent a paradigm

[*] Joseph A. Cleves, Jr. is a partner at Dressman Benzinger LaVelle psc in Cincinnati, Ohio, practicing in commercial construction and real estate law. He heads the firm's construction law group and specializes in commercial construction contracts. He is co-chair of the Ohio Valley Chapter of the Lean Construction Institute. He is also the co-chair of the ConsensusDOCS Committee charged with updating the CD300 Standard Tri-party Agreement for Integrated Project Delivery.

[**] Lisa Dal Gallo is a partner at Hanson Bridgett, LP in San Francisco practicing in the Real Estate and Construction Section and specializing in construction transactions and collaborative contract structures. She is a LEED accredited professional and serves on the AIA California Counsel IPD Steering Committee and the DBIA's Western Region's Legislative Committee.

shift from the currently prevailing methodologies, which many are coming to see as a bankrupt system.

SECTION I: WHY IPD (OR WHY NOT DESIGN-BID-BUILD)?

Design-bid-build is a project delivery method marked by division of the project team into silos, a stringent bidding process, and multiple contracts. Owners of design-bid-build projects typically select project participants using a single criterion – price.[4] Conventional wisdom maintains that the best way to secure the highest quality at the lowest price is to maximize the competitive pressure. The owner publicly requests bids from contractors to ensure competition. The assumption is that the lowest bidder has succeeded in minimizing waste and developed innovative solutions. However, this efficiency is rarely achieved because the design-bid-build process is fragmented, inefficient, and adversarial.

Design-Bid-Build Is Fragmented.

Selection based on price requires that each competitor bid on the same scope and requirements. The process begins with an owner hiring an architect to prepare project drawings and specifications in isolation.[5] The underlying assumption is the architect will develop the best design without consulting with those responsible for construction. The owner invites contractors to bid based solely on that design and other contract documents.[6] Bidders assume that the design accurately and completely represents the owner's building requirements for the project.

Both assumptions are significantly flawed. This process restricts the ability of the project team to communicate effectively. The owner and architect make key decisions at the beginning of the project based on a limited understanding of issues encountered in construction. The general contractor, trade contractors, and suppliers possess deep industry knowledge and understanding of critical project risks that the owner and architect may not consider. These

construction professionals have the expertise to identify the inevitable gaps and oversights that occur in the traditional design process. Such flaws are much more expensive to correct when discovered in the field.

The same problems that create design flaws also prevent the design from accurately and completely representing the owner's building requirements to the construction team. First, the design often does not reflect the owner's budget constraints.[7] Typically, the contractor knows more about the price of project components than the architect. Yet again, the contractor does not have access to the design until it is near completion. Second, important details and nuances are lost in translation. Architects do not draw every detail, leading to guesswork by the bidders and potential scope gap where the bidder does not comprehend the original design intent. Nuances are over looked or misunderstood since "trying to communicate via the transfer of documents is simply not as effective as inter-active conversations between the parties."[8] And the bid deadline creates a constraint as the bidders rush to comprehend and price the components to be constructed. This process gives the contractor "two weeks to absorb all the details and nuances of a design that took six months to create before throwing a binding number at it."[9]

Innovation frequently results from collaboration.[10] However, the design-bid-build's hierarchical and compartmentalized structure prohibits meaningful collaboration. It isolates the project into silos of design and the various components involved in construction. With such isolation, collaboration among the project participants, and consequently innovation, are rare. Bringing the construction professionals' expertise into the design provides the best solutions for design problems.

In addition to isolating project participants and preventing collaboration, design-bid-build's hierarchical communication structure hinders collaboration. Traditional design and

construction contracts control communication so that it flows from one party to the owner to the other party. For example, the contractor would submit a question about the design to the owner. Then, the owner would transmit it to the architect, instead of having the contractor engage the architect directly. Such a fragmented system is slow, cumbersome, and stifles collaboration. Despite the advantage of the construction players collaborating in the design, the traditional design process excludes them and their valuable insights.

Design-Bid-Build Is Inefficient.

The design-bid-build method is wrought with inefficiencies in terms of both time and money. For example, let's examine the inherent inefficiency in the hierarchical communication process. Such fragmented communication not only prevents collaboration but also contributes to the inefficiency of design-bid-build. This is evident in the expense created by requests for information ("RFIs"). Subcontractors issue RFIs when they need, or believe they need, clarification from the architectural team on design details. The construction contracts mandate that those requests proceed from the subcontractor up through the contractor to the owner and then submitted to the architect. After processing the request, the response is issued and follows the same communication path back to the requesting party. This process takes time and costs money and more than occasionally spits out an answer too late to provide the requested guidance. A statistical analysis of the bed tower project completed at the Cardinal Glennon Children's Medical Center in St. Louis in 2007 recently showed that each RFI added a cost of $500 to process.[11] And for multimillions dollar projects, there may be hundreds of RFIs, which use a traditional method of project delivery.[12] The hundreds of thousands of dollars consequently spent are the essence of waste.

Another example of cost inefficiency arises from selection of key project team members based solely on price. While such limited selection produces a low initial price, it also conceals the very large risk of a greater final cost through construction delays and change orders. Contractors have every incentive to compensate for their low bids by recovering lost margins through change orders.[13] Because there is "no need, nor even a place, for judgment, discretion, or trust in the selection process," the project goes to the lowest bidder.[14] Owners regularly forego quality in order to get the best price.

Moreover, while the owner may be choosing the lowest of the available bids, all bids conceal margins based on the inefficiency of past projects. Examples include padding to cover possible overtime induced by trade contractor delays, or crews sitting idle because a deadline for turning work is not met. These coordination issues increase the contractor's risks. The standard response is to conceal pockets of money within the bids as a protection against such risks. Other inefficiencies arise out of the competitive process itself. The traditional bidding process produces only one winner out of several bids. If three contractors bid on a project, one will recover the cost of its bid through the project. But two of the contractors are wasting their time and money.[15] Thus, the losing contractors must recover the overhead of creating these unsuccessful bids by having "the clients who do hire [them] . . . subsidiz[e] those who don't."[16] And the contractors are not the only project participants forced to sneak the costs of inefficiencies into their price. Architects may find themselves redesigning the project because the design far exceeds the budget of the owner. Often, the design professional has a "wonderful design sense but a poor idea of what the work will cost . . . ."[17] And, it is not the architect's job to price the construction work – the contractor handles that. Other inefficiencies include past

projects that have run over budget and increased material costs due to errors, redesign, or excess material.

In addition to concealed margins, costly change orders, and inefficient RFIs, the design-bid-build process itself fails in another significant way. Although it is counterintuitive that a construction delivery system would reward project participants who hold back good ideas, design-bid-build does just that. For example, typically general contractors will include major trade contractors at some point during the bidding process to establish a competitive price.[18] However, the consulted trade contractors -- who at this point have not been hired for the project -- have no incentive to communicate money-saving ideas. Instead, the trade contractors have an incentive to hoard those ideas and contribute them only when awarded the project. After the winning bidder reveals its good ideas, the design professionals must quickly rework the drawings to account for the trade contractor's contributions.

Revising the design after its initial completion is an expensive proposition.[19] If the trade contractor had initially shared its ideas, the trade contractor and the designers could have had more time to improve the design. Because of this somewhat perverse incentive to defer communicating creative solutions, it is not surprising that some critics have dubbed this process "design-bid-*redesign*-build."[20]

Design-Bid-Build Is Adversarial.

Ironically, the American industry that depends more than all others upon coordination, cooperation, and teamwork among multiple participants is our most adversarial. The antagonistic nature of the design-bid-build process begins with traditional construction contracts. Best practices for traditional construction contracts concentrate on thoroughly delineating the obligations of each party, defining any possible defaults, and specifying consequences for

defaults. These practices seek to allocate risks, resulting in project participants evading, rather than reducing, risks. Allocating the risks in this way "reinforce[s] self-protective behavior and instill[s] mistrust."[21] The so-called "blame game" begins before construction commences!

Further, risk often "flows down the contracting tiers to those least able to bear or control the risk."[22] These participants are not financially capable of bearing the risk and must increase their bids to cover it. On the other hand, the contracts create no incentive for the party who controls, but does not bear, the risk to minimize the risk. Such risk allocation benefits no one.

Not surprisingly, this concentration on risk-evasion does not stop after the contracts have been drafted. The mindset persists throughout the entire project. Delineating obligations, defaults, and consequences of defaults creates great financial risk for those who reach across trade boundaries. "It is hard to have a wholesome relationship with another when you have a charge of dynamite around your neck and the other holds the detonator."[23]

Finally, contracts cannot predict every situation that might occur. Situations that the contracts fail to predict almost always result in dispute and finger-pointing, wasting both time and money. If the parties cannot resolve a dispute, the court will step in and allocate the risk for them.

Design-Bid-Build Fosters Litigation.

When the risk-evasive nature of design-bid-build inevitably results in litigation, there is no easy solution. Unfortunately, the courts have created conflicting legal doctrines to deal with construction disputes on traditional design-bid-build projects. Cases regarding two of the most well-known construction law principles, the *Spearin* doctrine and the economic loss doctrine, provide great examples of this contradiction.

The *Spearin* doctrine holds that the owner provides an implied warranty that its plans and specifications are suitable for construction.[24] This doctrine is "[o]ne of the principal tools fashioned by courts for the allocation of liability in design defect cases . . . ."[25] But even this well-litigated doctrine is a maze of contradictory case holdings. One issue that often arises is whether provisions waiving damages for delay and requiring notice of claims will be upheld. Such provisions can come into conflict with the *Spearin* doctrine when design defects result in delays. An example, is where a contractor is delayed because of a design defect, but fails to comply with the notice of delay provisions. Does the contractor's failure to comply with the notice requirement rob the contractor of its claim against the owner for the defect in the design?

Recently, the Tennessee Court of Appeals addressed this question. The Tennessee court disregarded the "no damages for delay" clause and its corresponding notice requirements, upholding the *Spearin* doctrine and awarding trade contractors $1.1 million in damages.[26] However, the Ohio Supreme Court reached a contradictory conclusion when confronting this same issue. The Ohio Supreme Court held that the "no damages for delay" clause and notice requirement barred the contractor's claims against the owner, despite the *Spearin* doctrine.[27] "The results in these two fully litigated cases cannot be reconciled. More importantly, both of the opposing approaches taken in the two cases have strong support in *Spearin* case law."[28]

To make matters worse, recent cases have revisited pre-*Spearin* case law, requiring contractors to discover and disclose deficiencies in the owner's plans and specifications.[29] In *Fabi Construction Company, Inc. v. Secretary of Labor,* the contractor was responsible for the expansion of a hotel and casino.[30] The contractor hired Fabi Construction to place concrete for the project.[31] Fabi hired a third-party to convert the owner-provided structural drawings into "shop drawings." Part of the concrete work included the flooring of a ten-story parking garage.

While pouring concrete on the eighth level of the parking garage in accord with both sets of drawings, levels four through eight collapsed.[32]

The Occupational Safety and Health Administration (OSHA) investigated the accident and charged Fabi with several violations of the Occupational Safety and Health Act.[33] After contesting these charges in an agency adjudication, Fabi petitioned the District Circuit Court to review the adverse findings. As one of its arguments advocating its non-culpability, Fabi contended that the *Spearin* doctrine entitled it to rely on the drawings when working on the project. The court disagreed with Fabi. It held that "obvious inconsistencies in a shop drawing should put the contractor on notice to inquire about them instead of 'slavishly following' incorrect drawings."[34] According to the court, Fabi "knew or should have known that the drawings upon which they relied created a serious hazard for [its] employees."[35]

Many times the courts' base their justifications for placing increased accountability on the contractors on the terms of traditional construction contracts.[36] Such traditional contracts may require the contractor to report design errors or inconsistencies that it knew or should have known. The effect of this "on the construction process is to memorialize by contract and reinforce in fact the adversarial nature of the relationships among the main project participants. Skillful drafting of disclaimers regarding the adequacy and accuracy of project documents unambiguously signals that the parties are in opposing camps."[37] Between the unpredictable *Spearin* case law and the emphasis on "me-first" contract provisions, design-bid-build is setting the construction industry up for failure.

