

Relational Contracting and Lean Construction

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This special issue of the Lean Construction Journal is devoted to relational contracting and its relationship to lean construction, the subject of a Symposium held by the Lean Construction Institute in Atlanta, November 18-19, 2004. This is an introduction to this special issue, which otherwise consists of papers presented at the Symposium³. It explains the relationship between relational contracting and lean construction, and provides a summary description of the papers presented and the discussion provoked at the Symposium.

Connecting lean construction and relational contracting

In the business meeting of the International Group for Lean Construction's 1996 (fourth) annual conference at the University of Birmingham, UK, Glenn Ballard was moved to draw a precursor of Figure 1, which has since become a mainstay in the Lean Construction Institute's understanding of the research and deployment agenda for lean construction.

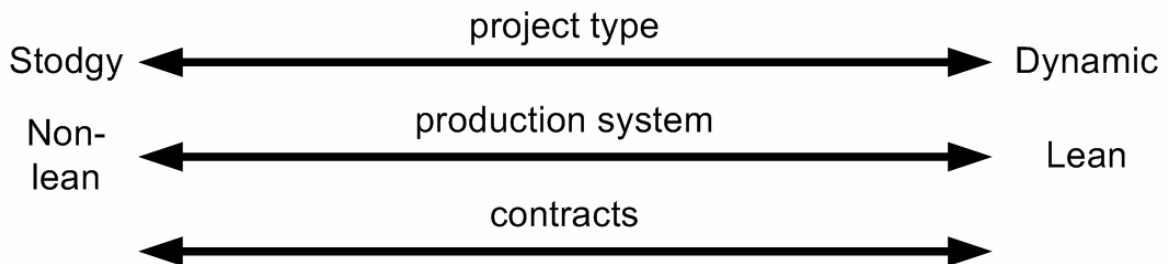


Figure 1: project types and forms of production system

That launched the authors' efforts to better understand the relationship between types of project and forms of production system, and led to the belief that lean forms of production system are adequate to the challenges posed by dynamic (quick, uncertain, complex) projects, while traditional forms of designing and making things progressively reveal their inadequacy as projects become more dynamic.

We were aware that industry efforts to improve performance tended to start not from thinking how to better design and make things in dynamic conditions, but rather from contract and organization. Partnering, for one example, at that time proposed to change project performance by changing the relationships between the players, but without changing how work was done. Design-build forms of contract, to take another example, too often changed only the contractual structure, but left intact traditional practices and processes of designing and making. As a result, we deliberately chose to subordinate consideration of organization and contract to what we considered the prior issues of understanding the challenges posed by dynamic projects and developing a lean project delivery system adequate to those challenges.⁴

We remain convinced that construction industry performance will not substantially and radically improve without the implementation of lean concepts and techniques. However,

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³ The papers in this special issue are the written versions of the Symposium presentations, with the exception of David Campbell's, which is republished here with the permission of Blackwell.

⁴ We have been involved in a few papers on the topics of contracts and organizational relationships. See Howell *et al* 1996 and Miles & Ballard 1997.

through the efforts of many people, lean project delivery has been sufficiently developed that it is time to turn to the task of forming project teams able to operate lean production systems, and that inevitably directs our attention to contracts as the tool for structuring relationships and forming teams.

Relational versus discrete contracts

Some time in the late '90s, Greg Howell became aware of the writings of Ian MacNeil, the leading theorist and prime advocate of the concept of relational contracting. Very much in the way we have located projects on a spectrum running from stodgy to dynamic, MacNeil locates contracts on a spectrum running from discrete to relational. He argues that the classic theory of contract is based on the idea of discrete transactions and ignores the agreements needed to enable and sustain relationships in more complex contracting situations.

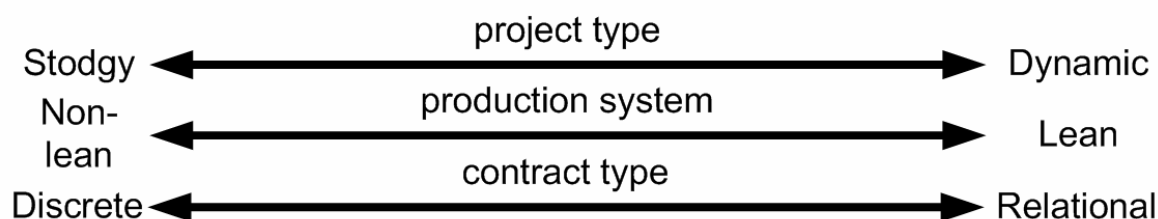


Figure 2: The spectrum of contracts correlated with types of production systems and projects

The parallel with our own thinking about production systems is shown in the modified figure above.

To develop and exploit the relationship between lean construction and relational contracting, we sponsored a symposium on the topic, inviting the best available people from around the world to share their experience and thinking and to help us tackle the difficult and important questions presented below.

Overview of the symposium

Glenn Ballard's opening presentation, "Traditional Business Structures and the Lean Ideal" proposed a number of key hypotheses and questions:

Hypothesis 1: Pursuit of the lean ideals is in everyone's interest except those who live off the waste.

Hypothesis 2: Traditional forms of contract and the associated business structures do not facilitate pursuit of the lean ideals.

Hypothesis 3: Substantial and enduring improvements in project delivery, value generation, or waste reduction cannot be achieved without changing how work is done; i.e., it is not sufficient to change contracts and incentives. However, doing so can facilitate pursuit of the lean ideals.

Question 2: What forms of contract/business structures facilitate that pursuit?

Question 3: How can 'lean' forms of contract/business structures be further developed and deployed?

The Papers

The remainder of the Symposium was devoted to eight presentations and the discussion of the above hypotheses and questions. The presentations included⁵:

⁵ All presentations can be downloaded from www.leanconstruction.org/files (April 2005)

- **Presentation and the Lawyer's Role in Contract Planning** – David Campbell, Professor of Law, University of Durham. David Campbell and co-author Donald Harris masterfully explained MacNeil's theory of relational contracting⁶ and provided the theoretical framework for the entire symposium. Campbell and Harris argue forcefully that cooperation is the means for maximizing self-interest in long-term contracts. "Long-term" contracts are those in which the contracting parties having made an unrecoverable investment should the relationship be abandoned, and no readily available substitute relationship is available. (In our opinion this may apply both to a single project as well as to an indefinite alliance extending over multiple projects.)
- **Relational Contracts-NEC in Perspective** – Robert Gerrard, Chairman, NEC Users Group. Rob explained the history of the New Engineering Contract, its various standard forms, and its advantages. To the editor's knowledge, NEC was the pioneer in reforming and rethinking construction contracts, and its contract forms are in wide use in the industry today.
- **PPC2000 – the Key to Partnering and Alliancing** – Katie Saunders, Trowers & Hamlin Solicitors. Katie presented the Project Partnering Contract2000, noteworthy for bringing the partnering agreement into the contract proper, in distinction from earlier efforts to keep them separate.
- **Relational Contracting and Lean Principles – an Aerospace Construction Comparison** – Penny-Anne Cullen, School of Law, University of Warwick. Ms Cullen's presentation was a combined effort, involving also Bob Butcher, Richard Hickman and John Keast, all from the Warwick Manufacturing Group. The contrast between the industrial settings and how client interests are linked to contractor performance is striking. In Aerospace we can foresee a future where the contractors become responsible for long-term performance of facilities. The wider acceptance of green and total life cycle cost consideration by clients should lead the construction industry to develop forms of agreement more like Aerospace.
- **Relational Contracting-Creating Value Beyond the Project** – Barbara Colledge, Deputy Dean Faculty of Information and Engineering Systems, Leeds Metropolitan University, links the development of relational contracting in projects to the wider development of trust and community in society. Carried out, this raises the provocative thought that construction, contentious and adversarial as it is today, could become the source of renewed trust and community,
- **Integrated Project Delivery-a case study in relational contracting** – Owen Matthews, Westbrook Mechanical. IPD is a unique form of organization, consisting of a number of different organizations, including an architect, consulting engineering firms, specialty contractors, and a general contractor. These firms pursue and execute work as a team, sharing pains and gains. This allows them to take advantage of opportunities for generating value and eliminating waste that are not available in traditional contractual structures.
- **Project Alliancing** – Captain Matthew Sakal, U.S. Air Force. Matt reports an initiative that began with BP's Project Andrews in the North Sea, but has since flourished in Australia. All members of a project, including the client, become members of an alliance, with pre-agreed methods for allocating pains and gains.
- **Sutter Health-Developing a Contract Model to Support Lean Project Delivery** – William Lichtig, McDonough Holland & Allen, Sutter Health Outside Counsel. Managers in Sutter Health, the largest health care company in Northern California, recognized that Lean Project Delivery was, "The right thing to do" and that the ability to create value and reduce waste was limited by traditional contracting practice. Informed by efforts of other relational contract models and the work of Ian MacNeil, they have developed and put in action a contract that serves as test bed and model for others to follow.

Symposium outcomes

The outcomes of the LCI Relational Contracting Symposium were

- Agreement on the three hypotheses:

⁶ For a complete account, see Campbell (2001).

1. Pursuit of the lean ideals is in everyone's interest except those who live off the waste.
 2. Traditional forms of contract and the associated business structures do not facilitate pursuit of the lean ideals.
 3. Substantial and enduring improvements in project delivery, value generation, or waste reduction cannot be achieved without changing how work is done; i.e. it is not sufficient to change contracts and incentives. However, doing so can facilitate pursuit of the lean ideals.
- In answer to **Question 2** (*What forms of contract/business structures facilitate that pursuit?*), participants agreed that relational contracts were those best suited to facilitate pursuit of the lean ideals, and agreed that the forms of relational contract presented at the Symposium had demonstrated that fact.
 - In response to **Question 3** (*How can 'lean' forms of contract/business structures be further developed and deployed?*), participants agreed to contribute to this special issue of the *Lean Construction Journal* and to serve on an Advisory Committee to LCI as the Institute develops and publishes standard forms of relational contracting for the United States. The following people have thus far agreed to take on the task of developing those standards forms: Glenn Ballard, Jeff Beard, Greg Howell and Will Lichtig. We intend to lean heavily on both the relational contracts presented at the Symposium and on those who so graciously agreed to participate in this initiative, which we consider to be vital for the construction industry.

References

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Flexibility In Long-Term Contractual Relationships: The Role Of Co-Operation

David Campbell¹ and Donald Harris²

Introduction

A very substantial body of empirical and theoretical literature now exists which purports to show that the explanation of long-term contracts by means of the classical law of contract is most problematic. The classical law, and its economic corollary in relatively unsophisticated forms of neo-classical economics, assume contractual promises to be the legal expression of the intentions of rational, utility maximising individuals making discrete exchanges in perfectly competitive markets. There is a strong implication bound up in this assumption that the parties to a contract rapidly would alter their allocative decisions should changed circumstances offer them the possibility of realising profits in excess of those to be realised by performance of the existing contract. One form of this idea is the notion of the efficient breach. The rejection of the possibility of coming to any general conclusion about the efficiency of breach because of the impossibility of quantifying such a breach's full costs to the non-breaching party is one example of the type of rejection of individual utility maximizing behavior as a tenable explanation of contractual relations that we will pursue in general here (Harris 1982, Macneill 1982, Macneil 1988).

This implication is contradicted by the widely corroborated empirical finding in the case of long-term contracts that such shifts, even when of recognisable and quantifiable benefit to the potentially breaching party, typically are eschewed in order to realise what is assessed as the greater utility of the preservation of a long-term contract or wider long-term relationship. Short-term individual maximising behaviour indeed is rejected as opportunistic.³

On a first glance, it would seem that very serious shortcomings of the classical law are exposed by these empirical findings, and we will argue that this is so. However, the way in which long-term contractual behaviour is to function as counter-evidence to the classical law has not, in our opinion, hitherto sufficiently clearly been formulated. Defences of the classical law which can, to some extent, be successful in their claims that this law can account for the rejection of opportunism have been and may continue

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³ TJ Muris, 'Opportunistic Behavior and the Law of Contracts' (nd) no 80 Working Papers, Law and Economics Center, University of Miami.

to be mounted. This possibility rationally⁴ arises because there is a continuing lack of clarity about the exact nature of the shortcoming of the classical law at issue.

We will argue that this shortcoming is fundamental. It is the implicit psychological and sociological assumption in the dominant law and economics literature of rational economic behaviour as narrowly *individual* utility maximisation that has run out of explanatory productivity in the case of long-term contracts and must be regarded as false. Efficient long-term contractual behaviour must be understood as consciously co-operative. We do not claim, of course, that all parties involved in long-term contracts act co-operatively. Purely individualistic attitudes are common enough. We do claim that those parties which contract efficiently act co-operatively. We see a long-term contract on an analogy to a partnership. The parties are not aiming at utility maximisation directly through performance of specified obligations; rather, they are aiming at utility maximisation indirectly through long-term co-operative behaviour manifested in trust and not in reliance on obligations specified in advance. The co-operative mechanism by which utility is achieved in a long-term relationship is radically different from that in the paradigmatic short-term, specified contract. The precise conduct required by future, long-term co-operation is necessarily unable to be specified in advance and the shares in the joint product of that co-operation are equally often not specified in advance. The parties accept a general and productively vague norm of fairness in the conduct of their relationship.

In this paper, therefore, we use two paradigms which we would like to keep distinct, of individual utility maximisation and co-operative utility maximisation (which we shorten to "co-operation"). We wish to use them to say, as bluntly as clarity requires, that the explanation of long-term contracts requires the rejection of immediate *individual* self-interest as the measure of economic rationality and its replacement by common interest as this measure. One may put it this way, that the adequate form of self-interest in long-term contracts is co-operation. In so doing, it is essential to recognise that the individual utility maximiser taken as a rationally discussable theoretical concept is now so unproductive that it must be rejected in the explanation of long-term contracting and in this there is entailed a very strong criticism of the heart of the classical law.

Our argument will be pursued along two lines, one of which it is trusted that this paper will complete but the second of which can only be outlined here and it will be the task of future work to complete. First, in a brief review of the existing literature on long-term contracting, the problems which this literature seems to pose for the classical law will be set out. In essence, these problems are the typical agreement of contractual documents of so open-ended a character that they simply cannot be regarded as fixing strict liabilities in respect of risks of non-performance. Even more, particularly when documents do purport to fix such liabilities, they typically are avoided by a repertoire of extra-legal strategies when the liability arises. This degree of flexibility seems to make the classical law more or less irrelevant to these contracts.

⁴ One is obliged to say that many such defenses are irrational in that they are not really defenses at all; they simply fail to acknowledge the problems involved. We will examine one of these cases, concerning long-term uranium sales, below.

The more powerful of the still broadly classical law's responses which have been and can be made to its apparent irrelevance will then be taken up. We will argue that the more sophisticated transaction cost accounts of forms of governance do not take sufficient distance from the classical law (Campbell 1990). Though the very substantial contribution of these accounts must be recognised, this contribution has now run up against the limits to which it can be developed. Transaction cost accounts of governance now involve theoretically unscrupulous variations of what is meant by the concept of the individual utility maximiser. Nothing but the extent of ingenuity can limit the unscrupulous defences which may be made of a concept. But, if assessed as part of an explanatorily progressive programme, then the maintenance of individual utility maximisation must make some determinate claims about the empirical attitudes of contracting parties. Once these claims clearly are recognised, then it will be seen that they are not supported by the empirical evidence of the attitudes of the parties to long-term contracts.

Pursuing this will bring us to the second line of argument we will wish to develop. We will attempt to set up a testable model of the co-operative attitudes and behaviour of the parties to long-term contracts which formalises some of the explanatory advances in contract theory associated with the works of, particularly, Macaulay, Macneil and Williamson which it is our intention to examine in future empirical work. For the present, we offer the model as a potentially more powerful explanation of the behaviour of parties to long-term contracts than the individual utility maximisation model and thus as itself a good reason, apart from the difficulties attendant on the maximisation concept, for the rejection of the classical law in the explanation of long-term contracting.⁵

The Features Of Long-Term Contractual Behavior

The problems posed for the classical law by long-term contracts seem clear and very profound. The classical law regards the contractual remedies which are open to an individual utility maximiser faced with a breach as the principal resources that party has to protect her or his contractual expectations. What should at once be said about this is that typically the classical law's remedies simply are not used by the parties to long-term contracts. The evidence we have shows the contracting parties disregarding the remedies they may have even when these clearly would win them a short term gain. The evidence available entirely supports Macaulay's early observation that:

Disputes are frequently settled without reference to the contract or to potential or actual legal sanctions. There is a hesitancy to speak of legal rights or of threats to sue in...negotiations (Macaulay 1963).

⁵ There is a sense in which this work attempts to challenge individual utility maximisation as a description of long-term contracting behaviour in the way that the concept of satisficing behaviour (HA Simon, *Administrative Behavior*, 2nd edn (1961)) did, and evolutionary theory (RR Nelson and SG Winter, *An Evolutionary Theory of Economic Change* (1982)) is doing, for maximisation goals in corporate planning.

If the legal remedy is not pursued when it is available, then the contract itself is not of the first importance. One does not need a contract to exchange goods - one needs the contract to get a state-underwritten guarantee of a remedy in the event of a breach. If there will be no necessary recourse to the remedy, then the form of the contract has less importance. Accordingly, there is considerable empirical evidence that long-term contracts will be formed even when there is less than even readily available clarity about the terms of those contracts, clarity being rejected in favour of a productive ambiguity (Beale and Dugdale 1975). As Beale has excellently put it in relation to a manufacturing industry (Beale 1980):

“...formal use of contract remedies to settle disputes was unusual. Court proceedings were very rare except for enforcing uncontested debts and arbitrations were uncommon. Claims were not settled out of court on the basis of contractual rights...when a contract was being made...the planning was far from complete...the exchange of paper produced no legally enforceable contract. Manufacturers were usually aware of this but do not seem to be very worried by it.”

This non-use of contracts turns on a rejection of the classically understood contract as a form of economic allocative mechanism. The classical law of contracts centrally turns on the goal of presentiation, the goal of making a present decision about all, including future, aspects of a contractual relationship (Macneil 1974). The parties to a contract determine all its terms at the time they agree. This point is to be identified by the acceptance of the offer. Such an agreement turns on the assumption that the parties' judgments about the nature of the world at the time of agreement, including judgments about the way the world will develop during the time of performance, are correct: this of course involves an element of risk. The strict liability of contractual obligations is a presentiated way of dealing with those risks. The party undertaking an obligation is strictly liable for its performance or non-performance, and in this sense the risk is allocated under the contract to that party (Polinsky 1983).

In long-term contracts, where the margin of such risk is considerable, a party will be loathe to contract on a strict liability basis. Accordingly, the market may be eschewed as a way of dealing with this margin of risk (Coase 1988):

“...where contracts are peculiarly difficult to draw up and an attempt to describe what the parties have agreed to do or not to do...would necessitate a lengthy and highly involved document, and where, as is probable, a long-term contract would be desirable, it would be hardly surprising if the emergence of a firm...was not the solution adopted.”

This reason for the emergence of the vertical integration of production has not always been described in the clearest way. It is not really that the transaction costs of attempting rationally to allocate all risks are lowered by integration. It is that the firm overcomes the residual risk which remains for those making the commitment to production even after they have decided to enter into some sort of relationship *and which cannot be eliminated* - Within the sense of "eliminated" we mean to include complete shifting through insurance. Were all risks capable of being presentiated, there would be no residual risk. The question for the organisation of production would be simply which governance structure involves fewest transaction costs. But this typically is not the entire question. The problem is that presentiation is a quite illusory goal and all long-term contracts must in practice be incomplete (Campbell 1990, p84-86). There must be a margin of irreducible uncertainty at *any* particular point of "acceptance",

uncertainty which produces this residual risk. In this sense, it is market *failure* that produces integration through the firm (Williamson 1986).

One can say that the market fails in the sense that the transaction costs of the adjustment of long-term commitments are less through the firm and, as part of this, one must recognise that, as market transaction costs are infinite for large scale projects (Chandler 1989), the firm can do things that simply cannot be done by the market conceived on the lines of the classical law. This situation follows, from the point of view of our present concerns, because within the firm there is an organisational structure of co-operation which deals sequentially with the contingencies of long term projects in a (hierarchical but nevertheless) co-operative way involving a "corporate culture" of general commitment to the goal of the firm's success (Kreps 1990). It is this unanimity of purpose which provides the framework in which problems typically will be dealt with in such a way as to minimise their cost consequences.

In a most important sense most transaction cost economics of alternative governance structures is, if assessed as an attempt to assess the choices which have been made, quite beside the point, for it assumes that the optimal structure will be sought. But in a class divided society there is no reason whatever to assume that that choice will be made with a rational attachment to the universal interest. This may be so, but it cannot be assumed. (Nor, as the corporation has made the invisible hand obsolete, is there any reason to assume that individual and general interest coincide). Coase (1988) is highly suspicious of assuming the state to have an attachment to the universal interest and in this he is not only often very witty indeed but also right. What Coase does not seem to appreciate, and what one imagines he would violently reject were the point ever put to him, but nevertheless it is so, is that the state has a far better record in this respect than many other capitalist economic planning units. Of course, as Coase no doubt would then say, mere good intentions are one thing.

Freed of non-rational considerations, the choice of how to deal with the governance of long-term commitments should boil down to the choice of the governance structure which keeps transaction costs to a minimum (Williamson 1985, Coase 1988). This choice may be of a long-term contract rather than integration, for, of course, the firm has its own organisational costs (Williamson 1983) and these may well outweigh its benefits to the contracting parties (Williamson 1985). The point which follows from the above comments on the nature of the firm, however, is that the long-term contracts themselves cannot begin to look like the discrete exchange paradigmatic to the classical law or the firm would be the most cost effective form of governance even in these areas (or the commitment would not be made). The long-term contract equally has to reject the fruitless goal of complete presentation even for market governance and does so by incorporating an "open-ended" approach which leaves a great margin for the variation or complete renegotiation of commitments or even eschews attempting to give those commitments any definite form at the outset but awaits the circumstances to arise which will allow such definition. This is co-operation within the market which is analogous to the co-operation organised within the firm.

A very wide repertoire of planning devices for long-term contracts now exists which to some extent are specific to particular enterprises and on which more work would be

welcome but from which some general legal⁶ and economic (Williamson 1985) principles can be drawn. Those principles eschew presentation and really turn on a commitment to the good faith, co-operative efforts of each of the parties (or to the acceptance of independent third party adjudication) to realise their joint and several goals (Collins 1986). It is an entirely natural claim that this renunciation of presentation is a fundamental contradiction of the remedy and formation doctrines of the classical law (Macneil 1978 and Williamson 1985). The situation is summed up adequately by Atiyah (1979):

"The modern commercial transaction is, in practice, apt to include provision for varying the terms of the exchange to suit the conditions applicable at the time of performance. Goods ordered for future delivery are likely to be supplied at prices ruling at the time of delivery; rise and fall clauses in building or construction works are the rule and not the exception; currency-variation clauses may well be included in international transactions...The rewards and penalties for guessing what the future will bring are no longer automatically thought of as being the natural consequences of success or failure in the skill and expertise of business activity".

We have omitted the following from the above quotation from Atiyah (1979):

"And even when such [explicit variation] provisions are not included in the contract itself, business people are in practice often constrained to agree to adjustments to contractual terms where subsequent events make the original contract no longer capable of performance on a fair basis".

This is also, we believe, accurate but it raises a different point. Here we are dealing not with the extension of long-term contract planning formally to provide for uncertain contingencies but with a co-operative response to failures in that planning. The classical law is clear about the response that should follow any such failure. This is liability and, indeed, efficient liability, because a firm that cannot make correct long-term decisions should be driven out of business. However, what Atiyah is postulating, and what the evidence we have shows to be the case, is that failures under these circumstances lead rather to extra-legal strategies to keep the long-term relationship alive in all but the most acute circumstances.

There is a rather good example of this, widely known and discussed, based on Westinghouse's difficulties over uranium supply contracts in the seventies. Westinghouse undertook very large long-term uranium supply contracts whilst leaving themselves without full cover of their own supplies. Shifts in the costs of all energy sources, in which the successful OPEC cartelisation of oil prices played some part, made these contracts potentially ruinous, even for a corporation of Westinghouse's size. So desperate was the industry as a whole that litigation was instituted by Westinghouse's buyers which Westinghouse tried to defend by a plea of commercial impracticability under UCC 2-615 (JPMDL 1975). Joskow (1977) has shown that Westinghouse made a number of, to speak politely, non-optimal decisions over these supply contracts, and, relying on an analysis of impossibility in contract derived from Posner and Rosenfield

⁶ IR Macneil, 'A Primer of Contract Planning' (1975) 48 Southern California Law Review 627. This article provides the essential structure for Macneil's casebook, *Contracts: Exchange Transactions and Relations*, 2nd edn (1978), and thus the casebook usefully provides a catalogue of the planning devices he describes.

(1977), he became rather warm in saying that Westinghouse should not be excused performance but should bear the costs of its non-optimal decisions. When, it would seem, the court's adjudication denied Westinghouse relief under 2-615, this was welcomed in this way by Maughmer (1979), who shared Joskow's reasoning and amplified his tone:

"The extension of relief to Westinghouse via section 2-615 would have created serious inroads in contract law from both a legal and an economic viewpoint. By applying strict tests and cautious interpretations to the elements of section 2-615, courts are able, as a matter of policy, to protect the legal and economic functions of contracts".

Thus the law on 2-615 now is authoritatively stated to be that commercial impracticability basically is a dead letter, for if Westinghouse going bust in order to perform a contract is not a case of commercial impracticability, then nothing ever can be (White and Summers 1980), and Joskow's analysis is taken to be evidence of the value of the Posnerian defence of the classical law of presentiated risk allocation.⁷

All this is very fine, except that a consultation of the list of corporations wound up for insolvency in the US in the seventies will not yield Westinghouse's name and, indeed, none of the heralded protection of the function of contracts took place. When the court seemed to declare the UCC irrelevant to the solution of this crisis in the energy economy of the US⁸, Westinghouse reached a set of completely renegotiated contracts of supply with its buyers on terms as favourable as the generally adverse business conditions allowed and things continued much as before - though in a changed international energy economy. Dawson (1984) expands this into an account of the irrelevancy of the plea of impracticability and sets up an account of frustration along similar lines. But it is not the practice of adjustment that is irrelevant, it is the ridiculous legal plea that will not even recognise the practice.

What one imagines happened is that the buyers realised that they could gain no possible advantage from the liquidation of Westinghouse for, as even Joskow recognised, Westinghouse's pricing and supply policies were designed in good faith to encourage its buyers and thus expand the nuclear energy industry.

When one is a little appreciative of the distance between the oligopoly economy of the giant corporations desperately seeking to expand typically moribund effective demand by large-scale, planned ventures and the neo-classical economy of buyers who should never commit themselves without being covered envisaged by Joskow, then one can readily imagine that Westinghouse's active encouragement of its buyers was at least arguably rational. The alternative would have been the conclusion that the nuclear

⁷ RA Posner, *Economic Analysis of Law*, 3rd edn (1987) sec 4.5. Joskow's analysis is excerpted in AT Kronman and RA Posner, eds, *The Economics of Contract Law* (1979) pp 143-9. That neither of these texts make any editorial reference to the developments in the Westinghouse case subsequent to Joskow's article which we are about to mention is most regrettable.

