

# Root Cause Analysis Training



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# Outline of Presentation

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- Root Cause analysis-Def
- Tools to identify Root Cause
- Contributing factors
- Example
- Conclusion



# What is a Root Cause ?

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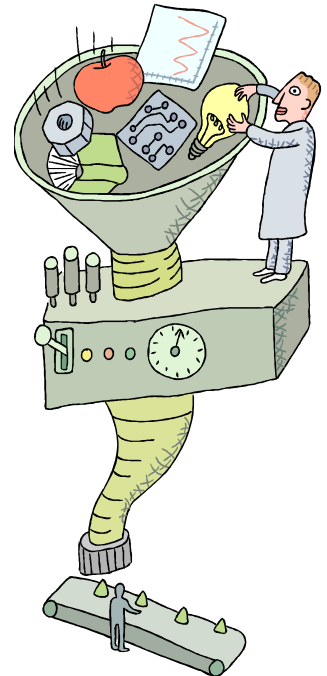
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# What is Root Cause Analysis?

**Root Cause Analysis** is an in-depth process or technique for identifying the **most basic** factor(s) underlying a variation in performance (problem).

***Focus is on:***

- Systems
- Processes
- Individuals





# Why Investigate?

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- Determine **what** happened
- Determine **why it** happened
- Figure out **what to do** to reduce the likelihood that it will happen again

# Root Cause Analysis





# Root Cause Analysis

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- Follows a specific set of steps
  - Define the **problem**
  - Collect **data**
  - Identify possible causal factors – **5 Whys**
  - Identify **root cause(s)**
  - Recommend and implement **solutions**
  - **Evaluate** solutions (Continuous improvement)



# Define the problem

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- What happened?
- When did it happen?
- Where did it happen?
- What was the impact?





# Problem Definition

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- Define the problem
  - Problem statement clear and accurate
  - Problem defined as the customer sees it
  - Do not add “causes” into the problem statement
- Examples:
  - **GOOD**: Customer received a part with a broken mounting pad
  - **NOT**: Customer received a part that was broken due to improper machining



# Collect Data

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- What **proof** do you have that the problem exists?
- **How long** has the problem existed?
- What is the **impact** of the problem?



# Identify Possible Causal Factors

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- What **sequence of events** lead to the problem?
- What **conditions allow** the problem to occur?
- What **other problems surround** the occurrence of the central problem?



# Contributing factors:

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## Human causes –

- People **did something** wrong
- People **did not do** something that was needed.
- Human **causes** typically lead to physical causes  
(e.g. no one filled the brake fluid, which lead to the brakes failing)



# Contributing factors:

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- **Physical causes**

- Tangible
- Material items failed in some way
  - (e.g car's brakes stopped working)

- **Organizational causes**

- A system, process, or policy is faulty
  - (e.g no one person was responsible for vehicle maintenance, and everyone assumed someone else had filled the brake fluid)



# Where to look for contributing factors

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- 1) **Tasks**...policy procedures, guidelines
- 2) **Environment** and site conditions (weather, noise, air)
- 3) **Materials**/equipment
- 4) **Personnel** (training, stress, fatigue, experience)
- 5) **Management** (supervision, inspections, action plan follow-up)

# Useful Tools For Determining Root Cause are:



- The “5 Whys”
- Pareto Analysis (Vital Few, Trivial Many)
- Brainstorming
- Flow Charts / Process Mapping
- Cause and Effect Diagram
- Tree Diagram
- Benchmarking (after Root Cause is found)

*Some tools are more complex than others*



# Causal Factor Identification Tools

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- **5 whys** – Ask “why” until you get to the root of the problem
- **Drill Down** – Break down a problem into small, detailed parts to better understand the big picture
- **Cause and Effect Diagrams** – Create a chart of all the possible causal factors, to see where the trouble may have begun





# 5 Whys

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- The answer to the first "why" will prompt another "why" and the answer to the second "why" will prompt another and so on;
- hence the name the "5 Whys" strategy.