Similarly, cases discussing the economic loss doctrine are equally as confusing. The economic loss doctrine bars unintentional tort actions where the damages consist of purely "economic losses." Economic loss or harm simply refers to damages to the product itself. In the

case of construction projects, economic loss is damage to the work. One court clarified the definition of economic loss as:

> damages for inadequate value, costs of repair and replacement of the defective product or consequent loss of profits – without any claim of personal injury or damage to other property . . . and also . . . diminution in the value of the product because it is inferior in quality and does not work for the general purposes for which it was manufactured and sold.[38]

The reasoning for barring tort recovery for economic loss claims is that tort law is appropriate for "personal injury or property damages resulting from a sudden or dangerous occurrence . . . ." [39] Contract remedies, on the other hand, are appropriate for "economic loss, loss relating to a purchaser's disappointed expectations due to deterioration, internal breakdown, or non-accidental cause . . . ."[40]

Decades of litigation have riddled this complex doctrine with even more complex exceptions. Courts make these exceptions when "strong countervailing considerations weigh in favor of imposing liability."[41] Some exceptions to the economic loss doctrine include special relationships,[42] negligent misrepresentation,[43] building code violations,[44] malicious injury,[45] indemnification claims,[46] residential inspection services,[47] unfair prejudice,[48] intentional misrepresentation,[49] unique circumstances,[50] violation of a construction defects statute,[51] and the creation of or failure to prevent a dangerous condition.[52] A number of these exceptions "require detailed factual analysis . . . , [which] likely prevents summary judgment adjudication . . . ."[53] Moreover, each jurisdiction varies on which exceptions apply to the economic loss doctrine, and some even vary within their own jurisdiction.

For example, the Pennsylvania Supreme Court upheld the negligent misrepresentation exception for the economic loss doctrine.[54] In that case, an architect prepared drawings for the construction of a new school.[55] Contractors submitted bids based on these drawings. Due to

errors in the architect's drawings, the winning contractor had to increase its construction costs substantially.[56] The contractor sued the architect for negligent misrepresentation, and the architect argued that the economic loss doctrine barred the claim. The Pennsylvania Supreme Court held that the contractor's claim should not be barred "simply because the action sounds in tort rather than contract law."[57] The court also noted that contract recovery would not be available to the contractor because it did not have privity with the architect.

The Supreme Court of Nevada, on the other hand, rejected a negligent misrepresentation exception to its economic loss doctrine. In that case, it held that an owner seeking purely economic damages could not sue an architect for its negligent design advice.[58] The owner entered a written contract with an architectural firm for professional engineering advice. The firm prepared a geotechnical report with its design recommendations for the foundation. Based upon its reports, the firm predicted a certain amount of settling beneath the foundation. The property owner constructed a foundation for the project based on the projected amount of settling. The county in which the project was located found that the settling was a danger to the "structural integrity" of the building and required the owner to repair and reinforce the foundation.[59] The owner sued the architectural firm based on professional negligence and breach of contract.

The court found that the economic loss doctrine barred the owner's claim because the doctrine's purpose is to "'shield [defendants] from unlimited liability for all of the economic consequences of a negligent act, particularly in a commercial or professional setting, and thus to keep the risk of liability reasonably calculable . . . .'"[60]

Still other jurisdictions, like Hawaii, take a middle of the road stance, drawing a distinction between economic loss claims where a contractual relationship exists and those

claims where a contractual relationship does not exist.[61] Where a party is seeking purely economic losses against a party with whom it has contracted, the economic loss doctrine bars the claim.[62] But where a party is seeking purely economic losses against a party with whom it has no contract, the doctrine does not bar the claim.[63] This "encourages the parties to negotiate the limits of liability in a contractual situation, but it holds the parties to the terms of their agreement."[64]

As evidenced in these cases, the economic loss doctrine "simply do[es] not provide a satisfactory framework for addressing economic loss problems."[65] The cases' differing results under similar fact patterns reflect conflicting policies. As a result, fewer and fewer cases can be resolved by summary adjudication or even initial trials. Disputes are drawn out into trials and appeals. Such inconsistency in the law and its underlying policies only increases the already exorbitant costs of litigation. It adds additional inefficiency to the repertoire of design-bid-build.

With all these problems inherent in design-bid-build, it is difficult to understand why it has remained the owner's preference for construction delivery for so long. Continued litigation of the *Spearin* and economic loss doctrines or further refinement of traditional contracts are not the solution. The inefficiency and adversarialness of the traditional method can only be cured with a drastic change. "Only a collaborative approach that forthrightly eschews claims making and litigation will have any measurable impact."[66] IPD does just that by replacing fragmentation and adversarial relationships with collaboration and contractual incentives. When owners embrace this ground-breaking construction delivery method, they will find that it truly is a "game changer."

SECTION II: WHAT IS INTEGRATED PROJECT DELIVERY?

IPD DEFINED

Integrated Project Delivery ("IPD") is a method of delivering project design and construction "[t]hat integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to reduce waste and optimize efficiency through all phases of design, fabrication and construction."[67] IPD is based on the Australian Alliancing model. IPD has stepped to the forefront of potential project delivery methods in the United States (during this new millennium) to address the urgent need to reduce the tremendous amount of inefficiencies and waste that currently plague the design and construction industry. And, although, there are still many skeptics within the industry who are reluctant move away from traditional ways of doing business, the facts dictate that change is necessary.

As discussed in the first part of this paper, the construction industry is fragmented, inefficient, and adversarial. The value of construction in the United States in 2007 was estimated at $1.288 trillion, and more than 50 percent of that cost was attributed to waste.[68] Areas of waste include, among other things, "48 percent of carbon dioxide emissions, the highest single contributor of green house gases," 30 percent in labor inefficiencies, 30 percent material waste, up to 10 percent waste due to rework and lack of coordination between trades, and 3 to 7 percent due to poor planning.[69] This tremendous amount of waste is, in large part, due to inaccurate information, poor planning, inefficiency, and bad behavior:[70] Traditional methods of contracting contribute to the majority of this waste because traditional construction contracts create silos between the various parties responsible for designing and constructing the project. These barriers

inhibit coordination, stifle innovation, and include boilerplate language that is prescriptive and punitive in nature.[71] In addition, traditional construction contracts attempt to precisely identify and allocate every possible risk, describe who is responsible for what deliverable, when it is going to be delivered, and the harsh consequences for failure.[72] And, more often than not, the risk is assigned to the party who has the least ability to control the outcome.[73] Contracting under this methodology also comes at a high cost. It not only causes unnecessary increases in initial contract pricing and excessive contingencies but it also reinforces fear, self-preservation, mistrust and adversity. IPD, however, does just the opposite.

IPD employs a relational, value based contracting approach by creating a virtual organization where the key project participants' interests are aligned with defined project objectives, and both collaboration and innovation are encouraged between the various team members throughout the design and construction process through a shared financial stake in the project outcome. Common themes for project outcomes utilizing IPD are a reduction in overall project cost and time of delivery, increased quality of workmanship, and success in meeting sustainability, and life cycle goals. In other words, IPD projects are typically on time, on budget, higher quality, have fewer requests for information and change orders, and so far no litigation.[74] The reason being is that IPD "addresses the entire sequence of programming, design, construction and building operations" through a tri-party relational, value based contract that requires mutual respect and trust among participants, transparency in project costs and financials, and open communications, collaboration and innovation among project team members.[75] This is a major paradigm shift from traditional contracting methods.[76]

The IPD paradigm uses trust-based teams comprised of key participants that are engaged early in the design process to optimize and inform the design and execute construction with

greater efficiency and precision.[77] And, unlike partnering, the contract is value-based because each of these key participants has shared incentives for success or financial risk for failure. So, they all have "skin in the game."

However, IPD is not for everyone or the solution for every project. IPD comes with increased up front costs. Although the up front costs are eventually recaptured due to increased value and efficiencies, whether the additional up front costs are acceptable to an owner depends on the type of owner and facility, available project financing, and duration of the project.[78] IPD projects also require an increased time commitment and more leadership from the owner, and not all owners have the capacity or desire to participate at this level.[79] That is not to say, however, that other project delivery methods such as design build and construction management at risk can not also benefit from adopting several of the key elements required by IPD.[80]

KEY ELEMENTS OF IPD

The American Institute of Architects has defined five key elements that are essential for a fully integrated process: (1) early involvement of key participants; (2) jointly developed goals; (3) shared risk/reward among key participants; (4) joint and collaborative decision making; and (5) reduced liability exposure.[81] Project teams trying to achieve a fully integrated process should include all five key elements in a single contract. In most cases, the owner retains the architect and contractor under a tri-party agreement either during the conceptual or design criteria phase of the project and the other key participants are either brought in through joining agreements or under separate agreement with the architect and contractor.

Early Involvement By Key Participants

Key participants have the greatest influence over project outcome.[82] Generally, key participants include the owner, architect, structural, mechanical and electrical design consultants,

the general contractor and its key trades, such as steel, mechanical, electrical, plumbing, fire protection, curtain wall, and drywall.[83] The integration and collective talent of these key participants is vital to having a significant impact on the project outcome.[84]

One reason integration influences the project outcome is because "teamwork produces optimal results in nearly all fields of human behavior."[85] And, creativity comes from teams with diverse backgrounds. Studies have demonstrated that "[o]ne common way managers kill creativity is by assembling homogenous teams" because "homogenous teams do little to enhance expertise and creative thinking."[86] Thus, the best chance of influencing the design and achieving better project value is to diversify the team by involving the owner more, and including the contractor and its key trade contractors early during the design process.

Harnessing this collective intellectual capital and specialized knowledge early in the design process creates significant cost savings because the contractor and key trades are able to provide practical feedback to the owner and design team regarding constructability and the most efficient approaches to building the project while the design is still flexible.[87] This is a major paradigm shift from more traditional delivery methods where the parties do not really understand what they are going to build, how they are going to build it, or who is going to build it until after completion of the construction documents, bid phase and, in most cases, the subcontractors' submittals.[88] This traditional approach fosters cost overruns, re-design (in some cases), value engineering, schedule delays, and claims.

In contrast, integrated project teams have achieved up to a 25 to 30 percent savings in the project schedule.[89] Early collaboration among key participants also adds value by substantially reducing or eliminating conflicts that typically arise during construction which in turn reduces the number of clarifications and change orders directly impacting the chances of claims. Early collaboration also allows subcontractors to fabricate materials sooner, order long lead items earlier and, in most cases, commence construction prior to completion of the design. These

increases in efficiency reduce the overall project cost and schedule and typically enhance sustainability, quality, and add value to the project.

Jointly Developed Goals

All current forms of IPD contracts have jointly developed goals that the key participants develop.[90] The majority of the standard IPD form agreements use project cost as the main threshold for determining success or failure, although some forms also use project schedule and quality as a metric.[91] Jointly developed goals are important because they align the other key participants' goals with the owner's goals.[92] Alignment creates joint ownership of the ultimate project outcome and commitment among project team members.

In order to establish the project goals and metrics, the key participants engage in a target value design process to validate the project cost and schedule before the "targets" are locked.[93] This is sometimes referred to as the validation period. For a project to succeed, the key participants must have a clear understanding of the project goals and share in those goals.[94] The project goals should be documented in writing. Although targeted value design will occur throughout the design development phase to ensure that the project is progressing as planned, this initial process is necessary to validate desired scope, cost, quality, schedule and sustainability.

Shared Reward/Risk Among Key Participants

Under an integrated project delivery approach, each key participant contractually shares in the reward generated by completing construction at or below the established target, which usually requires that the project also be completed on time. Although there are many variations for determining risk and reward, for purposes of illustration, the basic model requires each key participant to place either all or a portion of its profit at risk.[95] Throughout design and

construction, the key participants are paid the actual cost of design and construction (without profit or less the amount of profit placed at risk). If construction is completed within the established targets, the key participants will earn their respective profits previously at risk.

If the project is completed under the target, the key participants share in the additional savings with the owner on a pro rata basis depending on how much profit each key participant placed at risk. Also, sometimes the owner contributes to the incentive pool to reward key participants or other project team members for their outstanding performance, achievement of greater sustainability, and higher quality.

Conversely, if the project cost incurs cost overruns, the key participants would share in the risk of the overrun on a pro rata basis depending on the amount of profit placed at risk until all of the key participants' profit is exhausted. Once the amount of profit placed at risk has been exhausted, the owner continues to compensate the key participants for the actual cost of design and construction without any profit. Thus, the key participants' risk for project overrun is generally capped at the amount of profit placed at risk.[96] The continued payment for actual costs for design and construction is the owner's shared risk in the project outcome. This shared incentive/risk compensation structure is what makes the team commitment value-based rather than aspirational.

