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Compilation of Partnering and Integrated Project Team White Papers – Improving Construction Performance

136 pages

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Nuclear Power Industry Reference Information

Partnering and Integrated Project Teams

Improving Project Execution Performance

HIGH BRIDGE ASSOCIATES

List of Reference Information			
Ref. #	**Source and Description**	**Date**	**Pages**
1	Construction Industry Institute Team Building and Improved Project Performance	5/93	23
2	Harvard Business Review Magazine Strategic Alliances and Partnerships	7/94	13
3	Society of American Military Engineers/Stone & Webster Partnering and Improved Project Performance	9/94	17
4	Partnering Management Plan Fulfilling Vision Through Partnering	3/93	23
5	Nuclear Power Construction Stabilization Agreement A Partnership of Owners, Contractors, & Labor/AFL-CIO	4/78	11
6	U.S. Department of Defense Guide to Integrated Product and Process Development	5/96	42
7	Integrated Project Team (IPT) Start Up Guide for Federal Projects, MITRE Corporation	10/08	34

MATRIX MANAGEMENT

Taming the beasts is a

real challenge!

K. Hoppark
High Bridge Associates

Team Building:
A Process for Improving Project Performance

Prepared by
The Construction Industry Institute
Project Team Building Task Force

Publication 37-1
May 1993

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Contents

Executive Summary

Using an effective team building process in managing projects can bring significant, not simply marginal, improvements in project execution and results. Use of team building represents a "step change" difference in the way projects are managed and in the ultimate project performance. The purpose of this publication is to demonstrate how these statements are supported by research and case studies.

It is not uncommon during the design/construction process for an adversarial relationship to develop among the parties involved, usually the project owner, designer and contractor. Since this type of relationship is seldom constructive and frequently the cause of problems, CII formed the Project Team Building Task Force to examine how the adversarial relationship might be minimized.

Through a series of meetings, literature review, three mail surveys and personal interviews, the task force defined the research problem and conducted its research. This publication contains the major findings, conclusions and recommendations of the research.

The Team Building Process. This publication does not address "teams," per se; it addresses the team building *process.* What is the team building process? It is a process that brings together a diverse group of individuals and seeks to resolve differences, remove roadblocks and proactively build and develop the group into an aligned, focused and motivated work team that strives for a common mission and for shared goals, objectives and priorities.

On most projects studied during the research, individuals that participated in the team building process were from three different organizations—the owner, designer and contractor. On the remaining projects, team members were from only two of these organizations. Occasionally, team members included other major stakeholders such as subcontractors and construction managers.

Major research findings:

- The adversarial relationship is common but not universal, has several major causes which can have a detrimental impact on project costs and results, and can be reduced or eliminated by use of the team building process.
- Project team building was used successfully regardless of the type of commercial relationship ("lump sum" or "cost reimbursable" contract) among the parties.
- The decision to use the team building process was made primarily because the process was viewed as a proactive way to manage a project in a "win win" environment.
- The team building process forms a group into an aligned, focused and motivated work team that strives for a common project mission.
- The costs associated with using team building are minuscule when compared to the benefits received.
- Effective project teams have distinct characteristics.
- All interviewees on all of the projects studied in this research said they would use team building again!

Major conclusions:

- Successful use of the team building process will bring to the design/construction process significant and cost effective short-term and long-term benefits.
- The major motivation for using the team building process on the projects studied was to improve project results.
- The team building process and "partnering" share similarities and differences as forms of collaboration among an owner, designer and/or contractor.
- The successful use of project team building is independent of the specific type of commercial relationship that is used by the parties to the project.
- Owners, designers and contractors provided essentially similar responses to questions asked in this research.

- Both content and process benefits result from using an effective team building process.
- The costs of conducting the team building process are best thought of as an investment that yields a high rate of return.
- Adversarial relationships among a project owner,designer and/or contractor are common but not inevitable.
- Previous experience with the team building process is not a precondition for having effective teams.
- Implementing the team building process is facilitated by the use of a consultant, either from inside or outside one of the involved organizations.
- There is no "one best way" to facilitate the team building process. Different facilitating styles can lead to effective project teams.
- The team building process is not a management panacea.

Major recommendations:

- Use the team building process!
- Use a consultant to facilitate the process.
- Begin the process early in the life of the project.
- Seek broad participation in the process.
- Make the process an integral part of project management.
- Use the team building process!

Case Studies. Case studies of selected projects investigated by the task force are included in this publication as Appendix A. The case studies provide descriptive information on the actual use and results of the team building process.

Selected Sources for Information. Appendix B contains current references that are excellent sources for information on the philosophy and technology of the team building process.

1

Introduction

Using an effective team building process in managing projects can bring significant, not simply marginal, improvements in project results. Use of team building represents a "step change" difference in the way projects are managed. The purpose of this publication is to demonstrate how these statements are supported by research.

A Key Point

First, a key point needs to be made. This publication is not simply another tribute to the use of "teams" in management. Teams and the "team approach" are not new to project management, and the "integrated team," consisting of individuals who represent the owner, designer and/or contractor, is widely used. Owners, designers and contractors have used "project teams" for years, and many project managers would assert they do "team building."

The key point here is the task force focused on project teams that evolved out of a team building *process*. (see Figure 1) It is the effective use of the team building process, and not simply the use

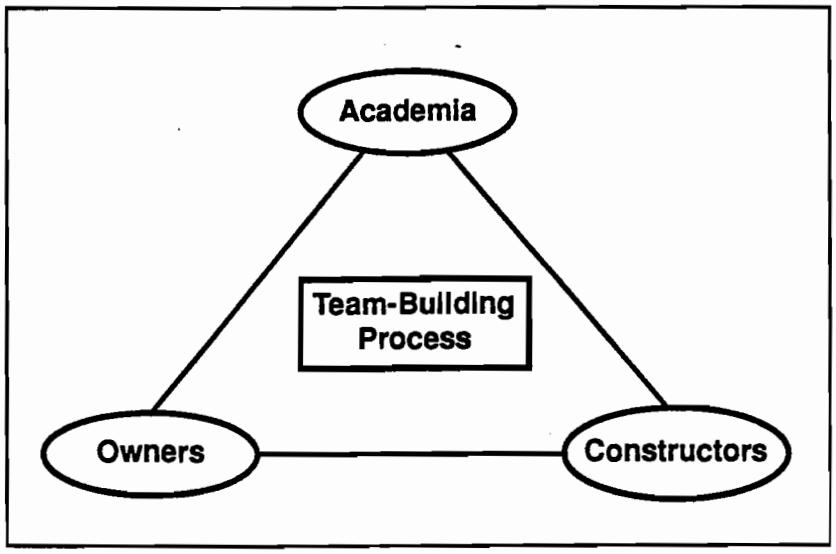

Figure 1. The team-building process facilitates effective utilization of the resources of the owner, the designer, and the contractor.

of teams, that facilitates improvement in project results. Without an effective team building process, the potential benefits of teams may not be realized. Thus, this publication's contribution to the construction industry and to more effective project results lies in what it says about the team building *process*. The basic nature and critical role of this process in improving project results will be highlighted.

Project Team Building Task Force

There is a widely held belief among owners, designers and contractors that the design/construction process often is characterized by mistrust, conflict and disputes. These characteristics can create adversarial relationships that lead to higher project costs, schedule delays, quality and safety problems and unsatisfactory future working relationships. To study the possibility of minimizing adversarial relationships among owners, designers and contractors, CII formed the Project Team Building Task Force.

The major purposes of the research conducted by the task force were to focus on the team building process as a means for minimizing adversarial relationships, to examine team building/behavioral relationships and to make recommendations for using team building to enhance project results. After reviewing existing literature and industry practice, it became clear a distinction needed to be made between "partnering" and the team building process.

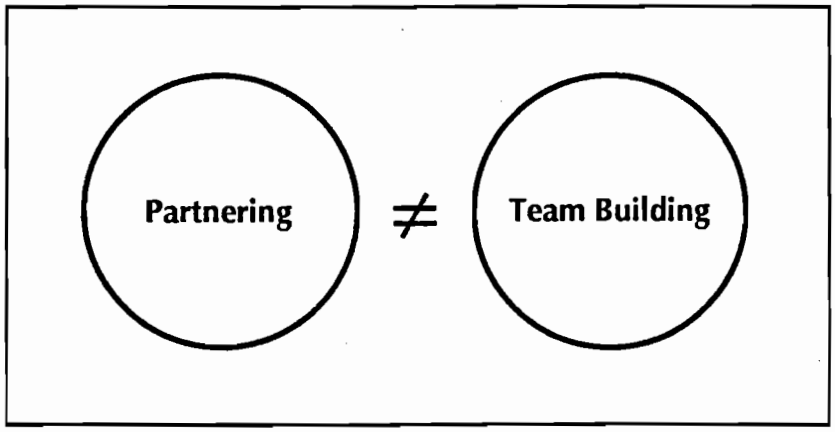

Figure 2. Although similar, partnering and team building are not identical.

Partnering

Partnering and team building are similar but not identical forms of collaboration among owners, designers and contractors. (see Figure 2) Partnering has received substantial, positive media coverage and is an accepted practice among many business firms. Partnering was the research focus of the CII Partnering Task Force.

Considerable overlap can be found in the content and processes of team building and partnering. Both are forms of collaboration, and, in practice, partnering and team building are terms often used synonymously. For example, the U. S. Army Corps of Engineers uses the term "partnering" in a way similar to the way the term "team building process" is used here. A few of the projects the task force studied were actually examples of partnering. In one project, a team building process was part of a larger partnering relationship, with blurred distinctions between the two.

Partnering may be thought of as a broader concept than team building. It is not focused on a particular project, although a single project (particularly in the public sector) can be a way of initiating a partnering relationship. Team building on a single project could be one component of partnering. CII Special Publication 17-1, *In Search of Partnering Excellence*, suggests the following definition of partnering:

Partnering *is a long-term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources. This requires changing traditional relationships to a shared culture without regard to organizational boundaries. The relationship is based on trust, dedication to common goals and an understanding of each other's individual expectations and values. Expected benefits include improved efficiency and cost effectiveness, increased opportunity for innovation and the continuous improvement of quality products and services.*

In elaborating on the above definition, CII Special Publication 17-1 identifies several key elements of partnering that characterize the relationship between parties. The key elements are: long-term commitment [emphasis added], trust, shared vision, equity, investment, synergism, shared risk, rewards, systemic and competitive edge. The probability of achieving these key elements is enhanced if the initiating party implements a systematic process for selecting a partner. Several guidelines for this process are

suggested in CII Special Publication 17-1. One of the outcomes of implementing the partnering process typically is a formal, contractual partnering agreement [emphasis added].

The Team Building Process

In contrast to partnering, the team building process, as the term is used here, is a short-term process implemented on a specific project. A formal, contractual team building agreement is not typical. The objective of the process is simply to build and develop effective inter-organizational teams. These teams may include representatives of the project owner, designer, contractor and possibly other key stakeholders in the project outcome. Further, membership on the project team often changes and grows as the project develops and different knowledge and skills become relevant to the team building process. However, in contrast to partnering, the project team typically ceases to exist and the team building process stops once the project is completed. As the terms are used in this publication, the team building process and an effective project team are defined as follows:

The **team building process** is a project focused process that brings together key stakeholders in the project outcome, usually representatives of the project owner, designer and/or contractor. It seeks to resolve differences, remove roadblocks, and build and develop trust and commitment, a common mission statement, shared goals, interdependence, accountability among team members and problem solving skills.

*An **effective project team** is a group who shares a common mission or a reason for working together, is interdependent in effectively achieving shared goals, shares a commitment to working together toward identifying and solving problems (rather than finger pointing and fault finding) and is accountable as a functioning unit within a larger inter-organizational context.*

Although the team building process has a short-term focus, it can have long-term payoffs for its participants. The skills and attitudes learned remain with participants long after project completion, and they become part of the human capital of the involved organizations.

Methodology

To define the research problem and collect data, a combination of task force meetings, literature review, three mail surveys and a series of personal interviews were used. Task force members conducted the personal interviews, over a six month period, with contact persons on 41 projects that had utilized a team building process to some degree. The 41 projects studied had an approximate total dollar value of $5.5 billion and represented a mixture of private- and public-sector projects and cost plus and fixed price contracts. On 25 of the projects studied, the owner, designer and contractor were three different firms; on 16 projects, only two were different firms.

3

Findings

Summary

A summary of the major research findings is given below, followed in the next sections with more detailed explanation.

- **Extent of Adversarial Relationship.** Working relations among a project owner, designer and/or contractor frequently are characterized by mistrust, poor communication and cooperation, and an adversarial nature. However, while such relationships are frequent, they are not the norm.
- **Causes of Adversarial Relationships.** In the opinion of experienced industry practitioners, the most important causes are: poorly defined scope of project, excessive change orders, changes not properly managed, lack of communication of objectives, unrealistic project schedule and unrealistic project budget.
- **Cost Impact of Adversarial Relationships.** The two causes cited as having the most severe impact on project costs and results are poorly defined scope and excessive change orders.
- **Commercial Relationship and Team Building.** Project team building was used successfully regardless of the type of commercial relationship ("lump sum" or "cost reimbursable" contract) among the parties.
- **Decision to Use the Team Building Process.** Previous experience with or exposure to team building and the presence of a team building "champion" facilitated the decision to use the team building process. The primary motivation for the decision was to initiate a proactive way to manage in a "win win" environment.
- **The Team Building Process.** The core contribution of the team building process is that it facilitates building and developing a "group" into an aligned, focused and motivated work "team" striving for a common project mission and for shared goals, objectives and priorities.

- **Costs and Benefits of Using the Team Building Process** . The costs associated with using team building are minuscule when compared to the benefits received. Those benefits may include reduced adversarial relationships, lower project costs, improved project quality, shorter project schedules and a commitment to future use of team building.
- **Characteristics of Effective Project Teams.** Effective project teams are characterized by trust, shared goals, interdependence, a shared commitment to work together, a shared sense of accountability, pride in team members, open communication and giving team members a lot of feedback.
- **Reactions to the Use of Team Building.** All interviewees on all of the projects studied in this research said they would use team building again! Only one interviewee said the team building experience was not beneficial.

Extent of Adversarial Relationships

A sample of construction firms was surveyed to determine if adversarial relationships during the project management process are common. Responses were requested to these two statements: (1) "Owner and contractor working relations can frequently best be described as adversarial and uncooperative," and (2) "In my experience, most owner and contractor working relations are characterized by trust and cooperation." The distribution of responses to both statements was similar. Thus, results from the survey suggest that adversarial relationships are frequently but by no means always present in most owner and contractor working relations. Additional data gathered during personal interviews supported this finding.

Causes of Adversarial Relationships

CII member firms were surveyed to gather data on the causes of adversarial relationships among owners, designers and contractors. Of the possible causes listed on the survey instrument, those that received the strongest response were: scope of project poorly defined, excessive changes, changes not properly managed, lack of communication of objectives, unrealistic project schedule and unrealistic project budget. (see Figure 3)

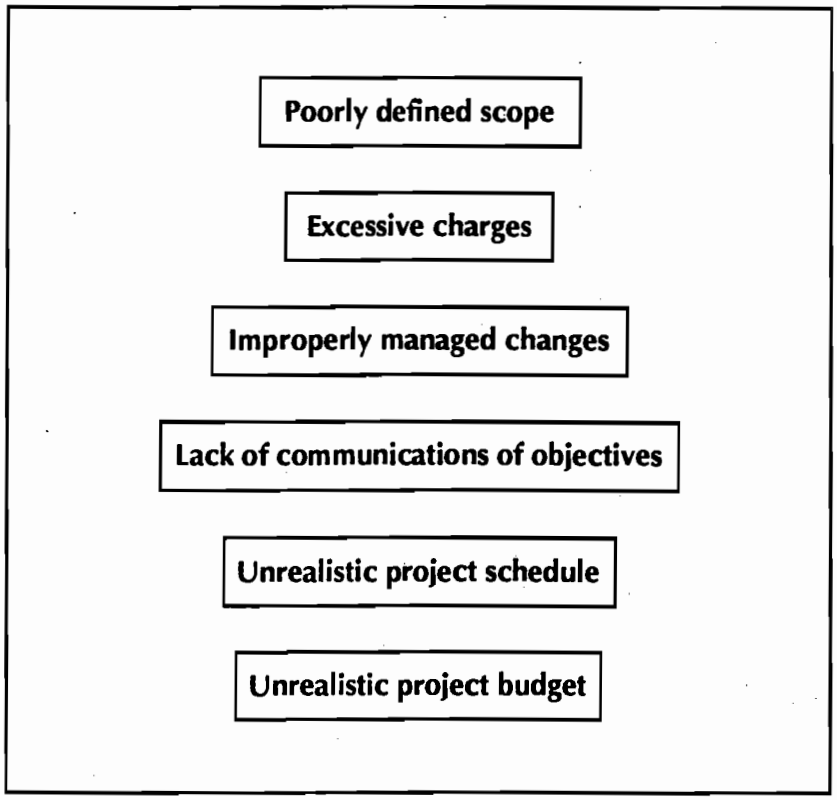

Figure 3. Major Causes of Adversarial Relationships

The task force wanted to determine if the team building process would help reduce the above causes of adversarial relationships. The personal interviews conducted by the task force led to two findings. First, the interviewees did not believe the team building process helped improve scope definition or reduce the number of changes in scope. This was not a surprising finding because on most of the projects studied, the team building process began after the project scope was defined.

Second, the interviewees stated unequivocally that the team building process contributed to the reduction of the other four causes of adversarial relationships mentioned above. Further, the interviewees overwhelmingly agreed that use of the team building process by an owner, designer and/or contractor reduces the probability that an adversarial relationship will develop on a project.

Cost Impact of Adversarial Relationships

In a mail survey, executives in CII member firms were asked about the cost impact of nineteen possible causes of adversarial relationships. Ninety percent of the respondents indicated "scope definition" and "change orders" have a severe or extremely severe impact on total project cost. Further, when asked, "Under ideal conditions, with all causes of adversarial relations removed, what percent reduction in total project cost could be achieved?," 79 percent of the respondents estimated 10 to 30 percent cost reductions could be achieved. Considering the high cost of most projects, even a 1 percent cost reduction is significant.

Commercial Relationship and Team Building

The specific type of commercial relationship ("lump sum" or "cost reimbursable contract) used by the parties to a contract sometimes is considered to be a source of adversarial relationship and a factor affecting total project costs and results. For example, in one survey conducted by the task force, 88 percent of the respondents agreed that the type of contract can have an influence on the level of owner and contractor trust and cooperation. A second survey confirmed these results. However, these findings, were not supported by data gathered in personal interviews. On the 41 projects studied in this research, 27 operated under a "cost plus and reimbursable" type of contract and 14 operated under a "lump sum" contract. No consistent relationship was found between the type of contract and any measure of project success. Thus, successful project team building was demonstrated regardless of the type of contract utilized.

Decision to Use the Team Building Process

Two major factors were identified that encouraged an owner, designer and/or contractor to use team building. The two factors were successful previous experience with team building and the presence of a team building "champion" in one of the organizations, most typically the owner organization.

The primary motivation for the decision to use team building was not typically to avoid adversarial relationships. The decision was made primarily because the team building process was viewed as a proactive way to manage a project in a "win win" environment—an environment characterized by broad "buy in" on the project, trust and open communication, problem solving and aligned attention on shared goals.

The Team Building Process

Once the decision to use the team building process was made, no particular obstacles to initiating and implementing the decision were found to be common to the projects studied.

On all but two of the projects studied, a consultant was used to facilitate the team building process. On 25 projects, an external consultant was used—a consultant not affiliated with either the owner, designer or contractor organization. On 14 projects, an internal consultant was used. No comments were made by the interviewees to suggest these projects were any less successful than those that used an external consultant. Further, this research suggests that personnel/human resource professionals in owner, designer and contractor organizations are a largely untapped but potentially useful organizational resource for facilitating the team building process.

The most common way of responding to dissenters—those who did not want to fully commit to the team building process—was to move them off the project. Dissenters were not common on the projects studied.

In suggesting changes they would make in the way to use team building on their next project, interviewees most frequently said they would involve more people in the team building process and would start the process earlier in the life of the project. The interviewees expressed the strong opinion that these two changes would enhance the payoff from team building. On most projects studied, the team building process was not initiated until after agreement on the project contract. In only a few cases was team building an explicit or implicit expectation of the bidding process.

Team members received primarily intrinsic rewards, rather than extrinsic rewards. The major intrinsic reward was the satisfaction of working in a "win win" environment. The major extrinsic rewards received were non-financial forms of recognition—lunches, jackets, hats, et cetera.

Costs and Benefits of Using the Team Building Process

Cost or Investment? While costs are associated with conducting the team building process, these costs should be viewed as an investment—an investment that yields an impressive rate of return. The actual costs of conducting the team building process appear to be minuscule when compared to total project costs and potential

benefits. The major costs are the opportunity costs of participant time (What would they be doing if they were not involved in team building?), fees and travel costs of the consultant, costs of lunches and other social events, costs of recognition items (hats, belt buckles, newsletters, et cetera) and costs of various training sessions. The clear impression gained from the interviewees is that team building costs are not a major issue. They are unlikely to be a determining factor in the decision to use or not use the team building process.

Quantifying Costs and Benefits. The costs and benefits of using team building *can* be quantified. Well-established accounting and utility analysis procedures can be used to quantify these costs and benefits. However, few of the projects studied by the task force gathered the kind of data required to attach dollar values to team building costs and benefits. While a few interviewees made statements containing specific dollar figures, such statements were not typical. Even when such statements were made, it was not clear the dollar figures cited resulted from a systematic accounting of costs and benefits.

The most common statement of interviewees on the issue of quantifying team building costs and benefits was that it cannot or was not done. A low priority was assigned to the practice of accounting for these costs and benefits. One interviewee responded, "Trying to quantify costs and benefits would be a waste of time and not worth the trouble." In most cases, there was an implicit assumption that, relative to total project costs, team building costs would be minor.

Content Benefits. On those projects viewed as successful (all but three of the projects studied), the interviewees were effusive in commenting on the benefits of the team building process. No single benefit was cited by all, or even most, interviewees. The comments from interviewees, however, fell into two major categories: content benefits and process benefits. *Content benefits* relate to the project work itself—to the schedule, cost, safety record, change orders and so on. *Process benefits* relate to how the project work was accomplished. (see Figure 4)

Examples of content benefits cited by interviewees include: low change rate, earlier problem identification, project ahead of schedule, change orders more reasonably priced, less rework, early start up, turnover to owner was easier, saved two projects that would have been moved, contractor experienced savings in

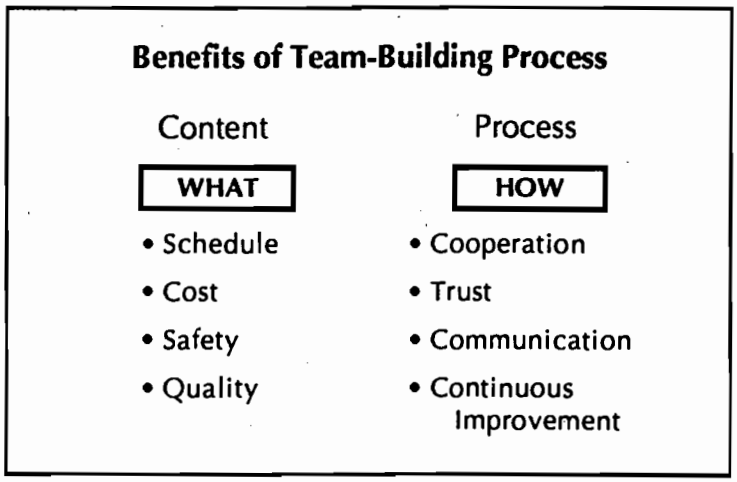

Figure 4. The team-building process results in two types of benefits.

costs, bid prices going down, more safety awareness, contractor profit more likely to happen, met 90 percent of milestones early, some help in getting relief on hard dollar contracts to allow acceleration, better focus on project objectives, accomplished objectives that would not have been achieved otherwise, helped avoid litigation, easier to work out scope changes and improved quality.

In the specific areas of project safety, costs, quality and schedule, the task force found the following:

Project Safety. No clear pattern of interviewee responses emerged on the effect of team building on the project safety incident rate or lost time incident rate. Interviewees did say safety on their projects was excellent, but did not necessarily give credit to team building. Thus, an association was observed, but cause and effect was not identified in this study.

Project Costs. With few exceptions, interviewees were unequivocal in expressing that team building contributed to lower total project costs. These lower costs resulted from avoiding rework, reducing schedule time, heightened involvement of team members, improved trust, reduced scope definition and engineering costs, more open communication, lower change order rates, improved problem solving (and absence of "blame fixing"), better

understanding of project objectives, decreased adversarial relations and "buy in" by team members of project objectives (rather than the objectives of their separate organizations).

Project Quality. A near consensus among interviewees emerged on the effect of the team building process on project quality. It helps! Team building processes facilitated communication of quality issues, led to earlier recognition of potential problems and helped develop a quality consciousness.

Project Schedule. Almost all interviewees believed team building contributed to completing projects ahead of schedule, sometimes by a matter of months. In addition to reducing the schedule, team building facilitated more discussion of the schedule and helped team members focus on the schedule.

Process Benefits. Process benefits relate to *how* the project work was accomplished. Examples of process benefits cited by interviewees include: improved cooperation and cohesiveness, helped develop trust, all work together for project success, more open communication, broke down barriers, mutual understanding of key issues, no turf problems, process led to earlier identification of problems, team members constantly search for ways to improve project, processes helped team members feel ownership of the project, speeds up the interaction and working relationship, provided chance to size up people away from the work area and team building made it fun to go to work everyday.

In the specific areas of company culture, adversarial relationships and future project management, the task force found the following:

Company Culture. Did the interviewees believe their experience with the team building process would change the culture—the set of shared beliefs, values and ways of acting—of their respective organizations? Some of the organizations already were experienced with using team building. In those cases, the projects discussed by the interviewees did not always reflect a "change" in project management style. The culture of a company does not change easily or quickly. It would be unusual for it to change in a major way because of experience on a single project, even a large project. Nevertheless, a large number of interviewees believed their team building experience on the projects studied would move their respective company cultures toward greater use of team building.

Adversarial Relationships. With few exceptions, interviewees said team building helped reduce adversarial relationships. The exceptions were interviewees who discussed projects that were not successful examples of team building or projects on which team building started too late.

Future Use of Team Building. Sample quotes from interviewees on their likely use of team building on future projects are: "Team building will be a way of life for us." "We will continue to use team building." "We have adopted team building as a standard practice." "Team building will be a definite part of our way of managing." "We will use team building on every project." "Team building is the only way to execute a project." These quotes were typical. The overall conclusion is these interviewees are likely to be involved in continued use of team building on future projects.