# Five Why's – The First Why

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- Clear statement of defect/ failure
- Easily understood by everybody
- 1<sup>st</sup> Why must be a short, concise sentence .
  - Do not try to justify it

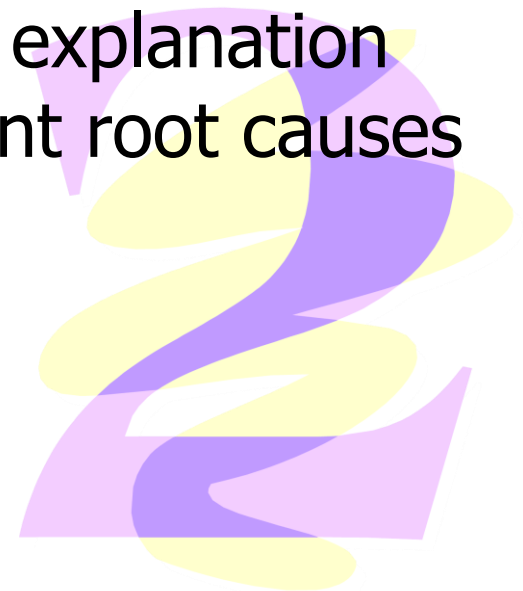




# Five Why's –The Second Why

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- A **more concise** explanation to support the first statement.
- Get into the **technical arena**, the explanation can branch out to several different root causes here.





# Five Why's – The Third Why

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- Some root causes may start surfacing.
- 3<sup>rd</sup> why is critical to differentiate between the obvious and the not so obvious.
- The first two why's - Focus on the **problem area**
- The last three why's- **Understanding** of the problem..

## **N/B**

You may be missing the obvious by rushing into “logical” explanations”.





# Five Why's – The Fourth Why

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- Two or more different avenues to explore .

This is a good time to include a Cause and Effect analysis and look at the 5 M's.

- ❖ Method
  - ❖ Materials
    - ❖ Manning
      - ❖ Machines
        - ❖ Mother Nature





# Five Why's – The Fifth Why

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- May lead you to a systemic cause.
- Address a systemic cause across the entire process
- Detect areas that may be under the same situation





# Identify the Root Cause(s)

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- Why does the causal factor exist?
- What is the real reason the problem occurred?

Use the causal factor identification tools to look at the roots of each factor. These tools are designed to encourage you to dig deeper at each level of cause and effect



# Evaluate Solutions For:

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- Effectiveness
- Ease of Implementation
- Return on Investment (not always applicable especially with Safety Incidents)
- Potential Negative Effects – you don't want your solution to cause other problems

***NB. Evaluate Solutions before you implement them***





# Implementation

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This is essentially your action plan

- How will the solution be implemented?
- Who is responsible for the solution?
- Target dates for completion

## **Use specific language**

Example: purchase **15 3/4"** steel bolts instead of purchase bolts.



# Example

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An employee ,James, in the plant slipped and fell while performing their regular duties.

- 1. Why? – There was oil on the floor.*
- 2. Why? – The machine in that cell was leaking oil.*
- 3. Why? – A pressure fitting on the machine failed.*
- 4. Why? – Inspection of hoses and fittings is not part of the preventive maintenance (PM) schedule.*
- 5. Why? – The PM system does not consider Equipment Manufacturer’s recommendations to develop PM schedules.*



# Example- Problem Identi..

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- We Have Successfully Established:
  - What the problem was
    - *A pressure fitting on the machine failed.*
  - How the problem occurred
    - *Inspection of hoses and fittings is not part of the preventive maintenance (PM) schedule.*
  - Why the system failed
    - *The PM system does not consider Equipment Manufacturer's recommendations to develop PM schedules.*



# Example-Corrective Action

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- **Effective Corrective Action** will focus on eliminating the cause of the stated problem.
  - This will eliminate the ***Why*** and ***How*** and prevent the ***What*** from recurring.
- **Disciplined problem solving** will also verify the effectiveness of Corrective Actions.



# Containment vs. Corrective Action

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- **Containment:**
  - Address the incident or symptom not the root cause
  - Has no long term effect on the system



## Containment vs. Corrective Action

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- **Containment action** in our example without determining the root cause
  - Wait for James to get better.
  - Retrain James to watch for oil hazards.
  - Remove or cover up the current oil leak.
  - Pray that it doesn't happen again.