Finally, it is important to note that profit may be deferred until the end of the project or distributed to key participants prior to completion of the project to reduce cash flow problems. Projects that use interim profit distributions, however, must establish milestones as part of their jointly developed goals as a metric to determine whether the project is proceeding within the jointly developed targets. This determination is made through performing a cost evaluation and analysis of the cost projections each time a milestone is achieved. Contingency and allowances

should be removed before comparing the actual project cost to the target cost, and it is also necessary to have a claw back provision to avoid overpayment.

Collaborative Decision Making

IPD projects differ from traditional delivery methods because project teams rather than just the owner or its project manager are governed by project teams rather than just the owner or its project manager. Although various standard forms will differ on the actual governance of the project, the project governing board is generally comprised of the owner, architect, and contractor representatives who discuss and collaborate on project decisions.[97] The governing board may also include a member from the key consultants and key trades to represent their collective interests.

Cluster teams are usually formed for deeper collaboration around integrated building components, systems, and equipment. These teams have the ability to influence project decisions by providing detailed information about constructability, cost and labor efficiencies, life cycle costs, and sustainability to the governing members.

Ideally, the governing board will make unanimous decisions that are in the best interest of the project. If a unanimous decision cannot be reached, most form agreements allow for a senior management group to make a business decision or, in some cases, the owner decides.[98] All of the IPD form agreements include a dispute resolution process for disagreements about project decisions, payment disputes, or changes.[99]

Reduced Liability Exposure

Although the various IPD form agreements differ regarding limitation of liability, most include, at a minimum, a waiver of certain claims between the key participants.[100] The primary reasons for limiting liability are to foster creativity by reducing fear of the threat of claims, build

trust, increase communications among the project team members, and reduce excessive contingencies.[101] However, willful misconduct, performance issues such as warranty claims and construction defects, and third- party claims generally are not waived. Also, under certain models waiver of claims are limited to claims that arise during the design and construction process rather than after the construction is completed, or alternatively, limit claims based on the dollar amount available under applicable insurance policies.

Discussions of waiver of liability spur heated debates of IPD topics because collaborative design requires multiple project participants of various disciplines to be actively engaged in the design process. This is mainly due to the traditional application of the *Spearin Doctrine,* laws governing delegation of design responsibility, and the exclusion on traditional errors and omissions design policies for construction means and methods.[102] Section 552 of the Restatement (Second) of Torts also permits actions for negligent misrepresentation for the "guidance of others" potentially subjecting project team members to liability for pecuniary loss caused by another party's justifiable reliance on a misrepresentation.[103] Thus, before engaging in an IPD project, the owner and other project team members should investigate appropriate waivers and insurance coverage with their legal counsel and insurance provider.

WHO IS BEST SERVED

As noted above, including all five key elements for a pure IPD project, while desirable, may not be allowed or practical for every type of owner or every type of project. So which owners and what types of projects are best served?

Most state public entities in the United States currently lack legislative authority to design and construct a project through IPD mainly because IPD projects involve negotiated contracts with design professionals and contractors. For example, competitive bidding

requirements in most states do not allow for selection of contractors on a qualitative or informal basis. Colorado is the notable exception.[104] Recent efforts to adopt IPD legislation in California for state and local agencies were unfortunately unsuccessful. So, in almost all jurisdictions, pure IPD is limited to the private market.

In the private market, IPD is gaining traction across the United States. Some critics believe that IPD should be reserved for larger, complex projects because IPD requires a significant initial cost investment and additional design efforts as well as increased owner involvement but a variety of smaller projects have been delivered and are currently being delivered using IPD.[105]

For example, of the projects reported and studied, most fall under the healthcare sector and those projects vary from a 70,000 square foot medical office building costing approximately $20 million to an 858,000 square foot hospital with estimated costs of over $1 billion.[106] The fact that IPD is being utilized for healthcare facilities is not surprising. Waste and inefficiencies are no longer acceptable given the complexity of hospital construction and the need for flexibility, the duration of schedules, and the rising cost of healthcare in the United States.

However, not all of the reported projects were large, complex, or fit within the healthcare sector. Other projects studied include tenant improvements, new office construction and educational institutions. These projects ranged from 7,000 square feet costing approximately $500,000 to 525,421 square feet with an estimated projected cost of approximately $123 million.[107]

Another area where IPD is gaining traction is repetitive facilities rather than the "one-off" project (e.g., banks, hotels, senior care). IPD makes sense for repetitive projects because the project team can re-use and continue to improve upon the design developed for one facility as

well as use the same teams gaining knowledge from lessons learned on previous projects. Consequently, the up-front cost and investment time would likely be substantially reduced for subsequent projects because the parties would already have standard form agreements, effective business models, design, leadership, and project teams already in place.

So if building type, size and complexity are not a common theme, what do these projects have in common? The answer is savvy owners or developers that are willing to roll up their sleeves and try something new. These visionary and entrepreneurial owners and developers embrace the required leadership skills, up front investment time, mutual respect, and team building that are necessary to succeed. In other words, IPD is not for passive owners or owners that believe contractors and designers have to be coerced by market pressure to deliver their best price.[108] IPD is also not for contractors or designers that are arrogant or egocentric because it requires mutual respect and collaboration.

Contractors and designers are also driving the market because they see IPD as a marketing opportunity. Proven success in delivering high quality projects on time and under budget without any disputes is one of the best ways to secure repeat business. So, many contractors and design firms are teaming and promoting IPD to owners for new projects. Generally, no one seeks a project that is plagued with design conflicts, schedule delays, finger pointing and, in many cases, expensive litigation. David Kievet, President of Boldt Construction sums it up nicely stating, "[b]y aligning the owner's commercial goals with those of the project team it is possible to create a win-win situation where any incentive payment becomes an acknowledgement of a job well done and not the driver of it."[109]

ADVANTAGES OF IPD

IPD is the construction industry's best opportunity for resolution of inefficiency and waste. New technologies and processes such as BIM, Lean and "owner demand for better quality and cost controls, have created a need for a collaborative approach to design and construction."[110] And, the AIA California Counsel's case studies demonstrate that IPD is rapidly developing a track record of producing higher quality projects that achieve sustainability goals and are still delivered on-time, at or below budget, and without claims.

The owner is not the only party that benefits from IPD. IPD offers advantages to all parties involved in the design and construction process. First, architects and designers regain the opportunity to provide intellectual leadership regarding design expertise and delivering projects.[111] This approach disappeared with the demise of the master builder and the rise of architects and designers offering professional services with limited financial stake for errors or inconsistencies in the design documents during development as well as no financial responsibility for the eventual cost overrun of constructing the project they designed.[112] As a result, their expertise has been somewhat marginalized over the years by owners and contractors when cost is at issue.[113] IPD offers the opportunity for designers and contractors to reunite.[114] Efficiencies in the design are maximized because fabricators or subcontractors who actually construct the work provide design details to inform the design which substantially reduces future conflicts, and eliminates the redundancy of design detailing and shop drawings.[115]

Second, general contractors, key subcontractors, and suppliers who enter into the process in the later stages of the project have the opportunity to gain a deeper understanding of the owner's desired goals before construction. As a result, they are able to impart their construction knowledge and expertise early in the design process informing the design and therefore avoiding field conflicts, costly delays, and claims. Early involvement in the design process also reduces

the risk of improper pricing. Contractors will gain a better understanding of the design which will enable the contractor to procure equipment and materials earlier in the process.[116] For these reasons, IPD virtually eliminates rework.[117]

Third, IPD projects are typically delivered faster, and owners have the opportunity to improve the project outcome because they have the ability to provide leadership, influence details and make informed decisions during the design process based on the project teams' collective input. This increases the owner's chance of meeting its project specific goals and gaining better value with the ability to control cost escalation and reduce the chance of claims.[118]

Finally, IPD projects are fun. According to the AIA California Counsel case studies prepared by Jonathan Cohen, project participants had a sense of empowerment, mutual respect, value, goodwill, trust, and professional satisfaction.[119] This exhilaration and pride contributes to the quality of the workmanship because each participant is part of a team working toward a common goal and contributing to the project outcome. Optimizing one's own gain at the expense of another's is almost non-existent on IPD projects. Elimination of self-interest substantially reduces the amount of slack, rework and frustration.

SECTION III: HOW DO YOU SET UP AN IPD SYSTEM?

DECISION AT TOP LEVEL OF OWNER'S ORGANIZATION

The threshold decision on any construction project is which delivery method to choose. The owner is the key decision-maker for project methodology. While all the key participants must be committed to IPD, it is the owner's investment in IPD that drives the project. Ironically, people rarely view the owner as the leader of a project. For years, project participants have fought for leadership in projects. In her book *The Owner's Dilemma: Driving Success and Innovation in the Design and Construction Industry*, Barbara White Bryson describes this dance perfectly:

> [A]rchitects flamboyantly yet blindly tap dancing with the strident yet risk-averse contention that they are the owner's advocate; contractors waltzing along, trying to step up and over an underlying conflict of interest that can't be resolved within their traditional delivery methods; and professional project managers contentedly leading the boogaloo without risk or consistency.[120]

Each of these parties has its particular expertise, but none have the global view or overall authority to drive the project methodology. Nor do they have as much at stake as the owner. As hired guns for the day, they perform their tasks and depart leaving the owner with the positive or negative results of their efforts.

Yet, why elevate the very participant who may offer no expertise to the project as critical to the process and its success? The owner initiates the project, "pays the bill, lives with the result, and has the ultimate carrot – to pick firms for repeat work."[121] Additionally, if one "follow[s] the decisions,"[122] as Bryson suggests, the owner has much more effect on a project than is typically assumed. The owner selects the prime participants, establishes the budget, sets the goals, may change the processes that impact more than one project participant, and decides

whether a project will continue.[123] By virtue of this authority, the owner alone has the power to establish the foundation needed to implement IPD on a project. Utilizing IPD and other lean tools represents a radical change in workplace organization, atmosphere, and relationships. Anecdotal evidence suggests that it is a refreshing change from the standard adversarial atmosphere at the jobsite. By the end, key participants and their workers embrace the process. But, that is at the end. At the outset, it takes a strong commitment from the highest authority of the owner to teach these old dogs some new tricks. And it takes a sustained commitment to avoid the inevitable backsliding that otherwise occurs. The owner's unique authority puts the owner in the best situation to harness his or her own "knowledge of strategic needs and the project team's experience and expertise" for innovation and elimination of waste.[124] Thus, the owner's buy-in to IPD is paramount.

It is also important to keep in mind that IPD is not right for every owner. Nor will every project, contractor, or architect succeed with IPD. Not all are wired to collaborate, and many do not have the intellectual curiosity that is necessary to succeed using this unfamiliar and rigorous approach. "Implementing lean IPD presents unique challenges that require perseverance, candor, a thick skin, and the desire to seek continual improvement."[125] IPD is somewhat the uncharted wilderness for most project teams and only those truly driven to explore and understand can master it.

OBTAIN LEGAL COUNSEL/CONSULTANTS

Once the owner decides to utilize the IPD method, the next step is to implement it. But the implementation of such a revolutionary process may be a difficult journey. It requires battling against engrained habits. While it is conceivable that project teams could execute IPD

on their own, anecdotal evidence indicates that the guidance of consultants and coaches greatly facilitates the implementation of IPD.

IPD consultants may assist owners from the beginning of the project, even before the key participants are selected. The consultants may help owners delineate their goals and objectives. Consultants may also advise owners on which potential project participants would be best for the owners' objectives.[126] During the selection process, consultants may develop selection criteria, draft Requests for Qualifications, and help select project participants. Consultants may also facilitate the implementation of IPD by providing training for the key participants. This role will be particularly important for projects involving participants with little or no IPD experience.

In some circumstances, attorneys experienced in IPD have stepped into the consultants' roles. This might be surprising to some who think that, because of IPD's concentration on avoiding litigation, attorneys are "part of the problem with the construction industry, not part of the solution."[127] While certain traditional attorney roles may no longer be necessary, IPD creates new opportunities for attorneys to participate in the selection and implementation of the project delivery method.[128] Before the project commences, an attorney may help an owner decide whether IPD is right for the owner and its project. If IPD is chosen, attorneys may provide a teaching role in the IPD learning process or help in the selection process by drafting selection documents such as Requests for Qualifications.

