

Key to Resolving Repeated and Longstanding Equipment Issue

Keys to a Successful Corrective Action Program (CAP)



Andrew Mantey
Plant Reliability and Resilience – Electrical Team Leader

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Importance of Rigorous Corrective Action Programs (CAP)

Ensures long-term
reliability and safety of
nuclear systems

Prevents recurrence of
equipment failures

Builds a culture of
accountability and
continuous improvement

Effective CAP is a Cornerstone of Strong Nuclear Safety Culture

Importance of Rigorous Corrective Action Programs

Systematic Issue Resolution

Programs systematically identify, analyze, and resolve issues threatening plant safety and performance.

Preventing Recurrence

Structured problem-solving prevents repeated equipment failures and operational disruptions.

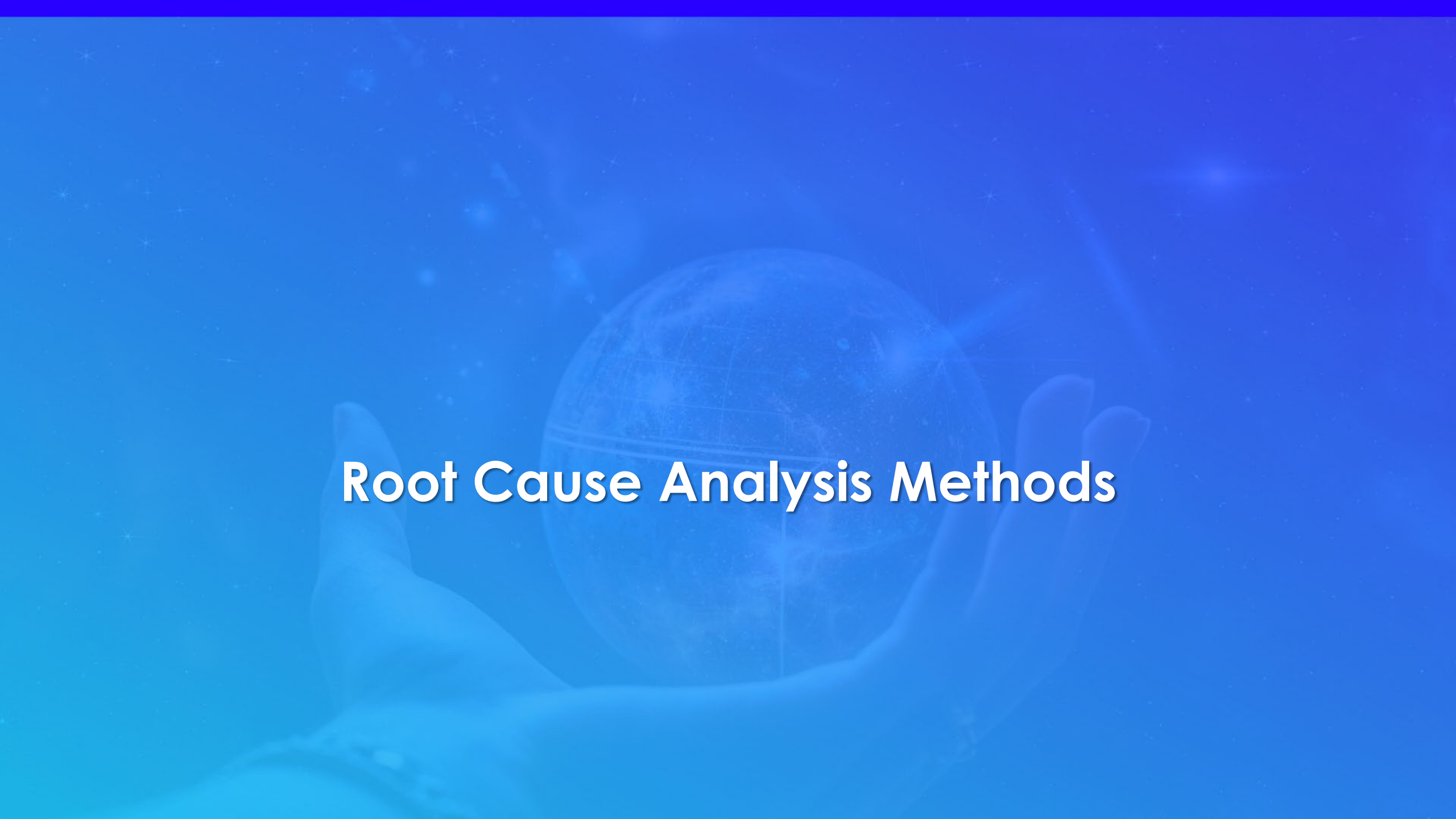
Culture of Accountability

Programs foster accountability and continuous improvement by encouraging proactive issue resolution.

Root Cause Analysis

