Improving Individual Problem Solving and Decision Making

INTRODUCTION

What This Chapter Is About

Regardless of how well an organization has analyzed its situation and formulated goals and plans, interim or ad hoc problem-solving situations will arise between planning processes. Fortunately, problem-solving and decision-making technologies and tools have evolved over the years (Leidner and Elam, 1993). Today, they help improve problem-solving practices and the outcomes from resulting decisions (Tasa and Whyte, 2005). This chapter deals with methods, tools, and practices that can help managers and their subordinates compensate for mental limitations, leverage capabilities, and thereby improve their individual, unit, and organizational problem-solving and decision-making processes.

The basics section describes types of problem-solving situations, approaches to problem solving that are less effective than the analytic approach, and phases and steps involved in the analytic approach (analyzing the situation, formulating alternative solutions, and choosing among the alternatives).

Going beyond the basics, the chapter describes problem-solving styles and orientations as well as additional ways to improve problem-solving effectiveness.

What Consultants, Trainers, and Facilitators Can Get Out of This Chapter

How can individuals improve their ability to solve problems, and how can organizational leaders create a climate that is conducive to problem solving in their organization? This chapter addresses those questions.

After studying this chapter, consultants, trainers, and facilitators should be able to help participants

- Analyze how participants conduct problem-solving processes and how problems are solved in an organization's unique corporate culture

285

- Identify, plan, and implement ways that the organization's culture can encourage in-depth problem solving
- Develop practices, policies, and procedures for improving and reinforcing problem-solving effectiveness throughout the organization

What Practicing Managers, Participants, or Students Can Get Out of This Chapter

After studying and discussing this chapter, the student, seminar participant, or practicing manager or leader should be able to

- Better identify and understand the variables that are influencing the effectiveness of his or her thought processes
- Apply a method for more effectively structuring thinking situations in order to compensate for mental and environmental limitations
- Better develop his or her own problem-solving and decision-making practices and skills, so that their use becomes second nature
- Improve or further develop subordinates' problem-solving and decision-making practices and skills
- More effectively contribute to organization-wide development and reinforcement of problem-solving and decision-making policies, practices, and procedures

How Instructors and Participants Can Use the CD-ROM's Supplementary Materials

The accompanying CD-ROM contains these materials for Chapter Thirteen:

- *Chapter Thirteen Study Guide.* For the reasons stated in earlier chapters, this class or seminar session preparation guide should be completed by students and seminar participants.
- *Table 13.1: Problem-Solving Phases and Steps.* This table can be printed out and used to help structure both individual and group problem-solving and decision-making processes. We recommend using it during training session workshops and the superior-subordinates discussion, OD application, and team-building sessions following this module's training sessions.
- *Quotations on Thinking and Planning.* These quotations make and drive home points in regard to individual and group thought processes.

THE BASICS

As discussed in Chapter Three on the analysis phase of the managerial process, problem situations almost always involve a number of causes, not just one single cause. Nonetheless, people do not generally think in terms of multicausality, so they usually say, "The problem is _____," citing one single cause. However, there is no such thing as *the* problem. Instead there is a problem situation involving a number of causes. Therefore, the term *problem situation*

will be used here in order to encourage readers to quit saying "the problem" and think more often in terms of multicausality.

Types of Problem-Solving Situations

Problem situations can be divided into four categories: (a) corrective (but also preventive of another occurrence); (b) preventive; (c) creative or innovative; and (d) improvement-oriented.

Corrective-preventive. Probably the most common type of problem solving in organizations, corrective problem solving deals with problems that have already occurred and have just been recognized. Something that was neither intended nor expected has happened, and there is a "fire" to fight. As shown in Figure 3.1 on page 48, such situations generally call for two sets of solutions. The first set is aimed at putting out the fire and *remedying the consequences* (negative effects or symptoms such as J1, J2, and J3 in Figure 3.1). The second set of solutions should be aimed at *preventing* the same situation from recurring (perhaps by correcting or improving underlying causal factors A though I in Figure 3.1). However, since formulating two sets of solutions can consume more time and effort, many people simply "put a band-aid on it" by performing remedial problem solving without going on to the preventive phase. This often results in (a) continually fighting the same fires, and (b) fighting additional fires that are started by them.

Preventive. Preventive problem solving is aimed at keeping a problem situation from developing. Prevention requires analyzing a situation in some depth and then identifying the factors (elements, activities, variables) that tend to exert the most significant desirable and undesirable influences on the situation. Once the major influences have been determined, the next step is to anticipate problem situations by looking for trends in those factors that could eventually lead to problems. Preventing problem situations then becomes a matter of changing, modifying, or otherwise influencing key factors so that they exert their influences in a more desirable manner. Preventive problem solving should be maximized during goal-setting and planning processes.

Creative or innovative. Often called *brainstorming*, creative thought involves describing the characteristics or uses of known or familiar objects, activities, ideas, concepts, or theories, then comparing or relating their characteristics, aspects, or uses. By finding previously unrecognized relationships between things, activities, or ideas, one arrives at fresh insights and ideas. Innovative thought, however, is not the same thing as innovation, which also involves moving something from the drawing board to general acceptance, availability, and use—a process that requires further analysis, planning, decision making, and action.

Improvement-oriented. Improvement-oriented problem solving focuses on developing new or improved products, concepts, methods, processes, procedures, tools, or applications. It involves several problem-solving steps: The first is analyzing the object, activity, process, idea, or situation that one wishes to improve. The second involves identifying the elements or parts of the whole (that is, the associated parts or characteristics of the object; the subactivities involved in the main activity; the elements or steps in the process; the elements of the idea; or the important variables involved in or operating on the situation). The third step is identifying the parts, elements, factors, or variables that can be improved. Improving the parts will bring about improvement in the whole. Improving the parts generally requires further analysis, some planning and decision making, and subsequent action. In our view, the bane of innovation and effective modern management is the old adage "If it ain't broke, don't fix it." There are very few

variables operating in organizations that could not stand some improvement. And without people seeking to improve things, there would be few innovations to make our lives better.

These four types of problem situations are related to each other in various ways. Prevention can involve creativity, innovation, and improvement. Innovation can stem from a need to improve or correct something. Correction may require innovation and improvement as well as prevention. It becomes evident, then, that the *type of problem-solving approach largely depends on the problem solver's objectives in a particular situation*.

Thus, it can be concluded that both individuals and organizations could save tremendous amounts of time, effort, and money by recalling that an ounce of prevention is worth a pound of cure and then incorporating preventive, creative or innovative, and improvement-oriented problem-solving activities into their planning processes.

Approaches to Problem Solving That Are Less Effective Than the Analytic Approach

Pages 42–43 of Chapter Two discussed a number of reasons why human beings generally do not think as well as they have the potential to think. Because our minds have difficulty handling complicated problems, we tend to avoid deep thought. We also tend to conserve time and psychic energy by thinking just enough to get by. These are some of the reasons that many have referred to ours as the "the mindless society." Several phenomena occur as a result of poor mental habits that limit our thinking effectiveness:

Using past experience. Rather than fully thinking out a problem situation or decision, we often respond by relying on a solution that seemed to work well in a previous, somewhat similar situation. Unfortunately, these "programmed" solutions or decisions may not be fully effective in the present situation.

Cutting through the detail. Even if learned responses are considered inadequate, we still consciously and unconsciously reduce the proportions of a situation to manageable basics that we believe to be most important. For example, many managers believe they are smart enough to "cut through the detail and zero in on the real causes" without doing much of an analysis. Other people, who may cut through the detail because they know only a few possible causal variables, tend to use what is often called a "common sense" or "simplistic" approach. In any case, when we solve problems and make decisions based on only a few seemingly important variables and corresponding facts, we tend to (a) overlook the real, underlying causes of more obvious causes; (b) overlook factors and facts that together could be more important than those we are considering; (c) be influenced by negative attitudes toward thought; (d) be influenced by expediency rather than rationality and objectivity; or (e) use an inferior approach.

