

BENEFITS OF ROOT CAUSE ANALYSIS



OBJECTIVES

- Define Root Cause Analysis (RCA)
- Principles
- The Process and Steps
- Tools
- Examples
- Benefits

RCA CREATOR



Sakichi Toyoda

1867 – 1930

Toyota Industries

Toyota Group

Toyoda Boshoku Corporation

5 Whys

DEFINITION

- Root cause analysis (RCA) is a class of problem solving methods aimed at identifying the root causes of problems or events.
- RCA is based on the belief that problems are best solved by attempting to correct or eliminate root causes, as opposed to merely addressing the immediately obvious symptoms.

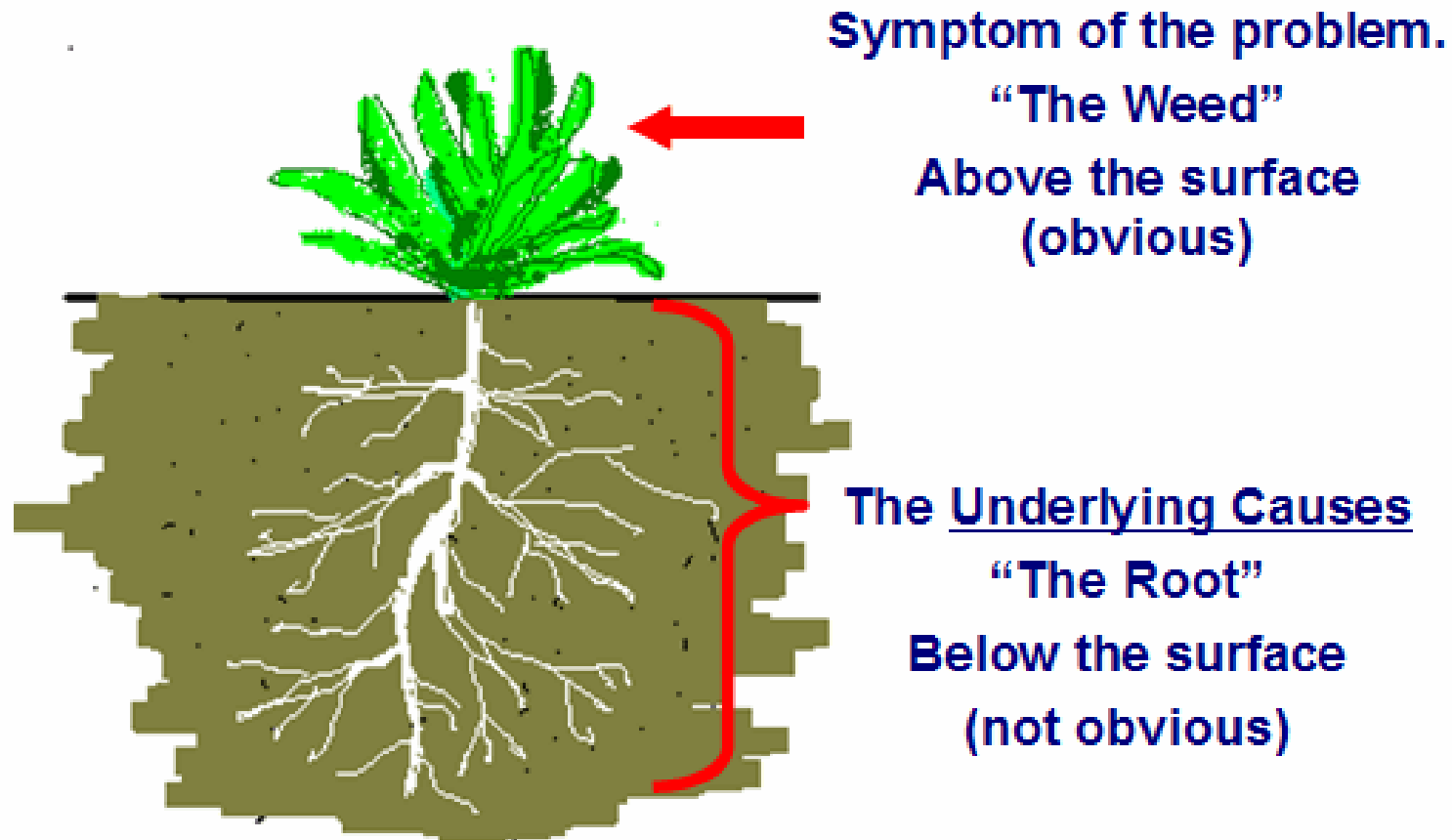
WHAT IS ROOT CAUSE ANALYSIS?