⁸ A more valuable decision, though universally excoriated in classical accounts of 2-615, was *Aluminium Company of America v. Essex Group Inc* 499 F Supp 53 (1980), which used the impracticability plea as a basis for the reasonable renegotiation of energy supply contacts. One should note, however, that even this was extra-legal as even the most relaxed reading of frustration remedies under the common law or the UCC could not yield this renegotiated outcome.

energy programme could not have been developed privately or, more generally, that the enterprise would stagnate.

No alternative, more favourable supplier could conceivably become available, especially not after Westinghouse's trauma. Once freed from the panic of the oil crisis and the competitive suspicion and hostility into which the mutually destructive idea of holding Westinghouse to its contracts or of Westinghouse abandoning its buyers led, a sensible, co-operative adjustment to the changed circumstances took place. The episode is accurately evaluated in Macaulay (1977), Macaulay (1985), Palay (1985), and Halpern (1987).

We have clearer evidence of these non-legal strategies in respect of other long-term supply contracts which suffered strain during the recession in the seventies. Daintith's example (Daintith 1986) of iron ore contracts is particularly significant, for the contracts he examined were very poorly drafted, their weakness following from their drafters' obvious commitment to presentation. Even prices were fixed over long periods. It would be hard to exaggerate the depth of the shortfall in demand for steel production over the period that these contracts were to run and yet virtually none of the formal legal remedies under those contracts were taken up. By a series of entirely extra-legal negotiating strategies, the relationship between the buyers and sellers of ore was renegotiated and, indeed, in a strong sense the contractual relationship was maintained. But the contracts all had been transformed into more flexible forms, with prices, quantities and delivery dates all becoming open to subsequent determination. The point is that the original form of the documents did not facilitate or even allow for this, but this form proved irrelevant as the document was changed by extra-legal negotiation. This example is corroborated by such evidence as we have.

In sum, then, long-term contractual documents eschew pursuit of the goal of presentation in order to leave open-ended the parties' ability to deal with contingencies during the course of their performances. Furthermore, the parties' typical recourse to extra-legal strategies when their documents fail to provide for a reasonable resolution of such difficulties as do occur shows a commitment to flexibility far in excess of that conceivably provided for by any document in order to avoid having to pursue formal remedies.

The Problem Of Long-Term Contractual Co-Operation: The Parties' Attitudes To The Adjustment Of Their Commitments

The conclusion that should be, but which has insufficiently strongly been drawn from what we know of long-term contract planning and extra-legal strategies, is that classical contract should be completely rejected as an explanation of long-term contracting. Risk allocation through presentation simply is not the mechanism long-term contracting parties use. But presentation is the corollary of regarding contracts as the expression of the intentions of the parties and this in turn is the legal corollary of assuming a market composed of rational, utility maximising individuals (Adams and Brownsword 1987). It is an explanatory requirement of a proper understanding of long-term contracting that we carry through our rejection of presentation to the rejection of the classical assumptions of the behaviour and attitudes of the contracting parties. These parties do, of course, typically rationally gauge their utilities, but not as discrete individuals.

Open-ended documents and extra-legal dispute resolution are not, in themselves sufficient to account for the form of long-term contracting. For such readily observable non-classical phenomena do not really go to the heart of the method of risk allocation going on in the long-term contract. Let us consider open-ended contract planning over, say, price and quantity adjustment. One might have such formal provisions, but they do not themselves really speak directly to the point at issue. We do not mean by this that formal provisions can never be perfectly flexible, though this is so. We mean that the open-ended provisions might themselves be interpreted narrowly in a competitively hostile fashion and that there is nothing in the formal document that could prevent this. Just as the static, purportedly fixed allocations of risk under presentation turn on competitive bargaining between rational, utility maximising individuals, so the plausibility of writing contracts in an open-ended fashion turns on assuming a co-operative attitude to the resolution at the appropriate time of the problems initially left open-ended. Without a shift in attitude, formal provision for flexibility is fruitless, for one cannot create a co-operative attitude by writing it down that such an attitude will be taken to contingencies as they arise. One needs the attitude to make the writing have any meaning (though the writing then reinforces the attitude, as under UCC 1-102).

This really is to say that explanation of the open-endedness of long-term contractual documents and the prevalence of extra-legal strategies to preserve long-term relationships requires a fundamentally different set of assumptions about the unit of the analysis of exchange. The classical law cannot describe the mechanisms for dealing with risk in long-term contracts because the assumption of the purely individual utility maximiser does not capture the co-operative stance which is fundamental to those mechanisms.

This strong claim for the lack of explanatory power in classical contract seems to involve three empirically testable hypotheses about the nature of long-term contracting, the last of which is the real heart of any claim that co-operation is a more explanatorily valuable model of long-term contracting behaviour than pure individual maximisation. The first hypothesis is that the form of long-term contracts as documents will tend to be open-ended and to display a rejection of the goal of presentation in favour of explicit flexibility. The second hypothesis is that, in addition to the explicit sophistication of these documents, there will be a co-operative recourse to extra-legal strategies to resolve problems which cannot be handled under these documents. The third hypothesis, which is the foundation of the plausibility of formally providing for flexibility and of turning to extra-legal strategies when necessary and thus is of more fundamental interest, is that the parties to the contract will, in all but the most extreme cases [Macaulay's reading of all the reported US appellate contract litigation of the two decades up to 1985 yielded examples of the litigious dissolution of long-term relationships only when "prompted by major shocks to the world economic system], adopt a co-operative rather than narrowly maximising, opportunistic attitude to their own and the others' performance.

The Nature Of Transaction Cost Analysis

There is considerable empirical work on all of these hypotheses, so much in the first and second cases that, though further evidence would be most welcome, particularly in respect of the specific contract planning and extra-legal strategies of particular

enterprises, we regard them as already being borne out by the evidence briefly discussed above. Amongst this evidence, we would draw particular attention to the writings of Macaulay, Macneil and Williamson, for we, hardly uniquely, regard these as representing the best of the available resources in the "law and economics" literature for the examination of long-term contracts. In particular, their accounts of the open-endedness of long-term contractual documents and the parties' recourse to extra-legal strategies set up the third hypothesis, that the parties' conduct will be consciously co-operative, as a requirement for the explanation of long-term contractual behaviour.

Macaulay's discussions of extra-legal strategies all reveal co-operative attitudes to the contract and these findings have, we feel, been more or less corroborated (Macaulay 1963, 1977, and 1985). However, though Macaulay has utilised his findings to set up very compellingly the necessity of a rival contracting model to the classical, he has not really advanced such a model in an explicitly coherent way. On the basis of this type of finding, Williamson already has asked explicit questions about the behavioural assumptions informing the classical law and criticisms of it (Williamson 1985). Macneil's work contributes to this questioning and takes the issue further by hazarding a number of schemas of co-operative contractual norms setting out the behavioural assumptions apposite for long-term contracting⁹. We now intend to reformulate Williamson's and Macneil's behavioural questions in such a way as to stress the necessary element of co-operation, consider the classical responses to this problem of co-operation and then advance our model of the co-operative attitudes of long-term contracting parties.

Williamson's discussion of "the behavioral assumptions imputed to contractual man" (Williamson 1985 - p44) in the chapter of *The Economic Institutions of Capitalism* on 'Contractual Man' is conducted by recognising two such assumptions as central to transaction cost economics. These are "bounded rationality and opportunism" (Williamson 1985 - p 45). These assumptions are established polemically, being intended to show transaction cost economics' heuristic superiority to neo-classical economics. As against the assumption of rational decision making in perfect markets, transaction cost economics "acknowledges limits on cognitive competence" (Williamson 1985 - p44) as "Bounded rationality is the cognitive assumption on which transaction cost economics relies"(Williamson 1985 - p45). With respect to individual utility maximisation, whereas "neoclassical man confronts self-interested others across markets [and] bargains are struck on terms that reflect original positions" (Williamson 1985 - p49), transaction cost economics "substitutes subtle for simple self-interest seeking" (Williamson 1985 - p45). An apparatus of levels of rationality and degrees of self-interestedness are developed which extend the transactional apparatus for the analysis of boundedness and less direct maximisation into the institutional accounts of the different governance structures which Williamson develops.

Without wishing to detract from the enormous productivity of Williamson's work, we must say that the stylistic form of this chapter on 'Contractual Man', entirely representative of the style of that work, recalls nothing so much to mind as Bentham

⁹ Those of Macneil's writings which are particularly important in this respect are *The New Social Contract* (1980) ch 2 and 'Values in Contract: Internal and External' (1983) 78 *Northwestern University Law Review* 340.

(Anything of Bentham's will convey his elephantine pedantry, but perhaps An Introduction to the Principles of Morals and Legislation (1790) chs 12-14 is a particularly clear example). A powerful insight is broadened through a plethora of classification and concept formulation focusing on idiosyncratic investment and asset specificity, but in this breadth there is something of a sacrifice of depth. The transaction cost apparatus is extended to cover, in *The Economic Institutions of Capitalism*, the whole of the advanced capitalist economy, but only in the form of a set of boundary conditions, of which bounded rationality is the most important, to the still retained assumptions of individual maximisation. This can go on only to a certain extent. The point must come when one has to ask fundamental questions about the heuristic power of a basic unit of analysis which can be applied only with a vast number of *ceteris paribus* clauses having to be entered for it.

Bounded rationality functions as an exception for Williamson (1986 - p 140):

“...but for bounded rationality, all economic exchange could be effectively organised by contract. Indeed, the economic theory of comprehensive contracting has been fully worked out [the Arrow-Debreu model]”.

What sort of an exception is it that is of far greater importance than the so-called normal case? What plausibility can be given to the normal case if it only exists through its exceptions, or through "concessions to human nature as we know it" as Williamson says (Williamson 1985 - pxiii). We do not know of any case discussed in the modern philosophy of science that can begin to compare with the tenacity of the retention of problematic core assumptions in neo-classical economics and its more sophisticated refinements. But the tenacity is not costless. By the time Bentham has finished classifying all the circumstances which, say, influence penal policy - such as the chance of getting caught, the hardness of the offender to be punished, etc - there is nothing left of his basic idea that punishment should be proportionate to the mischief of the offence. By the time Williamson has given his full institutional account of the conditions of economic behaviour, there surely equally is nothing left of the basic intuition of individual utility maximisation in long-term relationships.

And in fact what happens is that one of Williamson's behavioral assumptions plays so much the inferior role to the other, bounded rationality, that it really falls out of consideration. This is a mistake, because, as Coater (1982) points out, strategic bargaining is an obstruction to contracting theoretically distinct from and in addition to imperfect information. Our work is an attempt to state this insight as strongly as its full appreciation in the context of long-term contracting requires. It is a typical feature of Posner's work that he has a very brief way with this. Difficulties are typically explained away in this corpus by being redefined in such a way as to confirm Posner's initial position, and so, in this instance, strategic bargaining is a transaction cost (Posner, *Economic Analysis of Law*, pp 54-5). This is a perfect example of what is called concept stretching in the modern philosophy of science, a strategy for defending original positions at the cost of any actual explanatory growth.

This questioning of core assumptions is not a line actively pursued in Williamson because dwelling on the discussion of information costs can do a great deal apparently to save the initial individual maximisation approach. If we see relationships being preserved rather than terminated despite the occasion for legal termination arising, this might be redescribed as the parties' simply adjusting their view of their self-interest as the development of their relation over time yields progressively more information and

expands the bounds of their rational pursuit of that self-interest. "Co-operation" can thus be reduced to the constant "renegotiation" of self-interest along lines initially developed by Alchian and Demsetz in the context of the labour relationship:

To speak of managing, directing, or assigning workers to various tasks is a deceptive way of noting that the employer continually is involved in renegotiation of contracts on terms that must be acceptable to both parties (see Alchian and Demsetz 1972, and Townsend 1982) .

What one is tempted to do in the context of the labour relationship when one actually knows something of the concrete nature of that relationship is to say that this account is just wrong. One useful way of distinguishing between the good, reliable labour relationship and a bad one is to identify just what Alchian and Demsetz (1972) leave out - a type of attachment between the parties that cannot be reduced to a contract - or even worse, cash - nexus (Fox 1974). Now, this would be right, for Alchian and Demsetz (1972) do make hermeneutic errors of a type we will examine in Coase, of just missing what is essential to the relationship between the parties because of an unshakeable commitment to (mis-)describing that relationship in strongly individualistic ways. However, for the moment, it is perhaps better to acknowledge this type of reasoning and see what costs of theoretical integrity it involves.

When one follows the contractual applications of transaction cost analysis, one has the curious feeling of the tail wagging the dog. Transaction costs are to be minimised in order to approximate to the perfect discrete exchange, but the way in which this exchange works as a goal is entirely theoretically perverse. One can assume zero transaction costs, but the actual securing of that assumption takes a great deal more effort than is actually repaid when it is secured. The main focus cannot be the residual assumption, for the whole account shows it is not even remotely applicable, but rather attention is concentrated on the boundary conditions which are its corollaries. Of course, there is a great deal about the explanatory form of neo-classical and transaction cost economics which is expressed in this. Williamson is a little shamefaced about discussing behavioral assumptions, because he recognises that in economics there is "a widely held opinion that the realism of the assumptions is unimportant" (Williamson 1985 - p44). This agnosticism about the realism of assumptions really does place serious limits on what can be achieved even by economic explanation of Williamson's type and something must be said about this here.

For there is, of course, a sense in which the most interesting developments in the economics of contracting (and much else) are, as it were, focusing on what we have referred to as Williamson's boundary conditions and do so to such an extent as effectively to question the realism of the basic underlying assumptions. An obvious example is those game theoretical accounts of mutual interdependence which, moving beyond the prisoner's dilemma games probably most widely known in the "law and economics" literature¹⁰, now contain highly sophisticated accounts of firm structure

¹⁰ Luce and Raiffa (1957- pp 97-102) try to come to terms with the counter-intuitive non-co-operative result that tends to be produced by finite horizon prisoners' dilemma games. Now, extremely sophisticated reformulations of game theory avoiding these problems can, no doubt, be produced, eg

(Aoki 1984) and seem to offer considerable potential for a wide range of institutional analyses (Sutton 1992) through more sophisticated modelling (Kreps 1990). Such modelling is an example of the clear pursuit of realism in institutional economic analysis in an emerging "economic sociology" (Swedberg et al 1990) or, even, "political economy" (Ordeshook 1994) which may, indeed, radically question neo-classical assumptions (Brockway 1986). These movements are highly welcome, but their productive utilisation in the explanation of contracting will, in our opinion, have to take a strict stand against the form of "realism" which presently dominates transaction cost analysis, particularly in the "law and economics" literature. As it Coase who has determined the nature of this "realism", it is against him that our criticism should be pursued.

This criticism of a lack of realism seems a remarkable one to bring against Coase, for, of course, the power of his work lies, in an important sense, in its claims *to be* realistic: "Modern institutional economics should study man as he is, acting within the constraints imposed by real institutions. Modern institutional economics is economics as it ought to be" (Coase 1984). Coase's explanations of institutions purport to be of real structures, classically of course, of the firm (Coase 1990 - p 33-4, 54):

"It is hoped to show...that a definition of a firm may be obtained which is...realistic in that it corresponds to what is meant by a firm in the real world...the definition we have given is one which closely approximates to the firm as it is considered in the real world".

Although the reasoning involved did not become clear until 'The Problem of Social Cost' was published, Coase's account of 'The Nature of the Firm' puts forward a paradigmatic transaction cost explanation, the firm being described (against some contemporary contributions that are now not widely read) as a cheaper way of dealing with the risks of complicated production than the market.

In transaction cost analysis after Coase generally, a hypothetical discrete exchange carried out with zero transaction costs is assumed (Coase 1990 - p 97-114) and then the costs ancillary to establishing the exchange are added in as, to put it in a way of which Coase would not approve, externalities. The object of the exercise is to keep such costs to a minimum, for they obstruct or prevent the exchange. Hence the conclusion is the establishment of the least costly appropriate governance structures. This may mean regulating the market through congenial principles of contract or integrating through the firm, or even state governance (Coase 1990 - p 114-9).

By setting up transaction cost analysis in this way, Coase generated a serious bias which has characterised that analysis ever since. There is a very strong separation between the realism of his statement of boundary conditions, the transaction costs, and the unrealistic nature of his assumption of the transaction at zero cost. Coase recognises that transactions at zero cost could never take place but does not really see what this means. He thinks there will be a problem of residual, ineliminable costs but he does not see why. The negotiating, information gathering, organising, etc within which transactions take place are not *only* costs, they are also the social relations which are essentially facilitative of the transaction. All actions, including all transactions, can

Kreps et al (1982), but just how far this type of remodelling to produce an intuitive result known in advance is actually productive is a prime example of the type of question we are trying to raise.

take place only within a constitutive social system. If one really took away *all* the costs of exchanging, the exchange would not take place cost free. It simply would not take place.

However, this absolutely is *not* what Coase wants to say. At Coase's hands, transaction cost economics has, seemingly as a result of its technique but actually because of certain social and political positions he adopts, closed off all possible explanations of human nature and social relationships other than the most thoroughly individualistic ones. Coase does believe - and claims to identify this belief in Adam Smith (Coase 1976) - that there is some residual quality about human beings as such that makes them exchange or, as Coase's more modern synonym has it, choose. 'Economics', Coase says, is 'the science of human choice'¹¹. This is like saying that physics is the science of forces and objects, in that whilst it is in a sense true, it is so utterly abstract as to be useless. But Coase is quite sanguine about 'the acceptance by economists of a view of human nature so lacking in content' (Coase 1990 - p5), indeed he celebrates not only that economics might be applicable not only to all human phenomena¹² but to the 'animal behavior' of 'the rat, cat and octopus'(Coase 1990 - p3).

If we are to do anything with this idea, we must have some idea of concrete preferences, and, permeating his claims for generality, this is just what Coase has (Coase 1990 - p4):

I believe that human preferences came to be what they are in those millions of years in which our ancestors (whether or not they can be classified as human) lived in hunting bands and were those preferences which, in such conditions, were conducive to survival.

This identification of the preferences effective in contemporary economies - and Coase really has in mind the US - with some general idea of human preferences as such is complete nonsense which receives no corroboration from any philosophic or sociological work on the determinate features of human preferences of which we are aware¹³, other than the really quite suspect discipline, which Coase significantly cites in his support to the exclusion of all other social theory, of sociobiology (Coase 1990 - p5). Ignorance of social theory's conclusions about the nature of human agency and social structure (Giddens 1984) is essential to Coase. His position, a common enough one (Luke 1973), rests entirely on a mistaken identification of capitalism, a specific economic form with a clearly delimited historical provenance (Wallerstein 1979), with 'choice'.

It is obvious that on this basis Coase could not possibly give an accurate account of the origin or the nature of the capitalist (or indeed any) economic system, nor can do other than grudgingly acknowledge the structural properties of that specific system¹⁴. These

¹¹ Coase bases his view of economics as choice on Robbins (1935).

¹² Ibid, p 2. Coase has in mind the work of GS Becker, *The Economic Approach to Human Behavior* (1976).

¹³ The most productive lines of contemporary development are expressed in Harre (1979) and Bhaskar (1989).

¹⁴ To the extent that this is so, Coase's work represents a substantial failure to pursue a number of highly productive lines from Veblen which were taken up by a number of other institutionalists, including obviously Commons but represented principally by the sadly relatively little known Clarence Ayres. Eg CE Ayres, *Science: The False Messiah* (1927) and *Holier Than Thou: The Way of the Righteous* (1929) in

are very serious shortcomings which prevent any attempt to extend Coase's work into a general account of the modern economy. Coase correctly observes that 'in mainstream economic theory, the firm and the market are, for the most part assumed to exist and are not themselves the subject of investigation' (Coase 1990 - p5) and his own work undertakes such an investigation. But his accounts are based on the very assumption of a perfect market - of transactions at zero cost - which he is trying to refine, and there is a self-defeating circularity about this (Coase 1990 - p5):

What differentiates [my writings] is not that they reject existing economic theory, which...embodies the logic of choice and is of wide applicability, but that they employ this theory to examine the role which the firm, the market and the law play in the working of the economic system.

Coase's objection to assuming markets to exist is not that he wants to explain the market's existence, for he himself makes this assumption. He objects to assuming the market to exist everywhere and he goes on to explain instances of its non-existence (forgetting that this is all instances) as a departure from the normal case. The institutional thrust of Coase's work really is rather undercut in this way for a principal economic institution, the free market, is never itself explained. Rather than being regarded as a governance structure itself requiring explanation, the market is given the status of being *the* natural form of life, neither requiring nor permitting explanation.

What is most important to us here is that determining whether individual utility maximising assumptions still hold for contemporary long-term contracting behaviour - as is being undertaken by, for example, Taylor (1987) - simply cannot be an issue for Coase. He thinks that this assumption holds for all times and indeed for all creatures. If one is a little less ambitious about one's claims and is at pains to understand what attitudes and behaviour actually inform specific contractual phenomena, then the type of general applicability Coase claims must be viewed not as a strength but as the weakness of a theory now making claims which are so wide as to have no particular descriptive value for long-term contracting behaviour (or, indeed, for any particular behaviour). We believe that an accurate account of the attitudes and behaviour of the parties to long-term contracts requires a more realistic description of their *co-operation*, rather than the accumulation of the facts of co-operation as exceptions to individual utility maximising assumptions. Our point at the moment, however, is that this question cannot even arise for Coase. All institutions are the products of responses to a given human nature which functions as the assumed basis of explanation in his work when rather that nature - individual utility maximisation - is itself an empirical hypothesis which should be tested.

In the way Coase sets up transaction cost economics, it is immune from criticism. Its essential assumption of rational utility maximisation is stated so widely that it can never be attacked¹⁵ and all the power comes from the reality of the boundary assumptions. One can keep adding boundary assumptions indefinitely, but the theory which allows

One Volume with a New Introduction: Prolegomenon to Institutionalism (1973) pp. xi-xii. The empirical richness to be found in Ayres is a very different type of "realism" from that of Coase.

¹⁵ Coase is quite happy to say, in *The Firm the Market and the Law*, p 2, that utility is ".a nonexistent entity which plays a part similar, I suspect to that of ether in the old physics".

this can never be wrong, and this is the most profound failing a theory can have (Popper 1987). Coase's retention of the basic unit of neo-classical explanation in transaction cost economics rather should be viewed as an unscrupulous accumulation of boundary conditions - transaction costs - which have the theoretical form of exceptions to the essential form - neo-classical maximisation - of that explanation. The acceptability of a form of explanation which generates such exceptions as a condition of the basic plausibility of the explanation is entirely suspect (Lakatos 1978). What should be at issue is an assessment of the accuracy of the psychological and sociological assumptions of purely individual utility maximisation as the basis of explanations.

Williamson, we believe, generates more than enough evidence about the necessity of inventing concepts to save individual utility maximisation to show that it should not be saved but, remaining within a broadly Coasean notion of transaction cost analysis, does not attempt the necessary theoretical innovation. It is, however, to Macneil's enormous credit that he attempts to go beyond this type of explanatory structure. His account of long-term contracting behaviour attempts to make co-operative relations central to the explanation, avowedly working against any basic stress on the rational, utility maximising *individual*; we will consider this account now. Macneil explains the boundary conditions of transaction cost analysis not as costs (which should be minimised) but as essential relations which must be fully integrated into the account because their heuristic value in explaining long-term contracting massively dwarfs the purely abstract and obstructive notion of individual utility maximisation.

Macneil's crucial departure from the transaction cost approach lies in his depiction of the phenomena transaction costs describe as costs not as costs but as facilitative relations. The goal of the perfect discrete exchange, even as a remote abstraction, must be eschewed because it is inconceivable outside the relations which constitute even that exchange. Achieving zero transaction costs would not leave the perfect allocations of the rational utility maximiser. It would leave nothing, for those allocations take place only through the relations described as costs. Neo-classical and transactional analysis Macneil (1982 p 961):

...assumes the existence of very complex relations between the parties - relations established through society generally, language, law, and societal economic organization. But once such relations are assumed, the impact of those relations on the analysis is typically ignored. *Ceteris paribus* conquers all...Because economic analysis is the analysis of social behavior, economic man is necessarily in society at all times...potential fallacy lurks in all social analysis starting from the nonsocial, relation-omitting model of neo-classical economics.

As Macneil puts it in an economic fashion: "Because it is impossible to conduct exchange without transaction costs...they are every bit as much a factor of production as capital and labour" (Macneil 1981). Macneil continuously stresses a facilitative relational basis in explaining the content of contracts. He argues that this content is not arrived at by negotiations composed of perfect discrete exchanges conducted within transactional boundaries, but it is the product of negotiations *whose very form* is constituted by external and internal relations.

Macneil's account of the co-operation between long-term contracting parties runs essentially as follows. The self-interest of the individual utility maximiser must bring about a certain element of co-operation between the parties if their separate goals are to be realised through mutual performances (Macneil 1969). However, such co-

operation does not require commitment to the goal of the other party and indeed may, within prudential limits, be inimical to it. The transaction cost analysis describes the structures which set these prudential limits (and other boundaries), but they are to be kept to a necessary minimum in order to give as free a rein as possible to the rational individual allocation of resources by the parties. The exchange remains predicated on narrow self-interest: the elements of co-operation are considered to be an external structure.

For Macneil, the recognition that "...all mutual planning in transactions...is conflict laden", and indeed may involve "...the most brutal kinds of infighting" (Macneil 1974), is coupled with a description of co-operation which gives it a rather more central place than that of "...external material...of little interest" (Macneil 1980 - p91). The common sociality essential for all human activity (Macneil 1980 - p1) and the political limits to self-interest which prevent economic competition from decaying into war (Macneil 1980 - p1) or parasitism (Macneil 1980 - p42), are described, and their elements of co-operation are made central to the relational account. Furthermore, crucially, Macneil then goes on to argue that "...law contributes more than general stability, it is directly facilitative in [that] it provides for the accomplishment of co-operation [and the] continuation of interdependence" (Macneil 1980 - p93) through external and internal (Macneil 1980 - p36) "...values of contract behavior...generated...in billions of contractual relations". (Macneil 1980 - p351)

External norms or values are imposed, not only, nor even necessarily most importantly (Macneil 1980 - p37), by "...the positive law of the sovereign, but also from many other sources [including] private law, such as that imposed on ...businesses by trade associations". Not only are there such relatively "...vertical impositions", but there is also the "...more horizontal imposition of external values, such as those arising from...customs of a trade" (Macneil 1980). These foster co-operation by reducing the "...choice of a party which is reciprocating too little, is too powerful, is terminating relations, or is following arbitrary or other procedures viewed as inadequate" (Macneil 1980--379). Finally, internal norms or values orient "...both [the] actual behavior and [the] principles of right action" (Macneil 1980 -p 38) of contracting parties. A set of, in the latest formulation, ten common contract norms (Macneil 1974 -p808, Macneil 1978 - p895, Macneil 1980 - p40) underpin all contracting by generating a co-operative attitude which respects "solidarity and reciprocity", setting the boundaries within which legitimate negotiation and competition are allowed. A range of relatively discrete and relatively relational norms (Macneily 1980) operate within the common norms, but essential co-operation emerges at this internal level as well as at all other external levels. Any legitimate competition is bounded by an integral acceptance of co-operation as operative within the contract (Macneily 1981)-p1034:

"The word "solidarity" (or "trust") is not inappropriate to describe this web of interdependence, externally reinforced as well as self-supporting, and expected future co-operation. The most important aspect of solidarity...is the extent to which it produces similarity of selfish interests, whereby what increases (decreases) the utility of one participant also increases (decreases) the utility of the other...Seldom, if ever, is this merger of interests complete, but it is omnipresent, immensely significant, and, in a vast range of circumstances, complete for most practical purposes...[S]imilarity of interests may be produced by external forces such as sovereign law. But...solidarity may and does arise internally in relations".