Trial-and-success method. Another way to avoid in-depth thinking is to use the method previously called "trial and error." It involves either (a) attempting various known possible solutions until one finally works or (b) formulating possible solutions and trying them until one works.

The preceding discussion is not meant to assert that these simplistic approaches have no place in problem-solving situations. Nevertheless, their use is more justifiable in situations in which (a) immediate action is required, but too little time is available for more in-depth thought; (b) necessary facts are either unknown or unattainable; (c) the situation must be resolved in

one's head due to lack of aids such as paper and pencil, calculators, chalkboards, or flipcharts; or (d) the only way to determine whether a possible alternative will work is to try it. The point, however, is that *too often, simplistic approaches are used when the complexity or importance of the problem-solving or decision-making situation warrants use of the much more powerful analytic approach.*

Phases and Steps of the Analytic Approach

Because the analytic approach to problem solving and decision making was described in Chapters Two through Six, we will not go into more detail about the managerial aspects here. We will, however, go into more detail regarding the phases and steps that should be taken in order to maximize an individual's problem-solving and decision-making effectiveness.

Table 13.1 outlines phases and steps of the analytic approach in the left column, and describes their beneficial effects in the right column. Although the table is fairly self-explanatory, several points deserve some elaboration.

Phase I: Prepare

1. *Be aware and stop to think about what you are doing and how to do it well.* Although the analytic approach is the most powerful for structuring problem-solving and decision-making processes, and although its concepts and steps enable us to minimize or compensate for many mental limitations, managers must consciously think about what they are doing and then purposefully use the principles and steps they have learned in order to do it well. The question is, will individuals stop to think about such things, or will they simply slip unconsciously into using past responses to similar situations? As human beings, we are inclined to do the latter—unless we recognize that the present situation is an obvious exception to the fog of everyday problems and it dawns on us that we are in a problem-solving situation worth extra conscious thought. *Undesired, unintended, or unexpected events or phenomena* are the triggers or signals for creating that awareness. They prompt us to say to ourselves, "I am in an important thinking situation and will consciously apply what I have learned about the analytic approach in an effort to use my mind more effectively."

2. *Describe the situation.* In order to develop some sense of the nature and proportions of the situation, describe the unintended or unexpected phenomena that signaled that a problem situation has occurred. For example, exactly what did one person say or do that resulted in an interpersonal conflict? What exactly is wrong with an improperly manufactured part? What has occurred that you did not intend to occur? The important point here is that if you incorrectly describe what has happened, you may end up looking for the wrong causes.

3. *Increase motivation.* Motivation is one of the greatest influences on how well we do anything. The intensity of personal motivation is a function of the levels of our needs or drives, values, interests, goals, and expectations. Increasing our motivation helps us better focus attention, increase concentration in the face of distractions, sustain effort, and more conscientiously apply problem-solving and decision-making methods. To increase your own personal motivation, consider how resolving the situation successfully will increase the attainment of personal and organizational goals. Also, imagine how it will feel to attain those goals.

Table 13.1. Problem-Solving Phases and Steps

ACTION	BENEFICIAL EFFECTS
PHASE I: PREPARE	
1. **Be aware: think about what you're doing** and how to do it well. (Awareness is based on the brain's comparison of actual with planned or intended stimuli.)	Consciously recognize problem situation; consciously structure process and channel thought
2. **Describe** the situation—that is, the unintended or unexpected events or effects that signaled the problem.	Perform a more effective analysis
3. Increase **motivation:** determine importance in terms of personal and organizational goals and plans.	Focus attention; increase concentration; initiate and sustain effort; take necessary time
4. Seek a conducive **environment.**	Minimize distractions and interruptions
5. Get **organized** (materials, references, and so on).	Minimize distractions; be better organized
6. **Preview:** do a brief preliminary analysis.	Determine real importance and priority of situation; budget time and money; increase motivation and effort; be better organized
PHASE II: ANALYZE—DEFINE AND REDUCE THE PROBLEM SITUATION	
7. Do an initial **qualitative analysis:** identify a system of possibly causal variables involved and the relationships among them (not just a single cause).	Increase repertoire of knowledge; help minimize influence of dysfunctional attitudes; focus on **multicausality;** keep from immediately jumping to solutions phase
• Use checklists to augment knowledge of factors.	Help minimize effects of dysfunctional attitudes
• Diagram or model variables and their relationships.	Enable mind to handle complexity
8. Collect important **facts** associated with factors.	Increase repertoire of knowledge; use objective (factual) inputs to thought; increase objectivity
• Use facts and observations (rather than opinions); use working assumptions as necessary.	
• Add facts or data to the situation model.	Enable mind to handle complexity; elicit continuing use of the analytic approach
9. **Analyze** information and identify the real, underlying, multiple causes (in chains of causes and effects).	Identify true problem and causes
10. Formulate **criteria** for decision making (Phase IV).	Improve testing or weighing of alternative solutions
PHASE III: PLAN—ALTERNATIVES (SOLUTIONS) FORMULATION	
11. Formulate **goals or objectives:** identify the desired end results of implementing solutions.	Ensure going in right direction toward consciously identified targets
12. **Plan:** identify what must be done to improve, change, correct, or adjust variables and their relationships.	Identify a system of solutions for a system of causes (cause-effect sequences); fix situation and prevent future occurrence
• Formulate alternative sets of strategies and tactics.	
• Formulate alternative sets of courses of action.	
• Budget time and resources.	Effectively use time and resources
• Use appropriate diagrams.	Enable mind to handle complexity
PHASE IV: MAKE DECISIONS—TEST AND SELECT ALTERNATIVES	
13. Identify possible **outcomes** of alternative solutions: anticipate scenarios or sequences of actions and events.	Anticipate what could occur during implementation Increase use of propositional ("what if") logic
14. Assess realistic **probabilities** of possible events.	Minimize wishful thinking about what might occur
15. **Test and compare** alternatives.	Employ mental trial and error ("action in rehearsal"); generate inputs to final decision making
• Identify and compare advantages and disadvantages.	
• Weigh each alternative against decision-making criteria.	
• Also test or weigh combinations of alternatives.	
• Use appropriate diagrams.	Enable mind to handle complexity
16. **Select** appropriate solutions for implementation.	Make final decision
PHASE V: IMPLEMENT CHOSEN SOLUTIONS	
17. **Implement** plans; monitor and evaluate progress or results.	Check on progress; ensure desired results
18. **Adjust** plans or behavior.	Respond effectively to obstacles and contingencies

Source: Copyright © 1973, 1997, 2006 by R. D. Cecil and Company.

4. *Seek a conducive environment.* Limit interruptions, noises, and other distracting stimuli that can disrupt one's concentration and train of thought.

5. *Get organized.* Also limit interruptions and distractions by gathering any necessary information, materials, or equipment. Minimize "people problems" by planning and organizing interactions with those who should take part in the process.

6. *Do a brief preliminary analysis (preview).* At first glance, many problem situations seem simpler and less important than they actually are. It generally takes a preview analysis to determine (a) just how complex and important the present situation is; (b) its priorities relative to other situations; and (c) how much time, money, and effort might be required by the problem-solving process. Previewing usually increases personal motivation as well.

It may not always be possible to perform steps 2 and 5 in the order just given. Nevertheless, keep in mind that environmental, motivational, and organizational factors can all influence how effectively you handle a problem situation. The important point is this: the preceding steps should be taken before beginning to perform the analytic approach because several (such as increasing motivation and performing a preliminary analysis) can influence whether you actually go on to use that approach and, if you do, how effectively you will use it.

Phase II: Analyze—Define and Reduce the Problem Situation

7. *Perform an initial qualitative analysis.* Effects or events occur because variables such as people, objects, forces, or phenomena have been operating in the environment and causing those events. Solving a problem requires determining the factors that actually caused problematic effects. In most situations, there are many factors that could have been involved in some manner or to some degree. Discovering which of these were the actual causes first requires identifying *all the possibly significant variables* that could be involved. However, since factors are often interrelated and interdependent, one must also consider the interactions among them.

