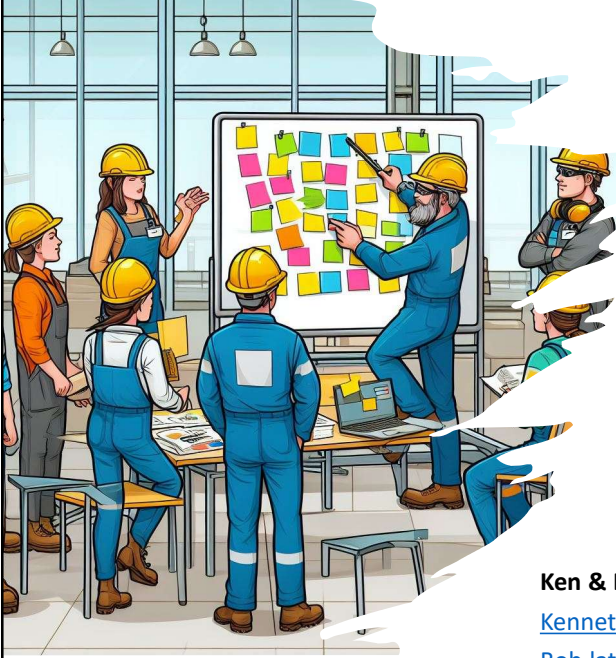




Root Cause Analysis Essentials Workshop

Ken & Bob Latino
Kenneth.latino@prelical.com
Bob.latino@prelical.com

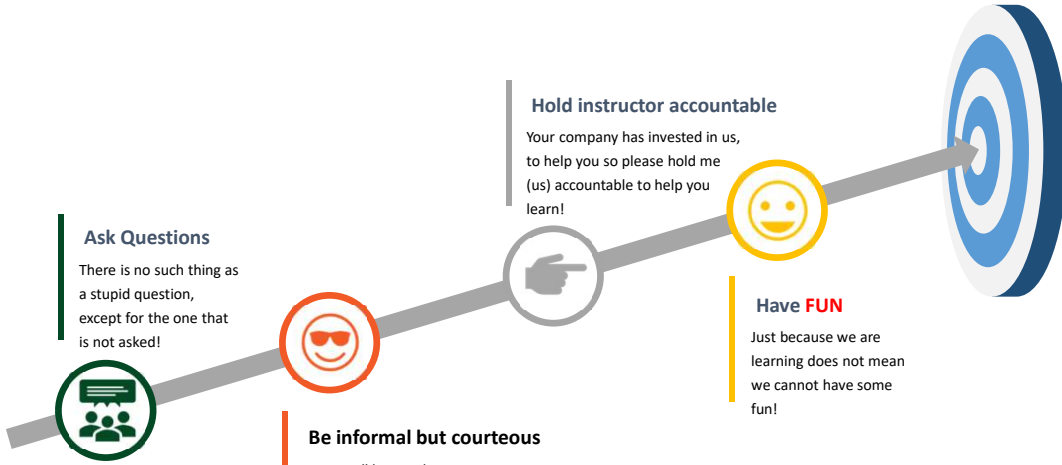
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 Practical Reliability Solutions

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Workshop Rules

Criteria for a Successful Course



Ask Questions
 There is no such thing as a stupid question, except for the one that is not asked!

Be informal but courteous
 We are all here to learn so **be yourself** and sensitive to others.

Hold instructor accountable
 Your company has invested in us, to help you so please hold me (us) accountable to help you learn!

Have FUN
 Just because we are learning does not mean we cannot have some fun!

