TEAM-BASED PROJECT ADMINISTRATION:
THEORY AND CASE STUDIES

by
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Submitted to the Department of Ocean Engineering
in Partial Fulfillment of the Requirements for the Degrees of

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and
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ABSTRACT

Team-based project administration is a proven method for
improving project performance in both commercial and Department of
Defense applications. This thesis presents an overview of the current
theory of this approach.

This theory is augmented with the lessons learned from three
successful US Navy vessel acquisition projects which were performed
using teams. To accomplish this, a series of case studies written at
MIT is analyzed to describe how teams have functioned in recent ship
acquisition projects. Successful aspects of team performance within
such large-scale projects are discussed, and documented
improvements in performance over previous contracts are presented.

The combined base of theory and lessons learned is then used to
consider the use of teams in the environmental management arena.
This is done by demonstrating how the attributes of a team-based
approach can effectively address the needs of a multi-organization
project concerned with environmental protection. Specifically, the
project considered is the development of a system to address the
safety of tankers and tanker operations by the International Maritime
Organization (IMO).

The paper makes conclusions regarding the use of teams in both
the US Navy ship acquisition and environmental protection and
management arenas. It is stated that the obstacles unique to each
arena are surmountable using team approaches, and that such
approaches should be considered for future projects.

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CHAPTER 1 - INTRODUCTION

In today’s business world, fierce competition dictates that companies and other organizations must find a way to distinguish themselves through cost, schedule, quality or other performance improvements. The shrinking budgets, increased regulations, and stiffer competition which characterize many industries present managers with strategic challenges which affect the direction of their organization, and indeed its health, in the years to come.

Managers are finding that they can no longer call all of the shots and expect their firm to become or remain successful. There are simply too many variables, both within and outside of an organization, which affect its performance. It cannot be expected that any one person would have adequate knowledge of all important parameters to make effective decisions.

To address this problem, many high performance organizations are changing their operating procedures to allow them to stay competitive. Many of the organizations that are emerging as leaders in this environment have achieved that status through the application of team-based project administration.

Chapter 2 of this thesis examines the changing face of business and presents the case for the use of team-based project administration to address the new business climate. Chapter 3 begins with a discussion of the theory of teams including the benefits which may be derived from this type of project administration. The chapter will then present the elements which must be present in the working environment, as well as human factors, which contribute to
the success of team-based applications. Barriers to the success of teams are presented in Chapter 4.

This thesis seeks to expand upon the current theory of teams, which is based largely on successful commercial applications, using lessons learned from three successful applications of teams in US Navy ship acquisition and overhaul programs. The details of these three applications are given in Chapter 5, with lessons learned being presented in Chapter 6.

This combined base of theory will be used, in Chapter 7, to support the case for the use of team-based administration for environmental management and protection projects. An example modeled from the international environmental policy making arena will be used to illustrate how teams can effectively address the needs of multi-objective environmental decision making projects.

Recommendations and conclusions are given in Chapter 8.
CHAPTER 2 - THE MOVE TOWARDS COLLABORATION

The Changing Climate Of Business

The unprecedented economic development of the earlier part of this century was accomplished in many countries using a management approach which is sometimes referred to as Management by Results.\(^1\) The method is fostered by the organizational hierarchies which are developed by traditional management practices. The upper levels of the hierarchies develop a set of objectives which are trickled down the chain of accountability in the form of numerical goals and quotas.\(^2\) These goals become the basis by which the organization operates. Managers at all levels attempt to meet or exceed quotas at all costs, fearing repercussions from above.

There are problems inherent to this type of system, where performance is evaluated using figures which are passed from one organizational level to the next. The figures are typically schedule, output, or cost-based, and the reporting of these numbers ignores the details of how the organization achieved the level of performance reported.

This way of doing business must change in order for companies to remain competitive. Managers must change the way their organizations are run. The views and ideas of customers and employees at all levels should be integrated into the decision making mechanisms for improving products and processes. The notion of

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\(^2\) Scholtes, p. 1-5.
short-term profits and bottom line results should be abandoned in favor of long-term objectives, the following of which will lead to healthier and more flexible organizations.

The Case For Collaboration

The problem inherent to managing by the numbers is that it is unusual for the numbers to adequately reflect the needs of the system as a whole. More often than not, the numbers are measures which are completely arbitrary when viewed from a system-wide perspective. The result becomes a series of suboptimizations as opposed to the optimization of the bigger picture.

That is, rather than using measures which improve the performance of an entire process or channel, the measures used are bound by the traditional operational limits of the various functions or organizations involved. As these measures often work towards conflicting objectives, the optimization of one measure by one department causes another department to operate under less than ideal conditions, both in terms of the second department’s performance measures as well as the flow of work into or out of that department.

As an example of how managing by the numbers creates waste, consider two departments in the same manufacturing company, purchasing and warehousing. Using traditional management techniques, in which the boundaries between these two departments and the information that they share are quite rigid, let us examine how the operations of the two departments affect the final product.
We will do this by considering the process of supplying an item to the manufacturing process.

For this examination, assume that the item in question is a commodity for which the manufacturing department has a steady need throughout the year, but demand for the final product which incorporates this item fluctuates throughout the year.

Examples of typical goals of the two departments being considered would be lowest unit cost for a given item for the purchasing department, and lowest operating costs for the warehousing function. To see how these goals are in conflict, assume that the item in question is offered at an extremely attractive cost to the company by a supplier. Further, the purchasing department has reason to believe that the cost of this item will soon rise above the offered price, and remain there for the duration of the current production year. Regardless of the magnitude of the potential price increase, the purchasing department will secure as much of the item at the lowest cost possible. By doing so, this department will thus perform quite well according to its performance measure.

For the warehousing function, however, the picture is much different. The warehouse manager now has to coordinate the space and manpower necessary to accept delivery and properly store the unusually large quantity of the item until it is needed by manufacturing. This could incur sharp cost increases due to hiring more workers or paying overtime to the existing crew, reorganizing warehouses for longer-term storage of the item, or even the need to purchase or lease additional space.
According to the warehouse function's numerical performance measures, that department will appear to be doing poorly due to the cost increases over past years to accomplish what other functions and management assume to be the identical amount of work.

So, although the purchasing department has secured an improvement in its own bottom line, the warehousing function has not. In fact, due to the added expenses that could be incurred, in addition to possible price volatility of the item purchased, the profitability of the company could also be severely impaired.

It is clear to see that the system would be much better served should the two functions discard their traditional performance measures and move towards the situation where shared information between the two functions lowers the overall costs of purchasing and supplying the item to the production line.

In fact, once the criticality of this link has been established, it becomes apparent that the effort to improve the company's competitive position, or other organizational objectives, would also be well served if information from manufacturing and logistics departments is incorporated by into the scheme. Moving back further, we see that sales and product development information should also be incorporated in these decisions, and this stepping back can be continued until it may be argued that all of the company's functions are so closely related to each other that cooperation among functions is vital to the long-term success of the company.

It is the widespread presence of such inefficiencies, and the potential to eliminate them using rational process redesign, which present the case for the use of partnering techniques to the astute
manager. The manufacturing example was used for illustration of the point, but regardless of the project, there is much benefit to be derived when systems are viewed as a whole, be it a manufacturing concern, large construction project, policy development, investigation, or most any other project.

The new paradigm is a system-wide perspective to agree upon a goal, and to work towards this objective while eliminating inefficiencies and identifying other areas of possible performance improvement. In order to identify and appropriately address the needs of the system, all of the component functions must work together, bringing the various needs and abilities of the system to the table and identifying the optimum way to apply these abilities to address the requirements of the project.

The idea is that the efficiency increases throughout the system far outweigh the costs associated with traditionally managed systems. When the savings are equitably distributed, even short term losses incurred in certain functions are recouped by the benefits commensurate with the long-term health of the system as a whole.

Table I presents the differences between the new, team-based approach to project management and the more traditional methods of project management.
Comparison of Characteristics of Traditional Versus Team-Based Project Administration

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Table I
CHAPTER 3 - THEORY OF TEAMS

Based on such Total Quality Leadership/Management (TQL/M) ideas as empowerment of employees and establishing close relationships with one's customers and suppliers, the use of teams as a form of project administration is gaining popularity. Teamwork, or partnering, attempts to replace the conflicting viewpoints and often hostile communications typical to multi-organizational projects with open relationships characterized by trust and the desire to advance the project towards agreed upon goals. ³

Along the way, the members of the team are expected to learn to work and think for the good of the project as opposed to thinking simply in terms of the needs of one's own organization. The desired result of this redesign of organizational and personal relationships is to arrive, eventually, at a symbiotic arrangement where work is performed and problems are solved efficiently, and the needs of all of the organizations involved are honored.

The many possible benefits of using team approaches on large-scale projects stem from the fact that the efforts of a properly functioning team as a whole will be greater than the sum of the efforts of the same group of individuals when working independently. This can be invaluable in a large, multi-organizational project and it is the fundamental idea behind the philosophy of partnering.

An efficient team is able to capitalize on the strengths, positions, and perspectives of all of its members. By doing so, performance gains

are achieved throughout the project in many areas. The result being a performance gain in the long term operations of the organizations involved.

The first step towards implementing a successful partnering arrangement is to improve communications among all parties involved\(^4\), and to allow all parties to gain familiarity with the needs, responsibilities, and objectives of the other parties\(^5\), both on organizational and individual levels.

Establishing clear paths of communication among workers and their counterparts in other organizations, and then allowing these people to become familiar with one another's operations and needs should be accomplished early in the project. Once this is accomplished, the openly-communicating teams can go on to address the project itself using techniques agreed upon by all.

Through open discussions and communications, as well as previous experiences with one another, the team itself can establish where the strengths lie and distribute tasks and other resources accordingly\(^6\). At the same time as a person is working in areas of his or her expertise, he or she is aware of which people to contact for help or information in other areas. The benefit of operating as a team exists not only in the ability to identify where certain expertise lies, but in the knowledge that all expertise is working toward the good of the project, and will be willing to assist when asked. The freer

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communications afforded by a team atmosphere not only allow for project performance increases, but also create mutually-beneficial relationships among team members who value self-improvement and are trying to improve their skills in areas of another's expertise.

Familiarity with others in the project breeds respect for the positions, viewpoints, and thoughts of these other people. From this respect, opportunities for new techniques (better performance) arise as people stand back and allow others to proceed along their own lines. People who are encouraged to pursue their own methods will be inspired to continue to apply their creativity to work in the future.

A large part of the team concept is to get all members involved in the design, implementation, and constant improvement of the goals and processes necessary to complete the project. By putting all team members into this position, the sense of belonging to a team and of "ownership" of the goals and processes are instilled in the team members. All of the individuals involved feel responsible for, and therefore to, the various components of a project. In other words, by allowing all team members to shape the strategy of the project, a sense of commitment is instilled in these workers. This type of commitment inspires better work from employees who take pride in their efforts.

The benefits of using teams continues into the future indefinitely, provided that the method is nurtured and allowed to continue. Once effective teams are in place, they may go on to address various problems that are common to a workplace or other ongoing

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7 Porter, Tom; Pickering, John; and Brokaw, Jerry, "When High-Performance is Not Enough: Lessons from the Closure of Charleston Naval Shipyard", unpublished paper, July 1994, p. 9.
relationship. The long term application of partnering allows for these problems to be continually and systematically eliminated. Several examples of such areas where teams are effective are given below.

One problem common to many organizations in many fields is a lack of resources. Be it manpower, time, facilities, or raw materials, many projects suffer simply because adequate supplies of the necessary goods are not available. In a team environment, the members can quickly identify deficiencies and redistribute resources from other areas of the team's operations to alleviate the situation.

Teams are effective in this situation for a number of reasons. First, as a means to cut through the bureaucracy associated with resource procurement, team members may elect to lend out the resources of their division on faith, and the knowledge that the team will be there to help out their own division when necessary. Also, the teams can quickly identify areas of resource over- and under-supply as they are composed of people that are close to the jobs, and these people are in the best position to identify how much of each resource is necessary for their own jobs, and therefore how much may be spared/is needed. This type of compensation applies to scheduling and task assignment issues, too.

The projects undertaken using a team approach can be expected to have much less rework than those which don't benefit from partnering. This is largely a function of communication and empowerment, allowing decisions to be made on the spot whether to

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9 Sashkin and Sashkin, p. 29.
10 Larson, p.22.
stop work or to continue if a questionable situation arises. Rather than to continue a project according to spec, realizing it will have to be changed later, employees in a team environment are allowed the opportunity to talk with appropriate people when a problem has been identified. The group as a whole then has the ability to make a final decision on the problem area with many viewpoints considered, but not a single memo written. In addition, the communications and decisions are made at lower levels within an organization, where the information is more timely and the repercussions to production may be better understood. The communication, and thus solution, is not only faster, it is of higher quality due to the fact that all team members recognize the needs of all of the groups, and everyone gets a voice in the decision.

Over the lifetime of the project, this ability to identify and resolve problems as they arise can have a very significant impact on the costs and development of the project. Using teams, problems tend to get resolved early on\(^\text{11}\), in informal meetings, before any work has been accomplished in the wrong direction. The earlier a problem is addressed, the easier it is to implement changes, and the less costly it is to resolve\(^\text{12}\). Without teams, work is often performed, even if a problem has been identified by one party early in the process, that must later be redone. This situation is encouraged by the "managing by numbers" technique which has functions pushing work across their boundaries in efforts to meet quotas. However, if substandard work is

\(^{11}\) Harback, Basham, and Buhts, p. 23.

not corrected as soon as it is identified, and the work process continues, the problem resolution process is put into a later time frame, when resolution is undoubtedly costlier.

Properly functioning teams are effective in making decisions from out on the decks of a vessel under construction right up to the boardroom.

**Advantages Of Teams**

- Conflict Replaced with Communications
- Cost/Schedule Performance Increases
- Increased Pride in Work
- Efficient Application of Available Resources
- Move Towards More Efficient Operations
- Performance Gain in Long-Term Operations of Shareholders
- Project Advances Towards Agreed-Upon Goals
- Overall Project Efficiency Increased
- Needs of all Shareholders Honored

**Table II**

Table II lists some of the many benefits obtainable through the application of team-based project administration. Again, the key is that an effective team outperforms the sum of its individual parts. When the organization considering teams recognizes the difference between short-term performance and long-term relationships, and
their respective impacts on the operations of all parties to a contract, partnering becomes a clear leader for project administration.

Elements Essential For Team Effectiveness

Several critical components must be present in the environment of a project in order for a team-based approach to be effective. It is the responsibility of the parent organizations, as well as the team members, to ensure that the working environment fosters these elements.

Most notably, the approach requires that the organizations develop strong communications, trust, and a sense of commitment to each other\textsuperscript{13} as well as the project. With these foundations laid, the remaining components presented in this section can be developed in the resulting team atmosphere.

This section presents several elements which are critical to the required environment of having all parties work toward the good of the project itself.

- Communication

As mentioned previously, communication is one of the foundations on which a team-based approach is built. In a partnering effort, it is essential that ideas and information are free to cross any boundary necessary to get to the parties that need the information.

This simple idea can be a significant hurdle to overcome for a number of reasons. Many organizations may not want to reveal certain parameters of their products in order to protect what they

\textsuperscript{13} Harback, Basham, and Buhts, p.23.
consider their own intellectual capital. Other projects, particularly defense and high-tech related undertakings, may require a certain amount of security. In some situations, there may be organizational policies or even legal barriers preventing the exchange of certain information with entities both inside or outside of the organization owning the information.

Beyond such organizational barriers, operational checks may be in place which slow the free flow of information. In such cases, the requirement to document and get signatures to clear the distribution of data or ideas may create a frustrating barrier to the real-time decision-making process.

Also on the operational level, there is quite often a reluctance to divulge information to parties who may have been viewed as adversaries in the past, or to "waste time" providing information to a party when the use of the information by that party is unclear to the provider.

All of these barriers hinder the abilities of people to work to their potential, and thus limit the possible success of a project. In a team environment, it is precisely these types of barriers which are targeted for removal from the beginning by allowing the various parties to the team to become familiar with the needs and goals of one another. Close communications are encouraged throughout the team, and traditional formal channels are replaced with more efficient, informal communication techniques.

In addition to communications which facilitate the performance of their every-day duties, team members must also remain informed
on team as well as "big picture" issues.\textsuperscript{14} Communications links must therefore be in place for all team members to be updated on recent developments in areas such as customer needs, incentive systems, new corporate or project directions, etc. This means that managers should not only periodically update employees on project progress, but they should also make the commitment to respond to the questions of employees at all levels when they arise.

Effective communications often rely on strong relationships between employees. Team approaches encourage such close relationships.

- \textbf{Trust}

True team members count on each other to work and make decisions that would be acceptable to the team as a unit. As mentioned earlier, effective teams rely on strong interpersonal relationships. Trust is the one element that is necessary in any significant relationship between people.

In the absence of trust, a team effort has little chance of capitalizing to the full extent on the talents available in its members. The potential for synergy will not be realized.

Research into team-based project management has shown that trust is fostered in an environment which includes the following attributes\textsuperscript{15}:

- Honesty
- Openness
- Consistency
- Respect

\textsuperscript{14} Larson, p. 24.
With these elements in place, the trust which is crucial to a successful team effort can develop. Trust is an integral element for a number of reasons.

First, trust allows the team members to maintain the common goal of the effort. On the most basic level, if team members are confident that the other members are striving towards the agreed upon goal, no energy is lost to political causes.

Mutual trust ensures that team members are allowed to focus on the common objective without feeling a need to second-guess the motives of other team members or to guard certain information vital to the task of the group. With trust in place, communications and information flow are allowed to proceed undisturbed, facilitating the team effort.

Trust also enhances the quality of communications. In addition to the increased efficiency in the flow of information mentioned above, the nature of the information is noticeably different in the presence of trust. When team members trust each other, they are comfortable in breaching and discussing topics which would otherwise be avoided. Such topics range from issues that may seem embarrassingly trivial to mention, despite the fact that the team suffers if these issues are not brought to the table, to issues which may be considered negative. Negative issues might include disappointing performance reports, conflicting viewpoints, or negative feedback related to the interactions of the team itself.

