FLUKE®
Reliability

Walk the Talk

Click to edit Master title style

Best Practices Webinar Series

Speaker Bio Slide

Blake A. Baca, CMRP, CRL
Owner, BDB Solutions LLC

- Asset Management professional with over 35 years of experience in industry including mining, refining, refining, smelting, oil & gas, power generation, foundry, manufacturing, and material processing.
- Worked for Alcoa, Inc. for the first 20 years of career.
- Finished up Alcoa career as the Maintenance and Engineering Manager at Alcoa Rockdale Operations in Rockdale, Texas as the facility was shut down due to business conditions in December 2008.
- Asset Management Consultant for over 15 years.
- Bachelor of Science in Mechanical Engineering degree from Texas Tech University.
- Certified Maintenance and Reliability Professional (CMRP) and a Certified Reliability Leader (CRL).
- Served as Maintenance Manager for Barrick Gold Corporation (Goldstrike and Cortez Hills Mines) in Elko, Nevada from 2017-2019.

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Reliability and Safety - Mutually Dependent

- If safety is not an option, then reliability is not an option
- They're both driven by the same principles – disciplined application of best practice!
- Improving reliability:
  - Reduces the exposure to the risk of injury- things don't fail, and have to be repaired as often
  - Reduces the risk of injury- defects are detected early, and managed in a planned, disciplined way

Source: The RM Group, Inc. Knoxville, TN

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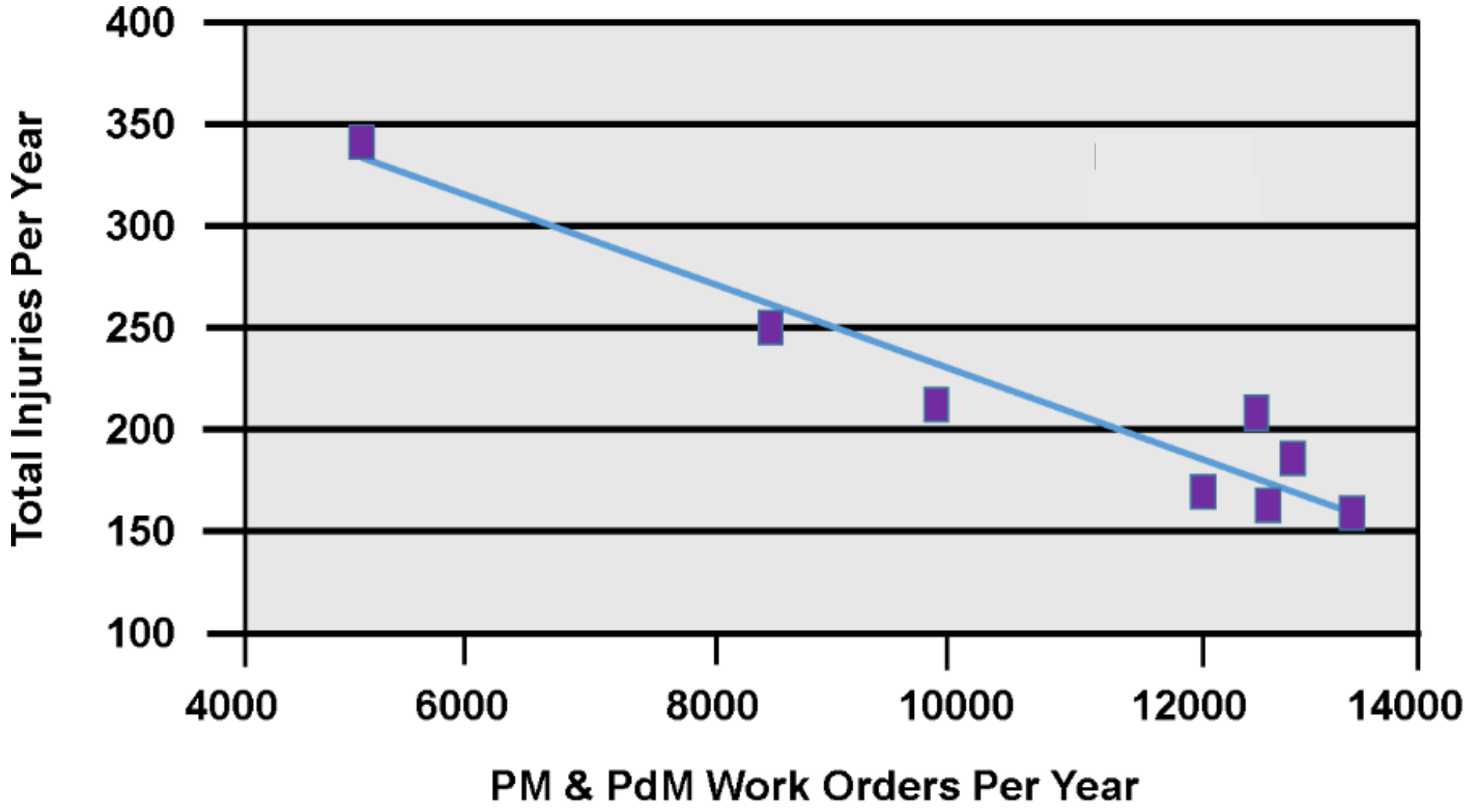
Large Chemical Plant (8-year period)



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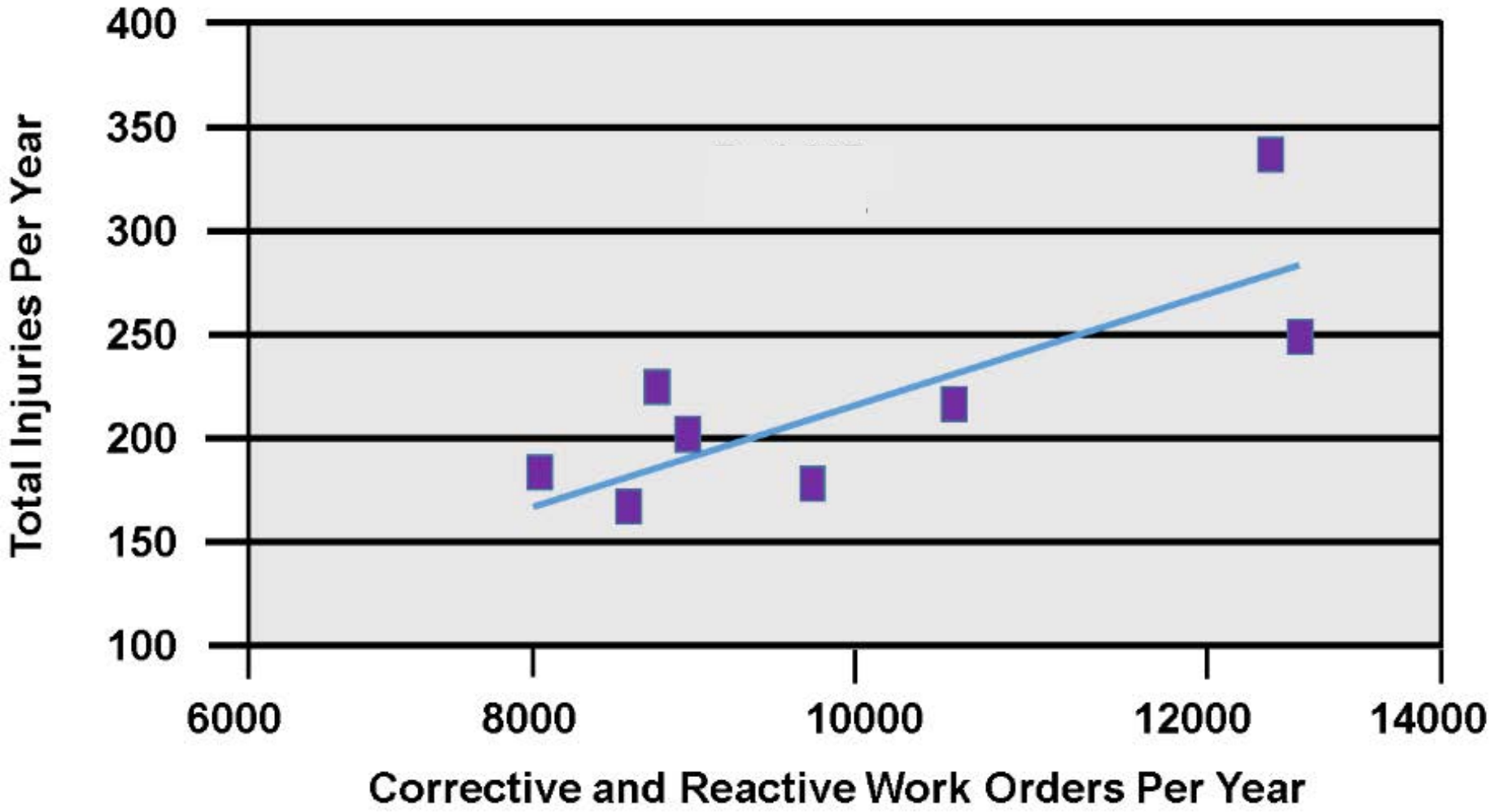
Large Chemical Plant (8-year period)



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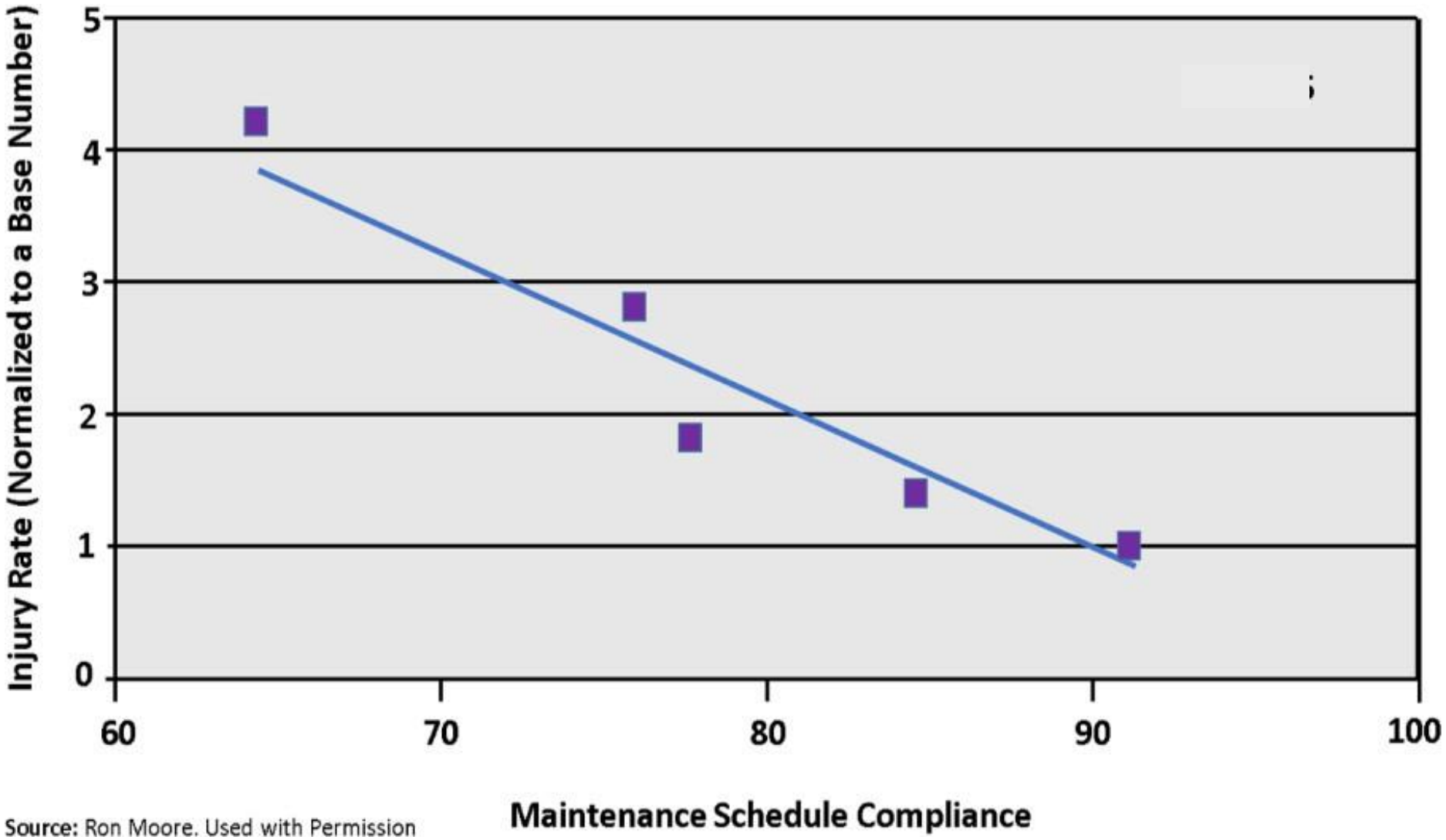
5 Large Manufacturing Sites (1-year)



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Why Are We Here?

- This Workshop's Purpose
  - Provide for attendees the ability to communicate to their leadership sponsoring their attendance at this conference the value of Asset Management Improvement
  - The ability for attendees to perform a high-level self-assessment and identify if closing gaps is something that can be done internally or with the help of experts
  - Although it is composed of specific tools and techniques, provide attendees with an understanding that effective Asset Management is not merely cherry picking the tools and techniques. It is a culture change that must be institutionalized that utilizes the integrated tools and techniques to achieve benefits.
  - Provide an example of results based on a disciplined implementation of leading practices

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How Many Initiatives are going on at your facility?

- Do you notice any that contradict your Asset Management culture?
- Is your facility or has your facility going through or gone through a structured Asset Management Transformation or are you just using Asset Management tools and techniques?
- As a leader, do you or do your leaders:
  - Understand and can effectively explain and articulate the Asset Management concepts?
  - Agree that an Asset Management culture will improve the business?
  - Have the courage to effectively push back to executive leadership to explain the value of effective Asset Management when the other initiatives contradict it?
  - Have the ability to and have the **courage** to hold people accountable with appropriate consequences and celebration?

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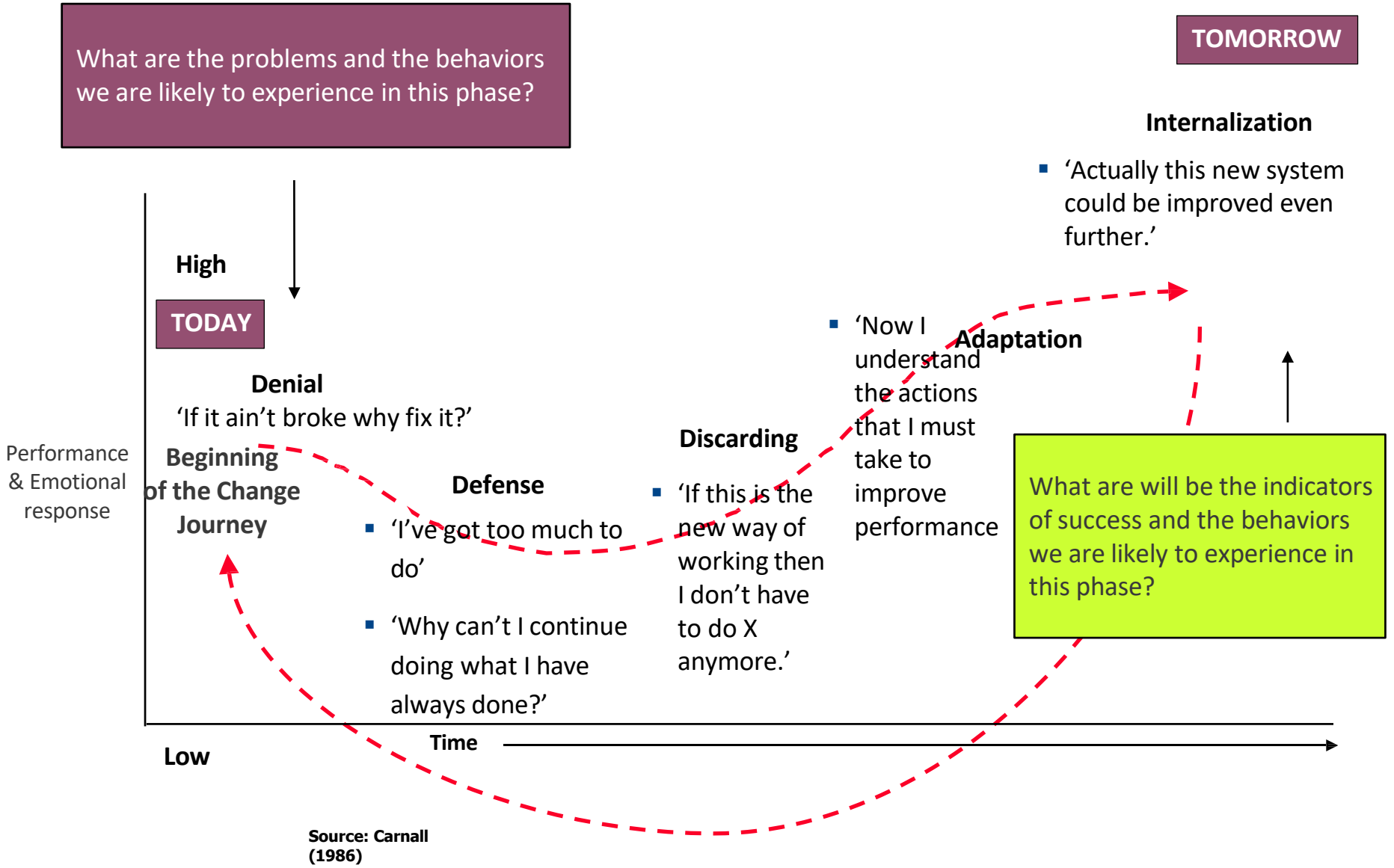
The Change Journey

What are the problems and the behaviors we are likely to experience in this phase?