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Workshop Introductions

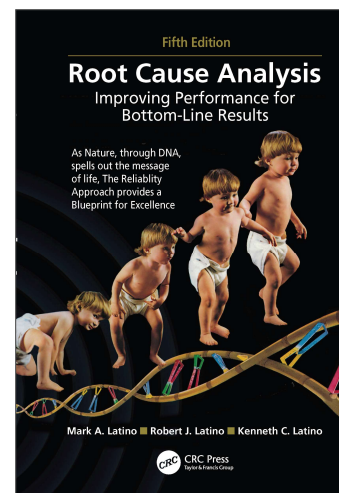
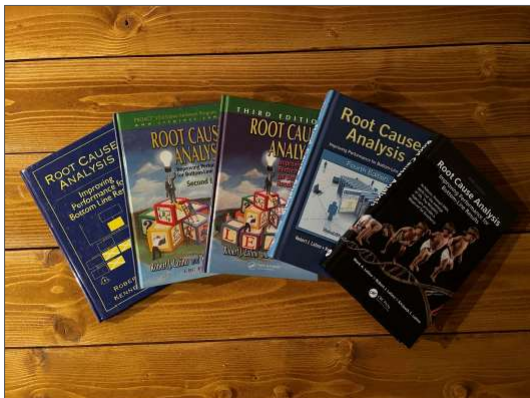
We're taking up your time...what are your expectations for when you leave this workshop?



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Your Workshop Manual...



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Reliability & RCA Are in Our DNA...



Charles J. Latino
1929 - 2007

Coined 'The Father of Manufacturing Reliability' in 1972

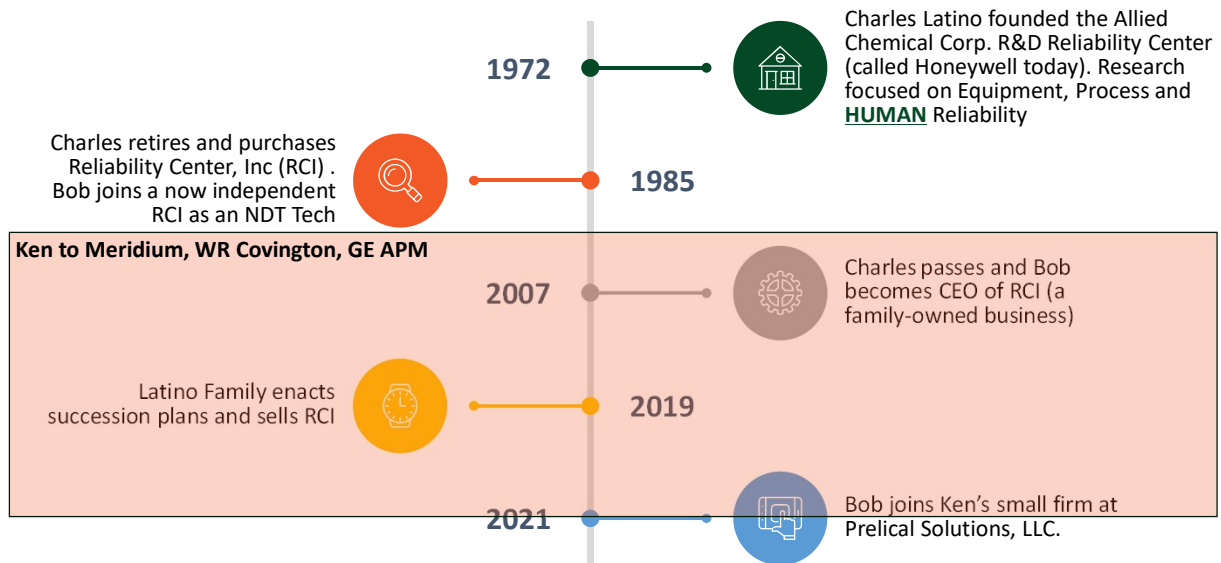


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Latino Family Career Path



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How would you go about trying to solve this problem?

- Repetitive Pump Failures
- Current MTBF is about 3 months
- Current cost per repair is approximately \$50k
- Causes decreased production when only one pump running
- Downtime cost is approximately \$25k/hr. when only one pump running
- Problem has been going on for many years and has been accepted as the cost of doing business



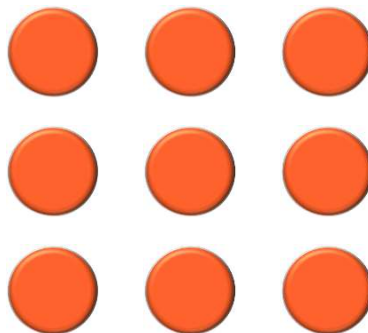
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9-Dot Game

