



# Root Cause Analysis

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## Agenda


1. A systems view of safety
2. Introduction to Root Cause Analysis (RCA)
3. RCA Techniques
4. Easy ways to integrate RCA into your existing safety programs
  - Near miss reports
  - Accident reports/ investigation
  - Upset business conditions and other problem-solving opportunities
5. An example of RCA in action



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# A Systems View of Safety

<b>Utilizing:</b>	<ul style="list-style-type: none"> <li>• Scientific skills</li> <li>• Technical skills</li> <li>• Managerial skills</li> </ul>
<b>Leveraging:</b>	<ul style="list-style-type: none"> <li>• Hazard identification</li> <li>• Hazard analysis</li> </ul>
<b>With the goal of:</b>	<ul style="list-style-type: none"> <li>• Elimination, control, or management of hazards throughout the life-cycle of a system, program, project or an activity or a product</li> </ul>

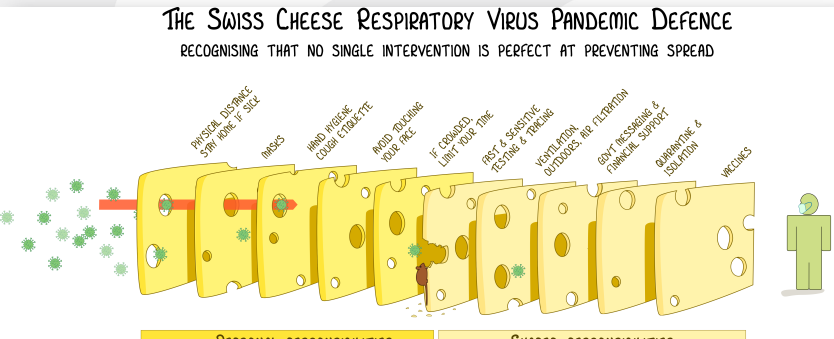


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# A Systems View of Safety


**THE SWISS CHEESE RESPIRATORY VIRUS PANDEMIC DEFENCE**  
 RECOGNISING THAT NO SINGLE INTERVENTION IS PERFECT AT PREVENTING SPREAD



**PERSONAL RESPONSIBILITIES**      **SHARED RESPONSIBILITIES**

EACH INTERVENTION (LAYER) HAS IMPERFECTIONS (HOLES).  
 MULTIPLE LAYERS IMPROVE SUCCESS.

LINK TO TRACK: [VIRUSOLOGYMANAGEMENT.COM](http://VIRUSOLOGYMANAGEMENT.COM)  
 WITH THANKS TO JOEY LAMARE, ENTREEKRE ARGEN & THE UN OF GLENE  
 BASED ON THE SWISS CHEESE MODEL OF ACCIDENT CAUSATION BY SWISS T. BERSON, 1990  
 VERSION 3.0  
 UPDATE: 24oct2022



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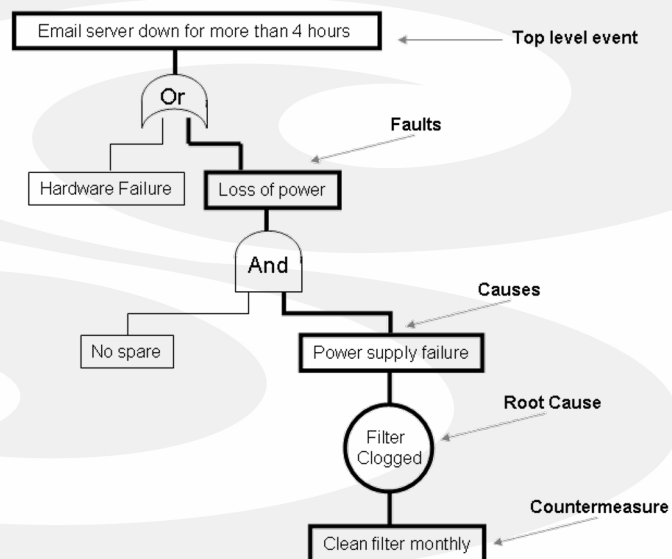
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## Introduction to Root Cause Analysis

- Problem solving method
- A structured approach to identify factors resulting in harmful outcomes
- Main objective: uncover the “root cause” of a problem
- Does **NOT** assign blame to an individual

## What is a “Root Cause”

A correctable behavior, **process**, policy or environment; which, if altered, will reduce the probability of a harmful outcome reoccurring.