Characteristics of Effective Project Teams

Teams used on the projects studied shared several characteristics.

Trust. Trust is *the* critical project team characteristic. It makes all the other characteristics possible. Trust is the key to unlocking the productive capability of those working on a project. Almost without exception, the interviewees spoke of being able to trust, not only team members from their own organization, but also those from the other involved organizations. The exceptions to this were the few interviewees who discussed unsuccessful project teams.

Trust grows out of having shared project goals and a realization and acceptance of the need to cultivate interdependence among team members. The explanation for its crucial role in effective project team management is unambiguous. Trust reduces or eliminates the perceived need to channel energy to nonproductive, and even dysfunctional, activities and relationships and makes it possible to direct energy toward issue identification and problem solving.

Shared project goals. The team members were committed to a set of shared project goals that were congruent with but not identical to the goals of the specific organizations involved. The shared project goals typically were formulated during one or more team building meetings facilitated by a consultant.

Interdependence. The team members realized they were in an interdependent relationship with each other. They accepted the idea that, if shared project goals were to be achieved, they would have to coordinate their activities and cooperate with each other.

Shared commitment to work together. This commitment flows from the above characteristics. It is a belief that team building will help get the job done and help make the project team work better. This shared commitment focuses on identifying problems and finding ways to solve them, not finding ways to blame someone for the problem. If a team member knows about a problem, this commitment to work together requires the team member to bring it out in the open quickly so it can be managed. It is a violation of this commitment to ignore problems or to keep them secret.

Shared sense of accountability. Having a shared commitment to work together also means team members take "ownership" of the work and share a sense of accountability to each other and to the project. This shared sense of accountability was developed through team building, incentive programs and cultivation of the success characteristics mentioned above. A successful project team has a "Let's get *our jobs* done" behavioral norm rather than a "That's not *my job*" norm.

Pride in team members. If the team characteristics mentioned above are developed, then, not unexpectedly, team members feel pride in and satisfaction from their work. Hats, belts, buttons, coffee mugs, jackets, banners, picnics, lunches, dinners, newsletters are used in varying degrees by successful teams. These forms of incentives both reflect and develop team members pride in and satisfaction from their work.

Open communication. Team building meetings conducted at the beginning of the project highlight the importance of open communication. Open communication is in part a natural consequence of developing trust, shared goals, a realization of interdependence and a commitment to work together. It is, however, difficult to develop and requires continuous effort to overcome communication barriers. In addition, the team building process helps develop communication skills among team members and helps institute mechanisms for communicating openly. Open communication about project related issues is an expectation and behavioral norm on successful project teams; not communicating such issues is a violation of trust.

Feedback. If open communication is to be realized team members must receive meaningful and timely feedback. Some mechanisms used by successful project teams for feedback purposes were constant dialogue about the project, quarterly progress evaluations, "what went well" meetings and weekly and bi-weekly meetings. Achieving a high level of productive feedback is difficult and is facilitated by the team building process.

Reactions to the Use of Team Building

There is no doubt how the interviewees felt about the use of team building. They wholeheartedly approved of its use. All Interviewees on all of the projects studied said they would use team building again! Of the 71 interviewees (There was more than one interviewee on several projects studied), only one said the team building experience was not beneficial.

In addition to the "qualitative" information collected during personal interviews, the interviewees provided "quantitative" information on how they felt about their project team building experience. Thus, following the personal interviews, the interviewees were asked to respond, using a numerical scale, to a 33-statement Team Relations Questionnaire. Each of the statements expressed a potential positive benefit of using team building.

The clear finding supported from this process of collecting quantitative information from the interviewees is that the interviewees overwhelmingly agreed their projects benefited from team building. Specific responses to each of the 33 statements may be found in the task force source document, *Team Building: Implications for the Design/Construction Process.* The interviewees agreed with 24 of the statements, were neutral on 8 and actually mildly disagreed with only one. The statements with the highest (most positive) and the lowest (less positive) numerical responses are identified below.

The statements the interviewees agreed with most strongly were that the use of team building on their projects helped:

- improve communications among project participants
- develop team spirit among participants
- project participants take responsibility for resolving disputes

- make all project participants more available to each other
- make project participants more receptive to communication and ideas from others
- participants deal more promptly with changes and unexpected conditions

The statements the interviewees were largely neutral on were that the use of team building on their projects helped:

- the contractor avoid bidding too low
- reduce the number of changes in scope definition
- project participants develop more realistic contractual provisions pertaining to risk sharing
- reduce the ambiguity of contract documents
- lead to a more realistic budget for the project.

It is likely the interviewees would have agreed more strongly with the latter set of statements had team building been used on their projects at an earlier stage of the project life.

4

Conclusions

Drawing on all information gathered as a result of the task force research processes, the following conclusions may be stated:

- **Major conclusion.** Use of the team building process is a true step change in the way project management typically is conceptualized and implemented. Its effective use will bring to the design/construction process significant and cost effective short-term and long-term benefits.
- **Motivation for Using the Team Building Process.** Use of the team building process to build and develop effective project teams is a means to an end. The primary motivation for using the team building process on the projects studied was that the process was viewed as a means of improving project results. It was viewed as a proactive way to prevent trouble on the project from occurring, to get "buy in" on the project, to reduce project costs, to assure project schedules would be met and/or to manage the project in a win win environment.
- **Team Building and Partnering.** These are similar but not identical forms of collaboration among an owner, designer and/or contractor involved in the design/construction process. As viewed here, team building focuses on a specific project; partnering is a broader concept, typically focused on long-term relationships. In practice, the terms are often used synonymously.
- **Commercial Relationship and Team Building.** The successful use of project team building is independent of the specific type of commercial relationship that is used by the parties to the project.
- **Similar Responses.** Owners, designers and contractors who participated in this research provided essentially similar responses to questions asked about adversarial relationships and team building. Regardless of how

information was collected (mail surveys or personal interviews), there were only minor differences in the responses the three groups gave to questions asked.

- **Benefits of Using the Team Building Process.** There are both content and process benefits to be gained from using the team building process to manage projects. Content benefits are the positive effects on project costs, quality, and schedule and/or on dealing more promptly with changes. Process benefits are the positive effects on reducing adversarial relationships, developing trust and team spirit, opening communication, improving cooperation and cohesiveness and identifying problems early.

- **Costs of Using the Team Building Process.** The costs of conducting the team building process on a project are minor relative to the benefits achieved. These costs are best thought of as an investment that will yield a high rate of return.

- **Adversarial Relationships.** An adversarial relationship among a project owner, designer and/or contractor is common but not inevitable. It can add significantly to project costs and to schedule delays. Many of the major causes of an adversarial relationship can be eliminated through use of an effective team building process.

- **Role of Previous Experience.** Previous experience among an owner, designer and/or contractor with the team building process is not essential in order for the process to build and develop effective project teams.

- **Role of Consultants.** Implementing the team building process is facilitated by the use of a consultant, either an external consultant or an internal consultant—consultants on the payroll of one of the involved organizations.

- **The Team Building Process and Effective Teams.** There is no "one best way" to facilitate the team building process. Different styles of facilitating the process can lead to effective project teams. It is a dynamic process,

and the facilitator has to be able to manage a variety of contingencies, such as new members entering the team after trust already has been established and members coming in and out of the team depending on the way the work on the project evolves. Regardless of the particular style of the facilitator, the team building process evolves through stages in order to build and develop the behavior patterns required for effective team performance.

- **No Management Panaceas.** The team building process and effective teams are not management panaceas. As experienced managers know, there is no management panacea. There are projects on which using the process would be inappropriate, for example, when one of the involved players, particularly the owner, does not fully commit to the process. Further, the team building process does not eliminate conflicts and problems. Nevertheless, this research reveals that, when used effectively, the process is a powerful method for resolving conflicts and problems and for contributing to significant improvements in project performance.

5

Recommendations

The task force strongly and unanimously endorses the below action recommendations regarding use of the team building process in managing projects.

1. Use the team building process!

Everything the task force found in its research process supports this recommendation. Those who have participated in an effective team building process are unequivocal in their support of the process. One-hundred percent of the interviewees said they would use team building again! From a cost vs. benefit perspective, there is no contest; the costs are far outweighed by the benefits of lower costs, improved quality, shorter schedules, improved working relationships and/or reduced adversarial relationships. It is not an exaggeration to say use of the team building process will make a step change difference in the way projects are managed and in project results. Owners who choose to act on this recommendation should incorporate team building into their governing documents.

2. Use a consultant to facilitate the team building process.

A consultant with the right professional skills will facilitate the team building process so that the desired results will be produced—effective project teams and improved project execution and results. The consultant may be an internal or external consultant.

While it is possible to conduct an effective team building process without the use of a consultant, the probability of success will be improved by using a consultant. A qualified professional usually is needed to bring the necessary skills to bear in guiding the team toward open and trusting communications and away from confrontational and threatening communications.

The team building process is demanding because it generally involves breaking old habit patterns and establishing new ones among people who are struggling with difficult and immediate problems and who come together from different corporate cultures with different perceptions and expectations. In addition, the process requires the full attention of a qualified professional. If the facilitator of the process is also involved with and immersed in the operational

aspects of a project, there is a high risk the team building process itself will be neglected. So, whether an external or internal consultant is used, it is sound advice to use a consultant to facilitate the team building process.

3. Begin the team building process early in the life of the project.

Begin the team building process early in the life of the project, preferably before the project scope has been defined. (see Figure 5) In this way, the benefits of using the process will be maximized. Recall that this research suggested that two major causes of an adversarial relationship are poor scope definition and excessive change orders. In general, interviewees did not believe use of the team building process improved project scope definition or reduced the number of change orders. Why? The most logical reason is that the team building process employed in the projects studied by the task force generally did not begin until after project scope definition was relatively complete. Had the process begun earlier, it undoubtedly would have had a positive affect on these two causes of adversarial relationships.

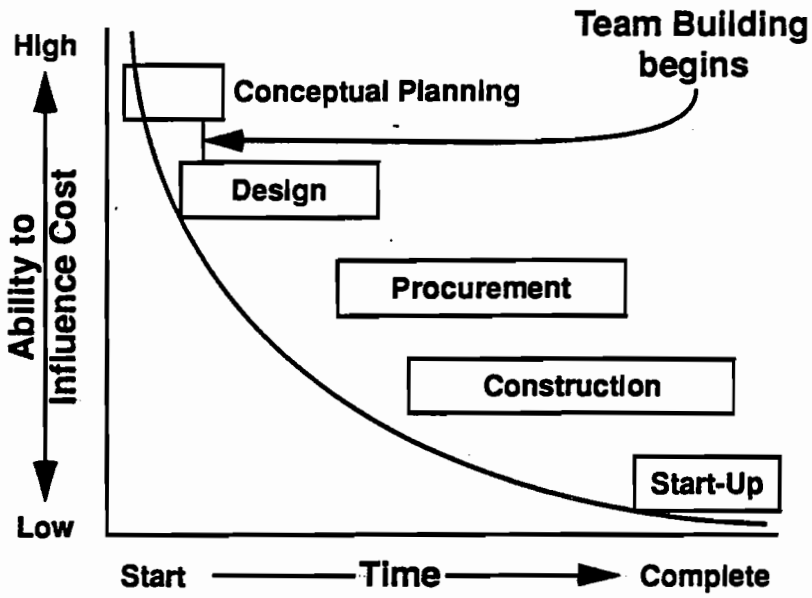

Figure 5. Optimum commencement for team-building to be effective.

4. Seek broad participation in the team building process.

In deciding on who to involve in the team building process, the net should be cast as wide as is practical. Better to err on the side of including too many stakeholders than to risk losing the benefits that can come from broad involvement in the process. In suggesting changes they would make in the team building process they experienced, interviewees felt strongly that more, rather than fewer, people should be involved with the process.

5. Make the process an integral part of project management.

The team building process used on a project sometimes involves nothing more than a 1- or 2-day "kickoff" workshop. The workshop usually is held early in the project life. If managed effectively, this short workshop can go a long way toward building effective team characteristics and developing teamwork norms. However, these characteristics and norms need reinforcement. That is why follow up team building workshops and meetings are needed. These are in addition to the recognition ceremonies, lunches, celebrations, et cetera that are part of the full team building process. In short, if it is to be part of the project strategy, the team building process must be integrated throughout the operational aspects of the project. What exactly does this mean? At the extreme, it could mean, as in one project studied, that the external consultant was a full member of the project team along with representatives of the owner, designer and contractor.

6. Use the team building process!

Successful partnerships manage the relationship, not just the deal.

K. Auppert
High Bridge Associates

Collaborative Advantage:

by Rosabeth Moss Kanter

Alliances between companies, whether they are from different parts of the world or different ends of the supply chain, are a fact of life in business today. Some alliances are no more than fleeting encounters, lasting only as long as it takes one partner to establish a beachhead in a new market. Others are the prelude to a full merger of two or more companies' technologies and capabilities. Whatever the duration and objectives of business alliances, being a good partner has become a key corporate asset. I call it a company's *collaborative advantage*. In the global economy, a well-developed ability to create and sustain fruitful collaborations gives companies a significant competitive leg up.

Yet, too often, top executives devote more time to screening potential partners in financial terms than to managing the partnership in human terms. They tout the future benefits of the alliance to their shareholders but don't help their managers create those benefits. They worry more about controlling the relationship than about nurturing it. In short, they fail to develop their company's collaborative advantage and thereby neglect a key resource.

Three years ago, I began a worldwide quest for lessons about productive partnerships, especially but not exclusively those intercompany relationships that spanned two or more countries and cultures. My research group and I observed more than 37 companies and their partners from 11 parts of the world (the United States, Canada, France, Germany, the United Kingdom, the Netherlands, Turkey, China, Hong Kong, Indonesia, and Japan). We included large and small companies in both manufacturing and service industries that were involved in many kinds of alliances. To ensure that the lessons were widely applicable, we sought companies less prominent in the business press than giants like IBM, Corning, Motorola, or Ford. Several of the relationships that we studied were more than 20 years old; others had formed only recently in response to industry and geopolitical changes. In multiple visits, we conducted more than 500 inter-

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iews with leaders and staffs of both partners. Over time, we saw relationships blossom after good or rocky starts; change goals or structures; and wither or dissolve – amicably or contentiously. Our research uncovered three fundamental aspects of business alliances:

☐They must yield benefits for the partners, but they are more than just the deal. They are living systems that evolve progressively in their possibilities. Beyond the immediate reasons they have for entering into a relationship, the connection offers the parties an option on the future, opening new doors and unforeseen opportunities.

☐Alliances that both partners ultimately deem successful involve *collaboration* (creating new value together) rather than mere *exchange* (getting something back for what you put in). Partners value the skills each brings to the alliance.

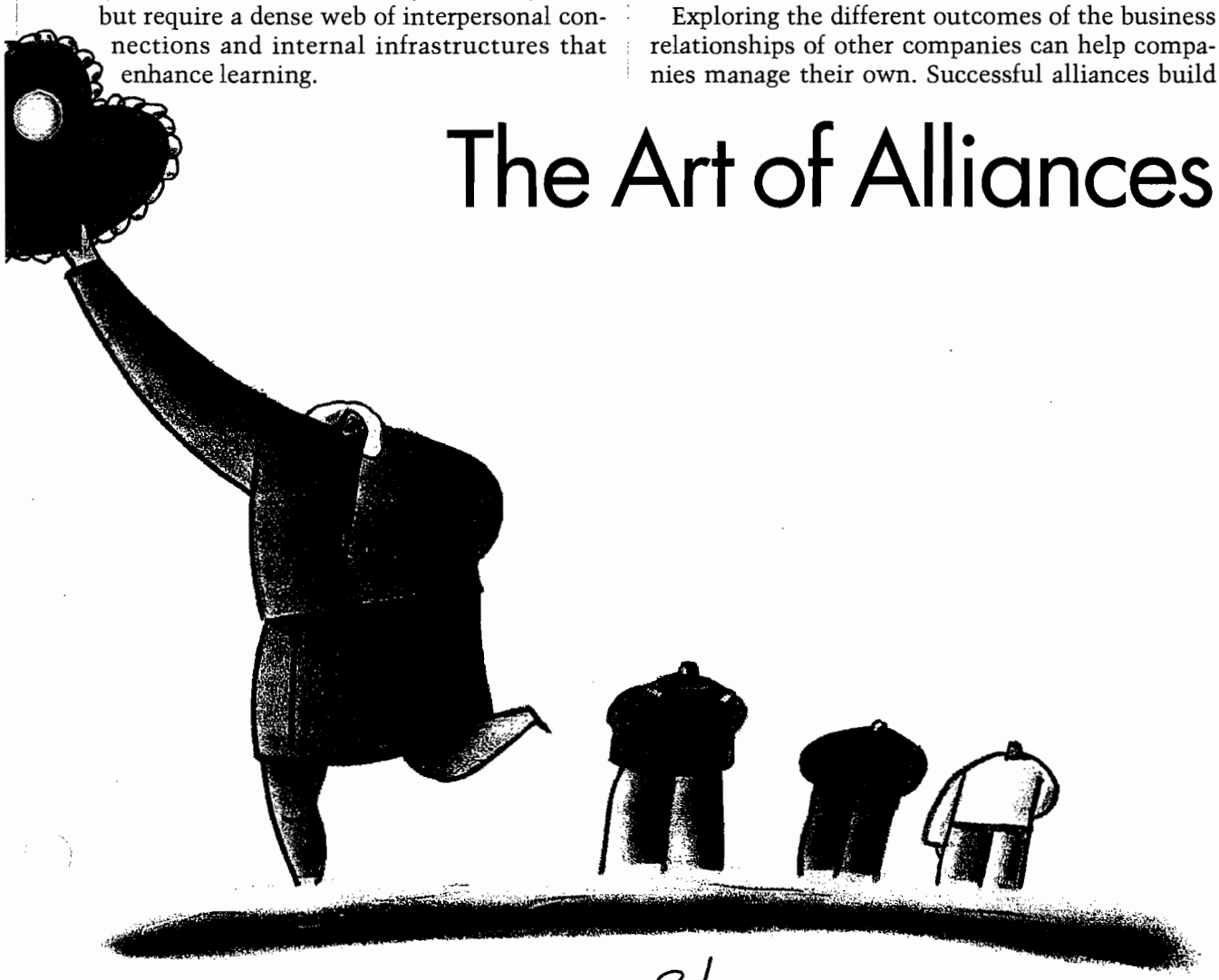
☐They cannot be "controlled" by formal systems but require a dense web of interpersonal connections and internal infrastructures that enhance learning.

Moreover, we observed that North American companies, more than others in the world, take a narrow, opportunistic view of relationships, evaluating them strictly in financial terms or seeing them as barely tolerable alternatives to outright acquisition. Preoccupied with the economics of the deal, North American companies frequently neglect the political, cultural, organizational, and human aspects of the partnership. Asian companies are the most comfortable with relationships, and therefore they are the most adept at using and exploiting them. European companies fall somewhere in the middle.

Business alliances are living systems, evolving progressively in their possibilities.

Exploring the different outcomes of the business relationships of other companies can help companies manage their own. Successful alliances build

The Art of Alliances



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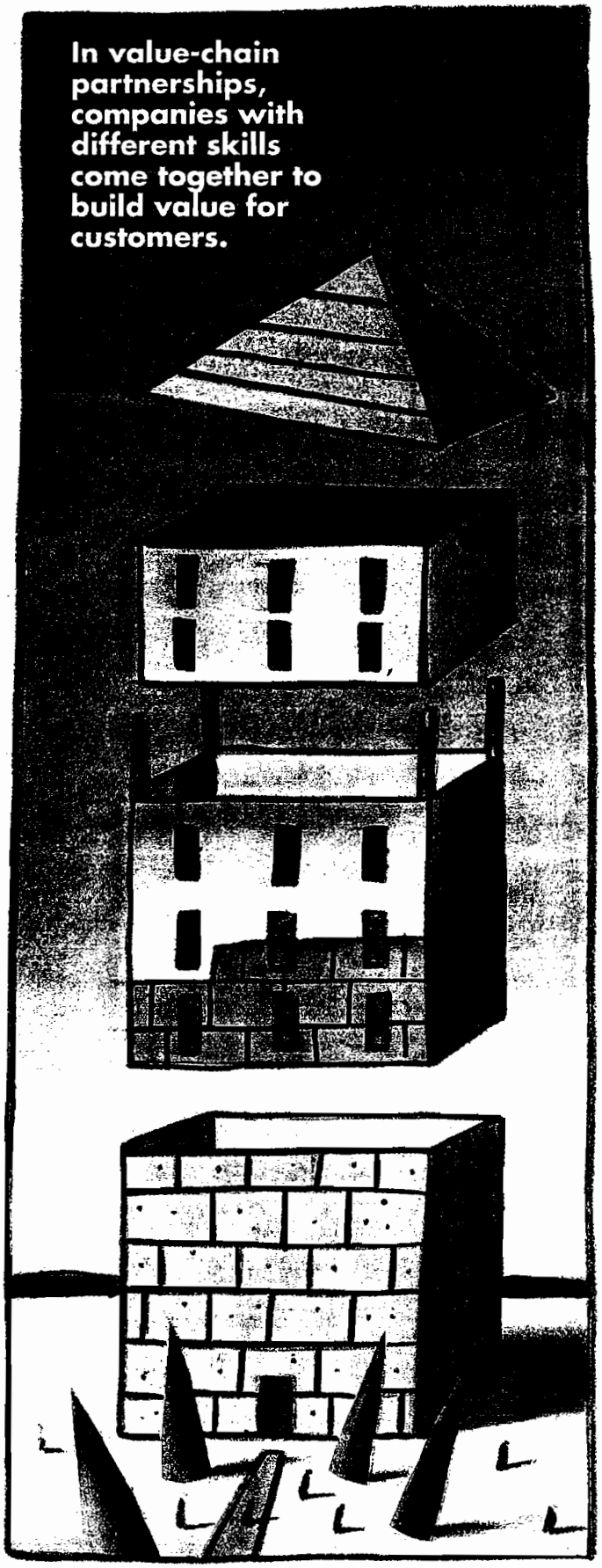

and improve a collaborative advantage by first acknowledging and then effectively managing the human aspects of their alliances.

Varieties of Relationships

Cooperative arrangements between companies range along a continuum from weak and distant to strong and close. At one extreme, in *mutual service consortia*, similar companies in similar industries pool their resources to gain a benefit too expensive to acquire alone–access to an advanced technology, for example. At mid-range, in *joint ventures*, companies pursue an opportunity that needs a capability from each of them–the technology of one and the market access of the other, for example. The joint venture might operate independently, or it might link the partners' operations. The strongest and closest collaborations are *value-chain partnerships*, such as supplier-customer relationships. Companies in different industries with different but complementary skills link their capabilities to create value for ultimate users. Commitments in those relationships tend to be high, the partners tend to develop joint activities in many functions, operations often overlap, and the relationship thus creates substantial change within each partner's organization.

Companies can participate simultaneously in many kinds of relationships, and partners in any relationship may play a variety of roles. The 65 partners in Inmarsat, a consortium that operates a telecommunications satellite, are simultaneously *owners* investing capital, *customers* routing calls through the satellites, *suppliers* of technology to the venture, *regulators* setting policy, and *competitors* offering services similar to Inmarsat's. Netaş, Northern Telecom's joint venture with local investors in Turkey, is simultaneously an *investment asset* for Northern, a *customer* for Northern equipment, a *supplier* of new software and systems, and a *gatekeeper* to other relationships.

In every case, a business relationship is more than just the deal. It is a connection between otherwise independent organizations that can take many forms and contains the potential for additional collaboration. It is a mutual agreement to continue to get together; thus its value includes the potential for a stream of opportunities.

Selection and Courtship

Relationships between companies begin, grow, and develop – or fail – in ways similar to relationships between people. (See the insert, "Eight I's That Create Successful We's.") No two relation-

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ships travel the same path, but successful alliances generally unfold in five overlapping phases.

In the first – courtship – two companies meet, are attracted, and discover their compatibility. During the second – engagement – they draw up plans and close the deal. In phase three, the newly partnered companies, like couples setting up housekeeping, discover they have different ideas about how the business should operate. In phase four, the partners devise mechanisms for bridging those differences and develop techniques for getting along. And in phase five, as old-marrieds, each company discovers that it has changed internally as a result of its accommodation to the ongoing collaboration.

Relationships between companies begin, grow, and develop – or fail – much like relationships between people.

"Love at first sight?" "The company of our dreams?" In fact, many executives use romantic analogies to describe the enthusiasm that accompanies their discovery of a new corporate partner. "One of the reasons our alliance was consummated so quickly," reports a Foote, Cone & Belding executive about the Chicago ad agency's partnership with Paris-based Publicis SA, "was that it was...love at first sight."

Such analogies are appropriate because business pairings aren't entirely cold-blooded. Indeed, successful company relationships nearly always depend on the creation and maintenance of a comfortable personal relationship between the senior executives.

Alliances and partnerships are initially romantic in another sense: their formation rests largely on hopes and dreams – what might be possible if certain opportunities are pursued. Strategic and financial analyses contribute a level of confidence, but, like all new business ventures, collaborative relationships draw energy largely from the optimistic ambition of their creators. COMCO, a Swiss diversified services company, seeing a big demand for environmental cleanup in Eastern Europe, touted enthusiastically the benefits of its joint venture with the U.S. expert, Martech. COMCO optimistically made the Martech joint venture a linchpin of its future growth strategy and assumed Martech felt the same way. Only later, when a cash infusion was needed and Martech backed off, did COMCO realize that its infatuation had been one-sided. Eastern Europe was less important to Martech than it was to COMCO, and more remote; also, Martech had wanted quick returns.

The risk of missing a rare opportunity also motivates company leaders to enter into relationships with open-ended possibilities beyond just clear financial payoffs. For example, newly privatized telecommunications businesses in Europe, Latin America, and Asia often find many foreign companies bidding for their affections, even when financial payoffs are uncertain and venture strategies confusing. Those companies offer a rare chance for outsiders to acquire inside positions in country markets.

Furthermore, distance lends enchantment. Company leaders often don't know each other well enough to be aware of, never mind bothered by, a potential partner's subtle differences. Selective perceptions reinforce the dreams, not the dangers. Leaders see in the other what they want to see and believe what they want to believe, often realizing only later that infatuation blinded them to early warning signs. One leader on the European side of an alliance with a U.S. company blamed himself for believing that his country unit would become the lead center for both companies' products worldwide. "I was ignoring the fact that we were two separate companies," he says, "and that our partner would never accept part of its business being run by an outsider."

Like romances, alliances are built on hopes and dreams – what might happen if certain opportunities are pursued.