Source: Carnall (1986)

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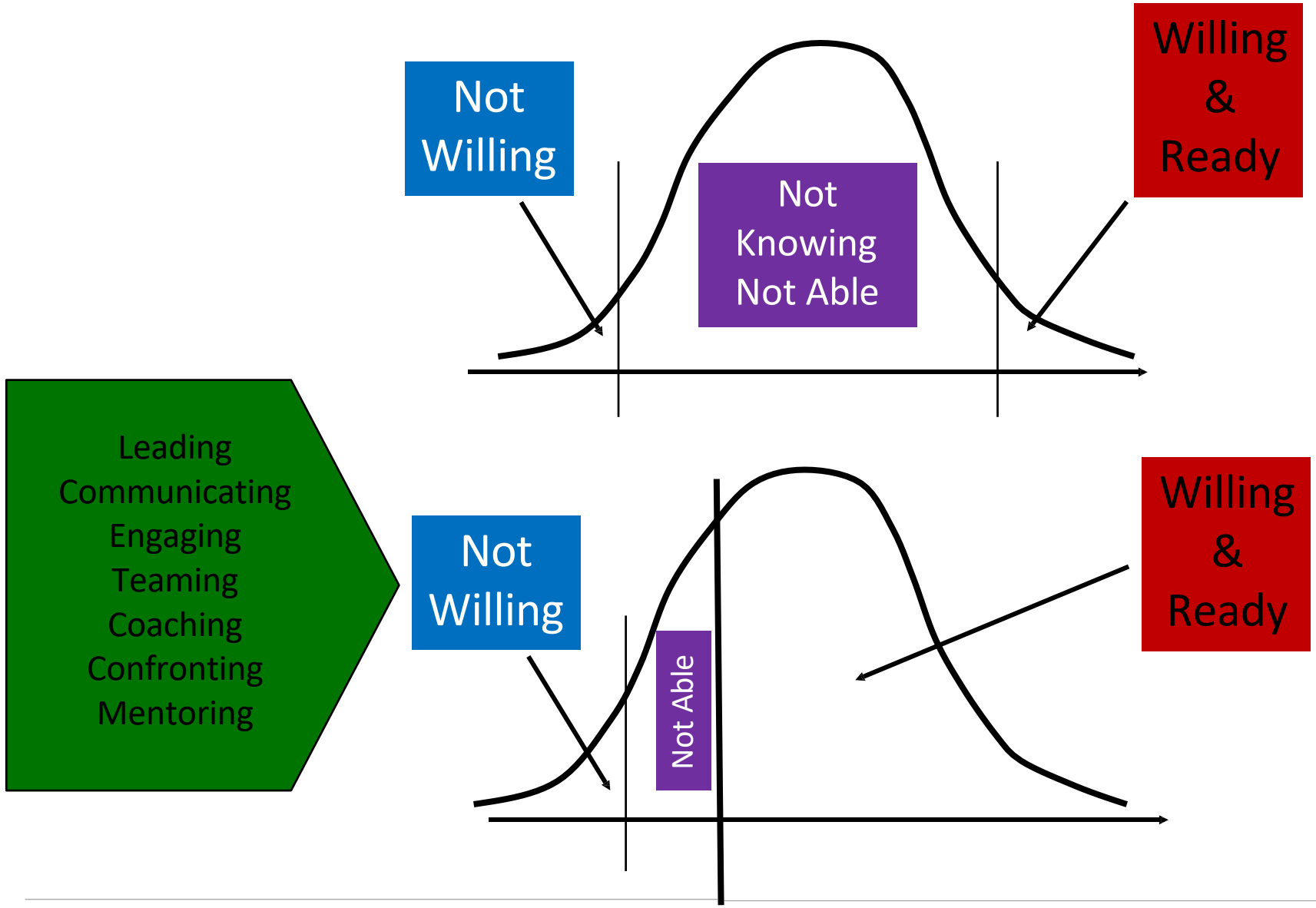
Where are we today? Where do we want to be?



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Requirements for Asset Management = Reliability Excellence

- Operations & Maintenance Partnership
  - Partnership Agreement
- Maintenance, Operations, and Management working together for common goals
- Active participation by all employees, not just maintenance employees
- An understanding of the Maintenance Department's role in Asset Management versus subservience to the Operations Department for repair ("customer")
- Asset Ownership including Reliability by Operations
- Work Management Process Buy In and Accountability
  - Well defined roles and responsibilities (operations and maintenance)
    - ***Not guidelines***
- Computerized Maintenance Management System (CMMS) utilization
- Utilization of asset life cycle management practices from cradle to grave – Total Cost of Ownership (TCO)
- A culture that understands the business case and the works to continuously improve

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We are all Asset Owners

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What's your philosophy?

Operations Owns the Assets

Maintenance Owns the Assets
(Rental Philosophy)

Hertz

AVIS

COOPER EQUIPMENT RENTALS

SMS RENTS

AHERN RENTALS

United Mining Rentals

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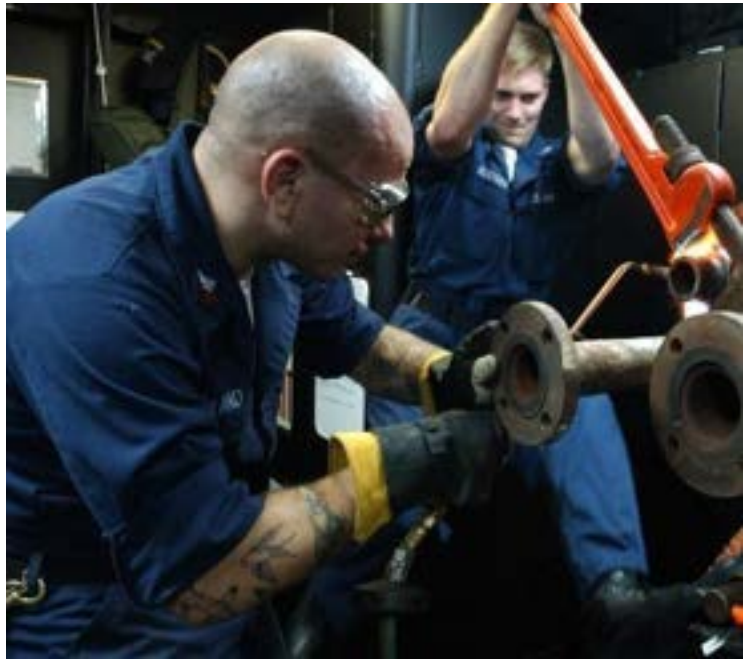
Is this the ‘Maintenance’ Guy at your facility?



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…or is this?

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…or maybe this?

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Recall that we are Asset Owners

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- Who is the operator of your vehicle?
- Who ensures that your vehicle gets maintained?
  - Preventive Maintenance (PM)
    - Oil Changes, Air filter changes, Lubrication
  - Condition Based Maintenance (CBM)
    - Brakes, Tires, Emission control
  - Operator Basic Care (OBC)
    - Washing and cleaning, Air cleaner, Turn signal bulbs

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- Who is responsible for determining if your vehicle gets maintained?
- Who is responsible for the cost associated with a failure on your vehicle due to lack of maintenance, missed maintenance, or abnormal damage to your vehicle?
- Who determines when you take your vehicle in for maintenance?
- Who owns the cost of maintaining your vehicle?

So, who owns your vehicle?
And who owns the reliability of that vehicle?

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Who is responsible for:

1) Determining the frequencies of maintenance of your vehicle?
2) Advising you as to the proper maintenance or repair of your vehicle?
3) Ensuring that the individuals performing maintenance on your vehicle have the proper tools and procedures and is qualified?
4) Ensuring that the maintenance performed on your vehicle eliminates or substantially postpones a failure on your vehicle?
5) Ensuring that maintenance on your vehicle is performed in a timely manner and is cost effective?

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What happens when we get here?

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Joey Logano 2024 NASCAR Cup Series Champion

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Paul Wolfe – Penske Penzoil racing Team Pit Crew Leader

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NASCAR – Penske Penzoil Racing Team

- Who is the asset owner/operator?
  - Joey Logano
- Who is the asset expert and advisor?
  - Paul Wolfe
- What would happen if they were not a team working as a partnership?

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If the NASCAR Penske Penzoil Racing Team Works together as a partnership, what is the result?

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What will be the result if your facilities' Operations, Maintenance, and Reliability Teams work together as a partnership?

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Asset Management

Asset Owner = Operations Department

Asset Reliability and Maintenance Advisor = Reliability and Maintenance Departments

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Operations & Maintenance = “We” instead of “Us vs. Them”

- Operations and Maintenance strive to recognize, understand, and respect the responsibilities and challenges the other faces every day.
- Joint accountability for equipment
- Ask “why” when equipment breaks
- Work together to recognize and stop recurring failures
- Set priorities and schedule available maintenance resources on planned work

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Asset Management

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Requirements for Asset Management

- Reliability Engineering
  - Application of appropriate Reliability Methodologies (Criticality, RCFA, FMEA, RCM, RAM, etc.)
  - Application of effective Condition Based/Predictive/Proactive Maintenance Tactics
  - **Reliability (Eliminating Failures) focus**

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Reliability Engineers Objectives

- Dedicated to asset reliability only
- Apply engineering concepts, techniques and methodologies leading to reduce the occurrence and probability of failures.
- Identify and correct the causes of failures that occur in spite of the efforts to prevent them.
- Apply methodologies to estimate the reliability of new designs.
- Analyze the information associated with the reliability of components, equipment, facilities and systems in general.
- Analyze equipment history data to determine and recommend solutions to chronic problems
- Work with planners in defining, developing and refining the Preventive and Predictive programs
- Determine lubrication requirements and frequencies
- Take the lead in ensuring reliability and maintainability of equipment, processes, utilities, facilities, control loops, safety and security systems
- Set up Condition Based Maintenance (CBM) programs and interpret results
- Participate in approval of all new installations to ensure their maintainability and reliability

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Reliability Engineer Don'ts:

- Major Redesign (Capital Project work)
- Planning & Scheduling activities
- Performing predictive/condition based inspections
- Performing routine maintenance troubleshooting
- Directing crafts
- Implementing the maintenance strategy
- Responding for all of the maintenance organization
- Budget Modeling
- Go-fer

FOCUS ON ELIMATING FAILURES/DEFECTS IS KEY FOR THE RELIABILITY ENGINEER!

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Requirements for Asset Management

- Reliability Engineering
  - Application of appropriate Reliability Methodologies (Criticality, RCFA, FMEA, RCM, RAM, etc.)
  - Application of effective Condition Based/Predictive/Proactive Maintenance Tactics
  - **Reliability (Eliminating Failures) focus**
- Good use of shared Key Performance Indicators (KPI's) to help improve the business
  - We will discuss this later

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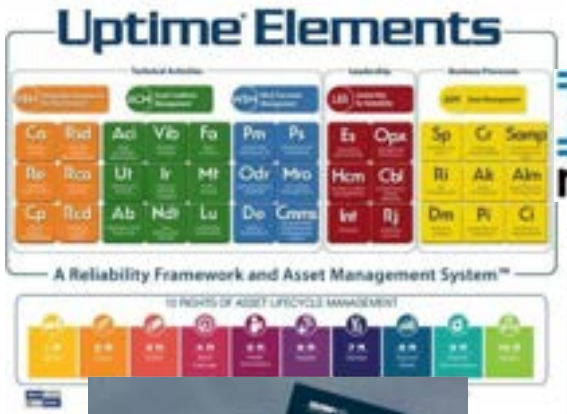
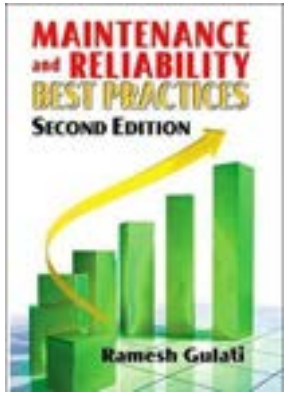
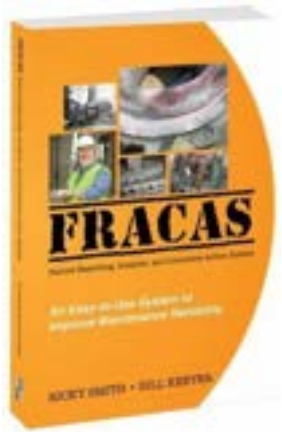
Work Management

Best Practices, Metrics and Guidelines





Body of Knowledge



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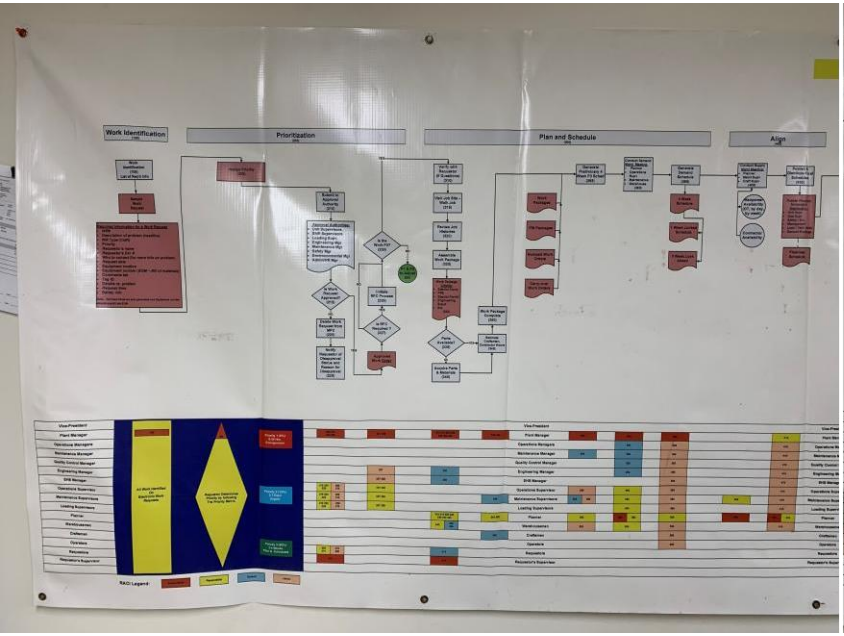

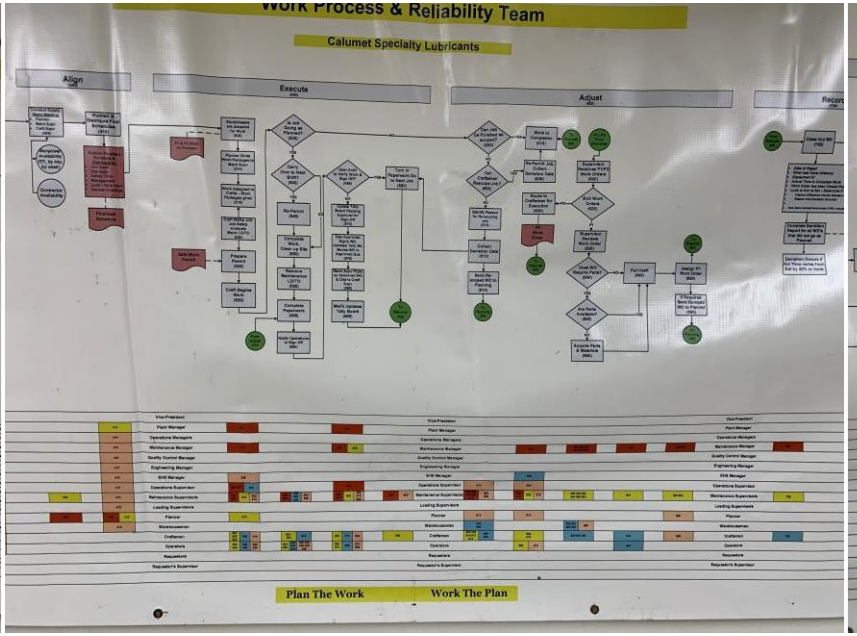

“Probably had 4 different maintenance and reliability consultants here……”

Why so many?

Have you implemented it and institutionalized it?

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Asset Management

Per ISO 55000, the Institute for Asset Management definition:

- “coordinated activity of an organization to realize value from assets.”
- “An asset is an item, thing, or entity that has potential or actual value to an organization.”

Simply put, Asset Management is a systematic process of deploying, maintaining, upgrading, and disposing of assets cost-effectively

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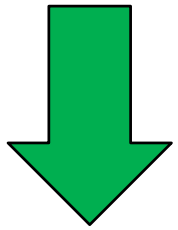
Why Asset Management?

