
SAP
PM
BY
ENG: AHMED AMIN

CHAPTER 2

Introduction to SAP PM

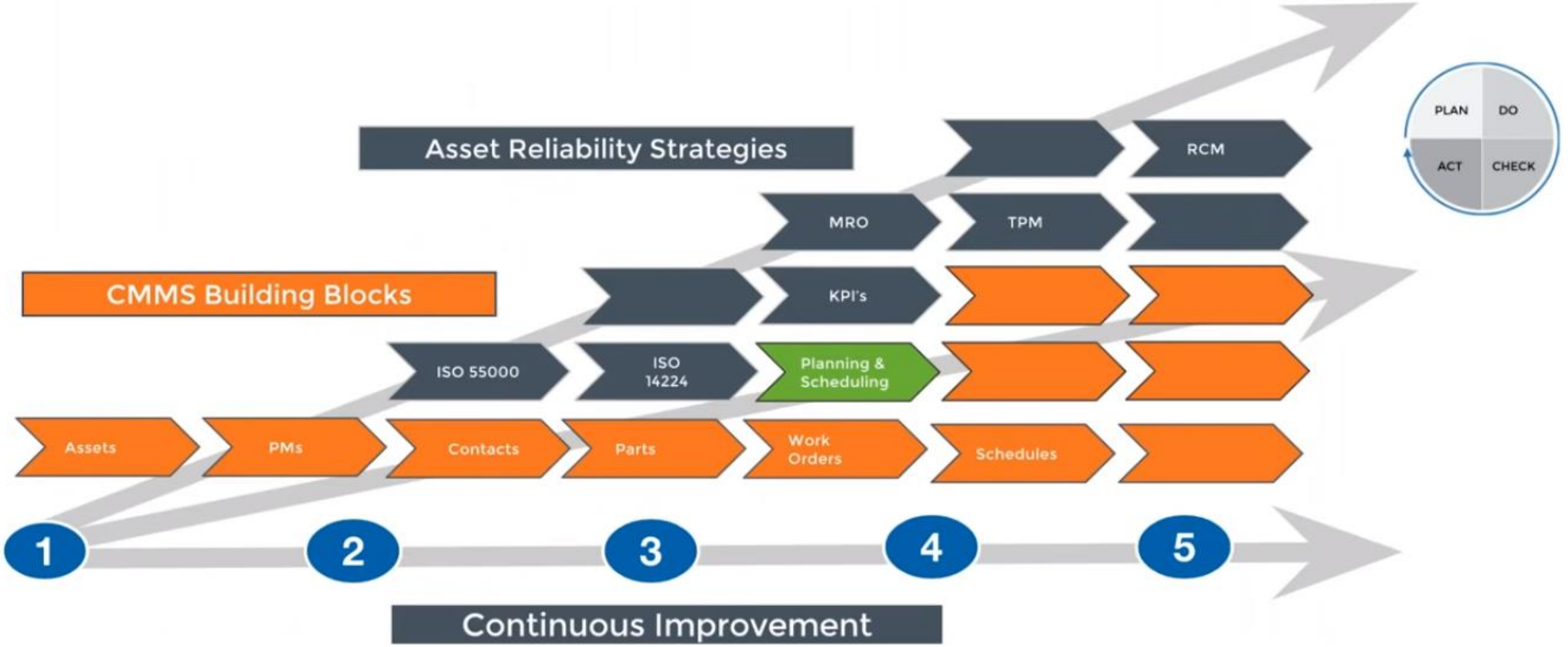
Introduction to SAP PM

- Introduction to SAP PM module
- Introduction to planned and unplanned maintenance
- Maintenance strategies
- Maintenance spare parts and the warehouse
- Planning and scheduling principles
- Maintenance planner and maintenance work order difference
- Difference between EAM and PM
- How to start to apply CMMS?

SAP Plant maintenance

- Not mean that we talk about planning maintenance only We talk about Planned and Unplanned maintenance
- Plant maintenance in SAP mean you do maintenance for the plant of the organization structure
- Plant maintenance is an important module because it affects the business success

The CMMS Journey



Almost company each one work alone in silos routine ,feel boring and bad performance

we have to working together in enterprise system
(integration between different department)
and must have a strategic plan of maintenance to achieve business success

To start plant maintenance in SAP Maintenance must be first

Why Maintenance First?

"One cannot discuss maintenance planning without first considering an overall perspective of maintenance itself". MPS Handbook: Richard D. Palmer

Chapter

1

The Benefit of Planning

One cannot discuss maintenance planning without first considering an overall perspective of maintenance itself.

Why maintenance first ?

- **When understand Maintenance**
- **Will start Planning right**
- **Then you can Schedule right**

why maintenance first ?

- One (**Cannot discuss maintenance planning** without first considering an overall perspective of maintenance itself.)
- Plant capacity is **the lifeblood of a company**. Plant capacity must **be reliable** for the company **to produce a product to stay in business**.
- **Reliable plant capacity** is by definition an **investment in maintenance**.
- If **maintenance can achieve** continued superior **availability**, then a company can defer construction of new capacity even as annual sales grow.
- Reliable plant capacity connected with **revenue streams**.
- In real life**, capacity must be maintained**. Capacity is not reliable by itself. **Poor maintenance equals poor revenue streams.**

Company Vision

- The purpose of maintenance is to **produce reliable plant capacity**.
- The company vision for producing a profitable product should understand that **effective maintenance provides reliable plant capacity.**
- "**The company vision should be how to *prevent* maintenance, not how to do it efficiently."**
- Maintenance **does not just provide a repair service**.
- *Proactive maintenance* **means to act before breakdowns occur** . It acts through preventive maintenance, predictive maintenance, corrective maintenance, and project work.
- Proactive maintenance recognizes and addresses situations to prevent them **from ever becoming urgent problems or breakdowns**.
- Breakdowns interrupt revenue producing capacity and destroy components.

Why Improvement Is Needed in Maintenance

- Effective maintenance **reduces overall company cost** because production capacity is **available** when needed.

- The company makes a **product** with this capacity to sell **at a profit**. This explains the (reliability–cost) relationship: **focus on overall cost reduction** and reliability gets worse, but **focus on reliability** improvement and **overall cost goes down**.

Maintenance is a tool of Reliability

Asset management VS Maintenance

Maintenance works as a part of a broader perspective that deals with entire life cycle of the physical assets that is AM

Asset instead of Equipment in AM

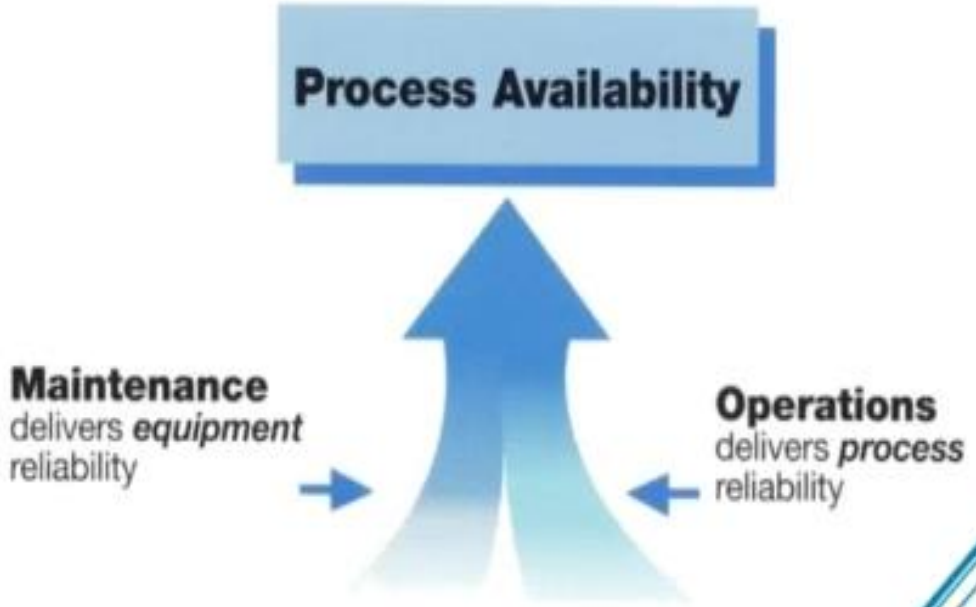
Is Maintenance Main or Support Function?

Business Success

Operational Excellence

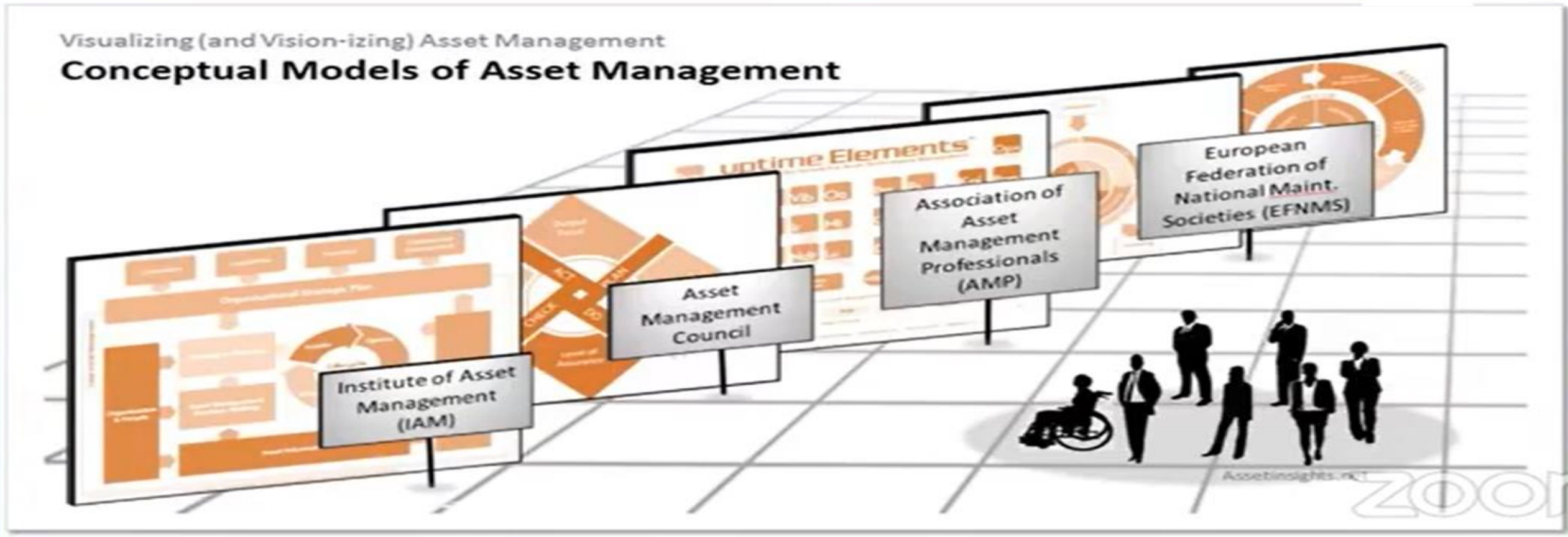
Operational Uptime

- **Maintenance & Reliability Perfection**



Relation between MAINTENANCE and ASSET

Where is Maintenance in the Big Picture?



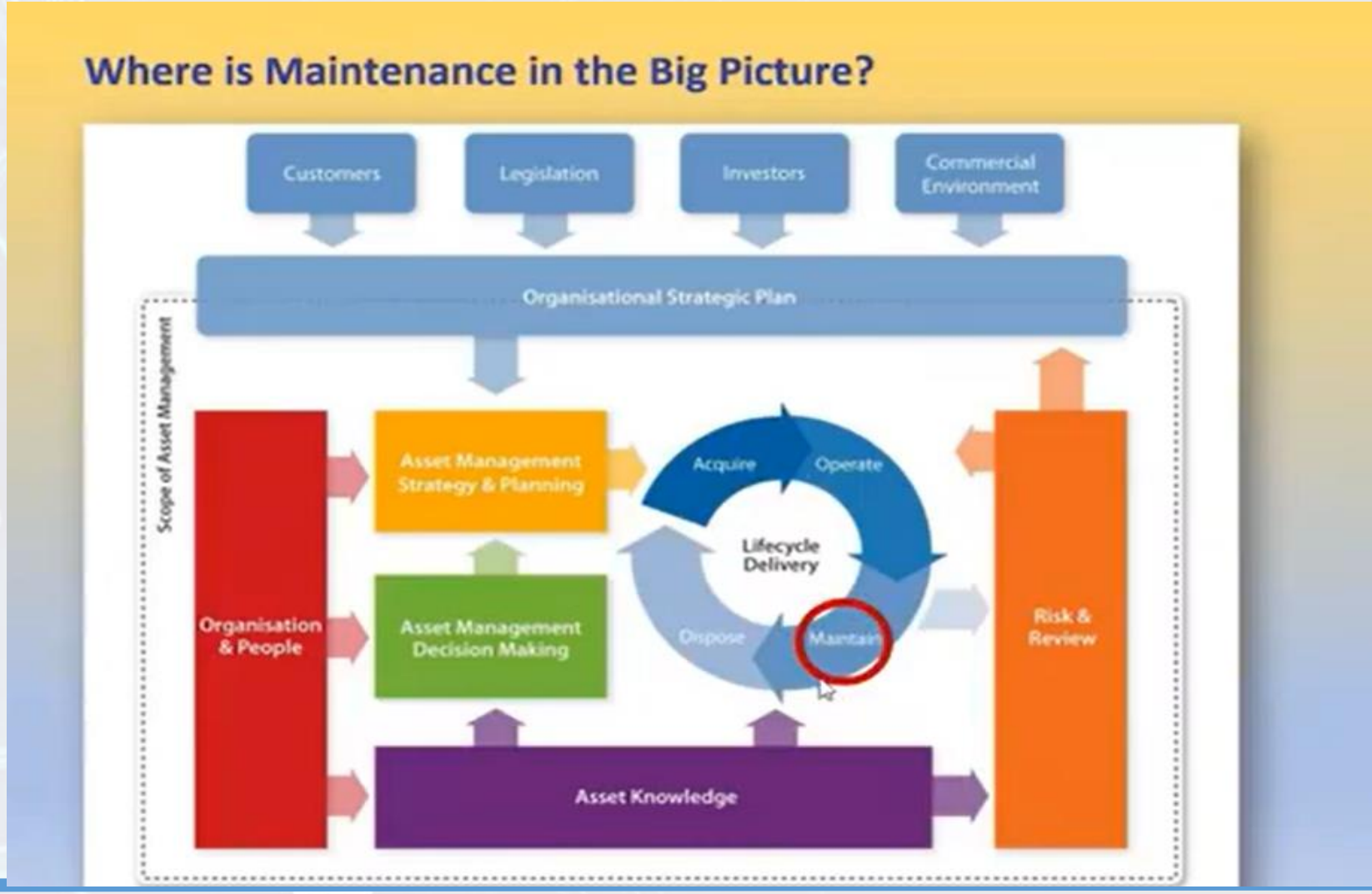
MAITAIN in the life cycle of asset

To buy new ASSET

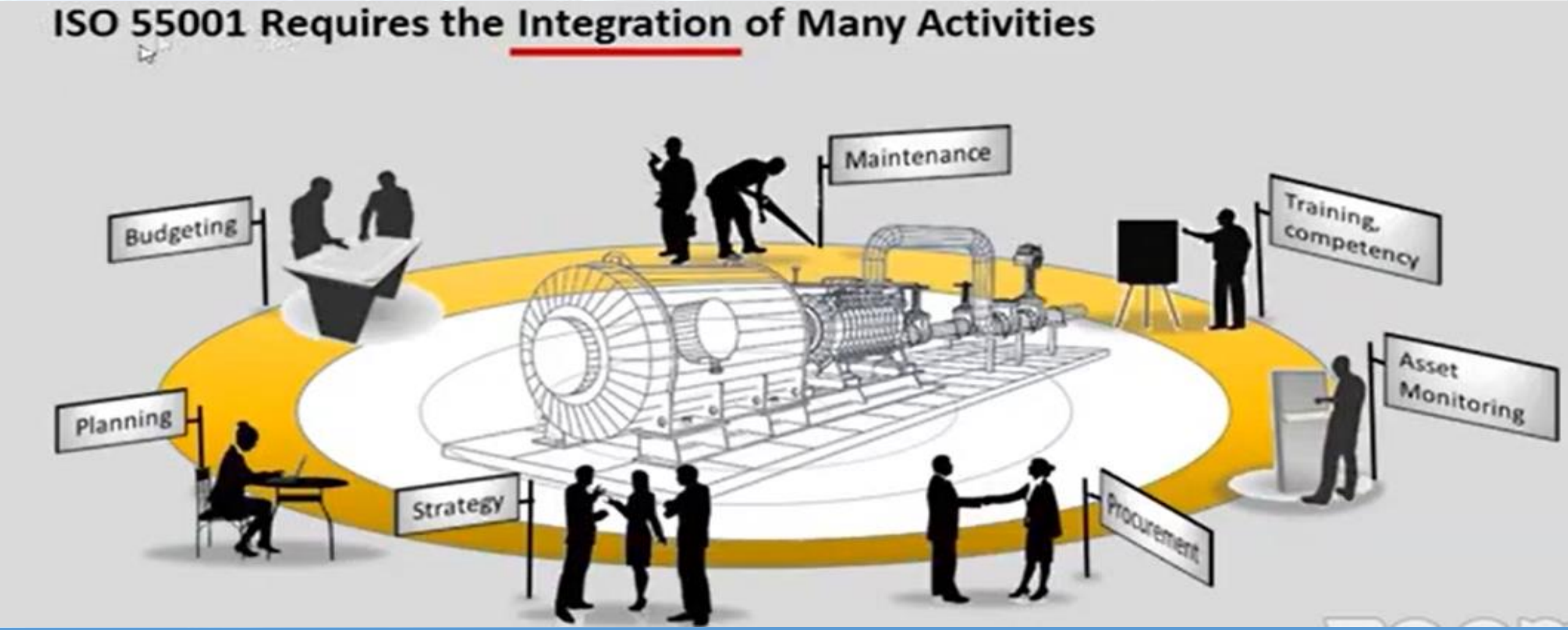
Decision maker of
(stakeholder –Shareholder) with consideration of
(Demand of products –Customers –Upgrade –refurbishment)+
Risk in case of buying or not

Maintain level in the life cycle of Asset

The preparation time and commissioning take max 2-3 years but the operation and maintain can be 50 years



Maintenance is a part of Asset management scope



Maintenance is a part of Asset management scope

- Every one doing his best in whole to achieve the goal not in his work only.
- Asset management is about breaking **the silos and bringing** all stakeholders together.

