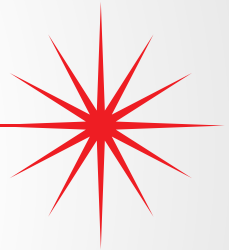
# Solutions2.0

## Virtual Conference



Presented by Reliabilityweb.com

# Upcoming CRL Workshops


## Dec. 12-15

**Co-located with IMC-2017**

**Bonita Springs, FL**

**More information: www.reliabilityleadership.com**

Solutions2.0
Virtual Conference

# Providers


http://imc-2017.com

Solutions2.0
Virtual Conference

# Sponsors

Keynote

# Do You Follow a Framework for Asset Condition Monitoring?

by Dave Reiber, Senior Reliability Leader, Reliabilityweb.com

Solutions2.0 Virtual Conference

# Dave Reiber CRL / CMRP

## Currently – *Senior Reliability Leader at Reliabilityweb.com*

***Recently** – Global Maximo Business Lead, Predictive Maintenance Lead, and Global Maintenance Business Process Leader*

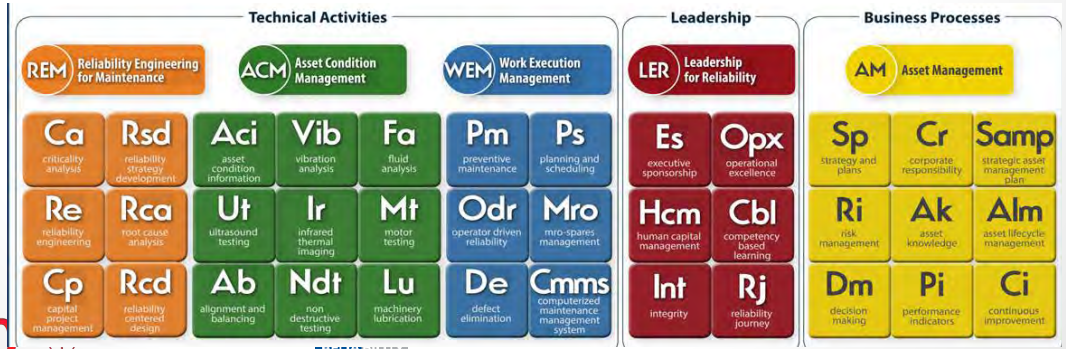
- Maximo Project Manager
- Global Maximo Business Lead
- Global Predictive Maintenance Lead
- Member of IBM Maximo Advisory Board
- Co-Lead for IBM Manufacturers User Group for Maximo
- Speaker at many Maintenance and Maximo Conferences
- Led Maintenance Webcasts for Reliabilityweb, Industry week, UE Systems, and Plant Engineering Magazine
- Member of editorial advisory board for Plant Engineering
- Hosted many Maximo & Predictive Webinars for General Motors
- Certified CRL – Certified Reliability Leader
- Certified CMRP – Certified Maintenance & Reliability Professional
- Certified – Infrared / Ultrasound
- Certified Maximo Deployment Professional

# Why use the Uptime Elements Framework?

*Because it works!*

Problem:
At large corporations and organizations, the toughest thing to accomplish, is to get everyone, from all departments, onboard and headed in a single direction.

The Uptime Elements Framework is an easy to follow roadmap that all departments can follow. Each department, or Site, can easily relate their value stream to at least one of the elements. Usually several elements can be aligned with the goals and objectives of the company, as well as the responsibilities of each group.




Solutions2.0
Virtual Conference

1. How will future maintenance assets look and act? (IIOT)
2. Do these factors significantly change how you perform operational activities?
3. What will be expected from maintenance professionals moving forward?

New tools and systems are available to provide better insight, and a path to faster and better decisions?

Significant advancements and challenges have emerged in the world of maintenance and reliability over the past few years. We are experiencing the age of the "Internet of Things, "industrially speaking, (IIOT), where traditional methods have become ineffective or inadequate.

**Maintenance teams are looking for:**

- Meaningful asset performance data
- Accurate predictive models
- Real-time asset health reports

***What does the Future Reliability Leader Professional look like?***

Skilled Maintenance and Engineering support people find their place. Some will just naturally rise to greatness. Others will go through life comfortably, making a contribution, but not stepping past their comfort zone. Both types of people are needed to make things work properly, but someone has to be willing to be the person who steps outside their comfort zone, always reaching for the next level. Those who are never satisfied with the end game, but seeking where do we go next. The future Reliability Leader Professional, will have a strong imagination, willing to look past what is status quo, but seasoned with experience earned by doing the job. A person with drive for solving problems and getting better at their business

***A professional person that acts with earned knowledge of what to do and when to do it. Continuously training, learning, and certifying in their craft.***

***They know when to call for help or outside influences to assure that the integrity of the Physical Asset, Scheduled Process, and Quality are all considered before action is taken.***

***A person that is well versed in varied Maintenance Sciences. Open minded to innovation and adaptable in action plans, that support the current situation. Recognizing that all problems are not presented or solved equally.***

**The primary goal of a maintenance team should be precision maintenance, where the organization is on a flightpath of continuous improvement.**

**Specifically:**

1. More precise calls around condition failure probability
2. Available, real-time asset health scores of the most critical assets
3. Automated actions direct from the software system(s)

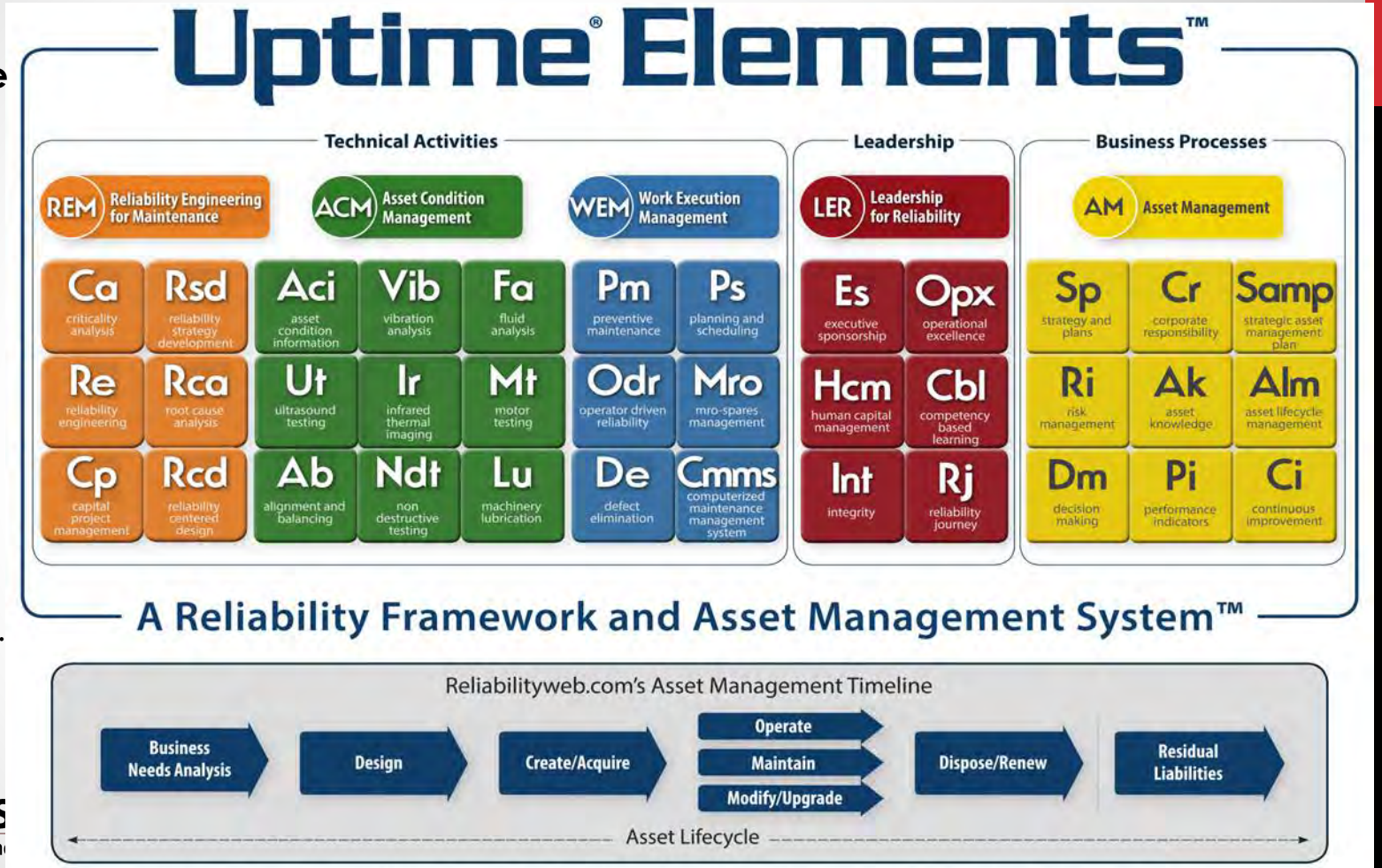
## Reliability Culture Supported by:

