BEYOND PARTNERING: TOWARD A NEW APPROACH TO PROJECT MANAGEMENT?

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ABSTRACT

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

This paper proposes that the construction process must be reconceived from the purchase of a product to a prototyping process. Changing the underlying mental model makes possible new approaches to managing production from concept through completion. In turn these approaches will suggest new ways to contract. Disputes will not vanish as they will remain an inevitable consequence of innovation but the frequency of commercial conflicts may be reduced.

The paper argues that partnering is an attempt to install important aspects of the prototyping model into the current product purchase model. Examples drawn from practice show the limits of current practices. They suggest a shift away from the primary focus on disputes arising in commercial contracting to the management of a concurrent design and construction process. Early examples of these trends are discussed and the workshop responses from industry representatives are reported. The paper closes with suggestions for future trends and a suggestion that Partnering be viewed as one of many programmatic efforts working to reform construction management.

1.0 INTRODUCTION

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

This paper proposes that the construction process must be reconceived from the purchase of a product to a prototyping process. Changing the underlying mental model makes possible new approaches to managing production from concept through completion. In turn these approaches will suggest new ways to contract. Disputes will not vanish as they will remain an inevitable consequence of innovation but the frequency of commercial conflicts may be reduced.

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The ambiguous definition of partnering illustrates the extent to which the current practice is deficient. It is easy to identify over half a dozen different perspectives on partnering. Is partnering a dispute and litigation avoidance and resolution technique? A risk reduction strategy? Is it a team building effort? A lateral communication vehicle? A problem solving or TQM forum? A continuing process of self-examination and relationship building? An effort to reduce the costs of managing contracts? An effort to reduce the bricks and mortar costs? A contract for behavior instead of a product? A system/team design process? A return to the good old days of fair dealing and equity? A leading indicator of deeper changes? Each of these perspectives is partly correct and each points to some deficiency in current management practice.

Partnering originated from, and is still generally conceived of as, a technique for reducing the costs of commercial contract disputes. These disputes are considered to arise either from failures to communicate clearly or from unethical or overly opportunistic behavior. Communications, process issues and relationships are foremost concerns.

But partnering is moving beyond its initial focus on commercial disputes to technical problem solving and improving production management through design and construction. In this sense, partnering works because it allows, even encourages, discussions and negotiations across contractual boundaries. Partnering as currently practiced makes it possible, for a short time and in a narrow setting, to break some of the contracting rules. Partnering's greatest contribution is to expose the limits of current practice forcing us to confront deeper questions such as: why do we have these rules? and then, to: what sort of process is construction? and finally, to: how should we manage projects?

We believe the partnering movement is evidence that the current rules provide an inadequate basis to manage complex, uncertain and quick projects and that it is time to reconceive the construction process. Once reconceived, radical changes in practice will make current forms of partnering interesting and important footnotes in construction history. To understand how construction might be reconceived, consider two models of the construction process.

2.0 TWO COMPETING MODELS:

2.1 BUYING A PRODUCT

In this model, construction is the purchase of a product. An owner decides what they want, a designer translates the desires of the owner into a design, and a constructor, using the design, directs the workforce in the application of well-known work methods. In this model, the owner determines what to build and contracts for an accurate technical description from a designer who has some consideration for how it will be constructed. The contractor's job is to finish determining the means but this should make no impact on what is being constructed. The transactions for the purchase of design and construction are governed by commercial contracts rooted in a commercial code for mediating the market-based exchange of products.

Uncertainty about what is to be built, *Ends* uncertainty, is minimal and changes are entirely at the whim of the owner or hidden conditions. Uncertainty associated with *Means* of construction is considered to be risk (which is often shifted to those with little control) or absorbed in pricing. In any case, Ends uncertainty is considered to be mostly independent of Means uncertainty. Contracts reflect this view of uncertainty by defining the process as a series of transactions for the purchase of products. The sequence of the delivery of sub-assemblies is reflected in the schedule and their cost in the estimate. Expectations or objectives for the project are left either unexpressed or inferred from the nature of the product purchased. A person must want to catch fish if they buy a fishing rod.