Session Poll #1

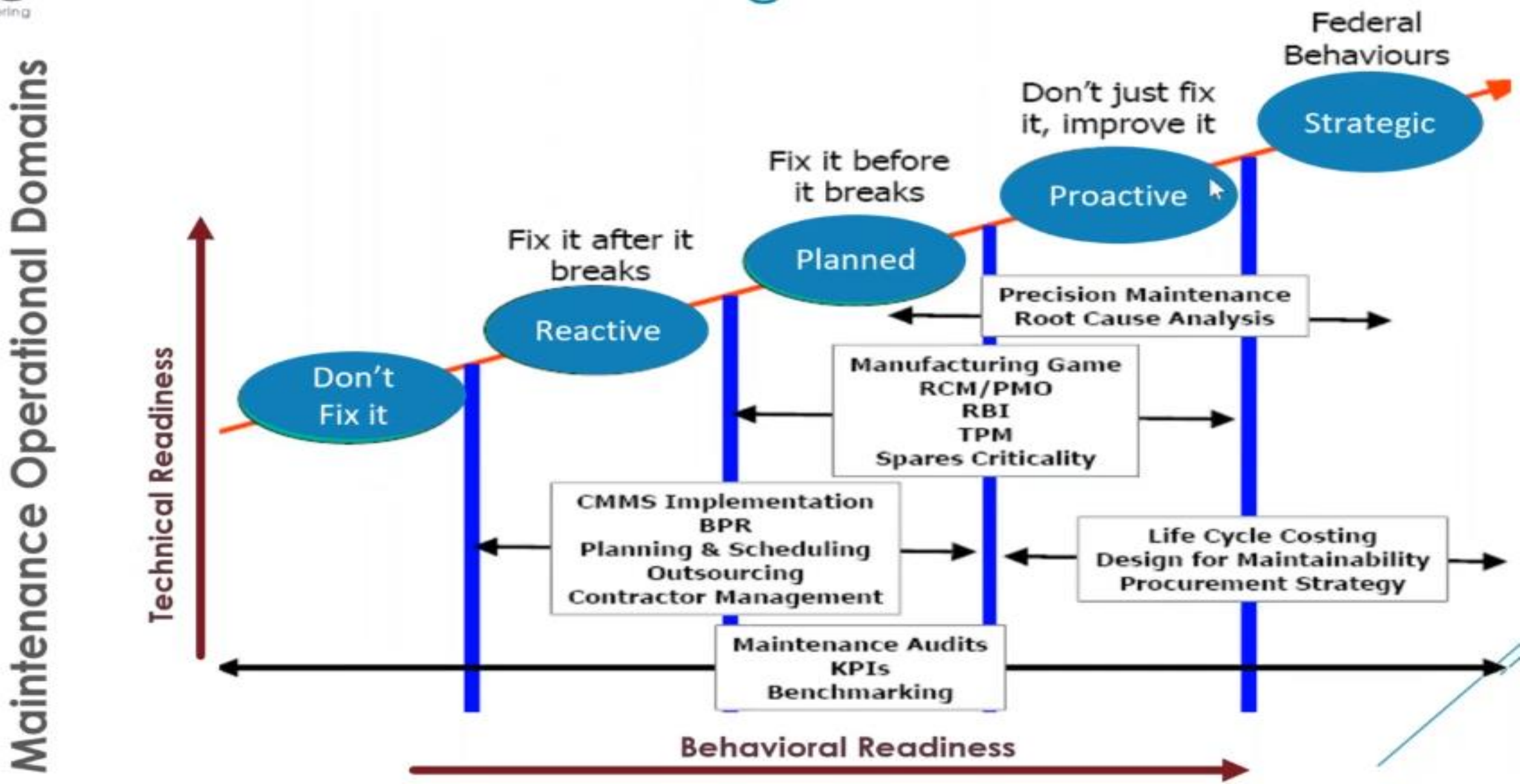
When needing to make cost reduction:

A. Maintenance budget can be cut by 10%

B. Reduce spare parts quantity in storerooms by 20%

C. Conduct preventive maintenance optimization study

D. Maintenance Training schedule to be postponed to next year


Maintenance Operational Domains
Technical Readiness
Behavioral Readiness
Federal Behaviours
Don't Fix it
Fix it after it breaks
Reactive
Fix it before it breaks
Planned
Don't just fix it, improve it
Proactive
Strategic
Precision Maintenance
Root Cause Analysis
Manufacturing Game
RCM/PMO
RBI
TPM
Spares Criticality
CMMS Implementation
BPR
Planning & Scheduling
Outsourcing
Contractor Management
Life Cycle Costing
Design for Maintainability
Procurement Strategy
Maintenance Audits
KPIs
Benchmarking

10 RIGHTS of Asset Management

10 Rights of Asset Management

All of these activities come before Maintenance

- 1st Right: Specify it Right
- 2nd Right: Design it Right
- 3rd Right: Source it Right
- 4th Right: Build/Fabricate it Right
- 5th Right: Install and Commission it Right
- 6th Right: Operate it Right
- **7th Right: Maintain it Right**
- 8th Right: Improve it/Modify it Right
- 9th Right: Decommission it Right
- 10th Right: Manage it Right

Understanding Industrial Maintenance

What the meaning of maintenance ?

What is Maintenance?

"Activities required or undertaken to conserve as nearly, and as long, as possible the original condition of an asset or resource while compensating for normal wear and tear."

Actions necessary for retaining or restoring a piece of equipment, machine, or system to the specified operable condition to achieve to achieve its maximum useful life.

What the job of maintenance ?

The job of maintenance is to provide reliable & safe plant for least operating cost – we don't just fix equipment, … we improve it and extract needed value from it!

- Equipment Reliability
- Least Operating Cost
- Defect Elimination
- Maximum Production
- Risk Reduction
- Failure Avoidance

What the meaning of maintenance ?

- "The combination of all technical and associated administrative actions intended to retain an item in, or restore it to, a state in which it can perform its **required function**."
  British Standard Glossary of terms (3811:1993)

- "Maintenance is the work undertaken in order to keep or restore a facility to an acceptable standard level." BS (3811:2000)

What is Maintenance?

- "All actions which have the objective of retaining or restoring an item in or to a state in which it can perform its **required function**. The actions include the combination of all technical and corresponding administrative, managerial, and supervision actions."
  European Federation of National Maintenance Societies

- **Does this have an impact on assets and Maintenance?**
- **Who is responsible for protecting your asset from such threats, is he a member of Maintenance?**
- **Is he contributing in Maintenance?**
- **What about IT, Supply chain, logistics, Engineering, Projects, etc.**

What the meaning of maintenance ?

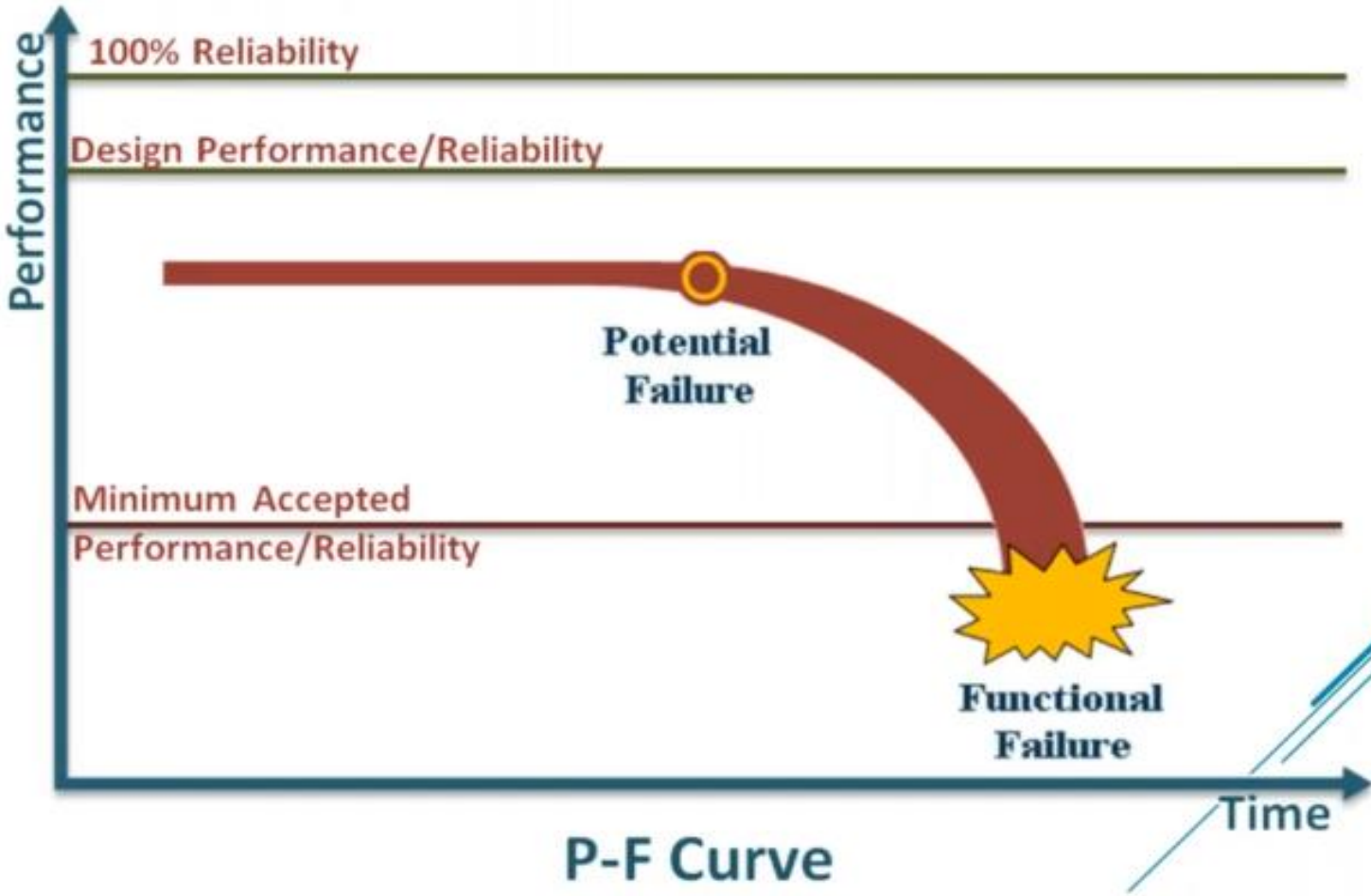
By definition:

- ✓ Maintenance is not only the technical work
- ✓ Maintenance is needed to **keep** the reliability (as designed) or **restore** it (when it degrades)
- ✓ Maintenance can't increase reliability (only Keep or restore, because reliability is inherited from design)

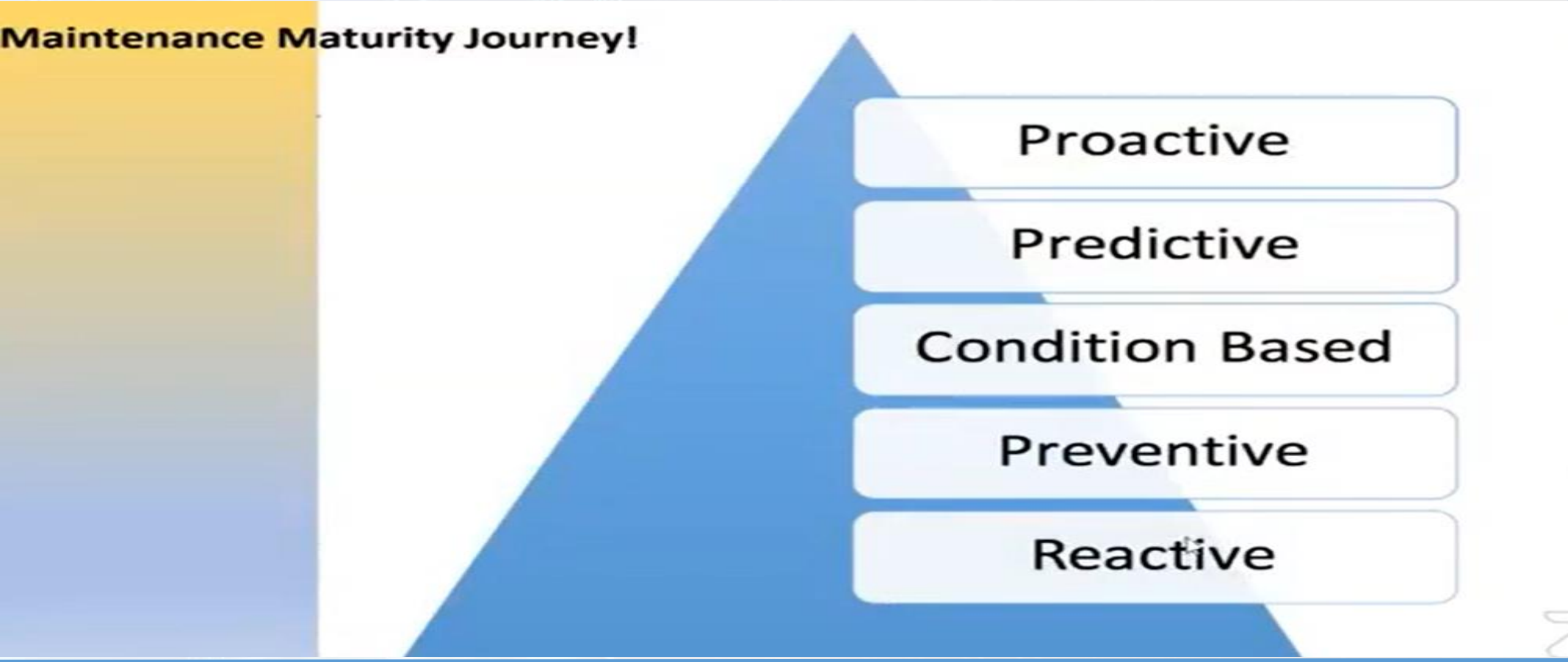
P-F CURVE

What is Maintenance?

Failures cause significant performance and reliability decrease.