**Using the Uptime Elements Chart describe where you fit in your organization;**

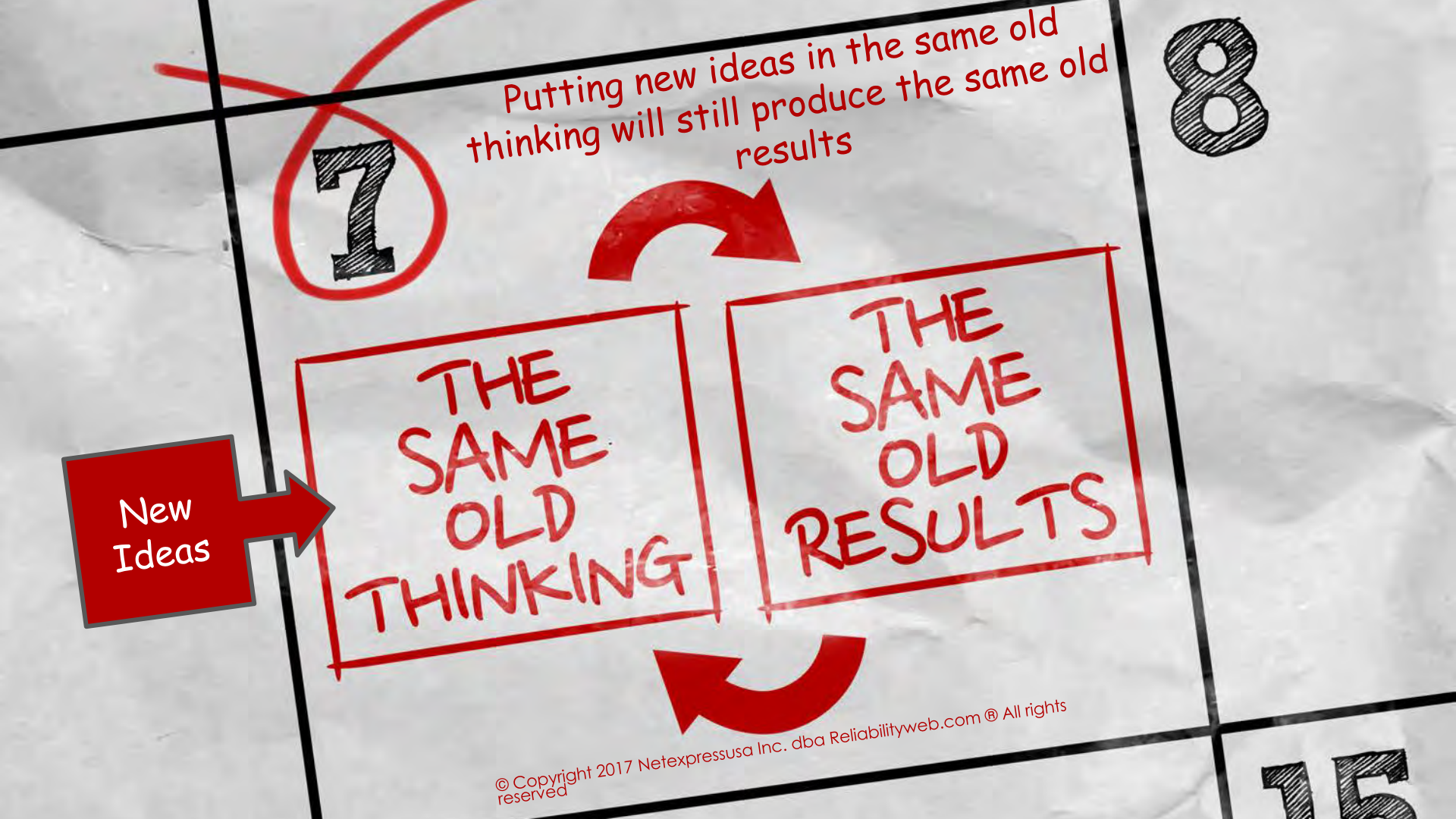
Use a RASIC approach:

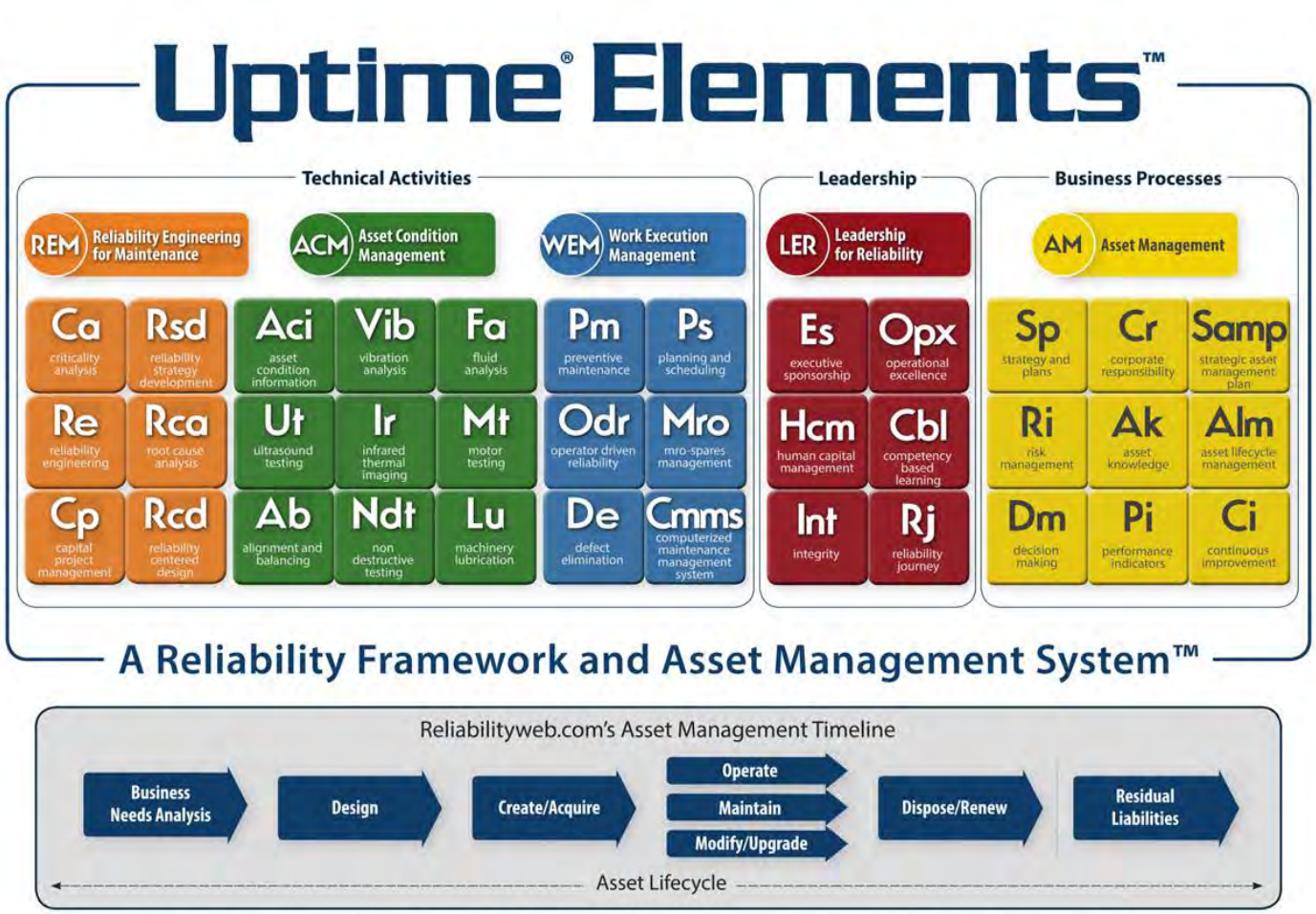
- ***R**esponsibility*
- ***A**ccountability*
- ***S**upport*
- ***I**nformed*
- ***C**onsult*

to understand your value stream.



# The Uptime Elements as a Cultural Language:

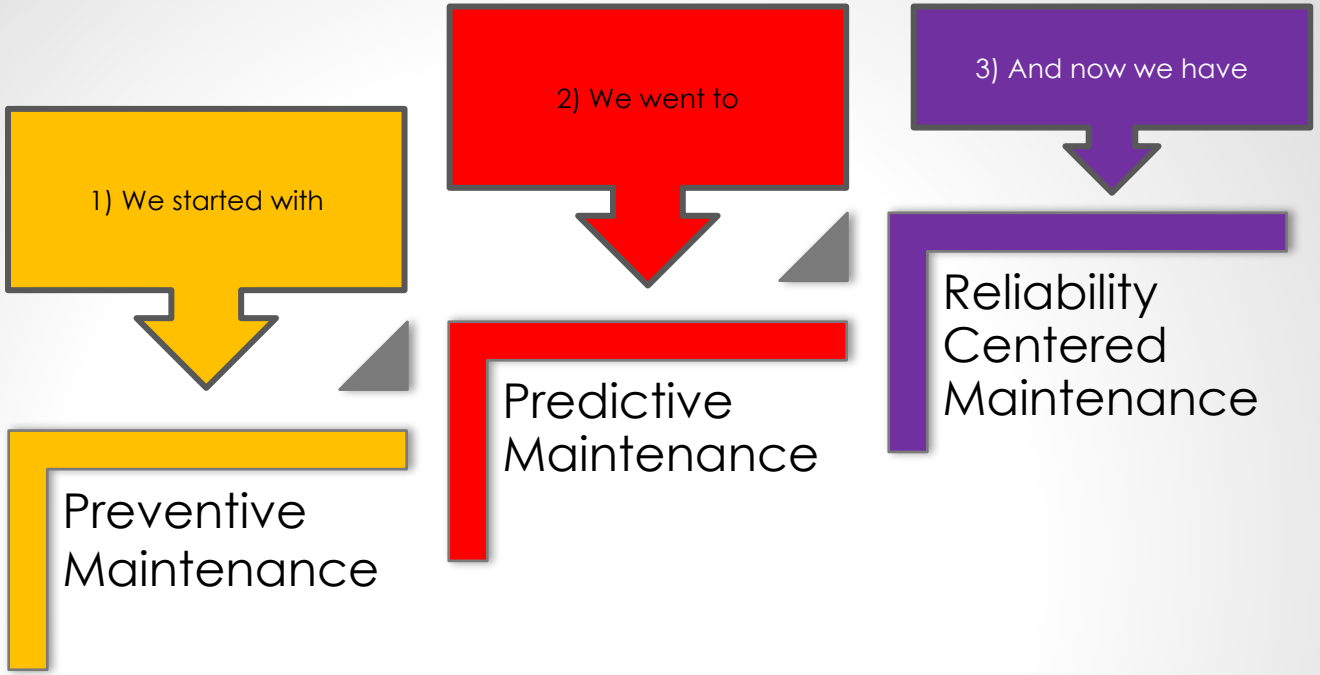

Putting new ideas in the same old thinking will still produce the same old results
7
8
15
THE SAME OLD THINKING
THE SAME OLD RESULTS
New Ideas
© Copyright 2017 Netexpressusa Inc. dba Reliabilityweb.com ® All rights reserved