- A standard process of:
 - identifying a problem
 - containing and analyzing the problem
 - defining the root cause
 - defining and implementing the actions required to eliminate the root cause
 - validating that the corrective action prevented recurrence of problem

PRINCIPLES OF RCA?

- Aiming corrective actions at root causes is more effective than just treating the symptoms of a problem.
- To be effective, RCA must be performed systematically and conclusions must be backed up by evidence.
- There is usually more than one root cause for any given problem and therefore there may be more than one corrective action.

Root Cause Analysis Basics



Symptom of the problem.

“The Weed”

**Above the surface
(obvious)**

The Underlying Causes

“The Root”

**Below the surface
(not obvious)**

The word root, in root cause analysis, refers to the underlying causes, not the one cause.

BUT WHO'S TO BLAME?

- The “no blame” environment is critical
- Most human errors are due to a process error
- A sufficiently robust process can eliminate human errors
- Placing blame does not correct a root cause situation
 - Is training appropriate and adequate?
 - Is documentation available, correct, and clear?
 - Are the right skillsets present?

CASE STUDY #1



CAUSE ANALYSIS

- Driver Statement: While backing up I misjudged the location of the tree.
- Safety Committee Findings: Driver failed to utilize the functioning backup camera to determine the location of the tree and failed to identify the visual cues on the monitor.
- Root Cause: Driver had turned down the audible alert on the camera system associated with the visual cues.

RCA.....WHERE DO WE BEGIN?

- Internal Audit can be the ideal group to analyze issues and identify root causes given their independence and objectivity. This perspective helps ensure biases are minimized, assumptions are challenged, and evidence is fully evaluated.

