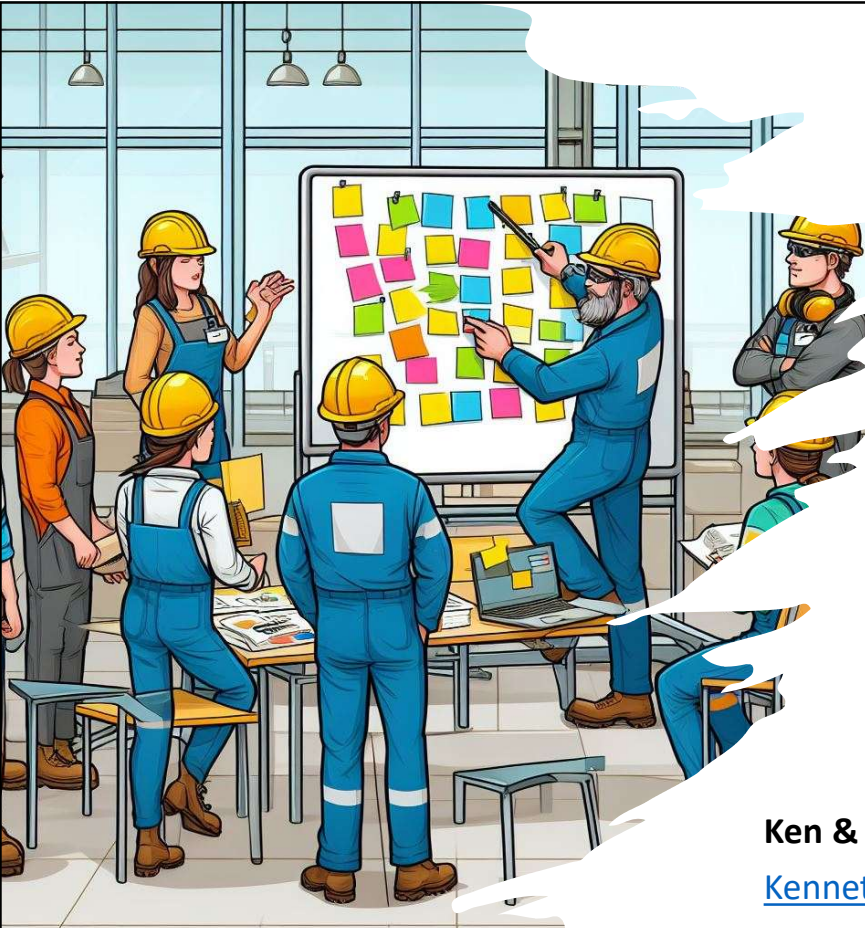




Root Cause Analysis Essentials Workshop

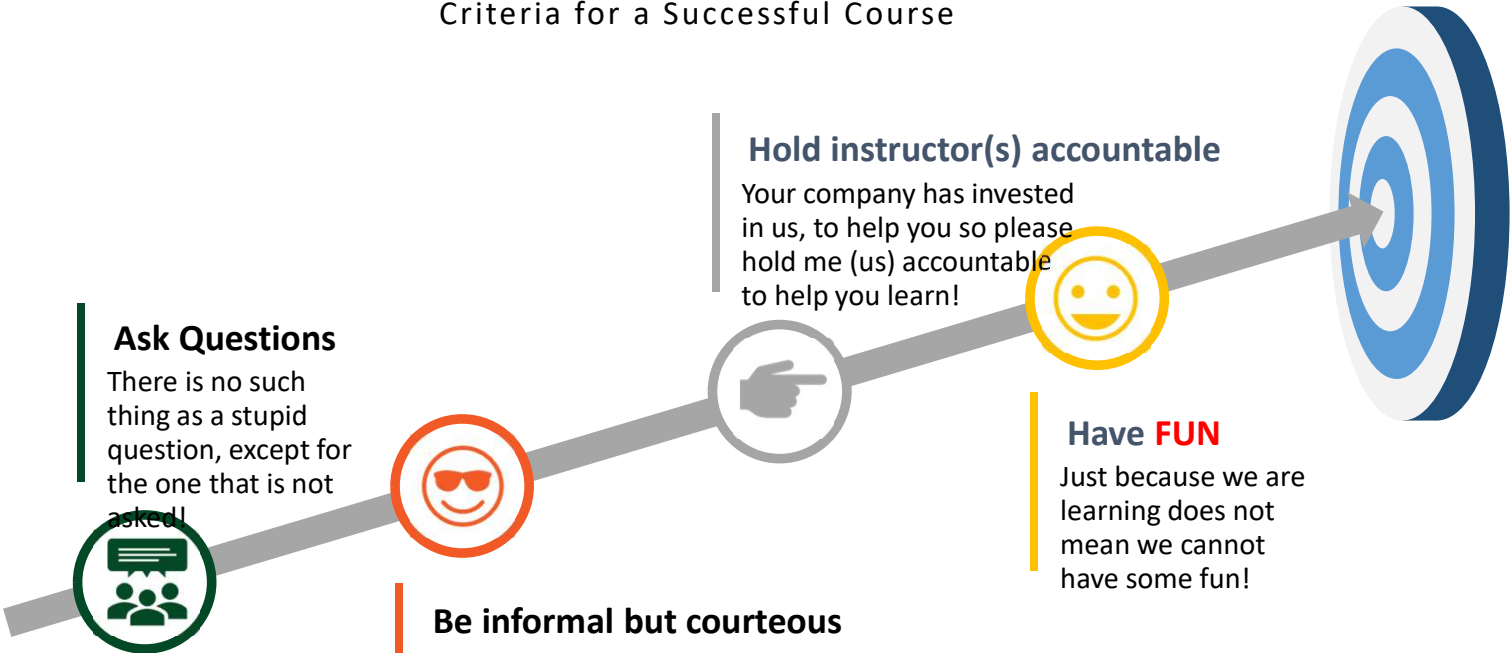
Ken & Bob Latino
Kenneth.latino@prelical.com
Bob.latino@prelical.com

