Integrated Project Delivery An Example Of Relational Contracting

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Abstract

Maximizing value and minimizing waste at the project level is difficult when the contractual structure inhibits coordination, stifles cooperation and innovation, and rewards individual contractors for both reserving good ideas, and optimizing their performance at the expense of others. This paper describes an innovative contractual structure that aligns the interests of all contractors with the objectives of the lean delivery system. The approach, requirements for implementation, and results obtained will be described and a brief reflection on theory offered.

Key Words

Contract, Lean Delivery, Project Organization, Primary Team Member, Pact, Relational Contracting, formula, Integrated Project Delivery™

Introduction

Westbrook is a 55-year-old mechanical contractor located in Orlando Florida. Chilled water systems have been the heart of Westbrook's construction business over the years. Westbrook also offers air-conditioning, plumbing and electrical services to residential and commercial Clients.

Westbrook has participated in a number of design build projects, sometimes as a subcontractor and sometimes as a prime contractor. They could not help but notice that when they worked as a subcontractor, promises of cooperation and teamwork never seemed to reach their potential, and the results often fell short of the team member's expectations. This happened even when they worked with high-caliber and well-intentioned General Contractors (GCs) and for clients who had bought into, and expected to receive the benefits of a design/build cooperative effort. Even as the prime contractor they were unable to sustain a spirit of teamwork through the end of the project. The instinct among all parties for self interest was too keen especially in instances where individual profit potential might have eroded somewhat throughout the project.

Maximizing value and minimizing waste at the project level is difficult when the contractual structure inhibits coordination, stifles cooperation and innovation, and rewards individual contractors for both reserving good ideas, and optimizing their performance at the expense of others. What was wrong? What was standing in the way of their being able to work as a true team; one able to work together to maximize value while minimizing waste throughout the process?

In pursuit of answers to these questions, they have been working over the past five years with a consortium of design professionals and construction practioners to determine if there might not be a better way to organize themselves to deliver a project than the models that are common today. For four years now they have been

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meeting for breakfast twice a month to further this pursuit and in the process have built relationships that form the basis for Relational Contracting.

Four major systemic problems with the traditional contractual approach

Problem 1: Good ideas are held back

The Mechanical, Electrical and Plumbing (MEP) contractors and other major trades were generally brought into the process by the GC once the drawings were at the Design Development (DD) stage in order to establish a competitive price. Even though the trades were frequently consulted through the design process, there was no real commitment to or from them because a number of different companies representing the same trades were involved. As a result, each of the trade contractors saved their best ideas in hopes of gaining a competitive edge during the "bidding process." Many times these ideas were very good. Time and the opportunity for innovation among the trades were lost as the design team attempted to revamp their designs to accommodate the best of these late arriving ideas.

Problem 2: Contracting limits cooperation and innovation

A systemic, but less obvious problem was the system of subcontracts that link the trades and form the framework for the relationships on the project. The prime contractor held the contract for every consultant and subcontractor. Long and tedious subcontract agreements attempted to spell out in great detail exactly what each subcontractor was to provide (and by deduction exactly what he was not to provide), rules for compensation, and sometimes useful, if unrealistic, information about when work was to be performed.

The 20 to 30 page subcontracts mostly dealt with remedies and penalties for noncompliance. These contracts made it difficult to innovate across trade boundaries even though the work itself was frequently interdependent. (*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.*) Of course, horse trading always takes place anyway, but for "equal" horses. Trading a small increase in effort by one contractor for a big reduction for another, a horse for a pony was almost impossible.

Problem 3: Inability to coordinate

While some projects held "partnering" sessions, there was no formal effort to link the planning systems of the various subcontractors, or to form any mutual commitments or expectations amongst them. Project organizations looked like 20 or more rubber balls, representing subcontractors, all tethered to a single point by long elastic bands. When the connection point jiggled, the balls jiggled in all random directions colliding with each other in unusual and unexpected ways.