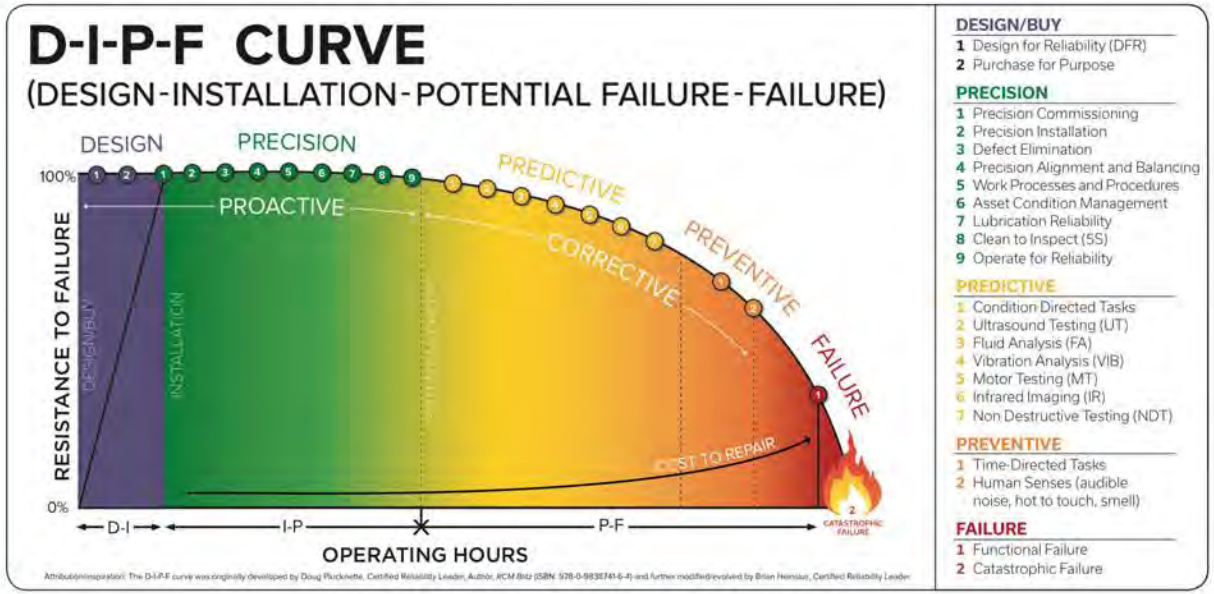


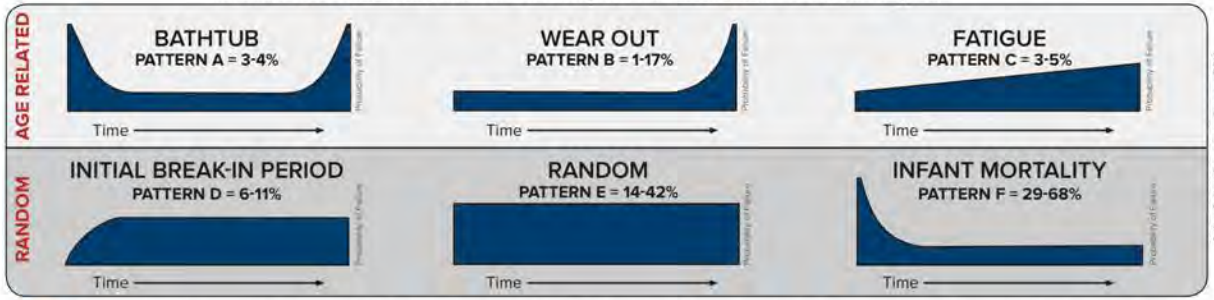

reliabilityweb.com • maintenance.org • reliabilityleadership.com

Soluti
Virtual



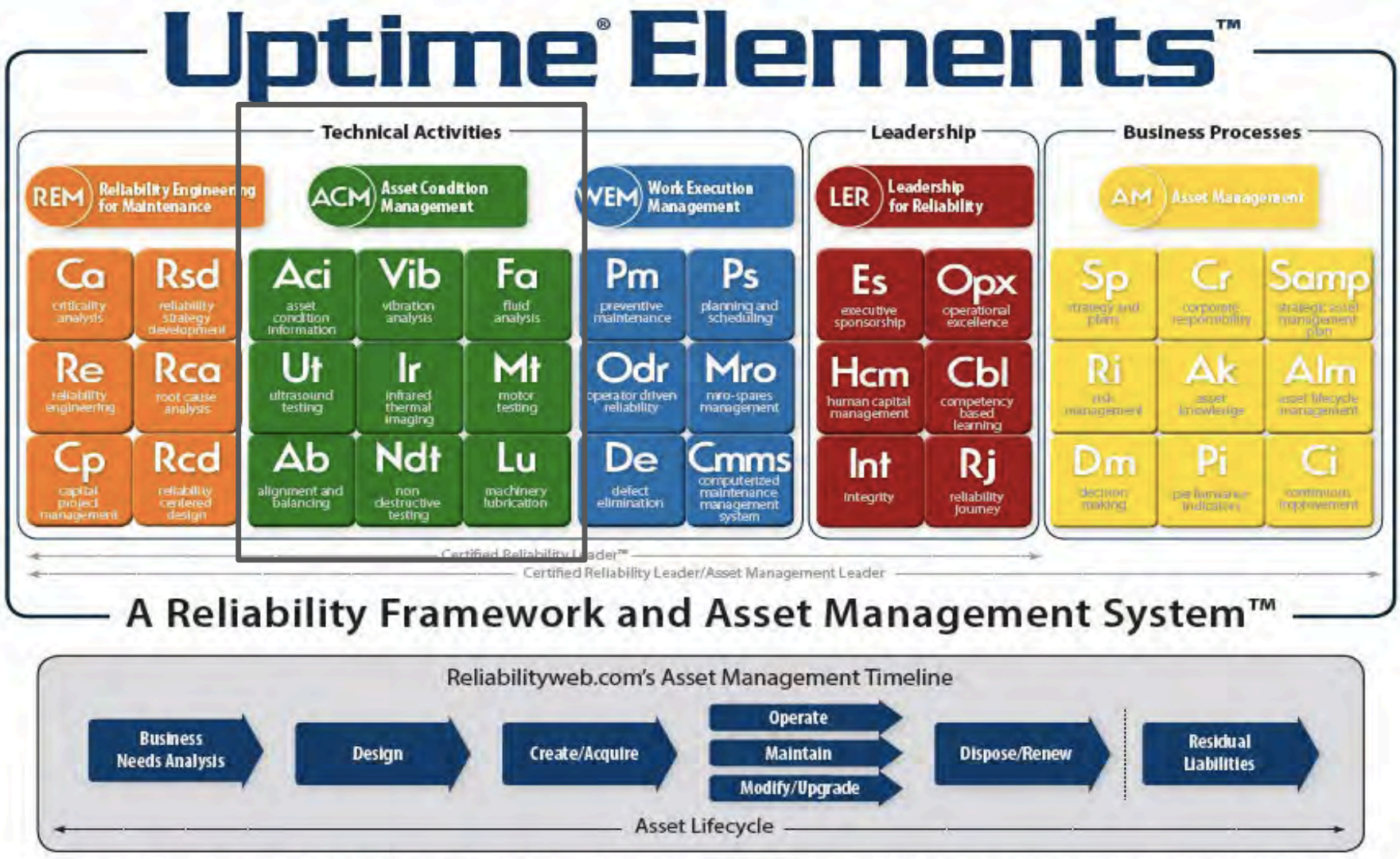
# HOW FAILURE OCCURS






Sol


Uptime® Elements™
Technical Activities
Leadership
Business Processes
REM Reliability Engineering for Maintenance
ACM Asset Condition Management
WEM Work Execution Management
LER Leadership for Reliability
AM Asset Management
Ca criticality analysis
Rsd reliability strategy development
Re reliability engineering
Rca root cause analysis
Cp capital project management
Rcd reliability centered design
Aci asset condition information
Vib vibration analysis
Fa fluid analysis
Ut ultrasound testing
Ir infrared thermal imaging
Mt motor testing
Ab alignment and balancing
Ndt non destructive testing
Lu machinery lubrication
Pm preventive maintenance
Ps planning and scheduling
Odr operator driven reliability
Mro mro-spares management
De defect elimination
Cmms computerized maintenance management system
Es executive sponsorship
Opx operational excellence
Hcm human capital management
Cbl competency based learning
Int integrity
Rj reliability journey
Sp strategy and plans
Cr corporate responsibility
Samp strategic asset management plan
Ri risk management
Ak asset knowledge
Alm asset lifecycle management
Dm decision making
Pi performance indicators
Ci continuous improvement
Certified Reliability Leader™
Certified Reliability Leader/Asset Management Leader
A Reliability Framework and Asset Management System™
Reliabilityweb.com's Asset Management Timeline
Business Needs Analysis
Design
Create/Acquire
Operate
Maintain
Modify/Upgrade
Dispose/Renew
Residual Liabilities
Asset Lifecycle

# Why the Uptime Elements and Asset Condition Monitoring:

***The Uptime Elements is a holistic system based approach to reliability that includes:***
***Technical Elements • Cultural Elements • Leadership Elements •. Business Elements***

The increased use of mobile and intelligent sensor devices, along with integration of condition based analytics, and asset life cycle management, has a direct and significant impact on bottom line process improvement. Good Asset Condition Monitoring, is an important strategy, to an IIoT process that works for your organization, to optimize a better return on investment capital.

**The primary goal of a ACM Team should be more precise calls related to failure.**
**The organization should be on a flightpath of continuous improvement, for data collection and data aggregation.**.

**Specifically:**

1. More precise calls around condition failure probability
2. Available, real-time asset health scores of the most critical assets
3. Automated actions direct from the software system(s)


# Asset Condition Management Data

**The ACM elements provide a visual framework.**
**Easy to follow & set up to prioritize your plan for a successful implementation.**

On most modern industrial assets, there are many sensors already, constantly gathering information. These sensors are giving us vital information to help us prolong the assets value to the organization.

The Uptime Elements can be referred to, throughout the ACM project. Some companies are using them as a visual roadmap, with priorities set up by your organization, and relationships to other Elements can be easily associated.

***Example:***
*Your goal is to implement Infrared, Ultrasound , and Vibration within the next 18 months. Prioritizes are understood by everyone. Also, the association to the Hcm (Human Capital Management) and Cbl (Competency Based Learning) elements, from the Leadership domain, can help you to stay on track, with the selection of the right candidates, and the appropriate training, for a successful implementation.*


# Asset Condition Management Data

**ACI** – All data linked to the Asset - could be found in the asset application, spare parts, histories, logs, reports, etc..

**Ut** – High frequency sound wave data for bearings, pumps, air leaks, steam systems, etc…

**Ab** – data from laser alignment & balancing work orders

**Vib** – data from vibration readings in the condition monitoring application

**Ir** – Infrared data gathered in the condition monitoring application

**Ndt** – all condition monitoring that is done non-destructing

**Fa** – data gathered from oil sampling after lab analysis

**Mt** – Condition Monitoring, routes, job plans, etc..

**Lu** –job plans, route inspections, people certifications, contractor info, etc..


**Asset Condition information is all data linked to the Asset.**

PM&C (Production Monitoring and Control) & Cimplicity/CMore - DATA

Connected Data Sets

Predictive Tools - DATA

**Failures can be:**
***Chronic**
***Sporadic**
***Catastrophic**
**Each need to be broken down separately**

MAXIMO - DATA

**Data can be very intricate and in separate systems**

Collecting live time continuous data around Asset uptime.

Collecting DATA around written Work Orders related to work competed by Maintenance Team, including Emergency, Preventive, Predictive, and Projects.