Production is managed by dividing the work among specialists who develop and follow the directions embedded in drawings, specifications and contracts and are coordinated by a plan. Coordination is a matter of assuring that each activity, package or piece of work is completed and purchased at the right time. Phases of a project are separated and the interaction between activities is either a matter of simple sequential logic or the result of resource allocation decisions. Information on work being done by others is of limited value as the interactions between ends and means are completely defined and the interaction between specialists minimized by sequential coordination. Control is a matter of measuring progress and cost expenditures against the owner's desires as represented in the contract and subdivided by contract activities. When things go wrong, the control systems point to problem activities so the erring party can be brought in line or replaced. If the problem is not solved, the waste-related costs are either passed up the chain or reduce the profit of some vendor or contractor. Improvement requires doing each task more quickly and less expensively. Rapid completion of tasks is the continuing drive of all parties.

Teamwork has a football definition;

> You do what I say, you do your job and I will coordinate the play. Saying yes shows me you are on board. Asking questions isn't in your job description.

Commercial disputes arise in this model from either a failure in forming the contracts or are due to excessive opportunism or low performance of individuals.

There is truth in this model. It works reasonably well by today's productivity standards, when projects are simple, slow and certain. In these cases management and contracting tools do not have to cope with even moderately high levels of complexity and uncertainty. But centralizing coordination of a large number of highly specialized parties with a single plan becomes impossible under conditions of high uncertainty and complexity. Communication channels are overloaded and decision making slows. The opportunity for genuine large scale continuous improvement is eliminated by the pressure of events.

2.2 A Prototyping Process

Construction people often complain that their problems would vanish if they could ever build a second identical project with the same people (and we suppose weather, prices, and technology). Oddly, those projects which approach this repetitive ideal are typically dismissed as not being real construction. Complaints about lack of repetition are expressions of the product purchase mentality which rest on the belief that standardization is valuable and uncertainty should be avoided.

But there is another model which more accurately describes the experience on complex, uncertain and quick projects. In this model, a construction project is seen as the result of a prototyping process. Prototyping is a continuous negotiation between ends and means, that is, between *What* is to be built and *How* to build it. This negotiation is completed by representatives of different value sets who must continuously resolve the ends/means question at increasing levels of detail. The owner, designer and constructor are no longer monoliths, rather the interests inherent in their organization are negotiated with those inherent in others. For example, consider an industrial construction project where the facility is part of a larger product development process. In these circumstances, values from the owner of finance, operations, marketing and maintenance, must be meshed with the designers' concerns for structural integrity and aesthetics, and the constructors' concerns for constructability, safety and labor availability. And each value has implications for both what is to be built and how and each may impinge on the final form of the project.

In product development, i.e. prototyping, the traditional boundaries between construction phases are no longer relevant, as functions previously associated with one phase are now carried out concurrently. Construction completes design. Representatives of multiple value sets work together from the first to define ends and test them against means to the extent needed to bound the problem for those who follow or who do physical production. Ends uncertainty and Means uncertainty are tightly related; rapid, simultaneous reduction of both drives all decisions. Risk is still assigned to those best able to control it and accounted for**,** but the identification and elimination of uncertainty is a shared responsibility.

Forecasting is based on measuring progress against the owner's desire**,** but control is a matter of bringing processes under control by assuring uncertainty is not injected or transmitted by intermediate functions (or the control systems themselves). Downstream decisions are taken in concert with both upstream ends and downstream means criteria. When things go wrong, some individual may be the problem, but the first consideration is the design and operation of the production system itself. Waste is more than evidence of error, it results from any obstacle to reducing uncertainty. Under this definition, waste can be reduced through improving reliability by continuous reduction in variation and improvement in the quality of plans and preparations. Teamwork requires people to represent their values faithfully and fully to assure rework is not required. This means saying 'no' until the differences can be resolved and criteria met or changed.

Disputes can arise in this model from two very different sources. The more familiar ones develop when the commercial contracts do not allocate risk to those best able to control it, or when the incentives from the commercial contracts increase uncertainty in the planning and production processes. This can occur when the contractual incentives for earning progress reward production, irrespective of downstream considerations. In the vernacular of piping construction, this is called 'Show Pipe'.