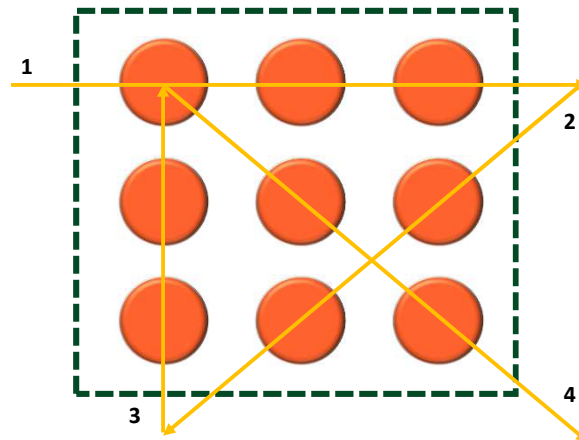
Connect all 9 dots using only 4 straight lines. Pen or pencil cannot come off the paper.



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9-Dot Game



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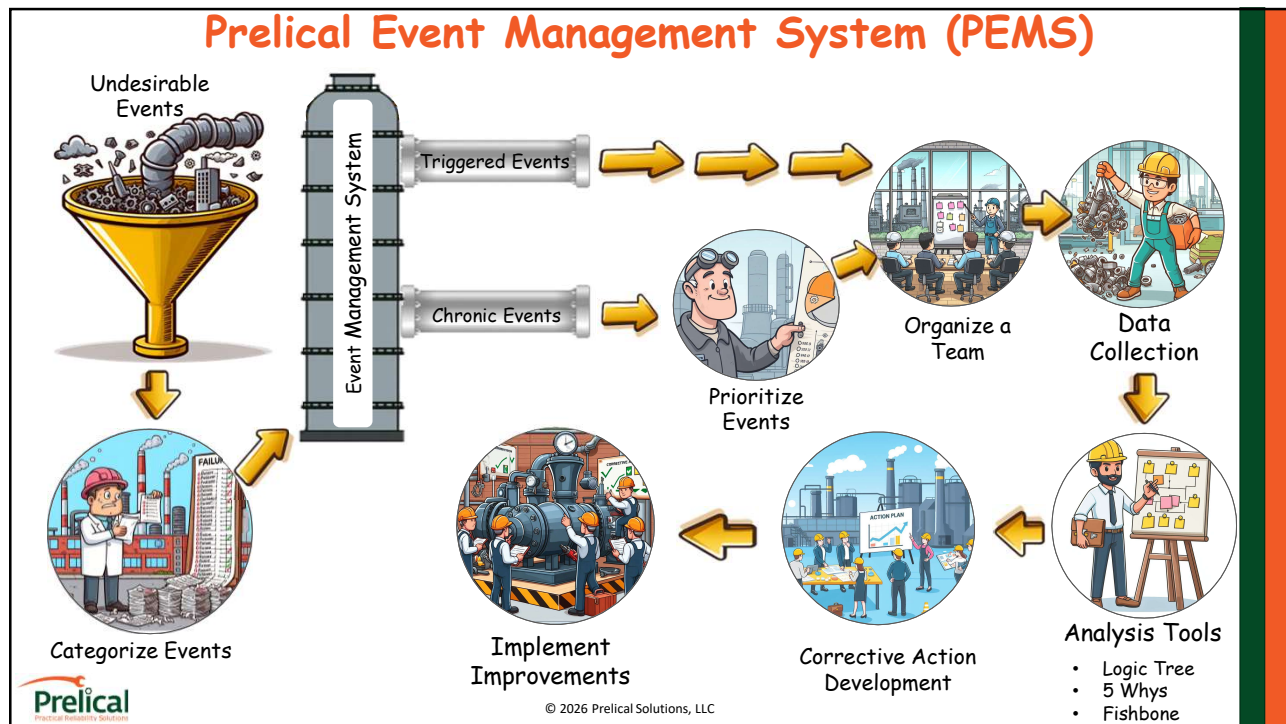
Joel Barker – The Business of Paradigms