People and remote Sensors collecting DATA around Vibration, Infrared, Ultrasound, etc…

## PMQ data Analytics

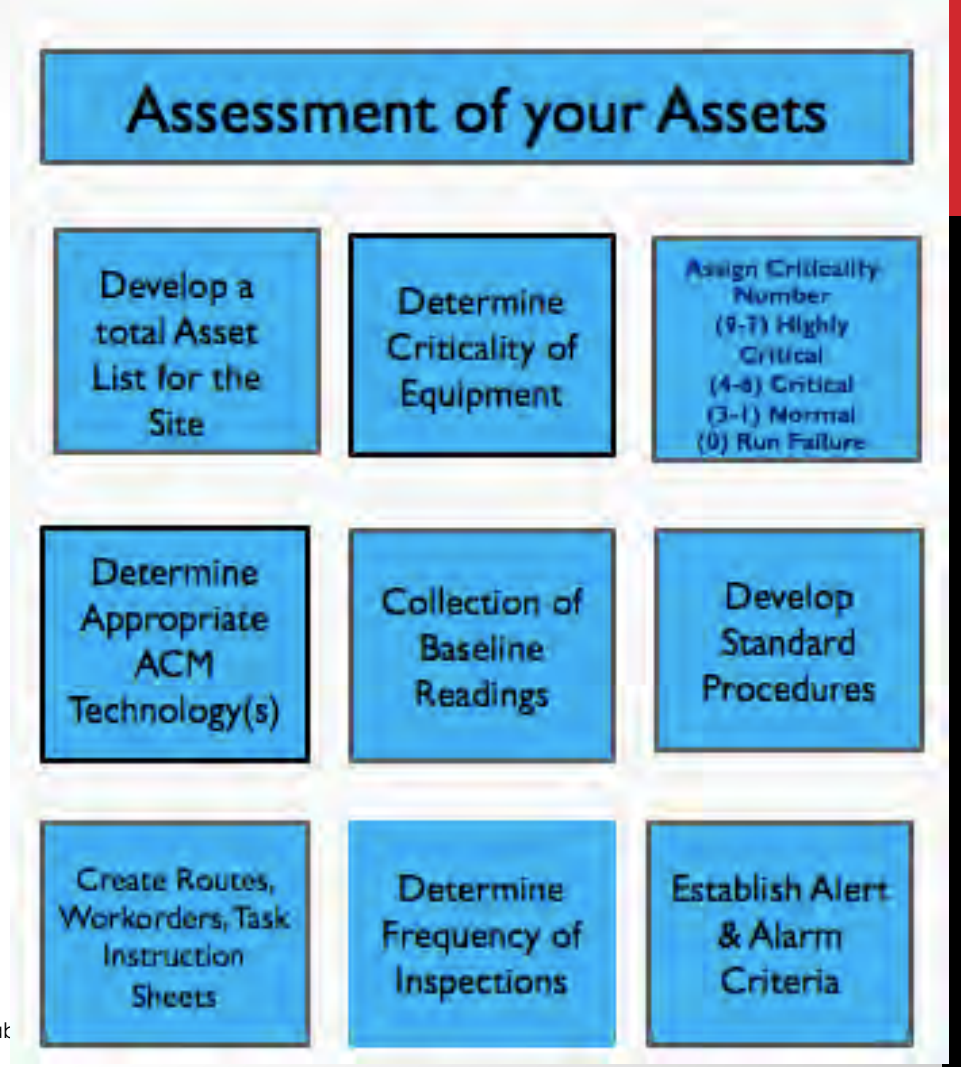
Trending, Patterning, learning, gaining intelligence around the data, to help us be more Predictive to Failures.
The new Term is called **Precision Maintenance**

Can write Work Orders back to the Maximo System

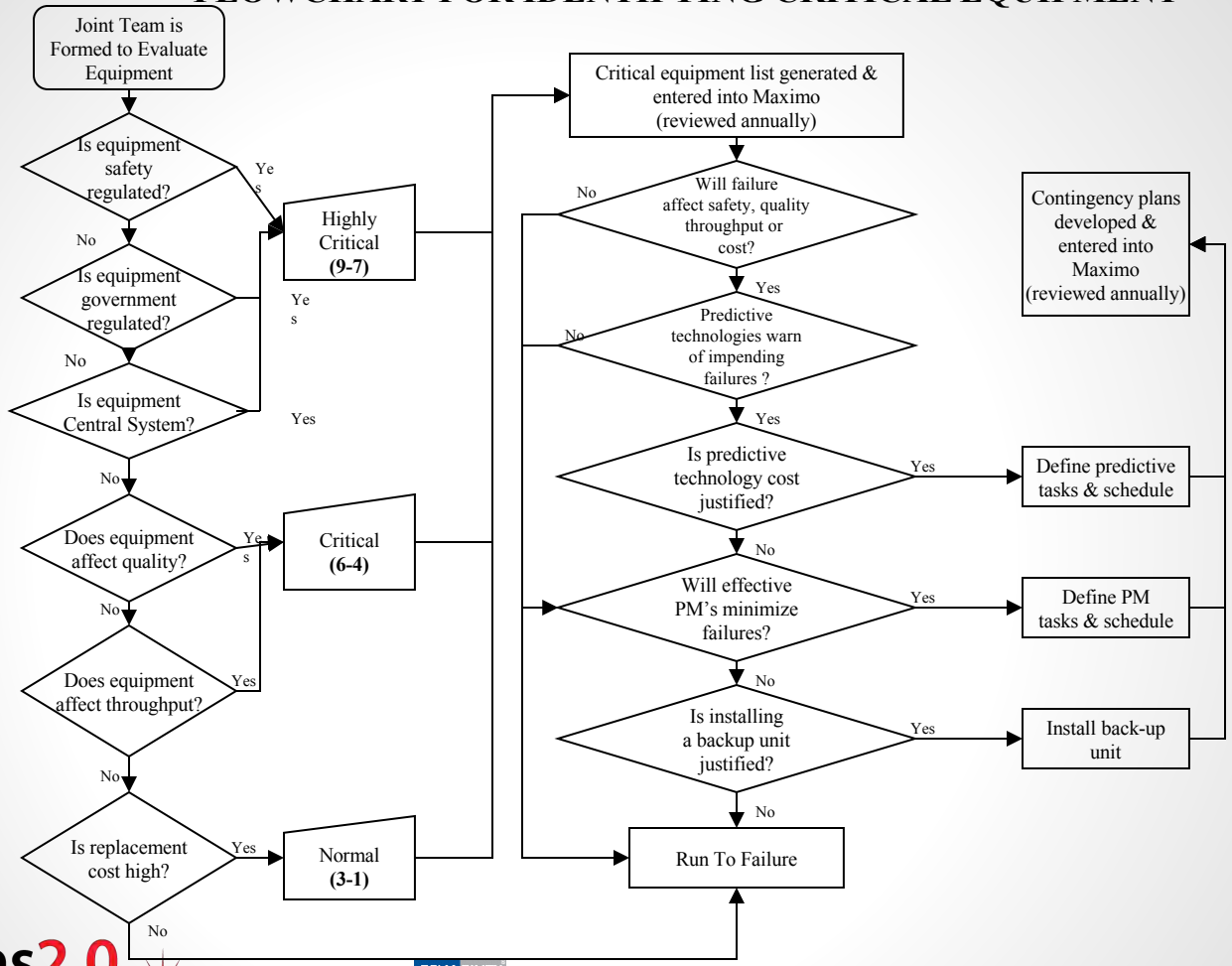
Can Notify through emails and other mobile applications

Discussion:

1. Do a cross-functional assessment of all Assets
2. Determine the Criticality of the Assets
3. Assign the proper Criticality # to aid in Routes
4. Determine the appropriate Condition Monitoring tool(s) to maintain Reliability
5. Collect Baseline Readings
6. Develop or refer to Standards
7. Create Routes & Task instructions
8. Establish Frequency of Route
9. Establish upper and Lower parameters to maintain Reliability



# FLOWCHART FOR IDENTIFYING CRITICAL EQUIPMENT



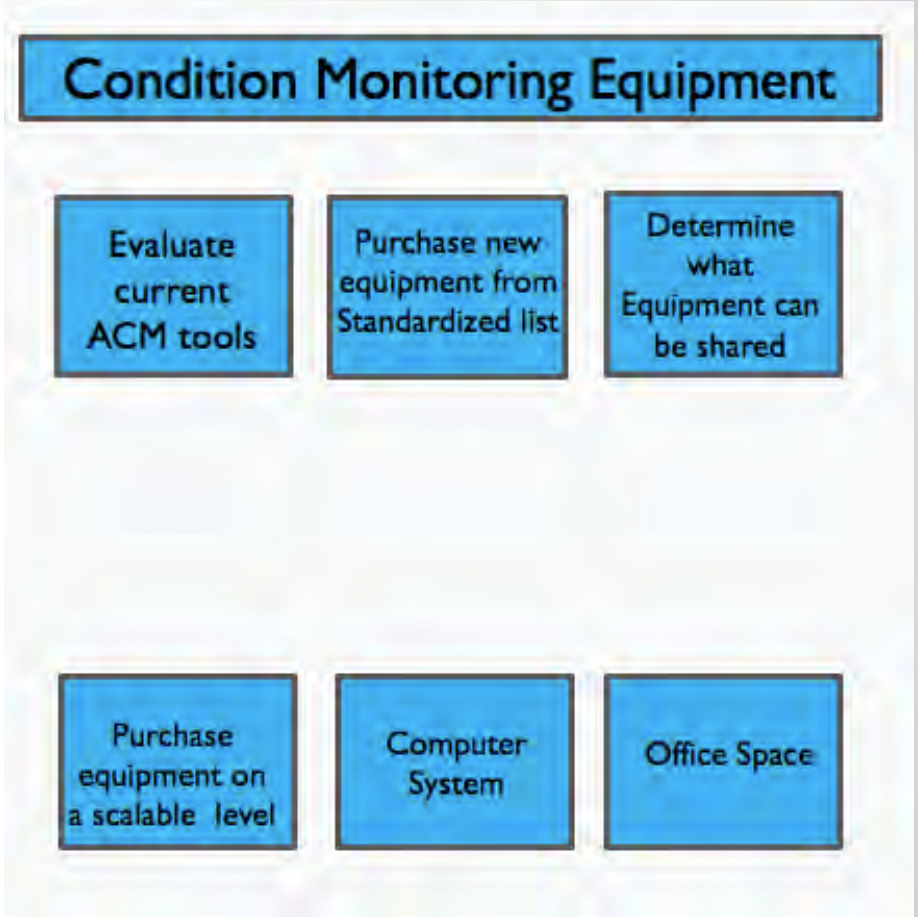
# Discussion:

1. Evaluate current ACM tools that you have and tools that you need

2. Purchase tools to work with your plan. Standardized lists can acquire better pricing and consistent training.

3. Match up these with the Uptime Elements Framework to the Project Framework

4. Purchase equipment on a scalable basis. Get some wins and talk about them, celebrate them.



Discussion:

