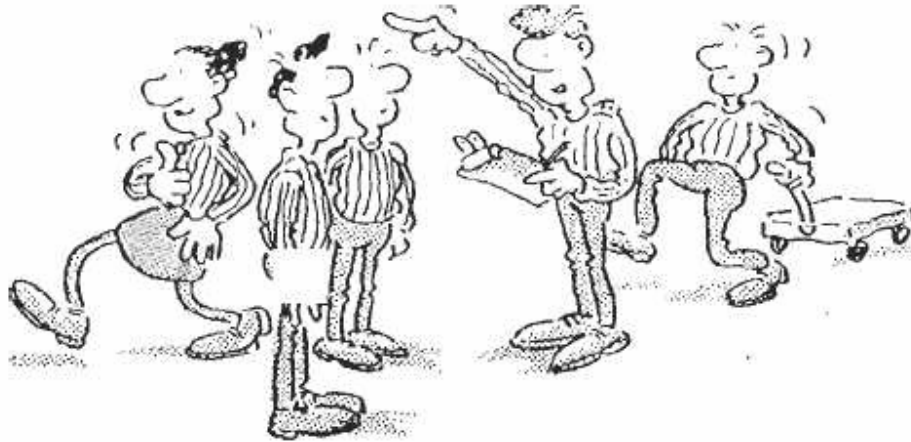


## PROBLEM SOLVING



### INTRODUCTION

1. The appreciation of a simple problem and the planning of its solution is fairly straightforward. Usually the problem is obvious and easy to understand. This is usually referred to as a "hard" problem, not because it is difficult but because it has hard facts to define it. The opposite type of problem is called "soft" because there are no obvious facts and it is not clear what the problem is or what the solution is. Problem solving techniques can be used to solve complex problems whether they are hard or soft.

### THE PROBLEM SOLVING PROCESS

2. There are four phases to the problem solving process as shown in Figures 6.1. Each phase is described below, techniques that can be used in each phase are described later.

- **Problem Analysis and Re-definition.** With complex problems it is not always obvious what the problem is. It is easy to start solving the symptoms of the problem rather than the problem itself. This phase of the process is designed to gather as much information as possible about the problem. The end result of this phase is a definition of the real problem that has to be solved.
- **Idea Generation.** Once the problem is defined it is necessary to generate ideas for possible solutions. Ready-made solutions may exist or simple adaptations of existing solutions may be possible. However, complex problems sometimes need innovative solutions. The idea generation techniques are designed to produce many possible solutions to form the output from this phase.
- **Idea Evaluation and Selection.** The problem with generating many ideas is that you then have to evaluate which is the best one and select the final solution.
- **Implementation.** Having selected the best solution the implementation phase is identical to the procedure described in "Getting Things Done". In summary that is make a detailed plan, brief the team, execute the plan and evaluate its success.

3. There are many hundreds of techniques that are: quick, long, easy, complex, for groups, for individuals, based on free association or forced relationships. The techniques described below are frequently used in problem solving and variations to each can be found.

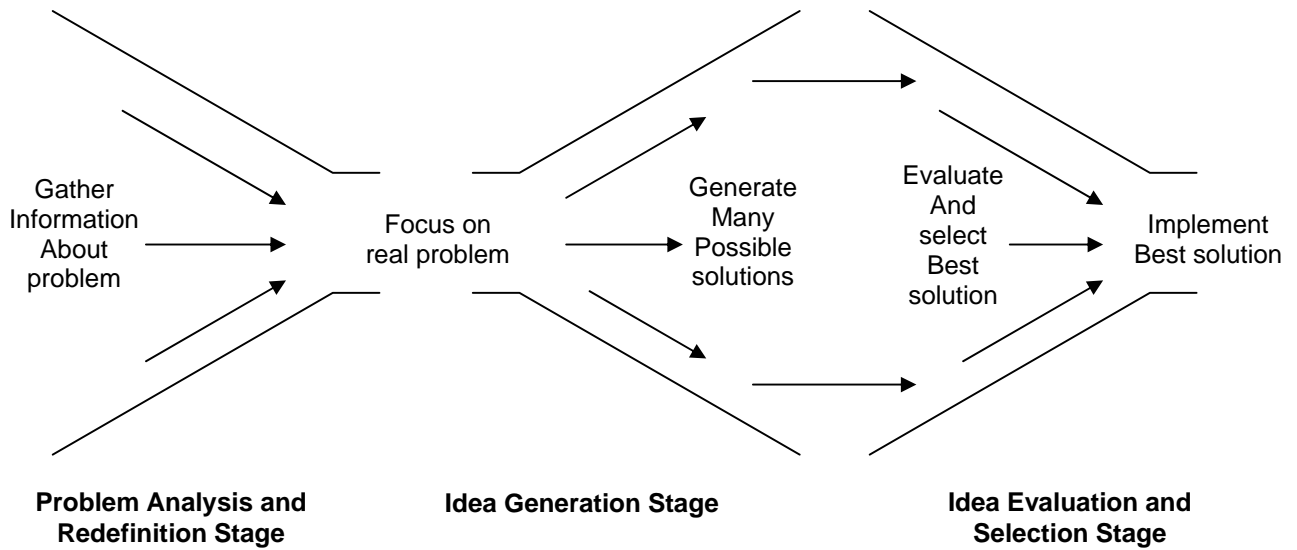


Figure 6.1 - The Problem Solving Process

## TECHNIQUES FOR PROBLEM ANALYSIS

4. This phase needs to gather information about a given problem. A simple technique is described which can be used by an individual or as a team.