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Workshop Guidelines

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(s) 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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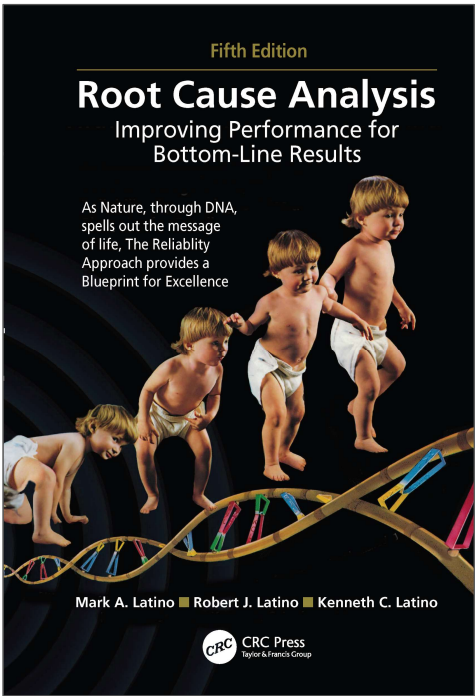
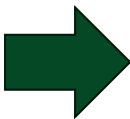
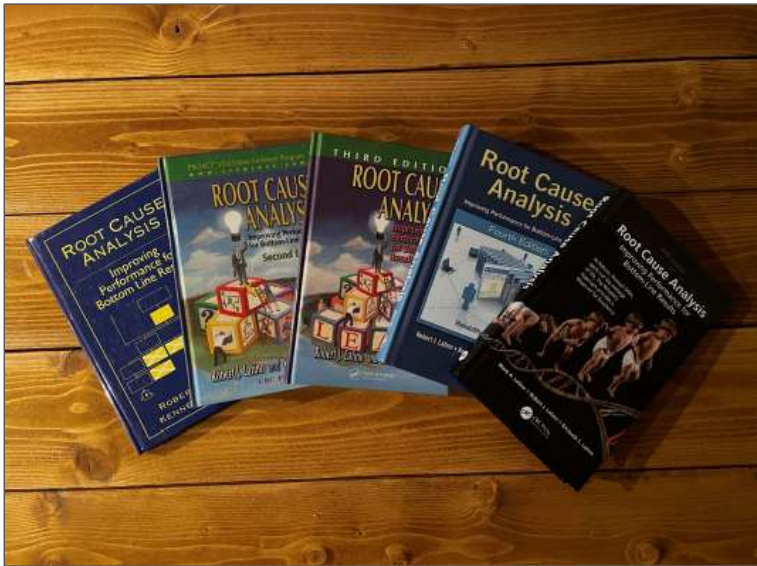
Workshop Introductions

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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RCA vs RCFA?



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Reliability & RCA Are in Our DNA...

