

# CONTRACTING FOR LEAN PERFORMANCE: CONTRACTS AND THE LEAN CONSTRUCTION TEAM

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**Abstract**

In a previous paper (Howell et al 1996) proposed that construction Partnering is a programmatic Band-Aid on the current construction management system. Claims caused by fundamental weaknesses in this system gave rise to partnering. These weaknesses are particularly apparent on today's complex, uncertain and quick projects. Partnering exposes and partially fills a gap in current practice but has had little impact on underlying mental models, the management of production, or commercial contracting. Moving beyond partnering means challenging and revising current thinking and practice.

Management of the construction process must be re-conceived from the purchase of a product (transactional contracting) to the execution of a production process (behavioral contracting). This dictates that the current standard construction contracting forms which are wholly based on the transactional contracting model, be revisited.

A number of progressive projects in the private sector have already been operating in behavioral mode, implementing many Lean Construction practices. But these projects executed and then worked *around* the industry standard contracts forms. This has functioned reasonably well in strategic alliance client-designer-constructor arrangements. However, this "work-around" approach is clearly problematic in the one-off project relationship.

This paper briefly discusses the shortcomings of the current construction contract forms. It then goes on to propose a framework for ongoing discussion and action. Without a revamping of the standard approach to construction contracting, propagation of the concepts of Lean Construction will be limited mainly to the arenas of strategic alliances, and government sponsored or supported experiments.

**Keywords:** lean construction, performance measurement, benchmarking

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## TRANSACTIONAL VERSUS RELATIONAL CONTRACTING

### Definitions

Ian R. Macneil (1974) in his extensive treatment of contracts, presents two poles of a continuum axis defining the forms of contracting. He proposes the examination of contracts along behavioral lines. The extremes of the axis are *Transactional* and *Relational*.

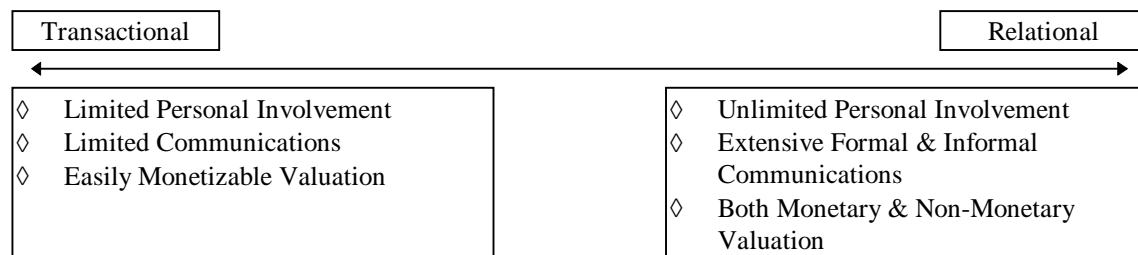
The purest form of Transactional contract is the simplest commodity purchase. The object of the exchange is clearly understood and certain. The method of exchange is simple. The exchange is uncomplicated and is of finite and foreseeable duration. Urgency is not an issue.

The clearest example of a Relational contract might be a marriage. It can be easily seen that there is a bi-polar contrast with the Transactional contract. The goals and objectives are much more undefined and the results uncertain. The duration of the contract is indefinite. Regardless of the best intentions of the parties to the marriage, the “rules” will change along the life of the contract.

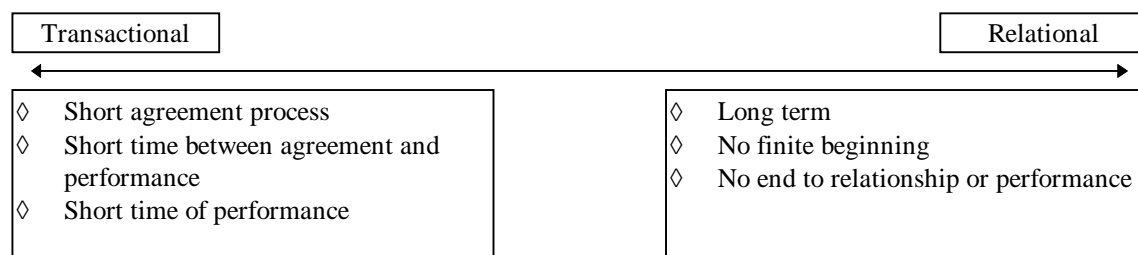
### Factors of differentiation

Macneil extensively outlines the polar extremes of this model. Following are a few of the factors of differentiation that highlight the extremes.