Less familiar but more important are those disputes that result from innovation. Our ability to innovate is limited by the ability to resolve the disputes which occur when one party must invest or take a risk or make an investment in order for another to be more productive. This problem can occur in the primary production chain, for example when change in packaging and positioning of resources on site is done to reduce the suppliers cost as opposed to reducing the total installed cost of the material. A similar problem can arise within an organization when additional resources such as cranes or lifting devices could reduce total cost but the requests are disallowed as not in the budget. In each case, the larger process innovations are stifled by the inability to alter local compensation.

3.0 PARTNERING AND THE CONSTRUCTION MODELS

Against these competing models, partnering can be understood both as a patch on a construction system, designed for the purchase of a product, and as a partial implementation of the prototyping model. So, while partnering has been extremely effective at reducing disputes and allowing effective problem solving in practice, partnering has not yet had a significant impact on production management because of the dominance and limitations of the product purchase model. The power, limits and future opportunities of partnering can be seen in the following case studies.

In the first, a large hospital is being constructed with state of the art management and partnering practices. Full use of partnering and ADR has been made. Significant problems have been solved and the definition of what is to be built has been changed to ease how it will be built.

3.1 A Public Sector Case Study

In this example, partnering transformed the Contractor Quality Control System at the Naval Hospital in Portsmouth Virginia. The General Contractor, the Subcontractors and the Owner worked together to develop a quality system appropriate for this large and complex project. The quality initiative was a big, costly effort but it is producing savings because it works. Savings accrue, as can be expected, in lower rip out and rework costs. But also, production is enjoying greatly improved efficiency and productivity because of the impact of in-process quality inspection on production coordination and planning. Subcontractors participate fully in the quality control and in process inspection. A production conscious Quality Staff and a quality conscious Production Staff are erasing the line between production and quality to the benefit of the owner and contractors.

The same project provides a second concrete example of sharing risk and reward. The owner wanted flat floors primarily for the sake of appearance: reflective floor coverings, case work, door and ceiling appearance. Unfortunately, the designer under-specified flatness in medical spaces and over-specified flatness in utility and roof areas. The specification used the F-number system found in ACI117-90 for specifying floor flatness and levelness.

The General Contractor wanted to meet the specification and gain the advantage of flat floors for finish work - goals shared by the owner. Unfortunately, the General Contractor, after three tries, could not find a Subcontractor with the knowhow, trained crews and equipment to even meet the minimal requirements in the specification. Further, none of the participants was knowledgeable in the F-number system engineering, techniques or measurement. The dilemma escalated before very much unsatisfactory concrete was placed.

The Owner and General Contractor decided to work together to find a solution instead of beating each other’s unknowledgeable engineers over the head with the unsatisfactory specification and inappropriate test results. A recognized national expert was brought in to analyze the situation, to recommend courses of action and to train the Owner, General Contractor and Subcontractor staffs in the F-number system. Crews were trained in proper strike-off and finishing techniques.

The application of the solution was tailored by the partnership. The specifications for flatness were increased in the medical areas and hallways and significantly reduced in utility areas and on the roof. Results exceeding the specifications were routinely achieved because the subcontractor agreed to use more demanding techniques. The subcontractor’s risk was reduced and the cost of the initiative was shared evenly by the Owner and General Contractor. When the last concrete was placed, the results for the whole project exceeded the expectations of the Owner, General Contractor and Subcontractor. A battle won.

In the first example, an up-front investment at reduced total costs was made possible by a serious financial investment and a willingness on both parties' part to take a larger responsibility for effective quality control. The second example illustrates the continuous negotiation between ends and means as the project unfolds. The initial problem with the specifications provided the basis for an exchange of value which funded improved finishing techniques.

But as effective as partnering has been on this job, both the owner and the contractor have been unable to manage the entire production process to assure smooth and efficient work. In part, this has been due to the inability to produce a unified production plan. The project has state of the art CPM scheduling support but, as suggested before, this system cannot assure the intimate details of close coordination between construction trades in the innumerable spaces and in the face of evolving design.

Here, the product purchase model effectively prevents the design of a planning system adequate to the demands of the job, precisely because the needed continuous adjustment and knowledge of work flows is not provided by controls designed to status progress under the product purchase. Improving the reliability of flows is a central innovation both provoked and constrained by the old model. The Contractor is afraid to commit to improving plan reliability, because he is not confident he can perform well in those waters, and is not sure who will pay the piper, should the new planning system reveal internal weakness.