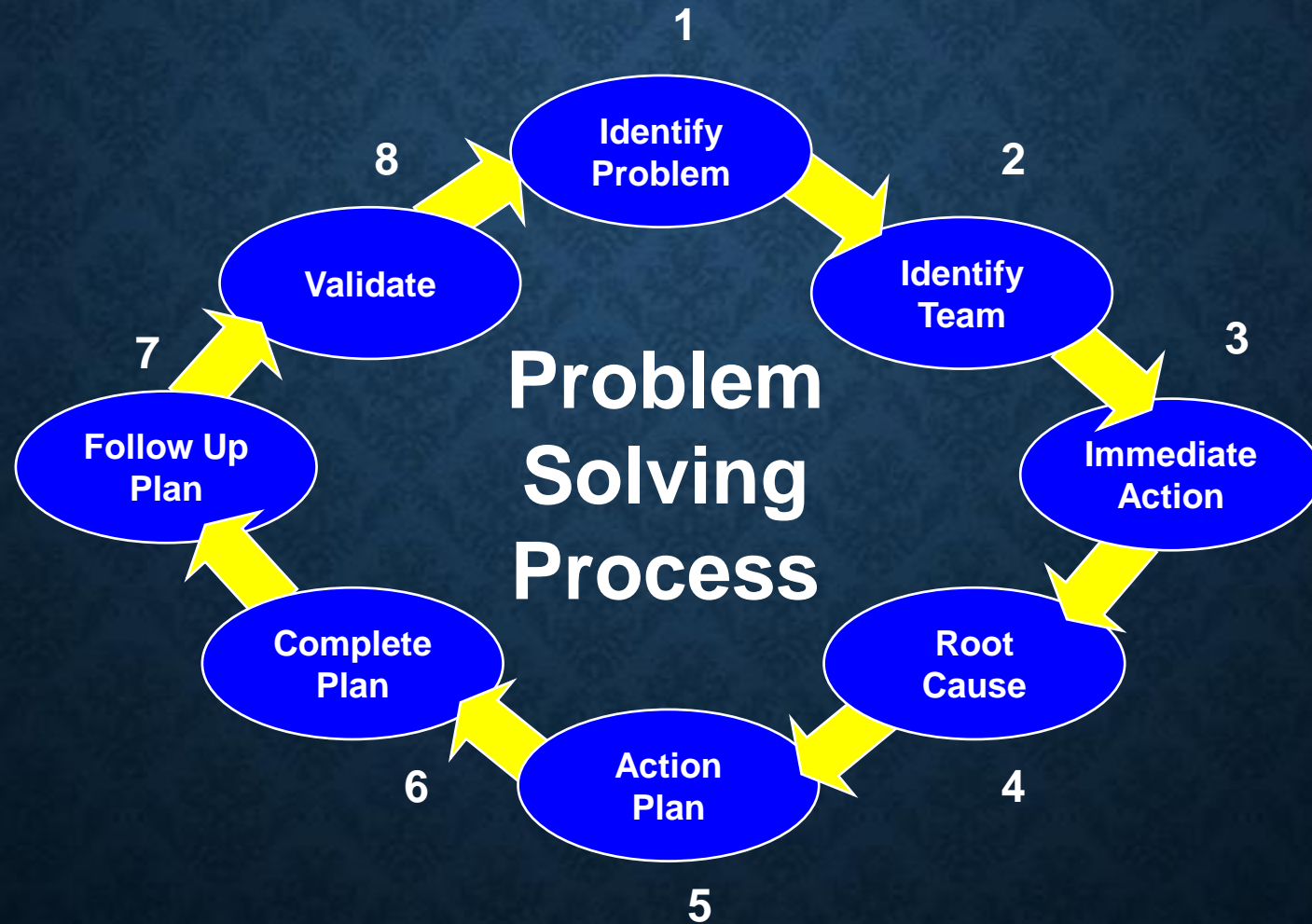
DETERMINE TEAM

- Team members:
- Team Leader – Terry
- Inspector – Jane
- Worker – Tammy
- Worker - Joe
- Quality Eng – Rob
- Engineer – Sally

There are several key roles on an 8-Step team

Sponsor	<ul style="list-style-type: none"> ▪ Defines 'high level' team ▪ Links team mission to organizational objectives ▪ Addresses cross-organizational issues ▪ Sets expectations for project status readouts & updates
Facilitator	<ul style="list-style-type: none"> ▪ Provides guidance through the problem solving process ▪ Guides the team discussions; stays objective and neutral ▪ Ensures everyone participates ▪ Requests reviews with Leader/Sponsor for effectiveness ▪ Adjusts direction when necessary ▪ Coaches & teaches sponsor, leader and members in the 8-Step process
Team Leader	<ul style="list-style-type: none"> ▪ Creates an environment of trust, open communication and creative thinking ▪ Provides the team with a vision of the project objectives ▪ Coaches & helps develop team members; help resolve dysfunctional behavior ▪ Maintains all pertinent data ▪ Intervenes when necessary to aid the group in resolving issues ▪ Communicates progress to Management, Status Meetings ▪ Plans team recognition/rewards
Scribe	<ul style="list-style-type: none"> ▪ Captures meeting minutes ▪ Sends progress report as agreed; highlights any open actions
Team member	<ul style="list-style-type: none"> ▪ Provides ideas, discussion, data, direct observation ▪ Have decision-making power
Coach	<ul style="list-style-type: none"> ▪ Problem solving process Subject Matter Expert (SME) ▪ Provides guidance on the 8 Step process ▪ Checks in with Team, Facilitator, Leader

PROBLEM SOLVING PROCESS



GENERAL PROCESS FOR PERFORMING ROOT CAUSE ANALYSIS

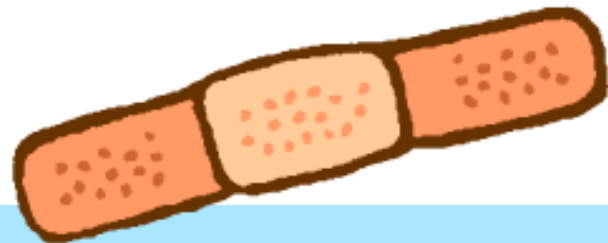
1. Define the problem.
2. Gather data/evidence.
3. Identify issues that contributed to the problem.
4. Find root causes. Identify which causes to remove or change to prevent repeated problem.
5. Develop solution recommendations that effectively prevent repeating the problem.
6. Implement the recommendations / changes.
7. Observe the recommended solutions/changes to ensure effectiveness of eliminating the problem.