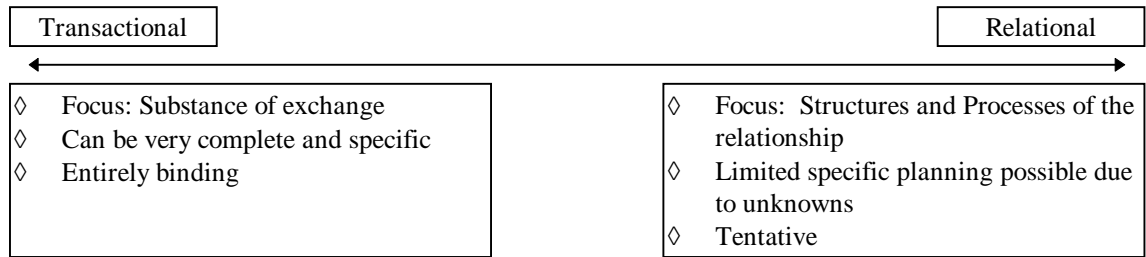
#### *Relation type*



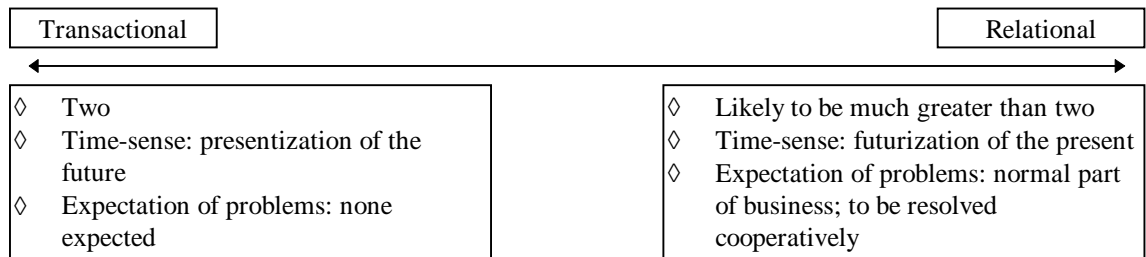
#### *Duration*



**Planning**

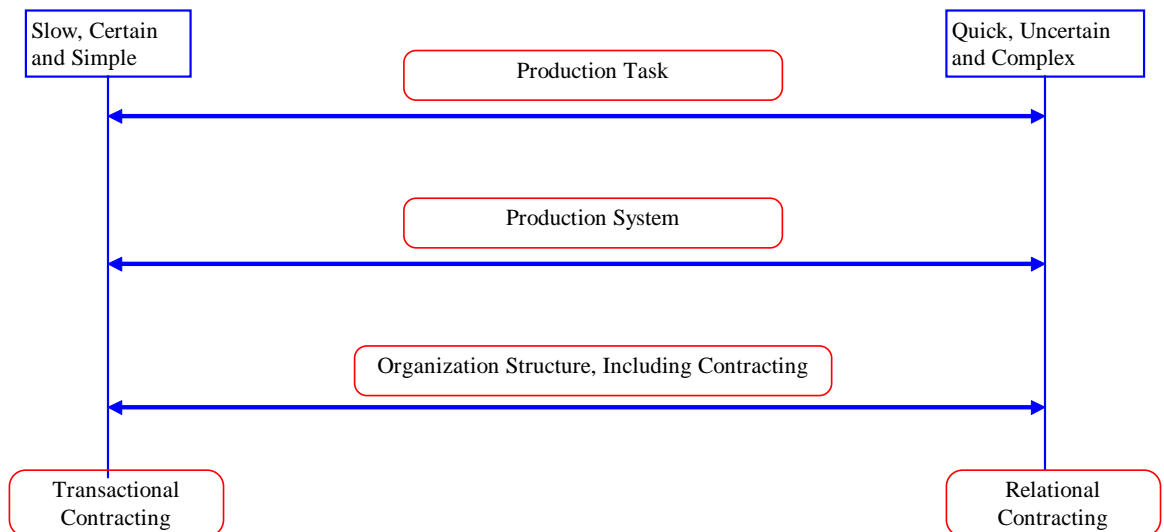


**Participants**



It is clear from the above that there are more similarities of all but the simplest, quickest, and most certain construction projects with the relational end of the axis than the transactional end. However, present standard construction project contracts are structured at the transactional end of the axis.

**A FRAMEWORK FOR DISCUSSION**



The Project Spectrum

### **The production model**

A “construction order” is a contract for doing a certain type of work. The nature of the work to be done drives the design of the production control system (Melles and Wamerlink 1993). Construction work may range from slow, certain, and simple (stodgy) to quick, uncertain, and complex (dynamic). Managing stodgy work is quite different from managing dynamic work. Further, the relationship among the organizations involved in performing that work must also change. There are three levels upon which this needs to be examined: the nature of work to be done, the system for managing that work, and the organizational structure and relationships between the parties.

Project delivery systems are now conceived primarily in terms of the contractual (i.e. transactional) relationships among the parties, often only the inner circle of owner, architect/engineer, and construction manager or general contractor. Owners tend to select one system (design-bid-build, design w/ construction services, design/build) over another without systematic consideration of the nature of the work to be done, i.e. its complexity, uncertainty, and quickness. Further, there is little appreciation for the differences in production control systems best suited for performing different types of work.

More dynamic projects call for the following changes in production systems and their management:

1. The design of product and process converge toward a single, integrated activity. Design/Build becomes much more than a contractual relationship between designer and builder; i.e. design/build is transformed from a method of procurement into a production control system.