Reliability 

Availability 

$$/unit 

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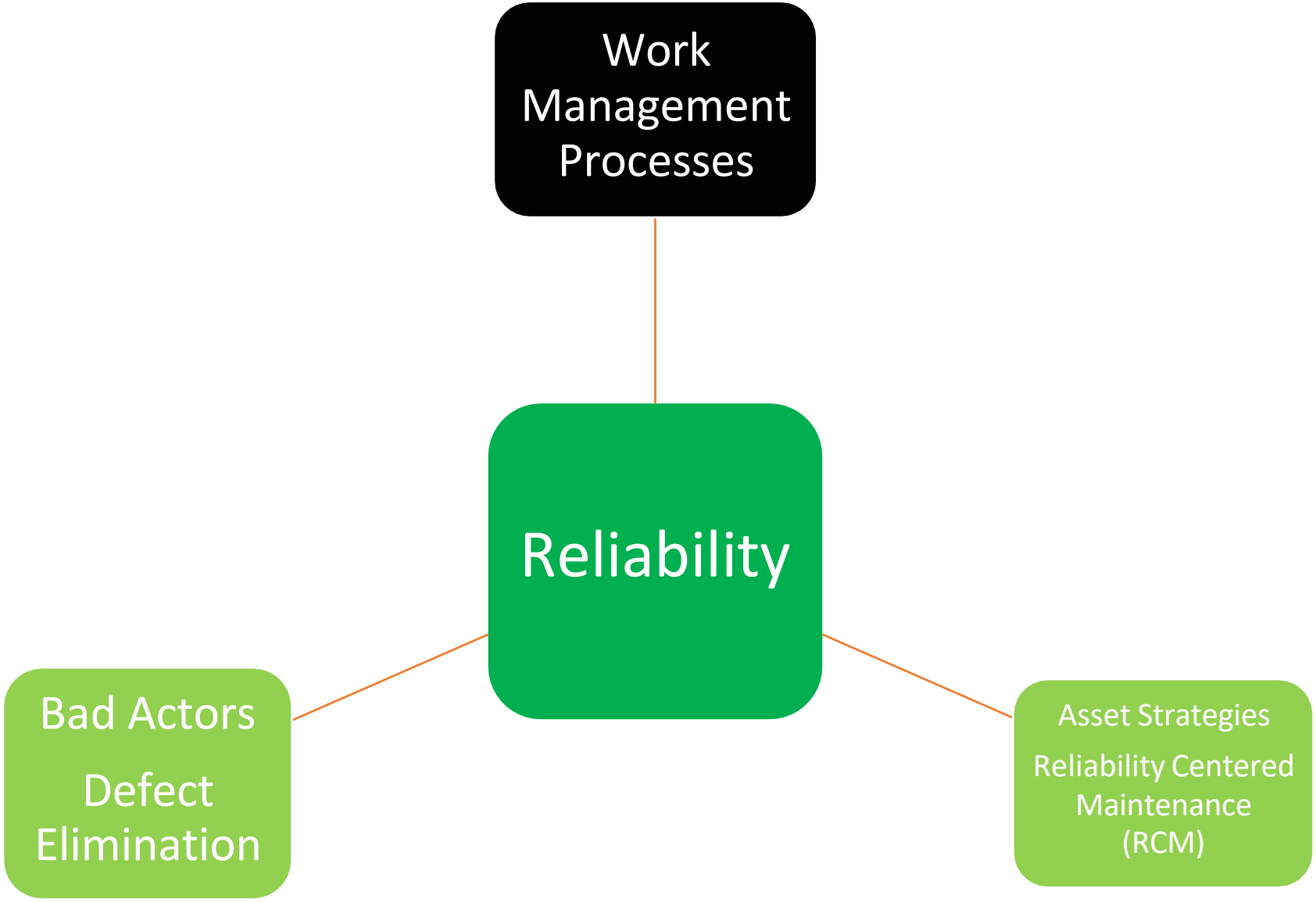
Asset Management



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Some questions…?

- Asset Strategies (PM, CBM, RTF)
  - How were they created?

- Work Management
  - How is the urgency of maintenance work determined?
  - Do you have Maintenance Planners?
    - If so, what are their objectives?
  - Are your Maintenance Technicians efficient and effective?
    - What are they working on?
    - Do they have the things they need to be successful?

- Defect Elimination
  - What are you doing to eliminate or substantially postpone repetitive and costly failures?

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What is Reliability?

- The duration or probability of failure-free performance under stated conditions
  - MIL-STD-721C Definitions of Terms For Reliability and Maintainability
- The probability of a product's performing its intended function under stated conditions without failure for a given period of time.
  - www.asq.org
- The probability that an item will perform a required function without failure under stated conditions for a stated period of time
  - Society of Maintenance and Reliability Professionals (SMRP)
- Reliability is a morphological form of reliable /rɪl'aɪəbəl/
  - Synonyms:
  - noun: dependability, trustworthiness, trustiness
  - Google Dictionary, March 14, 2023

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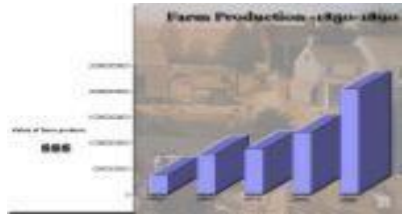
Why Reliability?

Better Safety

Better Productivity

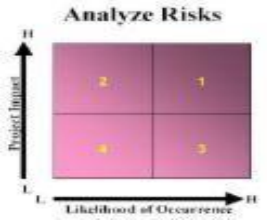


Better Profitability

Better Work Environment

Better Quality

Less Uncertainty



Better Decisions

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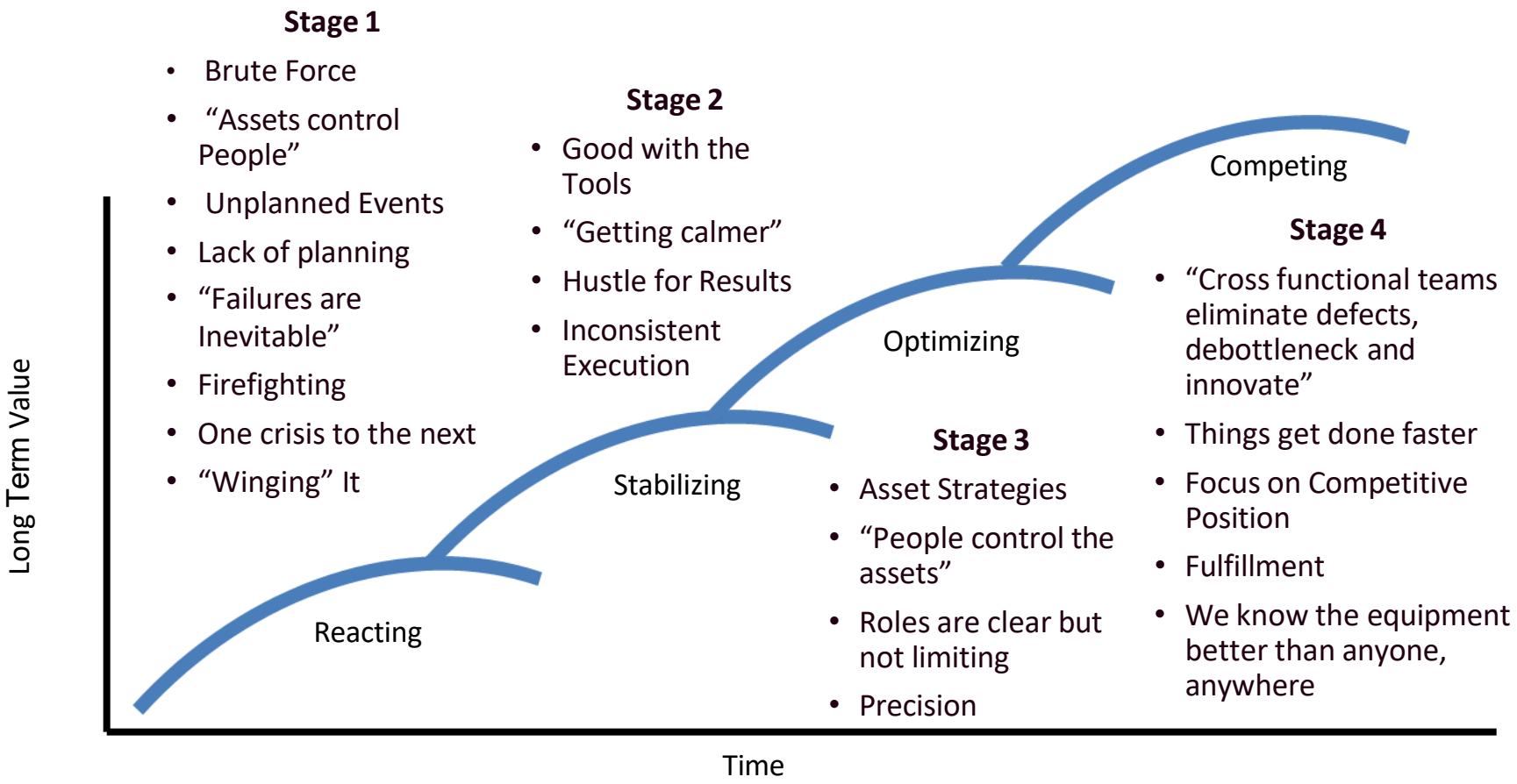
Stages of Reliability



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Reliability Principles Related to Asset Management

- Reliability is about eliminating the defects that result in failures, reduced ***availability***, ***and costs***

- If we're unable to eliminate the defects, we must detect them early, plan and schedule them, minimize their consequences ***and costs***, thus improving ***availability***

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Reliability

When you push the button, it runs (every time) until you tell it to stop.

(Asset Management)

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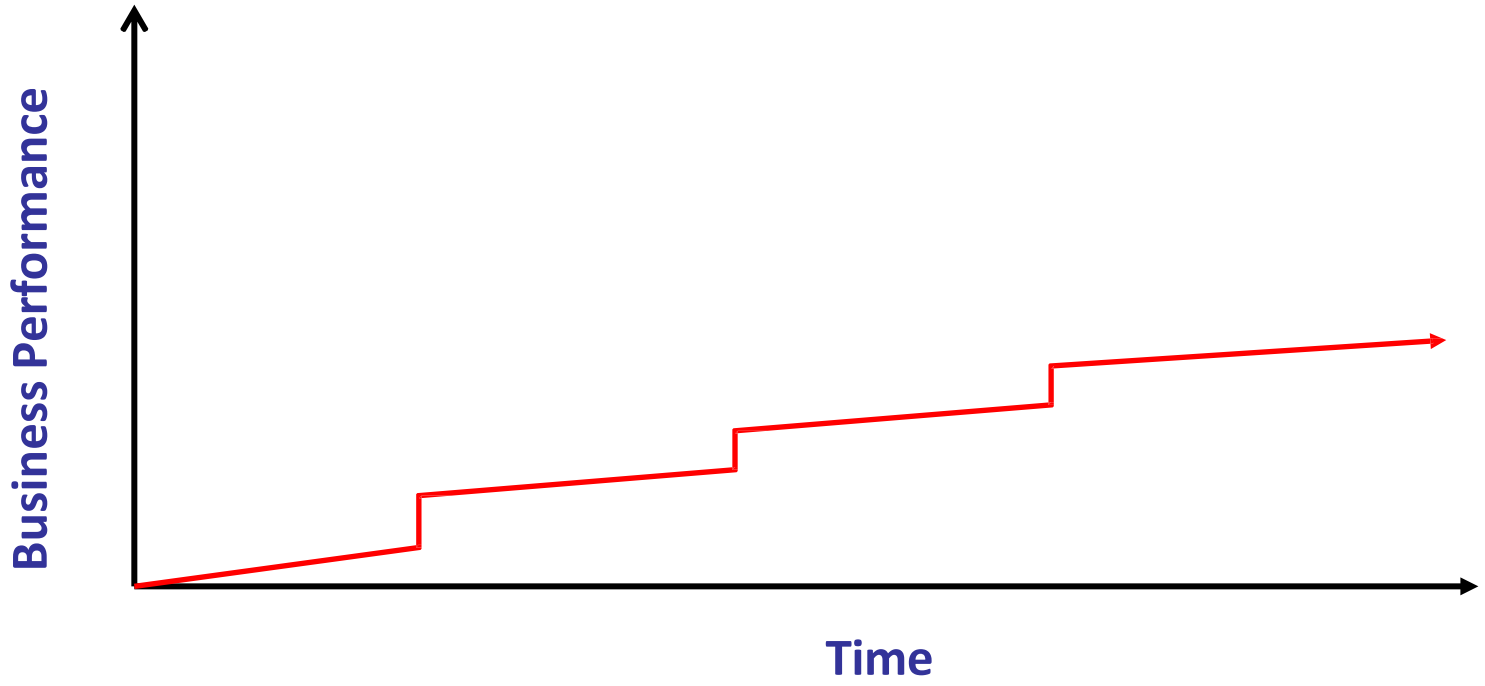
“Should you be satisfied with this performance?”



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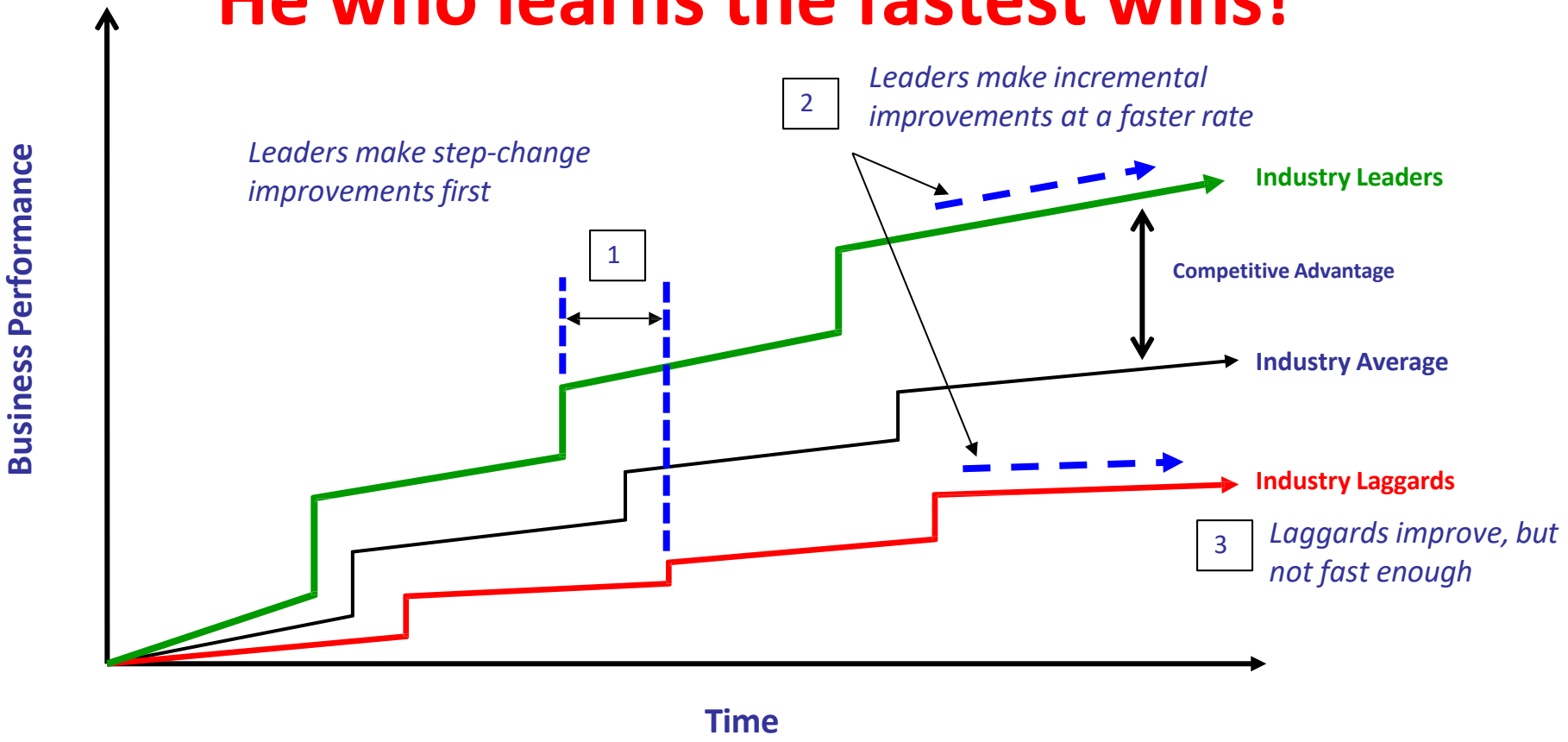
“He who learns the fastest wins!”



Gain competitive advantage by leveraging knowledge

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Preachin’ to the Choir

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Top Ten Reasons Why Organizational Initiatives Fail

1. Lack of management commitment—time, effort, or money
2. Lack of, inconsistent, or mis-communication about the initiative, its effect on the organization, its effect on people, and what will change as a result of the initiative
3. Lack of employee commitment
4. Perceived as just another management fad
5. Unclear objectives and goal
6. Lack of resources—people, capital, technology
7. Misallocated resources
8. “Everyone else is doing it”
9. Started for the wrong reason
10. Incorrect estimate of time and effort involved

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In order to get started, it is always good, but not absolutely necessary, to have a…..

BURNING PLATFORM

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Burning Platform(s)

Poor Reliability?

Poor Availability?

High Cost/unit?

All of the above?