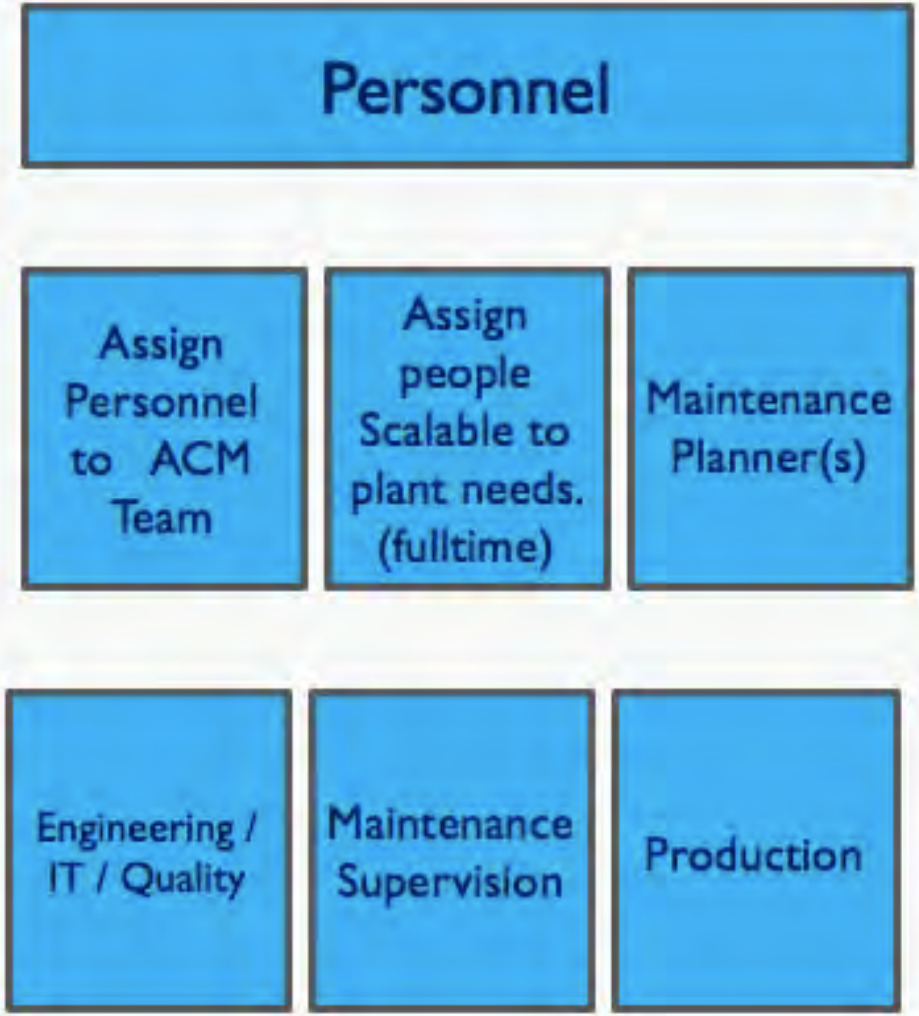
1. Assign proper people to the Team (Hcm)

2. Assign scalable to needs of the Site

3. Train them and the Maintenance Planners to work together in route building and frequencies.

4. Engineering, Maintenance Techs, and Condition Monitoring Techs all working together to solve the big problems

5. Attend Operations meetings to keep them in the loop



Discussion:

1. Consistency, Quality, Credibility, decision making, WIIFM

2. Good, clean data, software class, consistency, etc..

3. Work with Established Standards

4. Have periodic meetings with your Condition Monitoring team to collaborate on problems found and problems solved.

Discussion:

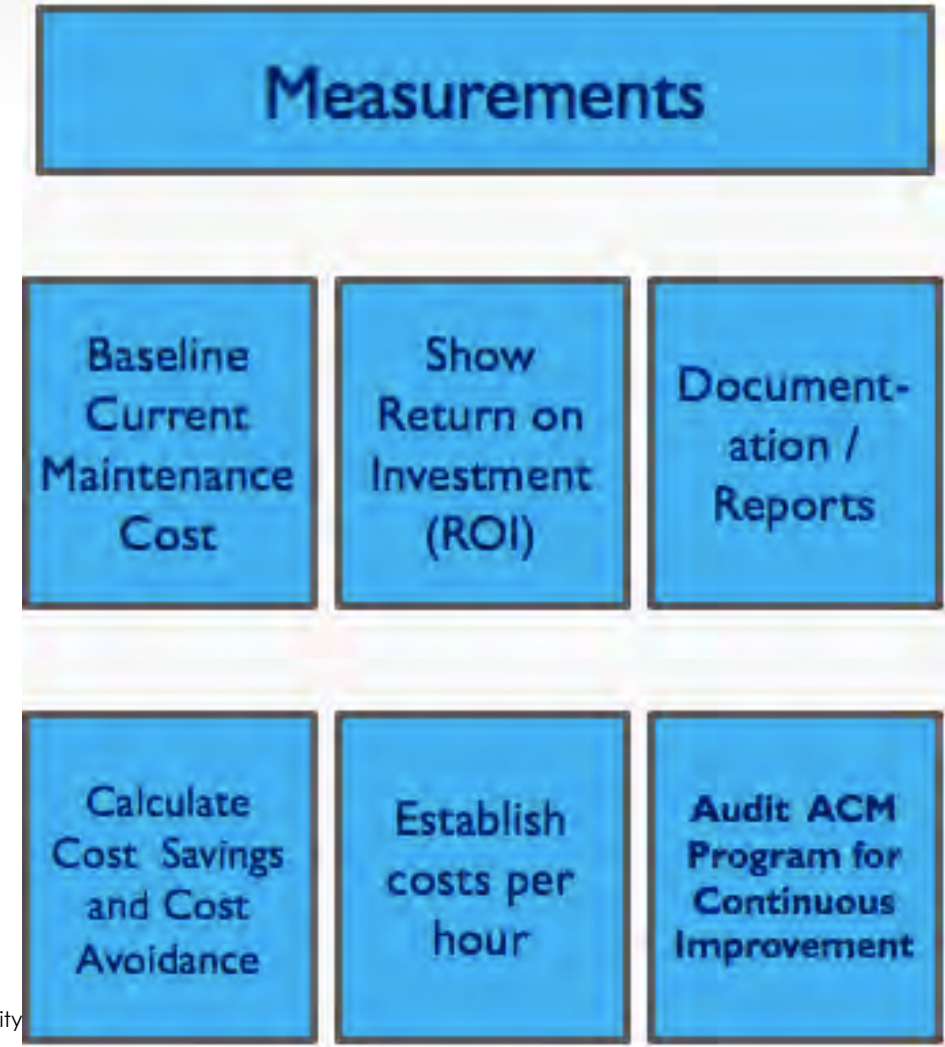
1. Understand the current state in relation to Maintenance Costs – Baselines

2. Give expectations – expect Results – (ROI)

3. Do before and after Reporting

4. Calculate Cost Savings / Cost Avoidance (Discuss)

5. Audit your program for results and improvements.



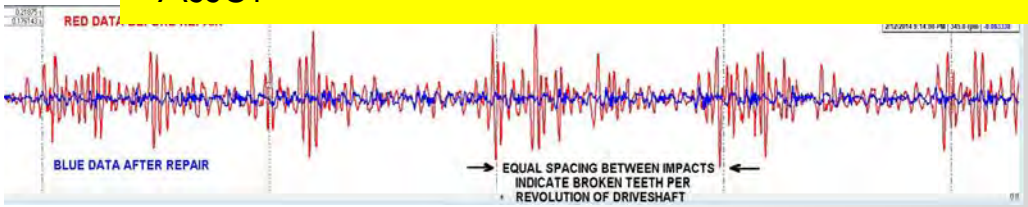
# A Closer look at the Condition Based Technologies

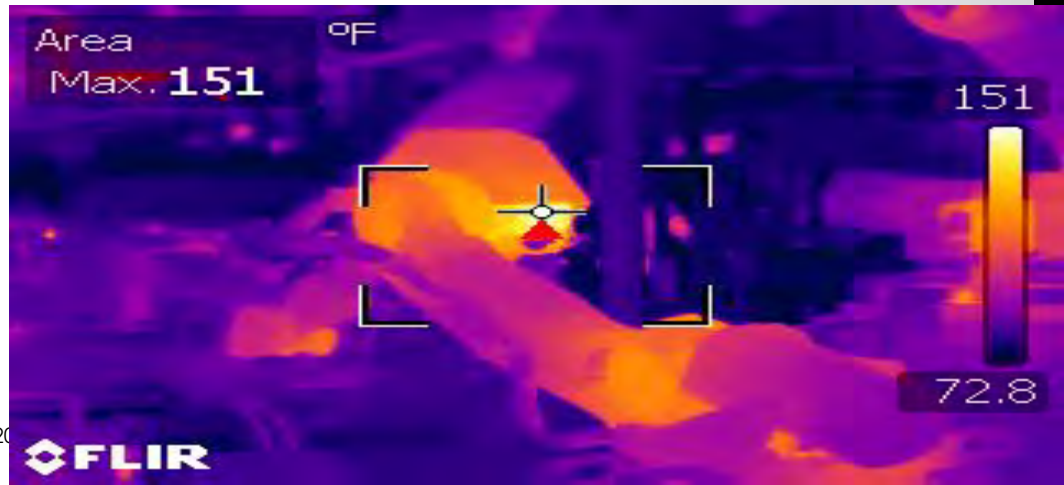
# Condition Based Technologies

- ❑ Vibration Analysis
- ❑ Infrared Thermography
- ❑ Ultrasound / Shaft Ultrasound
- ❑ Electrical Motor Diagnostics
- ❑ Oil Analysis / Lube Training
- ❑ Laser Alignment
- ❑ Hi-speed Video
- ❑ Video Probes
- ❑ Optivibe / Bridgeview

**Decisions around ACM Tools:**

- Recognizing the ROI timeframe
- Assign the right Predictive tool(s) to the Asset



# Cost Savings / Cost Avoidance

# Definitions

- **Cost Savings**
  - Dollars that are currently spent but will not be spent in the future.

- **Cost Avoidance**
  - An estimated dollar amount that would be expected to be paid in the future if proactive events did not keep the machine, tooling, or system producing units

# ACM

## ASSET CONDITION MONITORING PROJECT MANAGER'S GUIDE

# AUTHORS

### Jack Nicholas, Jr.

Jack Nicholas, Jr. CRL, CMRP, has over 45 years' experience leading, teaching, training and consulting in the fields of maintenance and reliability in government, military, utility and commercial venues in Asia, Australia, North America and the Caribbean. Mr. Nicholas is author, co-author, editor and major contributor to many books, professional papers and magazine articles on maintenance reliability subjects.

### Dave Reiber

Dave Reiber, CRL, CMRP, is the Senior Reliability Leader of Reliabilityweb.com. Mr. Reiber has 20 years as a leader in enterprise asset management and asset condition monitoring as the former Global Training Lead for Enterprise Asset Management & Predictive Maintenance Business Lead for General Motors. He is a seasoned international trainer with deep experience in handling diverse cultures and languages. Mr. Reiber received a Chairman's Honor Award for Leading Team in developing global maintenance business process and a CIO award for successful Enterprise Asset Management deployment in Liuzhou, China.

### Terrence O'Hanlon

Terrence O'Hanlon, CMRP, Chief Executive Officer of Reliabilityweb.com and Publisher for Uptime® Magazine, is an asset management leader specializing in reliability and operational excellence. He is certified in Asset Management by the Institute of Asset Management and is a SMRP Certified Maintenance & Reliability Professional. Mr. O'Hanlon is a popular keynote presenter with the ability to deliver awareness about the business advantages of asset management to top management.

