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ABSTRACT

This report reviews the need for teaming skills in the engineering workplace and discusses why these same skills can contribute to improving the educational process. It also includes a team training workbook and a facilitator's guide that contain exercises and ideas to help develop effective teams. The report examines the evolution of teams in industry and how Arizona State University is redesigning its core engineering curriculum to reflect the increased use of teams. The team training and facilitator workbooks each contain three sections which focus on: (1) techniques for making teams out of groups; (2) the results of team versus individual decision-making; and (3) team-building exercises. Appendixes contain tools for team decision making and a reading and video resource list. (MDM)

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Teams in Engineering Education

A Report Submitted on Work Completed
Under Sponsorship of the

National Science Foundation

Grant Number USE 9156176
Student Teaming and Design

Submitted by

L. Bellamy, Chemical, Bio, and Materials Engineering
D. L. Evans, Mechanical and Aerospace Engineering
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Tempe, Arizona 85287

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March 1994

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Abstract

This report reviews the needs for teaming skills in the engineering workplace and discusses why these same skills can contribute to improving the educational process. The report also includes a *Team Training Workbook* that contains exercises designed to take teams of participants through the stages of team development and the principles of effective team performance. A *Facilitator's Guide* is included to provide instructors with additional information to help insure the success of the exercises in the *Workbook*.

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Teams in Engineering Education

Introduction

The Slow Evolution of Teams in the Workplace

In 1966, Warren Bennis, a well-known business professor and consultant to multinational companies and governments throughout the world, published an essay entitled "The Coming Death of Bureaucracy" that contained the following predictions about the demise of the hierarchical structure then common to nearly all organizations [see Chapter 4 of Bennis (1993)]:

Organization

The social structure of organizations of the future will have some unique characteristics. The key word will be "temporary." There will be adaptive, rapidly changing temporary systems. These will be task forces organized around problems to be solved by groups of relative strangers with diverse professional skills. The groups will be arranged on an organic rather than mechanical model; they will evolve in response to a problem rather than to programmed role expectations. The executive thus becomes a coordinator or "linking pin" between various task forces. He must be a man who can speak the polyglot argot of research, with skills to be evaluated not vertically according to rank and status, but flexibly and functionally according to skill and professional training. Organizational charts will consist of project groups rather than stratified functional groups. . . .

Adaptive, problem-solving, temporary systems of diverse specialists, linked together by coordinating and task-evaluating executive specialists in an organic flux—this is the organization form that will gradually replace bureaucracy as we know it. . . . Organizational arrangements of this sort may not only reduce the intergroup conflicts mentioned earlier; they may also induce honest-to-goodness creative collaboration.

Motivation

The organic-adaptive structure should increase motivation and thereby effectiveness, because it enhances satisfactions intrinsic to the tasks. There is a harmony between the educated individual's need for tasks that are meaningful, satisfactory and creative and a flexible organizational structure.

I think that the future I describe is not necessarily a "happy" one. Coping with rapid change, living in temporary work systems, developing meaningful relations and then breaking them—all augur social strains and psychological tensions. Teaching how to live with ambiguity, to identify with the adaptive process, to make a virtue out of contingency, and to be self-directing—these will be the tasks of education, the goals of maturity, and the achievement of the successful individual."

Nearly 30 years of hindsight now make clear how profound Bennis' predictions were when the predictions are compared to current reality in the business world. Flatter organizations, movement to Total Quality Management (TQM) principles, more use of self-directed teams, and Senge's (1989) learning organization ideas are but a few of the signs of an emergence Bennis' perceived culture. Typical of the comments currently being heard from leaders in industry are the following:

The engineering curriculum will have been redesigned so that it adequately prepares students to meet the demands of the present and future engineering workplace and life in a complex technological society. Specifically it will:

-
- emphasize teamwork as well as individual effort;
- instill a sense of the social and business context and the rapidly changing, globally competitive nature of today's engineering;
-

While it may be necessary and important to develop the interpersonal skills of engineering students so that they can smoothly transition into the workplace, the early development of these skills holds great potential for enabling improved academic performance. Many educational elements within the engineering curriculum are best experienced by the students when they work in teams. This is certainly true of capstone design courses where faculty try to simulate the engineering workplace, but with the recent interest in active learning pedagogies, it is also true on a much wider scale.

The traditional approach to team building in academe is to put three to five students together and to let them "work it out" on their way to solving a problem. A better approach is to prepare the students with some instructional elements that will generate an appreciation of what teaming (as opposed to just working in groups) involves, and to foster the development of interpersonal skills that aid in team building and performance.

Purpose of this Work

The purpose of this work was to explore the reasons behind the recent emergence of a desire on the part of employers to have the educational system develop students' skills in teamwork. With a better understanding of this need, the development team was to explore the role of teaming in the lower division engineering curriculum and to create modules that would be useful in educating students about the function and efficient performance of teams. This included developing students' interpersonal skills and using some of the tools that enable teams to function effectively.

This narrative section of the report provides some of the background concerning teaming and describes how teaming may fit into the engineering curriculum. The major sections that follow this narrative present exercises that cover the differences between groups and teams and explore some of the elements that are a part of effective teaming. The exercises, applicable in the classroom, will take teams of participants through the stages of team development and the principles of effective team functioning. The format is one in which the participants would form teams and actively engage the materials.

More importantly, it caused the team to realize that the needs that are impelling non-academic institutions to this new culture are also needs that education has.

The Nature of Most Modern Engineering Tasks

The literature on group dynamics includes a typology for classifying tasks that are generally encountered by groups [Steiner (1972)]. The first classification in this typology distinguishes between whether or not a task being classified can be divided:

Can the task be **subdivided**? The task is referred to as:

Divisible, if it can be divided so that team members may work on the parts,
or

Unitary, if it cannot be divided and must be accomplished by one person.

The second classification in this typology distinguishes between the goals of the task being classified:

What is the **goal** of the task? The task is referred to as:

Optimizing, if the purpose is to produce the best possible product, or

Maximizing, if the purpose is to produce as much as possible.

The third classification in the typology distinguishes between the various ways that members of the team contribute to the final outcome:

How are **individual efforts combined** to yield the team product? The task is referred to as a:

Conjunctive, if all members must succeed in order for the team to succeed,

Disjunctive, if, when one member succeeds, the entire team succeeds,

Additive, if the sum total of all efforts is important,

Compensatory, if one member's extra effort makes up for another member's reduced effort,

Discretionary, if the team can decide how individual efforts relate to team performance.

The research of Katzenbach and Smith (1993) has verified the appropriateness of teams when "a specific performance objective requires collective work and real time integration of multiple skills, perspectives, or experiences," i.e., when the tasks are *divisible*, *optimizing*, and *conjunctive*. Indeed, many of the tasks encountered in the practice of engineering, such as managing, designing, and improving manufacturing processes and products, are *divisible*, *optimizing*, and *conjunctive*. Thus, engineering tasks generally match Katzenbach and Smith's performance objectives, and require team-oriented approaches.

taught traditionally (i.e. primarily with lectures and individual homework assignments), students taught by cooperative learning techniques tend to exhibit longer information retention, better performance on exams, higher grades, stronger critical thinking and problem-solving skills, more positive attitudes toward the subject and greater motivation to learn it, better interpersonal and communication skills, and higher self-esteem.

The pedagogy of cooperative learning yields less than optimum results when the tasks assigned to the groups are inappropriate and/or when the students do not possess the skills or attitudes to enable them to work with one another. Building the interpersonal skills of students enables them to benefit more from this active pedagogy.

Most students have experienced functioning in *compensatory task* efforts when they have worked in groups at some point in their education. Either they have done most of the work for the whole group or they have contributed less than their fair share to the group's effort. For this reason, students are often hesitant about group activity—in fact, they may strenuously object to being asked to work in groups again. Industry is seeing the effects of this dislike. For optimum group performance in cooperative learning environments, the instructor should structure the group's objective so that it involves the efforts of everyone on the team. In this way, interdependence within the group is built. In the typology of team tasks, this is closely related to designing *divisible, optimizing, conjunctive* tasks.

Design courses offer excellent opportunities for team activity on divisible, optimizing, conjunctive tasks. Good interpersonal skills of all members, combined with well-structured problems, are fundamental in bringing to fruition a good design.

Links with the Quality Movement

As might be obvious from the first section of this report, the evolution of teams in industry is linked to the acceptance and spread of the quality culture first started by W. Edwards Deming, Joseph M. Juran, and A. Feigenbaum. Although there are some cases in which the implementation of the quality movement has failed, there are several things that make the movement so persistent. First of all it espouses a philosophy that improvements can always be made—the search for these improvements never ends. Second, actions must be supported by data that verify that implemented changes are, in fact, real improvements. This requirement is intended to supplant the all-too-common "seat of the pants" approach to implementing a plan, wherein data are never collected to verify whether the implementations are working. Third, is the idea that process improvement teams must have representation from the people who participate in the process. This requirement is intended to supplant the concept that people who plan and evaluate processes can be segregated from the people who actually run and participate in a process. This latter and out-dated concept originated with Frederick Taylor, the

courses to contribute to the process being used. These tools essentially redistribute control from those who are very articulate and/or domineering, thus empowering all members.

The remaining tools in the "seven new quality tools" above are useful in upper division courses (e.g., in capstone design courses), and should not be overlooked.

Changes in the Engineering Core Curriculum

Since the grant period began in the fall of 1992, the engineering core curriculum at Arizona State University has been extensively discussed and debated. It was originally planned that the development of teaming modules under this program would be used in a new sophomore-level course intended to follow an existing freshman-level engineering design course in which the students worked individually. However, as the development team gained knowledge about the teaming process and the role it could play in improving the educational experience, it soon became apparent that the freshman course could and should start the development of teaming skills. This did not rule out the inclusion of a sophomore-level course in the curriculum, but it was decided that teaming should begin in the freshman course.

During the 1992-93 academic year various modules that might be used to teach teaming skills were tested and improved in several courses and in an ASEE Annual Conference workshop conducted by members of the ASU team. The testing is briefly described in a later section. After each trial, the modules were improved to make them more effective and efficient to deliver.

During the fall semester of 1993, a team-based version of the freshman course was piloted. The pilot version of this freshman course retained most of the design elements that existed in the original version, for they lent themselves well to team-type tasks. These are discussed elsewhere [McNeill et al. (1990)].

The teaming elements used in the pilot course were the exercises that can be found in the *Team Training Workbook* included with this report and discussed in the next section. They included the jigsaw exercise on team dynamics, the survival exercise, the team role exercise and the exercise of anticipating potential problems and establishing corrective norms. The tools that were used in these exercises included brainstorming, the affinity diagram, the process check, and the modified nominal group technique, all of which are included in the *Appendix* of the workbook portion of this report.

The freshman students were able to understand this material and put it to use. They became aware that there will naturally be problems that arise as their teams advance and that there will be periods of performance and maintenance. In addition, they had anticipated what some of these problems might be and had explored strategies for mitigating these anticipated problems. With this training they became better team members.

collection of experts from other expert groups to form³ "functional teams," each member of which is an expert in a different aspect of team formation and operation. Each member of these new teams then teaches the material to the other members of the team. That is, each member of a functional team brings a piece of the jigsaw back from the expert groups to the functional team. Upon completion of the exercise, all team members should have some knowledge and understanding of all the topics.

There are five different pieces provided for the jigsaw in *Section I*, thus accommodating up to five different "expert" groups. The five topics are:

- 1) Stages of Team Development;
- 2) Six Types of Team Decisions;
- 3) Recurring Phases in Task-Performing Teams;
- 4) Sources of Power in Teams; and
- 5) Five Issues to be Considered in Team Building.

The instructional strategy for *Section I* calls for the instructor to carefully choose the number of participants to be placed into each expert group. Although expert groups can accommodate from two to about six people, the ideal size is four or five. When the expert groups are too small (less than three) or too large (above six), active participation and learning decrease considerably. It is preferable to cover only four of the expert topics with larger expert groups (say, five or six) than to have very small groups (say, one or two) cover all five. If the number of participants forces the expert group size above six participants, the facilitator should form two or more groups on each expert topic.

Section II of the workbook presents exercises that demonstrate that team performance can exceed individual performances. This section begins with an exercise that is done independently by each individual in the team. It next presents a mini-lecture on structure for meetings and role assignments, and moves on to anticipating problems that might emerge when people attempt to work together. The teams then revisit and redo the exercise that had originally been conducted by individuals. The section ends by comparing team performance with the individual performance.

³ If these materials are to be used as a part of a class in which teams have already been defined and are expected to function later in the course, it is best to ensure that members of any one functional team not all become experts in the same subject. That is, the instructor should devise the expert groups so that each contains only one member from each of the functional teams that will be expected to perform later in the course. An easy way of accomplishing this is to have the members of each functional team count off (1 through n , where n is the number of expert topics the instructor wishes to cover in the jigsaw exercise. If the number of members on a team exceeds n , the count should recycle when the number n is reached.) At the conclusion of this counting exercise all of the people who are 1's would assemble in the same location, all of the people who are 2's would assemble in the same location, etc., in order to become experts in their appointed topics.

Sophomore-Level Course: Several of the modules under development at the time were tested in a sophomore-level set of 3 courses that was taught using the NSF/Texas A&M University integrated engineering sciences courses [Erdman et al. (1992)]. Two of the courses in the sequence were taught in the fall of 1992 and one course was taught in the spring of 1993.

Lessons learned: The modules improved the students' skills at teaming. The problems seemed to be greatly reduced, although some problems, such as strong personalities, seemed to persist. The need to continually reinforce the use of the material, especially in the second semester of the set of courses, was identified.

Freshman-Level Course: A new version of ASU's freshman design course, a curriculum element in the engineering program for the last 30 years (it was last significantly modified in 1985), was piloted in fall semester of 1993 as a course in which teaming was required. Three sections are being scheduled for fall of 1994. The pilot class of 14 students used all of the materials found in the workbook portion of this report. The students benefited from an introduction to the development of teams. Only one of the four teams had major problems in the final project at the end of the semester. Other teams were able to work together to get the project done.

Lessons learned: Beginning early in the program is the correct philosophy. Also, the materials in the workbook portion of this report are appropriate for freshmen.

These modules have also been used in faculty workshops for the purposes of (a) making faculty aware of team skills and how these develop and (b) providing them with exercises that they could use in the classroom to improve the performance of their students. These workshops are listed below:

Team Building Workshop (Session 0453), ASEE, 100th Annual Conference and Centennial Celebration, University of Illinois, Urbana/Champaign, June 21, 1993. 19 attendees from 19 institutions.

Special Teaming Workshop for the Foundation Coalition, Mission Palms Hotel, Tempe, AZ, July 22-24, 1993. About 40 attendees (total) from all member institutions participated in this training. These institutions are: Arizona State University, Mesa Community College, Rose-Hulman Institute of Technology, Texas A&M University, Texas A&M University at Kingsville, Texas Women's University, and the University of Alabama at Tuscaloosa.

administration (listed in the previous section) and who have continued to work with them as ASU attempts to grow its own new culture.

ASU's knowledge of teaming and active learning strategies contributed greatly to the successful coalescing and funding of the Foundation Coalition under the NSF Engineering Education Coalition program. This Coalition consists of Arizona State University, Mesa Community College, Rose-Hulman Institute of Technology, Texas A&M University, Texas A&M University at Kingsville, Texas Women's University, and the University of Alabama at Tuscaloosa. The pre-award workshop listed in the previous section has done much to make the management and operation of the Coalition more efficient and effective.

The visit to Mt. Edgecumbe High School led to one of the development team members spending the Fall Semester 1993 at this high school. The purpose was to better understand how quality principles are being applied there so that similar programs might be accelerated in other places.

Several of the workshops attended by the development team were also attended by K-12 teachers and administrators, leading to linkages being established that would not have been possible otherwise. For example, relationships with at least three Phoenix-area schools have been established, resulting in joint projects being initiated between the University faculty and the schools.

Summary

Although the exercises in the workbook portion of this report demonstrate the importance of teams and impart some of the skills and knowledge that are *necessary* for good team performance, these skills and knowledge are *not sufficient* to cause teams to operate at a high level of proficiency. Sufficiency requires, in addition, performance challenges that are "clear and compelling" (Katzenback and Smith [1993]) and tasks that are divisible, optimizing, and conjunctive. As stated previously, most engineering design is now recognized as an activity fitting these latter requirements, implying that it is done best by using teams of specialists who apply their skills concurrently rather than sequentially by each specialist in turn throwing the design "over the wall" to the next specialist. With the U.S. trying to become more competitive in the global economy, the "clear and compelling" nature of engineering design and production is also self evident. Thus, presuming the knowledge and skills of teaming are present in the participants, the conditions for sufficiency are present.

The experience of the team responsible for this study has shown that knowledge of and attention to the team process lead to a greater percentage of teams being successful in academe. This conclusion seems to be independent of whether the "teams" are short-term groups actively learning together in content-oriented classes or long-term teams working on design projects in capstone

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Team Training Workbook

Assembled by
College of Engineering and Applied Sciences
Arizona State University

With Partial Support from the
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The Format & Outcomes

- **Learning Environment**
 - Active
 - Group (team) based
 - Workshop facilitators, not lecturers
- **Expected Participant Outcomes**
 - An understanding of the principles of team dynamics
 - An ability to apply the principles to create effective teams

Issue Bin

- Assign either the team recorder or another team member to be the Issue Bin Collector
- Assign the following issues to the Issue Bin:
 - topics that will or may be addressed later
 - questions that can or should be deferred until the end of the agenda
 - items that can or should be the subject of future agendas
- Paraphrase the issue and record on the board or a piece of paper which is always visible
- At the conclusion of the meeting, the issues in the issue bin are brought out, one at a time, and discussed to see if they are still issues.
- Any issues which remain after the discussion must be addressed in a future meeting.

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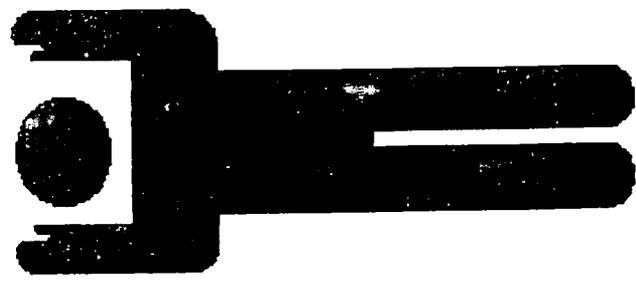
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Code of Cooperation

- EVERY member is responsible for the team's progress and success.
- Attend all sessions and be on time.
- Listen to and show respect for the contributions of other members; be an active listener.
- Criticize ideas, not persons.
- Resolve conflicts constructively.
- Pay attention - avoid disruptive behaviors.
- Avoid disruptive side conversations.
- Only one person speaks at a time.
- Everyone participates -- no one dominates.
- Be succinct, avoid long anecdotes and examples.
- No rank in the room.
- Attend to your personal comfort needs at any time but minimize team disruption.
- HAVE FUN.
- 23

*Adapted from the Boeing
Commercial Airplane Group*

“Focus on Facilitator” Signal



The facilitator needs your attention:

- Raise your hands to inform your neighbors
- Finish your sentence
- Do not finish your paragraph
- Turn to the facilitator

Making Teams Out of Groups

- Lecturette on Why Teams are Important (10 minutes)
- Jigsaw on Team Dynamic (80 minutes)
- Process Check on Jigsaw (10 minutes)

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Uses of Teams

In industry/business:

- Management teams (Team Xerox, San Diego Zoo)
- Continuous Quality Improvement teams (CQI)
- Design/Build teams (Chrysler H-car, Boeing 777)

In academe:

- Cooperative learning
- Short-term groups
- Long-term groups
- Base groups
- Project-based courses
- Single-discipline teams
- Multi-disciplinary teams
- Design Courses
- Technical multi-disciplinary teams
- Cross-functional teams (marketing, engineering, law, etc.)

"The task for us at Boeing is to provide a massive change in thinking throughout the company - this is a cultural shift, and it isn't easy!"

Phil Condit,
Executive Vice President
Boeing Commercial Airplanes

"If you can't operate as a team player, no matter how valuable you've been, you really don't belong at GE"

John F. Welch
CEO, General Electric
(1993)

Rating of Employee's Overall Employment Potential

Has demonstrated superior technical competence in a wide range of skills; has displayed outstanding leadership and team skills at every opportunity; learns & adapts to changing circumstances quickly; achieves more than expected through consistently hard work & dedication; finds innovative solutions to problems; demonstrates a passion for exceeding the expectations of customers; communicates exceptionally well spontaneously with little or no preparation.

Overall Rating
(1 to 100)

100

90

80

70

60

50

40

30

20

10

0

Factors to be considered in making overall rating:

- Attitude
- Ability to Learn
- Results
- Work Ethic
- Technical Competence
- Innovation
- Leadership
- Teamwork
- Communication
- Customer Orientation

Has consistently applied acceptable technical competence within several skill areas; has occasionally demonstrated strong leadership and team skills when conditions were favorable; adapts to changing circumstances and learns new skills when necessary; gets acceptable results and puts in "a good day's work for a good day's pay;" occasionally develops innovative solutions to problems; shows a modest interest in meeting the needs of customers; communicates well with certain groups and on familiar topics

Actual rating form used by employer of engineers

Has marginal technical competence with certain skill areas; displays little interest in assuming leadership; tends to cause dissension among team members; works best in isolation; resists change; shows pattern of absence from work suggestive of lack of dependability; when faced with problems, seeks out others to solve them; demonstrates little concern for anticipating the needs of customers; awkward in communicating ideas to others

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Employers' Incentive

INTERVIEW RATING SHEET

POSITION: _____ **APPLICANT:** _____

DATE: _____

The Performance Skills to be evaluated

| | Evidence skill NOT present | Evidence Some skill present | Evidence Adequate Skill Present | Evidence Above Average skill present | Evidence Superior skill present | Insufficient evidence for or against skill |
|----------------------------|----------------------------|-----------------------------|---------------------------------|--------------------------------------|---------------------------------|--|
| (1) RISK-TAKING/INNOVATION | (1) | (2) | (3) | (4) | (5) | |
| (2) TEAM SKILLS | (1) | (2) | (3) | (4) | (5) | |
| (3) LEADERSHIP | (1) | (2) | (3) | (4) | (5) | |
| (4) PROBLEM-SOLVING SKILL | (1) | (2) | (3) | (4) | (5) | |

NOTES:

Actual rating form used by
employer of engineers

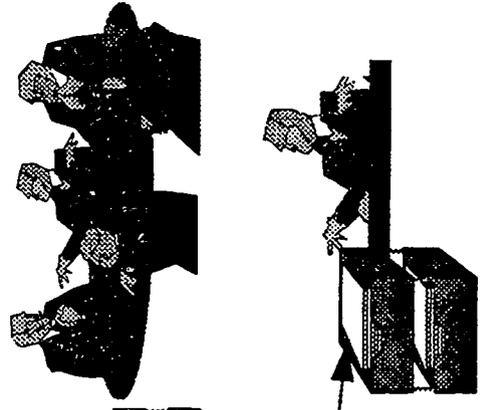
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What Employers Want: A Summary

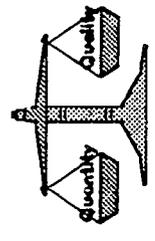
- Learning to Learn
- Listening and Oral Communication
- Competence in Reading, Writing, and Computation
- Adaptability: Creative Thinking and Problem Solving
- Personal Management: Self-Esteem, Goal Setting/Motivation and Personal/Career Development
- Group Effectiveness: Interpersonal Skills, Negotiation, and Teamwork
- Organizational Effectiveness and Leadership

Source: *Workplace Basics: The Skills Employers Want*, American Society for Training and Development and U.S. Department of Labor, Employment and Training Administration, 1988.