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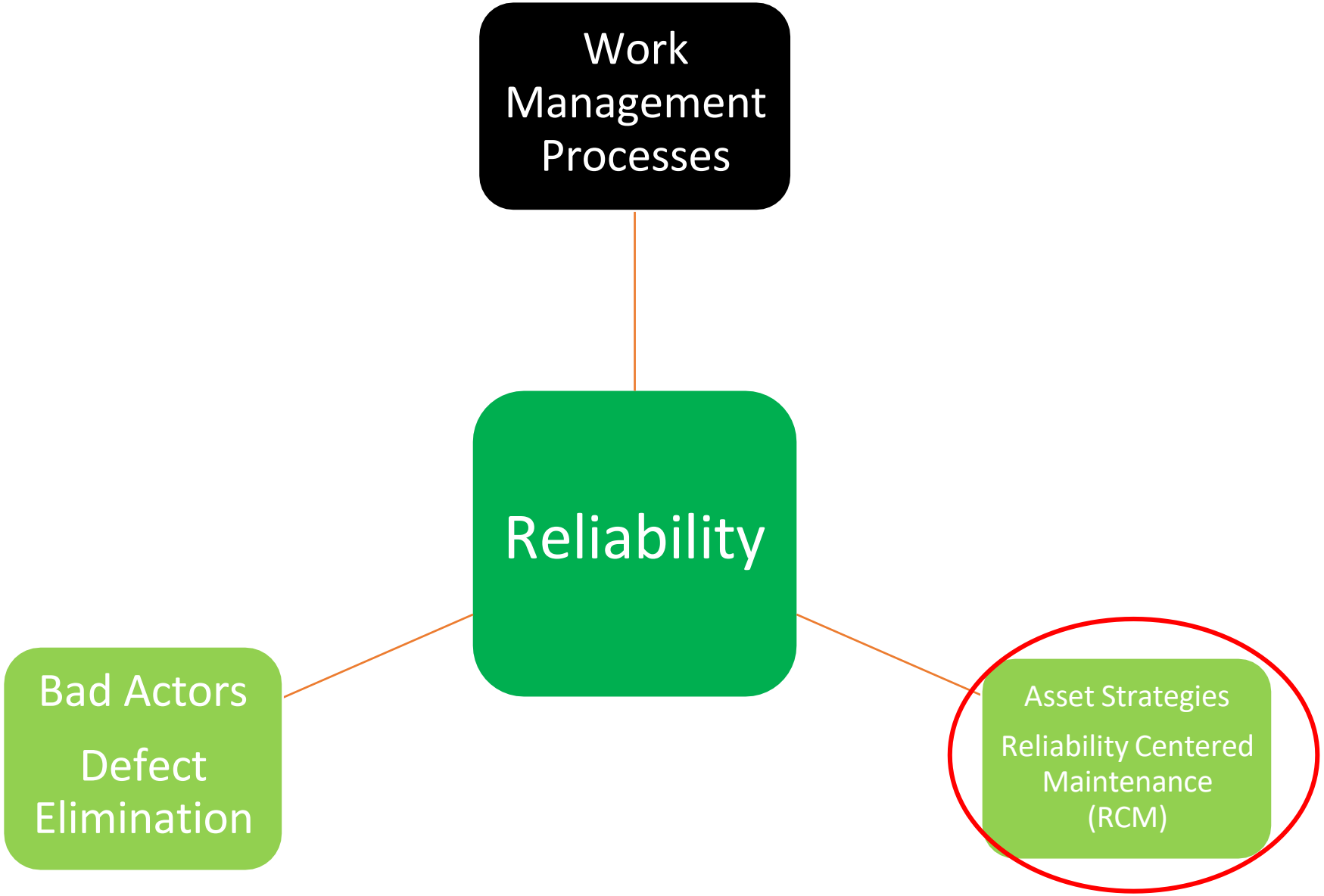
Asset Management



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Recognizing Interdependence and Where to Start

1) Asset Strategies
   - Do you have Asset Strategies?
     - Preventive Maintenance (PM's)
     - Condition Based Maintenance (CBM)
     - Run to Failure (RTF) or No Scheduled Maintenance (NSM)
   - How were they created?
     - OEM Recommendations
     - Failures
     - Best Practices
     - Someone requested them because of a failure
     - Reliability Centered Maintenance (RCM)?
   - Have the Asset Strategies been optimized?
     - PM Optimization

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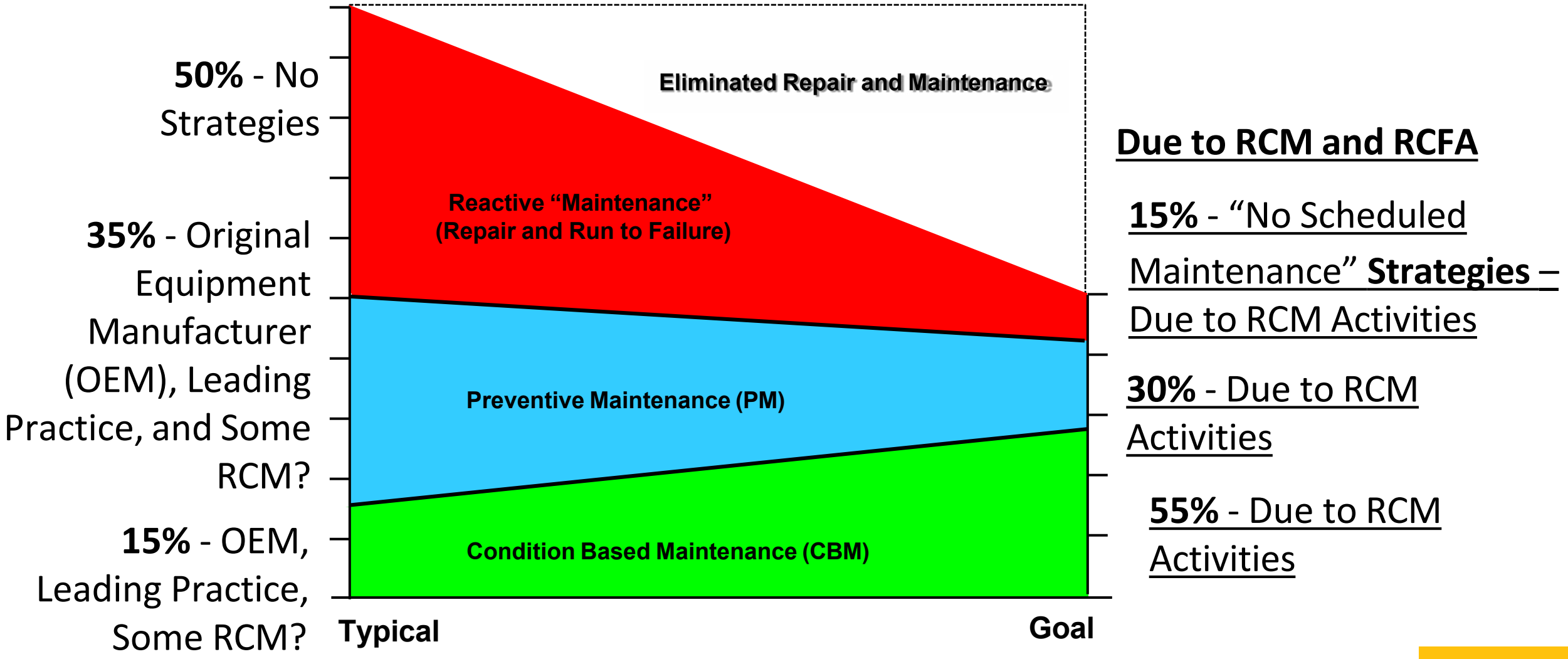
Where are you spending your maintenance labor to support reliability and availability



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Understanding Failures – What is a Failure?

- What is a failure?
  - “The presence of an unacceptable condition”
- Functional Failure
  - “The inability of an item, or equipment containing the item to perform to a specified performance standard.”
- Potential Failure
  - “An identifiable physical condition which indicates a functional failure is imminent.”

Nowlan & Heap

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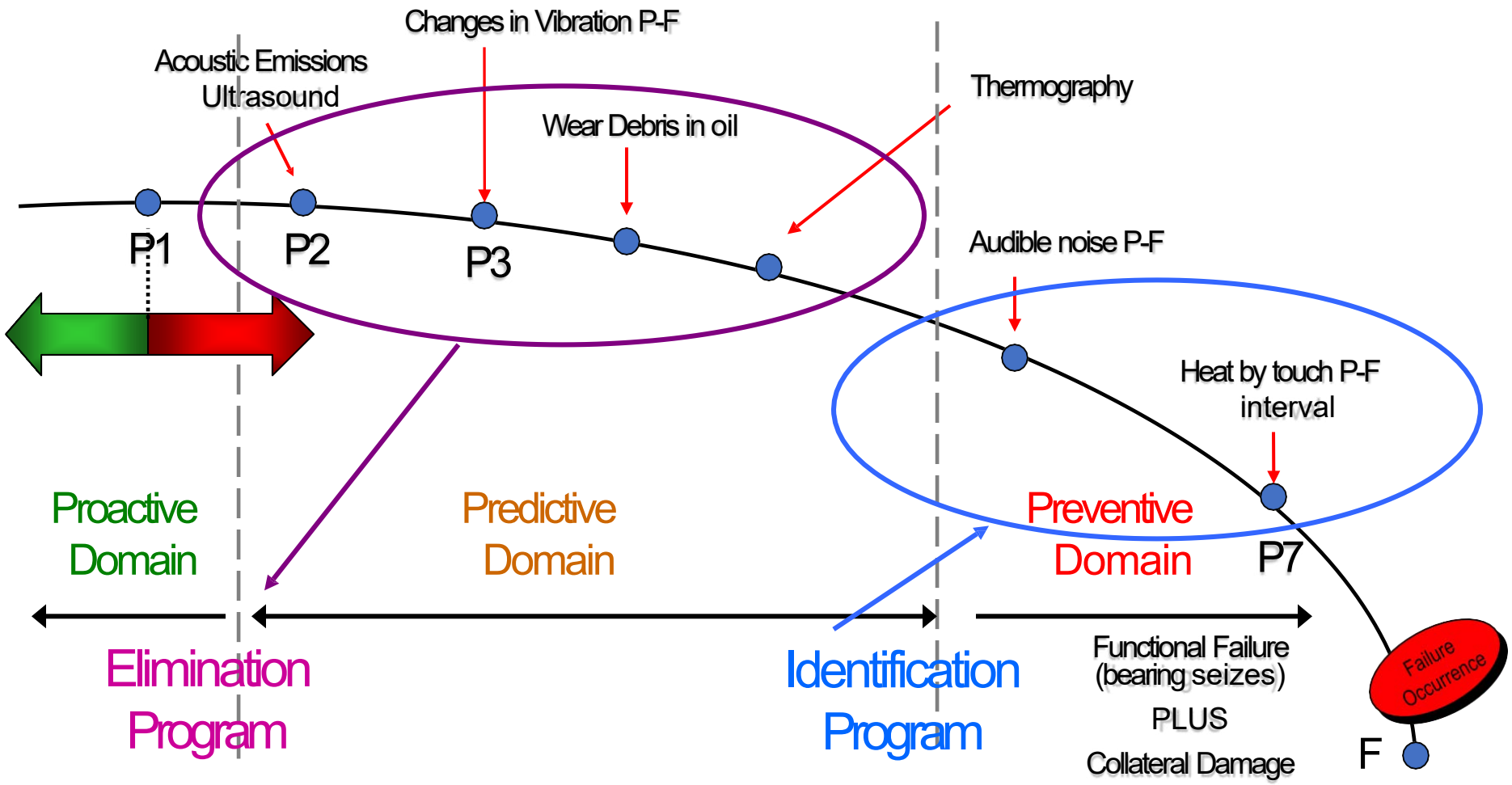
The Reliability Challenge



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What is a failure?

RCFA

A failure is an unwanted event

RCM

A failure is the inability of an asset to perform user's expectations

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What is a failure?

RCM

A failure is the inability of an asset to perform user's expectations

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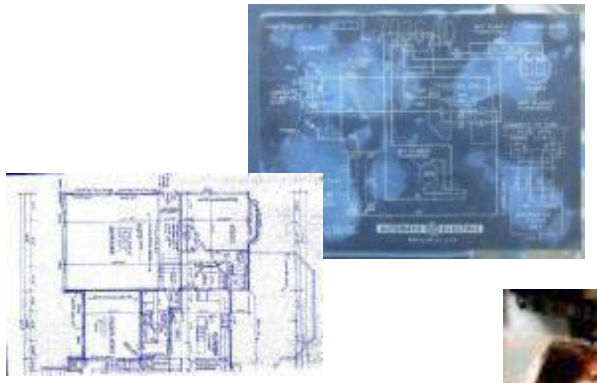
Reliability Centered Maintenance (RCM)

Methodology used to determine what should be done to ensure that any physical asset continues to fulfill its functions within a specific operational context.



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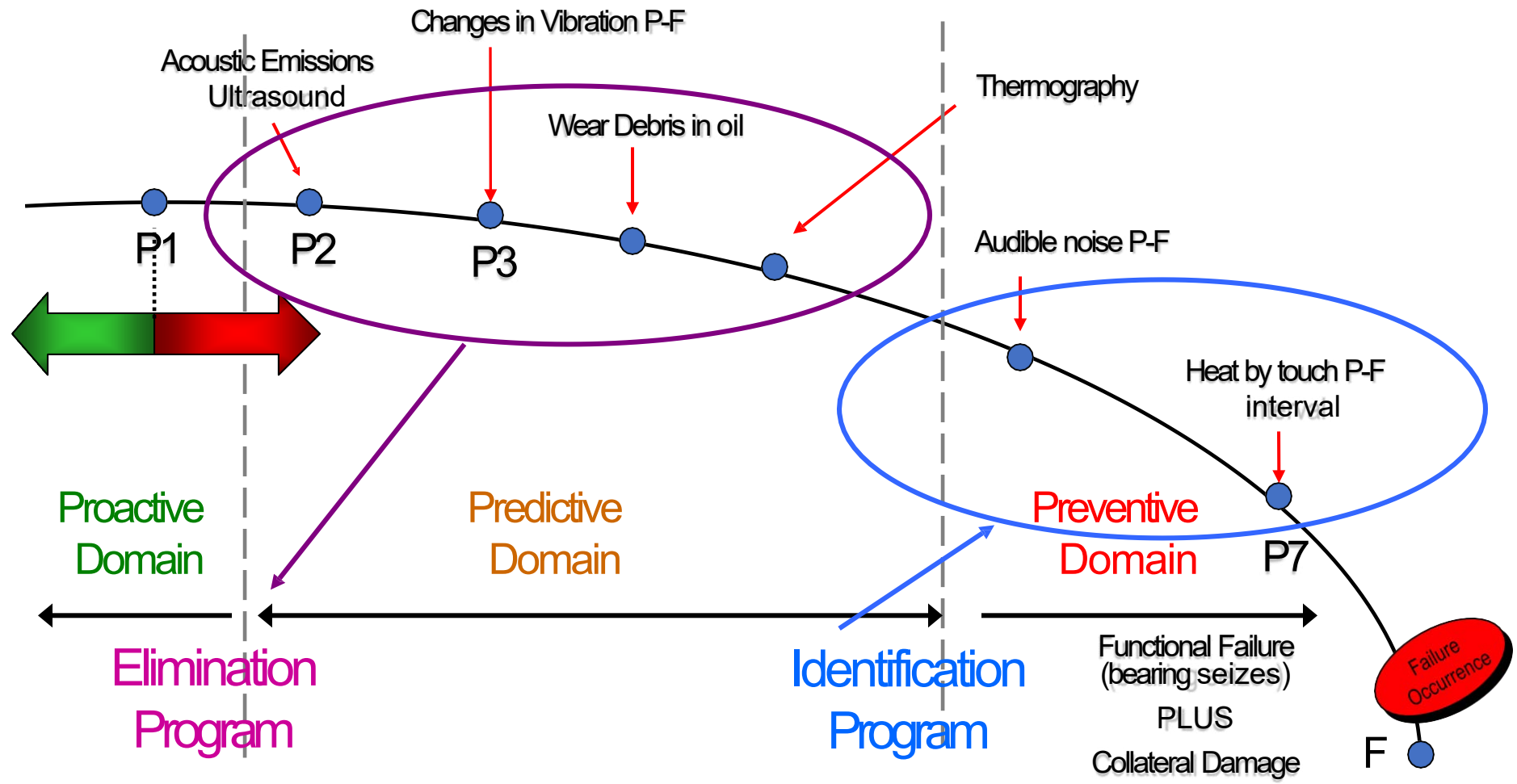
The Reliability Challenge



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Reactive Organization

- An organization that stays focused on “F” is a reactive organization
- Quotes:
  - “How long can we run it until it fails?”
  - “How bad is it?”
  - “How soon can you get it running?”

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More Mature Organization with Proactive Focus

- Begins to shift its focus from “F” to “P” by moving up the PF Curve.
- Quotes:
  - “Is there any way we could’ve predicted or prevented this failure?”
  - “What tolerances are necessary to leave this equipment in a precision state?”
  - “Is this the best way to detect these defects early?”
  - “I appreciate you letting me know about this problem, even though it is very early.”