Effectiveness depends on tracing problems to root causes and implementing sustainable solutions.





Root Cause Analysis Methods

Key Attribute: Formal Training in RCA Methods

Necessity of Training

Formal training equips staff with analytical skills to identify and address root causes accurately.

Preventing Misidentification

Proper training prevents teams from confusing symptoms with actual causes, avoiding recurring issues.

Consistency and Collaboration

Structured training enhances consistent problem-solving and fosters cross-functional collaboration.

Critical in High-Stakes Fields

In environments like nuclear power, formal RCA training supports safety, efficiency, and improvement.



Examples of Root Cause Analysis Techniques

Five Whys Technique

This technique uses iterative questioning to uncover the root cause by repeatedly asking 'why' a problem occurred.

Kepner-Tregoe Method

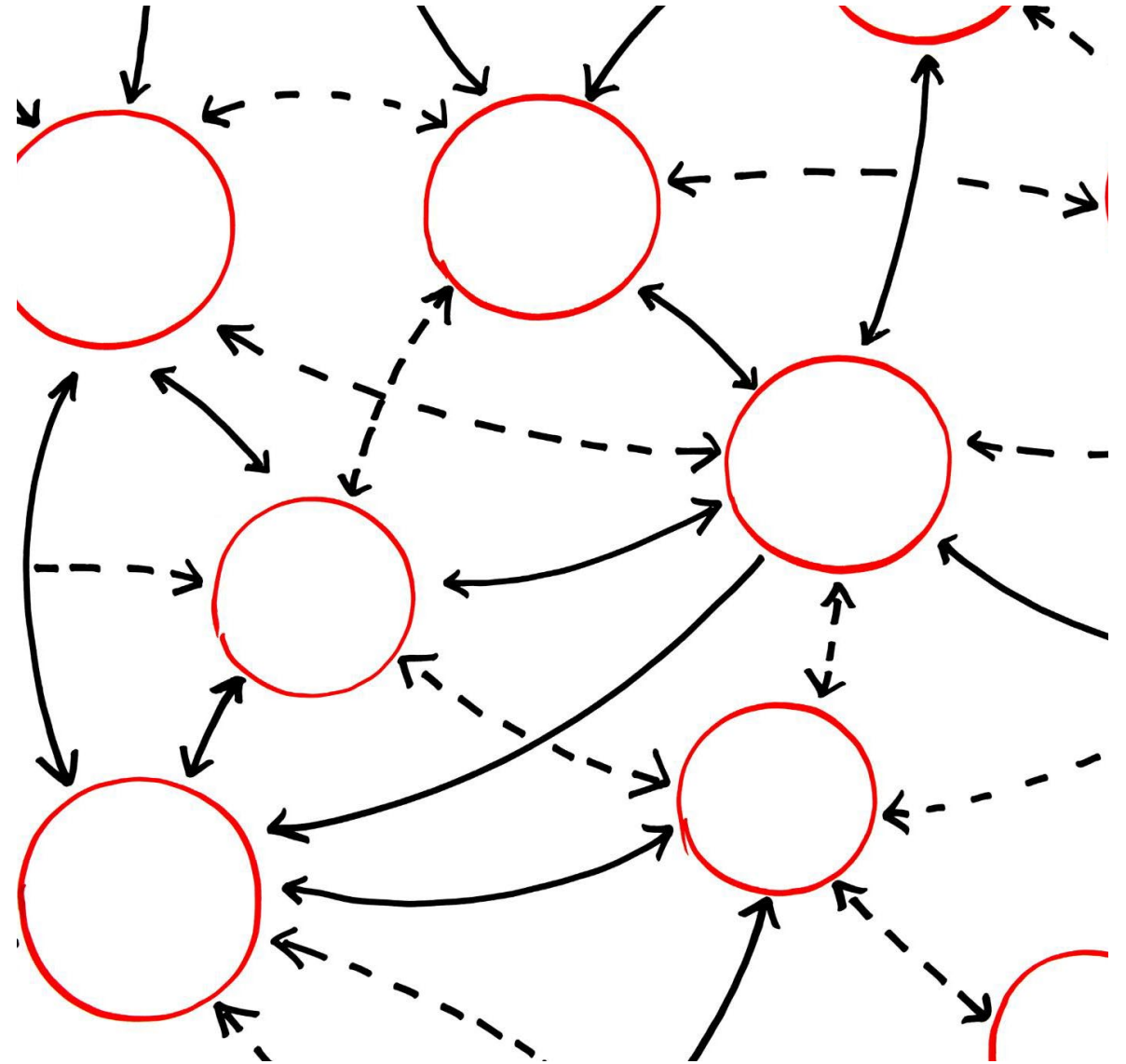
A systematic approach to evaluate potential causes and solutions logically for effective problem analysis and decision-making.