Trust not only enhances the flow of communications within a team, it also improves the quality of the output of the team for two reasons. First, it is obvious that a team operating with effective
communications will benefit from the information flow. The second reason that the quality of the team output is enhanced is that a trusting environment allows individual team members to take risks which might not normally be allowed during the course of the project.

Risk taking, when controlled, is at the heart of most innovations. When team members are aware of their own technical competence, as well as the areas of expertise of the other members, the team can foster a situation where members are encouraged to break the mold of traditional solutions and develop more creative solutions. This situation can only exist if the people involved trust each other to act within their expertise and to ask for assistance when necessary, and to report their findings, positive or negative, to the team.

Trust facilitates a collaborative climate. Decisions can be made which reflect all sets of information.

In addition to trust among team members, trust between members and management must also exist. The first type of trust can develop only through personal interactions, and is facilitated by support of the team effort by each team member's home function or organization. Trust between the team and management is fostered through ensuring that the team is involved with the development of its goals and processes, and ensuring that the team maintains a feeling of autonomy.16

Finally, the maintenance of trust is an easy but crucial task which must be performed to ensure the long-term health of a

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16 Larson and LaFasto, p. 93.
partnering effort. Trust is easy to maintain since it can only be
broken by an active effort to do so. It is crucial because once trust is
broken, it is very difficult to recover, and it can never be recovered
to the full extent to which it once existed. Therefore, even a slight
breach of trust can lead to very detrimental effects in the long run.

- **Commitment from Above**

A team approach requires commitment from all parties\(^{17}\), at all
levels. This commitment is especially important when it comes from
higher up.

A typical response to the implementation of a team-based
project in an organization which has not used management of this
type is that it is probably just the latest management fad, and it won't be around for long. In many potential applications, this is
precisely the case. Management must recognize this potential pitfall
and support the effort if it expects the team members to believe in
the approach. Employees need to know that the effort is not an
isolated experiment and that management wants the team to succeed.

Management must identify and allow for the necessary changes
and support which ensure the success of a partnering effort, from
increased time needs at the beginning of the project, to allowances
for departures from standard operational procedures. Also, incentive
systems and other organizational mechanisms which are in conflict
with the team approach must be addressed.

Traditional corporate mechanisms of incentive and reprisal, and
therefore, the goals and the threats that they create, must be removed

\(^{17}\) Katzenbach and Smith, p.40.
from the system to encourage employees to take risks and feel comfortable.

Management's commitment needs to be seen, both verbally as well as in the form of various cultural changes, for the team to feel that it is on the right track, and to remove the distractions of worrying about home-department issues in this foreign working environment.

Commitment must be maintained by all functions and organizations throughout the project to maintain a constancy of purpose for the project. If it becomes apparent that one or more parties is losing interest in the arrangement, the effort has not succeeded. An organization which is attempting to move to the use of team-based project administration must not be discouraged with what seems to be excessive expenses. The use of teams requires an early commitment, not only in words or writing, but also an up front investment of resources (time, lost productivity, training, and money) to bring the organization up to speed with the approach. The payoff of partnering is in the future, and the only way to obtain this payoff is to remain committed.

• Risk Sharing

What enables such components as trust, close communications, and the open sharing of information to materialize in a team effort is the equitable distribution of risk. The understanding that any problems, conflicts, or other traditional sources of conflict between interacting divisions or organizations would be viewed as shared by the team as opposed to any specific group or individual allows teams

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18 CII, P.3.
to look beyond traditional management mechanisms to view the system as a whole. This holistic approach is the means by which the most dramatic improvements in performance may be obtained. As mentioned earlier, risk taking has been the reason behind many great accomplishments.

Without this sharing of risk, a situation may be created in which one or more parties stand to "lose". By sharing risk evenly, only the team can succeed, and only the team can lose. This sharing replaces finger pointing with rapid action when a problem arises. Instead of asking, "Who did this?", the team members ask, "What does the team have to do to remedy this situation?" This second question will clearly yield more productive responses.

- Common Goal

Another crucial element to a successful partnering application is the alignment of the goals of all of the individuals and organizations involved towards a common goal\(^\text{19}\). By doing so, a situation is created in which decisions from all sides are made with the same objective rather than from the often conflicting agendas of the various functions and organizations. By eliminating such agendas, as well as decisions prompted by other motives, a situation is created where the members of the team will function towards the good of the project as opposed to simply forwarding the needs of their respective organizations.

The situation where goals are not aligned can be exacerbated when there are means for employee empowerment in place. This happens as people in many capacities are allowed to make and commit

\(^{19}\) CII, P. 3.
resources to decisions, yet each individual is also working towards a different end.

Goals should be mutually agreed upon, so that people are not only working towards a common goal, but team members feel that their interests have been considered when establishing the goal. Also, if a goal is dictated from a management position, or from the team leader, and that goal proves to require a lot more work than expected, the team may feel that it is being unfairly exploited. This situation has arisen in the past with the result that the team may generate some short-term improvements in productivity, but the long-term result is that members lose interest in, and withdraw commitment from, the team. Thus, in order to ensure that all team members buy into the goal, they must be allowed to develop the goals of the team as a team.

When a team is developing a goal, team members must be careful to avoid developing mission statements which are ambiguous, and instead design mission statements which clearly identify work to be performed, and objectives which can be measured.

In the haste to apply various management techniques, many organizations ignore the need to define quality in the context of the corporate goals. Because of this, the charters and mission statements of many organizations contain such inspirational but empty objectives as "to perform quality work" or "to improve customer service". Without defining what quality work or products are, or what customer service is and which directions are improvements, it is not clear when these objectives are being met, nor how to change one's work patterns to meet them.
Teams must avoid this trap by developing mission statements which not only define what output is required of the team, but also what performance measures will be used to assess the position of the team with respect to the desired goals. In many cases, the team must also interpret such vaguaries in the parent organization's charter as mentioned above to ensure that the team's objectives are in sync with those of the larger organization.

The process of developing the goals for a team contains an important element which quite often shapes the way the various team members regard each other and their respective organizations. When discussing possible goals, the members of a team gain an understanding of the needs of the other people they are working with along with the needs of the various parent organizations. People must understand what is going on around them, and what they are a part of, in order to realize how to maximize their productivity within the project. Quite often, the process of gaining an understanding of the needs of the various team members leads to a breaking down of organizational biases as members recognize that other members are under the same kinds of pressures and have similar accountability to their parent organizations. When members understand the missions of other members, personal relationships improve allowing better team cooperation and performance.

Finally, teams must consider their time frame when developing goals. For instance, some teams established for tactical missions may be disbanded once a particular problem has been solved. These teams must establish a method by which any lessons learned or potential process improvements identified are not lost when the
team disbands. Similarly, teams with indefinite ending criteria must make strategic provisions in their mission statement to allow for adaptation of changes which may occur over the longer time frame.

- **Operating Norms**

  The mission statement does not only define the goal of a team, but it also defines the team itself. The mission statement contains the operating norms of the team, the definitions of acceptable team behavior and the mechanisms by which the team will approach its assignment. They define the roles and standards which the team members must uphold.

  Norms establish acceptable limits on the various resources available to a team including time and money. They provide the team with accountability and performance measures. Norms establish operating procedures for the team. For instance, they may establish how long the team is allowed to study a problem before outside help must be called in for assistance, or which voting or decision mechanisms will be used at which times. Norms must also establish how decisions and discoveries by the team will be documented to support team decisions outside of the team structure and to ensure that efforts are not lost.

  The norms of a team should also state the deliverables required for the project. Deliverables considered by the mission statement are not limited to the final team output, but also include the reporting method by which each team member describes his or her progress to the rest of the team. Such norms outline the accountability each member has to the team.
Norms are particularly important to ensure that conflicts within the team remain manageable and to prevent the team from "getting stuck" on team or personal issues. The mission statement must provide the team members with effective methods by which to give one another feedback on their performance within the team. Norms established for this purpose are generally designed to preserve the relationships between the team members, but also allow team members an avenue to assist other members in adapting to the team environment. For instance, a team may establish that negative feedback may not be given unless it is preceded by a positive comment.

The mission statement must also establish processes for meetings such as whether or not an agenda will be used for meetings and, if so, how issues that are not on the agenda may be brought into the meeting. Also, where and when meetings will be held, and if minutes will be taken at the meetings. Norms establish acceptable attendance policies and address the situation where extra or "emergency" meetings are necessary.

Finally, the mission statement must include mechanisms for revisiting and redesigning the statement should it prove ineffective or lose applicability.

- Employee Empowerment

Effective partnering applications also empower employees throughout the project's hierarchy to make decisions in areas in which they are competent. The combination of improved communications with empowered employees lower down can create a powerful decision-making mechanism that can make organization-spanning
decisions in real-time. Not only does this mechanism save time and effort for many people, it returns the highest-quality decisions possible due to allowing operations-level decisions to be made by those employees with the perspectives. Further, in the absence of crises, empowerment leads the way towards continuous improvement.

The key factor to the success of empowerment is the recognition that workers add value not by tending machines and performing routine functions, but by capitalizing on their position in the system to discovering opportunities for improvement in the products and processes of the organization.\textsuperscript{20} A correlation to this is that any routine job which does not allow the worker input into the system is one that can be exported to a lower-wage area, or programmed into a machine.

By allowing more employees to make decisions which are within their areas of competence, an organization becomes more efficient and flexible.

- **Effective Incentive Systems**

Evaluating teams is an area of much dispute, but the fact remains that, unless there are effective mechanisms in place to do so, teams will not reach their full potential. This stems from the fact that, ultimately, it is the incentive system of the organization which motivates and establishes the behavioral patterns of its employees. Almost universally, incentive systems rely on the results of individual evaluations.

Even managers who recognize this situation are often powerless in the possible reshaping of corporate incentive systems. In these situations, the manager must attempt to establish non-monetary incentives to ensure team cooperation.

One such system is allowing the team to have a great deal of control over the project even prior to the widespread acceptance of the team approach. By allowing the team to establish its own mission, goals, and norms, and showing that the members will be free to experiment in different areas, a feeling of ownership of the project, and confidence in the method, is instilled early on. As mentioned earlier, this ownership often brings out the best in the members of the team as "people support what they help to create."

Thus, a properly functioning team environment, in which employees are empowered to make decisions, shape the strategy of the team, and challenge themselves, becomes an incentive in itself. People recognize the freedom in their work and respect of their teammates as a more positive experience than working in the same organization without the benefits of the team experience.

In addition to the recognition within the team structure itself, team members also respond to recognition from above. An effective management system will capitalize on this often overlooked method to inspire employees.

This type of recognition is particularly applicable in a team environment as team members are asked to take on challenging roles, redefine processes, and meet specific performance objectives. These duties are often outside of the job descriptions of the team members, and thus team participation means that employees are
going beyond the call of duty. This type of recognition encourages team members to not only accept risks, but also controls the amount of risk that employees are willing to accept.

Recognition should occur close to the time of the event being praised in order to reinforce the individual's own pride of accomplishment.

One other powerful mechanism that can be used to improve the willingness of individuals to cooperate within a team framework is increasing trust and freedom in their work. Allowing employees to increase the control over the approach that they take to their tasks not only improves their morale, but also allows them to work in a manner that is more comfortable and thus more productive for them.

The use of these incentive mechanisms should not be reserved only for individuals within teams, but should also be applied to the team as a whole. Such recognition adds a sense of belonging to the team members, and solidifies the relationships, inspiring increased and improved team efforts.

Occasionally, the monetary incentive system of an organization, if one exists at all, can be "massaged" by a shrewd manager to better reflect the needs of a team environment. For instance, if a department is periodically allotted a certain amount of money for bonuses, the manager might allow the team to decide how this money should be distributed. This is particularly effective if the money is part of a gain-sharing program which returns a percentage of money saved on expenses. In this latter case, the team has a strong incentive to set demanding goals.
Similarly, if monetary incentives aren't available directly to the employees, a manager might let the team decide how to spend certain facilities improvement funds. For a clever manager, there may be several ways to provide the team with the incentive to achieve high performance.

On the subject of incentive systems, it should be noted that there is a condition common to many organizations which is worse than a lack of an effective team evaluation and incentive system. This is the fact that many organizations place strong emphasis and incentives behind individual efforts. In fact most promotion schemes rely on individual assessments to allocate positions and bonuses. Therefore, while managers and others may preach and even practice the use of teams, people will go and do what they are paid to do.

In other words, while an effective incentive system to facilitate team performance has yet to be proposed, there are many mechanisms in place which act as disincentives to team efforts. Regardless of the many training programs, displays of commitment, or other mechanisms which the managers of a project may select to promote the use of teams, people will do what they are paid to do. If the reward systems of organizations are designed to enhance the performance of the individual, this is the type of performance which should be expected of any rational person working under that system.

Table III lists the elements which are essential to the effective use of teams.
Elements Of Successful Teams

- Strong Communications
- Trust
- Alignment of Goals of all Interests
- Top-Down Commitment
- Constancy of Purpose
- Equitable Sharing of Risk
- Employee Empowerment
- Operating Norms
- Mutual Understanding of Missions
- Effective Incentive Systems

Table III

Team Membership

In addition to the elements which must be present in the operating environment, teams need people to make them work. The crucial difference between teams and working groups is that teams can attain performance beyond the sums of the individual contributions. This is in contrast to working groups, which strive to maximize individual contributions.\(^{21}\)

There have been certain notions in the past of what was expected of team members. Traditionally, a "team" in the workforce implied the presence of "team players", people who attempted to guess what ideas were sought by top management, adopted these

\(^{21}\) Katzenbach and Smith, p. 131.
ideas as their own, and furthered them throughout the organization. Such a "team" environment inhibits creativity and progress. The organization loses the challenge of internal criticisms as they are not voiced. These "teams" do not have the ability to learn or achieve the synergy of information and ideas which allow true teams to outperform individuals.

To attain the performance increase, teams require that the membership possesses certain attributes and skills which enhance the relationships and interactions of its members.

By nature, the team process is one of learning, and successful teams are able to recognize and develop the skills required to accomplish the goal of the team. However, there are certain personality traits which, when present in team members, tend to improve the chances of success of the team.

The following section will describe some personal attributes which have been found to be predominant on successful teams. The section will outline traits of members in general, and then discuss traits which are critical to successful team leaders.

- Team Members

First and foremost, a team member should not consider team participation as an intrusion on their normal duties. The requirement of commitment from above to ensure the success of a team effort has already been mentioned. If this commitment is not present, the team cannot be expected to become successful, so membership becomes a trivial issue. However, given that this commitment exists, a company will show how certain projects are

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22 Scholtes, p. 3-15.
valued by establishing teams for the higher priority issues. Team members should recognize this, and allow themselves to put aside home-department issues when working in the team framework.

It is also critical for team members to be willing to contribute to the team effort, in whatever capacity required. This means that the member must take on work and responsibilities which are commensurate with his or her experience and the objectives of the team. Members must have a sense of individual accountability to the team and its objectives, and be willing to take on the risks which are required of the members for the team to become successful.

A team member must also recognize his or her right and responsibility to become familiar with the project. They should be prepared to initiate discussions on issues which may or may not have been addressed previously, and seek the information which will help them accomplish their tasks or provide insight to the team.

This should be kept in mind when a team member is avoiding asking a question because it may be trivial or received the wrong way. It should also increase a team member's willingness to constructively criticize or challenge other members. Similarly, a team member should recognize these rights in the other members and be ready to assist them in understanding the project or related systems. Members should be encouraged to voice their thoughts for the purpose of getting work done as opposed to harboring them and retaining inefficiencies and probably failing as a team. Also, team members must recognize the situation when a productive discussion has deviated too far from the core issues, and be willing to bring it back in line.
When assigning tasks, team members must avoid stereotyping themselves or others\(^\text{23}\). Self stereotyping occurs when a team member is reluctant to take on tasks or assist in making decisions outside of his or her area of expertise. A person who is unable to take on challenges outside of comfortable areas will lessen the potential for learning and innovation on the team.

Similarly, people will often stereotype others into roles which impede the progress of the team. For instance, one team member may have worked with another and know they can count on the second team member for assistance in certain areas. However, this doesn't allow for the learning desires of other individuals, including those of the second team member, and works against the team ethic of challenging and improving one's self. Similar stereotyping may be done along gender, race, or other lines. In these cases, not only is the exposure of certain teammates to certain tasks limited, it could also create an insulting distrustful climate.

Stereotyping is detrimental to the development of the team, by limiting its flexibility, capacity to learn and innovate, and can breed feelings of mistrust. A \(^\text{23}\), it is detrimental to the team members as individuals as it can prevent them from attaining their development goals.

Aside from these characteristics in team members, teams also require an appropriate set of skills to accomplish the project at hand. To allow for the greatest interaction, and thus the greatest chances for team success, the team needs a set of compatible ye.

complementary skills\textsuperscript{24}. The membership should strike a balance between the following skills in order to allow for the maximum performance from a team:

- **Technical or Functional Expertise** - Teams need to have expertise in all areas which have an impact on the project. For example, if the team is assigned to the task of redesigning a molded plastic part, the success of this project would not only depend on the skills of the designers and engineers in the team, but would also depend on information from areas such as chemicals, production, marketing, scheduling, etc.

- **Problem-Solving and Decision-Making Skills** - These skills ensure that the team has the facilities to identify the problem or situation which it faces, can identify the informational requirements to make an appropriate assessment, can generate options or alternatives to address the situation, and know how to identify and address tradeoffs inherent to the alternative courses of action suggested.

- **Interpersonal Skills** - The importance of communications has already been emphasized. Team members must not only be able to communicate, but they must also feel comfortable doing so. In addition, team members must be able to recognize when others need assistance, and offer it in such forms as constructive feedback and conflict, offering objective opinions and

\textsuperscript{24} Katzenbach and Smith, p. 47.
support, giving teammates the benefit of the doubt when problems arise, and providing recognition and praise when tasks are accomplished.