3.2 A PRIVATE SECTOR CASE STUDY

On this project, the partnering contributed to the re-invention of project management from beginning to end. Specific changes from standard practice are identified and discussed but watch for the techniques used to assure extensive communication required for concurrent definition of ends and means. Note how the organization changes, over time, with leadership shifting between parties. But also note that the management still has the same problems coordinating work at the level of crew assignments.

3.2.1 THE PROJECT

Design and construct the world's largest semi-conductor factory. The project would, purportedly, be the largest private sector project started in the United States in 1993. The total project cost would be about $1.8 billion, a third of that in the facility design and construction. It would include a better than state-of-the-art sub-micron fabrication plant (FAB) totaling one half million square feet with 120,000 square feet of ballroom style cleanroom at full build-out. In addition, included is a new central utility plant of over 175,000 square feet, housing air conditioning plant systems equivalent to that of 8,000 homes, ultra-pure process water systems, waste water treatment systems, and electrical distribution systems served by a new on-site power substation large enough to serve 2,500 homes. The project must include building new city utility services to support the site, including new deep water wells, utility mains, and street approaches.

3.2.2 THE CHALLENGE

Overcome a combination of challenges that previously were thought insurmountable, such as:

- Build it on the same site with an operating semiconductor FAB, while that facility was maintained in production. Ground vibration transmitted to the existing facility was prohibited as it would ruin the in-production product. All utility services had to be maintained without interruption.

- Build it fast. Time-to-market was everything to the success of the factory, and delays in having the plant in production would run to more than $10 million per day in gross revenues. Design and build it in half the time it previously took to build a previous plant half the size. From concept to ready-for-production, tool move-in and testing – 16 months.

- Build-in the highest degree of flexibility for future process modifications. But, at the same time, control the cost to a budget established before the building or factory processes were even in preliminary design. As it turned out, the process would be totally changed three times during design and construction resulting in major facility changes.

- Learn. Be prepared to use the lessons from this project to make the next project even quicker and less expensive, while retaining the quality of this project.

The project would require peak constructions burn rates of over $2 million per day, with approaching 5,000 workers.

3.2.3 The Approach

Set aside all preconceptions of how a project is accomplished. Start with the objectives, goals, and milestones of the project. Build upon these to construct the systems and build the team required. Remove all barriers to quick and decisive communications and decision making. Assemble a highly skilled, empowered and energized project staff. Then re-invent everything, bottom up.

3.2.4 The Team

The project Team had to be fully inclusive. Key parties to the Team would include:

- The Owner's Process Design and Construction Project Management Staff.
- The Engineering and Architectural Design Staff.
- The Construction Staff , including all the major contractors and sub-contractors.
- The Authorities Having Jurisdiction.
- Major Equipment Suppliers (Vendors of Choice)

3.2.5 The Office Space

Discontinue conventional staff assignment to offices or cubicles. Office space would be continuously reconfigured, and staff moved in order to create Team Space . An on-staff interiors group would move and reconfigure entire floors literally overnight. Staff from various branch design offices would be brought to the location of the Team Space for the duration of the design efforts as their skills were needed to support the core project staff. The Team Space would include:

- Abundant conference room spaces - to encourage extemporaneous meetings.

- Document QA review rooms - to accommodate just-in-time Work Package Reviews. Most review would be done over-the-shoulder.

- Accommodation for the client's Team members - to encourage Close-to-Customer encounters at all levels in the Project Team.
- Tackable walls, everywhere - to accommodate both scheduled Wall Coordination Meetings and frequent encounters at the walls while walking about or on the way back from the coffee bar.
- Low partitions - to make eavesdropping on project discussions common and encouraged (often heading off miscommunication or lack of communication).
- Fully computer and teleconference networked, all office locations, worldwide, including major project sites provides for plug-n-play flexibility. Staff can plug in at any office and desk.
- Integrated e-mail, Groupware, and video-telecommunications with the client.

The construction detailers would be part of the design team until most major work packages were issued for construction. Then, move the design office to the field. Ultimately, the construction job shack would grow to approximately 50,000 square feet of temporary portable structure. It would include a full LAN to support the completion of CAD detailing, on-going modifications due to client manufacturing process changes, and the real-time generation of record drawings. The LAN would be WAN'd to the engineering home office half a continent away.