Classification of Tasks:

1. Can the task be **SUBDIVIDED**?
Is it **Divisible,**
or **Unitary (Indivisible)?**
2. What is the **GOAL** of the task?
Is it to **Optimize quality,**
or **Maximize quantity?**
3. How are individual **EFFORTS** related to the team's performance?
Is it **Conjunctive** - All team members must contribute to the task
 Disjunctive - If one gets it, then all get it (eureka/non-eureka)
 Additive - Rope tug, stuffing envelopes
 Compensatory - One person's extra effort makes up for another's reduced effort
 Discretionary - Team decides how individual efforts relate to team performance

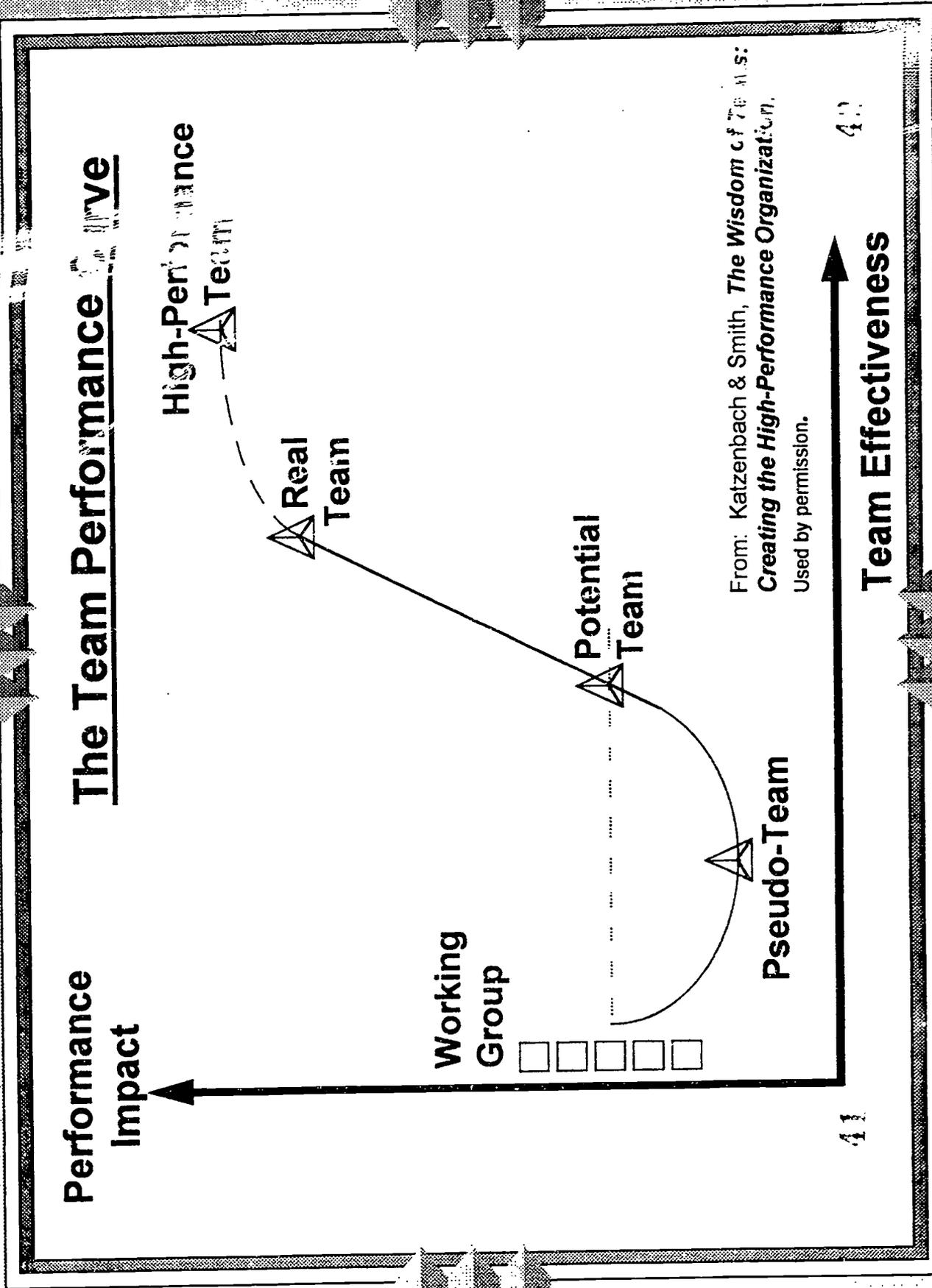


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Teams

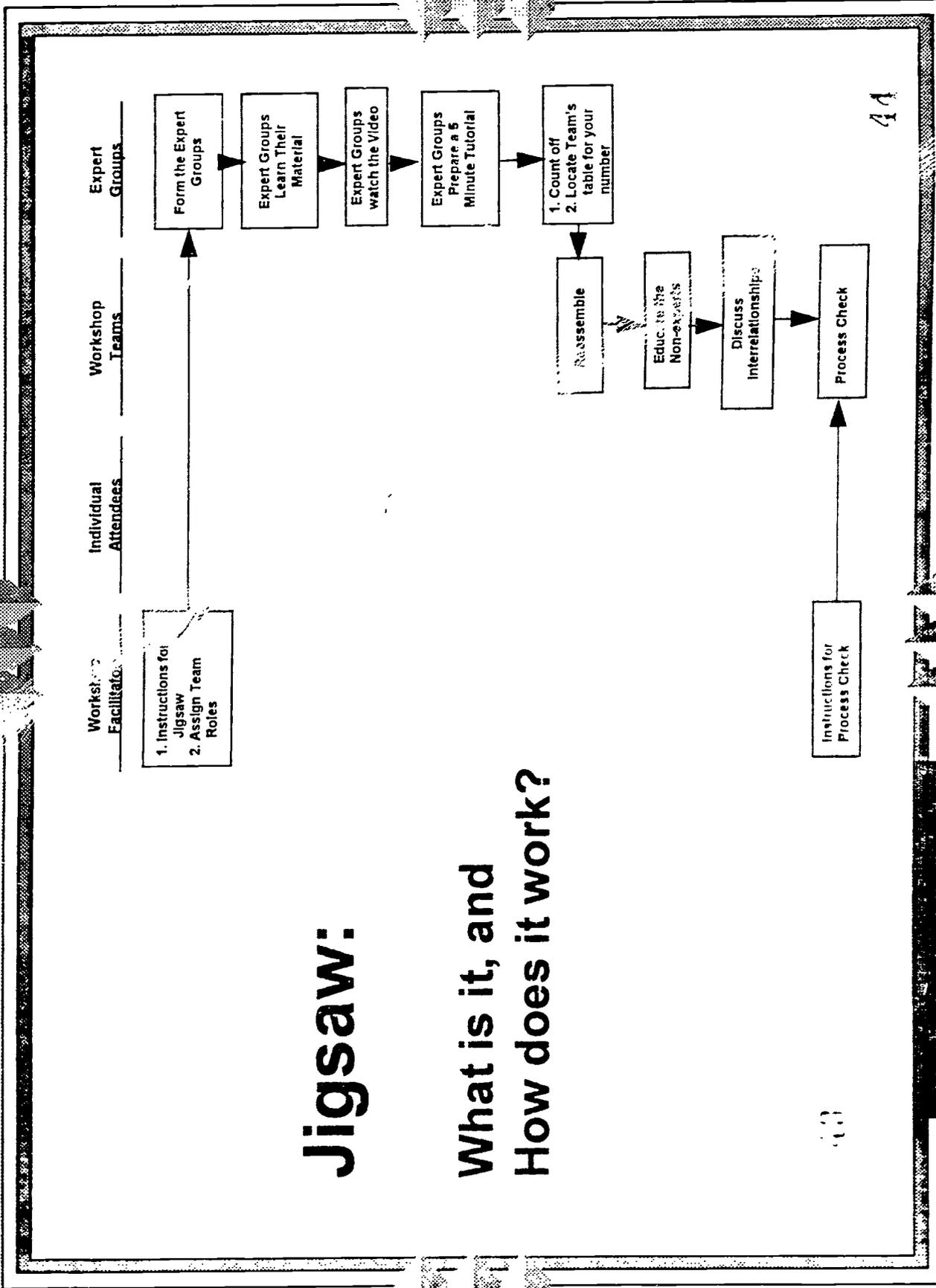
Teams are vital because all the following are divisible, optimizing, conjunctive tasks:

- Effective meetings
- Strategic planning
- Implementing innovation
- Designing continuous improvement projects



From: Katzenbach & Smith, *The Wisdom of Teams: Creating the High-Performance Organization*.
Used by permission.

Teams out of Groups



Jigsaw:

What is it, and
How does it work?

44

Flow of Session 1 Jigsaw

Becoming an Expert (13 minutes)

- Determine what team dynamics jigsaw piece your table has been assigned (#1, 2, 3, 4, or 5).
- Read the section of material on your assigned topic from this workbook (the reading material for this jigsaw is in the Appendix pages A-1 through A-8).
- Try to determine why your topic is important and how it might relate to teams that you create or teams of which you are a member.

45

46

Viewing a Video (about 20 minutes)

- The video will now be shown
- Watch the video looking for examples of what you have just been studying

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Becoming an Expert - Phase 2

(15 minutes)

- Discuss the examples of your expert topic that you saw in the video
- Expert groups discuss the material and help one another to prepare a *short* tutorial to use in educating another group of people

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Forming Teams

- Count off within expert groups - 1,2,3,4,, etc.
- All the 1's will get up and congregate at the same table; all the 2's will get up and congregate at the same table; etc.
- Check for understanding

51

52

Educating Your Team (25 minutes)

- **Convene your new team (1's all together, 2's all together, etc.)**
- **Each expert delivers her/his tutorial to her/his new team, in the order in which the topics appear in the workbook.**
- **Teams discuss the material to integrate the four or five topics and understand how they apply to student teams.**

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Process Check (10 min)

- **Monitoring of processes, especially processes which you own or are a part of, is necessary if improvement is desired**
- **A process check is a formalized way to do this monitoring and should be used at the end of all process related activities**
- **There are many different ways to conduct a process check**
- **A process check must focus on the process**
- **Failure of a process does not infer any judgment about the quality of the team members**

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Process Check Jigsaw Process

- Each member of each team fills out the Process Check form found on the following page in this workbook
- As a team, compare and discuss the results of the process check

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Jigsaw Process Check

AGREE DISAGREE

| | | | | | |
|---|---|---|---|---|---|
| The team now knows the importance of teams | 1 | 2 | 3 | 4 | 5 |
| As a member of this team, I now know about: | | | | | |
| Stages of team development | 1 | 2 | 3 | 4 | 5 |
| Team decisions | 1 | 2 | 3 | 4 | 5 |
| Recurring phases in team functioning | 1 | 2 | 3 | 4 | 5 |
| Sources of power in teams | 1 | 2 | 3 | 4 | 5 |
| Issues in team building | 1 | 2 | 3 | 4 | 5 |
| All team members participated | 1 | 2 | 3 | 4 | 5 |
| The team stayed focused on task | 1 | 2 | 3 | 4 | 5 |

50

60

Plus/Delta (+/Δ) Process Check On the Session

- Take two Post-It notes
- Mark one with a +
 - On this + note write one thing about Session 1 that you thought was very good.
- Mark one with a Δ
 - On this Δ note write one improvement you would suggest for this Session 1. (Don't just criticize; suggest an improvement.)
- Post these notes in the place designated by the workshop leaders as you finish the session.

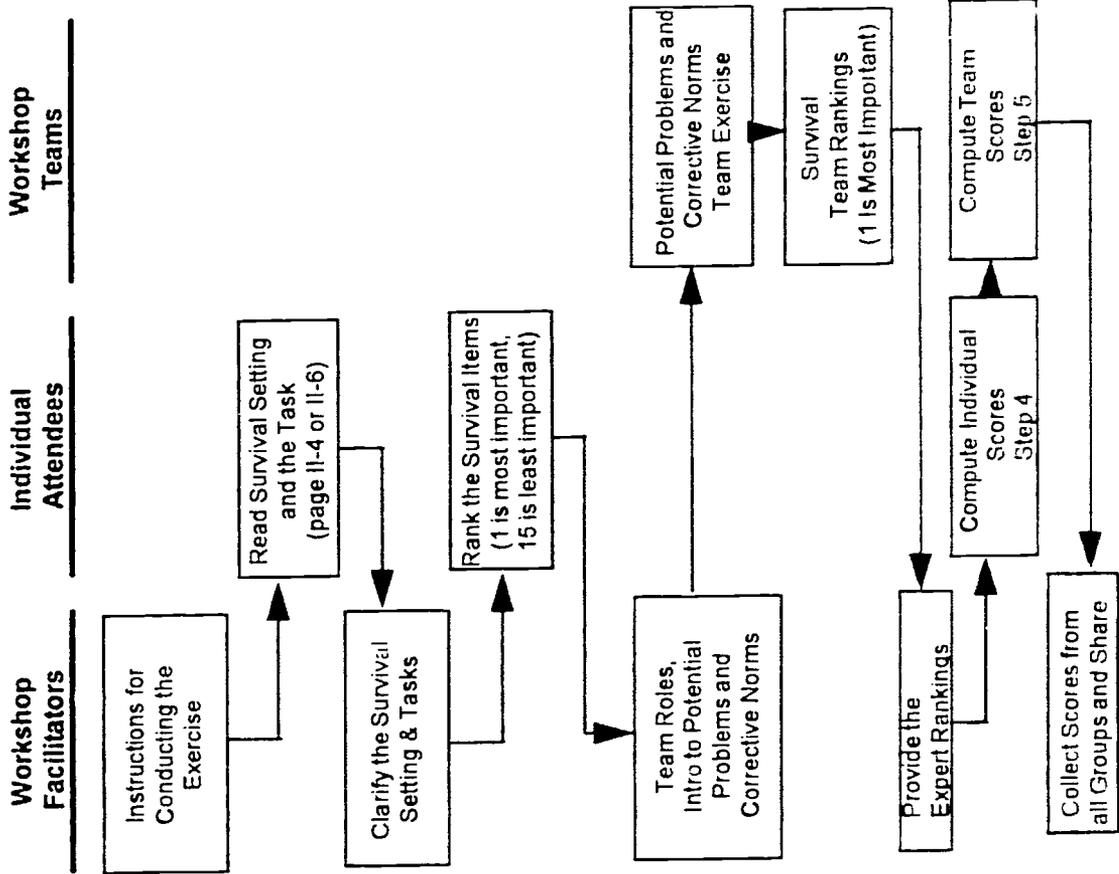
Individual vs Team Decisions

- Individual Rankings on Desert Survival Problem (15 minutes)
- Team Roles and Responsibilities (15 minutes)
- Potential Problems and Corrective Norms (35 minutes)
- Team Rankings on Survival Problem (25 minutes)
- Total Individual and Team Scores (10 minutes)
- Discussion of Team Decision-Making Process (10 minutes)
- Process Check (5 minutes)

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Session on Individual
vs, Team Decisions

Deployment Flow Chart for this Session



Team Building Exercises

The following four pages contain two team building exercises. These exercises are intended to show that team-based decisions can be superior to individual decisions. These exercises are:

DESERT SURVIVAL and SPACE SURVIVAL.

Only one exercise will be completed during the workshop. The other one is provided to give the participants some variety when using the exercises in the classroom.

Each exercise consists of determining the relative importance (ranking) of a number of items. The rankings will first be done individually and then as a team. Comparisons of the array of individual rankings with the ranking of experts and of the team-based ranking with the ranking of experts should reveal that:

- a) the team ranking was superior to all of the individual rankings signifying good team performance, or
- b) persons within the team who may have had better rankings than the team were unable to influence the team, signifying poorer team performance.

The exercises are indicated by the page footers

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Desert Survival

Space Survival

DESERT SURVIVAL Team Building Exercise

(Page 1 of 2)

DESERT SURVIVAL

Your "life" or "death" will depend upon how well your team can share its present knowledge of a relatively unfamiliar situation so that the team can make decisions that will lead to your survival. This problem is based on over 2,000 actual cases in which men and women lived or died depending upon the survival decisions they made.

Read the situation and do Step 1 without discussing it with the others in the team.

The Situation

It is 10:00 a.m. in mid-August and you have just crash landed in the Sonoran Desert in the southwestern United States. The light twin-engine plane, containing the bodies of the pilot and the co-pilot, has completely burned. Only the air frame remains. None of the rest of you have been injured.

The pilot was unable to notify anyone of your position before the crash. However, he had indicated before impact that you were 70 miles south-southwest from a mining camp which is the nearest known habitation and that you were approximately 65 miles off the course that was filed in your VFR flight plan.

The immediate area is quite flat and, except for occasional barrel and saguaro cacti, appears to be rather barren. The last weather report indicated the temperature would reach 110 degrees that day which means that the temperature at ground level will be 130 degrees. You are dressed in light weight clothing - short sleeve shirts, pants, socks, and street shoes. Everyone has a handkerchief. Collectively, your pockets contain \$2.83 in change, \$85.00 in bills, a pack of cigarettes, and a ball-point pen.

Your Task

Before the plane caught fire your team was able to salvage the 15 items listed on the next page. Your task is to rank these items according to their importance to your survival, starting with "1" the more important, to "15" the least important. You should assume the number of survivors is the same as the number on your team, you are the actual people in the situation, the team has agreed to stick together, and all items are in good condition.

69

(Continued)

Source: Unknown

21

DESERT SURVIVAL Team Building Exercise

Step 1 (Do this step now) Each person is to individually rank each item. 1 is most important; 15 is least important. Do not discuss the situation or the task until each member has finished the individual ranking.

Step 2 (To be done after the following mini-lecture on team roles.) Rank order the 15 items as a team. Once discussion begins don't change your individual ranking.

| Items | Step 1 Individual Ranking | Step 2 Team Ranking | Step 3 Expert Ranking | Step 4 Difference Ranking 1-3 | Step 5 Difference Ranking 2-3 |
|--|---------------------------------|---------------------------|-----------------------------|---------------------------------------|---------------------------------------|
| Flashlight (4 battery size) | | | | | |
| Jackknife | | | | | |
| Sectional air map of the area | | | | | |
| Plastic raincoat (large) | | | | | |
| Magnetic compass | | | | | |
| Compress kit with gauze | | | | | |
| .45 caliber pistol (loaded) | | | | | |
| Parachute (red and white) | | | | | |
| Bottle of 1000 salt tablets | | | | | |
| 1 quart of water per person | | | | | |
| A book entitled, <i>Edible Animals of the Desert</i> | | | | | |
| A pair of sunglasses per person | | | | | |
| 2 quarts of 180 proof Vodka | | | | | |
| 1 top coat per person | | | | | |
| A cosmetic mirror | | | | | |
| Total the absolute differences of Steps 4 and 5 (the lower the score the better) → | | | | Your Score | Team Score |

110
112

SPACE SURVIVAL Team Building Exercise

(Page 1 of 2)

SPACE SURVIVAL

In the following situation, your "life" and "death" will depend upon how well your team can share its present knowledge of a relatively unfamiliar situation so that the team can make decisions that will lead to your survival. This problem is fictional, although the ranking to which you will compare your results was done by a number of space experts.

Read the situation and do Step 1 without discussing it with your other team members.

The Situation

You are a member of a lunar exploration crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties however, your ship was forced to land at a spot some 320 kilometers (200 miles) from the rendezvous point. During the re-entry and landing, much of the equipment aboard was damaged, and, since survival depends on reaching the mother ship, the most critical items available must be chosen for the 320 km trip.

Your Task

On the next page are listed the 15 items left intact and undamaged after landing. Your task is to rank these items according to their importance in aiding you to reach the mother ship, starting with "1" the more important, to "15" the least important. You should assume the number in the crew is the same as the number on your team, you are the actual people in the situation, the team has agreed to stick together, and all 15 items are in good condition.

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(Continued)

71
Source: Prof. Dave Hughes,
Civil Engineering Dept.,
University of Bradford, GB

Space Survival

SPACE SURVIVAL Team Building Exercise (Page 2 of 2)

Step 1: (Do this step now) Each person is to individually rank each item. 1 is most important; 15 is least important. Do not discuss the situation or the task until each member has finished the individual ranking.

Step 2: (To be done after the following mini-lecture on team roles.) Rank order the 15 items as a team. Once discussion begins don't change your individual ranking.

| Items | Step 1 Individual Ranking | Step 2 Team Ranking | Step 3 Expert Ranking | Step 4 Difference Ranking 1-3 | Step 5 Difference Ranking 2-3 |
|--|---------------------------------|---------------------------|-----------------------------|--------------------------------------|--------------------------------------|
| Box of matches | | | | | |
| Food concentrate | | | | | |
| 20 meters of nylon rope | | | | | |
| Parachute silk | | | | | |
| Portable heating unit | | | | | |
| Two .45 caliber pistols | | | | | |
| One case dehydrated milk | | | | | |
| Two 50 kg tanks of oxygen | | | | | |
| Stellar map (of the moon's constellations) | | | | | |
| Life raft | | | | | |
| Magnetic compass | | | | | |
| 25 liters of water | | | | | |
| Signal flares | | | | | |
| First aid kit w/ hypodermic needle | | | | | |
| Solar-pow. FM receiver/transmitter | | | | | |
| Total the absolute differences of Steps 4 and 5 (the lower the score the better) → | | | | | Team Score |
| | | | | | Your Score |

Total the absolute differences of Steps 4 and 5 (the lower the score the better) →

Meetings

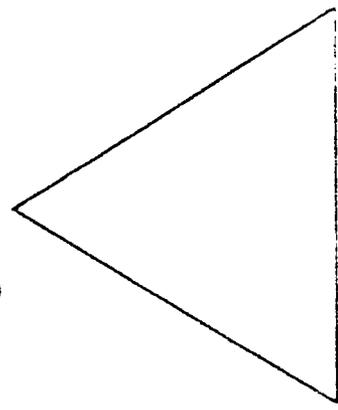
Most Teamwork Occurs through Face-to-Face Interaction in Meetings

- Over 19 million meetings take place everyday in the U.S.
- People spend over 1/2 their working life conducting, attending, preparing for and following up on meetings
- Almost 1/2 of all meetings are considered unnecessary by the people who attend

Good teamwork requires effective meetings!

Elements of an Effective Meeting

Roles of the Meeting Participants



Structure

Interpersonal Skills

Team Roles & Responsibilities

Team Leader

- Leads team through problem solving process
- Invests appropriate amount of time on the project
- Maintains accurate records of team activities and results
- Prepares for each team meeting
- Provides structure and guidance to allow maximum participation
- Influences team decisions equally with team members

Team Roles & Responsibilities (continued)

Team Member

- Invests appropriate time on the project
- Is committed and fully involved in project
- Participates equally in:
 - Defining problems
 - Investigating problems
 - Defining solutions
 - Documenting solutions
- Represents his/her organization's interest

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Roles & Responsibilities
Team Member (Con't)

Team Roles & Responsibilities (continued)

Team Facilitator

- Assists team leaders in training team members
- Suggests alternative methods and procedures
- Functions as a coach/consultant to the team
- Assures understanding of the team process
- Remains *neutral*
- Monitors the process rather than the task
- Attends team meetings and provides feedback on team's process and progress

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Team Roles & Responsibilities (continued)

Additional Team Member Roles

- **Team Recorder**
 - Writes down all the ideas and material generated during the working meeting
- **Team Timer**
 - Makes sure that team stays on its time budget for the various tasks
- **Team Gatekeeper**
 - Makes sure that all members of the team are participating
- **Team Devil's Advocate**
 - Makes sure that opposing ideas are brought up and discussed
- **Team Encourager**
 - Makes sure that everyone on the team is getting positive recognition for their contribution
- **Team Resource Holder**
 - This person holds team resources (e.g., calculators, instructions, paper & pencils, etc.)

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Assigning Team Roles

- The Team leader will be assigned by the workshop facilitator
- The team recorder will be the team member who is just to the right of the team leader
- The team gatekeeper will be the team member who is just to the right of the recorder
- The team facilitator will be the team member who is just to the left of the team leader
- The team encourager will be the team member who is just to the left of the team facilitator

Anticipating Potential Problems and Establishing Corrective Norms

Goals

- Make team members aware of what things bother other team members
- Organize potential problems into major groups
- Develop a strategy for addressing potential teaming problems

Tools

- Brainstorming
- Affinity process

Anticipating Potential Problems and Establishing Corrective Norms

Method

1. Silently brainstorm a list of team/member behaviors or attributes which can cause problems in student teams. Write each idea on a Post-it (5 minutes).
2. Place all the Post-its on your table face up so everyone can read them. Explain any questions and add new ideas as they occur (5 minutes).
3. As a team, silently move the Post-its around, grouping all the Post-its having the same general theme together (looking for affinity). If you think of a new problem as you move Post-its, write in down on a Post-it and add it to the set (6 minutes).
4. Write a header card (Post-it) for each group of Post-its. The header cards are the problem areas which need to be addressed by the team to help insure a successful team effort (9 minutes).

(The workshop will not do steps 5 and 6, below, which bring this class exercise to closure)

5. Select the affinity group which your team feels has the greatest potential of causing problems if left unaddressed. A decision tool is required here (see, e.g., the Modified Nominal Group Technique in the Appendix of this Workbook).
6. Generate a norm (i.e., a strategy) to avoid or to overcome each problem. A useful tool here would be the Force Field Analysis (see the Appendix).

Each team will report out the problem identified on their Header Cards (10 minutes).

05

00

Team Maintenance

At various points in a team's history, there may be a need for team maintenance requiring various levels of intervention. There are three levels of intervention.

Levels of Intervention

- **Prevention (Zero level intervention)**
Set the teams up for success
- **Mild Intervention (Level one intervention)**
Impersonal, done during formal team meeting
Private, non-meeting time conversation with the team
- **Strong Intervention (Level two intervention)**
Private, non-meeting time confrontation with the team or
with the individual(s)
Personal, on team time

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Team Rankings and Scores

- Now return to the survival exercise and rank the items as a team (Step 2). (25 minutes)
- Compute the individual and team scores (Steps 4 & 5; expert rankings for Step 3 are included in the Appendix). (5 minutes).
- Transfer the *individual* high, low, and average scores and the *team* score to the transparency provided (5 minutes).

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Discussion of Team Decision-Making Process

Have the team facilitator lead the team in a discussion of how the team reached its decisions; e. g., what was the process? (10 minutes)

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Process Check

- Report to the Workshop by Teams:
 - What Was Learned
 - What Do You Desire More Information On
- Do the following process check for this session

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Process Check

| | AGREE | | DISAGREE | | |
|--|-------|---|----------|---|---|
| All team members participated | 1 | 2 | 3 | 4 | 5 |
| The members with roles did their jobs | 1 | 2 | 3 | 4 | 5 |
| The group stayed focused on task | 1 | 2 | 3 | 4 | 5 |
| The group decisions were consensus | 1 | 2 | 3 | 4 | 5 |
| Overall, the team functioned well while performing this task | 1 | 2 | 3 | 4 | 5 |

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Additional Exercises

| <u>Exercise</u> | <u>Page</u> |
|--|-------------|
| A Team Exercise Requiring an Additive Effort | III-2 |
| A Team Exercise Requiring a Disjunctive Effort | III-3,4,5,6 |
| The RUSE: A Team Building Exercise | III-7,8 |
| Traffic Jam: A Team Building Exercise | III-9 |

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An overhead will be shown at this time.

Disjunctive - Eureka Team Exercises

Identify the familiar phrase that each of the following express:

Example

GROUND

FEET
FEET
FEET
FEET
FEET
FEET

1

(Six feet under ground)

111

112

Disjunctive - Eureka Team Exercises

Identify the familiar phrase that each of the following express:

Example

GROUND

FEET
FEET
FEET
FEET
FEET
FEET

1

(Six feet under ground)

2

CLOSE
CLOSE
THE
THE
PROBLEM

113

114

Disjunctive - Eureka Team Exercises

Identify the familiar phrase that each of the following express:

Example

GROUND

FEET
FEET
FEET
FEET
FEET
FEET

1

(Six feet under ground)

2

CLOSE
CLOSE
THE
THE
PROBLEM

115

ROWHENME

3

116

Disjunctive - Eureka Team Exercises

Identify the familiar phrase that each of the following express:

Example

GROUND

FEET
FEET
FEET
FEET
FEET
FEET

(Six feet under ground)

1

2

CLOSE
CLOSE
THE
THE
PROBLEM

117

ROWHENME

3

4

LUN
N C
OEH

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The RUSE

The Object of this Simulation

Is to Get the Most

(i.e., the Maximum Number of)

Points You Can

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120

The RUSE Objective

RESOURCE USE SIMULATION EXERCISE (RUSE) RULES

1. The resource pool will have an initial value of _____.
2. Teams may request **0, 1, 2, or 3** points on each trial by holding up a *request card* with the desired number of points.
3. All teams must hold up the *request card* **SIMULTANEOUSLY**.
4. After each trial, points requested are awarded to teams.
5. If, on any trial, the total points requested **EQUALS OR EXCEEDS** the number of points in the pool at the beginning of that trial, the pool is declared exhausted, no points are awarded, and the simulation ends.
6. After every trial, if the number of points remaining in the pool is greater than zero, a coin toss will determine whether the number of points is doubled or remains the same.
7. The upper limit on the number of points in the pool is the starting value.
8. Trials will continue at a **RAPID PACE** until the goal is reached or the pool is declared exhausted.

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Traffic Jam

Instructions () represents person 1 facing →)

Each group designates 6 persons to take the starting positions shown



The object is for all persons on the left to end up on the right and vice versa using only the legal moves described below:

Legal Moves:

1. A person may move into an empty space in front of him/her.
2. A person may move around a person who is facing her/him into an empty space.

Illegal Moves:

1. Any move backwards.
2. Any move around someone facing the same direction you are.
3. Any move which involves two or more persons moving at the same time.