Once the selection process is complete, input of legal counsel in negotiating and drafting relational contract documents will be essential. When negotiating this key document for the project, attorneys and key participants must keep in mind that negotiating an IPD contract is not the same as negotiating a traditional construction contract.[129] Contract negotiation should be the key participants' "first collaborative effort."[130]

Unlike the traditional construction contracts, the actual contract language is not the most important aspect of the negotiation process. IPD negotiations begin at a broad level. Key participants determine outcomes that they seek, identify the processes and behaviors that will realize those outcomes, and then establish tools and structures to support those processes and behaviors.[131] The key participants must openly discuss their interests with each other so that the contract will "create a project where all participants benefit by its success and are equally motivated to avoid its failure."[132] From these interests, the parties will summarize the principal elements of commercial terms. Finally, the attorneys will draft "a contract that fully expresses the agreement documented in the key terms summary."[133]

Because IPD is a revolutionary process, one issue that may arise during negotiations is differing levels of understanding among the key participants. If all parties do not understand IPD and how it differs from traditional construction methodologies, negotiations may slip back into traditional, adversarial ways. With this in mind, it might be beneficial to require IPD training before any negotiation occurs.[134] The workshop would provide the participants with a common understanding of IPD principles and facilitate collaboration and negotiation.

Attorneys may further aid the key participants by including IPD mechanisms discussed in this article in the contract documents. These mechanisms include incentive provisions, limitation of liability provisions, risk allocation provisions, and tools derived from lean manufacturing. Not all commercially available IPD agreements incorporate lean tools. However, these tools provide the essential roadmap for achieving IPD goals of eliminating waste through collaboration. Where a contract is chosen that does not incorporate lean tools, it may be essential for the attorney to provide this roadmap via a lean tools implementation guide to be incorporated in the prime contract by reference. Whether in the contract itself or incorporated by reference,

"[s]ound legal advice will be particularly critical . . ." to ensure effective drafting of these provisions.[135]

Ideally, attorneys' IPD roles will continue after the contract documents have been drafted. For example, attorneys may participate in and supervise sessions to encourage collaboration and team-building exercises.[136] Counsel may also be able to administer a project-wide conflict resolution system throughout the project. "The system would involve the establishment of channels of communication, standardised [*sic*] claim documentation, step and/or facilitated negotiation, mediation, standing neutrals, binding arbitration, and/or other binding and non-binding elements."[137] Finally, attorneys may assist with resolving any open issues in the construction project close-out through its conflict resolution system and any post-construction issues that may arise.

In short, an attorney with IPD experience can help educate a project team and help the owner decide the viability of IPD on a particular project.[138] "Change is coming and those who prepare for it will be much better equipped to lead in the transition. Through education and skillful advice, the legal community is uniquely positioned to facilitate the transformation of our industry."[139]

SELECTION PROCESS

Unlike traditionally delivered projects, an owner cannot select participants for an IPD project based on price alone. Project participants must have the right character and competency for the IPD project.[140] The compatibility of the key participants with each other and with IPD goals is of paramount importance. [141] IPD goals require not only the technical ability to deliver the project, but also more intangible skills such as the ability to collaborate, sound judgment, compatibility with other members, eagerness to learn, etc.

In their article *Integrated Project Delivery: An Example of Relational Contracting*, authors Owen Matthews and Greg Howell equate being a member of an IPD project team to mountain climbers roped together – if one falls, they all fall. Thus, being a key participant on an IPD project requires trust. And trust is "not something that can be created by contract but must exist independently of it." [142] Key participants must "recognize that everyone makes mistakes and [be] willing to jointly absorb the cost for those honest mistakes. They are comfortable in this because they have chosen team members with integrity, character, and competency; [t]eam [m]embers who are trustworthy."[143]

Generally, if an owner or its attorney has continuing relationships with either contractors or architects, the selection process will start there.[144] Absent those relationships, the owner can begin the IPD selection process by inviting contractors or architects to present their qualifications individually. The owner can then create a shortlist of the most qualified firms and interview them. But the "[t]radition . . . end[s] there."[145] Instead of primarily focusing on the applicant's bid amount, the owner and the applicant discuss exactly how the applicant plans on accomplishing the project, and its ability to do so. They look together at the owner's goals and plans, and the owner attempts to glimpse the applicant's ability to collaborate.

The first party the owner selects is either the architect or the contractor. This party then participates in the selection of the other main project participant. The architect's and the contractor's fees will be a factor in the selection process, but only as one of many key ingredients, which the owner will evaluate. As with design-build and certain construction manager at risk projects, the project cost is determined as an outcome of the design process.

Subsequently, the owner, contractor, and architect choose key design consultants and trade contractors.[146] While design consultants are usually among the key participants, not every

trade contractor is. Rather, the key participants include only those whose work affects the schedule and performance of others. In IPD, priority work is that which releases work to others. Prime examples include mechanical, electrical, and plumbing contractors. These are among the players who benefit from, and benefit the project by, tighter integration and collaboration. While key trade participants will vary by project, the anecdotal record suggests that the key participants typically account for approximately 50% of the budget on IPD projects.

Alternatively, the owner could invite contractors and architects to self-organize and bid on the project as separate teams. Contractors, architects, and key trades would begin collaborating before they even win the project. The owner would then create a shortlist of the most qualified teams and begin an interview process similar to that described above, concentrating on the owner's goals and plans and the team's cohesiveness and ability to collaborate.

TOOLS/CATALYSTS

There are a number of tools that an IPD project participant can use to minimize risk, maximize project efficiency, and encourage collaborative and non-adversarial relationships. The most widespread and time-tested tools are derived from lean construction methodologies, principally pioneered by the Lean Construction Institute over the last 20 years. They "focus project participants on creating best value for the project as a whole."[147] These tools create the vital mechanisms by which project teams can achieve collaboration, create value, and eliminate waste.

Target Value Design

One of the initial lean tools available for use is target value design. Target value design is "a disciplined management practice to be used throughout project definition, design, detailing,

and construction to ensure that the facility meets the operational needs and values of the users, is delivered within the allowable budget, and promotes innovation throughout the process to increase value and eliminate waste (time, money, human effort)."[148] Target value design is a collaborative process in which the key participants develop an understanding of the owner's purpose and program.[149] This stands in stark contrast to the traditional process in which the designers develop the plans and specifications in isolation. The goal of target value design is for the team assembled early in the business planning process to achieve the following: first, to develop a common understanding of the owner's goals and values; and second, to determine whether the facility can be constructed within the proposed budget and schedule. The participants evaluate the project and document their conclusions in a validation study. This consists of both an analysis of the design and a detailed cost estimate.[150] It is primarily the firms who will deliver the project that are responsible for creating this estimate.[151] In this process, the designers can draw upon the keen insights of the contractor and its trades. The validation study represents the key participants' "best estimate of what current practice would produce as a price for the facility."[152] The players make sure that the construction systems and techniques selected comprise the best practices and are most appropriate for the owner's requirements.[153]

If the expected costs exceed the owner's budget, there are three options. The key participants can "attack the gap with innovations in product/process design, restructure commercial relationships, etc."[154] Or the owner can adjust the value and scope of the project "by sacrificing lesser ranking values."[155] Finally, if the expected cost still exceeds the owner's budget, the owner may have to abandon the project. Through the validation study and cost analysis, the key participants can assure the owner of the project's viability prior to commencement. Most importantly, this is achieved using full team participation much earlier

and with more accuracy than the traditional process. The owner benefits vastly in terms of cost savings, elimination of waste, and project certitude.

Once the project's viability is established, the parties develop a strategy for its implementation, called the target value design plan. This is the mechanism by which the key participants develop the processes to establish the optimal design. First, the players establish initial target costs for major components and systems, and identify ways of adding value. At this time, the parties create a cross-disciplinary team which monitors the cost throughout the project. This target value design team meets regularly to monitor the overall progression of the design. They also assess design alternatives; evaluate the inevitable tradeoffs between aesthetics, functionality, and cost; and identify further opportunities for improvement. The owner and other key participants can scale this part of the process to the scope and size of the project as necessary.

After the target value design plan is established, the key participants finalize the target cost and the scope of work that must be achieved within that cost. To develop the target cost, the team takes into consideration the validation study, past integrated projects, and initial target costs. Then, it establishes "another, more aggressive target cost as a 'stretch' to drive innovation."[156] The participants have two options when setting this more aggressive target cost: they can lower the target cost itself or they can establish higher values and a greater scope of work for the same target cost.[157] Innovation and waste reduction become critical objectives at this point in the design process. The IPD team strives to reach these goals through intensive and coordinated collaboration.[158] After the target cost is finalized, the team launches into project-specific design. This process can be categorized into four separate phases:

planning/programming, design, detailing, and production planning. As part of this process the team will develop milestones and pull plans (described below).

Set Based Design

One of the significant tools that can be used to implement target value design is set based design. The idea is to produce a range or "sets" of solutions that are desirable, feasible, and viable at each decision point. The owner then reviews these sets to consider trade-offs and make selections that help it achieve its stated goals. The purpose is to provide the owner with sufficient knowledge to make informed choices to allocate its capital effectively. In this context, the team provides the research and analysis to guide the owner in making well-informed decisions.[159]

There are three main principles of set based design: (1) mapping the design space; (2) integrating by intersection; and (3) establishing feasibility before commitment.[160] The first step involves identifying and discussing the various sets of alternatives that the designers are carrying forward throughout the design process. The different sets of alternatives allow the design professionals to explore trade-offs and truly analyze what is the best decision. In the example of car production, there might be one set of alternatives for the air conditioning system and one set of alternatives for the interior design.

The second step – integrating by intersection -- involves finding intersection or overlap among different sets of alternatives being brought forward. In the car example, the team must identify which alternatives between the air conditioning system and the interior design of the car overlap. If the participants do not look for overlap among different sets of alternatives, they only end up optimizing part of the car, not the whole.[161] Similarly, the project participants of a

construction project can achieve optimal overall performance on the project when they review sets of alternatives as opposed to sequentially adopting alternatives.[162]

The third step – establishing feasibility before commitment – involves a "decision process that gradually eliminates possibilities until the final solution remains, rather than just picking the best from a set."[163] Each set of alternatives for a portion of the design must be consistent with the preexisting design.[164] "This is radically different from . . . [traditional] design, in which each design contribution may invalidate all previous work."[165] The first two steps are a way of ensuring that the third step is achieved.[166]

Choosing By Advantages

Another decision making process that can be used in all phases of the project is Choosing by Advantages (CBA). CBA is premised on the principle that every difference between two alternatives is an advantage for one or the other.[167] To make a sound decision, the importance of each advantage must be judged with care and precision until one alternative rises above the rest.[168] CBA offers a process for weighing these advantages.

The key participants first create a list of alternatives for each decision. Factors help the key participants to highlight possible differences between alternatives. Factors are containers of information and data, including criteria, specific attributes of alternatives, and their advantages.[169] Criteria are rules or guidelines for evaluating different alternatives. [170] The decision makers write the criteria as musts (mandatory) or wants (desirable).[171] For example, the key participants for most projects would consider labor safety a factor when evaluating alternatives.[172] In this case, the criterion for each alternative is that the alternative *must* assure safety for the workers.[173]

The key participants then analyze the characteristics, qualities, or consequences – deemed attributes in CBA speak -- of each alternative. The key participants then determine whether each alternative's attributes match up with the criteria of each factor.[174] "An advantage is a beneficial difference between two attributes."[175] So, if one alternative assures the safety of the project participants better than another, it will have an advantage over the other. While easy to comprehend and implement with a one factor example, this system becomes increasingly complex as decisions with more factors and alternatives are considered. In order for this decision making system to succeed, project participants must analyze each project decision through the CBA system.

Lean -- Free Communication

Free flowing communication among project participants is another hallmark of IPD. IPD contracts explicitly encourage open and frequent communication among all project participants.[176] This stands in stark contrast to the highly restricted channels of communication mandated by traditional contracts. The purpose of open communication is to facilitate the collaboration that lies at the heart of IPD. The only stipulation to such communication is that it be documented to the owner, the architect, and the contractor.[177]

To some extent, communication and collaboration require trust. In many cases, key participants will have worked together before. In these cases, long and successful past working relationships established a preexisting trust and facilitated open communication.[178] However, where team members have not collaborated before, old habits of adversarial behavior can be difficult to shed. In some such instances, the leadership of key participants has had to take steps to facilitate the requisite level of trust.[179] Often, requiring the parties to meet face-to-face alone

forces communication and establishes trust among the participants. This "allow[s] the teams . . . to constantly interact, communicate, and give each other feedback."[180]

However, just as important as the open communication is the format in which the participants transfer the information.[181] "Every player in this fragmented industry tends to collect and record information differently."[182] If an owner requires all communication to be in a certain format, it eases the understandability of the information and reduces the amount of time a person needs to analyze the information.