Fishbone Diagram

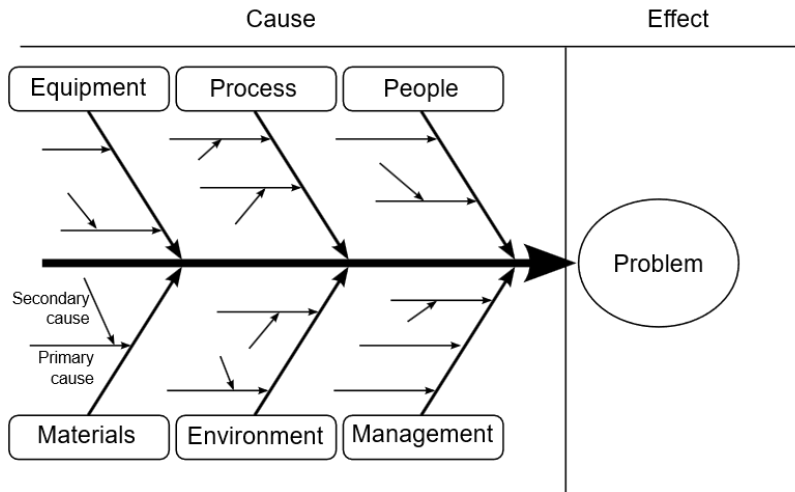
Visually categorizes potential causes into groups like people, processes, equipment, and environment for comprehensive analysis.

Advanced RCA Methods

Includes Fault Tree Analysis mapping failure pathways and Pareto Analysis prioritizing causes based on impact.



