

November 18, 2009

# Key Elements of an Effective Root Cause Analysis

An Overview of the Fundamentals of  
Root Cause Analysis and Problem Solving

**ThinkReliability**

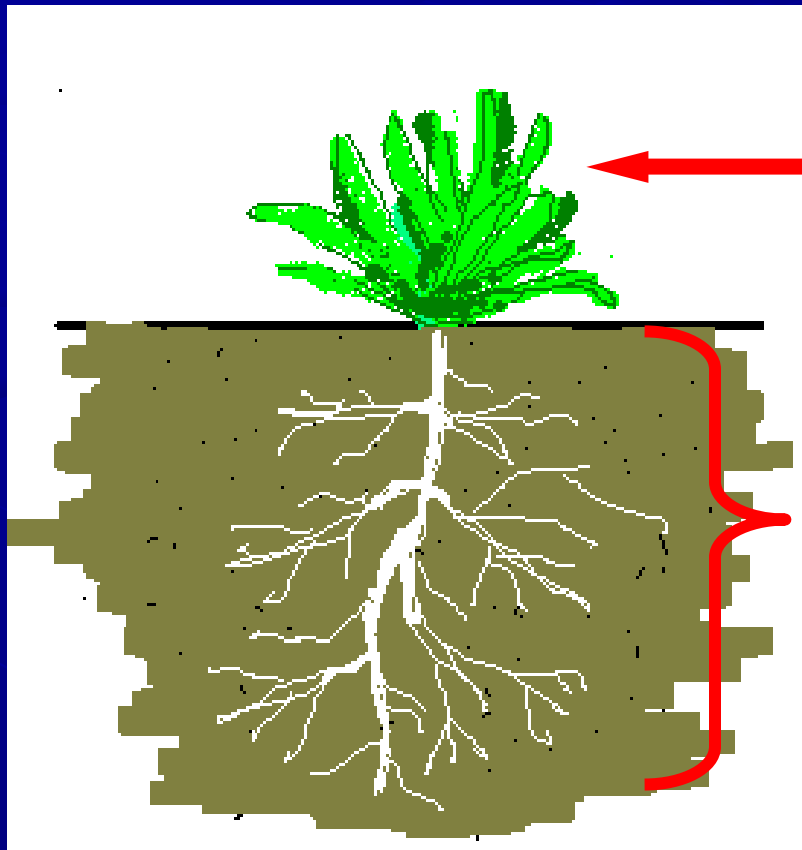
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# Root Cause Analysis - Explained



Symptom of the problem.

“The Weed”

Above the surface  
(obvious)

The Underlying Causes

“The Root”

Below the surface  
(not obvious)



There is no  
“single cause”  
of an incident

# Systems Thinking

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## What was the cause of the Titanic sinking?



- Hitting the Iceberg
- Navigational Course Decisions
- Strength of Steel
- Design of Hull
- Speed of Ship
- Size of Rudder

A system is a combination of parts that interact and function as a whole.

It takes all the causes of the Titanic sinking for the incident to occur.

# Root Cause Analysis - Explained

**Cause: the producer of an effect.**

**Anything that is required to produce an effect is a cause of that effect.**

**Every cause of the incident is required to produce that incident.  
Every link in the chain is required for it to be that chain.**

**The word “root” in *root cause analysis* refers to the underlying parts, not the one cause.**

# Solutions (Right Answer or Reducing Risk)

Prevention: To keep from happening, to impede, obstruct



## Right-Answer Problem

$$2 + 7 = ?$$

Right      Wrong

Solved    Not Solved

True      False

Off        On

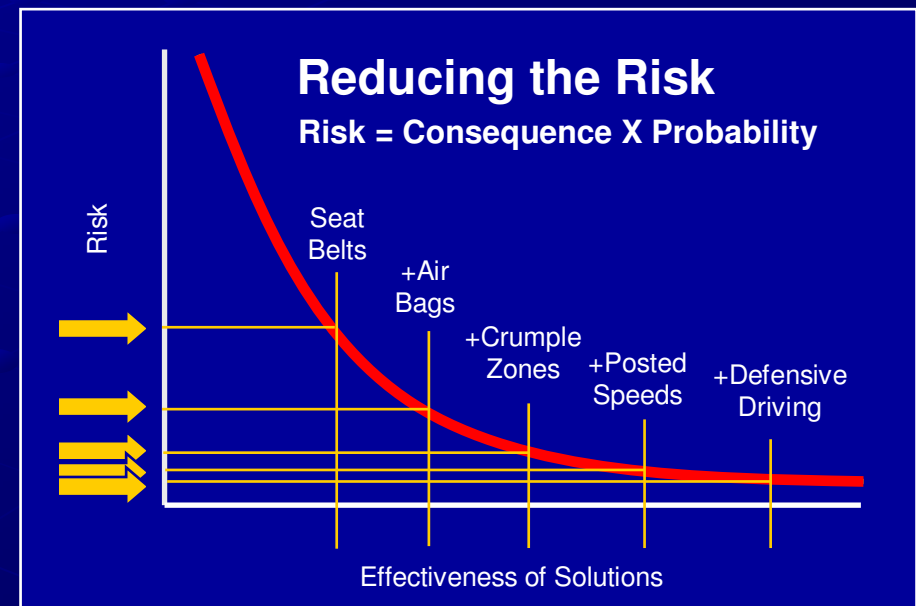
Safe      Unsafe

0 1

One Right Answer

## System Problem

How do we prevent automobile fatalities?