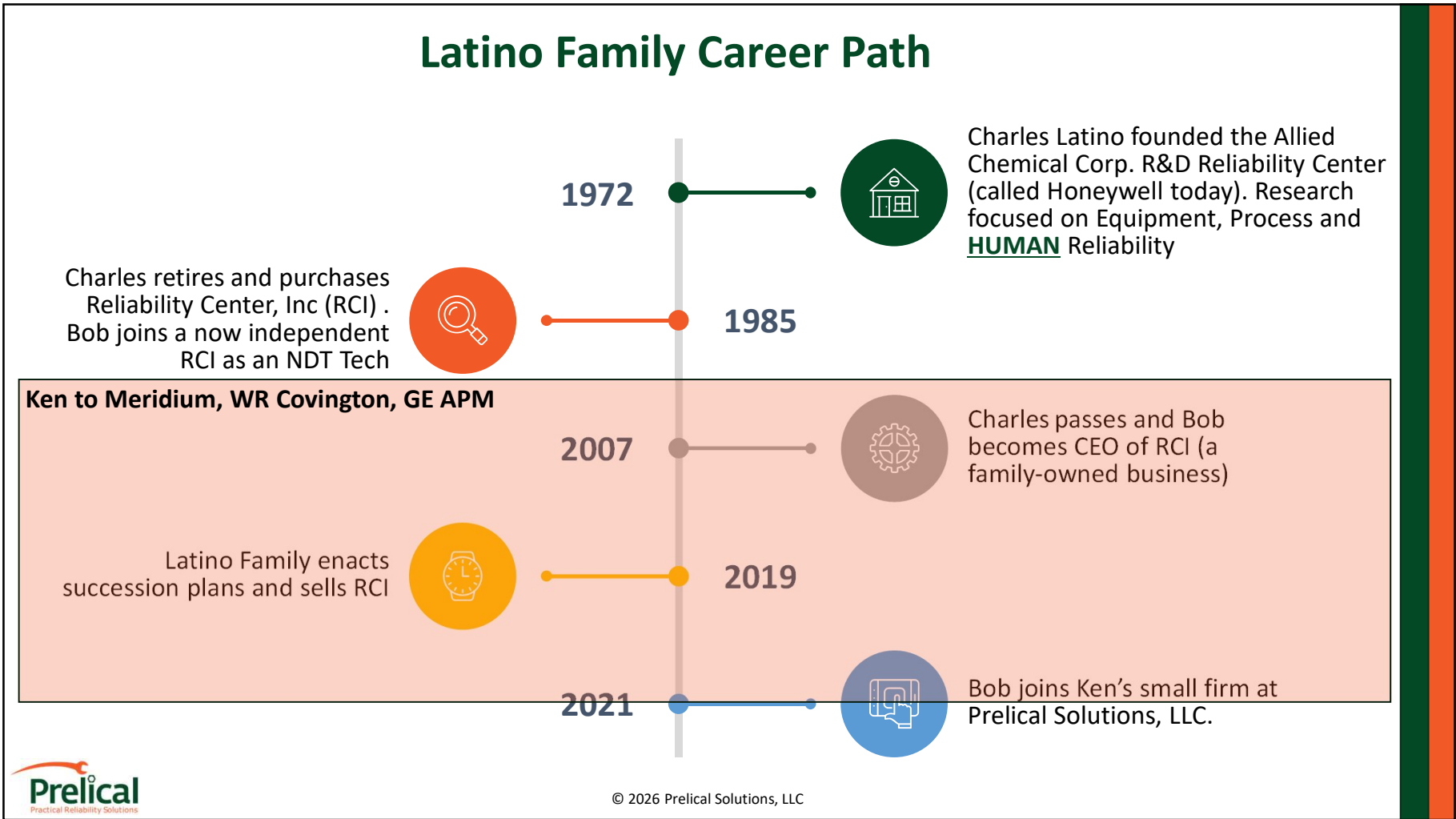


Charles J. Latino
1929 - 2007

Coined ‘The Father of Manufacturing
Reliability’ in 1972



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7

Exercise: How would you go about trying to solve this problem?



- 7 Thick Stock Pump Locations
- Current MTBF is about 6 months
- Current cost per repair is approximately \$200k
- Can cause machine downtime if repair takes longer than 12 hours
- Machine downtime is approximately \$20k/hr.
- Yearly repair costs typically exceed \$2MM
- Problem has been going on for many years and has been accepted as the cost of doing business

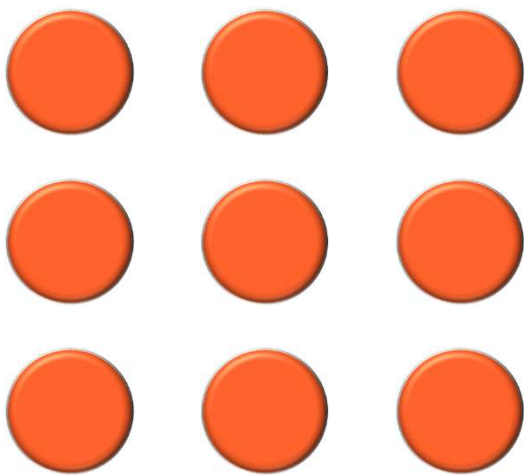
Prelical
Practical Reliability Solutions