Appendix

| <u>Topic</u> | <u>Page</u> |
|---|-------------|
| <u>Pieces for Jigsaw in Part I</u> | 2-8 |
| | |
| <u>Tools for Team Decision Making - Summary</u> | 9 |
| •Affinity Process | 10 |
| •Agenda Planner..... | 11 |
| •Brainstorming | 12 |
| •Code of Cooperation..... | 13 |
| •Comparison Matrix | 14 |
| •Deployment Flowchart..... | 15-16 |
| •Focus on the Facilitator | 17 |
| •Force Field Analysis..... | 18 |
| •Impact Changeability Analysis | 19-20 |
| •Issue Bin..... | 21 |
| •Modified Nominal Group Technique | 22 |
| •Prioritization Matrix..... | 23 |
| •Process Check | 24 |
| | |
| <u>Survival Rankings by Experts</u> | 25 |
| •Detailed Explanations of Experts Rankings | 26-29 |
| | |
| <u>Reading List and Video Sources</u> | 30 |

1. Stages of Team Development (Page 1 of 2)

Theory on team development predicts that teams, like individuals, pass through predictable, sequential stages over time. The most well known of these models is that of Tuckman (1965), who labeled the stages of team development as **forming, storming, norming, performing, and adjourning**.

Forming (the orientation stage)

Members of newly formed teams often feel anxious and uncomfortable. They must interact with other individuals whom they do not know well and begin to work on tasks which they may not yet understand completely. Their roles in the team and the procedures for interaction may be ambiguous as well. As members become better acquainted, some of the tension may dissipate. Members will begin to become more comfortable with their roles.

Storming (the conflict stage)

The polite interactions of the orientation stage may soon be replaced by conflict. *False conflicts* occur when members misunderstand or misinterpret each others behaviors. *Contingent conflicts* develop over procedural or situational factors (such as meeting times, places, or formats). These two types of conflict are relatively easy to resolve, whereas *escalating conflicts*, a third variety, may cause more serious problems for the team. Escalating conflicts may begin as simple disagreements which then lead into the expression of more fundamental differences of opinion. Such conflicts may be characterized by venting personal hostilities and the expression of long suppressed emotions or ideas. Although conflict may damage or destroy a team, most researchers agree that conflict is a natural consequence of team membership, and that it may, in fact, strengthen the team as the members learn to accept and constructively resolve their differences.

Norming (the cohesion stage)

During the third stage, team conflict is replaced by a feeling of cohesiveness. Teams experience a sense of *unity* or team identity. Membership *stability* also characterizes this stage. Members are highly involved and turnover is low. An increase in member *satisfaction* also happens at this time. Not only are members pleased with the team, but they themselves may experience higher self esteem and lower anxiety as a result of their participation in the team. The *internal dynamics* of cohesive teams change as well. Individual members are more likely to accept or be persuaded by team norms. One negative aspect of this is that, in some teams, dissent may not be tolerated during this stage.

(Continued)

1. Stages of Team Development (Page 2 of 2)

Performing (the task-performance stage)

High productivity is most likely when teams have been together for some time. Whether the focus of the team is task oriented or therapeutic, effective performance occurs late in the developmental life of the team. Although, as a rule, non-cohesive teams are less productive than cohesive teams, not all cohesive teams are productive. Some cohesive teams may have strong norms which encourage low productivity.

Adjourning (the dissolution stage)

Teams may adjourn spontaneously or by design. *Planned dissolution* occurs when the team has completed its task or exhausted its resources. *Spontaneous dissolution* occurs when members are unable to resolve conflicts, its members grow dissatisfied and depart, or when repeated failure makes the team unable to continue. Either type of dissolution may be stressful. Members of successful teams may not want to end, and when the dissolution is unexpected, members may experience a great deal of conflict or anxiety.

| Stage | Major Process | Characteristics |
|-----------------------------|---|--|
| 1. Forming (orientation) | Exchange of information; increased interdependency; task exploration; identification of commonalities | Tentative interaction; polite discourse; concern over ambiguity; self-discourse |
| 2. Storming (conflict) | Disagreement over procedures; expression of dissatisfaction; emotional responses; resistance | Criticism of ideas; poor attendance; hostility; polarization and coalition forming |
| 3. Norming (cohesion) | Growth of cohesiveness and unity; establishment of roles, standards, and relationships | Agreement on procedures; reduction in role ambiguity; increased "we-feeling" |
| 4. Performing (performance) | Goal achievement; high task orientation; emphasis on performance and production | Decision making; problem solving; mutual cooperation |
| 5. Adjourning (dissolution) | Termination of roles; completion of tasks; reduction of dependency | Disintegration and withdrawal; increased independence and emotionality; regret |

2. Six Types of Team Decisions (Page 1 of 1)

As a team works at a task, or even at team maintenance functions, decisions must be made. The quality of team decision making, and the extent to which a decision is accepted and implemented by team members, is greatly affected by the decision making process. Here are the six most common team decision making patterns.

1. Unilateral/Authoritarian

One person makes the decision and imposes it upon the team. Often, there is very little input from team members, and acceptance/commitment is low.

2. Handclasp

Two team members make a decision and impose it upon the team. This pattern sometimes looks participatory, but still elicits little input from the other members, who will have a low level of commitment to the decision.

3. Minority

Several members make a decision and impose it upon the majority, who have been disenfranchised. In the hands of skilled practitioners, this can look like participatory decision making, but it is only a handclasp among a few members. Decision quality suffers because of the lack of input from the majority, and commitment to the decision is low among those outside the minority.

4. Majority

This is the popular, "democratic" default option. When a team is unable to resolve a conflict, there is almost always a suggestion to "take a vote, majority wins." Majority rule has the illusion of fairness, but it cuts off discussion, thereby reducing decision quality. It also elicits no commitment to the decision from the losing minority. The "loyal opposition" is often a myth. Super-majorities of 2/3 or 3/4 do not solve the problems associated with voting.

5. Unanimity

Solves the problem of commitment, but is very cumbersome because now everyone has a veto. The U. N. Security Council is a good (horrible?) example.

6. Consensus

Difficult to achieve, but results in the best decision quality and the highest level of commitment to the team decision. The alternatives are discussed and refined until a consensus is attained. That may mean that no one gets exactly what he or she wanted, but everyone is able to say, "I might take a different course of action if it were entirely up to me, but I commit my support to the plan we have all agreed upon." Achieving consensus involves compromise on the part of all members, but it is each member's responsibility to present her/his position as effectively as possible. Only then does consensus lead to high quality decisions.

3. Recurring Phases in Task-Performing Teams (Page 1 of 1)

As teams perform, even those that have reached the performing stage in Tuckman's (1965) model of team development, they must shift between two different orientations, or phases, to be highly productive. When a team directs attention at its primary task, it is almost inevitable that fatigue, tension, and conflict will develop.

Fatigue will set in if the task is demanding, or boredom will develop if it is too easy. Tension and conflict will develop when alternative approaches to task performance are suggested, or when alternative solutions to a team problem are put forward and discussed. As these products of a task orientation develop and increase, team productivity suffers. It is then important for the team to shift to a team maintenance orientation. This is accomplished by setting the task aside and focusing on the relationships between members, resting, reducing tension, and resolving interpersonal conflicts.

In many teams there is a "rush to performance" in which the stages of team development are side-stepped or truncated. In many ways, the stages of team development prepare members with the skills required during team maintenance activities. But it is also important that members acknowledge the legitimacy, even the necessity, of taking time away from the task to deal with team maintenance issues. Two separate leadership roles may develop within a team, one person who directs task activities, and another who is the team maintenance specialist.

Here are some of the functions necessary for task performance:

- Analysis of problem or task structure
- Suggesting solutions
- Asking for information
- Summarizing
- Delegating
- Refocusing team on task
- Pushing for a team decision other task functions, from your experience -

Here are some functions necessary for team maintenance:

- Telling a joke
- Mediating a conflict between team members
- Encouraging all to participate
- Showing approval
- Suggesting a break from work
- Reminding members of norms for cooperation
- Encouraging and modeling positive affect for team members other team maintenance functions, from your experience

4. Sources of Power in Teams (Page 1 of 1)

The ability of an individual to influence others within the context of a small, task-oriented team is determined by the power of that individual. There are five sources of social power; some are more effective than others.

1. **Legitimate Power.** This power results from the position the person holds. A designated or elected leader, a military commander, a manager, all have legitimate power, power that is inherent in the position. Generally, influence based on legitimate power will be accepted by team members, but it is important that they accept the legitimacy of the power hierarchy.

2. **Reward Power.** This power is based on the ability of the person to control important sources of reward and reinforcement. Salary, bonuses, time off, access to resources, are all rewards that can be used to influence behavior. Reward power is usually well accepted by team members if the rewards are administered within clear contingencies and guidelines.

3. **Coercive Power.** This is the power to administer punishment for noncompliance. Fines, suspensions, undesirable assignments, verbal abuse, ridicule, are all examples of punishment or coercive power. The application of coercive power usually leads to compliance, but also generates resentment, negative emotionality, and dislike for the person who employs it.

4. **Expert Power.** This form of power is based on the knowledge, special skill, training, or experience of the person. When a person's expertise is known to the team, influence within that area of expertise is well accepted. The user of expert power must find a balance between being haughty and being too humble. Bragging about your skills doesn't establish useful expert power, but expert power can't be used if no one knows about it.

5. **Referent Power.** This is power based on the person's attractiveness and qualities as a human being. It is called "Referent" because teams members use this person as a point of reference in developing their own personalities. Referent power depends upon developing positive relationships with team members. It is not simply mutual attraction, but a relationship that includes a kind of mentoring and guidance that is possible because one person wants to learn from the other.

The use of power in teams is an ongoing process. The sources of power that are most useful to leaders and facilitators are expert power and referent power. They produce influence and change in a positive way, and minimize resistance and negativity. Reward and legitimate power can also be used effectively and in a positive way. Coercive power often quickly produces the desired behavior, but leads to other, undesirable consequences.

5. Five Issues to be Considered in Team Building (Page 1 of 2)

Team building exercises are very important in the development of base teams, task-oriented teams that will work together for an extended period of time on a complex project. Experiences designed to facilitate team development should be focused on some, if not all, of five issues, numbers 1, 2, & 3 of which follow on the next two pages.

1. Interdependence

This is the issue of how each member's outcomes are determined, at least in part, by the actions of the other members. The structure of the team task should be such that it requires cooperative interdependence. Functioning independently of other team members, or competing with them should lead to sub-optimal outcomes for the entire team. Both the learning task and the team-building task should have such a structure. Tasks that require the successful performance of subtasks by all team members are called divisible, conjunctive tasks. The team-building exercise should be structured so that the team becomes aware of, and experiences their interdependence.

2. Goal Specification

It is very important for team members to have common goals for team achievement, as well as to communicate clearly about individual goals they may have. Some team building sessions consist entirely of goal clarification exercises. The process of clarifying goals may well engage all of the issues on this list. Indeed, shared goals is one of the definitional properties of the concept "team." A simple, but useful, team building task is to assign a newly formed team the task of producing a mission and goals statement.

3. Cohesiveness

This term refers to the attractiveness of team membership. Teams are cohesive to the extent that membership in them is positively valued; members are drawn toward the team. In task-oriented teams the concept can be differentiated into two subconcepts, social cohesiveness and task cohesiveness. Social cohesiveness refers to the bonds of interpersonal attraction that link team members. Although a high level of social cohesiveness may make team life more pleasant, it is not highly related to team performance. Nevertheless, the patterns of interpersonal attraction within a team are a very prominent concern. Team-building exercises that have a component of fun or play are useful in allowing attraction bonds to develop. Task cohesiveness refers to the way in which skills and abilities of the team members mesh to allow effective performance. Exercises that require the application of the skills that will be necessary for completion of the team assignment, but require them in a less demanding situation, allow the team members to assess one another's talents. Such experiences can lead to

(Continued)

5. Five Issues to be Considered in Team Building (Page 2 of 2)

consideration of the next issue, the development of team member's roles and of the norms that govern role enactment.

4. Roles and Norms

All teams develop a set of roles and norms over time. In task oriented teams, it is essential that the role structure enables the team to cope effectively with the requirements of the task. When the task is divisible and conjunctive, as are most of the important team tasks in our society, the assignment of roles to members who can perform them effectively is essential. Active consideration of the role structure can be an important part of a team-building exercise. In some cooperative learning designs, it is the instructor's intention to rotate task roles so that all team members experience, and learn from, all roles. Even then, it is important that the norm, in this case imposed by the instructor, governing the assignment of roles is understood and accepted by team members. Norms are the rules governing the behavior of team members, and include the rewards for behaving in accord with normative requirements, as well as the sanctions for norm violations. Norms will develop in a team, whether or not they are actively discussed. The norms that govern most cooperative learning teams are imposed by the instructor, but that does not preclude a team building assignment in which those norms, as well as some that are specific to a team, are discussed and accepted.

5. Communication

Effective interpersonal communication is vital to the smooth functioning of any task team. There are many ways of facilitating the learning of effective communication skills. Active listening exercises, practice in giving and receiving feedback, practice in checking for comprehension of verbal messages, are all aimed at developing skills. It is also important for a team to develop an effective communication network; who communicates to whom; is there anybody "out of the loop?" Norms will develop governing communication. Do those norms encourage everyone to participate, or do they allow one or two dominant members to claim all the "air time?" Team building exercises can focus on skill development, network design, and norms, but even when the exercise is focused on another issue, communication is happening. Watch it! Shape it!

Summary:

Issues 4 & 5, along with issues 1, 2, & 3, are not intended to present a series of team-building exercises. Rather, they are intended to help you evaluate the potential effectiveness of an exercise you design, or one that you find in the numerous sources available. Team building is not a silver bullet for fixing dysfunctional teams, or assuring that all of your teams will work well. Team building exercises can be helpful in developing effective task-oriented teams, if they are selected to enable teams to explore the issues identified in this outline.

Tools Useful in Team Processing

A number of tools have been developed to provide a structure which facilitates team discussion, exploration of ideas, and decision making. Examples include:

Seven Planning Tools of the Quality Movement

Activity Network Diagram
Interrelationship Digraph
Prioritization Matrix
Tree Diagram
Affinity Diagram **
Matrix Diagram
Process Decision Program Chart

Others

Agenda Planner **
Consensogram
Fishbone Diagram
Histograms
Integrative Analysis Diagram
Modified Nominal Group Technique
Pareto Chart
Prioritization Matrix
Run Charts
Brainstorming **
Deployment Flow Chart
Force Field Analysis **
Impact/Changability (9-Square) **
Issue Bin **
Multivoting
P.E.R.T. Chart
Process Check **
Stability Chart

** Information is in this workbook

Source:
The Memory JoggerPlus+, GOAL/QPC, 13 Branch Street,
Methuen, MA 01844. 508-685-3900, Fax 508-685-6151

Some UsefulTools

Affinity Process

Purpose

To organize large sets of items (more than twenty items) into smaller sets of related items

Steps

1. The rules of brainstorming are followed but each idea is written (in seven words or less using a verb and a noun) on a self-adhesive Post-it note or card.
2. After all the ideas have been generated and entered on the Post-its, post all the Post-its on a wall or board. Discuss the Post-its to check if there are any questions about what any of the Post-its say or mean.
3. Team members now silently move the Post-it cards around, grouping cards which have an affinity, together.
4. If disagreement exists when grouping, make copies of the contested card and place in more than one group.
5. When the grouping has stopped, discuss each grouping to determine what it is that relates all the cards. Write a header card for each group which captures the theme and feeling of the cards.
6. If there are single idea cards that do not fit well with the other ideas, have the team decide if they should be kept.

Agenda Planner

| | |
|---|---------|
| Time Block (minutes) | Details |
| From To | |
| Duration | |
| Topic | |
| Participants | |
| Purpose Knowledge Know-How Application Analysis & Synthesis Appreciation / Evaluation Decision To Be Made | |
| Delivery Method or Activity | |
| Quality Tools or Activity | |
| Required Reading or Preparation | |
| Visual/Audio/Other Aids/Equipment | |

Team Leader

Team Recorder

Team Encourager

Team Facilitator

Team Time Keeper

Team Devil's Advocate

Brainstorming

Purpose

To generate a high volume of ideas in a non-analytical manner which permits the ideas of one individual to stimulate the ideas of the other individuals in the team

Steps

1. Define and write out a question (topic) for which you desire a large number of answers
2. Silently generate and write down a list of ideas. When it seems most team members have stopped adding to their lists, share the lists and continue to generate ideas as they occur.
3. Record the information as given (i.e., do not paraphrase).
4. Do not criticize ideas or people.
5. Strive for fluency of ideas by building (piggybacking) on the given ideas.
6. Strive for a maximum number of ideas.
7. Strive for flexibility of ideas. Welcome wild ideas which can act as triggers to stimulate breakthroughs into new directions.

Code of Cooperation

- EVERY member is responsible for the team's progress and success.
- Attend all sessions and be on time.
- Listen to and show respect for the contributions of other members; be an active listener.
- Criticize ideas, not persons.
- Resolve conflicts constructively.
- Pay attention - avoid disruptive behaviors.
- Avoid disruptive side conversations.
- Only one person speaks at a time.
- Everyone participates -- no one dominates.
- Be succinct, avoid long anecdotes and examples.
- No rank in the room.
- Attend to your personal comfort needs at any time but minimize team disruption.
- HAVE FUN.
-

*Adapted from the Boeing
Commercial Airplane Group*

Comparison Matrix

Convenient for rating criteria or options

- Create a table (matrix) with the proposed criteria as both row and column headings
- Starting with the first row, compare the row criterion with each column criterion until you reach the right hand side of the matrix
- For each comparison enter in the matrix the value
 - 9 if the row criterion is much more important
 - 5 if the row criterion is somewhat more important
 - 1 if the row and column criteria are about equal
 - 1/5 if the row is somewhat less important
 - 1/9 if the row is very much less important
- Repeat for all rows
- Add up the rows -- high scores imply more important criteria

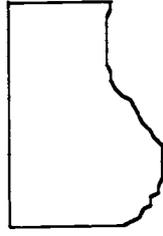
Deployment Flowchart

Construction Procedure

1. Identify steps for completing the *actual* process in the order they occur
2. Use flowcharting symbols (see next page) to diagram the steps in the *actual* process
3. Connect the symbols with arrows indicating process flow
4. Rework the flowchart by adding the people dimension
5. Stretch meeting ovals to include all meeting participants
6. Draw rectangular symbols under person of primary responsibility - indicate input of others by use of circular symbols under their names connected with a line and arrow to the rectangular symbol
7. Place decision diamond-shaped symbols under individual involved in the decision process

Deployment Flowchart

Common Symbols Used



document



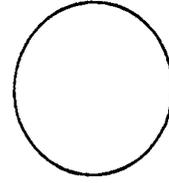
multiple task



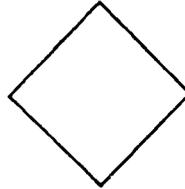
task



meeting



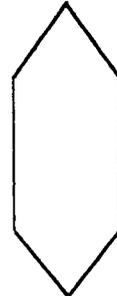
assistance or involvement



decision

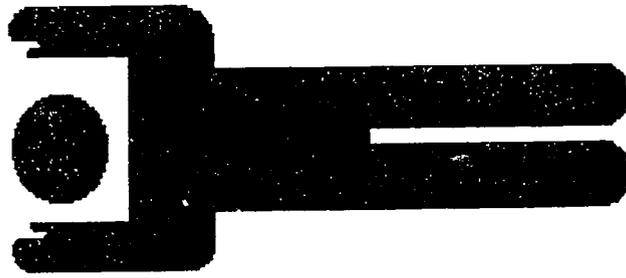


termination of process



standard process

“Focus on Facilitator” Signal



The facilitator needs your attention:

- Raise your hands to inform your neighbors
- Finish your sentence
- Do not finish your paragraph
- Turn to the facilitator

Force Field Analysis

Purpose

A force field analysis helps teams find out what is driving, slowing, or not allowing change. The tool helps a team to work together, to find a starting point from which to take action, and to show both sides of the change issue.

Steps

1. On a board or large piece of paper draw a vertical line down the middle and a horizontal line across the paper near the top
2. Label the left column Promoting and the right column Preventing
3. Brainstorm entries for the left hand column.
4. Brainstorm entries for the right hand column.

| Promoting | Preventing |
|-----------|------------|
| | |

Impact Changeability Analysis

Purpose

This tool helps prioritize a set of options

Steps

1. Review the tables on the next page for possible meanings of Impact and Changeability
2. Rank each option on impact and changeability using the following scales:

If option were implemented (or problem eliminated) what impact would this have?

- 1 = Little Impact
- 2 = Some Impact
- 3 = Considerable Impact

How difficult will it be to implement the option (or eliminate the problem)?

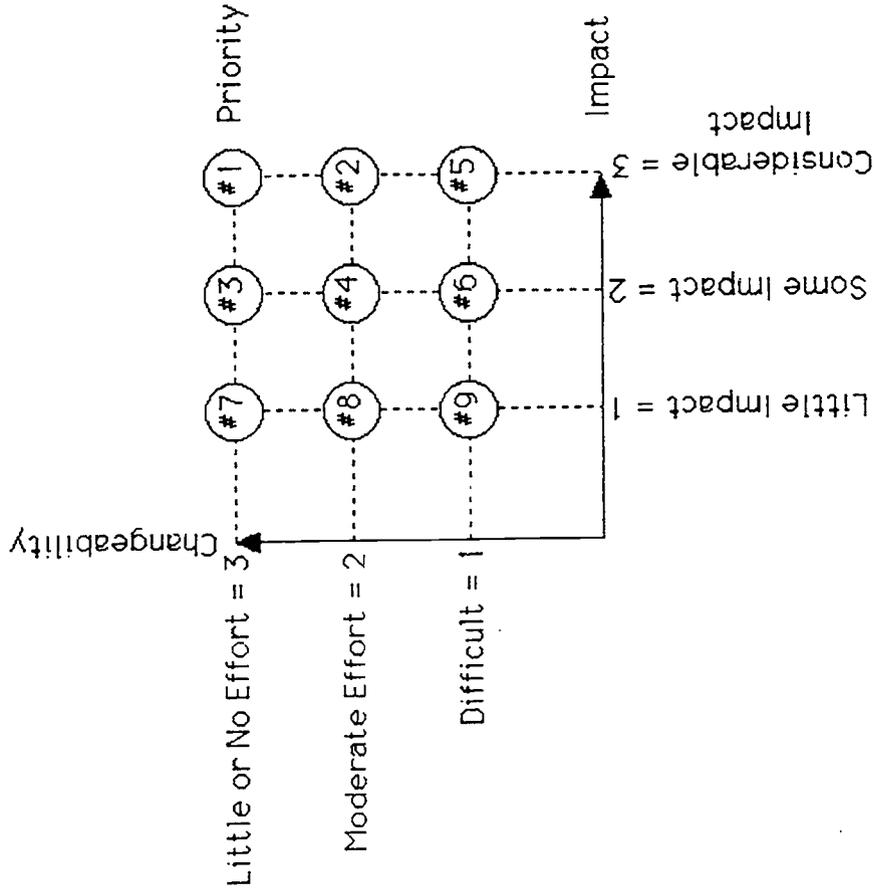
- 1 = Difficult
- 2 = Moderate Effort
- 3 = Little or no Effort

3. Use the chart on the next page to determine the relative priority of the options.

Impact Changeability (cont.)

Impact Considerations
 Effect on quality
 Time savings
 Material savings
 Morale
 Number of people who benefit

Changeability Considerations
 Resource requirements
 Complexity of investigation
 Time required
 Ability to measure outcomes
 Number of decision making levels required



Issue Bin

- Assign either the team recorder or another team member to be the Issue Bin Collector
- Assign the following issues to the Issue Bin:
 - topics that will or may be addressed later
 - questions that can or should be deferred until the end of the agenda
 - items that can or should be the subject of future agendas
- Paraphrase the issue and record on the board or a piece of paper which is always visible
- At the conclusion of the meeting, the issues in the issue bin are brought out, one at a time, and discussed to see if they are still issues.
- Any issues which remain after the discussion must be addressed in a future meeting.

Modified Nominal Group Technique

Purpose

Modified nominal group technique is a technique to help a team or group quickly reduce a large list of items to a smaller number of high priority items. The process elicits a high degree of team agreement and promotes team ownership. This tool is similar to nominal group technique but not quite as involved.

Steps

Step 1

Count the number of items on the list and divide by three. This is the number of votes each person has. (Round fractions off to the lower number.) If the items number more than 60, do not go over a vote total of 20. Vote totals of more than 20 are hard to manage. Give each team member as many colored dots as she/he has votes.

Step 2

Have each person use his/her votes (colored dots) to select the items he/she wants to keep. While each person can vote for any item, it is a good idea to limit the number of votes any one item can receive from a single person to three. Note: the team can decide if they want to allow more or less multiple voting.

Step 3

List alternatives in their new prioritized order

Step 4

Critically discuss the top alternatives in order to reach consensus. Eliminate those that are outside the control of the team

Prioritization Matrix

Purpose

To prioritize tasks, issues, alternatives, etc. to aid in selecting what tasks, issues, alternatives to pursue

Steps

1. Generate a set of criteria to be used in establishing the quality of the decision
2. Construct an L matrix with options, etc. down the left and selection criteria across the top
3. Each person prioritizes the criteria by distributing the value 1.0 among the criteria (i.e., sum of weights is 1.0)
4. Sum the weights from each person for each criterion, the sum becomes the team's weight for the criterion. Enter these weights in the L matrix in brackets -- each column will have the same number in each cell.
5. Going a criterion at a time, rank order all the options, etc. with respect to the criterion using the modified nominal group technique. Enter the vote totals for each issue into the L matrix.
6. Find the product of the vote totals and weight for each issue and sum these products for each row.
7. The rows with the highest sums are the issues of highest priority. Be sure to discuss any row which has a low total but seems like it should be retained.