Problem 4: The Pressure for local optimization

Each subcontractor fights to optimize his performance because no one else will take care of him. The subcontract agreement and the inability to coordinate drive subcontractors to defend their turf at the expense of both the client and other subcontractors. Remember that everyone on the project other than the prime contractor is a subcontractor. These subcontractors frequently, in their life outside of the subcontract, may be generous, caring and professional. However, since right or wrong is defined by the subcontract, they, more often than not, take on a very legalistic and litigious stance becoming an army where the rules of engagement are "Every man for himself."

Approaching the solution

Could they organize themselves to function as a single company with unified goals and objectives? Could independent design firms and construction companies actually find a way to integrate project delivery?" To use the earlier analogy, was there a way to take all of these rubber balls and connect each to the other so that they could all move in the same direction. A new set of questions suggested the new approach:

> What if every member of the design build team shared completely the responsibility for the entire project and set about correcting deficiencies or problems wherever they popped up without regard to who caused the problem or who is going to pay for it? What if all of the construction members were friends looking out for the interest of the Client and each other, applauding the successes of each other and sharing the pain of each others failures? What if all of the design and construction entities on a project could be organized in such a way that they all functioned as if they truly were a single company with a single goal and with no competition amongst themselves for profit or recognition?

They were not naïve. They knew that aligning interests, objectives and practices, even in a single business, is not easy or automatic; however, the advantages looked real, and they had powerful ties and long standing relationships with the companies that could make it happen. A new process which they called Integrated Project Delivery[3] (IPD) was taking shape. Primary Team Members would include the Architect, key technical consultants as well as a general contractor and key subcontractors.

There are two types of contracts, transactional and relational.

- transactional where exchanges are made for goods and services,
- relational contracts where the relationship "takes on the properties of 'a mini-society with a vast array of norms beyond those centered on the exchange and its immediate processes.

Without benefit of these definitions in the beginning, the Team was never the less creating a network of commitment built around relational contracts.

Two Principles Govern Their Team Relationship

With the IPD process, two principles define the relationships between the Team Member that holds the prime contract with the client and between that Team Member and the other Primary Team Members (PTM).

- With IPD, all PTMs are responsible for all provisions of the prime contract with the Client.
- Primary Team Members share the risk and profit for total project performance.

The Prime Contract

A single contract binds the IPD Team to the client. The prime contract may be any one of a number of standard forms that are available. It spells out the commercial terms and defines the scope, schedule and cost of the project. One entity signs the prime contract.

[3] Integrated Project Delivery (IPD) is a registered business mark with the US PTO

The Team Member Agreement

Each Primary Team Member (PTM), including the one who holds the prime contract, then enters into a single "pact" with the other PTMs. They each jointly and severally bind themselves to each other and to the fulfillment of all of the terms, conditions and requirements of the prime contract. Further, PTMs agree in this "pact" to share the cost on the project and to distribute profit based upon a formula that rewards the PTMs in accordance with their participation on the project. The entity that signed the Prime Contract is simply a PTM and receives profit based on the same formula and in the same manner as the other PTMs.

Key Pact provisions:

- The PTMs each agree to be bound together accepting full responsibility for all of the terms and conditions of the prime contract, sharing together in the cost and profit in accordance with a pre-established formula. Each member is reimbursed for all verifiable direct costs that he incurs. Profit is calculated at the project level at the end of the project and divided based on the formula.
- Each of the PTMs provides a certificate of insurance in the form and amounts as indicated in the prime contract.
- Each PTM agrees to open their books pertaining to this project to the other PTMs and to the Client.

Team members are united together under the prime contract. The Team has one price, and that is the price to the Client. The Team has one scope, and that is the project scope as defined in the prime contract. There is no accounting among PTMs for who is over or who is under budget. *Holding everyone solely accountable for their own scope and price would drive the project back down the road to local optimization and inhibit innovation. IPD was formed to avoid these problems.*

Through their association with the Lean Construction Institute, they have learned that their intuitive and practical approach rests on a principle of production system design; *local optimization leads to sub-optimal project performance*. Prior to forming IPD, they were working in a system that guaranteed that each participant would vigorously work to optimize his own part of the project without regard to the effect on the other parties or the over all project. Typical subcontracts confer upon the subcontractors an autonomy that always works to the detriment of the project. Instead of becoming a team working in harmony toward a common goal, they often became separate warring factions. The structure of IPD also supports innovation and improvement within each craft and between them. As a result, they may shift work and cost across traditional boundaries to reduce total expenditures and to improve total project performance.

