Creative Problem Solving &
Critical Thinking

What is a Problem?

- Random House Unabridged Dictionary includes several definitions for the word “problem.” The definitions that we are most concerned with while learning about the creative problem solving process are:
  - “Any question or matter involving doubt, uncertainty, or difficulty,” and
  - “A question proposed for solution or discussion”
What is Creative Problem Solving?

• Creative problem solving involves creativity
• Problem solvers come up with solutions that are innovative, rather than obtaining help to learn the answers or implementing standard procedures
• Creative problem solving process is at work anytime you identify solutions that have value or that somehow improve a situation for someone

Steps in the Creative Solving Process?

1. Information Gathering, or understanding more about the problem before proceeding
2. Problem Definition, or making sure you understand the correct problem before proceeding
3. Generating Possible Solutions using various tools
4. Analyzing Possible Solutions, or determining the effectiveness of possible solutions before proceeding
5. Selecting the Best Solution(s)
6. Planning the Next Course of Action (Next Steps), or implementing the solution(s) (not discussed)
Examples of a **SIGNIFICANT** Lack of Critical Thinking

(On September 17, 1994, Alabama's Heather Whitestone was selected as Miss America 1995.)

**Question:** If you could live forever, would you and why?

**Answer:** "I would not live forever, because we should not live forever, because if we were supposed to live forever, then we would live forever, but we cannot live forever, which is why I would not live forever."

--Miss Alabama in the 1994 Miss USA contest.

"Whenever I watch TV and see those poor starving kids all over the world, I can't help but cry... I mean I'd love to be skinny like that, but not with all those flies and death and stuff."

--Mariah Carey
"Smoking kills. If you're killed, you've lost a very important part of your life,"
-- Brooke Shields, during an interview to become spokesperson for federal anti-smoking campaign

"The word "genius" isn't applicable in football. A genius is a guy like Norman Einstein."
-- Joe Theismen, NFL football quarterback & sports analyst.

"Outside of the killings, Washington has one of the lowest crime rates in the country."
-- Mayor Marion Barry, Washington, DC.

Step 1: Information Gathering
Understanding Types of Information

There are many different types of information. The following list includes information you will need to consider when beginning the creative problem solving process:

- Fact
- Opinion
- Opinionated Fact
- Concept
- Assumption
- Procedure
- Process
- Principle

Identifying Key Questions

Here are some examples of more specific questions:

- Who initially defined the problem?
- What is the desired state?
- What extent is the roof being damaged?
- Where is the water coming from?
- When did the employee finish his training?
- How can we increase our market share?
- Which equipment is working?
Defining the Problem

Four tools to use in defining the problem are:
1. Determining where the problem originated
2. Defining the present state and the desired state
3. Stating and restating the problem
4. Analyzing the problem

You may not use all of these tools to help define a problem. Different tools lend themselves to some kinds of problems better than other kinds.
Determining Where Problem Originated

Successful problem solvers get to the root of the problem by interviewing or questioning anyone who might know something useful about the problem. Ask questions about the problem, including questions that:

• Clarify the situation
• Challenge assumptions about the problem
• Determine possible reasons and evidence
• Explore different perspectives concerning the problem
• Ask more about the original question

Where the Problem Originated – Root Cause Analysis
# Root Cause Analysis Defined

- Identification of why an issue occurred (versus only identifying or reporting on the issue itself)
- In this context, an issue is defined as a problem, error, instance of noncompliance, or missed opportunity
- Process of determining the causes that led to a nonconformance, event or undesirable condition and identifying corrective actions to prevent recurrence which (when solved) restores the status quo or establishes a desired effect

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# Purpose

- Root Cause Analysis helps to identify what, how, and why something happened, thus preventing recurrence
- Root causes are underlying, are reasonably identifiable, can be controlled by management and allow for the generation of recommendations
- The process involves data collection, cause charting, root cause identification, recommendation generation and implementation
- Only when you are able to determine why an event or failure occurred will you be able to specify workable corrective measures
Critical Thinking Break - Pork What?