2. Functions (design, supply, installation, startup) tend to overlap in participation, with those responsible for one stage in the facility life cycle becoming more and more involved with each others' work.
3. Functions tend to overlap in time.
4. More decision functions become differentiated, e.g. using Melles' terminology, more dynamic projects may require explicitly distinguishing the decision functions “project coordination, mobilization planning, and allocation planning”, which would be merged into a single decision function on less complex, quick, and uncertain projects.
5. More and quicker feedback is required between decision functions.
6. Greater degree of detail in planning and tracking.
7. Larger buffers of schedule lags, materials, and labor to accommodate greater uncertainty OR a substantial investment of resources and energy in plan reliability (Ballard and Howell 1995).
8. Methods planning becomes ever more critical to project performance.

Melles and Wamerlink propose a model of production control systems expressed in terms of decision functions, but deliberately abstract from technological uncertainty, i.e. from the decision function we might call Methods Planning. Methods planning is related to all other decision functions, and becomes more important with the volatility and range of:

- Components to be constructed
- Conditions in which that construction is to occur
- Available tools and techniques

The volatility and range of components, conditions, and techniques obviously is greater at the dynamic end of the spectrum of production tasks. Methods planning bears a large part of the burden of increasing plan reliability, a key to reducing time and cost throughout the entire supply chain (O'Brien 1995 and Ballard and Howell 1995). The ability and willingness of project participants to do methods planning is now often constrained by contractual relationships. For example, subcontractor A may need to understand how another subcontractor B plans to do its work, but may not get that information because B has no incentive to provide it, and the general contractor/construction manager has no incentive to expedite. In the world of transactional contracts, each organization tends to act as if its costs and profits were independent one from another.