5. **Five W's and H.** This is a variation on the Who, What, When, Where, Why and How, questions used by journalists to get all the information they need for a story. In the same way it can be used to gather information about a problem. There are five steps to the technique.

- State the problem using the expression "In what ways might .....?" (IWWM ..... ?). An example might be: "IWWM we motivate cadets to attend more events?"
- Write down separate lists of Who? What? When? Where? Why? and How questions relevant to the problem as stated above. Examples of such questions might be:
  - Who doesn't attend all events.
  - What events are least attended.
  - Where are the events held.
  - What makes cadets attend some events.
  - When do cadets attend events.
  - Why are some events unpopular.
  - How can we make all events popular.
- Write down responses to each of the above questions and examine them to see if it is possible to redefine the problem in some way. For example the answer to "When do cadets attend events", might indicate that it is not the events that are the problem but the timing of when they are held.
- Write down any re-definitions that are suggested such as "IWWM we hold events so that all cadets can usually attend"

- Select the new definition that best describes the real problem.

## TECHNIQUES OF IDEA GENERATION

6. Complex problems require lots of ideas to solve them. Generating ideas in a group sometimes leads to comments like "Don't be stupid" or "That will never work". This type of attitude prevents idea generation. Whatever technique is used the golden rules of idea generation are:

- **Defer Judgment.** That is don't criticise while ideas are being suggested, wait until the evaluation phase.
- **Quantity Breeds Quality.** If lots of ideas are generated then it is more likely that there will be some good ones amongst them.
- **Think Wild.** The wilder the idea the better, unusual ideas lead to breakthroughs away from normal solutions.
- **Combine and Improve Ideas.** Build on each other's ideas, ignore the fact that someone else thought of the basic idea first.
- **Take a Break.** Don't go on for too long, tiredness and boredom are not good for generating ideas.

7. Two techniques for generating ideas are described below:

- **Brainstorming.** Brainstorming is the simplest way of generating ideas. It relies on different people reacting to the ideas of others in different ways. The process requires a leader to control the group. The problem is stated and everyone is permitted to suggest a solution, usually in turn. The leader has to control the group firmly and a strict rule is that no one is allowed to criticise or make fun of any of the suggestions. The ideas are written down for evaluation later. It is sometimes a good idea to have more than one person taking down the ideas. To save time the leader might put a time limit on the process.
- **Reversals.** "Reversal" is a technique for looking at a problem from opposite points of view. For example solving a problem such as "How can we reduce the number of cadets leaving the Squadron?" might generate a few ideas. Reversing the problem to "How can we increase the number of cadets leaving the Squadron?" will probably generate many more ideas. The ideas are then reversed back to generate possible solutions. You may even find that the Squadron is already doing some of the things to drive cadets away!

## IDEA EVALUATION AND SELECTION

8. The selection of the best solution is not always easy, especially for soft problems. There are several techniques that can be used individually or together to select the best solution.

- **Advantages/Disadvantages.** One simple method is to write down two columns stating the advantages and disadvantages of each solution. This works fine until some advantages and disadvantages are more important than others.
- **Scoring or Weighting System.** If some advantages are more critical than others then award each a number of points, the critical advantages getting the highest points. Do the same for disadvantages and then add up the two columns: The solution with the highest advantages score and lowest disadvantages score wins.
- **Culling System.** One way to select the best solution is to eliminate the poorest solutions and see what is left. This approach is called the culling system. The method involves writing down

the pass/fail criteria for the best solution and then eliminating the solutions that don't meet the requirements. This technique is basically the one used when selecting a solution based on meeting all the essential requirements and all, or most, of the desirable requirements.

- **Voting.** If the choice of the final solution rests with a group of people then a simple voting system can be used to select the solution. A two round system works best, the first round is used to eliminate the "no hopers" then the group votes again on the remaining options. If the scores are really close then it is possible to go to a third round.

## **SUMMARY**

9. Problem solving can be a complex process that can be performed by an individual or a team. When working as a team the important point is to remember that the individual wins only if the team wins. Try and put to one side any personal goals of wanting your idea to be chosen.

10. The four phases of problem solving can be summarised as focus on the definition of the problem, generate possible solutions to the problem, evaluate and select the best solution and then implement it.