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Very Mature Organization with a Total Reliability Focus

- Focus on moving to the left of P1 by being very proactive utilizing all of the reliability concepts
  - This can be the “failure free” period
    - Can be seconds if installed improperly or years if installed properly
- Moving to the left on the curve represents the a process back to the installation of the component
  - Utilizing precision trained craftspeople to install the component
  - Utilizing detailed installation procedures and detailed maintenance practices

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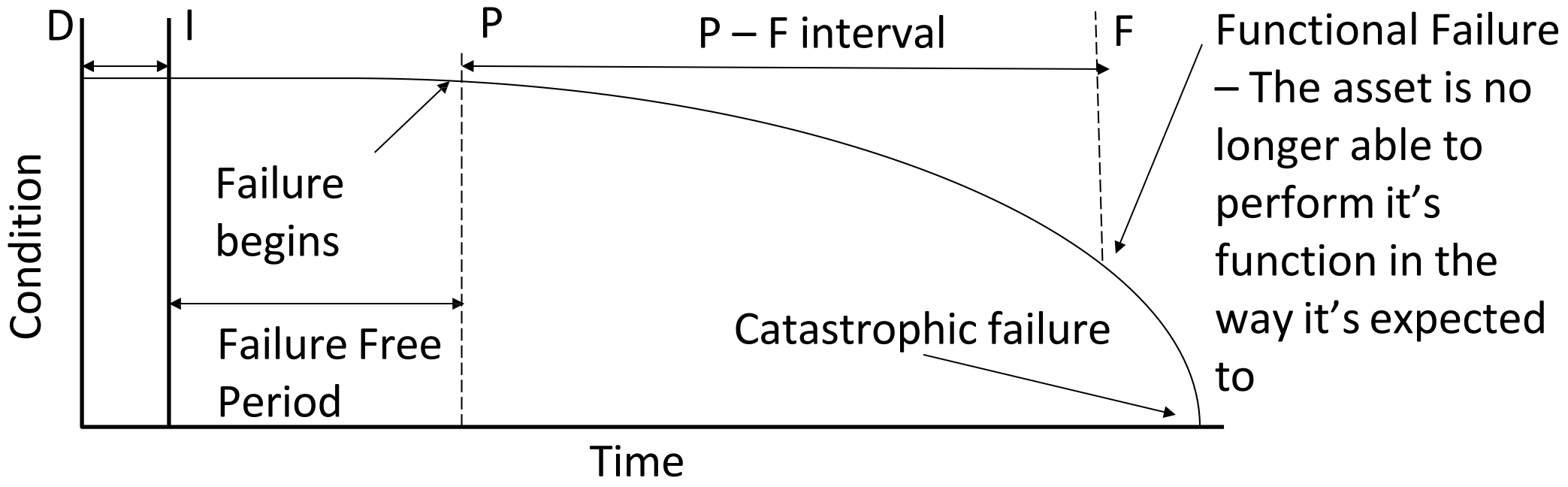
Predictability to Failure Curve

Most components give a sign that they are in a failed state, before they reach catastrophic failure. This led to the creation of the Failure Development Curve. An understanding of this methodology is essential when developing Asset Strategy improvement plans / programs.



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Asset Strategy

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Maintenance Plan Development

TYPICAL	BEST PRACTICE

• O.E.M Recommendations
• Failures
• Best Practices
	• RCM – Reliability Centered Maintenance
	  • MEL – Master Equipment List
	  • ECA – Equipment Criticality Analysis
	  • FMEA – Failure Mode and Effect Analysis
	  • ASSET STRATEGY – OBC, PM, PdM, CBM, Spare Parts
	• SFMEA – Simplified FMEA

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PME/PMO

- Preventive Maintenance Procedure (PM) Evaluation/Optimization
  - Preventive/Predictive Maintenance Procedures *eliminate or substantially postpone* a failure
  - Review existing PM's
    - Sample, Inspect, Review, and Check
    - Employee knowledge
    - PM Best Practice
  - Revise or Eliminate where necessary
  - Apply accurate time estimates, craft and available technology

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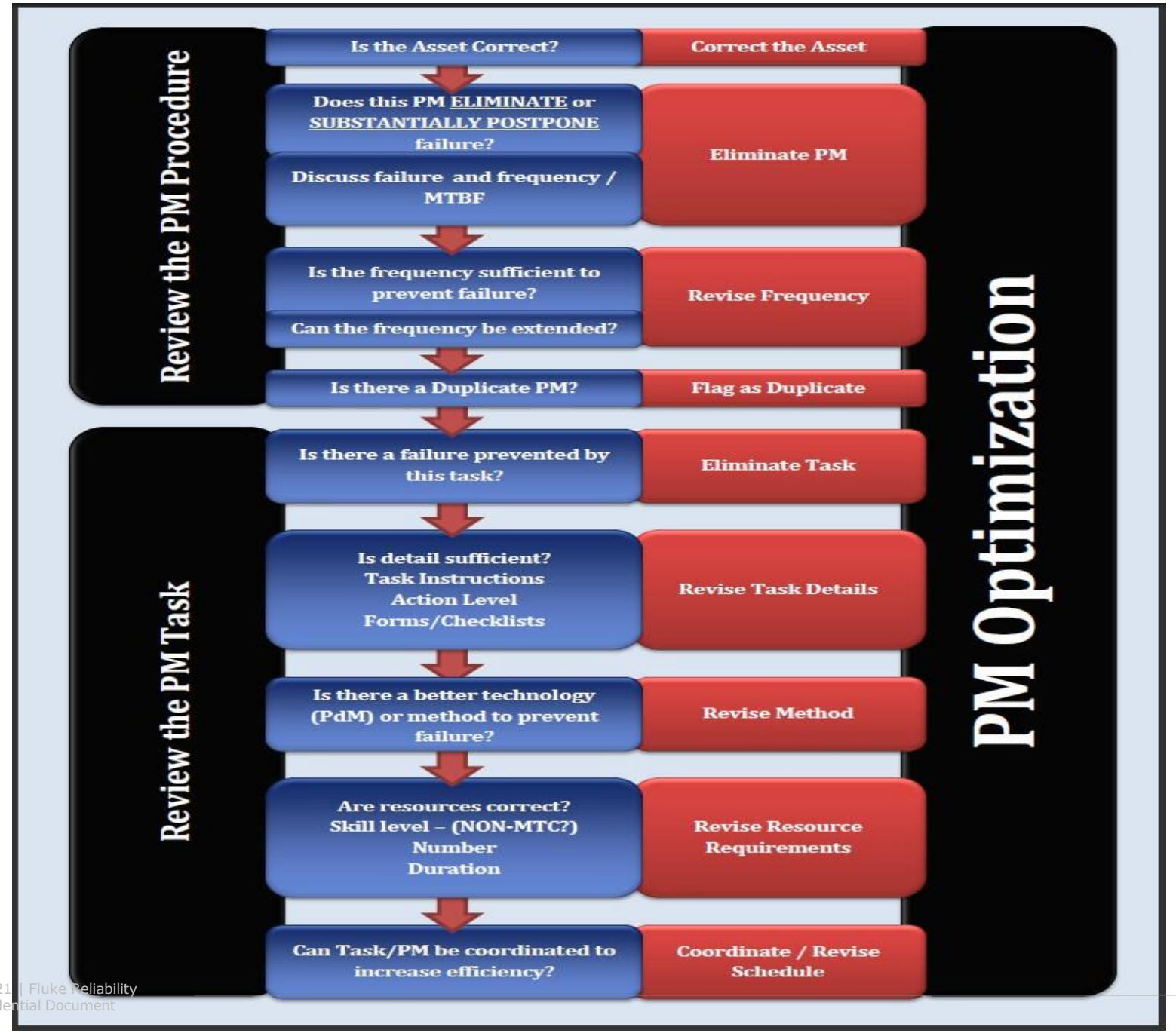

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Reliability Focus – Eliminate or Substantially Postpone Failures

- **Equipment or Asset Strategy Development**
  - **Reliability Centered Maintenance (RCM)**
    - Asset Hierarchy
    - Criticality Analysis
    - Failure Modes and Effects Analysis (FMEA)
    - Equipment or Asset Strategies
      - Preventive (PM)
      - Condition Based (CBM)
      - Predictive (PdM)
      - Run to Failure (RTF) or No Scheduled Maintenance (NSM)
        - - Quick change and warehouse/stores strategies

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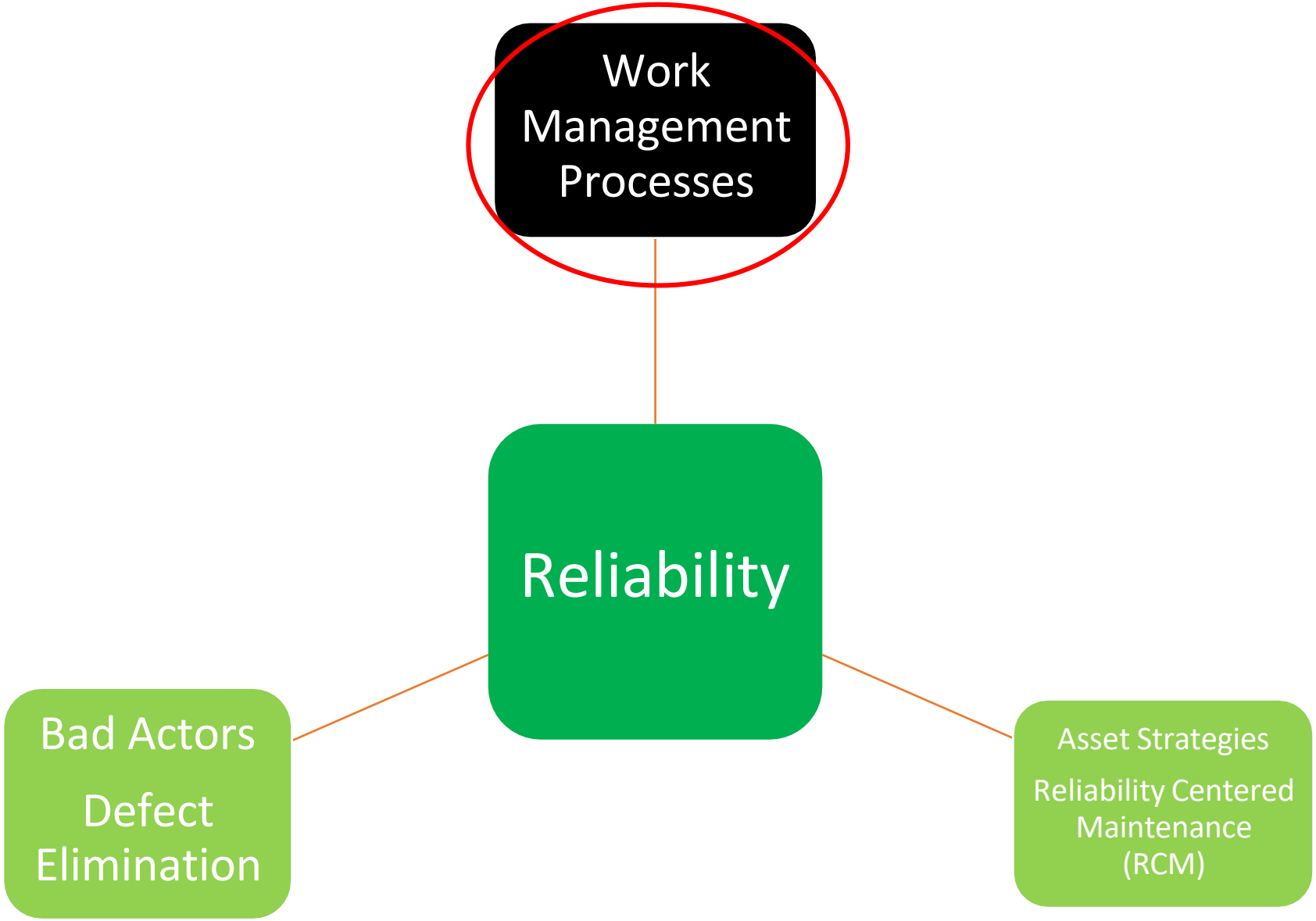
Asset Management



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Work Management Goals and Expectations

- Leadership and Operations must have confidence in Maintenance execution to see the ***value*** in the investment of the Work Management versus the ***cost*** of the Work Management
- Maintenance must provide efficient, effective, and quality work to:
  - Allow for efficient execution of the schedule to reduce scheduled down duration to improve availability
  - Eliminate or substantially postpone failures
  - Increase the Mean Time Between Failures (MTBF) or Failure Free Period
  - Eliminate or reduce rework

Zero Injuries

100% Availability

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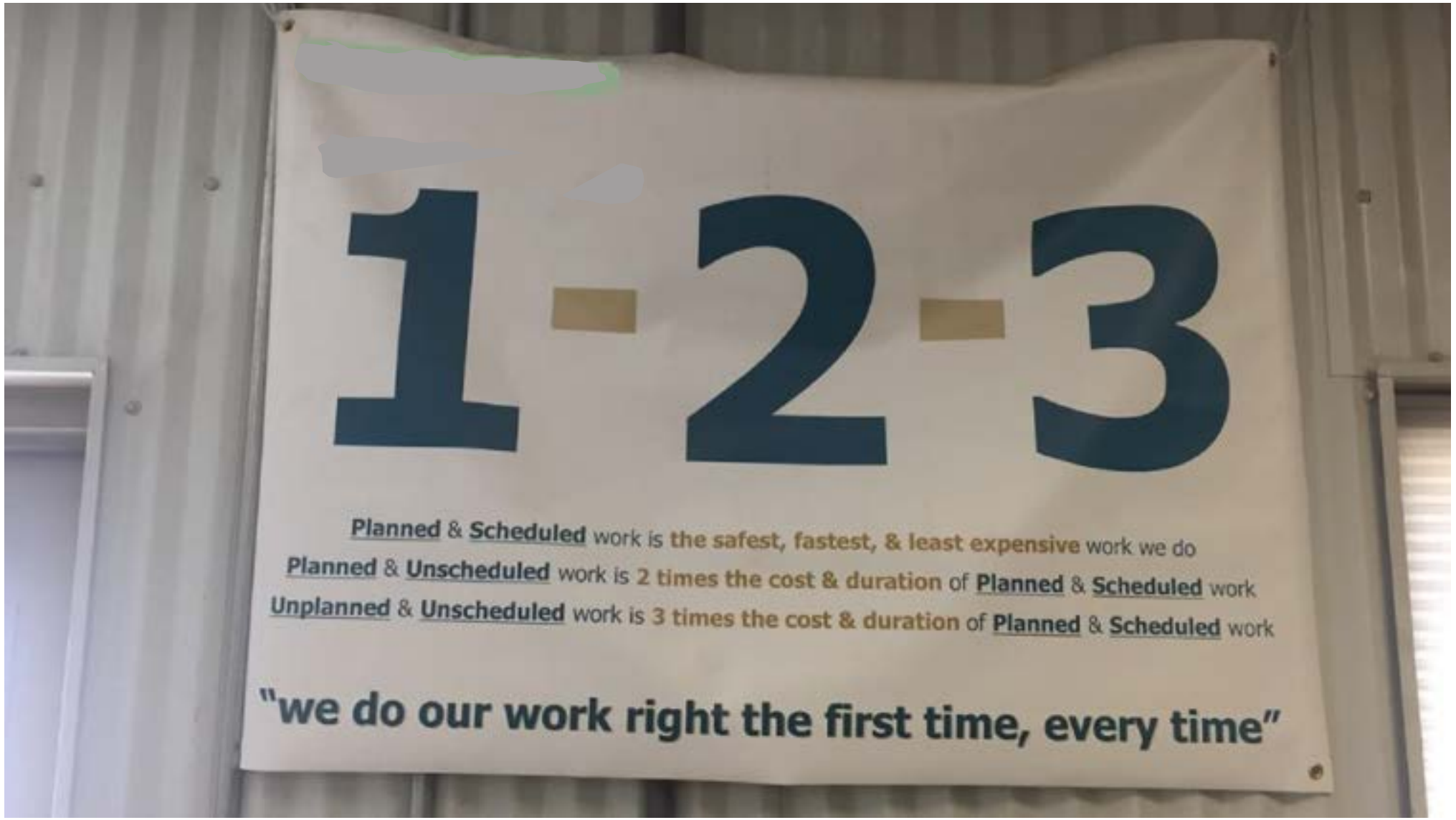

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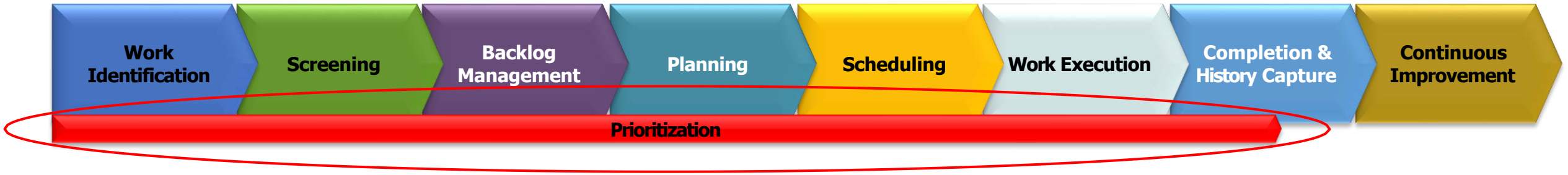
Work Management



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Recognizing Interdependence and Where to Start

2) Work Management

- Prioritization
  - Do you have well defined, documented, and communicated work prioritization (urgency) with specific criteria?
    - Today and this shift
    - Within the next 7 days
    - Beyond 7 days
  - How was prioritization created?
  - Is ***EVERYONE*** **held accountable** to follow?