THE leadership move the plant up



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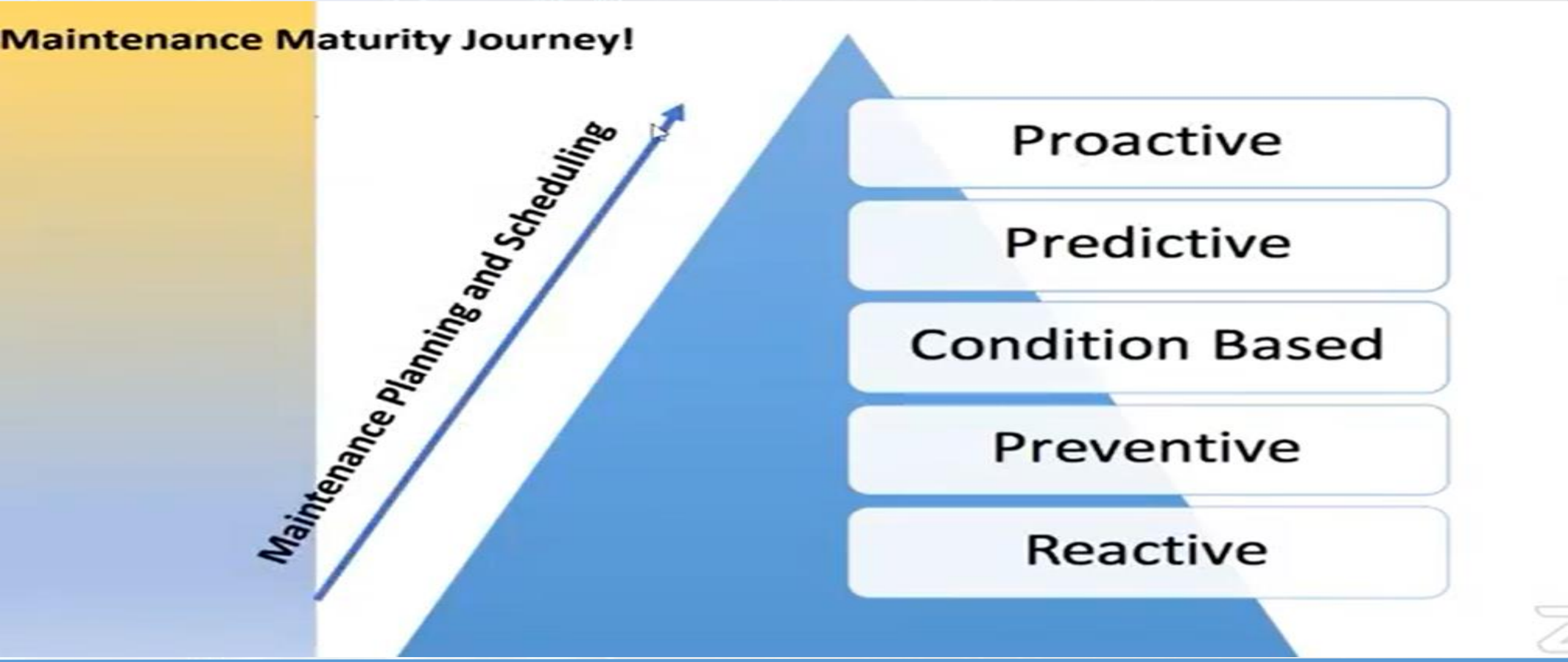

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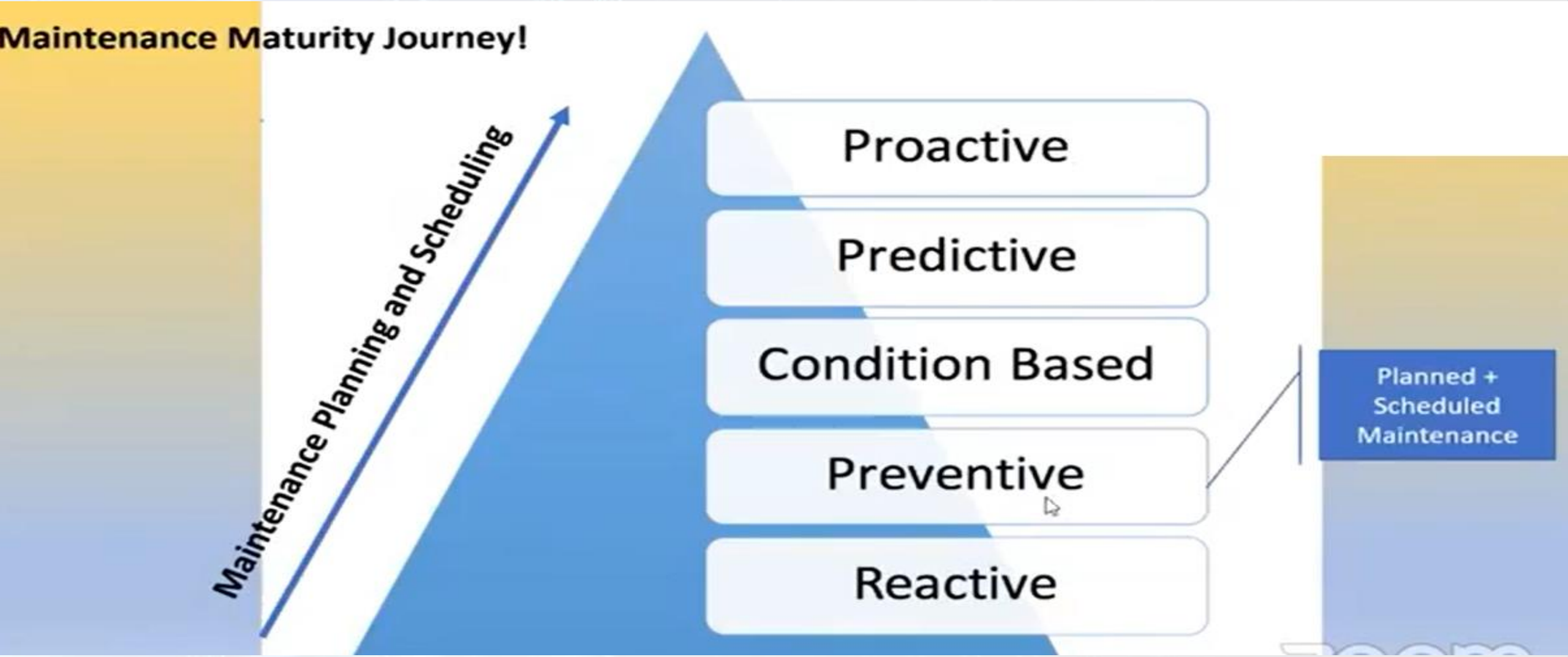

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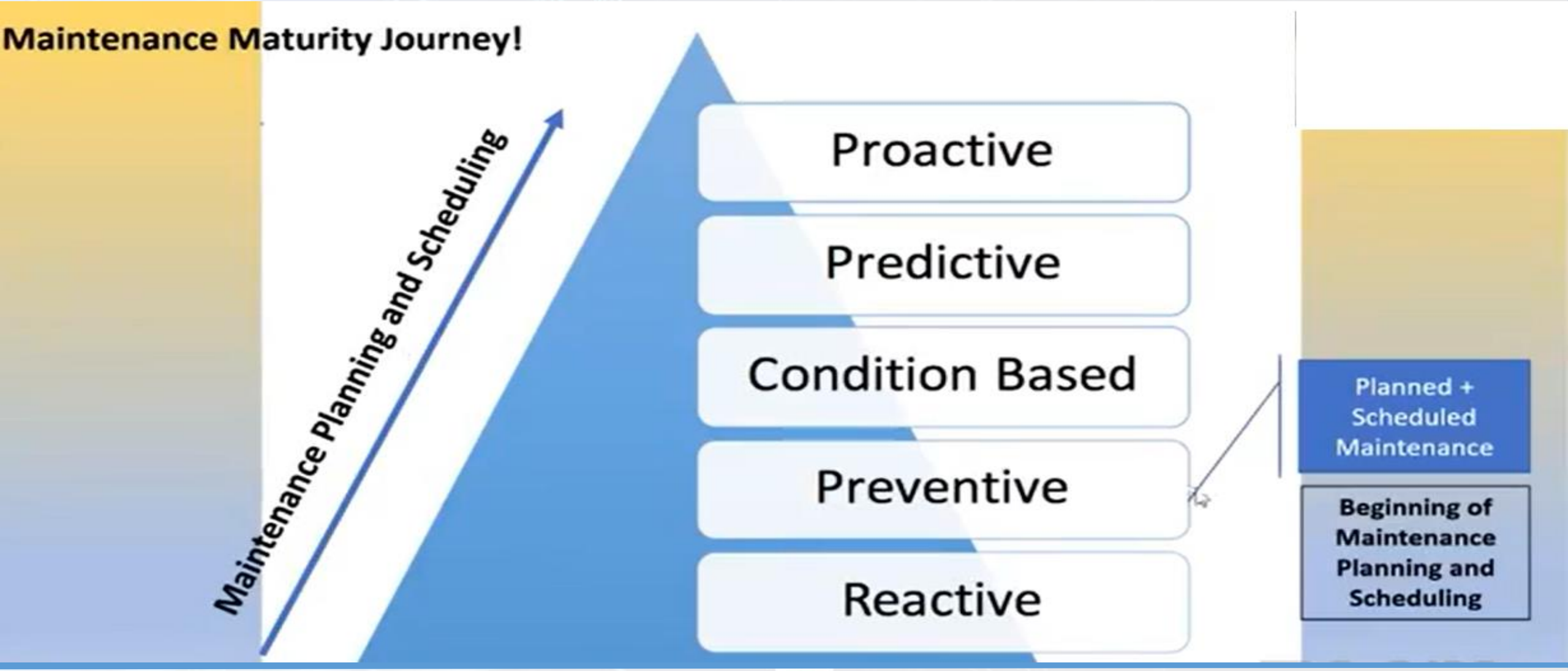


Maintenance Types and Strategies

Unplanned Maintenance (Reactive)

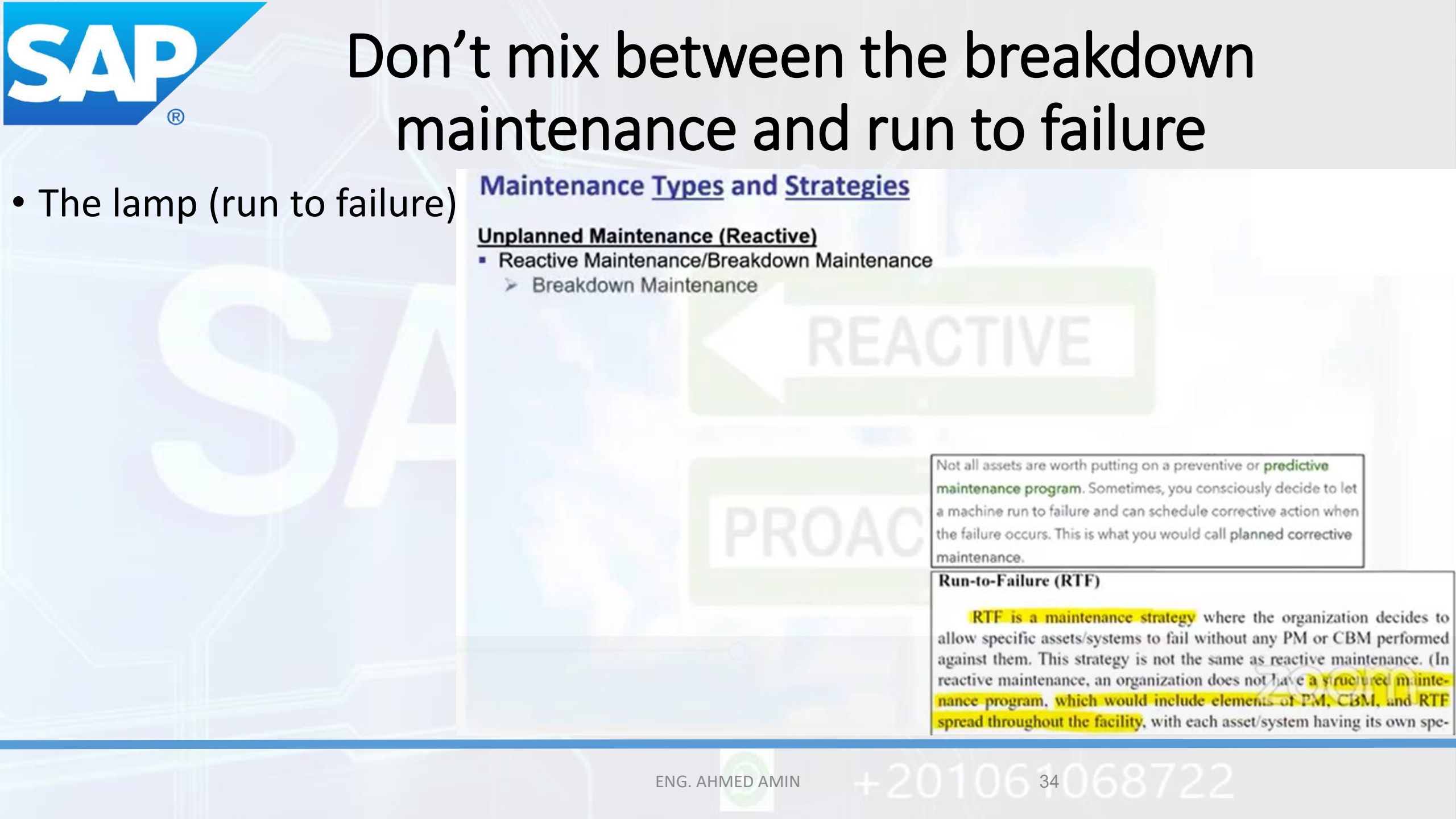
Don’t mix between the breakdown maintenance and run to failure

- The lamp (run to failure)

Maintenance Types and Strategies

Unplanned Maintenance (Reactive)

- Reactive Maintenance/Breakdown Maintenance
  - Breakdown Maintenance



Not all assets are worth putting on a preventive or predictive maintenance program. Sometimes, you consciously decide to let a machine run to failure and can schedule corrective action when the failure occurs. This is what you would call planned corrective maintenance.

Run-to-Failure (RTF)

RTF is a maintenance strategy where the organization decides to allow specific assets/systems to fail without any PM or CBM performed against them. This strategy is not the same as reactive maintenance. (In reactive maintenance, an organization does not have a structured maintenance program, which would include elements of PM, CBM, and RTF spread throughout the facility, with each asset/system having its own spe-

Maintenance Types and Strategies

Unplanned Maintenance (Reactive)

- Reactive Maintenance/Breakdown Maintenance
  - Breakdown Maintenance — **BDM**
  - Emergency Maintenance — **EM**

Unplanned Corrective

Planned Maintenance/Strategy (Proactive)

- Preventive Maintenance
- Routine Maintenance
- Scheduled Maintenance
- Programmed Maintenance
- Cyclical Maintenance
- Periodic Maintenance

PM

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PM

- Condition Based Maintenance — **CBM**
- Predictive Maintenance — **PdM**
- Proactive Maintenance

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→ **PM**

- Condition Based Maintenance — **CBM**
- Predictive Maintenance — **PdM**
- Proactive Maintenance
- Corrective Maintenance (Planned) — **CM**
- Shutdown Maintenance — **SD**
- Improvement Maintenance — **IM**

- *Where can you find the definitions of these terms in your company?*
- *What is the name of the document?*
- *What is the importance of this document?*

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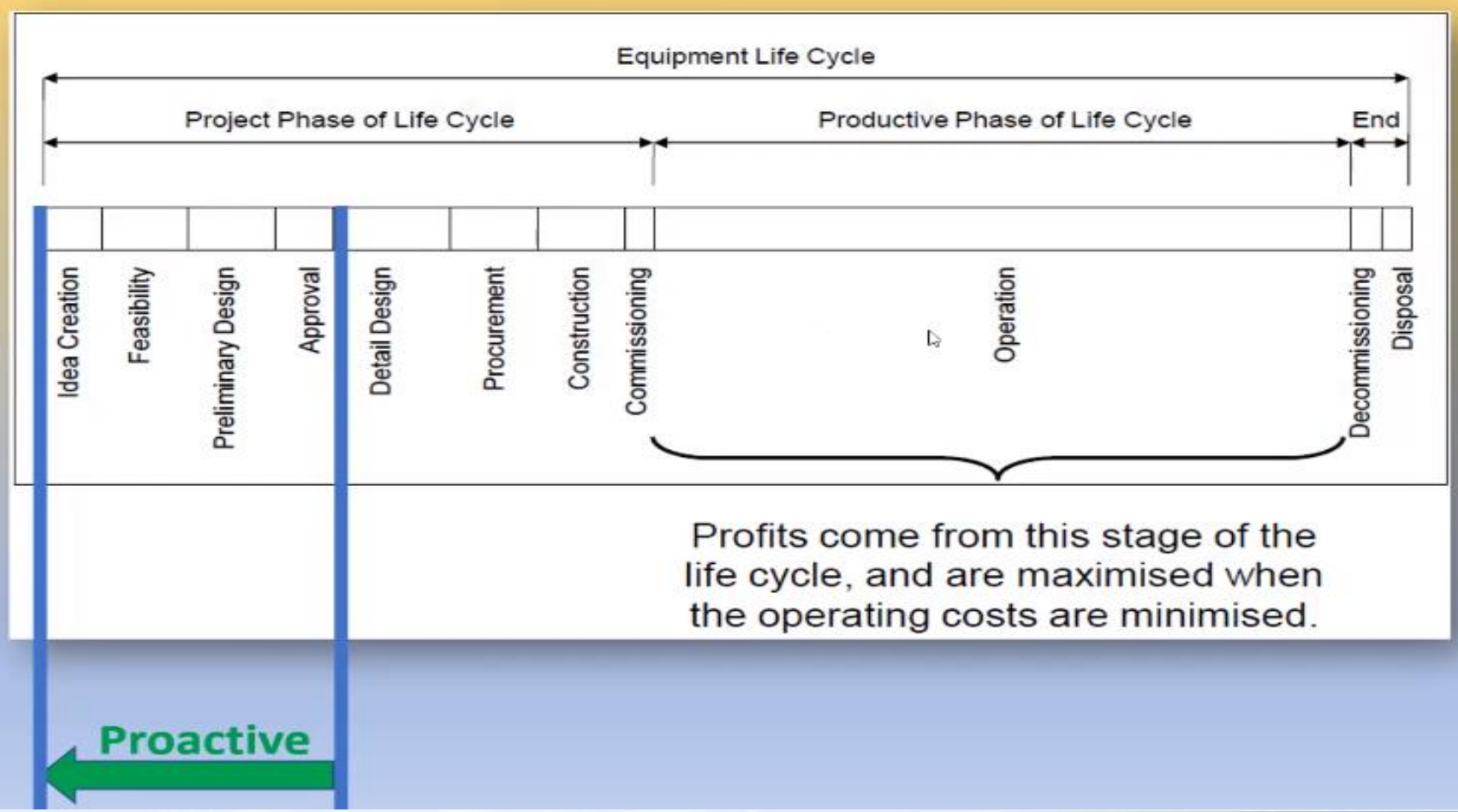
When should Proactive Maintenance Start?
(First Step Towards Maintenance Excellence)