Big Room

Scholars have described traditional construction systems as "over the wall" construction because of the stark separation between design and construction. The architect creates the design in isolation from other project participants, and the contractor constructs the project without much input from others. To encourage collaboration, IPD breaks down these walls – literally and figuratively -- with tools such as the "Big Room." The project participants co-locate, or gather in the Big Room, for weekly meetings or even a continuous period of days and engage in target value design.[183]

The Big Room team includes representatives for architects, engineers, general contractors, construction managers, consultants and representatives, major trade contractors, owner representatives, and end users.[184] This allows the design professionals and trade contractors to interact and collaborate as well.[185] Having the key participants together geographically "ensures that the right information is readily available, and that decisions can be made in real time without reverting to requests for information or holding numerous meetings."[186] During Big Room meetings, the key participants can discuss weekly work plans,

constraints on assignments, potential disputes, and evaluate alternatives, among other things. This encourages both time and cost efficiency.

The Big Room vastly facilitates the elimination of waste through the development of a common understanding among key participants much earlier than is the norm. Typically, the contractor and key trades begin reviewing and commenting on the design after its completion. Inevitably, redesign ensues as scope gaps are discovered or better alternatives are proposed. However, the ability to positively impact cost and function in design is highest early in the process. [187] Conversely, the cost of design changes are low at the outset and rise significantly as the design is completed.

Lean -- Reliable Commitments

And what is the glue holding all of this together? A network of commitments from all key participants. As mentioned in the prior section, IPD is based on relational, as opposed to transactional, contracting. Relational contracts establish mechanisms for delivery that focus on trust and partnership. Due to this focus, IPD places a premium on reliability. The reliability of each player in meeting his or her commitments is crucial to the project.

Because IPD is so dependent on collaboration, participants' ability to rely on each other's promises to fulfill tasks is essential. In fact, the making of a reliable commitment has five components, which some IPD contracts articulate as binding commitments.[188] First, the conditions to the commitment's fulfillment must be clear. Next, the party making a commitment must be competent and able to perform the task. [189] Not only must the performer be competent, but also it must know that it will have the necessary materials. "Keeping promises assumes keeping track of the things that routinely interfere with delivering on those promises."[190]

Additionally, the party must have available capacity to perform the task. To ensure capacity, the party must properly estimate the specific task's duration and make sure that it has the necessary time available for the commitment.[191] A party making a reliable commitment must be sincere and should have no current basis for believing that the commitment cannot or will not be fulfilled. [192] Finally, a party must be held accountable if the promise is not fulfilled.[193] "At a minimum, . . . [the party should] take an active role in providing a remedy for the breakdown. That may entail remediation, penalties, and stepping off the team. Whatever it takes."[194]

Reliable commitment among team members and accountability for failing to meet commitments will result in improved reliability of workflow in construction. Studies show reliable workflow to be the critical component in elimination of waste. The tangible byproducts of removing waste are cost savings and schedule benefits. But even keeping reliable commitments is not an individual effort during IPD projects. Reliable commitments require project control. The key participants must provide processes and methods for securing reliable promises and require open declarations of deadlines for work to keep each party accountable.[195] As part of the process of securing reliable commitments, IPD contracts often require Weekly Look Ahead Planning meetings. At these sessions, the coming week is reviewed to determine if any constraints remain which would keep someone from fulfilling a reliable commitment. For any remaining constraints, the participants must solicit promises for removal and confirm available work for the coming week.

Lean -- Pull Planning, Scheduling, and Designing

Reliable commitments and the prominence of trust and partnership were the key insights of Greg Howell and Glen Ballard of the Lean Construction Institute, who developed the concept of pull planning.[196] They hit the proverbial nail on the head when they identified the key item

flowing on a project is the work that is completed by one performer and handed off to a successor.[197] Like just-in-time deliveries of materials, what is delivered in a project setting is work from one trade to another. Consequently, pull planning depends on collaboration among team members in planning and scheduling. Resources are selectively pulled forward as needed to ensure smooth performance. It ensures that activities are not started sooner than needed to guarantee continuous performance of subsequent activities. As a result, available resources are effectively matched to a specific need. And, inefficient idle time as well as excess inventory are reduced, if not eliminated.[198] In pull planning, which has been trademarked as The Last Planner System, Howell and Ballard have created a system that values reliability over speed. Employing this system produces stable work flow, allowing the project team to explore other opportunities to eliminate waste from the design and construction process.

This methodology stands in stark contrast to that of the push planning system favored under traditional contracts. During push planning and scheduling, each activity waits for its resources to become available. By not precisely matching resources to utilization, it encourages excess inventory and inefficient utilization of resources, which lead to wasted time and money. Both traditional and lean construction project participants create long-term and short-term schedules. On traditional projects, the contractors will create short term schedules to coordinate various pieces of the work.[199] "However, lookahead schedules [on traditional projects] are rarely conceived as having the specific purpose of producing sound assignments, nor are procedures provided for lookahead processes."[200] In fact, project participants are failing to complete at least one-third of their tasks on schedule.[201]

There is a cure for the discrepancy between tasks as scheduled and the team's attainment of that schedule. It requires evaluating whether the work can be done before adding an activity

to the schedule. Howell and Ballard's Last Planner System employs this technique. Before adding an activity on the schedule, the project participants ensure both that the task can be done and that it will be done. In this way, the Last Planner System "improve[s] productivity by only allowing assignments which have been made ready to enter weekly work plans, and concentrates on actively making work ready."[202]

Pull planning utilizes master schedules that establish phase milestones, special milestones, and long lead time items.[203] The phase milestones are scheduled in detail for each project phase "such as foundations, structural frame, and finishing."[204] In order to create the phase milestone schedules, the team who will perform the work starts from the target completion date and works backwards.[205] In this way, the tasks are "defined and sequenced so that their completion releases work . . . ."[206] The key participants identify and discuss how to coordinate handoffs between the various specialty organizations during the project.[207]

Look-ahead plans then focus on particular phases, creating assignments out of the phase schedule, identifying their constraints, and assigning responsibility for each assignment.[208] The key participants include the assignment from the phase schedule in the look-ahead schedule only if it can be made ready in time.[209] The look-ahead plans typically span between two and six weeks.[210]

The key participants further break the schedules down into weekly work plans to facilitate pull planning. The schedules become more detailed as the time for executing the work gets closer.[211] Together, the key participants who will be contributing to the project that week create plans to make sure that the work is made ready before the participants plan to do the work. The team member with work dependent upon the prior performance of another team member requests that the prior performer offer a firm commitment as to when the work will be finished.

Planning ahead allows key participants to pull resources forward as needed. Further, it allows the participants to determine if any constraints remain which would keep a member from fulfilling a reliable promise. If any constraints are identified, the participants brainstorm ways to remove such constraints. In this way, the key participants reduce idle time and excess inventory.

During the weekly work planning, the participants also evaluate the success of past weeks by "measuring the percentage of planned activities completed (PPC), identifying reasons for non-completion, and tracing reasons back to root causes that can be eliminated to prevent repetitions."[212] Analyzing PPC allows the participants to distinguish between failures to perform caused by plan defects and those caused by the simple failure to execute plans.[213]

Continual Improvement

One essential element of IPD is continual improvement. The team members must constantly strive to improve the project, planning, and processes – both for the current project and future projects. Weekly meetings provide ample opportunity to review the project as it progresses. The participants may avoid the same mistake made in the early stages of construction in later stages if they seek to improve their methods.

Building Information Modeling

Building Information Modeling (BIM) is a database that stores building information and translates it into a three-dimensional model.[214] Unlike the two-dimensional, traditional design documents, a three-dimensional object has "the same properties and behavior as [its] physical counterpart."[215] But BIM can hold more information than just the physical characteristics of the facility to be built. BIM can house "manufacturer's specifications, warranty information, the hours estimated to build the object, locations in the building, tax classification, maintenance

schedule, energy use, rules for how [building components] behave[] in space, . . . and so on."[216] Additionally, if the user inputs cost information, BIM also may serve as an estimating tool.[217]

The ability to store all this information and translate it visually is revolutionary for the construction industry. In traditional two-dimensional drawings, the project participants look at layers of the building separated by phase and discipline.[218] BIM allows the participants "to perceive the whole in real time . . ." as they collaborate on the project design.[219]

More importantly, BIM provides a common database to share, store, and exchange design, construction, and operational details of the project. This alone can reduce errors caused by unsynchronized systems and the transfer of information during the project. Further, BIM can reveal conflicts between building systems designed by different consultants through a process called "clash detection."

Establishing an IPD system is a challenge. It requires a committed and knowledgeable owner, and a project team that is willing to learn a new way of operating. Strong leadership, both internally to participating organizations and externally in the way of experienced consultants, is necessary. Because a shift in mindset is required, key participants must be intellectually curious. It helps, though it is not a condition to success, if key participants form strong social bonds to tide them through the inevitable storms.

Discipline and steadfast devotion to the process are important. For when the inevitable crisis arises, the natural tendency is to revert to tried and true methods, which, of course, bring the familiar tried, true, and wasteful results. The enticement that keeps everything on track is the stunning success that IPD projects have usually achieved. Anecdotal, but widespread, reports suggest significant productivity improvements on IPD projects. These take the form of

significantly improved safety records, better product quality, achieving or surpassing schedule goals, and cost savings of up to 20%.

While the described tools all bring value to the project, the critical success factor is maintaining the correct mindset in utilizing IPD tools. "Without a mind-shift on the operational side and a contract structure that enables a higher level of trust, [the] value [of these tools] . . . can never be fully realized."[220] The project participants – from top to bottom – must undergo a shift in mindset. Unlike traditional projects, IPD does not measure success by how individuals perform, but whether the team achieves its overall project goals.[221] The participants must look to each other, not as adversaries, but as team members.

SECTION IV: NEGOTIATING THE DEAL

As discussed in the previous section, the first step in the IPD process is for the owner to make the decision to implement IPD. The second step is selecting the team, which initially includes the owner, architect, and contractor who later bring in the other key participants. The third step is defining the project objectives that will become the approved program and subsequently incorporated into the contract documents. The fourth step is negotiating the deal. This section focuses on the third and fourth steps which are accomplished during the validation period.

THE VALIDATION PERIOD

The validation period is the initial phase of the project where key participants collaborate on a cost reimbursable basis to define the project scope and determine the feasibility of constructing the desired project to meet the owner's deep goals within the owner's budget and scheduling constraints. If the project is feasible, the deal points are documented and the project proceeds. If the project is infeasible, or if the owner determines that the initial team is dysfunctional, the agreement is terminated for convenience and the parties are compensated for services performed on a cost reimbursable basis, typically without profit.[222]

Understanding the contribution each participant makes and achieving commercial alignment is the foundation of a successful project team.[223] During the validation period, any of the key participants, except the owner, can be replaced if the selected firms are not operating as a cohesive and high functioning team. Working with the key participants of the project team before the project is fully committed is advantageous because the amount of time and effort invested in any particular team member is minimal at this point in comparison to the time required over the duration of the project. In other words, it is early enough in the process that

team members who are disruptive to the collaboration process can be replaced, or even an entity can be replaced, without too much disruption to the project outcome. Also, because the key participants can test the relationship to make sure they have selected the right team members before financially committing to the project and moving forward. In this way, IPD has a way of self-correcting a bad team.[224] Generally, capable designers and contractors are not going to join a team and make financial commitments if the team has an incompetent member.[225]

Finally, because project feasibility is determined with input from the key participants before progressing the design beyond conceptual or criteria design, the owner is spared the experience of later discovering that it cannot afford to construct the project as designed.[226] Unfortunately, under traditional methods of delivery, this experience is more common than not leaving the owner with the limited options of either: (1) not moving forward with the project after having incurred major design expenses; (2) finding a way to raise more capital and increase the budget; (3) value engineering the project after it is designed in an attempt to meet the budget, which can eliminate desirable features and has a reputation of later leading to construction defects; or (4) starting over and paying the architect to redesign the project. In contrast, IPD projects are defined through collaboration of the key participants during the validation phase. These key participants commit to designing and constructing the project in accordance with the agreed program, within the owner's budget, and adhering to scheduling requirements through the target value design.[227] Utilizing target value design allows the key participants to analyze various design options allowing the owner and project team to make informed decisions based on cost, design features, constructability, sustainability, and life cycle during the development of the final design. If revisions are necessary to bring the project scope back in line with the target

cost, the team can easily make the changes because the design is still flexible. So, the surprise of cost overruns after the design is completed (or almost completed) can be avoided.