To support this IPD process each PTM agrees to immediately disclose any condition (internal or external) that might threaten their ability to fully perform on the project. The pact automatically expires with the final fulfillment of the terms and conditions of the prime contract and the final distribution of profits to the pact members after fulfillment of all warranty obligations.

"One for all and all for the project" sounds great but there is an unavoidable implication: If one PTM makes a mistake, each PTM will pay for it. Some find this hard to accept. Cost reductions anywhere are shared among those in the Pact and with the Client. An overrun on the project will reduce the gross profit available for distribution. Under this pact, they came to think of themselves as mountain climbers roped together. If one falters the others pick up the slack; they don't cut him loose. They are not involved in a search for the guilty. They are involved in applying all of their talents to getting the job done. They recognize that everyone makes mistakes and are 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; Team Members who are trustworthy.

The Impact of IPD on Project Delivery

On the design process

There is no incentive for team members to hold back ideas. This effect is very powerful in reducing project costs and enhancing the "value engineering" process. Value engineering takes place at the beginning of the project and throughout the project. It is "built in" as it should be and not "tacked on" at the last minute as a cost saving or profit enhancement tactic. It is amazing how quickly effective solutions can be devised when there is no concern over which entity will pay for them. This creativity always benefits the client, however, when the GMP is set too late in the process the IPD Team Members are limited in their participation in the savings brought about through this creativity.

Cooperation, Innovation and Coordination

All of the primary team members wear the same hardhats on the job with the same logo. They all work under one general superintendent who has total authority from the Primary Team Members to direct the project to achieve the most efficient and lowest overall cost delivery. Field problems are quickly resolved based on the lowest perceived overall cost and least impact principle.

The Team decides what positions such as Project Executive, Director of Design Services, Director of Construction Services, Project Manager, Project Superintendent, Project Accountant, Manager of Information Technology, and Systems Manager need to be filled for the particular project at hand. These positions are filled with the best available person from any of the Primary Team Members. They become direct job cost and the company from which they came is reimbursed for the time they spend on the project.

Each person assigned a project leadership position works for the Team, is paid by the Team, and is responsible to the Team. In this way, their allegiance is to the Team and the project and not to their own sponsoring company. All have the traditional authority and responsibilities of the positions that they are filling.

The principals of the companies developing the IPD process meet two mornings a month for breakfast and fellowship. They discuss the IPD concept in order to refine and further develop it. Attendance at these meetings, and the involvement and "buy in" of the top stakeholders is crucial to success of the process. These meetings underpin the broader network of relationships that hold the projects together.

Each month the PTMs are reimbursed based upon their actual verifiable direct job cost. At the end of the project, gross profits are distributed to each PTM in accordance with their incurred direct cost on the project. A mutually agreed upon formula is used for determining the actual amount of gross to be distributed to each team member. The formula is weighted more highly toward direct labor than subcontracts and more highly toward material purchases than major equipment purchases. The intent is to recognize the varying overhead associated with each type of job cost.

Governing the relationship

The best governance is self-governance. With IPD self-governance among PTMs is facilitated and encouraged by the structure of the IPD process. From the Client's viewpoint the IPD central accounting and monthly review of each of the PTMs billing packages is a form of governance. Since the collective interest of the PTMs is aligned with that of the Client, he can have confidence in this review process. The open book, and shared savings features are both means of governance. Governance of the project execution is vested in the people who perform the traditional roles of Project Executive, Project Manager, Superintendent, Director of Design Services, etc. These people have traditional responsibilities and authority on the project. Dispute resolution would be handled by discussion and agreement between the PTMs. They have found that most project disputes typically are rooted in the financial interests of the disputing parties. Since they have a common financial interest, disputes of the typical type do not seem to be a problem. In any case through the first four projects, there have been no disputes.