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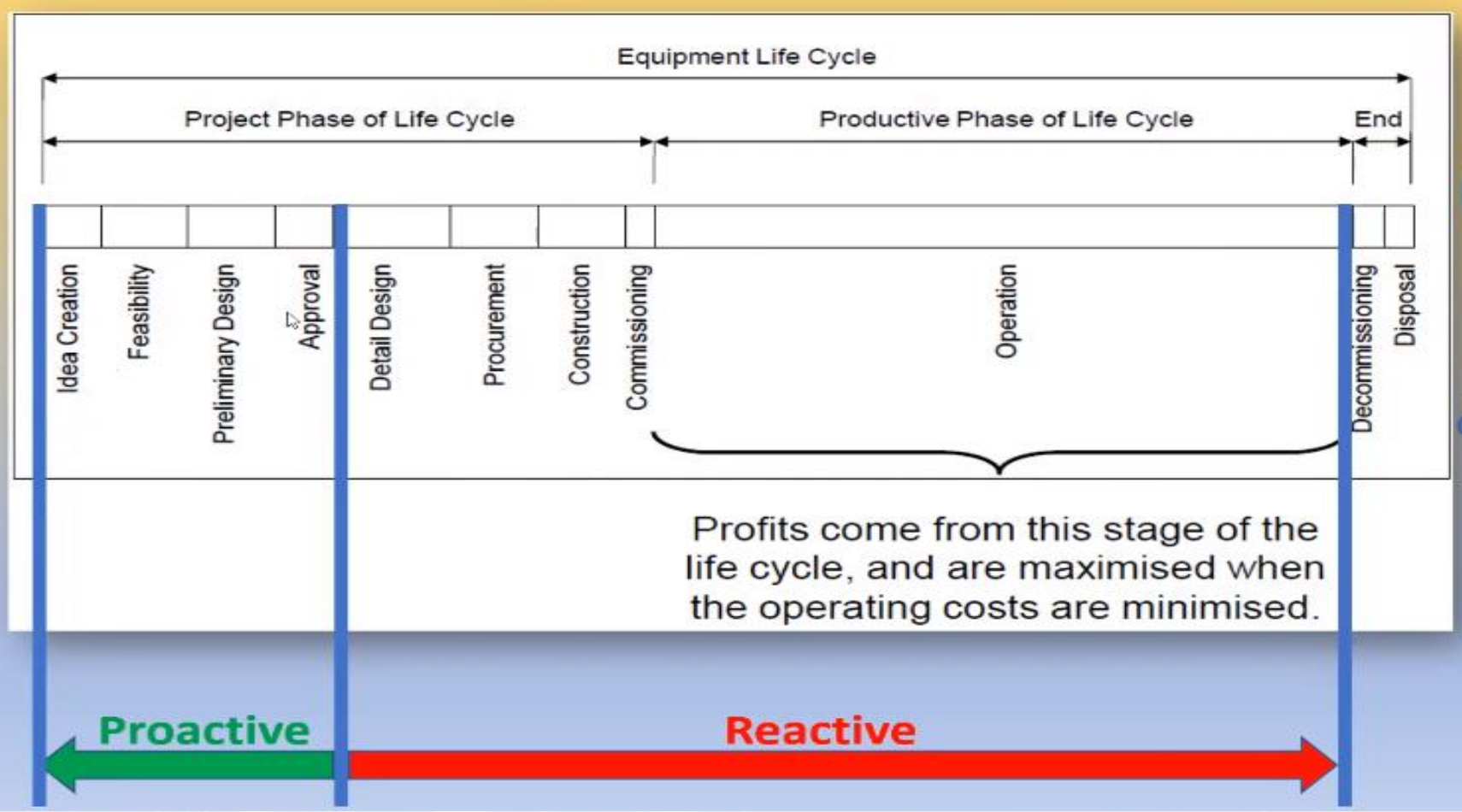
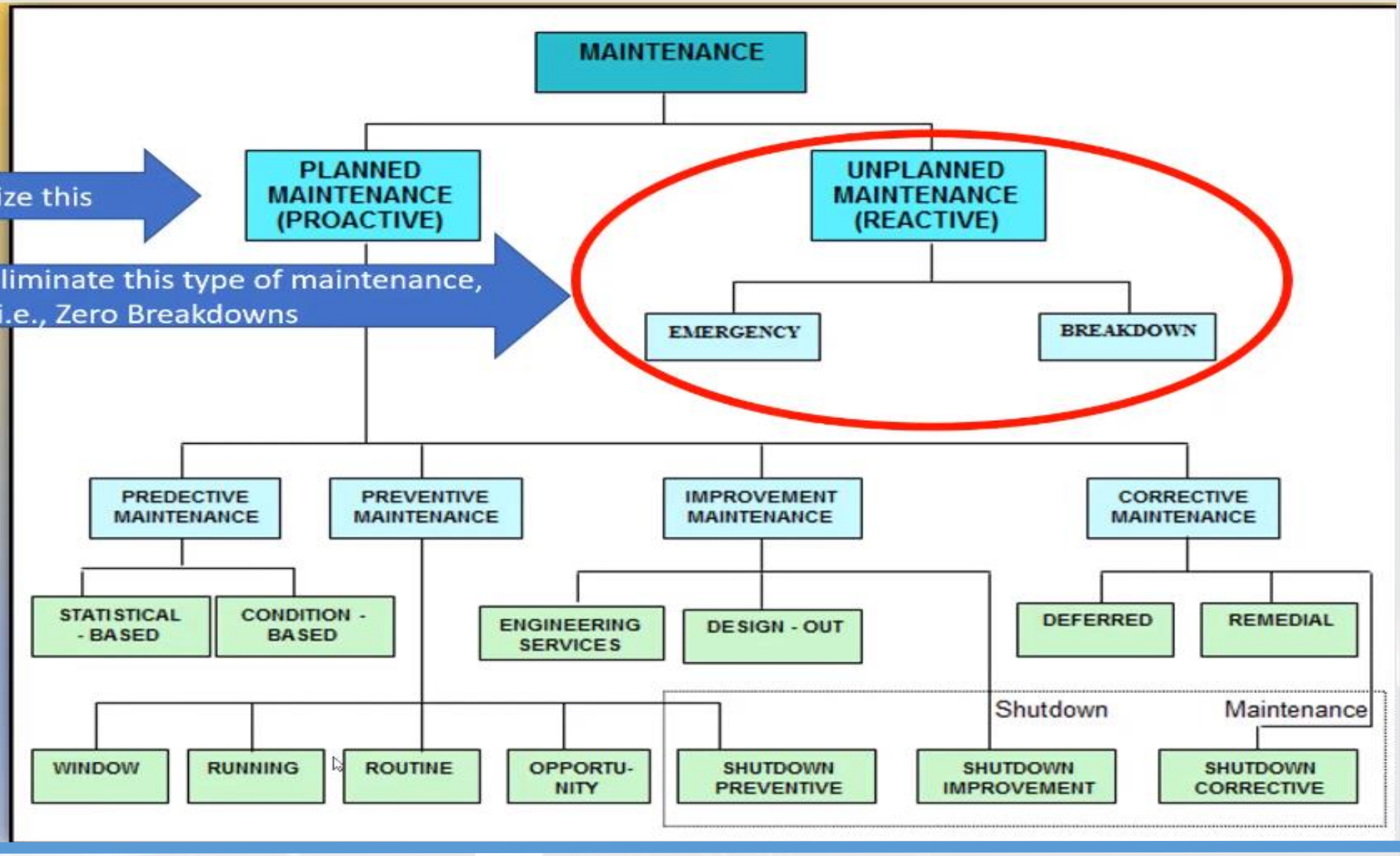


Maintenance doesn't increase reliability since reliability is a design attribute. Maximum it can do is to keep (maintain) the inherited reliability level from design.