Despite the importance of these skills to a high performance team, there is no requirement that all of these skills be present within the team from the outset. The requirement is that the team has the capacity to develop the necessary skills within a reasonable time frame. The initial lack of any of these critical skills can be compensated for in the short term, either by team members or outside help who are strong in certain areas.

The performance orientation of teams allows the members to identify what skills are missing, and create plans to address these needs. In fact, it is often the potential to develop the above skills rather than their initial presence, which allows the team to identify their initial position with respect to the objectives of the team.

- Considerations for the Selection of Team Members

There are two main traps to avoid when selecting team members.

The first involves the focusing on one of the above team member skills. For example, it may seem attractive to include a high degree of technical expertise on the team being developed for an engineering project. However, if the team established in this manner lacks the appropriate communication or analytical skills to effectively integrate their technical strengths toward the team objective, the team will remain ineffective.
The second trap arises as it is possible to place too much emphasis on ensuring the presence of the three criteria when selecting team members. Again, an effective team will be able to identify any skills which it is lacking, and it will address this problem. If a team possesses an adequate amount of any two of the above skills, and the drive to succeed, it should be able to develop the third. In fact, it is uncommon for a team to possess all of the required skills from the outset.\textsuperscript{25}

It must also be noted that the selection of the right team members is not always possible due to personalities, groups participating in a project, and skill sets available to the organization or organizations. Therefore, quite often the best that project management can do is to ensure that the team environment is in place to foster the team development, and to attempt to ensure that the team members believe in the approach and have the potential to develop the skills necessary for team success.

• Team Leaders

To understand the role of a team leader, one must first examine the needs of a team. On the most basic level, a team needs to see that the team approach is a valid method to address its project, it needs to understand its objectives, and it needs the resources and room to operate in the effort to meet these objectives. The leader, therefore, must work to ensure that the team's needs are met, allowing the team to become successful.

The first role of the team leader becomes one of championing the team approach. To be effective in this role, the leader need not

\textsuperscript{25} Katzenbach and Smith, p. 47.
reiterate the literature or cases available regarding teamwork, but instead simply possess an honest commitment to the team approach, and to the success of the team he or she is leading.

The demonstration of this commitment requires two crucial, yet often overlooked, components. The first of these is that the leader must demonstrate commitment in his or her own actions. This includes maintaining an attitude of enthusiasm for, and confidence in, the team.

The leader shows confidence in the team by recognizing when he or she needs help in managing the team, particularly if the situation is tending towards a possible decline in team performance. Being a team leader means that the individual must rely on, and recognize the limitations of, his or her experience, and ignore issues of rank when solving problems. When assistance is needed, a good team leader will ask for it, and call the attention of the team to the problem at hand. The leader must avoid attempting to provide answers, and rather challenge the team to develop them. It is an attitude which recognizes that neither the team leader, nor any other individual team member, possesses all of the answers which the team requires.

The second mechanism which the team leader must use to establish and solidify team commitment is that of functioning as an equal team member. Thus, a team leader must also make the contribution of working towards the goal of the team instead of hiding behind the position of leader to create distance between the functions of leaders and members.
In other words, the leader must perform real work towards the performance objective of the team, in addition to his or her other duties both within the team and outside of it. Many leaders find that assisting with the "grunt" work or other unattractive assignments, rather than delegating away such tasks, creates a powerful tool to demonstrate commitment to the rest of the team.

In addition to demonstrating commitment to the team approach and the team itself, the leader must also assist the team in the process of establishing performance objectives and team operating policies.

In the absence of a guiding role, many teams can become lost in the traditional literature of team approaches and develop mission statements and operating procedures which are both vague and uninspiring. The leader's function is to ensure that the team turns such ideals as "to improve quality" into clearly defined performance objectives which make it apparent whether or not goals are being attained. When acting in this capacity, the leader must also ensure that the performance goals developed by the team are pertinent to the objectives of the project and the requirements of the parent organization(s) of the team.

Similarly, the leader must ensure that the team includes mechanisms in its charter which clearly define acceptable team behavioral norms. For instance, early in the life of a project, when such documents are drafted, it is often overlooked that the team will more than likely reach several impasses throughout the lifetime of the project. The leader must ensure that the team includes
mechanisms for decision making and conflict resolution in its charter, and understands the implications of using such methods.

These roles are perhaps the most demanding roles which the leader must perform. The challenge lies in the offering of guidance to the team at two levels. At the first level, the team looks to the leader to reflect perspectives which must be considered in solidifying goals and procedures. This requires that the leader place distance between his or herself and the team in an effort to assist the team in the clarification of their goals and procedures. However, the leader is also expected to act as a team member, and must give input on this level. The danger here arises when the team cannot distinguish between the two levels of the leader's input, or the leader's input on the team member level goes unchallenged.

In either case, the result is the same, the team places more value on the leader's input, and the goals of the team become a reflection of the goals of the leader. This situation nullifies the team approach, and can happen at any time during the course of the project, but is most critical in the team definition phase.

Once the team is on track, the role of the leader becomes one of maintenance and guidance. The leader must ensure that trust and commitment is built among team members, and that the team is working towards its agreed-upon goals. The role means that the leader must monitor team progress and performance, and report that progress back to the team. When progress is good, the leader should commend the team. If progress is not as expected, the leader must make that clear, and challenge the team to develop an approach to rectify the situation. In this latter case, it is important that the
leader does not allow accountability to become an issue. It is times like this which make or break teams, and the leader must make it clear that only the team can succeed, and only the team can fail.

The maintenance role presents other duties for the team leader. For instance, the leader has to assist the team in sustaining or developing the necessary blend of skills to become successful.

The team approach, by nature, acknowledges that the skills required for a project may not be present among the combined skills of the team members. However, the philosophy provides that the members work together to cover areas in which they are lacking. This implies that team members share skills and experiences with one another when possible, but they also identify skills which are absent from the team membership. The team then decides if it would be possible to develop these skills within the team structure, or if outside help will be necessary to meet the team needs.

The leader assists in this process by encouraging team members to take the risks necessary to develop the missing skills, and by intervening (in the form of providing new talent or information from outside) when the skills cannot be developed internally or within the required time frame.

Other maintenance activities which the leader performs throughout the course of the project are related to the management of the interface between the team and its parent organization(s) and the removal of barriers to the success of the team. In the context of the whole system, the leader must be able to effectively balance the roles he or she plays as a link between the team and the rest of the organization.
The leader must recognize the duty that the team has to the parent organization, and ensure that the team's objectives are in line with, and team work is being done towards, the goals of the organization. On the other hand, team leaders are the strongest, and often the only, ally that the team has within the parent organization. In addition to the facilitating role that the leader must play within the team, the leader must also ensure that the team is insulated well enough from organizational pressures to perform effectively, and that the team is provided with the resources it needs to do so. This act of balancing the needs of both the team and the organization, has been referred to as "managing the boundary."

Managing the boundary between the team and the parent organization(s) requires that a leader perform three critical functions26. First, the leader must ensure that the team understands its own norms so that the leader supports the work in progress and can predict the performance of the team when reporting to management. Second, the leader must be provide constructive feedback to both the team as a whole, as well as the individual members. Feedback in areas ranging from project performance to individual behavior within the team structure are vital to the development and maintenance of a team. The third requirement of effective boundary management is that the team leader must be effective at negotiating the appropriate resources and scheduling which the team requires to accomplish their tasks.

These boundary management skills lead to the next requirement of an effective team leader, that of being trusted by the

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26 Hirschhorn, p. 18.
team. An effective team leader gains the trust of the team early in the life of the project. This trust grows as the leader demonstrates his or her commitment to the team by supporting the team and its purpose in the many management arenas in which the project may be discussed. Team members need to know that their leader will be fighting for their cause, often against potentially devastating organizational forces and barriers, in order to maintain the vision and goals of the team. When the members know that their leader will do so, they need not worry about the boundary between the project team and any other organization, and may continue pursuing their performance objectives.

The final maintenance role of the team leader involves the revisiting of the team charter or mission statement. Just as a team may become stagnant due to an improper mix of skills, or the lack of an infusion of new skills, ideas, or information, a team can suffer when its performance objectives become inappropriate.

In the course of the project, the team's goals may need to be revisited due to changes in the business environment, support from parent organizations, technological developments, or any number of other reasons. The leader must stay abreast of issues which may affect the team, and keep the team informed of its progress with relation to these issues. The leader must also recognize when changes create the situation in which the team must revisit its performance objectives, and modify them accordingly. In other words, the leader must make sure that the team maintains its objectives in a state that is appropriate to the operating
environment. As with the establishment of team goals, the leader must exercise care to avoid steering the team when revisiting goals.

Clearly, the leader's role is one of guidance which evolves with the progress of the project. The leader must recognize these facets of his or her role, and support the team according to its changing needs. The team leader must operate in a manner which not only supports, but furthers the environment of the team both in the team itself as well as in the context of the project as a whole.

Finally, when reviewing the traits of a successful team leader, it should be noted that these are all skills which almost everyone is capable of developing. In fact, in the course of a long or demanding project, it is not uncommon for leadership within the team to switch among the members, or for non-leaders to identify and develop the necessary skills for team leadership on subsequent projects. Leaders emerge when team members develop the above skills, and learn to apply them at the appropriate time.

- Considerations for the Selection Of Team Leaders

In most situations, team members may not be hand picked. In certain situations, they can be. However, a team approach is a learning process, and teams will learn to work together, or around hold-outs, and thus member selection is not so critical.

The selection of a team leader, on the other hand, is a much more significant process upon which the success of the project hinges.

Successful team leadership depends more on the external support which the team receives, the mechanisms by which a team will be allowed to succeed, than the skills which the initial team
leader possesses. As effective teams are learning units, they possess the potential to identify and address their leadership requirements. Time should not be wasted looking for the ideal team leader, but rather a person who possesses a good mix of competence, the drive to succeed, and a commitment to working with teams. It is this starting point from which successful team leaders, and successful teams, develop.

Managers should therefore commit more resources to supporting their chosen leaders than to the leader selection process itself.27

There is one major consideration when selecting a leader. Unfortunately, there are people in the work force who are predisposed against team-based approaches. Although such people have been successfully integrated into team structures, such people should not be selected for team leadership. If the team leader lacks a clear commitment to the approach, it cannot be expected that the approach will succeed.

27 Katzenbach and Smith, p. 146.
CHAPTER 4 - CHALLENGES TO SUCCESSFUL TEAMS

The true challenge to a team application comes when there is a problem that would ordinarily be handled by such mechanisms as contract clauses and dispute resolution departments. When such conflicts begin to appear in a newer partnering arrangement, it may be tempting for the people or organizations involved to resort to the more comfortable positions they had used in the past. However, these tactics are often detrimental to the spirit and execution of a partnering project.

Each project or organizational team faces a set of barriers which is unique to the given situation. Such barriers are spawned by every factor in the operations of the team, from the application or project which the team is to address, to the organizations involved with the team, to team membership itself.

This chapter will present a number of general areas in which barriers to the success of a team application may arise.

Barriers Due to Organizations

Despite the benefits that the theory of teams describes, and the proven performance of teams in cases involving many types and sizes of organizations, many companies are reluctant to adopt this approach. This reluctance is easier to understand if one steps back and examines the operations of traditional organizations in the U.S.

Barriers to the successful (or even attempted) application of teams within an organization can exist anywhere from the structure
and operations of the organization itself right down to the mindsets of the individual employees.

Many organizations do not value long-term benefits as much as short-term gains\textsuperscript{28}. This attitude creates a substantial barrier to developing a team environment as the theory behind a partnering philosophy assumes operations that extend well into the future. Using this assumption, the extensive training and other "down time" of employees required in the initial phases of establishing a working team culture are more than offset by performance gains in the future. The fact remains, however, that in the short term, time, money, and other resources are used which would not be consumed if the new approach was not attempted. An aversion to incurring these expenses can create a significant hurdle in an organization that is attempting to tighten its belt or to make a favorable financial report.

Related to the thinking of an organization's management, the leaders of many organizations don't recognize the fact that the competitive environment in which they operate is a constantly changing world\textsuperscript{29}. Through the use of empowered employees throughout the structure of the organization, the firm gains the capability to constantly adapt to its market. Before this potential is recognized, however, managers puzzle over why an approach that yielded success in the past does not produce the same results.

Dwelling on past methods of management and/or project administration, often established by the leaders of previous generations, managers create even tighter controls which choke the

\textsuperscript{28} Katzenbach and Smith, p.41.

\textsuperscript{29} Hirschhorn, Larry, p. 2.
operations of the firm rather than relax the controls to take advantage of the knowledge base possessed by the individual employees. The barrier here is that management is too caught up with managing from the top down, and unsolicited input from below is counter to traditional management philosophies.

One last barrier results from the traditional culture of a business organization. It is just not natural in this environment to trust one's customers and suppliers to an extent to have a completely free flow of information with these entities.\(^{30}\)

**Barriers Due to Individuals**

Beyond the hurdles encountered due to the structure and workings of an organization, barriers to the successful application of partnering may come from individuals as well.

For instance, the tendency many people have to resort to familiar ways when the environment becomes hostile also presents a significant problem for teams to overcome. In the workplace, this "survival" instinct may surface at the first sign of crisis situations ranging from "routine" emergencies to the case where such job-threatening situations as reductions in force arise. In this type of situation, employees would tend to drop the team method for earlier methods. This may be a result of feeling more comfortable in the earlier mode, and thus reverting makes the employee more comfortable in the adverse situation. It may also be the result of the employee's desire not to have their fate in somebody else's hands when the chips are down.

\(^{30}\) CII, p. 6.
Along the same lines, many people are reluctant to join teams in the first place as, by nature of becoming a team, control over certain areas of one's job is entrusted to others. This can be increasingly uncomfortable in crisis situations, or even in normal operation periods if the performance of the employee will be evaluated, at least in part, according to the successful accomplishment of the task in question. It is the desire to "cover one's tail" in this latter situation that presents a challenge to team approaches.

There are also barriers to partnering that occur due to individual personalities. Certain people are just not team players, and any efforts to attempt to make them a part of a team will not be well received, and will not yield results. The team must devise a way for dealing with such people, as their talents may still be needed on the project.

Certainly, the list of all barriers to the effortless application of teamwork would be quite long. Organizations considering using partnering should review their operations and employees in an attempt to identify barriers early in the process. For guidance, the central theme to the above barriers may be interpreted as follows: If a person or organization does not firmly believe in, or at least have an open mind in connection with, the application of a team approach, a serious barrier exists. In this situation, the approach cannot be expected to be successful. The following table (Table IV) lists some areas where barriers to a team-based approach may be encountered.
Barriers To Successful Team Applications

- Lack of Commitment/Belief
- Poorly Defined Teams
- Conflicting Organizational/Departmental Goals
- Organizational Biases
- Organizational Size/Structure
- Geographical Barriers
- Barriers to Information Flow (legal, strategic, etc.)
- Operating Environment (cutbacks, shrinking budgets, changing of guard, etc.)
- Personal Biases
- Personal Behavior (training/reactionary/personalities)

Table IV

Addressing Barriers

Although barriers take many different forms, the one constant among barriers to the success of a team is that they are only as dangerous as the team allows them to be.

Successful teams thrive on obstacles. With each surpassed barrier, the team becomes stronger as a unit. In fact, the most successful teams are those which incorporate obstacles into their missions. By relating a barrier to a measurable performance objective, the team can track its progress toward overcoming the
obstacle. This is the surest way for a team to successfully negotiate an obstacle. 31

It must be understood that the list of potential barriers to a team applications is much smaller than the list of barriers that a team can surmount by combining resources, skills, and experiences which would not be surpassed by work groups or individual efforts. Clearly, the small number of additional barriers unique to team-based approaches pales in comparison to the impact a high performance team can have on the overall performance of a project or organization.

31 Katzenbach and Smith, p. 152.
CHAPTER 5 - CASE STUDIES OF TEAM APPLICATIONS

Introduction To Cases

The chapter will present three case studies which involve team-based approaches. The authors of these case studies were attempting to investigate the current state of, and benefits derived from, partnering-type approaches where the Navy was a party to the project.

The **USS Dolphin** case\(^{32}\) involved a team building effort between Naval Sea Systems Command (NAVSEA), the Mare Island Shipyards employees, and the crew of a diesel-electric research submarine which was to be overhauled. The team effort began well in advance of the ship's arrival at the shipyard. This project had quality as the main focus, but it also had to operate with a budget that was 12\% less than that for previous overhauls of the same nature. In addition, the limited access of the vessel (a single hatch) brought logistics and safety issues to the forefront of the team's agenda. This project met all of its quality and budgetary requirements, although doing so required that the schedule slip a bit.

The procurement of the **T-AGS 45** research vessel is another example of applying partnering to a Navy project.\(^{33}\) This time, however, the partnering was to cover the procurement of a single vessel, from design through construction. The accelerated schedule requirement for this vessel encouraged the use of a team effort for this acquisition. This decision occurred before the vessel contract was

\(^{32}\) Dolphin Case
\(^{33}\) T-AGS case
awarded, and drove the selection of the contract type as well as the bidding process. In this case, the eventual partner to NAVSEA (the winner of the contract award) was the Avondale shipyard.

The third case examined was the SEALIFT Team building Workshop developed by SUPSHIP San Diego (SSSD) to create an open team environment for the SEALIFT vessels being converted and constructed at the NASSCO shipyard in San Diego.\textsuperscript{34} The application of a team approach for these projects began at NAVSEA in Washington, D.C., in the early planning stages of the project, and this workshop represented a culmination of these efforts. The groups represented at this workshop included SSSD, NASSCO, NAVSEA, Military Sealift Command (MSC), the American Bureau of Shipping (ABS), the US Coast Guard (USCG), and the US Army.