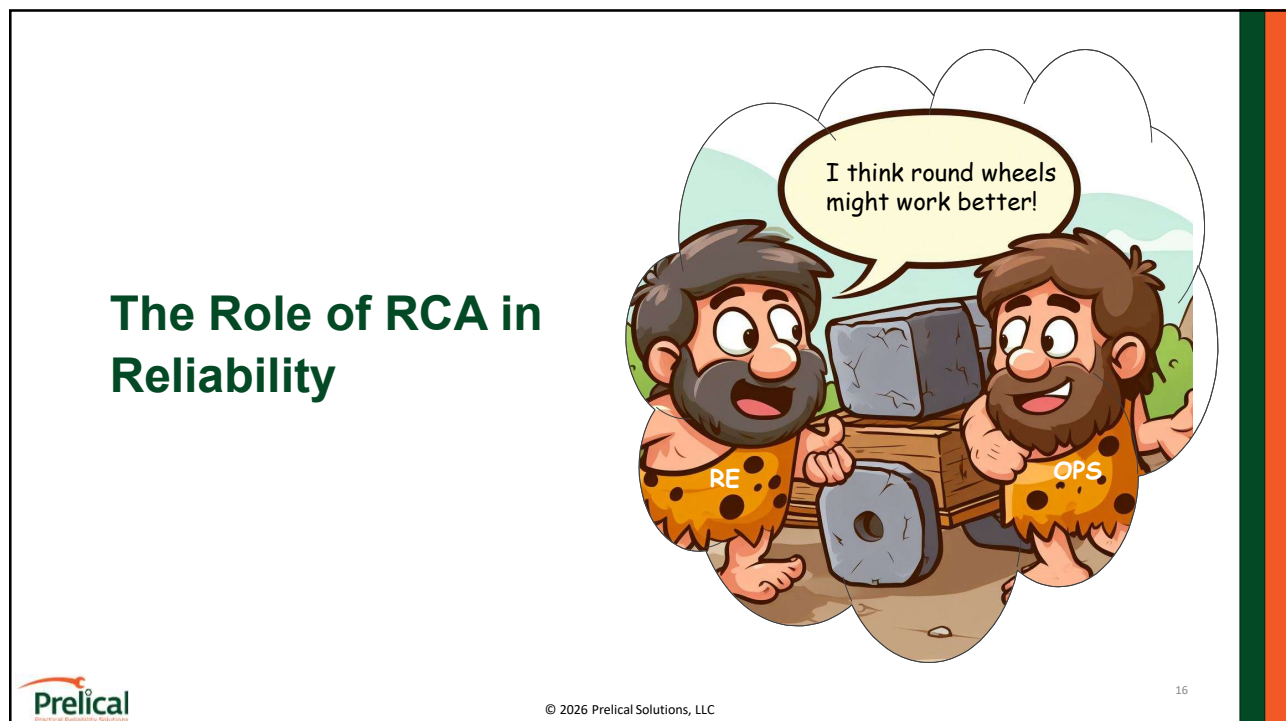
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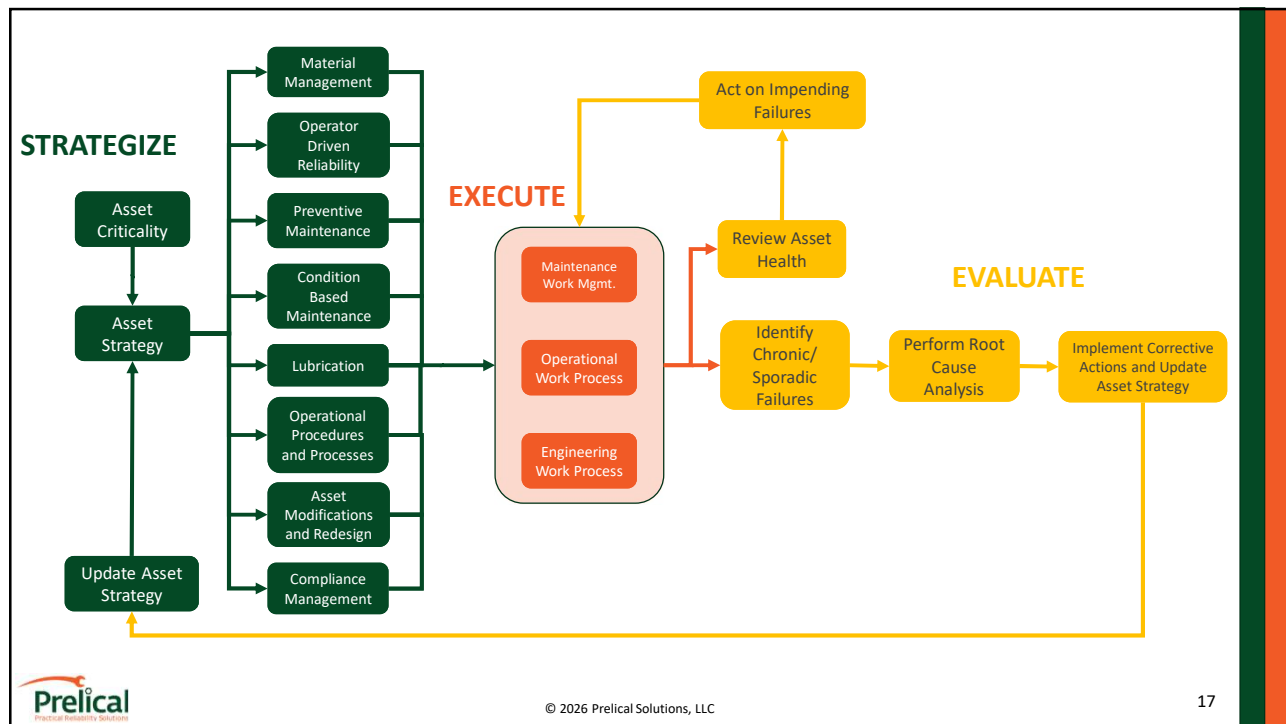