Macneil's analysis of contractual behaviour shows conduct which predominantly is so modelled *with this element of co-operation in the minds of the parties* that a contract "...no longer stands alone as in the discrete transaction, but is part of a relational web" (Macneily 1974). All the negotiating tactics adopted by parties, concerning formation, performance, variation, termination and application of remedies, are explained only as being informed by this attitude, so that, at the heart of the analysis, it is no longer possible to work with the assumptions of perfect discrete exchange, for they cannot plausibly be attributed to an economic actor. Such an attribution "...postulates individuals acting as if the relations in which those individuals exist had no effect on their behavior" (Macneily 1974, 1981, 1982). Transaction cost analysis treats parties as separate individual maximising units and then concerns itself with "the prevention of their *subsequently* acting as separate maximisers, the limiting of opportunism". But, crucially, we should note that in contracts (Macneily 1981):

"...there can be present a "sense of productive increase from the relationship which can dwarf variations in expectation, or of long-term anticipations of mutual benefit that dwarf variations in shares received by parties". This anticipatory, commonly held "sense" of the parties may virtually obliterate any present separation as maximisers, thereby making them effectively a single maximiser".

There are certain elements in Macneil's work which, in our opinion, rather undercut the power of this notion of contracts as "instruments for social co-operation". These turn on a failure to appreciate the limits to the co-operation which can be brought about by contracts properly understood as the legal expression of *capitalist* exchange. The nature of the co-operation arrived at through capitalist competition is, of course, overlaid by many themes of conflict (Bowman 1989). However, in terms of showing that co-operation is an essential and irreducible element of *efficient* long-term contracting behaviour, we regard Macneil's work as a foremost contribution to the social theory of the modern economy. It requires, however, empirical examination and possible factual corroboration of its co-operative hypothesis if its status is to be accepted.

In sum, the transaction cost analysis of contracting holds, in our opinion, the greatest promise for the examination of the difficult empirical case of long-term contract. However, the predominant line of transaction cost analysis in the "law and economics" literature is still so heavily dominated by Coase's quite unshakeable commitment to an assumption of individual utility maximisation as the unit of analysis that realising this promise is faced by serious handicaps. Much transaction cost analysis, and other developments in institutional economics, is beginning to question this commitment. Such questioning is essential is the principal feature of efficient long-term contracting, conscious co-operation, is to be properly appreciated and therefore such contracting be adequately explained.

The Co-Operative Attitudes Of Parties To Long-Term Contracts

Having, we trust, shown the necessity of replacing long-term individual utility maximisation with long-term, mutually reinforcing co-operation as the unit of the analysis of efficient long-term contractual behaviour, we should now like to formalise this idea of co-operation and indicate how we intend to operationalise it in future work and do so in Table 1.

Table1. Model of self-interested behavior which consciously adopts co-operation as the optimal long-term strategy

A: Party 1's analysis of the benefit of the relationship to it B: Party 1's assessment of the value which Party 2 places on the relationship	
Party 1's incentive to continue the relationship	Party 1's disincentive against terminating the relationship
Party 1's expectation of an undefined share in the joint gains to be generated by the relationship (which share is expected to be larger than any gain achievable by it independently)	The loss of any idiosyncratic investment made in the relationship. The potential cost to Party 1 of developing a new relationship and making an idiosyncratic investment in it

This model assumes that the continuance of a long-term relationship does not depend on the sanctions provided by the law nor on direct market pressures but rather on a package of incentives and disincentives established through a continuing co-operative relationship. "A" in this model represents the package of reasons for Party 1's wish to continue in the relationship. These are determined by a, perhaps informal or even implicit but in long-term contracting often highly formalised, cost-benefit analysis of the value of continuing the relationship rather than terminating it and of the costs of terminating it rather than continuing it. Party 1 expects to gain more from the continuing co-operation than from any alternative commitment of resources. "B" in this model provides the justification for Party 1 continuing to rely on Party 2's future co-operation. *This relationship of trust, we believe, is the crucial feature of our model.* It gives Party 1 the incentive to make further idiosyncratic investment in the relationship and it gives that party some protection against Party 2 acting in an opportunistic way to exploit the bilateral monopoly created by the relationship. So long as Party 2 continues to value the relationship more than any alternative commitment of its resources, Party 2 will not intentionally act in such a way as to risk Party 1 deciding to withdraw from the relationship.

Exactly the same model will apply to Party 2's analysis of the relationship. The relationship will continue so long as each party's analysis concludes that continuance is more advantageous than termination *and this essentially requires that each side can continue to trust with confidence in the other's co-operation.* The model requires reciprocity in making this evaluation and in relying on the other party's self-interest in continuance. But the incentives and disincentives of the parties need not be of equal weight, as long as they are each of sufficient weight to generate confident mutual reliance. One party's expected share of the joint gains may be greater than the other's. Nevertheless, each will have an incentive to continue so long as it expects its share to be greater than any profit it could make from any alternative commitment of resources. Similarly, one party may have made a heavier idiosyncratic investment in the relationship than the other. Nevertheless, each party is under a disincentive to terminate if it has made an investment of such a size that it is loathe to lose it.

The thinking of the parties we are trying to drive at runs essentially like this: "I calculate that I shall be better off in the longer term if I continue my relationship with you instead of terminating it; and I also estimate that you similarly have calculated that

you will be better off if the relationship continues". The first stage of our model, A, is the self-interested appraisal which each party conducts of its own position. The second stage, B, is the estimate which each party makes of the cost-benefit analysis carried out by the other party. Let us expand this reasoning.

A: Party 1's analysis of the value of the relationship to it

A1: Incentive on Party 1 to continue the relationship

The obvious starting point is each party's assessment of the net advantages expected to be gained from continuing the relationship, *viz* the surplus of the expected benefits over the expected costs. Unlike a partnership, in which the proportionate shares of the net profit are determined in advance, in a long-term contractual relationship the "shares" which each party will gain are not determined in advance, because each party operates as an independent profit centre. However, each party expects the relationship to generate joint profits which will exceed the sum of the net profits which each party could produce independently and that those joint profits will be divided in a way which exceeds the net profits of independent production. The relationship maximises the joint profit and thus maximises each party's own expected profits. Unless the jointly produced profit meets this standard of being so large as to be likely to yield more than independently produced profits, either party will terminate the relationship, as indeed either will if the division of the joint profit does not in fact yield excess profit. This cost-benefit analysis is not a once-and-for-all one: it will be a continuing assessment updated in the light of current information available to the parties.

A2: Disincentives on Party 1 against terminating the relationship

A second part of each party's own assessment will be the calculation of the expected costs of terminating the relationship. Williamson has identified the importance of idiosyncratic, asset specific investment which is made in a long-term relationship, *viz* the investment of resources which could not be transferred to any other use or to any other relationship (Williamson 1986). If a party were to withdraw, it could not adequately salvage the investment which has been committed to developing the existing relationship. This is an investment which the party expects to generate gains within the existing, unique relationship, but which cannot do so elsewhere.

There may be a further cost to terminating, which is the cost of developing a substitute relationship with another party if that is desired. This cost of developing an alternative relationship will, in a long-term contracting situation, often be substantial. In an empirical study of the relationship between UK car manufacturers and UK car dealers Beale et al (1989), the manufacturers said that the cost of replacing a dealer would be high. It would take a long time to search for a suitable dealer, with only one in fifty applicants being suitable in the opinion of the dealership manager of one manufacturer. Even if the manufacturer could find a suitable applicant with suitable premises, it would take the new dealer a considerable time to learn about a new range of cars, about the manufacturer's distribution network, servicing standards, supplies of spare parts, etc. The cost of finding and training a new dealer clearly was a very powerful disincentive to terminating an existing dealership.

B: Party 1's estimate of the value which Party 2 places on the relationship

In considering the maintenance of the relationship, each party takes into account an estimate of the cost-benefit analysis which it expects the other to be conducting. Each

party estimates the benefits which the other expects from continuing the relationship and estimates the costs which the other would expect to incur from terminating the relationship. Each party relies on the incentive which arises from the other party's expectation of joint excess profits as the outcome of continuing co-operation; and on the disincentive to terminate which arises from the other party's expectation of costs consequent upon the ending of the relationship. From each party's point of view, these costs are a sanction which the other party will suffer if it terminates. This sanction puts restrictions on the opportunistic behaviour which a party may be tempted to adopt. Neither party will exploit the relationship to the point where short run benefits are gained, but only by creating a risk of the loss of long-term profits by provoking the other party to terminate. Opportunistic behaviour puts a party's share of the co-operative gain at risk and creates the further risk of incurring the cost of termination.

In all, we are trying to model the fundamental reciprocity of concerns between the parties, where each identifies its own best interest so closely with the interest of the other that it is inaccurate to view them as individual maximisers. They are joint maximisers. Whilst the parties remain separate profit centres and thus a hypothetical point at which their relationship could be terminated does exist, their typical behaviour is co-operative. If we may partially repeat ourselves, one could say that this is merely sophisticated self-interest. There is no objection to this, if the burden of individual utility maximisation is separated from what is meant by self-interest. We believe that clarity is better served by seeing co-operation and individual utility maximisation as rival explanations.

Hypotheses To Be Tested In Empirical Studies

We are investigating various types of long-term business relationships where we can gain access for observation and interviews with key personnel. (We hope that our colleagues in the Center for Socio-Legal Studies at The Ohio State University will be able to conduct a parallel study in the USA of the same types of relationships, so that useful US/UK comparisons can be drawn). For this purpose, we have developed a number of hypotheses which we propose to test on the basis of the data to be gathered from actual business relationships.

By "long-term relationship", we refer to a business relationship in which the parties (firms or individuals) have made an idiosyncratic investment of resources, and for which no substitute relationship is readily available, *viz* any alternative relationship would involve, first, substantial search costs to find a suitable "partner" and, second, a considerable period of time before the parties could achieve the degree of understanding and co-operation already achieved in the existing relationship. The hypotheses which we have developed and hope to test in empirical studies are:

That the parties to a long-term relationship will continue to co-operate in maintaining and developing the relationship so long as -

(a) (The incentive) Each party calculates that, in the long run, the benefits which it expects to receive as a result of the co-operation will exceed the benefits which it could derive from any alternative use of its resources;

and (b) (The disincentive) Each party is unwilling to abandon the idiosyncratic investment which it has made in the relationship. (The disincentive will be increased if

a party would wish to develop a new relationship with a third party, should the existing relationship terminate);

and (c) (The reciprocal trust) Each party feels confident that a similar incentive and disincentive are operating upon the other party, so that it may rely on the continuing co-operation of the other.

If the hypothesis in (c) above is established by empirical findings, it is likely to carry with it the negative finding that the parties to a long-term relationship do not rely on either legal remedies or on market factors to preserve the relationship.

Our contribution to the analysis of long-term relationships is centred on the emphasis on factor (c) above, the reciprocal trust. The incentive and disincentive in our hypotheses are obviously based on the work of others, but we believe that an important additional factor is trust in the way these factors work on the other party.

It will be clear enough that our model draws heavily on transaction cost analyses, not least of all Williamson's, and in conclusion it is as well to state again what we hope to add to those analyses. The substantial findings of transaction cost analyses presently exist as an, at the very best, heavily unwieldy collection of exceptions to a basic assumption of individual utility maximisation. What is worse is that to the very large extent that they serve to shield that assumption from criticism when it is at odds to the appreciation of the co-operative features central to the long-term contract, they are explanatorily regressive. Following Coase, transaction cost economics largely has cast its explanations in terms of narrowly individual interest when the issue which seems to be of most importance at the moment seems to be the explanation of an emergent relationship of co-operation based on mutual trust. We hope, following Macneil, to place the insights of transaction cost analysis in a more productive framework by setting up those insights not as a protective barrier of exceptions around *individual* utility maximisation but as counter-evidence to holding that assumption to be the only possible basis of the investigation of long-term contracting.

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Relational Contracting - Creating Value Beyond the Project

Barbara Colledge¹

Abstract

Relational Contracting is a transaction or contracting mechanism that seeks to give explicit recognition to the commercial “relationship” between the parties to the contract. In essence, responsibilities and benefits of the contract are apportioned fairly and transparently, with mechanisms for delivery that focus on trust and partnership. At a project level in construction, this can improve working relationships between all project stakeholders, can facilitate efficient and effective construction, can enhance financial returns and can minimise the incidence and make easier the resolution of conflict.

However, the value of relational contracting can extend beyond the project benefiting for example the relationships between the parties in the longer term, or construction industry productivity or profitability. Less well disseminated is the value that relational contracting can create for the wider community or society. The development of sustainable communities is a goal to which society aspires. The adoption of relational contracting approaches can make a significant contribution to the development of social capital, and the four pillars of sustainable communities, those of connectedness, citizenship, creative citizens and competitiveness. This paper considers relational contracting from this perspective and argues for greater recognition of the value created beyond the project.

Introduction

The use of relational contracting models in business generally and in the construction industry in particular has grown over the last thirty years and has acquired significance internationally (See Motiar Rahman, 2004).

“The globalisation of market economies, facilitated by developments in information and communications technology, has led to a shift towards collaboration and partnership as the models for commercial success, and demand a more trust-based approach to innovation and competitiveness” (Bryant & Colledge , 2002,; see also Maclean, 1994, Gold, 1994; Keen et al , 1999 and Snowden, 2000).

This co-operative or relational approach is illustrated by the use of partnering or supply chain management practices for example and in the proposition that relational contracting provides a more efficient and more effective contracting mechanism for certain types of transactions particularly where these demand close collaboration of parties to realise a complex construction project or long term development programmes.

These people and process centred practices have been advocated by a number of recent studies of the construction industry (Latham, 1994; Egan, 1998; RCF, 1995, ECI, 1997; CIB, 1997) and are apparent in the rise in credibility of different forms of contractual

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relationships (for example, the increased use of partnering; the introduction of new forms of contract such as the ECC, GC Works suite, PPC; the use of mediation for conflict resolution). It is the increased mutual trust and co-operation that exists in these forms of contracting that enhances commercial competitiveness and advantage. *"Collective competitiveness is enhanced through exchange and sharing"*, (Bryant & Colledge 2002; Nalebuff & Brandenburger, 1996; Dixon, 2000).

Relational Contracting therefore is a transaction or contracting mechanism that seeks to give explicit recognition to the commercial "relationship" between the parties to the contract. In essence, the terms of the contract assume less prominence than the relationship itself, with mechanisms for delivery that focus on trust and partnership. At a project level in construction, this has been found to improve working relationships between all project stakeholders, to facilitate efficient and effective construction, to enhance financial returns and to minimise the incidence and make easier the resolution of conflict.

However, the value of relational contracting extends beyond the project benefiting for example the relationships between the parties in the longer term, or construction industry productivity or profitability. Less well disseminated is the value that relational contracting can create for the wider community or society. The development of sustainable communities is a shared international goal building on the United Nations Agenda 21 policies (UN, 1978). The adoption of relational contracting approaches can make a significant contribution to the development of sustainable communities through the building of "social capital" (Putnam, 2000), and the contribution to the four pillars of sustainable communities, those of connectedness, citizenship, creative citizens and competitiveness (Colledge, 2004). This paper considers relational contracting from this perspective and argues for greater recognition of the value created beyond the project.

The value of relational contracting in general will be considered first to set this approach in the context of wider economic models of contracting. The value that relational contracting provides to construction projects will be considered next to outline benefits that accrue to the stakeholders involved. Finally, this project-based value will be extended to consider the creation of value beyond the project to include wider social and community benefit that can accrue.

Relational Contracting Theory - Value in General

The relational contracting approach to commercial relationships is part of a wider set of economic models that are intended to provide value in terms of facilitating transaction efficiency and effectiveness. The purpose of such a relationship primarily is an economic one, to facilitate transactions between organisations and to provide a framework for the conduct of the exchange (see Macaulay, 1963; Goldberg, 1976 and Bryant & Colledge 2002). These models vary according to the nature of the exchange and the relationships between the parties to the exchange. Whereas a micro-economic approach focuses on the individual exchange or discrete transaction, theoretically without the prior existence of duties (see Goldberg 1976, pp 49, 51) the relational contracting approach gives recognition to the wider framework of rights and duties created by law and social value. Macneil's richer classification (Macneil 1978, 1983) takes account of the nature and duration of the relationships with levels of trust being a distinguishing feature across the spectrum. Thus, limited features of trust promotion might be displayed in discrete transactions with trust being a strong characteristic in relational contracting models (Eisenberg 1995, Macneil 1983).

This spectrum of commercial relationships results in three broad categories (derived from Williamson, 1981), classical, neo-classical and relational which align with the

general economic concepts of markets, networks and hierarchies (Colledge, 1992). Hierarchies here are seen as “alliances” or “confederations” rather than those associated with bureaucracy or command and control structures. This provides a range of efficient contracting models for commercial transactions that form the basis of those applied in the construction industry in many countries (see Figure 1).

The general value as we move along this spectrum towards relational contracting models is the increasing level of trust that becomes an essential component in sustaining and maintaining the relationship. Whilst most transactions are partially relational, in that they involve “deeply embedded interconnected relations”, (Macneil, 1983, p 345), the influential elements of relational contracting that assume greater significance are co-operation and dependency. A further aspect of this is that there is a shift from trade and competition based on product to one based on process and beyond to the business relationship (Bryant & Colledge 2002). It is the sharing of knowledge for commercial advantage that is apparent in these contracting models (Barlow & Jashapara, 1998)

The general value of relational contracting is therefore in terms of the commercial relationships that are formed. These connections not only foster mutual trust, but also facilitate the sharing of knowledge and information to generate innovation and value for the parties to the relationship. This approach generally is more people orientated as it is the application of tacit knowledge creatively by those involved that will result in competitive advantage. Through these mechanisms, time, cost and quality risks are managed collectively and emphasis is placed on the achievement of wider, shared values or purposes e.g. a successful outcome for the client.

Relational Contracting in Construction - Value for the Project

The nature of construction itself, often highly specialised, complex projects, involving multiple participants, with extended durations for commencement and completion, necessitate relational approaches even on the simplest of building projects e.g. a consumer extension to a house. Therefore it is perhaps not surprising that most construction projects will evidence some forms of relational contracting approaches and that the use of relational contracting in the construction industry has grown world wide.

Criticism of the industry as a whole in the past has focused on the inability of contracting stakeholders to engage co-operatively in the delivery of the client’s objectives and an apparent inability to deliver on time, cost and quality. It would appear that adversarial contracting approaches and the pursuit of individual company gain has resulted overall in a less efficient industry and lower levels of productivity and innovation, (see for example Latham, 1993, 1994; Egan; AAA, 1994).

The shift towards more relational contracting relationships has been evident in the increase of project partnering agreements as a tool, together with the development of construction process relational tools such as project team goals, meetings and reviews. The development of team-based incentive or reward mechanisms are often a feature of relational contracts placing value on the successful outcome rather than in cost, or quality reduction by one of the parties.

The value for the project is in the achievement of time, cost or quality objectives, despite complex and challenging construction parameters, benefiting the client and the project team. The wider benefit is in the process of delivery creating a team or community of stakeholders committed to resolving any construction challenges that emerge. Whilst this may result in commercial value for the parties involved, more significant is the value of effective team working, the development and sharing of tacit knowledge and the longer term benefit derived for future projects. The process of

relational contracting in itself relies on and develops further, creative and competent people. The value in project terms is also the benefit to individual participants in the process of construction and in their enhanced contribution to the company and construction projects in the future.

ECONOMIC MODEL	GOVERNANCE STRUCTURE	FEATURES
Markets	Classical Contracting	<ul style="list-style-type: none"> • Reliance on the market; discrete transaction • Adherence to legal frameworks • Use of legal remedies • Standardised contract planning
Networks	Neo-Classical Contracting	<ul style="list-style-type: none"> • Longer-term relationship begins to assume more importance • Development of relational tendencies • Contract provisions cater for flexibility
Hierarchies	Relational Contracting	<ul style="list-style-type: none"> • The commercial relationship assumes equal or greater importance compared to the legal agreement • Significant sharing of benefits and burdens • Greater interdependence • Bilateral governance (e.g. Strategic Alliance, Partnering) • Unified governance (e.g. Joint Ventures, Mergers)

Figure 1: Economic models and governance structures

Relational Contracting Futures - Value Beyond the Project

The value of relational contracting derives from the way in which strong commercial relationships are developed and sustained for the mutual benefit of all parties. Whilst often related to specific projects or transactions, relational contracting has parallels with the concept of connectedness or the development of social capital (Putnam, 2000). It is this connectedness and the alignment of both the commercial and social corporate agendas that is important in the creation of sustainable communities. Relational contracting therefore has the potential to create value to stakeholders beyond the project to those in the wider industry or community. This is explored further in relation to the four pillars of sustainable communities, Competitiveness, Citizenship, Connectivity and Creative Citizens. But first the notion of community is explored to inform understanding of how relational contracting might add value beyond the project.

The Notion of “Community”

There is an extensive body of knowledge in social science disciplines as to what is a “community” however, there are important elements that are of relevance here.

In defining “Community” in Blackwell’s Encyclopaedia of Political Thought, (Miller D, Coleman J. Connolly W., Ryan A., Eds., 1991, The Blackwell Encyclopaedia of Political

Thought, Basil Blackwell Ltd., Oxford, pp 88-90), Raymond Plant suggests that term “Community” has a high level of use but a low level of meaning and is one of the most pervasive, yet indefinite, terms of political discourse (at p 88). So this makes it difficult for us in developing our understanding of this term.

It can for example assume one or all of the following characteristics:

- A particular form of social interaction
- Something positive and valuable
- Community linked to a location or specific common interest
- Quality of relationships

Ferdinand Tonnies’s “Gemeinschaft und Gesellschaft” (Community and Association) in 1887 sought to determine the qualities associated with a community depending on its origin, for example that communities are born and not made, they evolve over time, they are organic, whereas Maclver’s Community 1917 drawn from Rousseau focused more on a commonality of interests and anticipated that a community can be created by will if there is will for a collective interest or a common good.

How then might such a community be developed by relational contracting methods and what qualities or features need to be fostered?

M. Taylor in “Community, Anarchy and Liberty” 1982, Cambridge University Press pp 26-27 suggested that there are common features of community that need to be considered:

These include:

- Reciprocity
- Beliefs and values in common
- Relations between members are direct and many sided

Above all, it is clear that there is something special about the quality of relationships that makes a social grouping into a community and the same is true of relational contracting.

More recently, Robert D. Putnam has drawn similar conclusions in his major study of the collapse and revival of American Community, “Bowling Alone”. (Putnam, 2000).

In this he reaffirms the notion of a community dependent on relationships, being another term for what he terms “social capital”. He describes this as follows:

“ Whereas physical capital refers to physical objects and human capital refers to properties of individuals, social capital refers to connections among individuals - social networks and the norms of reciprocity and trustworthiness that arise from them”. (Putnam 2000 at p19).

According to Putnam (Putnam, 2000 p 19), social capital, like human and physical capital, increases the productivity of individuals and groups. It facilitates co-operation for mutual benefit and affects our well being, our health, our relationships and our economy. Without it, according to Putnam, our communities would be less efficient and effective. The decline of community in America he argues is as a result of a decline in social capital.

The defining features of social capital are trust, shared norms and networks. In essence, what is identified as social capital in business and industry, such as inter-firm co-operation or collaboration, aligns well with the features of relational contracting. Latham’s UK construction industry reports (Latham, 1993, 1994) were describing the same approach to projects and relationships in the industry, calling for greater social capital, reciprocity, good faith and trust rather than adversarial contracting to foster both individual and collective prosperity, the epitome of a win-win solution. Similar

conclusions were drawn in the USA in 1994, by the “Dispute Avoidance and Resolution Task Force” of the American Arbitration Association:

“During the past 50 years much of the United States construction environment has been degraded from one of positive relationship between all members of the project team to a contest consumed in fault finding and defensiveness which results in litigation. The industry has become extremely adversarial and we are paying the price... A positive alliance of the parties (involved in the construction process) constitutes an indispensable link to a successful project.. Disputes will continue as long as people fail to trust one another.”

(AAA, 1994).

However, reciprocity of a more general nature as contemplated by Latham, is of greater value for building a community. Such a society “is more efficient than a distrustful society! (Putnam 2000 at p 21).

“Generalised reciprocity is a community asset, but generalised gullibility is not”. “ Trustworthiness not simply trust, is a key ingredient”. (Putnam 2000 at p136).

Such an approach is applicable not only to individual personal relationships but more widely in social and business endeavours. What Putnam’s study identified in America however, was that the development of this social capital, of these complex network of relationships had declined leading to a decline of community.

From this it is apparent that the following qualities are important for sustainable communities:

- Connectivity of relationships and social capital
- Beliefs and values in common
- Trustworthiness

It is proposed that relational contracting fosters these qualities and makes a significant contribution beyond the project to sustainable community development. The four pillars of sustainable communities are considered next to identify ways in which relational contracting can add value.

The Four Pillars of Sustainable Communities

The four pillars of sustainable communities, Competitiveness, Citizenship, Connectivity and Creative Citizens and their features are set out in Figure 2 (Colledge, 2004). These pillars (see Figure 3), draw together the thinking on sustainable community development (Egan 2004) and reflect other debates such as regional competitiveness, innovation and knowledge transfer (Egan, 2004), community and social capital (Egan, 2004, Putnam, 2000, Plant, 1991; Taylor 1982) and core cities and Ideopolis (Hutton, 2002, Cannon, 2003). The contribution of relational contracting to each of these pillars is explored.