AGREED PROGRAM

During the third step, the project objectives are developed into an agreed program. The agreed program is a final document that provides a clear statement defining the project goals, scope, targets, accountability, and the desired project outcome. The agreed program is developed during the validation period and is generally included in the contract because it forms the basis for guiding the project team throughout the design process.

The ultimate content of the agreed program is derived from the project objectives and that content will vary depending on the key participants' commercial alignment with the owner's deep goals. The project objectives are the working draft of the agreed program and typically define the initial project goals and owner's expectations. The project objectives, at a minimum should define the owner's initial project budget and elements that make up direct costs versus those that fit within the key participants' corporate overhead and normal profit, owner's schedule criteria, sustainability and life cycle goals, and a detailed narrative description of the overall project, which may also include exterior elevations, block diagrams or design concepts.

When developing the project objectives, it is important to explore the owner's "deep goals" and desired project outcome. The deep goals impact the compensation structure which affects how targets are defined and the risk/reward model is created.[228] Often the owner's or developer's deep goals turn on the type of owner, type of facility, duration of the project, and available project financing. For example, if the developer is building a condominium project, one of its deep goals is likely to construct the project quickly and for the best price because getting to market and turning a profit are important. If there is a lending institution involved, it

will likely want an outside guarantee on the construction cost. An opposite example would be an institutional project. Most owners of institutions are seeking best value because they are not selling the project. Many times the project is self-funded and has been allotted a specific budget for the design and construction of the facility. So, rather than savings, the owner is interested in better quality or more capital improvements for the allotted budget.

The project duration also impacts the compensation structure.[229] Longer projects will require milestone distributions to eliminate cash flow issues while shorter projects may defer profit until after the project is completed. The project duration also shortens the validation period and affects the amount of time allowed for team building. Hence, on projects with a shorter duration, an owner may request IPD teams that have a proven track record of successfully completing design build or IPD projects.

COMPENSATION STRUCTURE

The fourth step is negotiating the deal, which also occurs during the validation phase. The exercise of negotiating a fair and reasonable compensation structure is a good indicator of how well the key participants will work together in resolving conflicts or issues that arise during the project. Negotiations are considered to be the first value based act. All of the key participants' actions up until this point, while well intended, are aspirational.

Striking the deal requires commercial alignment and financial commitment based on the feasibility of the agreed program developed during the validation phase. Alignment of the key participants' commercial interests and financial commitment before the project is designed is one of the main characteristics that distinguishes IPD from other collaborative processes. The compensation structure should be simple, fair, stimulate innovation and creativity, limit risk of claims, and buffer cost overruns. While negotiating, the key participants should focus on

reaching consensus on their intersecting interests because the deal is in the intersection of these common issues. An error many teams make is selecting the form of the agreement before establishing the agreed program and aligning commercial interests. Attempting to review contract language before aligning commercial interests diverts the key participants' attention away from developing the agreed program and negotiating the deal. Also, once the compensation structure is agreed upon, it will be easier to select which form agreement best supports the desired compensation and risk structure between the parties.

The financial negotiation points for IPD projects include: 1) establishing and defining the project targets; 2) defining compensation and the risk/reward structure; and 3) determining risk allocation, which includes the extent of waiver of liability, indemnification and insurance provisions. Defining the key participants' governing authority, decision making process, and dispute resolution are also considered but all of the current IPD form agreements include some form of joint control. Also, joint control is a management function and therefore does not have a significant impact on the compensation structure.[230]

Setting Targets

Targets are the threshold measurements for determining the success or failure of the key participants' collective performance. By collectively establishing the metrics for success or failure, each of the key participants are vested in doing what is best for the project rather than protecting their own individual company's interests. Hence, the targets motivate the project team and align their respective interests while also providing financial incentive to meet or exceed the project goals and assigning risk for failure.

All of the basic form agreements include project cost as a threshold measurement and some of the form agreements also include schedule and quality.[231] Determining what targets best

suit the needs of the project will depend on aligning the key participants' interests with the project goals. In other words, if schedule is a key factor the parties should include a target schedule. Assuming (project completion) is not an issue, the owner should consider cost and quality as the determining factors to obtain the best value. Therefore, the project goals should influence which targets are used.

The timing for establishing the target is also important because potential project savings and design efficiency are directly related to when the targets are set. Under traditional methods of contracting, the cost of the project is calculated after the project scope is defined in the construction documents.. In other words, the design is either completed or almost completed. Evaluating the project after the design is close to completion, discourages project-centric behavior and substantially reduces the opportunity to eliminate waste. Setting targets early does just the opposite.

Setting targets early also forces collaboration among the key participants during the design process encouraging creativity and eliminating waste. Increasing collaboration informs the design process allowing the project team to make intelligent choices that are in the best interest of the project. To accomplish this goal, key participants evaluate design options as the design progresses based on performance, cost, constructability, life cycle, sustainability, etc. Early evaluation allows for adjustments in the design that may be necessary for constructability or to meet the project goals while the design is still flexible enough to accommodate the design modifications. This target value design process eliminates traditional cycles of waste, which include, among other things, wasted design efforts, conflicts between various building components, constrained options because the design has progressed too far without the necessary feedback, and upward drift in costs, project delays and, in some cases, claims. Because

optimization of the design is directly related to when the targets are set, most of the form agreements recommend setting the targets either at the conclusion of the conceptual phase or not later than the design criteria phase.[232]

Finally, because the targets are connected to incentive and risk, they should be aggressively set. Setting the targets are tricky because most key participants are selected early based on qualifications and profit before the project is designed and will control the scope and cost during the validation phase. Team members may be tempted to pad the project cost and contingency because they are sharing in the incentive or risk of the project outcome, which will cheapen the design, or reduce scope, which would be an unintended result.[233] Owners will have the expectation that the target cost will be at or below their budget for the project.[234] Non-owner participants will want to equalize their risk and will want to ensure that the project can be delivered at or below the target cost.[235] When validating the project objectives and establishing the "targets," it is also important to find a balance and eliminate the low hanging fruit. If the risk of earning a profit is too high, fear will take over, creativity and candor will be lost, and transparency will be clouded.[236] Likewise, the risk should not be so low that earning an incentive is easy. In other words, earning an incentive should not be impossible but it should be challenging in order to stimulate creativity among the project team members, add value, and benefit the overall project outcome.

Shared Risk/Reward -- Basic Compensation Structure

On IPD projects, key participants are compensated on a cost-reimbursable basis for all direct costs (e.g., labor, material, equipment and services) during the design and construction phases with an agreed fixed profit, which is placed at risk.[237] Although some projects will have a varied approach to incentive and risk, the simplest structure is to compare the actual direct costs

of the project (meaning without profit) to the target cost (also without profit). This comparison is the threshold measurement for success or failure. It is important to specifically define what is included in the actual cost and target cost to avoid making an "apples" to "oranges" comparison. Including a detailed target cost breakdown as part of the agreed program is also recommended. To maintain credibility, the actual cost breakdown line items should mirror the target cost breakdown line items.

Although compensation structures differ, the simplest approach is for key participants to place all of their profit at risk. If, upon final completion, the actual cost is below the target cost, the key participants would earn an incentive usually based on their pro rata share of profit placed at risk. If the project is delivered at target cost, the key participants each earn their fixed profit. If, however, the actual cost overruns the target cost, the profit placed at risk is used to cover the overrun until it is exhausted. Once the at risk profit is exhausted, the owner continues to pay all direct costs until the project is completed. So, financial risk for the project outcome is shared by all project participants.[238]

The timing of the threshold measurement will depend on whether the project has milestone distributions allowing payment of a portion of the profit earned or whether all profit is deferred until the end of the project. As noted above, if the project has a longer duration, milestone distributions are recommended to eliminate cash flow problems. The milestones, however, must be defined up front and the owner may want to engage an independent cost consultant to audit current project costs and projected costs through the end of construction to help prevent overpayment. Also, the owner must have contractual rights to withhold a portion of future payments in case of project overruns at the next milestone to recapture previously distributed profit.

Shared Risk/Reward -- Allowances

The treatment and development of contingencies and allowances should also be considered when determining the compensation structure. On construction projects allowances are typically used to cover undefined scope for building components or systems and unknowns such as material and labor escalation, permit costs, etc. After the allowance item is procured, the allowance is reconciled and the target cost is either increased or decreased through change order to reflect the actual cost for that line item. Generally, allowances that have not be reconciled should be subtracted from both the target cost and the actual cost before determining any incentive or profit distributions because the actual cost for allowance items that have not been procured are unknown. Contingency is more complicated.

Shared Risk/Reward -- Contingency

Contingency is used to cover unpredictable events and mistakes made during design and construction.[239] Traditional projects have three different types of contingencies: (1) owner's contingency, (2) design contingency, and (3) construction contingency, which also includes contractor and subcontractor contingencies. These contingencies are more than what is needed for the project. In contrast, most IPD projects either do not have a separate contingency fund or they have one shared project contingency for design and construction.[240] The need for a separate design contingency is reduced or eliminated because the project design is developed in collaboration with the other key participants therefore eliminating most design discrepancies and conflicts, as well as the risk of cost overruns due to design. Similarly, the need for a separate construction contingency is substantially reduced or eliminated because the risk of conflicts, rework, and scope gaps are minimized through the collaborative design process. Additionally, the contractor is not guaranteeing the direct cost of the project. Remember, the owner is

compensating all key participants on a cost reimbursable basis so all direct costs are reimbursable and only profit is placed at risk.[241] The owner, however, still needs a separate contingency fund to cover unforeseen and differing site conditions, changes in governmental requirements, and owner elected scope changes.[242] Nonetheless, IPD projects still have far less contingency than traditional contracting methods. And, under traditional methods of contracting, there is no incentive to avoid using contingency because unused contingency is typically returned to the owner.

Currently, there is a lot of debate among IPD proponents regarding whether IPD projects should explicitly include a separate contingency fund. While some proponents argue that a separate contingency fund is unnecessary because the target cost will automatically include a buffer allowing all project funds to be dedicated to achieving the agreed program.[243] Others believe that requiring a separate contingency fund offers transparency and requires consensus among the project participants as to whether or not contingency funds should be spent. Regardless of the inconsistency of opinion, several projects still include a combined design and construction contingency to buffer the risk of setting the target early.[244] Because use of contingency is often a hotly contested topic, it is important to define the appropriate use of the project contingency and when use requires the governing board's approval. Also, if contingency funds are used, it is important to contractually require that the funds be transferred into the line item when spent. Defining when contingency can be used, requiring approval, and having to physically transfer the contingency funds into the line item focuses the project teams' attention on areas of cost overruns allowing the root cause assessment analysis and adjustment to be performed by project team.

Finally, if there is a separate project contingency fund, the project team must also determine whether the contingency should be included within or outside the target cost. And, whether or not unspent contingency will be considered part of the incentive or returned to the owner. If project contingency is kept outside or above the target cost, all unspent contingency is the owners.[245] While some owners prefer this method, there is no real incentive for non-owner key participants not to deplete the project contingency. If the project contingency is included within the target cost, the key participants will generally share in any project contingency savings as part of their incentive. Sharing in unused project contingency is advantageous because it stimulates creative resolutions by the team rather than just using contingency to cover cost overruns. Also, if contingency is being utilized to consistently cover one team member's mistakes or bad behavior, attention is drawn and there is peer pressure from the other team members for correction of the behavior. If project contingency is included within the target cost, the project team should delete the contingency before making a comparison of the target cost to actual costs because unused contingency acts as a buffer for cost overruns and therefore can be a misleading indicator of whether or not the project is progressing as planned. This is especially critical if the project includes milestone distributions of profit.