The Damaging Effects of Preconceived Notions

Where the magic happens

Your comfort zone
What are Preconceived Notions?

Opinion formed beforehand without adequate evidence

- Could be based on experience
- Could be based on “what you heard”
- Could be based on what you have seen
- Prejudice
- Stereotypes

“Preconceived Notions are the locks on the door to Wisdom.”

Why are they Damaging?

- Look at the Definition! – Opinion without Evidence (this is NOT auditing)
- Lead to negative and critical beliefs
- Lead to beliefs that are not always accurate
- Lead to close-minded thinking (this is the way it is and has to be)
RCA Guidelines to Success

• Use a systematic approach
• Knowledge of the business process
• Treat it as part of the audit plan
• Remember, even a great RCA will never prevent a problem from happening...

• Consider the possibility of more than one root
• Maintain your objectivity and integrity
• Stop talking... LISTEN
• Find the cost-benefit point

The Y's
Five Why’s Preparation

Five Why’s is a Root Cause Analysis Tool; Not a problem solving technique. The outcome of a 5 Why’s analysis is one or several root causes that ultimately identify the reason why a problem was originated. There are other similar tools as the ones mentioned below that can be used simultaneously with the 5 Why’s to enhance the thought process and analysis.

Root Cause analysis Tools (previously mentioned)
- Ishikawa Charts (Fish Bone)
- Design of Experiments
- Is / Is not Analysis
- Five Why’s
- Cause & Effect Diagram
- Statistical Data Analysis (Paretto Charts)

Five Why’s Preparation

- Any 5 Why’s must address two different problems at the same time. The first part is related to the process that made the defective part. [WHY MADE OR WHY DID THIS INITIALLY HAPPEN?]  
- The second one must address the detection system that was not able to detect the defective part before it became a problem. The lack of detection of a defective product is a problem of its own and must be treated independently than the product problem itself. [WHY NOT DETECTED?]  
- If you do not follow a regimented process, we tend to lose focus and grab at the first or second why.
5 Why’s – The First Why

- Clear statement of the reason for the defect or failure to occur, understood even by people that is not familiar with the operation where the problem took place
- Often this 1st Why must be a short, concise sentence that plainly explains the reason
- Do not try to justify it, there will be time to do that later on in the following why’s if it is pertinent to the thought process. It is Okay to write it down even if it seems too obvious for you. (It may not seem that obvious to other persons that will read the document)

Five Why’s – Transitional Causes

- More concise explanation to support the first statement
- Get into the technical arena, the explanation can branch out to several different root causes here
  - OK to follow each of them continuing with their own set of remaining five why’s and so forth
The Fifth Why
= Root Cause (POSSIBLE OPTIONS)

- You may be missing the obvious by rushing into “logical” explanations
- Do not jump to conclusions yet, follow the regular thought process even though some underlying root causes may start surfacing already
  - Watch out for preconceived notions
  - Watch out for assumptions
- This fifth why is critical for a successful transition between the obvious and the not so obvious.
  - Visualize the process where the product went through (process mapping) and narrow down the most likely sources for the problem to occur
- Goal – Find the **systemic cause**

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Five Why’s – Conclusion

- Good way to identify if the Five Why’s was done properly is to try to organize the collected data in one sentence and define it in an understandable manner
- If this cannot be done or the sentence is fragmented or meaningless chances are that there is gap between one or several of the why’s.

“Problem Description” occurred due to “Fifth Why”. This was caused by “Fourth Why” mainly because of the “Third and Second Why”, and this led to “First Why”
CT – Exercise

DIVERGENT THINKING

I occur once in a morning, twice in an afternoon, and never at night.

What am I?

Now Lets Exercise!

What is the Root Cause of Traffic Problems in this Area?
Discussion – What are the 3-5 Root Causes that Most Audit Issues would fit into?