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Many Possible Solutions, Select the Best

# Analysis: Cause and Effect

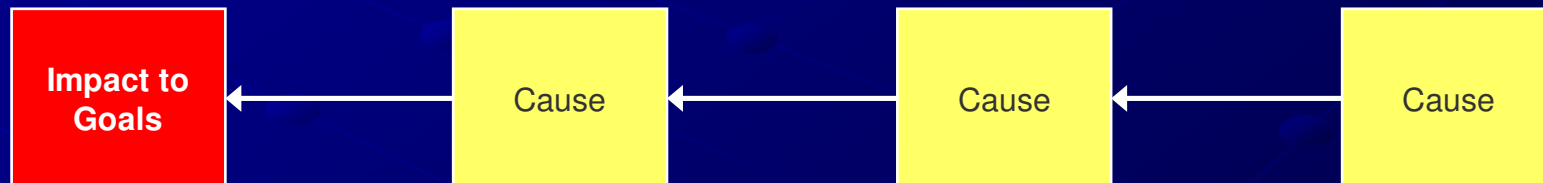
Start with something that went badly (problem).

Define the problem in terms of the impacts to goals.

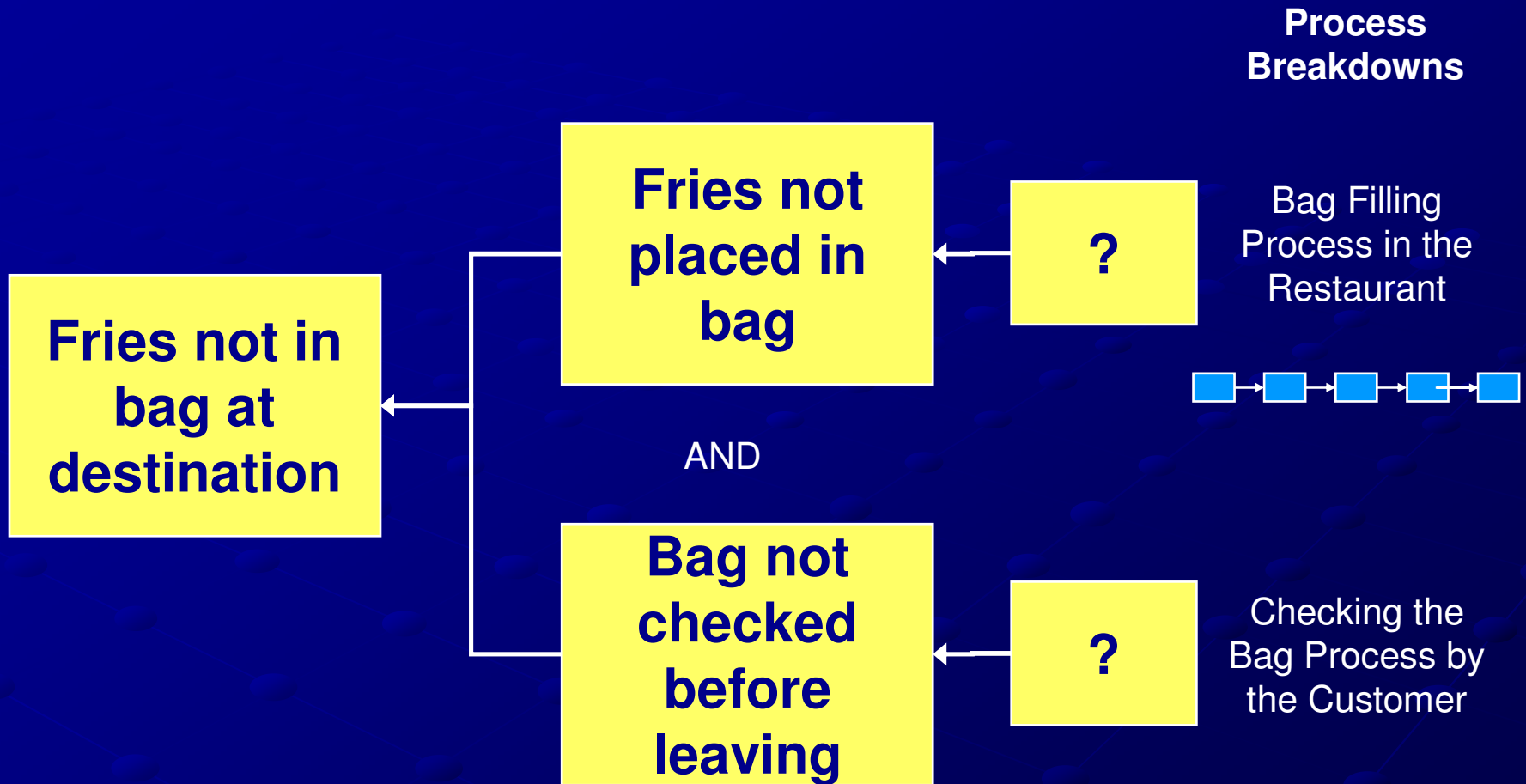
Ask why questions as you read across the page.