   In order to consider possibly important variables that you might not already know about, use *checklists* of factors and other information sources. This will increase your repertoire of knowledge and help you "think outside the box." In fact, it will usually help you think about variables in a number of "boxes."

   To handle details about factors and their interrelationships visually, use *models or diagrams*. These tools make many bits of information visible at one time, thereby (a) enabling the mind to juggle them all more easily and (b) freeing it to analyze, evaluate, relate, and develop deeper insights into the situation. Writing information on diagrams or models also records the information better in memory. (Neurophysiologists [Eccles, 1960; Eccles and Robinson, 1984] have reported that the brain does not record well what we think or say or periods of skilled activity.) Furthermore, since *problem solving is a major mode of learning*, diagramming variables and their relationships also expands the amount of accumulated knowledge that one will have available for future problem-solving and decision-making situations.

   Diagramming and modeling also yield these benefits: As we write down and model the system of potentially causal variables, additional factors and their relationships tend to occur to us. Diagramming also helps us keep factors, their relationships, and our own thoughts, insights, and ideas organized. Perhaps the greatest benefit lies in the fact

that modeling elicits our continued use of the analytic approach. As we write down factors and their interrelationships, we automatically begin to formulate solutions and think about whether they could work successfully.

8. *Collect important facts or data.* Having identified factors for further consideration, you can proceed to determine what to find out about them and then gather the corresponding facts or data. When collecting the important facts, ask the following questions: Are the "facts" being collected actually facts, or are they someone else's opinions, assumptions, or conclusions? Are the sources reliable and credible? How could the facts be colored by those sources' needs, values, attitudes, biases, knowledge, experiences, and personal goals? How and to what extent is my interpretation of the facts perhaps being colored or distorted by my own needs, values, interests, biases, goals, expectations, and limited knowledge and experience? With respect to any statistics being compiled, what assumptions might have been made in their compilation? How were they interpreted? Have they been presented in a manner designed to prove a particular point? Statistics and other people's assumptions, conclusions, and opinions about them can be very misleading.

Many times, facts are unknown, unavailable, unverifiable, or uncertain. Therefore, it may be necessary to fill in the blanks (gaps in information) with *working assumptions*. These assumptions should be based on known facts and actual experience to the extent possible. For example, one might deduce that, since X and Y are known to be true (it is true that person X and person Y in a three-person unit are both highly motivated), it is reasonable to conclude that Z is also true (it is probably true that person Z is also highly motivated)—and that, therefore, the conclusion about Z constitutes a viable working assumption. Having formulated such assumptions, however, one must constantly distinguish between them and the real facts. It can be very risky to base solutions or decisions on an analysis of important variables whose corresponding facts have only been assumed. Making too many assumptions can lead to faulty decisions.

Collecting important facts helps compensate for one's limited knowledge and experience. It is also an important learning process that expands one's repertoire of information for future use.

In order to better recall and use important facts, keep them organized, and mentally juggle them, write them down on the model of the problem situation, next to the variables with which they are associated.

9. *Analyze the situation's qualitative aspects and associated quantitative aspects to identify the system of multiple causes and effects requiring solutions.* Once the facts or data have been gathered and connected with the appropriate variables and their relationships (on the model), the situation can be fully analyzed. As shown in Figure 3.1 on page 48, one should determine the following: (a) which variables affect which other variables and in what cause-effect sequences; (b) the symptomatic factors that require repair; (c) the immediate or obvious causes that require correction or improvement; and (d) the underlying causes that require correction or improvement.

10. *Formulate criteria for testing and selecting alternatives.* Use the insights gained from the preceding analysis to identify the appropriate quantitative and qualitative criteria for testing and comparing alternative solutions (which will be formulated during the next phase). These criteria can define, for example, (a) factors that should remain unchanged, (b) performance parameters, (c) desired standards or benchmarks of

performance, and (d) time, budgetary, and other limits that should be imposed on solutions. Many specific examples can be found in Table 5.1 on page 106.

Phase III: Plan—Alternatives (Solutions) Formulation

11. *Formulate goals or objectives.* Formulate the desired end results to be obtained through the implementation of solutions. For guidance on this step, see the "Goal Setting" section in Chapter Four.

12. *Plan what to do (strategies, tactics, or courses of action).* Once all the variables that should be changed, adjusted, or improved have been identified, this series of steps amounts to formulating the means of bringing about the desired changes or improvements. Depending on the nature and importance of the situation, formulating alternative solutions may involve formulating alternative strategies, tactics, programs, projects, action plans, and budgets. However, any problem-solving situation should at least involve formulating alternative action plans. For guidance on this series of steps, see the "Planning" section in Chapter Four.

    Because problem situations most often involve systems of causal factors, there will almost certainly be more than one single solution. It will probably be appropriate to formulate a number of alternative solutions. The alternatives may be modified or combined in various ways in order to constitute an effective system of solutions.

    To help keep track of solutions and how they interrelate, continue using analytic diagrams of factors and associated quantitative or qualitative information as appropriate. To help keep track of what should be done, in what order, by whom, and when, use the visual planning tools described in Chapter Four.

Phase IV: Make Decisions—Test and Select Alternatives

13. *Anticipate possible outcomes of implementing each alternative.* Many problems are only solvable by trial and success (that is, what many people call "trial and error"). However, in many situations, trying a poor solution can create more problems than it solves. Why? Because a problem situation is a system of many variables, and because the variables are often interrelated or interdependent, changing, adjusting, or otherwise influencing one can also affect others. These indirect changes may not be desirable for a number of reasons. Because implementing solutions will cause subsequent events or effects, now—before any of them are actually implemented—is the time to predict and analyze the possible outcomes of various solutions. In effect, you need to evaluate and test the chain of causes and effects that might occur. What you plan to do will constitute causative actions (*acts*). What happens as a result will be the effects (*events*). The idea is to use trial and error mentally or on paper rather than immediately doing something that may adversely affect the system you are hoping to improve. As Sigmund Freud said, "Thought is action in rehearsal."

    To handle details involving acts, possible events, and probabilities of possible events, use tabular tools such as comparison matrices and visual tools such as scenario diagrams and decision trees. See Chapter Five for guidance and examples.

14. *Assess realistic probabilities of possible events.* When doing so, be as objective as possible. Be careful not to let wishful thinking taint assessed probabilities with your preferences. If, for example, you have a preference for a particular outcome or event, be careful not to let it increase your estimate of the probability that it will occur. If, on the other hand, you have an aversion to an outcome or event, be careful not to let it

decrease your estimated probability. Record assessed probabilities on, for example, a payoff matrix or decision tree to help visualize the information.

15. *Test and compare alternatives.* As you test hypothesized solutions, there is yet another important point to keep in mind: nothing is perfect. Everything has advantages and disadvantages. This also applies to hypothesized solutions. There is a natural tendency to overlook certain advantages and disadvantages because of our positive and negative attitudes toward particular solutions and their possible outcomes. Therefore, identify all the advantages and all the disadvantages. If you cannot find both, something may very well be wrong with your analysis. You must decide whether the advantages outweigh the disadvantages. Use decision-making criteria to compare the pros and cons of all the sets of alternatives.

16. *Choose appropriate solutions for implementation.* As discussed earlier, using Figure 3.1, solving problems most effectively usually means choosing a system of solutions to deal with a system of causes. This choice may involve determining the following: (a) whether to use any particular solution independently of the others (by reviewing its advantages and disadvantages, its estimated probability of success, and its ability to meet or exceed decision-making criteria); (b) whether to modify or adjust a solution so that it will work more effectively; (c) whether to use combinations of alternative solutions; (d) whether implementing any one alternative might adversely affect the implementation of any other alternatives; and, given the previous answers, (e) whether using various possible combinations—and thereby affecting various factors in potentially positive *and* negative ways—will somehow cause solutions to work against each other and adversely affect final results. It takes the use of visual aids such as situation models, scenario diagrams, and decision trees to handle the complexity of the preceding analyses. However, we caution against the use of decision trees if you have not been properly trained in their use.