Contracts are one dimension of organizational relationships. Following Macneil, we characterize the contracts spectrum as extending between the poles of transactional contracting and relational contracting. Transactional contracting is appropriate for stodgy projects because the work to be done can be accurately predetermined and the conditions in which it is to be done are stable. In other words, the exchange of money for construction is quite like buying a loaf of bread. By contrast, buying construction on a dynamic project is more like hiring a player to join your team. You expect that player to perform a somewhat specialized role (much like a midfielder, tight end, or shortstop), but what they are actually going to do and how they will do it will be worked out by the team both in preplanning and during the course of the 'game.'

The sequence and duration of activities can be established with certainty in a schedule created at the beginning of stodgy projects. Consequently, the interface between the organizations performing those activities is limited and simple. Dynamic projects do not offer the same conditions. The various specialist organizations are more intimately interrelated. Schedules must be continuously revised based on the latest discoveries and forecasts regarding scope, design, deliveries, and completions.

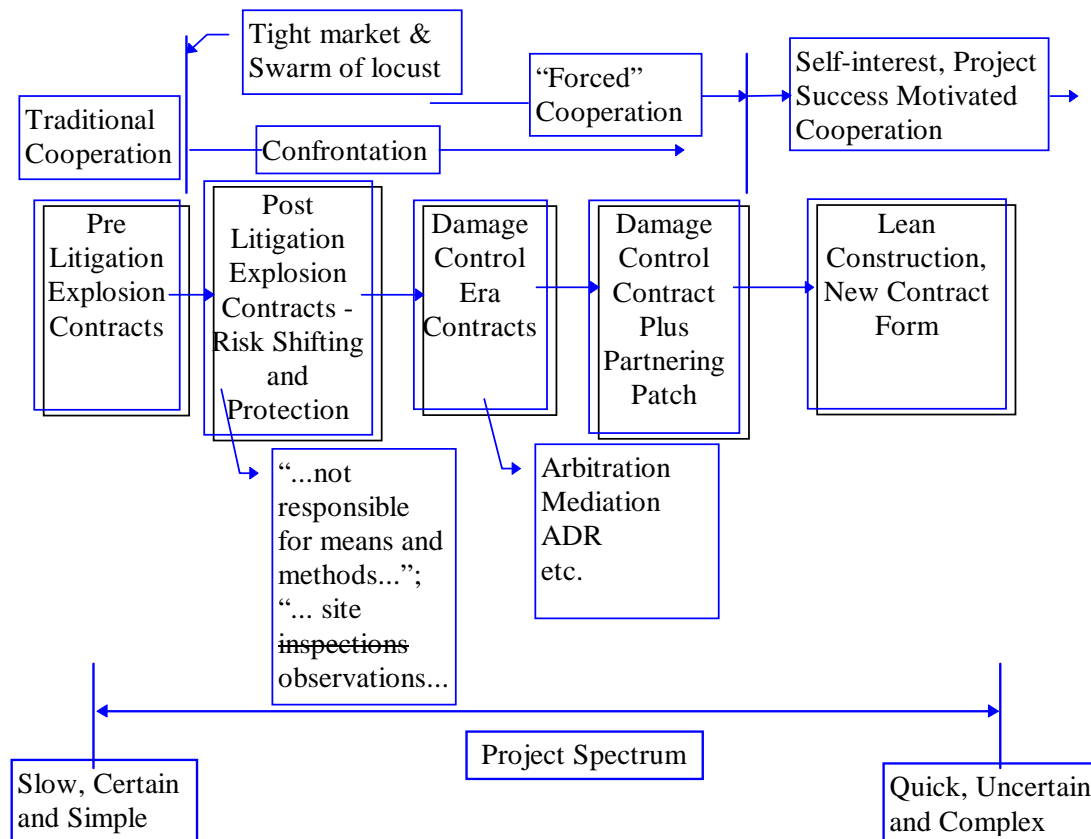
## **CONSTRUCTION CONTRACTING**

### **An historical model**

In order to set a framework for the analysis of contracting deficiencies and the future of construction contracting it may be helpful to consider a US historical model set against a spectrum of project types. The model covers only the last thirty or so years. While other nations would find their construction industries somewhere else along the continuum, arguably the sequence of events may not differ substantially<sup>1</sup>. In any case this will serve well as a basis of discussion.