Symptom Approach vs. Root Cause

- If we do a poor job of identifying the root causes of our problems, we will waste time and resources putting bandaids on the *symptoms* of the problem.

Symptom Approach

- “Errors are often a result of worker carelessness.”
- “We need to train and motivate workers to be more careful.”
- “We don’t have the time or resources to really get to the bottom of this problem.”



Root Cause

- “Errors are the result of defects in the system. People are only part of the process.”
- “We need to find out why this is happening, and implement mistake-proofs so it won’t happen again.”
- “This is critical. We need to fix it for good, or it will come back and burn us.”



TOOLS FOR RCA

- 5 whys
- Perato Chart
- Fishbone or Ishikawa Diagram
- Chart and/or Graphs

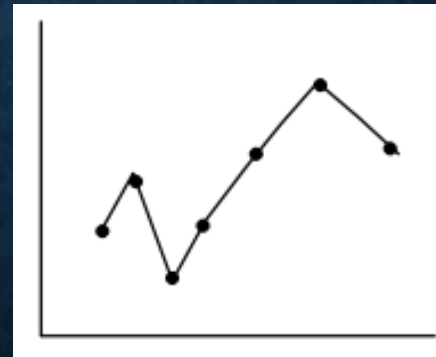
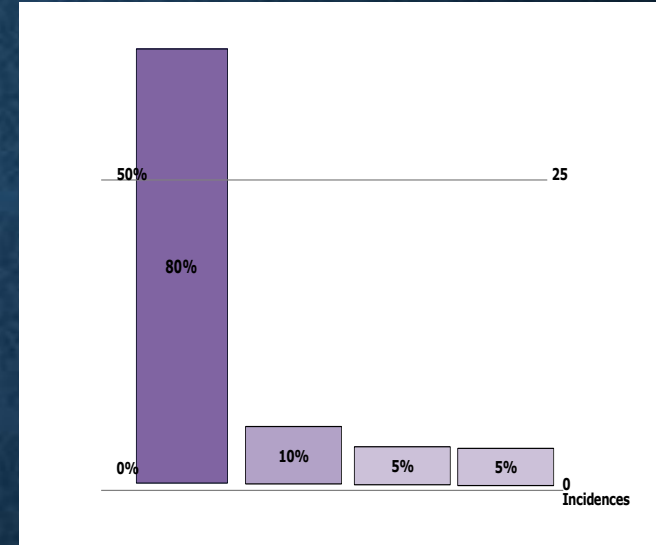
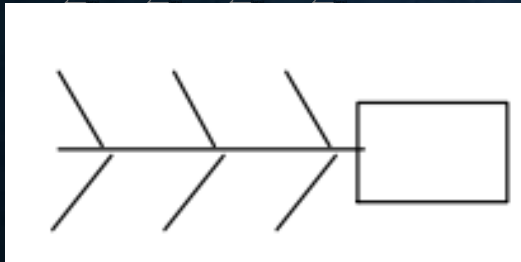
Why?

Why?

Why?

Why?

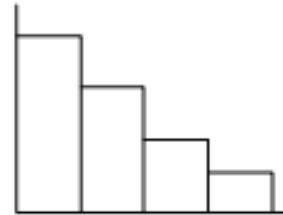
Why?