Examples of success

They have completed four successful IPD projects and have been awarded a five-year continuing services contract for design build work for Orlando Utilities Commission, an enthusiastic Client from a prior IPD project. Rather than describe the projects that have been completed, it may be more helpful to offer some examples of the IPD process in action. Some of these examples may seem trivial in size but they are offered as best illustrating the effects IPD. A "Case Study" is also included for the OUC North Chiller Plant which is the most current IPD project.

The Last Planner™: An extensive dormitory renovation had to be done over the summer. The Team knew that an exhaustive approach to planning and organizing the work would be required because the renovation of an old building can be very complex, a large number of trades would be involved, and the completion time was short. They committed to an aggressive use of the Last Planner™. Their integrated approach to the project enabled us to optimize implementation of the Last Planner™ system. Instead of a GC having to herd a group of independent contractors and design professionals, each with their own agendas, toward a project completion date, they were able to develop a coherent approach and work as a unit. No one wanted to let the Team or themselves down. They each shared the full responsibility for the total project and this meant keeping on schedule. Occasionally, despite their best efforts, work fell behind. In other situations it cost more than expected to hold to the schedule. These situations did not present an insurmountable obstacle as they were sharing all cost and the burden of overtime, etc. The cost of keeping up did not fall on the party working to catch up, but was shared by the total Team through their shared cost arrangement. The project finished two weeks ahead of schedule while other similar projects on campus ran over their schedules.

Shared Manpower: Their electrical team member made use of workers from other trades as needed to assist in pulling wire and other chores. This availability of ready casual labor enabled him to complete the job with fewer workers assigned to the project than otherwise would have been required. This type of impromptu sharing of manpower occurred throughout the project and between all trades.

Problem Resolution: In the course of construction, a large conduit bank masked a portion of a new roof hatch. The IPD superintendent agreed with the Client's representative to install a second hatch in another section of the plant. This solution gave the Client a full hatch and a second hatch with somewhat restricted access. There was no need to price anything or to get any kind of approval. All trades simply did what was necessary to quickly and efficiently make this change.

Handling Major Changes to the Work: The intention was to match new cooling towers to existing towers. After the towers were released the manufacturer notified them the model had been changed to one that was taller and had a different footprint. The

Client opted to go with a different manufacturer. The IPD Team was able to stop the order for the original towers without penalty, select the new towers that were suitable, redesign the support steel and modify the piping and electrical to accommodate the new towers. Because of the flexibility of the IPD process and integrated design team, they were able to make this change without requiring an increase to the GMP or any extension of the project schedule. They believe that the magnitude and timing of this major change would have scuttled the schedule and budget of a traditionally run project.

Work Across Traditional Boundaries: Their electrical Team Member received a favorable quote for variable frequency drives as a part of the equipment package. These drives were originally intended to be provided in the mechanical package. They simply agreed on the spot for the electrical to buy the drives as a part of his package as that made the best sense for the project. The project cost was reduced and the increased profit shared by all including the Owner.

Recovering From Oversights: When they discovered a missing elevation for an exterior light, the superintendent called the architect and explained the problem. Within 30 minutes a sketch was faxed showing the mounting elevation. No RFI was required and there was no impact on the project because of this omission. It was their integrated approach that made it possible for the field superintendent to call the project architect direct and effect this fast resolution.

Avoiding Redundant Effort and Expense: Multiple trades required core drilling, fire protection, electrical and pipe chases, and clean up. The trade that had the most in each category, or for whom the work was most convenient, provided this service for all trades. There was no need to record or charge back any cost. This resulted in efficiency and lowered overall project cost.

Enhancements to Job Site Safety: The IPD Team determined to run accident free projects. The superintendent has the authority to direct the activities of all workers on the projects. This ensures uniform compliance with safety procedures. The cost of safety compliance falls to the entire team and not just to the involved subcontractor, so there has been no resistance to following these sometimes costly safety procedures. There has not been a single accident on any of the four IPD projects completed to date. All shared the costs and the benefits of this achievement.

Spending More to Save More: Normally, the Design Engineer prepares design drawings from which the contractor prepares shop drawings for fabrication. Major changes in the layout can arise during this translation. In the case of the OUC South project, the engineer sent his designer to the mechanical contractor's office. The designer worked there with an experienced mechanical piping expert to lay out the equipment room in detail using object based 3-D. This increased engineering cost at first, but saved money downstream. The mechanical contractor did not have to produce shop drawings because the engineering drawings were sufficient for the fabrication shop. The pipe was fabricated and installed exactly as designed.