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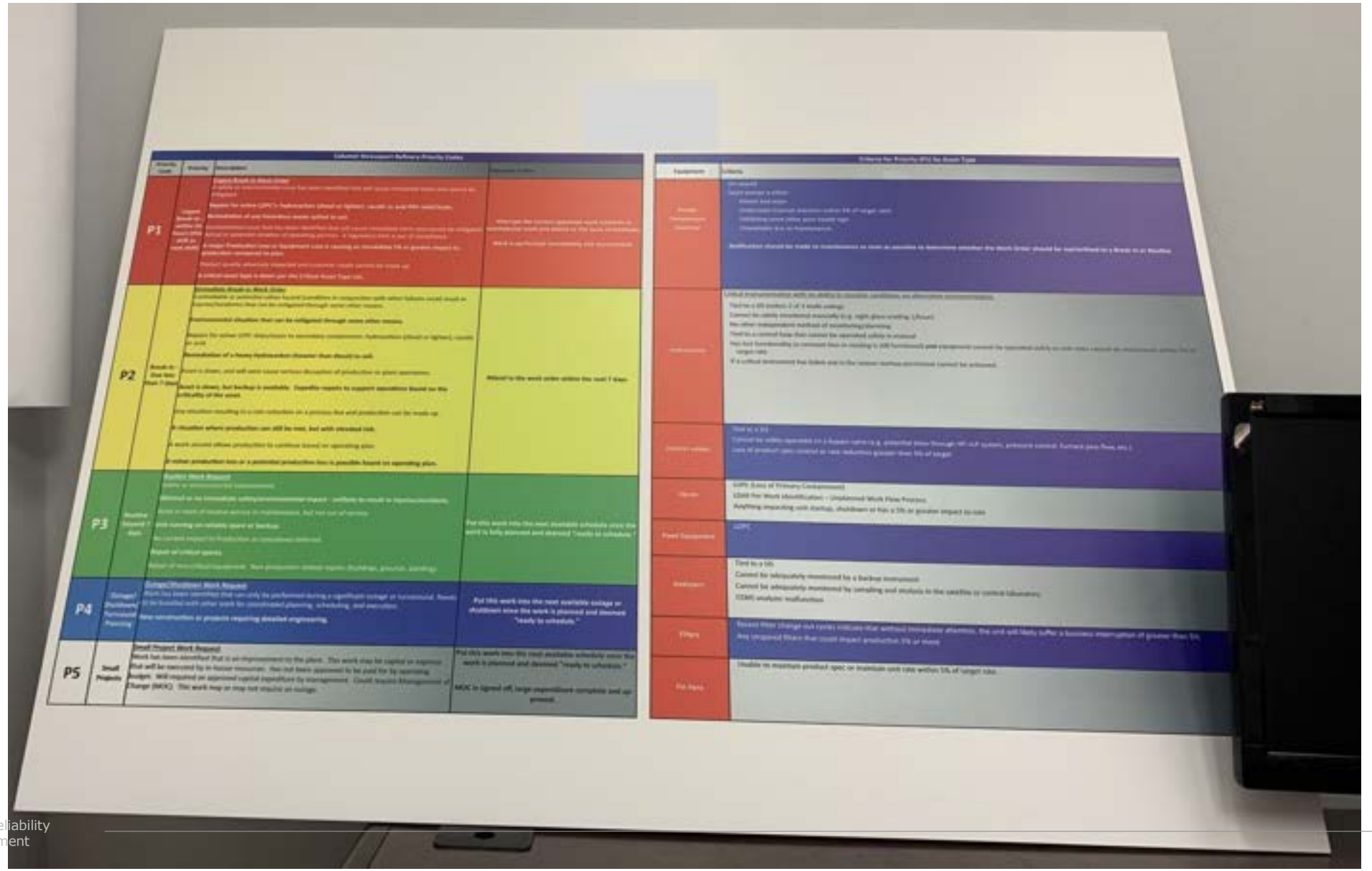

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Recognizing Interdependence and Where to Start

2) Work Management

- Are processes developed, communicated, and utilized with well-defined roles and responsibilities to:
  - **Identify** Maintenance-related work
  - **Screen** for appropriateness and impact to the business
  - **Manage the backlog** such that planners work is forced ranked
  - **Plan the work** – the WHAT and HOW
    - Includes a Kitting and Staging process to provide the required parts and materials for efficient maintenance execution
  - **Schedule the work** – the WHO and WHEN
    - Begins first with the scheduling the PM's and CBM's
  - **Execute the work** - complete the planned and scheduled work as well as any urgent work in a safe and efficient manner
    - Includes and Urgent/Immediate (Break-in) Work Execution process with a ***philosophy to never break-in to PM's as they are what eliminate or substantially postpone failures***
  - **Complete Work Orders and Capture History** - historical purposes and Reliability Engineering, which can support updates to Asset Strategies

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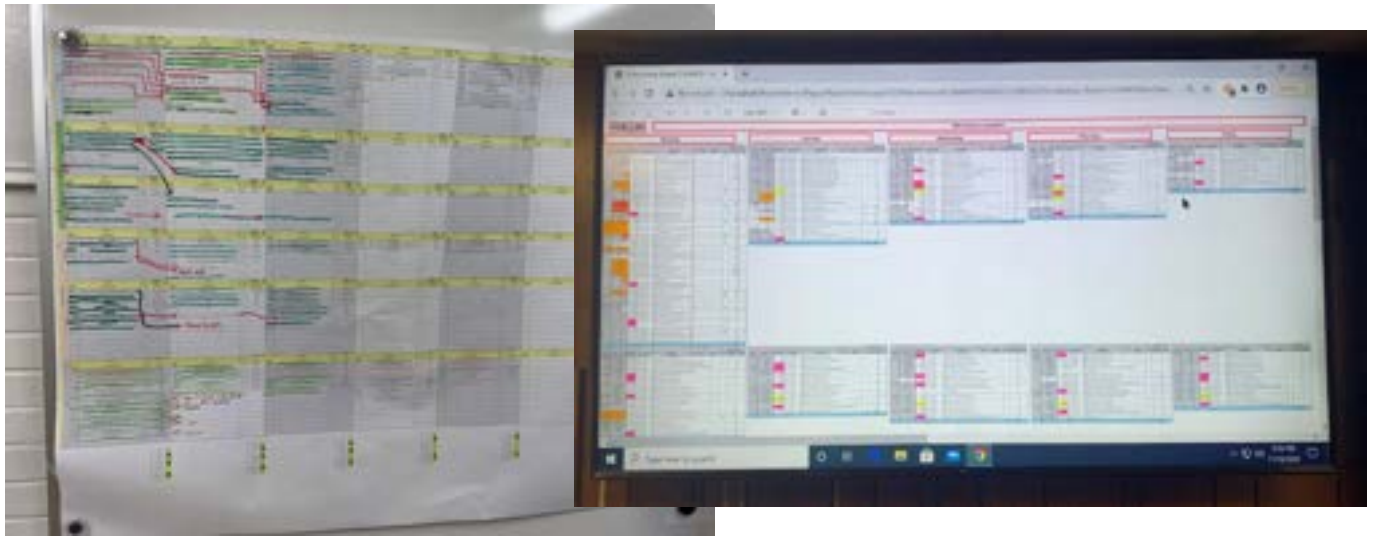

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"Maintenance is still a face-to-face process, and at the end of the day, wrenches must still be turned."

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A Plant Manager has undertaken, sponsored, implemented, and paid for a year long Asset Management Transformation. He and takes his weekly tour of the facility. Things that require maintenance support are observed by the Plant Manager. The Plant Manager takes photos of the issues, texts them to the Maintenance Manager, and tells the Maintenance Manager to fix these items today. In addition, the plant is located in the Southeastern US, and it is the middle of summer. The Plant Manager mentions to the Maintenance Manager that his air conditioner in his office is not working properly, and it needs to be fixed today as well.

What do you think?

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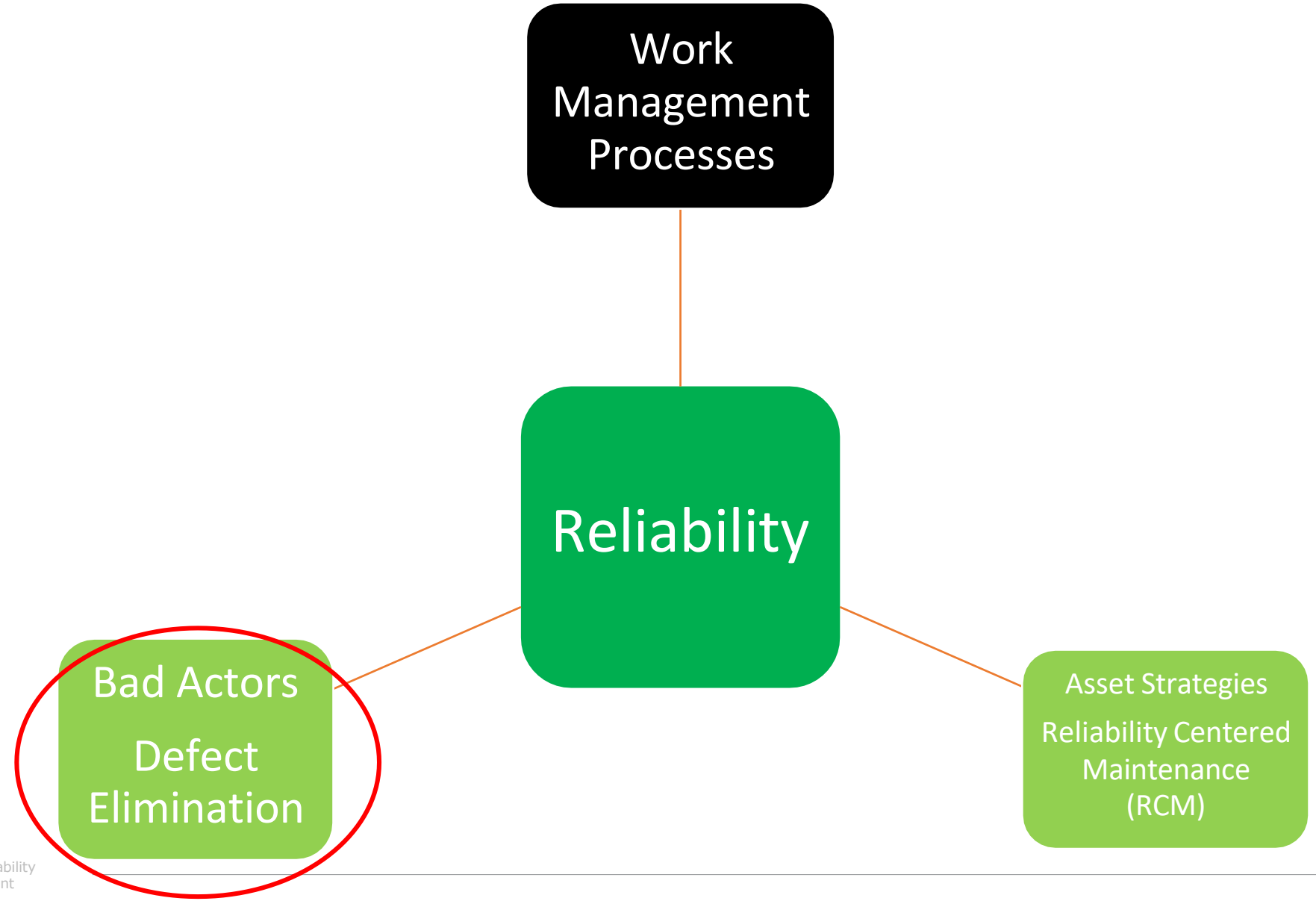
Asset Management



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Recognizing Interdependence and Where to Start

3) Bad Actors/Defect Elimination

- Through the Work Management Process, are you capturing the frequency and associated cost (labor and materials) in the CMMS associated Urgent/Immediate Break-in work orders?
  - Is pareto analysis available?
- Does a process exist with roles and responsibilities to formally and periodically review the pareto of high frequency and high cost failures associated with those Urgent/Immediate Break-in work orders **with Leadership?**
- Do reliability engineers exist who are **focused** on the elimination of failures?
  - Are they trained in formalized Root Cause Failure Analysis (RCFA)?
- Is the cost associated with those failures or the impact to cash flow from lost production understood?
  - Corrective actions can result in improved asset strategies and reduced labor and materials associated with Work Management.

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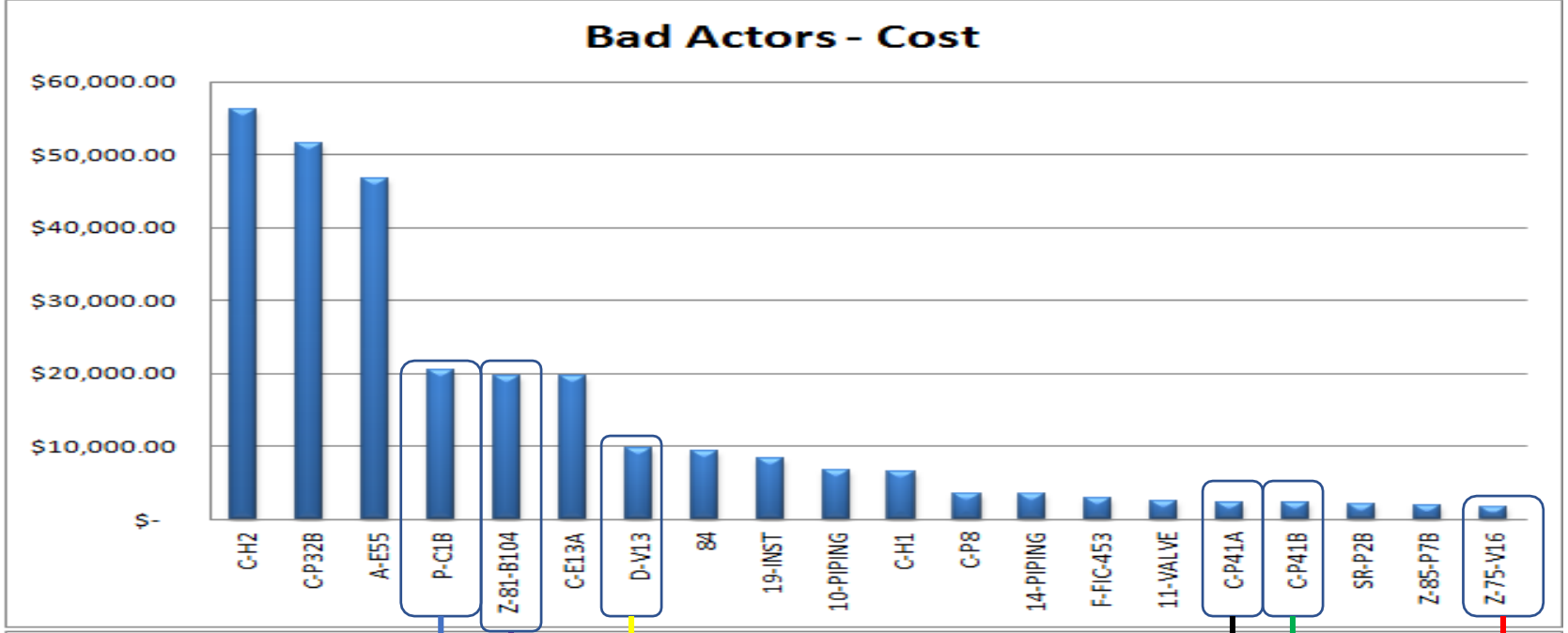