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8

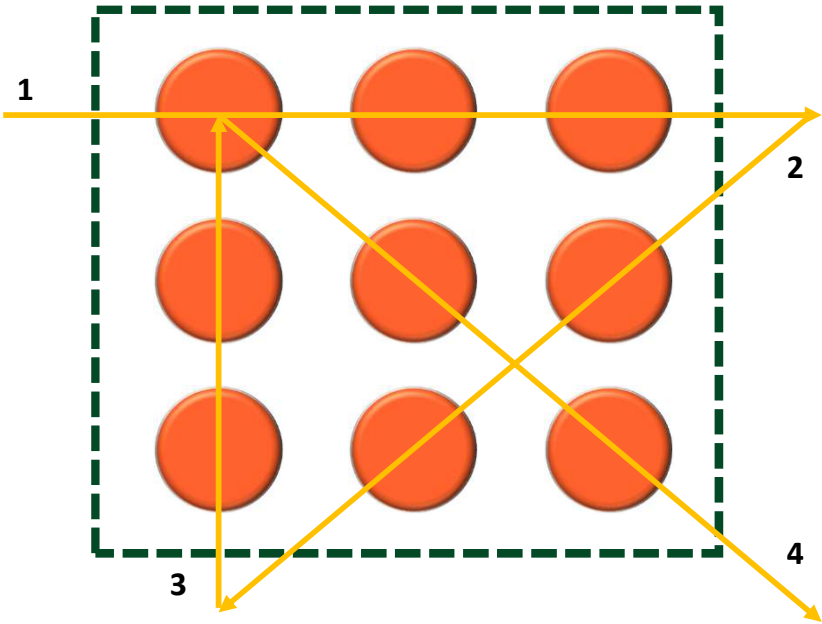
The 9-Dot Game

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



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The 9-Dot Game



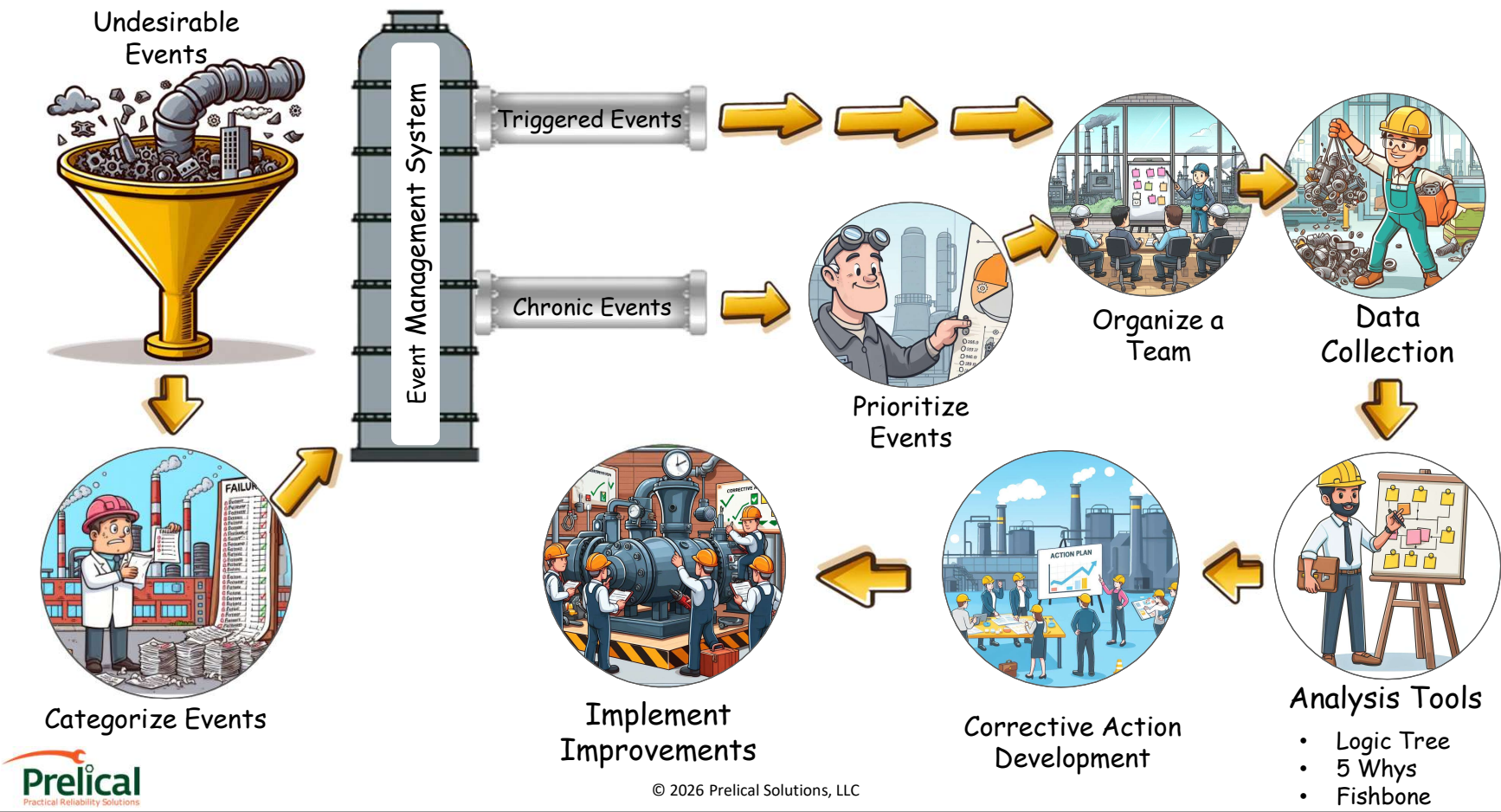
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Joel Barker – The Business of Paradigms



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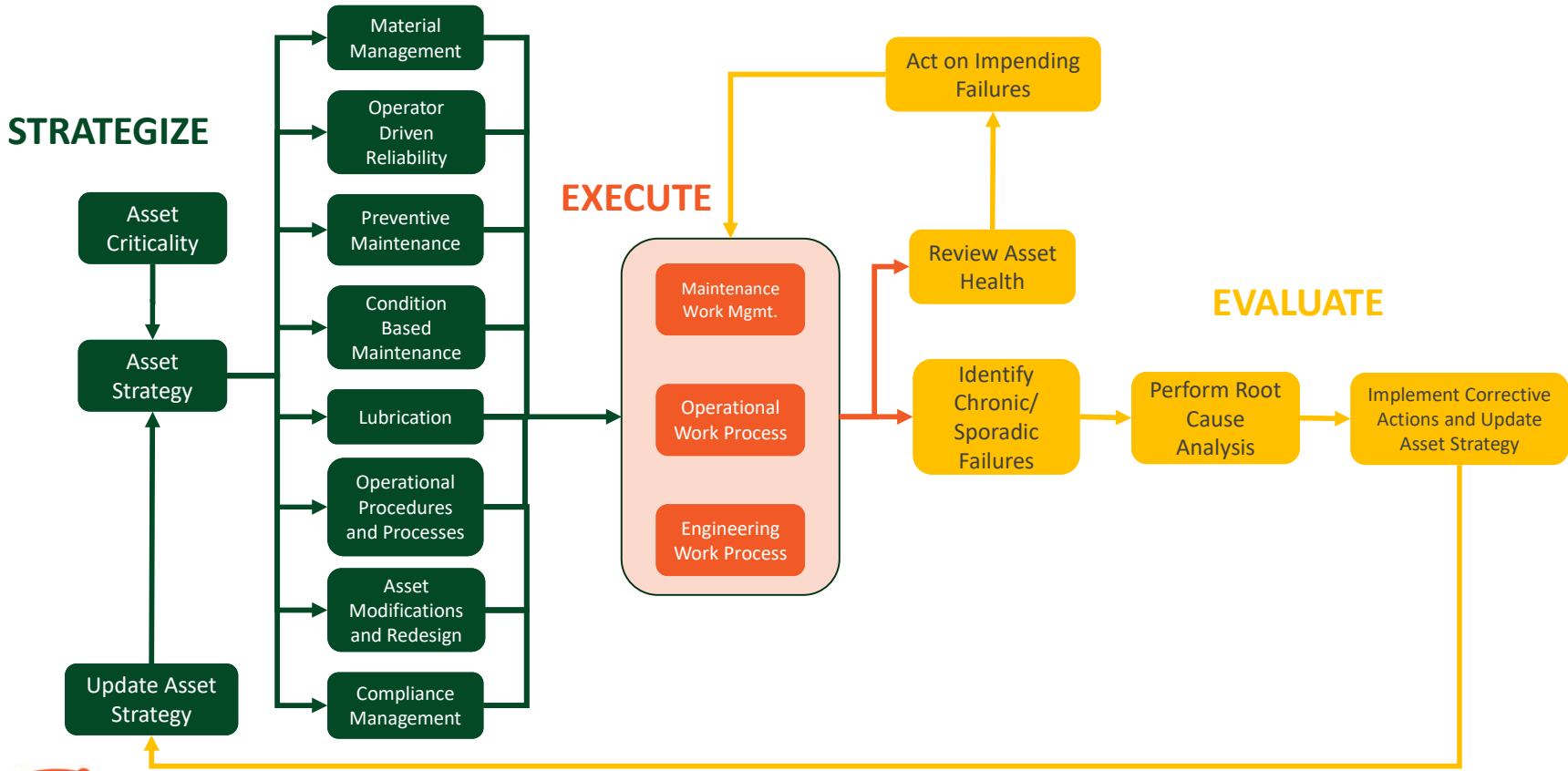
Prelical Event Management System (PEMS)