Shared Risk/Reward -- Change Orders

Change orders are also treated differently on IPD projects for key participants. Under traditional methods of delivery, the contractor will typically be entitled to a change order for any mistakes or lack of detail in the design documents, constructability conflicts, conditions arising from field conditions, and schedule delays associated with changed conditions. Architects and designers are likewise entitled to additional services. On IPD projects, such events are absorbed by the key participants due to the transparency and collaborative culture of IPD.[246] Change order

conditions for key participants are generally limited to cost and schedule impacts related to owner elected changes, unforeseen and differing site conditions, post permit or governmental revisions, and force majeure events. Changes due to constructability issues and coordination are completely eliminated[247] It is business as usual for design consultants and subcontractors who have not placed profit at risk. Yet, despite this fact, change orders on IPD project are relatively non-existent other than owner elected scope changes. So even among non-risk/reward participants, change orders are rare. If a change occurs, the target cost (and schedule if there are time impacts) is adjusted and key participants are compensated all direct costs associated with the change but profit is withheld. Non participating design consultants and subcontractors are paid for the cost of work or services associated with the change plus agreed overhead and profit. The retained profit from key participants remains at risk until profit is either earned through milestone distributions or at the end of the project.

Risk Allocation

Risk allocation, for the most part includes waiver of liability, indemnification and insurance. Because each of the form agreements include a comparative fault indemnification standard, this section will only discuss liability waivers and insurance.

Risk Allocation -- Waiver of Liability

Although each of the available standard IPD form agreements differ slightly, they generally offer some form of waiver of liability. Both the AIA C-191 and Hanson Bridgett model include waiver of most claims. The current form of ConsensusDocs300 has a check the box approach and it offers either no waiver of liability or a safe harbor provision, which provides a waiver for joint decisions and willful default.[248] Other projects studied by the AIA California Counsel had either a limitation on total liability and a mutual waiver of consequential damages

or just a mutual waiver of consequential damages.[249] Generally, regardless of the form agreement, willful misconduct, performance issues such as warranty and construction defects, and third party claims for personal injury and property damage are not waived. Likewise, claims arising from owner non-payment are not waived.

Limiting liability makes sense where key participants are operating as a virtual organization with a shared risk/reward compensation structure based on the project outcome. By limiting liability among key participants, participating project team members are able to focus attention on solutions to problems that arise during design and construction rather than seeking someone to blame.[250] If certain claims are not waived, key participants who have solutions during design and construction are more likely to hold back good ideas. Limiting liability increases communication and encourages collaboration during the design process by eliminating the fear of claims. Eliminating fear fosters creativity and substantially reduces the chances of design errors and omissions and constructability issues. Because most mistakes, unknowns, inconsistencies and field conflicts are eliminated through the collaborative design process, contingencies are also significantly reduced and change orders are virtually eliminated. For these reasons, the chances for costly litigation are diminished.

Risk Allocation -- Insurance

Unfortunately, despite the trend towards using IPD, the insurance industry has not caught up.[251] In large part, this is due to the fact that liability insurance has traditionally been based on claims and fault.[252] Because IPD contracts blur design responsibility through collaborative design processes, and generally require waiver of certain liabilities, traditional insurance may not provide coverage for all claims. This is due, in part, to the fact that most design errors and omissions policies have exclusions for construction means and methods. Likewise, contractors'

errors and omission policies and commercial general liability policies generally exclude design liability.[253] Finally, because insurance underwriters base coverage on proven track records and clarity, most insurance companies are not yet willing to fully endorse IPD.[254] And, IPD is too new to have a "proven track record." That being said, as more IPD projects are completed the insurance industries' ability to assess the risk will improve because the current studies demonstrate that IPD reduces the risk of claims.[255] In the mean time, parties entering IPD Agreements are forced to either find a carrier that will offer a specialized wrap policy, which is project specific and can be very expensive, or piece together various traditional insurance policies.

Combining multiple policies based on the contract language is an available option and requires the following types of coverage.[256] Standard traditional commercial general liability coverage should be procured to provide insurance for third party claims arising from personal injury and property damage.[257] Builders risk coverage, which is also standard coverage, will cover the loss or damage to the project and cover certain risks under the agreement.[258] If the form of agreement only waives claims between the parties during design and construction, the parties can also procure rectification coverage to remedy problems that arise during construction without having a formal claim from a third party.[259] For example, if a project participant catches a design error in a structural beam that has not caused property damage or personal injury, the rectification policy could be used to cover costs associated with redesign, procurement, fabrication and installation of the new structural member. This coverage is not typically purchased for traditional contracts because traditional insurance usually will not pay out until there is an actual claim arising from damages or alleged damages. Standard errors and omissions coverage for liability arising from professional design services will be required to cover future

losses due to design errors that arise after construction is completed.[260] Whether conventional errors and omission coverage will cover claims depend on whether the architect and other professional engineers are the "responsible designer" for their respective discipline. Because errors and omissions coverage arises from the standard of care, the "responsible designer" would ensure the accuracy of the drawings or BIM.[261] Finally, all non participating subcontractors and consultants who do not have waiver of claims must be adequately insured.[262] These are the people that are outside the "circle" and therefore coverage and claims are pretty much business as usual.

In conclusion, insuring an IPD project may be challenging but it is not impossible. The form of the agreement is important because the contractual waivers impact the cost of insurance products and available coverage. Therefore, project owners and team members interested in IPD should seek counsel and provide the actual contract form to their insurance provider to determine what insurance products are available and economically feasible.

CONCLUSION

The impetus for change in the commercial construction industry is the rampant waste and inefficiencies that lie at the core of current prevalent methodologies. Decades of contradictory legal doctrines, which turn attempts at clarity in contract drafting into guesswork, have further entrenched adversarial attitudes and behaviors and fostered the division of project teams into silos. Continuing to play the same old game is too costly.

IPD is a revolutionary approach that addresses the manifest problems of the industry at all levels. IPD offers owners, contractors, and designers the best opportunity to effectively and efficiently design and construct high quality projects that offer sustainability and best value in the new millennium. Global warming and waste are no longer tolerated by society and statistics

demonstrate that the construction industry is currently one of the biggest offenders. New technology has opened the door to eliminate inefficiency in design through the use of BIM, and lean principles have taught project teams how to eliminate waste in the process of construction. Proper use of these tools demands a change in the way owner's contract with project teams. Although changing the way we traditionally design and construct projects may take time, IPD is the game changer and it represents the future of design and construction.

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[70]*Id.* at 3-4. Prior to 1964, construction productivity was keeping pace with manufacturing but since 1964 construction has continued to decline while manufacturing and other industries have continued to have increased productivity. The bureau of labor statistics measured a 275% gap by 2003.
[71]There are two basic types of contracts: transactional and relational. Transactional contracts are for goods and services while relational contracts create a pact between the parties and are

intended to foresee many possible outcomes while binding the parties to pursue the desired objective while maintaining their relationship. Design and construction contracts have traditionally been transactional contracts. Owen Matthews and Gregory A. Howell, "Integrating Project Delivery An Example of Relational Contracting," Lean Construction Journal 2005, Vol 2 #1 April 2005 at p. 60-61. (string cites omitted).

[72]Patrick J. O'Connor, Jr., "Integrated Project Delivery: Collaboration Through New Contract Forms," 2009 at p. 1.

[73]*Id.*

[74]"Integrated Project Delivery Case Studies," AIA California Council, January 2010 p. 10-52. Jonathan Cohen evaluated 6 projects that were delivered using IPD and the most remarkable statistic is that the only change orders on these projects were due to the owner adding scope. In other words, none of the change order arose out of the usual suspects -- lack of coordination between the various design disciplines or trades, misunderstanding of the intended scope, schedule delays, etc. And, all of these projects had under 500 RFIs, with the majority between 100 -300 and a large percentage of those RFIs only being used by the project team to document decisions.

[75]*Id* at 5-7.

[76]"Advocates of Lean construction techniques have identified at least four major systemic problems with the traditional contractual approach: (1) good ideas are held back; (2) contracting limits cooperation and innovation; (3) an inability to coordinate; and (4) pressure for local optimization at the expense of the project as a whole." *O'Connor* at p. 5 *citing* Owen Matthews and Gregory Howell, "Integrated Project Delivery: An Example of Relational Contracting," Lean Construction Journal, 2 (1) (2005).

[77]*Miller*, *supra* note 68 at 43.

[78]Roland Nikles, "Commentary: Integrated Project Delivery and The Cost Curve," Construction Advisory Report, Construction Claims Edition No. 6, Innovative Construction Risk Strategies For Lean Economic Times, December 2011.

[79]Chuck Thomsen, "Integrated Project Delivery: An Overview," p. 13.

[80]Most public agencies currently do not have authority to enter into IPD Agreements. However, public agencies with design build authority can benefit from the collaborative process through early engagement of key participants and the use of tools such as BIM and LEAN. David S. Gerhig and Lisa Dal Gallo, "Design-Build is Gaining Traction in the Public Sector," March 9, 2011.

[81]"Integrated Project Delivery Case Studies," AIA California Council, January 2010 p. 9 and "Integrated Project Delivery, A Working Definition," AIA California Counsel, McGraw-Hill Construction version 2, updated June 13, 2007 at p.2.

[82]Howard Ashcraft, "Negotiating An Integrated Project Delivery Agreement," The Construction Lawyer, Summer 2011 at 19.

[83]Randy Tuminello and Lisa Dal Gallo, "Every Marriage – and Project – Needs A Honeymoon," Seattle Daily Journal, May 25, 2011.

[84]*Gehrig and Dal Gallo*, *supra* note 80 at 3.

[85]*O'Connor*, at p. 7 *citing* Construction Industry Institute, "Potential for Construction Industry Improvements," Vol. I at 20 (Nov. 1990).

[86]Teresa Amabile, "How to Kill Creativity," Harv. Bus. Rev., Sept-Oct. 1998, at 77.

[87]"The greatest savings are achieved in getting the design right, and incorporating detailed efforts from the general contractor and key subcontractors during the design phase." Nikles and O'Donnell, *supra* note 78.
[88] "Integrated Project Delivery, A Working Definition," AIA California Counsel, McGraw-Hill Construction version 2, updated June 13, 2007 at 4.
[89]*Miller,* p. 83.*citing* figure 5.7 provided by Solidus, Construction industry Institute: Findings, National Project Delivery System Study.
[90]*See*, Standard forms of IPD Agreements AIA C-191, ConsensusDocs300, Hanson Bridgett IPD Model. *See*, also, Hanson Bridgett Comparison Spreadsheet at http://www.hansonbridgett.com/Practices-Industries/construction/ipd-bim.aspx
[91]*Id.*
[92]*Thomsen*, "Managing Integrated Project Delivery: Concepts and Contract Strategies," at p. 19.
[93]Target value design in an important IPD concept that includes(i) evaluating the constructability of the design throughout the design process, (ii) proactively evaluating the cost implications of design decisions and alternatives early and recommending more efficient or more economical approaches that are consistent with the project requirements; and (iii) providing repaid cost estimating throughout the design process to help ensure that the cost of construction will not exceed the owner's cost or project schedule requirements. This continued evaluation optimizes and informs the design as it progresses and avoids waste, lost opportunities, inefficiencies and schedule delays.
[94]*Thomsen*, "Managing Integrated Project Delivery: Concepts and Contract Strategies," at p. 19.
[95]See, Standard forms of IPD Agreements AIA C-191, ConsensusDocs300, Hanson Bridgett IPD Model.
[96]This depends on the form agreement selected. For example, the AIA C-191 also has a boxed in the compensation section that if checked, also placed the contractors' labor (or general conditions) at risk.
[97]Miller, *supra* note 68.
[98]*Id.*
[99]*Id.*
[100]*Id.*
[101]*See*, *Ashcraft*, *supra* note 82 at 21-22.
[102]David Hatem, "Design Responsibility in Integrated Project Delivery: Looking Back and Moving Forward," January 2008 at 5, 9, 11 and 15. "Many contractual approaches to risk allocation in design delegation operate under the assumption that applicable state public law allows design responsibility for distinct portion of permanent project work to be assigned, … or shared among multiple project participants provided that those participants are qualified and licensed to provide such a contribution to their respective portion of the permanent project design work…." However, few sates have directly addressed this issue.
[103]Restatement (Second) of Torts section 552.
[104]Colorado State House Bill 07-1342, An Act Concerning Authorization for Public Entities to Use Integrated Project Delivery Methods in Connection with Contracts for Public Projects.
[105]*See,* "Integrated Project Delivery Case Studies," AIA California Council, January 2010 at 22.
[106]*See*, "IPD Case Studies," AIA, AIA Minnesota, School of Architecture University of Minnesota, February, 2011 and "Integrated Project Delivery Case Studies," AIA California Council, January 2010.