# Containment vs. Corrective Action

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- **Containment** in this case should include:
  - Clean up the oil leak.
  - Repair the leaking equipment.
  - Inspect other similar equipment for similar problems.
  - Send James a “**Get Well Soon**” card



# Effective Corrective Action

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- Effective Corrective Action Usually Includes the Following:
  - State the **problem** clearly
  - Select a champion and corrective action team
  - **Contain the problem** (Short term corrective action)
  - **Investigate** the problem
  - Perform **Root Cause Analysis**
  - Long term **Corrective Action**
  - Verification of **effectiveness**
  - Closure





# Effective Corrective Action

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- In Our Example: State the Problem Clearly:

## Problem Statement

- **Nonconformity:** The system for ensuring employee safety in production areas is not effective.
- **Requirement:** OHSAS require management to maintain safe production facilities. Ministry of Labour Requirements..



# Effective Corrective Action

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## **Objective Evidence:**

James slipped and fell in the plant on Dec. 15, 2005. Lost Time Accident records for December 2005

## **Select a Champion & Corrective Action**

### **Team:**

- Champion: Shadrack
- Corrective Action Team: All



# Effective Corrective Action

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## Contain the Problem

(Short Term Corrective Action)

- Clean up the oil leak
- Fix broken pressure fitting
- Check other similar machines



# Effective Corrective Action

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## Investigate the Problem:

- **Interview** affected personnel (James will have the most information about the incident).
- **Look** at the affected area.
- **Observe** the process in regular operation.
- **Record** the facts.



# Effective Corrective Action

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## Perform Root Cause Analysis

- 1. Why? – There was oil on the floor.*
- 2. Why? – The machine in that cell was leaking oil.*
- 3. Why? – A pressure fitting on the machine failed.*
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# Effective Corrective Action

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## Investigate the problem (Specific)

- Repeat 5 “Whys” to investigate the specific non conformity
- Investigate **why** we have the problem ?
- **Interview** affected personnel (James will have the most information about the incident).
- **Look at** the affected area.



# Effective Corrective Action

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## Detection

- Repeat 5 Whys to investigate why the problem was **not detected**
- Why did the problem **reach the customer?**

## Systemic Problem

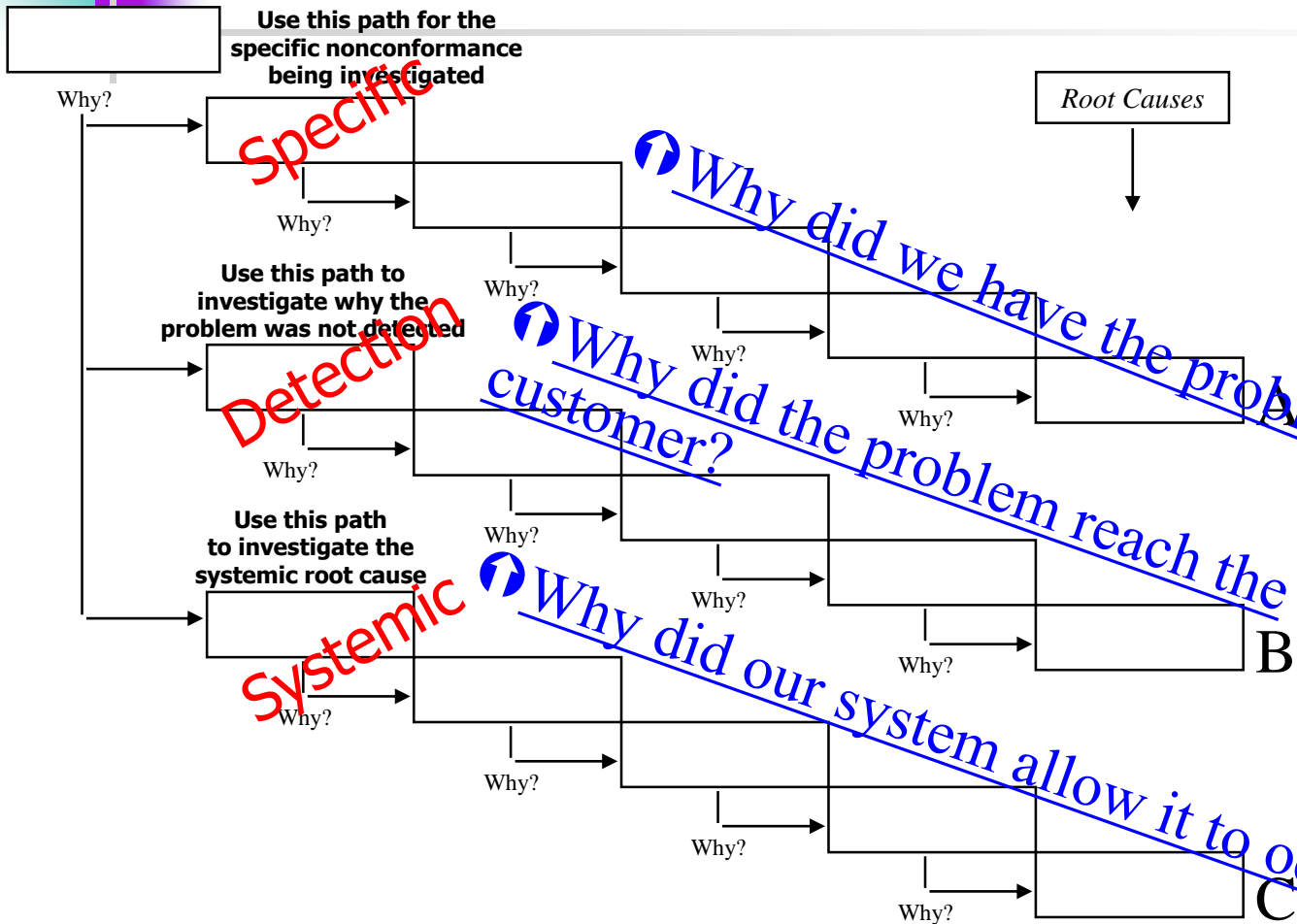
- Perform similar root cause analysis to investigate **systemic root cause**
- Why did our **system allows** It to occur?