   If specific solutions or certain combinations of solutions conflict, choose between them based on the following considerations: First, do the overall advantages of one outweigh the overall advantages of another? Second, which alternatives have the greatest probability of contributing to successful resolution of the problem situation? Third, which alternatives best meet the selection criteria established in Phase II? Fourth, which alternatives best fit into the overall system of solutions? After answering these questions, stand back from the trees and look again at the forest. Ask, "Does this system of solutions work together effectively to deal with important aspects of the situation?" Then ask, "Is this system of solutions compatible with organizational goals and plans?" If either answer is "No," further modification of alternatives may be advisable. If the answers are both "Yes," you are ready to go on to Phase V (implementation). However, keep in mind what Rachel K. Sobel (2001) reported: research shows that even when people think they are making judgments rationally, their emotions may actually be driving their choice of alternatives.

Phase V: Implement Chosen Solutions

At this point, thinkers should shift gears and take action. Action-oriented people should also take action, but only if they have adequately thought things out first.

17. *As you implement solutions, monitor and evaluate outcomes.* Check on progress by reviewing and analyzing data on events, progress, outputs, outcomes, or results. If obstacles or problems are identified, take the next step.

18. *Solve problems.* Make adjustments to original plans, or if necessary, develop and implement fresh solutions.

BEYOND THE BASICS

Problem-Solving Styles and Orientations

Problem-solving styles are often called *thinking styles* or *cognitive styles*. Experts have identified various styles, but they emphasize different concepts and use different terms to categorize them. Due to these differences, all the parameters could not be interrelated within a single matrix. Therefore, the following discussion of styles requires two separate but somewhat related tables.

Table 13.2 focuses on a frame of reference suggested by Harvard psychologist Howard Gardner (1983, 1999). It identifies seven types of intelligence, which Stephen Abram (2003) calls "types of smarts." Three types are verbally oriented and four types are nonverbally oriented. One important type of intelligence is missing from Gardner's typology: "machine smart" (mechanical intelligence, of which spatial intelligence is a part). In Table 13.2, it has been substituted for "music smart," because activities in most organizations involve mechanical matters rather than musical matters. The table also indicates other characteristics that are generally associated with the primary classifications: (a) the scholarly terms for the mental capabilities involved; (b) the major sources of information on which a person generally relies when thinking and learning, according to Malcom, Lutz, Gerken, and Hoeltke (1978); (c) the senses a person primarily uses for gathering information; and (d) personality traits.

Table 13.3 primarily focuses on cognitive styles suggested by McKenny and Keen (1974) and further described by Whetten and Cameron (2005). Unlike the previous frame of reference, which primarily dealt with types of intelligence, McKenny and Keen's frame of reference primarily deals with different ways in which people gather, assimilate, evaluate, and apply information. Note that the "Preceptive" category has been divided into "Verbal Orientation" (for people who primarily relate verbal constructs) and "Abstract Orientation" (for people who primarily relate mathematical or scientific numbers and symbols). Also note the arrow, which indicates that in order to be able to relate verbal or abstract constructs, preceptive information gatherers initially had to learn (be receptive to) the more basic verbal or abstract information that underlies or makes up the constructs. The table also indicates associated types of learners, a frame of reference suggested by Kolb, Rubin, and McIntyre (1971, 1999), as well as values and personality traits that we (the authors) associate with the categories.

Factor-Related Ways to Improve Problem-Solving Effectiveness

Although the analytic approach is powerful, simply using that approach is not enough to maximize problem-solving and decision-making effectiveness. As discussed in Chapters Two through Five, other major elements influence how well we can solve problems and make decisions. To think most effectively and efficiently, some of these factors must be minimized, while others must be maximized.

The left side of Figure 13.1 lists advance and ongoing activities that people can perform in order to enable themselves to solve any subsequently encountered problems more effectively. Goal setting should be done in advance—before any problem-solving situations arise. The others should be performed in advance to the extent possible, then performed on a continuing basis. The benefits of these activities are indicated by arrows pointing to the affected phases and phenomena on the right side. The activities and their benefits are described in the following sections.

Table 13.2. Thinking (Problem-Solving) Orientations or Styles

	Verbally Oriented			Nonverbally Oriented			
GENERAL SKILL ORIENTATIONS (Gardner, 1983, 1999)	Verbal, linguistic	Intrapersonal	Interpersonal	Sensory-motor (physical)	Visual, spatial	Mechanical	Quantitative, mathematical
Type of "Smarts" Used (Abram, 2003)	Word smart	Self smart	People smart	Body smart	Picture smart	Mechanically smart	Number smart
Mental Capabilities Involved Aspect of academic intelligence	Verbal						Mathematical
Social Intelligence or insight			Social insight				
Spatial thinking					Spatial thinking	Spatial thinking	
Mechanical intelligence						Mechanical intelligence	
Type of logic used Class and deductive logic	Class logic	Class logic	Class logic		Class logic	Class logic	Class logic
Propositional and inductive logic	Propositional logic		Propositional logic		Propositional logic	Propositional logic	Propositional logic
Information Sources	External information (reading materials)	Internal feelings, thoughts	External sources	External sights, internal sensations	External sources	External sources	External information, internal thoughts
Senses Used for Information Gathering Visual (reading, observing)	Read	Observe	Observe	Observe	Observe		Observe
Auditory (listening)	Listen	Listen	Listen				Listen
Tactile (touching)			Touch				
Kinesthetic (motor) feedback				Motor feedback			
Personality Tendencies Active (vigorous)				Active, vigorous			
Original thinking Concrete (tangible, observable)					Concrete	Concrete	
Conceptual (verbal concepts)	Conceptual; verbal						
Abstract (math, symbolic)							Abstract
Thinking introvert or extrovert		Thinking introvert	Thinking extrovert				
Social introvert or extrovert		Social introvert	Social extrovert				

Table 13.3. Cognitive (Problem-Solving) Styles and Related Orientations

COGNITIVE STYLE TYPES (McKenny and Keen, 1974)	Information Gathering and Assimilation			Information Evaluation		Information Response	
	Receptive ⟶ Preceptive			Systematic	Intuitive	Active	Reflective
	(Tangible Orientation)	(Verbal Orientation)	(Abstract Orientation)				
Basic Description	Focuses on **details**, examines all **data**	Focuses on **concepts** and **relationships** among variables (relational thinking)		Uses **methods** and sequence of logical **steps**	Goes by **intuition** or gut feeling; more **subjective** than objective	**Practical,** impatient to **act** or experiment	**Ponders** situation and information before taking action
Focus of Thinking Tangibles (what can be seen or touched)	Concrete information				Concrete information		
Methodologies				Applying methods			
Conceptual (concepts or ideas in verbal terms or constructs)		Verbal constructs					Verbal constructs
Abstract (concepts or ideas in mathematical or symbolic terms)			Abstract constructs				
Feelings, attitudes					Feelings, attitudes		
Level of Intellect and Education Verbal constructs	Average intellect and education	Above average intellect and education	Above average intellect and education	Above average intellect and education	Average intellect and education	Average intellect and education	Above average intellect and education
Abstract (math) constructs	Average intellect and education	Above average intellect and education	High intellect and education				
Problem-Solving Approach Past experience	Past experience				Past experience	Past experience	
Common sense (simplistic)	Common sense				Common sense	Common sense	
Trial and success	Trial and success					Trial and success	
Analytic approach		Analytic approach	Analytic approach	Analytic approach			Analytic approach
Major Learning Method Used Whole to parts		Whole to parts	Whole to parts				
Parts to whole	Parts to whole						
Mediating (whole to parts to whole)				Mediating			Mediating
Basic Type of Learner Concrete experiencer	Concrete experiencer					Concrete experiencer	
Active experimenter						Active experimenter	
Verbal conceptualizer		Verbal conceptualizer					Verbal conceptualizer
Reflective observer							Reflective observer
Abstract conceptualizer			Abstract conceptualizer				Abstract conceptualizer
Most Significant Value Practical-mindedness	Practical					Practical	
Intellectual (theoretical) value		Intellectual value	Intellectual value				Intellectual value
Major Personality Traits Original thinking		Original thinking	Original thinking				Original thinking
Active (vigorous)						Active, vigorous	
Orderliness				Orderly, organized			
Emotionality					"Feelers," "emoters"		
Where Required		General management	Mathematics, science		Creativity and idea generation	Quick decisions and action	Complex situations; best decisions