Introduction of maintenance

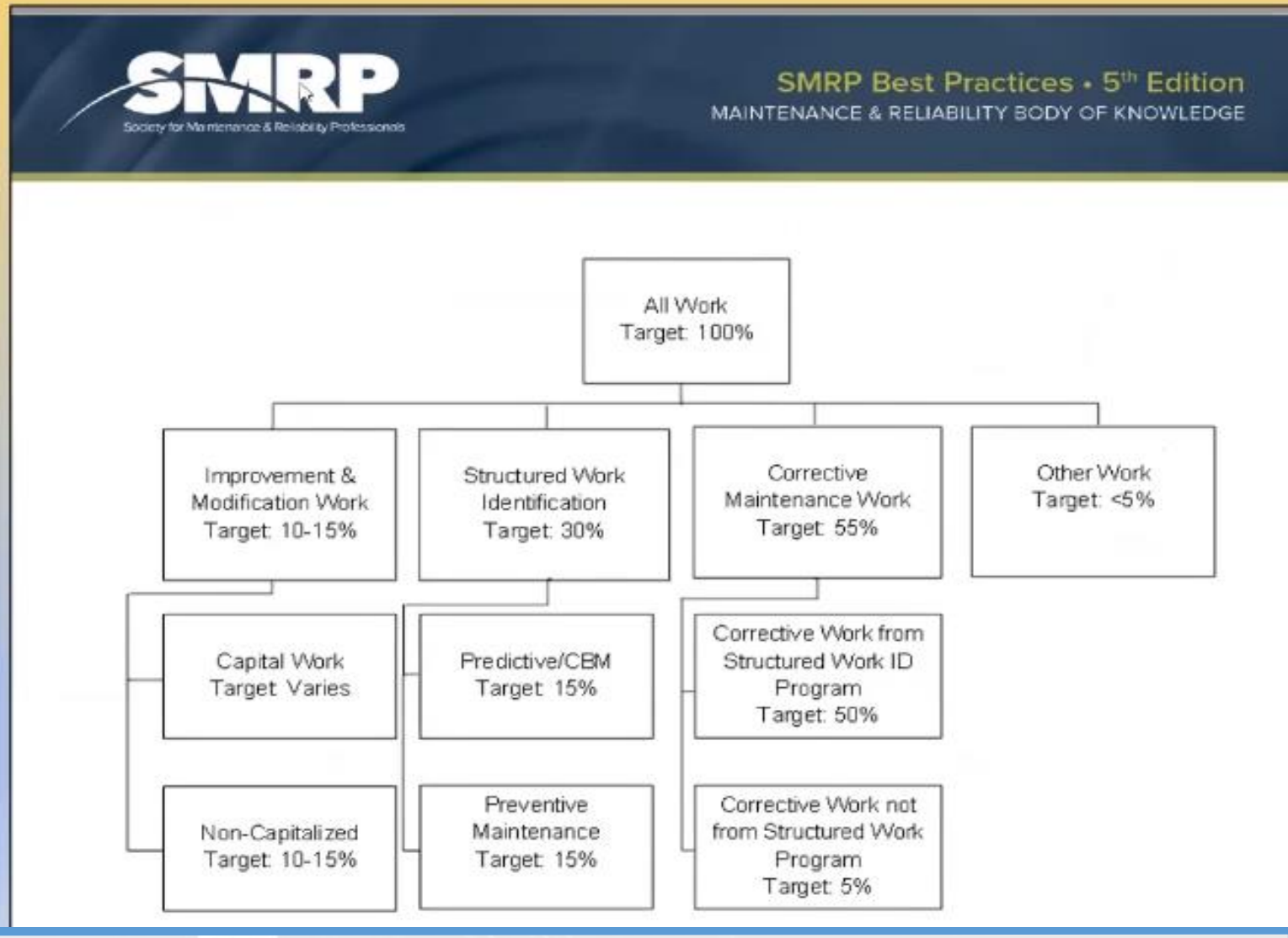
Maintenance Types… Continued

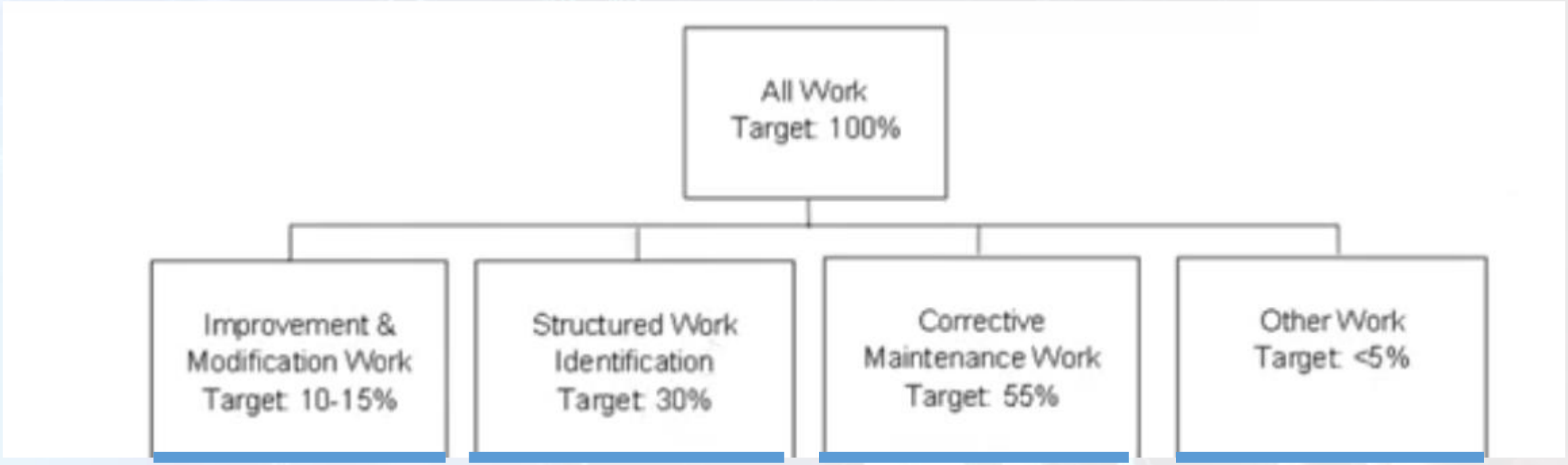


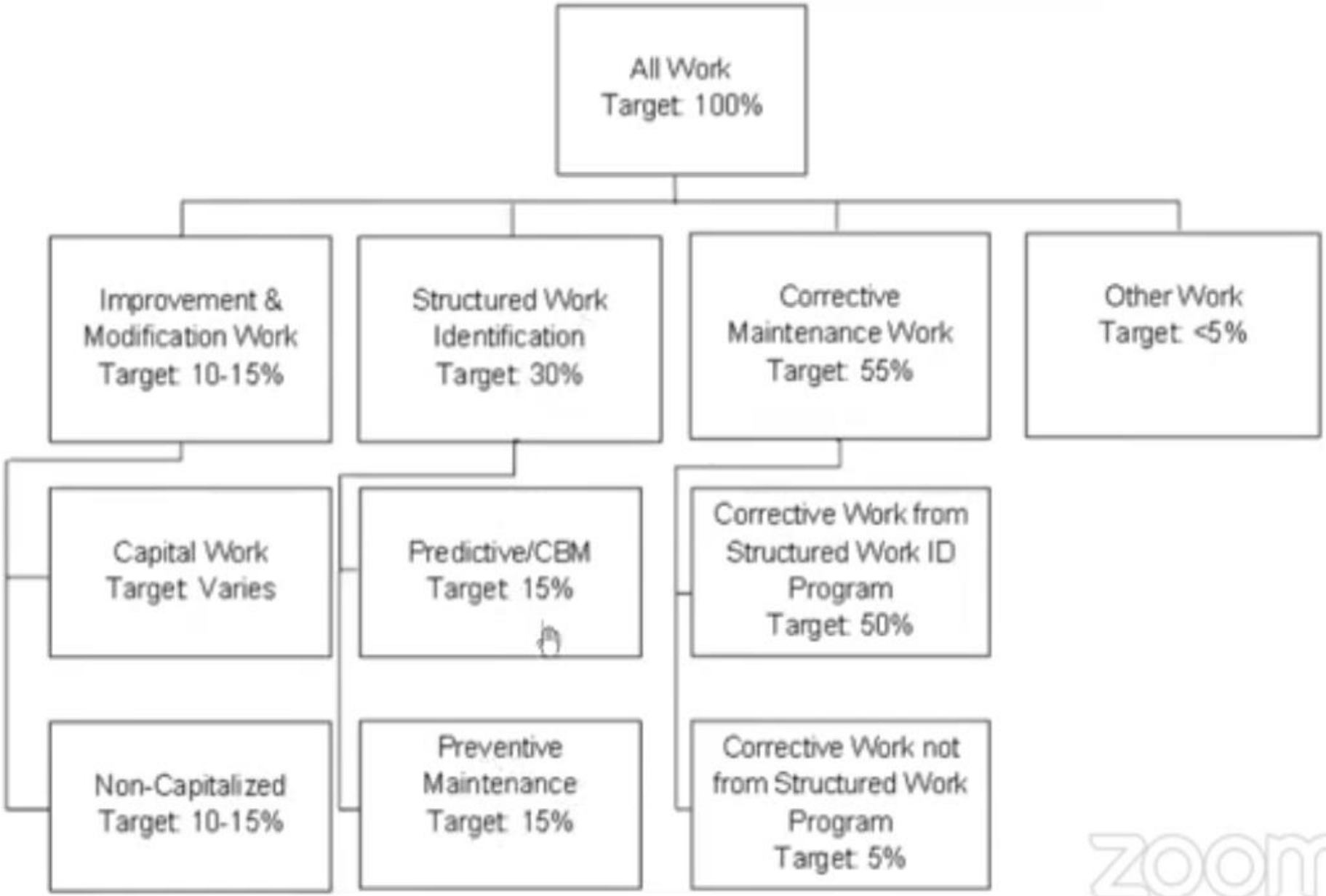
- **We need to understand the last slide to talk together to achieve the same goals and language**

Maintenance Work Types Best Practices (Towards Maintenance Excellence)

- Please refer to my article on why and how to implement this KPI in CMMS.
- The Link: https://www.reliabilityconnect.com/why-should-we-identify-corrective-maintenance-cm-comes-from-preventive-maintenance-pm-or-predictive-maintenance-pdm-and-how/







	Preventive maintenance					Corrective maintenance	
Maintenance Type	**Time Based Maintenance**	**Failure Finding Maintenance**	**Condition Based Maintenance**	**Predictive Maintenance**	**Risk Based Maintenance**	**Deferred Maintenance**	**Emergency Maintenance**
Task Type	Scheduled Overhaul / Replacement	Functional Test	Measurement of condition	Calculation and extrapolation of parameters	Inspection or Test	Repair / Replace	Repair / Replace
Objective	Restore or replace regardless of condition	Determine if hidden failure has occurred	Restore or replace based on a measured condition compared to a defined standard	Determine if failure is imminent and intervention is required	Determine condition and conduct risk assessment to determine when next inspection, test or intervention is required.	Restore or replace following failure. Result of a Run to Failure Strategy or an unplanned failure.	Restore or replace following unplanned failure.
Interval	Fixed time or usage interval e.g. 1 month, 1,000hrs or 10,000 km	Fixed time interval (can be set based on risk assessment e.g. SIL)	Fixed time interval for condition measurements / inspections	Continuous online monitoring of parameters, intervention as required	Time based interval between tasks and scope of task is based on risk assessment	Not applicable, but intervention is deferred to allow for proper planning & scheduling.	Immediate intervention required.

Important Step Towards Maintenance Excellence

What do We Need to Perform Right Maintenance?

One

- Understand How Things Fail

Two

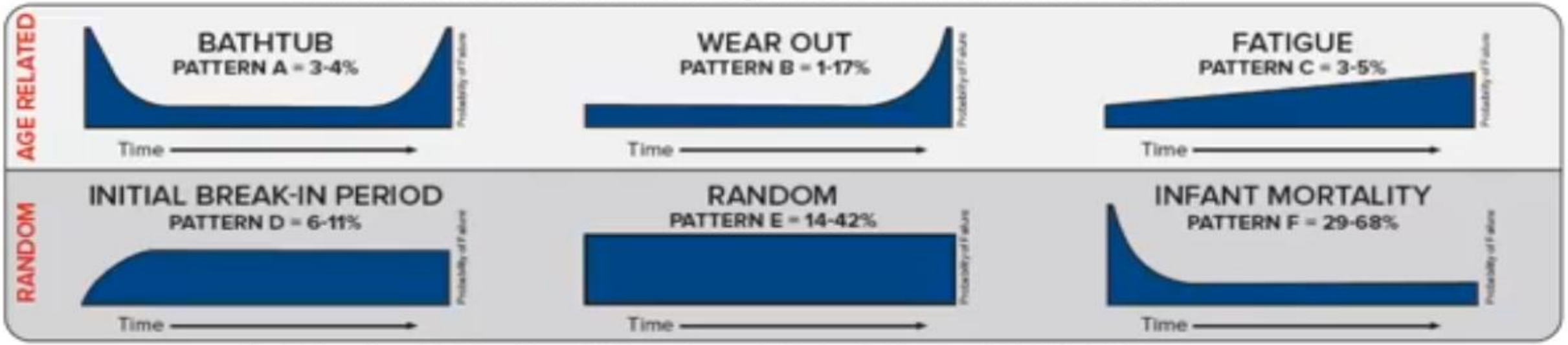
- Understand the Language of Failure

Three

- Understand the Treatment Options of Failure

FAILURE PATTERNS

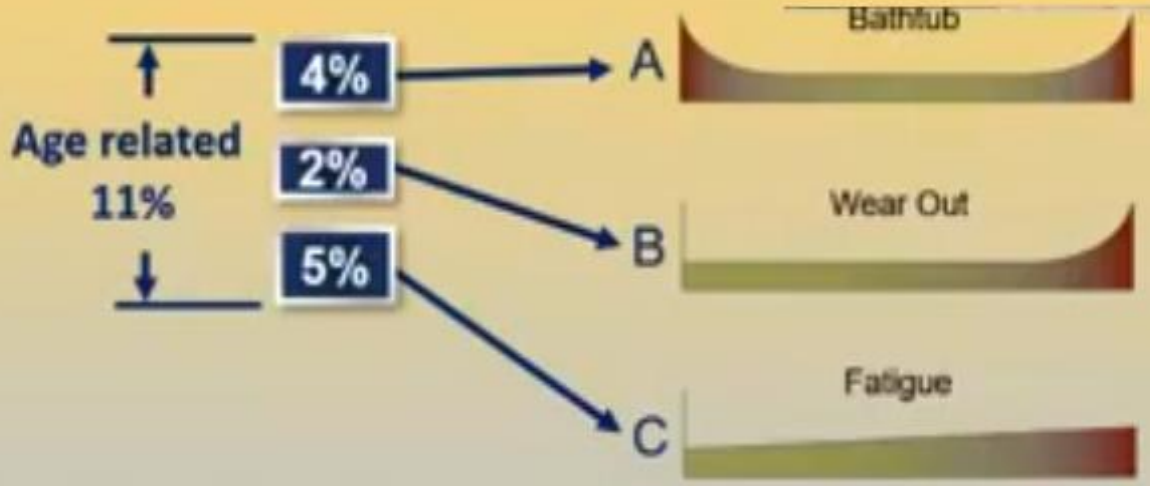
Random failures account for 77-92% of total failures and age related failure characteristics for the remaining 8-23%.



The failure characteristics shown in Figure 1 were first noted in the report titled, *Reliability-Centered Maintenance* by F. Stanley Nowlan and Howard F. Heap. Follow-on studies in Sweden in 1973 and by the U.S. Navy in 1983 produced similar results. ***In these three studies, random failures accounted for 77 to 92 percent of the total failures and age related failure characteristics for the remaining eight to 23 percent.***

What Maintenance Needs to be done for Each Failure Pattern?

- *"There is little point in doing maintenance the right way if you are doing the wrong maintenance".* ***John Moubray***
- **Age-Related**
  These types of failures can be addressed through **fixed time maintenance**. Fixed time maintenance **includes replacements, overhauls, and basic cleaning and lubrication**.



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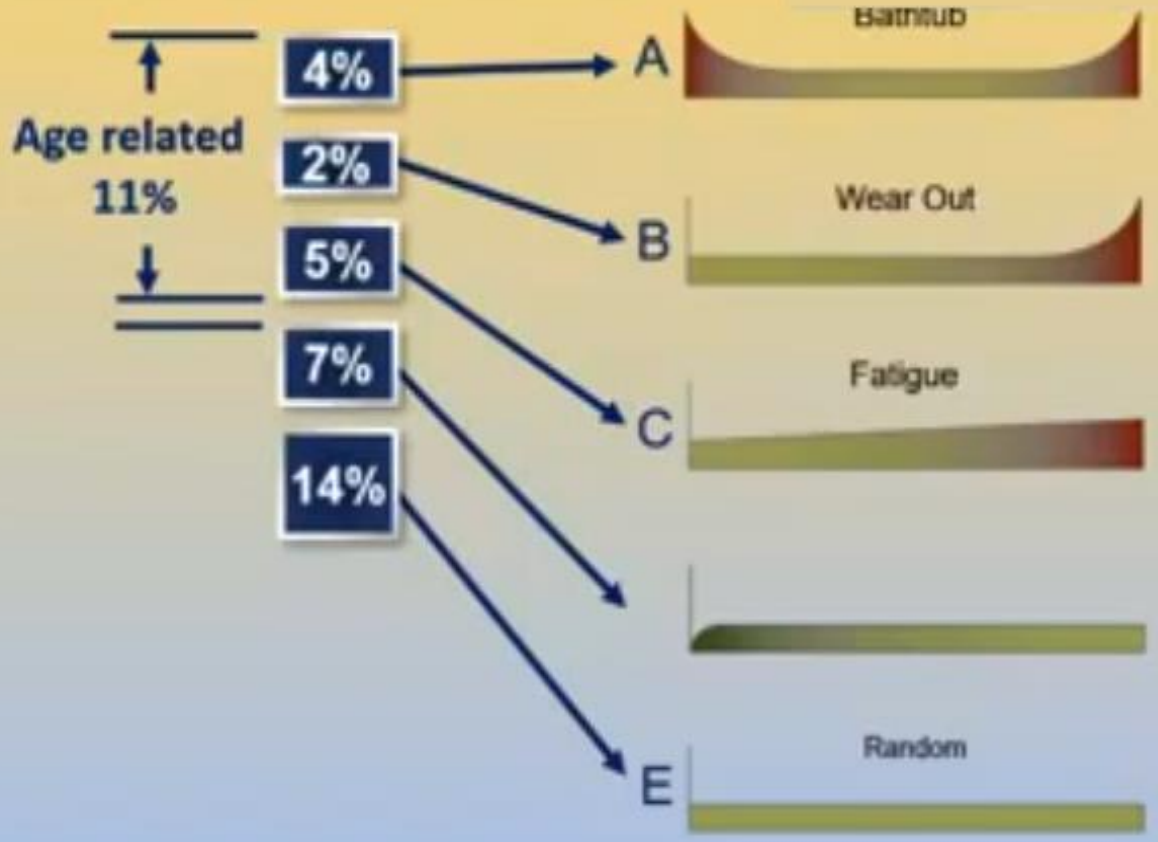
- **Random**
  These types of failures **need to be detected**, as they are not predictable, or based on a defined "life".
  The equipment must be monitored for specific indicators.
  These indicators may be changes in **vibration, temperature, flow rates, etc.**
  These types of failures must be monitored using Predictive or Condition monitoring equipment.



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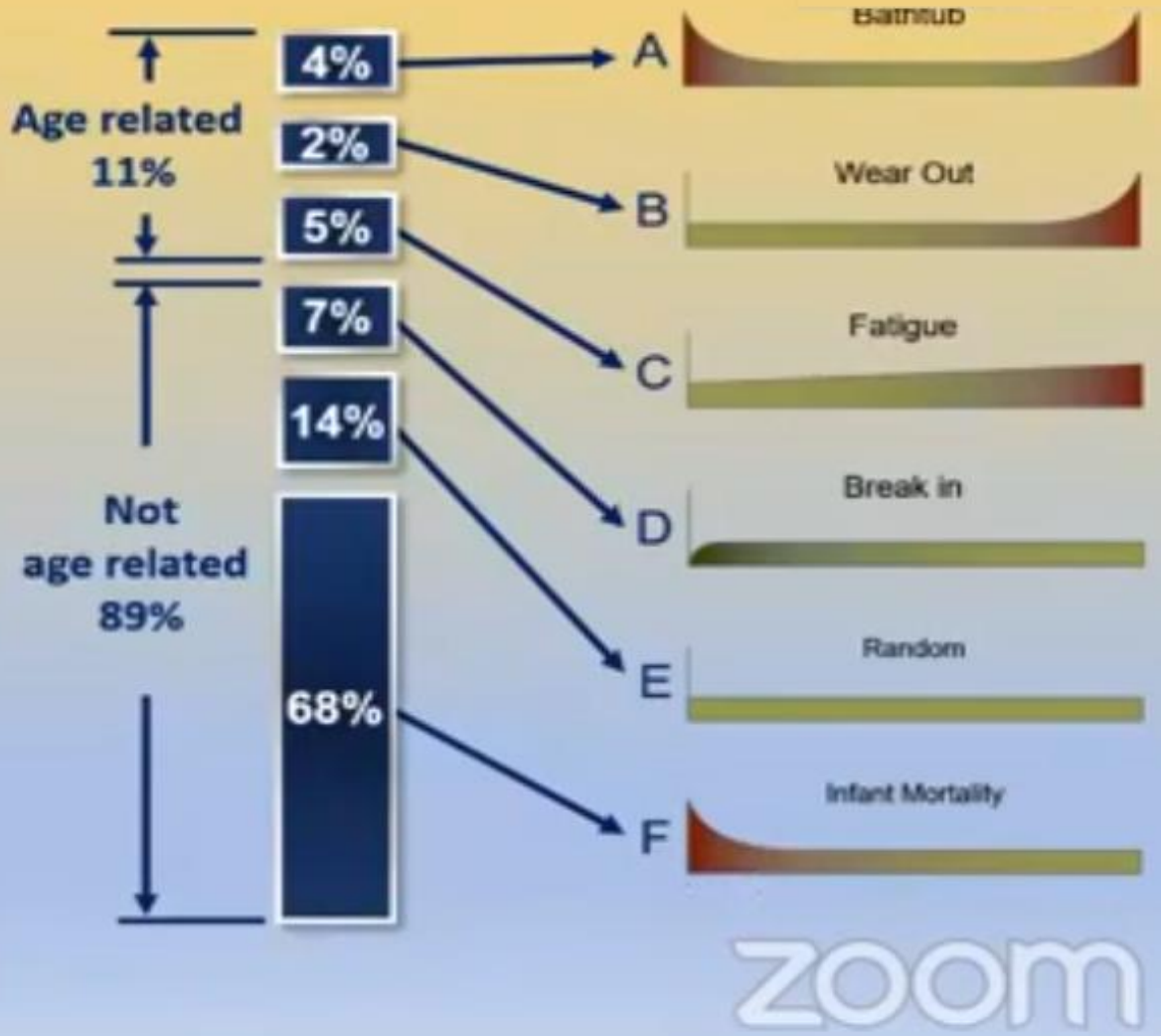
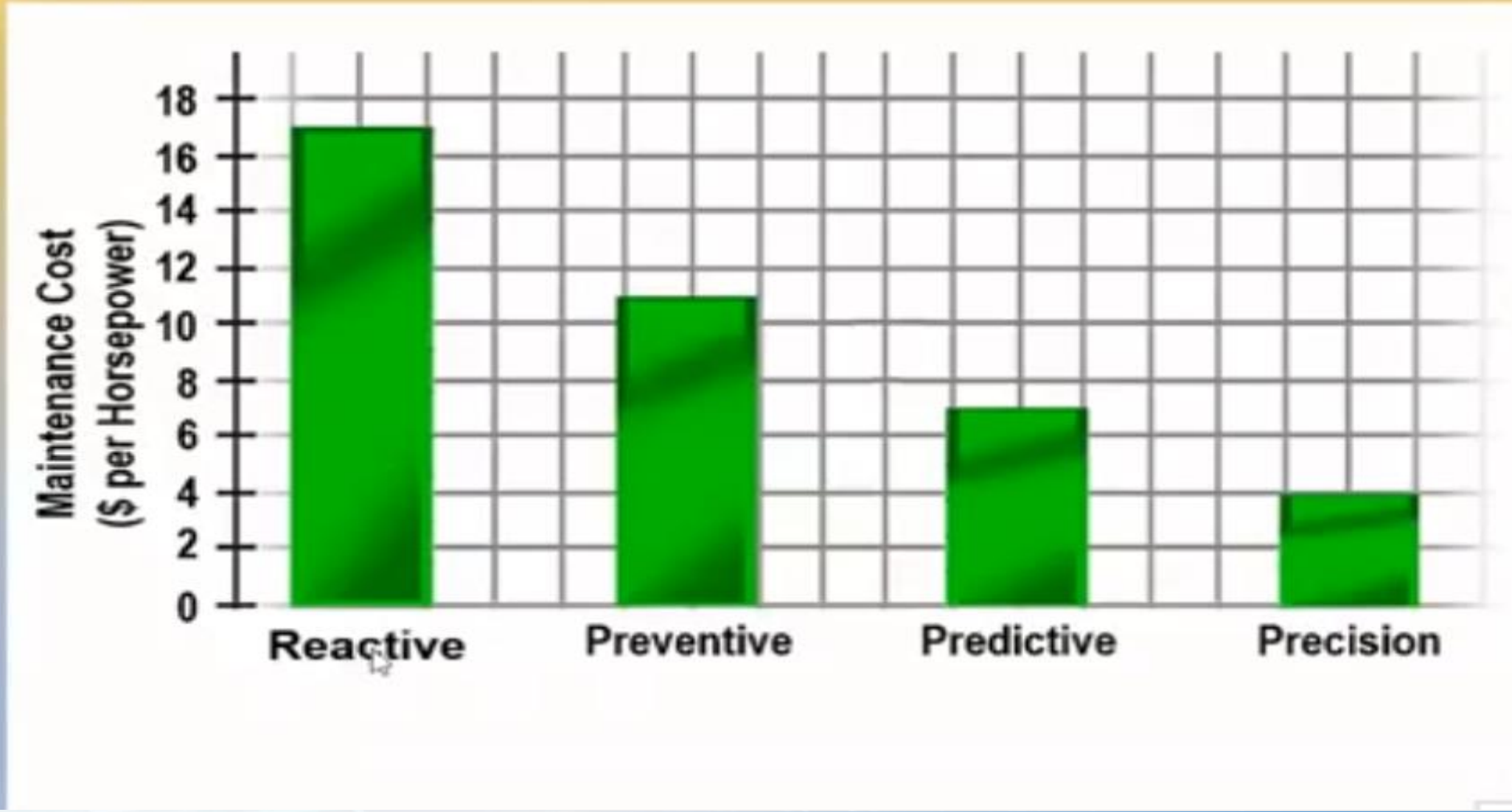
- **Infant Mortality**
  These types of failures cannot necessarily be addressed through fixed time, predictive or condition-based maintenance programs. Instead, **the failures must be prevented through proper design & installation, repeatable work procedures, proper specifications and quality assurance of parts.**