Tools Used in Root Cause Analysis



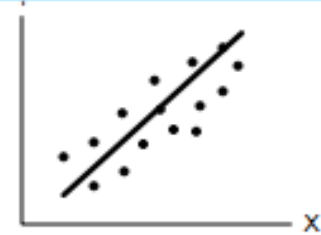
BRAINSTORMING



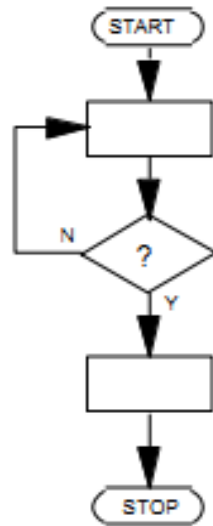
PARETO CHART



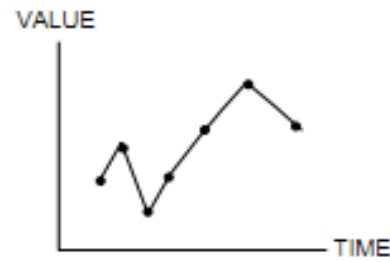
FISHBONE DIAGRAM



SCATTER DIAGRAM



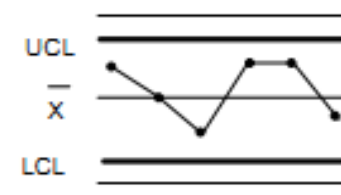
FLOWCHART



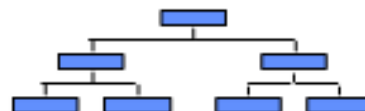
RUN CHART



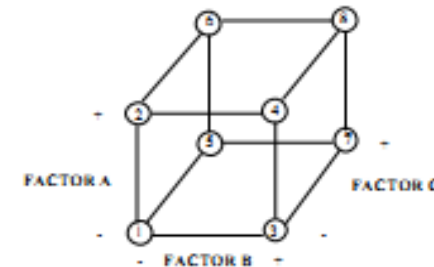
HISTOGRAM



CONTROL CHARTS



TREE DIAGRAM



DESIGN OF EXPERIMENTS

BASIC ELEMENTS OF ROOT CAUSE

- **Materials**

- Defective raw material
- Wrong type for job
- Lack of raw material

- **Man Power**

- Inadequate capability
- Lack of Knowledge
- Lack of skill
- Stress
- Improper motivation

- **Machine / Equipment**

- Incorrect tool selection
- Poor maintenance or design
- Poor equipment or tool placement
- Defective equipment or tool

- **Environment**

- Orderly workplace
- Job design or layout of work
- Surfaces poorly maintained
- Physical demands of the task
- Forces of nature

BASIC ELEMENTS OF ROOT CAUSE (cont.)

- Management

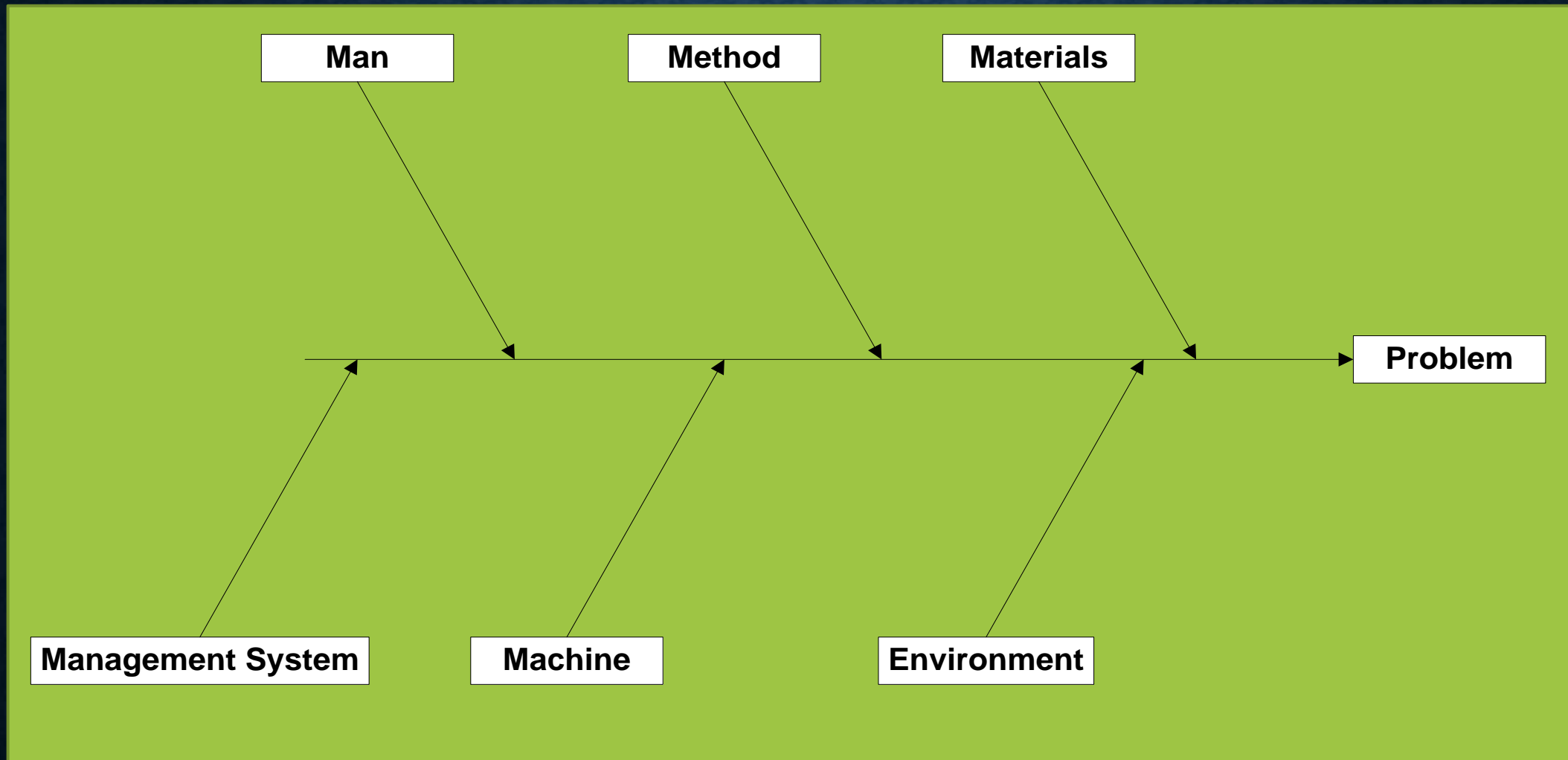
- No or poor management involvement
- Inattention to task
- Task hazards not guarded properly
- Other (horseplay, inattention....)
- Stress demands
- Lack of Process