The field office would include video conference facilities to the involved engineering offices. The available facilities would equal that of the home engineering office.

3.2.6 PROJECT DELIVERABLES

The need to deliver projects faster, cheaper, and better redefines the way deliverables are defined, executed, and delivered. They became a joint effort of all parties to the Team.

Deliverables took the form of Just-in-Time (JIT) work packages - the definition of the scope, content, completeness, delivery schedule, and delivery medium were jointly negotiated by design, construction, procurement, and the facility owner/operator. The objective was for the packages to be structured to both speed the fast-track schedule, while not unduly disrupting the design flow to the point that inefficient, or worse, defective design was produced.

Supporting the construction sequence required that many educated guesses be made before final criteria were developed to truly engineer. These were later verified and any needed modifications made at the shop drawing submittal phase, with any cost impacts negotiated with the supplier or contractor.

Design, manpower, materials, and equipment delivery to each construction task was virtualized at the planning stage, and continuously reconsidered to allow for unforeseen problems. Flexibility is key.

Advanced forms of document delivery medium were developed to speed the design execution, reduce rework in hand-off to the construction and the fabrication vendor, thus, also reducing the opportunity for destructive variation. This included use of database-driven integrated engineering, drafting, and construction detailing software and virtual and real-life mock-ups (construction version of the manufacturing prototype). These systems often had to be invented and developed by the Team.

Ultimately, over 150 major work packages would be issued in about 12 months, including over 4600 unique, very complex engineering drawing. Many of the drawings were issued a number of times in various levels of development to support the construction sequence.

Continuous lessons learned feedback - real-time feedback of lessons learned in a medium and managed such that these both successful and unsuccessful practices were captured, communicated, and made part of standard practice for future projects.

3.2.7 DESIGN SERVICES DURING CONSTRUCTION (SDC)

Design involvement during construction actually began at project inception, given the fact that construction involvement began then. Construction provided cost, constructability, and scheduling input from the inception of the project.

Design remained involved through project completion and start-up (and during operation, as continuing client services). They transitioned to the project site as portions (Work Packages) of the project were released for construction. They were the focal point for creation of turn-over and start-up plans, as systems were made ready for operation throughout the duration of the total project.

Design Staff led the organization of the project construction Quality Control efforts. The underpinning of the QC was a no final punch-list program - all deficiencies were spotted during construction and immediately remedied, not left to the end of the project. The SDC engineer, the construction engineer, and the client's owning parties would walk-down the building system that they own at least once per week.

3.2.8 MULTI-FUNCTIONAL WORK GROUPS

Working Groups (WG) were formed at the inception of the project. These were the engine to the project unification.

All organizational parties to the project would be represented - owner's project management, owner's end user groups, design, construction (including all significant subcontractors), turn-key vendors, vendors of choice, etc.

WGs would 'morph' as to function as the needs of the project changed. They would be technology-based and self-managing, changing as the project moved from concept design and scoping, to systems construction, to systems start-up, to tool fit-up, to continuing service, and so forth. However, there was continuity of Working Group membership.

The WGs developed the work scope, budget and schedule for their portion of the project. The WGs collaborated to negotiate the alignment of these with the overall project budget and schedule. The end result was a plan of record against which all project goals, changes, and the project incentive system would be based.

Real-time cost control was performed by the WGs. The members of each WG tracked and managed the budgets for the portions of the project they jointly owned. Since these same parties participated in developing the original scope and budget of their systems, they were best equipped to manage the cost.

The WGs forecast the cost, schedule, and quality (based on the goal of no final punch-list) of their portion of the project on a real-time basis. They reported out to the Client by-weekly. The report out meeting was used, not to kill the messenger, but to identify challenges, find solutions, and flush out cross-WG disconnects. They came prepared to offer solutions or work-arounds, not to dump problems at management's feet.

3.2.9 Team Integration

For a fully integrated project Team to truly function in unity, the incentives, both financial and psychological, must be based upon the Team's success at each milestone of the project. Milestones are defined and formed the basis of success - based upon genuine and agreed-upon critical measures that must be achieved for the best success of the end purpose of the project.

Based upon the concept of the interests of all the participants being achieved - no party to the Team would be asked to lose so that another could succeed. If one party had to take a hit to meet the project goals, and another would unduly benefit, then there was a realignment. The incentive system would be based upon a scoring system that was negotiated and agreed upon by all - however, with provisions to re-negotiate the scoring should the emphasis of the project be required to shift due to unforeseen problems.