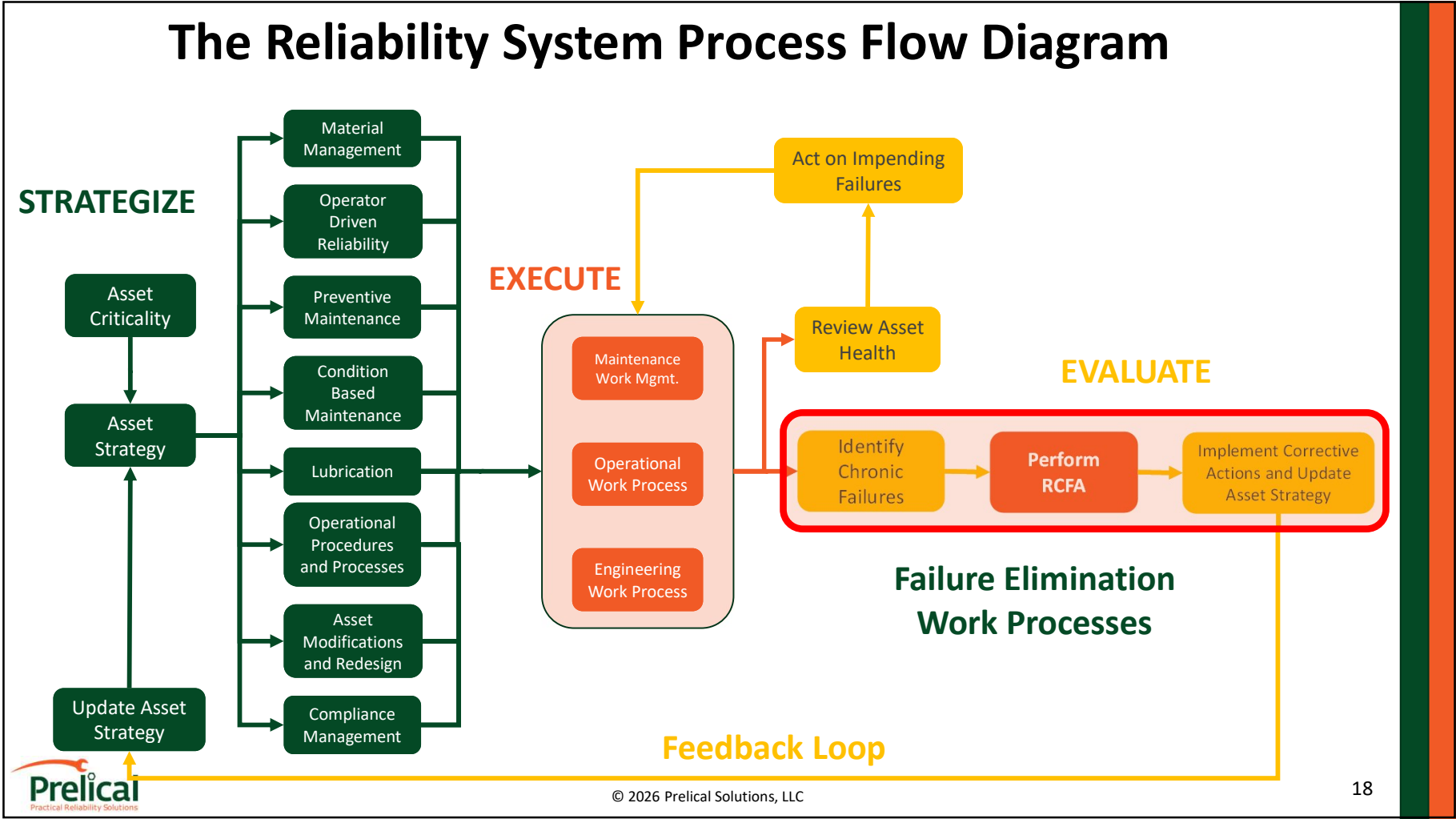


The Role of RCA in Reliability



The Reliability System Process Flow Diagram