Step 3: Generating Solutions
Where are the Best Solutions?

- Client
  - Transparency
  - Trust
  - Open-ended questions
- Brainstorming
- Mind Mapping

Avoiding Groupthink

Explore different scenarios
Encourage each member of the team to be a critical evaluator, allowing them to openly question ideas and propose alternatives
Leaders should deliberately not express their opinion when asking a group to find a solution to a problem
Invite outside experts into the meeting and take their opinions seriously. Allow the group members to speak with the experts individually and privately if they desire
If the decision is major enough, instruct several different groups to solve the same problem simultaneously but independently of each other
Assign at least one group member to deliberately play the role of devil's advocate
Step 4: Analyzing Possible Solutions

Analyzing Wants and Needs

- Needs are items the potential solution absolutely must meet. If the potential solution does not meet a need requirement, you can disregard it from further analyzing.

- Wants are nice to have items. You can provide a weight to each item to indicate its importance. For each potential solution, you can provide a rating for how well the solution addresses the selected want. Multiply the rating by the weight of the want to score the potential solution.
Using Cost/Benefit Analysis

• Cost – benefit analysis is a method of assigning a monetary value to the potential benefits of a solution and weighing those against the costs of implementing that solution.
• It is important to include ALL of the benefits and costs. This can be tricky, especially with intangible benefits (or costs). Some benefits or costs may be obvious, but others may take a little digging to uncover.

Doing a Final Analysis

• For each potential solution, you must weigh the potential advantages and disadvantages. Consider the compatibility with your priorities and values. Consider how much risk the solution involves. Finally, consider the practicality of the solution. It may be helpful to create a map for each solution that addresses all of the relevant issues.
• Consider the potential results of each solution, both the immediate results and the long-term possibilities.
• In the final analysis, you will refine your shortlist and keep re-refining it until you determine the most effective solution.
Analyzing Potential Problems

- Brainstorm for potential problems related to the solution. Consider how likely potential problems might occur and how serious they are. These potential issues can then be evaluated as needs and wants along with the other criteria for evaluating the solution.

- Sometimes this analysis can uncover a potential hardship or opportunity that changes the criteria, problem definition, or other aspects of the problem solving process. Remember to be flexible and revisit the other stages of the process when necessary.

CT - Exercise

Tom left home quickly. After running for a while, he turned left, ran a little further, turned left again, ran even further, and made one more left turn. Running as fast as he could, Tom headed towards home. When he got there, a masked man was waiting for him. Who was this man?
CT Exercise: Perception v. Reality
Count the # of F’s in the Below Sentence

FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS

The Critical Thinking Process

Stages are not linear, and may overlap

1. Identify Assumptions
2. Check Accuracy & Validity
3. Take alternative Perspectives
4. Take Informed Actions
Steps to Critical Thinking

1. Identify Existence of Assumptions
   - What is fact versus fiction?
   - What is assumed versus known?

2. Assessing their Accuracy and Validity of Assumptions
   - Do these assumptions make sense?
   - Do these assumptions fit reality as we understand and live it?
   - Under what conditions do these assumptions seem to hold true? Under what conditions do they seem false?

3. Consider all Alternatives/Varying Perspectives

4. Informed Action

CT Exercises – Key Controls
Strategies to Identify Key Controls

- Discussion with Auditee (what do they rely on?)
- Controls that address three or more control objectives
- Review process flows and review for controls that if that control failed, the risk would not be mitigated
- If control objective is not addressed, control gap (risk is not mitigated = key control is missing)
Auditing a New Area

You have been asked by Management to perform an operational review of an area that you have no experience in and has never been audited before.

Where do you start?

Summary – Problem Solving & RCA

- Always attempt to question the obvious, do not assume and never stop attempting to improve
- If not, you might end up like this:

"It isn't pollution that's harming the environment. It's the impurities in our air and water that are doing it..."

--Al Gore, Vice President