CENTER FOR HOMELAND DEFENSE AND SECURITY
NAVAL POSTGRADUATE SCHOOL

Argonne NATIONAL LABORATORY

HSX MODULE: ROOT CAUSE ANALYSIS

March 2017

OVERVIEW

- Definition: Root-cause analysis is an evaluation method utilized for the identification of root causes of an incident and subsequent prevention of incident recurrence.

- The goal: comprehensive understanding of causal factors and effective mitigation

- Components:
  - “5-Whys”
  - Causal Tree

- Application

Root Cause Analysis

A method primarily used to identify the underlying cause of an incident or issue, and more effectively mitigate or prevent future similar incidents

Rather than simply addressing the ***proximate cause***, root cause analysis seeks the ***root cause*** of an incident or issue

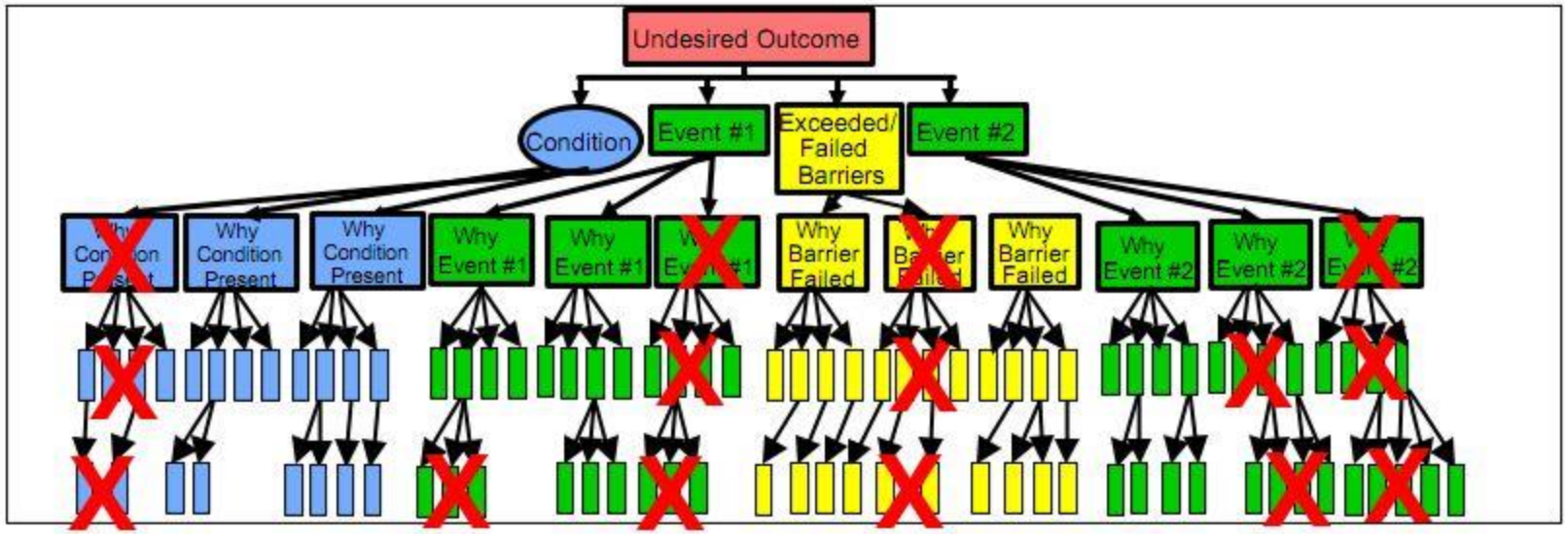
Highly effective tool for problem-solving