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<sup>1</sup> Some nations may find that they have not seen the full spectrum of evolution, *yet*.



### ***Traditional cooperation***

Those who were in the business before the 1980s will recall an era of *Traditional Cooperation*. Most work was performed locally or regionally, by “local boys.” There was a relatively small club of design professionals, constructors, and facility owners/builders who generally worked together on project after project. It was in the best interests of those parties to cooperate, and to resolve any issues amicably. At the same time, the bulk of projects were *slow, certain, and simple*.

In this era, construction contracts were generally simple, and short. It was not unusual that smaller projects were performed under letter contracts of only one page. In other cases, many owners used the same standard form pre-printed purchase orders that they used for the purchase of commodities such as carbon paper (remember that!) and pencils. These forms of agreement were indicative of a *Transactional* mentality.

### ***Confrontation***

Beginning sometime around the end of the 1970s there began a radical shift in the economic environment. Fueled by monetary inflation, downturns in regional construction markets<sup>2</sup>, and (initially to a lesser impact) increasing complexity of projects, the “good old days” started to fade. Projects started to become *quick, uncertain, and complex*.

Inflation was a major factor in the economic viability of construction projects. Projects were financed based upon interest rates that were too low to return a profitable

<sup>2</sup> Often regional downturns in one area of the country were simultaneous with short term booms in others. This resulted in the importation of design professional firms and constructors into “foreign” markets. When these markets turned down again, the glut of these out of state firms often drove local players into dire circumstances.

return on the investment, unless the facilities were completed quickly and on schedule. Many construction contracts included stiff “damages for delay” clauses. If these delays occurred due to design deficiencies or services during construction such as submittal review duration, the design firm could find it self the target of law suits.

Contractors suffered from the inability to accurately forecast cost escalation due to inflation. These contractors often were faced with the option of looking for design errors, causes for delays beyond their control, or any other reason to pursue additional compensation (often through the courts). To further aggravate the situation, the market began to tighten<sup>3</sup>.

This trend opened the door for a major rise in litigation, at first in an effort to recover unforeseeable-conditions losses. But later contingent fees lawyers saw an opportunity to reap huge fees from construction litigation. It was not unusual for law firms (the “swarm of locust”) to offer to review design construction documents (plan drawing, specifications and contracts) at no cost for contractors, with the goal of finding errors or omissions that were recoverable in court. Since these lawyers were paid from the costs they could recover, there was nothing to lose for the contractor who was feeling the market pinch and the loss of repeat work with clients.

This market atmosphere initiated the era of *Confrontation* in the American construction industry. The short form, letter, and purchase order forms of contract not only provided little legal protection for the parties, but in most cases were likely to work to everyone’s detriment due to their vague language. The same language that had served to allow for flexibility and therefore cooperation, now was the source of confrontation and litigation. Not surprisingly (while shortsightedly) the contracts were blamed for much of the problem, and more lawyers were hired by both sides - “for their own protection.”

This post litigation-explosion era of confrontation had a number of important impacts on the content (and forms) of current construction contracts. Just a few of the most troubling are discussed below.

### ***Risk shifting***

Risk shifting contract clauses attempt to place risk on parties who are forced by market conditions to accept them. In many cases, these are the parties least able to control the conditions leading to the risk. An example is the “no damages for delays” clause. This clause makes contractors accept the cost of any delays, whether under their control or not. Normally, the contractors would have simply raised their prices to cover this risk, but in the shrinking market, they were unable to do so. Many contractors found themselves facing bankruptcy due to these conditions and they or their bonding agents sued anyone they could in order to collect for unforeseeable conditions, when it was the owner that justly should have retained these risks.

### ***Risk avoidance***

Parties to the construction contract found themselves being coached by their attorneys and insurers to include risk avoidance language in their contracts. On example is the “not responsible for means and methods of construction” clause in design firm’s contracts. This clause attempts to excuse the design party from any responsibility related to the contractors means and methods employed in the actual construction activity.