- Methods

- No or poor procedures
- Practices are not the same as written procedures
- Poor communication

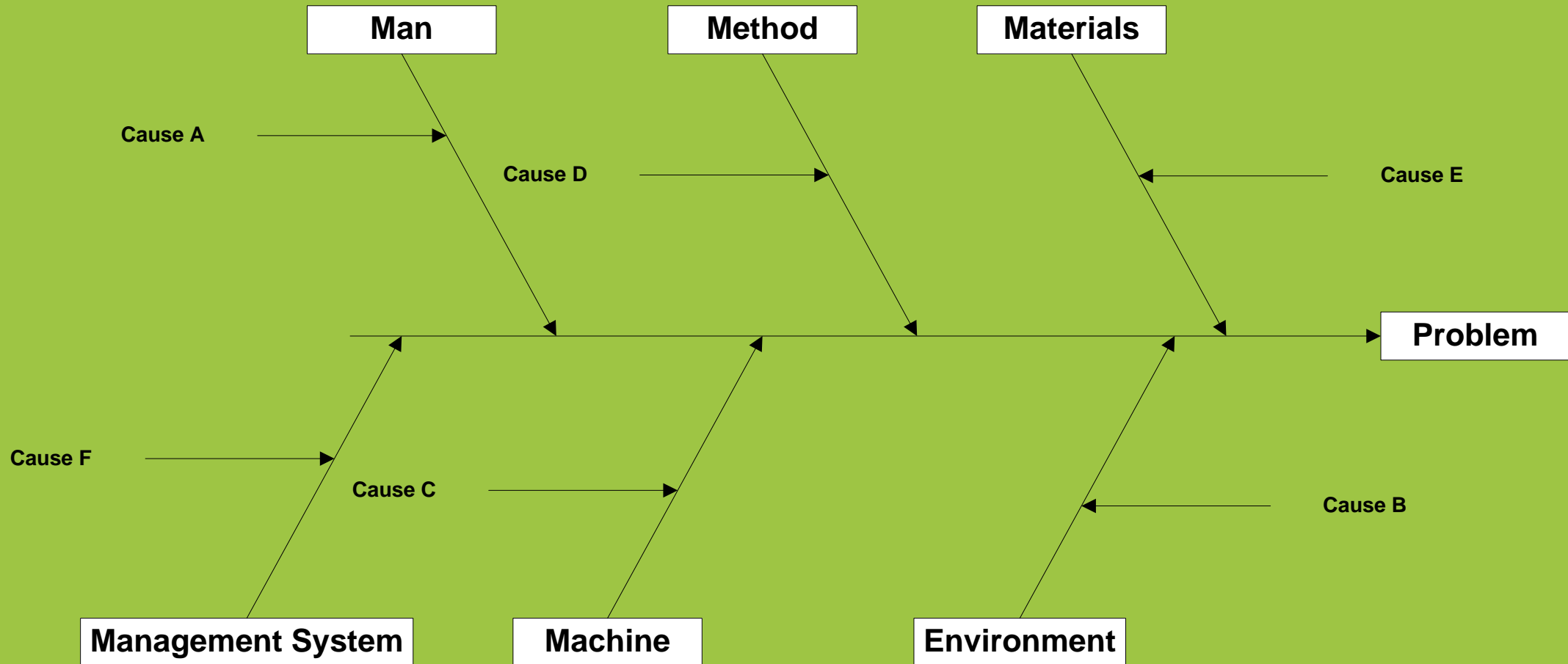
- Management system

- Training or education lacking
- Poor employee involvement
- Poor recognition of hazard
- Previously identified hazards were not eliminated



**Ishikawa or Fishbone Diagram
(Cause and effect)**

BRAIN STORM POSSIBLE CAUSES



CASE STUDY #2



CAUSE ANALYSIS

- Driver Statement: I thought the driver in front of me started moving so I started moving. I tried to stop, only moved about 3 feet and tried to stop before hitting the car.