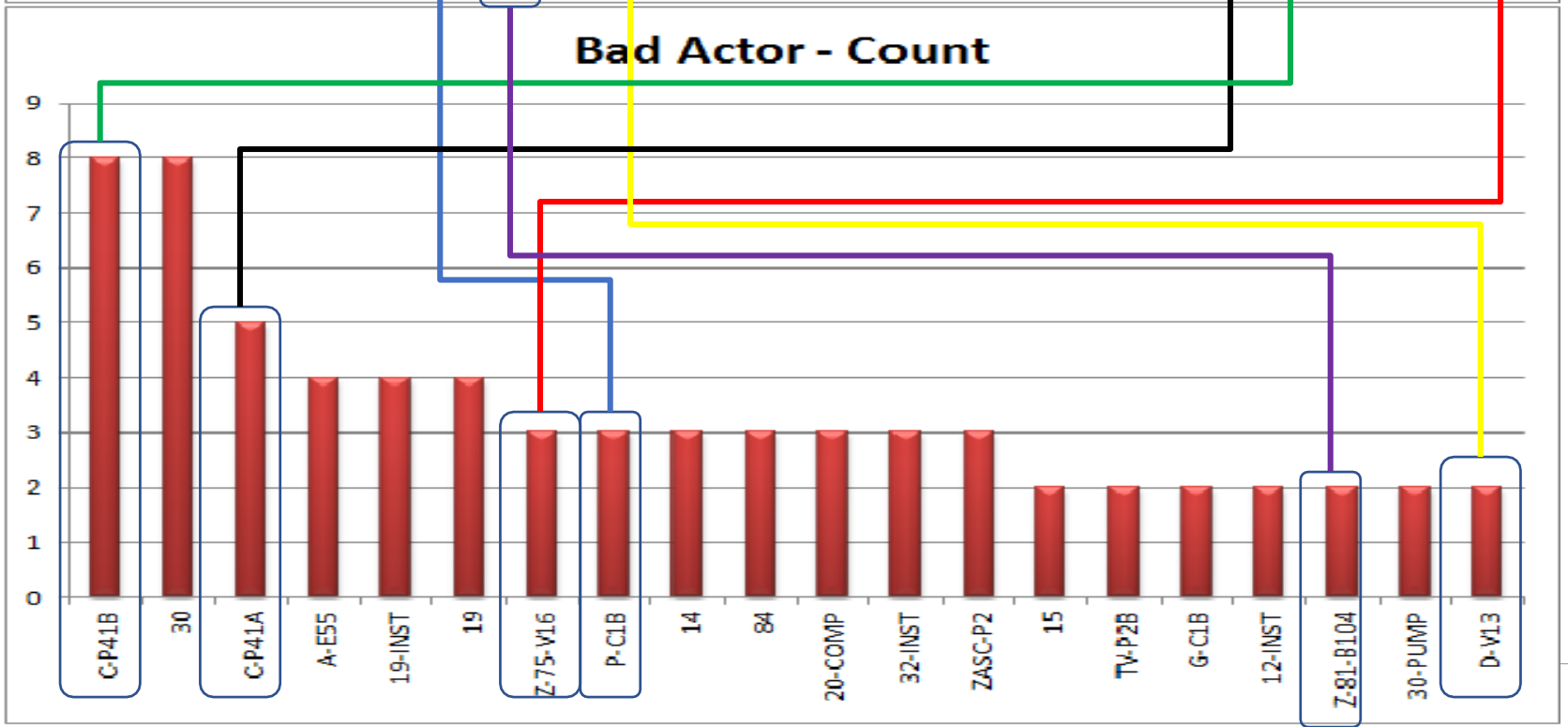

Correlate Data from the CMMS and Downtime (Availability)

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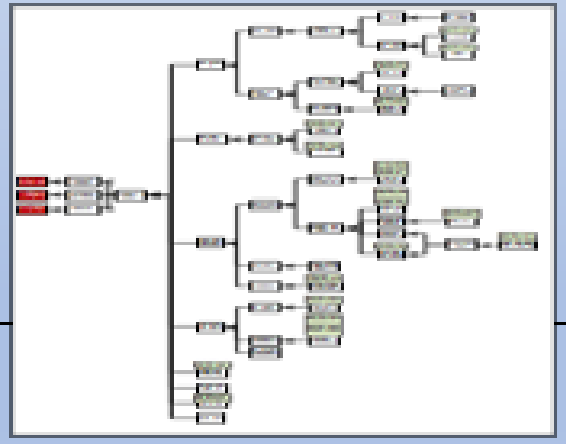
AP19A/B Pump Seal Failures

- Goals Impacted
  - Safety : HF Acid Release
  - Environmental: HF Acid Release
  - Reliability: MTBF = 26 days
  - Financial : >$240k repair costs ($160k annualized)
  - Production: >$14k production losses

- Goal
  - Eliminate EHS risks associated with seal failures
  - Increase MTBF > 90 days
  - Eliminate interruption to operations
  - Reduce yearly repair costs to <$50k

- Analysis



Action Item	Due Date	Responsible
Install New Pump	9/15/15	Steve / Danny
Install Continuous Vibration Monitoring	7/31/15	Steve / Danny
Evaluate re-installing acid loading pump	12/31/16	Allen / Loren
Clean Rebuild Area	06/01/15	Steve / Danny

New Acid Pump Installation Cost Analysis	
Failures / year	13
Maintenance Material Savings / year	$240,000
Maintenance Labor Opportunity	$6,864 (208 hours)
Production Savings / Year	$14,000 (cost avoidance)
Cost of Implementation	$210,000
Total Savings (1st 12 months)	$50,864
Ongoing Savings (Yearly)	$260,864

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Recommended Initial Work Management Key Performance Indicators (KPI's)

1) Resource Allocation = Total number of HOURS of scheduled work X 100 = 100%
Total maintenance hours available

2) Schedule Completion (Count) = Total # of scheduled work orders/operations completed and closed for the week X 100
Total # of work orders scheduled for the week

Total # of work orders scheduled for the week = Total number of work orders on the **Weekly Maintenance Schedule**.
Weekly Maintenance Schedule = The list of maintenance work to be done in a week finalized three to four days before the start of the work week.

3) Schedule Compliance (hours) = Total number of HOURS of scheduled work charged for the week X 100
Total number of hours scheduled

4) PM Completion (10% Rule) = Number of Scheduled and completed PM work orders by the due date X 100
PM work orders due

The window of acceptable tolerance around the due date is defined as 10% of the periodicity, usually expressed in days, i.e. a 30-day PM must be done within a 3-day (10% of 30) window around the scheduled date.

5) Urgent/Immediate Break-In % = Hours of unscheduled work charged to work orders X 100
Total number of hours worked (includes overtime)

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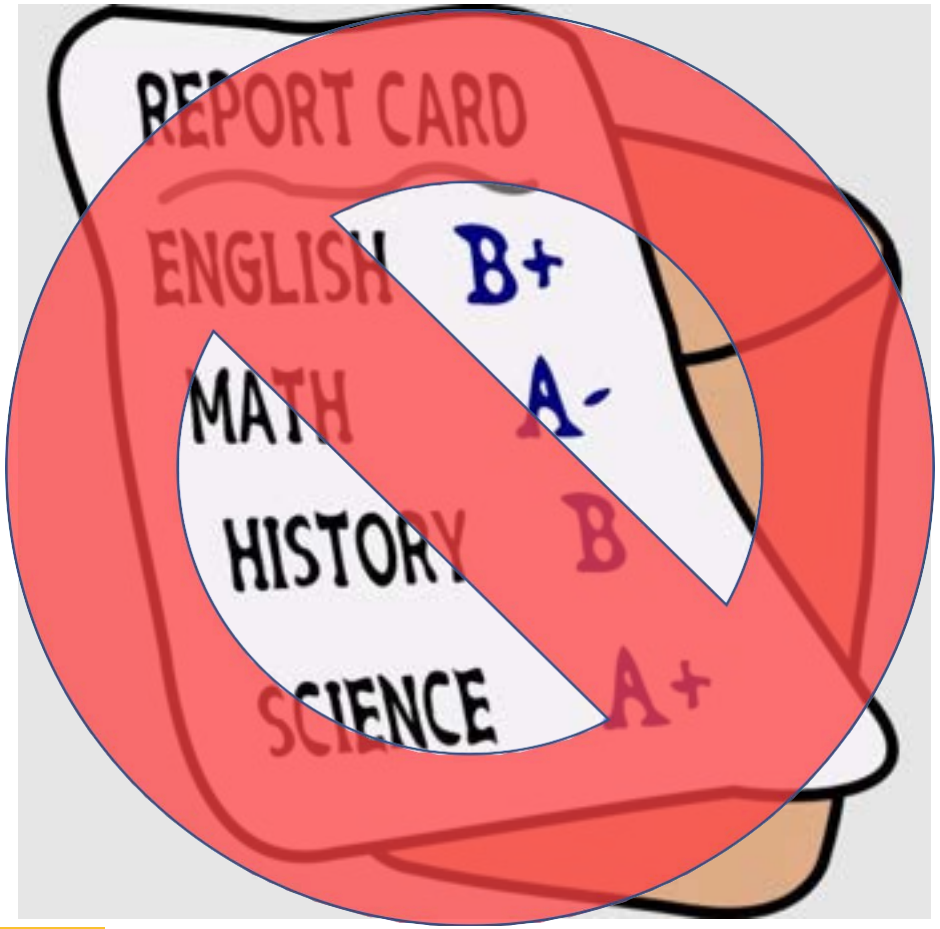
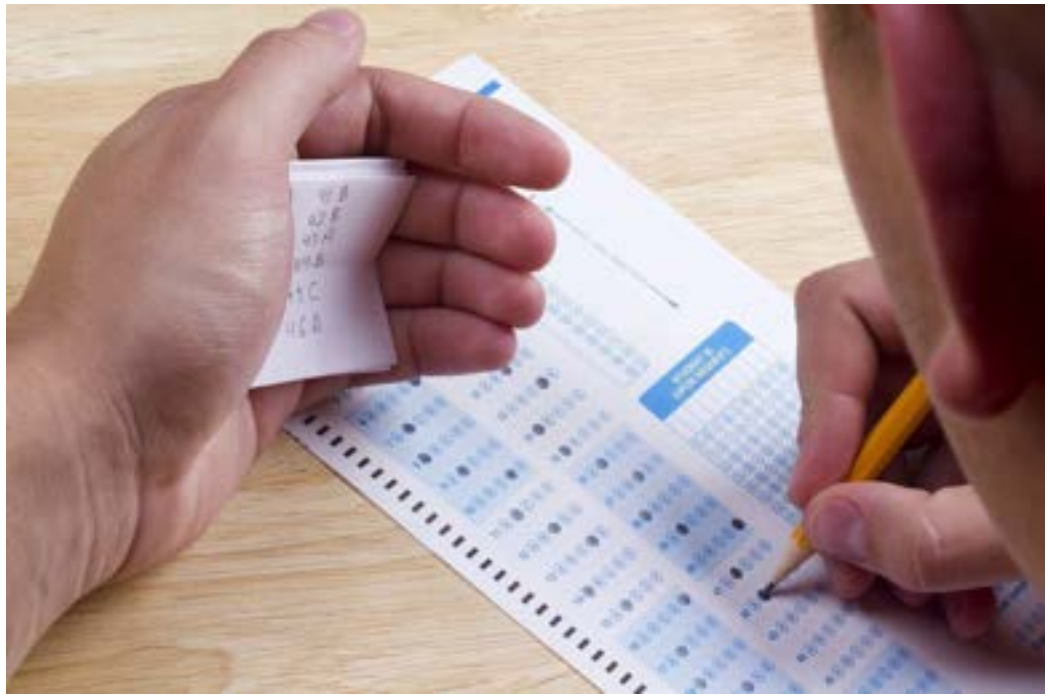
Key Performance Indicators (KPI's)

Not trying to make a "B"



- ✓ Where are we?
- ✓ How can we improve?
- ✓ *Do not* put KPI expectations in yearly performance expectations



KPI's will be what they need to be to meet or exceed performance expectations…..

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Visual KPI’s

A – Resource Availability – 10 Techs x 6.5 hours/day x 5 days = 325 hours
(1.5 hours – lunches, breaks, safety meetings)

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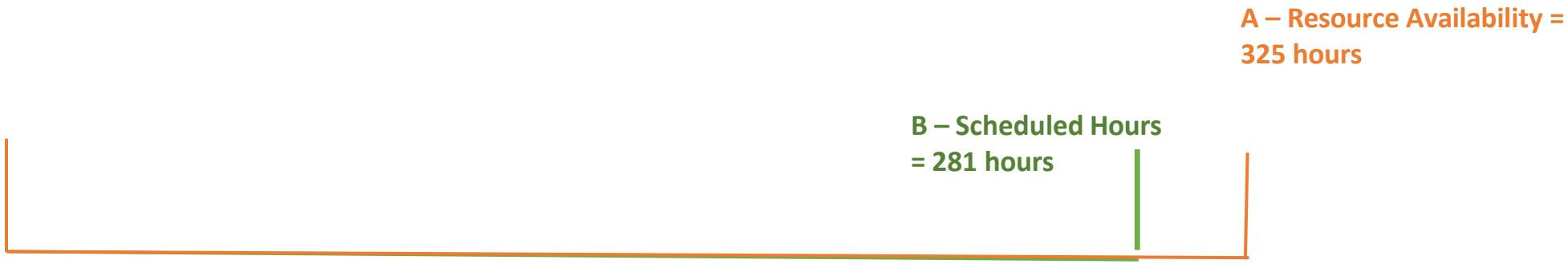
Visual KPI’s



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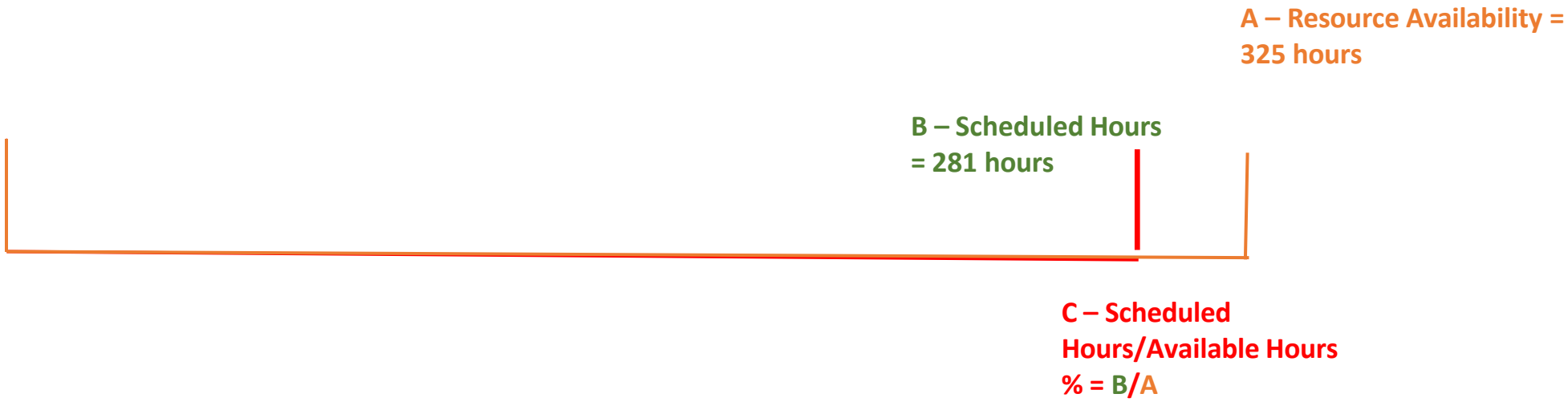
Visual KPI’s



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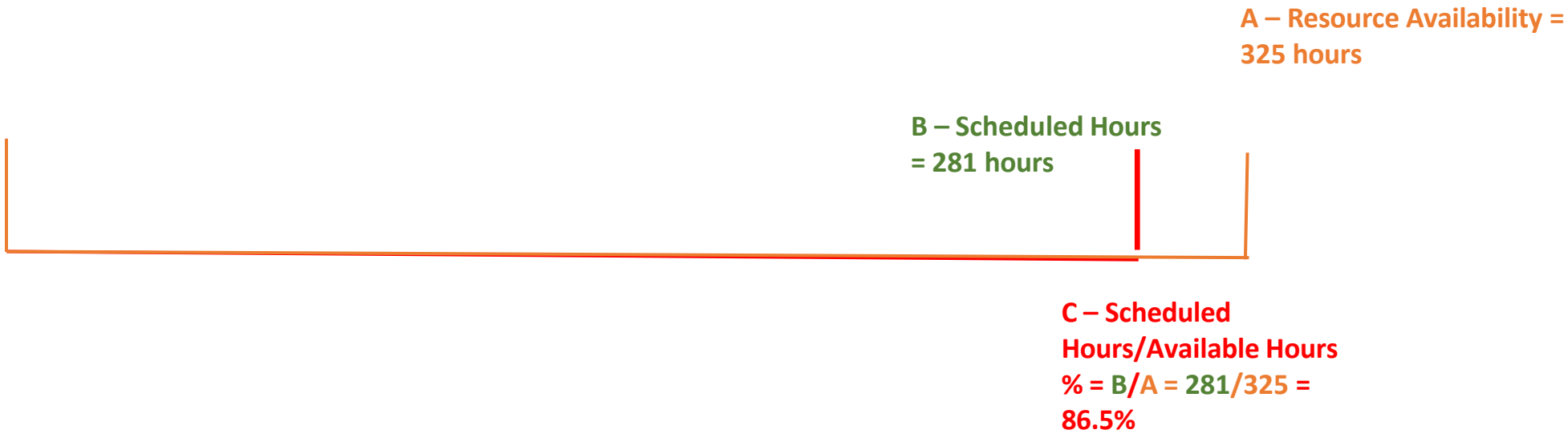
Visual KPI’s



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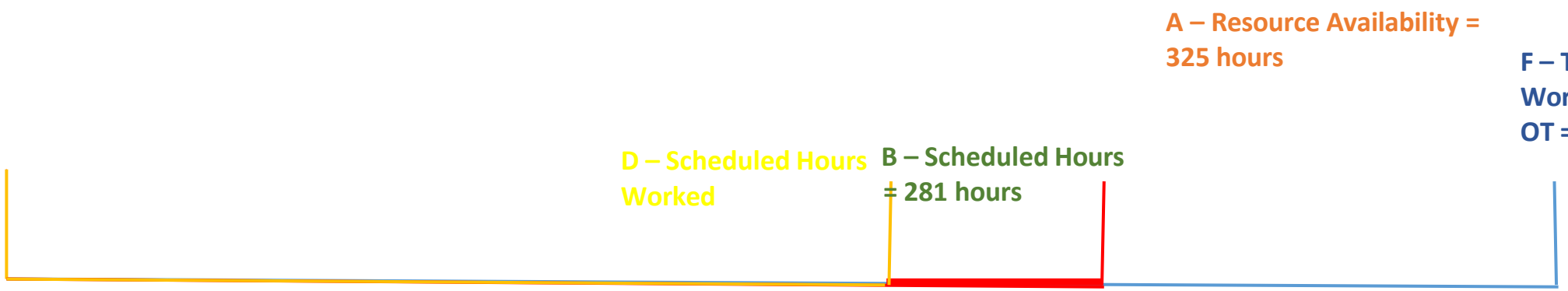
Visual KPI’s