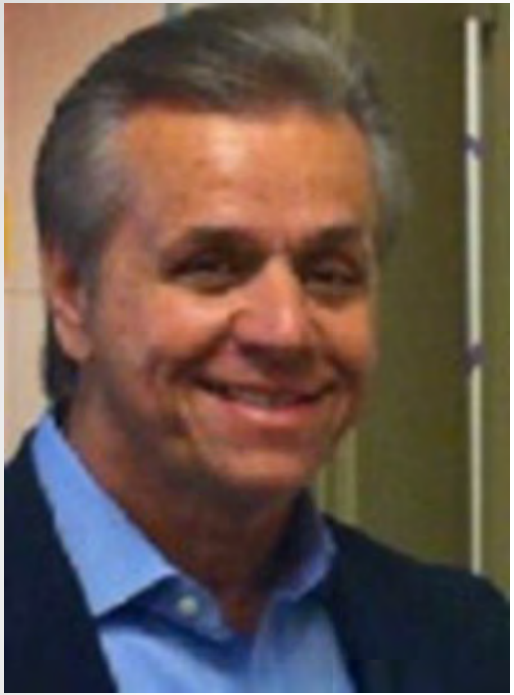
# Questions / Comments

Dave Reiber CRL / CMRP
Senior Reliability Leader at Reliabilityweb
Email – dave.reliabilityweb.com
Phone - 239-333-2500 - 126

Solutions2.0 Virtual Conference



RELIABILITY WEB.COM
A Culture of Reliability®



THE ULTRASOUND institute

Mister Ultrasound

Jim Hall, CRL, Executive Director
The Ultrasound Institute, LLC
Contributing Author: UPTIME Magazine

*Since 1988 - ULTRASOUND TRAINING...Through Experience.*

# The Ultrasound Institute (TUI)

"WE SELL *NO* INSTRUMENTS" we are solution provider!

The Ultrasound Institute (TUI) is a member of Mapped Services and Training (MSAT).

Ultrasound, Infrared and Vibration Analysis are complimentary technologies.

TUI takes pride in training and equipping ultrasound technicians with ultrasound familiarity…

- Ultrasound Theory
- Acoustic Lubrication
- Ultrasonic Electrical Inspections
- Energy Audits

# ULTRASOUND

1. Ultrasound can detect any gas leak?
2. Ultrasound can detect Corona?
3. Ultrasound can detect bearing anomalies before heat & vibration?
4. Ultrasound can detect a .005” leak  at 5 psig at 50 feet?
5. Ultrasound ***unlike*** IR and is Line-of-Sight?

# Three Most Popular Ultrasound Applications

## Energy Audits

**Air & Steam "LEAK" audits – Your Quickest Payback or ROI**

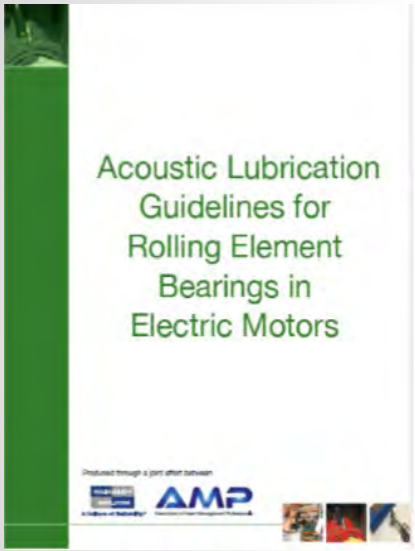
## Acoustic Lubrication

**Member's of Asset Management Professional (AMP) you can download a copy of…The Guidelines for Acoustic Lubrication of Electric Motors (free)**

## Ultrasonic Electrical Inspection of Switchgear / Substations

**Ultrasound can be used outside the switchgear by scanning openings around doors and empty bold holes.**

# Acoustic Lubrication




**Implementing an Acoustic Lubrication program as a condition based lubrication procedure is a "NO-BRAINER".**

- Reduction of Man-Hours lubricating
- Cost saving by not purchasing as much lubrication
- REDUCTION of motor maintenance & failures

# Ultrasonic Electrical Inspection

- Ultrasound can detect Corona, Tracking & Arcing
- Does not require Line of Sight (unlike IR & Corona Camera's)
- Ozone, Nitric-Oxide, Carbon, Ultra-Violet Light
- Performed from outside of cabinet.
- Several Stress Cone & Insulation Failures…


7,200V Phase to Ground &12,470V Phase to Phase

**ULTRASONIC WAR STORIES**

**Is Returning "*early*" 2018!**

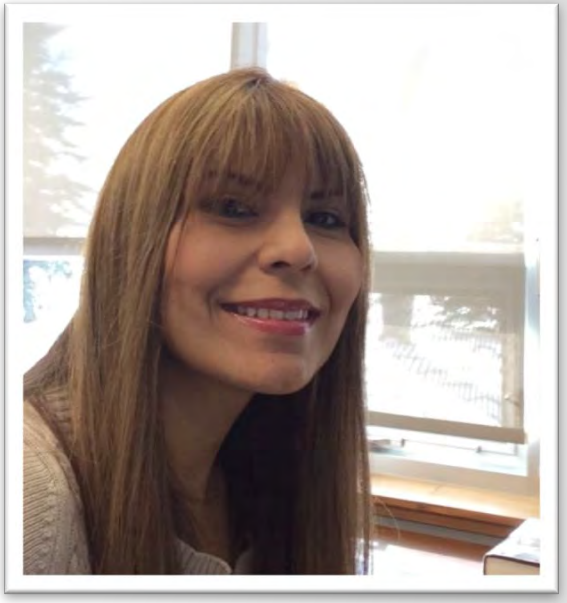
# WIRAM Series Sponsor

WIRAM Series

WIRAM
Women in Reliability and Asset Management

# Implementing the 5Rs to Build a World-Class Lubrication Program

by Johanna Valera, Senior Reliability Engineer, Inter Pipeline



Solutions2.0
Virtual Conference

# Inter Pipeline Ltd.

Inter Pipeline (IPL) is a major petroleum transportation, storage and natural gas liquids processing business based in Calgary, Alberta.

We own and operate world-class energy infrastructure assets in western Canada and Europe.

We own three major straddle plants, two offgas plants, an offgas liquids pipeline and a fractionator, all located in Alberta.

Our pipeline systems span over 7,700 kilometres in length and transport approximately 1.3 million barrels per day (b/d).

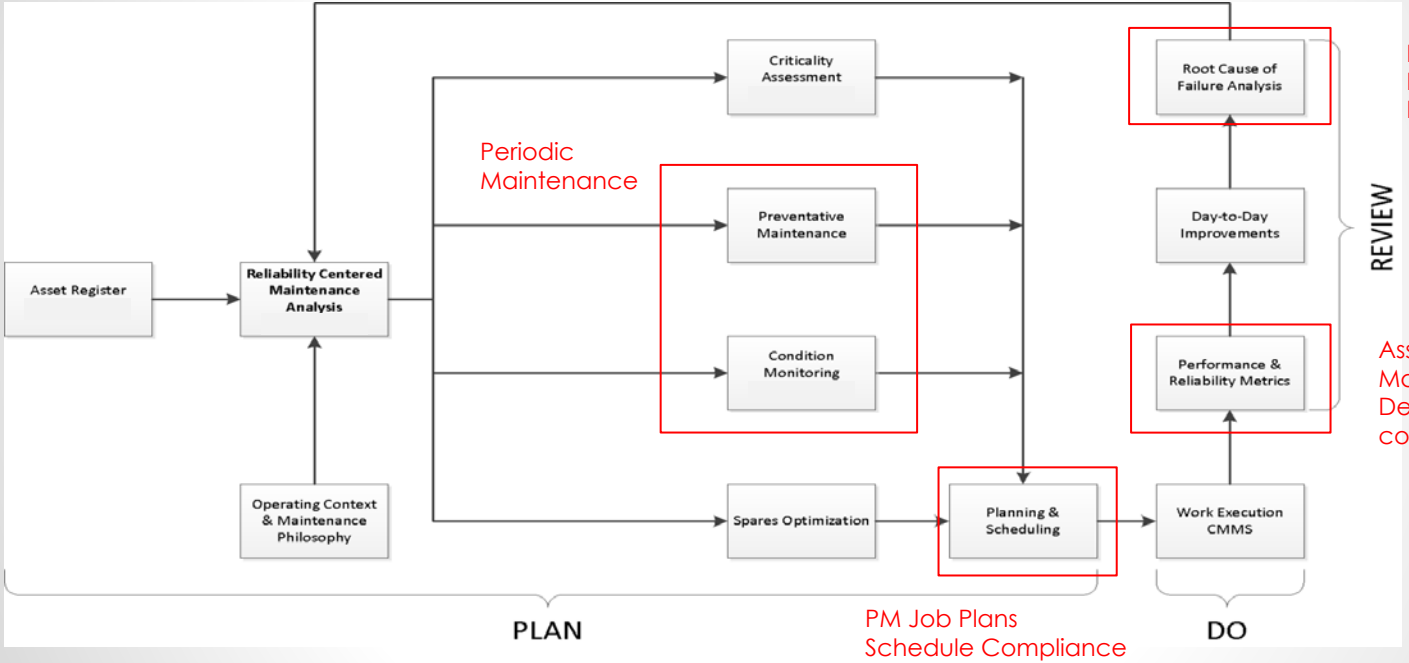
# Asset Management & Reliability Program (AMRP)

AMRP is a formal asset management and reliability program for Canadian operations to prevent losses, improve asset reliability and maintenance effectiveness. AMRP provides an all encompassing solution to scheduling & planning, maintenance, inventory, management of change, and incident reporting.

One objective of AMRP is to implement standardized best practices, processes and solutions across Pipelines and NGL Extraction.

# IPL Asset management Roadmap

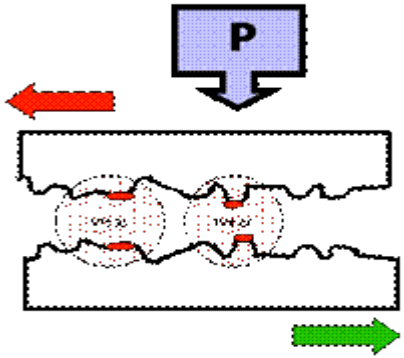
## The flow chart outlines a strategy focused on providing continuous improvement

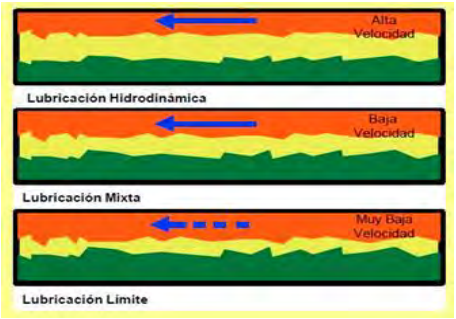


# Tribology & Lubrication

The word tribology comes from the Greek -tríbō, "I rub", and suffix -logy from logia "study of", "knowledge of".