This workshop, taking place roughly one year after the SEALIFT conversion contract was awarded to NASSCO, had large-scale improved communications and process improvement as the central foci. The nature of the SEALIFT projects is quite unique, and it was believed that these projects presented an excellent opportunity to improve relationships between the many groups involved to the benefit of all involved.

Prior to summarizing the details of the three case studies, this chapter will present a number of challenges to partnering applications which are unique to military and certain other government applications.

\textsuperscript{34} SD Case
Challenges To Military Applications

At this time, it should be noted that, in addition to all of the barriers to the successful application of teams previously presented, military and other government projects have an additional set of barriers imposed upon them.

Some of these barriers will later be shown to have potential impact in the final case, where the potential for a multi-government teaming effort will be evaluated.

Sharing all of the potential barriers to success that a commercial application may have to overcome, a military or government application of a team approach introduces the possibility of even more obstacles that the approach may have to surmount. As with the general case (non-military specific) barriers, the obstacles to a military (or government) application of teamwork may be grouped into two broad categories, organization-related and individual-related.

Many of the organizational barriers to successful team approaches are due to the sheer size of the government, and the rules and regulations established for its operations.

For instance, many Navy projects demand a high degree of security, with information often revealed only on "need to know" bases. Team approaches, on the other hand, rely upon free information flow between all parties to keep everyone informed of the current status and project needs in order to allow the project to progress smoothly. This conflict has many opportunities to arise over the course of most Navy acquisition projects in such areas as scheduling and access of work crews. It is one of the larger barriers to the successful implementation of teams that may exist in a Navy
project, and is a subset of the larger problem of legal barriers. These barriers can be summarized with the statement that, due to the mission of the organization and the information it uses, the Navy just cannot develop as close a relationship with its suppliers as a commercial outfit may.

Another barrier exists because very few, if any, people are familiar with all of the intricacies and people involved in a typical government procurement contract. In many cases, employees of the government as well as its contractors do not understand the full scope of the projects they are working on, where their role is in relationship to the big picture, and whom they should consider as their customers and suppliers. This creates an environment where people cannot distinguish a team at all, at which point such crucial elements as feeling as part of a team, and pride in the program are lost. It is difficult to have any kind of customer focus when you don't recognize who your customers and suppliers are.

A team approach should try to address this lack of understanding in an attempt to give the employees the view of the program they need. At the same time, a government team approach must carefully consider where lines are to be drawn for teams. On the one hand, it is nice to imagine a military project where all involved are members of one big team, but the reality of the situation is that the current state of affairs is a long way from this ideal, and teams of this size are not effective. Facilitators must carefully establish the extent of the teams they are attempting to develop, but also show the members of these teams where the team fits into the big picture.
Team boundaries are difficult to establish in a government project as people essential to the processes in one location (for example, any shipyard) may be located in an entirely different location (Washington, D.C.). Using such organizations as SUPSHIP, the government attempts to address this problem, but there are limits to the authority that is granted to such organizations. Therefore, the teams remain unwieldy if all of the necessary people are to be included for a given task, and ineffective if certain people (functions) are not included.

Beyond the difficulty of defining a team that includes members from many organizational levels as well as from widely separated areas, the efficient operation of the team, and therefore the project as a whole, are compromised by this situation. The people involved with the project are involved due to the many rules and regulations that legally must be followed during the work processes. Due to required communications and authorizations needed to accomplish even routine tasks, these rules add much time and many people to the project that a commercial operation would not have. In addition, the channels of communication can be quite slow when so many people have to give their approval, both on site and across the country. This situation of large-scale, intricate operations can have the effect of robbing precious schedule performance from even an extremely well organized team.

Other constraints to a team approach within a government project are the result of the current atmosphere of shrinking budgets and operations. A successful team approach relies on proper training and group exercises which incur costs from the outset. Again, the theory of teams indicates that these costs will be recaptured in the
long run, but there isn't always room for such advanced planning in a military contract. This is especially true in an age of one-off vessel types and heavy competition between the few remaining yards for a small number of vessels.

Barriers to creating successful team situations can arise as a result of the rigorous laws, regulations, and documentation requirements established for the construction and maintenance processes for military vessels. For example, the selection of sub-contractors for such jobs has often been driven by a "lowest cost" criteria in the past. This means that it may be more difficult to allow for selection based on "best value". For example, a contractor may not be able to favor sub-contractors with whom he had already established good working relationships (previously partnered with) if a lower bid is obtained from another sub-contractor. Here, the value of long lasting, mutually beneficial, relationships is lost to operating procedures established long ago. Other examples of this type of barrier would be the traditional requirement for MILSPEC equipment when other, readily available, equipment is cheaper and higher quality, as well as the tremendous paper trails generated out of requirements of government contracts.

As with any government-related processes, organizational biases may occur within Navy contracts. The source of such biases may be the results of previous incidents or rumors (recently or long ago), or simply due to the cultural differences between the Navy and a shipyard or other organization. Regardless, such bias creates a distrust between Navy and contractor personnel which may have a lot of momentum behind it, and is very difficult to ignore. This is
particularly true when such mechanisms as cross-functional teams are
being developed.

Unfortunately, even when a relationship of trust is established
between the Navy and a shipyard, the conflicting goals of each entity
must be honored. The Navy wants a good ship to be built, preferably
at the lowest cost and on time. The shipyard and other contractors are
in business to make a profit. The theory of teams suggests that, in the
long run, team-related results will keep all parties happy and
operating into the future. However, it is often difficult to explain this
to an organization that is uncertain of its future, as many shipyards
are, that they should invest in their future when they are trying to
figure out how to pay their bills.

Other barriers to team approaches on government projects may
appear at the personnel level. For instance, the commitment from
above that is vital to the continuation of such programs can be quite
hard to establish or demonstrate on such projects. In addition to the
reluctance to accept new methods that may be proven in the
commercial realm, the Navy has additional problems in establishing
this commitment. Perhaps most notably is that the command of Navy
entities (SUPSHIP, NAVSEA, etc.) is constantly rotating.

The threats to team initiatives stemming from this fact are two-
fold. First, it is generally not known how the new commanders of a
post, such as a SUPSHIP, will view a team effort. At best, he or she
may promote and further the cause, and at worst, he or she may bring
the traditional prejudices and procedures back to the post, ending the
team experience.
Likewise, the management entering the post may want to "leave his/her mark" on the organization, and deem the partnering effort a failure prematurely, and go on to adopt another technique in the hopes that there will be some noticeable difference in operations which would become his/her legacy.

The second threat that comes from a change of command is that, regardless of the new authority's outlook on teams, he or she may have a different plan for the future of the post than the previous CO had. This discontinuity in the constancy of purpose is a threat to any advances made by the team effort. Teams rely on a constancy of purpose for their alignment to achieve other goals.

Government processes also have the same problems with certain individuals that may be encountered in a commercial project. The difference being that often times, in Navy or other government projects, such entrenched personalities can have quite a bit of clout. The result of this can be anything from delayed information flow, to the refusal to cooperate or acknowledge a team effort. This can be extremely detrimental to the effort when coming from above.

Another barrier due to a single personality is that it is not unusual for the Commanding Officer (CO) of a vessel to view the yard personnel as the "enemy". This is quite readily passed on to the crew, and the situation becomes one where interactions between the ship and the yard may include shouting matches, where neither side assists the other in getting work done.

Finally, governments suffer the same problems that any organization that is downsizing has, including panicked workers and overall low morale in some instances. There may be many employees
throughout an organization who, like the organization itself, are operating in survival mode.

SEALIFT Case

The SEALIFT case benefited from the TQL program being implemented at SUPSHIP San Diego. The implementation of TQL at this installation acknowledges that the COs will rotate. To address this, a cross-functional Quality Management Board (QMB) has been established at SSSD to maintain constancy of purpose for TQL. Many of the same people on this QMB are also on the SEALIFT QMB which took the lead on the partnering effort from NAVSEA in Washington. These board members are generally quite enthusiastic towards the use of partnering on the SEALIFT project, and the existence of these boards ensured that a team effort will not be severely hampered by a change of command.

The state of the TQL program at SUPSHIP San Diego, in addition to the Total Quality Management initiatives at NASSCO, make for an environment full of enthusiasm for attempting a team effort with these two organizations as the key players.

The designers of the SEALIFT team building workshop, the Teambuilders of SUPSHIP San Diego, knew that they had to open communication lines which crossed many organizational and geographical barriers if the team effort were to succeed. The approach that they took was to introduce people and organizations on a personal level, and to facilitate interactions at the workshop with the hope that such introductions would be the catalyst for improved communications when the workshop attendees returned to their jobs.
Introductory exercises held at the workshop not only familiarized people with people from other organizations, but they also introduced the organizations themselves. After being introduced to "the big picture", workshop attendees claimed that they now knew why other people needed certain information, and they also claimed that by knowing that others are under similar pressures as they are, this gave them a new perspective on their own work.

To further familiarize employees with the big picture, process mapping exercises were done not only to show the elaborate networks of information flow, but also to allow people involved, who would have the best perspective, a chance to comment on the current processes. This first step towards process improvement had a very positive reception from the people attending the exercises, and was a source of very positive feedback for the managers involved.

The non-combatant nature of the SEALIFT vessels allows for a couple of unique opportunities to arise in the procurement process, opportunities which partnering can make quite significant. The first is the possibility to eliminate MILSPEC requirements in certain areas. As will be shown with the T-AGS 45 case, groups within the SEALIFT team could get together to evaluate the appropriateness for MILSPECs in their areas in a very efficient manner. The other opportunity that arises is that the procurement process for the SEALIFT vessels does not have to follow the same rigid guidelines as for a combatant vessel. The result is that a streamlined acquisition process may be followed, one that is not often employed. Teams can help facilitate this process.

The SEALIFT case involves very close cooperation with NAVSEA employees from Washington. These employees are kept well informed
and are invited to all team meetings, although they don't always attend these meetings. As would be expected, this can create many scheduling and logistics problems, but the links between Washington and San Diego seem to work fairly well on this project, and the team attempts to work together to optimize schedules to include all parties.

To demonstrate the effectiveness of teams and convince employees that the theory works in practice, the SEALIFT effort was able to follow from the example set by high performance core teams which were in operation and very visible within the organizations that were part of the team efforts. This case had the SEALIFT New Construction QMB at its center, and the enthusiasm and commitment demonstrated by the representatives from SUPSHIP, the trade unions, and NASSCO were a very positive factor in the success of this case.

**USS Dolphin Case**

Although usually viewed as a severe blow to such projects, the 12% reduction in the budget proved to be a great motivator in the case of the **USS Dolphin** overhaul. Recognizing that only a new approach to the overhaul would allow the shipyard to meet this requirement, NAVSEA and the Mare Island Shipyard decided to investigate the use of a team-based approach for the project.

The managers recognized the ability of teams to eliminate inefficiencies such as those related to the heavily regimented processes inherent to this type of job. However, it was also recognized that this was actually a different job than normal given the budget constraint, and it was felt that any way a team could maintain quality
and achieve the final output required of an overhaul was an acceptable method.

From the start, the strategy adopted by NAVSEA and Mare Island Naval Shipyard to address this challenge was to put the best available people together, and allow them to interact as an open, honest and communicative team. In general, most of the people assigned to this job worked well within the team approach, however, several held out against the team environment. This latter group will be discussed later.

The budget cut assisted the team effort as it presented the team with a tangible, measurable goal for the project. From this starting point, it was then up to the team itself to develop a set of performance objectives which would allow the job to be completed within this constraint. The first step toward this was for the team to decide whether to attempt to perform the complete overhaul, or eliminate items of lesser value from the project to cut costs by the required 12%.

It was decided that the content of the overhaul should not be altered due to the decreased budget. In fact, beyond meeting the budget, the quality of the job was made the central focus of the project. The team developed and agreed upon several quality criteria for the project. The team also established the norm of doing what was "best for the *Dolphin*".

The importance of communications and trust in a team-based approach was recognized by the project team leaders and the Commanding Officer (CO) of the *USS Dolphin*. Together, they developed the objective of replacing the traditionally hostile crew-yard relationship with a more open and positive one.
This process was facilitated by the presence of the CO, or a representative, at all of the daily project team meetings. At these meetings, he explained that the yard and crew were not enemies, and this message made it down through to the deck plates. He also made sure that crew members at the lowest possible levels were empowered to make decisions to facilitate decision making and communications in the yard. The CO also replaced the traditional process of crucifying people for mistakes with efforts focused on learning. For Instance, if a task fell behind schedule, the person assigned to that task was asked to predict when it would be back on track.

In addition to these displays, which had the dual effect of demonstrating the commitment of the CO, both the project team and the submarine sponsored social events for all involved with the project to improve morale, relationships, and communications.

Trust was fostered through the use of mechanisms to ensure that the idea of problems belonging to the team as a whole, and not to any individual, were in place. In addition, all disagreements within the team were kept among its members, and the focus was on arriving at solutions which met the needs of the project. Also, the boundary between the team and its parent organizations was limited to two project leaders. These liaisons were the only people to provide information outside the team, and it was always relayed on a positive note. Knowing this, team members felt at ease in expressing their opinions and ideas. This type of boundary management has been discussed earlier as an effective method for keeping the members focused on the needs of the project and the team itself by
eliminating inputs from the parent organization(s), greatly enhancing trust within the team.

These efforts paid off with crew and yard workers building strong relationships, communicating, and working well together.

This team approach was also effective at integrating such elements as team ownership of ideas, team learning, and the need for a changed culture to adapt to the new approach.

Ownership came into play through a unique mechanism, challenging team members to expand themselves by taking on tasks which would become learning experiences.

The team as a whole determined which tasks needed to be accomplished, but the distribution of tasks was done by allowing the members to select a task that would enrich their own personal experience, rather than a task that they had done routinely in the past or otherwise did not present a challenge. By selecting a task, a member became the owner of that task, and was responsible for its completion.

The only inflexible rule in the system was that everyone was responsible for the success of the team. As soon as a task was completed, the next person in the pipeline of work had to be notified, ensuring a seamless flow of work through the team. If a problem arose, it was the team's problem, and the team had to solve it without assigning blame. This atmosphere encouraged the risk-taking desired in the job distribution scheme. Knowing that they would have the full support of the extended team, team members took responsibilities for jobs which would challenge them. The resulting enthusiasm
contributed to the strong project performance and yielded some very creative solutions.

In addition to the team learning which was fostered through the above challenge, the team working on the Dolphin demonstrated another way in which an organization can learn through a team effort. Since this was the first time a team-based approach had been used at Mare Island, there had been no previous team effort to study in an attempt to improve performance on the project. However, the team took records from a previous overhaul and examined them for areas in which the team could improve performance even before the vessel entered the yard.

In preplanning and risk mitigation exercises started well in advance of the overhaul, it was determined that the area of hull inserts had much room for improvement. At the point this was determined, two years before the vessel was due in the yard, the process of designing, building and testing new inserts was begun, and it was completed well in advance of the project. The effort paid off by not only saving time, but also by showing how a team can work together to anticipate problems and alter the standard procedures to improve performance.

The team also learned how to benefit through the integration of information from other areas, and the close sharing of information which is normally hidden or guarded. The sharing of information was required due to the limited access to the vessel available through the single hatch. The team had to design a schedule that allowed access through the single hatch of the vessel for all tasks that had to be
accomplished. This schedule had to keep an eye toward efficient use of the hatch, but could not compromise safety.

It is in this type of situation where partnering shines. Representatives for all of the trades could sit down, discuss their access needs, listen to what others needed, and work out a schedule that optimized the limited use of the access hatch. As the situation changed, the project as a whole would attempt to take advantage of, or attempt to correct, deviations from the previous schedule meeting. This could only have been accomplished through honest communication of the exact needs of all of the parties who needed access to the vessel through the hatch.

In the examples cited above, it is clear that the Dolphin project took advantage of the learning and synergy which are possible through teamwork while improving the processes of the system, and in adapting to adverse conditions. Creative solutions were always sought, particularly when unexpected situations arose. With all creative solutions being mindful of the goals of the team, the results were noticeable process improvements and problem solutions which had only positive impact on the remainder of the project.

The theory of teams holds that the transition from a traditionally managed organization or project to a team-based approach requires a fundamental change in the culture of organizations to assist in removing the biases and inefficiencies of old, and bringing in the collaborative spirit. The CO and the project team leaders made many steps in the direction of this cultural change. As mentioned earlier, the improved crew/yard relationships, both at work and in the social activities, were clever
methods for transforming the team members attitudes into team-friendly ones.

Also, the respecting of the thoughts and approaches of others was clearly demonstrated on this case. Project leaders remained patient and kept their distance when they saw inexperienced team members proceed with their tasks in approaches different from their own. Although there were some minor setbacks, the inexperienced members soon grew more proficient and confident in their tasks and other contributions. This cultural transformation tests the commitment from above as it is often the case in such situations for managers to be tempted to assign a task which is not progressing satisfactorily to other employees in an effort to make up for lost time. By not reassigning such tasks, there was a lot of good will generated between the team and the leaders as people realized that the leaders could be relied on to keep their word.

It was recognized that an incentive system needed to be in place which would encourage team cooperation. Unfortunately, all parties involved were used to, and in fact still subject to, performance assessments based on individual evaluations. Clearly, this type of mechanism provides an incentive not to act as a team player, as such efforts would not be recognized or properly rewarded.

To counteract the effects of these systems, oral praise and notes of recognition were given when jobs were done well. Project team leaders gave cash awards between $50-300 to yard personnel. Awards were made at morning meetings to allow the whole team to take part in the recognition process, and to encourage others to become determined to help the team work well. It should be noted
that these awards were rarely, if ever, seen by the yard workers prior to this project, so when they were given, workers often became emotionally moved.

Finally, the move towards a team culture was made evident even in dealing with people who were not expected to work well within the team environment comfortable with the team process. "Free-spirits", as they were referred to, were included on the project from the beginning because their talents were needed, and they were challenged to cooperate in the team framework. For some, the test was a success as they faced up to the task of becoming productive team members, and were readily incorporated into the framework. This was largely attributed to the desire to work in such a dynamic environment, and also to the obvious and genuine commitment to the project and the method from both the CO and the project team leaders.