The selection process may go better if companies look for three key criteria:

1. *Self-analysis.* Relationships get off to a good start when partners know themselves and their industry, when they have assessed changing industry conditions and decided to seek an alliance. It also helps if executives have experience in evaluating

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Eight I's That Create Successful We's

The characteristics of effective intercompany relationships challenge many decades of Western economic and managerial assumptions. For example, most Westerners assume that modern industrial companies are run best by professional managers operating within limited, contractual Western obligations. And most Westerners assume that any person with the requisite knowledge, skills, and talents can be a manager in the modern corporation. Although smaller companies, family businesses, and companies that are operating in developing countries have retained "premodern" characteristics, the "rational" model has been considered the ideal to which all organizations would eventually conform.

Intercompany relationships are different. They seem to work best when they are more familylike and less rational. Obligations are more diffuse, the scope for collaboration is more open, understanding grows between specific individuals, communication is frequent and intensive, and the interpersonal context is rich. The best intercompany relationships are frequently messy and emotional, involving feelings like chemistry or trust. And they should not be entered into lightly. Only relationships with full commitment on all sides endure long enough to create value for the partners.

Indeed, the best organizational relationships, like the best marriages, are true partnerships that tend to meet certain criteria:

Individual Excellence. Both partners are strong and have something of value to contribute to the relationship. Their motives for entering into the relationship are positive (to pursue future opportunities), not negative (to mask weaknesses or escape a difficult situation).

Importance. The relationship fits major strategic objectives of the partners, so they want to make it work. Partners have long-term goals in which the relationship plays a key role.

Interdependence. The partners need each other. They have complementary assets and skills. Neither can accomplish alone what both can together.

Investment. The partners invest in each other (for example, through equity swaps, cross-ownership, or mutual board service) to demonstrate their respective stakes in the relationship and each other. They show tangible signs of long-term commitment by devoting financial and other resources to the relationship.

Information. Communication is reasonably open. Partners share information required to make the relationship work, including their objectives and goals, technical data, and knowledge of conflicts, trouble spots, or changing situations.

Integration. The partners develop linkages and shared ways of operating so they can work together smoothly. They build broad connections between many people at many organizational levels. Partners become both teachers and learners.

Institutionalization. The relationship is given a formal status, with clear responsibilities and decision processes. It extends beyond the particular people who formed it, and it cannot be broken on a whim.

Integrity. The partners behave toward each other in honorable ways that justify and enhance mutual trust. They do not abuse the information they gain, nor do they undermine each other.

potential partners. They won't be easily dazzled by the first good-looking prospect that comes along.

2. *Chemistry.* To highlight the personal side of business relationships is not to deny the importance of sound financial and strategic analyses. But deals often turn on rapport between chief executives. And the feelings between them that clinch or negate a relationship transcend business to include personal and social interests. Also, a good personal rapport between executives creates a well of goodwill to draw on later if tensions develop.

Northern Telecom was not even on the list when Matra Hachette of France began to seek partners for its Matra Communication subsidiary. In late 1991, negotiations with Philips, Siemens, and AT&T were well under way when Northern chairman Paul Stern asked Matra chairman Jean-Luc Lagardère to consider his company. Eventually Matra

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executives flew to North America to meet Stern and other senior staff. Two weeks later, Stern flew to France to dine with Lagardère. Skeptical at first, Lagardère was won over. "Our views on business," Stern says, "were similar: speed, disdain for bureaucracy, a willingness to make decisions. We hit it off socially; we share an interest in the arts and fast cars." Northern also impressed Lagardère and other Matra managers because Stern got personally involved; CEOs from other companies had left all contact to lower functionaries. In July 1992, Northern and Matra closed the deal.

Signs of the leader's interest, commitment, and respect are especially important in certain countries. In China, as well as in Chinese-dominated businesses throughout Asia, company suitors should give "face" (honor and respect) to a potential partner's decision makers by investing the personal time of their own leaders.

3. *Compatibility.* The courtship period tests compatibility on broad historical, philosophical, and strategic grounds: common experiences, values and principles, and hopes for the future. While analysts examine financial viability, leaders can assess the less tangible aspects of compatibility. When British retailer BhS decided to form partnerships with a small number of key suppliers instead of continuing its "promiscuity" with many suppliers, to use one executive's term, then CEO David Dworkin met with the head of each prospective partner to explore business philosophies – not products and finances.

The initial relationship building between ad agencies Foote, Cone & Belding and Publicis involved the discovery of many commonalities. Publicis, operating in 39 major European cities by 1987, was twentieth in the world in billings. FCB, also with an extensive international presence, ranked fifteenth. Both agencies shared the same industry imperative – to improve their international reach – and the same important catalyst, the announcement by Nestlé, a leading client of both, that it would reduce its ad agencies from 100 to 5.

FCB and Publicis both brought humility to their growth plans, which made them open to sharing control; each believed that it could not grow alone and that industry globalization was blunting its competitive edge. Both had searched for several years without finding the right partner, so they had sufficient experience with other potential partners to be satisfied with what they found in each other. Each company was strong in territories that the other was not, but there was reasonable equivalence in the strengths each brought to the relationship. The companies had similar creative principles and operating philosophies, similar experiences with common clients, and few areas of direct business conflict.

In 1987, "Nestlé told us it wanted five global agencies and that, unless we did something, we would not be one of them," Publicis managing director Gerard Pedraglio recalls. Meanwhile, he had tried to hire Antonio Beja to manage the company's Spanish operations. Though Beja did not take the offer, the two men stayed in touch. Beja eventually became head of Asian and Latin American operations for FCB. In December 1987, Beja and Pedraglio met for dinner, and in the course of their conversation, Beja described his chairman's strategy for FCB. Pedraglio interrupted. "Now, Antonio," he said, "You stop, and I will finish." He did, and Beja was astounded. "How did you know?" he asked. "That's our plan too," Pedraglio replied.

FCB and Publicis had common goals: expand internationally and retain Nestlé as a client.

Beja told FCB chairman Norman Brown about his dinner discussion with Pedraglio, and soon after that, Publicis representatives were on a plane to Chicago. Six months and five meetings later, having seen in each other a fulfillment of their needs, Publicis and FCB announced their alliance. "We found early on a remarkable degree of similarity in our creative and operating philosophies," an FCB executive explains.

The results of their collaboration confirm those findings. Since 1988, Publicis and FCB have operated an innovative global alliance and built a network of 173 agencies in 43 countries. Together the partners constitute the second largest agency in Europe, the second largest in North America, and the eighth largest in the world.

The FCB-Publicis alliance is evidence that, especially in fast-moving industries, potential partners must find compatibility in legacy, philosophy, and desires, because specific opportunities are often short-lived and won't sustain a long-term relationship. A relationship that falters or fails as soon as the first project is concluded precludes other opportunities from developing. Moreover, side deals can quickly become significant in a sustained relationship. The potential to tap Matra Communication's

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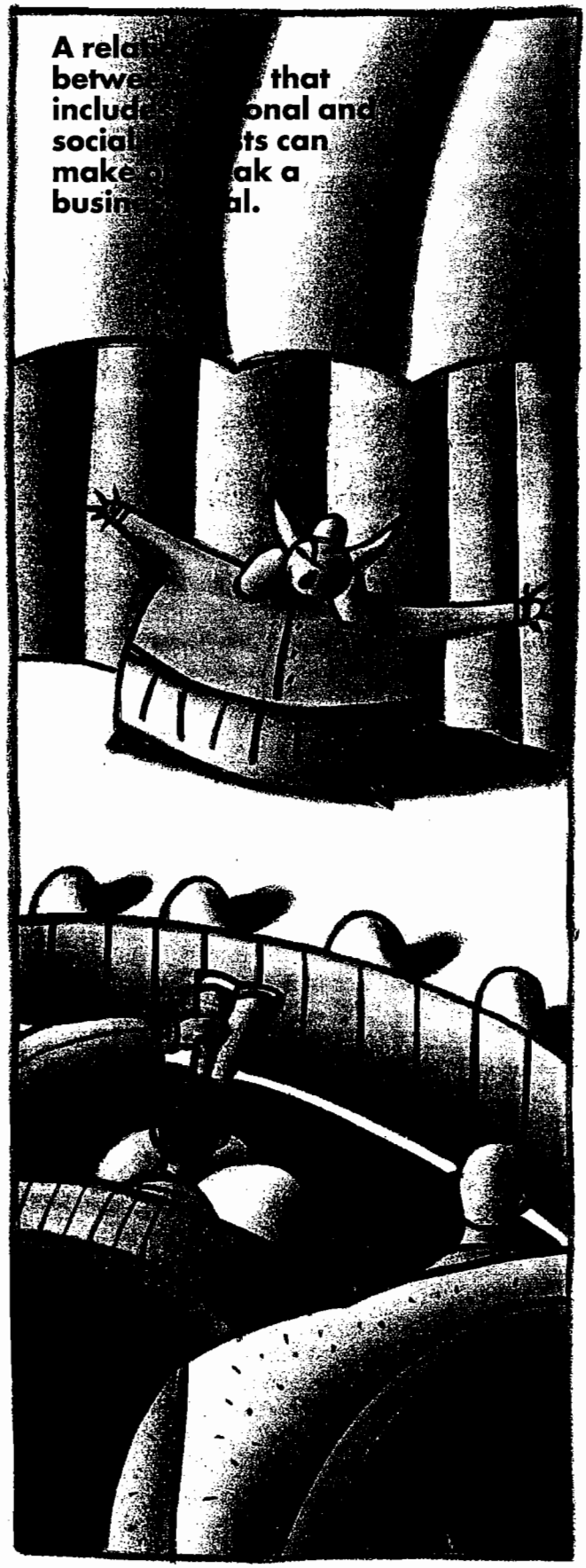

cellular radio technologies was a side benefit of Northern Telecom's alliance with Matra Hachette. Within a year, the side benefit had become the most important and productive piece of the alliance.

Powersoft entered into an alliance with Lotus to share manufacturing space and soon discovered that sharing Lotus's new packaging technology was even more valuable. Inmarsat's original maritime communications venture, which joined partners such as Comsat, British Telecom, Teleglobe, and Japan's KDD, has been dwarfed in growth potential by newer activities in aeronautical and land mobile communications. For TechRidge, a small manufacturer of specialized cameras for identification card photos, a long-standing relationship with Polaroid took a new turn when a Polaroid ally included Polaroid in a large contract in Mexico, and Polaroid brought along TechRidge. This unanticipated opportunity gave TechRidge a platform for further globalization.

Sometimes, particularly in Asia, partners are selected more for their potential to open future doors than for immediate benefits. Lippo Group, a rapidly growing financial conglomerate, has tapped a network of Japanese, European, and U.S. partners to expand from its Indonesian home base to Hong Kong and China. Founder and chairman Mochtar Riady believes that promising relationships should be nurtured for their future value, even when initial joint ventures are not very profitable.

Many relationships die an early death when they are scrutinized for quick returns. COMCO's alliance with Martech for environmental cleanup services in Eastern Europe dissolved in less than two years because of disputes over slower-than-expected returns and the need for new investment, even though the market potential was still great.

Getting Engaged

What starts out as personal rapport, philosophical and strategic compatibility, and shared vision between two companies' top executives eventually must be institutionalized and made public. Other stakeholders get involved, and the relationship begins to become depersonalized. But success in the engagement phase of a new alliance still depends on maintaining a careful balance between the personal and the institutional.

Meeting the Family. The rapport between chief executives and a handful of company leaders must be supplemented by the approval, formal or informal, of other people in the companies and of other stakeholders. Also, each partner has other outside relationships that need to approve of the new tie:

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government ministries, major customers and suppliers, other partners, and investors. Sometimes those meetings don't go well.

In the early stages of an alliance in Europe, a French company representative took his U.S. counterpart to meet with a French government official in a ministry that had partial oversight of the deal. The U.S. manager proceeded to lecture the French official, a socialist, about the virtues of free-market capitalism. French leaders pride themselves on their intellect, so both the form and the substance of the meeting created significant problems. Later, the French managers had to smooth things over at the ministry and educate the American on appropriate behavior.

The Vows. Third-party professionals – lawyers, investment bankers, and their staffs – play their most important roles at this point in the process. But if they dominate, the relationship can become too depersonalized and lose the leaders' vision. It is important to remember that outside professionals don't have to live with the results of their work. Also, because of their professional bias, they are less likely to be interested in the symbolic substance of relationship building: the gestures of respect or the mutual give-and-take that cement a relationship.

One alliance between a U.S. company and a French company in the North Sea oil fields involved a few perfunctory meetings between the chief executives. Then the legal, financial, and strategy staffs took over under the guidance of external law firms. The alliance collapsed in just three years. The professionals were savvy about finance and contracts but not about what it would take to operate the joint venture or whether the two companies were operationally compatible. When the U.S. company later formed a productive alliance with a Dutch company, executives and key managers spent a great deal of time together discussing principles as well as specific agreements; lawyers' and analysts' roles were minimized.

The best agreements between companies contain three important components. First, they incorporate a specific joint activity, a first-step venture or project. This project makes the relationship real in practice, helps the partners learn to work together, and provides a basis for measuring performance. Having real work to do makes it possible to get the relationship started; the longer a courtship drags on without consummation, the more likely conditions or minds or both can change and jeopardize it.

Second, the vows should include a commitment to expand the relationship through side bets such as equity swaps or personnel exchanges. Such a commitment reflects a willingness to connect the fates of the companies, as in the European Retail Alliance, formed in 1989 by three large food retailers: Ahold in the Netherlands, Argyll in the United Kingdom, and Groupe Casino in France. The ERA collaboration gives partners low-cost opportunities for scale efficiencies and innovation. To cement the relationship, the partners bought modest amounts of one another's stock. The three ERA partners sell products to one another and collaborate in joint projects in insurance, data processing, hardware purchasing, quality assurance, and personnel development. They have also developed an 11-company marketing association based in Switzerland that works closely with manufacturers on product development.

ERA has enlarged each member's international supply base by sharing relationships already tested by another ERA company. These new alliances, in turn, provide new product offerings that enhance the companies' reputations as taste leaders in their home markets. For example, Argyll's Safeway stores bought 320,000 cases of wine from Casino for their 1992 Christmas promotion; Casino used Safeway suppliers in the United Kingdom to introduce Scottish smoked salmon products and other high-quality U.K. fresh foods to French consumers. Safeway's store-of-the-future, which opened in Edinburgh in November 1993, features ERA-derived concepts new to the U.K. market – French-style delis, for example. ERA also helps its partners test future opportunities that might emerge as Europe integrates further. Argyll's chairman, Sir Alistair Grant, stresses ERA's long-term benefits: "Perhaps above all, the Retail Alliance has helped our team to become serious about Europe. I believe that our successors will be grateful for this." Externally, ERA opens borders. Inside member companies, it opens minds.

Third, the vows should incorporate clear signs of continuing independence for all partners. The FCB-Publicis alliance appointed an American as chairman of the European joint venture, so FCB's European staff and clients wouldn't think FCB was ceding its European operations to its French partner. When Matra allied with Northern Telecom, it preserved continuity in its product lines, even at the price of duplication with Northern products, to show customers that it would continue to upgrade and service installed machines.

Setting Up Housekeeping

The romance of courtship quickly gives way to day-to-day reality as partners begin to live together. Joint ventures are also new ventures and are thus

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fraught with uncertainty and unanticipated roadblocks. Now more than just the upper echelons of management must work together to make the partnership succeed.

Problems of Broader Involvement. As actual projects get under way, many more people filling many more roles must work with members of the other organization. This broader involvement threatens to undermine the commitment forged at the top, for four reasons:

1. People in other positions may not experience the same attraction and rapport as the chief executives did. For example, during their alliance's early years, Publicis and FCB top executives maintained close contact, traveling often to each other's headquarters. They spent a lot of time together both informally and formally. Other employees had not been in touch with one another, however, and in some cases had to be pushed to work with their overseas counterparts.

2. Employees at other levels in the organization may be less visionary and cosmopolitan than top managers and less experienced in working with people from different cultures. They may lack knowledge of the strategic context in which the relationship makes sense and see only the operational ways in which it does not. For example, a member of the team developing a new financial product to be launched with a foreign partner complained repeatedly to his boss about the risks inherent in the product and the difficulties in introducing it, even recommending termination of the venture. He didn't realize that the foreign partner was a key gatekeeper for a lucrative development deal in another country. Senior managers were tolerating this risky venture in the hope of a larger payoff elsewhere.

3. Usually only a few staff people are dedicated full-time to the relationship. Others are evaluated on the performance of their primary responsibilities and therefore often neglect duties relating to the new alliance. Venture managers, more concerned about their future in the parent company that appointed them, often give priority to their own company's events or executives and subordinate those of the partner.

4. People just one or two tiers from the top might oppose the relationship and fight to undermine it. This is especially true in organizations that have strong independent business units or among professional groups whose incentives aren't aligned with the interests of the organization as a whole. For example, a health care services company formed an alliance with a group of hospitals to create a single new facility to replace duplicate capacity in the hospitals. All the hospitals invested in the alliance, and the services company assumed they would bring enough business to make the venture profitable quickly. But that assumption proved wrong. While the hospital heads had committed to the relationship, they had ignored the views and needs – and the power – of the staff at the units to be closed. The staffs fought back. They cited issues about quality for not sending business to the new venture, and because it was having start-up problems, their claims were plausible. They also cut the transfer prices to internal customers to win their backing in keeping their units alive. And they neglected to send their people to work with the venture, which began to hemorrhage money badly. Eventually the alliance folded.

Discovery of Difference. Operational and cultural differences emerge after collaboration is under way. They often come as a surprise to those who created the alliance. That failure could reflect blind spots on the part of the legal and financial analysts who dominate the engagement period, but even operating people see the similarities more often than the dissimilarities in potential partners. Experience has a way of opening their eyes.

Differences in authority, reporting, and decision-making styles become noticeable at this stage in the new alliance: what people get involved in decisions; how quickly decisions are made; how much reporting and documentation are expected; what authority comes with a position; and which functions work together.

Before the alliance, for example, Publicis was a 75% privately held company whose chief executive dominate strategic decisions. FCB was a public company with a large number of senior managers trying to operate by consensus and generating a lot of paperwork: reports, financial statements, and lengthy meeting minutes. One key U.S. manager, who worked slowly through others according to a philosophy of empowerment, was regarded as weak by the French, who were used to a more directive style. Early in the relationship, some U.S. managers found Publicis too hierarchical, but some French managers found FCB's frequent meetings and paperwork too bureaucratic. And the French managers' abstractions and penchant for theory contrasted with the Americans' desire for concrete empirical facts.

Differences in structuring authority can have immediate practical consequences. In China, a chief engineer reports typically to the chief executive, whereas in Canada, at Northern Telecom, he or she reports to the manufacturing director. Numerous other logistical and operational differences are soon

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discovered to be hiding behind the assumed compatibility: different product development schedules, views of the sales process, or technical standards, for example. Also, when the partners extend their areas of collaboration, the relationship becomes more difficult to govern and to evaluate on a purely financial basis.

The most common conflicts in relationships occur over money: capital infusions, transfer pricing, licensing fees, compensation levels, and management fees. Also, the complexity of roles each partner has with respect to the other can make economic decisions difficult. Remember, the relationship is larger than any one venture.

Operational dissimilarities require working out – more communication than anyone could have anticipated.

All operational dissimilarities require working out. More communication than anyone anticipated is necessary, and different languages make things even harder. In a Franco-American joint venture, meetings were conducted in both languages and thus took twice as long. Differences between companies do not disappear because of an alliance, but they can be handled so they don't jeopardize it. Companies that are good at partnering take the time to learn about the differences early and take them into account as events unfold.

Respect Versus Resentment. People will take the time to understand and work through partnership differences to the extent that they feel valued and respected for what they bring to the relationship. Using stereotypes to explain people's behavior – the French always do this, or the Germans always do that, for example – denigrates individuals and therefore diminishes their incentive to bridge troubling differences.

Stereotyping polarizes the partners, setting up us-versus-them dynamics that undermine the desire to collaborate. One North American manager observed soon after forming an alliance with a European company, "You're an ugly American to them, backwater folks from across the pond, here to purchase, steal, whatever." A cynical countryman wondered whether the European partner's motive was to push the North American company out of the market.

Mistrust, once introduced, sets off a vicious cycle. It makes success harder to attain, which means someone has to be blamed for the lack of success. Because of their differences, outsiders are the most suspect – a fact that only increases mistrust. Respect that builds trust begins with an assumption of equality: all parties bring something valuable to the relationship and deserve to be heard. In one alliance, tension began to build after the local partner felt shut out of decisions, even though local knowledge was vital to the venture's success. A Chinese manager commented on the resentment that Western companies create when they assume that their superior technology gives them the right to make all the decisions. "The focus here," the manager said, "is on face, reputation. Even if people are poor, you need to give them face. North Americans feel that because they gave us jobs, we can't argue. But the Chinese people don't need their jobs. We can replace them with another foreign company; we can import from another place."

Learning to Collaborate

Active collaboration takes place when companies develop mechanisms – structures, processes, and skills – for bridging organizational and interpersonal differences and achieving real value from the partnership. Multiple ties at multiple levels ensure communication, coordination, and control. Deploying more rather than fewer people to relationship activities helps ensure that both partners' resources are tapped and that both companies' own needs and goals are represented.

The most productive relationships achieve five levels of integration:

1. *Strategic integration*, which involves continuing contact among top leaders to discuss broad goals or changes in each company. Leaders should not form an alliance and then abandon its nurturing to others. The more contact top executives have, the more changes they will hear about, the more chances they will have to work things out, the more information they will be able to turn into benefits, and the greater the possibility that the companies will evolve in complementary rather than conflicting directions.

Often, new governance forums evolve after the relationship is under way. The chief executives in the European Retail Alliance devote a day a month to their meetings, rotating among the three countries. Investment bankers Wertheim of the United

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States and Schroders of the United Kingdom began their alliance in 1986 with infrequent board meetings but soon saw the need for broader and more frequent contact. FCB and Publicis built their Alliance Operating Committee after realizing that having the CEOs sit on each other's boards didn't produce enough communication.

2. *Tactical integration*, which brings middle managers or professionals together to develop plans for specific projects or joint activities, to identify organizational or system changes that will link the companies better, or to transfer knowledge.

The ERA developed projects in insurance, information technology, and transportation that involved staff from member companies. Leadership for each project came from the company with the most experience or the best practices in that area. Northern Telecom and Matra Communication pinpointed four product domains in which potential synergies existed. Then they created four working groups of eight to ten people that met monthly to define specific ways of cooperating in each area. Members of all four groups convened in a general assembly every three months to report progress and problems to management. The small British apparel supplier Cohen & Wilks and its large retail partner, BhS, developed joint planning projects, including team efforts to improve computer linkups and financing mechanisms, such as a proposed retrospective discount scheme. BhS buying director Liz Broughan meets frequently with Cohen & Wilks staff members to plan product designs.

Establishing formal integrator roles is another way to ensure tactical integration. Lotus, Powersoft, and other partner-rich software companies have senior executives dedicated to alliance management, equivalent in status to the heads of finance or human resources. Worldwide account directors (WWADs) at FCB and Publicis work to make the best use of all resources of both partners on behalf of major clients. That task is complicated by another dynamic, the fact that each client relationship is very different. Some have highly centralized global marketing efforts; others give companies or regions autonomy to develop their own. Salomon Salto, WWAD for the FCB-Publicis relationship with Nestlé, communicates ideas to all parties but also intervenes in local conflicts. He is viewed as an impartial observer with experience in many countries and brands. "My job is more diplomacy and negotiation than power," he observes. His ability to speak French, Spanish, English, and German helps a lot.

3. *Operational integration*, which provides ways for people carrying out the day-to-day work to have timely access to the information, resources, or people they need to accomplish their tasks. Participation in each other's training programs helped two companies in a technology-based relationship develop a common vocabulary and product development standards. Computer connections between Cohen & Wilks and BhS provide direct data interchange, which speeds product development and delivery cycles. Inmarsat engineers in London share a technical vocabulary and systems with counterparts at the earth stations where partners receive satellite signals.

4. *Interpersonal integration*, which builds a necessary foundation for creating future value. As relationships mature beyond the early days of scrambling to create initial projects and erect structural scaffolding to manage them, the network of interpersonal ties between members of the separate companies grows in extent and density. Leaders soon feel the need to bring people together to share information. FCB and Publicis first expanded their initial Alliance Operating Committee to include more people. They then initiated worldwide conferences for executives and country managers. Next, they brought creative directors and account managers from both companies and many countries together to make recommendations for business development, creative excellence, and international client management.

Broad synergies born on paper do not develop in practice until many people in both organizations know one another personally and become willing to make the effort to exchange technology, refer clients, or participate on joint teams. Lippo Group, which has many partners involved in its network of banks and property development ventures, uses senior management conferences to sell the concept of synergy, identify cross-unit business opportunities, and build personal ties among managers.

Many strong interpersonal relationships help resolve small conflicts before they escalate. "There really is no good system for working out problems except through personal relationships," observes a European manager experienced in transatlantic relationships. "If you don't establish good rapport with your counterparts, you haven't got a prayer of making it work. Formal structures of decision making don't do anything for you unless you've got the relationship to start with."

5. *Cultural integration*, which requires people involved in the relationship to have the communication skills and cultural awareness to bridge their differences. Northern Telecom and Matra picked executives for their Matra Northern Cellular joint venture who had shared a similar foreign assign-

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ment. Chief executive Émile Gratton is a bilingual Canadian who had worked in the United States, South America, and Saudi Arabia. Chief operating officer Olivier de Pazzis, deployed by Matra in France, had run a joint venture with a U.S. company in Saudi Arabia.

Managers from both partners or affiliated companies must become teachers as well as learners. Managers at Tong Guang Nortel, the successful venture in China between Tong Guang Electronics and Northern Telecom, have committed themselves to teaching and learning. TGNT managing director Gerry Jones, deployed from the Northern side, arranged for Chinese deputy managing director Frank Yong to participate in a three-month training program in Canada to become familiar with Western business practices. That experience enabled Yong to raise questions with Northern managers in China and educate them about how situations appeared from the Chinese side of the venture. In turn, Yong arranged for his Western partners to visit important Chinese historic sites, such as the Great Wall and the Summer Palace, and invited them to Chinese weddings and to employees' homes.

When managers accept teaching and learning roles, they demonstrate interest and respect, which helps build the goodwill that's so useful in smoothing over cultural and organizational differences. TGNT's Canadian manufacturing director learned to speak Mandarin. Although he could hold only a simple conversation in Chinese, the enthusiastic applause he received at quarterly meetings in Shekou attested to his popularity. An American expatriate heading part of Lippo Group's insurance joint ventures knew that his primary job was to teach local managers analytic skills, but he also took the time to set up classes for himself and other expatriates to learn the local language and customs.