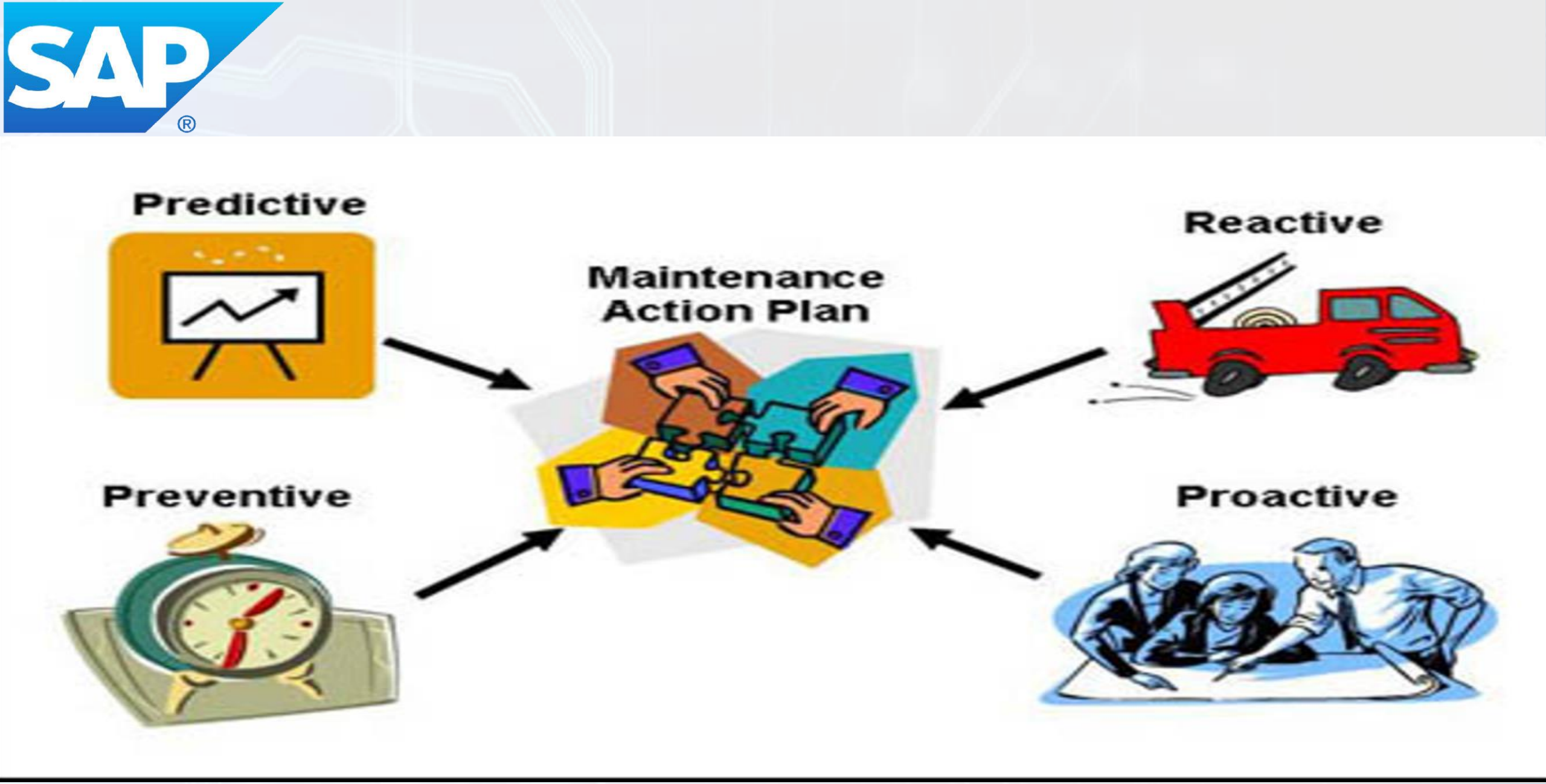


Cost Comparison of Maintenance Programs



What Else do We Need to Know about Maintenance?

Reference: Wevalgo Maintenance Management Comprehensive Dive Model


Predictive
Maintenance
Action Plan
Reactive
Preventive
Proactive

THE MAIN TARGET OF MAINTENANCE

To prevent equipment failures

To detect early failures

To discover hidden failures

- **Reduce the number of failures**
- **Reduce the unplanned downtime**
- **Increase the mean time between failures (MTBF)**
- **Improve the equipment availability & reliability**

'Our target is ZERO unplanned downtime!'

Refer to BS3811:2000

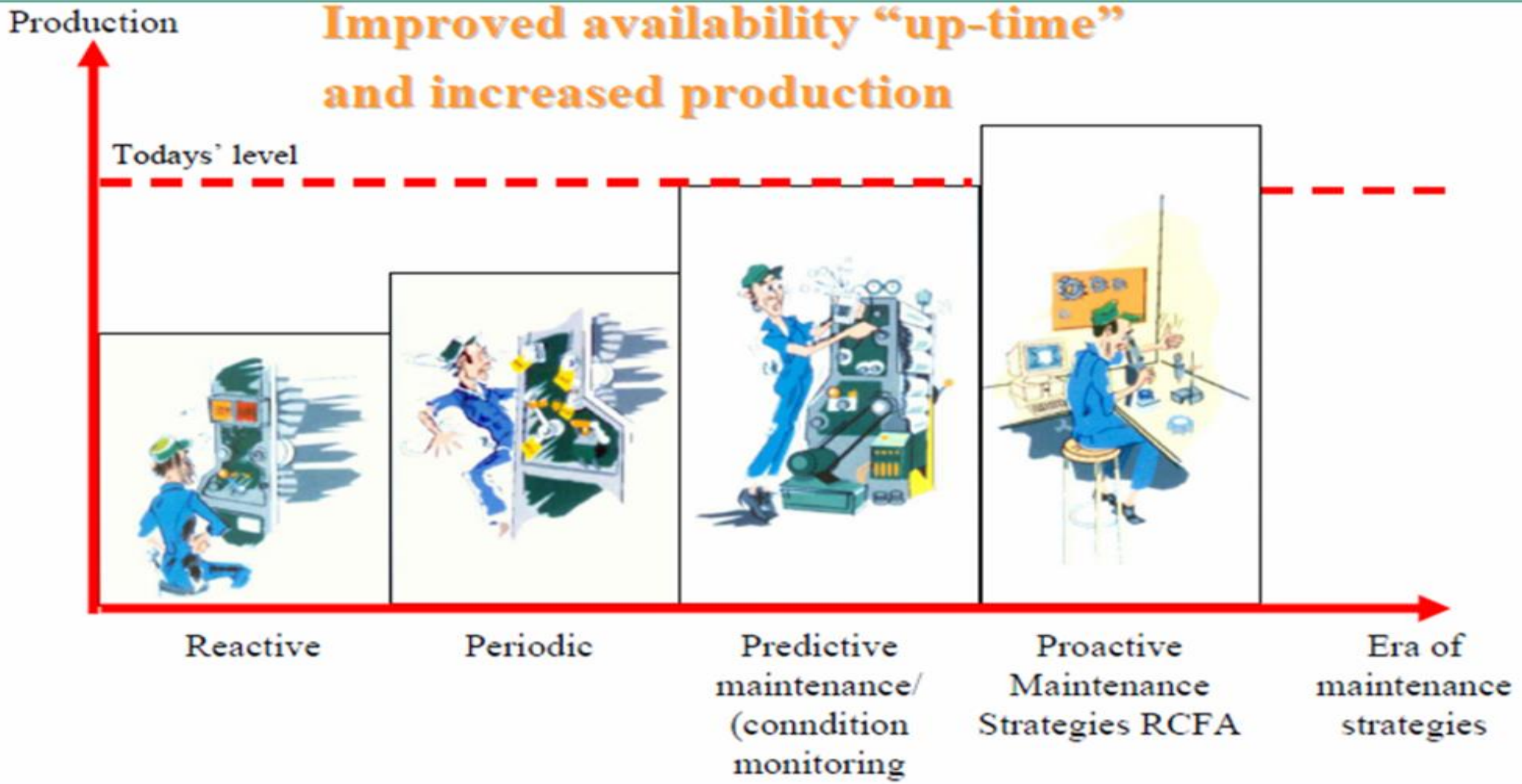
Maintenance is the work undertaken in order to keep or restore a facility to an acceptable standard level.

Work undertaken	All activities (information, analysis, repair, etc.)
To keep	Planned maintenance (preventive, predictive and proactive) policy for critical equipment
To restore	Unplanned maintenance (corrective or run to failure policy for non-critical equipment
Facility	System level (equipment, unit, train, plant)
Acceptable standard level	Acceptable level at certain working condition (HSE, working hours, etc.)

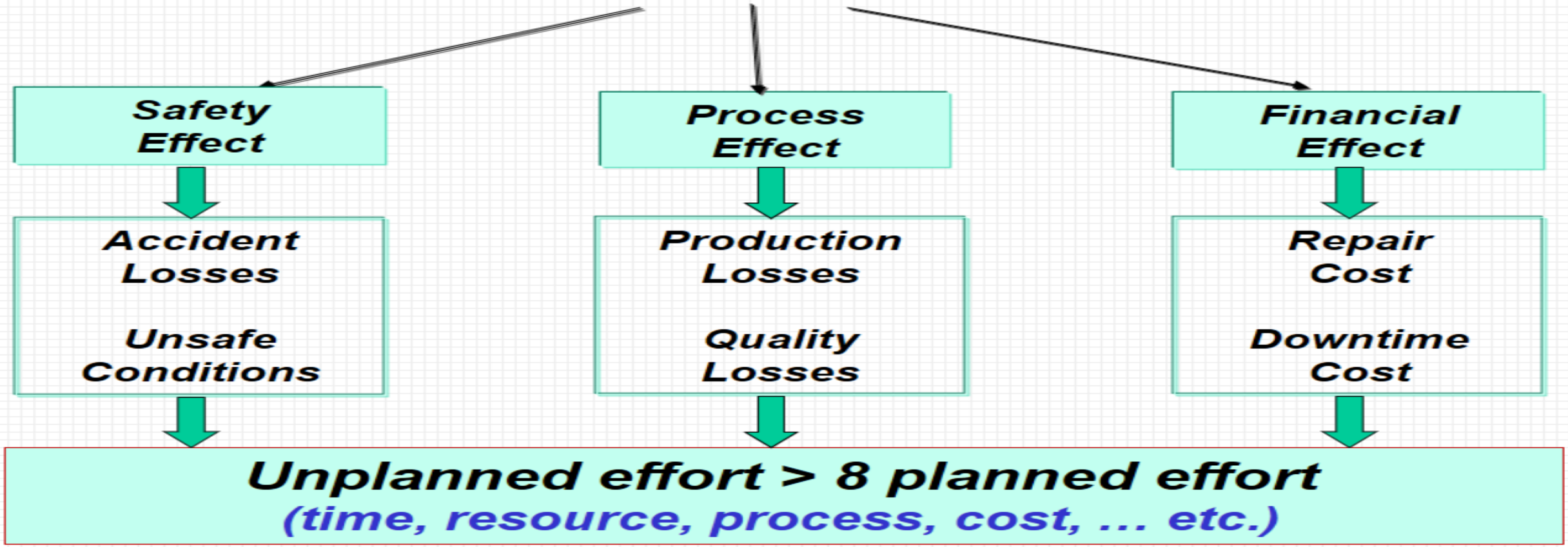
Principle – "Prevention is better than cure"