Advance and Ongoing Preparation	Phases and Steps of a Think-Work Process

Advance and Ongoing Preparation

Set goals and plan (in advance) ⟶

Make a habit of using the analytic ⟶
approach

(Goal setting;
motivation)

Increase repertoire of knowledge
and experience (learn) ⟶

Further develop thinking
(information-processing and logical) ⟶
abilities

Modify or compensate for other
personal characteristics (such as ⟶
values, attitudes, and personality
traits) and behavior patterns

Further develop
implementation skills ⟶

Phases and Steps of a Think-Work Process

Awareness (unconscious mind signals conscious mind)

Analytic approach

Prepare

→ Motivation   Maximize concentration
  Environment   Estimate time and effort
  Organization   needed
  Preview analysis   Estimate resources needed

Analyze Situation
(define and reduce problem)   Emphasize
  Use checklists and diagrams   multicausality

Formulate Alternative Solutions (plan)
  Goals   Use
  Strategies and tactics   diagrams
  Programs and projects   to handle
  Action plans   detail
  Budgets

Make Decisions
(test and select alternatives)

Implement Chosen Solutions
  Do; communicate; learn

**Better
Problem Solving
and
Decision Making**

Increased repertoire
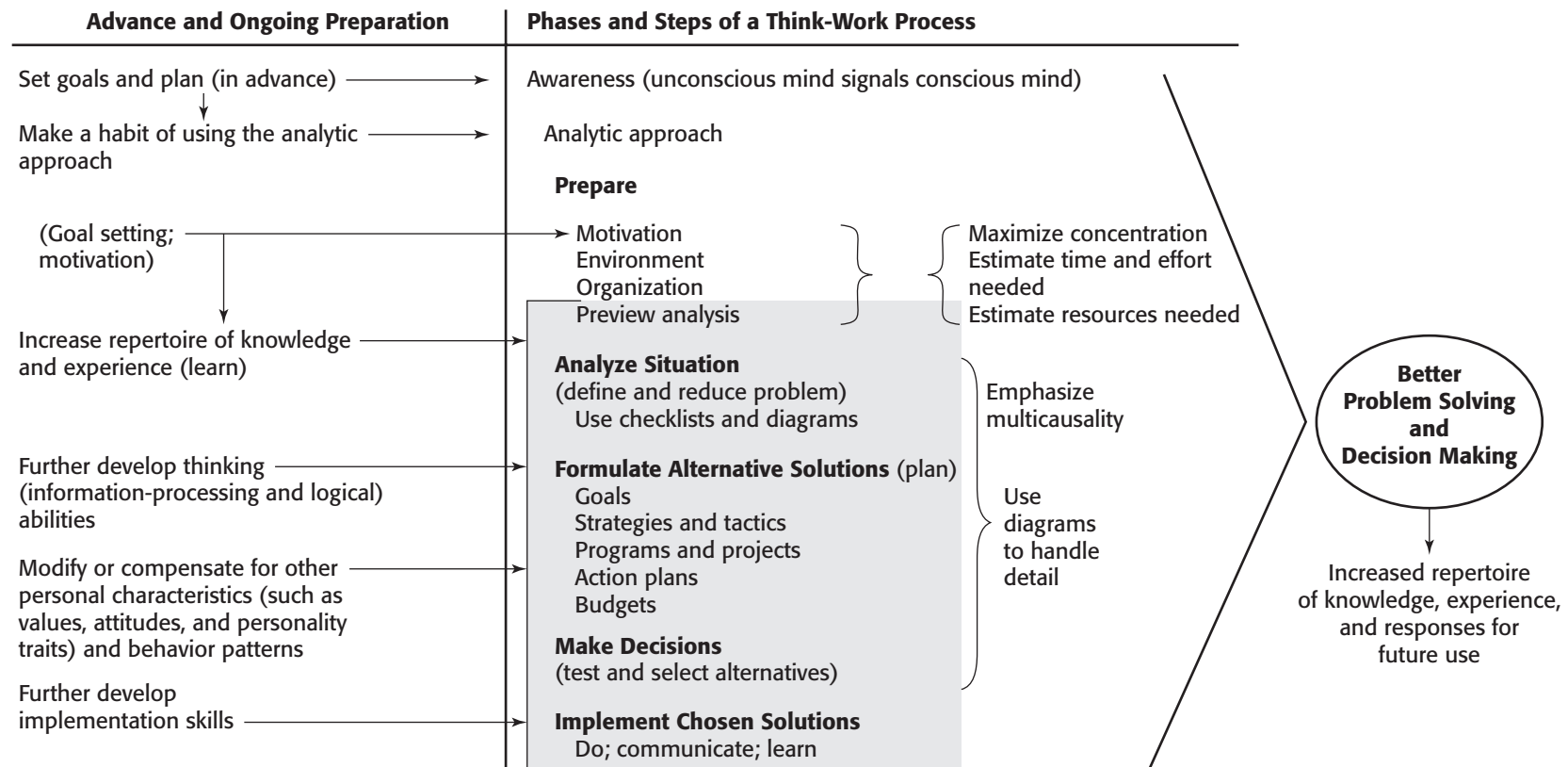of knowledge, experience,
and responses for
future use

Figure 13.1. Advance and Ongoing Activities for Continually Improving Problem-Solving and Decision-Making Processes

Source: Copyright © 1973, 1997, 2006 by R. D. Cecil and Company.

Set Goals and Plan. In order for us to become consciously aware of an important problem situation and then stop to think about what we are doing and how to do it well, something must trigger that awareness. For the necessary awareness to be triggered, brain mechanisms that operate at subconscious levels must monitor the stream of environmental stimuli we are sensing and somehow select certain stimuli for our conscious attention. These mechanisms continually compare actual stimuli with intended or expected stimuli—*if* those intended or expected stimuli have already been recorded somewhere in memory. If actual stimuli are similar to intended or expected stimuli, we do not perceive that a problem situation exists. But if they are dissimilar, we become consciously aware that we are in a problem situation. This phenomenon is the brain's version of management by exception, in which actual figures are compared with budgeted figures, and if the two figures do not match, managers recognize that some sort of problem situation may exist. The point is that if we don't have in mind any preferred, desired, intended, anticipated, or expected outcomes or events, it will seldom occur to us that we have a problem.

Therefore, a major key to more effective individual and organizational problem solving involves (1) *formulating personal and organizational goals and plans* and then (2) *writing them down* in order to better record them in memory. By doing so, we (1) increase the likelihood that our subconscious mind will trigger conscious awareness that a problem situation exists and (2) increase the likelihood that we will actually stop to think about what we are doing and how to do it well. Furthermore, personal and organizational goal setting have the additional benefits indicated in Figure 13.1: (a) they help increase motivation during the preparation phase (as indicated by the arrow pointing to the right), and (b) they increase motivation to improve oneself in the four ways described in the next sections (as indicated by the arrow pointing downward).

Make a Habit of Using the Analytic Approach. Almost everyone has learned the phases and steps of the analytic approach at some time. The question is, have we made a habit of using them when we should—and using them properly? If we have not practiced them to the point where their use has become second nature, we may not use them at all. In fact, we may keep using the bad habits we have developed, especially if we do not consciously think about using the proper phases and steps when it is important enough to do so. Two activities help to make their use habitual. First, formulate personal and organizational goals and plans in order to trigger one's use of the approach in a greater number of important situations. Second, it may help some people if they remember this phrase: PREPARE for DRAFTS and IMPLEMENT. "PREPARE" refers to the preparation steps. "DR" stands for Define and Reduce (analyze); "AF" stands for Alternatives Formulation; and "TS" stands for Test and Select. "IMPLEMENT" refers to the implementation phase. Associate the phrase with the words *undesired*, *unintended*, and *unexpected*, to help jog awareness of problem situations.

