Lecture 1

IAQS | INSTITUTE OF ACTUARIAL & QUANTITATIVE STUDIES

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Chapter: Unit 3 Chp 2

Chapter Name: Problem-Solving Techniques: Generating Creative Solutions

Today's Agenda

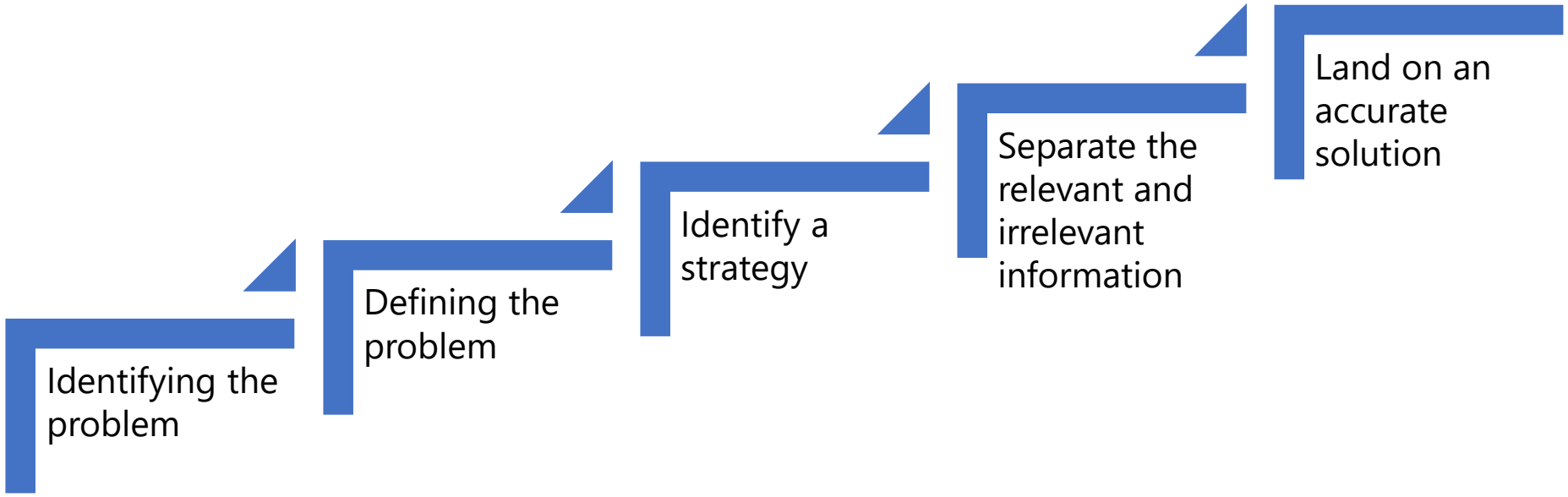
1. Introduction
    1. Problem solving cycle

2. Problem solving strategies
    1. Abstraction
    2. Brainstorming
    3. Hypothesis testing
    4. Lateral thinking
    5. Means end analysis
    6. Analogy
    7. Proof
    8. Reduction
    9. Trial & error
    10. Six thinking hats
    11. SWOT Analysis
    12. Speed boat

1 Introduction

Problem solving strategies are those steps that are used to identify the problems that one faces while trying to achieve a goal. This is usually referred to as the **'problem solving cycle'.**

1.1 Problem solving cycle



2 Problem solving strategies

Abstraction	Brain storming	Hypothesis testing	Lateral thinking
Means end analysis	Analogy	Proof	Reduction
Trial & error	Six thinking hats	SWOT Analysis	Speed boat

2.1 Abstraction

- Abstraction is a technique where the actual problem is broken down into smaller problems. Each of these problems is first solved in order to find a solution to the bigger problem. These solutions are first tested on a system. If the solution works, it is applied to the real system.