[107]*Id.*
[108]John Strickland, "Competition and Collaboration Are Not Mutually Exclusive," Lean Construction Institute Journal 2010 at pg. 1.
[109]Integrated Project Delivery Case Studies, "AIA California Council, January 2010, p. 22.
[110]The American Institute of Architects and AIA California Counsel Announce Positive Results in Integrated Project Delivery Case Studies, Press Release, February 2, 2010.
[111]*See Thomsen, supra* note 79 at 10.
[112] See, generally, Thomsen, "Managing Project Delivery," at 11-14.
[113]*Id.*
[114]*Miller*, *supra* note 68 at pg. 251.
[115]*See,* "Integrated Project Delivery Case Studies," AIA California Council, January 2010, p.8.
[116]*Id.*at 13.
[117]*Id.* at 21.
[118]*Supra*, note 110.
[119]*See,* "Integrated Project Delivery Case Studies," AIA California Council, January 2010 at 8 and 22.
[120] Barbara White Bryson and Canan Yetmen, THE OWNER'S DILEMMA: DRIVING SUCCESS AND INNOVATION IN THE DESIGN AND CONSTRUCTION INDUSTRY 18 (2010).
[121] Chuck Thomsen, *Integrated Project Delivery: An Overview*, 13, *available at* http://charlesthomsen.com/essays/IPD%20summary.pdf; Barbara White Bryson and Canan Yetmen, THE OWNER'S DILEMMA: DRIVING SUCCESS AND INNOVATION IN THE DESIGN AND CONSTRUCTION INDUSTRY 20 (2010).
[122] Bryson et al, *supra* note 120.
[123] *Id.*
[124] Bryson et al, *supra* note 120.
[125] Kevin F. Peartree, *ConsensusDocs 300* CONSENSUS DOCS CONTRACT DOCUMENTS HANDBOOK Revised Edition § 4.12 (Wolters Kluwer 2012).
[126] *Id.*
[127] Chris Noble, *Friend of the Project – A New Paradigm for Construction Law Services in a "Partnered" Construction Industry,* 15 THE INTERNATIONAL CONSTRUCTION LAW REVIEW 78, 81 (January 1998).
[128] *See* Noble, *supra* note 127 at 81.
[129] Howard W. Ashcraft, Jr., *Negotiating an Integrated Project Delivery Agreement* 31 The CONSTRUCTION LAWYER 17, 17 (Summer 2011).
[130] *Id.* at 17
[131] *Id.*
[132] *Id.* at 18.
[133] *See* Ashcraft, supra note 129 at 17.
[134] *Id.*
[135] Joseph A. Cleves, *Why Lean Economic Times Call for Lean Construction*, January 29, 2010, *available at* http://www.martindale.com/construction-law/article_Dressman-Benzinger-LaVelle-psc_901478.htm.
[136] *See Noble, supra* note 127 at 83.
[137] *See Noble*, *supra* note 127 at 83.
[138] *See Cleves*, *supra* note 135.

[139] *Id.*
[140] Rex Miller, Dean Strombom, Mark Iammarino, and Bill Black, THE COMMERCIAL REAL ESTATE REVOLUTION: NINE TRANSFORMING KEYS TO LOWERING COSTS, CUTTING WASTE, AND DRIVING CHANGE IN A BROKEN INDUSTRY 106 (2009).
[141] BRUNER AND O'CONNOR ON CONSTRUCTION LAW §§ 6:18:40.
[142] BRUNER AND O'CONNOR ON CONSTRUCTION LAW §§ 6:18:40.
[143] Owen Matthews and Gregory A. Howell, *Integrated Project Delivery: An Example of Relational Contracting*, 2 Lean Construction Journal 46, 50 (April 2005).
[144] Chuck Thomsen, *Integrated Project Delivery: An Overview* 16, *available at* http://charlesthomsen.com/essays/IPD%20summary.pdf.
[145] *Id.*
[146] *See* Matthews et al., *supra* note 143 at 50. Matthews and Howell note that this may sometimes be difficult on public projects: "Public Owners may not be able to include people who are not government employees as voting members of a selection committee, but they can have them sit in on the process and offer opinions. In a collaborative environment that produces the same result.").
[147] Joseph A. Cleves, Jr. and Richard G. Meyer, *No-Fault Construction's Time Has Arrived*, 31 THE CONSTRUCTION LAWYER 6, 12 (Summer 2011).
[148] William A. Lichtig, *Understanding Target Value Design: A Practitioner's Guide to a Common Language, Fundamental Principles, and Basic Practices* 1 (2011).
[149] *Id.* at 1.
[150] *Id.*
[151] *Id.*
[152] *Id.*
[153] *Id.*
[154] William A. Lichtig, *Understanding Target Value Design: A Practitioner's Guide to a Common Language, Fundamental Principles, and Basic Practices* 1 (2011).
[155] *Id.*
[156] Chuck Thomsen, *Integrated Project Delivery: An Overview* 22, *available at* http://charlesthomsen.com/essays/IPD%20summary.pdf.
[157] Glenn Ballard, *The Lean Project Delivery System: An Update*, LEAN CONSTRUCTION JOURNAL 12-13 (2008), *available at http://www.leanconstruction.org/lcj/2008/LCJ_08_001.pdf.*
[158] Glen Ballard, *Target Value Design and Integrated Project Delivery*, Powerpoint Presentation January 27, 2010, http://www.leanconstruction.org.uk/tvd-ipd.
[159] William A. Lichtig, *A Bold Thinking Primer On Target Value Design: Including A Common Language Fundamental Principles, & Basic Practices in Consensus Doc 300,* 8 (2012).
[160] Durward K. Sobek II, Allen C. Ward, and Jeffrey K. Liker, *Toyota's Principles of Set-Based Concurretn Engineering* 40 SLOAN MANAGEMENT REVIEW 67, 73 (Winter 1999).
[161] *Id*. at 76.
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[163] *Id.*
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[165] *Id.*
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[168] *Id*; see also Enlign Consultants, *Choosing by Advantages*, http://www.enlignconsultants.com/ChoosingByAdvantages.htm.
[169] Hung V. Nguyen, Baris Lostuvali, and Iris D. Tommelein, *Decision Analysis Using Virtual First-Run Study of a Viscous Damping Wall System* 17th Annual Conference of the international Group for Lean Constuction 378.
[170] Hung V. Nguyen, Baris Lostuvali, and Iris D. Tommelein, *Decision Analysis Using Virtual First-Run Study of a Viscous Damping Wall System* 17th Annual Conference of the international Group for Lean Constuction 378.
[171] *Id.* at 378.
[172] *Id.* at 379.
[173] *Id.*
[174] *Id*.
[175] *Id.*
[176] BRUNER AND O'CONNOR ON CONSTRUCTION LAW §§ 6:18:40.
[177] ConsensusDOCS 300, Article 4 § 4.9.1 (2007).
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[179] *Id.*
[180] Barbara White Bryson and Canan Yetmen, THE OWNER'S DILEMMA: DRIVING SUCCESS AND INNOVATION IN THE DESIGN AND CONSTRUCTION INDUSTRY 43 (2010).
[181] Barbara White Bryson and Canan Yetmen, THE OWNER'S DILEMMA: DRIVING SUCCESS AND INNOVATION IN THE DESIGN AND CONSTRUCTION INDUSTRY 60-61 (2010).
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[186] Rex Miller, Dean Strombom, Mark Iammarino, and Bill Black, THE COMMERCIAL REAL ESTATE REVOLUTION: NINE TRANSFORMING KEYS TO LOWERING COSTS, CUTTING WASTE, AND DRIVING CHANGE IN A BROKEN INDUSTRY 125-26 (2009).
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[217] Chuck Thomsen, *Integrated Project Delivery: An Overview*, 17, *available at* http://charlesthomsen.com/essays/IPD%20summary.pdf

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[219] *Id.*

[220] Randy Tuminello and Lisa Dal Gallo, *Every Marriage Needs a Honeymoon,* DAILY JOURNAL OF COMMERCE (May 25, 2011).

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[222]*See*, *Ashcraft*, supra note 82 at 25.

[223]Richard Morwood, Deborah Scott, and Ian Pitcher, "Alliancing, A Participant's Guide, AECOM, 33.

[224]*O'Connor*, supra note 72 at 6.

[225]*Id.*

[226]Both the AIA C-191 and the Hanson Bridgett model validates the targets before completion of either the conceptual design phase or criteria design phase is completed. The current published version of ConsensusDocs300 does not set the target until after the construction documents are completed. *See*, *supra* note 90.

[227]*See* Patrick O'Connor, Jr., "Integrated Project Delivery, Collaboration Through New Contract Forms" at 15-16 and *Morwood*, *supra note* 223 at 33-34.

[228]Ashcraft, *supra* note 81 at 23-24.

[229]*Id.*

[230] For a comparison regarding how the variance form agreements treat governing and decision making *see*, Hanson Bridgett Comparison Spreadsheet at http://www.hansonbridgett.com/Practices-Industries/construction/ipd-bim.aspx

[231]*See*, Standard forms of IPD Agreements AIA C-191, ConsensusDocs300, Hanson Bridgett IPD Model.

[232]*See*, *supra* note 91.

[233]*Thomsen, supra note* 92 at 19-20.

[234]*Morwood*, supra note 223 at 139.

[235]*Id.*

[236]*Thomsen, supra* note 79 at 22. *See, also Amabile*, *supra* note 87.

[237]*Supra*, note 67. Designers and contractors are not reimbursed on the same basis because profitability and costs are accounted for differently. So, it is important to define cost reimbursable services for both the contractor and the designer. For a detailed discussion on this subject, *see* Ashcraft supra note 81 at p. 31-32.

[238]*Id.*
[239]Thomsen, "Managing Integrated Project Delivery, *supra* note 79 at 21-22.
[240]See, Ashcraft, *supra* note 81 at 29. Under traditional projects because every one carries a separate contingency, there is typically too much cushion in the cost of the project.
[241]Although this is generally true the various form agreements differ on risk and incentives. See, Hanson Bridgett Comparison Spreadsheet at http://www.hansonbridgett.com/Practices-Industries/construction/ipd-bim.aspx.
[242]*Id.*
[243]Projects that don't include a separate fund for contingency still account for the risk of setting the target early by including a buffer within the target cost. See, Ashcraft *supra* note 81 at pgs. 29-31 for more detailed explanation about contingencies.
[244]*See*, Thomsen, "Managing Integrated Project Delivery, supra note 79 at 21-22. *See*, also Ashcraft *supra* 82 at 29-31 and Hanson Bridgett Comparison Spreadsheet at http://www.hansonbridgett.com/Practices-Industries/construction/ipd-bim.aspx.
[245]Having a project contingency completely outside of the target can cause an unintended result because contractors and designers will pad the target cost to cover potential overruns because they will not have any control over when or if project contingency can be used. Ashcraft, *supra* note 81 at 31.
[246]Strickland, *supra* note 109 at pg. 82.
[247]See, AIA California Counsel Case Studies, *supra* note 43.
[248]See, Hanson Bridgett Comparison Spreadsheet at http://www.hansonbridgett.com/Practices-Industries/construction/ipd-bim.aspx. ConsensusDocs300 is in the process of updating their current form agreement.
[249]*Supra* note 67.See, AIA California Counsel Case Studies *supra* note 108 at 5, 12, 19, 33, 40 and 47.
[250]See, "Integrated Project Delivery" at www.constructech.com/news/articles/article.aspx?article__id=7619.
[251]Miller, *supra* note 67 at p. 233.
[252]Amanda Fish, "Integrated Project Delivery: The Obstacles of Implementation," Kansas State University, Manhattan, Kansas, 2011 at 29.
[253]Contractor errors and omissions policies will generally provide some coverage during preconstruction services but not as broad as coverage available to design professionals for design related errors. Andrejko, Martin, *Design [realized] A LearnVirtual Education Program, "Legal Aspects of IPD and VDC*," July 22, 2011.
[254]Miller, *supra* note 67 at 234.
[255]See, AIA California Counsel Case Studies *supra* note 43 and Miller, *supra* note 67 at 233 *quoting* Will Lichtig with respect to Sutter Heath, "[t]here have been no claims to date."
[256]Miller, *supra* note 67 at 234 and Fish, *supra* note 83 at 31.
[257]Fish, *supra* note 83 at 31 citing personal communications with D. Griggs of Willis on January 7, 2011.
[258]*Id.*
[259] *Id.*
[260] *Id.*
[261] See, Miller *supra* note 67 at p. 233 and Hatem, *supra* note 102 at p. 17.
[262]Fish, *supra* note 83 at p. 31.