On the other hand, when it became apparent that a few did not choose to cooperate in this setting, they were asked to leave the team. However, there was no stigma attached to a person who was asked to leave the team. The culture allows for the recognition that some people are not comfortable with the team process, but are valid contributors elsewhere within organizations. The allowance for this was made from the start, simply by identifying the "free spirits" and asking that they try the team approach as the team recognized their talents. By handling people in this manner, they will not be soured on the idea of teams in the workplace, and may learn to work with, or even within, teams in the future.
The success of the *Dolphin* case may be largely attributed to the fact that quality was maintained as the central focus of all parties involved. Maintaining this focus allowed for all quality criteria to be met by project completion. Budget constraints were also met, but to do so, the schedule of the project was allowed to slide slightly. This seems reasonable as the budget that was met was significantly less than previously allotted for the work performed. The overhaul was viewed as "win-win" by all involved.

**T-AGS 45 Case**

The key to the performance of the *T-AGS 45* project was the streamlining of the acquisition process, and the breaking down of some traditional DOD barriers. These feats were accomplished largely by creating a team that was aware of the scheduling situation, having all members focused on, and working towards, the meeting of the schedule needs, and empowering employees in critical positions.

A main DOD barrier that was overcome was the need for approval from Washington to perform certain tasks and to make changes when necessary. On the *T-AGS 45* project, the Assistant Project Manager from NAVSEA was empowered to make real-time decisions on site at the yard. These decisions typically had needed approval from Washington in the past. The ability to do this in certain crisis situations enabled the project to cut through the traditional bureaucracy of Navy projects and respond rapidly and effectively to problems.

It was also attempted on this case to eliminate as many MILSPECs as possible from the design as a means of reducing cycle
times and costs of the project, and to grant the yard more flexibility in selecting vendors.

It should be noted that such exercises as eliminating MILSPECs benefit from the use of the many perspectives possessed by a team. There are many sides to a MILSPEC requirement, and having people representing all of these angles present in the process of reviewing the need for MILSPECs can reduce the time and misunderstandings that may be involved if such an activity were undertaken through the use of a letter writing exercise.

From the beginning, NAVSEA had intended on using some form of partnering for the T-AGS 45 project. It was felt that this was the only way to ensure that the vessel construction remained on schedule as required.

The unique nature of the T-AGS 45 vessel, the tight schedule requirement, and the fact that only one of these vessels was to be built, made it an undesirable vessel for a contractor to bid on. Depending on the type of contract selected, a yard accepting the contract for the single vessel could stand to lose a lot if held responsible for schedule overruns. The yard could also incur losses ranging from monetary penalties due to contract disputes to the loss of experience for opting to build this one-off vessel as opposed to bidding on a class with more than one vessel. In this latter case, the yard would be at a competitive disadvantage to other yard(s) when the bidding for following vessels commenced.

NAVSEA decided at the outset that the best way to execute the construction of this vessel would be to couple a team approach with a performance-incentive type contract. This had the effect of creating a
desirable working environment for both parties, and quality bids were received from shipyards that wanted to take part in an obviously performance-oriented project.

One other barrier that the T-AGS 45 case had to overcome was that due to people who did not want to work under the team philosophy. To eliminate this element, people were made aware that they had the option to work outside of the team environment with no penalty. By giving employees this choice, it was ensured that teams would be composed of people who were at least willing to try to make such an approach work. The ability to "own" this decision also makes for a more enthusiastic, and thus more prone to success, group of people.
CHAPTER 6 - LESSONS LEARNED FROM CASES

The success of the cases described in the previous chapter supports the case that teams can work in very large projects in arenas where they would not be expected to work. The approach leads to better understanding among organizations about the needs of other organizations as well as the needs of the project itself. This understanding, coupled with improved relationships and working environments, can yield only beneficial results when properly supported.

Despite the vast differences between the nature of the parties and projects involved in the three case studies, they all yielded success stories for the application of partnering to Navy projects. This is in no small way related to the similarities that the three situations shared. Not surprisingly, many of the traits shared by these cases have been presented previously as some of the essential elements for successful partnering.

The three cases will be reviewed to determine which factors contributed to the success of these projects in particular. Similarities will be drawn, when possible, to enhance the understanding of the needs of large-scale, multi-organizational team projects in general. These factors and similarities will be presented in the first part of this section.

As mentioned previously, the theory holds that the benefit of team-based approaches is obtained in the long term. However, all three cases studied have exhibited performance improvements, over similar projects in past, shortly after the efforts commenced. This
section will close with a description of the specific performance improvements which were obtained by these cases.

TEAMS IN LARGE-SCALE PROJECTS

- Commitment From Above

Perhaps the most noticeable similarity between all three cases was the visible and genuine commitment demonstrated from the upper levels of the parties involved. Enthusiasm and commitment from the top was exhibited with people from the upper levels of organizational hierarchies participating in meetings and other work activities along side of people from much lower down in the various organizations. The people from higher up recognized the opportunities available due to this type of interaction, and made it clear to the other employees that they were real people who were willing and available to discuss project issues with anyone harboring concerns. This type of access was looked upon very positively by many people throughout the various organizations.

It is essential to show the workers at all levels that the organization believes in the new technique. If the workers feel that this is true, they themselves find it easier to support the new method, and thus the seeds are sown for the necessary transformation in the workplace.

The Dolphin case provides an illustration of the power of very clear commitment from above as well as a good understanding of the needs of a team and the team effort. The obvious commitment from the CO and the project team leaders was the reason behind the success of the approach with converting "free spirits" who had been holding
out against the team approach into believers in team-based methods. By seeing the people in charge of the project not only championing the effort, but also making positive contributions and changing the rules for both the work and interactions among the parties involved, the "free spirits" realized that this was not simply a management ploy.

As a counter-example, we can look at the impressions of one of the interviewees involved in the SEALIFT case in San Diego who was skeptical towards the team approach. He had been with his organization for over twenty years and had seen numerous programs initiated by the Navy come and go. He regarded the initiative between SUPSHIP and the shipyard as a similar exercise to the "quality circles" which came through several years before. Noting the failure of this "experiment" and other initiatives, he felt that partnering was another waste of resources, and there was simply no way to change Navy operations. Because of his outlook, he put very little effort into the team building exercises and adopting the team approach in general. Such attitudes, when visible and coming from above can doom the application of partnering from the start. Luckily, this type of viewpoint was rare in the cases examined, and did not come from very high up in the organizational hierarchies.

- **Constancy of Purpose**

The significance of maintaining a constant purpose for the team was demonstrated quite clearly in the SEALIFT case.

The Teambuilders' workshop gave this application of teams a running start, bringing many project participants up to speed with the project as well as the team approach to be used. However, the
approach soon went into limbo, and though never officially disbanded, the current status of the team aspect of this project is unclear.

The reason for the decline of the team approach on this project stems from an interruption in the visible support that was given from people in charge of the effort. The constancy was interrupted by two circumstances. The first was that the Commanding Officer (CO) of SSSD was changed soon after the beginning of the SEALIFT project. This had a large impact on the team effort as SSSD was one of the major drivers of the team approach, but when the command changed, human resources which were needed to foster the team effort were required to bring the new CO up to speed on the overall operations of the installation. Further, it was not clear whether or not the new command would "buy-into" the team approach, which could have had a devastating impact on the effort.

The second circumstance which affected the constancy of the SEALIFT application was that follow-up meetings to guide the team and further its interactions were not held. These meetings are crucial in team efforts for a number of reasons ranging from the exchange of information to the display of commitment. However, their absence along with the large number of parties involved meant that there was no mechanism in place to ensure the health of the team approach. The reason for this second circumstance is that SSSD was viewed by many as the major force driving the team approach. Therefore, interviewees from all of the organizations involved who noted the need for follow up meetings also looked to SSSD to arrange and hold these meetings. SSSD also noticed a need for the follow up meetings, but simply had no money in their budget to host another workshop. SSSD also did not
feel that they were the only people responsible for workshops, but nobody else "picked up the ball".

On the other hand, both the Dolphin and T-AGS 45 efforts benefited from constancy of purpose. However, these were both short term projects which were granted special status and subject to very strict control mechanisms. Also, the shorter time frame and dedicated resources of these projects give them significant advantages over the SEALIFT team in sustaining a constant focus. It should be noted that the unfortunate timing of a command change, like that in the SEALIFT project, could also have occurred in either of the other cases, and might have caused similar problems.

- Clarity and Alignment of Goals

In addition to the degree of commitment from throughout the organizations, the three cases also were able to benefit from a willingness on behalf of all parties to establish and strive for a central set of goals. Driven largely by contract requirements and recognition of the needs of the organizations involved, the goals were created early and remained the focus throughout the projects in the Dolphin and T-AGS 45 cases. As mentioned earlier, the Dolphin case had budget as the central focus, the T-AGS 45 case addressed the tight scheduling needs.

The SEALIFT case, the largest effort, also enjoyed a mutually accepted goal, that of improving communications. However, since this project is still underway, it is difficult to evaluate the final impact of having this goal. Initially, the scale of the project, and the geographical locations of the organizations involved, made communications the most logical area for emphasis by the team.
Initial indications are good for this focus, with improved communications being cited by many team members. Once the team agrees that this goal has been sufficiently addressed, the members expect to benefit even further by switching to the more performance-oriented goal of process improvement. Clearly, the SEALIFT effort recognizes the need to progress slowly but steadily down the road of continuous improvement.

Again, contrasting the Sealift case with the other two can be used to illustrate the necessity of converting goals into clearly defined and measurable performance objectives. The lapse in the constancy in the purpose of the SEALIFT team has already been mentioned as a key factor leading to the current status of this team effort, and it can be assumed that the lack of clear performance objectives may be another factor.

The goals of the SEALIFT team were left at improving relationships and communications. Without further refining these goals into measurable criteria, and without linking these goals to performance-based goals which are directly related to the completion of the project, it cannot be clear to the team whether or not these goals are being addressed. Further, it can not be determined when or if these goals are met. Based on the interviews, many believed that communications had indeed improved. The team members therefore perceived that the mission of the team was met, based on their own criteria, but did not necessarily know what the next step for the team was.

The goals of the **Dolphin** team were clearly defined, and related to the performance of the team in both meeting a budget and
improving processes. As with the Dolphin, the T-AGS 45 team had measurable performance improvements at the heart of the team's mission, and these were translated into such criteria as eliminating MILSPECs from the project and meeting a tight schedule.

To summarize the importance of clearly defined goals and measurable performance criteria, it may be stated that all three of the teams met their goals. However, only the Dolphin and T-AGS 45 teams can demonstrate that their goals were met by showing the improvements made on the metrics selected.

- **Communications and Trust**

Major target areas of all three efforts was the removal of adverse relationships and the proliferation of trust among the employees and organizations involved. In the T-AGS 45 and Dolphin cases, this was achieved largely through efforts of those in higher positions to get the best available people together to interact as honest, open teams. These team members were required to trust the other parties. When necessary, people who found these ideas difficult to work with were persuaded to leave the projects.

The SEALIFT case took a different approach. The organizers of the workshop relied on personal introductions between people and organizations to eliminate biases and improve feelings of mutual respect.

Both approaches returned positive results with strong relationships being built and used to the benefit of the projects.

When trust is built between the members of a team, and all members recognize that all others are working towards the same goal as themselves, people are more apt to respect the thoughts and
approaches of others. This situation helps the project as it encourages new approaches and creative solutions to even the most routine problems, and steps are made towards continuous improvement.

This was seen on the Dolphin case when project leaders kept their distance and allowed less experienced workers to approach problems by methods of their own design. In the past when this happened, the leaders would have stepped in to alter the course of these newer employees to have them approach the problem using previously accepted methods.

Sometimes the new approaches yielded better methods, other times, they ended in failure. Despite such setbacks, the newer employees soon grew confident in their abilities due to the freedom and support that they were allowed, and the team as a whole benefited from seeing the successes that were possible when a routine problem was addressed from a fresh perspective.

This type of respect was shown in a different way on the SEALIFT case. The workshop held to initiate team work on this project included attendees with experience levels ranging from weeks to decades. The respect held by the more experienced team members towards the newer employees manifested itself in patience and support for the less experienced. The more experienced employees knew that the team could benefit from their experiences, and they shared them in an effort to educate all regarding the operations of their respective organizations as well as SEALIFT itself. Regarded by many to be a highlight of the workshop, the introductory presentations of organizational functions made by the experienced
team members also did much towards cutting through organization-
level biases.

- **Fundamental Change in Culture**

Another notable similarity between the three cases was that the
organizers of each effort were able to create a working environment
that the team members enjoyed and that was beneficial to the project
as a whole. The working atmospheres created in the three cases were
characterized by enthusiasm, trust, pride in the project, and, of course,
the feeling of belonging to a team. The high morale which results from
such environments can be expected to dramatically increase the
productivity of the workforce.

The organizers of each case made it clear to all team members
that the team as a whole, not individuals, owned the problems arising
on the projects. It was also made clear that the team was responsible
for the success of the project. Areas of possible conflict between
organizations were thus replaced by an overall desire to achieve.

The creation of such productive environments is a function of
the commitment from the top as well as the design and execution of
the partnering efforts themselves. Group exercises and facilitators
such as the "Teambuilders" from SUPSHIP in San Diego are an integral
part of this process. However, the T-AGS 45 and *Dolphin* projects
succeeded without formal teambuilding exercises.

Thinking of a project as a team effort, particularly a project
involving multiple organizations, is not the traditional mindset of the
typical U.S. firm/worker. However, this is the mindset necessary for
the benefits of team work to be realized. Those in charge of designing
the team efforts of all three cases were able to accomplish the difficult
task of instilling the feeling of being on a team in all members involved. Whether or not this feeling can be maintained in these organizations on future projects has yet to be seen. It is this important cultural transformation which will allow team-type relationships to become efficient operational mechanisms.

Regardless of the questions for the long-term success of teams, those facilitating partnering on the three cases were able to create the desire in people working in support of each project to do just that, support the project. People from all parties found that working towards the goals of the project, as opposed to the needs of their individual departments or organizations, made the project progress in a manner that was beneficial to all. Simply put, employees learned to answer questions in terms of what was best for the project.

- Other Points of Interest

All of the cases examined suffered from the traditional practice of individual, rather than team, assessment. The USS Dolphin case addressed this problem, with a good deal of success, with the reward and recognition program established for this overhaul.

The managers in the Dolphin case took advantage of such non-monetary incentive systems such as creating a rewarding team environment, strengthening the relationships of employees with social activities, and by creating mechanisms which recognized valuable contributions made to the team by individuals. All of these programs were welcomed by the employees, and provided incentive to work as a team.

One interesting incentive mechanism used by the project management of the T-AGS 45 was the use of a performance-incentive
type contract. This contract, which allowed the contractor to add value to the contract with exceptional performance, ensured that the contractor was working toward the same goal as the acquisition team, that of building a high quality vessel within a limited time frame. This mechanism allowed for the critical alignment of goals for the two main parties.

The largest of the team-based efforts studied, the SEALIFT case, managed to obtain several unexpected benefits through the Teambuilders' Workshop. The most significant of these was that many participants had never been exposed to the "Big Picture" perspective which was afforded by the workshop. This drastic oversight may point to a fundamental problem with the training programs in all of the organizations involved, as well as that of the SEALIFT program.

Another interesting benefit of the workshop was that the people who were invited from lower levels within the various organizations felt proud that they were invited to participate in this exercise alongside people who were quite high in the various organizational hierarchies. Not only did this group enjoy the introductions and overviews that were being presented, they noted that they could take more pride in their work knowing where they fit into the SEALIFT program. These people seemed very inspired by whole process and the ability to participate.

Unlike the other two cases, the SEALIFT case did not have the benefit of being able to select membership. However, the team was fortunate enough to include several very receptive people in key positions in all of the organizations, as well as people receptive to the approach throughout the program. This distribution of team players
will allow the team to work around potential hold-outs to the team approach should the need arise.

Finally, all three cases used some form of parallel team as a method to take advantage of the open team work environment while honoring the organizational needs of the Navy and other parties involved. The Navy parties to the Dolphin and T-AGS 45 cases did this by applying parallel teams directly to their operations for the cases. The SEALIFT case benefited from the SUPSHIP San Diego TQL initiative which already had parallel teams in operation in several areas of the organization.

Similarities Among Cases

From the analysis above, it can be inferred that there are several critical factors required to ensure the success of a team-based approach in multi-organizational projects involving large-scale hierarchies and much organizational biases. These factors are given in Table V.

**Similarities Among Cases**

- Top-Down Commitment
- Constancy of Purpose
- Communications
- Trust
- Fundamental Change in Culture

Table V
It should be noted that the elements of Table V are a subset of those listed in Table III. The apparent anomaly can be explained as follows. The elements listed in Table III have been obtained from the body of theory which attempts to describe "high-performance" teams. The theory of "high-performance" teams holds that teams should be limited in the number of members participating in the team. Such teams are often characterized by innovation, flexibility, and closeness.

The teams described in the previous section have many more members than these teams, and are not necessarily seeking the kind of high performance described in the theory. However, they are looking to address the inefficiencies inherent in their systems to increase the performance which they have traditionally exhibited. Thus, the size and mission difference between the two sets of teams means that the set of elements required for success are different between for each type.

Specific Performance Gains

Although the philosophy of partnering maintains that the majority of the benefit of this approach is to be obtained in the long-term, the three cases did yield some degree of improvements in performance in the short-term. Of course, the big performance gains are still to come if the organizations involved continue on the team approach track, but the gains realized already are worthy of note.

Communications were improved in each case. In the paperwork driven world of government contracts, this is a step in the right direction. In all three cases, conflicts that in the past may have been left unresolved even after lengthy and costly memo writing campaigns
were instead solved through meetings among those closest to the problem, in timely, relatively friendly manners.