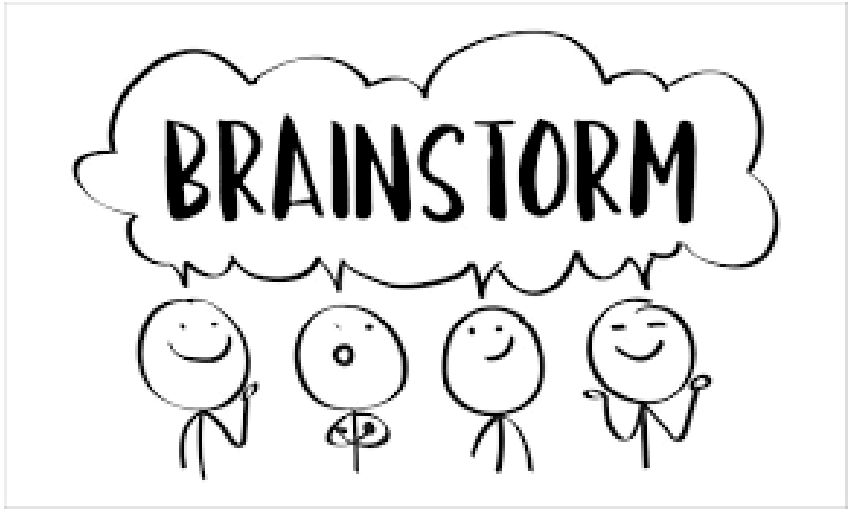
- Another name for this technique is to divide and conquer. This technique was used by most armies while invading any country during the medieval period.

- For instance, consider a mathematics problem on differentiation. The problem here is to identify whether the function provided is a maximum or a minimum function. For this, we have to find the first and second derivatives. Once we find the first and second derivatives, we can deduce whether or not the function is maximum or minimum.

- Here you have used abstraction to solve the problem. You have identified your set goal and divided the problem into smaller problems and used the solution obtained in those problems to solve the bigger problem

2.2 Brainstorming

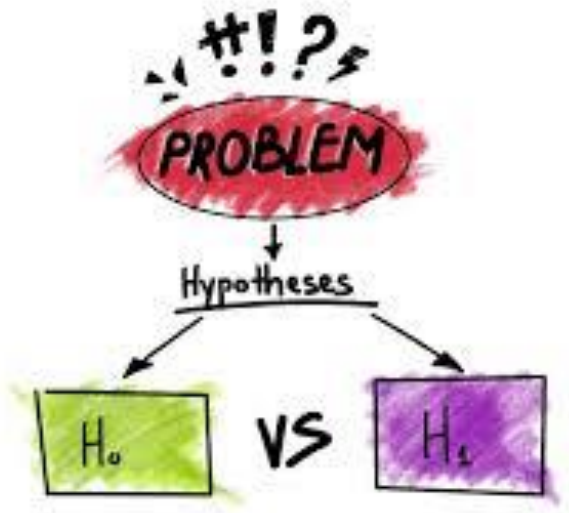
- Brainstorming is a perfect strategy to use when there is a group of people involved in solving the problem.
- This is a great technique since multiple methods to solving a problem come up during discussions. Each member of the group can see how the problem at hand can be solved. Based on their perspectives, they can provide solutions to the problem. These solutions can be combined and developed to form an accurate or optimum solution.



2.3 Hypothesis Testing

- Hypothesis testing is a common statistical method where assumptions are made to explain the problem at hand. The method works towards proving the assumptions that have been made.

- For example, we have to identify if there is a relation between smoking and lung cancer. The problem here is to identify the relationship. The assumption (hypothesis) made could be that there is no relationship between smoking and lung cancer. The alternative to this assumption (hypothesis) is that there is a relation. Since our main assumption is that there is no relation, we have to find certain techniques to prove whether this hypothesis is true or not. That way we will be able to identify a solution to the problem. If there is no connection then we do not have to come up with further solutions. However, if the hypothesis is proved false, we have to identify certain solutions to reduce the effect of smoking on the lungs.



2.4 Lateral Thinking

- Lateral thinking is thinking out of the box. The major barrier to this strategy is the mindset. One cannot think out of the box since he is used to a certain method of solving problems.

- Lateral thinking often obtains solutions which make the problem seem very obvious.