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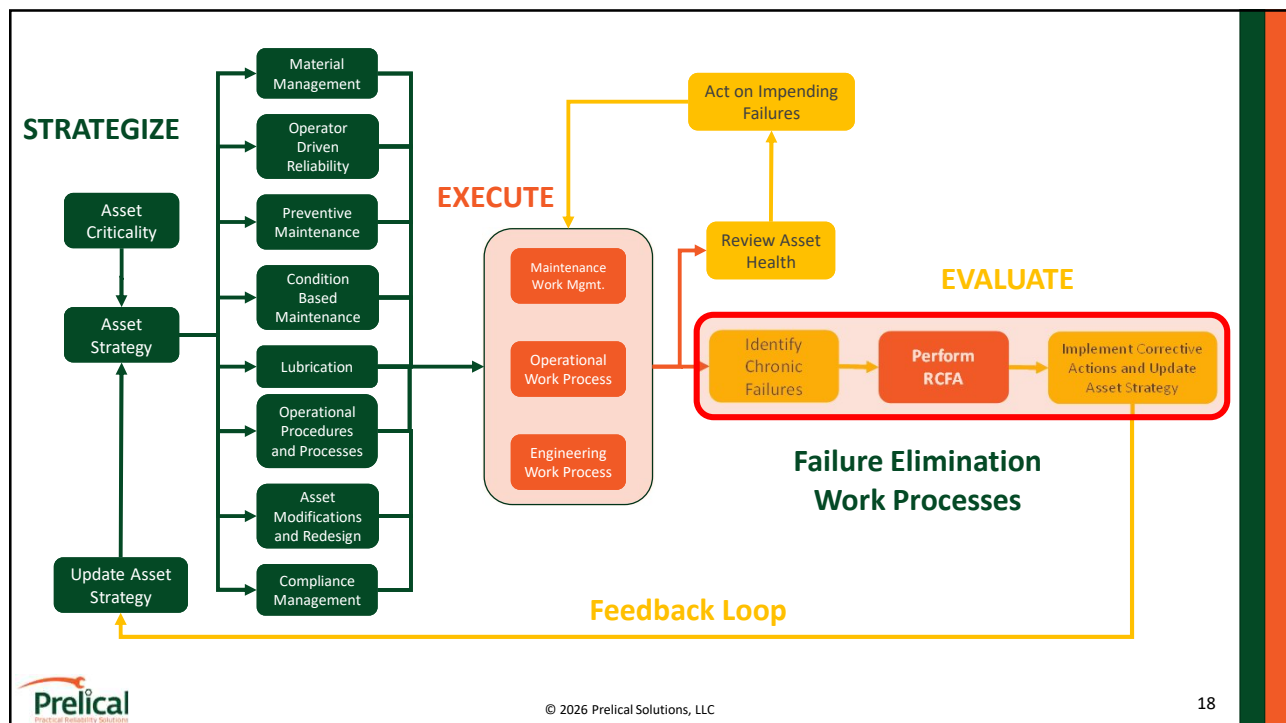
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Root Cause Analysis Case Study