Process Check

- **Monitoring of processes, especially processes which you own or are a part of, is necessary if improvement is desired**
- **A process check is a formalized way to do this monitoring and should be used at the end of all process related activities**
- **There are many different ways to conduct a process check**
- **A process check must focus on the process**
- **Failure of a process does not infer any judgment about the quality of the team members**

Survival Rankings by Experts

| Desert Survival Ranking | | Space Survival Ranking | |
|-------------------------|----|------------------------|----|
| Flashlight | 4 | Matches | 15 |
| Knife | 6 | Food | 4 |
| Map | 12 | Rope | 6 |
| Raincoat | 7 | Parachute | 8 |
| Compass | 11 | Heating unit | 13 |
| Compress kit | 10 | Pistols | 11 |
| Pistol | 8 | Milk | 12 |
| Parachute | 5 | Oxygen | 1 |
| Salt tablets | 15 | Map | 3 |
| Water | 3 | Raft | 9 |
| Book | 13 | Compass | 14 |
| Sunglasses | 9 | Water | 2 |
| Vodka | 14 | Flares | 10 |
| Top coat | 2 | First aid kit | 7 |
| Mirror | 1 | FM receiver | 5 |

More specific information follows

| ITEM & RANK | RATIONAL |
|--|--|
| #7 PLASTIC RAINCOAT (LARGE SIZE) | <p>In recent years the development of plastic, nonporous materials had made it possible to build a solar still. By digging a hole and placing the raincoat over it the temperature differential will extract some moisture from urine-soaked sand and pieces of barrel cactus and produce condensation on the underside of the plastic. By placing a small stone in the center of the plastic a cone shape can be formed and cause moisture to drip into the flashlight container buried in the center of the hole. Up to a quart a day could be obtained in this way. This would be helpful, but not enough to make any significant difference. The physical activity required to extract the water is likely to use up about twice as much body water as could be gained.</p> |
| #8 .45 CALIBER PISTOL (LOADED) | <p>By the end of the second day speech would be seriously impaired and you might be unable to walk (6 to 10% dehydration). The pistol would then be useful as a sound signalling device and the bullets as a quick fire starter. The international distress signal is three shots in rapid succession. There have been numerous cases of survivors going undetected because they couldn't make any loud sounds. The butt of the pistol might also be used as a hammer.</p> <p>The pistol's advantages are counterbalanced by its very dangerous disadvantages. Impatience, irritability and irrationality would all occur as dehydration increases. This is why critical decisions should be made before dehydration sets in. Under the circumstances the availability of so lethal a tool constitutes a real danger to the team. Assuming it were not used against humans, it might be used for hunting, which would be a complete waste of effort. Even if someone were able to shoot an animal with it, which is very unlikely, eating the meat would increase dehydration enormously as the body uses its water to process the food.</p> |
| #9 A PAIR OF SUNGLASSES PER PERSON | <p>In the intense sunlight of the desert photophobia and solar retinitis (both similar to the effects of snow blindness) could be serious problems especially by the second day. However, the dark shade of the parachute shelter would reduce the problem, as would darkening the area around the eyes with soot from the wreckage. Using a handkerchief or compress material as a veil with eye slits cut into it would eliminate the vision problem. But sunglasses would make things more comfortable.</p> |
| #10 COMPRESS KIT WITH GAUZE | <p>Because of the desert's low humidity, it is considered one of the healthiest (least infectious) places in the world. Due to the fact that the blood thickens with dehydration, there is little danger from bleeding unless a vein is severed. In one well documented case, a man, lost and without water, who had torn off all his clothes and fallen among sharp cactus and rocks until his body was covered with cuts, didn't bleed until he was rescued and given water.</p> <p>The kit materials might be used as: rope or for wrapping your legs, ankles, and head, including face, a further protection against dehydration and sunlight.</p> |
| #11 MAGNETIC COMPASS | <p>Aside from the possibility of using its reflective surfaces as an auxiliary signalling device, the compass is of little use. It could even be dangerous to have around once the effects of dehydration take hold. It might give someone the notion of walking out.</p> |
| #12 SECTIONAL AIR MAP OF THE AREA | <p>Might be helpful for starting a fire, or in toilet paper. One man might use it for a head cover or eye shade. It might have entertainment value. But it is essentially useless and perhaps dangerous because it too might encourage walking out.</p> |

X. SCORING THE DECISIONS

The Expert

Alonzo W. Pond, M.A., is the desert survival expert who has contributed the basis for the item ranking. He is the former Chief of the Desert Branch of the Arctic, Desert, Tropic Information Center of the Air Force University at Maxwell Air Force Base.

Two of the several books Mr. Pond has written are *Survival*, an excellent reference if you would like to do more reading on this subject and *Peoples of the Desert*, written after Mr. Pond had spent years living with people of every desert in the world except the Australian.

During World War II Mr. Pond spent much of his time working with the Allied Forces in the Sahara on desert survival problems. While there and as Chief of the Desert Branch, he encountered the countless survival cases which serve as a basis of the rationale for these rankings.

The Expert Ranking and Rationale — STEP 4

| ITEM AND RANK | RATIONALE |
|--------------------------------------|--|
| #1 COSMETIC MIRROR | Of all the items the mirror is absolutely critical. It is the most powerful tool you have for communicating your presence. In sunlight a simple mirror can generate 5 to 7 million candle power of light. The reflected sunbeam can even be seen beyond the horizon. If you had no other items you would still have better than an 80% chance of being spotted and picked up within the first 24 hours. |
| #2 1 TOP COAT PER PERSON | Once you have a communication system to tell people where you are your next problem is to slow down dehydration. Forty per cent of the body moisture that is lost through dehydration is lost through respiration and perspiration. Moisture lost through respiration can be cut significantly by remaining calm. Moisture lost through perspiration can be cut by preventing the hot, dry air from circulating next to the skin. The top coats, ironic as it may seem, are the best available means for doing this. Without them survival time would be cut by at least a day. |
| #3 1 QUART OF WATER PER PERSON | You could probably survive 3 days with just the first 2 items. Although the quart of water would not significantly extend the survival time, it would help to hold off the effects of dehydration (See Table II). It would be best to drink the water as you become thirsty, so that you can remain as clear-headed as possible during the first day when important decisions have to be made and a shelter erected. Once dehydration begins it would be impossible to reverse it with the amount of water available in this situation. Therefore, rationing it would do no good at all. |
| #4 FLASHLIGHT (4 BATTERY SIZE) | The only quick, reliable night signalling device is the flashlight. With it and the mirror you have a 24 hour signalling capability. It is also a multiple use item during the day. The reflector and lens could be used as an auxiliary signal device or for starting a fire. The battery container could be used for digging or as a water container in the distillation process (See plastic raincoat). |
| #5 PARACHUTE (RED AND WHITE) | The parachute can serve as both shelter and signalling device. The saquaro cactus, which is pictured on the cover, could serve as a tent pole and the parachute shrouds as tent ropes. Double or triple folding the parachute would give shade dark enough to reduce the temperature underneath it by as much as 20%. |
| #6 JACKKNIFE | Although not as crucial as the first 5 items, the jackknife would be useful for rigging the shelter and for cutting up the very tough barrel cactus for moisture. Its innumerable other uses gives it the high ranking. |

| ITEM & RANK | RATIONAL |
|--|--|
| <p>#13</p> <p>A BOOK ENTITLED. <i>EDIBLE ANIMALS OF THE DESERT</i></p> | <p>The problem confronting the group is dehydration, not starvation. Any energy expended in hunting would be costly in terms of potential water loss. Desert animals, while plentiful, are seldom seen. They survive by laying low as should the survivors. If the hunt were successful the intake of protein would cause an increase in the amount of water used to process the protein in the body. General rule of thumb - if you have lots of water, eat, otherwise, don't consume anything. Although the book might contain useful information, it would be difficult to adjust your eyes to reading and remain attentive as dehydration increases.</p> |
| <p>#14</p> <p>2 QTS. OF 180 PROOF VODKA</p> | <p>When severe alcoholism kills someone, they usually die of dehydration. Alcohol absorbs water. The body loses an enormous amount of water trying to throw off the alcohol. We estimate a loss of 2 to 3 oz. of water per oz. of alcohol. The Vodka consumed could be lethal in this situation. Its presence could cause someone in a dehydrated state to increase his problem. The Vodka would be helpful for a fire or as a temporary coolant for the body. The bottle might also be helpful. All in all, the Vodka represents more dangers than help.</p> |
| <p>#15</p> <p>BOTTLE OF SALT TABLETS (1,000 TABLETS)</p> | <p>Wide spread myths about salt tablets exist. The first problem is that with dehydration and loss of water blood salinity increases. Sweat contains less salt than extra cellular fluids. Without lots of extra water the salt tablets would require body water to get rid of the increased salinity. The effect would be like drinking sea water. Even the man who developed salt tablets now maintains they are of questionable value except in geographical areas where there are salt deficiencies.</p> |

BEST COPY AVAILABLE

SPACE EXPERTS RANKING

KEY

| | | |
|--|-----------|--|
| Little or no use on moon | <u>15</u> | Box of matches |
| Supply daily food required | <u>4</u> | Food concentrate |
| Useful in tying injured together, help in climbing | <u>6</u> | 20m of nylon |
| Shelter against sun's rays | <u>8</u> | Parachute silk |
| Useful only if party landed on dark side | <u>13</u> | Portable heating unit |
| Self propulsion devices could be made from them | <u>11</u> | Two .45 calibre pistols |
| Food mixed with water for drinking | <u>12</u> | One case dehydrated milk |
| Fills respiration requirements | <u>1</u> | Two 50kg. tanks of oxygen |
| One of principal means of finding directions | <u>3</u> | Stellar map (of the moon's constellations) |
| CO bottles for self-propulsion across Chasms, ets. | <u>9</u> | Life raft |
| Probably no magnetized poles; thus, useless | <u>14</u> | Magnetic compass |
| Replenishes loss by sweating etc. | <u>2</u> | 25 litres of water |
| Distress call when line of sight possible | <u>10</u> | Signal flares |
| Oral pills or injection medicine available | <u>7</u> | First aid kit containing injection needles |
| Distress signal transmitter, possible communication with mother ship | <u>5</u> | Solar-powered FM receiver transmitter |

Reading & Video List

- Bradford, L. P. (Ed.) (1978) *Group Development*. La Jolla, CA: University Associates.
- Forsyth, D. (1990) *Group Dynamics*. Pacific Grove, CA: Brooks/Cole Publishing Company.
- Johnson, D. W., Johnson, R. T. & Smith, K. A. (1991) *Active Learning: Cooperation in the College Classroom*. Edina, MN: Interaction Book Company.
- Johnson, D. W. & Johnson, F. P. (1987) *Joining Together: Group Theory and Group Skills*. Englewood Cliffs, NJ: Prentice-Hall.
- Katzenbach, J. R., & D. K. Smith, (1993); *The Wisdom of Teams*, HarperBusiness, New York.
- Scholtes, P. S. (1988) *The Team Handbook*. Madison, WI: Joiner Associates, Inc. (Joiner Associates: 1-800-669-8326, fax 1-608-238-2908
- Brassard, B., *The Memory Jogger Plus+*, , Goal/QPC, 13 Branch Street, Methuen, MA 01844, (508) 685-3900.

Additional books, videos, and training materials may be obtained from:

Joiner Associates and QOAL/QPC (see addresses above).

Pfeiffer & Company, 8517 Production Ave., San Diego, CA 92121-2280, (619) 578-5900.

Suggested Videos for use in Exercises (either one suffices)

Meeting Robbers, CRM Films, 2215 Faraday Avenue, Carlsbad, CA 92008-7295

Meetings, Bloody Meetings, Video Arts, 8614 W. Catalpa Avenue, Chicago, IL 60656

Facilitator's Guide

for the

Team Training Handbook

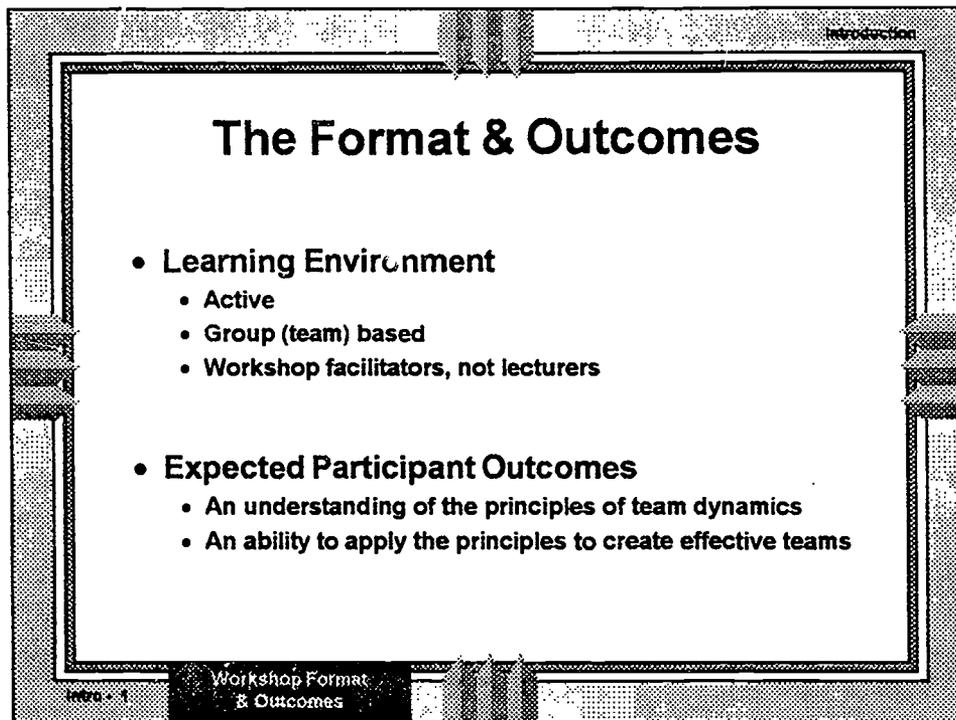
Assembled by
College of Engineering and Applied Sciences
Arizona State University

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This begins a suggested **Introduction** to the exercises in this workbook.

This workbook is set up for a workshop-environment delivery of the teaming materials that follow. These materials have been tested to insure that workshop participants increase their awareness of the development of teams and that they develop some teaming skills. There needs to be at least 8 people in the workshop, but it works better if there are more.

The materials have been successfully delivered to groups of faculty and to groups of students (freshmen level through senior level); both groups have consistently given the experience high ratings in process checks.

This slide on the workshop areas of emphasis can be used to quickly tell the workshop what is going to be covered and in what order. This should not be more than a minute or so of overview. The workshop relies on active learning of the participants. It is delivered in a way that it can be effective for both faculty and students in the classroom.

Introduction

Issue Bin

- Assign either the team recorder or another team member to be the Issue Bin Collector
- Assign the following issues to the Issue Bin:
 - topics that will or may be addressed later
 - questions that can or should be deferred until the end of the agenda
 - items that can or should be the subject of future agendas
- Paraphrase the issue and record on the board or a piece of paper which is always visible
- At the conclusion of the meeting, the issues in the issue bin are brought out, one at a time, and discussed to see if they are still issues.
- Any issues which remain after the discussion must be addressed in a future meeting.

Intro - 2 Issue Bin

In an active presentation/learning environment there will be a need for several tools to keep things moving smoothly. This slide and the next two present three tools that are wise to discuss. These tools contribute to keeping the exercises on track, to establishing norms for the participants to follow, and to enabling the workshop leader to regain control when necessary.

This slide introduces the **Issue Bin**. The workshop leader will need to introduce this tool and explain how it will work for the workshop. This is an important tool for keeping a meeting (and the workshop) on tasks established by an agenda. A large piece of paper should be used; it should be posted where it is visible to the meeting participants.

The workshop leader should use the **Issue Bin** during the presentation of the material so that questions do not side-track the purpose of the workshop.

Introduction

Code of Cooperation

- EVERY member is responsible for the team's progress and success.
- Attend all sessions and be on time.
- Listen to and show respect for the contributions of other members; be an active listener.
- Criticize ideas, not persons.
- Resolve conflicts constructively.
- Pay attention - avoid disruptive behavior.
- Avoid disruptive side conversations.
- Only one person speaks at a time.
- Everyone participates -- no one dominates.
- Be succinct, avoid long anecdotes and examples.
- No rank in the room.
- Attend to your personal comfort needs at any time but minimize team disruption.
- HAVE FUN.
-

*Adapted from the Boeing
Commercial Airplane Group*

Code of Cooperation

Intro - 3

This is the first mention of a **Code of Cooperation** and it is an important one. Presenting this Code as a way of defining desirable team norms and acceptable interpersonal communication is very helpful.

The Code sets a norm for behavior - a code of ethics, if you will.

Teams should add to this code as desired and as the need arises to address necessary new norms. The code should be viewed as a "living document." In fact, it is advisable to request additions at the time you present this.



There is a true need for the workshop leader (or active classroom facilitator) to be able to get everyone's attention at times when the groups are actively processing. This **Focus on Facilitator** signal has been found to be effective (there are many related ones just as effective):

It signals:

Finish your sentence

Do not finish your paragraph

Inform your neighbors

Turn to the facilitator

Information is about to come from the facilitator

When the signal is first used, it will typically take some time (maybe 5 to 10 seconds) to gain control back from the teams. Ask, in subsequent uses, if this time can be reduced (maybe cut in half each time).

If a signal is not agreed upon and used, valuable time will be lost in trying to regain control - the more active the groups, the more difficult it is to gain control.

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Facilitator's Guide

Intro - 4

The slide is titled "Making Teams Out of Groups" and is framed with a decorative border. In the top right corner, it says "Teams out of Groups". In the bottom center, there is a button labeled "Begin Session 1".

- **Lecturette on Why Teams are Important (10 minutes)**
- **Jigsaw on Team Dynamics (80 minutes)**
- **Process Check on Jigsaw (10 minutes)**

This begins a suggested **Part I** on how teams mature and operate.

This slide shows the structure before task for Part I of this workbook. Covering structure before task is important so as to reduce confusion in and among teams after the task has begun.

Teams out of groups

Uses of Teams

In industry/business:

- Management teams (Team Xerox, San Diego Zoo)
- Continuous Quality Improvement teams (CQI)
- Design/Build teams (Chrysler H-car, Boeing 777)

In academe:

- Cooperative learning
 - Short-term groups
 - Long-term groups
 - Base groups
- Project-based courses
 - Single-discipline teams
 - Multi-disciplinary teams
- Design Courses
 - Technical multi-disciplinary teams
 - Cross-functional teams (marketing, engineering, law, etc.)

"The task for us at Boeing is to provide a massive change in thinking throughout the company - this is a cultural shift, and it isn't easy!"

Phil Condit,
Executive Vice President
Boeing Commercial Airplanes

"If you can't operate as a team player, no matter how valuable you've been, you really don't belong at GE"

John F. Welch
CEO, General Electric
(1993)

Section I - 2 Uses of Teams

This and the next five slides should consume about 15 minutes. The first four slides are worth about 7 minutes total and the last two slides are worth about 8 minutes total

This slide shows some of the places teams are used and gives a rationale for studying how to become a team.

One saying goes like this:

You will be hired for your technical knowledge.

You will be promoted according to the quality of your communication skills.

You will be fired because of your lack of "people skills."

Teams out of Groups

Rating of Employee's Overall Employment Potential

100 Has demonstrated superior technical competence in a wide range of skills; *has displayed extensive leadership and team skills at every opportunity*; learns & adapts to changing circumstances quickly; achieves more than expected through consistently hard work & dedication; finds innovative solutions to problems; demonstrates a passion for exceeding the expectations of customers; communicates exceptionally well spontaneously with little or no preparation.

90

80

70

60 Has consistently applied acceptable technical competence within several skill areas; *has occasionally demonstrated strong leadership and team skills when conditions were favorable*; adapts to changing circumstances and learns new skills when necessary; gets acceptable results and puts in "a good day's work for a good day's pay"; occasionally develops innovative solutions to problems; shows a modest interest in meeting the needs of customers; communicates well with certain groups and on familiar topics.

50

40

30

20

10 Has marginal technical competence with certain skill areas; *displays little interest in a problem leadership - tends to cause dissension among team members - works best in isolation*; resists change; shows patterns of absence from work suggestive of lack of dependability; when faced with problems, seeks out others to solve them; demonstrates little concern for anticipating the needs of customers; awkward in communicating ideas to others.

0

Overall Rating
(1 to 100)

Factors to be considered in making overall rating:

- Attitude
- Ability to Learn
- Results
- Work Ethic
- Technical Competence
- Innovation
- Leadership
- Teamwork
- Communication
- Customer Orientation

Actual rating form used by
employer of engineers

Employers' Incentive

This and the next slide show examples of what industry expects of its employees and the big role played by being able to function in a team. (it also shows the somewhat low emphasis on technical skills.

This slide is an actual employee rating form of a Georgia-based company.

The time spent here will depend on the group. For an audience that knows the recent demand for teaming and interpersonal skills, this slide can be presented in little time. For an audience that is unfamiliar with the need for these skills, this slide needs a little more coverage and emphasis.

Recent numbers being quoted indicate that as many as 90% of the employee dismissal in large corporations are because the dismissed employee lacks interpersonal skills - they have a hard time working with fellow employees.

Teams out of Groups

INTERVIEW RATING SHEET

POSITION: _____ APPLICANT: _____
 DATE: _____

| The Performance Skills to be evaluated | Evidence skill NOT present | Evidence Some skill present | Evidence Adequate Skill Present | Evidence Above Average skill present | Evidence Superior skill present | Insufficient evidence for or against skill |
|--|----------------------------|-----------------------------|---------------------------------|--------------------------------------|---------------------------------|--|
| (1) RISK-TAKING/INNOVATION | ① | ② | ③ | ④ | ⑤ | |
| (2) TEAM SKILLS | ① | ② | ③ | ④ | ⑤ | |
| (3) LEADERSHIP | ① | ② | ③ | ④ | ⑤ | |
| (4) PROBLEM-SOLVING SKILL | ① | ② | ③ | ④ | ⑤ | |

NOTES: _____

Actual rating form used by employer of engineers

Employers' incentive

This is another example of what one particular company is using as a standard interviewing rating sheet.

Teams out of Groups

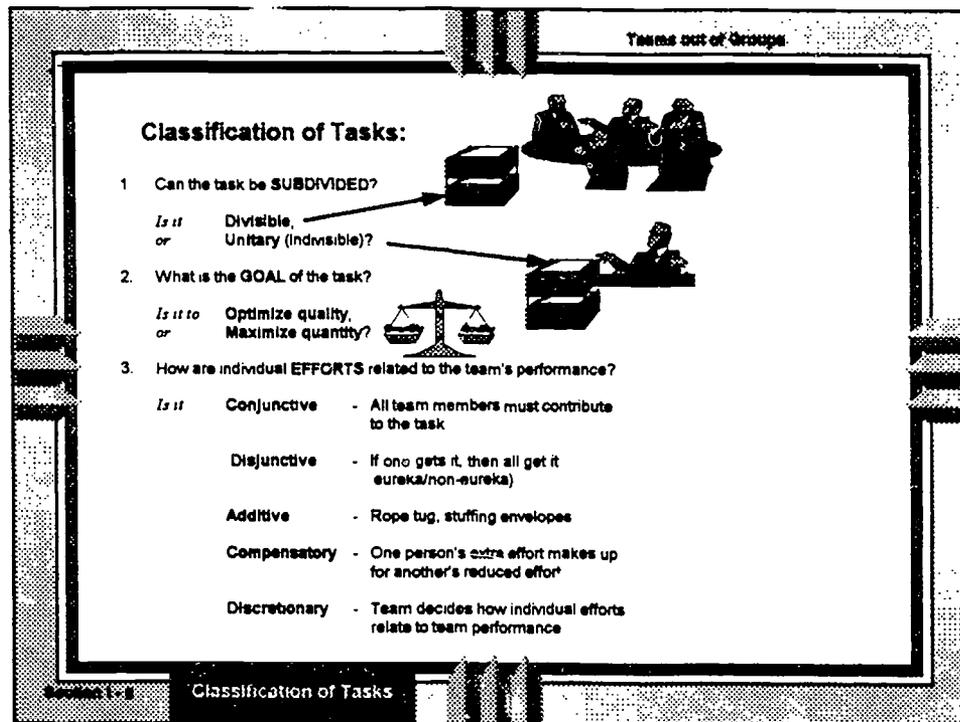
What Employers Want: A Summary

- Learning to Learn
- Listening and Oral Communication
- Competence in Reading, Writing, and Computation
- Adaptability: Creative Thinking and Problem Solving
- Personal Management: Self-Esteem, Goal Setting/Motivation and Personal/Career Development
- Group Effectiveness: Interpersonal Skills, Negotiation, and Teamwork
- Organizational Effectiveness and Leadership

Source: *Workplace Basics: The Skills Employers Want*, American Society for Training and Development and U.S. Department of Labor, Employment and Training Administration, 1988.

Employers' Use of Teams

The study referenced surveyed employers to find out what they were looking for. The study addressed their need for all employees, not just for engineers or technologists.



This slide looks at the classification of tasks that are typically found in all types of human activity.

Most of the problems facing society today consist of divisible, optimizing, conjunctive tasks that will be solved only by teams of people, working together. While it is true that there are disjunctive efforts (one person discovers a concept and all may share the insight) and additive efforts (e.g., brainstorming) that are a part of these major problems, full solutions will require the expertise of a number of people, all of whom possess different pieces of the solution initially (i.e., they are primarily conjunctive efforts).

Most students have experienced functioning in compensatory efforts when they have worked in groups at some point in their education. They have either done most of the work for the whole group or they have not contributed much to the group's effort. For this reason, most students are hesitant about group activity - in fact they may strenuously object to being asked to work in groups again. Industry is seeing the effects of this dislike.

For successful team operation in academe, the instructor must structure the team's objective so that it requires the effort of everyone on the team. In cooperative learning, this is called building group interdependence.

Exercises demonstrating disjunctive tasks and additive tasks are included in the Appendix this workbook.

Teams out of Groups

Teams

Teams are vital because all the following are divisible, optimizing, conjunctive tasks:

- Effective meetings
- Strategic planning
- Implementing innovation
- Designing continuous improvement projects

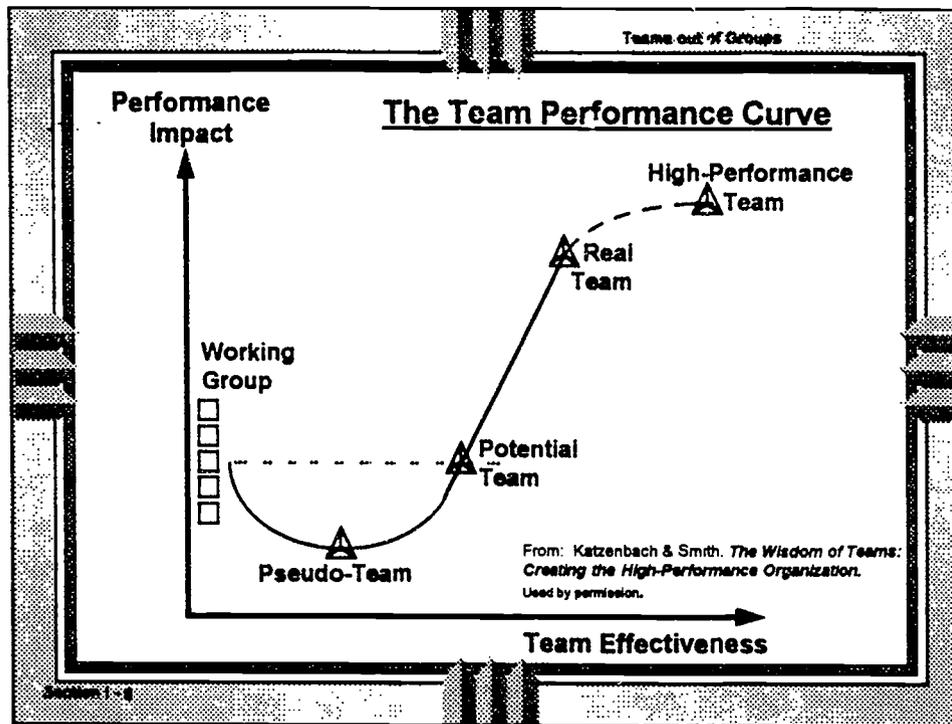
Importance of Teams

Meetings are where most team decisions are made. Faculty are generally familiar with inefficient meetings (faculty meetings?). Efficient meetings require the participation of all attendees. Meetings have to be structured and planned - meetings just don't happen.