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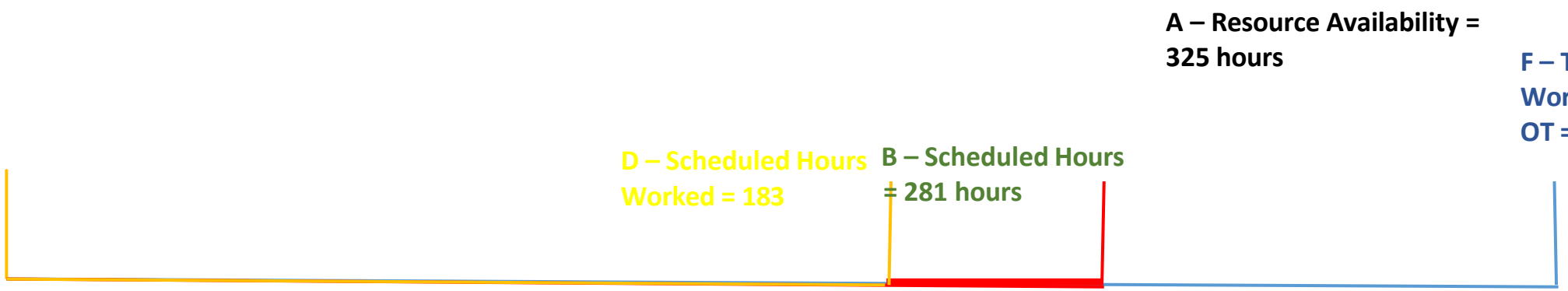

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Visual KPI's

A – Resource Availability = 325 hours

B – Scheduled Hours = 281

C – Scheduled Hours/Available Hours % = 281/325 = 86%

D – Scheduled Hours Worked – 183

F – Total Hours Worked – 353.75

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Visual KPI's

A – Resource Availability – 325 hours

B – Scheduled Hours = 281

C – Scheduled Hours/Available Hours % = 281/325 = 86%

D – Scheduled Hours Worked – 183

F – Total Hours Worked – 353.75

E – Schedule Compliance % = D/B

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Visual KPI's

A – Resource Availability – 325 hours

B – Scheduled Hours = 281

C – Scheduled Hours/Available Hours % = 281/325 = 86%

D – Scheduled Hours Worked – 183

F – Total Hours Worked – 353.75

E – Schedule Compliance % = D/B - 183/281 = 65%

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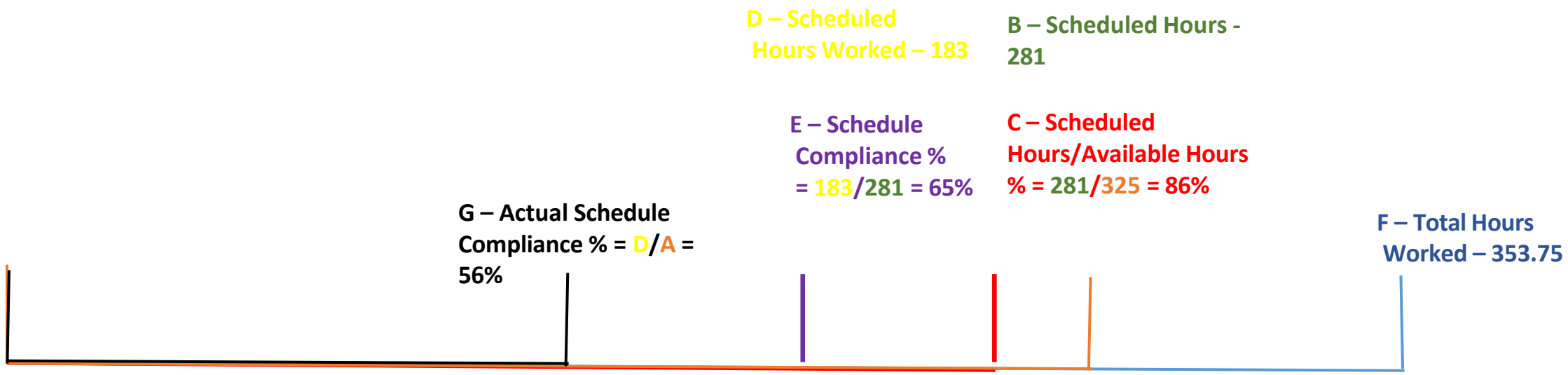
Visual KPI’s



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Visual KPI's

A – Resource Availability – 325 hours

D – Scheduled Hours Worked - 183

B – Scheduled Hours - 281

E – Schedule Compliance % = 183/281 = 65%

C – Scheduled Hours/Available Hours % = 281/326 = 86%

G – Actual Schedule Compliance % = D/A = 56%

F – Total Hours Worked – 353.75

Unscheduled Work and Unscheduled Overtime

=353.75-183 = 170.75

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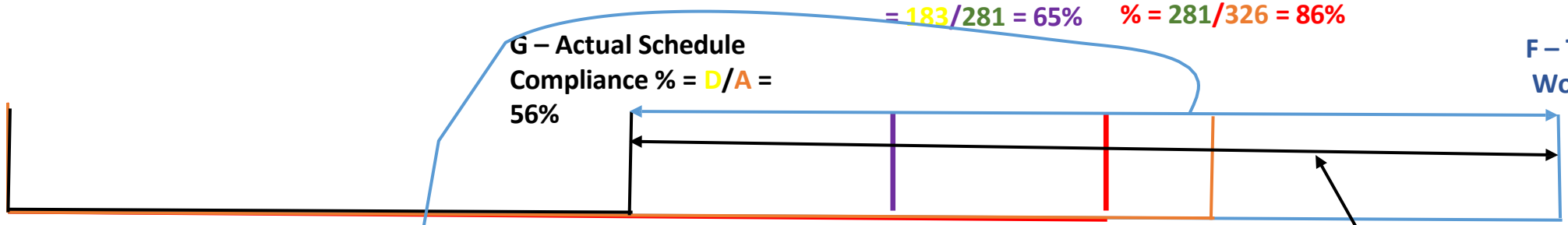

Unscheduled Work and Unscheduled Overtime

=353.75-183 = 170.75

What is this?

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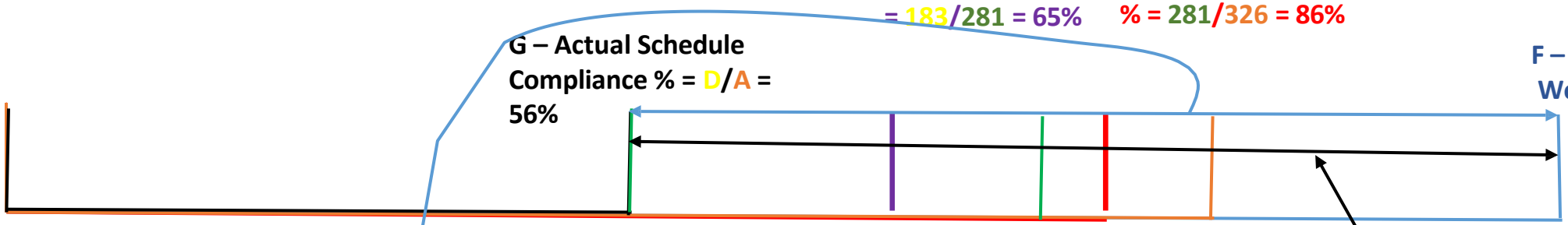

Unscheduled Work and Unscheduled Overtime

=353.75-183 = 170.75

What is this? Who requested it?

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Visual KPI's

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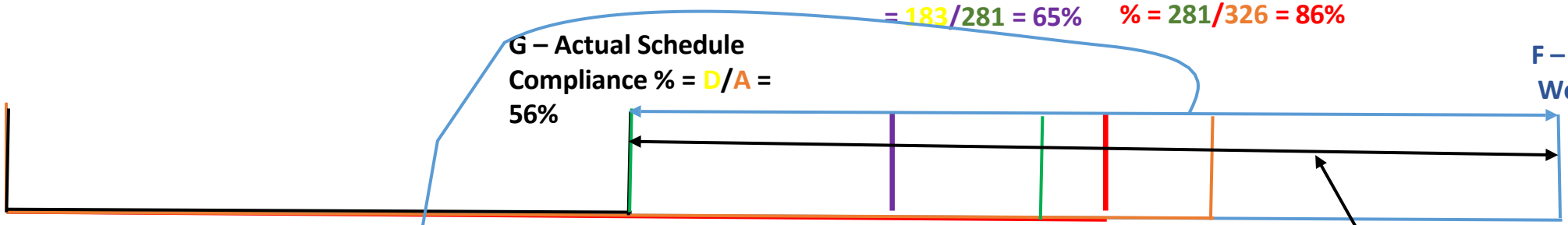

Unscheduled Work and Unscheduled Overtime

=353.75-183 = 170.75

What is this? Who requested it? Why?

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Visual KPI's

A – Resource Availability – 325 hours

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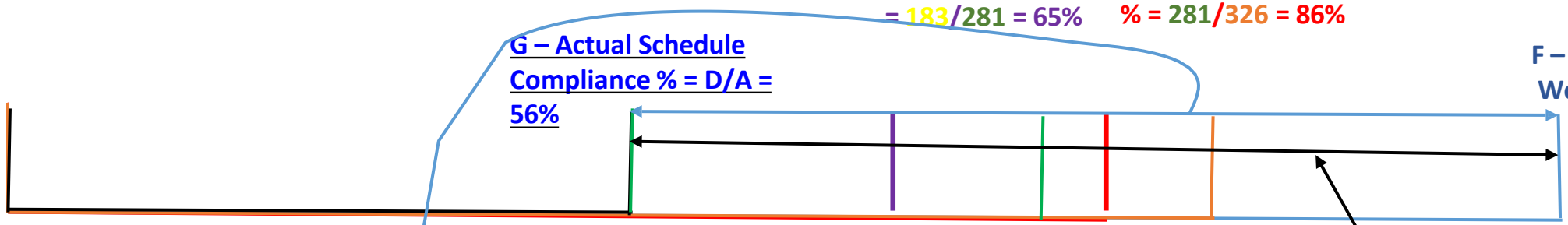

Unscheduled Work and Unscheduled Overtime

=353.75-183 = 170.75

What is this? Who requested it? Why?

Defect Elimination

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A plant has a critical piece of equipment fail at 2:30 a.m. on a Saturday. Would you celebrate success and congratulate maintenance employees after performing a significant amount of repair and patching of failed equipment at 2:30 a.m. on a Saturday morning just to get production running again?

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Better Reasons, but Harder to Celebrate Success

With Operations and Maintenance together:

- Increases in Reliability
- Increases in Operational Availability
- Increases in Overall Equipment Effectiveness (OEE)
- Implementation of solutions resulting from Root Cause Failure Analysis performed by Cross-Functional teams that eliminated failures

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Hydraulic Failure Scenario

Your plant experienced a hydraulic unit failure due to a severe piston failure (after numerous directional valve failures over the last 24 hours). All of the directional valve spare inventories were used up because of the numerous failures. This resulted in a major unplanned shutdown. **You are currently down.**

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What Questions do you ask?

- Common Answers
  - How soon before we can get this running again?
  - How could we have run out of spares?
  - Are you flying in more spares?
  - Did you replace ……?

Focus is on how to get it going quickly

- Proactive Culture…
  - Did you figure out the root cause of the failure?
  - Are we following the right process to make sure this unit will meet our expectations?
  - Will it start-up in a precise state?

Establish what we expect using the right tone

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…the rest of the story…

- The directional valves failed because they were plugged with trash. Initially, plugged valves were replaced with new valves
- After all new valves were consumed, maintenance rebuilt and cleaned plugged valves and put back in service
- After more valve failures, replaced piston pump, flushed lines, and installed kidney loop filtration on reservoir. System ran for few hours and then valve started to fail again.
- Maintenance shut line down, sent shift home, rebuilt valve, flushed unit, and installed pressure filter just upstream of directional valve.
- Started up line next morning, started to have more issues with valves.
- Shut down, checked cylinder piston and found severe damage. Replaced both cylinders, started up and ran well.
- Found cylinder ring was subjected to over pressure condition, pressure compensator set too high, and pressure relief valve was not installed.
- The operation is running well now

Knowing this information….What leadership gaps are present?

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Requirements for Asset Management

- Reliability Engineering
  - Application of appropriate Reliability Methodologies (Criticality, RCFA, FMEA, RCM, RAM, etc.)
  - Application of effective Condition Based/Predictive/Proactive Maintenance Tactics
  - Reliability (Eliminating Failures) focus
- Good use of shared Key Performance Indicators (KPI's) to help improve the business
- **LEADERSHIP COMMITMENT!**

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Leadership Commitment – What does that mean?

1) Must have personal knowledge of Asset Management principles
   - Asset Ownership
   - Publications
   - Training
   - Conferences
2) Clearly articulate opportunities
   - What is the business case (burning platform)?
   - Add Value – lower cost or more production (availability)
3) Hold your team accountable
   - An understanding of the Maintenance Department's role in Asset Management versus subservience to the Operations Department for repair ("customer") - Partnership
   - Work Management Process discipline with clear roles, responsibilities and expectations for ***EVERYONE***
     - ***Not guidelines***
   - Shared KPIs
   - Individual and Team accountability

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Leadership Commitment – What does that mean?

4) Lead by Example

- Get people excited
- Facilitate Alignment of priorities (Focus on the critical few)
- Asset Management is not an initiative. It is how to run the business.
- Ask the right questions
- Challenge GOOD with BETTER

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What's In It For Me - WIIFM

- "Better history tracking so that I can improve equipment reliability"
- "Cost associated with WO's"
- "An opportunity to be part of a change, and the chance to keep this place open. I truly believe if we continue to operate this facility the way we have and continue with same financial results, it will not stay open or at least open under the same ownership."
- "Operations and Maintenance on the same page vs assuming the WO process."
- "Work order flow will now be smoother to completion"
- "This process will pay off and will be able to accomplish more of our needs to keep this facility running"
- "…simplifying as much as possible is the key to the buy in of what we are trying to accomplish. …the more that is thrown at different roles and stakeholders ends up as a waterfall effect. Ownership of our roles and expectations without overwhelming individuals due to shortages in key positions will play a key role…"

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What's In It For Me - WIIFM

- "Less frustration and forced overtime"
- "Mechanics know what the issues are and can effectively address the issue"
- "Less burnout from employees because they're not overwhelmed"
- "The ability to get off work in time to coach my daughter in softball"
- "Feedback from planning to execution and vice-versa"
- "Joint determination and understanding of maintenance priorities"
- "The ability to get a full night's sleep without being worried about being called out"
- "Operations input to Maintenance Activities"
- "Feedback to operators will be better"
- "Operators communicate with maintenance to clarify issue"
- "Less overlap in job responsibilities"
- "Standard to follow so that people know what to do (flow chart)"

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Remember these questions?

- Asset Strategies (PM, CBM, RTF)
  - How were they created?

- Work Management
  - How is the urgency of maintenance work determined?
  - Do you have Maintenance Planners?
    - If so, what are their objectives?
  - Are your Maintenance Technicians efficient and effective?
    - What are they working on?
    - Do they have the things they need to be successful?

- Defect Elimination
  - What are you doing to eliminate or substantially postpone repetitive and costly failures?

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High Level Self-Assessment

- Asset Strategies (PM, CBM, RTF) – Target score: 2
  - Were they created from OEM recommendations, failures that caused downtime, emotion, latest technology, etc.? (Y-0, N-1)
  - Are critical spare parts identified? (Y-1, N-0)
- Work Management – Target score: 7
  - Are you skipping or rescheduling PM work due to failures or other reasons? (Y-0, 1-N)
  - Is the urgency of work required by maintenance based on emotion, authority, or tribal knowledge? (0-Y, 1-N)
  - If you have Maintenance Planners, do they work on maintenance work in the current week? (Y-0, N-1)
    - (Deduct one point for lack of Maintenance Planners)
  - Do the Maintenance Planners order parts for urgent/immediate/emergency work? (Y-0, 1-N)
  - Are job plans from Planners detailed with parts, tools, materials, and labor estimates? (Y-1, N-0)
  - Are all of your Maintenance Technicians fully loaded up proactive work on a daily basis? (Y-1, N-0)
  - Do your Maintenance Technicians or Craftspeople go to the warehouse to request parts for proactive work? (Y-0, N-1)
- Defect Elimination – Target score: 2
  - Do you have a means to solve repetitive and costly failures to root cause? (Y-1, N-0)
  - Do you communicate to organization the impact to cash flow of those failures? (Y-1, N-0)

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Questions?

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THANK YOU!