Pillar	Features
Competitiveness	Sustainable economic prosperity Innovation and entrepreneurship Knowledge transfer
Citizenship	Active citizens Organisational citizens Corporate Social Responsibility
Connectivity	Social capital Connectivity of Relationships
Creative Citizens/People	Development of skills behaviour/attitude of people Creativity, entrepreneurship and tolerance

Figure 2 - The Features of the Four Pillars of Sustainable Communities

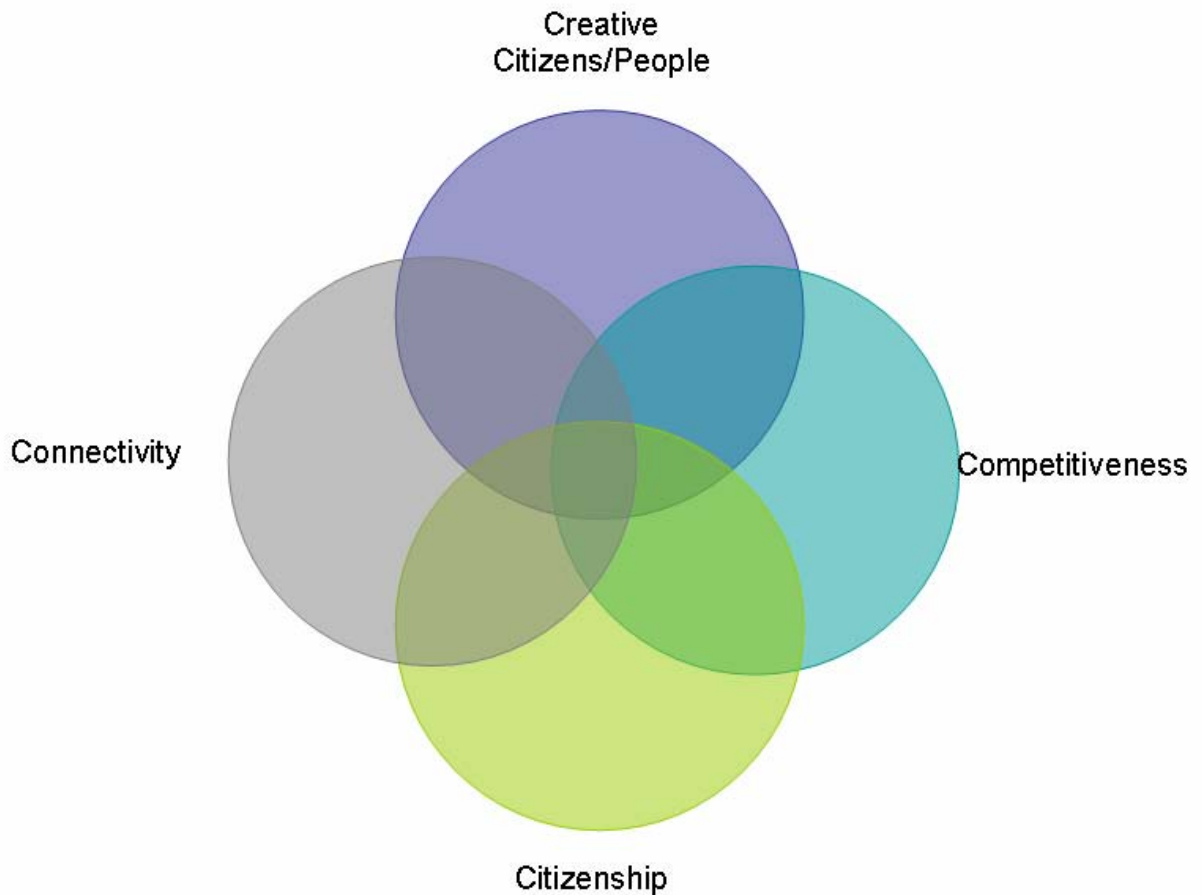


Figure 3 - The Four Pillars of a Sustainable Communities

The Competitiveness Pillar

It is widely accepted that "*Knowledge has been a key dynamic in the long evolution of modern business*", (Bud-Frierman, 1994) and more generally a key component of economic growth (Castells, 1996; Black, 2004). More recently this driver of the economy has emerged through reports such as Lambert (2003) which identified knowledge transfer as critical to innovation and economic success and OPDM (2003), which identified the strength of innovation, and the level and relevance of workforce skills as critical factors for success.

What is apparent is that for the economy as a whole and by association therefore a sustainable community, "*innovation is the key to higher productivity and greater prosperity for all*". (dti 2003 at p5) and "*innovation ultimately depends on the knowledge, skills, and creativity of people at work*" (dti 2003 at p 6)

"Productivity in the UK: The Regional Dimension emphasised that the invention and application of new technologies, products and production processes is a key driver of productivity growth - accounting for around two thirds of UK economic growth in the past fifty years" (OPDM 2003 at p10).

Relational Contracting contributes to this competitiveness agenda through the emphasis on long term relationships, the fostering of innovation through knowledge sharing and the enhancement of project value through lean construction methodologies, thus supporting the economic sustainability of communities (Figure 4). Evidence of the success of these approaches derives from practice in industry and is international in its scope (see for example "Constructing Excellence" in the UK). Case Study 1, drawn from a recent study of quantity surveying firms in the UK provides reassurance that relational contracting approaches are adopted by the more innovative and successful firms.

The Citizenship Pillar

Citizenship involves both rights and obligations as citizens, although the balance and nature of these competing components have generated significant debate.

Aristotle (384-322) developed the idea of the state being a "*community of citizens*" with the state's existence being for the sake of the good life, the aim being the well-being of its citizens. In this state, the citizens' private interests are subordinate to the public good. (Barnes,1991).

In a similar vein, the French moral and political philosopher, Jean-Jacques Rousseau's concept (1712-1778), in his work *The Social Contract* (1762), of "*general will*" informs our ideas of citizenship and community today. That is "*in addition to each individual's self-interest (the private will), the citizen has a collective interest in the well-being of the community.*" (Masters, 1991)

The concept of "Active Citizenship" emphasises that citizens and business have a social or community responsibility. This notion of active participation by citizens in the development and maintenance of a community has been promoted by the UK government more recently with the introduction of Citizenship curriculum in Schools or the promotion of Volunteering in the community through a range of initiatives such as the City Cares projects, or the Millennium Volunteers programme.

Tony Blair's vision of Britain as a community sums up these various elements:

"... A society is a community of people, who share common values and purpose, where everyone thinks of "we" as well as "me", about what they can put in as well as what they can take out...in making a more active community...there will other benefits - less anti-social behaviour; less crime; less of the corrosion of

values ...- and a better understanding that every community rests on how much people give as well as what they take" (Blair, 2000)

This leads to both individual and corporate contributions that support this Citizenship Pillar. Relational Contracting draws on similar values and develops a sense of community and commitment in relation to the project or transaction. However, through corporate citizenship and attention to this wider social purpose, it is possible for relational contracts to add further value to communities (Figure 5). This is illustrated by Case Study 2, demonstrating the way in which business and social corporate agendas can be aligned.

Sustainable Community Action	Relational Contracting Response
<ul style="list-style-type: none"> • Responsibility of individuals and organisations to contribute to the innovation agenda to support the economic sustainability of communities. • Investment in skills development • Knowledge transfer and capacity to absorb and use new knowledge • Networks and collaboration • Education and training • Action long term and beyond own immediate geographical and interest boundaries. 	<ul style="list-style-type: none"> • Investment in skills development • Knowledge transfer and capacity to absorb and use new knowledge • The development of networks and collaboration • Rich interaction with stakeholders • Development of a longer term relationship • Working in partnering frameworks and other forms of project alliances • Development of a learning organisation project culture • Service providers who think and act long term and beyond their own immediate geographical and interest boundaries

Figure 4 - Relational Contracting and Competitiveness

<p>Case Study 1: Page M., Pearson S, Prye S, "Innovation and current practice in large UK quantity surveying firms" RICS, London, 2004</p> <p>Innovative firms displayed the following relational characteristics:</p> <ul style="list-style-type: none"> • Rich interaction with clients and development of a longer term relationship • Working in partnering frameworks and other forms of project alliances (including competitors and firms not associated with construction) • Investment in infrastructure and development of ICT to enhance services and facilitate knowledge transfer • Development of learning organisation culture with the capability to support the systematic diffusion of explicit and tacit knowledge

The Connectivity Pillar

To achieve sustainable communities, changes in attitude and behaviour are needed (Egan, 2004). What is sought is, in essence, a culture change on a grand scale. As Latham identified in his report in 1993, "Trust and Money", a cultural change in the UK

was needed, with components of greater trust, less adversarial and more relational contracting, greater reciprocity and focus on the common purpose of the client’s needs are important new ways of thinking that can lead to a better industry or increased project success. A relational contracting approach was advocated to include provisions such as good faith and partnering.

These components hold true whether applying them to a project or a sustainable community. As Putnam has identified, social capital or relational connectivity between individuals and organisations fosters long term relationships and reciprocity norms that benefit communities as well as the individuals or organisations concerned. It is then important for us to consider how relational contracting might contribute further to this connectivity agenda. As we have seen, a relational contracting approach fosters longer term relationships and supports the potential for added value in the construction process.

Sustainable Community Action	Relational Contracting Response
<ul style="list-style-type: none"> • Citizenship involves both rights and obligations as citizens • Community of citizens with collective interest in community well-being • Citizens and business have a social or community responsibility • Active Citizenship • Need for an effective business case for the behaviours and actions to achieve a better alignment between the Social and Corporate Agendas. 	<ul style="list-style-type: none"> • Community participation - in social, cultural, governance and education areas • Volunteering - through promotion of paid volunteering work-based or industry based schemes • Corporate Social Responsibility - developing the notion of active corporate citizenship. • Inclusive, active and effective participation in governance by organisations • Protecting and improving natural resources and biodiversity (eg air quality, noise, water quality)

Figure 5 - Relational Contracting and Citizenship

This greater connectivity between the various professions and stakeholders, greater partnership working, greater sharing of knowledge and ideas or knowledge capital and greater capacity for creativity, to identify creative, effective solutions is a feature of relational approaches. This longer term perspective in turn facilitates future transactions and projects through both organisational and individual skills developed.

As Putnam has discovered, social capital or connectedness serves to promote wider benefits in terms of the social agenda for communities.

"The most tolerant communities in America are precisely the places with the greatest civic involvement. Conversely communities whose residents bowl alone are the least tolerant places in America."

"The positive link between connectedness and tolerance is especially strong with regard to gender and race" (Putnam, 2000 at pp 355-356)

As this shows, networks or the quality of relationships between people and organisations are important not only for economic prosperity but also for social prosperity or social sustainability. Relational contracting mechanisms can support and foster this connectedness (see Figure 6).

Case Study 2 - British Airports Authority - Heathrow Terminal 5 Project

- Recognised importance of skilled workforce, the opportunity for local people and the contribution to regeneration
- Airport depends on relationships with local community and sustaining these relationships is important for business
- Innovative partnership with local agencies
- Aims to increase local workforce skills and support some growth
- Leadership at Board level including time commitment to local partnerships
- Paid leave entitlement to invest in local community activities
- Local organisations consulted and contribute to target setting
- Joint implementation of projects and Community Liaison Strategy
- Measurable impact achieved - recognised by Business in the Community Award for Excellence 2004

"The positive link between connectedness and tolerance is especially strong with regard to gender and race" (Putnam, 2000 at pp 355-356)

As this shows, networks or the quality of relationships between people and organisations are important not only for economic prosperity but also for social prosperity or social sustainability. Relational contracting mechanisms can support and foster this connectedness (see Figure 6).

In practice, this illustrated by the empirical studies undertaken by Macaulay (Macaulay, 1963) and Beale and Dugdale (Beale and Dugdale, 1975). *"Businessmen often prefer to rely on 'a man's word' in a brief letter, a handshake, or 'common honesty and decency' even when the transaction involved serious risks"* (Macaulay, 1963). The need for maintaining trust, fairness and the spirit of co-operation, is important for maintaining the ongoing relationship. This connectivity is illustrated further by Case Study 3, where partnership working resulted in greater project efficiency.

This echoes the conclusion of a recent report on business innovation, that identified that *"An innovation system is a set of interrelated organisations joined together by opportunities and incentives that exist to bring something new to market"..." innovation systems..become less centred on the individual firm and more based on markets and knowledge networks* (OECD, 2003). The relational contracting approach provides a practical mechanism to achieve this.

The Creative Citizens Pillar

As the Deputy Prime Minister in the UK, John Prescott, has indicated, new skills, behaviours and attitudes are required for the sustainable communities vision to be realised. The development of new skills, behaviour and knowledge (Egan, 2004) includes for example:

Behaviours: Creativity, strategic thinking, open to change, awareness of limitations, challenging assumptions, flexible, clear, decisive, respect for and awareness of the contribution of other professionals

Actions: Entrepreneurial, can-do mentality, co-operation, able to seek help, humility, committed to making it happen, respect for diversity and equal opportunity, able to take action, having a shared sense of purpose.

Sustainable Community Action	Relational Contracting Response
<ul style="list-style-type: none"> • Changes in culture, attitude and behaviour are needed • A strong business community with links into the wider economy. • Social capital or relational connectivity between individuals and organisations fosters long term relationships and reciprocity norms that benefit communities as well as the individuals or organisations concerned. • Networks or the quality of relationships between people and organisations are important for economic prosperity. • The positive link between connectedness and tolerance is especially strong with regard to gender and race • Build capacity and skills to identify opportunities for creative and effective partnerships or relationships. 	<ul style="list-style-type: none"> • Greater trust, less adversarial and more relational contracting • Connectivity between the various professions and stakeholders • Partnership working • Sharing of knowledge and ideas or knowledge capital • Foster social capital and connectedness • Participation of organisations in the development of strategies and plans for their region or city. • Aligning business activities with wider community needs, for example education programmes in schools, development of company policies that meet the needs of the regional workforce (such as nursery policies, flexible working, work-life balance, the example of B&Q and the positive recruitment of an elder workforce). • Contribution by companies to community based activities such as volunteering or cultural events

Figure 6 - Relational Contracting and Connectivity

This requires *“people with the ability to think and work outside their traditional compartments, who can bring together disparate organisations and interests to help deliver the common goal. This will require new skills and new ways of thinking and acting from all those involved in delivery.”* (Egan, 2004 at p 23)

To create sustainable communities, this will require

“...leaders to create the right culture and delivery processes within their own organisations. ..for many this will entail cross-cutting delivery...and require new skills and ways of working that emphasise team, effort, shared values and delivery of common goals.” (Egan, 2004 at p 25)

These same skills for achieving sustainable communities are essential also to the success of relational contracting transactions. Through this relational contracting experience, the capacity of individuals and organisations to engage more effectively in this sustainable community agenda is enhanced (see Figure 7). The need for a culture change in successfully implementing relational approaches is also well established. Projects that fail to achieve this shift in understanding and behaviour develop lower levels of trust and long term benefit. Case Study 4 illustrates practical ways in which this is being addressed.

<p>Case Study 3: BG Transco plc and Laing Limited Utilities Division, Movement for Innovation Case Study Project No 38 (Constructing Excellence)</p>
<p>The design and construction of gas pipeline over a 12 month contract period, £19M project value:</p> <ul style="list-style-type: none"> • A joint project team was formed - the aligned team. • Single objective was to work together to improve efficiency. • Use of the Engineering Construction Contract with non-adversarial relationships. • The aligned team made outstanding progress towards five of Egan’s seven targets for industry improvement. • Overall costs reduced compared to similar recent projects due to innovation and problem solving by the aligned team. • Reduction in disputes released time for engineering.

Sustainable Community Action	Relational Contracting Response
<ul style="list-style-type: none"> • Investment in the development of people is essential for the creation and sustainability of communities • New skills, behaviours and attitudes needed. • Cross-cutting delivery and culture 	<ul style="list-style-type: none"> • Develop creativity, innovation and entrepreneurship • Foster modern working practices such as team working, shared values, common goals • Investment in workforce development • Education and training • Invest in cultural development

Figure 7 - Relational Contracting and Creative Citizens

<p>Case Study 4: British Airports Authority - Heathrow Terminal 5 Project</p>
<p>£3.7 Billion project to be completed 2008:</p> <ul style="list-style-type: none"> • Innovative partnership and integrated seamless team approach • A culture of personal responsibility and improvement • Investment in team development • A can do attitude • No blame culture and open door management • Supplier development unit to help build relationship with project team and manage change • Working with supply chain to improve the design and construction process. • Set target for team to reduce project costs by 10%. • The adoption of best practice for productivity and quality gains

Conclusions

Relational contracting in the construction industry provides added value for those involved, and benefits to project success. However, relational contracting approaches provide a strong foundation for development of essential values, behaviours and actions more generally. In this way, not only is project-value created for the stakeholders concerned but this has wider benefit and impact beyond to industry and the community. As we have seen creating sustainable communities is a complex task requiring a multi disciplinary approach and new ways of thinking and acting. The tangible and intangible value generated through relational contracting approaches, contributes directly to each of the four pillars of sustainable communities, thereby enhancing individual and organisational participation. Further empirical research into and greater recognition of the value created beyond the project by relational contracting is warranted.

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Integrated Project Delivery An Example Of Relational Contracting

Owen Matthews¹ and Gregory A. Howell²

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 practitioners 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 Delivery³ (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 utilities⁵

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.

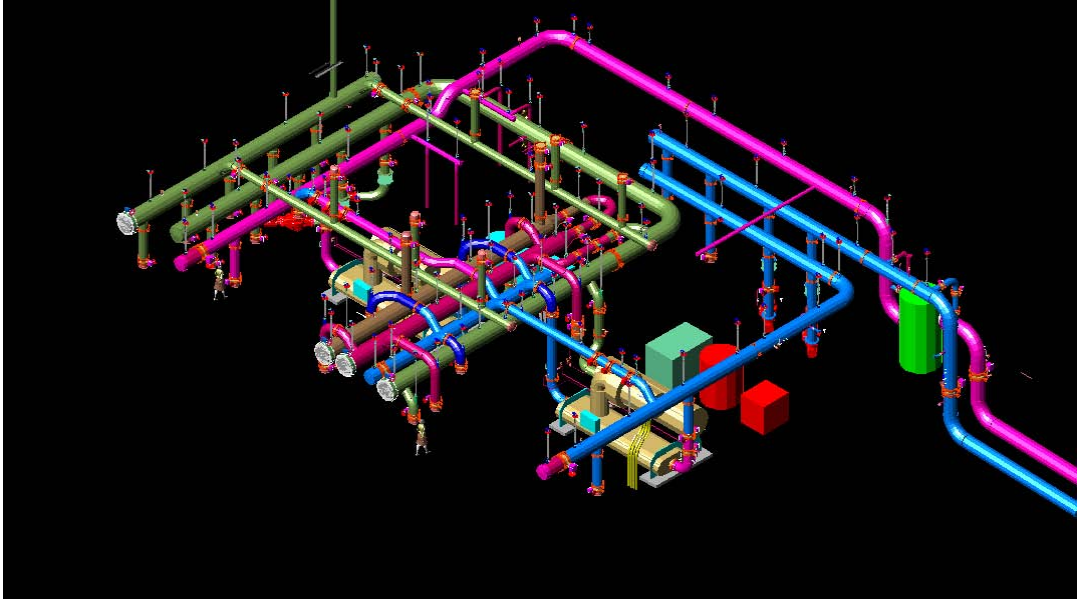


Figure 4. CADD drawing of hanger assembly.

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".

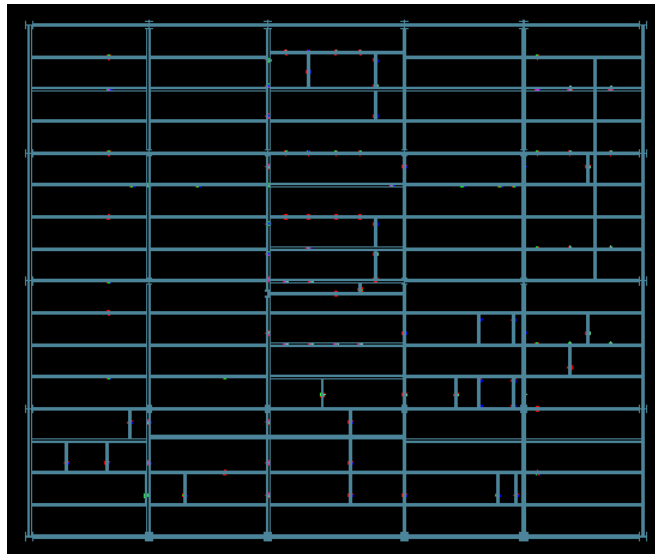


Figure 5. Column grid layout

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.

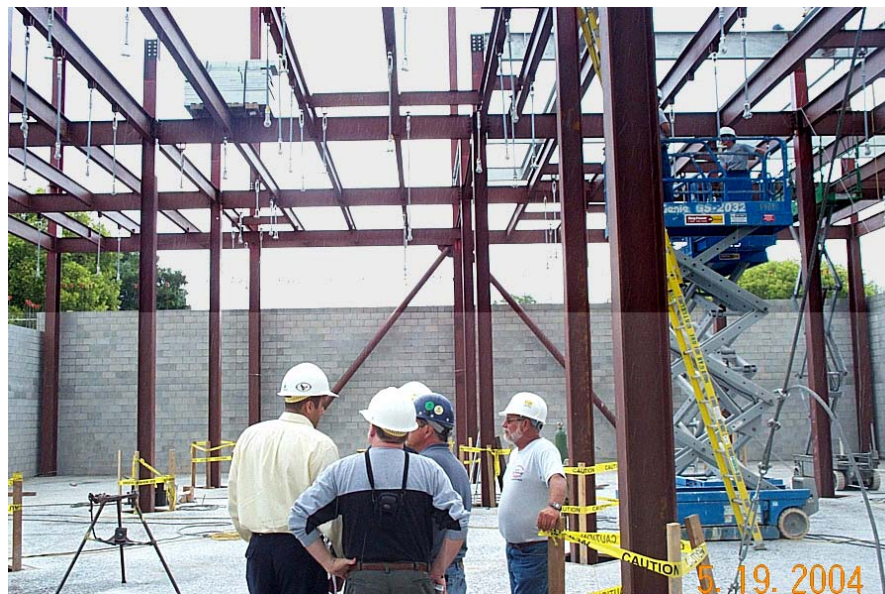


Figure 7. Hanger assemblies installed.

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 Macneil 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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PPC2000: Association Of Consultant Architects Standard Form Of Project Partnering Contract

Katie Saunders and David Mosey¹

Introduction

PPC2000 (Mosey 2005) is a published form of multi-party contract for procurement of capital projects in any jurisdiction. It is based on heads of terms devised by the cross industry Construction Industry Council Partnering Taskforce and was drafted by the UK and International law firm Trowers & Hamblins. PPC2000 was launched by Sir John Egan in September 2000 and has since been adopted on over £8 billion of construction and engineering projects. The key differences between PPC2000 and other published contract forms are that:-

- it integrates the entire Project Team under a single multi-party contract;
- it covers the entire duration of the procurement process.

Integrated Team

A multi-party contract puts the Constructor, the Consultants and key Specialist Sub-contractors on the same terms and conditions, so that they are fully aware of each other's roles and responsibilities and owe each other a direct duty of care. This avoids the risk of inconsistencies, gaps or duplications otherwise present in a series of two party contracts and thereby establishes a much stronger contractual base for all activities. It also avoids the Client having to act as the conduit for communication and resolution of problems between other team members.

Integrated Process

To obtain better value from projects it is essential to harness the maximum input to design development and risk management from the main contractor (the "Constructor") and its Specialist Sub-contractors at the earliest opportunity. PPC2000 creates the contractual structure to achieve this by providing for the Constructor, Consultants and Specialist Sub-contractors to be appointed as early as possible in the design development process and to work in accordance with a single integrated timetable to achieve all necessary pre-conditions through to commencement of the Project on Site.

As a project management tool PPC2000 therefore creates a clear structure and set of processes to govern the pre-construction phase of the Project. This is the time when value can be added by the Constructor and Specialist Sub-contractors in terms of:-

- Contributions to design development;
- Value engineering of existing designs;
- Value management by the assessment of alternative solutions; and
- Analysis/management of Project risks with a view to reducing or eliminating their costs.

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Build up of Designs/Supply Chain/Prices

The early creation of a team, if it is to include the Constructor, requires agreement of a Project Budget and the Constructor's level of profit and overheads. It therefore envisages the selection of a Constructor on the basis of a mix of financial and qualitative criteria rather than simply a lump sum price. PPC2000 provides for flexible processes to reflect the Client's needs, based on the following logical sequence of activities:-

- design development with Constructor input and provisional Specialist Sub-contractor input;
- analysis of Constructor business cases for any single source selection (through direct labour or preferred Specialist Sub-contractors) and the open-book tendering of other sub-contract packages;
- approval of each works package and agreement of whether Specialist Sub-contractors will join the overall Project Partnering Team, in either case with the approval of robust fixed prices;
- analysis and management of risks to reduce or eliminate price contingencies;
- incentivisation of cost savings and added value proposals that derive from the value engineering of designs (where prices have previously been approved) or the reduction of risks (where risk contingencies have previously been approved);
- the finalisation of an Agreed Maximum Price supported by a full Price Framework, with a complete supply chain and after satisfaction of all other pre-conditions to commencement of the Project on site.

Project on Site

The new processes under PPC2000 continue not only during the pre-construction phase but also during the construction phase. They include the following:-

- an Early Warning system as regards any problems in performance;
- advance evaluation of any proposed change or the event of delay or disruption and a restriction on the Constructor's right to obtain additional profit or central office overhead as a result of delay or disruption (effectively the earlier involvement of the Constructor in an ordered process through to start on site is a trade-off for excluding their right to benefit from later claims if there are problems on site);
- operation of a Core Group of key individuals representing team members, who are the medium for adding value through a partnered collaborative approach - if they can reach agreement (if they can't, the Project proceeds on the basis of the agreed documentation);
- a contractually binding Project Timetable governing the interface between team members during the construction phase, thus following on from the Partnering Timetable that governs those activities during the pre-construction phase;
- agreed incentives including financial links between achievement or non-achievement of agreed Key Performance Indicator targets;
- a structured approach to alternative dispute resolution including a Problem-Solving Hierarchy and reference to the Core Group, conciliation or mediation;
- the use as appropriate of a Partnering Adviser to support the entire team (rather than an individual member of it), documenting their relationships and advising on the new relationships and processes in practice.

Contrast with alternative approaches to procurement

A number of the innovations in PPC2000 also present to some degree in the New Engineering Contract "NEC" (Telford 2005) suite of contracts (e.g. early warning and advance evaluation of changes/delay/disruption). PPC2000 has the benefit of taking these much further and achieving a level of integration not present in NEC or any other form of contract. PPC2000 is designed to overcome the following risks that arise under many traditional contracts:-

- protracted design development in the hands of Consultants without Constructor/Specialist input as to innovation/buildability/affordability;
- inadequate information issued to Constructors at tender stage so that they add excessive price for risk;
- inadequate time for tendering so that Sub-contractor prices are estimated only (with further risk contingencies added) and so that Sub-contractors do not provide added value - because they are tendering to someone who has themselves not yet won the Project;
- hidden information as to the relationship between the Constructor and its Specialist Sub-contractors (by way of discounts etc.), "Dutch auctions" to obtain cheaper Sub-contractors later and enhance Constructor profit, and lack of open-book pricing information - particularly relevant if there are changes or costs arising from delay/disruption;
- inability of team members to declare problems early and propose solutions, for fear of inviting claims;
- absence of advance information in relation to changes or delay/disruption, to enable the Client and other team members to mitigate their effect;
- absence of binding timetables, with the result of misunderstandings and consequent delays;
- absence of alternative ways of resolving disputes, thus encouraging the risk of adjudication/litigation/arbitration.