- For example, the production of soap was supposed to be 2000 per hour. Over the last few days, the production dropped to 800 soaps an hour. Through the other strategies you try to identify ways to overcome this problem and increase the production rate. However, it is different in lateral thinking. The solution to the problem might state that there is no harm in a drop in production since this would mean that the quality of the soap has increased. This increase in quality would mean a greater number of sales implying a higher profit. This would in turn motivate the workers and the employees to do better!

2.5 Means End Analysis

- In means end analysis you create sub goals in order to reach the final goal. You try to bridge the gap between the initial state and the final goal state. There are many examples to this method of problem solving that are very popular. One of the best examples is the 'Towers of Hanoi'.

- While using this strategy you have to identify the initial state and also your final goal. The initial state to this problem is represented by the first three disks of the tower being stacked in the order of the size of the disk on the first peg, also called the start peg. The goal is to represent these disks being stacked on the last peg, or the end peg, which is the third peg. This must be done in exactly the same order!

- The rules to this problem are:

- You can only do this by moving one disk at a time.
- You can only move a disk that is on top of the stack
- You cannot put a bigger disk on top of a smaller disk.

2.5 Means End Analysis

- Since we are using the technique of means end analysis, we will have to first create our sub goals. Below is one possible way of creating sub goals.

- Move the disks that are on the largest peg onto the second peg
- Move the biggest disk to the third peg
- Move the other disks onto the third peg as well.

- This can be applied continuously in order to reduce the magnitude of the problem. You will finally come to a stage where you will only have to move one disk to reach your final goal. You can use this strategy to solve problems that you might face in your daily life as well – identify the correct train connection, correct road map to follow to go on a road trip. You will have to identify every aspect of your journey in order to reach your final goal. These small aspects of your journey are your sub goals.

2.6 Analogy

- Analogies are another common strategy to solve problems. Here similar problems are viewed and solved. Using these solutions the problems that are being faced now can be solved.

- The perfect example for this is the radiation problem that was stated by K. Duncker in the year 1945. When you have a patient with a tumor, you might have to use radiation in order to get rid of the tumor. This ray is harmless. But when the intensity of the ray increases, it kills the tumor inside the body but also harms the other healthy tissue that comes in its way. The problem here was to identify how to prevent the latter. When the experiment was conducted on a certain number of subjects, they were asked to identify a solution to the same problem. They were stumped and could not identify a solution. The problem was then restructured. The subjects were told a story that went along these lines:

It was then stated that this strategy was a three step strategy:

1. Notice- You will have to try to identify or notice an analogical connection that might exist between the source of the problem and the target problem.
2. Map - Once you identify the problems, you will have to map the attributes in the analogous problem to the problem at hand.
3. Apply - You will have to then use the solution that was used in the source problem to solve the target problem.

2.7 Proof

- In this strategy you have to be pessimistic in the beginning and state that the problem cannot be solved. You will then have to prove why this problem cannot be solved. The minute you reach the stage where you find that it is difficult to prove your assumption, you will have to begin solving the problem.

2.8 Reduction

- Reduction is a combination of both Abstraction and Analogy. You will have to break the problem down through abstraction and by using analogy you will have to identify solutions to those smaller problems. Using these solutions, a consolidated solution is found for the bigger problem.

2.9 Trial and Error

- Trial and error is one of the most common strategies that are used to solve problems. However, this is very tedious and might take a lot of time.

- Here you will have to try and use all the different solutions that you might find to solve a problem. You will have to see which solution worked best to solve the problem. You might not find the accurate solution in the first go. The barrier, mindset, might actually prove helpful in this situation. You can use all the solutions that you are used to in order to solve the problem at hand.

2.10 Six Thinking Hats

- Individual approaches to solving a problem can be very different based on what team or role an individual holds. It can be easy for existing biases or perspectives to find their way into the mix, or for internal politics to direct a conversation.

- Six Thinking Hats is a classic method for identifying the problems that need to be solved and enables your team to consider them from different angles, whether that is by focusing on facts and data, creative solutions, or by considering why a particular solution might not work.