The next four inputs all contribute to the effectiveness with which activities in the shaded area of the second column are performed. It should also be noted that using diagrams helps people handle details during all phases of the process, as indicated by the brace to the right of the shaded activities.

Constantly Increase One's Repertoire of Knowledge and Experience (Learn). We use our existing *knowledge* (information and experiences previously recorded in memory) to analyze problems and understand them in all their aspects. At any given moment, therefore, how much we already know partially determines how many potentially causal variables we are able to identify

and how many corresponding facts we can use to analyze the situation (without having to collect more). Solving problems is largely a matter of using what we know. If we are fortunate, we will know enough to recognize what more we might need to find out (factors to consider and facts to collect). But as discussed with reference to Table 3.1 on page 52, everyone's knowledge of variables and facts is limited and imperfect. Obviously, this limits our analytic, planning, and decision-making effectiveness.

Experience helps us answer questions such as "What might happen if we do this or that?" and "What has worked before, and what hasn't?" Therefore, experience is useful when (a) identifying cause-effect relationships among variables, (b) formulating possible solutions, (c) selecting one or more solutions for implementation, and (d) implementing plans or decisions. Here again, everyone is limited. No one has all the experience necessary to solve a particular problem as well as it might be solved. Also, as mentioned earlier, past experience (previously used solutions) may or may not be appropriate for a new situation. What happened or what worked in a previous situation undoubtedly occurred within the context of a particular set of circumstances. Even though the two situations may be similar, there are always differences that may nullify the appropriateness of previous solutions.

Knowledge and experience can certainly be increased by reading, studying, watching, listening, and doing. They can also be increased by using checklists to help consider factors that might otherwise have been overlooked or ignored. However, we emphasize that knowledge and experience can be maximized over time by using each important problem-solving situation to do the following: (a) more fully analyze the situation by thinking in terms of multicausality and by identifying and considering more potentially causal variables and their relationships; (b) collect more associated facts or data; (c) formulate more alternative solutions and possible combinations thereof; (d) identify more possible outcomes of alternative actions; (e) increase consideration of probabilities of possible events; and (f) identify and consider more advantages and disadvantages of alternatives. In other words, the more we consider, sort out, anticipate, weigh, diagram, and write down *each time*, the more that gets recorded in memory for use the next time. When are especially good times to perform these activities? During *personal and organizational planning processes*. The results of acting on these suggestions are cumulative—and perhaps even exponential.

Further Develop Thinking Abilities. Thinking requires our use of the mental abilities described in the following sections. More effective thinking requires their improvement or further development.

Types of "Smarts." As suggested in Tables 13.2 and 13.3, how well we are able to analyze and solve many of life's problems is largely a function of our levels of academic intelligence and social intelligence (or social insight). In general, the more intelligent a person is, the better his or her abilities to reason (think logically) are. How well a person can analyze and solve mechanical and spatial problems depends to a great extent on his or her level of practical or mechanical intelligence and aptitude for spatial thinking (or mechanical visualization). Spatial thinking is thought to be a pure (inborn) ability and not subject to further development. Mechanical intelligence can be further developed by increasing knowledge of mechanical principles and by accumulating experience through applying the principles and working with mechanical objects. Verbal abilities associated with academic intelligence can be further developed by increasing one's vocabulary and dealing with verbal constructs. Mathematical aspects of academic intelligence can be further developed by taking math and science courses and by working on mathematical problems.

Developable Abilities. The following are mental abilities involved in moving visual, verbal, and other types of information back and forth between the brain's reasoning areas (its CPU) and its short- and long-term memory areas (its RAM and hard drive, respectively):

Class logic is the ability to (1) define or describe objects or activities in terms of various characteristics and (2) compare or contrast the characteristics of the objects or activities in order to determine similarities and differences between them. Class logic is most important during the analysis phase but is also involved in the analytic aspects of formulating solutions and making decisions.

Deductive logic is related to class logic. Using deductive logic, one draws a conclusion—based on given or accepted general principles, statements, facts, or assumptions—that something (for example, a fact) must be true. Conclusions are treated as certain because they are implied by the givens or assumptions. For example, given the premise that all monks are poor and given the premise that some Englishmen are monks, one deduces (concludes) that some Englishmen are poor. Notice that this conclusion was derived by putting these people into groups based on shared characteristics (that is, using class logic).

Propositional logic deals with things as they might or could be. In other words, it deals with the future and its uncertainty. Using propositional logic is a matter of asking "What might happen if . . . ?" It is essentially a matter of mentally testing alternatives and their outcomes, based largely on past experience. Here are two examples: "If A is true and if B is true, then C either is or is not true" and "Given that I have successfully used Solution X many times to resolve Customer Complaint A (under circumstances X, Y, and Z), and this situation is exactly the same in all respects, then Solution X should probably resolve this customer complaint. But I'm still going to consider other solutions as well."

Inductive logic is related to propositional logic. It basically involves drawing a conclusion that something is or may be operating—such as a principle or a theory. In this case, the study and comparison of accepted facts leads to the derivation of a theory. Often, one is seeking to provide a true statement concerning all objects in a class by examining a sample of objects in that class. For example, "Given the fact that there's been a unit meeting every Tuesday so far this year and given the fact that there is no apparent reason for this policy to have been changed since last Tuesday, one can conclude that there will be a meeting this coming Tuesday."

These mental abilities are seldom if ever fully developed in any of us. The more we work on further improving or developing them, the better we will be able to solve problems and make decisions. Class logic and deductive logic can be further developed by (a) increasing one's vocabulary for defining and describing things, people, events, and so forth; (b) actually defining, describing, and categorizing things; and (c) analyzing complex situations. Propositional logic and inductive logic can be further developed by taking math and science courses. They can also be developed by constantly asking the following during planning and decision-making phases: "Based on what I (or we) have seen happen (or read about) in many and varied situations, what might happen if we do ⎯⎯⎯⎯⎯ (some activity), but perhaps a little differently?"

Modify or Compensate for Other Personal Characteristics and Behavior Patterns. The values and personality traits described in Table 10.1 can be discussed in a number of contexts. Managerial styles are one. Problem solving and decision making are another. If students or seminar participants have taken the values and personality assessments mentioned earlier, they should

be able to gain deeper insights into their problem-solving and decision-making orientations and effectiveness by comparing their scores with the following points on values, attitudes, and traits. Students and participants can modify the levels of these characteristics to some extent by following the suggestions at the end of this section.

Values. A relatively high level of the theoretical (intellectual) value can be an advantage to a problem solver. A predisposition to ask "Why?" means that a person will probably be analytical, dig into situations to find underlying as well as superficial causes, and think things out fully. It also means that a person will probably be inclined to anticipate and consider the results or consequences of alternative solutions. If this type of person is not careful, however, he or she may get bogged down in details and become indecisive. He or she may also have difficulty selling ideas to other people. On the other hand, a less thoughtful individual will tend to be higher in other values that may be more useful in the practical world. Consequently, a less thoughtful person may be better at implementing solutions through other people. A balanced approach is generally most effective. Problem solving requires analysis, but it also requires action.

A person's value system also affects his or her repertoire of knowledge and experience. Both knowledge and experience tend to be greater in the areas or activities that are most important to a person. Managers should occasionally take time to consider their highest and lowest values and the implications for their ability to solve problems in areas that are important to them and their organization. Remember our earlier examples: Those who are higher in the economic value (concern for money, financial success, and material things) and the political value (concern for power, influence, or authority over others) will tend to know more about and think more about the task-related and organizational variables that may be causes of an organizational problem. On the other hand, they will probably know and think much less about individual and social variables. Those who are higher in the social value (altruism or love of and concern for people) will probably know and think more about people's characteristics and social interactions than about the mechanics of operations and what is going on politically in their organization.