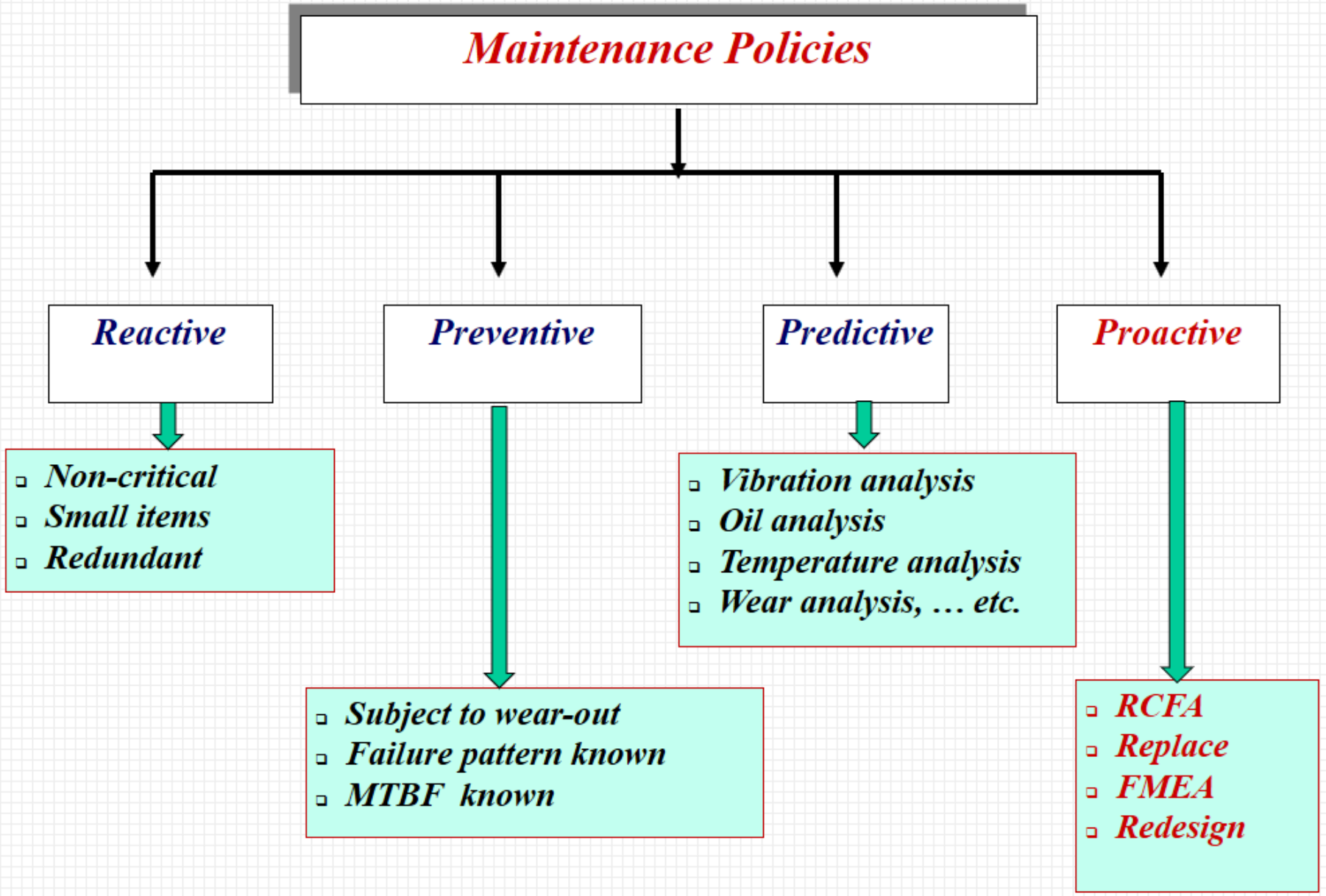
Comparison of Maintenance Strategies

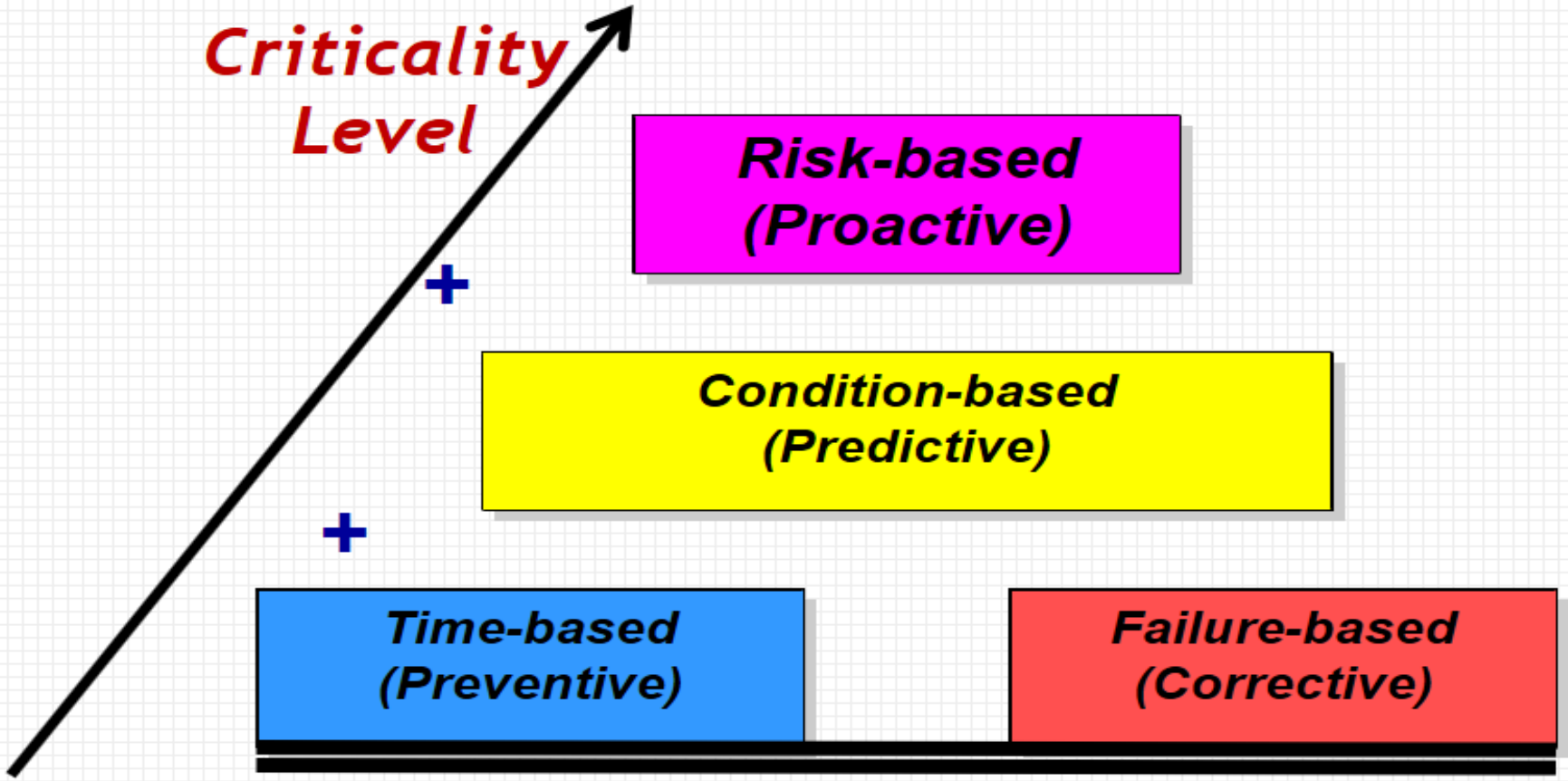
	Run-to-breakdown	Preventive	Predictive
Method	Failure based	Time based	Condition Based
Premise	No maintenance	MTBF	As-Needed
Advantages	•No maintenance cost	•Planned Maintenance. •Structured program	• Lower maintenance costs . •Fewer machine failures. •Less repair downtime. •Reduced inventory. •Longer machine life. •Increased production. •Improved operator safety. •Verification of new equipment condition. •Improved overall profitability.
Disadvant-ages	•High spare parts inventory •High machine downtime •High overtime labor costs •low production availability	•Failure may occur before scheduled maintenance. •Maintenance may be perf-ormed unnecessarily. •Maintenance may cause failure.	•Initial investment in equipment
Use	Used only on cheap, abundant and insignificant components	Used on all machines	Used on all machines


Production
Improved availability "up-time"
and increased production
Todays' level
Reactive
Periodic
Predictive
maintenance/
(conndition
monitoring
Proactive
Maintenance
Strategies RCFA
Era of
maintenance
strategies

What is the Consequence of Unplanned Maintenance?




Maintenance Policies
Reactive
Preventive
Predictive
Proactive
Non-critical
Small items
Redundant
Subject to wear-out
Failure pattern known
MTBF known
Vibration analysis
Oil analysis
Temperature analysis
Wear analysis, … etc.
RCFA
Replace
FMEA
Redesign



Different types of maintenance strategies

Road Map for Maintenance Management

Maintenance Policies

Unplanned Maintenance

(1) Failure-Based
Reactive (ReM):
- RTF
- CM
- BD
- FF
::

Planned Maintenance

(2) Time-Based
Preventive (PM):
- Calendar:
  - Weekly
  - Monthly
  ::
- Running:
  - 1000 R.H.
  - 1000 K.M.
  ::

(3) Condition-Based
Predictive (PdM):
- Oil analysis
- Vibration analysis
- Temperature analysis
- Pressure analysis
- Wear analysis
- Efficiency analysis
::

(4) Risk-Based
Proactive (PaM):
- RCFA
- FMEA \ FMECA
- HAZOP

- RBM / RCM \ RCM2
- RBI ::

(5) Total-Based
Global (GM):
- GMM
- OSM
- TPM
::

Long Term Continues Improvements ➔ Long Term Project

Term	Description
RTF	Run To Failure
CM	Corrective Maintenance
BD	Breakdown Maintenance
FF	Fire Fighting Maintenance
PM	Preventive Maintenance
PdM	Predictive Maintenance
PaM	Proactive Maintenance
RCFA	Root Cause Failure Analysis
FMEA	Failure Mode Effect Analysis
HAZOP	Hazard Operation Study
RBM	Risk Based Maintenance
RCM	Reliability Centered Maintenance (Risk based maintenance)
RBI	Risk Based Inspection
GMM	Global Maintenance Management
OSM	Optimal System Maintenance
TPM	Total Productive Maintenance

Comparison of different maintenance policies

Policy	Approach	Goals
Reactive	Run to failure (fix-it when broke).	Minimize maintenance costs for non-critical equipment.
Preventive	Time or Use-based maintenance program.	Minimize equipment breakdown.
Predictive	Maintenance decision based on equipment condition.	Discover hidden failures and improve reliability for critical equipment.
Proactive	Detection of sources of failures.	Minimize the risk of failures for critical systems.
Global	Integrated approach.	Maximize the system productivity.

Risk-Based

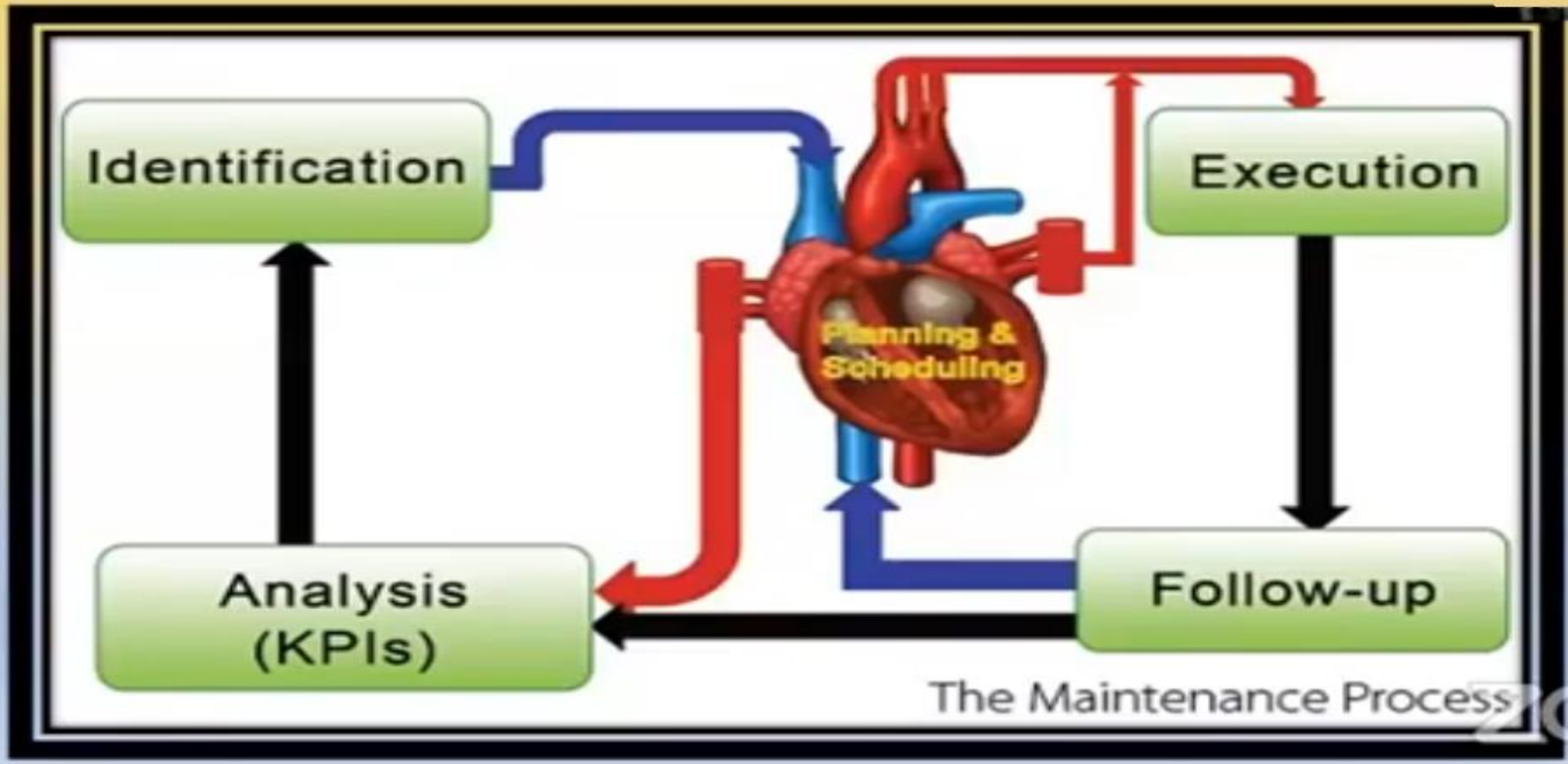
A comparison among proactive maintenance approaches

Policy	Approach	Goals
RCFA	Identification of root causes of failures.	Eliminate failures.
FMECA	Identification of criticality of failures.	Improve equipment availability.
HAZOP	Identification of hazards and problems associated with operations.	Improve HSE effect.
RBM / RCM	Determination of best maintenance requirements for critical systems.	Keep system function & improve reliability.
RBI	Determination of an optimum inspection plan for critical systems.	Improve system HSE and availability.

Comparison of different maintenance policies

	Strategy			
	Reactive	Preventative	Predictive	Proactive
Definition	Fix it when it breaks / Run to Failure	Conduct maintenance at regular intervals	Maintain based upon known condition / standards	Redesign to eliminate root causes of failure
Advantages	Cheap	Can be planned for / scheduled	Spot a potential failure	Less maintenance required.
Disadvantages	High spares stock levels. Emergency Outages.	Unnecessary replacement of parts. Poor utilization of labor	Costly if implemented incorrectly.	Could be expensive.
Equipment you would maintain	Headlights	Oil change	Automobile Tires	2 Year Lease

Understanding Maintenance Planning & Scheduling



Definitions: Planned Work and Scheduled Work

SMRP
Society for Maintenance & Reliability Professionals

SMRP Best Practices • 5th Edition
MAINTENANCE & RELIABILITY BODY OF KNOWLEDGE

COMPONENT DEFINITIONS

Planned Work

Work that has gone through a formal planning process to identify labor, materials, tools, and safety requirements. This information is assembled into a job plan package and communicated to craft workers prior to the start of the work.