Sharing Rental Equipment: Rental equipment and other resources were shared by the Team. This resulted in optimum usage of the equipment. There was no need to track who used the equipment or for how long. The Team Members shared all cost.

OUC North Plant – A Case Study

Westbrook and the IPD Team was awarded a contract for the design and construction of a central chilled water plant in downtown Orlando that would have the utility infrastructure to support the ability to deliver 12,000 tons of chilled water to the chilled water customers of Orlando Utilities Commission in the downtown area. Initially the plant would have an installed capacity of 3,000 tons that could be easily and quickly expanded as needed to the ultimate build out of 12,000 tons.

This contract was awarded to the Westbrook/IPD team pursuant to their having been selected as one of two design-build firms that would deliver chilled water plants such as this to OUC over a five year period.

The plant stands today as a testament to the benefits of Relational Contracting as employed by the Westbrook/IPD Team.

Schedule Performance

- Contract Date 12/30/03
- DD Complete 1/26/04
- Demolition Complete 1/7/04
- Permit Issued 4/14/04
- Work Begins on Site 5/4/04
- Plant Ready to Operate 7/28/04

This performance would not have been possible without the Team commitment and the heavy reliance on the relationships amongst the Team Members to ensure that commitments were kept. Once everyone got in the spirit of accelerating the project, it seemed that anything was possible.

Budget Performance

- GMP $6,000,000
- Final Price $5,400,000
- IPD savings against GMP $600,000

The GMP was set after the DD documents were complete and reflected the Team's best value engineering which was applied from the first day. These savings of approximately 10% were realized in the construction phase of the project. No one ever dreamed such savings were possible in the actual construction phase. The IPD advantages mentioned above contributed to these savings. Beyond that, they have discussed below some of the job specific events that contributed to these extraordinary savings in both time and direct job cost.

Coordinate Design With Schedule: Many different column cross sections will satisfy a design requirement. By involving the steel erector, they were able to use the mill schedule to inform the selection of columns that would be available when needed. This type of coordination would have been next to impossible under traditional delivery systems.

Function Over Form in Design: The placement of the columns can be arbitrary to some degree. The mechanical contractor modeled the equipment room using the 3D objects for the actual equipment and suggested a column spacing that worked best even to the point of offsetting one of the columns 18" from its predicted location. From a structural viewpoint this worked as well as any other layout and it was adopted. The structural engineer verified the adequacy of the design to accommodate this change. Rarely, if ever, would a mechanical contractor be involved in the determination of the column grid and certainly no other system would afford the opportunity to offset a main column to accommodate the mechanical work.

Early Fundamental Design Decisions Support Construction Details: When the Team began to seriously consider placing all utilities under the slab the design of the column footers was the subject of a rigorous Team meeting which considered how high the tops of the pads could be and still allow utilities that had to pass over them to turn up properly to the finished floor. Several vertical offsets were planned in the perimeter foundation wall to allow passage of utilities without sleeving or cutting that wall.

Figure 1. Column Footers [4]

Figure 2. Step downs in the wall footer allowed for proper utilities crossing – Team decision

[4] The top of the column footers was set 30" below top of grade to allow room for all utilities to turn up and penetrate the finished floor vertically. Setting the elevation for the top of the footers was a Team decision determined in a weekly Team design meeting.

Figure 3. Installing under-slab utilities[5]

GC Goes the Extra Mile: The general contractor backfilled and compacted to an elevation 30" below grade and the site was turned over to the Team Member responsible for the electrical construction who laid 1 mile of conduit without the need for any excavation. Seeing the entire grid laid out "above ground", as it was, afforded the opportunity for accurate layout and verification. The GC then came back in and backfilled to grade using fire hoses to wash fine aggregate in and around the conduits. This innovation saved more than three weeks off of the schedule and many thousands of dollars. Consider that the conduit was originally intended to be run overhead in galvanized pipe. This implied extensive hangers and considerably increased lengths as the pipe would have had to run parallel to column lines and would have required 20' drops at each end of each run.