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<sup>3</sup> In great part due to tightening availability of investment capital due to inflation fears, and also to over building in certain markets such as commercial office space.

The clause was principally a result of suits against designers related to constructors' failure to construct in a safe and effective manner. By statute in the United States, the constructor's employees have no recourse for injuries incurred on the job other than the Worker's Compensation Insurance furnished by the employer. These workers (or their survivors), unsatisfied with the insurance allotment, often sued anyone they could. The designer (being a "third party" to the employment of the worker) found themselves defending against conditions for which they had little control. In addition, the designers often found themselves caught in the middle of disputes related to damages resulting from the designer's means or methods direction directly to the constructor.

This one clause has done more to divide the designer and constructor than any other. It has resulted in a bureaucracy of written communications to protect and document. It also resulted in a *d'facto* prohibition on the involvement of the designer in the construction phase activities as anything more than an limited "observer." Site inspections became site *observations* in the contract language - legalese attempting to protect the designer. The efficiency gains possible due to proper involvement of the designer in the construction activity were lost.

### ***Alternative dispute resolution***

As a reaction to this litigious environment, the construction industry looked for alternatives to the unacceptably expensive, uncertain, and slow court system. They found various forms of Alternative Dispute Resolution (ADR) to be effective in reducing the cost and speeding the process. Although not certain, the ADR processes proved in most cases to be more just in resolution of most disputes.

Initially, only ADR forms that were direct substitutes for litigation were implemented. These included arbitration, mediation, mini-trials, and others. Later, more preventative forms were used *during* the project. These forms of ADR included Dispute Review Boards, Standing Neutrals, and post contractual "Partnering." These also showed definite gains by heading off issues before they became full disputes resulting in litigation. However, these tools remained reactions to problems rather than proactive management of production processes and so did nothing to restore the cooperative efforts that addressed true project productivity.

### **Forced Cooperation**

The next era is what I will term *Forced Cooperation*. The principle invention characteristic of this era in construction was Partnering. It has been otherwise termed the Partnering "Patch" or a "Programmatic Band-Aid" (Howell *et al* 1996). More about Partnering will be offered below. It is sufficient here to point out that while no consideration was give to the fundamental contractual relationship issues in construction, Partnering was an attempt to *overlay* the existing contract forms with a relationship building exercise.

### **Self-interest, project success motivated, cooperation**

The next era necessary for the construction industry to move forward is one of *Self-interest, Project Success Motivated Cooperation*. This cooperation must be based upon realistic appreciation and recognition of the self-interests of the participants in a project. The contracts must support these self-interests and provide a framework for the overall best success of the project. This new era will include *Relational Contracting*

This new contract framework will afford moving forward to implement Lean Construction principles and practices on a wide scale of differing projects. Lean Construction will then allow the missing practices of true quality control and project performance improvement to occur.



Until the contract issues are addressed, only a limited number of projects under a relatively unique set of circumstances will be able to see the full benefits of Lean Construction.

These new practices will allow for the most efficient implementation of the quick, uncertain and complex projects that are today becoming more the norm than the exception.

### **Standard contract forms**

The standard US forms of construction contracts are the American Institute of Architects and the Engineers Joint Construction Documents Committee. Most other contracts are either directly derived from or very closely follow the model of these standard contracts. Both of these contract sets are wholly based upon the transactional model. They attempt to fully spell out the responsibilities, authority, and compensation of each party.

Variants of the traditional design-tender-build project approach are handled by alternative clauses and add-on language<sup>4</sup>. Partnering is almost always excluded from the formal contract and is executed by a separate “mutual understanding” document.

### **Shortcomings**

There seems to be a movement away from fixed price contracting, principally because of the adversarial relationship it produces between the parties and the adverse impact on managing work.

Both Pond (1996) and Allen (1996) call for cost reimbursable forms of compensation with incentive-based fees. Pond explicitly says that the traditional responsibilities of contractor and owner do not change, i.e. the contractor is responsible for means and methods and the owner is responsible for design and engineering.