Interests and Other Attitudes. Interests, beliefs, ethics, and cultural attitudes all affect what one has learned and will learn. As in the case of values, a person's interests and other attitudes may help to maximize knowledge and experience in some areas but limit them in other areas. They may increase a person's awareness of some problems and dull awareness of others. They may bias a person to view important problems as unimportant. They may keep a person from considering numerous variables and corresponding facts. They may cause a person to treat facts stated by other persons as assumptions or opinions—and vice versa. Not only can attitudinal characteristics hinder the effectiveness of an analysis, but they can also hinder the effectiveness with which solutions are identified and planned. Furthermore, they can hinder the entire problem-solving or decision-making process by reducing open-mindedness and objectivity.

Personality Traits. The more *adaptable* a manager is, the more honest and objective she will tend to be in thinking about and solving her problems. On the other hand, if she is too adaptable, she may acquiesce to others' solutions even though she may disagree with them. She may also be too self-critical when thinking about her own behavior.

The more *socially conscientious* a manager is, the more he will tend to consider how his solutions, decisions, or behavior will affect others' needs and feelings. This can make him more effective when thinking and otherwise interacting with subordinates and others.

If a manager is a highly *self-sufficient* person, he may tend to seek and verify information for himself. However, if he is too self-sufficient, he may not bother to seek others' knowledge, ideas, or opinions, even though two heads are better than one. In addition, the manager may want to implement his solutions himself, even though others' involvement would be more advisable.

The more *self-confident* a manager is, the more positive and assured she will tend to be in confronting problems. Self-confidence in problem-solving and decision-making situations may reflect well-developed thinking capabilities. It may also aid the implementation of solutions or decisions through others. If the manager is confident of her solutions, she will probably be more persuasive when soliciting others' involvement or cooperation. On the other hand, she might be too self-confident and not thoroughly consider the aptness of her own analysis, solutions, or conclusions.

If a manager is highly *dominant*, he may seem too pushy to others and fail to gain their cooperation in implementing solutions. On the other hand, if he is not aggressive enough, he may not be inclined to stand up for his own conclusions, solutions, or decisions when appropriate.

If a manager is highly *introverted*, she may tend to be a good thinker, but she may also tend to keep good ideas and solutions to herself. If she is more *extroverted*, she may be somewhat less analytic but, being more congenial, may be able to implement solutions through others more effectively (unless she is too highly extroverted).

The more *emotionally stable* a manager is, the more logical and objective his repertoire of knowledge and experience will tend to be. In addition, he will tend to approach problems with greater objectivity and less waste of emotional energy.

The more *self-controlled* and self-disciplined a manager is, the better she will be at concentrating and sustaining attention and effort on a problem (even though her interest and motivation to do so may be relatively low).

Although the levels of a person's values and personality traits are not necessarily fixed, it is very difficult to increase or decrease them, especially in the short term. Nevertheless, here is a basic suggestion for modifying these traits to some extent over time. As discussed in Chapter Ten, people-related capabilities can influence people-oriented motive/attitudinal traits (and vice versa). Thus, to increase levels of people-oriented values and personality traits, work on further developing people-related capabilities. As you use your more well-developed capabilities and become more interpersonally adept, you should begin to experience the increased positive feedback that results from better and more fulfilling interpersonal relationships. In turn, the increased positive feedback should tend to increase the levels of your people-oriented values and personality traits. The same approach applies to increasing the levels of task-oriented values and personality traits by further developing task-related capabilities.

Further Develop Implementation Skills. In order to implement solutions as effectively as possible, it is generally advisable for personnel to further develop the following skills and traits: learning and reading skills; interpersonal awareness, insight, and sensitivity; communication skills involved in both sending (expressing) and receiving (listening); physical skills; and general health and energy. Chapter Fifteen describes how to improve communication processes and further develop communication skills. Chapter Seventeen discusses how to improve learning processes and further develop learning skills.

CONCLUDING REMARKS

Human beings are systems of brain circuitry, emotion mechanisms, needs and drives, abilities and aptitudes, knowledge and experience, physical traits, values, personality traits, interests, and goals and expectations. All these and many environmental factors influence what we think about and how well we think. Many of these variables limit effective think-work. If we add all these limiting variables together, it is little wonder that problem solving and decision making can be difficult and even unpleasant activities. Nor is it any wonder that we tend to use relatively simplistic approaches rather than the more powerful analytic approach. Nonetheless, as this chapter discusses, all of these factors can be influenced in some way and to some degree so as to increase our effectiveness and efficiency in thinking situations.

However, thinking effectively is one thing; interacting well with others is another. Therefore, Part Four deals with interpersonal relations and skills. Building on previous discussions of behavior, it adds more information to the reader's repertoire of behavioral information and helps increase his or her social awareness and insight, interpersonal sensitivity, and ability to analyze and solve interpersonal problems or conflicts.

We conclude this part with Figure 13.2. It does not go into the detail concerning problem-solving steps that Table 13.1 does. However, it does relate the think-work aspects of interim or ad hoc problem-solving situations—which occur between planning processes—with the overall managerial process.

The next section contains recommendations for conducting the superior-subordinates discussion, OD application, and team-building sessions that conclude Module 3.
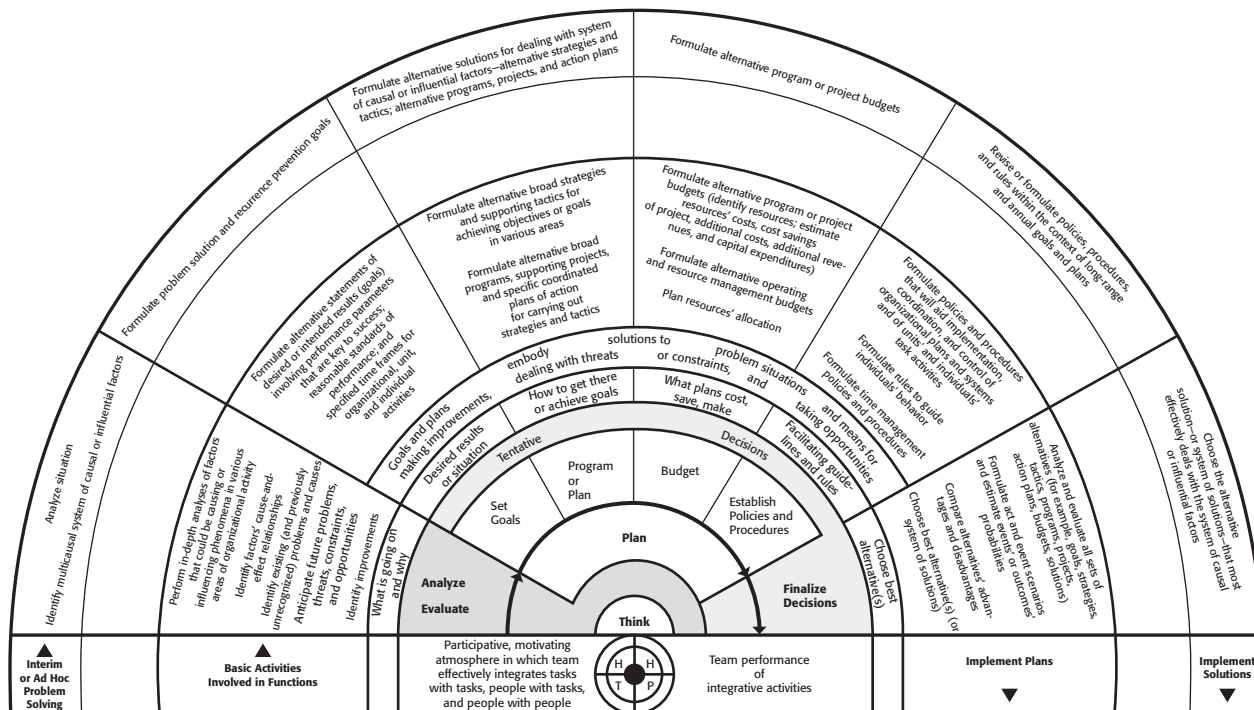

Figure 13.2 Problem Solving in the Managerial Context
Source: Copyright © 1981, 1998, 2006 by R. D. Cecil and Company.