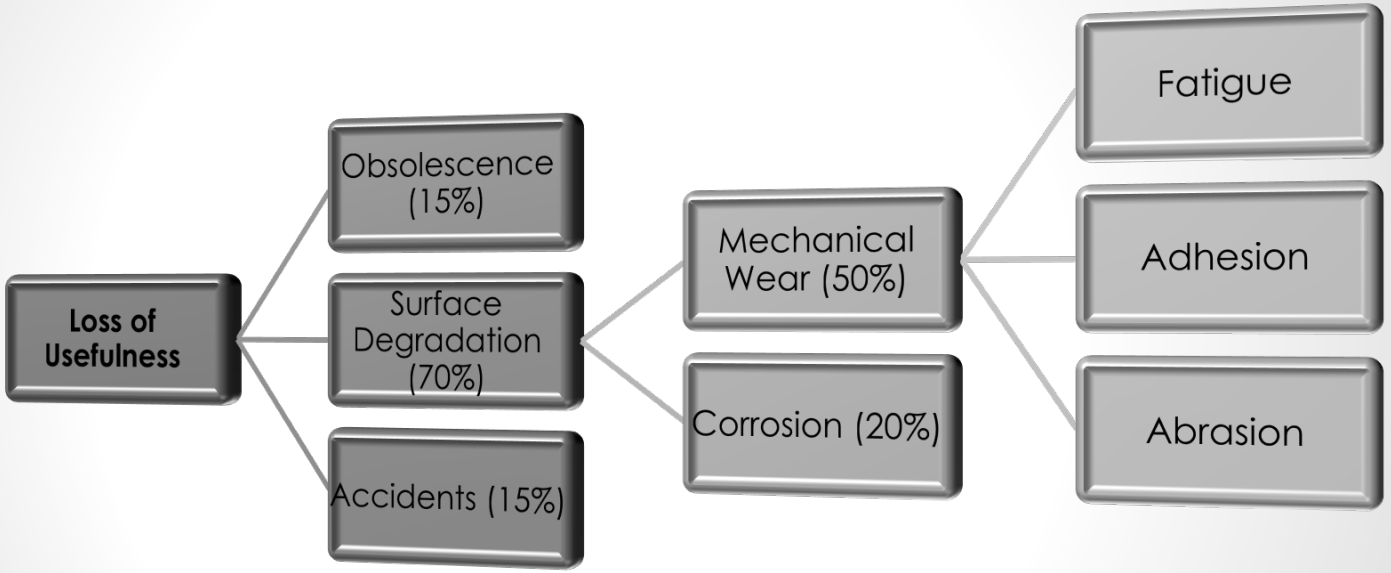
Is the science that studies the friction, the wear and the lubrication that take place during the contact between solid surfaces in movement



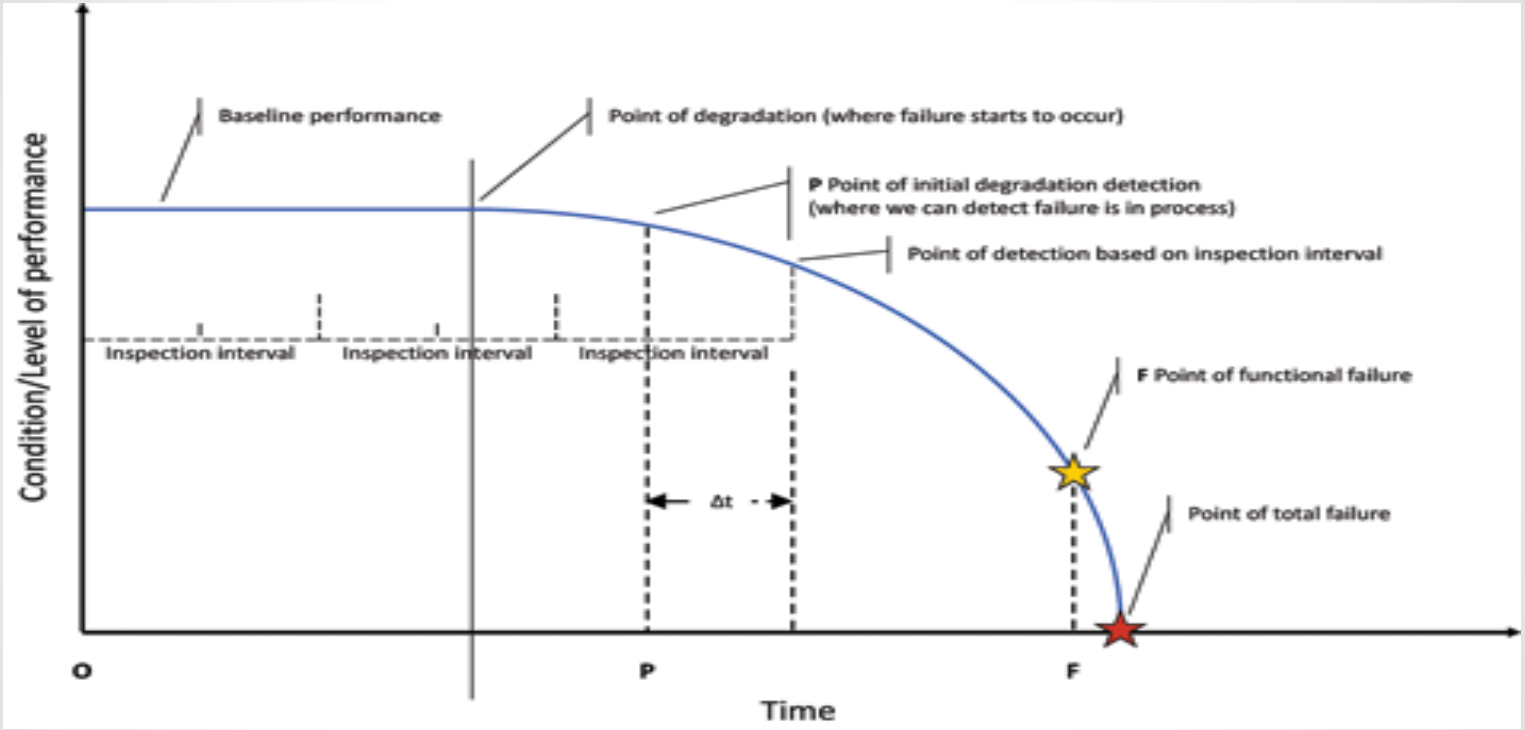




The lubrication is used to reduce the friction between, and wear of one or both, surfaces in proximity and moving relative to each other, by interposing a substance called a lubricant in between them

# Equipment life & Lubrication

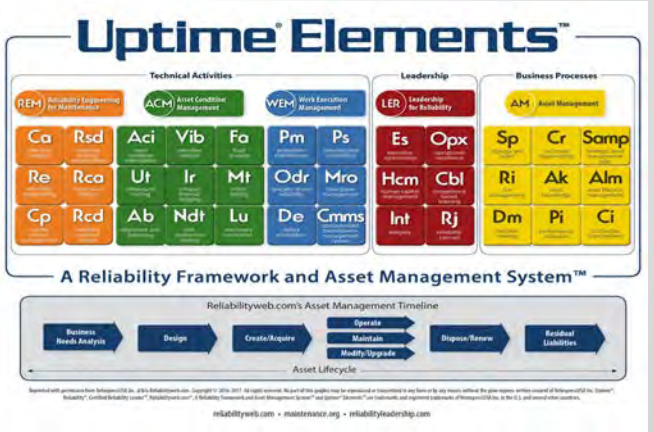


# Equipment life & Lubrication



# Implementation of the lubrication program – Steps to success

- **Development of the Lubrication Program (Benchmark Performance)**
- **Implementation of the Lubrication Program**
- **Lubrication Program Management**
- **Lubrication Program Improvement**




Solutions2.0
Virtual Conference

# Implementation of the lubrication program – Steps to success

**Step 1: Benchmark Performance - Define the scope and criteria, set goals and priorities, and benchmark current performance to best practice.**

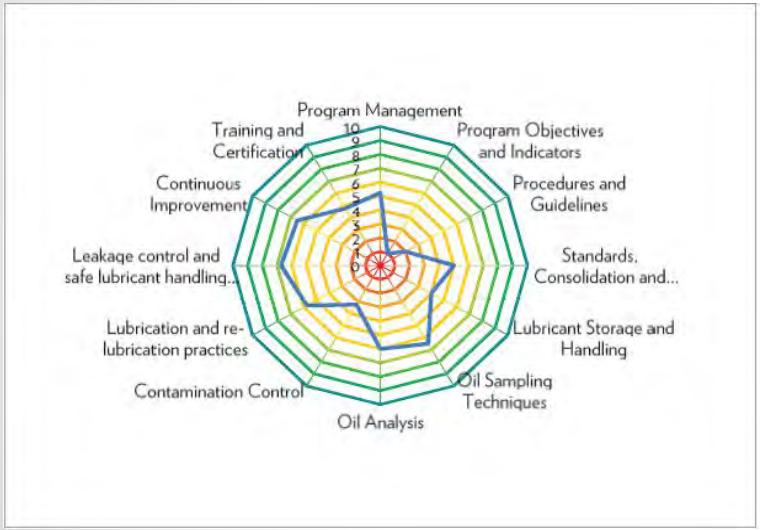
**Step 2: Define Opportunities -These opportunities may relate to PM scope optimization, failure prevention, failure severity minimization, and work planning and energy efficiency.**

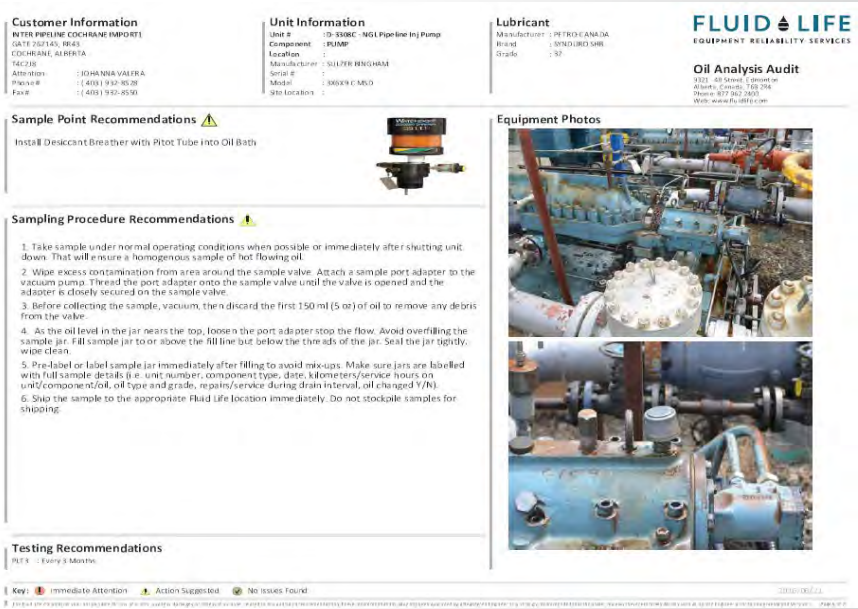
**Step 3: Design Best Practice - Create the blueprint for oil analysis inspection, lubricant selection, lubrication procedures, contamination control, training and skills management, and metrics.**