[5] An initial perceived obstacle to laying out all of the utilities exposed was how backfill could be done without crushing and moving the conduits. The Team solution was to begin backfill at one point using fine sand, washing it in with fire hoses, compacting and testing as they fanned the backfill operation over the entire building. It worked flawlessly. Here you can see the backfill process beginning at the top of the picture. An added benefit was that each run was totally visible and could be easily checked for correctness.

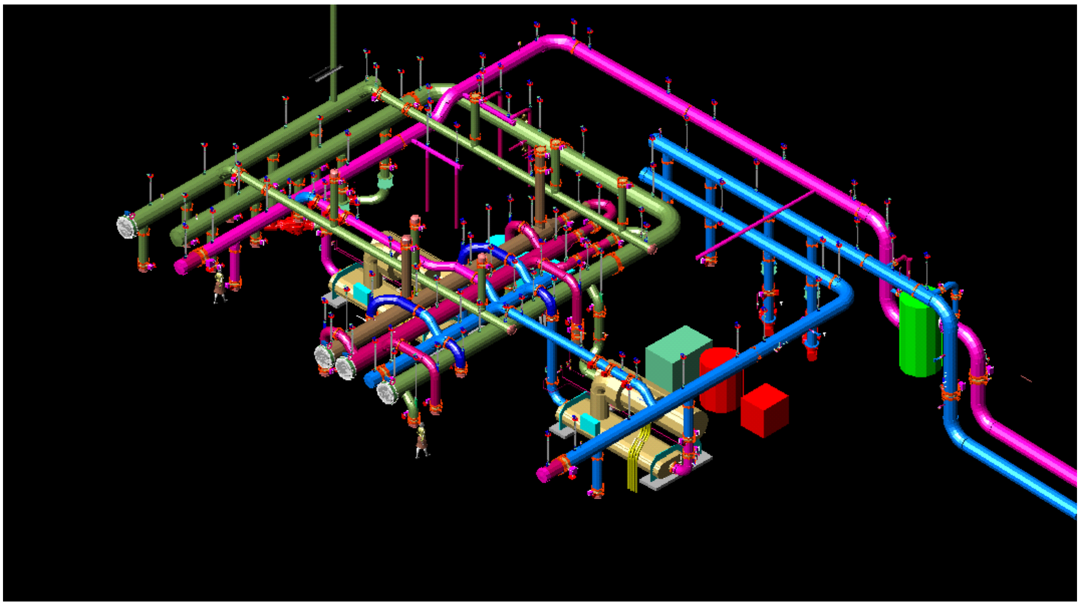

Figure 4. CADD drawing of hanger assembly.

Figure 4 illustrates a CADD drawing prepared by Westbrook, in which we can see each hanger assembly. The main headers are 30" and 24" pipe. Everything shown was prefabricated off site and delivered "just in time".

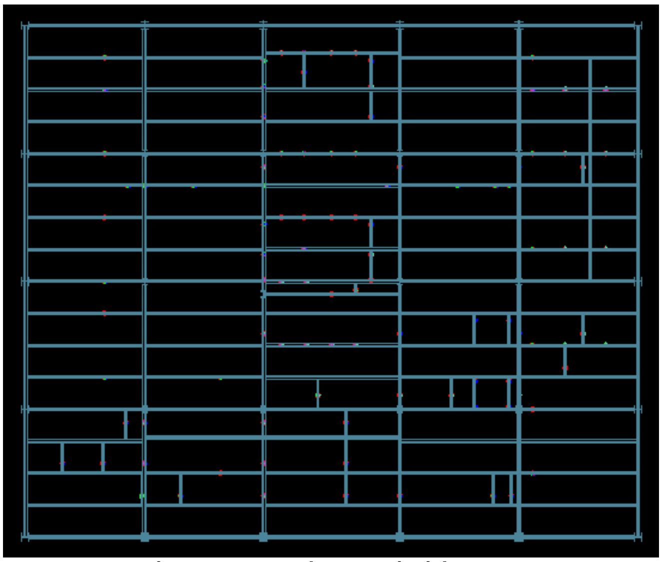

Figure 5. Column gird layout

Figure 5 shows a column grid layout as determined by the mechanical design and where the structural engineer designed to suit. Here we see that one column near the center was offset to accommodate connections to one chiller. The points represent pipe hanger locations placed by mechanical contractor/design team. Where no steel existed, the structural engineer added beams to carry the pipe hangers.