Integration in all five of these dimensions – strategic, tactical, operational, interpersonal, and cultural – requires that each party be willing to let the other parties inside, which entails a risk: the risk of change.

Changing Within

Productive relationships usually require and often stimulate changes within the partners, changes that they may not anticipate at the outset of the collaboration. When two companies place themselves in intimate contact with each other through an alliance, it is almost inevitable that each will compare itself with the other: How do we measure up to our partner in systems sophistication or operational efficiency? What lessons can we learn from our partner? In fact, learning and borrowing ideas from partners is part of realizing the full value of the relationship. FCB and Publicis used the formation of their alliance as the occasion to rethink the nature of an advertising agency and to create new roles for regional and country managers as well as for worldwide account directors.

Empowerment of Relationship Managers. Because collaborative ventures often make new demands, managers involved in the relationship must be able to vary their own companies' procedures to make venture-specific decisions. Staff involved in alliance activities often need more knowledge and skills. When British retailer BhS established partnerships with suppliers like Cohen & Wilks, buyers on both sides needed new strategic and financial information and negotiating skills to work effectively with one another. One success factor in Northern Telecom's joint ventures in Turkey and China is the autonomy of each venture's board of directors and expatriate managers, an autonomy that allows them to depart from the practices the company follows in North American markets. In China, the ability to adapt to local markets – for example, in accounts receivable policies or incentive schemes for sales personnel – helped TGNT succeed. Developing flexibility – "letting go," as one manager describes it – may be difficult for tightly managed companies with detail-oriented managers.

> Establishing many interpersonal relationships between partners helps resolve small conflicts before they escalate.

Infrastructure for Learning. Companies with strong communications across functions and widely shared information tend to have more productive external relationships. Thus other desirable internal changes include greater cross-functional teamwork and exchange of ideas. At BhS, cross-functional teamwork is crucial for achieving the speed, innovation, and quality the company seeks from supplier partnerships. Liz Broughan had to build bridges to marketing director Helena Packshaw and trading manager Sandee Springer.

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Many businesses fail to realize the full potential from their relationships because internal barriers to communication limit learning to the small set of people directly involved in the relationship. One large U.S. company's highest award for quality went to a joint venture operating in a developing country, yet managers in that venture had a hard time convincing their colleagues in other countries that they had anything to teach them.

The company's systems are usually the culprit in such situations, not its people. In the early stages of its relationship with Northern Telecom, Matra learned that Northern put designs into production earlier than Matra did. Despite a common stereotype that speed is less important in France, the French engineers rose quickly to the challenge and proudly demonstrated a new capability several months ahead of schedule.

Specific forums to exchange ideas can help companies import lessons from their partners. In addition to top management's participation in the ERA, Argyll's Safeway stores have created a regional managers' forum and a senior executive development program. Cross-functional projects, such as offering discounts to customers who buy combinations of products, link marketing, information technology, and stores.

Managing the Trade-offs

There are limits to how much a company should change to accommodate the demands of an alliance. The potential value of the relationship must be weighed against the value of all the other company activities, which also make demands on its resources – including the time and energy of executives. Even when relationships have high value, an organization can handle only so many before demands begin to conflict and investment requirements (management time, partner-specific learning, capital, and the like) outweigh perceived benefits. (See Benjamin Gomes-Casseres, "Group Versus Group: How Alliance Networks Compete," HBR July-August 1994.)

Sometimes companies must face the challenge of terminating an alliance. Relationships can end for a number of reasons. A partner may be suitable for one purpose and not another. Managers or other venture participants may be needed for more urgent tasks. Shifts in business conditions or strategy can mean that a particular relationship no longer fits as well as it once did. For whatever reason, ending a partnership properly is difficult to do and requires much skill and diplomacy. Partners should be fully informed and treated with integrity. If they are not, future relationships will be jeopardized – especially in Asian countries, where business and government leaders have long memories.

Like all living systems, relationships are complex. While they are simpler to manage when they are narrow in scope and the partners remain at arm's length, relationships like these yield fewer long-term benefits. Tighter control by one partner or development of a single command center might reduce conflicts and increase the manageability of a relationship. Many benefits, however, derive from flexibility and being open to new possibilities. Alliances benefit from establishing multiple, independent centers of competence and innovation. Each center can pursue different paths, creating in turn new networks that go off in new directions. Flexibility and openness bring particular advantages at business frontiers – in rapidly changing or new markets or in new technology fields.

The effective management of relationships to build collaborative advantage requires managers to be sensitive to political, cultural, organizational, and human issues. In the global economy today, companies are known by the company they keep. As the saying goes, success comes not just from what you know but from who you know. Intercompany relationships are a key business asset, and knowing how to nurture them is an essential managerial skill.

The author acknowledges Pamela Yatsko, Paul Myers, Kalman Applbaum, Lisa Gabriel, Madelyn Yucht, and Gina Quinn, who collaborated on the research. Pamela Yatsko made especially important contributions.

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K. Aupperle
High Bridge Associates

The Society of American Military Engineers

Partnering and Improved Project Peformance

- Trust
- Shared Vision
- Long-term Commitment

by

Ken Aupperle

Stone & Webster Engineering Corporation

September 21, 1994 *Richland, WA*

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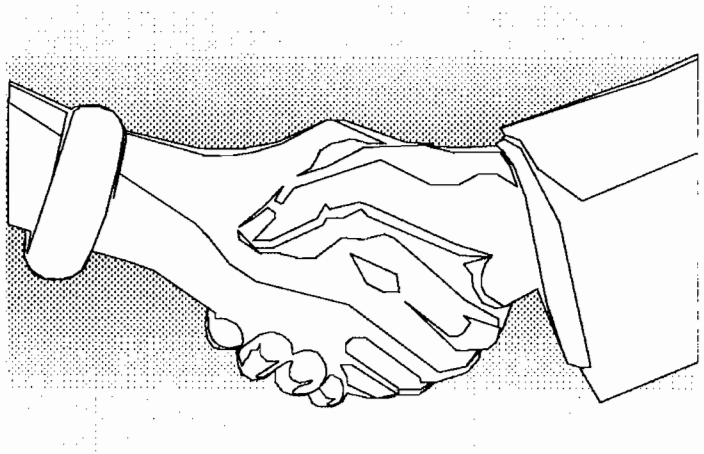
Presentation Outline

- Introduction
- Elements
  - Attributes
  - Requirements
  - Benefits
- Experience
  - Industry
  - Stone & Webster
- Conclusion



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Partnering Advocates

- Owners
  - Private
  - Government
- Contractors
- Suppliers
- Organized labor
- Regulators
- Academia
- Industry groups
  - Construction Industry Institute (CII)
  - Associated General Contractors (AGC)
  - Business Roundtable

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Partnering is:

"A long-term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources. This requires changing traditional relationships to a shared culture without regard to organizational boundaries. The relationship is based on trust, dedication to common goals and an understanding of each other's individual expectations and values. Expected benefits include improved efficiency and cost effectiveness, increased opportunity for innovation and the continuous improvement of quality products and services."

Source: Construction Industry Institute
In Search of Partnering Excellence,
Partnering Task Force Report 17-1

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Partnering

Partnering is a long-term commitment between two or more organizations, based upon trust and a dedication to common goals.

Source: Construction Industry Institute,
In Search of Partnering Excellence,
Special Publication 17-1

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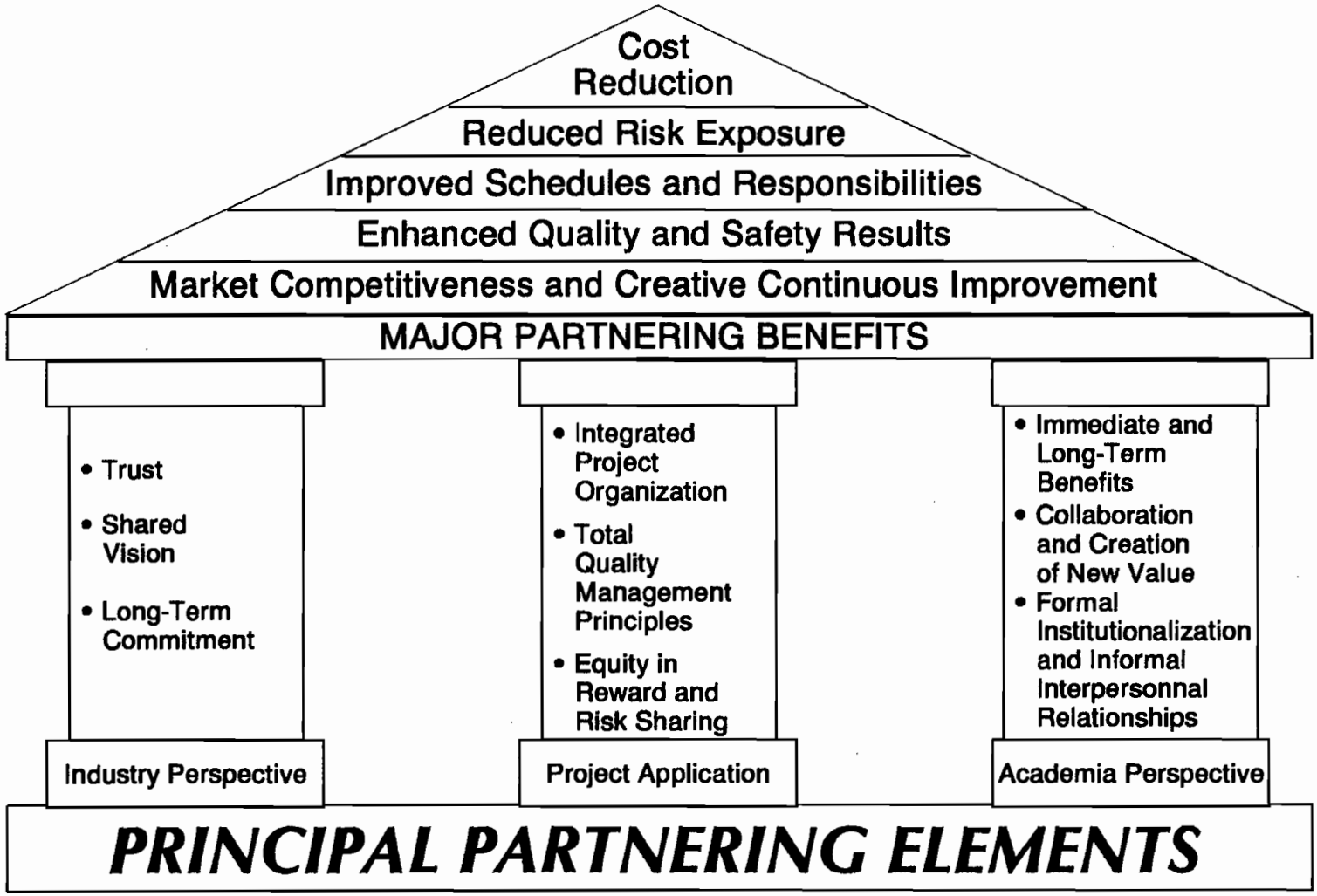

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Project Partnering Model

INTEGRATED ORGANIZATION AND RESOURCES	TOTAL QUALITY MANAGEMENT PRINCIPLES	EQUITY IN REWARD AND RISK SHARING
• Team building	• Trust	• Reduced/shared risk
• Single project ego	• Communication	• Reasonable profit
• Sharing experience	• Employee involvement	• Performance expectations
• Sharing technology	• Individual empowerment	• Shared cost savings
• Common administrative policies and procedures	• Recognition and reward	• Performance measurement
• Technology and skill transfer	• Customer focus	• Fiscal accountability
• Lessons learned and problem solving	• Strategic planning	• Do more with less
• Reduced staffing levels	• Value engineering	
• Common focus and goals	• Training	
	• Quality accountability	

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Equity in Reward and Risk Sharing

- Establish definitive basis for contract
  - Target costs
  - Schedule milestones
  - Quality goals
  - Safety results
- Establish definitive cost targets as a basis for contracts
- Administration of contingency within target cost
- All partners share risk and reward
- Individual employee sharing of cost savings
- Partnership steering committee approval of all changes to target cost

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Total Quality Management Principles

- Establish, communicate and constantly reinforce goals and expectations
  - Project level
  - Function level
- Create an environment where:
  - Everyone knows where they fit in
  - Personnel are willing, able and trusted to perform
  - Mutual problem solving is the norm
  - Earning and achievement are the norm
- TQM is a continuous process
  - Top management must set example

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Integrated Organization and Resources

- Partnership steering committee
- Integrated work methods and procedures
- Anonymity of organizational participants
- Functionally-driven assignment of personnel
  - 'Best person for the job'
- Reduction of management and indirect activities
  - 'More direct work and deliverables'

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Formulating the Partnership

- Establish the partnership steering committee
- Implement management team building
- Develop partnership agreement
  - Terms and conditions
  - Common vision, goals and expectations
  - Critical success factors
  - Performance measurement standards
- Formulate project approach
- Select key project personnel
- Execute partnership agreement

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Stone & Webster Partnering Highlights

► COMANCHE PEAK UNIT 2 -TU ELECTRIC

- Performed work under an integrated organization
- Executed under performance-based incentive fee contract

► BELLEFONTE NUCLEAR PLANT - TVA

- Reduced total project cost-to-complete by 30%
- Identified additional $73 million savings through value engineering
- Reduced indirect to direct overhead ratio by 50%

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Stone & Webster Partnering Highlights

- SEQUOYAH NUCLEAR PLANT - TVA
  - Operating under a performance-based incentive contract
  - Established partnership steering committee
- AHLSTROM RECOVERY, INC
  - Committed to partnering principles and financial obligations
  - Utilized a phased implementation approach
  - Merged engineering department

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Reference Partnering Information

- In Search of Partnering Excellence
  - CII Publication 17-1
- Partnering: A Concept for Success
  - Associated General Contractors
- Team Building: A Process for Improving Project Performance
  - CII Publication 37-1
- Partnering: Contracting for the Future
  - Cost Engineering, Scott Baker, Rust International
- Collaborative Advantage: Successful Partnerships and the Art of Alliances
  - Harvard Business Review, Rosabeth Kanter

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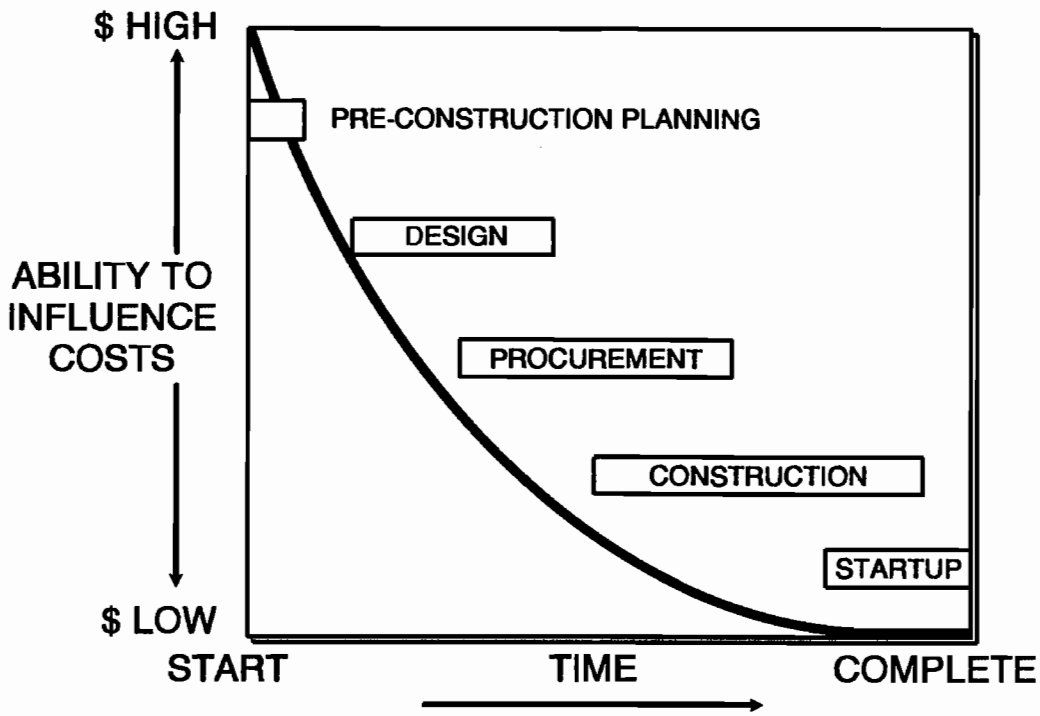
K. Hopper 6

Industry Experience

Patnering Cost-Influence Curve



Source: CII

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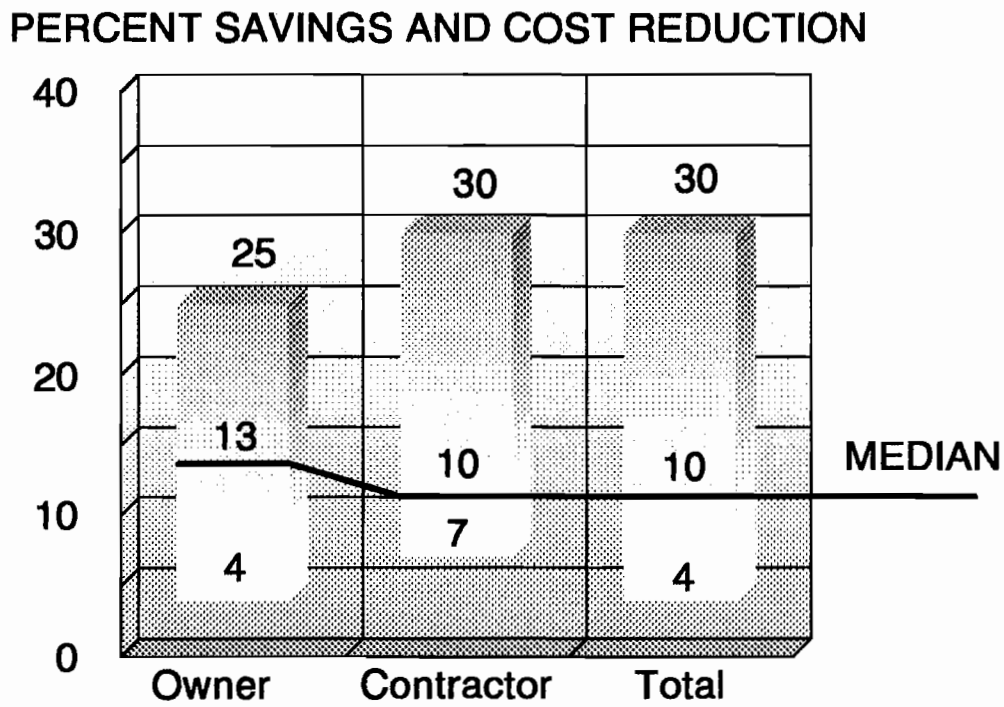
Industry Experience

~~*Impact of Partnering on Total Installed Cost*~~



Source: August 1994 CII Annual Meeting, Boston, MA

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Conclusion

► PARTNERING WITH THE GOVERNMENT INVOLVES BOTH CHALLENGES AND OPPORTUNITIES

- Statutory rules and regulations
- Administrative policies and procedures
- DOE/COE synergy of complementing strengths
- Transition and change at DOE

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High Bridge Associates

Fulfilling Vision

TVA

Through Partnering

Partnering Management Plan

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TVA PARTNERING MANAGEMENT PLAN

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EXECUTIVE SUMMARY

On October 14, 1992 Mr. Oliver W. Kingsley Jr., President of TVA Generating Group, hosted a meeting for senior officers of key contractors. The purpose of the meeting was to share TVA's Vision and strategic plan for the future along with a roadmap for translating that vision into results. A key factor for TVA in realizing their visions is PARTNERING.

Mr. Kingsley outlined a partnering approach for TVA managers as well as key contractors that called for a genuine "from the top down" effort to make partnering work. He challenged all key contractors and TVA managers with nine specific "expectations". Mr. Kingsley issued another challenge in the form of "next steps" to follow-up on activities for achieving TVA's partnering expectations. The nine expectations and next steps follow-up actions are incorporated as part of our plan under the Attachments section.

This management plan outlines Stone & Webster's Proactive program for helping Mr. Kingsley achieve TVA's vision through effective partnering. It also serves as a statement of our recognition of TVA as "our most important client". It follows Mr. Kingsley's roadmap allowing for adjustments to our plan based on feedback as we progress. The plan does not rely on any preconceived text book formula for success nor does it imply that effective long term partnering with TVA will be easy considering the internal challenges that TVA faces in their transition to utilizing contractors in partnership.

WHAT IS PARTNERING?

Partnering is a way for owners and contractors to achieve mutual goals through a more collaborative and productive relationship. Effective partnering is a long term endeavor built around openness and trust resulting in the breakdown of traditional adversarial roles. A true partnering relationship creates a more pleasant, progressive and healthy work place for the individual. Partners don't always agree but they can take advantage of disputes to build a stronger relationship based on lessons learned. The merits of an effective partnership can be jointly measured in improved quality, productivity, cost savings, employee satisfaction and profitability.

THE IMPORTANCE OF PARTNERING WITH TVA

The importance of partnering with TVA to achieve Mr. Kingsley's Vision for improvement cannot be underestimated. Our "most important client" has endorsed "partnering" as a way of doing business. The message is very clear: Mr. Kingsley's plans favor companies and people who can effectively practice partnering.

The Tennessee Valley Authority employs more Stone & Webster people than any other client. The reasons are simple: we have the best and longest track record in the industry, our people know their business, our rates are competitive and our proposals that won TVA work relied heavily on partnering. We are now entering a phase in our relationship with TVA where we must demonstrate our capacity to stick with partnering for the long term. We have achieved this with other clients; however, success in partnering does not come easily from client to client. Each has different needs, desires, styles, and personalities.

Our challenge is to make partnering work for Stone & Webster and TVA. Our incentives are long term employment in a beautiful area, profit for our company so that it can continue to sustain us, and the prospects of working with TVA to give people a better feeling about working in the Tennessee Valley through our improved stability.

PARTNERING AS A PERSONNEL PERFORMANCE ATTRIBUTE

Individual ability and initiative to partner with TVA should be taken into consideration during personnel evaluations for salary increases or promotions. On TVA projects, a Stone & Webster employee's ability to effectively practice partnering adds to their value. The weight of partnering as a personnel performance attribute will vary depending on the individual's assignment. Partnering should weigh more heavily in evaluating employees who frequently interface with TVA or are in a position to greatly influence others.

EFFECTIVE PARTNERING RELIES ON BASICS

Much has been written about partnering over the past few years by the Construction Industry Institute and Associated General Contractors of America. Our studies and recent experiences with other clients show that effective partnering relies on a few basic elements.

Openness: We should be willing to give information as well as accept information from TVA on a business level that openly addresses problems.

Trust: Cynicism about others' motives is a barrier to partnering. Communicate openly to develop the kind of personal relationship that leads to trust and understanding. Try to take the guess work out of understanding the motives of partners.

Support from the Top: Stone & Websters corporate management supports Mr. Kingsley's partnering expectations and expects feedback from us so that they can provide ongoing support where and when it is needed. On the project site level our managers should set an example for others by building partnering into the work place.

Be Proactive: We should take the first step toward demonstrating the initiative to partner with TVA wherever possible. The burden is on us to prove to TVA that they can become more efficient through partnering with Stone & Webster.

Good Performance: Partnering does not relieve us of our individual responsibilities to do a good job. Good performance will go a long way toward breaking down barriers to partnering.

A Long Term Commitment: Our experience shows that the benefits of partnering don't come quickly. It is very important that we commit to partnering with TVA for the long term. We both need time to learn from our mistakes, build on our successes and to take advantage of lessons learned.

Be Realistic: Not all individual partnering efforts will be a complete success. The key is to avoid negative projections to others. In difficult partnering situations try to at least maintain a neutral posture so that the overall positive impact of partnering will take over.

Share Risks and Rewards: All of our major contracts with TVA are structured around Partnering to share Risks and Rewards. Not only are we pro-actively engaged in helping Mr. Kingsley achieve his partnering expectations, we have contractual incentives tied to partnering. When contractors don't receive incentives in a partnering effort, both partners lose. The emphasis should be on helping each other win.

KEEP PARTNERING EFFORTS VISIBLE

Building a good partnership with TVA can take on many different forms. Community service, for example, is one of Mr. Kingsleys expectations. Our partnering plan calls for increased visibility to all aspects of partnering including community service. Let TVA employees in your work place know that Stone & Webster is part of the Tennessee Valley Community by participating in community services with them whenever possible.

We want to make "Partnering" a household word in the Tennessee Valley. Partnering is not a buzz word or fad. Rather it is a more efficient way of doing business whose time has come. We need to talk partnering, teach partnering, advertise partnering and write about partnering until our people understand that it is a business practice. This element of our plan will receive a great deal of attention during our meetings and critique sessions. Each project should develop its own initiative for giving high visibility to partnering with TVA and educating its people about partnering as a joint business venture.

PROACTIVE PARTNERING AT ALL LEVELS TO HELP TVA CHANGE

Partnering with contractors represents a big challenge to TVA. It is a change in philosophy that some TVA employees may see as a threat to their jobs. It is a new concept to TVA that represents change and most people inherently possess some resistance to change.

As a key contractor we should be understanding of TVA's position. Partnering simply comes easier to us and, by the nature of our business, dealing with change is a part of our job. We have been asked by TVA to help bring about a culture change by helping them get away from old ways of doing business, serving as a model for new approaches or attitudes and to help coach and develop TVA's workforce.

In order to do this we are taking a Proactive approach to partnering at all levels. Partnering initiatives will be established within Stone & Webster at the following levels:

1 - Corporate
2 - Project
3 - Individual

Note: Large Projects may also want to develop departmental initiatives.

Each level should develop proactive goals to address each of Mr. Kingsley's nine partnering expectations. The Corporate and Project Goals toward achieving TVA's partnering expectations will be incorporated into the Partnering Management Plan or Appendices I through IX. Our performance toward achieving these goals will be reviewed jointly and measured in accordance with the following section of this plan.

MEASURING PARTNERING PERFORMANCE

Cost Savings and Product Improvements: We consider these to be primary indicators for measuring the effectiveness of partnering. In most cases product improvements will result in cost savings. Product Improvements may be achieved through quality improvements, process improvements, productivity improvements or innovations. The attached "Partnership Savings" form (attachment "A") should be used to report on partnering cost savings at the corporate, project or individual level. These forms should be turned in to your local partnering sponsor for evaluation and discussion at our quarterly meetings.