PPC2000 in practice

In its early days PPC2000 was adopted primarily by the public sector on housing programmes. It has since spread very quickly to other sectors and types of work. Relevant projects/programmes range in value from £½ million to £800 million and include:-

- a) De Vere Hotels who used PPC2000 for a major capital project in Scotland;
- b) BAE Systems, who adopted PPC2000 as the basis for a capital programme covering all construction and engineering projects including offices, production and manufacturing facilities, runways etc, and who have obtained good time/cost/quality results on early projects;
- c) Virgin Trains who adopted PPC2000 on a capital programme for station upgrades and retail facilities, and who were particularly impressed by the contract's programming provisions;
- d) Durham County Council who are using PPC2000 on a £575 million programme over 7 years to cover all highways and bridge projects and all schools and other public buildings projects, recognised as a "Pathfinder" project by the Office of the Deputy Prime Minister;
- e) Surrey County Council who have adopted PPC2000 as the basis for a 10 year strategic programme for all highways and bridge projects with an aggregate

value totalling £340 million, a project which won 3rd place in the 2003 Lawyer Awards for "Public Sector Team of the Year".

- f) Manchester Airport who achieved major cost savings through using a "construction management" adaptation of PPC2000 on two terminal projects;
- g) HM Prison Service who have adopted PPC2000 for their £2-3 billion strategic programme.
- h) Department of Work & Pensions and Land Securities Trillium who use PPC2000 for a £500 million "roll-out" programme for Job Centre Plus projects across the UK, winning the OGC Government Procurement Award and the "Building" Health and OGC Safety Award in 2003.

Many of the projects adopting PPC2000 involved private funders, including for example the first major programme which comprised £240 million of housing upgrade in Coventry. In addition PPC2000 has been accepted by professional indemnity insurers and by a wide variety of consultants and constructors and specialist-sub-contractors.

Trowers & Hamblins' Role as Partnering Adviser

Trowers & Hamblins drafted PPC2000, the related Specialist Sub-Contract SPC2000 and the official published Guide to both forms of contract (Mosey 2005).

Trowers & Hamblins have drafted bespoke adaptations of PPC2000 and SPC2000 to deal with:-

- Creation and operation of development teams;
- Provision of operating and maintenance services;
- Strategic alliancing and framework arrangements;
- Construction management partnering;
- Minor works partnering.

Partners and solicitors from Trowers & Hamblins fulfil the role of "Partnering Adviser", supporting teams who utilise PPC2000 and providing training and guidance as required. Full details of these services are available on request.

International

PPC2000 has attracted considerable interest world-wide and is under detailed consideration in countries which include Australia, Singapore and Japan. It has already been used successfully on bank refurbishment projects in West Africa and has been adopted for a major Embassy Project in the Middle East.

PPC2000 is specifically designed to be used in any jurisdiction and with any legal system, subject to a minimum of adaptation.

Availability and User Group

The following documents are available in published form from the Association of Consultant Architects (www.ACArchitects.co.uk) or from Trowers & Hamblins:-

- PPC2000;
- SPC2000 Form of Specialist Sub-Contract for use with PPC2000;
- Guide to PPC2000 and SPC2000.

There has recently been formed a PPC2000 User Group for development of best practice and exchange of information between clients, constructors and consultants on PPC2000 projects across the UK. Further details are available from the Association of Consultant Architects and Trowers & Hamblins.

There also exists an Association of Partnering Advisers to ensure accreditation of individuals who are suitable and experienced to support the implementation of PPC2000 in practice. Numerous partners and solicitors in Trowers & Hamlins are members of the Association of Partnering Advisers (www.partneringadvisers.co.uk), and further details can be provided upon request.

Conclusions

PPC2000 is a medium to achieve greater integration and better results in the procurement of any capital Project in any jurisdiction. It requires, and rewards, closer client involvement in the Project and creates a new set of relationships and processes leading to:-

- removal of gaps/duplications between team members and avoidance of confusion and wasted time/money resolving these at a later stage;
- clear timetables through to start on site and resultant savings in cost;
- earlier Constructor and Specialist input leading to innovations and efficiencies with the potential to improve quality/reduce cost;
- more open cost information to establish price accuracy, removal/reduction of arbitrary price contingencies, and closer control over the consequences of changes and unforeseen events;
- improved performance of Constructor/Consultants/Specialists through early creation of a team supported by improved communication and mutually compatible roles and responsibilities.

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Project Alliancing: A Relational Contracting Mechanism for Dynamic Projects

Matthew W. Sakal¹

Abstract

The environment in which construction projects are accomplished today often involves completing complex, uncertain projects within tight budget and time constraints. In this environment 'change' is a defining characteristic and is inevitable. Unfortunately, most traditional contracts do not embrace change, but instead treat it as an anomaly by trying to specify every possible contingency and assign liability in the event change occurs. As projects become more dynamic, this increasingly leads to detrimental adversarial relations as individuals focus on protecting profit and not collaborating to maximize project performance. In response to traditional contracting limitations, Project Alliancing, developed originally by British Petroleum in the North Sea, is a relational contracting mechanism widely employed by Australia's public sector to handle high visibility, complex capital works projects. Project Alliancing is a dramatic departure from traditional contracting methods in that it encourages project participants to work as an integrated team by tying the commercial objectives (i.e. profit) of all the parties to the actual outcome of the project. In this arrangement all decisions are made "best for project" and not "best for individual" since the alliance either wins or loses as a group.

Keywords: Project Alliancing, relational contracting, project management, contract

Introduction

Over the last four decades, construction projects have continually become much more dynamic in nature, largely due to the increasing complexity and uncertainty of these projects. In addition, the industry as a whole has become much more dynamic as illustrated by its continual fragmentation (McGuinn 1989) which contributes specifically to increased complexity—more parts, more interfaces. In the face of this challenging dynamic environment, clients continually attempt to reduce project costs and design/construction time while still demanding high quality final products.

In all construction projects 'change' is a defining characteristic and is almost inevitable. This is especially true as projects become more dynamic. In order to achieve truly outstanding project outcomes, dynamic projects require contracts that are designed specifically to embrace and manage change. Unfortunately, most traditional contracts do not embrace change, but instead treat change as if it is an anomaly. This is illustrated by the fact that traditional contracts attempt to predict and specify all possible eventualities by drafting contracts to prepare for the worst-case scenario. Unfortunately, the goal of trying to achieve "100% planning is never achieved in life" (Campbell 2004). Therefore, when changes do occur, the focus of traditional contracts is on "the bump at the bottom of the cliff" which leads to difficulty (Cockram 2002) and not on the cooperation that is necessary to embrace change and diffuse problems before they get out of control. McInnis (2004) echoes this sentiment when he states, "The success of the contractual relationship depends less upon what has been agreed than upon how the parties will agree to handle events in the future." This is one of the

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fundamental issues that separates relational contracts from traditional, more 'discrete, transactional', types of contracts.

Another problematic issue with using traditional contracts for dynamic projects is that instead of focusing on maximizing project outcomes and creating a good framework for developing a collaborative environment between the parties involved, they are generally legal shields, written in a biased manner to protect the drafter. For the most part this is due to an overall lack of trust of one another. Owners often use contracts in an attempt to shed unbearable risk to contractors through the form of harsh exculpatory contract clauses. This subsequently leads to large contractors passing the same risk onto the shoulders of smaller subcontractors who are the least able to financially bear the risk. Often owners feel that the shedding of risk to the contractor through clear documentation in the contract will reduce the number of claims and disputes. This is not correct. Not only does it not prevent disputes, it actually causes increased antagonistic relations between the owner and contractor that are clearly not in the best interest of the project (Steen 1994). Besides increased conflict, Ruben et al. states that, "harsh contracts discourage responsible bidders" as well as "attract those bidders willing to take any kind of chance, or those who expect from the outset to make up their dollars via claims" (Rubin et al. 1999). In fact, as explained at the 5th Annual meeting of the American Bar Association's Forum on the Construction Industry, "the General Committee of the Forum on the Construction Industry has identified the use - more accurately, the abuse - of the risk allocation process as one of the principal causes of the present morass in the construction industry" (McGuinn 1989).

While most of the construction industry seems resigned to the fact that there's no better way to conduct business and, therefore, continue to experience the negative ramifications of using traditional forms of contract, there are progressive groups searching for ways to improve. These parties have begun creating and implementing new innovative relational contracts to address the inherent problems of using traditional standard forms of contract on dynamic construction projects. A prime example of a relational contract that is proving to be very successful at meeting these new demands is Project Alliancing. Project Alliancing, developed originally by British Petroleum in the early 1990's, is a relational contracting methodology widely employed by Australia's public sector to handle high visibility, complex capital works projects. This innovative contracting mechanism is a dramatic departure from traditional contracting methods in that it encourages project participants (client, designer, contractors) to work as an integrated team by tying the commercial objectives (i.e. profit) of all the parties to the actual outcome of the project. In this arrangement all decisions are made "best for project" and not "best for individual" since the alliance either wins or loses as a group. What follows is a description of Project Alliancing's origination and its main characteristics.

The Birth of Project Alliancing

In the early 1990's British Petroleum (BP) faced a daunting situation. Known oil reserves in the North Sea had become uneconomical to exploit due to their smaller size and, at the same time, competition began appearing from other attractive drilling locations around the world (Knott, 1996). It became apparent to BP that the only way to profitably tap into these reserves was to somehow reduce the high project development costs. Not surprisingly, BP's first attempt involved the traditional approach of trying to engineer a cheaper project through the use of the latest technology. While important, this strategy provided only minimal reductions in development costs—failing to delivery the necessary cost savings to make the project economically feasible. BP began to realize that something more drastic needed to be

done. As a result, BP decided to explore a departure from its standard business strategies (i.e. competitive bidding and traditional risk allocation contracts) that generally resulted in mistrust and conflict between the contracting parties. To prove that it was serious, BP chose a notoriously problematic oil reserve named Andrew field as its showcase trial project. As John Martin, BP Project Manager, states, "An even more radical formula was called for, a complete departure from the usual style of oil industry contracting, one which required a step change in behavior. The adversarial relationships between oil companies, contractors and suppliers had to be confined to the history books - we believed that only by working in close alignment with our contractors could we hope to make Andrew a success. To this end, behavior was identified as the essential partner for technology; the twin building blocks which if brought together could be capable of producing extraordinary results" (Knott, 1996).

The realization that a radical change in behavior was necessary was a critical breakthrough in BP's search for a more effective contracting method. To this end, BP realized that its new contracting strategy would need to create an environment that somehow necessitated commitment to teamwork, relationship development, and trust. In order to accomplish these lofty aspirations, BP's project team knew that it had to figure out a way to align each project participant's commercial interests to the actual project outcome. The traditional practice of contractors making suboptimal project decisions in order to optimize or protect their profit had to change. To accomplish this transformation for the Andrew Field project, BP developed a new "painshare - gainshare" compensation program. This contracting methodology, ultimately named Project Alliancing, involved complete open-book accounting, *sharing* all "uninsurable" risk between all project members, and setting an initial target cost generated by the whole project team. This target cost would then be compared to the final cost and the under or over-runs would be shared by all project participants. In other words, the team would win or lose financially as a group depending on the overall project performance. Another critical aspect of BP's new contracting strategy involved team member selection. The seven main contractors that formed the alliance with BP were not selected competitively based on cost, but instead on virtue since project performance was now the undisputed main priority around which everything else centered.

The incredible results of the Andrew field project clearly illustrate the resounding success of BP's new relational contracting tool-- Project Alliancing. Before instituting these new innovative contracting methods and after many attempts to reengineer the project using the latest technology, estimates for the Andrew field project originally stood at £450 million-- well above the necessary development cost to achieve profitability. In order to send a clear message and show prospective contractors BP's sincere desire to change the way it did business, BP initially set an astonishing target estimate of £270 million as part of the Project Alliance bid documents. After a rigorous contractor selection process and six months of intense collaboration with the partners, the project team agreed to a target cost of £373 million; almost £80 million lower than the previous low estimate! Then, due to unprecedented dedication to teamwork and growing trust, within 3 months after the project commenced the alliance had already revised this estimate down to £320 million and the team felt the project could be finished three months earlier than originally scheduled. Ultimately, the final cost ended up at, amazingly, just under £290 million and the project began producing oil 6 months before originally scheduled! John Martin, BP Project Manager, explained, "To achieve this degree of cost reduction and produce oil six months ahead of schedule was never in my wildest dreams at the time" (Knott, 1996).

Project Alliancing: The Specifics

Since the completion of the Andrews field project in the North Sea, BP has continued to use the Project Alliancing relational contracting mechanism as a means to compete with and differentiate itself from its competitors (Peters 2001). Project Alliancing has also now been refined and used in several different countries, but the country that has most eagerly embraced this new contracting strategy is Australia. The first two projects to use Project Alliancing in Australia were 'The Wandoo Project', an oil field project started in April 1994, and 'The East Spar Project', a gas field project that began in July 1994. Ultimately, based on the resounding success and good press of these two projects, other Australian clients and contractors in the heavy civil works sector took notice and began learning about and utilizing this new collaborative model. Today, numerous large, complex Australian private and public civil works projects have been constructed using Project Alliancing's relational contracting techniques (Peters 2001). Besides heavy engineering projects, Project Alliancing has also been successfully employed in the commercial building sector, with the first being the construction of the National Museum of Australia completed in March of 2001².

So what is it specifically that has made Project Alliancing such a popular relational contracting tool for managing dynamic projects in Australia? According to the Australia Government Department of Defense, "Use of a Project Alliancing contracting methodology can assist to overcome some of the difficulties faced by Defence in its traditional methodologies for certain high risk acquisition projects, including inappropriate risk allocation, cost overruns, schedule delays and adversarial relationships with industry. Project Alliancing has the potential, in some circumstances, to assist in improving relationships with industry, and to produce better returns for both Defence and industry" (Australia 2005). More specifically, through a unique compensation model that aligns project participants toward achieving outstanding project outcomes, Project Alliancing encourages collaboration and innovation between project participants in a way that is unrivaled by traditional, more discrete forms of contract. In more traditional standard forms of contract, compensation is commonly tied to an individual party's performance and not the project outcome, which typically leads to decision-making that is "best for self" and not "best for project". Also, as projects become more dynamic, the Project Alliancing team's ability to react to multiple future outcomes is far superior to traditional contracting mechanisms that are more appropriate for slow, stodgy, fixed scope projects. This is reinforced by the Australia National Audit Office (2001), in its 'Contract Management: Better Practice Guide' when it states, "Alliance relationships are best suited for providing services that are *difficult to define* or are *likely to change substantially over time*, critical to an organization's performance or *requiring innovative solutions* from the provider and *creative management* by the purchaser."

It's important to note that Project Alliancing is more than just a contract; it's a new approach to conducting business and constructing projects that's a dramatic departure from traditional contracting practices-- where trust is in short supply and antagonism runs rampant. Driven by its compensation model, Project Alliancing demands collaboration, cooperation, and "best for project" decision-making. Other essential core alliance principles are a no-blame culture, equitable sharing of risk and reward, and open and honest communication between the parties (Ross 2003). Project Alliance's also require tremendous buy-in at the outset from the top management levels

² The National Museum of Australia project was a complete success. It opened on time, under budget, and with high quality scores due to a highly innovative, collaborative project team. For more information on the museum project, refer to Hauck et al (2004).

of each project participant in the cultural shift away from traditional risk-allocation and distrust, towards the principles of this new relational contracting mechanism. When project participants are carefully chosen for dynamic construction projects and all parties are completely committed to the alliance principles, Project Alliances can lead to extremely powerful innovative and collaborative relationships that result in outstanding project outcomes.

The following is a detailed explanation of Project Alliancing covering the specific topics listed below:

- Essential Features of Project Alliancing
- Risk Sharing vs Risk Transfer
- Compensation Structure
- Development of Alliance
- Value for Money?

Essential Features of Project Alliancing

While certain elements within Project Alliances differ from project to project, to maximize the probability for success all Project Alliance projects should have the following characteristics (Ross, 2003):

- 1) All uninsurable risk in the project is shared between alliance project participants, as opposed to specifically allocating risk which is common practice in traditional standard forms of contract (see Risk Sharing vs Risk Transfer below).
- 2) The Alliance participants are paid using a 3-limb, open-book compensation model where Limb 1 fees are guaranteed and Limb 2 fees are the maximum amount that the participant can lose for target cost overruns (see Compensation Structure below):
 - *Limb 1*: direct project costs and project overhead
 - *Limb 2*: corporate overhead and profit
 - *Limb 3*: predetermined gainshare/painshare arrangement depending on how the final cost compares to the target cost
- 3) Project is governed by a "Project Alliance Board (PAB)" where decisions need to be unanimous
- 4) Project management team that handles daily issues is made up of participants from all parties; team makes decisions for the best interest of the project with no outside influence from actual employers
- 5) All alliance disputes and conflict will be handled internally with litigation being reserved only for very rare circumstances

Risk Sharing vs Risk Transfer

As explained earlier, with traditional standard forms of contract, owners often use contracts as legal shields in an attempt to shed risk to contractors through the form of harsh exculpatory contract clauses. This subsequently leads to larger contractors passing the same risk onto the shoulders of smaller subcontractors who are the least able to financially bear the risk. This attempt by project participants to protect themselves by shedding risk ultimately backfires and leads to adversarial relationships and costly litigious battles. As Rubin et al. (1999) writes, "the scenario for construction claims is invariably written right into the contract documents. Long before men and machines reach the jobsite, conditions for claims and disputes have often been signed by both parties". In fact, as projects become more dynamic and changes become more

frequent, no matter how fairly the drafter attempts to allocate risk with its associated liability, it is impossible to draft a contract to predict all possible outcomes (Campbell 2004). Therefore, this again leads to adversarial relationships as the project participants struggle to deal with the repercussions of “change” that are not supported by the contract.

Project Alliancing, on the other hand, handles risk completely differently than traditional contracts that attempt to allocate (or shed) risk between project participants. Due to the ‘painshare-gainshare’ compensation model structure, in Project Alliancing all uninsurable risk is shared between the contracting parties with the assumption that collective responsibility leads to improved overall project outcomes. The result of sharing risk (as opposed to allocating risk) is that the project team will either win or lose as a group, therefore, creating an environment where teamwork and collaboration are a necessity for success. There is no incentive in this scenario for a single party to focus on maximizing individually, since the individual succeeds only if the overall team and project succeeds. This leads to all project decisions being made “best for project” instead of “best for self”.

Compensation Structure

If the core alliance principles (i.e. no-blame culture, open and honest communication, encouragement of innovative thinking, etc.) are the heart of Project Alliancing, then the backbone providing the structure is the compensation model. As previewed under *Essential Features of Project Alliancing*, Project Alliancing’s ‘gainshare/painshare’ compensation model consists of a 3-limb, open-book compensation model. The 3 components of the compensation model are broken up as follows (see Figure 1). Limb 1 fees are all direct project costs, including rework, and project overhead incurred by the Alliance team members. These fees are viewable by all the contracting parties using 100% open-book accounting and must not include any hidden elements of corporate overhead or profit. Limb 2 fees refer to corporate overhead and profit. They are generally a fixed lump sum that is set as a percentage of the target cost. Limb 3 fees involve predetermined gainshare/painshare arrangements depending on how the final cost compares to the target cost.

The most critical component of Project Alliancing’s painshare/gainshare model is the development of the target cost. Once the selection process of all the essential non-owner participants (NOP’s) is completed (as will be discussed further in *Development of Alliance*), the new alliance begins an incredibly intense, dynamic period of collaboration and innovation in an attempt to develop a target cost for the project (Ross 2003). Once developed, this target cost is used as a benchmark with which to compare the actual cost (Limb 1 fees) at the end of the project. If the actual cost of the project comes in under the target cost, then the alliance as a whole wins and splits the savings (Limb 3 fees). If the actual cost of the project ends up greater than the predetermined target cost, then the entire alliance team loses and shares in the losses.

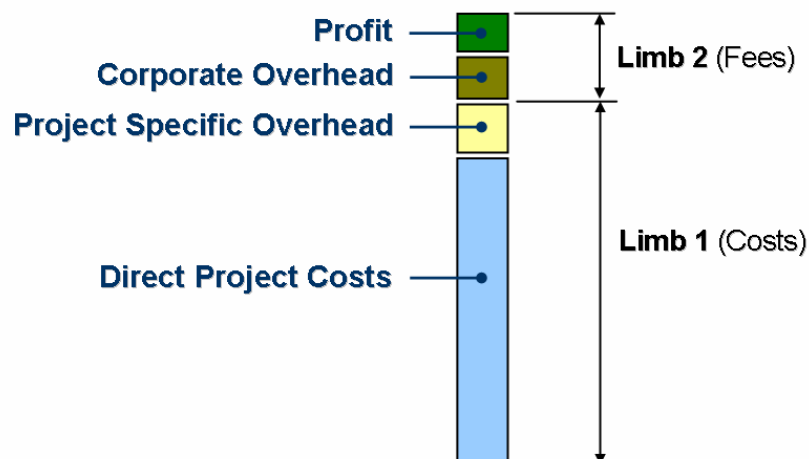


Figure 1: Project Alliancing Compensation Model (Ross 2003)

This may seem like an unacceptable risk for contractors who have agreed to give up a lot of control by sharing risk amongst the alliance. In order to address this concern, in pure Project Alliances NOP's are guaranteed to receive *at least* their Limb 1 fees (direct cost and project overhead), so that at worst their risk is capped at only losing their Limb 2 fees (corporate overhead and profit). Owners then take on the financial burden once the NOP Limb 2 fees are exhausted. By capping NOP risk, these provisions make Project Alliancing attractive to contractors and designers, while also providing the not so appetizing potential for total loss of profit and corporate overhead. These provisions are also attractive to owners since the capping of risk lessens the need for higher NOP fee percentages and inflated target cost estimates due to lower NOP risk exposure.

Now it's time to focus on Limb 3 fees and the predetermined "painshare/gainshare" arrangement (see Figure 2). As previously explained, the guaranteed Limb 1 fees are compared to the target cost at the end of the project in order to determine if the alliance wins or loses as a group. Before the target cost discussions even begin the alliance predetermines how the savings or over-runs will be divided between the owner and NOP's. While cost is indeed the major factor for determining the sharing of pain or gain, it is also supplemented by other non-cost factors, Key Result Areas (KRA's), which are measured using Key Performance Indicators (KPI's) (Ross 2003). The KRA's are other project outcomes besides cost (i.e. schedule, quality, etc.) that the owner values. The KRA's collectively are assigned an overall percentage of the target cost that the NOP's can either win or lose based on their performance in these areas. Individually they are weighted in relation to each other and scored based on the arranged KPI's. For instance, for a \$100 million project, assume the actual costs came in \$2 million under the target cost and the KRA's had been assigned as 2% of the target cost (\$2 million). If the performance on the non-cost KRA's was exceptional, then the NOP's collectively could make up to \$2 million more than their split of the \$2 million cost under-run. On the other hand, if the team performed poorly on the KRA's the NOP's could lose up to \$2 million dollars—more than wiping out their entire split of Limb 3 fees! Therefore, by including the non-cost factors into the painshare/gainshare model, the client provides extra incentive for the alliance to achieve outstanding performance in these areas.

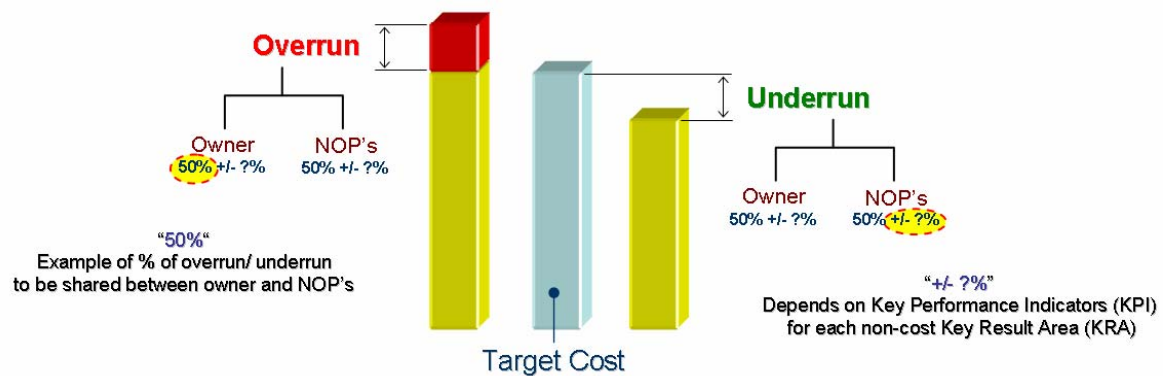


Figure 2: Limb 3- Sharing of Pain/Gain (Ross 2003)

Development of Alliance

After deciding that Project Alliancing is the right contracting mechanism for the proposed project, the process of developing the alliance begins. The development of a Project Alliance can be broken up into four distinct parts: selection of preferred alliance team members, commercial discussions, interim Project Alliance Agreement, and the final Project Alliance Agreement (Ross 2003).

The first step in setting up a Project Alliance is the selection of the preferred non-owner participants. Selection of the right participants is the most important step of the four aforementioned steps to developing an alliance. It is absolutely critical to the overall success of the project. This is due to the fact that the Project Alliancing contract is a relational contract that requires absolute dedication to a step change in behavior between the project participants in order to be successful. Therefore, besides typical technical skills, alliance proponents are chosen based on their willingness to buy-in completely to the ideas of sharing risk, open and honest communication, and creating a "no blame" culture that encourages collaboration and innovation. To this end, the selection process is very robust to ensure that it is virtually impossible to select the wrong proponents. To serve as an example, the following two figures offer the participant selection criteria and the selection process used for the aforementioned National Museum of Australia project. It is important to note that commercial discussions begin *after* the alliance team members have been selected and not during the selection process. The reason for this is that any conversation concerning project-related costs will increase the risk that the selection process will become tainted and the wrong participant could potentially be chosen.

- ### Selection of National Museum of Australia Construction Alliance Partners
- 1) Demonstrated ability to complete the full scope of works including contributing to building, structural, mechanical and landscaping design.
 - 2) Demonstrated ability to minimize project capital and operating costs without scarificing quality. (Value analysis and life-cycle costing.)
 - 3) Demonstrated ability to achieve outstanding quality results.
 - 4) Demonstrated ability to provide the necessary resources for the project and meet the project program. (Including resumes of key staff.)
 - 5) Demonstrated ability to add value and bring innovation to the project.
 - 6) Demonstrated ability to achieve outstanding safety performance.
 - 7) Demonstrated ability to achieve outstanding workplace relations.
 - 8) Successful public relations and industry recognition.
 - 9) Demonstrated practical experience and philosphical approach in the areas of developing sustainability and environmental management.
 - 10) Demonstrated understanding and affinity for operating as a member of an alliance. (Collaborative experience and views on risk/reward schemes.)
 - 11) Substantial acceptance of the draft alliance document for the project including related codes of practice, proposals for support of local industry, and employment opportunities for Australian indigenous peoples.
 - 12) Demonstrated commitment to exceed project objectives.