Figure 6. Structural steel beginning to take shape.

As Figure 6 shows, the steel has arrived and is being erected. Note the weldments to receive the pipe hanger assemblies. This steel with the weldments was prefabricated in another state. Note the date on the picture.

Figure 7. Hanger assemblies installed.

By the end of the next day, 5/19/04 (see Figure 7), every hanger assembly was installed and still no pipe had been delivered to the site. The hanger assemblies were prefabricated to exact lengths. No measuring or layout was required to install them. All that was required was putting assembly A on point A and installing a bolt.

Figure 8. Pipe hoisting and installation using special crane.

In Figure 8, we see pipe being hoisted into place using a crane rigged through the steel. The steel erector held off the decking to facilitate this time saving and safe operation; another example of a contractor spending a nickel to save the project a dollar. This worked because we never had to consider who was spending the nickel or who was saving the dollar. All pipe was installed, two 1,500 ton chillers set and connected in 10 calendar days. Everything fit perfectly. Finally, Figur 9 shows the final plant - a showplace of quality and efficiency of design and execution.

Figure 9. Completed plant.

PROBLEMS ENCOUNTERED

IPD has encountered and resolved a number of challenges concerning such issues as insurance, bonding, job costing, job accounting, the formula for distributing gross, the form of the internal "pact", project leadership, consolidated budgeting, warranty, communications, etc. These have all been, for the most part, expected issues that simply needed to be addressed and solved. Even so, over the past four years there have been other problems worth noting.

The Uncommitted Member: IPD team members were carefully selected and had significant history working together on design-build projects and design-bid-build projects. Nonetheless, they still had a team member who wasn't suitable for the IPD process. The managing partner and majority shareholder of that member of the Team had very little personal involvement with IPD. As a result, the representative of that company experienced significant internal pressure to revert to the old self-preservation concepts. At the conclusion of the project, the member withdrew from the IPD Team through mutual consent.

Old Habits Die Hard: On an early IPD project the General Contractor assigned a skilled and respected project manager who had been working in the industry for more than 20 years. While the President and Executive Vice President of the GC partner were fully on board with IPD and attended the bi-monthly meetings, the assigned project manager just could not get his mind around the concept. He often seemed offended that he was not being asked or allowed to function in his typical role as PM. This was a man that the Team Members had enjoyed working with successfully on other more traditionally run projects, but he could not work effectively in the IPD environment.

These cases show that not everyone is suited to work in this environment. Those assigned to work on IPD projects must be carefully selected and prepared for the new rules.

Continuing Concerns - areas for development

Setting the price: With IPD, the value engineering process is so strong and effective that by the time they reach the design-development stage, everyone's best ideas are incorporated. The budget produced at that time, therefore, reflects all of the Team's creativity and experience. Value engineering, experienced as cost saving ideas submitted late in the design process, does not occur as the construction practitioners and design professionals work together from the start to ensure a cost efficient design. The Client receives the full benefit of this process and the likelihood of contractor initiated change orders is greatly reduced. It seems clear that this offers powerful benefits for the Client but the IPD Team is uncertain at this point how these benefits can be quantified and how they can be compensated for the true value that the IPD process adds to the project. As it stands today, IPD members benefit only from cost savings after the budget is developed. These result from the considerable field efficiencies inherent in the IPD process and the application of Lean Construction Principles.

Managing Risk: Depending on the size or complexity of the project, a joint risk assessment committee could review the project monthly focusing on such areas as the team's performance, any indications of a team member problem, change orders and claims initiatives, payment history of the Client and any trends that may need correcting.

Working with Non IPD members, expanding the team

It is fairly easy to introduce a specialty contractor into a project as a member of the team either by bringing him in early and negotiating a price at the appropriate time or by actually inviting them to become a full member of the team for a particular project sharing cost with the rest of the Team. Circumstances would determine which method might be employed.