Formal Methodologies May Be Different for A Given Issue

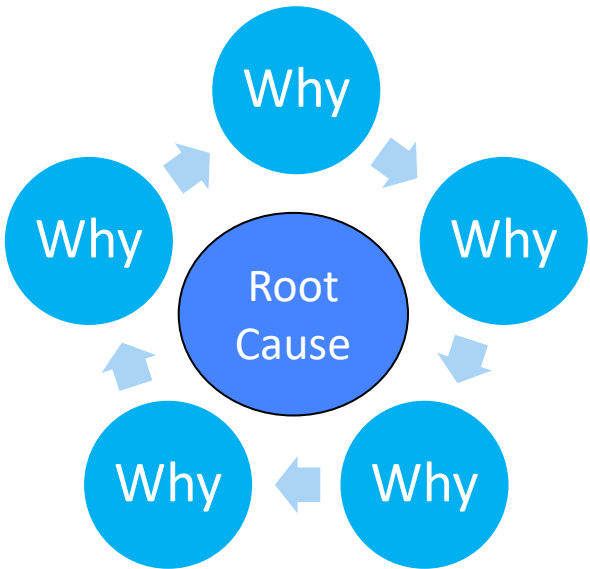


Fishbone Diagram: Visual tool to categorize potential causes



Kepner-Tregoe: Systematic decision and problem analysis

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Five Whys: Simple iterative questioning to trace cause

Formal Methodology Tailored to the Issue Provides Structure to the Issue Resolution



Root Causes Versus Symptoms

Distinguishing Root Causes from Symptoms

Difference Between Symptoms and Root Causes

Symptoms are visible effects of a problem, while root causes are the underlying factors leading to these effects.

Impact of Addressing Symptoms Alone

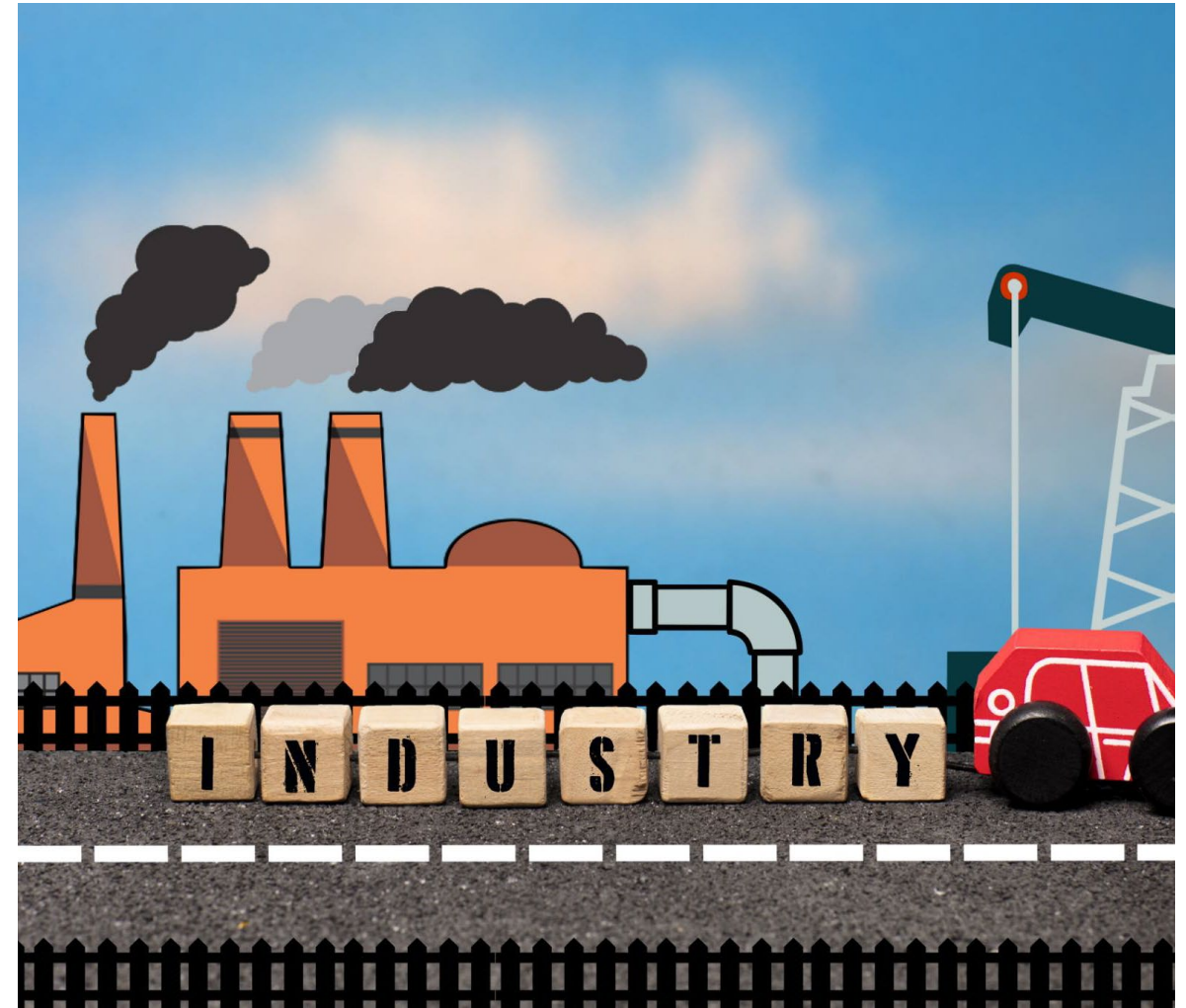
Fixing symptoms may offer temporary relief but does not prevent the problem from recurring over time.