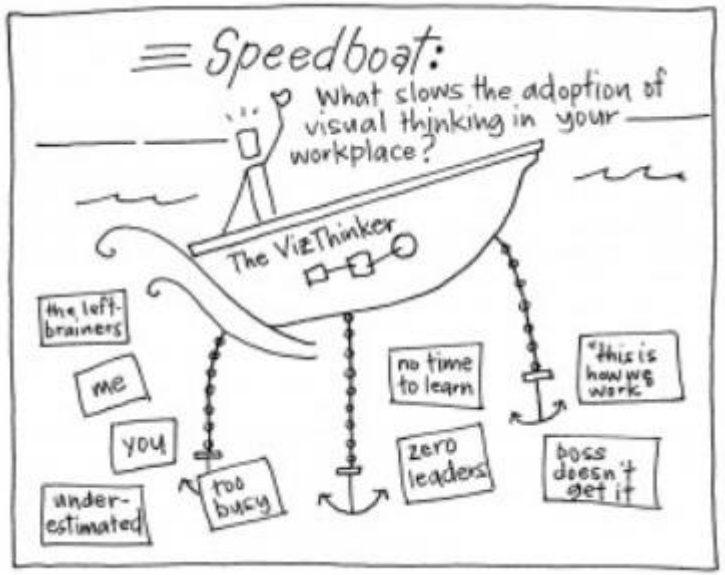
https://www.sessionlab.com/methods/the-six-thinking-hats

2.11 SWOT Analysis

- This problem-solving method focuses on identifying strengths, weaknesses, opportunities, and threats is a tried and tested method for both individuals and teams.
- Start by creating a desired end state or outcome and bare this in mind – any process solving model is made more effective by knowing what you are moving towards. Create a quadrant made up of the four categories of a SWOT analysis and ask participants to generate ideas based on each of those quadrants.
- Once you have those ideas assembled in their quadrants, cluster them together based on their affinity with other ideas. These clusters are then used to facilitate group conversations and move things forward

2.12 Speed boat

- Speed Boat is a short and sweet activity that can help a team quickly identify what employees, clients or service users might have a problem with and analyze what might be standing in the way of achieving a solution.
- Methods that allow for a group to make observations, have insights and obtain those eureka moments quickly are invaluable when trying to solve complex problems.
- In Speed Boat, the approach is to first consider what anchors and challenges might be holding an organization (or boat) back. Bonus points if you are able to identify any sharks in the water and develop ideas that can also deal with competitors!



2.12 Activity

In a white space visible to the players, draw a boat with anchors attached and name the boat after the product/service or goal under discussion. This picture is the metaphor for the activity—the boat represents the product/service or goal and the anchors represent the obstacles slowing the movement toward a desired state.
Write the question under discussion next to the boat. For example, “What are the features you don’t like about our product?” or “What’s standing in the way of progress toward this goal?”

Flow

1. Introduce Speedboat as a game designed to show what might be holding a product/service or goal back. Ask the players to review the question and then take a few minutes to think about the current features of the product/service or the current environment surrounding the goal.
2. Next, ask them to take 5–10 minutes and write the features of the product/service they don’t like or any variables that are in the way on sticky notes. If you’d like, you can also ask the players to estimate how much faster the boat would go (in miles or kilometers per hour) without those “anchors” and add that to their sticky notes.
3. Once they are finished, ask them to post the sticky notes on and around the anchors in the picture. Discuss the content on each sticky note and look for observations, insights, and “ahas”. Notice recurring themes, because they can show you where there’s consensus around what’s holding you back.

Questions

What strategy has the team used below to solve the problem?

A company that provides customer support services to a range of clients is struggling to keep up with the increasing volume of customer inquiries. The company's customer service team is finding it difficult to manage the diverse range of issues that customers are reporting. As a result, the company is experiencing a high rate of customer churn.

The company decides to solve the problem by streamlining its customer support process. The team begins by identifying the most common issues that customers are reporting and grouping them into categories. They then develop a standardized set of responses to each category of issue. This enables the customer service team to quickly identify the issue and respond with a pre-approved response, reducing the time taken to resolve the issue. As a result, the company sees a significant reduction in customer churn and an increase in customer satisfaction.

Questions

Which strategy would be more effective in the below scenario?

A marketing team is tasked with designing a new marketing campaign to promote a product. The team is unsure which marketing channels i.e social media, direct mail, email marketing,etc will be most effective in reaching the target audience.