- Safety Committee Findings: Driver failed to look up or forward to see that the traffic directly in front of the truck had not moved.
- Root Cause: Driver must have been distracted by phone, route sheet or something taking his eyes of the road directly in front of the truck.

CAUSE MAPPING OF ROOT CAUSE ANALYSIS

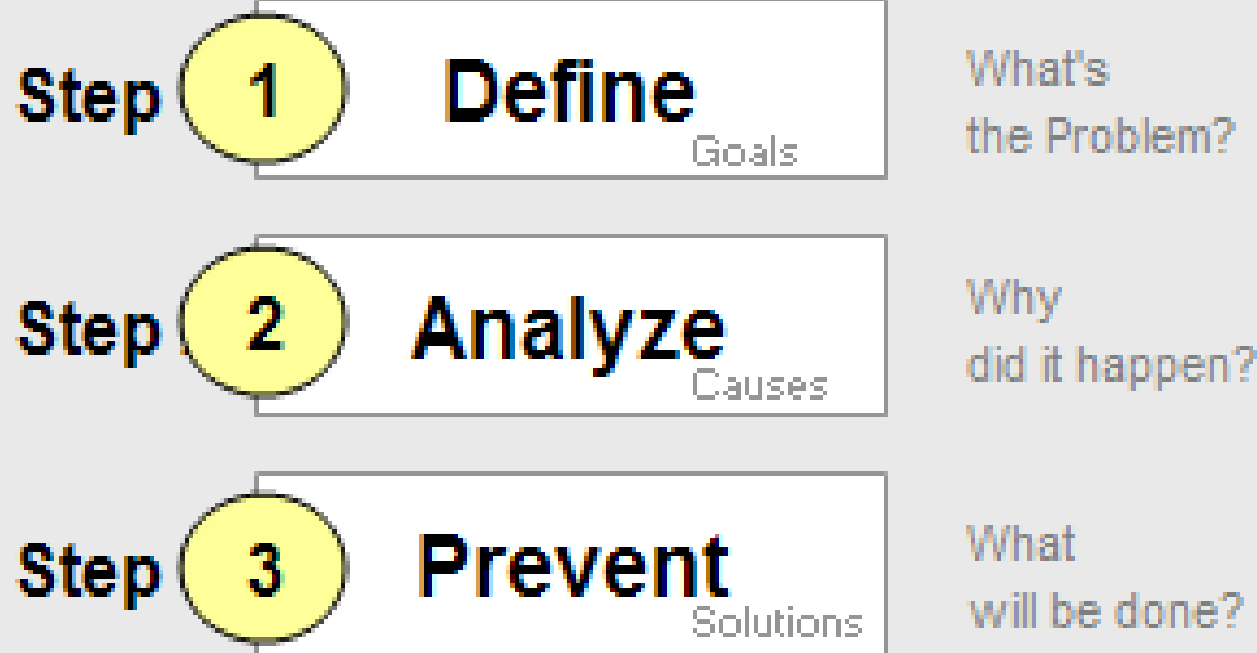
- “**ROOT**” refers to the causes beneath the surface. It is the system of causes that shows all the options for solutions.
- Do not focus on a single cause as this can limit the solutions set resulting in missing a better solution.
- A Cause Map provides a simple visual look at all the elements that produced the problem.