## Root Cause Analysis Examples

- **Safety-based RCA:** Accident investigation, OSH
- **Production-based RCA:** Manufacturing, production-scale HazMat incidents
- **Process-based RCA:** Builds on production-based, but accounts for management and executive leadership
- **Failure-based RCA:** Engineering design
- **Systems-based RCA:** Encompassing, risk management, continuous improvement, aircraft crashes

## Root Cause Analysis Techniques

- Re-enactment/Re-construction
- Barrier analysis
- Change analysis
- Mathematical modeling (Bayesian inference)
- Fault-tree analysis
- Why-because analysis
  - **Five Whys**

## Near Miss Reports

- Integrate into existing processes
- Require RCA at a predetermined level of risk (i.e., any near miss requiring work to stop).
- RCA team:
  - Reporting employee
  - OEHS professional
  - Line management
  - Safety committee accident investigation group

**MYSTIC AQUARIUM** **Aquarium "Oops"**  
A Near-Miss Report Form

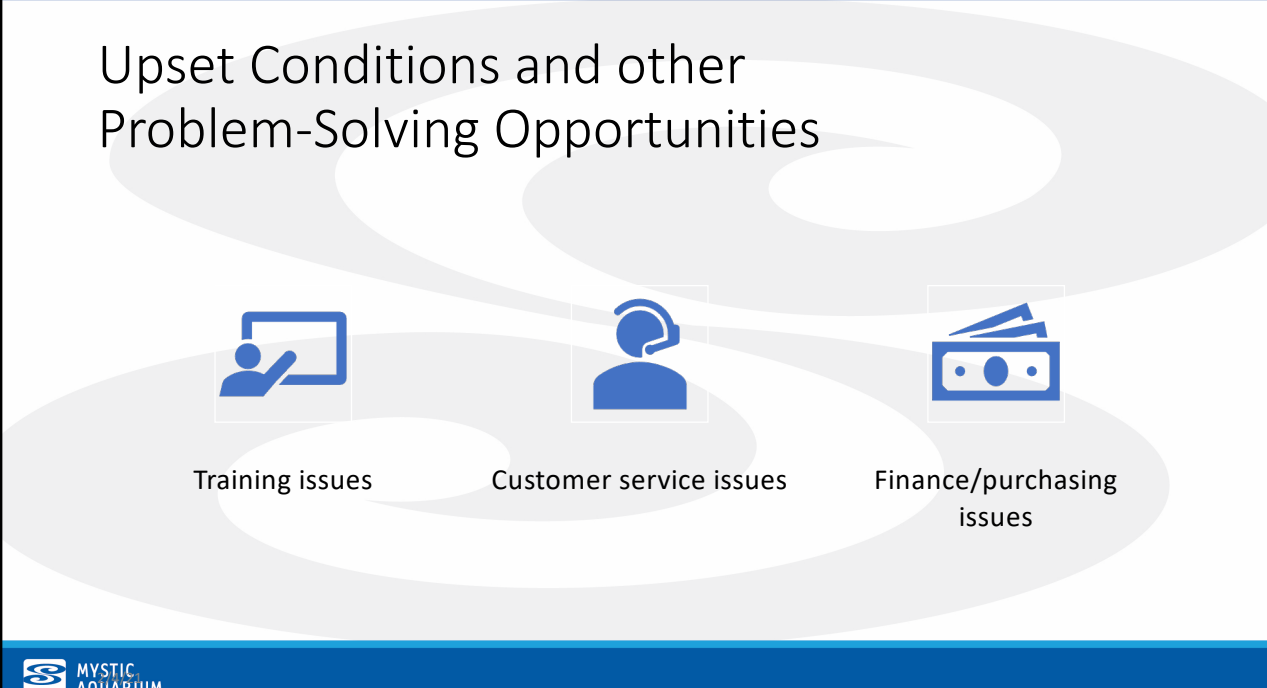
Please forward completed form to Safety & Security