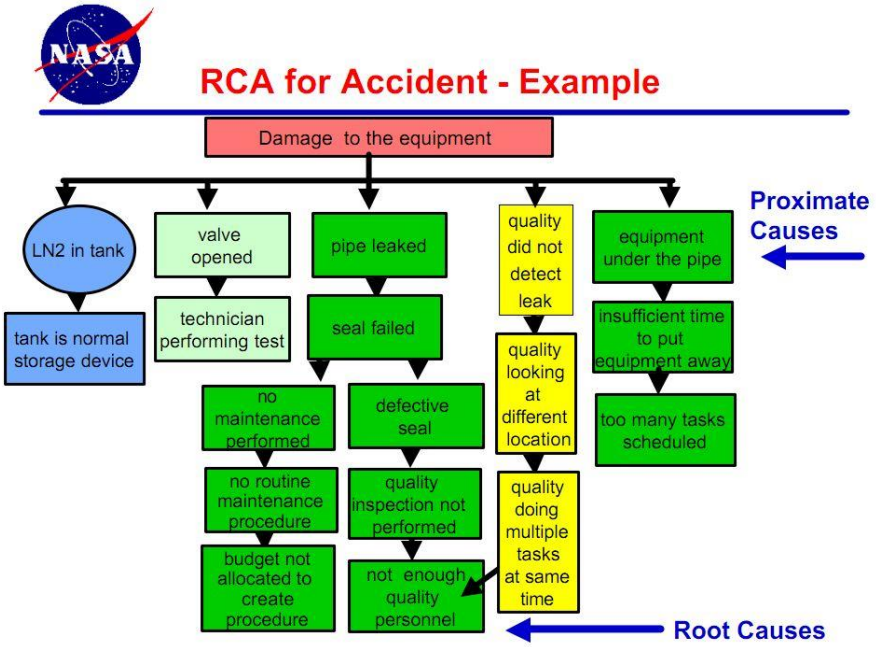
Proximate cause (direct cause) - occurs immediately prior to the incident; directly results in its occurrence and, if eliminated or modified, would have prevented the undesired outcome
Root Cause - One of multiple factors (events, conditions or organizational factors) that created the proximate cause and subsequent undesired outcome. Typically multiple root causes contribute to an undesired outcome.

Source: Office of Safety & Mission Assurance. NASA, July 2003. Web. 16 Feb 2017. http://www.au.af.mil/au/awc/awcgate/nasa/rootcauseppt.pdf

Causal Tree

- Undesired incident at the top
- Immediate causes below
- Continue to ask what the causes of the causes were until you reach:
  - root cause
  - insufficient data
  - issue that you cannot personally or organizationally resolve

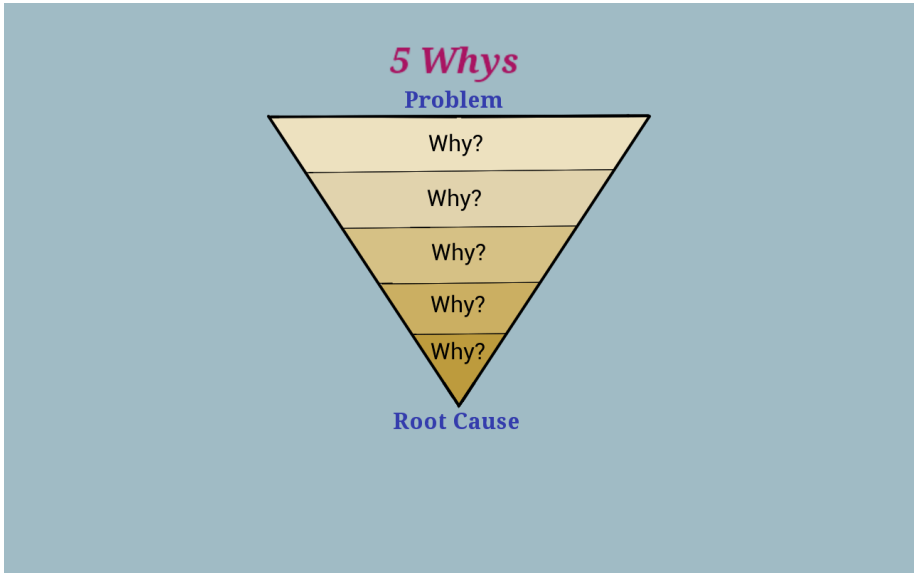




Source: Office of Safety & Mission Assurance. NASA, July 2003. Web. 16 Feb 2017. http://www.au.af.mil/au/awc/awcgate/nasa/rootcauseppt.pdf

The 5-Whys Method

- Ask “why?” an undesired outcome occurred
- The answer to this question becomes the next “Why?” question
- The 5-Why method can also be used to aid in the creation of a causal tree



Source:Lifetime Reliability Solutions, “Understanding How to Use the 5-Whys for Root Cause Analysis.” Web. http://www.lifetime-reliability.com/tutorials/lean-management-methods/How_to_Use_the_5-Whys_for_Root_Cause_Analysis.pdf

Application of Root Cause Analysis

- Mitigating undesired outcomes
- Preventing recurrence of undesired outcomes
- Fixing/streamlining systems and processes
- Root cause analysis has been applied in business, international risk management, healthcare, and other diverse sectors

Key Takeaways

- Root cause analysis- Identifying the base causes of an issue or incident, which may not be immediately apparent

- Methods:
  - Causal tree
  - 5 Whys

- Potential for broad application across fields (see literature resource sheet)