NOTE: Partnering is a business practice which should result in financial benefits to each partner. The burden is on us to help TVA clearly identify the financial benefits of partnering with Stone & Webster.

TVA'S Nine Partnering "Expectations": These are very important performance indicators since they represent the attributes that TVA is seeking in a partner (attachment "B"). Our performance toward achieving these expectations should be measured at the corporate, project and individual level as follows:

> The attached "TVA Partnering Plan Work Sheets" (attachments "C-1 through C-9") should be filled out at all three levels to show plans for achieving each of the nine expectations. The work sheets should then be updated periodically to show accomplishments or actions to meet the plan.
>
> The attached "Partnering Performance Evaluation" (attachment "D") form should be filled out periodically to measure performance toward fulfilling each TVA partnering expectation at the corporate, project and individual level. The results should be discussed at our quarterly meetings.

Evaluating the Basic Elements of Partnering: This can help to break down barriers that get in the way of a successful partnership. The attached form titled "Evaluating the Basics of Partnering" (attachment "E") is designed to be used by either partner as a tool for self evaluation, joint evaluation or one partner evaluating the other. This is a good tool for stimulating open discussions at joint partnering sessions assuming that both partners agree on its use. This should also be filled out periodically for discussion at our quarterly meetings.

Measuring the Effectiveness of a New Partnership is not Easy: The ultimate measure is longevity and accomplishments. The following are some general guidelines which apply to measuring partnering performance.

A. Progress should be measured periodically in joint sessions with TVA.

B. Attributes for measuring progress in joint sessions should be mutually agreed upon by TVA and Stone & Webster.

C. This is in addition to existing contract requirements for evaluating partnering. The results of contract evaluations will weigh heavily in measuring the overall effectiveness of partnering with TVA.

D. Emphasis should be placed on measuring progress based on a "win-win, as partners" approach. Each partner has an obligation to help the other win. The causes for either partner not feeling like a winner should be shared, jointly measured and jointly resolved.

All Stone & Webster employees should take on the challenge to constantly improve the process for measuring partnering benefits, so that both partners can more clearly demonstrate progress.

PARTNERING SPONSORS AND PARTNERING STEERING COMMITTEE

Each project is to assign a Project Partnering Sponsor and Senior Sponsor. The Project Partnering Sponsor should be someone who has time to serve on a working level steering committee for purposes of coordinating and communicating partnering activities throughout the region. The sponsor will also be called upon to coordinate and gather partnering data such as partnering performance evaluations. The Senior Sponsor should be a SWEC Senior Manager who provides overall partnering guidance and exemplifies a "From the Top Down Approach".

The Partnering Steering Committee should report back to the Senior Sponsors. Examples of committee activities are as follows:

1. Recognition of individual and project excellence in supporting partnering goals.

2. Promote joint Stone & Webster/TVA activities both on and off the job.

3. Involve other contractors in partnering activities.

4. Encourage technology exchanges.

5. Encourage integration of organizations.

6. Sponsor the development of joint technical papers.

7. Foster the exchange of information for project or company newspapers.

8. Find ways to show visual signs of partnering that depict equality.

9. Coordinate the exchange of partnering information throughout the region.

10. Provide open feedback from the working level on the progress of partnering.

11. Collect, evaluate and make recommendations on Partnering Performance Activities.

Attachment "F" shows a list of Senior Sponsors and Sponsors for each project.

SCHEDULE FOR PARTNERING ACTIVITIES

Attached are schedules for planned partnering activities (attachments G-1 & G-2) for the remainder of 1992 and a schedule for planned partnering activities during 1993.

These schedules are patterned after Mr. Kingsley's "Next Steps" agenda. They call for regular joint sessions to evaluate progress, regular project partnering meetings and regular executive sponsor meetings to keep Mr. Kingsley appraised of our progress. They also call for the establishment of Project Partnering Sponsors to act as conduit for sharing information and coordinating activities.

As the Executive Summary indicates, a part of our plan is to refine or enhance the plan as we progress allowing time for lessons learned to take effect. Although the schedules only show activities through 1993, they are the start of a multi year plan to establish Stone & Webster as a working Partner of TVA "Our Most Important Client" for a long time.

NEXT STEPS

The last attachment (attachment H) to our plan is a hand out from Mr. Kingsley's October 14, 1992 Key Contractors meeting titled "Next Steps". This attachment outlines follow-up activities for all contractors involved in partnerships with TVA. Our Partnering Management Plan addresses all long term aspects of Mr. Kingsley's "Next Steps".

ATTACHMENTS

PARTNERSHIP SAVINGS

LEVEL OF REPORTING	*NAME OF ORIGINATOR* _____
☐ *Corporate*	*DATE* _____
☐ *Project*	*LOCATION* _____
☐ *Individual*	*PHONE NO.* _____
☐ *Other (ie., Department, Group)*	

Describe partnering activities resulting in cost savings or cost reductions, attach additional information as required.

Estimate of cost savings, showing calculation or basis for saving. This may be one time saving or update of ongoing cost saving activities.

Return to your partnering sponsor.	*Estimated Savings =$*

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PARTNERING EXPECTATIONS

I. Personal Involvement
- top management always aware of status of the relationship
- project status tracking reports
- key indicators on progress, quality, improvements
- routine contact with TVA counterparts
- buy-in to TVA goals and plans
- commitment to TVA success

II. Continuous Critique
- open, mutual feedback and critique
- regularly scheduled sessions
- continuous critique at all levels

III. Sharing Resources and Innovations
- devote your best people to our work
- identify and share industry best practices
- develop and share innovations and new technology

IV. Help in Culture Change
- help TVA get away from old ways of doing business
- model new approaches and attitudes
- help coach and develop TVA workforce

V. Process Improvement
- close involvement with TVA in:
  - problem identification
  - problem solving/process redesign
  - replication

VI. Communication and Teamwork
- reinforce partnership theme at all levels
- schedule routine site and project meetings
- ongoing teambuilding
- consistent message and direction

VII. Share Risks and Rewards
- key ingredient of partnership
- mutually profitable and cost effective
- contract incentives to perform
- long-term relationships

VIII. Community Partnerships
- good local citizen
- support schools
- local purchasing
- minority/women subcontracting
- local hiring

IX. Labor Relations
- take the lead in day-to-day labor relations
- recognize impacts on TVA workforce
- support intent of project agreements

TVA PARTNERING ACTION PLAN WORK SHEET

Expectation No. 1: Personal Involvement

- top management always aware of status of the relationship
- project status tracking reports
- key indicators on progress, quality, improvements
- routine contact with TVA counterparts
- buy-in to TVA goals and plans
- commitment to TVA success

Actions, Accomplishments and Future Plans

TVA PARTNERING ACTION PLAN WORK SHEET

Expectation No. 2: Continuous Critique

- open, mutual feedback and critique
- regularly scheduled sessions
- continuous critique at all levels

Actions, Accomplishments and Future Plans

TVA PARTNERING ACTION PLAN WORK SHEET

Expectation No. 3: Sharing Resources and Innovations

- devote your best people to our work
- identify and share industry best practices
- develop and share innovations and new technology

Actions, Accomplishments and Future Plans

TVA PARTNERING ACTION PLAN WORK SHEET

Expectation No. 4: Help in Culture Change

- help TVA get away from old ways of doing business
- model new approaches and attitudes
- help coach and develop TVA workforce

Actions, Accomplishments and Future Plans

TVA PARTNERING ACTION PLAN WORK SHEET

Expectation No. 5: Process Improvement

- close involvement with TVA in:
  - problem identification
  - problem solving/process redesign
  - replication

Actions, Accomplishments and Future Plans

TVA PARTNERING ACTION PLAN WORK SHEET

Expectation No. 6: Communication and Teamwork

- reinforce partnership theme at all levels
- schedule routine site and project meetings
- ongoing teambuilding
- consistent message and direction

Actions, Accomplishments and Future Plans

TVA PARTNERING ACTION PLAN WORK SHEET

Expectation No. 7: Share Risks and Rewards

- key ingredient of partnership
- mutually profitable and cost effective
- contract incentives to perform
- long-term relationships

Actions, Accomplishments and Future Plans

TVA PARTNERING ACTION PLAN WORK SHEET

Expectation No. 8: Community Partnerships

- good local citizen
- support schools
- local purchasing
- minority/women subcontracting

Actions, Accomplishments and Future Plans

TVA PARTNERING ACTION PLAN WORK SHEET

Expectation No. 9: Labor Relations

- take the lead in day-to-day labor relations
- recognize impacts on TVA workforce
- support intent of project agreements

Actions, Accomplishments and Future Plans

PARTNERING PERFORMANCE EVALUATION

Grade yourself, your project, or other area of responsibility against TVAs Partnering Expectations

Performance Points:

- *0 = Not productive, poor effort to meet partnering expectations*
- *1 = Minimal effort to meet partnering expectations*
- *2 = Marginal effort to meet partnering expectations, proactive sometimes*
- *3 = Reasonable effort to meet partnering expectation, usually proactive*
- *4 = Good effort to meet partnering expectation, proactive where possible*
- *5 = Very Good to excellent effort to meet partnering expectation, very proactive*

	TVA PARTNERING EXPECTATIONS	PERFORMANCE POINTS
I.	**Personal Involvement** - top management always aware of status of the relationship; project status tracking reports; key indicators on progress, quality, improvements; routine contact with TVA counterparts; buy-in to TVA goals and plans; and commitment to TVA success	
II.	**Continuous Critique** - open, mutual feedback and critique; regularly scheduled sessions; continuous critique at all levels	
III.	**Sharing Resources and Innovations** - devote your best people to our work; identify and share industry best practices; develop and share innovations and new technology	
[illegible]	**Help in Culture Change** - help TVA get away from old ways of doing business; model new approaches and attitudes; help coach and develop TVA workforce	
V.	**Process Improvement** - close involvement with TVA in problem identification, problem solving/process redesign, replication	
VI.	**Communication and Teamwork** - reinforce partnership theme at all-levels; schedule routine site and project meetings; ongoing teambuilding; consistent message and direction	
VII.	**Share Risks and Rewards** - key ingredients of partnership; mutually profitable and cost effective; contract incentives to perform; long-term relationships	
VIII.	**Community Partnership** - good local citizen; support schools; local purchasing; minority/women subcontractors; local hiring	
IX.	**Labor Relations** - take the lead in day-to-day labor relations; recognize impacts on TVA workforce; support intent of project agreements	

THIS IS AN EVALUATION OF	SOURCE OF EVALUATION	
☐ My Partnering Efforts	_____ Individual	_____ Total Points
☐ Project Partnering Efforts	_____ Project	
☐ Other Partnering Efforts	_____ Other	_____ Average in each category
_____ _____ Indicate	_____ Date	

EVALUATING THE BASICS OF PARTNERING

This form can be used for self evaluation, joint evaluation or partners evaluating partners.

Evaluation Points:

- *0 = Poor effort, not supporting Partnering*
- *1 = Minimal effort, intentions are not clear, or paying Lip Service to Partnering*
- *2 = Marginal effort, some interest, scattered support*
- *3 = Reasonable effort, fairly good support and participation*
- *4 = Good effort and support, clearly demonstrates interest*
- *5 = Very Good to Excellent effort, consistantly demonstrates commitment to Partnering*

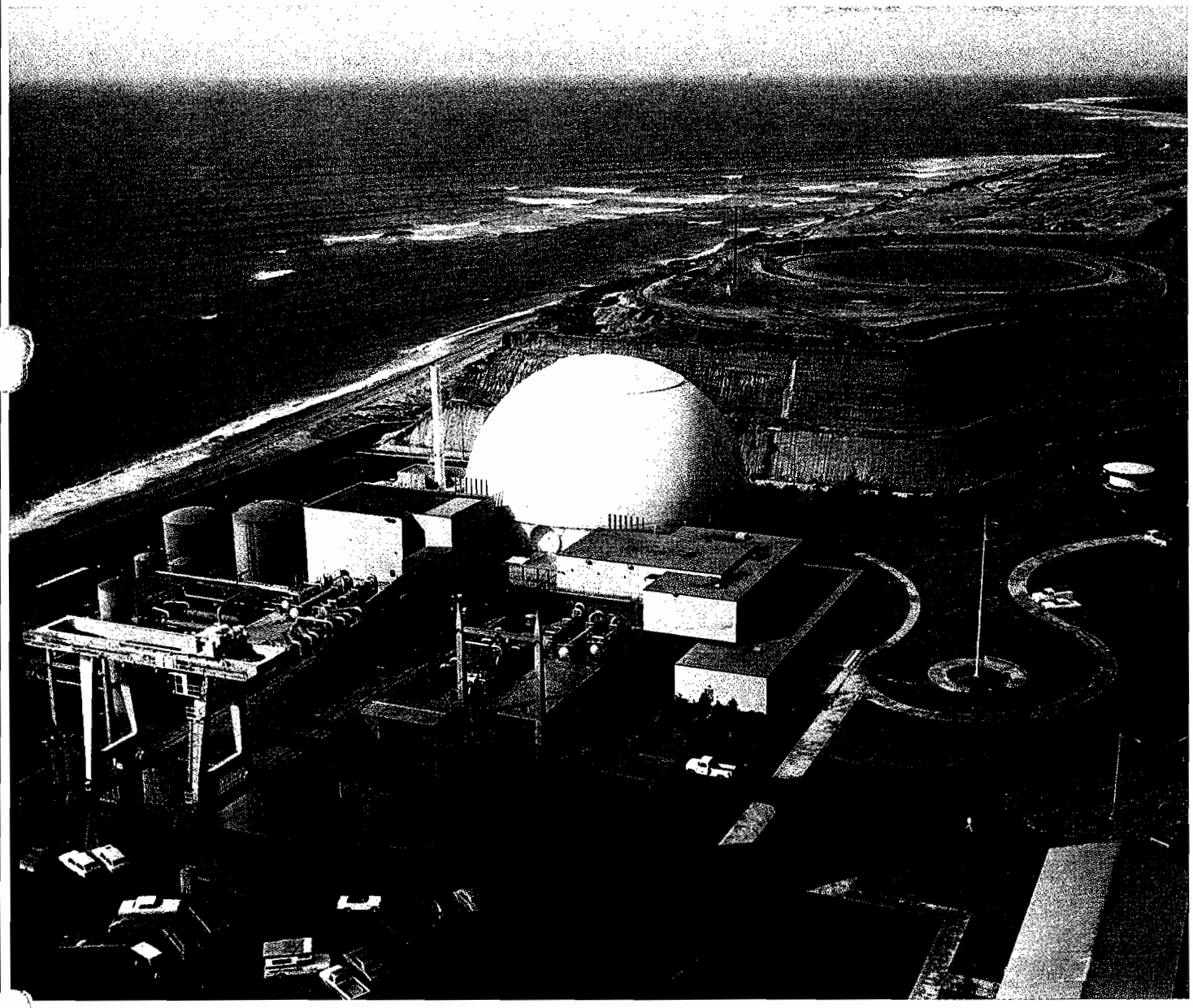
		Points
A.	**Support from the Top,** top management supports Partnering	
A1.	**And the support trickles down**	
B.	**Openness,** openly and honestly discusses problems, shares company information	
C.	**Proactive Partnering,** takes the initiative, goes half way	
D.	**Good Performance,** provides the kind of support or product you need from a partner	
E.	**Long Term Commitment,** displays interest in a long term partnership	
F.	**Trust,** exudes trust, does not let company ties get in the way	
G.	**Realistic About Individual Partnering Expectations,** accepts the fact that not every individual effort will meet expectations	
H.	**Sharing Of Risks & Rewards,** practices win/win in the work place and contract management, gives Partner credit where due	

THIS IS AN EVALUATION OF	SOURCE OF EVALUATION	
☐ My Partnering Efforts	_____ Individual	
☐ Project Partnering Efforts	_____ Project	Total Points
☐ Other Partnering Efforts	_____ Other	
_____	_____ Date	
_____ Indicate		Average in each category

K. Auppark
High Bridge Associates

The Nuclear Power Construction Stabilization Agreement

A Contribution to the National Energy Program



Building and Construction Trades Department, AFL-CIO and Construction Employers

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Nuclear Power Construction Stabilization Agreement

Preamble

The parties to this Nuclear Power Construction Stabilization Agreement recognize that the construction of nuclear power plants is a specialized, unique branch of construction, requiring a long period of construction, large scale capital outlays, exacting construction and performance standards including protection of the health and safety of the public and employees, and the need for high labor skills for many operations and complex managerial organizations. The careful planning and scheduling of work operations can make a major contribution in these circumstances to cost reduction and more rapid job completion.

The parties further recognize the decisive national importance of nuclear power in assuring adequate supplies of energy for economic growth, the creation of job opportunities and for a greater degree of energy independence in the national interest. The parties believe that this Agreement constitutes a vital contribution to the achievement of the objectives of a national energy policy.

The parties have consulted with representative utilities, both privately and publicly owned, as to problems previously encountered in the construction of nuclear power plants and as to means to improve construction efficiency and to reduce costs while assuring that the health, welfare and safety of the public and of on-site personnel is fully maintained. The parties to this Agreement recognize the continuing interest of the privately and publicly owned utilities, and the customers they serve, in efficient, speedy and safe construction, and they propose to secure the continuing views of such owners on these matters on projects at the planning stage and in process. The parties are of the view that this Agreement provides the means to substantial cost reduction and more efficient operations.

The elimination of construction delays attributed to labor-management issues, and the opportunity for more effective planning of work operations by contractors, provides greater inducement to standardize the governmental regulatory processes, to reduce unnecessary delay, and further to contribute significantly to safe, efficient and shorter construction schedules, thereby further reducing costs.

This Nuclear Power Construction Stabilization Agreement is uniquely a full and complete national agreement that does not depend on other collective bargaining agreements in the construction industry, whether local, regional or national in scope.

The parties agree to abide by the terms and conditions of employment set forth in this Agreement and to resolve any question or any dispute in accordance with the procedures specified in this Agreement without strike or lockout or other interruption of work operations.

Additional contractors or associations of contractors may become parties to this Agreement for all construction work encompassed by this Agreement that they perform at nuclear power sites.

ARTICLE I

Scope Of Agreement

Section 1. This Agreement, dated April 1, 1978, by and between the Construction Employers signatory hereto (hereinafter referred to as the "Employers") and the Building and Construction Trades Department (AFL-CIO) and the International Unions signatory hereto and the International Brotherhood of Teamsters (hereinafter referred to as "Unions").

Section 2. Except as hereinafter provided, this Agreement shall be applicable to all construction work performed on nuclear power plant sites in the United States by the signatory Employers. Those projects covered by this Agreement will remain under its terms and conditions until project completion. This Agreement, along with any related Memoranda of Understanding which may be entered into between the parties to this Agreement, or others who may hereafter become parties to this Agreement, represents the complete understanding of the parties and none of the provisions contained in any local, regional or national collective bargaining agreements shall be controlling on projects covered by its terms.

Section 3. A construction project involving a new nuclear power plant may be placed under the Agreement and within the province of the Committee by request of the owner or authorized contractor or contractors and the concurrence of the Committee. It is the intention of the parties to the Agreement to include all such projects which the owners or authorized contractors state they wish to have built under the Nuclear Power Construction Stabilization Agreement.

Section 4. The Committee, established in Article II, when requested may review nuclear power plants under construction, to determine which particular projects it is practical and legally feasible to place under

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the terms of this National Nuclear Power Construction Stabilization Agreement rather than to continue under various other agreements. Any decision is to be made on a project-by-project basis.

Section 5. This Agreement is designed particularly for the specialized character of nuclear power plant construction and its provisions are not to be applied, and shall not constitute a precedent, for other types of construction projects.

Section 6. At the earliest possible date in advance of the start of construction work on nuclear power construction, the Committee, established in Article II, shall review the scope of work operations to be included under the operations of this Agreement on the particular project.

Section 7. Prefabricated and/or pre-assembled materials, equipment, machinery, etc., purchased by or at the direction of the Owner, shall not be subject to any restrictive provisions whatsoever.

ARTICLE II

Joint Labor-Management Administrative Committee

Section 1. A Joint Labor-Management Administrative Committee (hereinafter referred to as the "Committee") shall be established immediately following the date of this Agreement. The Committee shall exercise oversight over all projects placed under this Agreement; it is empowered to resolve any dispute over the meaning and application of this Agreement. The Committee will schedule regular and periodic meetings.

At the earliest possible date in advance of the start of a nuclear power project, the Committee shall consider and determine, with the contractor or contractors and the international unions responsible for the work operations, a range of issues essential for orderly and efficient work operations, including such matters as:

—source of labor supply for each craft

—health and welfare and pension funds to which payments are to be made under this Agreement

—the representatives on the project of each international union and the representative of the Building and Construction Trades Department

—the training and apprenticeship arrangements, including funding, applicable to the project

—the jurisdictional agreements and mark-up of drawings and work tasks applicable to the project

—the scope of work operations under the Agreement

—the initial wage and benefit schedules and the grouping of wages, benefits and agreements to be considered in the periodic reviews

—any reporting time and method of administration

—any travel and subsistence arrangements

—any other questions that may subsequently arise not inconsistent with the terms of this Agreement.

Section 2. The Committee shall consist of an equal number of Employer and Union representatives, not to exceed 8 persons on each side. The Union members will represent the interest of the signatory unions and the Employer members will represent the interests of the signatory employers. Employer representatives shall be appointed by the Employers signatory to the Agreement, and Union representatives shall be appointed by the Building and Construction Trades Department.

The parties to this Agreement shall set forth, in separate by-laws, the method of operation of the Committee including a cost allocation procedure covering the Committee expenses. Decisions of the Committee shall not be inconsistent with the terms of this Agreement.

ARTICLE III

Agreement Umpire

Section 1. One individual shall be chosen by the Committee immediately on its designation to function as the Agreement Umpire. This individual shall be thoroughly cognizant of industrial and building and construction trades work particularly on nuclear power plants.

Section 2. The Agreement Umpire shall serve on the Committee and shall preside over its meetings. The Agreement Umpire shall have no authority to cast a vote on issues presented to the Committee unless explicitly authorized by the Committee to decide a specific issue, and shall otherwise function solely as mediator and chairman.

Section 3. The Agreement Umpire shall serve for a three (3) year term beginning with the date initially

selected. The Committee shall have the authority to remove the Agreement Umpire at any time and to replace the Agreement Umpire.

ARTICLE IV

Agreement Arbitration Panel

Section 1. An Arbitration Panel shall be convened for final and binding resolution of issues which arise through the Grievance Procedure (Article XIV) and which the Committee decides in the specific case to refer to arbitration. The Committee may also refer to arbitration issues which are initially considered by the Committee. The Panel shall consist of one (1) person chosen by the Employer representatives on the Committee and one (1) person chosen by the Union representatives on the Committee. The two (2) persons chosen shall mutually select an impartial third party to complete the Arbitration Panel in the particular case or issue.

Section 2. The Arbitration Panel shall have the authority to make final and binding decisions on issues referred to it by the Committee arising through the Grievance Procedure or directly with the Committee. The Panel shall have no authority to change, amend, add to or detract from any of the provisions of this Agreement. Expenses of the person chosen by the Employer shall be borne by the Employer; expenses of the person chosen by the Union shall be borne by the Union; and expenses of the impartial third party shall be borne equally by the Employer and the Union.

Section 3. After a dispute has been reduced to writing and submitted to the Panel by the Committee, the Employer and the Union shall have ten (10) working days to submit their positions on the issue in writing to the Panel. The decision of the Panel shall be in writing and shall be final and binding on both parties.

ARTICLE V

Management Rights and Union Security

Section 1. The Employer retains full and exclusive authority for the management of its projects and shall retain all existing rights of management and all rights conferred on it by law.

The management and supervision of the projects, including, but not limited to the hiring, promoting, laying off, suspending, disciplining or discharging for cause, the direction of the work force, work schedules and practices, are vested solely in the employer except as specifically and expressly limited by this Agreement. The employer has the right to establish and enforce reasonable work rules for the job and to refuse to rehire anyone terminated for cause.

Section 2. All employees working under the terms of this Agreement, as a condition of their continued employment, may be required by the appropriate signatory union, commencing on the eighth day following the beginning of their employment to acquire and maintain membership in such signatory union. This must be done in accordance with the provisions of the National Labor Relations Act, as amended, and this Section shall be effective only in those states permitting union security.

ARTICLE VI

Union Recognition and Representation

Section 1. The Employer recognizes the Building and Construction Trades Department and the signatory international unions as the sole and exclusive collective bargaining representatives for its craft employees employed on nuclear power plant jobsites which are covered by this Agreement.

This Agreement shall not apply to any craft employees above the classification of general foreman or to other job classifications on the jobsites unless recognition is demonstrated.

Section 2. Each international union may assign a representative to the project to serve as its jobsite representative or it may designate a working employee as its jobsite representative. The Building and Construction Trades Department may assign a representative to each project.

ARTICLE VII

No Strikes-No Lockouts

Section 1. The Union and its members, agents, representatives and employees shall not incite, encourage, condone or participate in any strike, walkout,

slowdown, picketing, sympathy strike or other work stoppage of any nature whatsoever for any cause whatsoever, during the life of this Agreement, and it is expressly agreed that any such action is a violation of this Agreement. The Union and its officers shall take immediate action to prevent, end or avert any strike, walkout, slowdown, or work stoppage or threat thereof, and the Committee shall review such action to determine whether every reasonable effort has been made consistent with this Agreement.

Section 2. The Employer shall not cause, incite, encourage or participate in any lockout of its employees during the term of this Agreement. The term "lockout" does not refer to the discharge, termination or layoff of employees by the Employer for any reason in the exercise of its rights as set forth in any provision of this Agreement, nor does "lockout" include the Owner's decision to terminate or suspend work on a project or any portion thereof for any reason.

Section 3. In the event of a violation of the terms of this Article by either Employer or Union, the parties specifically agree that either party reserves the right to pursue remedies available under the law. In the event of a jurisdictional dispute the parties shall be bound to accept the jurisdictional decision of the Committee.

Section 4. Any employee or employees inciting, encouraging or participating in any strike, slowdown, picketing, sympathy strike, or other activity in violation of this Article is subject to immediate discharge.

ARTICLE VIII

Hours of Work, Shifts and Overtime

Section 1. HOURS OF WORK—The normal work day for all employees shall be eight (8) consecutive hours of work, exclusive of a one-half (½) hour non-paid lunch period.

The work day for each employee shall be defined as the twenty-four (24 hour period which begins with the regular starting time of the employee's shift and ends with the regular starting time of the employee's shift the following day. The work week for each employee shall be defined and computed as the seven (7) consecutive days beginning with the start of the employee's shift on Monday.