Check appropriate level		
RED - Stop Work and Report	YELLOW - Use Caution and Report	GREEN - Continue and Report
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location (Department)	Date	Time
Public area (Y/N)	Reported by (Optional)	Supervisor review (Optional)
Ground surface and weather conditions (if applicable)		Date of supervisor review
Category of near miss (Circle all which apply): Potential to negatively impact the guest experience <input type="checkbox"/> Potential injury to person(s) <input type="checkbox"/> Potential injury to animal collection <input type="checkbox"/> Potential security issue <input type="checkbox"/> Potential property damage <input type="checkbox"/> Potential environmental incident		
Description of occurrence (your review of incident)		
Were photos taken?		Were photos sent to Safety & Security?
YES <input type="checkbox"/> NO <input type="checkbox"/>		YES <input type="checkbox"/> NO <input type="checkbox"/>
Corrective actions taken:		
Safety & Security findings (not needed if reported for red)		
Name:	Date:	Residual risk at acceptable level? YES <input type="checkbox"/> NO <input type="checkbox"/>

## Accident Reports & Investigations


- Dedicated section for cause of accident
- Require RCA at a predetermined level of consequence (i.e., OSHA-recordable)
- Require RCA at a predetermined incident rate (i.e., 2 or more injuries of the same type)

## Upset Conditions and other Problem-Solving Opportunities



The diagram features three icons arranged horizontally, each pointing towards a central point. From left to right: a person pointing at a screen, a person wearing a headset, and a stack of money. Below each icon is a text label. The background consists of light gray, swirling, concentric shapes.


- Training issues
- Customer service issues
- Finance/purchasing issues

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## The Five Whys

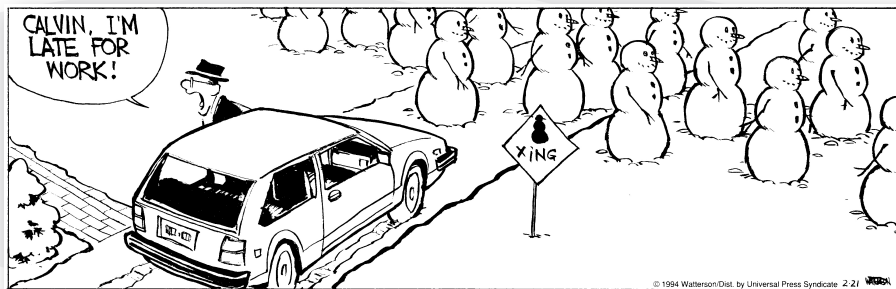
- Developed by Sakichi Toyoda
  - Part of the Toyota Production System
- Responsible for driving sustainable growth, employee accountability, and continuous process improvement
- *Kaizen*, lean manufacturing, Six Sigma ( $6\sigma$ )
- Can be used all levels of employees
  - Can be integrated into all job functions

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## The Five Whys – An Example

- Pose a situation meriting further investigation
- List possible causes of said situation
- Our scenario: My car won't start!



## The First Why

- Scenario: My car won't start
- Why?
- Answer: My battery is dead

## The Second Why

- Scenario: My car won't start
- Cause: My battery is dead
- Why?
- Answer: My alternator is not functioning

## The Third Why

- Scenario: My car won't start
- Cause: My battery is dead
- Cause: My alternator is not functioning
- Why?
- Answer: My alternator belt is broken



## The Fourth Why

- Scenario: My car won't start
- Cause: My battery is dead
- Cause: My alternator is not functioning
- Cause: My alternator belt is broken
  
- Why?
  
- Answer: The alternator belt was beyond its useful service life

## The Fifth Why – A Root Cause

- Scenario: My car won't start
- Cause: My battery is dead
- Cause: My alternator is not functioning
- Cause: My alternator belt is broken
- Cause: My alternator belt was beyond its useful service life
  
- Why?
  
- Answer: The vehicle was not maintained according to the manufacturer's recommended service schedule

## Why is this a Root Cause

- Scenario: My car won't start
- Root Cause: The vehicle was not maintained according to the manufacturer's recommended service schedule
- Alterable behavior
  - In the workplace: A management control, such as devising a process to ensure maintenance logs are kept and scheduled maintenance is preformed can be put in place to prevent the situation from arising again

## Limitations of RCA using the Five Whys

- Different individuals can determine different root causes
  - Relies on investigator's current knowledge
- Tendency to settle on a single root cause
- Tendency to not "dig deep enough"
  - Five iterations may be sufficient, however every incident will be different and command a different depth of investigation
- Too basic?

Questions?

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