RCFA Case Study – A Preview of Where We’re Headed



Audio Intro

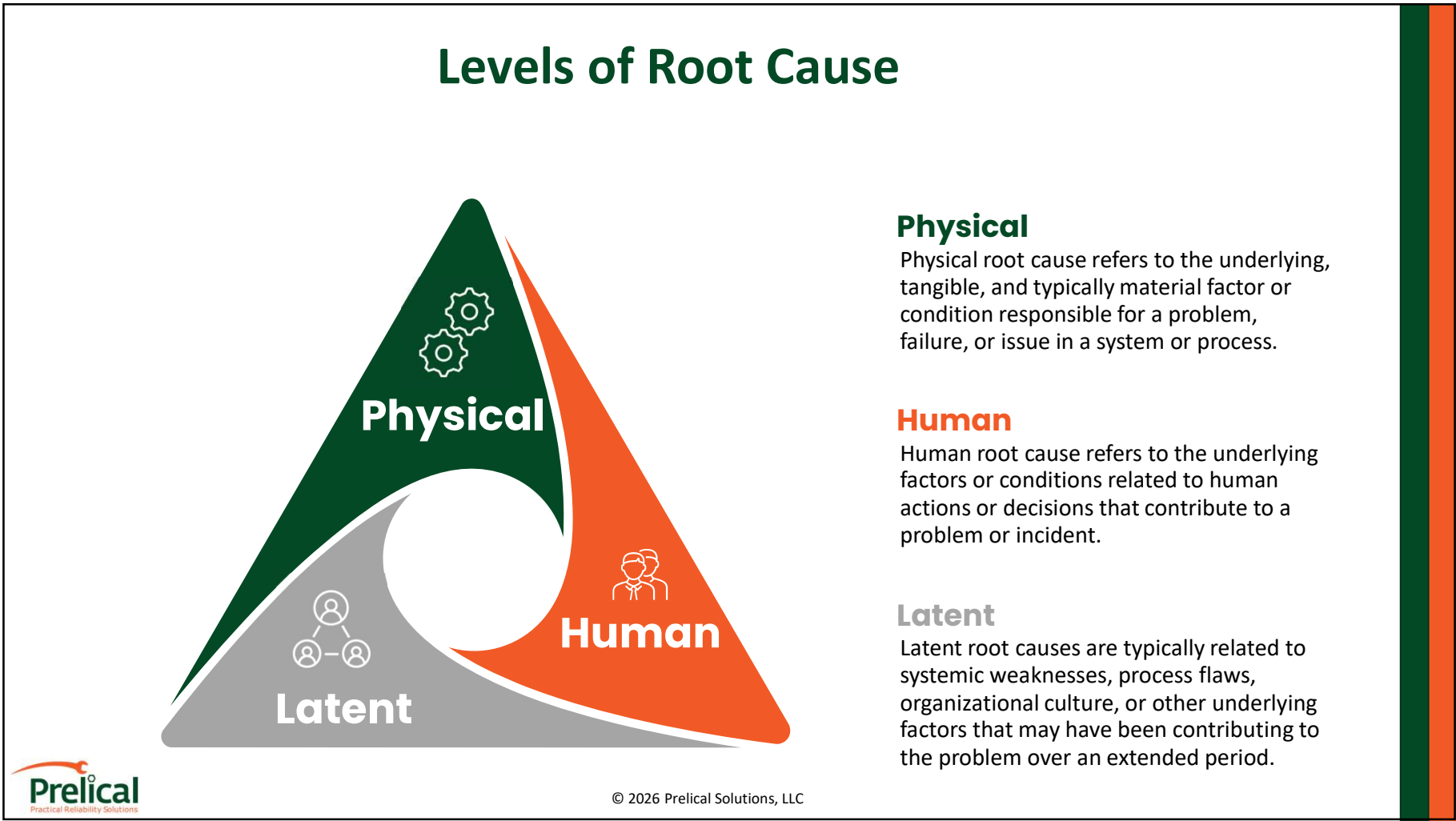
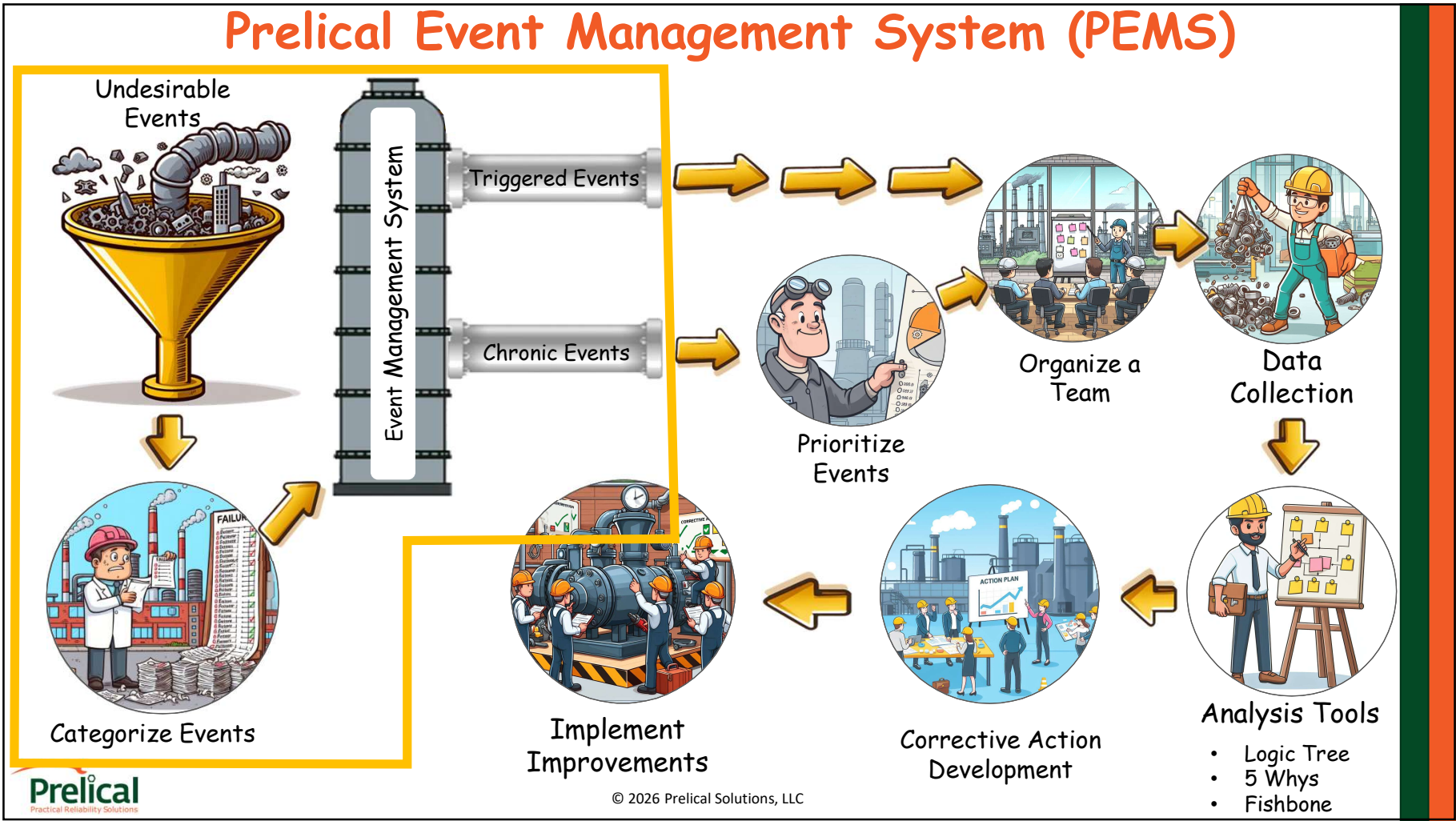