Section 2. SHIFTS—The Employer shall have the right to establish shift work arrangements for all or any portion of the project in accordance with this Section. The first shift shall consist of eight (8) hours of continuous work between the hours of 6:00 a.m. and 5:00 p.m. for eight (8) hours of pay at the basic straight time hourly wage rate, exclusive of a one-half (½) hour non-paid lunch period. If two work shifts are established, the second shift shall consist of eight (8) hours of continuous work for eight (8) hours of pay at the basic straight time hourly wage rate, plus twelve percent (12%) of the basic rate, exclusive of a one-half (½) hour non-paid lunch period. If three shifts are established, the third shift shall be paid at the basic straight time hourly wage rate, plus twenty-five percent (25%) of the basic rate, exclusive of a one-half (½) hour non-paid lunch period for the hours of work to be designated for the shift on the project.

Time actually worked in excess of eight (8) hours of the first and second shift and in excess of six and one-half (6½) hours on the third shift shall be paid for at the rate of time and one-half (1½) the basic straight time hourly wage rate for the first two (2) hours of overtime after which the overtime rate will be double time.

Second and/or third shifts of a multiple shift arrangement shall be established for a minimum of five (5) continuous working days.

The Employer shall have the right to establish a first and/or a second shift consisting of ten (10) hours of work, exclusive of a one-half (½) hour non-paid lunch period per day. The first eight (8) hours of work on these shifts shall be paid for at the basic straight time hourly wage rate. On the second shift an additional twelve percent (12%) of the basic straight time hourly wage rate shall be paid for the first eight hours of work. The last two (2) hours of work on either shift, up to ten hours of work, shall be paid for at the rate of time and one-half (1½) the basic straight time hourly wage rate. After 10 hours of work the rate shall be two times the basic straight time hourly wage rate.

On shift work that extends into overtime, the shift premium and the overtime premium shall not both be paid; only the overtime rate shall be paid. Fringe benefit payments shall be paid only on the basis of hours worked, not hours paid for, except where this is in violation of the applicable trust agreement, in which case the trust agreement will prevail.

Section 3. SATURDAYS—Work performed on Saturday shall be paid at the rate of one and one-half (1½) times the basic straight time hourly wage rate.

Section 4. SUNDAYS AND HOLIDAYS—Work performed on Sundays or on holidays as designated in Article XII, Section 6, shall be paid at the rate of double the straight time hourly wage rate.

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Section 5. An Employer may request the Committee to approve a work schedule on particular operations for a specified duration of seven consecutive days a week comprised of alternating ten (10) hour shifts. The Committee in reaching its decision shall take into account the need for an accelerated schedule, the job scheduling, the availability of requisite manpower, the region of the country and other factors, and shall determine compensation arrangements.

ARTICLE IX

Referral and Hiring

Section 1. The Union shall be the primary source of all craft employees.

In the event the Union is unable to fill the requirements for specific classifications requested by the Employer within forty-eight (48) hours (Saturdays, Sundays and holidays excepted), the Employer may hire from any source. The Employer shall be the sole judge of the number of employees required to perform the work covered by this Agreement, and the Employer reserves the right to reject any applicants referred by the Union.

Section 2. The Employer and the Union will comply with applicable federal and state laws governing discrimination in employment.

Section 3. Recognizing that the ratio of journeymen to non-journeymen will vary among crafts and different stages of the job, the Employer shall request journeymen and apprentices or trainees, helpers or probationary employees, whichever is the appropriate designation for the craft involved, through the International Union Representatives assigned to the project. Further, the Employer and the Union recognize the need for continuing support of apprenticeship and training programs to supply an adequate level of competent manpower.

Section 4. The Employers shall develop, in cooperation with the Unions, an appropriate program as an introduction to each new employee on a project, and to each supervisor, stressing the importance of the nuclear power project in the national interest, the desire of the parties to this Agreement to provide efficient and cost-effective operations, and specifying the procedures established by this Agreement to resolve any question or dispute.

ARTICLE X

Assignments of Work

Section 1. The Employer shall have the sole responsibility for making work assignments in accordance with the Procedural Rules of the Plan for the Settlement of Jurisdictional Disputes and the Union shall have the responsibility of insuring that their members comply with such assignments.

Section 2. Jurisdictional mark-up meetings of the Committee will constitute the basis for jurisdictional assignments. The Committee shall; 1) conduct mark-up meetings for the different operations on nuclear power plant construction and assemble all written understandings on prior agreements covering nuclear construction; 2) resolve any recurring jurisdictional problems on nuclear construction; and 3) issue consolidated mark-ups and statements of agreed-upon work assignments to all parties concerned.

Section 3. Disputes arising out of work assignments which cannot be resolved at the project level between the Employer and the International Union Representative assigned to the project within five (5) working days after the dispute arises, shall be submitted to the Committee for resolution.

Section 4. The Committee's decision under Section 3 can be processed through an appeals procedure to be developed by the Committee.

Section 5. In the event of a repetitive or significant dispute on nuclear power construction, the Committee and/or a craft may request the Joint Administrative Committee of the Plan for the Settlement of Jurisdictional Disputes Locally and Nationally to refer an issue to a Hearings Panel for a national decision to apply to work on nuclear power plant projects.

ARTICLE XI

Subcontracting

Section 1. The terms and conditions of this Agreement, including its procedural provisions, shall only apply to any contractor or subcontractors performing construction work on a nuclear power construction site to which this Agreement applies; it shall not apply to

any contractor or subcontractors performing work on any other project.

Section 2. The furnishing of materials, supplies or equipment, and the delivery thereof, shall in no case be considered as subcontracting.

ARTICLE XII

Wages and Fringe Benefits

Section 1. The Committee shall establish the basic hourly wage rates for the craft employees under this Agreement to cover the following classifications: general foreman, foreman, journeyman, apprentice, and such classifications as trainee, helpers or probationary employees as appropriate to the craft.

Section 2. In establishing a wage rate and benefit schedule for all crafts and classifications and in the periodic revisions of such schedules, the Committee shall consult with the affected international unions and also consult with the national contractor associations which have collective bargaining agreements in the area of the project as to the appropriate wages and benefits. After such consultation the Committee shall initially establish a wage rate and benefit schedule for all crafts and classifications at the outset of the project based upon the wages and benefits in collective bargaining agreements established in the locality and area. The Committee may take into account the expected expiration of agreements in the locality and area. These initially determined wages and benefits shall run until the end of the calendar year in which wages and benefits are initially established when they will all be reviewed for a specified period, one to three years, into the future.

In establishing a wage rate and fringe benefit schedule the Committee shall take whatever action is appropriate to prevent any spiraling effect on local or regional negotiations. The Committee shall also assure that negotiated wages, benefits and travel and subsistence allowances that discriminate against nuclear power construction are not used in determining the wage rates and benefit schedule for this Agreement.

Section 3. The Committee shall also determine at the outset of a project a wage area, such as a state or region, to be used as a reference base to determine increases in wage rates and benefits on a project. Sixty (60) days before the end of a calendar year in which the wages and benefits on a project are to be reviewed, the Committee through the Unions and Employers shall assemble data on all wages and benefits in collective bargaining agreements applicable to industrial-type construction work in the designated wage area for the project and such other relevant data as living costs, labor supply and performance. On the basis of these data, the Committee may determine a wage and benefit schedule for a project for a period, one to three years ahead, to begin at the outset of the next calendar year. Notwithstanding the aforementioned, wage rates and benefits in local collective bargaining agreements may be established for the project.

It is agreed that with regard to the establishment of wage rates and benefits for all crafts on a specific project covered by the National Nuclear Agreement that where all crafts have wage rates and benefits established into the future by one or more years and those wage rates and benefits reflect the traditional relationships among the crafts that the Committee will put into effect the wage rates and benefits as established. It is further understood that if any craft exceeds unreasonably the traditional relationship with other crafts, the wage rate and benefits would be adjusted to its proper level with respect to all other crafts.

Section 4. There shall be no strike, walkout, slowdown, picketing, sympathy strike, or no lockout or shut-down of any nature whatsoever, during the life of this Agreement, over wage and benefit disputes on projects covered by this Agreement.

Section 5. On each nuclear power project the Employer will maintain a forward schedule of manpower requirements by craft. In the event of a regional or local economic work stoppage in the area where the Employer is working under the terms of this Nuclear Power Construction Stabilization Agreement, it is specifically agreed that the Employer will not for the duration of the strike, hire or layoff craft employees in the craft or crafts engaged in the local or area stoppage in excess of the planned schedule of manpower requirements.

Section 6. New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, the Friday following Thanksgiving and Christmas Day shall be recognized holidays. Work shall not be performed on any of these days except in cases of emergency involving life and/or property. In the event a holiday falls on Sunday, the following Monday shall be observed as said holiday.

Section 7. The Committee shall periodically review individual projects at the time of a wage and benefit review when the project is located in remote areas to determine whether or not a living expense allowance

and/or travel allowance is warranted. When such allowances are in effect the Committee shall periodically, at the time of a wage and benefit review, consider the changing availability of labor supply and living accommodations to determine whether or not such allowances should be modified.

ARTICLE XIII

Pre-Job Conferences

Six months before the start of construction on a project covered by this Agreement, or at the earliest possible date, the Employer and the Union will meet to review the conditions applicable to the project. This pre-job requirement applies to each Employer and its sub-contractors before the start of their operation.

ARTICLE XIV

Grievance Procedure

There shall be no strike, walkout, slowdown, picketing, or honoring any picket line, sympathy strike or other work stoppage by Unions and no lockout or shutdown by Employers during the duration of a project under this Agreement. It is specifically agreed that in the event any dispute arises out of the interpretation of this Agreement, it shall be settled by means of the grievance procedure contained herein. No grievance shall be recognized unless called to the attention of the Employer by the Union, or to the attention of the Union by the Employer within five (5) working days after the occurrence of the events giving rise to the grievance.

Step 1. The International Union Representative assigned to the project and the Employer's Representative shall attempt to resolve the grievance at the project level.

Step 2. If agreement is not reached at Step 1 within five (5) working days, the grievance shall be referred in writing to the General President of the International Union, or his designee, and the Employer's Labor Relations' Manager, or his designee, for resolution which may include resorting to an established national joint machinery.

Step 3. If ageement is not reached in Step 2 within ten (10) working days, the grievance shall be referred to the Committee. Each party is responsible for submitting its position, including supporting data, in writing to the Committee.

Step 4. If the grievance is not resolved within a reasonable time, the Committee shall submit the matter to the Panel as established in Article IV.

ARTICLE XV

Savings Clause

If any article, clause or provision of this Agreement shall be declared invalid, inoperative or unenforceable by any competent authority of the executive, legislative, judicial or administrative branch of any federal or state government, the Employer and the Union shall immediately suspend the operation of such article, clause or provision. The Committee will then meet for the purpose of drafting a valid article, clause or provision to fulfill the intent of the parties and to replace the invalid article, clause or provision provided, however, that the remainder of this Agreement shall continue in full force and effect.

ARTICLE XVI

Term of Agreement

This Agreement shall become effective on April 1, 1978, and shall continue in full force and effect through December 31, 1979, and year-to-year thereafter, unless notice is given in writing by the Union or the Employer to the other party, not more than ninety (90) days or not less than sixty (60) days prior to December 31 of any year, of its desire to modify, amend or terminate this Agreement. The parties shall begin negotiations within thirty (30) days after receipt of this notice. It is understood that if the Agreement is reopened and an impasse is reached during negotiations, this Agreement will remain in full force and effect for the duration of those projects started or placed under this Agreement. The impasse in negotiations would only affect future projects.

For projects which receive construction permits after March 1, 1978, this agreement will become effective with the approval of the Committee on the date the Owner assigns the first construction contract to be worked under this Agreement. Any question over the administration of this paragraph shall be resolved by the Committee.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the day and year first above written.

H. O. Rennoch
by: Bert V. Hartford
BECHTEL POWER CORPORATION

INTERNATIONAL UNION OF BRICKLAYERS AND ALLIED CRAFTSMEN

INTERNATIONAL BROTHERHOOD OF PAINTERS AND ALLIED TRADES

EBASCO SERVICES, INC.

UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA

OPERATIVE PLASTERERS' AND CEMENT MASONS' INTERNATIONAL ASSOCIATION

STONE & WEBSTER ENGINEERING CORPORATION

UNITED ENGINEERS & CONSTRUCTORS, INC.

INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS

UNITED SLATE, TILE AND COMPOSITION ROOFERS, DAMP AND WATERPROOF WORKERS' ASSOCIATION

INTERNATIONAL UNION OF OPERATING ENGINEERS

SHEET METAL WORKERS' INTERNATIONAL ASSOCIATION

PRESIDENT, BUILDING AND CONSTRUCTION TRADES DEPARTMENT

INTERNATIONAL ASSOCIATION OF BRIDGE, STRUCTURAL AND ORNAMENTAL IRON WORKERS

TILE, TERRAZZO, FINISHERS AND SHOPMEN INTERNATIONAL UNION

AFFILIATED INTERNATIONAL UNIONS:

UNITED ASSOCIATION OF JOURNEYMEN AND APPRENTICES OF THE PLUMBING AND PIPE FITTING INDUSTRY OF THE UNITED STATES AND CANADA

INTERNATIONAL ASSOCIATION OF HEAT AND FROST INSULATORS AND ASBESTOS WORKERS

LABORERS' INTERNATIONAL UNION OF NORTH AMERICA

INTERNATIONAL BROTHERHOOD OF TEAMSTERS, CHAUFFEURS, WAREHOUSEMEN AND HELPERS

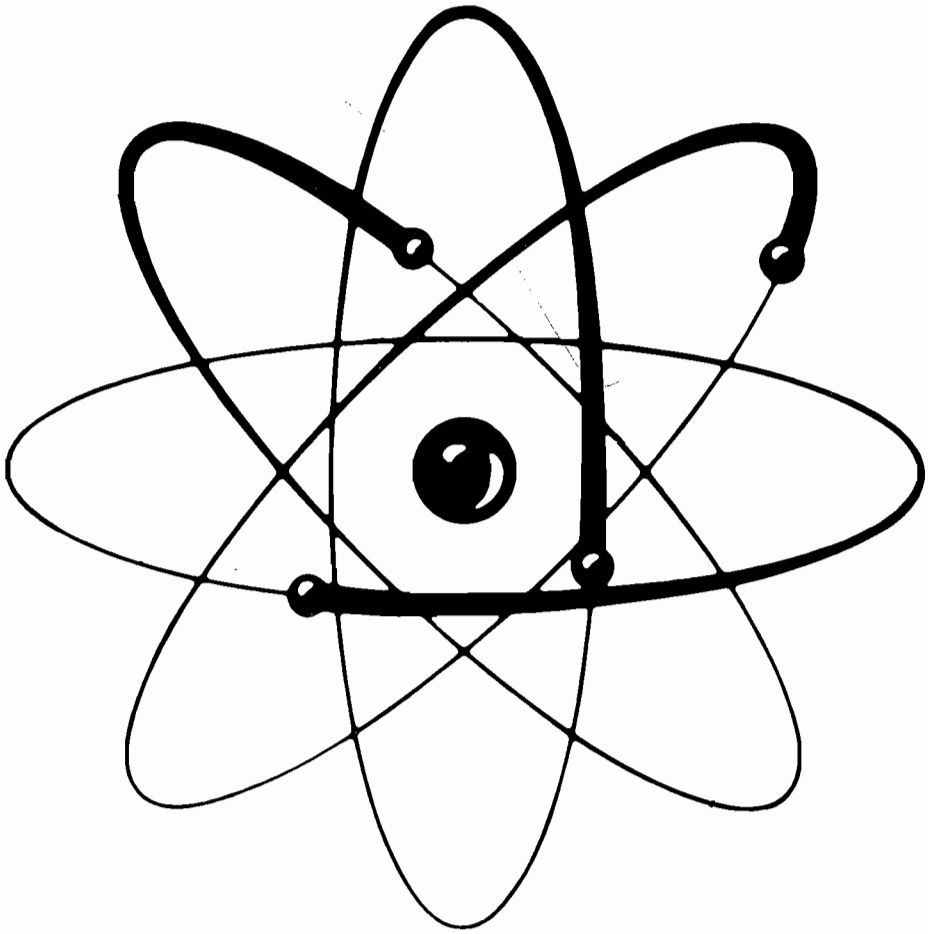
INTERNATIONAL BROTHERHOOD OF BOILERMAKERS, IRON SHIPBUILDERS, BLACKSMITHS, FORGERS AND HELPERS

WOOD, WIRE AND METAL LATHERS INTERNATIONAL UNION

10/11

Quality Construction • Stabilized Energy Costs

A Way of Slowing Inflation



Reduced Construction Cost

Source of Energy, Free from Foreign Oil Dependency

11/11

DoD Guide to

Integrated Product and Process Development

(Version 1.0)

February 5, 1996

OFFICE OF THE UNDER SECRETARY OF DEFENSE
(ACQUISITION AND TECHNOLOGY)
WASHINGTON, DC 20301-3000

FOREWORD

Reform of the acquisition process is now a driving force in the Department of Defense. A number of specific acquisition reform initiatives have been conceived, some borrowed from industry, and briefed at the highest levels of Government. Many have been mandated by the Secretary of Defense, Dr. William Perry, implemented by the Under Secretary of Defense for Acquisition and Technology, Dr. Paul Kaminski, the Services, and some have been enacted by Congress. One such initiative borrowed from industry that will fundamentally change the way the Department does business is Integrated Product and Process Development (IPPD).

IPPD is a widely defined management technique normally implemented by Integrated Product Teams (IPTs). IPPD is currently in growing use in many commercial and government organizations. This guide has been written to serve as a primer for the Defense Acquisition Workforce to foster, facilitate and understand the use of IPPD. It's focus is how industry implements IPPD and how this impacts the DoD's role in the acquisition process and the program office interfaces with their industrial counterparts. It is a non-directive "living document" that contains industry and government best practices acquired from a survey regarding IPPD implementation.

This guide is being developed in concert with the revised versions of DoD Directive 5000.1 and DoD Instruction 5000.2 and with "The Rules of the Road — A Guide for Leading Successful Integrated Product Teams." Through periodic updates, it will be kept consistent with the acquisition direction given in DoDI 5000.2 and OSD guidance publications, as well as other current approved acquisition practices. This guide will also be included in the forthcoming DoD Acquisition Deskbook.

Follow-on efforts will include a closer look at the use of tools, teams, and processes to be included in future editions and an accompanying IPPD Handbook. This handbook will present IPPD management practices in greater depth citing appropriate lessons learned and case studies.

Suggestions for improving the guide or potential case studies for the handbook are welcomed. Members of the defense acquisition community are encouraged to submit inputs. Comments and recommendations for improvement to the guide can be forwarded to: OUSD(A&T)/DTSE&E; ATTN: Mr. Mark D. Schaeffer, Deputy Director, Systems Engineering; 3110 Defense Pentagon; Washington, DC 20301-3110. Telephone: Commercial: (703) 697-6329 or DSN 225-2300. E-mail: mschaeff@acq.osd.mil.

(Signed)
John A. Burt
Director, TSE&E

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Executive Summary

The ultimate goal of DoD acquisition is to provide the warfighters with world-class equipments and systems at an affordable cost and on a schedule that is responsive to the need. Accordingly, the Secretary of Defense, William J. Perry directed on May 10, 1995, the "immediate implementation" of a management process called Integrated Product and Process Development (IPPD) throughout the acquisition process to the maximum extent practicable. To expand upon the Secretary's memorandum and to outline an application of the IPPD process to the Acquisition System, this guide has been prepared to assist the acquisition work force and the defense industry. It is **non-directive** and serves as only one tool in understanding this time-tested, proven, yet evolving process.

At the core of IPPD implementation are Integrated Product Teams (IPTs) that organize for and accomplish, tasks that acquire goods and services. These multifunctional teams are the foundation of the process. The IPT decision-making processes and the empowerment of the teams may require cultural change in the way decisions are made in the Department. Results of a recent DoD survey show that where an IPPD process has been effectively implemented, the acquisition timeline has been shortened, and life-cycle costs have been reduced, while continuing to meet the warfighter's needs.

This document is designed to provide a general understanding of the Department's perspective on IPPD. It is intended to build upon the IPPD efforts underway within industry and government. DoD Components are encouraged to use this guide in the education of their acquisition work force and to tailor its contents as applicable to their particular acquisition programs.

The contents of this guide are organized into three chapters. Chapter 1 is a discussion of generic IPPD and IPT concepts, characteristics, and benefits normally found in industry. Chapter 2 outlines tools, techniques, and processes used in DoD and includes a list of barriers that organizations have encountered. Chapter 3 addresses the management of IPPD involving both DoD and supporting industry. This guide borrows heavily from many industry and government sources. Additionally, this guide incorporates suggestions from a recent DoD survey of government and industry that sought lessons learned and information on IPPD experiences.

OSD implementation of IPTs and guidance regarding their formation and use is contained in the DoD "Rules of the Road - A Guide for Leading Successful Integrated Product Teams" (November 95)

It is the intent to continuously augment, update, and increase the utility of this guide. As such, suggestions for its improvement are welcome.

Chapter 1 IPPD Concept

Introduction

> **"...I am directing a fundamental change in the way the Department acquires goods and services. The concepts of IPPD and IPTs shall be applied throughout the acquisition process to the maximum extent practicable."**
>
> from SECDEF Memo of 10 May 1995

The Department of Defense (DoD) has worked to find the best methods for reengineering its processes. Several studies have addressed the benefits of using Integrated Product and Process Development (IPPD). IPPD has been successfully used by the private sector and by the Services on selected programs to reduce product cost and to field products sooner.

In "Acquisition Reform: A Mandate for Change," the Secretary of Defense concluded,

> "(DoD) must reduce the cost of the acquisition Process by the elimination of activities that, although being performed by many dedicated and hard-working personnel, are not necessary or cost effective in today's environment."

DoD must shift from an environment of regulation and enforcement to one of incentivized performance. The objective is to be receptive to ideas from the field to obtain buy-in and lasting change.

IPPD has been mandated for the Department of Defense. IPPD is a management technique that simultaneously integrates all essential acquisition activities through the use of multidisciplinary teams to optimize the design, manufacturing, business**,** and supportability processes.

At the core of IPPD implementation are Integrated Product Teams (IPTs) that organize for and accomplish tasks that acquire goods and services. These multifunctional teams are the foundation of the process. The IPT decision-making processes and the empowerment of the teams may require cultural change in the way decisions are made in the Department. The Under Secretary of Defense (Acquisition & Technology) has recently identified critical changes that must take place in DoD in order for successful IPTs to be formed. He indicated that DoD must move away from a pattern of hierarchical decision making to a process where decisions are facilitated across organizational structures by IPTs.

> "It means breaking down institutional barriers. It also means that our senior management staffs are in a <u>receive</u> mode - not just a <u>transmit</u> mode."

This guide is a primer on IPPD. Nothing in this guide should be construed as directive in nature. <u>Any processes described are examples. Those processes actually used should be decided upon at the appropriate time by the implementing organization and tailored for each application.</u>

Background

IPPD has its roots in integrated design and production practices, concurrent engineering, and total quality management. In the early 1980s, U.S. industry used the concept of integrated design as a way to improve global competitiveness.

Industry's implementation of IPPD expanded concurrent engineering concepts to include all disciplines, not just technical, associated with the design, development, manufacture, distribution, support, and management of products and services. Diverse segments of U.S. industry have successfully implemented this concept to become recognized leaders in IPPD practices, most notably in the auto and electronics industry. Many corporations have institutionalized the IPPD process and associated training programs. Several of these corporations were consulted in the development of this guide.

Several government actions led to the Department of Defense (DoD) formally adopting IPPD principles. These include:

The Federal Acquisition Streamlining Act of 1994

Among other things, this legislation simplified acquisition of commercial items and allowed DoD to explore innovative acquisition procedures under DoD's statutory pilot program authority.

Reengineering the Acquisition Oversight and Review Process

The Secretary of Defense chartered this effort to provide a road map of the needed changes in the oversight and review process while maintaining the DoD acquisition system's guiding principles of meeting the warfighter's needs.

Defense Manufacturing Council Review of Office of the Secretary of Defense (OSD)/Service Oversight

The report of this work proposed paradigm changes in OSD/Service oversight by shifting from regulation and enforcement to incentives; from functional isolation to integrated team action; from performance focus to looking at cost as an independent variable; from classic acquisition to a tailored, innovative approach; and from end-item focus to emphasis on the total system to include life-cycle products and processes.

Defense Science Board Report on Engineering in the Manufacturing Process (March 1993)

This task force study recommended a shift from product focus to process focus with primary emphasis on value and solution rather than performance and schedule. As had been stated in previous Defense Science Board studies, superior products result when the manufacturing processes are well understood in the development phase.

These efforts encouraged the Under Secretary of Defense for Acquisition and Technology (USD(A&T)) to issue a memorandum to reengineer the DoD acquisition oversight and review process by directing the use of multidisciplinary teams rather than the traditional functional process. In May 1995, the Secretary of Defense issued a memorandum which broadened the scope of the USD(A&T) memorandum by directing full implementation of IPPD and IPTs in the DoD acquisition process. This guide provides suggestions on the implementation of IPPD in DoD acquisition.

IPPD Concept

DoD defines IPPD as, "A management process that integrates all activities from product concept through production/field support, using a multifunctional team, to simultaneously optimize the product and its manufacturing and sustainment processes to meet cost and performance objectives." IPPD evolved from concurrent engineering, and is sometimes called integrated product development (IPD). It is a systems engineering process integrated with sound business practices and common sense decision making. Organizations may undergo profound changes in culture and processes to successfully implement IPPD.

IPPD activities focus on the customer and meeting the customer's need. In DoD, the customer is the user. Accurately understanding the various levels of users' needs and establishing realistic requirements early in the acquisition cycle is now more important than ever. Trade-off analyses are made among design, performance, production, support, cost, and operational needs to optimize the system (product or service) over its life cycle. In order to afford sufficient numbers of technologically up-to-date systems, cost is a critical component of DoD system optimization. Cost should not simply be an outcome as has often been the case in the past. Thus, cost should become an independent rather than dependent variable in meeting the user's needs.

Although there are common factors in all known successful IPPD implementations, IPPD has no single solution or implementation strategy. Its implementation is product and process dependent. A generic IPPD iterative process is shown in figure 1-1.