# 3-Legged / 5-Why Form )

Complaint Number: \_\_\_\_\_

Issue Date: \_\_\_\_\_

Define Problem



Corrective Actions	Date
A.	
B.	
C.	
Lessons Learned	
•	
Look Across / Within Plant	
•	





# Effective Corrective Action

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## Long term Corrective Action

What should our long-term Corrective Action focus on? May include:

- Updating maintenance procedures
- Revise PM schedules based on equipment manufacturer's recommendations
- Training maintenance personnel
- Testing pressure fittings on machines
- Re-Designing cell layouts to eliminate the effect of spilled oil



# Effective Corrective Action

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## Long Term Corrective Action Should:

- Address the system problem
- Eliminate the Root Cause
- Be implemented in a timely manner
- Include a detailed plan if it will take considerable time
- Be commensurate with the risk involved
  - Risk to the customer, employee, organization, public, etc.



# Effective Corrective Action

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## Verification of effectiveness

- Monitor and measure if anyone else will sustain a similar injury?
  - This seems like a logical way, but is reactive in nature.
  - Someone has to get hurt before we take further action.
  - Risk may be too great.
  - Additional methods should be considered.



# Effective Corrective Action

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## Verification of Effectiveness

- Often confused with verification of implementation.
  - Completion of corrective action tasks.
- Monitor and measure the process to verify the effectiveness of the actions taken.
- Poor results often indicate wrong Root Cause or wrong Corrective Action(s).
- Consider performing audits as a verification tool.



# Effective Corrective Action

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## Verification of effectiveness

- Perform regular audits of:
  - Production Areas
    - Check for oil leaks in production cells
  - Preventive Maintenance Process
    - PM schedule
    - Maintenance personnel training
    - Introduction of new equipment



# Effective Corrective Action

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## Closure

- Closure can only happen after successful verification of Corrective Actions.
- By nature, effective Corrective Actions will prevent recurrence.
- If Corrective Actions cannot be called effective, then Root Cause Analysis should be repeated.
- Record the date of closure.



# Risky Solutions to watch out for

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- Applying solutions with no **due date assigned**
- **Non acting solutions** – they require more information before being implemented. These are action items, not solutions
- Solutions that begin with **“re”**
  - example: re-train, re-write
- **Overdependence** on procedures - developing a new procedure should not be the first line of defense



# Five Why's – Conclusion

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- Test the 5 Why's
- Can they form a one sentence ?
- *Something like:*

*"Problem Description" occurred due to "Fifth Why".  
This was caused by "Fourth why" mainly because  
"Third Why" was allowed by "Second why", and this  
led to "First Why".*







# Five Why's – Conclusion

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- One final point to ponder:

A PROBLEM THAT CANNOT  
BE REPRODUCED IS A  
PROBLEM THAT HAS NOT  
BEEN RESOLVED YET.

1

2

3

4

5

**Thank You**