THREE BASIS STEPS OF CAUSE MAPPING

1. Define the issue by its impact to overall goals
2. Analyze the cause in a visual map.
3. Prevent or mitigate any negative impact of the goals by selecting the most effective solutions.

CAUSE MAPPING

Problem Solving • Incident Investigation • Root Cause Analysis



5 WHYS ???

- Why ?
- Why ?
- Why ?
- Why ?
- Why ?

Root Cause Analysis

Example #1

EXAMPLE #1

Identify Problem

A manager walks past the assembly line and notices a puddle of water on the floor. Knowing that the water is a safety hazard, she asks the supervisor to have someone get a mop and clean up the puddle. The manager is proud of herself for “fixing” a potential safety problem.

EXAMPLE #1

But What is the Root Cause?

The supervisor looks for a root cause by asking 'why'?

IMMEDIATE ACTION

Knowing that the water is a safety hazard, the manager asks the supervisor to have someone get a mop and clean up the puddle.

ROOT CAUSE

5 Why's

Puddle of water on the floor

Why?



ROOT CAUSE

Puddle of water on the floor



Leak in overhead pipe

Why?



ROOT CAUSE

Puddle of water on the floor



Leak in overhead pipe



Water pressure is set too high

Why?



ROOT CAUSE

Puddle of water on the floor



Leak in overhead pipe



Water pressure is set too high



Water pressure valve is faulty



Why?

ROOT CAUSE

Puddle of water on the floor



Leak in overhead pipe



Water pressure is set too high



Water pressure valve is faulty



Valve not in preventative maintenance program

Root Cause

CORRECTIVE ACTION

- Permanent – Water pressure valves placed in preventative maintenance program.
- Preventive - Developed checklist form to ensure new equipment is reviewed for possible inclusion in preventative maintenance program.

CASE STUDY #3



CAUSE ANALYSIS

- Driver Statement: As I started backing up people walked behind the truck. I had to stop. When they passed I continued backing up looking at my mirrors and camera and I backed into the vehicle sitting in the driveway.
- Safety Committee Findings: Driver failed utilize the backup camera to see that the driveway was not clear and the pickup truck was sitting in the driveway preparing to back into an available parking space.
- Driver Appeal Statement: The driver explained that he was in a no win situation and that he was either going to hit the truck or the nearby citizens.
- Root Cause: Driver failed to utilize the backup camera and assumed the red truck had turned the corner and continued without stopping.

BENEFITS OF A ROOT CAUSE ANALYSIS

- Employee Safety
- Financial Impact
- Production Time
- Eliminate Reoccurrence

BENEFITS OF A ROOT CAUSE ANALYSIS

By eliminating the root cause...

You save time and money, prevent injury, etc.!

- Problems are not repeated
- Problems are prevented in other areas
- Communication improves between groups
- Secure long term company performance and profits

GENERAL BEST PRACTICES FOR ROOT CAUSE ANALYSIS

- **Make the aim of Root Cause Analysis to determine how to fix a particular problem and other related problems.**
- **Your root cause analysis is only as good as the info you collect.**
- **Use Root Cause Analysis in a systematic way.**
- **Remember a problem can have more than one root cause.**
- **You can't solve all human performance problems with discipline, training, and procedures.**
- **Keep cost in mind when determining a fix to a problem.**
- **Keep in mind a fix needs to be sustained.**
- **Understand that Root Cause Analysis can cause a change to a culture and resistance from those who will implement the change.**

SUMMARY

- **Root Cause Analysis is a method to focus our efforts on the true “Root Causes” of escapes, so that we truly prevent their reoccurrence.**
- **The benefits of RCA are that it uncovers relationships between causes and symptoms of problems, works to solve issues at the root itself, and provides tangible evidence of cause and effect and solutions.**
- **Each problem is an opportunity. It contains the information needed to eliminate the problem. But to identify the root cause, we have to ask “why?” over and over, until we reach it.**

QUESTIONS?

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