Teamwork used on these three cases significantly reduced the turn-around times for decisions and changes. For example, on the T-AGS 45 case, drawing changes which would normally take two to three revisions were finalized on the first pass through the loop. To achieve this, the team used regular weekly meetings between the responsible parties which included Navy engineers and project managers who were authorized to make binding decisions. These decisions were further facilitated by NAVSEA accepting ultimate responsibility for all authorized changes, eliminating the fear throughout the project of being held responsible for an expensive decision.

The T-AGS 45 case documented performance improvements in the areas of Action Item Requests (AIRs). Traditionally, acquisition programs use contractually specified systems of forms and processes to address such items. These systems provide a government response in 45 days. This type of response was not quick enough for the schedule driven project, so the AIR system was used. This system uses informal, but documented, AIR forms to address the same technical or programmatic issues that are resolved through the old system. However, since the AIRs are either faxed or hand-delivered, the response is much more rapid. Of the more than 1000 AIRs written, 99% were answered in less than 45 days. Of the 145 critical issues having both governmental and shipyard responsibility, all were answered within 27 days. Ninety-three percent were answered in 20 days or less, and 47% were answered in less than five days.
The most significant numbers related to the *Dolphin* case would have to be the accomplishment of its quality objectives while keeping costs 12% under the budget previously allowed for this type of job. Of the three cases examined, the SEALIFT project is the only project that has not yet reached completion. The actual performance of this project will not be known until well in the future. Early indications are that team objectives are being met, with communications being improved, and many employees being enthusiastic about seeing where they fit in the big picture. However, as mentioned previously, the team method in this project faltered due to a lapse in the constancy of purpose for the team. This situation is currently being remedied with a new series of meetings which occur roughly every six weeks. This renewed commitment shows that, despite the setback, the seeds of teamwork have been sown in this project. Management recognizes the value on such a large, long-term contract, and hopefully the effort to rejuvenate the use of teams in SEALIFT will succeed.
CHAPTER 7 - The Use of Team-Based Project Administration in the Environmental Safety Arena

The Case for Teams in the Environmental Arena

In the environmental arena, negotiations and other projects which attempt to integrate the views of multiple groups are often stalled when the groups stray from the pertinent issues and focus on non-material issues or, worse, organizational- or personal-level attacks. In these situations, there is no winner as negotiations drag on, issues get clouded by various agenda, and the resulting product, if any, is not viewed as acceptable by any or all of the parties involved.

Thus, projects involving environmental concerns have much room for improvement. It is proposed, based on the theory and successful cases already presented in this paper, that such projects can benefit greatly from appropriately designed applications of teams.

This chapter will present the case for the use of teams in the environmental policy-making arena. The specific example to be used for illustration will be the International Maritime Organization (IMO) setting which is currently investigating the possibility of developing a vessel safety index. A team-based approach will be designed for this international negotiation which will highlight the various problems which a team can solve to improve the effectiveness of negotiations involving environmental concerns.

This chapter will begin with an introduction to the IMO project for which a team-based approach will be proposed. After identifying
the need for a team approach on this project, the application of this approach will be examined using the lessons learned from the three previous cases to determine the necessary components to ensure success. The IMO environment will also be examined to determine what factors inherent to this forum will contribute to the success of a team-based approach.

Finally, conclusions on the appropriateness of this type of approach for environmental applications will be drawn.

Background

At the 37th session of the IMO Marine Environmental Protection Committee (MEPC), the Norwegian contingency submitted Agenda Item 21, which proposed a ship environmental index which was based on scientific principles. As proposed, the system would evaluate a vessel's potential to be the source of all manner of operational and accidental pollution, and assign an index to that vessel based on its inherent safety. Although possible uses for such an index have been discussed, an actual application has not yet been agreed upon.

This proposal may be considered a response to unilateral legislation, specifically the Oil Pollution Act of 1990 (OPA 90), in the United States. Passed amid the public outcry for safer tanker operations following the grounding of the Exxon Valdez, this act mandates the use of double-hull tankers within the US Exclusive Economic Zone (EEZ), among other stipulations. The Norwegian proposal allows for non-structural factors to be considered and
ranked accordingly with respect to such structural considerations as established by OPA 90.

This case focuses on the subset of the IMO negotiations which will address the situation of accidental oil spills from tankers as part of an overall vessel indexing system. It will develop a team-based approach to these negotiations which should improve the effectiveness of the effort.

The Need For Teams In IMO

When viewed as a project, IMO negotiations to examine tanker safety issues lend themselves quite readily to a team-based approach. There is much room in this type of process to improve efficiencies and relationships, and the approach would also lead to a better solution in terms of integrating the many issues related to tanker safety.

In the past, using traditional project management techniques, attempts to perform similar tasks has usually meant that political issues arise from the outset. These issues become the focal point of such negotiations, various agendas taint the proceedings, and progress can grind to a halt. The problem is that the many parties involved feel that it is necessary to take stances on the various political issues which are brought forth, and attempt to sway the index development in favor of their concerns, often simply hampering negotiations if it suits their agenda.

In this type of environment, the fundamental issue of assessing, and improving if possible, the safety inherent to tanker operations is pushed aside in favor of protecting one's interests.
Delegates become more concerned with protecting the interests of their constituents as opposed to reducing the impact of vessel operations on the environment. This situation is completely analogous to the situation of an organization which must make a strategic decision allowing the functional managers to attempt to make the decision among themselves.

It has been shown that this type of situation, unless properly controlled, will result in ill feelings between functional managers and impasses as each manager attempts to further the cause of his or her department, despite possible ramifications on the long-term health of the company and thus themselves, as opposed to stepping back and looking at the system as a whole.

By simply refocusing the knowledge of the group into a team effort, an IMO attempt to identify and address tanker safety issues can benefit from the many perspectives and experiences represented by the delegates present.

In addition to the ability to openly exchange ideas to facilitate the development of a tanker safety index, IMO would be concerned with the time period over which the development process occurs. Team-based approaches achieve substantial gains in schedule performance over traditional approaches.

Taking a lesson from the 30-year development of the Law of the Sea Convention, which in the end was not ratified by many of its designers, IMO delegates should recognize the potential for conflict, high costs, and meaningless results in the index development process. IMO should also seek a better approach to take to the
process to avoid the pitfalls of such large scale negotiations involving multiple objectives.

It is quite possible that a team approach, a simple mechanism which allows all delegates to work toward the same goal, should greatly enhance the performance and outcome of the negotiations. It is not an easy transition, but the benefits are readily apparent.

**Surveys**

In an effort to assess the potential for cooperation within a team effort of this nature, surveys were distributed to two of the most influential sectors of the international tanker industry; owners and operators, and regulators. It is assumed that these will be the parties with the most influence on the delegates to the IMO negotiations, and each of these groups is expected to hold a position which is in direct conflict with that of the other group.

The surveys attempted to focus on issues of direct impact on the issue of safe tanker operations, and avoided issues involved with the implementation of any type of tanker safety program, whether they involved an index or not. This was done in an effort to isolate the positions of the groups with respect to tanker safety, and to determine if these positions contained any overlap upon which a team effort may be built.

The results of the surveys are found in Appendix A. Surprisingly, the two positions are remarkably similar when implementation of an index system is not a factor. This implies that a team approach to address tanker safety should be feasible. In addition, such agreement may imply that both groups may be able
work together to establish an appropriate method for improving the safety of operations in the tanker industry. As there are many doubts over the ability to implement a tanker safety index, the system developed may not be index based.

Applicability of Navy Models

There is a large amount of literature available regarding the use of teams in various projects, including tactical teams to address certain needs within or across organizations. It is this theory which will be used as the basis for the development of the team-based approach for IMO to use when addressing the area of tanker safety.

This base of theory, while largely applicable to the IMO negotiations, has never been proven on teams composed of more than 30 or so members. In fact, certain literature discourages against the use of teams numbering greater than 10 members. Therefore, the analysis of the IMO case will supplement the large amount of small-scale team theory with the empirical lessons learned from the Navy case studies presented earlier.

The idea behind the larger scale teams is that, although the type of synergy which is present in the smaller teams cannot be developed in larger teams, certain principles still hold. These principles allow for benefits to be derived from larger teams which facilitate the accomplishment of the task of the team, including those which follow from improved trust and communications, and process improvements relating to efficiency and aligning the efforts of all participants toward a single goal. In the case of the IMO negotiations, countless earlier international negotiations which have
dragged on for years and/or yielded results of little value could be used to present the case to attempt such proceedings using a different approach.

The lessons learned from studying the Navy team applications are appropriate to the IMO case for a number of reasons stemming from unusual circumstances common to both organizations.

The large size of both types of projects has already been noted. In addition, both arenas are composed of very diverse groups seeking to impose their needs on the outcome of a project. These groups often hold many biases both for their own operations and against other organizations involved with the same project. In both cases, such organizational biases have much momentum behind them and negotiations are often tainted by grudges.

In both cases, the organizations are bound in many areas by specific procedures that must be followed as well as legal matters which could interfere with the progress of the project.

Another substantial challenge to team applications within the Navy which can also be expected to hamper IMO team efforts is the lack of constancy in team membership. In the Navy environment, changes in Commanding Officers (COs) can hinder the team approach. For instance, when a CO who strongly supports and encourages the use of teams is replaced by a CO who does not understand or agree with the approach in the middle of a project, the project suffers from the interruption of support from above. This situation is analogous to the fact that the delegates sent to the IMO proceedings can be expected to change over the course of the index development process.
Finally, both the Navy projects as well as the IMO proceedings contain many members at higher levels in various groups who are similarly empowered to alter the course of the project process. Because of the empowerment of these individuals, it is very important to ensure that all parties agree with the direction of the team effort.

Because of these similarities, it is expected that the insight gained through studying the Navy cases will allow for the successful identification of the needs of an IMO team effort.

Assumptions For IMO Negotiations

Three assumptions have been made to facilitate this analysis of the potential to utilize a team-based approach in the IMO arena.

The first assumption is that a tanker safety index is simply a starting point for the IMO team to attempt to address the issue of safety in international tanker operations.

An index may not be the best way, and certainly isn't the only way, to reduce the impacts of tankers on the marine environment. The word "Index" conjures up images of grades, which vessel owners and operators may not want to be subject to for any number of reasons. This understandable reaction may cause information to be withheld or altered, and could have severe impacts on the tone and output of the negotiations. The IMO team effort must respond to the proposed Norwegian index, but should also jointly agree upon the most effective way to identify, assess, and quantify the many factors which contribute to tanker safety. The resulting system may or may not be an index, but since it would be a jointly developed system, the
system will account for the concerns of both the owners and the regulators.

Regardless of the most appropriate methodology, the key issues to address remain the same: What are the significant factors related to tanker safety, and how can these factors be quantified, or at least characterized, to allow for the most effective assessment and prevention of risk to the environment? It is therefore assumed that the IMO negotiations will result in the development of an effective safety system which answers this question. For the remainder of this chapter, this output will be referred to as a tanker safety system.

The second assumption is that the most efficient way for IMO to develop a tanker safety system is to ignore the very political implementation stage, and develop a purely scientific system. This assumption seems reasonable as it is scientific principles which cause oil spills, not political issues.

Although politics do have a great impact on the actual operations of tankers, including the safety of these operations, until a scientific basis which supports changes in vessel and port management practices is developed, negotiations in this area will prove to be futile.

The second assumption underlying this analysis is that all people participating in the IMO negotiations being considered are interested in improving tanker safety. Although certain groups can be expected to attempt to hamper the implementation of any type of system in an effort to preserve their ability to conduct low-cost tanker operations, it is not expected that they would be against the
idea of determining the root causes of tanker safety problems and
determining the combination of factors which would yield the safest
tanker and tanker operations possible based on the current state of
knowledge.

In other words, this analysis makes the rational assumption
that no participant in the IMO arena will have an objection to the
development of a purely scientific system, index or otherwise, which
can assess the inherent safety of a tanker.

Therefore, this analysis will assume that the delegates to IMO
can agree to develop such a system and ignore the issues of
implementation until a system has been developed.

An Effective IMO Team Approach

This section will outline the design and needs of an effective
team approach to the IMO project of developing a system to assess
tanker risk.

Care must be taken when developing and implementing the
IMO team approach to address the very interesting nature of the
effort and its participants. These concerns would be present in any
application of a team-based approach in the environmental arena.

• Alignment of Goals

The survey results demonstrated that the views of both the
operating and the regulating sectors of the tanker industry with
regards to safety in this industry are fundamentally in alignment.
This situation must be emphasized, and the goal of developing a
rational, scientific system which addresses tanker safety issues must
be adopted by all of the delegates.
• "Big Picture" Perspective

As was the case with the SEALIFT application of teams, the IMO application can stand to benefit with a general introduction of the delegates to the "Big Picture" of the organization, the groups involved, and the team goal.

Therefore, the first step should be a workshop which presents the scientific goal to the delegates, allows the delegates to become familiar with the various interests represented within IMO, and gives an introduction to the team approach.

It is true that people usually know their own jobs extremely well, but it is overlooked that they may not understand the entire system or where they fit within the system. To become effective, team members need to know how the performance of their job relates to the tasks of others, and how their role fits into the overall team framework or organization.

The lack of a big picture perspective hinders a team member's ability to make effective decisions which work toward the goals of the team. Also, people need to understand the needs, responsibilities, and expertise of the other team members in order to effectively eliminate biases and gain a sense of trust. The introductory session should be designed to further the overall knowledge of the system, eliminate biases, and lay the groundwork for an effective team approach.

• Mission Statement

The next step in the team process at IMO would be to develop a mission statement for the team which all members agree with. A mission statement allows team members to participate in the
developing of the charter for the team which clarifies its goals and operating processes. By allowing all delegates to participate in the charter development, buy-in to the team method is ensured as concerns and reservations related to the approach can be raised and addressed at this point. Also, the team members become committed to a project when they are allowed the opportunity to help design it, which is what the drafting of the mission statement achieves.

A team mission statement contains three main components, the team's goal, a series of measurable performance objectives which lead toward the accomplishment of the team goal, and the team norms.

- **Measurable Performance Objectives**

  The scientific nature of the team's goal will facilitate in the establishment of clearly defined, measurable performance objectives. The goal of developing system to improve tanker safety is sufficiently vague to allow many interpretations. However, if the needs of such a system are discussed, the team can establish a series of deliverables which work to define when the goal has been achieved and allow the progress of the team toward its goal to be tracked.

  The performance measures in the IMO case may include the development of relationships between various factors, the returning of certain numbers pertinent to the design of a comprehensive system, the establishment of which factors being considered are critical and those which aren't, or the identification and performance of various research needs. In other words, once the team goal is broken down into the requirements of an effective system, the
delegates can translate these requirements into tasks which must be accomplished, and the associated deliverables. These tasks can then be undertaken by the team and by the delegates while the negotiations are not in session.

- **Norms Of Behavior And Operations**

At the same time as the team is developing its performance measures, it must establish its norms to the extent that they are not covered by normal IMO procedures. The norms established by a team define the team and its interactions, and it is critical to the success of the IMO effort that certain norms be included in the mission statement.

As with the performance objectives, the scientific nature of the project facilitates the development of team norms. With this objective in place, there are no political agendas present, so norms can be developed for such processes as decision making, flooring issues, elimination of components when necessary, and the revisitation of goals.

The norms need to establish accountability mechanisms as well as attendance requirements for delegates at meetings. They must address the issue of how to proceed with less than 100% of delegates present, and how many delegates are required as a minimum to hold a meeting.

Norms must present the team with decision making guidelines, including the information needs which must be met before an issue can be voted on, and what mechanisms will be used for voting. Due to the many possible natures of decisions to be made throughout the
tanker safety system development process, a number of decision mechanisms must be present and clearly defined.

In addition to decision making mechanisms, the IMO team will need guidelines which establish how issues can be brought up for, or eliminated from, consideration by the team. Similarly, the ability to revisit goals and change them according to the changing needs of the system and developmental needs of the team must be included in the norms.

For instance, suppose that the team establishes that structural solutions are of such little impact on the overall safety of tanker operations that IMO need not waste its resources on following through with reaching performance objectives related to these solutions. In this case, it would seem appropriate to drop structural designs from the slate of tasks which the team must perform. However, without mechanisms to do so, the team will be constrained to work in this area until its mission statement is fulfilled. Similarly, should a significant issue arise that had not been considered earlier, there must be a way to get it onto the list of areas which the team will investigate.

As another example of needs which IMO norms must address, if an issue continues to develop impasses in the proceedings due to informational needs, the team needs a way to postpone the consideration of this issue to avoid wasting effort in an area which cannot be adequately resolved.

Norms should also establish such team processes as information recording needs. The work of such major international efforts can be expected to include tradeoffs, assumptions, or other factors which are
not readily apparent in the interim and final products which must be documented to allow the decision process to be recreated in the future if necessary. Also, recording of processes and discoveries is required to avoid wasting energy on rework should the negotiations for the convention extend over a long period of time.

When developing its standards and norms, the IMO team should take a lesson from the UN Law of the Sea Convention. This effort, which spanned three decades, suffered severely not only because of the well-known political conflicts, but also because the proceedings lacked the structure which an effective set of norms could provide.

- Constancy Of Purpose

The need to establish a constancy of purpose has already been mentioned. The tedious processes and rotating membership inherent to the IMO negotiations can be expected to take a heavy toll on the enthusiasm and commitment of the team members. At best, IMO proceedings will be hampered as delegates do not remain constant over time. In the worst case, the team approach and goals will be dropped as new people and attitudes pervade the negotiations.

The IMO team needs to ensure that when delegates are not going to return to meetings, their replacements show up with an understanding of the project, the team approach, and the mission statement of the team. This can be facilitated through giving delegates the responsibility to educate their replacements on these issues, and by holding optional refresher workshops each time the effort reconvenes to bring new as well as returning delegates up to speed on the project and the team approach.
• **Incentive System**

Team approaches often require that incentives be in place to achieve the full cooperation of the team. This is a difficult issue in the case of the IMO as this body is not in a position to evaluate, praise, or reward people based on any criteria. Further, it has nothing to offer delegates in terms of incentives. However, the true incentive in this case is directly related to the team approach. The potential to establish a team with operating norms which accomplish a clear set of performance objectives should be incentive enough to the delegates who are well aware of the tedium and long-term commitment often required in such proceedings. The new approach, and chance to be a part of a large high-performance team becomes the incentive to collaborate with the team.