Audio Intro



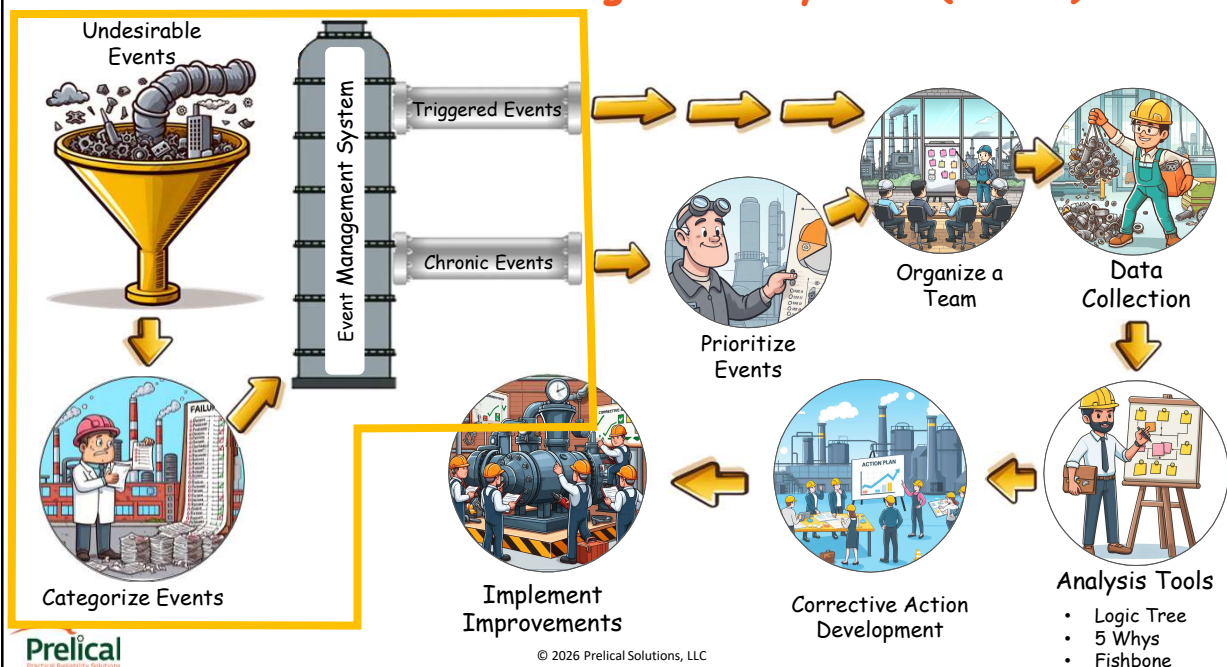
Logic Tree



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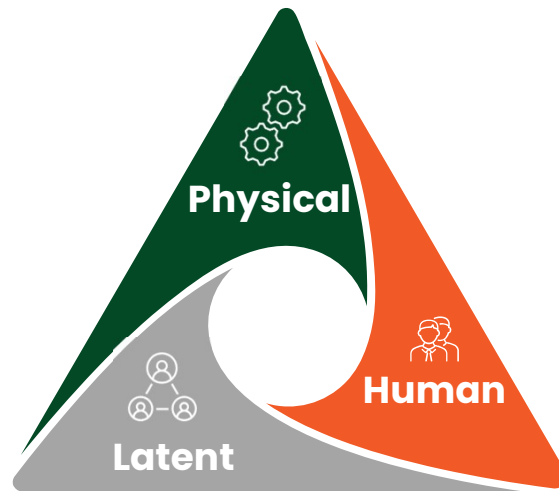
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Prelical Event Management System (PEMS)



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Levels of Root Cause



Physical

Physical root cause refers to the underlying, tangible, and typically material factor or condition responsible for a problem, failure, or issue in a system or process.