Strategic planning efforts require similar participation by a large numbers of people. This participation brings "ownership" and the potential for all participants to understand and contribute to the achieving the plan.

Innovation, in most cases, is very complex. It generally occurs at the fringes of a technology or discipline. At the fringes, contributions from a wide array of disciplines is crucial for true innovation.

Design is certainly an area where we have learned the importance of design/build teams. Design generally is a conjunctive task. The concept of a designer specifying a new product and then throwing it over the wall to manufacturing is dead in industry.

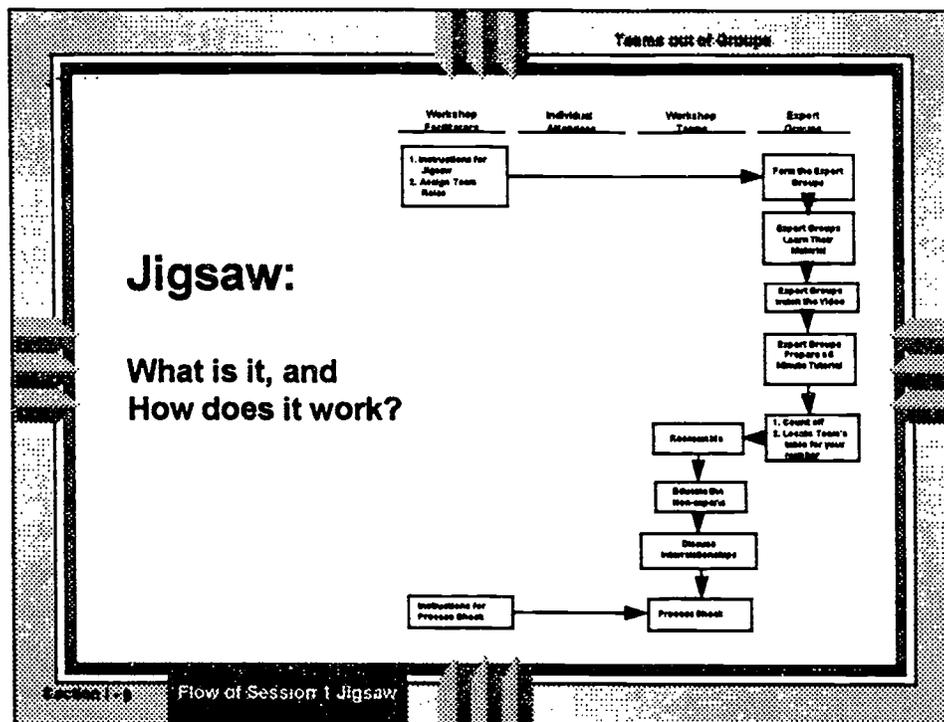


The figure and following quote are from Jon R. Katzenbach & Douglas K. Smith, *The Wisdom of Teams: Creating the High Performance Organization*. New York: HarperBusiness, 1994. ©1993 by McKinsey & Company, Inc. Reprinted by permission of Harvard Business School Press.

1. **Working group:** This is a group for which there is *no significant incremental performance need* or opportunity that would require it to become a team. The members interact primarily to share information, best practices, or perspectives and to make decisions to help each individual perform within his or her area of responsibility. Beyond that, there is no realistic or truly desired "small group" common purpose, incremental performance goals, or joint work products that call for either a team approach or mutual accountability.
2. **Pseudo-team:** This is a group for which there could be a significant, incremental performance need or opportunity, but *it has not focused on collective performance and is not really trying to achieve it*. It has no interest in shaping a common purpose or set of performance goals, even though it may call itself a team. Pseudo-teams are the weakest of all groups in terms of performance impact. They almost always contribute less to company performance needs than working groups because their interactions detract from each members' individual performance without delivering any joint benefit. In pseudo-teams, the sum of the whole is less than the potential of the individual parts.
3. **Potential team:** This is a group for which there is a significant, incremental performance need, and *that really is trying to improve its performance impact*. Typically, however, it requires more clarity about purpose, goals, or work-products and more discipline in hammering out a common working approach. It has not yet established collective accountability. Potential teams abound in organizations. As our performance curve illustrates, when a team approach makes sense, the performance impact can be high. We believe the steepest performance gain comes between a potential team and a real team; but any movement up the slope is worth pursuing.
4. **Real team:** This is a small number of people with complementary skills who are *equally committed to a common purpose, goals, and working approach for which they hold themselves mutually accountable...*
5. **High-performance team:** This is a group that meets all the conditions of real teams, and has *members who are also deeply committed to one another's personal growth and success*. That commitment usually transcends the team. The high-performance team significantly out performs all other like teams, and out performs all reasonable expectations given its membership. It is a powerful possibility and an excellent model for all real and potential teams.

Facilitator's Guide

Section I - 8



This slide is used to show the structure for the jigsaw process suggested for the exercise found next in this workbook. The workshop leader should briefly run through the steps. There is no need to spend time on each step since there are slides following which details the steps.

When you talk through this slide you can point out the use of a deployment process flow chart. This type of chart not only shows the process but also shows who is involved.

Timing

This entire activity is scheduled to last about 75 minutes. Expert teams should spend 13 minutes learning the material. The video will be shown for 22 minutes (but this depends on the video-the video *Meeting Robbers* is 22 minutes). The "experts" should then work on tutorials for 15 minutes. Teaching should then be done in jigsaw teams for about 25 minutes.

Teams out of Groups

Becoming an Expert (13 minutes)

- Determine what team dynamics jigsaw piece your table has been assigned (#1,2,3,4, or 5).
- Read the section of material on your assigned topic from this workbook (the reading material for this jigsaw is in the Appendix pages A-1 through A-8).
- Try to determine why your topic is important and how it might relate to teams that you create or teams of which you are a member.

Becoming an Expert

This slide is used to show the structure and its timing for the participants.

Jigsaw piece 1 is located on pages A-2 and A-3.

Jigsaw piece 2 is located on pages A-4.

Jigsaw piece 3 is located on pages A-5.

Jigsaw piece 4 is located on pages A-6.

Jigsaw piece 5 is located on pages A-7 and A-8.

If the people participating divide nicely into teams of 4 (even or with a remainder), then assign only pieces 1, 2, 3, and 4, and double up the remainders. Tell the participants they will not be doing piece 5, but they can read it at a later date (after the workshop).

If the people participating divide nicely into teams of 5 (even or with a remainder), then assign pieces 1, 2, 3, 4, and 5, and double up the remainders.

Terms out of Group

Viewing a Video (about 20 minutes)

- The video will now be shown
- Watch the video looking for examples of what you have just been studying

View a Video

Suggested videos for use in this exercise include, *Meeting Robbers* and *Meetings, Bloody Meetings* (sources are given in the Appendix). Both are very business oriented (there seems to be no academic equivalents), but the behavior and process are to be observed, not the content. It is desirable to call the participants attention to this if they are from academe.

Turned out of Groups

Becoming an Expert - Phase 2 (15 minutes)

- Discuss the examples of your expert topic that you saw in the video
- Expert groups discuss the material and help one another to prepare a *short* tutorial to use in educating another group of people

Becoming an Expert (Cont.)

The two recommended videos have many examples.

The length of the tutorial will depend on how many participants there will be in each jigsaw team. Obviously, a 4 member jigsaw team will take less time for all the members to teach the others, than a 5-member team will take. 3 to 4 minutes should be used by each "teacher," depending on the number of members in the team. You can quantify the term "short" in the above slide once you know how many members each jigsaw team will have when the jigsaws are formed by taking one person from each "expert" group.

Teams out of Groups

Forming Teams

- Count off within expert groups - 1,2,3,4,.., etc.
- All the 1's will get up and congregate at the same table; all the 2's will get up and congregate at the same table; etc.
- Check for understanding

Form Your Team

This slide explains how to form the jigsaw teams.

Talk through the slide (structure before task) and make sure the participants understand what is required. Decide where the table for the 1's will be and the table for the 2's will be, etc., and let the participants know this information. It is helpful to have the tables numbered 1, 2, 3, 4, ...

Ask someone in one of the groups to explain the process.

Leave the slide up until the jigsaw teams have formed.

Teams out of Groups

Educating Your Team (25 minutes)

- Convene your new team (1's all together, 2's all together, etc.)
- Each *expert* delivers her/his tutorial to her/his new team, in the order in which the topics appear in the workbook.
- Teams discuss the material to integrate the four or five topics and understand how they apply to student teams.

Educate Your Team

This should be self explanatory. If all did their work well, then a healthy discussion should ensue.

Take me out of Groups

Process Check (10 min)

- **Monitoring of processes, especially processes which you own or are a part of, is necessary if improvement is desired**
- **A process check is a formalized way to do this monitoring and should be used at the end of all process related activities**
- **There are many different ways to conduct a process check**
- **A process check must focus on the process**
- **Failure of a process does not infer any judgment about the quality of the team members**

Process Check on Jigsaw

Process checks are very important. They should be a part of every continuous improvement process. There are many ways to conduct a process check. Two examples follow on the remaining slides.

Teams out of Groups

Process Check Jigsaw Process

- Each member of each team fills out the Process Check form found on the following page in this workbook
- As a team, compare and discuss the results of the process check

Process Check on Jigsaw

This is just informing the participants of the structure before task. But it is important to make the structure clear.

Teams out of Groups

Jigsaw Process Check

| | AGREE | | | DISAGREE | |
|---|-------|---|---|----------|---|
| The team now knows the importance of teams | 1 | 2 | 3 | 4 | 5 |
| As a member of this team, I now know about: | | | | | |
| Stages of team development | 1 | 2 | 3 | 4 | 5 |
| Team decision | 1 | 2 | 3 | 4 | 5 |
| Recurring phases in team functioning | 1 | 2 | 3 | 4 | 5 |
| Sources of power in teams | 1 | 2 | 3 | 4 | 5 |
| Issues in team building | 1 | 2 | 3 | 4 | 5 |
| All team members participated | 1 | 2 | 3 | 4 | 5 |
| The team stayed focused on task | 1 | 2 | 3 | 4 | 5 |

Process Check on Jigsaw

This is a very formalized process check. It is important to have each team conduct an inter-group discussion of the results and talk about how the team could do the process better next time.

If there is time, it is useful to have the teams report to the workshop how the process of working together and teaching each other worked for them.

Plus/Delta (+/Δ) Process Check On the Session

- Take two Post-It notes
- Mark one with a +
 - On this + note write one thing about Session 1 that you thought was very good.
- Mark one with a Δ
 - On this Δ note write one improvement you would suggest for this Session 1. (Don't just criticize; suggest an improvement.)
- Post these notes in the place designated by the workshop leaders as you finish the session.

This is another good way to do a process check. It takes little time and it generally gets to the most important points.

This technique is convenient to use in class - have the students do a +/Δ regularly during the term so that you have good feedback.

When convening the next class period, be sure to go over these +/Δ 's and say what can be done to implement the Δ's suggested. The system in which you work may not permit you to correct all of these, so point out to the participants the ones you can't immediately do anything about and the ones you can

Be sure to implement the improvements you can, thus showing the students that their comments are taken seriously as long as the comments are made in a serious vein.

Individual vs Team

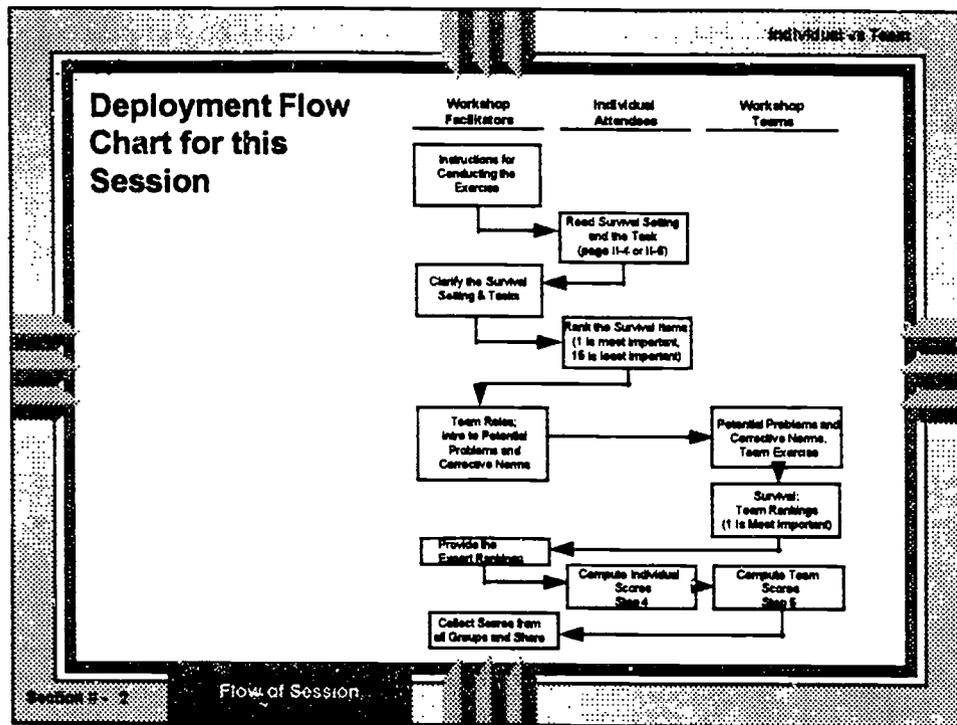
Individual vs Team Decisions

- Individual Rankings on Desert Survival Problem (15 minutes)
- Team Roles and Responsibilities (15 minutes)
- Potential Problems and Corrective Norms (35 minutes)
- Team Rankings on Survival Problem (25 minutes)
- Total Individual and Team Scores (10 minutes)
- Discussion of Team Decision-Making Process (10 minutes)
- Process Check (5 minutes)

Session on Individual vs. Team Decisions

This begins a suggested **Part II** on experiencing team development.

This slide maps out this session. The session begins with some individual tasks, goes into roles and responsibilities and potential team problems, and then puts the teams to work to see how they function.



This is a structure-before-task slide showing the process of what will take place in the next session. Talk through the process and check with participants for understanding.

This is another chance to mention the use of a deployment flow chart.

There are no times shown on this chart, but it is timed for 120 minutes. A good breakdown would be

| | |
|-------------------------------------|-------------|
| This slide(structure) | 3 minutes |
| Individual ranking | 15 minutes |
| Team Roles | 15 minutes |
| Establishing Norms | 35 minutes |
| Team ranking | 25 minutes |
| Assessment of rankings | 10 minutes |
| discussion of results with workshop | 10 minutes |
| Process Check | 7 minutes |
| Total | 120 minutes |

Individual vs. Team

Team Building Exercises

The following four pages contain two team building exercises. These exercises are intended to show that team-based decisions can be superior to individual decisions. These exercises are:

DESERT SURVIVAL and *SPACE SURVIVAL*.

Only one exercise will be completed during the workshop. The other one is provided to give the participants some variety when using the exercises in the classroom.

Each exercise consists of determining the relative importance (ranking) of a number of items. The rankings will first be done individually and then as a team. Comparisons of the array of individual rankings with the ranking of experts and of the team-based ranking with the ranking of experts should reveal that:

- a) the team ranking was superior to all of the individual rankings signifying good team performance, or
- b) persons within the team who may have had better rankings than the team were unable to influence the team, signifying poorer team performance.

The exercises are indicated by the page footers

Desert Survival Space Survival

This is some preliminary information on what is going to happen next. The workshop leader has to decide which of the two survival exercises will be done by participants.

Individual vs Team

DESERT SURVIVAL Team Building Exercise (Page 1 of 2)

DESERT SURVIVAL
Your "life" or "death" will depend upon how well your team can share its present knowledge of a relatively unfamiliar situation so that the team can make decisions that will lead to your survival. This problem is based on over 2,000 actual cases in which men and women lived or died depending upon the survival decisions they made.

Read the situation and do Step 1 without discussing it with the others in the team.

The Situation
It is 10:00 a.m. in mid-August and you have just crash landed in the Sonoran Desert in the southwestern United States. The light twin-engine plane, containing the bodies of the pilot and the co-pilot, has completely burned. Only the air frame remains. None of the rest of you have been injured.

The pilot was unable to notify anyone of your position before the crash. However, he had indicated before impact that you were 70 miles south-southwest from a mining camp which is the nearest known habitation and that you were approximately 65 miles off the course that was filed in your VFR flight plan.

The immediate area is quite flat and, except for occasional barrel and saguaro cacti, appears to be rather barren. The last weather report indicated the temperature would reach 110 degrees that day which means that the temperature at ground level will be 130 degrees. You are dressed in light weight clothing - short sleeve shirts, pants, socks, and street shoes. Everyone has a handkerchief. Collectively, your pockets contain \$2.83 in change, \$85.00 in bills, a pack of cigarettes, and a ball-point pen.

Your Task
Before the plane caught fire your team was able to salvage the 15 items listed on the next page. Your task is to rank these items according to their importance to your survival, starting with "1" the more important, to "15" the least important. You should assume the number of survivors is the same as the number on your team, you are the actual people in the situation, the team has agreed to stick together, and all items are in good condition.

(Continued) Source: Unknown

Desert Survival

This slide sets the context of the assignment. Any details that may come up when the participants read it should be cleared up at this time. Generally, few questions are asked - the problem setting is clear.

The individual ranking generally takes about 15 minutes. Each participant completes this task by completing the column labeled Step 1 on the next slide. How participants arrange their priorities is really not of concern here. Some will just pick them one-by-one. Others may pick pairs of high and lows in each round. But they do need to complete this part.

Individual vs Team

DESERT SURVIVAL Team Building Exercise

Step 1 (Do this step now) Each person is to individually rank each item. 1 is most important, 15 is least important. Do not discuss the situation or the task until each member has finished the individual ranking.

Step 2 (To be done after the following mini-lecture on team roles.) Rank order the 15 items as a team. Once discussion begins don't change your individual ranking.

| Items | Step 1 Individual Ranking | Step 2 Team Ranking | Step 3 Expert Ranking | Step 4 Difference Ranking 1-3 | Step 5 Difference Ranking 2-3 |
|--|---------------------------------|---------------------------|-----------------------------|--------------------------------------|--------------------------------------|
| Flashlight (4 battery size) | | | | | |
| Jackknife | | | | | |
| Sectional air map of the area | | | | | |
| Plastic raincoat (large) | | | | | |
| Magnetic compass | | | | | |
| Compress kit with gauze | | | | | |
| .45 caliber pistol (loaded) | | | | | |
| Parachute (red and white) | | | | | |
| Bottle of 1000 salt tablets | | | | | |
| 1 quart of water per person | | | | | |
| A book entitled, <i>Edible Animals of the Desert</i> | | | | | |
| A pair of sunglasses per person | | | | | |
| 2 quarts of 180 proof Vodka | | | | | |
| 1 top coat per person | | | | | |
| A cosmetic mirror | | | | | |
| Total the absolute differences of Steps 4 and 5 (the lower the score the better) | | | | Your Score | Team Score |

Desert Survival

The first visit of the participants to this page is made as individuals complete the column labeled Step 1.

They will later return here and complete a similar ranking as a team to complete the column labeled Step 2. In completing Step 2, they will hopefully begin to operate as a team and reach decisions that are better overall.

Once the team has finished its work, Step 3 can be completed from the expert results contained in the Appendix (page A-23). Having Step 3 completed allows the team to finish columns labeled Step 4 and Step 5. Notice only the absolute differences (all positive numbers) are entered for the differences in Steps 4 and 5.

Columns 4 and 5 are totaled to compare individual results with team results. If transparencies are made from pages A-31 through A-38 in the *Facilitator's Guide* and provide one to each team to complete, the results can easily be displayed to all participants with an overhead projector. Typical results are shown below:

| <u>Minimum Individual</u> | <u>Maximum Individual</u> | <u>Average of Individuals</u> | <u>Team Score</u> | |
|---------------------------|---------------------------|-------------------------------|-------------------|-------------------|
| 41 | 82 | 67 | 60 | (From ASEE |
| 40 | 84 | 54 | 30 | workshop, |
| 58 | 82 | 68 | 56 | June 1993, |
| 45 | 68 | 56 | 38 | Urbana/Champaign) |

Please note that the team that assembled this workbook has given this exercise to a group of freshman on the first day of class before the students had been put through the teaming materials found earlier in this book (and those that follow), only to verify that the pseudo-team of page I-8 is a real phenomenon. This exercise should be preceded with some training!

Facilitator's Guide
Section II - 5

Individual vs Team

SPACE SURVIVAL Team Building Exercise

(Page 1 of 2)

SPACE SURVIVAL

In the following situation, your "life" and "death" will depend upon how well your team can share its present knowledge of a relatively unfamiliar situation so that the team can make decisions that will lead to your survival. This problem is fictional, although the ranking to which you will compare your results was done by a number of space experts.

Read the situation and do Step 1 without discussing it with your other team members.

The Situation

You are a member of a lunar exploration crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties however, your ship was forced to land at a spot some 320 kilometers (200 miles) from the rendezvous point. During the re-entry and landing, much of the equipment aboard was damaged, and, since survival depends on reaching the mother ship, the most critical items available must be chosen for the 320 km trip.

Your Task

On the next page are listed the 15 items left intact and undamaged after landing. Your task is to rank these items according to their importance in aiding you to reach the mother ship, starting with "1" the more important, to "15" the least important. You should assume the number in the crew is the same as the number on your team, you are the actual people in the situation, the team has agreed to stick together, and all 15 items are in good condition.

(Continued)

Source: Prof. Devo Hughes,
Civil Engineering Dept.,
University of Bradford, GB

Space Survival

This slide sets the context of the assignment. Any details that may come up when the participants read it should be cleared up at this time. Generally, few questions are asked - the problem setting is clear.

The individual ranking generally takes about 15 minutes. Each participant completes this task by completing the column labeled Step 1 on the next slide. How participants arrange their priorities is really not of concern here. Some will just pick them one-by-one. Others may pick pairs of high and lows in each round. But they do need to complete this part.

Individual vs Team

SPACE SURVIVAL Team Building Exercise (Page 2 of 2)

Step 1 (Do this step now) Each person is to individually rank each item. 1 is most important, 15 is least important. Do not discuss the situation or the task until each member has finished the individual ranking

Step 2: (To be done after the following mini-lecture on team roles.) Rank order the 15 items as a team. Once discussion begins don't change your individual ranking.

| Items | Step 1 Individual Ranking | Step 2 Team Ranking | Step 3 Expert Ranking | Step 4 Difference Ranking 1-3 | Step 5 Difference Ranking 2-3 |
|--|---------------------------------|---------------------------|-----------------------------|--------------------------------------|--------------------------------------|
| Box of matches | | | | | |
| Food concentrate | | | | | |
| 20 meters of nylon rope | | | | | |
| Parachute silk | | | | | |
| Portable heating unit | | | | | |
| Two .45 caliber pistols | | | | | |
| One case dehydrated milk | | | | | |
| Two 50 kg tanks of oxygen | | | | | |
| Stellar map (of the moon's constellations) | | | | | |
| Life raft | | | | | |
| Magnetic compass | | | | | |
| 25 liters of water | | | | | |
| Signal flares | | | | | |
| First aid kit w/ hypodermic needle | | | | | |
| Solar-pow. FM receiver/transmitter | | | | | |
| Total the absolute differences of Steps 4 and 5 (the lower the score the better) → | | | | Your Score | Team Score |

Space Survival

The first visit of the participants to this page is made as individuals complete the column labeled Step 1.

They will later return here and complete a similar ranking as a team to complete the column labeled Step 2. In completing Step 2, they will hopefully begin to operate as a team and reach decisions that are better overall.

Once the team has finished its work, Step 3 can be completed from the expert results contained in the Appendix (page A-23). Having Step 3 completed allows the team to finish columns labeled Step 4 and Step 5. Notice only the absolute differences (all positive numbers) are entered for the differences in Steps 4 and 5.

Columns 4 and 5 are totaled to compare individual results with team results. If transparencies are made from pages A-31 through A-38 in the *Facilitator's Guide* and provide one to each team to complete, the results can easily be displayed to all participants with an overhead projector.

Please note that the team that assembled this workbook has given this exercise to a group of freshman on the first day of class before the students had been through the teaming materials found earlier in this book (and those that follow), only to verify that the pseudo-team of page I-8 is a real phenomenon. This exercise should be preceded with some training!

Individual vs Team

Meetings

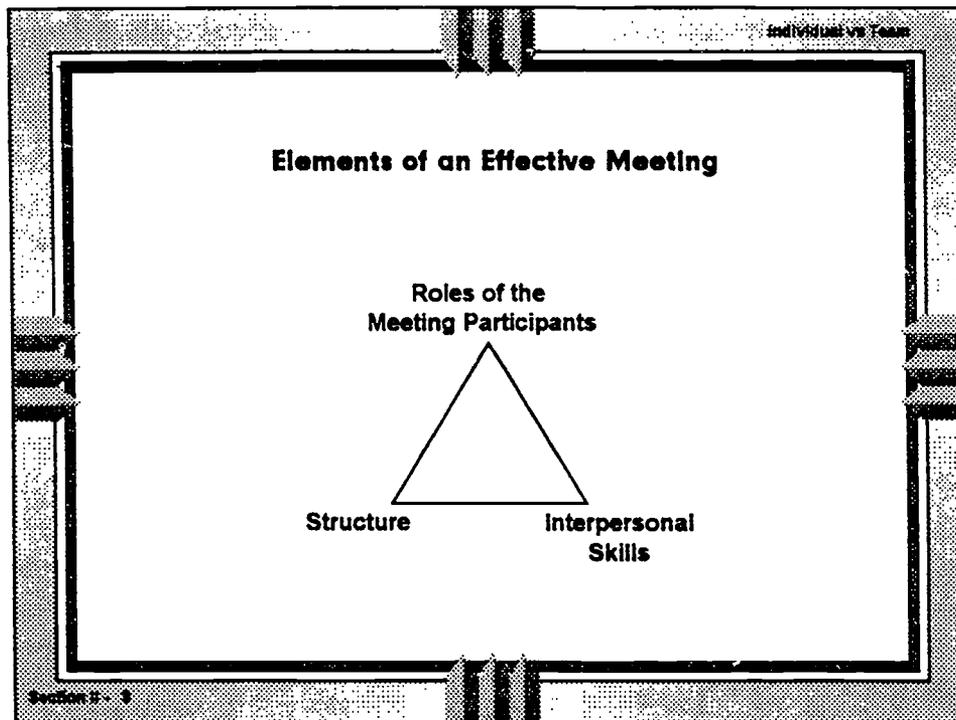
**Most Teamwork Occurs through
Face-to-Face Interaction in Meetings**

- Over 19 million meetings take place everyday in the U.S.
- People spend over 1/2 their working life conducting, attending, preparing for and following up on meetings
- Almost 1/2 of all meetings are considered unnecessary by the people who attend

Good teamwork requires effective meetings!