• **Boundary Management**

Finally, the IMO team needs to address the issue of managing the boundary between the team members and the countries and organizations which sent them. Quite often in this type of negotiation, delegates may change their positions on certain issues several times due to political pressures. The IMO team must create an environment where the team is allowed the room to operate without such pressures.

One way to accomplish this is to obtain a buy-in to the team approach from all of the organizations sending delegates. If the establishment of a tanker safety system is presented as the objective, and the team approach is given as the mechanism to meet this objective, it may be possible to have the parent organizations
agree to allowing their delegates to operate autonomously within the IMO team provided the norms and goals of the team are upheld.

The following table (Table VI) lists the needs which an IMO team application must address in order to be successful.

**IMO Team Application Requirements**

- Agreement Upon Scientific Goal
- Clear Performance Objectives
- "Big Picture" Perspective For Delegates
- Constancy Of Purpose
- Appropriate Norms and Standards
- Incentive To Work As A Team
- Boundary Management Mechanisms

**Table VI**

**Positive Attributes To Assist In Success**

The goal of developing a system which evaluates the inherent safety of a vessel is a lofty one, and one that will be difficult regardless of who is involved and what approach is being used. The case for the IMO to use a team-based approach toward this objective has already been presented, as well as the specific needs of this approach. This section will describe several factors inherent to the IMO effort which should facilitate both the implementation of a team approach as well as the development of the tanker safety system.
• **Culture Of IMO Proceedings**

First, the culture of the IMO proceedings have been described as being one which should be very receptive toward a team approach.\(^{35}\) The delegates spend much time together socializing in very informal conditions, which implies that there are many open channels of communication. This type of interaction provides the groundwork for the trust and communications required for a team effort to be successful. As was shown in all three of the case studies presented in Chapter 5, strong interpersonal relationships allow for traditional organizational biases to be replaced with attitudes which foster collaboration.

• **Widespread Agreement On Tanker Safety Issues**

The survey results demonstrated that there is widespread agreement within the tanker industry on subjects concerning tanker safety. This implied that regardless of which sectors of industry are influencing certain delegates, reaching agreement on safety factors should not be difficult. The sectors which would be expected to have the least common ground in their positions on tanker safety have proven to be in quite close alignment on this front, and thus appropriate decisions made in this area would be expected to support the concerns of both groups.

Therefore, by keeping the scientific focus, the normally conflicting sectors of regulators and operators will actually be going into the effort on the same side of the table, greatly facilitating the flow of discussions, decisions, and information. It is this common

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\(^{35}\) CAPT Alan J. Brown, 13.64 class discussion, MIT, February, 1996.
front which allows many teams to accomplish tasks which would be thought unlikely.

The surveys gave insight into the use of teams beyond the information itself. For instance, the willingness to participate in the survey and candidly discuss certain issues so freely throughout the tanker industry is very promising to the IMO team effort.

- **Mechanisms To Develop Trust**

There is plenty of room within the IMO structure to allow trust to be built among various nations and organizations. For example, in theory, the US could agree to drop OPA 90 (a major driver of the IMO index development process) in favor of whatever system is developed by IMO.

In this way, the US will not only be extending a display of faith to the convention, but valuable IMO resources (perhaps the most notable being the meetings themselves), will not be wasted on addressing a unilateral mandate that has limited promise of improving tanker safety. This will allow the focus to adjust to more appropriate issues.

- **Potential For Conflict**

Another positive aspect of the IMO team approach is that due to the possibility of conflict. Though generally viewed as detrimental to group decision processes, conflict, when controlled, can improve the resulting decision. In fact, it is a widely accepted notion that conflict within working groups assists in the creative process, and optimal decisions cannot be made without some form of conflict.

Despite the lack of conflict in surveys, certainly none that can't be worked out, it can be expected that much more will surface in the
international arena. The key is to allow this conflict to surface, and
to control it in a manner which assists in the process of identifying
and quantifying factors related to tanker safety. Such factors of the
proposed team-based IMO effort as the team approach itself, the
focus on scientific goals, and the establishment of team norms impose
constraints on possible conflict which steer it away from
interpersonal conflict towards the positive conflict which often
results in innovative problem solving. Thus, the structure of the IMO
team effort as presented should minimize performance inhibiting
personal-level conflict while maximizing issue-oriented conflict.

Such issue-oriented conflict enhances performance of teams in
a number of ways. It inspires otherwise apathetic team members to
take a part in the decision process, allows a broader range of issues
and alternatives to be suggested and explored, and by allowing more
members to participate and expend energy in the conflict, it
improves the commitment of the team to the final outcome of the
process.

The delegates will come prepared for conflict, and the team
approach will allow it. However, the team approach is designed to
recognize this and encourage only performance enhancing, issue-
oriented conflict.

• Customary International Law

Finally, the IMO process proposed will effect an international
agreement on tanker safety issues. Some interpretations of
international customary law hold that, if a country is represented
during the development of an international agreement and does not
voice objections to the treaty or specific parts of it at any point
during the negotiations, that country can be held to the provisions of
the treaty in an international court under international customary
law.

This arises from the following requirement of customary
international law. This law requires two components to be present,
the general practice of states (usage), and the acceptance of states of
this practice (opinio juris). However, many countries interpret these
mechanisms differently, thus allowing for this type of law to be used
in a variety of circumstances.

For instance, on a particular issue, usage may be viewed as
continued practice over a long period of time by one country, or
simply a legal document stating that the country intends to practice
the subject issue in a specific way, but has not ever done so yet.
Similarly, one country may view opinio juris as being present once a
document like an IMO index is signed, ratified and in force; another
may claim that once the index is drafted, and no nation objects to its
provisions, it has become part of customary law. While a third
country may claim that the mere act of coming together to negotiate
a treaty may place certain agreed-upon provisions into the realm of
customary international law. Further, the Vienna Convention of the
International Court of Justice in 1969 contained a provision which
supports the potentially binding nature of a treaty upon a third
party. Article 38 of this convention established that:36

"Nothing...precludes a rule set forth in a treaty from
becoming binding upon a third state as a customary rule
of international law."

From this, it is clear that the implications of the IMO negotiation process could be quite substantial. By making sure that all delegates are aware of this fact, the concern of delegates for the responsibility these mechanisms present will ensure that issues will be brought to the front as soon as they arise. Also, only scientific truths, as far as current knowledge defines them, will be universally accepted due to the inability to refute them.

This legal mechanism should not only keep the process on track, but it will also allow the team the ability to continually keep abreast of the concerns of its various members. Delegates will simply be reluctant to harbor issues throughout the proceedings which could later become binding on their countries.

**Positive Attributes of IMO Environment Which Will Support the Team Approach**

- Culture of IMO Meetings
- Widespread Agreement on Tanker Safety Issues
- Mechanisms to Develop Trust
- Potential for Issue-Oriented Conflict
- Customary International Law Mechanism

**Table VII**
Conclusions

The IMO process of addressing tanker safety has much to gain in terms of efficiency and results if a team-based approach is taken to the proceedings.

The unique nature of the IMO proceedings requires a set of special considerations when developing the team approach and mission statement.

In any multi-organizational negotiation, it can be expected that organizational biases will color the process, and the political nature of the IMO effort to address tanker safety will not be an exception. Certain constituents of the shipping industry will resist any attempts to examine the root causes behind oil spills. By approaching the system as a scientific effort and ignoring implementation issues until the physical system has been characterized, the effect of organizational biases can be controlled.

The team approach recognizes the potential for conflict and allows for problems to surface immediately, and the effort to address these problems and to be adjusted accordingly.

The IMO case was used simply for illustration of the point that environmental negotiations and other projects can be improved, and work toward environmental rather than political agenda through the effective use of teams.

Team approaches can improve both the efficiency and effectiveness of projects aimed at improving the health of environmental systems. Team-based environmental projects would not only save time in the development of effective solutions, but with team agreement on the final product, higher rates of ratification
and implementation can be expected. This is not limited to the environmental policy arena which was selected for illustration, but it also applies to such projects as environmental clean-up and monitoring efforts. In these situations, many parties and low budgets often set the tone for the effort. In such situations, the use of teams would allow the groups involved to identify the needs of the system and develop a method which makes the most efficient use of the available resources which meets the needs of the project.
CHAPTER 8 - CONCLUSIONS

The flexibility and information integration possible through team-based methods make them ideal approaches to the tactical and strategic decisions required of many projects in today's business world. Such approaches allow organizations to learn about themselves and their processes and to make the most effective use of their human and other resources.

There is potentially valuable information existing at all levels of an organization. Bringing that information to the upper levels of management can be both time consuming and impractical, and is usually accompanied with decreased levels of understanding of the impact of the information. Therefore, management's best efforts are not those towards making all of the decisions of the organization.

The efforts of management will ultimately yield greater results if they are directed towards developing an environment in which employees at all levels are encouraged to identify and address the problems they are facing without the need for intervention from a higher perspective. If more information is needed to address these situations, the most effective environment would also allow for inputs from other areas to be sought and obtained. This environment is the goal of team-based approaches.

Such methods can be particularly effective in arenas where some form of control is necessary to limit non-productive activities spurred by political, emotional, or limited resource situations. This thesis demonstrated this potential in two very politically charged areas, those of US Navy vessel acquisition and environmental protection.
Clearly, the method can work for the Navy, especially given stronger support. In fact, the USS Dolphin case presented in this paper had all of the essential elements for a team approach, and was viewed as a tremendous success. As such, it may be considered a "textbook" example of partnering in Navy ship acquisition as well as in multi-organizational projects in general.

The other Navy-related cases presented in this thesis demonstrate that, given the proper support and resources, team-based administration has the potential to dramatically improve the performance of Navy acquisition and maintenance projects. It is recommended that the Navy restructure the contracts for vessel acquisition to allow for the selection of contractors who agree to follow a team-based approach. Further, due to the required training and meeting attendance of all parties involved with a team effort, the resources to foster an appropriate team atmosphere should be provided in appropriate Navy contracts.

The Navy should also look into methods to increase the use and ensure the success of teams throughout its organization. This organization suffers from the inefficiencies inherent to the application of top-down management techniques in large-scale systems and expansive operations. The Navy does not include mechanisms for effective organizational learning. To address these needs, such areas as individual accountability, empowerment, and recognition and rewards should be examined and redesigned to allow for the replacement of the traditional management techniques with team-based approaches.
Team-based project administration also holds much promise for applications in the environmental arena. The approach allows for solutions to be made which utilize information and resources in the most effective manner to address environmental concerns. The flexibility and goal orientation of team approaches enable such projects to steer away from potential impasses and toward solutions which attempt to ensure or enhance the health of the environment. Also, the integrative "big picture" aspect of the approach would allow the most effective system designs for a given set of resources facing an environmental management or protection project.

It is recommended for applications in this arena that parties be educated on the approach as well as the environment itself. This way, projects have less chance of getting sidetracked by political agenda or insufficient information, issues which often paralyze environmental safety efforts. An effort should be made to ensure that funds which are designated for environmental projects, both in the public and private sector, be administered through team-based approaches. These approaches will develop solutions which have the most positive impact on the health of the environment.

The greatest barrier to the successful application of teams in both of these arenas is also the greatest barrier that commercial applications have had to overcome, that of the culture of the respective arenas. There are many elements essential to the success of a team approach which, although seemingly common sense from a project and organizational health perspective, are counter to the operating environments in many industries. However, as the success of teams is demonstrated on increasing numbers of projects, it can be
expected that a move toward more team-friendly operations will become evident in many industries.

The demonstrated success and continued use of team applications should be taken as an indication of the direction of project administration.
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APPENDIX A - TANKER INDUSTRY SURVEY

Content Of The Surveys

Questionnaires were developed to meet the objectives of establishing the viewpoint of two of the most influential sectors in the tanker industry on issues regarding tanker safety. The content of these questionnaires was driven by the need to make a survey which would yield worthwhile information from minimum effort on the part of the respondents, as well as the desire to create a format which would allow respondents who wished to expend more than a minimal effort to do so.

The resulting surveys featured questions which addressed technological and human factor issues relating to ship and port operations and characteristics, and allowed the respondents to not only comment on such issues, but also rank them in order of importance to the development of an index.

Questions were presented in a manner which would yield worthwhile information if the participant did not wish to commit much time to the survey, but would also allow the participant to include as much information as he or she chose. To accomplish this, the first half of the survey contained questions which would accommodate both short answers as well as essays. The second half of the survey had the participants rank several factors according to their potential impact on safety in tanker operations. Space was provided on these latter, ranking, questions to allow respondents to incorporate issues not mentioned into the ranking scheme.
All survey participants were contacted prior to being issued a questionnaire. An example of a survey is given in Appendix B.

**Parties Surveyed**

The people chosen to participate in the survey were selected because of the role they have within the industry. The participants fell within two general categories: Owners/Operators/Charterers and Regulators.

It was felt that the opinions held by people working in these capacities would extend over the wide range of possible opinions, and that the differences in opinion between members of the various categories would be quite significant. It was also assumed that these parties will bring with them the concerns of related sectors, for instance, the issues of importance to the tanker operators would similarly be of importance to the P&I clubs, Regulators would have concerns similar to those of the Classification Societies, etc..

The following two sections present the information obtained from the surveys which were returned.

- **State And Federal Regulators**

  Both state and federal regulators employed their own systems for differentiating between individual vessels in terms of inherent environmental risk. Members of both type of regulator believed that such a system, when standardized across the industry, would be of use in reducing the environmental risk of tanker operations. The possible use of such a system by a charterer was noted by one federal regulator, but the incentive to go to a less risky vessel was not noted.
One federal regulator felt that additional crew training and ensuring proper crew communications would have the greatest impact on reducing risk in tanker operations.

He felt that an indexing system was possible, but mentioned barriers to an indexing system which were related to the application and enforcement of such a system. The barriers that he mentioned included political concerns inherent to such a large system and the difficulty of standardizing an index across the system (particularly since the system includes many different countries, and thus can be expected to have an equal number of interpretations of the rules and regulations developed). As these issues are beyond the scope of our project, that of developing a scientifically-sound system, and occur at a later step than our goal, it can be assumed that this regulator would agree that a scientific system is possible.

Another federal regulator concurred that there was much to do in the areas of human factors (training, communications, and watchstanding), better escort regulations, and improved vessel structural designs. He felt that, in the tanker industry, the players generally had a good grasp of the issues, and reducing risks was a matter of money and effort which the owners and operators were willing to put forth.

He described the Coast Guard system of differentiation between vessels to prioritize which vessels should be boarded. He mentioned that the system was standardized within the federal government, but some states had their own system. (See comments about federalization in "Owners/Operators/Charterers" section) He did not see a benefit to standardizing this system across the industry, except
for the ability for charterers and terminals to discern differences in ships.

He thought that a rational indexing system would be possible, but mentioned a few obstacles to the implementation of such a system. These included the subjectivity involved in assigning parameter values, determining who would maintain the system, and determining a rational basis for "scoring" the parameters. Again we see that a regulator feels that the main barriers to a rational indexing system come in at the implementation stage.

He thought that the tanker practices of operating in restricted waterways and high traffic density areas (historically the highest density casualty areas) were the practices which entailed the most risk of adverse impact on the environment. His reasoning was that since the majority of transit is on open waters, so these types of operations are the least frequently done, factors such as fatigue/communications/poor training are really exacerbated in these areas, and that tankers are simply difficult to maneuver, and it is hard to plan ahead for surprises.

Both federal regulators noted the importance of a vessel's casualty history in their ranking system, but the state regulator went one step further to say that one of the most important assets that the industry has in the reduction of tanker risk is the "lessons learned" from experience.

To this end the state regulator, an employee with the Washington State Office of Marine Safety (OMS), strongly supported the various programs of the OMS as methods which could be applied more widely to mitigate the risk of oil spills and other marine
casualties. These measures include the submission of Oil Spill Prevention Plans to OMS, the review of these plans versus Best Achievable Protection (BAP) standards, agreement to submit to yearly inspections and tug escort requirements (by USCG and Washington state). The responsibility for these plans, as well as evidence of financial responsibility and Oil Spill Contingency Plan, goes to the vessel operators.

It was the opinion of the state regulator that this package of requirements, reduces the risk of oil spills in Washington. She also stated that OMS believes that such measures, in conjunction with education programs aimed at tanker owners, would lead to greater prevention of oil spills if they were employed by maritime jurisdictions worldwide.

The state regulator agreed with the federal regulators that the design of a rational indexing system is possible. As with the federal regulators, the main difficulties she associated with this task were on the implementation side.

It was a universally held by all of the regulators that human factors were the most important issues concerning tanker safety. The regulators noted such human factors as training, language and other communications issues, and fatigue as areas of concentration to mitigate human error.

Regulators felt that normal tanker operations included several risky practices. One such practice mentioned was the discharge of cargo immediately after long crossings. With fatigue being the key issue here, one regulator noted that it is not uncommon for tankers to attempt to make up for lost time on rough crossings, or when long
hours had recently been spent to repair equipment malfunctions. One can see how the combination of maintenance practices and crew rest become quite crucial factors in these situations.

Another typical tanker operation which could lead to possible adverse impacts on the environment is that of operations in restricted waterways or high traffic density areas. These operations are often dictated by the location of loading and discharging facilities, but several alternatives were mentioned to lessen the risks of such operations. These alternatives included use of smaller, lightering vessels in restricted waterways, use of offshore terminals or land-based pipelines, or the redesign or relocation of the current terminal system which has matured in restricted waterways while tanker sizes increased.

From the above, we see that the most important factors relating to tanker safety that the regulators identified included human factors and maintenance issues. Regulators also felt that the management practices and operating procedures of the tanker owners and operators weighed very heavily in the risk inherent to a specific vessel.