Something  
“Bad”  
Happened

**Why?** because... **Why?** because... **Why?**



# What Causes Are Required?



# Evidence: Validate the Causes

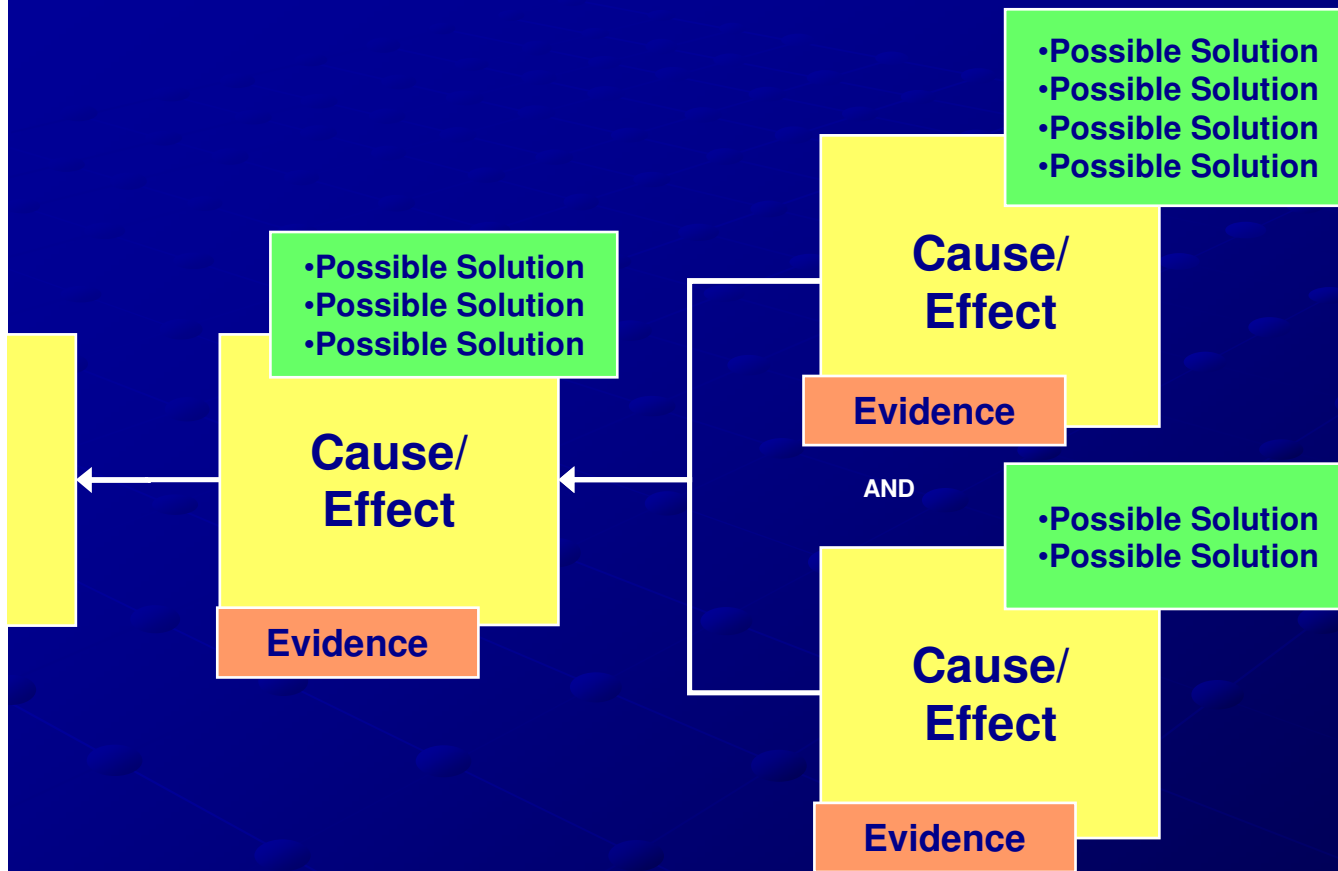
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## Sources of Evidence:

- People's Statements, Testimony, Accounts, Experience
- Parts, Pieces, Components
- Scene, Diagrams, Layout
- Historical Information, Trends and Patterns
- Procedure and Documentation
- Measurements, Calculations and Experiments (Tests)

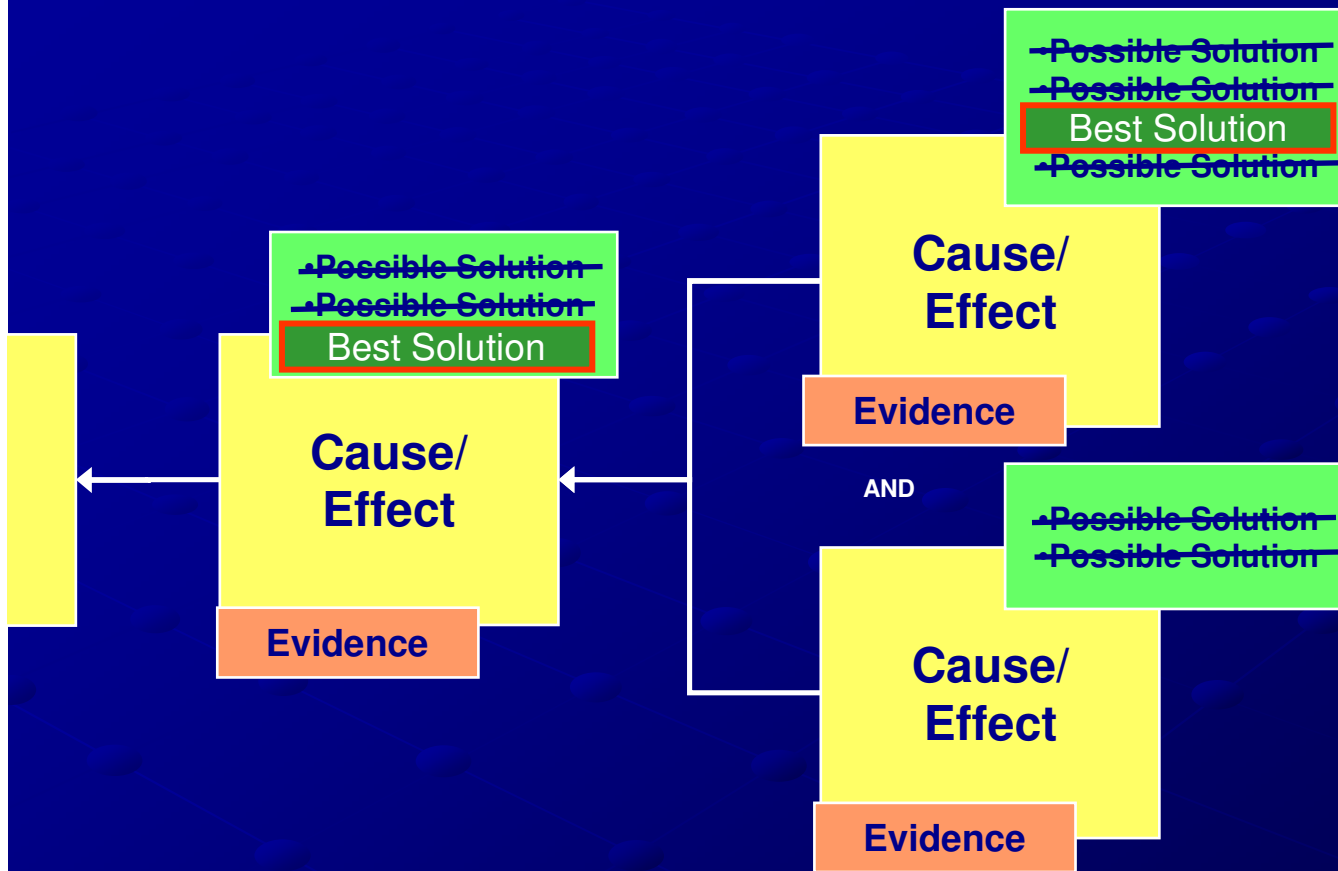
# Solutions

## Identify Possible Solutions



# Solutions

## Select the Best Solutions



# Root Cause Analysis

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## Key Elements:

- 1) Start with the Impacts to Goals
- 2) Identify the Causes
  - Ask “Why?”
  - Ask “What else is required?”
  - System Thinking, Process Focus, Be Specific
- 3) Validate Causes with Evidence
- 4) Identify Possible Solutions Connected to Causes
- 5) Implement the Best Solutions