Importance of Root Cause Focus

Identifying and correcting root causes leads to sustainable improvements and problem elimination.

Application in Nuclear Power Safety

Distinguishing causes improves reliability and safety in nuclear power operations through thorough investigation.



Too Many Recurring Issues Result From Addressing Symptoms

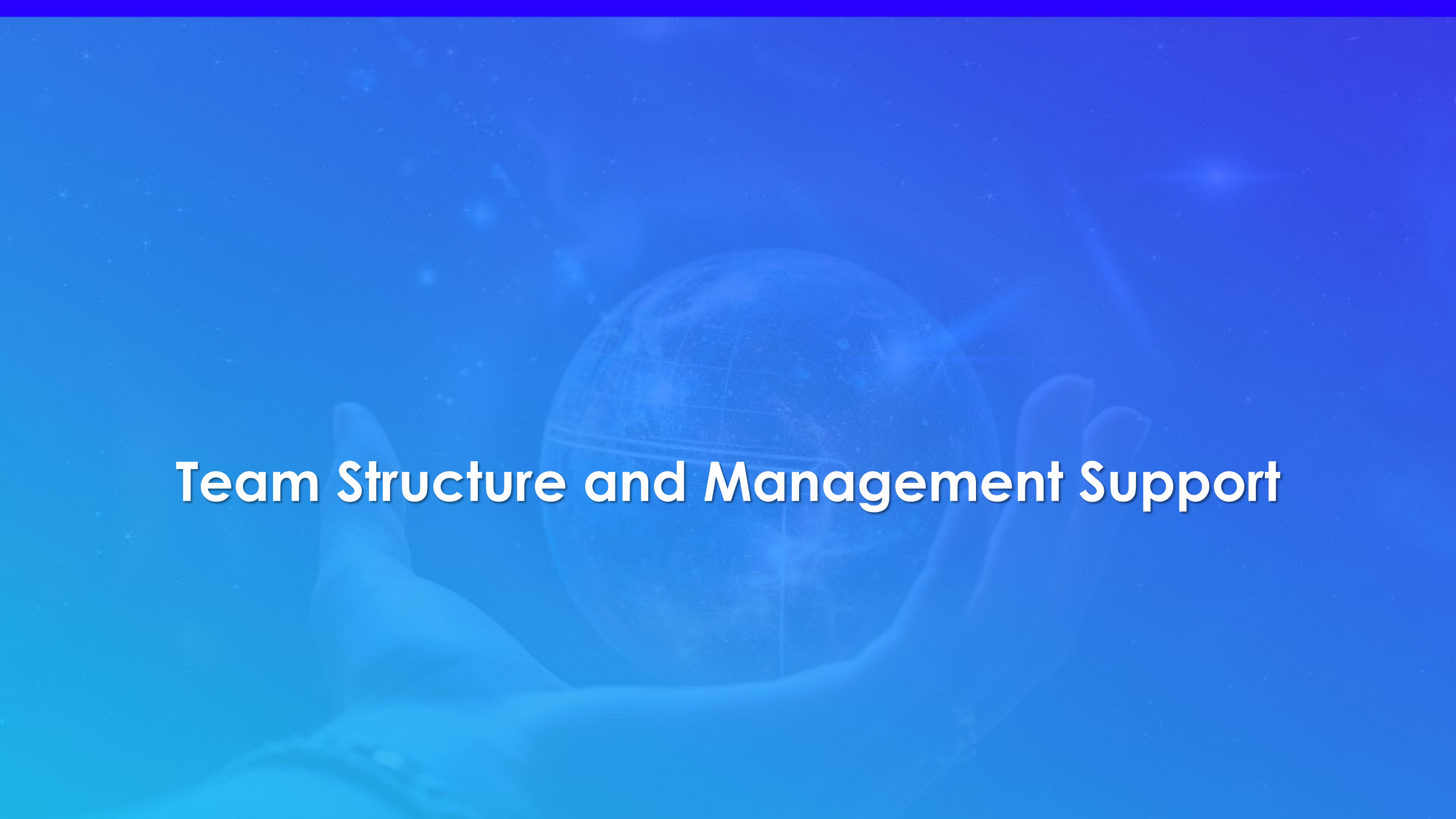
Symptom vs. Cause

Series of Events

- Main generator bushings replaced
- A phase isophase bus clamshell failure at welds a few months later
 - Initial root cause was fatigue failure of original welds after a few months of operation
 - Rewelded the plates and reconnected the bus clamshells to the bushings
- Second A phase isophase bus clamshell failure 6 months later
 - Welds failed at the same location as previous failure
- Initial failure was a symptom (fatigue failure of old weld)
- Both welds failed from high cycle fatigue caused by change in resonant frequency post bushing replacement (root cause)
 - Contributing cause was failure to do a “bump test” when the new bushing was installed which would have shown the resonant frequency was close to the frequency of the generator



Weld Failure Was the Symptom, Root Cause was the Bushing Installation Changed the Structure Resonant Frequency



Team Structure and Management Support

Building an Effective Root Cause Team

Expertise and Leadership

The team should be led by a trained root cause analysis practitioner guiding effective investigation.

Multidisciplinary Team Composition

Include experts from Operations, Engineering, and Maintenance to provide diverse perspectives and knowledge.

Clear Roles and Responsibilities

Defined roles ensure efficient collaboration and accountability within the root cause analysis team.

Access to Data and Tools

Teams must have necessary data, tools, and resources to conduct thorough investigations.



Role of Management Sponsorship

Active Leadership Support

Senior leadership provides necessary resources, authority, and backing to the RCA team for thorough investigations.

Commitment to Accountability

Management's endorsement fosters a culture of accountability and continuous improvement within the organization.

Driving Operational Changes

Leadership willingness to implement significant changes ensures effective corrective action execution and lasting improvements.

Essential in High-Stakes Industry

In nuclear power, strong management sponsorship drives meaningful change and maintains operational excellence.





Proper Extent of Condition and Effectiveness Review

Effective Follow-Up Actions

Extent of Condition Review Attributes

Prevents Recurrence:

- Identifies similar conditions in other systems, components, or processes that may be vulnerable.

Improves Safety & Reliability:

- Ensures that latent issues are addressed before they cause failures.

Supports Regulatory Compliance:

- Demonstrates thoroughness and accountability in corrective action programs.

Strengthens Root Cause Analysis:

- Validates whether the identified root cause is isolated or widespread.

Optimizes Resource Allocation:

- Helps prioritize actions based on risk and impact across the organization.