In addition to the human factors mentioned above (training, fatigue, language issues), regulators felt that the decision making and watch standing effectiveness of the crew were also significant crew-related factors.

Of the other factors offered for ranking, regulators felt that such issues as the structure of a vessel, the navigation and emergency systems on board the vessel, spill equipment available in the area, and the prevailing weather and currents in the area had
very little impact on tanker operations when compared to other factors.

The competence of pilots and the traffic in a port were ranked very highly by the regulators as port-related issues which may possibly contribute to tanker safety.

Regulators felt that such factors as instrumentation ergonomics, bridge design, and the size of the crew had little to do with tanker safety. Using the issues that regulators emphasized, it can be deduced that they valued a small, alert team with effective communications on an older vessel than a large crew that had difficulties exchanging information in a state-of-the-art vessel.

Finally, all regulators surveyed felt that environmental damage was the most important effect of oil lost to the environment.

- **Owners/Operators/Charterers**

  To simplify writing and reading, this group will be referred to as "operators" or "owners" for the remainder of this report.

  The first operator queried uses a risk assessment/voyage assessment "Vetting" system to rank his own vessels as well as the vessels and management of other companies that his company might hire to carry product on a charter basis. It is his belief that this vetting system would be beneficial to others, and he has presented system and accompanying software, to other players in the industry.

  This operator felt that "rational" is the key word in the inquiry into whether or not an indexing system can be developed. He believed that such a system sounds like a good idea, but it must be "uniformly" applied by well-trained people. As a counterpoint to an effective system, he cited the current "SIRE" system, which is not
standardized, and therefore not effective. In this latter system, data in system is input by inspectors who use differing criteria, standards, and experience levels.

Once an indexing system was in place, this operator noted the importance of follow-up reviews and inspections to maintain the effectiveness of the system.

One owner/operator called for a "federalization" of the US. approach to regulations. His company, with extensive operations between US ports, often experiences difficulties as different states require different operational procedures and requirements. It should be noted that his company has tanker operations in the state of Washington, so is subject to the reviews and requirements noted by the state regulator above. Other measures which this operator felt should be taken to improve the safety of tanker operations included mandatory bridge team training and emergency training on simulators, uniform enforcement of current IMO and USCG regulations by port state authorities, and stricter enforcement of "3rd world flag" operators by port state authorities.

Another operator felt that a number of technology-related solutions would greatly reduce the risks inherent to tanker operations. He felt a need for automated navigation systems (ones which would warn of converging vessels or other anomalies), automatic ID systems on all vessels, and "practical" VTS systems. He also expressed a need for the recording of "near misses". It should be noted that the systems he mentioned are all systems developed to improve safety in high-traffic areas. This has already been shown to be an area of concern for the regulators.
In addition to these technology solutions, this operator noted that the improved selection and training of, and increased regulation of pilots, and the improved selection and continual training of crews would greatly enhance the safety of tanker operations. It is interesting to note that this same operator who calls for increased regulation of pilots claims that there are "too many nitpicking regulations" on tanker operators, which rendered many systems ineffective.

Further, this operator did "not agree with environmental indexing", nor did his company did not use any system to rank vessels according to risk. He did not feel that such a system would be useful, but instead proposed that if the charterers/owners were to be held accountable for the safety of the vessels that they employed, the system would do much towards improving itself without regulations. Beyond not being useful, he claimed that a rational indexing system would not even be possible, as there are too many "cheaters in this industry". Also, he was concerned that the first time a waiver was issued to a vessel, the system would become "useless". Considering the scientific nature of the negotiations being proposed, such systemic matters can be ignored for the time being, leaving this operator with no real objection to an indexing system.

Another operator was quite clear in calling for the elimination of substandard operators as a method to improve the overall safety of the tanker industry. He claimed that this would involve "transparency" of information from measures such as Port State Control, or vetting inspections like the OCIMF SIRE program. In addition, he felt strongly that implementation of IMO ISM Code
would "make it mandatory to do what good operators have done for years: create, implement, and audit the use of safe operating procedures..."

He also called for the effective implementation of the new STCW requirements, including oversight authority by IMO itself relative to delinquent flag states.

This operator felt that a closer link between statutory requirements (SOLAS and LOADLINE) and Class requirements would prove useful. He also felt that class requirements could be "beefed up".

This operator suggested the following measures would also serve to make for safer tanker operations: Finding ways of creating better "alternative" tanker designs than double-hulls, better structural design, "better maneuvering design and power levels, much better attention to traffic and waterways management issues involving pilots, VTS, Under Keel Clearance, and similar measures, and he felt that there should be much more emphasis placed on making charterers financially liable for the quality of the vessel which they charter.

He echoed the thoughts of the second owner in believing that there would never be an indexing system that one could call "rational" which would be practical in making further improvements in tanker safety. He also agreed with the second operator in the desire to have "near misses" reported, and went further to state that he thought there should be "Black Box" technology on all vessels. Again, he felt that there should be more transparency with these types of information.
His thoughts on the most effective ways to minimize tanker spills is through the following preventative measures: better waterways management and VTS, and factors such as pilotage, Passage Planning involving both the master and the pilot, under keel clearance, etc. He also noted that one measure that could have been adopted in this country, but wasn't, was much greater use of deep water ports, and the restriction of large tankers from operations in narrow, lengthy, inland rivers and canals. In fact, he saw this as the most risky tanker operation, in terms of adverse impact on the environment.

This operator stated that "undoubtedly" the most cost-effective method for minimizing the impact of tanker spills (once oil has entered the water) is to let nature handle the clean-up, as opposed to the massive "cosmetic" projects seen in the US. He did digress to suggest that there was a place for bio-remediation and other carefully thought-out scientific techniques, but reaffirmed that, once the oil is in the water, it was up to nature to do the job.

The aggregate position of the owners is hard to assess, as owners disagree not only on the possibility of a rational indexing system, but also on the main cause for concern (lost commerce vs. environmental damage) when oil is lost to the marine environment.

Among the operators, the two who had operated in capacity of Captain (on board tankers) cited organizational factors as very big influences on vessel safety. Including standing orders and procedures, as well as how closely these are followed by the crew.

All operators cited pilots as important to safe tanker operations. Solutions ranging from increased liability, regulations, to
review boards with power to discipline were all suggested as mechanisms to increase the effectiveness of pilots.

As with the regulators, the owners agreed that crew factors were the dominant factor of impact on tanker safety. In addition to training and crew selection, the owners also cited standing orders and the following of (proper) procedures as among the human factors with the most significant impact on the safe operations of a tanker. Others included the decision making effectiveness and experience of the crew, and the organizational structure and policies of the ship operators.

Operators, like the regulators, ranked such factors as bridge design and instrumentation ergonomics as being of very little impact on the safe operations of a tanker, particularly when there are adequate training programs in place.

Beyond a vessel's crew and officers, the owners felt that there was a lot of room for improvement in other human factors, those related to pilots as well as the port's vessel traffic management.

Other areas that operators cited as needing improvement included such policy issues as tug escort policies and a move toward more effective vessel traffic management. It was suggested that vessel traffic management move from an advisory position to one of control in congested areas.

Operators cited traffic management and navigation systems along with pilots and the owners standing orders as the factors inherent to a given vessel which would have the most impact on its position with respect to an environmental risk index. They agreed with the regulators that the spill equipment available in a given area,
and the emergency systems on board a vessel had little impact on the amount of risk that the vessel posed.

Operators also agreed with the contention of the regulators that large vessels operating in restrictive waterways were the operations which put the environment at the most risk of contamination by oil spills.

Crew factors and pilots emerged as two of the dominant port-related factors which the operators cited as possible contributors to a tanker casualty. Also mentioned were the traffic in the port, the management of the waterway, and the physical characteristics of the port, particularly the approach to the port.

Finally, the tanker operators were not in agreement about which effects of an oil spill were most important. Although each owner recognized environmental damage as among the top two concerns, one owner placed lost commerce due to public perception above this, and another ranked liability for claims as higher.

**Analysis**

The enthusiasm with which the surveys were received by those in the tanker industry who were asked to cooperate was quiet impressive. It was clear that most respondents spent significant amounts of time to ensure that their responses would contain useful information. The result is that there is much to be learned from the surveys.

Similarities and differences of opinion among the respondents were flushed out, and these are given below. These were obtained in an effort to determine what common ground was present. It is this
type of common ground which is used to develop and align the goals for a team approach.

Common Ground

Despite the seemingly contradictory operational goals of the two groups participating in the survey, there was an unexpected amount of consistencies in the responses. Certain issues dominated the questionnaires of many as being among the most significant factors impacting safe tanker operations.

This leads to the most notable similarity among all of those surveyed, that similarity being that people in both sectors of the industry are very aware of tanker safety issues. However, just as readily apparent from the survey information is that, within the current system of international tanker operations, there are no benefits to offset the high capital costs of implementing the myriad of alternative tanker risk reduction techniques.

This observation came from both sectors, often as a way to justify or sympathize with the position of owners who would be burdened by more expenses to make their operations safer. It is not clear where these costs may be recovered, if they can be recovered at all, and these expenses can leave the operator who incurs them at a severe competitive disadvantage to those operators who are not as concerned with safe operations.

Another important similarity was that all respondents noted that there was a need for the identification of "bad" (dangerous) players within the international tanker industry.
Beyond identification, agreement on the use of this information was not apparent, even within a single sector. Surprisingly, only one participant (a regulator) mentioned a need to actively force such players out of operation. Others simply felt that a system which reliably identified the bad players was the primary concern on this front.

Many other mechanisms were offered as modifications to the current system to create an environment where safer operators would be favored over the bad players, including market measures, trade restrictions, or liability schemes. Once again, we see the need and the call for incentive to move towards safer operations.

In addition to the need to identify bad players, only one respondent (an operator) "objected" to the possibility of a tanker indexing system. If this opinion is discarded due to the complete lack of support for his position, it can be assumed that the development of a rational environmental indexing system is possible. The only technical barrier to this type of system cited was related to the difficulty of quantifying and assessing possible impacts of certain factors.

When questioned about specific issues important to safe tanker operations, all respondents emphasized the role of human factors in safe tanker operations. In fact, such factors were cited as the single area with the most potential impact on the environmental risk of tanker operations.

It is interesting to note that, although there was agreement on the importance of human factors, the specific factors identified as having the most importance differed from sector to sector. For
instance, regulators felt that such human factors as the nationalities of the crew and officers, the amount of rest that the crew is operating on, and effectiveness of the communications (language barriers between vessel operators and other vessels, pilots, tug/escorts, the port, etc.) were the most significant from a risk standpoint. Operators, on the other hand, felt that organizational issues (e.g. standing orders and their implementation), the training of the crew, and the crew selection itself were the human factors with the most impact on tanker safety.

Both operators and regulators felt that the double-hull standard, as imposed by OPA 90, was not the most effective solution to the problem of tanker safety. One federal regulator stated that it was a reactionary fix, and other factors in the system (in his case, especially crew training and communication issues.), had much greater impact on safety.

One survey respondent pointed out that most regulations, both in federal and international regulations, are the result of reactions to an incident at sea or in port in which losses were suffered. Taken in this context, it is easier to understand why the unilateral OPA 90 regulations came into being despite the fact that many people recognize such regulations as having little value.

Many respondents agreed that the histories of owners, operators, crews, vessels, etc. are important indicators of the risk inherent to a vessel. This implies that there is a need in an indexing system to incorporate empirical data with theoretical and scientific measures.
There was concern expressed from both sectors that there are certain risky situations which have become commonplace in tanker operations. Two practices in particular which were called risky were the operations of large vessels in restricted waters, and the operations of vessels in high traffic and near-coastal areas.

There was not much agreement on how to address these issues, but improved waterways and traffic management systems, tug and pilot issues, electronic solutions, and terminal redesign were all suggested.

On a related note, many regulators pointed out that the inherent riskiness of a single vessel can vary throughout the course of a voyage. This is because risk is dependent on a number of constantly changing predictable factors (port/weather characteristics), and other events (maintenance procedures prior to entering a port, extreme weather conditions, equipment or communications failures, etc.)

It was noted that certain factors can feed off one another to exacerbate a situation. For example, the effects of fatigue, poor communications, and inadequate training or response mechanisms can all came into play in certain weather or traffic situations.

Differences

Just as it is important to identify the similarities between the positions of the various sectors of the tanker industry, it is equally, if not more, important to identify areas of conflicting viewpoints.

As mentioned earlier, the main differences of opinion surrounded the possibility of an environmental indexing system. As
the points of contention were all related to the implementation of such a system, this difference is not a concern of this study which proposes to focus on identifying and addressing the root causes of tanker risk.

Other differences in opinion surrounded technology-related solutions. Operators emphasized the importance of such developments as GPS, electronic navigation and identification systems, improved communications systems, and the increased use of electronic traffic management systems. However, regulators did not denote these developments as being of importance. The position held by this group is that the crew factors dominate, even in the most technologically advanced bridges and waterways.

Another difference of opinion surrounded the role of pilots in tanker safety. According to the operators, if liability or some other mechanism for holding tugs and pilots liable for their advice, there would be a positive impact on tanker safety. Regulators, on the other hand, did not cite pilots as being a significant factor. Pilots were not the solution to problems that were inherent to the system. This viewpoint asserted that there are many other flaws inherent to port and waterway systems, ranging from traffic management systems to the physical layouts themselves, and that only a system-wide audit and redesign would appropriately address the problems.

This surprisingly low number of substantial differences of opinion can be expected to increase dramatically in the international IMO arena.
Conclusions

It is quite promising to note from the surveys returned that players operating in both sectors of the international tanker industry are well aware of safety issues. Further, the cooperation from these sectors in the survey, and the virtual agreement on the ability to develop a rational environmental indexing system implies that the development of a consistently applied, scientific indexing system would not only be supported throughout the industry, it would also be welcomed by many.

It is quite clear that human factors dominate the concerns of people in every sector of the industry. Structural solutions, although the subject of many federal and international regulations, are viewed as having little impact on the safety of normal tanker operations. One final note on human factors is that people from all four sectors placed a strong emphasis on the need for language compatibility between crew and officers, captains and pilots, captains and tugs, vessels and ports, vessels and other vessels, etc. Although this trend may be the result of recent, highly publicized, tanker accidents attributed to this factor, such language skills would appear to be a human factor area that is easily quantified and addressed.

It is encouraging to the development of systems which attempt to protect the environment to note that the only barriers to employing such a system occur in the implementation phase. Granted, the installation and continual effective implementation of this type of system encompasses a wide range of problems and issues, the task of developing a rational, scientifically-based system
to gage inherent tanker safety is not impacted by these considerations.

Finally, the need for incentives to move towards safer tanker operations was described by representatives from all sectors of the industry. Again, this implementation stage issue is beyond the scope of the project, but the number of survey respondents to cite this issue make it worth noting.

The problem was most often phrased as an incentives to use higher quality carriers, implying a burden on charterers for safety issues. Owners/operators believed that bringing accountability to the charterers and pilots would be an appropriate mechanism to induce the use of safer carriers/vessels, along with certain regulations toward the same end. In the words of one owner, the issue is not so much one of knowing which are good or bad ships, but what one does with this information. Most charterers know which are the good and bad owners and ships, but don't always use that information when selecting vessels due to available tonnage and the costs involved with hiring a better vessel.
APPENDIX B - SAMPLE QUESTIONNAIRE

TANKER SAFETY INDEX QUESTIONNAIRE

What is the role of your organization with respect to the tanker operations industry (owner, operator, charterer, regulator, etc.)?

What measures do you believe should be taken in the business of tanker operations which would reduce the impact of shipping on the environment? What measures that are commonly considered to be effective do you believe are not necessary or effective?
If an environmental indexing system were to be developed, what five parameters do you feel should be integrated into the index (hull design, crew size, etc.)? Please rank these factors in order of importance.

Does your organization currently differentiate between individual vessels (via a numerical or some other system) in terms of their inherent environmental safety or risk? If standardized across the industry, would this system be useful to other parties?
Do you believe that it is possible to develop a rational indexing system of this nature? If not, please explain why. If so, what barriers do you believe will exist in the design of such a system?

Many organizations have published studies and opinions regarding tanker-related oil pollution issues. Please briefly discuss any articles or publications with which you particularly agree or disagree.
Irrespective of cost, what is the single most effective technology or method for minimizing the impact of tanker spills? (ship design, cargo handling procedures, port traffic controls, human factors, etc.)

What is the most cost effective method or technology for minimizing the impact of tanker spills?

What tanker operations or practices do you believe entail the most risk of adverse impact on the environment? Why?
For the remaining questions, blanks have been provided for you to add factors that we have not presented. These should also be ranked along with those provided.

Rank the following factors according to their possible contribution to tanker-related oil pollution (1 being the factor having the most impact, etc.):

- Structural Design of Vessel
- Preventative and Corrective Maintenance of Vessel
- Preventative and Corrective Maintenance of Systems
- Weather/Currents
- Crew Factors
- Navigation Systems of Vessel
- Emergency Systems Aboard Vessel
- Traffic in Area
- Readiness of Spill Containment Equipment in Area

Rank the following port-related factors according to their potential for contributing to tanker-related oil pollution (1 having the highest potential):

- Physical Characteristics of Port
- Traffic in Port
- Other Activities in Port
- Crew Factors
- Prevailing Weather

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Rank the following human factors according to their potential for contributing to tanker-related oil pollution (1 having the highest potential):

- Crew Size
- Training
- Rest or Fatigue
- Decision Making Effectiveness
- Watch Standing Effectiveness
- Bridge Design
- Organizational Structure
- Instrumentation Ergonomics
- Experience

How would you rate the following effects of oil lost to spillage in terms of importance (1 being most important):

- Environmental Damage and Clean-Up
- Lost Commerce Due to Public Perception
- Lost Commerce Due to Lost or Interrupted Supply
- Lost Commerce Due to Tanker Damage

Additional Comments (Attach extra sheets if necessary):

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