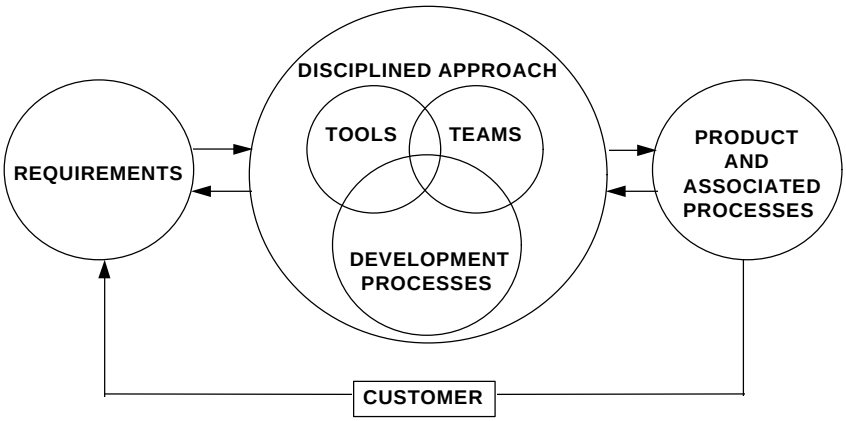

Figure 1-1. A Generic IPPD Iterative Process

Resources applied include people, processes, money, tools, and facilities. The IPPD process reorders decision making, brings downstream and global issues to bear earlier and in concert with conceptual and detailed planning, and relies on applying functional expertise in a team-oriented manner on a global-optimization basis. It is necessary to understand early the processes needed to develop, produce, operate and support the product. Equally important are these processes' impacts on product design and development. Basic elements of the iterative process are:

Requirements, a first step in the iterative process above, are generated by the customer in a negotiation among many parties, each with serious and

important concerns. Knowing and understanding the customers (command structure, doctrine, tactics, operating environment, etc.) and their needs is essential. Integrating the user's requirements, logistical requirements, and the acquirer's budgetary and scheduling constraints is a fundamental challenge in DoD acquisition.

Disciplined approach includes five general activities: understanding the requirements, outlining the approach, planning the effort, allocating resources, and executing and tracking the plan. Decisions made using this approach should be re-evaluated as a system matures and circumstances (budgetary, threat, technology) change. A disciplined approach provides a framework for utilizing tools, teams, and processes in a structured manner that is responsive to systematic improvement efforts.

Tools in this IPPD process include documents, information systems, methods, and technologies that can be fit into a generic shared framework that focuses on planning, executing and tracking. Tools help define the product(s) being developed, delivered or acted upon, and relate the elements of work to be accomplished to each other and to the end product. Examples of tools used include integrated master plans, 3-D design tools and their associated databases, cost models linked to process simulations/activity-based costing, development process control methods, and earned value management.

Teams are central to the IPPD process. Teams are made up of everyone who has a stake in the outcome or product of the team, including the customer and suppliers. Collectively, team members should represent the know-how needed and have the ability to control the resources necessary for getting the job done. Teams are organized and behave so as to seek the best value solution to a product acquisition.

Development Processes are those activities which lead to both the end product and its associated processes. To ensure efficient use of resources, it is necessary to understand what activities are necessary and how they affect the product and each other. Examples include requirements analysis, configuration management, and detailed design drawings.

Product and Associated Processes include what is produced and provided to the customer. Customer satisfaction with the product, in terms of mission effectiveness, as well as operating and support aspects and costs, is the ultimate measure of the team's success.

Customer is the user and a team member and also the ultimate authority regarding the product. Any changes to the formal requirements driving the product/process development must come through negotiation with the customer.

This generic IPPD iterative process described above is a systems engineering approach. It differs from the long held view that systems engineering is essentially a partitioning, trade-off, control process that brings the "-ilities" and test functions together. This IPPD process controls the evolution of an integrated and optimally balanced system to satisfy customer needs and to provide data and products required to support acquisition management decisions which, themselves, are part of the IPPD/IPT process. This approach also transforms the stated needs into a balanced set of product and process descriptions. These descriptions are incrementally matured during each acquisition phase and used by DoD and its contractors to plan and implement a solution to the user needs. This process balances cost, system capability, manufacturing processes, test processes, and support processes, as identified in DoD Instruction 5000.2.

The IPPD process is an integrated team effort within DoD and contractor organizations and with each other. DoD crafts the basic acquisition strategy, almost always with industry assistance. Contractors usually play a significant role in development, design, and manufacturing with DoD in a management role. Both participate in each others' major activities through team membership, and the implementation and use of tools and technology.

IPPD Key Tenets

To implement IPPD effectively, it is important to understand the interrelated tenets inherent in IPPD. These key tenets, listed below, were outlined by the Secretary of Defense mandate on IPPD and are consistent with those found in industry:

Customer Focus

The primary objective of IPPD is to identify and satisfy the customer's needs better, faster, and cheaper. The customer's needs should determine the nature of the product and its associated processes.

Concurrent Development of Products and Processes

Processes should be developed concurrently with the products they support. It is critical that the processes used to manage, develop, manufacture, verify, test, deploy, operate, support, train people, and eventually dispose of the product be considered during product design and development. Product and process design and performance should be kept in balance to achieve life-cycle cost and effectiveness objectives. Early integration of design elements can result in lower costs by requiring fewer costly changes late in the development process.

Early and Continuous Life Cycle Planning

Planning for a product and its processes should begin early in the science and technology phase (especially advanced development) and extend throughout every product's life cycle. Early life-cycle planning, which includes customers, functions, and suppliers, lays a solid foundation for the various phases of a product and its processes. Key program activities and events should be defined so that progress toward achievement of cost-effective targets can be tracked, resources can be applied, and the impact of problems, resource constraints and requirements changes can be better understood and managed.

Maximize Flexibility for Optimization and Use of Contractor Approaches

Requests for Proposals (RFPs) and contracts should provide maximum flexibility for employment of IPPD principles and use of contractor processes and commercial specifications, standards and practices. They should also accommodate changes in requirements. and incentivize contractors to challenge requirements and offer alternative solutions which provide cost-effective solutions.

Encourage Robust Design and Improved Process Capability

The use of advanced design and manufacturing techniques that promote (1) achieving quality through design, products with little sensitivity to variations in the manufacturing process (robust design), (2) a focus on process capability, and (3) continuous process improvement are encouraged. Variability reduction tools such as ultra-low variation process control similar to "Six Sigma" and lean/agile manufacturing concepts should be encouraged.

Event-Driven Scheduling

A scheduling framework should be established which relates program events to their associated accomplishments and accomplishment criteria. An event is considered complete only when the accomplishments associated with that event have reached completion as measured by the accomplishment criteria. This event-driven scheduling reduces risk by ensuring that product and process maturity are incrementally demonstrated prior to beginning follow-on activities.

Multidisciplinary Teamwork

Multidisciplinary teamwork is essential to the integrated and concurrent development of a product and its processes. The right people at the right place at the right time are required to make timely decisions. Team decisions, as a result of risk assessments, should be based on the combined input of the entire team (technical, cost, manufacturing and support functions and organizations) including customers and suppliers. Each team member needs to understand his role and support the roles of the other members, as well as understand the constraints under which team members operate. All must operate so as to seek global optima and targets.

Empowerment

Decision making should be driven to the lowest possible level commensurate with risk. Resources should be allocated to levels consistent with risk assessment authority, responsibility and the ability of people. The team should be given the authority, responsibility, and resources to manage its product and its risk commensurate with the team's capabilities. The authority of team members needs to be defined and understood by the individual team members. The team should accept responsibility and be held accountable for the results of its efforts. Management practices within the teams and their organizations must be team-oriented rather than structurally-, functionally-, or individually-oriented.

Seamless Management Tools

A framework should be established that relates products and processes at all levels to demonstrate dependencies and interrelationships. A management system should be established that relates requirements, planning, resource allocation, execution and program tracking over the product's life cycle. This integrated or dedicated approach helps ensure teams have all available information thereby enhancing team decision making at all levels. Capabilities should be provided to share technical, industrial, and business information throughout the product development and

deployment life cycle through the use of acquisition and support shared information systems and software tools (including models) for accessing, exchanging, validating, and viewing information.

Proactive Identification and Management of Risk

Critical cost, schedule and technical parameters related to system characteristics should be identified from risk analyses and user requirements. Technical and business performance measurement plans, with appropriate metrics, should be developed and compared to best-in-class government and industry benchmarks to provide continuing verification of the effectiveness and degree of anticipated and actual achievement of technical and business parameters.

Integrated Product Teams (IPT)

Integrated Product Teams are cross-functional teams that are formed for the specific purpose of delivering a product for an external or internal customer. IPT members should have complementary skills and be committed to a common purpose, performance objectives, and approach for which they hold themselves mutually accountable. IPTs are the means through which IPPD is implemented. Members of an integrated product team represent technical, manufacturing, business, and support functions and organizations which are critical to developing, procuring and supporting the product. Having these functions represented concurrently permits teams to consider more and broader alternatives quickly, and in a broader context, enables faster and better decisions. Once on a team, the role of an IPT member changes from that of a member of a particular functional organization, who focuses on a given discipline, to that of a team member, who focuses on a product and its associated processes. Each individual should offer his/her expertise to the team as well as understand and respect the expertise available from other members of the team. Team members work together to achieve the team's objectives.

Critical to the formation of a successful IPT are: (1) all functional disciplines influencing the product throughout its lifetime should be represented on the team; (2) a clear understanding of the team's goals, responsibilities, and authority should be established among the business unit manager, program and functional managers, as well as the IPT; and (3) identification of resource requirements such as staffing, funding, and facilities. The above can be defined in a team charter which provides guidance.

A Typical Industry Approach

Each step identified in figure 1-2 is important in establishing IPTs to implement IPPD. It is representative of an implementation process found in industry. These steps should be tailored in scope depending upon the size of the program and type of IPT.

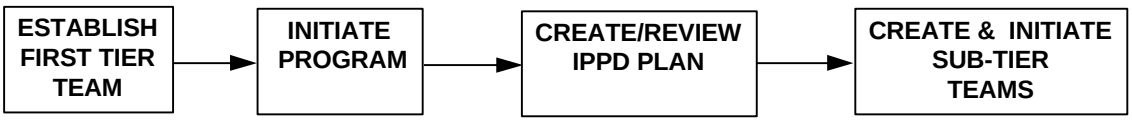

Figure 1-2. Generic IPTs Implementation Process (Industry)

The intent of this sequence of steps is to insure that the team's mission, objectives, and end products are well defined, and that each team member's role and responsibility are clearly stated.

Establish First Tier Integrated Product Team - The selection of a first tier team, which provides strategic direction and corporate oversight, and review, is an important aspect of the process. Appropriate cross-functional team composition will optimize the chances for success.

Initiate the Program - The first tier team identifies/validates a need and organizes for program management by initiating a program.

Create/Review IPPD Plan - An IPPD Plan (a document containing an Integrated Master Plan, Integrated Master Schedule, and a Project Budget Baseline) should define the scope of the anticipated effort and role of the first tier IPT, and the inter-dependencies and expectations between the first tier and sub-tier teams.

Create and Initiate Sub-tier Teams - Once the first tier team has created an initial plan, the sub-tier teams are established. These sub-tier teams should also be multidisciplinary rather than functionally oriented and have specific charters that identify expectations and responsibilities in providing program support. Sub-tier team leaders should be members of the next higher tier team.

This approach to teaming differs from traditional program organizations, which usually focus on single-function disciplines. IPTs are responsible not only for designing the product and its associated processes, but also for planning, tracking, and managing their own work and the processes by which they do their work. Successful application of IPPD rests heavily on the ability to form, align, empower, and lead these cross-functional teams. By transitioning from the traditional use of mandated decisions to a style of leadership that operates through coaching and empowering, an open environment of rapid and honest communication and effective, timely decision making required by IPPD can be created.

The concepts of effective team formation apply to all types of teams. IPTs can be applied at various levels ranging from the overall structure of an organization to informal groups functioning across existing units. IPTs can be formally chartered or natural working groups. Implementation of IPPD, therefore, does not mean that an organization needs to restructure. However, virtually all successful, sustained implementations in industry have eventually entailed reorganizations or re-missioning of organizations or both. These reorganizations are generally undertaken after IPPD implementation has been initiated and experience has indicated a need to realign functions. The team is not the end goal of IPPD, but rather the means through which much of the work is accomplished. The teams are created for the specific purpose of delivering a product and its processes or managing a process for their customer(s).

An IPT structure can be optimized for the product/customer requirements. The number of teams, functional disciplines, and full/part-time members required to support the product

development may be different for every program. In addition, team membership, including team leadership, may change throughout the product development cycle. The core members of the team, generally assigned full-time, provide continuity from one development phase to another.

Teams focus on achieving set goals and objectives. Metrics are a means for creating and maintaining that focus. When metrics provide meaningful data, IPTs can clearly see and understand their progress, and better allocate resources for the remaining tasks. Identification and management of risk are key responsibilities of each IPT.

Expected Benefits of IPPD

Applying the IPPD management philosophy can result in significant benefits to the customer, DoD, and industry. The primary benefits are reduced cost and schedule while maintaining, often increasing, quality. Essentially, a more balanced tradeoff is achieved among cost, schedule and performance. These gains are realized by the early integration of business, contracting, manufacturing, test, training, and support considerations in the design process, resulting in fewer costly changes made later in the process (e.g., during full rate production or operational test). Figure 1-3 displays anticipated design changes resulting from IPPD implementation versus traditional (serial) acquisition approach, overlaid on a curve of relative cost of making changes. In a traditional approach, the largest number of changes occur late in development, when change costs are high, resulting in higher program costs. In an IPPD process, the bulk of changes occur early in development, when change costs are low, resulting in lower program costs.

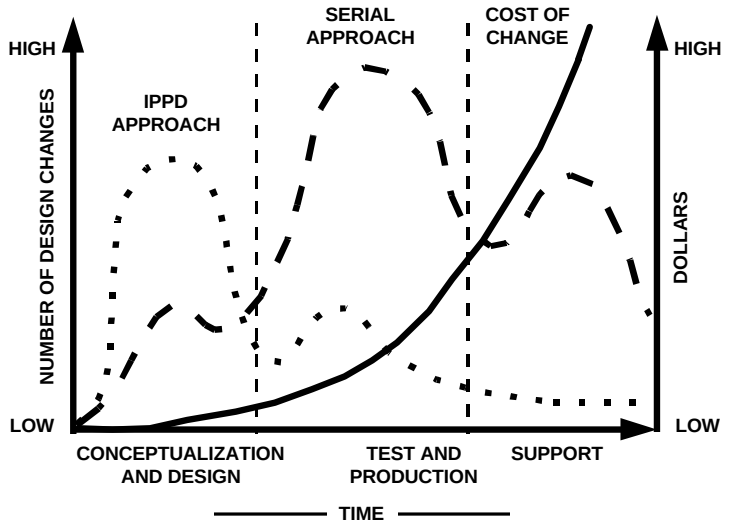

Figure 1-3. Traditional Serial Approach Versus IPPD

The traditional acquisition approach involved each specialist group completing its work in isolation and then passing results on to the next specialist group. This serial approach has resulted in stovepipe competition for organizational rewards. It establishes walls between organizations with resulting inefficiency and ineffectiveness, including a lack of networking and inter-functional communication.

Use of IPPD and IPTs is the antithesis of the traditional approach. The central notion is that product quality and user satisfaction can best be achieved by the integrated concurrent design of the product and its processes. For example, in IPPD future process requirements are identified and integrated into the evolving product design while still very early in the design phase. However, IPPD does not stop with a one-time identification of process requirements. As product design matures, continued emphasis is placed on the processes, and their attendant costs, required to manufacture, operate, and support the product. This approach greatly reduces the risk associated with design and development. Product and process maturity are achieved earlier, obviating some of the costly late redesign efforts that characterize traditional developments. Moreover, the up-front trade-offs result in more cost-effective designs. Designs can be optimized for cost effectiveness based not exclusively on acquisition cost, but on overall life cycle cost. Such considerations can be critical, since operations and support costs may far exceed acquisition cost.

Successful IPPD implementation can result in:

Reduced overall time to deliver an operational product. Decisions that were formerly made sequentially are now made concurrently and from an integrated perspective. These decisions are based on a life cycle perspective and should minimize the number and magnitude of changes during manufacturing and eventual operational deployment of the product. This in turn reduces late, expensive, test-fix and test-redesign remanufacture cycles that are prime contributors to schedule extensions and overruns.

Reduced system (product) cost. Increased emphasis on IPPD at the beginning of the development process impacts the product/process funding profile (as shown in figure 1-3). Specifically, funding profiles based on historical data may not be appropriate. Some additional funds may be required in the early phases, but the unit costs as well as total life cycle costs should be reduced. This will be primarily due to reduced design or engineering changes, reduced time to deliver the system, and the use of trade-off analyses to define cost-effective solutions.

Reduced risk. Up-front team planning and understanding of technologies and product processes permits better understanding of risk and how it impacts cost, schedule, and performance. This understanding can result in methods or processes for reducing or mitigating assumed risks and establishing realistic cost, performance and schedule objectives.

Improved quality. Teamwork coupled with a desire for continuous improvement results in improved quality of the processes and a quality product for the user.

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Chapter 2 IPPD and DoD Acquisition

> **"Reengineering our oversight and review process and practices is one of the most difficult issues we will face in acquisition reform. It means we will have to create a climate of reasoned, well-informed risk-management by our PMs and PEOs. Your leadership and good judgement will be critical to successful implementation of this reform. I encourage you and your leadership teams to be active participants in establishing the environment essential for implementing this change."**
>
> **Paul G. Kaminski, 28 April 1995**

Background

The Department of Defense is undergoing a fundamental change in its acquisition of goods and services. Recent acquisition reform actions and new legislation, policies and procedures, along with the IPPD/IPT mandate, will be included in an update/rewrite of the DoD 5000 series of publications. Implementation and management of IPPD and IPTs are addressed in those updates. In addition, a *Defense Acquisition Deskbook* is being developed that will contain information on IPPD management and the roles and responsibilities of IPTs. This guide will be included in the deskbook and updated as necessary to reflect the latest available information to assist in implementation.

Acquisition Process

The following discussion describes the milestones and phases identified in DoDI 5000.2. This particular structure for the acquisition process has proven successful in a majority of programs. However, adherence to this process is not mandatory. Tailoring of this process to eliminate unnecessary elements is encouraged where there is clear cost or schedule benefit without unacceptable technical risk.

Tailoring may be especially appropriate when the solution to the mission need is (1) a modification to an existing military system, (2) an existing commercial item that can be used as is or adapted by modification to military use, or (3) a one-of-a-kind system. Whether or not the system follows the entire acquisition process, or is tailored, adoption of IPPD principles should be strived for, to the maximum extent practicable, to improve program performance.

The DoD acquisition process is set in motion by the validation of a mission need. Mission needs result from a continuous assessment of current and projected capability**.** In the case of Acquisition Category (ACAT) I programs, the Joint Requirements Oversight Council (JROC) validates the need. If a materiel solution is required, alternatives are recommended to the Milestone Decision Authority (MDA) to be considered at Milestone 0 (Approval to Conduct Concepts Studies). USD(A&T), as the MDA, may authorize one or more concept studies to determine which alternatives best satisfy the need.

Following Milestone 0, the MDA will normally delineate exit criteria to be satisfied during Phase 0 (Concept Exploration). This phase explores selected alternatives. After exploring and reviewing the alternatives and having met exit criteria, the most promising system concepts are defined in terms of initial broad objectives for cost, schedule, and performance for the MDA. A favorable decision at Milestone I (Approval to Begin a New Acquisition Program) establishes a new acquisition program and an acquisition program baseline.

Following Milestone I, the program enters Phase I (Program Definition and Risk Reduction) as a new program start. This phase ensures that the appropriate product and process technologies have been researched, tested, and validated. Associated risks are identified, analyzed and minimized as much as possible. There must be some assurance that technologies will be available for production and use within cost targets and at an appropriate time. Assurance here varies inversely with the length of time in the projection. IPPD, therefore, has the potential of changing the technological profile for new weapons systems. Such a change would be required in any case in order to shorten schedules. This, in turn, implies a different relationship between acquisitions and the science and technology programs, described further in Variations of the Acquisition Process below. At the end of Phase I, the program should be able to establish firm cost, schedule, and performance thresholds/objectives. An integrated master plan and other documentation may be presented to the MDA. Satisfaction of Phase I exit criteria is verified at Milestone II (Approval to Enter Engineering and Manufacturing Development).

Following Milestone II, the program enters Phase II (Engineering and Manufacturing Development). In Phase II, the most promising design is developed into a system design to include manufacturing and support process development, manufacturing and support process validation, and system capability assessment through test and evaluation. Program IPTs use information available during this phase to reassess projected cost, schedule, and performance goals. As with the previous phase, satisfaction of established exit criteria is verified at Milestone III (Production or Deployment Approval).

Following Milestone III, Phase III (Production, Deployment and Operational Support) is entered. Phase III objectives include: establishing a stable efficient support base, and an operational capability that satisfies the need, confirming performance and quality, and verifying corrections of deficiencies. Once a contractor has demonstrated a system of stable compliant processes leading to cost and technical performance as contracted, the Government shall rely almost exclusively on contractor self-governance rather than Government inspectors, auditors, and compliance monitors to ensure that these processes continue to result in a system producing goods and services which meet customer needs. The Program Office supports system deployment to the field by assessing system performance, implementing support plans, and identifying deficiencies requiring correction.

This acquisition process outlined above allows for and encourages program specific tailoring. The concepts of IPPD/IPT are consistent with this process and are equally applicable to new and existing programs.

Variations of the Acquisition Process

There are variations of the acquisition process described above. These variations can result from pre-acquisition activities and/or a reduction in the scope of remaining development. Each of these alternatives will enter the DoD acquisition process at an appropriate point based on the maturity of the product. Although there are variations in the acquisition process, the need to employ an IPPD approach still applies. IPPD continues to ensure that all of the necessary activities that optimize life cycle performance and suitability are considered as early as possible.

Pre-Acquisition Activities

Two types of activities the Department is using to develop, demonstrate, and evaluate emerging technologies are Advanced Technology Demonstrations (ATDs) and Advanced Concept Technology Demonstrations (ACTDs). These activities precede the formal acquisition process.

ATDs are typically integrated demonstrations that are conducted to demonstrate the feasibility and maturity of an emerging technology. They provide a relatively low-cost approach for assessment of technical risks and uncertainties associated with critical technologies prior to the incorporation of these technologies into a system entering the formal acquisition process. If successful, the ATD can lead to an acquisition program or be integrated into a larger acquisition program. IPPDs should be used to ensure that the product(s) of the ATD provide a cost-effective, life-cycle solution that can be quickly transitioned into a formal acquisition program. All aspects of the life cycle need to be considered in order to optimize the end product. Early integration of IPPD tools, teams, and processes is essential to the efficient implementation of ATDs.

ACTDs are designed to respond quickly to an urgent military need. They employ available technologies, which frequently may have been successfully demonstrated in an ATD. Under ACTDs, systems are designed, fabricated, and then demonstrated in realistic combat exercises to gain an understanding of the military utility of the system, to support development of the associated concept of operations, and to place a limited but demonstrated capability into the hands of the warfighter at the conclusion of the ACTD. When additional quantities or capabilities are required to meet the full military requirement, the system enters the acquisition process at the point that is appropriate given the level of developmental maturity. Implementation of an IPPD approach is critical to the concurrent definition of user requirements, system design, and concept of operations.

Nondevelopmental Items

For programs considered to be Nondevelopmental Items (NDI), where little or no development is required, an IPPD approach still applies and should be employed in independent evaluation and planning activities which not only consider performance and delivery cost, but also fielding the system, to include training, maintenance, long term support, logistics, disposal, and follow-on products, as well as their associated costs.

OSD IPT Implementation

OSD implementation of IPPD has resulted in a major change in the way OSD maintains oversight and review of major programs. Guidance regarding the formation and use of oversight and review IPTs is contained in the DoD “Rules of the Road - A Guide for Leading Successful

Integrated Product Teams" (see shaded area of figure 2-1). Guidance on IPTs for other than OSD oversight programs may be adapted from the "Rules of the Road", this guide, or other government, industry, or commercial publications. Figure 2-1 depicts the types and focus of IPTs covered in "Rules of the Road" and in this guide.

Organization	Teams	Focus	Participant Responsibilities
OSD and Components	OIPT *	• Strategic Guidance • Tailoring • Program Assessment • Resolve Issues Elevated by WIPTs	• Program Success • Functional Area Leadership • Independent Assessment • Issue Resolution
	WIPTs *	• Planning for Program Success • Opportunities for Acquisition Reform (e.g., innovation, streamlining) • Identify/Resolve Program Issues • Program Status	• Functional Knowledge & Experience • Empowered Contribution • Recommendations for Program Success • Communicate Status & Unresolved Issues
Program Teams & System Contractors	Program IPTs **	• Program Execution • Identify & Implement Acquisition Reform	• Manage Complete Scope of Program, Resources & Risk • Integrate Government & Contractor Efforts for Program Success • Report Program Status & Issues

* See *The Rules of the Road, A Guide for Leading Successful IPTs*

** Covered by this guide

Figure 2-1. DoD IPT Types, Focus and Responsibilities

IPPD Tools

Implementing state-of-the-art methods and tools for planning, information, management, design, cost trade-off analysis, and modeling and simulation significantly improves the effectiveness of IPPD. It is incumbent on both DoD and its contractors to become knowledgeable of the capabilities of the tools, to integrate them into their internal tool sets, and to improve service to their customers.

Information technology and decision support

Document management, process documentation, and configuration control are important activities in traditional systems engineering and are even more critical in IPPD implementation. The concurrency of efforts, the numerous trade-offs being conducted, and successive prototypes under investigation make the documentation process an integral part of IPPD implementation. The architecture and process of the IPTs should be documented and retained. Directives, standards,

specifications, team decisions and approvals, and policy and operating procedures are all reference data requiring categorization and control.

A common information system is needed to afford team members the opportunity to access program (product) or process information at any time and from any location. This access includes design information, automated tools, specifications and standards, schedule and cost data, documentation, process methodologies, program tracking, metrics, and others. If the IPT(s) members are not collocated, or if the teams are large, such a system may be a major undertaking in itself.

The number of tasks, the complexity of teams, and the early concurrency of interrelated activities, schedules and communications all require management via an integrated information system. This does not mean that a custom information system should be developed for each IPPD program; there are many commercially available off-the-shelf management information systems which can be integrated to serve this purpose. Commercially developed group decision support system software is also available for IPT use in conducting trade-off analyses.

In addition to complex shared databases, there are many commonly available communication tools that can be used to effectively facilitate information exchange and communication between team members. These tools include Fax machines, overnight mail delivery, increasingly effective teleconferencing, secure electronic mail, voice mail, Electronic Data Exchange (EDE), File Transfer Program (FTP), and video recorders. The last six tools are particularly useful because they are paperless.

Trade-off studies and prioritization

Cost, schedule, and system performance are the three classic parameters in all product and system acquisitions. Traditionally, analyses of variations in systems performance characteristics were conducted to obtain the resultant effect on projected system cost and development schedule. To take full advantage of the IPPD process, design trade-offs which evaluate system requirements versus costs must be conducted at an early design stage if we are to succeed in making cost an independent rather than dependent variable.