At Risk dollars were to be involved. The construction and design parties would put money into the pot with matching funds from the owner. Based on the scoring, design and construction could lose, break-even (if milestones were met), or win. As the score was to be based upon best success of the project goals and milestones, all parties to the Team won or lost together.

3.2.10 Results

- Significant improvements in project quality. No final punch-list. The client has publicly reported that the facility has achieved greater product yield (less reject) then their original best expectations, due entirely to the level of quality of the facility.

- Dramatic reduction in design and construction time. The facility was completed on-time, to the very aggressive schedule. Even with three complete process design changes by the owner during construction, the project was completed on the original completion date. A critical milestone date that had traditionally been missed on all other projects was met - to the date and hour.

- On-budget performance of the project plus reduction of cost on a sister facility constructed after this project, due to lessons learned from this one. Almost all of the incentive dollars were awarded to the Design/Construct team.

- No project issues escalated above the Project Manager direct negotiation level of the project's Stepped ADR system. The majority of issues were resolved at the trenches of the working-groups.

3.2.11 On-going Challenges

1) Pushing decision making and issue resolution down to the level where the work is being performed has challenged the skills of the parties involved. Decisions and issues that were

previously handled by higher levels of project management are now in the hands of many who have previously not needed or acquired the appropriate skills.

2) Continued improvement of the support functions needed to function in a JIT and real-time mode. CPM's are fine for milestone setting and to find fundamental task relationships, but they are too static to manage at the speed that these projects proceed, and with the continuous change. The Working Groups fill this gap in the micro-management level, but they need better tools and practices. Those that exist today do not address these challenges. Control of the impact of the un-anticipateds and un-knowables on both design and construction in this type of project delivery needs entirely new practice theory and implementation methods.

3) The process described here works best in a design/construct relationship. It also can work well in a CM relationship, were the design firm provides the CM services. It is more difficult if there is a separate CM that is not operating in the same mode. The traditional methods obviously will not accommodate the challenges of this process. Better definition of the contract relationships for the parties is severely needed. There are currently no available standards that address this form and which enhance the incentive system based on joint project success.

4.0 REFLECTIONS FROM PRACTITIONERS:

The ideas and trends identified in this paper were presented in initial form in the Beyond Partnering session at the DART 1996 Partnering Conference in San Antonio, Texas in April 1996. Two breakout sessions were conducted, one for public projects and the other for private work. Both were asked to consider three questions.

4.1 PUBLIC SECTOR BREAKOUT NOTES

The three questions posed to the public sector breakout included;

1. Can you relate any experiences like those at the Navy Hospital which illustrate the current limits of partnering and production management?

Several similar examples of the impact of partnering on the management of production were offered. On one, the effort finally collapsed in the face of resistance by trade unions to specific actions not directly related to the partnering. On another, there was extensive joint management, shared work space, and work planning which cut across contractual boundaries. Partnering was reported to have provided the basis for these innovations. (The majority of the breakout session was devoted to a more detailed explanation of how the innovations had been achieved under the Federal Acquisition Regulations).

2. Do you have any examples where production management was pushed beyond current practices in the public sector?

Examples of where production management in public sector work had transcended current practices were limited to quality control and reflected the same trend toward joint quality and operational planning efforts reported on the Navy project.

3. How do you see the future?

The discussion of next steps was limited to the difficulty of sharing resources.

4.2 PRIVATE SECTOR BREAKOUT:

Three questions were posed to the private sector breakout.

1. What stresses and strains do complex, quick uncertain jobs place on working relationships and contracts?

Key stresses include -

• Hard to align goals among so many parties, • Lack of time to respond to problems, • Increased number of organizations to coordinate often slowing decisions, • More communications channels, • Constant rework, • Inability of contracts to cope with uncertainty, • Design is completed by construction, • More staff and staff burn out,	• No time to train, staff must be ready from the first, • Small leadership failures are amplified, • Project support always behind the curve, • Easy to get into reactionary mode, • Fair payment difficult to determine, • Little time for trial balloon change orders, • Project controls are overloaded and inadequate, • Safety is tougher to manage and assure.