**Step 4: Implement Best Practice - Ensure awareness and communication to stakeholders, equipment modifications, auditing/testing, and continuous improvement.**

# Lubrication Benchmark assessment

**Recognize and promote the importance of a well-designed lubrication program**



# Implementing The Five Rights of Lubrication (5R's)

**Lubrication basics – The 5 R's**

**The Right lubricant**

**In the Right quantity**

**At the Right time**

**At the Right point**

**With the Right method**

# 1R "The Right lubricant"

Lu

Selecting the right lubricant

- Operating conditions
- Manufacturer's recommendations
- Lubricant supplier
- Lubricant Specification (correct viscosity and additives)
- Special Applications
- Consolidate Lubricants (If applicable)

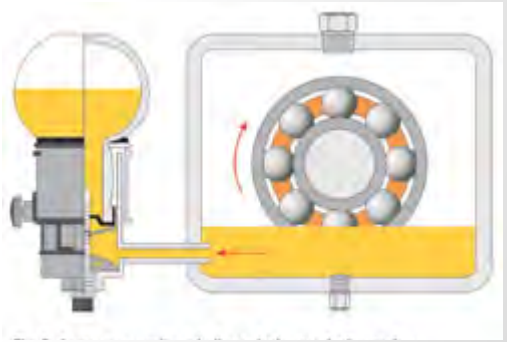

# 2R “The Right quantity” – “More is not better”
# 3R “The Right time”

**Grease:**

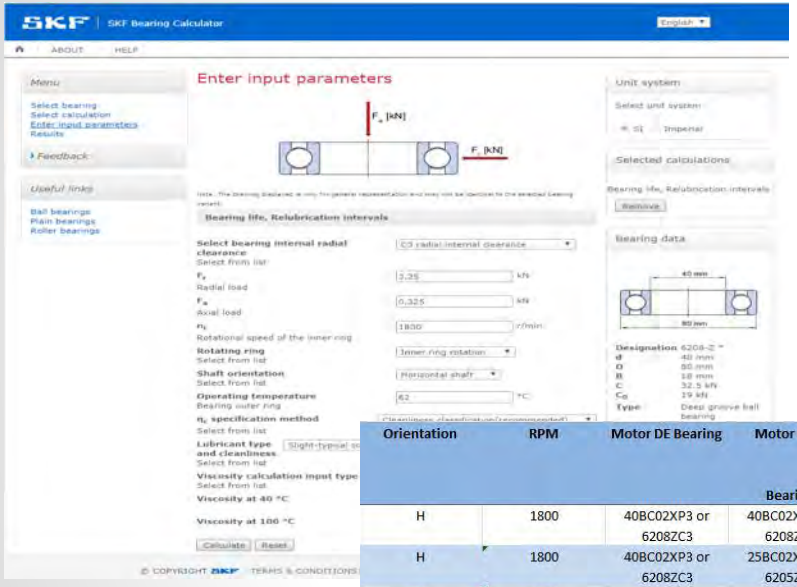
- Manufacturer's recommendations (OEM)
- Calculate and Adjust to maximize based on application context and environment
- Use of calibrated grease guns
- Proper lubrication intervals
- Condition-Based Lubrication Using Ultrasound Technology

**Oil:**

- Type of Lubrication
- Oil Levels
- condition of the oil (oil analysis)



# 2R “The Right quantity” – “More is not better”
# 3R “The Right time”

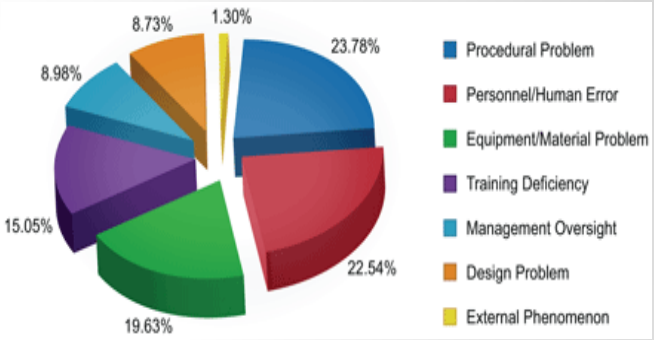




| Orientation | RPM | Motor DE Bearing | Motor NDE Bearing | Casing Temp. (Cels) [generally add 10 for bearing temp] | Grease Amount DE (g) | Interval DE (h) | SKF DE Rating Life (h) | Grease Amount NDE (g) | Interval NDE (h) | SKF NDE Rating Life (h) |
|---|---|---|---|---|---|---|---|---|---|---|
| H | 1800 | 40BC02XP3 or 6208ZC3 | 40BC02XP3 or 6208ZC3 | 50 (341A), 35 (341D) | 7 | 16500 | 32200 | 7 | 16500 | 32200 |
| H | 1800 | 40BC02XP3 or 6208ZC3 | 25BC02XP3 or 6205ZC3 | 52 | 7 | 15100 | 32200 | 4 | 18700 | 12200 |
| H | 1800 | 6308ZZ | 6306ZZ | 35 | NA | NA | 58800 | NA | NA | 41100 |
| H | 3600 | 6313-C3 | 6313-C3 | 38 | 23 | 4800 | 37300 | 23 | 4800 | 37300 |
| V | 3375 | 6316 | 6318 | 54 | 33 | 1180 | 50800 | 41 | 890 | 61200 |
| H | 1181 | 6316 | 6318 | | | | | | | |
| H | 1181 | 6316 | 6318 | 36 | 33 | 16700 | 145100 | 41 | 15100 | 174900 |

# 4R "The Right point"

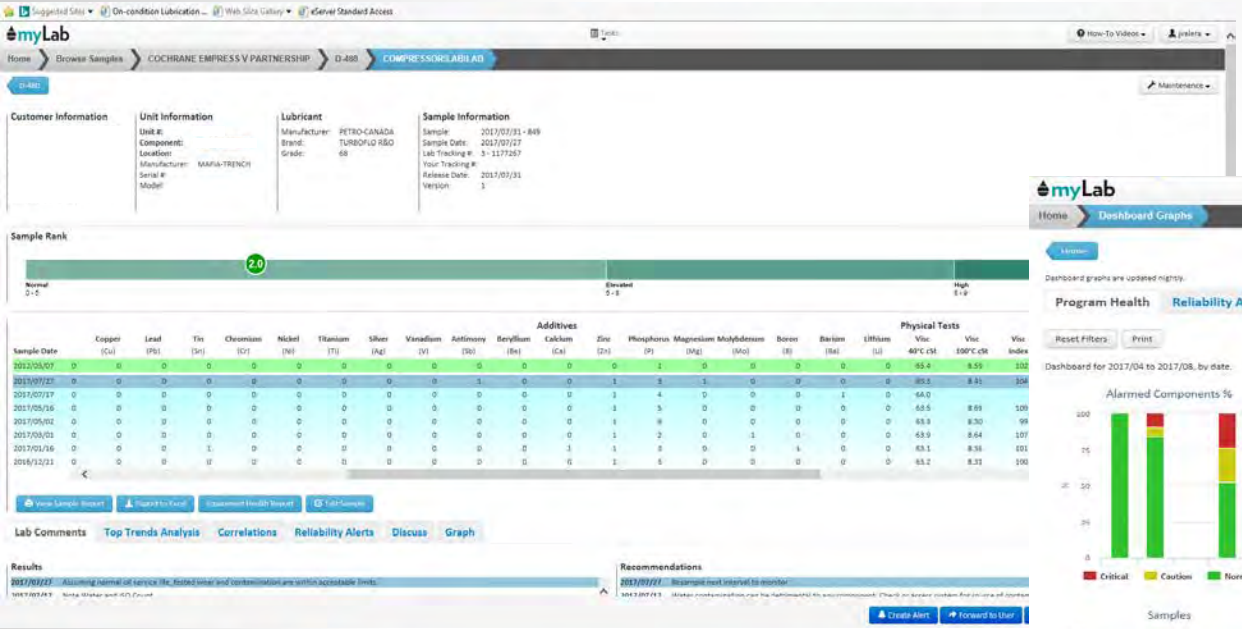
- Identify the lubrication points
- Critical equipment and backup equipment
- Bad actors
- Detailed mapping of lubrication points
- All lubrication points must be labeled
- Train personnel on correctly adding lubricants to equipment
- Separate containers for different lubricant types
- Containers properly tagged

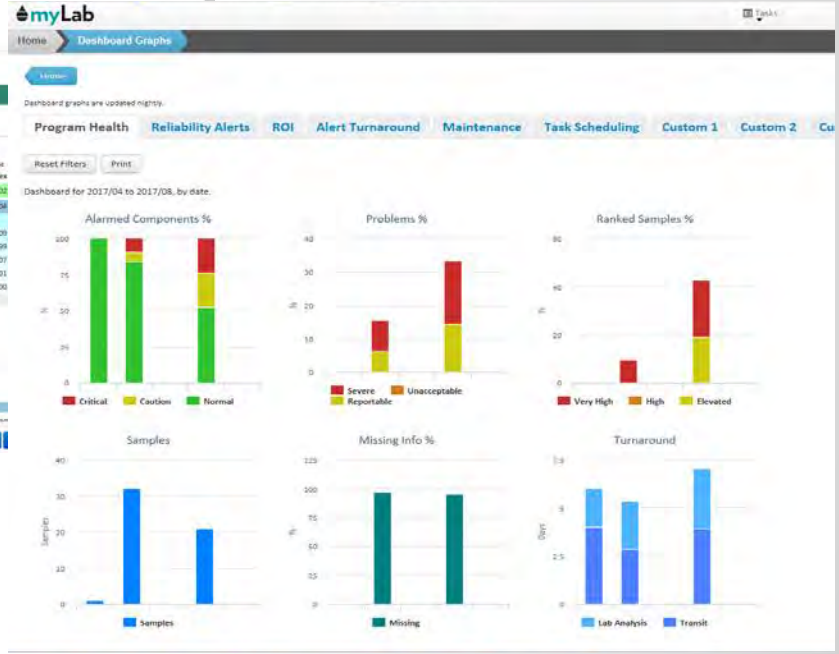



# 5R “The Right method”

- Criticality analysis
- Define maintenance strategies
- Roadmaps
- Automatic lubrication
- Condition-Based Lubrication Using Ultrasound Technology

# Continuous Improvement




Solutions2.0
Virtual Conference

# QUESTIONS?

# Thanks to Our WIRAM Series Sponsor

# Questions & Answers


Solutions2.0
Virtual Conference

# Thanks to Our Sponsors

# Next Webinar

## Date: Wednesday, November 15

Solutions2.0
Virtual Conference

# Keynote

by SDT

Solutions2.0
Virtual Conference

# Educational Session

by Joseph Paris, Chairman, XONITEK; Founder, Operational Excellence Society

We'd love to hear your feedback!
Email your questions or comments to
sean@reliabilityweb.com

# Thank You for Joining Us!

Solutions2.0 Virtual Conference