Effectiveness Review Considerations

Timing Considerations:

- Allow sufficient time for action to take effect and
- Schedule reviews based on risk and complexity

Documentation:

- Record objective evidence of effectiveness
- Update CAP records and close actions formally

Common Pitfalls:

- Premature closure without verification
- Incomplete scope of review
- Lack of measurable success criteria



Conclusion

Summary and Key Takeaways

Importance of Corrective Action

Corrective action programs ensure safety and reliability in nuclear power operations by resolving equipment issues effectively.

Root Cause Analysis (RCA)

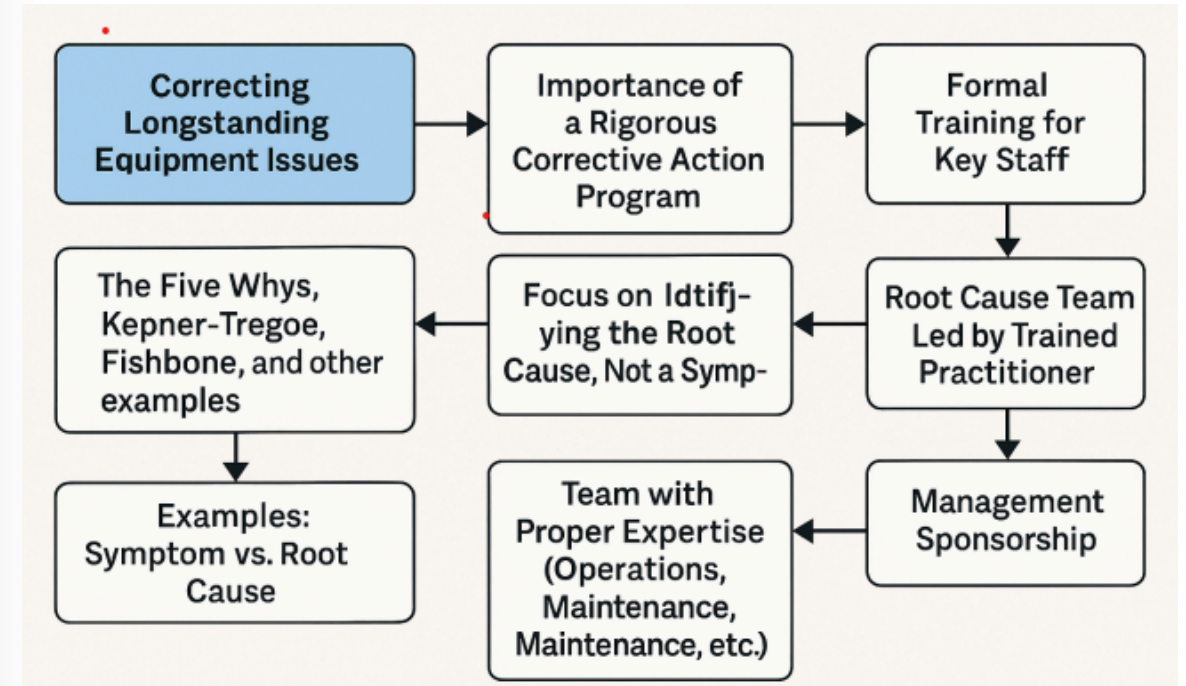
Rigorous RCA methods identify underlying causes, distinguishing root causes from symptoms for sustainable solutions.

Training and Expertise

Formal training and a structured RCA team ensure consistent, accurate problem-solving with expert knowledge.

Management Sponsorship

Management support provides essential resources and backing to implement continuous improvement and operational excellence.



Questions



Slide 2 of 2

A blue-tinted photograph of four people standing in a row. From left to right: a man with curly hair and glasses wearing a white lab coat; a man with glasses wearing a white lab coat; a woman wearing a white hard hat and a dark polo shirt; and a man with glasses and a beard wearing a light blue button-down shirt. The text 'Together...Shaping the Future of Energy™' is overlaid in white in the center.

Together...Shaping the Future of Energy™