

Can "Human Error" or Human Factors be considered a Root Cause?

- No, Human Factors or "Human Error" is never a root cause; it is, at most, an active failure or a contributing factor.
- Because human nature (such as susceptibility to fatigue, distraction, or cognitive overload) cannot be engineered out of existence, you cannot write a feasible corrective action to "fix" it.
- Human error is merely a symptom of a deeper failure inside the system's design, culture, or training.

What is a "Direct Cause" and why shouldn't investigations stop there?

- A direct cause is the immediate event, unsafe act, or condition that directly resulted in the occurrence.
- When organizations confuse a direct cause with a root cause, the true underlying issue remains unresolved, leaving the system exposed to future problems.
- Stopping at the direct cause often leads to a "blame culture" rather than a culture of continuous improvement.

What is the Swiss Cheese Model in accident causation?

- The Swiss Cheese Model, illustrated by Prof. James Reason, demonstrates that accidents happen when holes in multiple layers of defense temporarily align.
- Each "hole" represents a systemic vulnerability, which means multiple root causes must exist for a hazard to successfully penetrate all defenses.

What are the three typical types of causes found in aviation systems?

- **Physical Causes:** A specific failure of infrastructure or mechanical mechanisms.
- **Human Interface Causes:** Events involving human errors, requiring exploration into precursors.
- **Organizational Causes:** Failures within the system, processes, or underlying decision-making policies.

What are the fundamental steps of the RCA process?

- Define the problem and collect relevant data/evidence.
- Identify causal factors by examining the sequence of events.
- Identify the root cause(s) by understanding "why" the causal factors exist.

- Propose solutions and mitigations.
- Conduct an impact assessment and measure the effectiveness of the implemented solution.

What is the "5 Whys" technique?

- It is a structured technique that involves repeating the question "why?" to understand contributing factors and underlying root causes.
- The number "5" is derived from the empirical observation of how many iterations it typically takes to reach the root of a problem.

What is a Fishbone (Ishikawa) Diagram?

- It is a visualization tool used to categorize the potential causes of a problem to help identify root causes.
- It is typically used by teams to brainstorm and organize causes under major headings like People, Equipment, Method, Process, Materials, and Environment.

How can 5 Whys and Fishbone be used together?

- The Fishbone diagram is excellent for summarizing high-level causes and stimulating the identification of potential issues.
- The 5 Whys technique can then be applied to drill down into the specific subcategories on the Fishbone diagram to achieve a more detailed analysis.

What is Fault Tree Analysis (FTA)?

- FTA focuses on understanding the causal relationship of a "top-level" hazard by progressively uncovering successive layers until root causes are identified.
- It follows Boolean logic to create a tree-like visual diagram of failures, showcasing risk-based paths to base-level events.

What is the Bowtie Risk Assessment Methodology?

- The Bowtie methodology is a visual risk evaluation tool that demonstrates causal relationships in high-risk scenarios.
- It places a hazard and a top event in the center, with threats (causes) on the left and consequences on the right.
- It is highly effective for identifying preventative controls (defenses) and recovery controls (mitigations).

What is Process Failure Mode and Effects Analysis (PFMEA)?

- PFMEA looks at each process step to identify risks and potential errors originating from human, process, material, tooling, or environmental sources.
- It utilizes a Risk Priority Number (RPN) calculated by multiplying Severity, Occurrence, and Detection rankings to prioritize action plans.

How is Pareto Analysis used as an RCA technique?

- Pareto analysis is based on the 80/20 rule, recognizing that 20% of problems often cause 80% of occurrences.
- It utilizes a bar chart ordered from highest frequency to lowest, helping organizations prioritize quality improvement efforts on the most significant issues.

What is the Human Factors Analysis and Classification System (HFACS)?

- HFACS is a framework that systematically identifies active and latent failures within an organization.
- The goal is not to assign blame, but to uncover the psychological origins of unsafe acts alongside the latent organizational conditions that enabled them.

What is the difference between RCA in Quality Assurance (QA) and Safety Auditing?

- In QA auditing, the focus is on compliance gaps; it is the auditee's (Post Holder's) responsibility to determine the root cause and fix it.
- In Safety auditing, the focus is on risk and exposure; auditors use RCA to understand "why" and recommend mitigations, though the business area owner ultimately decides on the action.

Who is responsible for addressing audit findings and mitigations?

- The responsibility to address a finding and implement appropriate action always rests with the Post Holder or Business Area owner.
- The Quality Auditor is responsible for assessing and accepting that the proposed mitigation complies with requirements.

What makes RCA evidence trustworthy and valid?

- Evidence must be accurate, credible, and its integrity must not be compromised.
- It should be free from auditor bias, repeatable (another auditor would see the same issue), and accurately connected to the functioning of the auditee's system.

What are the common errors made during Root Cause Analysis?

- Lack of detailed appreciation during the initial assessment of the event.
- Insufficient validation of root causes (failing to prove cause-and-effect).
- Not going deep enough and stopping at symptoms or active failures.
- Lacking objectivity (e.g., auditors trying to make evidence fit a preconceived conclusion).
- Terminating the investigation prematurely due to time constraints or cost implications.

How should an organization balance human error and organizational culpability?

- Organizations must strive to design systems that take normal human error into consideration while affording maximum protection