Human

Human root cause refers to the underlying factors or conditions related to human actions or decisions that contribute to a problem or incident.

Latent

Latent root causes are typically related to systemic weaknesses, process flaws, organizational culture, or other underlying factors that may have been contributing to the problem over an extended period.

Determining Candidates for Appropriate Levels of RCA



Defined Triggers

"Root Cause Analysis Triggers" are specific events, incidents, or circumstances that initiate the need for a Root Cause Analysis (RCA) process. These triggers serve as signals or prompts for an organization to investigate and identify the underlying causes of a problem, failure, or undesired outcome.



Chronic Failures

Chronic or repetitive failures refer to a pattern of recurring and persistent issues, malfunctions, or breakdowns in a piece of machinery, equipment, or a system. These failures happen on a regular or frequent basis, and they typically occur over an extended period. Such failures are characterized by their repetitiveness and can be a significant source of disruption, cost, and operational inefficiency for an organization.

Examples of Triggers



> 16 hours of downtime on a process



An unplanned repair that costs more
that \$150K in maintenance cost



Boiler Trip

What are your Triggers?

Example Triggers for a Paper Mill

- Safety Recordable Injuries
- Environmental Excursions
- 8 hours unscheduled downtime on any major process area (C1, C2, C8, Power, Recovery, Fiberline)
- Unscheduled mechanical or electrical repair where costs exceed \$100,000 in maintenance expense
- Rejects greater than 250 tons for a single event
- Boiler trip for Recovery Boilers (1 or 2) or Power Boilers (1 or 9)
- Manager invoked



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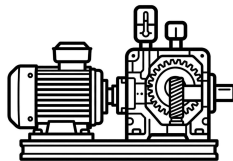
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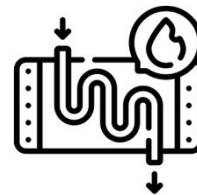
Examples of Chronic Failures



Pump 101 fails 4 times per year



Multiple Gearbox Failures



Heat Exchanger 101 experiences numerous tube leaks



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Triggered (Sporadic) Event Characteristics



Urgent

These events are typically dramatic event that require immediate attention from the site

Infrequent

These events, by definition, do not occur very often

Time Consuming

These events take considerable time and attention away from the site to deal with the consequences of the event

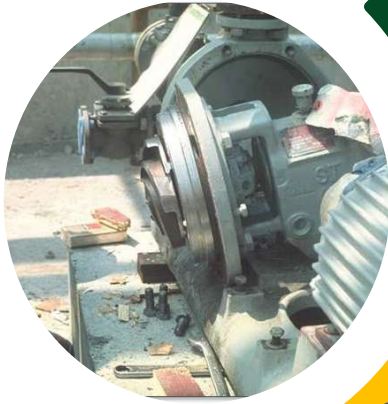
Costly

These events require considerable financial resources to get back to steady state operations

Team Exercise: Develop a List of Triggered Events

As a group, let's develop a list of significant failures that meets the definition of **Sporadic (aka - Triggered)**. Break the failures into the areas of the facility.

Chronic Failure Characteristics



Routine

These are events that happen so often, they are considered part of the status quo

Frequent Occurrence

These events, by definition, happen very frequently

Quick Fix

These events generally get resolved quickly. Mainly due to how often they occur

Not Individually Costly

Individual events do not cost very much when compared to sporadic failures. However, they are very costly if you multiple their impact by their frequency of occurrence.

Team Exercise: Develop a List of Chronic Events

As a group, let's develop a list of [chronic failures](#) that meets the definition of chronic. Break the failures into the areas of the facility.

Good vs. Evil

The Paradox of Proaction vs. Reaction



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The plant's internal debate:
"Fix it now" vs. 'Run it till it breaks.



The timeless battle of foresight
versus... faith.