Section II - 8

This slide is self explanatory, but its importance can not be overlooked. Most of the interactions between the team members will occur in meetings, so it is important that these meetings are efficiently and effectively conducted.



This slide covers the elements of good meetings - there are three principle ones.

Role playing is effective in conducting good meetings. The next few slides covers roles that are important and what the responsibility of that role player is. In student teams these roles should rotate often so that everyone has a chance to develop.

Structure is also important. Structure in a meeting means that there is an agenda with both the topics to be considered and the process by which that topic is handled.

The attendees (the team members) have to have some interpersonal skills that will aid in bringing resolution to the issues being discussed. It is also important that norms for behavior be set. This is the function of the Code of Cooperation. Also, the exercise that begins on page II-15 is a norm setting exercise.

Individual vs Team

Team Roles & Responsibilities

Team Leader

- Leads team through problem solving process
- Invests appropriate amount of time on the project
- Maintains accurate records of team activities and results
- Prepares for each team meeting
- Provides structure and guidance to allow maximum participation
- Influences team decisions equally with team members

Roles & Responsibilities
Team Leader

This is first of several slides which define some of the responsibilities of various team roles. The last slide showing the roles of gatekeeper etc. comes mainly from the cooperative learning people but it's useful to have some of these tasks assigned in the team.

You don't need to spend too much time on these role slides but be sure to connect this material to the work they did in the Part I jigsaw (one of the expert groups was at least introduced to the idea that there are various roles in a team).

This material on roles generally takes about ten minutes which works out to 2.5 minutes per slide.

Individual vs. Team

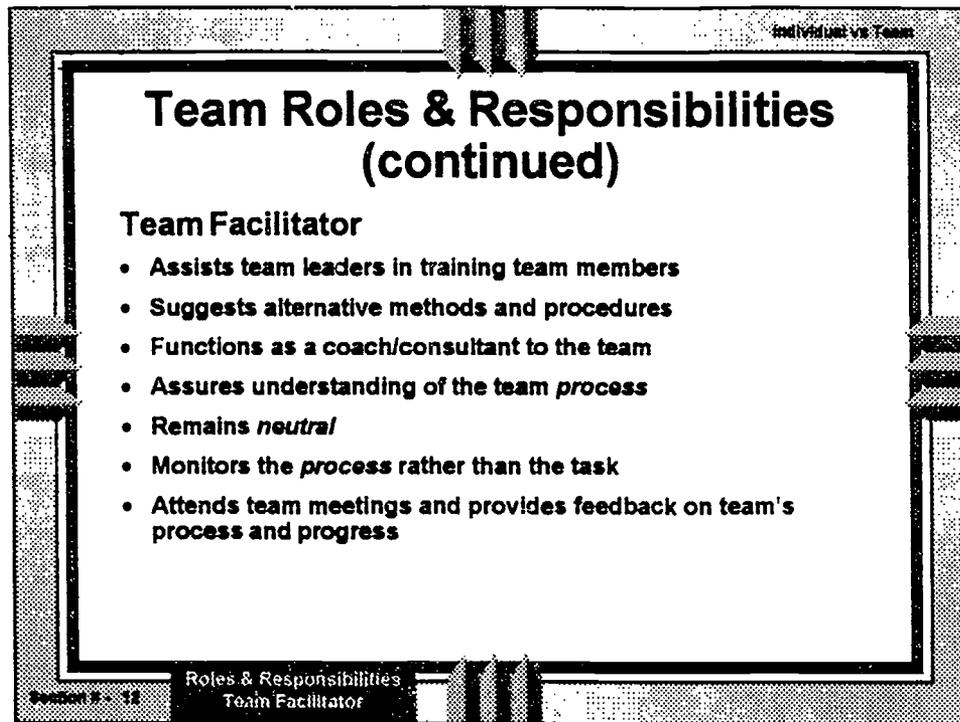
Team Roles & Responsibilities (continued)

Team Member

- Invests appropriate time on the project
- Is committed and fully involved in project
- Participates equally in:
 - Defining problems
 - Investigating problems
 - Defining solutions
 - Documenting solutions
- Represents his/her organization's interest

Roles & Responsibilities
Team Member (Con't)

Team members have more responsibilities than just showing up.



The facilitator plays an important role in a team. It is this person's responsibilities to ensure that the process runs smoothly. In many companies this role is assigned to a person who is not a familiar with or have a stake in the outcome (the product) of the process. Then the facilitator is only interested in the process.

Some organizations do not provide an unbiased facilitator for each team, in which case a regular team member must act as facilitator. However, it is sometimes difficult to both monitor the process and participate in it.

In classes (e.g., design courses) this role is often assumed by the instructor, at least for the "meetings" that take place in her/his presence.

Katsenback and Smith (*The Wisdom of Teams*) state that although a true facilitator is often needed to get a team started or to get a "stuck" team moving again, most often a team member can offer effective facilitation.

Individual vs Team

Team Roles & Responsibilities (continued)

Additional Team Member Roles

- **Team Recorder**
 - Writes down all the ideas and material generated during the working meeting
- **Team Timer**
 - Makes sure that team stays on its time budget for the various tasks
- **Team Gatekeeper**
 - Makes sure that all members of the team are participating
- **Team Devil's Advocate**
 - Makes sure that opposing ideas are brought up and discussed
- **Team Encourager**
 - Makes sure that everyone on the team is getting positive recognition for their contribution
- **Team Resource Holder**
 - This person holds team resources (e.g., calculators, instructions, paper & pencils, etc.)

Roles & Responsibilities
Other Roles

These are common cooperative learning roles that work well for teams in most any situation. The roles should rotate with time. Assign as many as needed to cover all the members of the team

These are listed here in the order of decreasing importance to the team.

Individual vs Team

Assigning Team Roles

- The Team leader will be assigned by the workshop facilitator
- The team recorder will be the team member who is just to the right of the team leader
- The team gatekeeper will be the team member who is just to the right of the recorder
- The team facilitator will be the team member who is just to the left of the team leader
- The team encourager will be the team member who is just to the left of the team facilitator

Roles & Responsibilities
Assigning Roles

This is a structure-before-task slide. Talk through the slide and ask an attendee to summarize.

You can select the team leader any way you want -- e.g., determine the person who got up the latest (or earliest) this morning and then pick the person on the left (or right) of the early (or late) riser. Or find the person with the most red in their clothing and then pick the person on their left (or right).

This is a 2 minute task

Individual vs. Team

Anticipating Potential Problems and Establishing Corrective Norms

Goals

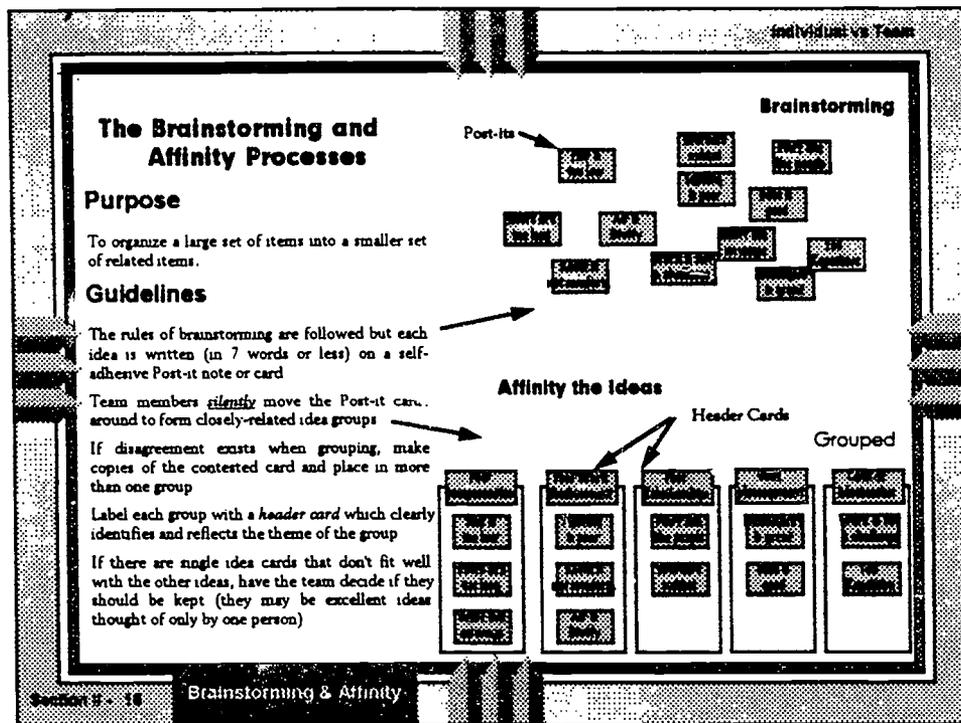
- Make team members aware of what things bother other team members
- Organize potential problems into major groups
- Develop a strategy for addressing potential teaming problems

Tools

- Brainstorming
- Affinity process

Anticipating Problems

This is more structure-before-task. It clarifies the goals of the next exercise and the tools to be used.



This is information on two tools that the participants will be using in the next exercise. Although this is fairly self-explanatory, further information is included in the Appendix on pages A-10 and A-12.

Individual vs Team

Anticipating Potential Problems and Establishing Corrective Norms

Method

1. Silently brainstorm a list of team/member behaviors or attributes which can cause problems in student teams. Write each idea on a Post-it (5 minutes).
2. Place all the Post-its on your table face up so everyone can read them. Explain any questions and add new ideas as they occur (5 minutes).
3. As a team, silently move the Post-its around, grouping all the Post-its having the same general theme together (looking for affinity). If you think of a new problem as you move Post-its, write in down on a Post-it and add it to the set (6 minutes)
4. Write a header card (Post-it) for each group of Post-its. The header cards are the problem areas which need to be addressed by the team to help insure a successful team effort (9 minutes).

(The workshop will not do steps 5 and 6, below, which bring this class exercise to closure)

5. Select the affinity group which your team feels has the greatest potential of causing problems if left unaddressed. A decision tool is required here (see, e.g., the Modified Nominal Group Technique in the Appendix of this Workbook).
6. Generate a norm (i.e., a strategy) to avoid or to overcome each problem. A useful tool here would be the Force Field Analysis (see the Appendix).

Each team will report out the problems identified on their Header Cards (10 minutes).

Anticipating Problems
Exercise

This is a structure-before-task slide covering what will take place next. Check for understanding by calling on someone at random.

This is an exercise that can be used in classes where teams are going to work together for an extended period of time. It makes the team members think about the things that can happen and talk about how to avoid it. It is easier to talk about potential problems before they occur, than to try to deal with them after they do.

At the conclusion of this exercise, have a few of the teams report out on what problem they decided on. Can they suggest some norm that might avoid this problem.

Individual vs Team

Team Maintenance

At various points in a team's history, there may be a need for team maintenance requiring various levels of intervention. There are three levels of intervention.

Levels of Intervention

- **Prevention (Zero level intervention)**
Set the teams up for success
- **Mild Intervention (Level one intervention)**
Impersonal, done during formal team meeting
Private, non-meeting time conversation with the team
- **Strong Intervention (Level two intervention)**
Private, non-meeting time confrontation with the team or with the individual(s)
Personal, on team time

Section II - 18

This slide reviews briefly team maintenance. There are three levels. If there is time available, the teams could be asked to determine the level of maintenance required to address the problem(s) that they identified in the work just completed.

Individual vs Team

Team Rankings and Scores

- Now return to the survival exercise and rank the items as a team (Step 2). (25 minutes)
- Compute the individual and team scores (Steps 4 & 5; expert rankings for Step 3 are included in the Appendix). (5 minutes).
- Transfer the *individual* high, low, and average scores and the *team* score to the transparency provided (5 minutes).

Section II - 19 Team Desert Survival

This is about a 3 minute slide covering structure-before-task on what will happen next.

The participants now return to the survival exercise to rank the items as a team and to compute the scores for both individual performance and team performance. In this booklet the survival worksheet is either on page II-5 or on page II-7.

The transparencies referred to are to be made from the masters found at the end of the *Facilitator's Guide*. These sheets, when made into transparencies, allow the results for all teams to be displayed on an overhead projector.

Individual vs. Team

Discussion of Team Decision-Making Process

Have the team facilitator lead the team in a discussion of how the team reached its decisions; e. g., what was the process?
(10 minutes)

Section II - 20

Team Discussion

This is a ten minute exercise. The teams may find this discussion hard to do; they have not really observed the process (it is the team facilitators job, but they probably became engrossed in the process). The various workshop leaders need to circulate and help out.

Did they reach consensus?

Did the team leader dominate?

Was there good discussion of each point (pro and con)?

Was a process for making the decisions discussed before actually trying to make a decision?

Were all team members active and if not were they encouraged to be active?

How were differences or conflicts resolved?

Individual vs. Team

Process Check

- Report to the Workshop by Teams:
 - What Was Learned
 - What Do You Desire More Information On
- Do the following process check for this session

Process Check - Session 2

This is structure-before-task again.

Individual vs Team

Process Check

| | AGREE | | DISAGREE | | |
|--|-------|---|----------|---|---|
| All team members participated | 1 | 2 | 3 | 4 | 5 |
| The members with roles did their jobs | 1 | 2 | 3 | 4 | 5 |
| The group stayed focused on task | 1 | 2 | 3 | 4 | 5 |
| The group decisions were consensus | 1 | 2 | 3 | 4 | 5 |
| Overall, the team functioned well while performing this task | 1 | 2 | 3 | 4 | 5 |

Section II - 22

This process check is to be done individually and then comparisons made with other team members. Usually, everyone is very nice to each other, not wanting to step on each other's toes. This may mean that the team is still in the norming stage. If the feedback (not criticism) is direct and to the point, then they may be in the performing stage.

| Additional Team-building Exercises | |
|---|-------------|
| <u>Exercise</u> | <u>Page</u> |
| A Team Exercise Requiring an <i>Additive</i> Effort | III-2 |
| A Team Exercise Requiring a <i>Disjunctive</i> Effort | III-3,4,5,6 |
| The RUSE: A Team Building Exercise | III-7,8 |
| Traffic Jam: A Team Building Exercise | III-9 |

Section III - 1 Additional Exercises

This begins a suggested Part III which has additional teaming exercises.

Part III contains some exercises that aid in breaking down barriers between team members. These barriers should not be broken down with exercises in which the participants have a stake. That is, when the team is in its forming stage, simulations work better than the tough problems that the team will have to solve. When the participants have a large stake in these forming exercises, they often violate the code of conduct and go right to storming.

All the exercises presented here have been used in the classroom and found to be beneficial when done in the proper context. They should not be done just to do an exercise, but rather to accomplish an overall goal.

An overhead will be shown at this time.

This is an exercise that demonstrates very well an additive task (see page I-6). Prepare a transparency of the logo sheet found at the end of the *Facilitator's Guide* for this exercise. When assigning this task, it is useful to give the participants a quick glimpse (for 1 or two seconds) by projecting this transparency of logos to set up the rest of the exercise. Follow this with announcing the object of the task or effort. The object is to recall as many logos as possible within the team. Each member should write down the logos that he/she recalls.

The workshop leader might give the teams time to plan how they would do this task (usually they divide up the sheet into parts [i.e., quadrants if there are four members on a team]). Without this hint about the need to plan to get the best result, everyone tries to memorize every logo resulting in fewer logos being recalled by the team (there will be lots of duplication).

Once the object of the exercise is clear and the teams are ready, project this transparency for about 30 seconds. Then let the balance of the exercise continue.

On completion, have each team tabulate the number of logos that each team member recalled, the average number of logos recalled per person, and the total number of unique logos (no duplicates) recalled by the whole team

This exercise should make additive tasks or efforts obvious. To take this further, you can ask them for examples of similar tasks (brainstorming, harvesting crops, taking surveys, etc.)

There are 47 logos on the logo sheet.

Additional Team-building Exercises

Disjunctive - Eureka Team Exercises

Identify the familiar phrase that each of the following express:

Example

| |
|--------|
| GROUND |
| FEET |

1

(Six feet under ground)

Section III - 3 Disjunctive Team Exercise

This, and the following 3 slides, demonstrate disjunctive tasks or efforts (see page I-6). This slide is intended to be an example of the effort to be found on the next three slides. The task is, given the word puzzle (words, letters, placement), identify the familiar phrase that each of the following express. Be aware that cultural differences may have great influence on these puzzles.

The answer here is *six feet underground*.

Give each team a chance to come up with the solution - they should work as a team to solve this. Do not let the teams shout out the answer if they solve the puzzle early. When all teams have an answer, or when some of the teams have the answer and the others have reached an impasse, then randomly choose some of the groups that solved it and have these teams report their answer.

The idea here is that as soon as one person gets the correct answer within a team, all of the members of that team will probably get it - thus, this is a disjunctive or Eureka task.

Disjunctive - Eureka Team Exercises

Identify the familiar phrase that each of the following express:

Example

GROUND

FEET
FEET
FEET
FEET
FEET
FEET

1

(Six feet under ground)

2

CLOSE
CLOSE
THE
THE
PROBLEM

Disjunctive Team Exercise

Two CLOSE two THE PROBLEM. That is, *too close to the problem*.
Eureka!

Disjunctive - Eureka Team Exercises

Identify the familiar phrase that each of the following express:

Example

GROUND

FEET
FEET
FEET
FEET
FEET
FEET

ROWHENME

1

(Six feet under ground)

3

2

CLOSE
CLOSE
THE
THE
PROBLEM

Disjunctive Team Exercise

WHEN in RO-ME. That is, "*when in Rome.*" Eureka!

Disjunctive - Eureka Team Exercises

Identify the familiar phrase that each of the following express:

Example

GROUND

FEET
FEET
FEET
FEET
FEET
FEET

ROWHENME

1

(Six feet under ground)

3

2

CLOSE
CLOSE
THE
THE
PROBLEM

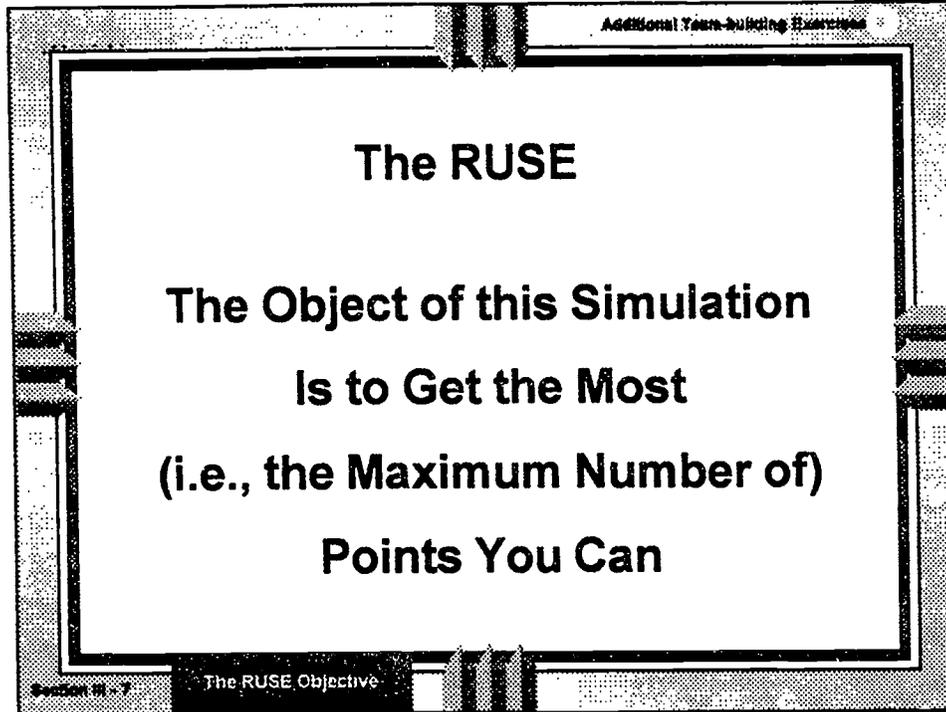
LUN
N C
OEH

4

Section III - 6

Disjunctive Team Exercise

Square meal. Eureka!



The acronym RUSE stands for Resource Utilization Simulation Exercise. This introductory slide sets the objective of the exercise, the rules of which are on the next page. Most teams will interpret this to mean get more points than any other team, but this is not what the objective is. Indeed, when any of the teams try to compete, the the pool is always depleted and no one wins.

The use of the word RESOURCES is not to be lost here. Resources are usually limited (e.g., non-renewable resources on this planet) and it is in everyone's best interest to use the resources (here points) so that everyone wins. Every team maximizes its own points by working together with other teams to insure that all teams maximize their points. Either all teams win or no team wins. But the teams are to discover this by playing the game. The pool will be depleted a few times before the players begin to catch on and start to work together with all the other teams.

RESOURCE USE SIMULATION EXERCISE (RUSE) RULES

1. The resource pool will have an initial value of _____.
2. Teams may request 0, 1, 2, or 3 points on each trial by holding up a request card with the desired number of points.
3. All teams must hold up the request card SIMULTANEOUSLY.
4. After each trial, points requested are awarded to teams.
5. If, on any trial, the total points requested EQUALS OR EXCEEDS the number of points in the pool at the beginning of that trial, the pool is declared exhausted, no points are awarded, and the simulation ends.
6. After every trial, if the number of points remaining in the pool is greater than zero, a coin toss will determine whether the number of points is doubled or remains the same.
7. The upper limit on the number of points in the pool is the starting value.
8. Trials will continue at a RAPID PACE until the goal is reached or the pool is declared exhausted.

The RUSE Rules

These instructions should be reproduced and distributed to each team. The teams should be given enough time to digest the rules but not enough time to deduce the fact that no single team can win.

It is important to fill in the blank in the first line for the starting number of points in the pool. This value should be between $3n$ and $6n$, where n is the number of teams playing. The lower the starting value, the sooner the crisis presents itself (pool depletion). The higher the value, the longer the problems are postponed.

Between rounds, give the teams sufficient time to plan their next strategy. Note, no rules about working with other teams are included here. It is important that you do not set any rules of this type.

This exercise can be very frustrating with immature audiences. They may think it is a waste of time. However, there is a valuable lesson to learn when the game is fully understood.

Traffic Jam

Instructions (P1 represents person 1 facing →)

Each group designates 6 persons to take the starting positions shown



The object is for all persons on the left to end up on the right and vice versa using only the legal moves described below:

Legal Moves:

1. A person may move into an empty space in front of him/her.
2. A person may move around a person who is facing her/him into an empty space.

Illegal Moves:

1. Any move backwards.
2. Any move around someone facing the same direction you are.
3. Any move which involves two or more persons moving at the same time.

Traffic Jam Rules

This exercise involves teams in physical activity. The directions are given above. These directions should be copied and distributed to each team (try one copy per team to build interdependence). It is unfortunate that six participants per team work nicely since six may not match the number of members on each team. Fewer than six participants per team reduces the complexity to where the challenge is gone. More than six participants per team increases the complexity somewhat. The exercise can consume anywhere from 30 to 60 minutes.

The team members (P1,P2,P3,P4,P5,P6) should take positions as shown above leaving a comfortable distance between each other and an empty position in the middle. The arrows show the direction that the members should be facing. Pieces of paper stuck to the floor to mark seven spots are desirable.

One question that always arises is does P1 have to get to where P6 began, P2 to where P5 began and P3 to where P4 began? The answer is no; in fact the rules will prohibit that (*Illegal Move 2: Any move around someone facing the same direction you are*). At the successful completion of this exercise people will have moved from



to

Often, the first team to succeed will not have deciphered the algorithm involved. In a successive round another team may win.

To build intra-team cooperation, you can have the first team that solves this puzzle go work with other teams that have not solved it as yet.

If you want to increase the competitiveness of the game once the teams have played a round or two, ask the them to solve it without talking or while holding their breath. They can also compete against their previous time.

| Appendix | |
|---|-------------|
| <u>Topic</u> | <u>Page</u> |
| <u>Pieces for Jigsaw In Part I</u> | 2-8 |
| <u>Tools for Team Decision Making - Summary</u> | 9 |
| •Affinity Process | 10 |
| •Agenda Planner | 11 |
| •Brainstorming | 12 |
| •Code of Cooperation | 13 |
| •Comparison Matrix | 14 |
| •Deployment Flowchart | 15-16 |
| •Focus on the Facilitator | 17 |
| •Force Field Analysis | 18 |
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| <u>Logo Sheet for the Additive Effort Exercise In Section III</u> | 39 |

APPENDIX - Index

This is an index to the Appendix

The first part of this appendix is the jigsaw material that is needed for the exercise on page I-10.

The second part consists of tools that are helpful in reaching decisions and solving problems in teams.

The third part gives the expert rankings for the survival exercises in section II

The fourth part contains a reading list for those who want more depth in teaming and source information on videos that work well with the jigsaw material

In this Facilitator's Guide will be found the following additional forms:

- A collection of forms (pages A-31 to 38) that are convenient for collecting results from the teams on the survival exercise tallies. When these forms are made into viewgraphs, it is quick and easy to display the results to the whole workshop by stacking the transparencies on top of one another on the projector.
- A logo sheet on page A-39 for use in the additive exercise found on Page III-2. A transparency should be made from this page.

1. Stages of Team Development (Page 1 of 2)

Theory on team development predicts that teams, like individuals, pass through predictable, sequential stages over time. The most well known of these models is that of Tuckman (1965), who labeled the stages of team development as *forming*, *storming*, *norming*, *performing*, and *adjourning*.

Forming (the orientation stage)

Members of newly formed teams often feel anxious and uncomfortable. They must interact with other individuals whom they do not know well and begin to work on tasks which they may not yet understand completely. Their roles in the team and the procedures for interaction may be ambiguous as well. As members become better acquainted, some of the tension may dissipate. Members will begin to become more comfortable with their roles.