We advocate a change in compensation methods, but also in the distribution of responsibilities, in part in order to involve contractors in design development, but more generally to make everyone responsible for production management. This objective can be achieved in design/build project delivery systems. Unfortunately, design/build too often changes only contractual relationships and not the production process.

Another issue regarding the relationship between the parties is the presence or absence of a long-term alliance. Its presence facilitates problem solving because the parties have a longer time horizon in which to evenly distribute losses and gains. However, such alliances are more difficult to achieve for design firms or construction managers operating over a broad geographic area. General contractors pose some difficulties in this regard, but specialty contractors’ geographic scope is often even more limited.

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<sup>4</sup> The New Engineering Contract of The Institute of Civil Engineers in the UK improves upon the model, but still basically adheres to the Transactional form.

## THE PARTNERING PATCH

### An add on

The implementation of Partnering in construction has, in all cases the authors are aware of, been an add on to the pre-existing construction contract forms. The fundamentally transactional nature of the contracts remain. In most cases the partnering agreement is separate from the legal contract. Whether executed before or after the execution of the legal agreements or after, the partnering “charter” is actually little more than an informal statement of intent to cooperate.

The partnering charter has no effect in law to enforce or support the cooperation it purports to establish. In fact, there is great controversy as to how the courts will treat these documents in the case of a dispute. How would the legal system deal with something as vague as an agreement to cooperate? What does this mean in law? The fact that there is little or no support for the partnering charter within the formal contracts makes this all the more problematic. The transactional nature of the standard construction contracts simply does not support the relational nature of the partnering charter.

One way to view this is the difference between marriage law (the contract) and marriage vows (the partnering charter). How likely is the law to support the vow to “cherish till death do us part?” And does the enforcement of community property laws<sup>5</sup> by the courts support a reconciliation?

### Strategic alliances

Partnering has found its greatest degree of success in the context of long term, strategic alliance relationships. These projects represent a series of awards for construction projects to a pre-selected team of designer and constructor firms. This generally includes the primary design firm and the construction manager (CM) or general construction contractor (GC). In most cases, each of these primary parties will self-perform some defined scope and sub-contract the remainder.

This relative guarantee of future work for the providers sets an environment that encourages cooperation. The formal contracts become secondary to the partnering relationship, and serve as a last resort should problems not be resolved amicably.

A major area of failure of partnering relates to the sub-contractors not being included up front in the partnering relationship. They also generally have no assurance of future work from the owner or the prime contractors. Both these serve to virtually assure that these subs do not buy-into the relationship. In the case of very well defined, certain, and defined duration tasks, this may not be fatal. However, if applied to quick, uncertain, or complex tasks, they can become the weak link in the successful completion of the project.

### One-off projects

The U.S. Army Corps of Engineers pioneered this arena of Partnering application in the public project sector. These projects were generally well defined, slow, and simple.

Private project application of partnering has found limited success. Again, only relatively certain, slow and simple projects seem to be appropriate. The major issues that hinder partnering in private projects relate to the limits of the transactional contracts. There are no real incentives for the various trade contractors, or for the

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<sup>5</sup> Community property in marriage law in the USA enforces joint and equal ownership of all property acquired during the marriage, regardless of which party performed the work that resulted in the property.

designer and contractors to cooperate in building efficient delivery systems and methods.

### **Not productivity focused**

Partnering was invented as a method to bridge the gap between the hidden agendas of the various parties to a construction project - the patch. It was never conceived to directly address project productivity, efficiency, speed, or quality. While partnering has partially filled the behavioral gap, it has failed to do much more.

In fact, it is doubtful that partnering is at all applicable to the implementation of what we are calling Lean Construction. It can be argued that healthy self-interest (the life blood of good old capitalism) is the best motivation. Team building and partnering that ignores the self-interests of the parties can never fully achieve the goals of Lean Construction.

The use of transactional contracting with a partnering patch, falls far short of the mark. In fact, the mixing of the transactional contract with the relational partnering charter is inherently ambiguous at best and schizophrenic at worst. What is needed is a cohesive, focused contracting arrangement that is based on the relational end of the contract behavioral axis.