Logic Tree



Prelical Practical Reliability Solutions

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Determining Candidates for Appropriate Levels of RCA



Defined Sporadic 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 Typical Sporadic Triggers



> 16 hours of downtime on a process (e.g., Paper Machine)



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



Boiler Trip





What are your Triggers?

Sappi Pulp Mill/U&R Triggers

Page 4 of RCFA Manual

- **Production Loss:** An equipment failure resulting in lost digester revolutions equivalent to 500 tons or more of production loss, whether caused by slowing back operations or fully shutting in a digester.
- **Repeat Failures:** Any two repeat equipment failures within a three-month period, regardless of immediate production impact.
- **Cost Impact:** An equipment failure resulting in repair or replacement cost of \$100,000 or more.

Sappi Woodyard Triggers

Page 5 of RCFA Manual

- **Unscheduled Maintenance Downtime:** An equipment failure resulting in six hours or more of unscheduled maintenance downtime.
- **Repeat Failures:** Any two repeat equipment failures within a three-month period, regardless of downtime duration.
- **Cost Impact:** An equipment failure resulting in repair or replacement cost of \$100,000 or more.



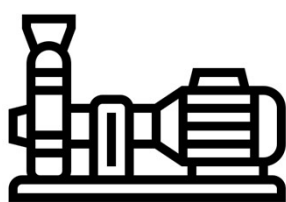
Sappi Paper Mill Triggers

Page 6 of RCFA Manual

- **Machine Downtime:** an equipment failure resulting in *four hours or more of unplanned machine downtime*.
- **Repeat Failures:** Any *two repeat equipment failures within a three-month period*, regardless of production loss.
- **Yield Loss:** An equipment failure resulting in a *yield loss of 250 tons or more within a one-week period*.
- **Cost Impact:** An equipment failure resulting *in repair or replacement cost of \$100,000 or more*.