RECOMMENDATIONS FOR CONDUCTING SUPERIOR-SUBORDINATES DISCUSSION, OD APPLICATION, AND TEAM-BUILDING SESSIONS FOLLOWING THE TRAINING PORTION OF MODULE 3

General Information

After individuals at all the levels involved in the program have completed the educational sessions based on Chapter Thirteen (first half day) and individual problem-solving sessions (second half day), superiors and their immediate subordinates should reinforce what they have learned up to this point in the program by actually using it to analyze and solve previously suggested important unit problems. As shown in the lower Module 3 box in Figure 1.1 on page 20, these problems may involve intra-unit activities, behavior, relationships, interactions, and performance. Superior-subordinates groups should freely discuss any possibly causal or influential nonpersonal socio-technical factors. Although personal factors (discussed in Chapter Ten) may also be involved, at this point in the program it is not necessarily functional for a group to delve into members' personal characteristics. Generalized insights into group knowledge, attitudes, and skills, however, can be discussed without threatening egos and hurting feelings. Again, these sessions should be facilitated by an OD consultant or properly trained facilitator.

Objectives

These discussions (a) help participants crystallize (through further thought) what they have learned; (b) help them reinforce (through repetition and actual use) what they have learned; (c) enable participants to immediately and beneficially apply what they have learned (rather than waiting until the end of the program to experience benefits or results); (d) help improve superior-subordinate relationships; and (e) enable managers' subordinates to participate in deciding what needs doing, how it should be done, by whom, and when.

As shown at the very bottom of the lower Module 3 box in Figure 1.1, these linking pin sessions are aimed at identifying and dealing with task-related and organizational socio-technical factors that can involve or affect the following: (a) unit or group performance problems; (b) responsibilities and authority that may need clarification or reformulation; and (c) any other unit-related task and interpersonal relationships that could stand some improvement.

Preparation

If participants have used the session preparation and study guide provided on the CD-ROM for Chapter Thirteen, they will have already thought about the following Module 3 issues and will be better prepared to discuss them.

Sessions should be scheduled for at least four hours, including breaks. Participants may choose to continue their discussions during subsequently scheduled sessions.

Socio-Technical Areas for Factor Analysis

During class or seminar discussions, participants usually identify or suggest problem areas that could be discussed during these sessions. Thus, discussing the problems on people's minds is a common approach. If they rely solely on this approach, however, managers and their subordinates may (a) fail to identify the real, underlying causes of problems; (b) fail to

notice unidentified problems; and (c) miss opportunities to improve many aspects of operations that could be fine-tuned or otherwise improved. If participants and consultants choose to take an approach that simply emphasizes solving the problems that immediately come to mind, they should also deal with the issues listed in the next section, "Topics for Problem-Solving Discussions."

Instead of an impromptu choice of problems, we recommend a more organized and orderly improvement-oriented factor analysis approach. Because prior modules have discussed how numerous task factors, organizational variables, and personal influences (such as those listed in Table 3.1) can influence managers', leaders', and personnel's motivation, attitudes, and behavior, and because participants have further studied the analytic approach, they are now prepared to combine that methodology with their increased behavioral knowledge and insights to perform more sophisticated analyses.

1. In preparation for the superior-subordinates sessions, assign different sets of factors or variables to individuals or groups for preliminary analysis. This will save time during discussion sessions.

2. During the sessions, use participants' prepared inputs to help analyze what is going on and why. Look at each category of factors or each finite factor in turn, and do the following:

   a. After writing the factor on a surface that is large enough to accommodate an in-depth analysis of systems of factors, answer the question "What is our situation with regard to this category of variables or this finite factor?" Write down next to it the facts or other appropriate information associated with that factor.

      As factors and associated facts are added to the analytic diagram, use lines and arrows to indicate cause-effect or sequential relationships among factors. The diagram should show how numerous task-related, organizational, individual, and external factors may be influencing the motivation, attitudes, behavior, and performance of managers, their immediate subordinates, and their worker personnel. It should also show how these phenomena are all influencing each other.

   b. Through discussion, ascertain whether each distinct factor-related situation (as described by the facts or other information) is *functional or dysfunctional* for motivation, attitudes, or behavior affecting unit or organizational performance. If the situation is considered functional and cannot really be improved, then go on to the next category or the next finite factor.

   c. If the situation is considered dysfunctional but improvable, formulate either (a) solutions (and implementation plans) for dealing with it or (b) plans for improving the factors involved.

This process generally gets participants thinking about all of the topics mentioned in the next section.

Topics for Problem-Solving Discussions

If the improvement-oriented factor analysis approach just described is not taken, consider using the following topics to help identify and solve problems.

Identify mainly task-related and organizational socio-technical variables that exert major influences on the internal workings of the unit or group. (Social variables such as norms and

interpersonal behavior are dealt with following Module 4, so it might be better to postpone discussing them until then.) Identify factors or variables that could stand improvement or correction. (Concentrate on unit or work group situations rather than situations that are systemic within the wider organization.) For example,

1. Clarify or reformulate individual or group job responsibilities and decision-making authority in order to, for example, resolve task-related or territorial conflicts, improve working relationships, or foster effective communication. (The Delegation Worksheet, found with the Chapter Six content on the CD-ROM, helps organize a unit by crystallizing internal working relationships.) Note that if the organization is likely to be restructured following the program, it might be better to postpone this topic.

2. Determine how superior-subordinate working relationships, interactions, and communication patterns might be improved. Formulate plans for bringing about changes in whatever variables or phenomena are involved.

3. Consider how activities, interactions, and performance in other units may be affecting unit performance. Formulate suggestions about what both units might do to improve matters.

4. Think about how the organization's structure, systems, policies, and procedures might be adversely affecting unit performance. Formulate ideas or recommendations regarding possible improvements.

Regardless of which approach is used to identify problems, for each of the preceding areas discussed, identify issues or problems that will require more in-depth analysis (a) later in the MD/OD program (once relevant subjects have been covered), (b) within a different context during the MD/OD program, or (c) following the program. Then prioritize them and plan when to address them.

Commitments to Actions and Results

In formulating goals and plans, superiors and their immediate subordinates should contract with each other on the following specifics: (a) who is going to be held responsible for which final outcomes; (b) milestones on the way to the end results; and (c) who will do what, when, with whom, in what sequence, and over what period of time.

Participants should apply the principles, practices, and visual tools discussed in Chapters Two through Six. They should also take into consideration other anticipated changes and their priorities and costs.

Facilitation

These discussions should be facilitated by an OD consultant, a professional outside facilitator, or a well-trained internal facilitator—at least until the end of Module 5, by which point managers may have developed adequate team think-work facilitation skills.

To guide these sessions, the facilitator or consultant may use Table 16.1 (also on the CD-ROM), which outlines leader and participant responsibilities involved in preparing for and conducting team think-work processes. The same table can also be used as a handout for participants. However, because a number of topics in that table have not yet been covered, at this point, we suggest handing out copies of Table 13.1 (also on the CD-ROM) and briefly walking participants through its problem-solving steps.

In addition to guiding the mechanics of the group process, the facilitator should use his or her knowledge and experience to lead participants toward identification of (a) real, underlying causes of problems; (b) other influential (or possibly causal) factors, whose impacts are not always obvious; and (c) solutions or plans that have been or would tend to be most successful.

Evaluation and Follow-Up

After each end-of-module session has been completed, the facilitator may ask participants to critique the process by filling out or at least discussing the items on the Group Process Evaluation Form (found with the Chapter Sixteen content on the CD-ROM).

After the sessions are over, monitor participants' planned activities and their adherence to the commitments they made during these sessions. With guidance from an OD consultant, a facilitator, or an appropriate high-level manager, participants (superiors and their subordinates) should evaluate results upon arrival at each planned milestone.