### **WHERE DO WE GO FROM HERE?**

The objective of this paper is to set a framework for discussion, and (most urgently) to spur discussion of the hindrance of transactional contracting to the future success of Lean Construction on a broad scale. We propose that to move forward the following must happen.

1. Develop production control models appropriate to dynamic projects. Consider such issues as:
  - The nature and extent of uncertainty
  - Planning hierarchy: extent and detail of each level
  - Distribution of mobilization (lookahead planning) and allocation (commitment planning) decision functions
  - Integration of production control systems throughout the supply chain
  - Make/Buy decisions; i.e., when/what to subcontract
  - Investing in flexibility in the form of multi-skilled labor or multi-functional tools
  - Buffer sizing and location for intermediate product (schedule buffers), materials, and excess production capacity
  - Handoff management; i.e. improving/assuring the quality and timeliness of handoffs between production units
2. Direct Partnering to the design and management of production control systems; include opportunity exploitation as well as problem solving. Current contracts and mental models are obstacles to improved performance both as regards problem solving and as regards opportunity exploitation. Partnering has been primarily oriented to problem solving, the key to which is flexibility, especially on dynamic projects. Partnering has hardly addressed the opportunities for supply chain performance improvement that are now all but invisible, and the key to which may well be solving the riddle "Who pays, who gains?"
3. Embrace the trend toward cost reimbursable contracts with performance-based fees, but for dynamic projects, treat "performance" as participation on the project team as opposed to exceeding predetermined cost or schedule goals.

4. Explore structuring incentives that promote increased plan reliability. It is arguable that fee-only general contractors and construction managers have no incentive to maximize the productivity of specialty contractors. Consequently, insufficient investment is made in proactive production planning and control, resulting in low plan reliability, i.e. a low probability that work assigned to a specialty contractor can be done productively or at all. Obviously, this failure to maximize specialty contractor productivity within the constraints of project objectives is a failure to improve total project performance.
5. Further develop the implications of relational contracting for contract design. How can/should contracts be structured to exploit the tremendous opportunities for performance improvement? This must include pragmatic appreciation of the resistance that will be felt from traditional sources of standard contracts, internationally. It must also recognize that this will likely meet with more virulent opposition from the legal professions than did ADR and Partnering.
6. Identify the likely allies in the effort to revise current contracting to move it toward the Relational end of the axis. Keep in mind that the strongest support for other innovations have come from unexpected and indirect sources<sup>6</sup>.

## REFERENCES

- Allen, Chris (1996) Value judgment, *Management*.
- Ballard, Glenn and Howell, Gregory (1995) Toward construction JIT, *Proceedings of the 1995 ARCOM Conference*, Association of Researchers in Construction Management, Sheffield, England. (Available in *Lean Construction*, A.A. Balkema Publishers, Rotterdam, Netherlands, 1997.)
- Howell, Greg; Miles, Robert; Fehlig, Charlie and Ballard, Glenn (1996) Beyond partnering: toward a new approach to project management?, Presented at the 1996 annual IGLC Conference in Birmingham, England.
- Macneil, Ian R. (1974) The many futures of contracts, University of Southern California *Southern California Law Review*, Vol. 47:69.
- Melles, Bert and Wamelink, J.W.F. (1993) *Production control in construction: different approaches to control, use of information and automated data processing*, Delft University Press, Delft, The Netherlands.
- O'Brien, William (1995) Construction supply-chains: case study, integrated cost and performance analysis, *Proceedings of the 3rd Annual Meeting of the International Group for Lean Construction*, Albuquerque, NM, USA. (Available in *Lean Construction*, A.A. Balkema Publishers, Rotterdam, Netherlands, 1997.)
- Pond, Robert A. (1996) Underground contracts for the 21st Century, *Civil Engineering*, American Society of Civil Engineers, December.

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<sup>6</sup> The strongest support for ADR and now for Partnering in the private sector of construction projects in the US has not been owner, designers, or contractors, but instead insurers. By offering premium and deductible incentives, they have move the use of these forward in short order.