Figure 3: National Museum of Australia Selection Criteria (Hauck et al. 2004)

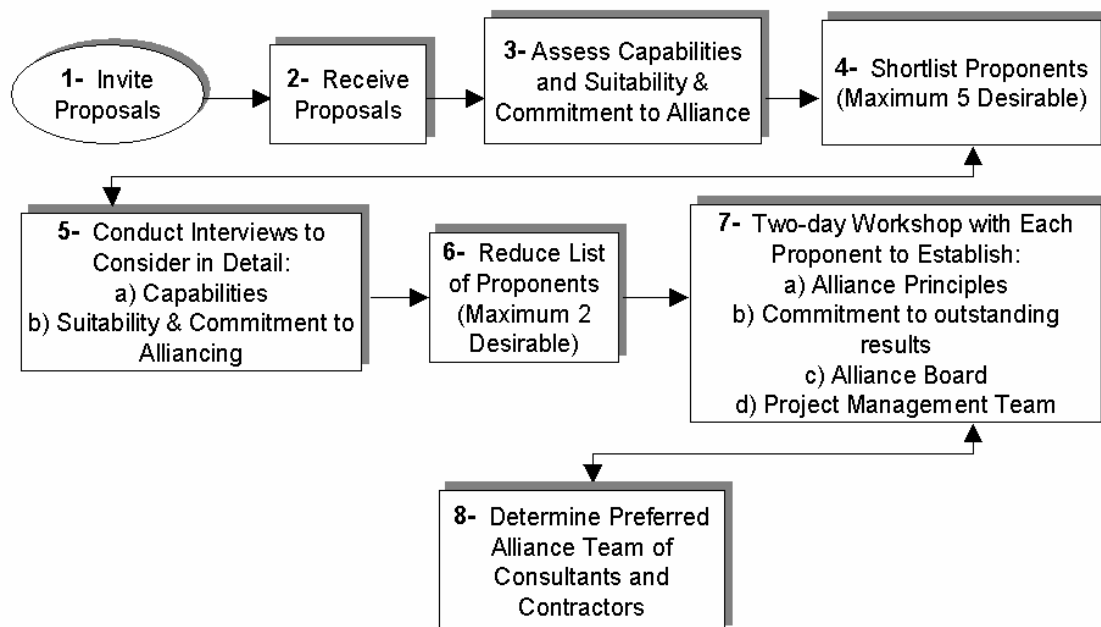


Figure 4: National Museum of Australia Selection Process (Hauck et al. 2004)

The second step in developing a Project Alliance is commercial discussions between the owner and NOP's. During commercial discussions the NOP Limb 2 fees (corporate overhead and profit) are set using the assistance of a third party independent alliance auditor. It is also during this step that all KRA's are set, weighted, and assigned to be a percentage of the target cost.

Once commercial discussions are complete and all the key issues are agreed, the alliance team enters into the interim Project Alliance Agreement (iPAA). In this stage NOP's are paid for actual costs incurred and are paid profit and overhead if the alliance enters into the final PAA. Also, all project participants can walk away from the project up until this step is completed. It is in the iPAA where the target cost is developed and as mentioned earlier, this is an incredibly intense, dynamic process. This is the first true test for the alliance and to achieve success, alliance participants must discard traditional distrust and communication barriers in order to produce innovative solutions for creating tremendous project outcomes.

One other issue needs to be addressed with the target cost. Since Limb 2 and 3 fees are linked to the target cost, there would seem to be an apparent conflict between the owners pushing to set a low target cost while the NOP's would prefer a higher target cost. However, this is not generally a problem due to following four issues (Ross 2003): 1) the target cost is developed using open-book accounting so there can be no hidden costs; 2) if the target cost is too high then the project may not proceed which is not in the best interest of any party; 3) profit for the NOP iPAA work will only be paid if the alliance enters into the PAA; and 4) there is potential for damage to reputation and future business relationships if owner feels NOP's attempted to inflate the target cost. Finally, and most importantly, if an owner actually believes this is a problem during development of the target cost, then the wrong project participants have been selected.

Once the contracting parties finalize the target cost and enter into the Project Alliance Agreement, only the owner has the right to terminate the contract beyond this point. This milestone marks the official formation of the Project Alliance and consists of all the remaining planning, design and construction efforts.

Value for Money?

One concern that clients may have with Project Alliancing is the value that is generated for the money spent. Since the project is not competitively bid, many clients (especially in the public sector) may be hesitant or unwilling to enter an arrangement where risk is shared and participants are selected before the target cost of the project is defined. Also there is the fear that, even once the target cost is developed, there is still a lack of certainty in the overall cost outcome. While there is obviously some uncertainty with Project Alliancing costs, competitively bid project costs are also far from certain. The lowest competitive bid is seen by many owners as the best value option, but when conflicts arise resulting in costly litigious claims, the real cost of the project is often much higher than the initial winning bid. The failure to understand that bid price does not equal final project cost is a major cause of the overall downward spiral of the construction industry (Egan 1998). Also, when dealing with complex, uncertain projects that have tight budget and time constraints, it is very difficult to imagine that a collaborative, innovative project team would produce a more costly project than a traditional project team where individuals have far less incentive to share information and work together.

Summary

We no longer live in a world where slow, stodgy, simple projects are the norm. Many projects, today, are extremely complex with limited budgets and increasingly tight schedules. Unfortunately, the traditional standard forms of contract that were designed to handle simple, slow projects have not adapted over time to address these significant changes. This situation has led to adversarial relationships and overall distrust between project participants. For the most part, the solution in the past has

been to leave the harsh contract 'in the drawer' and hope that it will not be needed. Partnering, improved forms of dispute resolution, and innovative management techniques have developed in an attempt to try to reduce conflict, but they are only part of the solution and can not hide the inherent flaws of trying to use traditional contracts to handle dynamic projects. This is due to the fact that when things do go wrong, undoubtedly the contract will not stay in the drawer and the weaknesses of the contract will be exploited by project participants to the detriment of the project and team as a whole (Mosey 2001). Simply adjusting or altering traditional contracts is also not the answer. As Sir William Latham writes, "Endlessly refining existing conditions of contract will not solve adversarial problems. A set of basic principles is required on which modern contracts can be based" (Latham 1994). Dr Martin Barnes echoes Latham's sentiments when he states, "Civil engineering management in the next century will be dramatically different from the last, thanks to a growing and long-overdue realization that the traditional forms of contract have had their day" (Barnes 2000). Therefore, what is needed is more than just a substantial overhaul of current contracts, but instead the development of new relational contracts that foster collaboration and embrace 'change'.

Fortunately, within the global construction industry there are progressive groups who believe that construction contracts must begin to change. One example is British Petroleum (BP) who, when faced with incredibly complex, uneconomical North Sea oil reserve development projects, acknowledged that a step change in behavior was necessary in the way it worked with designers and contractors. To this end, BP developed a new innovative relational contract that is known today as Project Alliancing. Project Alliancing is a dramatic departure from traditional contracts in that it encourages project participants to work as an integrated team by tying the commercial objectives (i.e. profit) of all the parties to the actual outcome of the project. In this arrangement all decisions are made "best for project" and not "best for individual" since the alliance either wins or loses as a group. Today, maybe surprisingly, Australia's public sector is one of the principal pioneers in using Project Alliancing and has had tremendous success utilizing this contracting mechanism on large, complex Australian government capital works projects. In fact, as Gallagher and Hutchinson (2001) write, during an International Bar Association conference, representatives from the USA and Europe, "could not believe that Australian public sector procurement methods had advanced to the point of conscientiously considering, if not preferring, Project Alliancing to deliver high profile complex capital works projects."

While many clients, designers and contractors are still skeptical of using relational contracts such as Project Alliancing, Ross (2003) explains that "the success achieved by these pure alliances is hardly surprising—the alliance construct creates a single seamless organization, focused on specific project outcomes, totally free from the barriers that traditionally inhibit collaboration and limit the development of powerful relationships (under risk transfer forms of contract). It would be a surprise and a great disappointment if an alliance, used in the right circumstances and set up properly, failed to deliver a good outcome for the owner." While the construction industry is historically slow to adapt to change, the positive empirical evidence that is growing from the use of collaborative relational contracts, such as Project Alliancing, will soon be impossible to ignore. In time the use of these relational contracts for dynamic projects will undoubtedly become a competitive business advantage as progressive, innovative businesses begin to differentiate themselves from their slower reacting, less progressive competitors.

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Relational Contracts - NEC in Perspective

Robert Gerrard¹

"The challenge to the construction industry and its advisers is not so much the NEC's suitability as a contract ... but rather how effectively existing practices can mould to the change of attitude and openness to new approaches that the NEC demands" Philip Capper²

Brief History of NEC

In 1985 The Institution of Civil Engineers (ICE) Legal Affairs Committee led a 'fundamental review of alternative contract strategies for ... design and construction with the objective of identifying the needs for good practice'. From the review came a strong recommendation that it was time to look afresh at conditions of contract.

The main reasons for this were:

- A proliferation of standard forms available
- The majority of projects are multi-disciplinary yet most contract forms are of a single disciplinary concept
- There was a high incidence of disputes and wastage of resources involved resolving them
- The origins of most forms of contract came before modern principles of project management were known
- A perception that clients wanted greater certainty of achieving project objectives.

The following year the ICE commissioned new style of contract to be developed, which was to meet the three key objectives of:

- Clarity and simplicity
- Flexibility of use
- Stimulus to good management.

A consultative version published 1991, which was trialled by the likes of BAA, Yorkshire Water, The Royal Hong Kong Jockey Club and ESKOM (South Africa).

Philosophy and Ethos of ECC

The current published NEC contracts are:

- NEC Engineering and Construction Contract (ECC), 2nd Edition 1998
- NEC Engineering and Construction Short Contract (ECSC), 1st Edition 1999
- NEC Engineering and Construction Subcontract (ECS), 2nd Edition 1995
- NEC Engineering and Construction Short Subcontract (ECSS), 1st Edition 2001
- NEC Professional Services Contract (PSC), 2nd Edition 1998
- NEC Adjudicator's Contract, 2nd Edition 1998
- NEC Partnering Option X12

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² quoted in Dr Arthur McInnes The New Engineering Contract: A Legal Commentary'

There are also published Guidance Notes and Flowcharts to support the above documents.

These are currently all being revised as part of 'NEC3' and are due to be launched in June 2005 together with the following new publications:

- NEC Term Service Contract
- NEC Framework Contract
- NEC Procurement and Contract Strategies

The most popular form of NEC contract used is the NEC Engineering and Construction Contract (ECC), which is the contract between an Employer and a Contractor. The ECC has been developed to meet the current and future needs for a form of contract to be used in all types of construction, which improves upon existing standard contracts in a number of ways.

In terms of clarity and simplicity, the ECC is intended:

- To be written in ordinary language
- To contain minimal legalistic phrases
- To minimise subjective phrases such as 'fair', 'reasonable' and 'opinion'
- To have a user friendly structure
- For the actions of parties to be defined precisely so fewer disputes about who does what, when and how
- To have the procedural logic backed up by flow charts
- To have reasons for decisions stated.

For flexibility, the ECC is intended:

- To be a multi-disciplinary contract, for use in engineering or construction work
- That responsibility for design can be set with either party, in any proportion
- To give a choice of pricing mechanisms including lump sum, admeasure, target cost, cost reimbursable, management contract and construction management
- To give the choice of bolt on secondary options that allow the Employer to build up the contract to suit his policies
- To have international application.

In terms of being a stimulus to good management, this is probably the most important characteristic of the ECC. Every procedure is designed to contribute to rather than detract from the effectiveness for all parties.

The two principles the ECC uses to stimulate good management are:

- foresight applied collaboratively mitigates problems and shrinks risk, and
- clear division of function and responsibility helps accountability and motivates people to play their part.

In total, the ECC is intended to provide an up to date method for employers, designers, contractors and project managers to work collaboratively and to achieve their own objectives for their work more consistently than other forms of contract. This should lead to a much reduced risk of cost and time overruns and of poor performance of the completed projects which should give a much increased likelihood of achieving a profit for the contractor, subcontractor and suppliers.

Drafting Philosophy

“The ICE conditions of contract proceed on the basis that each side looks to its own interest. The NEC seeks to focus the interest of both parties on the project.” Professor John Uff³

The change in drafting philosophy within NEC compares to other forms of contract in that most other major forms of contract seem to expand with successive editions with the result that many conditions of contract are filled with many terms that are rarely read and used.

The NEC describes a generic process for the management of problems that inevitably arise during a construction or engineering project. It attempts to tread a fine line between sufficient tightness, so that the contract participants follow the procedures, and sufficient looseness so that it can be interpreted in a way appropriate to the situation encountered.

Some of the main criticisms at the time of NEC being issued was that the drafting was not subjected to judicial interpretation. A response might be to ask whether in fact any precedence will indeed guarantee certainty of meaning? Further, it has been commented that the use of plain English could cause difficulties in certainty and proper legal construction. The intention is to draft contracts to give parties the best chance of achieving the projects' and their objectives, as surely it is desired that the parties and not the Courts administer contracts.

NEC Contractual Arrangements

“At the heart of the NEC is a new creed that Project Management techniques can be successfully written into a main contract to produce more co-operation, more efficiency and fewer disputes” Professor John Uff⁴

In terms of project organisation, the NEC can be used in a variety of contractual arrangements. An Employer can appoint consultants to carry out design, quality checks, cost consultancy, archaeological work etc on individual or multiple projects using the NEC PSC. A consultant can use the PSC in turn as a sub-consultancy contract. An Employer for individual projects using the NEC ECC or NEC ECSC can engage a Contractor. In turn a Contractor can appoint sub-contractors under NEC ECS or NEC ECSS or a consultant under NEC PSC. The NEC TSC provides Employers the opportunity to engage suppliers for construction or non-construction on a term basis.

The pivotal role under the NEC ECC is the Project Manager, who is appointment by the Employer to administer the ECC to achieve the Employer's objectives.

³ quoted in Dr Arthur McInnes The New Engineering Contract: A Legal Commentary'

⁴ quoted in Dr Arthur McInnes The New Engineering Contract: A Legal Commentary'

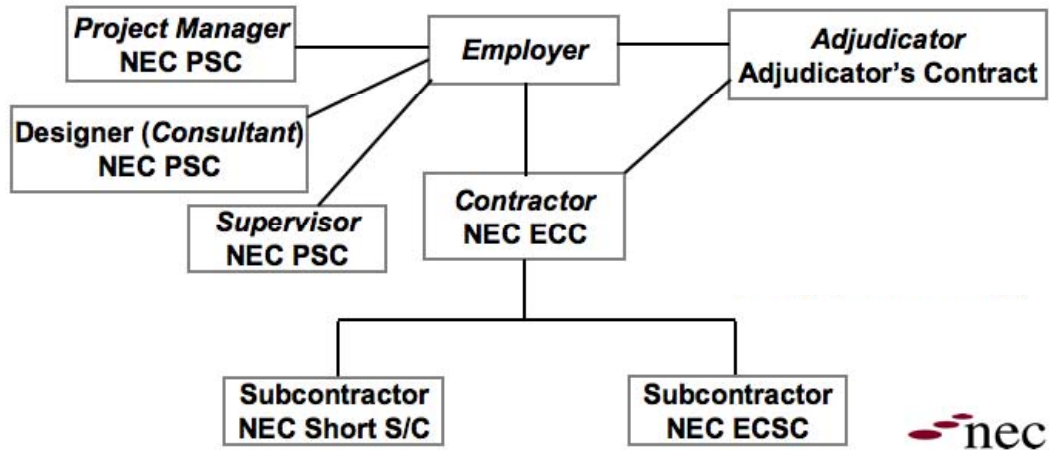


Figure 1: The NEC family: traditional bi-party partnering arrangement

This is a traditional arrangement where an independent designer designs the works and the Contractor is engaged to construct them. The Contractor can design some elements in this arrangement. This is a bi-party partnering arrangement.

Following on from figure 1, a bi-party partnering design and construct arrangement can be achieved where the Contractor who is engaged to construct the works is responsible for design. It is always open as to who fulfils the role of Supervisor (the person who's role is to check the quality of the works is in accordance with the contract). This could be an Employer appointment of an independent firm or even the Contractor can fulfil this so as to achieve a self-certification arrangement.

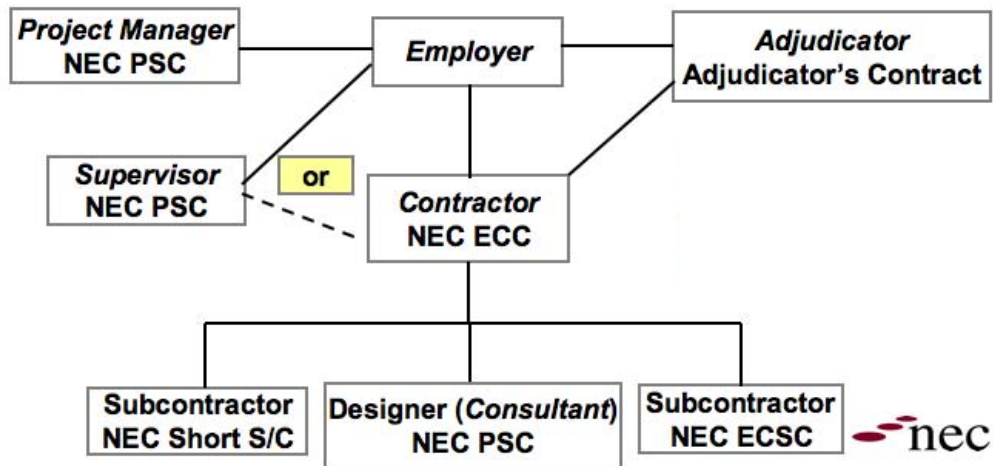


Figure 2: The NEC family: Design and build bi-party partnering arrangement

Figure 3 shows a traditional arrangement where the design of the works is carried out by an independent designer and the Contractor is engaged to construct the works but this time Partnering Option X12 is included in the contracts of key supply chain members. Again, an element of design can be carried out by the Contractor and in this arrangement, a multi-party partnering arrangement is achieved.

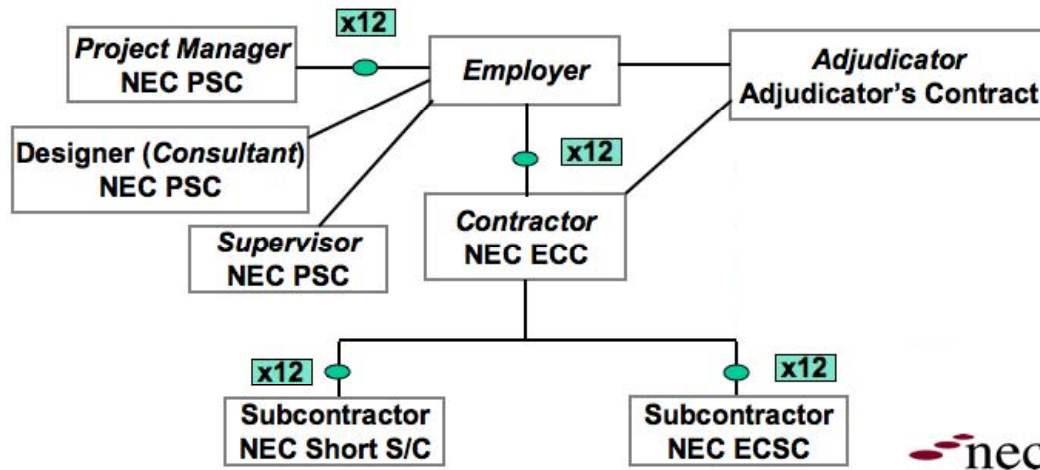


Figure 3: The NEC family: Multi-party partnering arrangement – NEC Partnering Option X12

NEC Partnering Option X12 creates an open structure and is the common link within suppliers' NEC contracts and creates the multi-party partnering arrangement. The benefits are that a Core Group is appointed from the selected suppliers pool to partner the project, not all suppliers have to be engaged from day 1 of the project, they can come and go to complement the project lifecycle and suppliers are comfortable in a bi-party relationship with the added benefit they can be aligned to project objectives through Key Performance Indicators.

A design and construct arrangement can be drawn from figure 3 using Option X12 and moving the designer to a sub-consultant of the Contractor.

NEC Users' Group

The NEC has an active Users' Group that currently has some 250 members from across the industry with a remit to share best practice. It has regular newsletters, offers a member Helpline facility, hosts seminars, workshops and roadshows. More details can be found on www.neccontract.com.

Key ECC Characteristics

Actions

Clause 10.1 requires certain of the NEC players to 'act as stated in this contract and in a spirit of mutual trust and co-operation'. This is quite a departure from most conditions of contract and law, and covers both obligations and attitude.

Communications

All communications under ECC must be in a form that can be read, copied and recorded. The Project Manager and Contractor must reply to communications within the period for reply.

Project Manager

The Project Manager plays a pivotal role in administering ECC contracts.

- The Project Manager is the key management person on behalf of the Employer
- All Project Manager decisions should reflect the Employer's business decisions

- Any Project Manager acceptance of communications from the Contractor does not change the Contractor's responsibility to Provide the Works of his liability for his design
- It is essential that the Project Manager is sufficiently close to the work and has the time and authority to carry out his duties effectively
- The Contractor has recourse to an Adjudicator where he believes the Project Manager's actions or decisions do not accord with the ECC

Early Warning

This is the jewel in the crown of the ECC. The Contractor and Project Manager both have a duty to notify each other if aware of a matter that could:

- increase the total of the Prices
- delay Completion or
- impair the performance of the works in use.

Once early warning is given, there is an instruction to attend meeting and those attending consider proposals, seek solutions and decide actions.

The focus of the meeting is to solve the problem in the interests of the project. It is about prevention rather than cure and focuses participants' efforts to be proactive rather than reactive. It encourages collaboration, innovation and ability to adjust to circumstances during the contract.

Programme

The ECC relies upon an up-to-date and realistic programme being at the heart of management of the contract. The Accepted Programme is latest accepted by Project Manager and includes the likes of

- key dates
- method statement for each operation, and
- order and timing of operations.

It is therefore likely to be a collection of documents, which may include method statements, histograms, network diagrams, bar charts and the like. The frequent updating allows the best chance for foresight in resolving time and resources issues of change and problems to be understood and properly dealt with, with minimal waste occurring.

Compensation events

Compensation events are events that, if they occur, and do not arise from the Contractor's fault, entitle the Contractor to be compensated for any effect the event has on the Prices and the Completion Date.

The compensation event process includes notification, quotation, assessment and implementation. The aim of compensation event assessment is to agree the whole cost and time implications that each event has, ideally using a resource forecast approach, rather than having regard to tender allowances or schedules of rates.

Risk

The ECC contains typical risk allocation provisions in compensation events and Employer's risk, but of course each project has its' own risk profile. There is provision made to alter risk allocation pre-contract according to project risk register and any subsequent negotiations during the tender period. There is also provision made within the ECC to re-appraise risk allocation when quoting for effects of compensation events.

Value engineering

Provision is made in ECC target cost contracts for value engineering initiatives from the Contractor.

Payment

There are a variety of payment options available within ECC, of which one must be selected prior to tender stage. The main factor to be considered in making this choice is risk. The ECC places great emphasis on the parties controlling and forecasting out-turn cost.

Disputes

The ECC uses adjudication as the first step in resolving disputes before arbitration or litigation commences, the focus is, however, dispute avoidance and not dispute resolution.

NEC in Use

In the UK in particular the NEC is used across the construction sector in building, civil engineering, utilities and power. Some of the major projects NEC is used on includes BAA's Heathrow Terminal 5, Channel Tunnel Rail Link, the Eden project and the National Health Services' ProCure21 hospital building framework. Outside the UK, Eskom in South Africa is a major user.

Some notable NEC attributes to date:

- It has been used in more than 20 countries
- Though statistics are somewhat difficult to gather, the NEC has been used on over 45,000 projects of some £20bn+
- There is no substantive NEC case law
- The NEC is probably responsible for generating a new breed of modern day forms of contract
- It is rarely not used subsequently by clients
- The UK Government believe NEC to be reasonable 'Achieving Excellence' compliant

As we better appreciate that project management plays an essential role in contract administration, that participants appreciate the plain English drafting style in relational contracts and we move away from bespoke one-off conditions to a contract structure that offers the flexibility we need, then NEC is likely to become a leading standard form of contract for the World to embrace.

The Application Of Lean Principles To In-Service Support: A Comparison Between Construction And The Aerospace And Defence Sectors

Penny-Anne Cullen¹, Bob Butcher², Richard Hickman³, John Keast⁴, Miguel Valadez

Abstract

Lean principles have shaped the automotive sector's success in reducing costs and improving performance. Other industry sectors such as aerospace and construction in the U.K. have pursued similar benefits by similar means with differing degrees of success. An acknowledged vein of research in the transaction cost economics and relational contracting fields, emphasises the importance of informal norms and formal, legal documents and doctrines in commercial relations. This research illustrates that written agreements are influenced by the parties' past relations, each one's perception of the other's reputation, future business prospects, as well as influences from the external environment.

This paper argues that a successful and thorough application of lean principles is predicated on establishing these relational contracting norms and formal contracts which, we argue, promote an environment for fully rendering lean principles. We present a comparison of the construction and aerospace and defence sectors which have attempted to follow the automotive lead and apply lean principles in somewhat different environments. Their experiences in aftermarket and in-service support operations provide preliminary evidence supporting the paper's central hypothesis. In effect, the construction and aerospace and defence sectors have adopted different positions relating to the importance of contractual structures in the pursuit of business improvement and as a result, have had varying success in the implementation of 'lean' approaches.

Keywords: Lean, Contract, Law, Relational, Incentives, Aerospace, Construction

Introduction

Background on Lean Thinking and Relational Contracting

The essential nexus between lean principles and transaction cost economics is to reduce costs by eliminating waste whilst increasing efficiency. From a cost reduction perspective, if duplication of resources is to be eliminated, all parties to the entire transaction should jointly agree processes and a commitment to co-operate. The logical extensions of these objectives are collaborative working relations, grounded in formal and informal norms. The significance of relational characteristics for commercial contracting is well-established as being as much a part of a contract as formal legal

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doctrines (Macaulay, 1963; Macneil, 1974a, 1973b, 1978, 1981, 1985; Beale and Dugdale, 1975; Deakin, Lane and Wilkinson, 1997). However, there is an entrenched perspective that contracts are placed in a metaphorical bottom drawer and consequently, they do not undermine collaborative working relations. Conversely, a contemporary line of research (Cullen, Keast and Simpson, 2002; Cullen and Hickman, 2001; Cullen, 2004), including the ECLOS⁵ and LOTISS⁶ research projects, challenges this perception and suggests that contract forms have a major impact on transacting parties' perspectives of their past and future relationships, which significantly influence their stance whilst they are negotiating and performing of their formal obligations. Therefore, unnecessary waste and thus transaction costs are created when contract forms fail to reflect the parties' common relational objectives. In extending this theme, formal contracts have a major impact on the efficiency gains from applying lean principles but the symbiosis between these two factors is the focus of this paper and our fundamental research strategy.

Overview of the Lean Principles

Toyota Motor Company of Japan developed the principles of Lean Production in the late 1950s and early 1960s, under the production engineering leadership of Taiichi Ohno. The application of lean production methods was one of the key success factors in the dramatic competitive advantage gained by the Japanese car industry through the 1970s and into the 1980s (Womack, Jones and Roos, 1990; and Womack and Jones, 1996.)

The concept of lean is best summed up with a direct quotation from "*Lean Thinking*":

In short, lean thinking is lean because it provides a way to do more and more with less and less - less human effort, less equipment, less time and less space - while coming closer and closer to providing customers with exactly what they want.