2. Share new ways of managing both production on complex, uncertain and quick projects and discuss how contracts can be managed so as to not interfere with the management of production.

• Change value engineering expectation to align with owner's objectives, • Leave old paradigms at the gate, • Plug construction in earlier, • Use new standards to evaluate business, • Need new business tools,	• Bring design to the site to focus on construction time line, • Integrate multiple discipline teams early, • Reduce the number of suppliers, • Rapid feed forward of lessons learned, • Increase authority at lower levels, • Take advantage of design technology.

3. How do you see the future?

• Tough to sell even good ideas, • Increased use of strategic alliances, • More design involvement in partnering ,	• Greater but fairer risk sharing • More community involvement • Increasing demand for skilled labor puts

• Increased resistance to buzzword partnering, • Challenging business as usual, • Rapid learning,	greater pressure on need for improved productivity • Faster communication technology leading to more overload

6.0 REFLECTIONS WHERE WILL PARTNERING LEAD?

Partnering as illustrated in the examples offered and from the discussion notes can now be seen as an attempt to apply some of the techniques appropriate to the prototyping process model to problems inherent in the product purchase model. Partnering is a leading indicator, pointing to the need for increased organizational and technical integration, and more effective production management on complex, uncertain and quick projects.

We believe partnering will evolve rapidly as pressures on project organizations increase. Many of the techniques in current practice will remain important but they will change in application. Important advances will be seen in planning and control techniques where issues of system reliability will become paramount. Interesting and difficult questions remain about how partnering will effect the sharing of risk and reward.

The outlines of three trends are becoming apparent. Note that all three trends are designed more to improve the management of flows than they are to eliminate commercial disputes.

The first trend is toward greater emphasis on production management through supply chain alliances. Alliances between members of supply chains are being formed explicitly for managing production. Waste is being reduced at downstream stations by actions taken upstream and the gains shared. In some cases, alliance formed between contractors and owners appear on the surface to be long term partnering to avoid disputes. Closer examination shows these alliances to have little to do with disputes and much to do with integrated planning and operations.

The second trend is toward long term partnerships where each party is responsible for the acts of others and the performance of the larger entity. This trend can be seen both in the Build Operate Transfer and privatization schemes. In these cases the relationship may become a legal partnership lasting throughout the useful life of the facility. The designer and builder are committed to the success of the project and have long term incentives to achieve the highest performance for the lowest total or lifecycle cost. But these arrangements are not complete partnerships in so far as the joint entity is not concerned with the success of others beyond the limits of the project.

The third trend combines aspects of the first two trends. Here, a project is the result of the efforts of a virtual corporation. The project is now managed as a firm with numerous owners involved almost as stockholders for greater or lesser periods. Rapid, efficient production of a complex new product is the goal of these organizations. In a sense, these organizations manage two high level interacting supply chains - one which defines what is to be built and the other determines how.

7.0 CLOSING THOUGHTS

Partnering is not a comprehensive approach which addresses the total range of problems faced on today’s complex, uncertain and quick projets. Partnering itself does not provide any basic theory which can be used to describe or explain what happens as projects unfold. Rather partnering exposes our lack of theory or even common perspective on the problem of construction management. Partnering devotees have contributed a great deal to the industry by revitalizing communication and working relationships, but their contributions are limited in so far as they have not probed for deeper understanding and change. In this regard, partnering is but one of many partial solutions. Other programmatic fixes abound, such as value engineering, and constructability. As with partnering, each of these programs have helped solve some problems but have masked deeper deficiencies in current practice.

Perhaps some sort of uniform field theory of construction is impossible or unnecessary but important new understandings are emerging under the umbrella of Lean Construction. This developing area is pulling together programmatic threads from within construction as well as incorporating important conceptual breakthroughs from other industries.

Perhaps the most intriguing leads for new thinking will be found in the science of complexity and recent developments in robotics, but with a surprising twist. These developments suggest that complexity must be built from the bottom up from reliable sub-units which operate reflexively, often with little direct communication between them. Central minds seem unable to handle the details as effectively as a decentralized organization which is coordinated by the highly predictable response of subunits. Think of your own blink reflex or the adjustment of your eye to varying levels of light. Could the Lean in Lean Construction result from the need for a smaller central brain because more reliable decentralized decisions resulted in higher performance?