Performance parameters can be analyzed against design, testing, manufacturing, operations and support, training requirements, and overall life-cycle costs. The overall evaluation criteria should consider all aspects of the design including mission capability, operational safety, readiness, survivability, reliability, producibility, testability, manufacturing costs, and others.

Techniques such as Quality Function Deployment (QFD) can be useful in these complicated analyses. QFD is a systematic process for truly understanding the user's requirements and expectations and documenting the best approach and methods for satisfying these requirements. The customer at times states requirements vaguely, and at other times too tightly, i.e., a specific solution. The QFD process revolves around understanding what the customer really expects and focuses efforts on satisfying these needs through extensive trade-off analyses. QFD also provides a way of tracking and tracing trade-offs through various levels from requirements through design decisions to production and support processes.

Cost-performance trade-offs

The Under Secretary of Defense (A&T) has directed that cost goals be used as a management tool. (USD(A&T) memo of July 19, 1995.) It is based on the concept of "cost as an independent variable," and has been initially adopted for ACAT ID/IAM ("ACAT IAM" refers to ACAT IA programs in which the Senior Information Management Official (the ASD(C3I)) is the MDA.) Although required in the memo for ACAT Is, it is encouraged for all programs. Life-cycle, cost-performance analyses conducted by integrated product teams are based on the principle that the best time to reduce life-cycle cost is early in the acquisition process, and that the best cost-performance trade-offs must be conducted before an acquisition approach is finalized.

Activity-Based Costing is a valuable tool for IPPD cost analysis. Activity-Based Costing focuses on the activities performed in the realization of a product. Costs are traced from activities to products, based on each product's consumption of such activities. The cost of a product equals the sum of all activities performed including overheads, capital costs, etc.

Traditional cost systems work well in processes where products are produced in large quantities by companies with a relatively simple cost accounting structure. However, batch sizes have become smaller, and competitiveness and budget constraints require stringent cost analysis. Traditional cost systems systematically "under cost" low-volume products, and "over cost" high-volume products. The objective of activity-based costing is to organize the actions into activities so that costs can be traced and estimated with a desired level of accuracy.

Design for manufacturing

Quality of the manufacturing process is most effectively attained if producibility is considered during design and development. It should be integrated throughout all elements and activities of a program. Product quality should be an integral part of design, production planning, and manufacturing efforts. The application of advanced design practices and tools to achieve product quality can be used in the Source Selection process as an indication of an effective IPPD process.

Many commercial manufacturers currently adhere to a collection of quality principles or imperatives known as Taguchi methods (proposed by Genichi Taguchi in the 1980s). Taguchi methods stem from the belief that quality is a virtue of design, and that the *robustness* of products is more a function of good design than of manufacturing quality control. Rather than process optimization, the target of this methodology is product robustness. The product is designed to accommodate a wider variation in the product processes without degradation of the overall product utility or value. Further, the quality of products or performance of processes must continuously be improved so that the deviation of product performance from specified values is minimized.

Prototyping

Prototypes can provide a representation of the product or system under development. Prototypes enhance communications between designers and users; they provide an opportunity for the user to better describe or gauge actual needs. In the implementation of IPPD, there is a greater need to develop prototypes on a rapid basis early in the design phase. Prototypes increase our knowledge about a product design and the associated manufacturing process in the product development life cycle and thereby reduce the time for completing the design and implementing production processes while reducing risk. However, prototyping must be controlled. Otherwise, unnecessary prototyping cycles can cause cost and schedule increases.

Virtual prototyping is a process for replacing physical prototypes by computational prototypes of products and processes. Its value lies in the potential for dramatically reducing product development time, manufacturing facility preparation time, and production cost while providing greater user satisfaction.

Modeling, Simulation, and CAE/CAD/CAM

Modeling and simulation technologies can be used as a cost-effective way to reduce time, resources, risks, and increase the quality of the systems being acquired. Representatives of proposed systems (virtual prototypes) can be embedded in realistic synthetic environments to support all phases of IPPD. Validated modeling and simulation should be applied, as appropriate, throughout the system life cycle in support of the various system acquisition activities, including (1) requirements definition, (2) program management, (3) design and engineering, (4) test and evaluation, (5) manufacturing, and (6) logistics support.

A product design that provides full customer satisfaction has to incorporate many features or requirements that consider not only the technical performance of the product but operational factors such as the skill required for use, reliability, supportability, even appearance. To provide expert knowledge in each of these factors, groups of specialty engineering -- commonly referred to as the "-ilities" -- are used to review the product design and they occasionally make suggestions to benefit their particular discipline. The experience of "-ilities" specialists has been captured into tools that fall into the general category of simulation-based design, e.g., Computer-Aided Engineering (CAE), Computer-Aided Design (CAD), or Computer-Aided Manufacturing (CAM)). Often it is still necessary to run these tools repetitively to achieve an optimum balance of all the desired product characterizations.

Metrics

Metrics, or measures of success, serve as a powerful management tool for evaluating effectiveness in accomplishing project objectives and in achieving and improving customer satisfaction. They allow Program Managers to manage on the basis of facts and data. The IPPD philosophy stresses defining processes and establishing check points to determine process health using accurate measurement and open, fear-free communication. Continuous measurable improvement should be an integral part of IPPD implementation. Defining and using process-focused metrics allows for early feedback and continuous monitoring and management of IPT activities and program maturation. Metrics solely focused on individual process results do not give a picture of overall success in implementation. Metrics, therefore, should also be structured to identify the overall effects of IPPD implementation. Measures that could be used to gauge success include schedule, communications, responsiveness, and timeliness. Particularly useful is the measurement of variances between planned and actual schedules, consumption of resources, and completion of tasks. Also of great importance are measures of productivity, customer satisfaction, and cycle time.

Development Processes

Development Processes, as stated in Chapter 1, are activities which lead to the end product (which may itself be a process). DoD focuses on acquisition and contractor oversight processes and the linking of requirements with the Planning, Programming, and Budgeting System (PPBS).

Industry, on the other hand, is primarily interested in processes which are a part of system development, contract and customer interface, finance and business, and DoD oversight. Some of these processes are shared interests between DoD and industry. Processes can be formally structured, such as the DoD acquisition process or the PPBS process, or informally structured such as a procedure created by an IPT to facilitate record keeping or maintain communication.

Development processes of interest to DoD are found at all levels of management. Generally, these processes fall into three categories:

- Policy processes are stated at the highest levels of the acquisition hierarchy. They involve such processes as the Requirements Generation System, PPBS, and the Defense Acquisition Management System.

- Oversight processes include those meant to verify program, contractor, or product performance. Examples are the test and evaluation process, risk assessments, earned value analysis, or contract audits.

- Management processes are generally those which are used at the Program Manager's level. These might include source selection, Request for Proposal (RFP) generation, design reviews, or archiving of documents.

Industry is the builder of a product or system and as such is interested in those processes which affect product cost, schedule, and performance and in DoD processes that interact with contractor processes. Product-related processes may include design, manufacturing, hardware and software research and development, or be financial in nature. Processes in which contractors interact with DoD may include the RFP, DoD audit, or contract arbitration.

Selected processes also generate information needed by a decision maker (e.g., risk assessments, developmental tests, analysis of alternatives) or may directly or indirectly impact cost, schedule, or performance of the product (e.g., operational test, design, manufacturing). It is important to understand the life-cycle processes of the system to ensure they are properly integrated into the system's life cycle and critical resources are properly expended.

Education and Training

A key factor contributing to IPPD success is education and training regarding IPPD management philosophy and the use of IPTs for the practical implementation of IPPD by the DoD staff. Program offices are encouraged to use their own facilitators or trainers as much as possible, and to enrich the training with as many examples, case studies, and lessons learned as are available. Each service and DoD should maintain a list of available educational resources for this program.

IPPD training may be viewed in three parts: program-specific, IPPD methodology, and team building. The program-specific training should assure that everyone has a common vision and understanding of the customer's requirements and the organization's purpose and products. Next is an overview of IPPD methodology and an introduction to the tools and techniques used to

implement this management philosophy. Finally, team building exercises should be conducted to bring the organization together as a whole and to facilitate the cultural change. The organization's customers and suppliers should be included as an integral part of these activities.

In addition to the above, functional managers should ensure that representatives to IPTs are trained within their respective functional area. Training of functional representatives is necessary to ensure that the representatives stay current in their area and that they understand how their decisions within the IPT will be viewed by their managers.

Good training requires interaction between an individual with training and subject-matter expertise and a trainee with specific needs, understanding, and capabilities. Both, what is offered and what is heard are affected by the individuals involved. It is not possible for one trainee to bring the characteristics of an entire team into that interaction. Further, an individual cannot in one class take in all the knowledge presented. At best, only part of that knowledge is brought back. Nor is it possible to bring back to everyone all the skills and knowledge acquired by one individual. Therefore, a complete training process should include training in which individuals participate in teams.

What distinguishes IPPD training from education in general is not the underlying educational principles but the content and relationship to specific needs, i.e., the desired future state. The underlying principles and philosophy are the same. IPPD training efforts should strive to:

- Provide specific information on approaches needed for implementation (i.e. QFD, IPT, etc.),
- Improve problem-solving and leadership skills,
- Instill a team and a product/process orientation, and
- Develop risk assessment/intervention skills.

As with the use of IPPD, additional training should be offered that builds upon the initial three-part training. This training should provide detailed guidance on the implementation of the IPPD management philosophy as it pertains to a specific team. It should focus on the roles and interrelationships between the various disciplines and between teams, on the participation of core and adjunct members, and on bringing the group together as a team. The training should identify customers, both internal and external, and the products delivered to those customers. This training should be repeated for any new team members and as a refresher for other team members as needed.

Barriers to Implementation

IPPD can provide tremendous leverage in managing product development. However, situations can develop throughout the process that can impede IPPD implementation or its effective use. Like most barriers of this nature, careful planning and vigilance can identify these problems and mitigate them as they arise. A description of some of the more common barriers follows.

Lack of sustained top management commitment

The first principle of successful IPPD implementation is to obtain unequivocal top management commitment. Without total top management commitment many employees may view IPPD as just

another fad. *Recommendation*: *Obtain a written commitment from senior management to the principles of IPPD and its application to the program/product/service at issue before embarking on this effort*.

Cultural change required

Given current approaches, cultural change is required for the IPPD process to work. Because of the hierarchical structure of the military services, adaptation to the IPPD method of doing business may be difficult due to the changing roles of the different staffs. This perception can become more pronounced as differences in rank increase. It is essential that an atmosphere with freedom to express ideas without repercussion from those conflicting views is created. *Recommendation: Do not underestimate the forces of resistance to change. Spend what may seem like an inordinate effort on cultural change management. To the maximum extent possible, utilize a rewards system to recognize and encourage the desired change.*

Functional organization not fully integrated into the IPPD process

Functional organizations are responsible for technology development, personnel development, process improvement, and administrative functions. These activities cannot be adequately performed if the functional organization and its people are treated as outsiders to the work to be accomplished. For example, process improvement can only occur when teams understand and use the processes developed by the functional organizations. *Recommendation: With the implementation of IPPD, the role of the functional organization changes from controlling the work of the program to the care and development of the resources available to the team. These include people, information systems, libraries, models, education and training, public and financial recognition, and often operational processes and capital equipment.*

Lack of planning

Planning can be rushed and incomplete as teams quickly form to start an effort already behind schedule. *Recommendations*: *(1) Up-front planning that includes all functions, customers, and suppliers must be accomplished at the start of any team activity. This allows the program activities and work to be defined and the early identification and management of risk. (2) The integrated master plan must be consistent with the project/organization objectives and it must be constantly reevaluated and modified to meet current team needs and capabilities. (3) Resist temptation to take short cuts - it will cost more later.*

Insufficient education/training

Education/training has often been overlooked in the process. Sometimes it is assumed that members have received the required training and, therefore, do not require additional education/training. *Recommendation: Include IPPD education/training as an integral part of the comprehensive up-front planning. In order to optimize the effect of training, it should be done immediately before the particular skill is required.*

Lessons learned and good practices not shared across programs

There is often a lack of communication across programs/organizations in areas of problem solving, lessons learned, and good practices. *Recommendation: A formalized, documented process for exchanging information related to IPPD implementation should be created and used.*

Not invented here

There is a natural tendency when things are not going well for a team to focus on its immediate problems to the exclusion of other organizations and their needs. A "Not Invented Here" philosophy can develop causing teams to exclude ideas/inputs from their internal and external customers and co-workers. *Recommendation: The key concept that must be stressed is the idea of teamwork — all individuals working together for a common goal. Publicly acknowledge when good ideas are brought in from outside the team.*

IPPD practices directed by contract

A series of "approved, recommended, or best practices" for applying IPPD should not be contractually imposed. These practices will become standards by implication and contractors will be hesitant to deviate from them for fear of being found non-responsive. *Recommendation: The contractor selected should already have established an IPPD culture and should not need steps for implementation dictated by DoD. If presently imposed in existing contracts, seek to remove them if feasible.*

Contractor uses IPPD/DoD doesn't

Problems may arise when DoD expects contractors to use IPPD approaches, but DoD does not participate in IPPD tools, teams, or processes. *Recommendation: DoD must suppress the tendency to monitor progress along functional lines, to conduct design reviews function by function, and to mandate accounting methods that inhibit IPPD.*

DoD asks for IPPD in RFP but awards to traditional approach bidders

It will not take long for contractors to pick up on the fact that DoD may ask for new and innovative IPPD approaches in the RFP, but still awards contracts based on lowest cost and traditional approaches. *Recommendation: If the IPPD approach is to work, DoD's commitment must be real.*

Contractors promise more than they can deliver in implementing IPPD

The possibility of contractors promising more than they can deliver has always been a problem for Source Selection Evaluation Boards (SSEBs). This will be an even greater concern in an IPPD environment because, in the spirit of teamwork, oversight may develop a tendency to be less independent than prior to IPPD implementation. A related trap is if contractors parrot back the IPPD requirements without making the internal cultural changes needed to operate using IPPD techniques. *Recommendation: It is important that the SSEB become familiar with successful IPPD techniques/methods and what can realistically be done, perform a thorough technical evaluation of each proposal, and look closely at contractor past performance in IPPD implementation.*

Poor incentives/award fees criteria

Under the IPPD philosophy, the driving force behind incentive/award fees should be successful product/process development. Concurrent product and process development, full life cycle design considerations, and continuous improvements should be the focuses. Unfortunately, some contract incentive criteria can disincentivize contractors from using IPPD. For example, incentivizing only development cost can cause the contractor not to perform needed design analysis, testing, and alternative examination. Incentivizing meeting of scheduled milestone events, such as design reviews, causes contractors to meet those dates whether they are ready or not. *Recommendation:*

Better contract incentives can be based on effectiveness of the contractor's IPPD methods and measures of contractor performance in meeting or exceeding contractual requirements. Beware of including criteria which may preclude optimization of the product.

Over-extended reviews

When all members of a multifunctional team are encouraged to participate in a design, many questions and issues will be brought up which could be discussed for an excessive time. *Recommendation: Setting a specific agenda for meetings and reviews should create a structure that allows for the discussion of issues. This structured agenda should not allow the discussion to be dominated by any one specific point. Time limits, however, should only be stressed by the meeting facilitator or chairperson when the discussion becomes repetitive, or a consensus cannot be reached.*

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Chapter 3 Management of IPPD in DoD Acquisitions

> **"Cultural change cannot be directed from the top. We need buy-in at the working level as well. I hope you will join me...by working together to improve our product --- fielded equipment that works within a shortened acquisition cycle time."**
>
> **Paul G. Kaminski, 3 October 1995**

Background

The two previous chapters have described IPPD concepts, tools, processes, and barriers to implementation. This chapter explains the roles of DoD and industry in the IPPD process and the industry-DoD team relationship.

Industry and DoD use IPPD to work as a team. Each performs a different function. Industry is the developer of the product and contributes state-of-the-art technical expertise and best manufacturing practices to the team. DoD manages the effort and contributes by removing impediments which hinder success of the program.

DoD's Role

DoD acts in the role of the customer or user by defining the need for and evaluating performance of a product or process. The DoD also performs the role of the acquisition manager, validating the need, researching alternatives, defining requirements, allocating resources, determining priorities, measuring technical and operational performance, and establishing an operational and support capability.

As a manager, DoD balances three systems (Requirements Generation System, Acquisition Process, PPBS) to acquire affordable products which meet the users' needs. This role requires decisions based on cost, schedule, and performance trade-offs, risk analysis and management. Because of the need to do more with limited funding, it is important that DoD requirements and acquisition personnel understand the IPPD tools, teams, and processes used by industry, as well as DoD.

As the ultimate and often only customer, DoD defines operational performance requirements for the needed system. In the customer role, DoD conveys information to both industry and DoD acquisition management through many fora.

Acquisition managers, using the IPPD process, establish an oversight and program IPT structure that meets their needs for managing their programs. Guidance on how OSD oversight and review IPTs are implemented for ACAT ID/IAM programs may be found in the DoD "Rules of the Road" publication. A notional program IPT structure for program implementation is shown in figure 3-1. This structure will vary from program to program depending on scope and complexity.

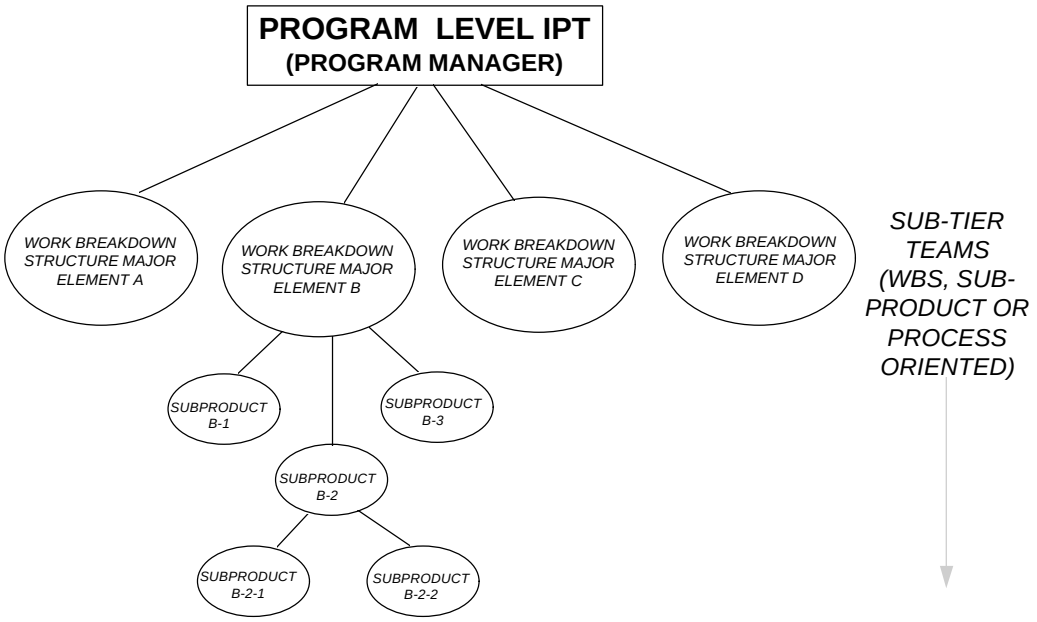

Figure 3-1. Notional IPT Structure

A Program level IPT is formed to provide for program execution. This IPT represents the system level in a structure where multiple levels of IPTs may be required due to program size or product complexity. Usually, the leader is the Program Manager. Selection of team members is an important part of the process. Normally sub-tier team leaders are members of the Program IPT and provide for integration. Careful consideration needs to be given to the multidisciplinary requirements of the team during selection.

Sub-tier Teams implement plans for product development created from the acquisition strategy. These IPTs manage elements of the program's resources and risk, integrate government and contractor efforts, and report program status and issues. These teams are created as necessary to execute and track program plans, usually in concert with the Work Breakdown Structure (WBS), and also may be formed functionally, or process related (i.e., support, manufacturing, etc.). Sub-tier Teams may consist of functional representatives from DoD, the Services and industry. Teams may be created in a horizontal or vertical relationship with other teams at the discretion of the Program Manager.

This notional structure allows for the creation of an integrated management framework employing resources (tools, teams, processes) as part of a disciplined approach (see Chapter 1). An integrated management plan can then outline actions by which the product is acquired.

Users, program managers, functional managers and acquisition management staff should be represented in IPTs along with contractors and suppliers. To achieve the full potential of IPPD, team members must be empowered and capable of effectively performing their IPT roles. Representative tasks and responsibilities include:

Program Managers are responsible for managing the program as a whole. Tasks, as cited in industry literature and survey responses, include ensuring that:

- Funding profiles and program schedules are adequate to support early involvement of all functional elements that have a stake in the design concept.
- Teams as a whole - not just the team leaders - are held accountable for team performance.
- Team members work to optimize the entire program - not just their functional discipline.
- Product developments and downstream process decisions are made within the team bounds and not by either functional or program management.
- An environment exists to support cohesiveness within and among IPTs.

The program manager, and possibly his staff, will normally be involved in both the oversight and review IPTs as well as the execution, or program level IPTs.

Functional Managers are responsible for guiding and ensuring consistent practices for their functions across IPTs. Tasks, as cited in industry literature and survey responses, may include ensuring:

- Long-term interest in the education, training, career development and assessment of employees assigned to teams is maintained.
- Continued maintenance and development of centers of functional excellence.
- Technical expertise and perspective are provided.
- That Functional Managers understand the programs that their staffs are supporting so that they can better manage their own technology development.

Acquisition management staff support is required from many DoD functions and activities not directly engaged in the technical aspects of product and process design. Specifically:

- The user community's single most valuable contribution to a successful IPPD effort and program is at the very outset to provide guidance for a realistic, stable statement of mission needs. Stability is important. To achieve stability, fewer revolutionary advances may be indicated and a shorter schedule assumed. A cause for requirements instability and delays results from waiting for significant technology advances. The user community should participate in and be open to cost/performance trade-offs.
- A well-constructed RFP and a sound acquisition strategy are important keys to successful acquisition. The RFP should be structured to assure that language does not create barriers to implementing IPPD and should incentivize the use of IPPD.

- Cost accounting organizations can provide useful cost information necessary to make cost/performance trade-offs. Methods must track changes in process management due to IPPD, improved information technology, and other process improvements. Traditional cost prediction is based only on past history over long periods.

- The comptroller should recognize that a need may exist to incur higher development costs at an earlier point in the life cycle than is the case in traditional acquisition programs, and to support that requirement.

- The legal staff may play a role in areas such as patents or product liability of commercial products used in the system under acquisition, data rights, and the role of DoD and industry personnel in IPTs.

- DoD/Service schools should provide the necessary training and education outlined herein to assure DoD staff understanding of the IPPD process and their respective roles in successful IPPD operations.

Industry-DoD Team Relationship

A positive early relationship between DoD and industry can be key to effective management. Early planning, a key tenet in IPPD management, should involve the customer and supplier. Part of that tenet is to involve the customer and supplier as soon as possible, especially in the requirements definition phase. In some cases, it may be beneficial to involve many suppliers with the greatest potential to assist with requirements definition. This can be done through a variety of methods.

Request for Information (RFI*)* process where the goal of DoD is to gather information on technology and systems development to aid in refining the initial requirement. Industry provides this information to assist DoD in writing a Request for Proposal (RFP) that can be responded to by industry.

Electronic bulletin boards perform multiple roles in DoD/industry communications. Bulletin boards post relevant information and ask questions anonymously for viewing. This type board provides for sharing of information without revealing source or competitive strategy.

Libraries for industry can be established to provide a repository of DoD literature regarding the acquisition process and requirements, acquisition, and budgetary documentation.

Vendor conferences provide a forum for sharing information by way of briefings and question and answer sessions between industry and DoD. They also update all parties on the status of the requirement.

Draft RFPs allow prospective bidders to comment on RFP content, particularly Statements of Work (SOW). An advantage of this approach is for industry to address RFP contents which require explanation or may unnecessarily restrict concept development or exploration of novel approaches. This effort should result in a better final RFP.

Once sufficient information has been gathered, the program concept can be defined using a systems engineering approach similar to that outlined in Chapter 1. This can be done with the assistance of a SETA contractor who is knowledgeable in the technical area being explored. This contractor is to act as an independent technical advisor to DoD and is particularly useful when DoD has a need to augment its technical expertise.

The IPPD approach facilitates the effective use of tools that can be used in the development of an RFP. To realize the advantages of IPPD, team members who participate in WBS, SOW, and RFP development should be retained and utilized throughout the execution of the resulting contract. Members of teams that develop the WBS, SOW, and RFP, potentially form the best source selection team.

"I want all those involved in the acquisition process to employ these concepts for all acquisitions when it makes sense. The Department's oversight staffs shall fundamentally shift their roles from sequentially checking on a program beginning six months prior to a milestone decision point to participating early to facilitate program success through continuous teamwork and assistance throughout the acquisition process."

William J. Perry, 10 May 1995

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Appendix 1

Acronyms

ACAT	Acquisition Category
ACTD	Advanced Concept Technology Demonstration
ATD	Advanced Technology Demonstration
ADM	Acquisition Decision Memorandum
CAD	Computer-Aided Design
CAE	Computer-Aided Engineering
CAM	Computer-Aided Manufacturing
CTP	Critical Technical Parameters
DAB	Defense Acquisition Board
DoD	Department of Defense
DoDI	Department of Defense Instruction
DOT&E	Director, Operational Test and Evaluation
DTC	Design to Cost
DTSE&E	Director, Test, Systems Engineering and Evaluation
ECP	Engineering Change Proposal
EMD	Engineering Manufacturing Development
ILS	Integrated Logistics Support
IMP	Integrated Master Plan
IMS	Integrated Master Schedule
IPPD	Integrated Product and Process Development
IPS	Integrated Program Summary
IPT	Integrated Product Team
JROC	Joint Requirements Oversight Council
LRIP	Low-Rate Initial Production
MDA	Milestone Decision Authority
MNS	Mission Need Statement
MOU	Memorandum of Understanding
NDI	Non Developmental Item
OIPT	Overarching Integrated Product Team
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense
PPBS	Planning, Programming, and Budgeting System
QFD	Quality Function Deployment
RFI	Request for Information
RFP	Request for Proposals
SETA	Systems Engineering and Technical Agent
SOW	Statement of Work
SSEB	Source Selection Evaluation Board
SSP	Source Selection Plan
TEMP	Test and Evaluation Master Plan
TPM	Technical Performance Measures
USD(A&T)	Under Secretary of Defense for Acquisition and Technology
WBS	Work Breakdown Structure