The Lean Principles as defined by Womack et al (1990) can be summarised as follows:

- Define value from the perspective of the Customer
- Map the value stream
- Create flow
- Allow Customer demand to pace and pull production
- Manage continuous improvement and pursue perfection

The guiding ethos of 'Lean' is the identification and continuous elimination of waste in all its forms. The Toyota Production System defines seven types or categories of waste ("The Seven Wastes").

- Overproduction
- Waiting
- Transportation
- Inventory
- Motion
- Over-processing
- Defectives

The quintessential tool for the clear identification of waste within a value stream has become the technique of Value Stream Mapping. The methodology for the application of this tool is detailed in the publication "*Learning to See*" (Rother and Shook, 1998) and is advocated by Womack and Jones. The technique involves the construction of a detailed map of the value stream in its current state, which identifies the sources of waste in

⁵ Effective contracting as a tool for better customer-supplier relationships: Engineering and Physical Research Council UK GR Ref. M60484

⁶ *Long-Term In-Service Support*: University of Warwick, funded by EPSRC, UK Ministry of Defence, construction, defence and aerospace companies

the current condition. An ideal or utopian state is then considered, before a specifically targeted improved future state is constructed. The improvements are driven by the removal of the waste identified in the current state map. An action plan is then formulated which migrates the value stream from the current state to the targeted future state, within a defined period of time. Once that future state has been achieved, the improvement cycle is repeated continuously.

The Lean Principles, in the context of this methodology, have been extensively and successfully applied to the automotive sector and other medium to high batch size, original equipment production environments. High variety, low volume industries have been slower to apply the principles, in common with the aftermarket and in-service support operations across many sectors.

Overview of Relational Contracting

Following Macaulay's (1963) pioneering empirical study of commercial contracting, Macneil (1974a; 1974b) proposed that present and future contracting relations are embedded with links between the corporations, which affect the progress and outcomes of transactions. This led Macneil to suggest that when parties expect to work together again in the future, they approach and manage their current transaction in the manner in which they perceive their relationship might proceed. In expanding his theme, Macneil (1978a, 1981) suggested that peoples' behaviour and the social context in which they function influences the outcome of the transaction.

Macneil (1974a; 1974b; 1978) proposes that contracts are complex bundle of relations that evolve from informal norms that include the:

- Relationship between competition and co-operation
- Implementation of planning
- Preservation of the relationship
- Parties' reputation
- Interdependence
- Morality and altruism
- Shared benefits and burdens
- Problems anticipated as a matter of course
- Adjustments to accommodated changes in circumstances
- Ongoing, flexible relations

Macneil perceives that contractual relations resemble small, nuclear societies, with their own internal system of evolving norms. In addition to these traits that are internal to the social perimeter of the transaction, Macneil also cites the external environment as a norm that affects the contract as a social structure.

Over a decade, Macneil (1981) reclassified his original five norms into relational, common and discrete traits. This concept is illustrated in Table 1, with relevant examples.

Table 1: How Norms Affect Aerospace Contracting (Macneil 1974a; 1974b; 1978)

Norms	Aerospace examples	Construction examples
1) Relational		
For their mutual benefit, the parties:		
Work together on the basis of flexibility and reciprocity in their mutual benefit.	'Risk and revenue share' deals incorporating asset management or 'fleet hour' arrangements.	Prime contractor embedded within the client organisation, acting as Construction Manager for the client, undertaking serial construction projects within the context of a framework agreement
Remain separate economic units, whilst collaborating	Formalised requirements development phase post contract award.	
2) Common		
The parties have a united approach to:)
Preserving their relationship as they predict that they will work together in the future	Contractors collaborate on contracts whilst also competing on others	Prime contractors retaining the services of preferred sub-contractors on serial construction projects
Harmonious dispute dissolution rather than conflicts	Conflicts resolved internally; rarely do the parties resort to litigation or arbitration	
Changes in the external environment		
3) Discrete		
The parties freedom to contract is limited in their mutual interests by:		
Restricting their individual freedom to choose how to execute the contract	The MoD standard forms of contract restrict the parties ability to negotiate	'Arms length' Local Authority contracting
Accepting that they must take the consequences of focusing on the outcome of the contract, which restricts the individual party's freedom to act in its immediate interests	Suspension of strict legal rights during performance, to focus on a successfully completed contract	

Macneil's theory is relevant to exchanges because contracts between aerospace and construction companies are long-term, with typical aircraft lifecycles lasting for 20 to 25 years (Cullen and Hickman, 2001; Cullen, Keast and Simpson, 2002; Cullen, Hickman, Keast, 2004). The long-term relations are embedded because aircraft must be overhauled and repaired according to regulatory requirements. Therefore, to safeguard future suppliers of spares units, airlines ensure that prime contractors are contractually bound to produce spare parts for the duration of an aircraft's lifecycle. Not only do the same contractors work together on specific aircraft, their relationship is embedded across its lifecycle and frequently across families of aircraft that share common systems.

There is evidence that relational contracting is used in the civil aerospace industry to maximise the potential benefits from implementing lean principles (Cullen, Hickman, Keast and Butcher, 2004). In the US construction sector, there are parties to public and private sector projects that are developing collaborative and flexible alliances to ensure that the neo-classical (Williamson, 1979) basis of formal contracts does not impede the efficiency gains from their transactions. In the UK, there is a discernable use of more relational contract forms (Cullen, Hickman, Keast and Butcher, 2004)

Transaction Cost Economics and Relational Contracting

The evolution of transaction cost economics (Williamson, 1974) was influenced by Macneil's perspective of the contract as a bundle of social norms, which were as

significant as legal doctrines and formal agreements. In applying Coase's (1937) reasoning regarding firms' choices, to source externally or within their organisation, Williamson recognised that contractors develop relationships and formal agreements according to their assessment of their use as means of efficiently governing projects. In extending the work of Coase and Macneil, Williamson (1996) compares how transactions are managed. In common with Macneil, Williamson's focus spans entire exchanges from their conception to post completion stages.

Relevance of Contracts and Lean to a traditional procurement model

Traditional procurement has focused primarily on the initial cost of the acquisition and the technical specification of the product to be delivered. Once acquired the product then has to be supported, often under complex contractual arrangements derived from the original procurement. Typically there was no attempt to assess and minimise the overall life-cycle costs of the acquisition making the procurement process both costly and inefficient. This was particularly true in military procurement where in the (Levene, 1987) fixed price contracting environment, the Defence Procurement Agency (DPA) has used its position and power to drive prime contractors into accepting contracts on extremely low margins (Taylor, 2001). In civil aerospace similar practices have been employed by large airframe manufacturers. Often the only way that a prime contractor can remain in business, let alone make a reasonable return on investment has been to use every possible opportunity to slash costs by taking "short cuts"⁷ in the delivery of the original equipment and to attempt to make money on the after-sales spares and maintenance contracts. The differences between the defence and civil sectors of aerospace and construction with respect to the influence of prime contracts on formal and informal norms throughout the supply chain reveal an important correlation with the application of lean principles.

It can also be argued that some aspects of the traditional approach to competitive tendering and contracting can actually add waste to the process. The traditional approach can result in multiple sources of supply which clearly duplicates resources and erodes economies of scale. Even if multiple sources are avoided, traditional approaches can result in large costs for multiple protagonists involved in an extensive bidding process, all but one of which will have effectively wasted that investment. Lastly, an arms length relationship between customer and supplier will often lead to a situation where only a part of the value stream is under consideration for improvement. Typically, this comes about when the value stream crosses the organisational boundary between the parties and the customer denies the supplier access to its internal environment. There is always a risk under these circumstances that the application of the lean principles will not yield the expected benefits, simply because the rate governing constraints or 'bottlenecks' are not present in the portion of the value stream under consideration.

Contracts and Lean in Support-oriented Procurement

Since the late 1990s, with the introduction of the Smart Procurement Initiative (SPI, MoD, 1999⁸) the DPA and Defence Logistics Organisation (DLO) (Support Chain Integrated Business Team, 2001) and civil aerospace contractors have endeavoured to consider the impact of long-term support by contracting for complete packaging of projects. The overriding objective is to minimise the total cost of ownership of a particular aerospace product whilst promoting good working relationships and securing the future of the aerospace supply chain. In civil aerospace this has led to the increasing popularity of 'power by the hour' or 'fleet hour' (Cullen, 2004) agreements.

⁷ Private conversations with industry managers 1999-2005

⁸ Ministry of Defence (1999) *The Acquisition Handbook: A Guide to Smart Procurement*, Ministry of Defence, London

These contracts are drafted on the basis that the product provider bears the full cost of support and in return, it is paid a set amount for each flying hour.

Empirical research suggests (Cullen, 2004; LOTISS; ECLoS) that the common elements in Power-by-the-Hour (PbH) and Asset Management Agreements (AMA) are long-term contractual relations, normally of between 5 and 7 years, with a supplier's obligations involving high degrees of product support in addition to supplying equipment. In both PbH and AMA contracting, the operators' acquisition and lifecycle support costs are spread over the duration of the contract, with the price being fixed and payable at monthly intervals. From the suppliers' perspective, they have predictable markets and revenue streams during the contract terms, in addition to being incumbent suppliers when the contracts are due for renewal.

The PbH form of contract provides an enhanced level of support in comparison to contracts for the sale of equipment; they are essentially time and materials contracts. In comparison, an AMA represents an extension of the PbH arrangement that provides the highest level of support to airline operators. The formal agreement represents an overriding agreement to govern the business relationship between an airline and producer/service provider. In addition to the normal "boiler plate clauses," (Berg, 1991) the AMA covers the management and planning of the physical stock and long-term service-support. It also includes the planning and management processes, with the supporting communications and logistics structures to manage both predicted and unforeseen events.

These transactions give the customer a fixed cost base and provide a strong incentive for the suppliers to reduce their own costs and increase the profitability of the transaction. There is broad interest within both civil and military aerospace in initiatives to reduce the high costs of in-service support and thus it is developing strategies to tackle both the relevant symptoms and the root cause. This two-pronged attack can be supported both by internal improvement initiatives and by longer-term research into possible approaches to the root causes and their solutions.

While there are common strands between principles of relational contracting and lean practices that collaboration is an essential factor in realising economic efficiencies, there are also divergences. Lean theorists exclude the role of formal legal doctrines and documents, whilst relational schools have not considered manufacturing strategies. This paper attempts to synthesise both strands by establishing a link between them by presenting evidence from our research into the business relationships between the UK's Ministry of Defence (MoD) and its aerospace and construction supplier.

Background on LOTISS Research and Current Context

The long-term research objective of the LOTISS team is to improve the efficiency of inter-firm relations by comparing four principal facets of typical construction and aerospace transactions. These facets are classified into the two broad groups of contractual or managerial elements. The contractual element contrasts the developments in parties' relations and the attendant procedures that culminate in a formal agreement, then how they plan and manage these arrangements. Similarly, the managerial element assesses the principles and their supporting processes whereby the parties govern the transaction to achieve economic efficiency and maintain their competitive position. This broad objective was initially developed during the ECLoS research programme, based on the hypothesis that current standard forms of contracts and arms length contractual relations leads to adversarial working relationships between contract parties. The effect was proven to increase transaction costs and undermine the efficiency gains that parties intended from reengineering strategies. This line of research is being developed by the LOTISS team, to develop strategies for minimising the cost of long-term support of aerospace and construction programmes.

The overbidding of LOTISS is to increase the efficiency of long-term support projects provide a migration path from existing modes of support to those proposed by the research, focusing particularly on contractual issues. Within this objective, the particular focal points contractual issues, risk identification and reduction and the applicability of lean principles to long-term transactions.

Methodology

The methodology was constructed from five principal sources. These were: a review of the theories of lean principles, contract, and industrial economics research methods (Leedy, 1998), and the contextual basis of the aerospace and construction industries (ECLOS). The research process is illustrated in Figure 1:

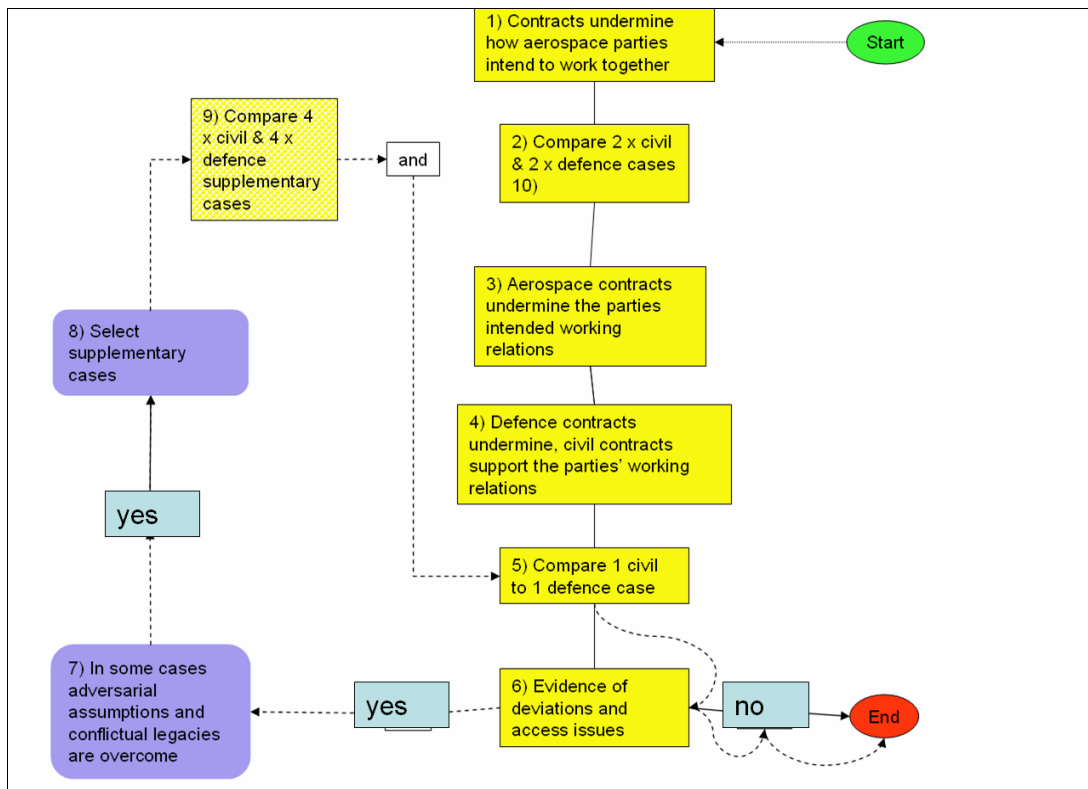


Figure 1: Principal Aspects of the Research Related to the Data Gathering and Review Process. (Based On Hamersley's And Atkinson's Model, 1993)

The impetus that underpins the ECLOS-LOTISS research stream is that the classical foundations of contract law in Common Law jurisdictions, which is embodied in formal agreements, conflicts with the real-world phenomena of contractual relations.

Comparative Analysis of Aerospace and Construction

Relational Contracting

Despite endemic differences between the two industrial sectors studied, there are common elements which relate to the uncertainties in both product and business environments. Moreover, both sectors traditionally rely on detailed forms of contract.

On the other hand, the differences between them allow a broader appreciation of the elements that influence the link between lean and relational contracting. Broadly speaking there are clear differences. There is wide acceptance that the aerospace industry is limited in how it can diversify when there is a fall in demand in a particular market, whereas the construction industry has more prospective sources of demand.

This inability to diversify adds more sources of inefficiency to the aerospace sector in comparison to the construction sector. The prevalence for inefficiencies also increases the complexity of contracts, which suggests that contracts should incorporate the flexibility that is required to manage unforeseen circumstances. Furthermore, the level of technical complexity of aircraft is higher in comparison to buildings

At the level of contractual relations, differences exist not only between the aerospace and construction industries but also between the civil and defence segments within the aerospace industry. In terms of these civil to defence differences, the UK MoD standard forms of contract⁹ require evidence that contracts have been awarded competitively (Levene, 1987; SDR, 1998; SPI, 1999). This constrains its freedom to draft contracts that reflect its “partnering” (SPI, 1999) policy with which to develop collaborative relations with its suppliers. In contrast to its public sector counterparts, civil contractors broke with the tradition of competitive tendering. Instead of forming agreements at the outset of the transaction, primes persuaded their subcontractors to agree new forms of contract that underpinned their objective to improve their efficiency by taking a long-term view of how they could collaborate beyond project terms

With regards to the public sector business of the UK construction industry, the public sector aerospace traits were evident when Joint Council Tribunal (JCT) contracts and competitive tendering were the norm. However, in an apparent contrast to the MoD’s agencies, (the DPA and DLO), the government’s Estates Department reviewed how it could demonstrate the competitive requirement whilst changing its contracting policies and forms to develop relational contracting with its prime contractors (Department of the Environment Transport and Regions, 1999).

In relation to private sector construction projects, the evolution of relational contracting has been supported by the industry developing standard forms of contract (NEC, PPC2000, Be) that reflect the collaborative norms that the parties intend to develop in pursuance of transactions that yield mutually beneficial outcomes from their contracts.

Lean Principles

When compared with construction, the aerospace and defence sector has been more consistent and coordinated in the way in which models for the application of the Lean Principles have been developed and then applied to the In-Service Support (ISS) value stream.

Within the construction sector, the very definition of what ISS means varies significantly from segment to segment. For some companies, in-service support means the undertaking of serial, ‘one off’ construction projects for a single customer, under the auspices of a framework agreement, in effect acting as the construction manager for that client, embedded within the client organisation. For other companies, this activity refers to post construction management of facilities or the long term maintenance and repair of facilities or utilities. These different interpretations may require the development of different implementation models, which reflect those differing requirements. Without effective and coordinated leadership in the construction sector, these models are developing slowly and in a ‘piece meal’ fashion, within different companies and institutions. Therefore, the implication is that a practical template for what constitutes a “lean” implementation is still evolving in many segments of this sector

⁹ known as “DefCons”

Results and Implications

The results of the empirical studies are summarised in the following tables and attached in Appendix 1: "The Application of Lean Principles on ISS Contracts". The study results confirm that whilst the effectiveness with which the Lean Principles were applied varied considerably between the various case study projects, effective implementations tended to exhibit similar characteristics:

- A good understanding of the lean principles by the senior managers involved in the project
- Commitment to implement those principles on both sides
- Creation of an environment of relatively level demand
- A focus on the flow velocity of the value stream
- Ruthless and continuous elimination of waste

Mutual recognition that lean principles must be supported by collaborative relations

Table 2 ranks the case study projects according to the relative proportions of these characteristics exhibited.

Table 2: Effectiveness of Lean Implementations



Characteristics	Aerospace examples	Construction examples
MORE	Military case study A	
	Civil sector AMA case study	Civil Transportation case study
	Number of effective characteristics	Military case study B
	Military case study C	Local Authority contracting case study
	LESS	

Table 3 applies Macneil's norms (1975) to the contractual characteristics of the case study projects in both sectors. The source material for these tables comes from Appendix 1 which synthesises the respondents' responses in relation to the application of lean principles to ISS contracts and classifies the responses according to whether they relate to the aerospace or construction industry.

Table 3: The Application of Macneil's Norms to the Aerospace and Construction Industries

Norms	Aerospace examples	Construction examples
1) Relational		
For their mutual benefit, the parties:		
Work together on the basis of flexibility and reciprocity in their mutual benefit.	Civil Sector AMA case study Military case study A	Civil Transportation case study
Remain separate economic units, whilst collaborating		
2) Common		
The parties have a united approach to:		
Preserving their relationship as they predict that they will work together in the future	Military case study B	Retail Chains, Food Outlets (Modules Check together)
Harmonious dispute dissolution rather than conflicts		Long term commitment based on joining developed norms (formal and informal
Changes in the external environment)
3) Discrete		
The parties freedom to contract is limited in their mutual interests by:		
Restricting their individual freedom to choose how to execute the contract	Military case study C	'Arms length' Local Authority contracting case study
Accepting that they must take the consequences of focusing on the outcome of the contract, which restricts the individual party's freedom to act in its immediate interests		

The correlation between Table 2 and Table 3 is striking and suggests that effective implementations of the lean principles tend to be associated with contractual structures that reflect Macneil's relational norms. This result provides evidence that flexibility and collaboration (i.e. Macneil's relational norms) increase the likelihood of fomenting an environment that delivers the key success characteristics for effective lean implementation. There is clear conceptual reasoning to support the study results. At the relational norms, the parties cooperate for the common benefit of the transaction. The further away from the relational norm the contract moves, the more difficult an effective implementation becomes, until at the discrete end of the spectrum, contractual conditions are actively inhibiting a successful implementation as the parties play "tit for tat" games (Hviid, 1996, 1999) that engender destructive competition (Deakin et al, 1997).

From the outset, the results support the view that the aerospace and defence sector has applied the lean principles more extensively than the construction sector. In relation to the construction sector, the aerospace and defence sector has:

- Been more customer led in its approach to "lean"
- Claimed a wider range of benefits from the implementation of the lean principles
- On average, been prepared to share more of those benefits with the customer in order to enhance value
- Used more of the control tools and techniques classically associated with the Toyota Production System
- Demonstrated more easily identifiable applications of customer demand directly pulling and pacing production
- Built continuous improvement into business planning routines more comprehensively

Other Important Considerations

Industrial Environment

The initial study observations must be placed into their proper context especially given the way the industry environment of the two sectors plays a role in determining the extent of lean implementation:

- Aerospace and defence contractors were traditionally seen as high cost, high margin operators. Lean has been seen by the industry as a tool for restructuring to meet the threat of foreign competition and by customers as a vehicle for 'cutting out some fat' and redressing the perceived imbalance of risk and reward. Implementation of lean has therefore been defined, supported and driven by a variety of stakeholders in the sector. Consequently, progress has been made with its application to in-service support.
- Conversely, construction has been living off thin margins and poor cash flow for decades (Latham 1994). Within its famously adversarial structure, hierarchy and niche market segmentation, collaborative approaches are at best fraught with difficulty. Attempts to define a lean agenda for the industry (Egan 1998) were met with scepticism by the protagonists. No consensus has been developed which defines what is meant by 'lean' in the context of the sector, let alone its application to in-service support, a term which itself has different meanings in different construction industry segments.

The ability of the construction sector to develop such templates should not be discounted. Earlier work on this research project [ECLOS] has already added to the body of evidence that suggests that operational construction managers within the industry are developing innovative reinterpretations of the lean principles and are attempting to apply them in real situations despite the institutional barriers and widespread scepticism within the Industry.

Furthermore, our research indicates that there are areas that enable the adoption of lean practices, in which the construction sector is more developed than the aerospace and defence sector. These are:

- Project management disciplines
- Effective use of risk analysis and management
- Supply chain integration
- Continuing education and training

The Role of the Customer

In continuing the theme of the ECLOS project, the results lead the LOTISS team to suggest that customers, in the sense of the users of the subject-matter of the contract, can exert profound influences on relationships from prime contractors throughout the supply chain. In our view, recent research (ECLOS, LOTISS, Cullen, 2004) shows that the MoD's standard forms of contract fetter primes' discretion in relation to their own operations and makes their working relations with their suppliers contentious. Furthermore, its procurement policy is limited to competitive tendering on a project-by-project basis, instead of developing relations that extend over the operational lifetime of the project. The incentives for suppliers are perverse, providing the opposite effect to the cooperation than the MoD requires. Instead of inducing suppliers to remain efficient, the narrow and even non-existent profit margins lead the industry to use variation clauses to recoup their costs. Furthermore, original equipment manufacturers apply margins to spares in the aftermarket that provide them with acceptable returns on investment. Clearly it follows that the iteration of tit-for-tat games and destructive competition militates against ISS contracts that are beneficial to both customers and the supply chain.

There is a particularly interesting facet that has influenced the propositions in this paper. Whilst industry has generally applied lean principles, there is no evidence of an overall trend to adopt relational contracting. There is evidence that the UK defence sector recognises the role of informal norms and lean principles in achieving efficiency gains but there is no basis for suggesting that this is supported in the terms of formal contracts. There is strong evidence that the UK construction industry is recognising that contract forms must reflect the collaborative basis of lean strategies. However, the UK MoD failed to recognise that their current forms of contract blight relations with their defence and construction industry providers.

Despite this, there is some albeit not extensive evidence that the construction and civil aerospace sectors recognise that relational contracting is the efficient way to apply lean principles. Indeed our research corroborates our earlier work on the ECLOS project and allied research by the LOTISS and ECLOS teams, that forms of UK defence contracts undermine collaborative relations

Therefore, we reiterate that the MoD's general interpretation of competitive procurement and its contract forms conflict with the objectives that it hopes to gain from the Smart Procurement (SPI, MoD 1999). "Partnering" requires the parties to have sufficient mutual confidence and trust to share sensitive information. However classical contract forms militate against collaboration. We contend that as the UK construction industry delivers economically efficient results to both the public and private sector customers, whilst forming long-term alliances that transcend individual projects, there is scant logic in the MoD continuing to espouse the benefits of each transaction being competitively tendered

Interestingly, both the ECLOS project and the present state of knowledge within the LOTISS environment strongly suggest that appropriately developed incentives can overcome a negative legacy and thus reduce transaction costs. For instance, competitive tendering for every phase of the product lifecycle, coupled with excessively detailed, prescriptive contract forms leads to 'arms' length rather than collaborative relational contracting. However, the transaction costs of defensive behaviour and iterative cycles of renegotiations are not endemic and can be reduced by a balanced portfolio of competition, relational norms, appropriate incentives, lean practices and crucially, legally binding agreements that formally support the parties' joint commitment to increasing their mutual economic benefit. This was clearly indicated in civil aerospace and certain construction case studies, where the parties expressly overrode formal contract terms because to do otherwise would have serious consequences on the parties' finances and reputations.

Recent research (LOTISS, Cullen, 2004) suggests that there are significant differences in how the customer influences the forms of prime and sub-contract. It has also been established (ECLOS, Cullen, 2004; Cullen *et al*, 2004) that contract terms affect the parties' working relations and their economic outcomes of the transactions.

Interestingly, whilst the MoD has no apparent intention of changing its classical contract terms in relation to procuring equipment and ISS, it piloted a more relational approach to construction contracting (Nicolini, Holti, Smalley, 2001). Furthermore, the MoD's participation in developing and managing transactions, throughout the *ex ante* and *ex post* phases, has a negative effect on contractual relations. The basis for this proposition is a combination of classical contracts, arms' length relations (LOTISS; ECLOS) and its intervention in managing transactions. The outcome is that suppliers create defensive barriers, which undermines the collaborate objectives of SMART Procurement and adds transaction costs.

In contrast, construction customers and their professional advisors do not intervene in contract management matters. Traditionally in UK construction, contracts are based on

a triad, with an architect being appointed by the customer to ensure that the prime contractor constructs the works according to the design and specification

Although airlines are involved in specifying the performance criteria that they require, they limit their involvement in the progress of the contract. As airlines also do not fetter prime contractors' freedom to draft the terms in their subcontracts, forms such as risk-revenue-sharing agree can reflect the parties relational and lean objectives.