They pursued a major project where their usual engineering partner was unable to participate. They agreed to invite another engineering firm to participate with them as a full Team Member for that particular project. The substitute firm readily understood the IPD process and was an eager and capable participant in the preliminary design and pricing. IPD was not the successful bidder for this design-build project, but the experience with the "plug in" Team Member was successful.

Reflection on theory (Greg Howell)

IPD developed as the participants applied common sense drawn from their experience; No particular theoretical consideration shaped the effort. Even so, reflection on organizational theory, particularly those rooted in transactional cost analysis, helps explain why the approach is so effective and may offer guidance for future development. This note proceeds by first considering two types of cost that arise in the course of doing work in an organization. This is followed by a discussion of the way managing these types of cost shape organizations and contracts. IPD is located in the resulting framework and suggestions offered.

Types of costs

The cost associated with doing work in organizations can be divided between the cost expended producing goods and services – the production cost, and transactional costs – the cost of "doing the deal", associated with the movement of those goods and services across organizational or market boundaries (Williamson 1979). In construction, transaction costs include among others, the cost of preparing and negotiating contracts, insuring performance and settling disputes. Efforts such as partnering are aimed at reducing the transaction costs associated with disputes. Constructability and value engineering efforts are mostly aimed at reducing production costs. Examples of efforts that reduce both costs can be found in this paper under the heading "Examples of Success." For example, IPD demonstrates how they reduced transaction costs in "Recovering from Oversights". An example of reduced production costs is found in "Sharing Rental Equipment". (Interested readers are advised to read closely the works of Williamson, Ouchi, Gunnarson & Levitt, and Macniel included in the references section of this paper.)

Types of contracts

Williamson and Macneil discuss two broad classes of contracts; transactional where exchanges are made for goods and services, and relational contracts where the relationship "takes on the properties of 'a mini-society with a vast array of norms beyond those centered on the exchange and its immediate processes.'" (Williamson 1979, pg 238) Relational contracts arise as transactions become less discrete, and the transaction costs increase due to the duration, uncertainty and complexity of the matter at hand.

Transactional contracts foresee a single outcome; the value of a single future outcome is made present and both parties agree to the exchange – money for the project (Williamson 1979). The dispute record of the construction industry proves that drafting transactional contracts for the delivery of complex and uncertain construction that foresee all contingencies, allocate all risks, limit opportunistic behavior and still motivate highest global efficiency is impossible.

Macneil, cited extensively by Williamson, proposes relational contracts to manage in this situation (Macneil 1974). Relational contracts foresee many possible outcomes – for richer, for poorer, in sickness and health, now and forever – and bind the parties to maintain their relationship even as they pursue other objectives[3].

IPD Contract and Organization

IPD employs both transactional and relational contracts. Externally, they enter a classic transactional contract with the client and some suppliers. Internally, members are bound by a relational contract described in the "pact" they all sign. The "pact" minimizes transactional cost by binding the parties together in a partnership for the duration of the project. Records are not kept to allocate costs or determine blame. They have yet to have a dispute internally or with a client.

Production costs have been reduced by sharing resources and finding innovative ways to reduce project cost; trading ponies for horses. All this is accomplished because the contractual incentives and operating rules reward cooperation and still stimulate innovative approaches to managing work. (It could be argued that sub contractor transaction costs may be increased if they could have made more money pursuing their own short term interest or by the requirement for a larger insurance policy, but we hear no complaints from IPD participants.)

IPD is a clever solution to the tough organizational and contracting problems faced in today's market. It relies on careful participant selection, transparency and continuing dialog. They have not set in place alternative dispute resolution methods or taken other steps to insure they can solve problems and retain their organizational structure. Perhaps they will never face such problems. In any case, it is hard to imagine a better internal contractual relationship for applying lean construction. Construction consumers might consider rethinking their contracting strategies to share more fully in the benefits.

Conclusion

IPD is a Relational Contracting approach that aligns project objectives with the interests of key participants. It creates an organization able to apply the principles and practices of the Lean Project Delivery System.

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