Storming (the conflict stage)

The polite interactions of the orientation stage may soon be replaced by conflict. *False conflicts* occur when members misunderstand or misinterpret each others behaviors. *Contingent conflicts* develop over procedural or situational factors (such as meeting times, places, or formats). These two types of conflict are relatively easy to resolve, whereas *escalating conflicts*, a third variety, may cause more serious problems for the team. Escalating conflicts may begin as simple disagreements which then lead into the expression of more fundamental differences of opinion. Such conflicts may be characterized by venting personal hostilities and the expression of long suppressed emotions or ideas. Although conflict may damage or destroy a team, most researchers agree that conflict is a natural consequence of team membership, and that it may, in fact, strengthen the team as the members learn to accept and constructively resolve their differences.

Norming (the cohesion stage)

During the third stage, team conflict is replaced by a feeling of cohesiveness. Teams experience a sense of *unity* or team identity. Membership *stability* also characterizes this stage. Members are highly involved and turnover is low. An increase in member *satisfaction* also happens at this time. Not only are members pleased with the team, but they themselves may experience higher self esteem and lower anxiety as a result of their participation in the team. The *internal dynamics* of cohesive teams change as well. Individual members are more likely to accept or be persuaded by team norms. One negative aspect of this is that, in some teams, dissent may not be tolerated during this stage.

(Continued)

A - 2

Jigsaw Piece #1 (Page 1 of 2)

This is the reading material for the first expert group.

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1. Stages of Team Development (Page 2 of 2)

Performing (the task-performance stage)

High productivity is most likely when teams have been together for some time. Whether the focus of the team is task oriented or therapeutic, effective performance occurs late in the developmental life of the team. Although, as a rule, non-cohesive teams are less productive than cohesive teams, not all cohesive teams are productive. Some cohesive teams may have strong norms which encourage low productivity.

Adjourning (the dissolution stage)

Teams may adjourn spontaneously or by design. *Planned dissolution* occurs when the team has completed its task or exhausted its resources. *Spontaneous dissolution* occurs when members are unable to resolve conflicts, its members grow dissatisfied and depart, or when repeated failure makes the team unable to continue. Either type of dissolution may be stressful. Members of successful teams may not want to end, and when the dissolution is unexpected, members may experience a great deal of conflict or anxiety.

| Stage | Major Process | Characteristics |
|-----------------------------|---|--|
| 1. Forming (orientation) | Exchange of information; increased interdependency; task exploration; identification of commonalities | Timid interaction; polite discourse; cautious over ambiguity; self-disclosure |
| 2. Storming (conflict) | Disagreement over procedure; expression of dissatisfaction; emotional responses; resistance | Criticism of ideas; poor attendance; hostility; polarization and coalition forming |
| 3. Norming (cohesion) | Growth of cohesiveness and unity; establishment of roles, standards, and relationships | Agreement on procedure; reduction in role ambiguity; increased "we-feeling" |
| 4. Performing (performance) | Goal achievement; high task orientation; emphasis on performance and production | Decisive making; problem solving; mutual cooperation |
| 5. Adjourning (dissolution) | Termination of roles; completion of tasks; reduction of dependency | Disintegration and withdrawal; increased independence and autonomy; regret |

A - 3

Jigsaw Piece #1 (Page 2 of 2)

This is a continuation of the reading material for the first expert group, continued.

2. Six Types of Team Decisions (Page 1 of 1)

As a team works at a task, or even at team maintenance functions, decisions must be made. The quality of team decision making, and the extent to which a decision is accepted and implemented by team members, is greatly affected by the decision making process. Here are the six most common team decision making patterns.

1. Unilateral/Authoritarian

One person makes the decision and imposes it upon the team. Often, there is very little input from team members, and acceptance/commitment is low.

2. Handclasp

Two team members make a decision and impose it upon the team. This pattern sometimes looks participatory, but still elicits little input from the other members, who will have a low level of commitment to the decision.

3. Minority

Several members make a decision and impose it upon the majority, who have been disenfranchised. In the hands of skilled practitioners, this can look like participatory decision making, but it is only a handclasp among a few members. Decision quality suffers because of the lack of input from the majority, and commitment to the decision is low among those outside the minority.

4. Majority

This is the popular, "democratic" default option. When a team is unable to resolve a conflict, there is almost always a suggestion to "take a vote, majority wins." Majority rule has the illusion of fairness, but it cuts off discussion, thereby reducing decision quality. It also elicits no commitment to the decision from the losing minority. The "loyal opposition" is often a myth. Super-majorities of 2/3 or 3/4 do not solve the problems associated with voting.

5. Unanimity

Solves the problem of commitment, but is very cumbersome because now everyone has a veto. The U. N. Security Council is a good (humble?) example.

6. Consensus

Difficult to achieve, but results in the best decision quality and the highest level of commitment to the team decision. The alternatives are discussed and refined until a consensus is attained. That may mean that no one gets exactly what he or she wanted, but everyone is able to say, "I might take a different course of action if it were entirely up to me, but I commit my support to the plan we have all agreed upon." Achieving consensus involves compromise on the part of all members, but it is each member's responsibility to present her/his position as effectively as possible. Only then does consensus lead to high quality decisions.

A - 4

Jigsaw Piece #2 (Page 1 of 1)

This is the reading material for the **second** expert group.

3. Recurring Phases in Task-Performing Teams (Page 1 of 1)

As teams perform, even those that have reached the performing stage in Tuckman's (1965) model of team development, they must shift between two different orientations, or phases, to be highly productive. When a team directs attention at its primary task, it is almost inevitable that fatigue, tension, and conflict will develop.

Fatigue will set in if the task is demanding, or boredom will develop if it is too easy. Tension and conflict will develop when alternative approaches to task performance are suggested, or when alternative solutions to a team problem are put forward and discussed. As these products of a task orientation develop and increase, team productivity suffers. It is then important for the team to shift to a team maintenance orientation. This is accomplished by setting the task aside and focusing on the relationships between members, resting, reducing tension, and resolving interpersonal conflicts.

In many teams there is a "rush to performance" in which the stages of team development are side-stepped or truncated. In many ways, the stages of team development prepare members with the skills required during team maintenance activities. But it is also important that members acknowledge the legitimacy, even the necessity, of taking time away from the task to deal with team maintenance issues. Two separate leadership roles may develop within a team, one person who directs task activities, and another who is the team maintenance specialist.

Here are some of the functions necessary for task performance:

- Analysis of problem or task structure
- Suggesting solutions
- Asking for information
- Summarizing
- Delegating
- Refocusing team on task
- Pushing for a team decision other task functions, from your experience.

Here are some functions necessary for team maintenance:

- Telling a joke
- Mediating a conflict between team members
- Encouraging all to participate
- Showing approval
- Suggesting a break from work
- Reminding members of norms for cooperation
- Encouraging and modeling positive affect for team members other team maintenance functions, from your experience

A - 5

Jigsaw Piece #3 (Page 1 of 1)

This is the reading material for the **third** expert group.

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4. Sources of Power in Teams (Page 1 of 1)

The ability of an individual to influence others within the context of a small, task-oriented team is determined by the power of that individual. There are five sources of social power, some are more effective than others.

1. **Legitimate Power** This power results from the position the person holds. A designated or elected leader, a military commander, a manager, all have legitimate power, power that is inherent in the position. Generally, influence based on legitimate power will be accepted by team members, but it is important that they accept the legitimacy of the power hierarchy.

2. **Reward Power** This power is based on the ability of the person to control important sources of reward and reinforcement. Salary, bonuses, time off, access to resources, are all rewards that can be used to influence behavior. Reward power is usually well accepted by team members if the rewards are administered within clear contingencies and guidelines.

3. **Coercive Power** This is the power to administer punishment for noncompliance. Fines, suspensions, undesirable assignments, verbal abuse, ridicule, are all examples of punishment or coercive power. The application of coercive power usually leads to compliance, but also generates resentment, negative emotionality, and dislike for the person who employs it.

4. **Expert Power** This form of power is based on the knowledge, special skill, training, or experience of the person. When a person's expertise is known to the team, influence within that area of expertise is well accepted. The user of expert power must find a balance between being haughty and being too humble. Bragging about your skills doesn't establish useful expert power, but expert power can't be used if no one knows about it.

5. **Referent Power** This is power based on the person's attractiveness and qualities as a human being. It is called "Referent" because team members use this person as a point of reference in developing their own personalities. Referent power depends upon developing positive relationships with team members. It is not simply mutual attraction, but a relationship that includes a kind of mentoring and guidance that is possible because one person wants to learn from the other.

The use of power in teams is an ongoing process. The sources of power that are most useful to leaders and facilitators are expert power and referent power. They produce influence and change in a positive way, and minimize resistance and negativity. Reward and legitimate power can also be used effectively and in a positive way. Coercive power often quickly produces the desired behavior, but leads to other, undesirable consequences.

A - 6

Jigsaw Piece #4 (Page 1 of 1)

This is the reading material for the fourth expert group.

5. Five Issues to be Considered in Team Building (Page 1 of 2)

Team building exercises are very important in the development of base teams, task-oriented teams that will work together for an extended period of time on a complex project. Experiences designed to facilitate team development should be focused on some, if not all, of five issues, numbers 1, 2, & 3 of which follow on the next two pages

1. Interdependence

This is the issue of how each member's outcomes are determined, at least in part, by the actions of the other members. The structure of the team task should be such that it requires cooperative interdependence. Functioning independently of other team members, or competing with them should lead to sub-optimal outcomes for the entire team. Both the learning task and the team-building task should have such a structure. Tasks that require the successful performance of subtasks by all team members are called divisible, conjunctive tasks. The team-building exercise should be structured so that the team becomes aware of, and experiences their interdependence

2. Goal Specification

It is very important for team members to have common goals for team achievement, as well as to communicate clearly about individual goals they may have. Some team building sessions consist entirely of goal clarification exercises. The process of clarifying goals may well engage all of the issues on this list. Indeed, shared goals is one of the definitional properties of the concept "team." A simple, but useful, team building task is to assign a newly formed team the task of producing a mission and goals statement.

3. Cohesiveness

This term refers to the attractiveness of team membership. Teams are cohesive to the extent that membership in them is positively valued; members are drawn toward the team. In task-oriented teams the concept can be differentiated into two subconcepts, social cohesiveness and task cohesiveness. Social cohesiveness refers to the bonds of interpersonal attraction that link team members. Although a high level of social cohesiveness may make team life more pleasant, it is not highly related to team performance. Nevertheless, the patterns of interpersonal attraction within a team are a very prominent concern. Team-building exercises that have a component of fun or play are useful in allowing attraction bonds to develop. Task cohesiveness refers to the way in which skills and abilities of the team members mesh to allow effective performance. Exercises that require the application of the skills that will be necessary for completion of the team assignment, but require them in a less demanding situation, allow the team members to assess one another's talents. Such experiences can lead to

(Continued)

A - 7

Jigsaw Piece #5 (Page 1 of 2)

This is the first page of the reading material for a fifth expert group (if necessary).

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5. Five Issues to be Considered in Team Building (Page 2 of 2)

consideration of the next issue, the development of team member's roles and of the norms that govern role enactment.

4. Roles and Norms

All teams develop a set of roles and norms over time. In task oriented teams, it is essential that the role structure enables the team to cope effectively with the requirements of the task. When the task is divisible and conjunctive, as are most of the important team tasks in our society, the assignment of roles to members who can perform them effectively is essential. Active consideration of the role structure can be an important part of a team-building exercise. In some cooperative learning designs, it is the instructor's intention to rotate task roles so that all team members experience, and learn from, all roles. Even then, it is important that the norm, in this case imposed by the instructor, governing the assignment of roles is understood and accepted by team members. Norms are the rules governing the behavior of team members, and include the rewards for behaving in accord with normative requirements, as well as the sanctions for norm violations. Norms will develop in a team, whether or not they are actively discussed. The norms that govern most cooperative learning teams are imposed by the instructor, but that does not preclude a team building assignment in which those norms, as well as some that are specific to a team, are discussed and accepted.

5. Communication

Effective interpersonal communication is vital to the smooth functioning of any task team. There are many ways of facilitating the learning of effective communication skills. Active listening exercises, practice in giving and receiving feedback, practice in checking for comprehension of verbal messages, are all aimed at developing skills. It is also important for a team to develop an effective communication network; who communicates to whom; is there anybody "out of the loop?" Norms will develop governing communication. Do those norms encourage everyone to participate, or do they allow one or two dominant members to claim all the "air time?" Team building exercises can focus on skill development, network design, and norms, but even when the exercise is focused on another issue, communication is happening. Watch it! Shape it!

Summary:

Issues 4 & 5, along with issues 1, 2, & 3, are not intended to present a series of team-building exercises. Rather, they are intended to help you evaluate the potential effectiveness of an exercise you design, or one that you find in the numerous sources available. Team building is not a silver bullet for fixing dysfunctional teams, or assuring that all of your teams will work well. Team building exercises can be helpful in developing effective task-oriented teams, if they are selected to enable teams to explore the issues identified in this outline.

A - 8

Jigsaw Piece #5 (Page 2 of 2)

This is the continuation of the reading material for a **fifth** expert group (if necessary) - Continued

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Tools Useful in Team Processing

A number of tools have been developed to provide a structure which facilitates team discussion, exploration of ideas, and decision making. Examples include:

Seven Planning Tools of the Quality Movement

| | |
|---------------------------|--------------------------------|
| Activity Network Diagram | Affinity Diagram ** |
| Interrelationship Digraph | Matrix Diagram |
| Prioritization Matrix | Process Decision Program Chart |
| Tree Diagram | |

Others

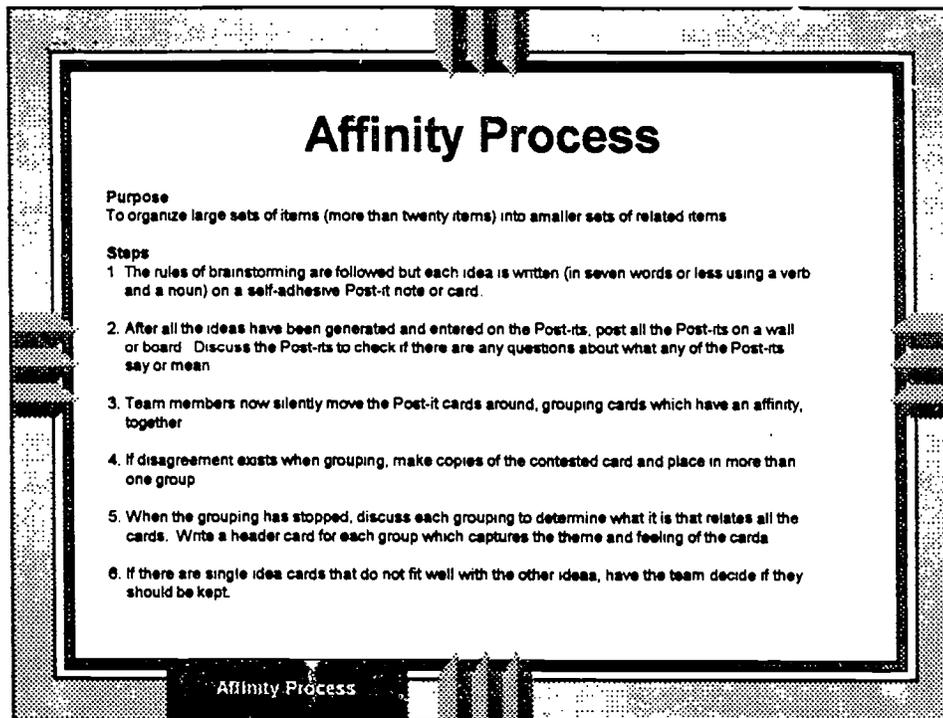
| | |
|----------------------------------|-----------------------------------|
| Agenda Planner ** | Brainstorming ** |
| Consensogram | Deployment Flow Chart |
| Fishbone Diagram | Force Field Analysis ** |
| Histograms | Impact/Changability (9-Square) ** |
| Integrative Analysis Diagram | Issue Bin ** |
| Modified Nominal Group Technique | Multivoting |
| Pareto Chart | P.E.R.T. Chart |
| Prioritization Matrix | Process Check ** |
| Run Charts | Stability Chart |

** Information is in this workbook

Source: The Memory JoggerPlus+, GOAL/QPC, 13 Branch Street, Melhusen, MA 01844. 508-685-3900, Fax: 508-685-6151

Some Useful Tools

This is a listing of various tools that are useful in solving problems and reaching consensus in teams. Some of these tools are explained in the following pages. Others can be found in *The Memory Jogger*.



The affinity process is useful when:

The team has no clear direction

A creative thinking process is needed

The team must identify broad areas of agreement

There are a broad set of possibilities that need to be ordered into similar groups.

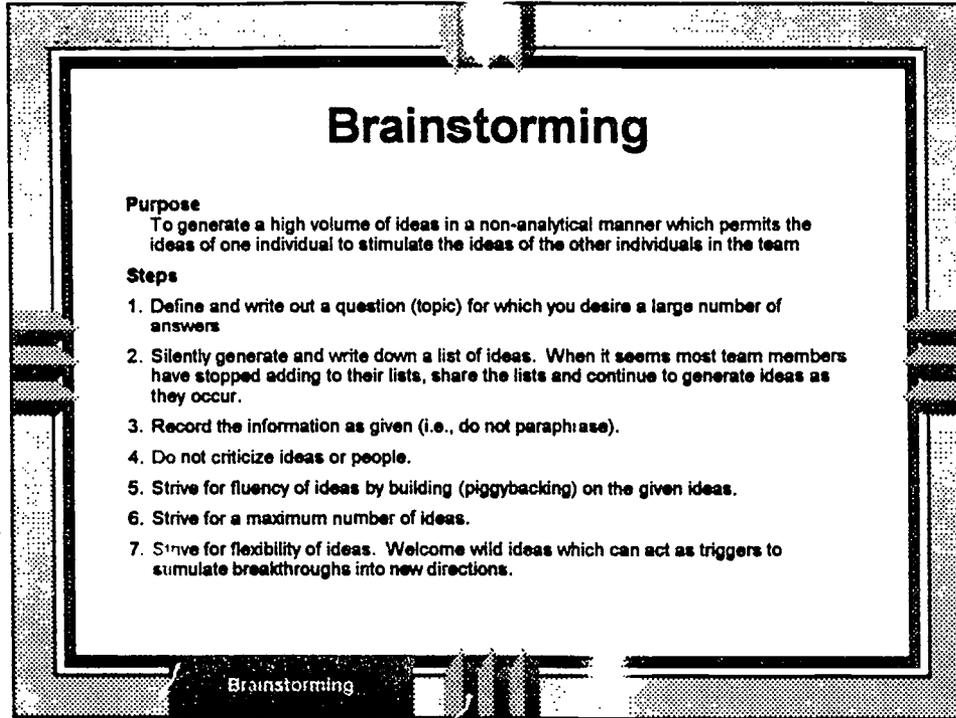
Agenda Planner

| Time Block (minutes) | From | To | Details |
|---|------|----|---------|
| Duration | | | |
| Topic | | | |
| Participants | | | |
| Purpose | | | |
| <small> Knowledge Know-How Application Analysis & Synthesis Appreciation / Evaluation Decision To Be Made </small> | | | |
| Delivery Method or Activity | | | |
| Quality Tools or Activity | | | |
| Required Reading or Preparation | | | |
| Visual/Audio/Other Aids/Equipment | | | |

- Team Leader
- Team Recorder
- Team Encourager
- Team Facilitator
- Team Time Keeper
- Team Devil's Advocate

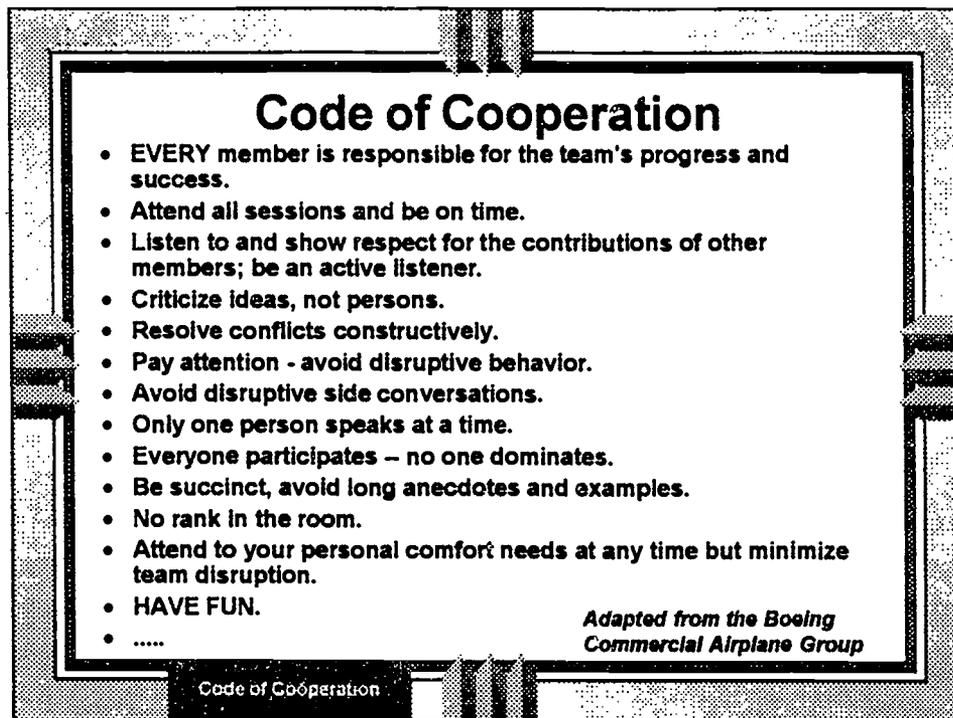
Agenda Planner

This is helpful when planning a meeting



Brainstorming:

This is set up to post the ideas on *Post-It* notes (trademark of the 3M Company). The affinity process can then be used to separate the ideas into similar groups.



Code of Cooperation

- EVERY member is responsible for the team's progress and success.
- Attend all sessions and be on time.
- Listen to and show respect for the contributions of other members; be an active listener.
- Criticize ideas, not persons.
- Resolve conflicts constructively.
- Pay attention - avoid disruptive behavior.
- Avoid disruptive side conversations.
- Only one person speaks at a time.
- Everyone participates – no one dominates.
- Be succinct, avoid long anecdotes and examples.
- No rank in the room.
- Attend to your personal comfort needs at any time but minimize team disruption.
- HAVE FUN.
-

*Adapted from the Boeing
Commercial Airplane Group*

Code of Cooperation

A code of cooperation is useful in setting the norms for team behavior. This is a “living document” and can be added to at any time with the consent of all members. Violations of the code can be pointed out in non-personal ways to get the team back into operation.

Comparison Matrix

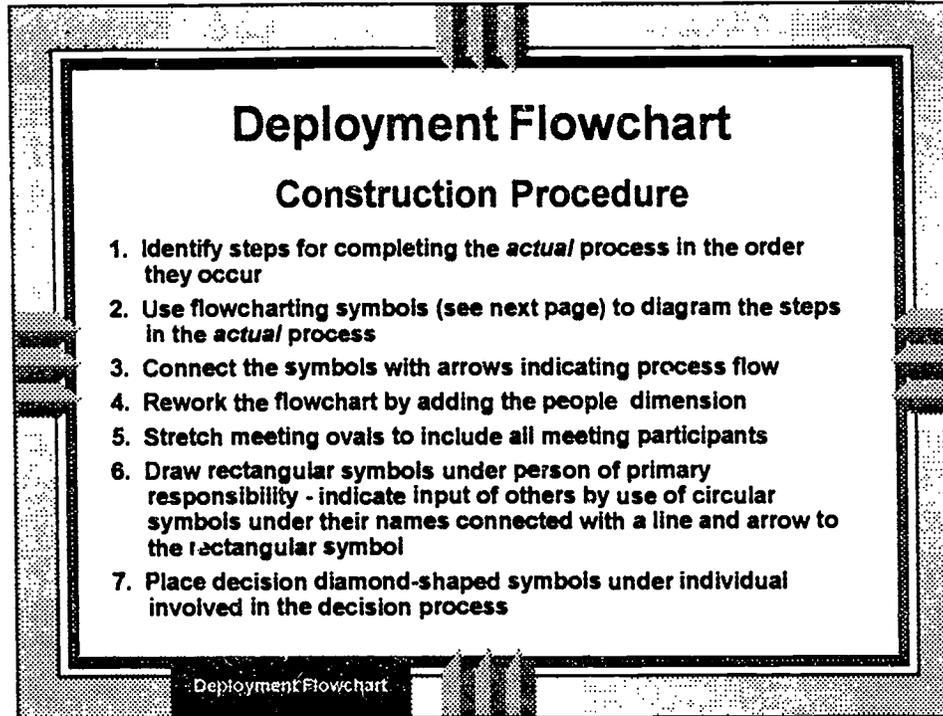
Convenient for rating criteria or options

- Create a table (matrix) with the proposed criteria as both row and column headings
- Starting with the first row, compare the row criterion with each column criterion until you reach the right hand side of the matrix
- For each comparison enter in the matrix the value
 - 9 if the row criterion is much more important
 - 5 if the row criterion is somewhat more important
 - 1 if the row and column criteria are about equal
 - 1/5 if the row is somewhat less important
 - 1/9 if the row is very much less important
- Repeat for all rows
- Add up the rows -- high scores imply more important criteria

Comparison Matrix

Comparison Matrix:

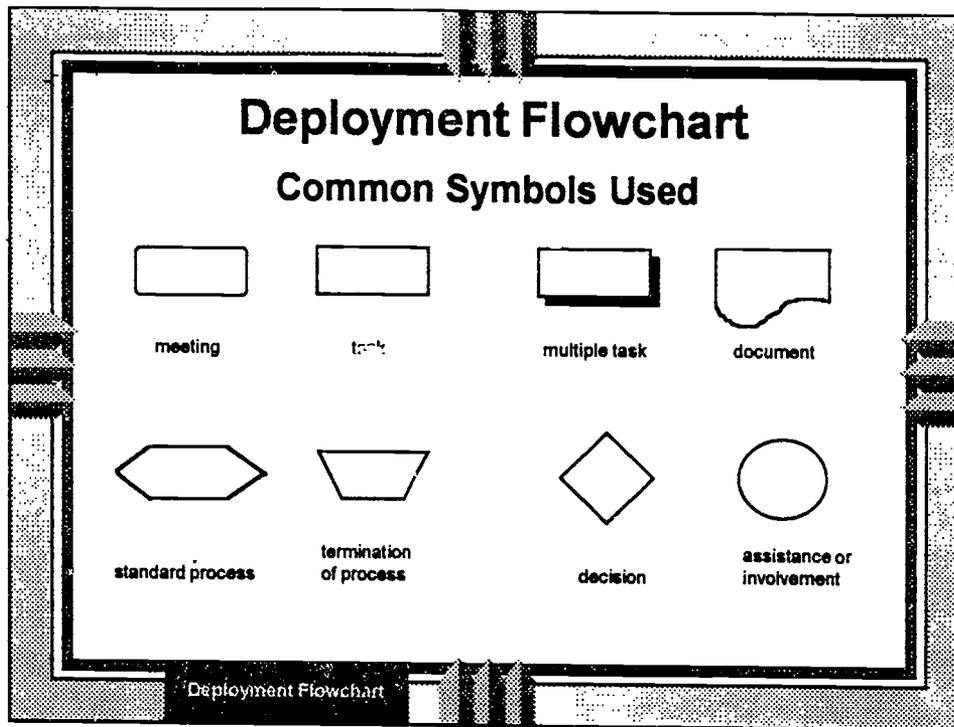
This tool, like the impact/changeability tool, the modified nominal group technique, and the prioritization matrix, can be used for ranking a number of options.