Conclusions

In previous work (ECLOS) we examined the synergy between written contract forms, whilst relating their impact on both the contracting and technical processes. This study focused on the product introduction phase of procuring original equipment. The results of this research unequivocally indicated that for all the three sectors studied, the form of contract heavily influenced the parties' relations, from the *ex ante* to *ex post* phases of the transaction. Furthermore, in concurring with Macneil's fifth norm, the transaction environment had a crucial effect on the economic outcome of the transaction. A history and contemporary social context engendered hostile and defensive behaviour that added transaction costs and undermined the efficiency gains that were envisaged from the application of lean principles.

Future Research

This research project will be continued to verify and develop these initial conclusions. On the basis that there is no consensus of what constitutes 'lean' implementation, the LOTISS project will continue this line of research, with the objective of identifying the patterns that evolve from different segments within the sectors. The objective behind this line of investigation is to develop one or more frameworks that embody the practices that lead to efficiency gains from a holistic supply chain perspective as well as between contracting parties.

Further study could be conducted regarding how the architect's design could be integrated with lean practices and relational contracting. In terms of linking the relational and lean elements of collaborative contractual alliances, the LOTISS team proposes the adaptation to Lamming's (1993) four phase evolution of working relations between aerospace and construction parties (see Table 4: below) as a basis for future study. The development of the LOTISS research will also examine the roles of incentives in developing more efficient (Williamson, 1996) relationships that are characteristic of the contemporary industrial environment.

Therefore the LOTISS team will extend this line of research to examine the role of contract documents and inter firm relations in the three focal sectors and will investigate the wider context of practices in other industries. This line of research accords with Williamson's (1996) proposition, that future research should construct a model that reflects the economic facets of contractual relations between organisations in the early twenty-first century

In relation to the influence of contract law, both relational contracting theorists and transaction cost economists recognise that the doctrinal principles of contract law influences forms of contracts and the allied informal traits. Therefore, future research should also compare how contract law relates to contemporary exchange relations. This line of research has profound implications for the economic outcome of transactions and whether the parties' investment in applying lean principles is efficient. This is especially relevant in relation to long-term, in-service support contracts, where the legacy of previous trading and future expectations have significant effects on how support contracts are negotiated, drafted and managed.

Table 4: Four Phase Evolution of Relationships between Aerospace Contractors (Modified From Lamming, 1993 (Cullen, 2004))

4 Phases	1 Traditional (Pre-1970's)	2 Stress 1970's	3 Resolve Early-mid 1980's	4 Partnering Late 1980's-early 90's
Characteristics	Manufacturers owned most of the means of production	Consolidation	Consolidation continued	OEM/main contractors divested other than core activities; focused on specific expertise and assembly modules
Hierarchy	Market testing by competitive tenders followed by annual contracts for components	Competition forced down prices, further reduced by best and final bids	Quality demands from purchasers; Logistics ¹⁰ with progressive price reductions	Long-term framework agreements; quality + reliability; elimination of duplication; economics of scale and scope; supply of pre-assembled modules; progressively reduced prices
Contracting	Mass production; short-term commitment	Oil crisis: 25% global overcapacity; increased pressure on subcontractors to reduce costs	Challenge from Japanese rivals. Subcontractors demand more commitment from purchasers; demands for investment in plant and equipment to achieve quality and logistics reqmts	Specialisation; long-term collaboration
Industry and environmental conditions				
Supply/demand	Buoyant demand	E x c e s s s u p p l y		

In comparison to the construction and civil aerospace sectors, the level of the MoD's intervention during original equipment and ISS transactions is significantly higher than in the construction and civil engineering industries. The difference lies in the MoD's perception it is "an expert customer¹¹". Consequently, the role of the customer forms a strand for future research by the LOTISS team, to propose how to resolve this conundrum between non-interference and using a customer's expertise to enhance the mutual benefits for contract parties.

¹⁰ e.g. "Just-in-Time"

¹¹ private conversation with senior manager in the Ministry of Defence, March 2004

Appendix 1:

Application of Lean Principles on ISS Contracts

Principle	Aerospace Responses	Construction Responses
1. Definitions		
Lean	More external focus on customers, industry expectations and the provision of customer service.	Strong internal focus on 'getting more out of less'. No references to customer.
In-Service Support	Consistent responses: 'Long term maintenance, repair, overhaul and support of product, equipment or facilities in the field.'	Responses varied by market sub-segment: 'Facilities management' 'Serial construction project management on behalf of client' No definition
2. Identification of Value from the Perspective of the Customer	Tendency to adopt formal/informal procedures processes or mechanisms for identification of customer value within in-service support (ISS) process. Relationships seen as important in the successful delivery of customer value. Relationships regarded as critical in military segment. Changes of personnel seen as disruptive Evaluation and resolution of project risk seen as particular source of conflict in military contracting segment. Transience of political direction and resulting impact on funding seen as major barrier to innovative, long-term agreements that deliver value. More innovative long-term agreements which deliver value to both sides seen as easier to do in civil segment. Value delivered most effectively in environment where performance measures developed and managed jointly.	Tendency to focus on traditional project evaluation criteria of time-scale, cost and quality (TCQ) Relationships seen as important in the successful delivery of customer value. Changes of personnel seen as disruptive Some evidence of innovative approaches driven by individual managers Value delivered most effectively in environment where performance measures developed and managed jointly.
3. Mapping the Value Stream	Majority of respondents used mapping techniques to evaluate current state of the value stream. Less than half generated a target future state map Less evidence of involving key suppliers in mapping of current states	Majority of respondents used mapping techniques to evaluate current state of the value stream. Less than half generated a target future state map All respondents involved key suppliers in mapping of current states

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Principle	Aerospace Responses	Construction Responses
4. Creating Flow	<p>Majority of respondents claimed successful implementation of action plans that improved flow in the value stream.</p> <p>All respondents reported benefits in: Due date compliance Improved service Reduced lead-times/throughput times Improved customer/supplier relationships</p> <p>All respondents also reported benefits in: Costs and hence prices to customer Improved responsiveness Space utilisation</p> <p>Intention to share both cost and lead-time benefits with customer.</p> <p>More use of classical Toyota Production System tools and techniques including: Inventory management Demand smoothing Visual control systems Standard operations Single piece flow Ergonomics Housekeeping systems 'Takt' time</p>	<p>Majority of respondents claimed successful implementation of action plans that improved flow in the value stream.</p> <p>All respondents reported benefits in: Due date compliance Improved service Reduced lead-times/throughput times Improved customer/supplier relationships</p> <p>All respondents also reported benefits in: Improved quality</p> <p>Either cost or lead-time benefits shared with customer, not both.</p> <p>Much less use of classical Toyota Production System tools and techniques incl: Visual control systems Standard operations Housekeeping systems</p> <p>More effective use of risk analysis and management. More use of training, development and team based mechanisms to improve flexibility of people More evidence of effective supply chain integration and integrated project teams</p>
5. Letting Customer Demand Pace and Pull Production	<p>Considerable variation in extent to which 'pull' versus 'push' type systems are being used.</p>	<p>Little general application of 'pull' systems. However, individual examples of innovative interpretations were found.</p>
6. Managing Continuous Improvement and the Pursuit of Perfection	<p>All respondents described themselves as team based organisations and all were running some form of team based improvement activities</p> <p>All claimed to be involving all levels in the organisation, including customers and suppliers</p> <p>All claimed to be monitoring improvement trends and majority were displaying or routinely communicating this information.</p> <p>All claimed that improvement targets were embedded in business plan</p> <p>80% claimed development of high speed product modification process</p>	<p>All respondents described themselves as team based organisations and all were running some form of team based improvement activities</p> <p>All claimed to be involving all levels in the organisation, including customers and suppliers</p> <p>All claimed to be monitoring improvement trends and majority were displaying or routinely communicating this information.</p> <p>Only two thirds claimed improvement targets were embedded in business plan</p> <p>None claimed development of high speed product modification process</p> <p>All claimed use of risk analysis to support problem solving activity</p>

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Sutter Health: Developing a Contracting Model to Support Lean Project Delivery

William A. Lichtig¹

Who is Sutter Health

Sutter Health is a not-for-profit, community based healthcare and hospital system headquartered in Sacramento, California. The Sutter system serves more than one hundred communities in Northern California. From its historical roots of being a small community-based hospital in Sacramento, it has grown to be one of the largest healthcare providers in Northern California, caring for more patients than any other network. Its affiliate-based system includes 27 acute care hospitals, over 3,400 physicians, 41,000 employees and recorded over 2.6 million outpatient visits in 2003.

Building Program

In 1994, after the Northridge earthquake caused significant damage to healthcare facilities in Southern California, the California Legislature enacted SB 1953 - the Hospital Facilities Seismic Safety Act. In summary, as currently applied, SB 1953 requires significant structural seismic upgrades to be accomplished by January 1, 2013. In reality, because of the nature of the required improvements, in most cases it is more cost effective to replace existing facilities, rather than seismically retrofit.

Sutter Health's building program, initially undertaken in response to SB 1953, was expanded to include a more comprehensive assessment of long-term facility requirements based upon community needs, community growth and healthcare trends. In addition to the mandate of SB 1953, Sutter Health made the decision to expand access to healthcare in the communities it serves by building ambulatory care centers, cancer treatment facilities, and medical office buildings. Each region developed proposals to create facilities that would meet the community's healthcare needs and improve the patient experience.

As currently contemplated, the program includes \$5.5 billion of design and construction to be completed by 2012. This includes acute care facilities permitted by California's Office of Statewide Health Planning and Development (OSHPD)(where permitting can take upwards of 20 months), non-acute outpatient facilities (surgery centers), medical office buildings, parking structures, as well as significant remodels of newer structures that do not require replacement.

From senior management's perspective, the overall program goal is to successfully traverse the risks associated with a program of this magnitude, reliably deliver these projects to their communities, and maintain Sutter Health's superb financial ratings. In support of these goals, an executive management team composed of Robert Mitsch (Vice President, Real Estate), David Chambers (Director, Planning, Architecture and Design), and David Pixley (Director, Project Management and Development) was tasked with expanding the Facility Planning and Development Department (FPD) to support the program and put systems in place to manage the task.

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In developing the necessary systems, FPD focused on increasing the reliability that projects – including some that would take upwards of five years to design, permit and construct – would be delivered:

- on time or early
- within budget or less
- without claims
- safely (without creating patients), and
- without burn-out of FPD staff²

In attacking these challenges, FPD developed internal "Standards of Practice," standardizing practices that worked well in the past, but also sought to innovate and adopt new practices to support its goals. As a result, Sutter Health has moved to implementing Lean Project Delivery.

Move to Lean Project Delivery

The Lean Construction Institute ("LCI") articulated the theory that projects can be characterized as "stodgy" (simple, certain and slow) or "dynamic" (complex, uncertain, and time sensitive). Within these classifications, LCI characterized various systems that operate within projects: Physics of work (how work gets done), Systems and Organizations (how the relationship among principal companies is structured), and Contracts (how the commercial relationship is structured). Historically, LCI and implementers of the Last Planner System™ have focused on the physics of the work and attacked the unreliability of project work flow in an effort to reduce project waste. The question has always remained, to what extent do the other systems operate to promote or constrain lean project delivery?

With the assistance of Lean Project Consulting, Inc., Sutter Health has developed an approach which strives to coherently address each level of the project delivery system. This approach has become known in the community as the Five Big Ideas³. The Five Big Ideas are summarized in the following graphic:

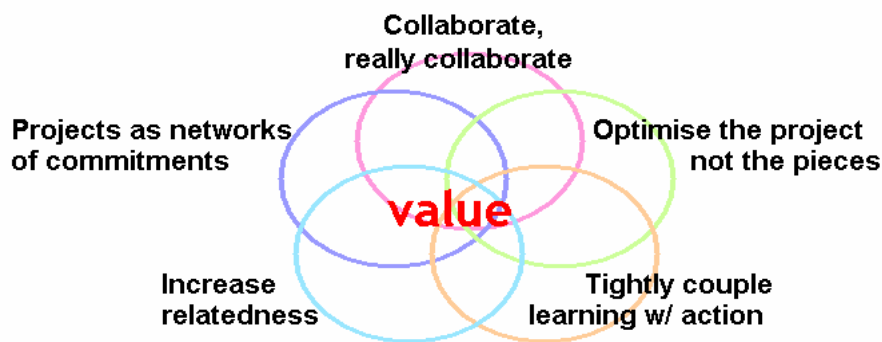


Figure 1: The Five Big Ideas

The Five Big Ideas form the framework for approaching all aspects of Sutter Health's Lean Project Delivery. The description that follows is taken from the manifesto that

² The combined demands of constructing healthcare, education and other public and private facilities has created a demand for design and construction services that is unprecedented in Northern California. One challenge facing Sutter Health and other owners will be assuring that its work is attractive enough for quality contractors and subcontractors in a time of heightened demand. This is coupled with a growing scarcity of qualified construction trades people to actually perform the field construction. The problem of a shrinking workforce is not limited to California but is prevalent throughout the western United States.

³ Adopted by Sutter Health as the foundation of its lean initiative, the *Five Big Ideas* were developed and brought to the Sutter Health community by Hal Macomber and Greg Howell.

has been signed by members of FPD and Sutter Health's design and construction community:

1. ***Collaborate; really collaborate, throughout design, planning, and execution.***
Constructable, maintainable, and affordable design requires the participation of the range of project performers and constituencies. Since abandoning the master-builder concept, and separating design from construction, we have been patching a poorly conceived design practice. Value engineering, design assist, and constructability reviews mask an underlying assumption — that design can be successful when separated from engineering and construction. Design is an iterative conversation; the choice of ends affects means, and available means affects ends. Collaborative design and planning maximizes positive iterations and reduces negative iterations.
2. ***Increase relatedness among all project participants.***
People come together on AEC projects as strangers. They too often leave as enemies. Healthcare facilities projects are complex and long-lived, requiring ongoing learning, innovation, and collaboration to be successful. The chief impediment to transforming the design and delivery of capital projects is an insufficient relatedness of project participants. Participants need to develop relationships founded on trust if they are to share their mistakes as learning opportunities for their project, and all the other projects. This will not just happen. However, we are learning that relationships can be developed intentionally.
3. ***Projects are networks of commitments.***
Projects are not processes. They are not value streams. The work of management in project environments is the ongoing articulation and activation of unique networks of commitment. The work of leaders is bringing coherence to the network of commitments in the face of the uncertain future and co-creating the future with project participants. This contrasts with the commonsense understanding that limits planning as predicting, managing as controlling, and leadership as setting direction.
4. ***Optimize the project not the pieces.***
Project work is messy. Projects get messier and spin out of control when contracts and project practices push every activity manager to press for speed and lowest cost. Pushing for high productivity at the task level may maximize local performance but it reduces the predictable release of work downstream, increases project durations, complicates coordination, and reduces trust. In design, we incur rework and delays. In the field, this means greater danger. We have a significant opportunity and responsibility to reduce workers' exposure to hazards on construction projects. Doing so can bring about greater than 50% improvements in the safety on the work site. As the leading community-based healthcare system in northern California we are committed to do all that is possible so that the people who build these projects are able to go home each night the way they came to work. The way we understand work and manage planning can increase that messiness or reduce it.
5. ***Tightly couple action with learning.***
Continuous improvement of costs, schedule, and overall project value is possible when project performers learn in action. Work can be performed in a way that the performer gets immediate feedback on how well it matched the intended conditions of satisfaction. Doing work as single-piece flow avoids producing batches that in some way don't meet customer expectations. The current separation of planning, execution, and control contributes to poor project performance and to declining expectations of what is possible.

While the focus of this paper is on the commercial strategies employed by Sutter Health in moving towards a "relational contracting model," that discussion cannot proceed without mentioning the other efforts undertaken in support of the initiative.

Sutter Health began by hosting the Sutter Lean Summit, a three-day event held during March 2004, in Concord, California. The first two days, attended by over 225 members of FPD and the design and construction community, focused on an introduction to lean principles structured around the Five Big Ideas. The third day convened company leaders to discuss the leadership challenges that would emerge during this effort.

The Summit was followed by:

- on-going training for FPD staff, including both formal workshops, weekly conference calls, and monthly initiatives
- implementation of the Last Planner System™ (LPS) on five projects of differing size and complexity. Implementation included Sutter Health sponsored two-day kick-off sessions which trained the project team in the tools of LPS and on-going project coaching to help the team put the concepts in action.
- a Sutter Health sponsored web-based portal, styled as a "wiki" – a community-based body of knowledge – for sharing information, tools and experiences.
- members of the design and construction community meeting with FPD staff in *Vendor Forums* for facilitated conversations on topics of interest to the community.
- Sutter Health formed a *Lean Executive Leadership Group*, a think-tank of leading industry executives participating in Sutter Health's program, to meet periodically and share information, successes, and challenges.

Through these efforts, Sutter Health has sought to develop a collective awareness and understanding of the concepts inherent in Lean Project Delivery, while also building a sense of community. This has served to provide new foundations for project-based collaboration and has increased the relatedness of the parties.

Applying Commercial Strategies

Team Selection

Sutter Health continues to look to the Five Big Ideas to inform its commercial strategy, seeking alignment between the goals of Lean Project Delivery and the commercial terms of its contracts. Following on its efforts to build a sense of community through the Sutter Summit and Vendor Forums, Sutter Health looks to build project teams from the Sutter Health "design and construction community." FPD is focused on forging an integrated project team, where there are no masters or slaves, but equal participants.

The selection process for Architects and Construction Managers/General Contractors (CM/GC) is a quality-based evaluation of responses to requests for proposal and follow-up interviews with short-listed firms. CM/GC selection proceeds immediately after Architect selection. Major subcontractors are also selected early, typically during the schematic design phase, to gain maximum participation and innovation when their efforts are likely to have the greatest financial impact.⁴

Creating a Collaborative Design Environment

Sutter Health believes that collaboration occurs best when the participants view themselves as equal participants in the process and when the initial collaboration centers on exploring and defining the problem, rather than commenting on someone's proposed solution. Sutter Health expects its design and construction partners to come to the collaborative meetings from a position of inquiry, rather than advocacy; hoping to learn something from someone else in the collaborative process that will spur a new understanding of the problem and a broadened range of possible solutions.

⁴ Sanvido, Victor E. and Konchar, Mark D. 1999. Selecting Project Delivery Systems: Comparing Design-Build, Design-Bid-Build and Construction Management at Risk, at p. 51.

In support of these efforts, Sutter Health anticipates that the CM/GC and trades will have a seat at the table throughout design. It expects that major portions of the project will garner the participation of design-collaboration or design-build subcontractors (Mechanical, Electrical, Plumbing, Fire, Curtain wall, skin). Again, the design process is structured to encourage the sharing of intermediate design documents, rather than just handing off large batches of drawings at extended intervals.

By involving the constructors early, Sutter Health requests that constructability and buildability be addressed throughout design, in essence being treated as a design criteria. Similarly, the team is expected to engage in design reviews with an eye toward value analysis and value engineering -- constantly exploring whether other construction options will better serve Sutter Health's value proposition.

While always having required over-the-shoulder pricing to inform design decisions, Sutter Health has recently moved to experimenting with Target Value Design.⁵ In support of the primacy of designing and constructing each project within budget, the design team accepts significant design-to-budget obligations, which cause the Architect and CM/GC to collectively focus on the quality of the documents available for pricing and the quality of the cost modeling that is developed by the CM/GC and its trade contractors.

Sutter Health also expects that the design and construction team will collectively create the *Conditions of Satisfaction*. The parties are expected to develop a joint site/existing condition investigation plan, proposing the level of investigation that the team recommends as prudent. In addition, the team jointly develops the scope for third-party consultants and collectively assess the resulting work product to evaluate it for completeness and sufficiency to inform design and construction.

Finally, in order to assure that a commercial strategy supporting Lean Project Delivery is carried through to all levels of the project team, Sutter Health reviews the subcontract terms to confirm alignment with Sutter Health's commercial and Lean Project Delivery policies. Similarly, because traditional project management bonus terms for CM/GC firms can motivate by local, rather than system-wide, optimization, Sutter Health's contract provides that for bonuses to be considered a Cost of the Work, they must be reviewed and approved by FPD's project manager. By way of example, the CM/GC might bonus based upon cash flow, which could cause work to be installed without regard to the LPS.

Joint Management of Financial Risk

Sutter Health's contracts attempt to create a system of shared risk, with the goal of reducing overall project risk, rather than just shifting it. The commercial terms also call for joint management of the contingency funds available to off-set those risks that are not eliminated.

As described above, Sutter Health pays for the early involvement of the project team in an effort to eliminate ambiguity in the documents and maximize the collective understanding of the project's conditions of satisfaction. Sutter Health also strives to raise the quality of design by insisting that design fees be supported by a resource loaded work plan. CM/GCs are uniformly compensated on a cost-plus fee, guaranteed maximum price basis, with some subcontractors being cost-plus GMP also. GMP proposals are generally submitted on drawings submitted for permit, reducing the need for added contingency.

⁵ Target Value Design is similar to Target Costing, but may be broadened to encompass additional design criteria beyond cost, including time, work structuring, buildability, and similar issues. For a discussion of Target Costing see Ballard, Glenn and Reiser, Paul (2004). The St. Olaf College Fieldhouse Project: A case Study in Designing to Target Cost. Proceedings of the 12th Annual IGLC Conference.

Sutter Health establishes separate contingency amounts for design development or estimating, permitting changes, construction, escalation, and overall project uncertainty. These contingencies are jointly managed throughout design and construction.

As a result of their early involvement, the CM/GC and trade contractors agree to a limited basis for change orders – material scope change, changed site conditions, or unforeseen regulatory or code interpretations. The traditional bases for many change orders -- lack of document or discipline coordination - are eliminated as a result of the coordination efforts during the design phase. Because Sutter Health, despite its lean ideals, does not expect perfection, the Construction Phase Contingency is made available to address work that was inadvertently omitted from the GMP estimate or results from coordination mistakes.

Sutter Health has also moved to eliminate the traditional “negligence” standard as the measure of the designers’ financial responsibility. Instead, Sutter Health negotiates a deductible as a percentage of construction costs for “errors & omissions,” even those resulting from negligence, that Sutter will fund out of the design contingency (E&O Contingency). Above that deductible, the parties negotiate a percentage for which the designer will be responsible without proof of negligence (“non-negligent cap”). Above these combined percentages, Sutter must show negligence in order to recover. This system allows that parties to establish an agreed level of quality and share the risk without being forced into an adversarial system that creates significant waste. With the level of quality established, the Architect is able to prepare its resource loaded work plan accordingly.

Throughout construction, the parties meet regularly to assess reasons for “extra work” and apportion financial responsibility. The team collectively assesses which of a number of predefined categories a supposed extra falls within. This collective assessment allows a full discussion of both the reason for the extra (e.g., design error, differing site condition or owner scope addition) and financial responsibility in light of the parties' performance obligations. For example, supposed extra work may be a by-product of both a design error and the CM/GC's failure to adequately perform its preconstruction services. In that case, an apportionment would be made between the Construction Phase Contingency and the E&O Contingency. If the parties are unable to agree, the issue becomes subject to the dispute resolution process discussed below.

Joint Management of Disputes

Sutter Health seeks to maximize the opportunities for party-controlled dispute resolution. In addition to the monthly change order review meetings, the contracts establish an escalating series of dispute resolution meetings. If a dispute is not resolved through informal negotiations, any party may request that it be elevated to the Project Manager level. Within 14 days a special meeting is convened at the project site, to be attended by representatives of Owner, Architect and Contractor.

If the project representatives are unable to resolve the disagreement, it is then elevated to the Senior Executive level. Here, senior executives from Owner, Architect and Contractor are to meet face-to-face within 14 days of an impasse being reached at the project level. The senior executive meeting is expressly for the purpose of exchanging and reviewing all pertinent documents and information related to the dispute, freely and candidly discussing each party's position, and "reaching agreement upon a reasonable compromise resolution of the Claim."

If the dispute is not resolved within seven days of the Senior Executive meeting, the Owner has the right to appoint an independent expert to review the dispute and issue a recommendation. The Independent Expert's recommendation is non-binding, but should

help inform the parties' negotiations by providing an informed, objective view of the facts and circumstances surrounding the dispute.⁶

If these earlier efforts have been unsuccessful, the agreements call for mandatory mediation, with the cost to be shared equally by the parties. The mediation must occur within 30 days, unless all parties agree otherwise. Failing resolution, the parties may resort to the litigation process, with the prevailing party recovering attorneys' fees and costs.

These dispute resolution procedures are designed to encourage the parties to freely share information and negotiate a resolution at the lowest level possible. It is also sensitive to preserving the on-going relationship between project personnel and contracting companies, since most project participants are performing on multiple projects within the system. The goal is to resolve disputes, while preserving the relationships.

Developing an Incentive Program

Historically, Sutter Health has not used a "shared savings" mechanism, instead having all project cost savings revert to the owner. A number of Sutter Health's vendors have requested that it reconsider this position. In assessing whether to implement an incentive program, Sutter Health has concluded that any such program must be fashioned to support the Five Big Ideas and balance between the different behaviors and results called for by those concepts.

From Sutter Health's perspective, the purpose of the incentive program is to encourage superior performance based upon Sutter Health's goals for Lean Project Delivery and to reward the design and construction team for successfully achieving superior performance and successfully exceeding the project expectations and benchmarks. The program must provide a basis for continually monitoring and reviewing the project team's performance, providing the team with periodic performance information to allow corrections or modifications *during* project performance to improve the quality of the services provided. Also, the team must participate in the pool so that it supports the creation of one, unified team focused on overall project performance.

Too often, projects are completed without capturing the learning; "lessons learned" are discussed at project completion to be applied on the "next" project. One of the Five Big Ideas is to "Tightly couple learning with action." If periodic project reviews are not performed, then the opportunity for improvement over the life of a multi-year project is lost. Moreover, the existence of financial incentives provides added motivation for individuals and organizations to stretch beyond their current levels of performance or ways of doing business and may help overcome the inertia and resignation that often exists on projects.

As preliminarily conceived, the incentive program would be funded with project savings as evidenced by both contingency preservation and reduction in the project's Costs of the Work as compared to the amounts contained within the GMP. These savings would create the "incentive pool" which would then be paid based upon evaluation of performance against other performance criteria. For example, Sutter Health envisions that the team would establish performance goals in at least the following areas: cost, quality, safety, schedule, planning system reliability, innovative design or construction processes. The team's goals would be expressed as a range of outcomes from "business-as-usual," to "stretch goals," to "ideal performance." Performance would be monitored

⁶ Sutter Health has successfully used the Independent Expert procedure to produce a negotiated solution to a significant design-related claim. The assessment of the Independent Expert helped inform the Owner's position, resulting in a negotiated settlement and payment in excess of \$100,000 to settle a claim.

and rated, with the overall portion of the incentive pool to be paid to the team based upon performance on the non-cost performance criteria.

Challenge to Sutter Health's Vendors

Sutter Health has challenged its vendors to learn the skills needed for Lean Project Delivery. It has also requested that its major vendors develop and share with Sutter Health their internal implementation strategies, which include strategies to measure progress along the way. Vendors have been asked to demonstrate a commitment to continuous improvement and exhibit a willingness to share their learning in the Sutter Health project community. So far, a number of vendors have met these challenges and have begun to learn alongside the Sutter Health project management staff.