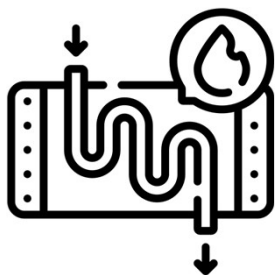
Examples of Chronic Failures



Pump 101 fails 4 times per year



Average 10 wet end breaks on PM-1



Heat Exchanger 101 experiences numerous tube leaks



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





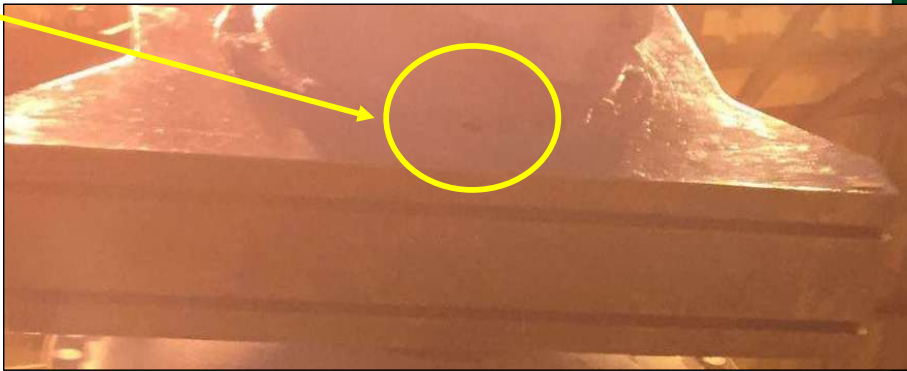
Triggered
Event
Example



Gloss Calender Roll Failure



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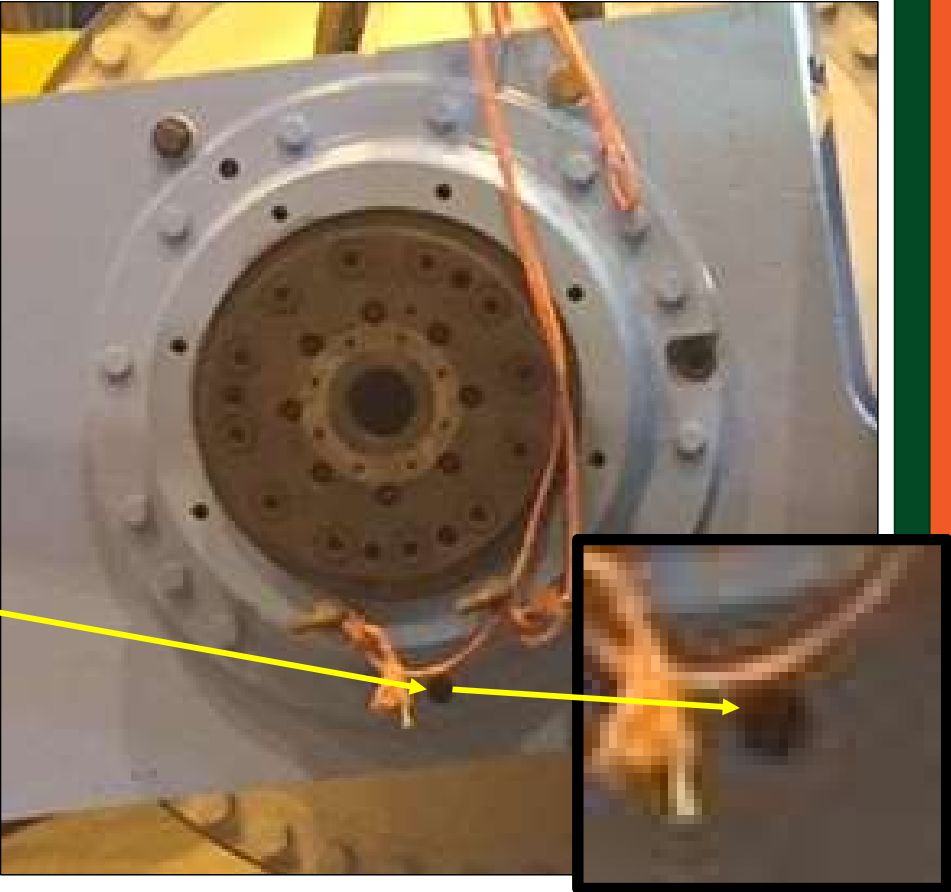
2nd Plug not easily visible
inside the role (6”
deeper than 1st plug).



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2nd Plug not easily visible inside the roll





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32



Front Side

Note: Practice was to hold roll being replaced before sending out for repairs, in case new roll had issues.



Back Side



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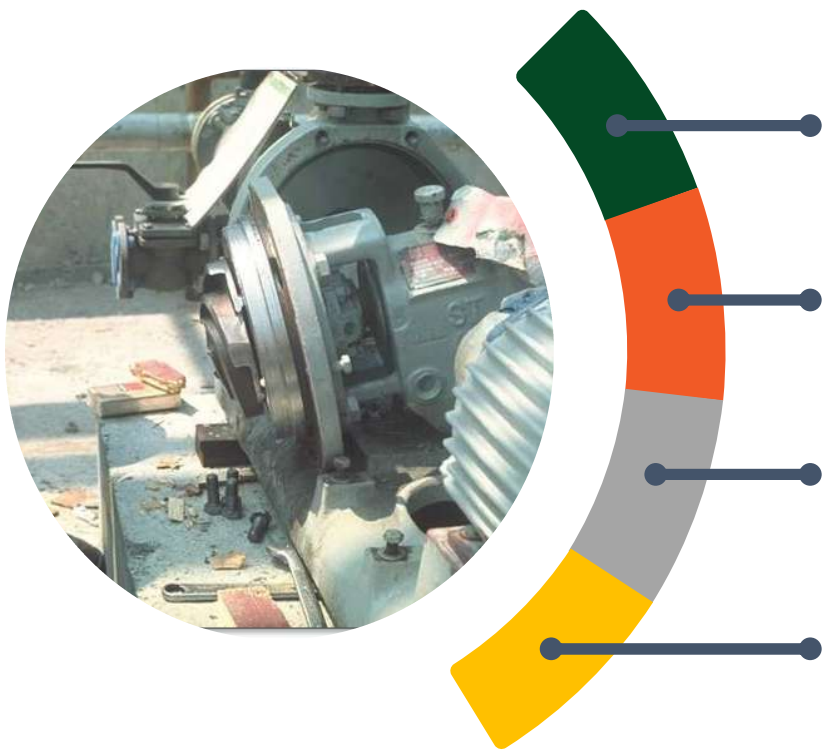
33

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.



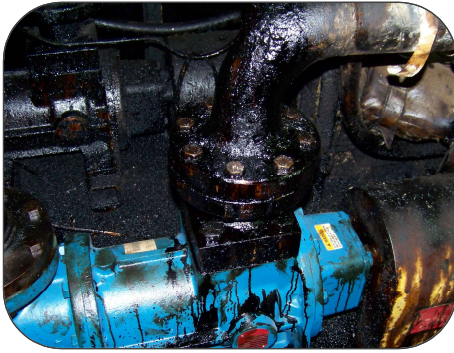
Chronic Failure Characteristics



- 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.



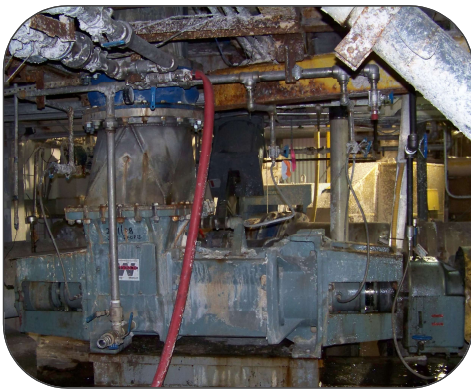
Chronic Effect



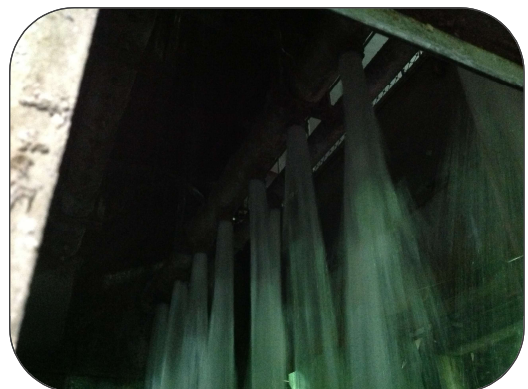
Fuel Oil Pumps



Trim Squirt Pumps



Thick Stock Pumps



Pulper Plugging

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