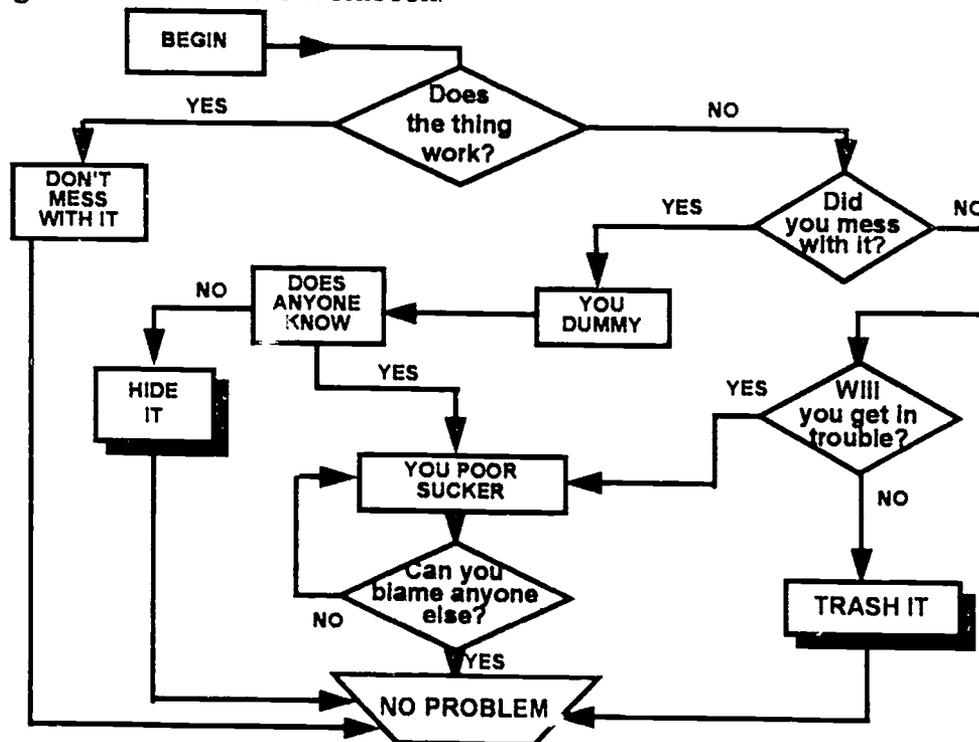
A *deployment flowchart* is convenient for describing *both* the individual steps and the responsible parties for each step in a process. It is useful when one is trying to establish the flow of an existing process, since its construction can show flaws or problem areas that are difficult to see any other way. It is also useful in mapping out a process which has to be constructed.

Symptoms to watch for when analyzing a deployment flowchart include:

- Duplicated tasks
- Multiple approvals or unclear responsibility
- Rework or backward flows on the flowchart
- Excessive photocopying/logging/proofing
- Processes which could be combined
- Process participants who do not add value
- Manual work where automation may be appropriate
- Indirect routing of paperwork and deliveries



These are symbols that can be used to describe various types of steps that are a part of a larger process. An amusing flowchart is shown below. Note this example is not a deployment flowchart because it does not show the participant's roles. Examples of deployment flowcharts can be found on pages I-9 and II-2 of the Workbook.



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There is a true need for the workshop leader (or active classroom facilitator) to be able to get everyone’s attention at times when the groups are actively processing. This signal has been found to be effective (there are many related ones just as effective):

It signals:

- Finish your sentence
- Do not finish your paragraph
- Inform your neighbors
- Turn to the facilitator
- Information is about to come from the facilitator

When first used, it will typically take some time (maybe 5 to 10 seconds) to gain control back from the teams. Ask, in subsequent uses, if this time can be reduced (maybe cut in half each time).

If a signal is not agreed upon and used, valuable time will be lost in trying to regain control - the more active the groups, the more difficult it is to gain control.

Force Field Analysis

Purpose
 A force field analysis helps teams find out what is driving, allowing, or not allowing change. The tool helps a team to work together, to find a starting point from which to take action, and to show both sides of the change issue.

Steps

1. On a board or large piece of paper draw a vertical line down the middle and a horizontal line across the paper near the top.
2. Label the left column Promoting and the right column Preventing.
3. Brainstorm entries for the left hand column.
4. Brainstorm entries for the right hand column.

| Promoting | Preventing |
|-----------|------------|
| | |

Force Field Analysis

The force field analysis is useful when:

It is not clear what impact a process change will have

Arguments can be made for both supporting and opposing ideas

Defining the “Promoting” and “Preventing” items allows “pushing” on all the “Promoting” entries uncovered and “pulling” on all the “Preventing” entries defined. It is as important to work on the things that prevent an implementation as it is to work on the things that promote an implementation.

Impact Changeability Analysis

Purpose

This tool helps prioritize a set of options

Steps

1. Review the tables on the next page for possible meanings of Impact and Changeability
2. Rank each option on impact and changeability using the following scales:

If option were implemented (or problem eliminated) what impact would this have?

- 1 = Little impact
- 2 = Some Impact
- 3 = Considerable Impact

How difficult will it be to implement the option (or eliminate the problem)?

- 1 = Difficult
- 2 = Moderate Effort
- 3 = Little or no Effort

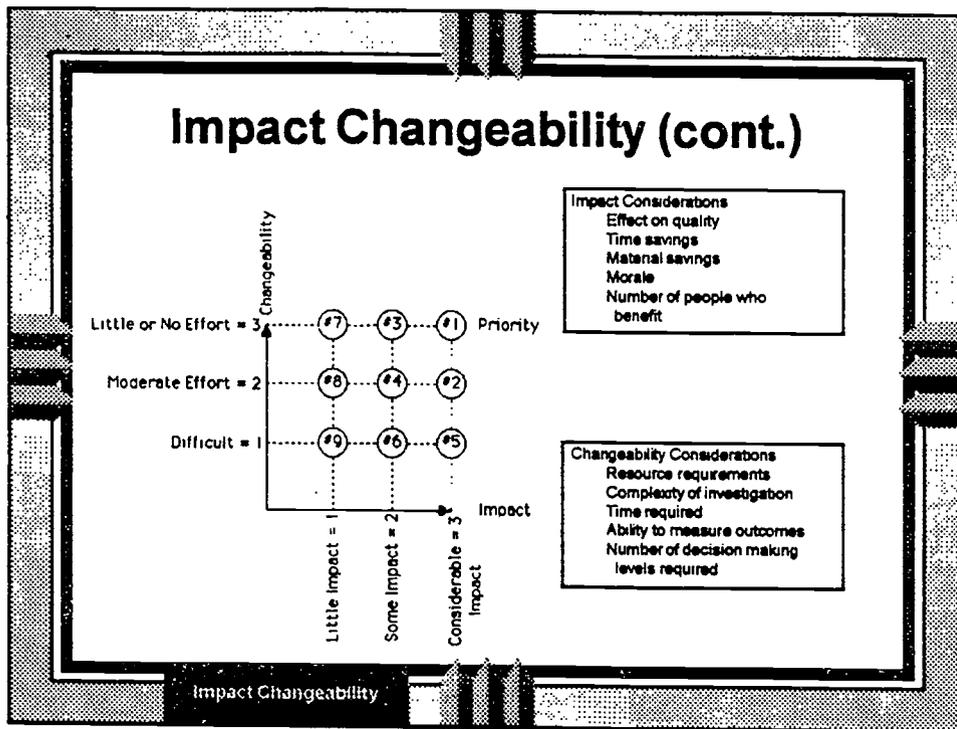
3. Use the chart on the next page to determine the relative priority of the options.

Impact Changeability

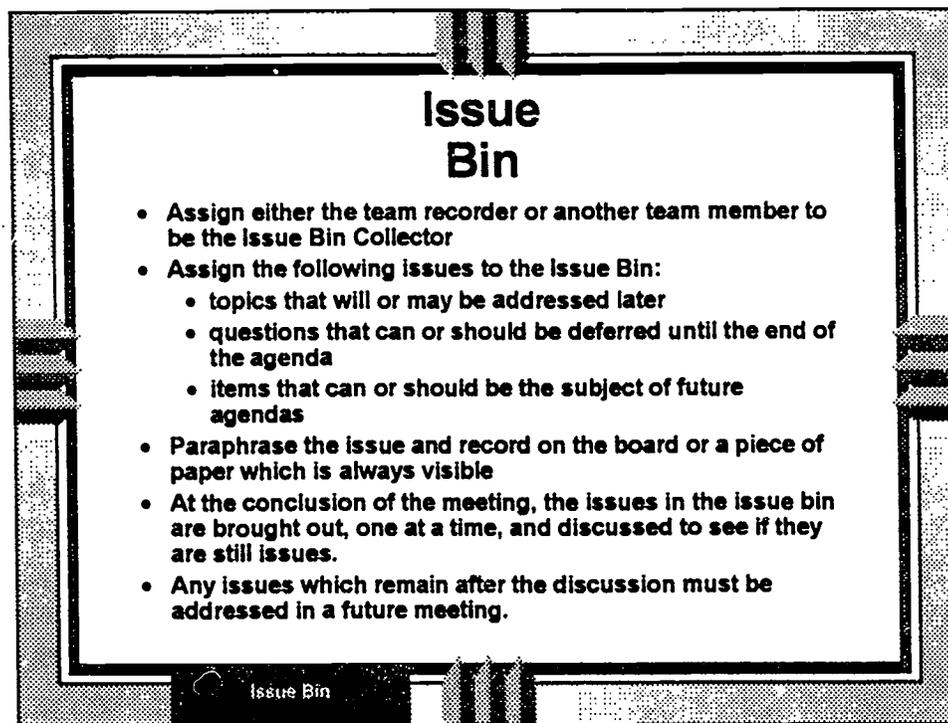
This goes by several names including “impact/changeability” and “9-block.”

This tool can be used for prioritization of a number of options. It is helpful when:

- The team disagrees on the impact of the options
- A limited number of options can be implemented
- There is a need to easily prioritize the options



Impact/changeability (Continued)



The Issue Bin is a tool that can be used to keep discussion on track. It is useful when:

Discussion topics stray from the meeting agenda

Related topics should be considered later or at a future meeting

Modified Nominal Group Technique

Purpose

Modified nominal group technique is a technique to help a team or group quickly reduce a large list of items to a smaller number of high priority items. The process elicits a high degree of team agreement and promotes team ownership. This tool is similar to nominal group technique but not quite as involved.

Steps

Step 1

Count the number of items on the list and divide by three. This is the number of votes each person has. (Round fractions off to the lower number.) If the items number more than 60, do not go over a vote total of 20. Vote totals of more than 20 are hard to manage. Give each team member as many colored dots as she/he has votes.

Step 2

Have each person use his/her votes (colored dots) to select the items he/she wants to keep. While each person can vote for any item, it is a good idea to limit the number of votes any one item can receive from a single person to three. Note: the team can decide if they want to allow more or less multiple voting.

Step 3

List alternatives in their new prioritized order

Step 4

Critically discuss the top alternatives in order to reach consensus. Eliminate those that are outside the control of the team

Modified Nominal
Group Technique

Modified Nominal Group Technique:

This tool, like the impact/changeability tool, can be used for prioritization of a number of options. It is helpful when:

- The team disagrees on the impact of the options
- A limited number of options can be implemented
- There is a need to easily prioritize the options

Prioritization Matrix

Purpose

To prioritize tasks, issues, alternatives, etc. to aid in selecting what tasks, issues, alternatives to pursue

Steps

1. Generate a set of criteria to be used in establishing the quality of the decision
2. Construct an L matrix with options, etc. down the left and selection criteria across the top
3. Each person prioritizes the criteria by distributing the value 1.0 among the criteria (i.e., sum of weights is 1.0)
4. Sum the weights from each person for each criterion, the sum becomes the team's weight for the criterion. Enter these weights in the L matrix in brackets - each column will have the same number in each cell.
5. Going a criterion at a time, rank order all the options, etc. with respect to the criterion using the modified nominal group technique. Enter the vote totals for each issue into the L matrix.
6. Find the product of the vote totals and weight for each issue and sum these products for each row.
7. The rows with the highest sums are the issues of highest priority. Be sure to discuss any row which has a low total but seems like it should be retained.

Prioritization Matrix

Prioritization Matrix:

This tool, like the impact/changeability tool and the modified nominal group technique, can be used for prioritization of a number of options. It is more involved than either the impact/changeability tool and the modified nominal group technique. It is helpful when:

- The team disagrees on the impact of the options
- A limited number of options can be implemented
- There is a need to easily prioritize the options

Process Check

- **Monitoring of processes, especially processes which you own or are a part of, is necessary if improvement is desired**
- **A process check is a formalized way to do this monitoring and should be used at the end of all process related activities**
- **There are many different ways to conduct a process check**
- **A process check must focus on the process**
- **Failure of a process does not infer any judgment about the quality of the team members**

Process Check

Process checks are very important. They should be a part of every continuous improvement process. There are many ways to conduct a process check. Two examples can be found on pages I-17 and I-18.

Survival Rankings by Experts

| Desert Survival Ranking | | Space Survival Ranking | |
|-------------------------|----|------------------------|----|
| Flashlight | 4 | Matches | 15 |
| Knife | 6 | Food | 4 |
| Map | 12 | Rope | 6 |
| Raincoat | 7 | Parachute | 8 |
| Compass | 11 | Heating unit | 13 |
| Compress kit | 10 | Pistols | 11 |
| Pistol | 8 | Milk | 12 |
| Parachute | 5 | Oxygen | 1 |
| Salt tablets | 15 | Map | 3 |
| Water | 3 | Raf | 9 |
| Book | 13 | Compass | 14 |
| Sunglasses | 9 | Water | 2 |
| Vodka | 14 | Flares | 10 |
| Top coat | 2 | First aid kit | 7 |
| Mirror | 1 | FM receiver | 5 |

More specific information follows

Survival Rankings by Experts

This page contains the rankings for the items in the survival exercises. These are ordered so that they can easily be transferred to the ranking sheets on pages II-5 & II-7. Further explanations of the experts can be found on the following pages (A-24 through A-27).

X. SCORING THE DECISIONS

The Expert
 Alvin W. Ford, M.A., is the desert survival expert who has contributed the basis for the item ranking. He is the former Co. 2 of the Desert Branch of the Arctic, Desert, Tropic Information Center of the Air Force University at Maxwell Air Force Base.

Two of the several books Mr. Ford has written are *Survival*, an excellent reference if you would like to do more reading on this subject and *Prolog of the Desert*, written after Mr. Ford had spent years living with people of every desert in the world except the Australian.

During World War II Mr. Ford spent much of his time working with the Allied Forces in the Sahara on desert survival problems. While there and as Chief of the Desert Branch, he encountered the countless survival cases which serve as the basis of the rationale for these rankings.

The Expert Ranking and Rationale - STEP 4

| ITEM AND RANK | RATIONALE |
|-----------------------------------|--|
| #1 COSMETIC MIRROR | Of all the items the mirror is absolutely crucial. It is the most powerful tool you have for communicating your presence. In sunlight a simple mirror can generate 5 to 7 million candle power of light. This reflected sunbeam can even be seen beyond the horizon. If you had no other items you would still have better than an 80% chance of being located and picked up within the first 24 hours. |
| #2 1 TOP COAT PER PERSON | Once you have a communication system to tell people where you are your next problem is to slow down dehydration. Forty per cent of the body moisture that is lost through dehydration is lost through respiration and perspiration. Moisture lost through respiration can be cut significantly by remaining calm. Moisture lost through perspiration can be cut by preventing the hot, dry air from circulating next to the skin. The top coat, if it may seem, are the best available means for doing this. Without them surviving times would be cut by at least a day. |
| #3 1 QUART OF WATER PER PERSON | You could probably survive 3 days with just the first 2 items. Although the cost of water would not significantly extend the survival time, it would help to hold off the effects of dehydration (See Table III). It would be best to drink the water as you become thirsty, so that you can remain as dehydrated as possible during the first day. The important decisions here to be made are a shelter erected. Once dehydration begins it would be impossible to reverse it with the amount of water available in this situation. Therefore, rationing it would do no good at all. |
| #4 FLASHLIGHT (4 BATTERY SIZE) | The only quick, reliable night signaling device is the flashlight. With it and the mirror you have a 24 hour signaling capability. It is also a multiple use item during the day. The batteries and lens could be used as an auxiliary signal device or for starting a fire. The battery container could be used for digging or as a water container in the distillation process (See plastic raincoat). |
| #5 PARACHUTE (RED AND WHITE) | The parachute can serve as both shelter and signaling device. The canvas fabric, which is pictured on the cover, could serve as a unit gate and the parachute shroud as tent roof. Double or triple folding the parachute would give sheets thick enough to reduce the temperature underneath it by as much as 25%. |
| #6 JACKKNIFE | Although not as crucial as the first 5 items, the jackknife would be useful for rigging the shelter and for cutting up the very tough barrel cactus for moisture. Its unemulsifiable oil wax gives it the high ranking. |

Justification of desert survival experts for the desert survival exercise (Pages II-4 & 5).

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| ITEM'S RANK | RATIONAL |
|--|---|
| #7 PLASTIC RAINCOAT (LARGE SIZE) | In recent years the development of plastic, nonporous material has made it possible to build a raincoat. By digging a hole and placing the raincoat over it, the temperature differential will extract some moisture from urine soaked band and sheets of buried cactus and produce condensation on the underside of the plastic. By placing a small stone in the center of the plastic a cone shape can be formed and cause moisture to drip into the flashlight container buried in the center of the hole. Up to a quart a day could be obtained in this way. This would be helpful, but not enough to make any significant difference. The physical activity required to extract the water is likely to use up about twice as much body water as could be gained. |
| #8 .45 CALIBER PISTOL (LOADED) | By the end of the second day, strength would be seriously weakened and you might be unable to walk 16 to 18% dehydration). The pistol would then be used as a food signaling device and the bullet as a cactus fire starter. The dehydration process would be three times as rapid as usual. There have been numerous cases of survivors going undetected because they couldn't make any loud sounds. The best of the pistol might also be used as a hammer. |
| #9 A PAIR OF SUNGLASSES PER PERSON | The pilot's sunglasses are counterbalanced by its very dangerous disadvantages. Irradiance, irritability and intensity would all occur as dehydration increases. This is why critical decisions should be made before dehydration sets in. Under the circumstances the availability of a lethal tool constitutes a real danger to the team. Assuming it were not used against humans, it might be used for hunting, which would be a complete waste of effort. Even if someone were able to shoot and animal with it, which is very unlikely, using the most would increase dehydration enormously as the body uses its water to process the food. |
| #10 COMPRESS KIT WITH GAUZE | In the intense sunlight of the desert, photolysis and solar radiation (both similar to the effects of snow blindness) could be serious problems especially by the second day. However, the dark shade of the tarpolus shelter would reduce the problem. It would determine the area around the eyes with foot from the wreckage. Using a handkerchief or compressed material as a veil with eye lifts cut into it would eliminate the vision problem. But sunglasses would make things more comfortable. |
| #11 MAGNETIC COMPASS | Because of the desert's low humidity, it is considered one of the healthiest (least infectious) places in the world. Due to the fact that the blood thickens with dehydration, there is little danger from bleeding unless a vein is severed. In an well documented case, a man, lost and without water, who had torn off all his clothes and fallen among sharp cactus and rocks until his body was covered with cuts, didn't bleed until he was rescued and given water. |
| #12 SECTIONAL AIR MAP OF THE AREA | The kit materials might be used as: rope or for wrapping your feet, ankles, and head, including face, a further protection against dehydration and sunlight. |
| | Aids from the possibility of using its reflective surface as an auxiliary signaling device. The compass is of little use. It could even be dangerous to have seen it once it is of dehydration take hold. It might give someone the notion of walking out. |
| | Might be helpful for starting a fire, if it were paper. One man might use it for a head cover or eye shade. It might be an entertainment value. But it is mainly useless and possibly dangerous to use it for anything else. |

Justification of desert survival experts for the desert survival exercise (Pages II-4 & 5).

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Facilitator's Guide
Appendix A - 27

| 1. ENL & RANK | RATIONAL |
|--|--|
| <p>#13 A BOOK ENTITLED, EDIBLE ANIMALS OF THE DESERT</p> | <p>The problem confronting the group is dehydration, not starvation. Any energy expended in hunting would be costly in terms of potential water loss. Dead animals, while plentiful, are seldom seen. They survive by laying low as should the survivor. If the hunt were successful, the intake of water would cause an increase in the amount of water used to process the protein in the body. General rule of thumb - if you have lots of water, eat, otherwise, don't consume anything. Although the book might contain useful information, it would be difficult to adjust your eyes to reading and remain attentive as dehydration increases.</p> |
| <p>#14 2 QTS. OF 180 PROOF VODKA</p> | <p>When severe alcoholism kills someone, they usually die of dehydration. Alcohol absorbs water. The body loses an enormous amount of water trying to throw off the alcohol. We estimate a 'loss' of 2 to 3 oz. of water per oz. of alcohol. The Vodka consumed could be lethal in this situation. Its presence could cause someone in a dehydrated state to increase his problem. The Vodka would be helpful for a fire or as a temporary coolant for the body. The bottle might also be helpful. All in all, the Vodka represents more dangers than help.</p> |
| <p>#15 BOTTLE OF SALT TABLETS (1,000 TABLETS)</p> | <p>Widespread myths about salt tablets exist. The first problem is that with dehydration and loss of water, blood salinity increases. Sweat contains less salt than extra cellular fluid. Without lots of extra water, the salt tablets would require body water to get rid of the increased salinity. The effect would be like drinking sea water. Even the man who developed salt tablets now maintains they are of questionable value except in geographical areas where there are salt deficiencies.</p> |

Justification of desert survival experts for the desert survival exercise (Pages II-4 & 5).

**SPACE EXPERTS RANKING
KEY**

| | | |
|--|----|--|
| Little or no use on moon | 15 | Box of matches |
| Supply daily food required | 4 | Food concentrate |
| Useful in tying injured together, help in climbing | 6 | 20m of nylon |
| Shelter against sun's rays | 8 | Parachute silk |
| Useful only if party landed on dark side | 13 | Portable heating unit |
| Self propulsion devices could be made from them | 11 | Two .45 calibre pistols |
| Food mixed with water for drinking | 12 | One case dehydrated milk |
| Fills respiration requirements | 1 | Two 50kg. tanks of oxygen |
| One of principal means of finding directions | 3 | Stellar map (of the moon's constellations) |
| CO bottles for self-propulsion across Chasma, etc. | 2 | Life raft |
| Probably no magnetized poles; thus, useless | 14 | Magnetic compass |
| Replenishes loss by sweating etc. | 7 | 25 litres of water |
| Distress call when line of sight possible | 10 | Signal flares |
| Oral pills or injection medicine available | 7 | First aid kit containing injection needles |
| Distress signal transmitter, possible communication with mother ship | 5 | Solar-powered FM receiver transmitter |

Justification of space experts for the space survival exercise (Pages II-6 & 7).

Reading & Video List

- Bradford, L. P. (Ed.) (1978) *Group Development*. La Jolla, CA: University Associates.
- Forsyth, D. (1990) *Group Dynamics*. Pacific Grove, CA: Brooks/Cole Publishing Company.
- Johnson, D. W., Johnson, R. T. & Smith, K. A. (1991) *Active Learning: Cooperation in the College Classroom*. Edina, MN: Interaction Book Company.
- Johnson, D. W. & Johnson, F. P. (1987) *Joining Together: Group Theory and Group Skills*. Englewood Cliffs, NJ: Prentice-Hall.
- Katzenbach, J. R., & D. K. Smith, (1993); *The Wisdom of Teams*, HarperBusiness, New York.
- Scholtes, P. S. (1988) *The Team Handbook*. Madison, WI: Joiner Associates, Inc. (Joiner Associates: 1-800-669-8326, fax 1-608-238-2908)
- Brassard, B., *The Memory Jogger Plus+*, Goal/QPC, 13 Branch Street, Methuen, MA 01844, (508) 685-3900.

Additional books, videos, and training materials may be obtained from:

- Joiner Associates and QOAL/QPC (see addresses above).
- Pfeiffer & Company, 8517 Production Ave., San Diego, CA 92121-2280, (619) 578-5900.
- Suggested Videos for use in Exercises (either one suffices)
- Meeting Robbers*, CRM Films, 2215 Faraday Avenue, Carlsbad, CA 92008-7295
- Meetings, Bloody Meetings*, Video Arts, 8614 W. Catalpa Avenue, Chicago, IL 60656

Information for further details or tools and on videos that work well with the jigsaw from Part I.

| Minimum Individual | Maximum Individual | Average of Individuals | Team Score |
|--------------------|--------------------|------------------------|------------|
| | | | |

266

267

Transparencies of the next 8 sheets can be used to collect results of the survival exercise.

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200

200

Minimum Individual Maximum Individual Average of Individuals Team Score

Tools & Miscellaneous

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270

Minimum Individual

Maximum Individual

Average of Individuals

Team Score

271

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270

Minimum Individual Maximum Individual Average of Individuals Team Score



Tools & Miscellaneous

275

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274

Minimum Individual Maximum Individual Average of Individuals Team Score

| Minimum Individual | Maximum Individual | Average of Individuals | Team Score |
|--------------------|--------------------|------------------------|------------|
| | | | |

278

Tools & Miscellaneous

| 278 | Minimum Individual | Maximum Individual | Average of Individuals | Team Score |
|-----|--------------------|--------------------|------------------------|------------|
| 279 | | | | |

201

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|--|--|--|--|

Team
Score

Average of
Individuals

Maximum
Individual

Minimum
Individual

250



Weber



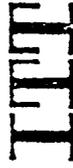
GENERAL DYNAMICS



FMC



Raytheon



BOEING

Honeywell



U.S. Navy

XEROX

TEXAS INSTRUMENTS



INGERSOLL-RAND



LEAR SIEGLER, INC.
ASTRONICS DIVISION



ALLIED Bendix Aerospace

EATON



LANDIS & GYR

NORTHON



TRIM



Kearfott
a division of the SINGER Company

GTE



Transamerica CORPORATION

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NAVISTAR



ALLEN-BRADLEY
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