Scheduled Work:

This is the process in which all **resources which are required for work are scheduled for execution within a specified time frame.**

Executing this component requires an understanding of asset availability as well as technician, material, and specialty tool availability

Definitions: Planned Work and Scheduled Work

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PLANNING	SCHEDULING
=	=
WHAT	WHO
+	+
HOW	WHEN

Planned and Scheduled Work

- Planned Work: ***what & how***
  - What is to be done? - defined work
  - How it will be done & how long it will take? - sequence of work
  - What resources - skills are required?
  - What materials / tools /equipment are required?
  - What Safety, environmental, work clearances are required?
- Scheduled Work: ***when (and Who)***
  - When it will be done?
    - Do we have the resources - material/ skills/tools/ available?
    - Do we have work permits/ clearances?
  - Who will do it ? Work crew (some time this function is done by the area/craft supervisor)

Line of sight (اهداف الشركة)

- Any organization have a vision and mission

- Planning and scheduling to achieve the maintenance objective
- Planning Vision (**increase the labor productivity**)

required maintenance → no breakdown → high reliability

Cash flow → profit

Mission of planning → right jobs ready to go

(permit-material –labor- document)

Kill the waste time between effort

- The vision of planning is simply to **INCREASE LABOR PRODUCTIVITY**
- The mission of planning revolves around making the **right jobs "ready to go"**

PLANNING	SCHEDULING
reduces	*reduces*
delays	*delays*
DURING	BETWEEN
jobs	*jobs*

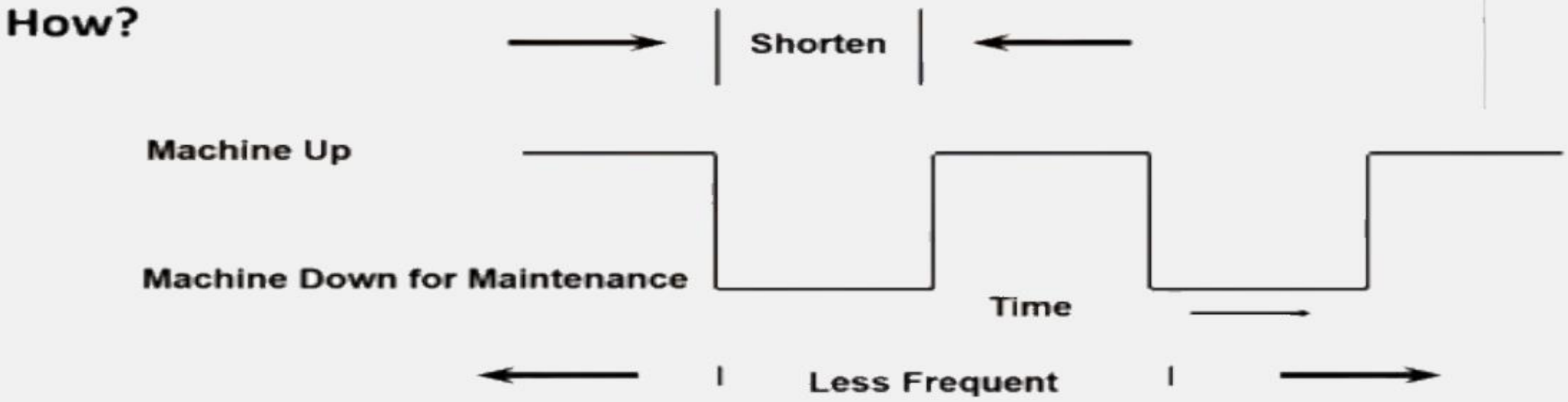
ROAD TO RELIABILITY

LINE OF SIGHT

- The vision of planning is simply to **INCREASE LABOR PRODUCTIVITY**
- The mission of planning revolves around making the **right jobs "ready to go"**

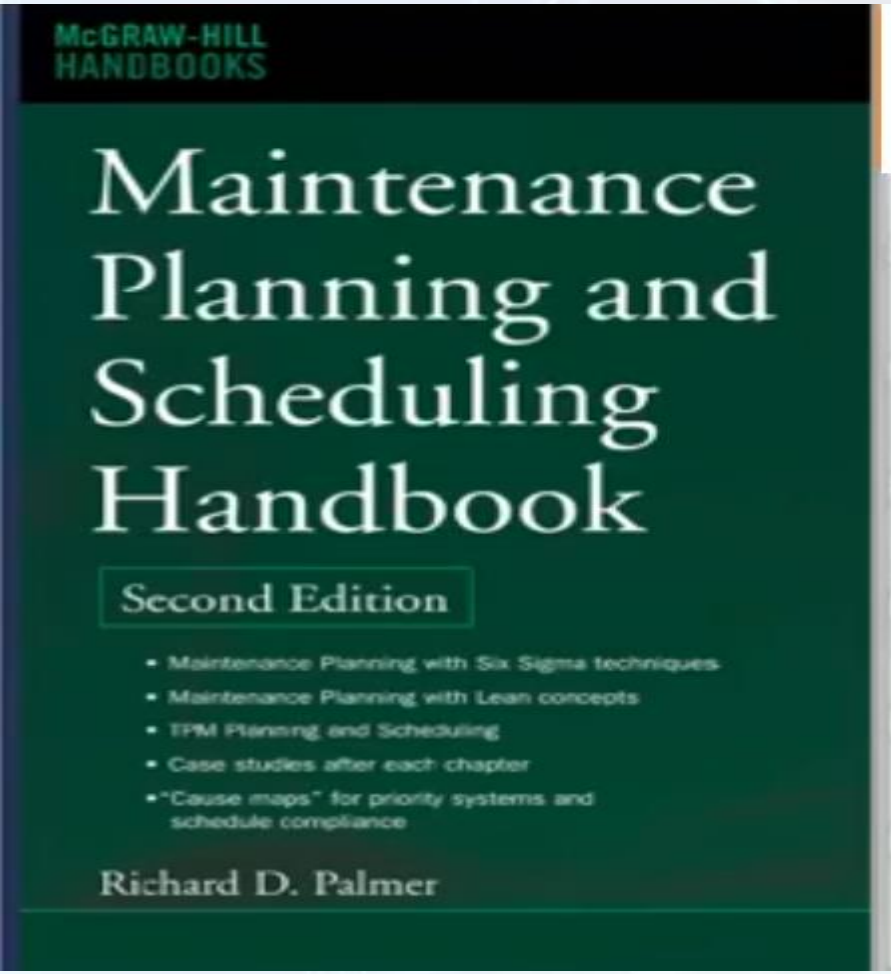
PLANNING	SCHEDULING
reduces	*reduces*
delays	*delays*
DURING	BETWEEN
jobs	*jobs*

Decreasing mean time to repair



- ✓ Saving Maintenance team time increases their productivity, they focus only on execution
- ✓ This reduces job time

Maintenance Planning and Scheduling Principles



1. Protect the planner
2. Focus on future work
3. Component-level files
4. Use planner judgement for time estimates
5. Recognize the skills of the techs
6. Measure performance with work sampling

1. Job plans are needed for scheduling
2. Scheduling and job priorities are important
3. Schedule based on the highest skills available
4. Schedule for every available work hour
5. Daily work is handled by the crew leader
6. Measure performance by schedule compliance

The Right Setup for the Desired Expectations!

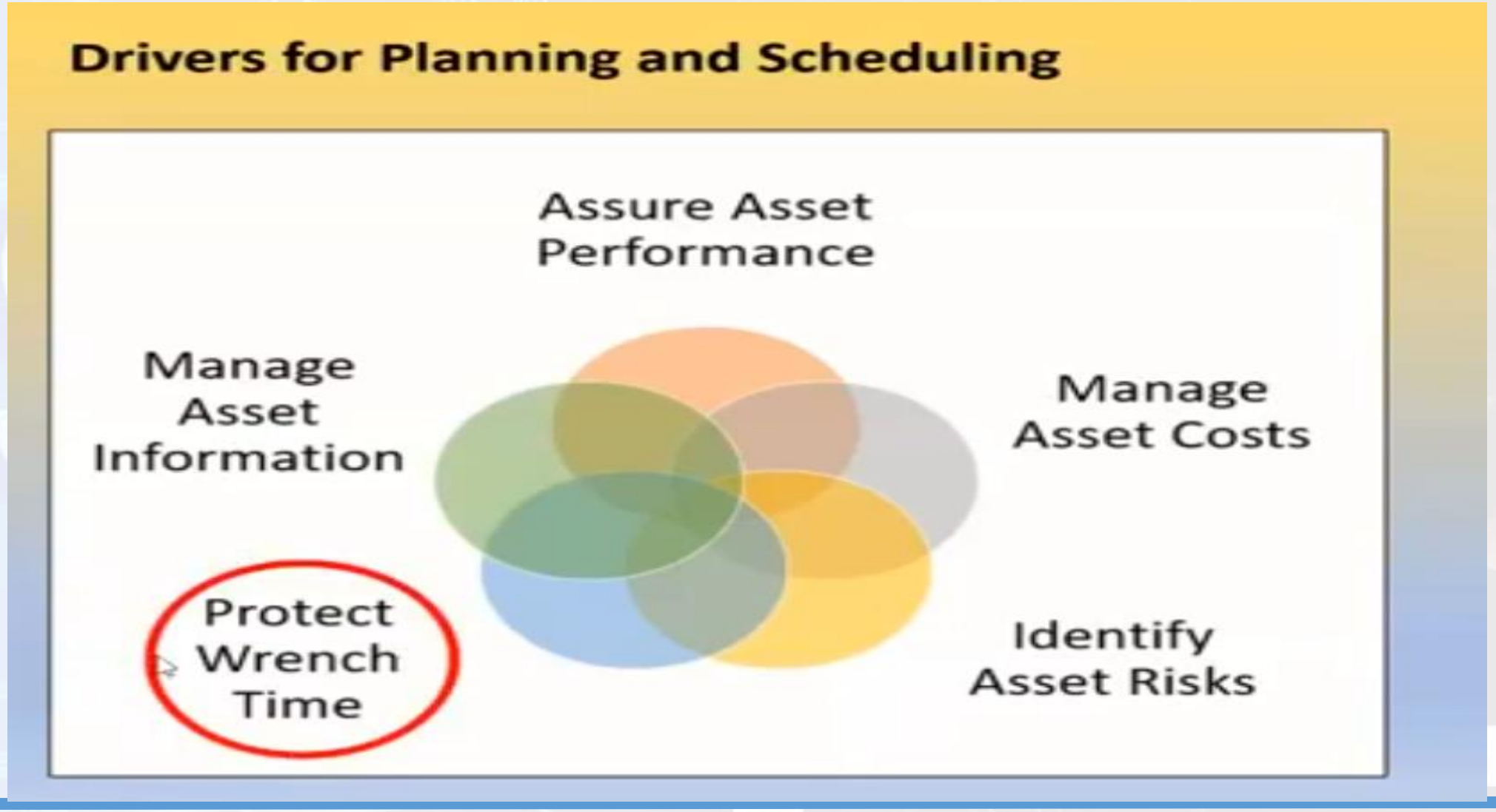
- Understand Maintenance Planning and Scheduling Principles to setup accordingly
- Separate Planning Department NOT part of or reporting to Maintenance
- Effective and documented planning and scheduling process with clear roles and responsibilities
- Adequate Number of Planners and Schedulers with a ratio of **15:1 to 20:1,** to raise maintenance **labor productivity** up to **60 percent** level
- Maintenance experienced planners and schedulers (minimum site hands on experience of 5 years)
- Computer and CMMS skilled planners and schedulers
- Project management skilled planners and schedulers
- Dedicated only for maintenance planning and scheduling
- Well equipped with all required tools such as efficient CMMS and Project Management software
- Fully supported by management and leadership to get support and cooperation from all stakeholders (e.g. Maintenance, Production, Safety, Integrity, Engineering, etc.)

Doc Palmer...

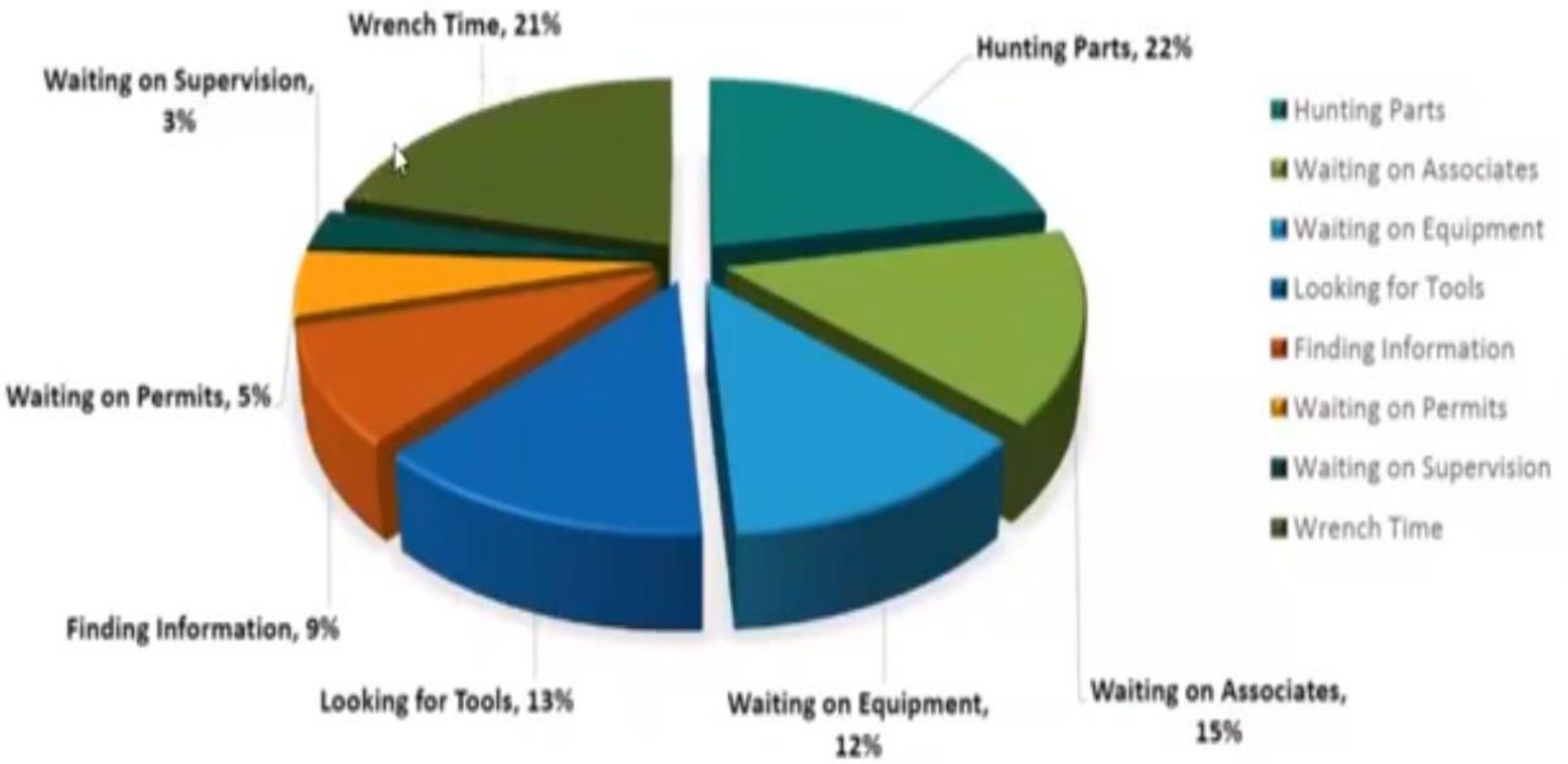
Maintenance Planning Principles

1. Separate Departments
2. Focus on Future Work
3. Component Level Files
4. Estimate Job based on Planner Expertise
5. Recognise the Skills of the Craft
6. Measure performance with Work Sampling

Why we plan and schedule



Where does the time go?



Typical Job Planned On-the-Run

Same job if Effectively Planned & Scheduled

Work Activity

Typical Maintenance Craftsman's Day
Planned & Scheduled vs. On The Run

	Reactive WITHOUT Planning & Scheduling	Proactive with Planning & Scheduling
Receiving instructions	5%	3%
Obtaining Tools and materials	12%	5%
Travel to and from job (both with and w/o tools and materials)	15%	10%
Coordination Delays	8%	3%
Idle at job site	5%	2%
Late starts and early quits	5%	1%
Authorized breaks and relief	10%	10%
Excess personal time (extra breaks, phone calls, smoke breaks, slow return from lunch and breaks, etc.)	5%	1%
Sub-Total	65%	35%
Direct actual work accomplished (as a % if whole day)	35%	65%

The Leverage of Planning

Provides the service of generating Labor Hours

Wrench Time

Currently

20 to 35% Direct Work

Becomes

World Class

55% Direct Work

57% Improvement

55 / 35 = 1.57

* Direct Work = Not hunting for parts, information, or waiting for equipment to become available

Currently

Work of 30 Technicians

Yields

57% Improvement

World Class

Equivalent of 47 Technicians

30 x 1.57 = 47

Planner can do all of this

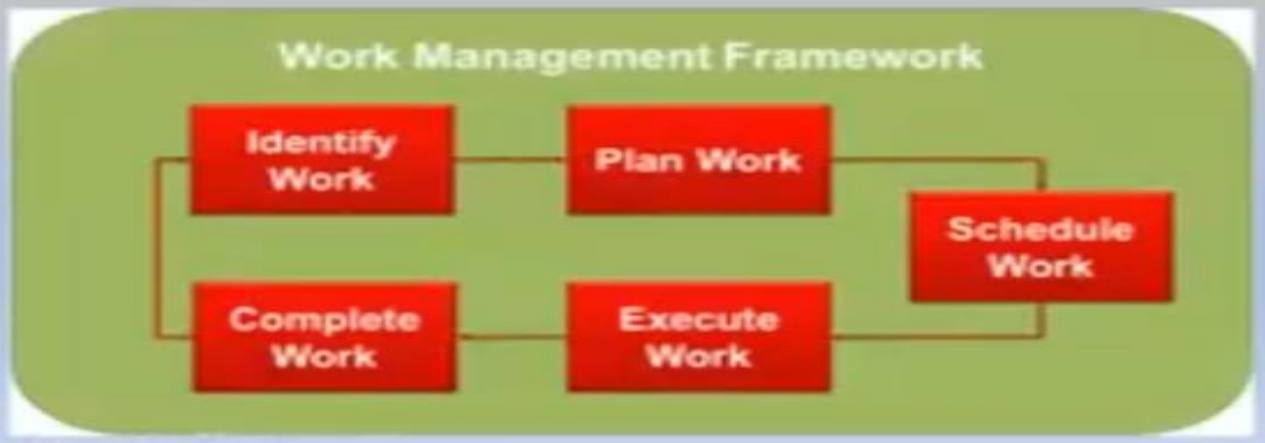
What is being Planned?

- Preventive Maintenance (PM)
- Predictive Maintenance (PdM)
- Corrective Maintenance (planned & unplanned)
- Outsourced work
- Capital Project work
  - ➢ Maintenance Schemes
  - ➢ Assisting in Projects work
- Shutdowns/Turnarounds/ Overhauls

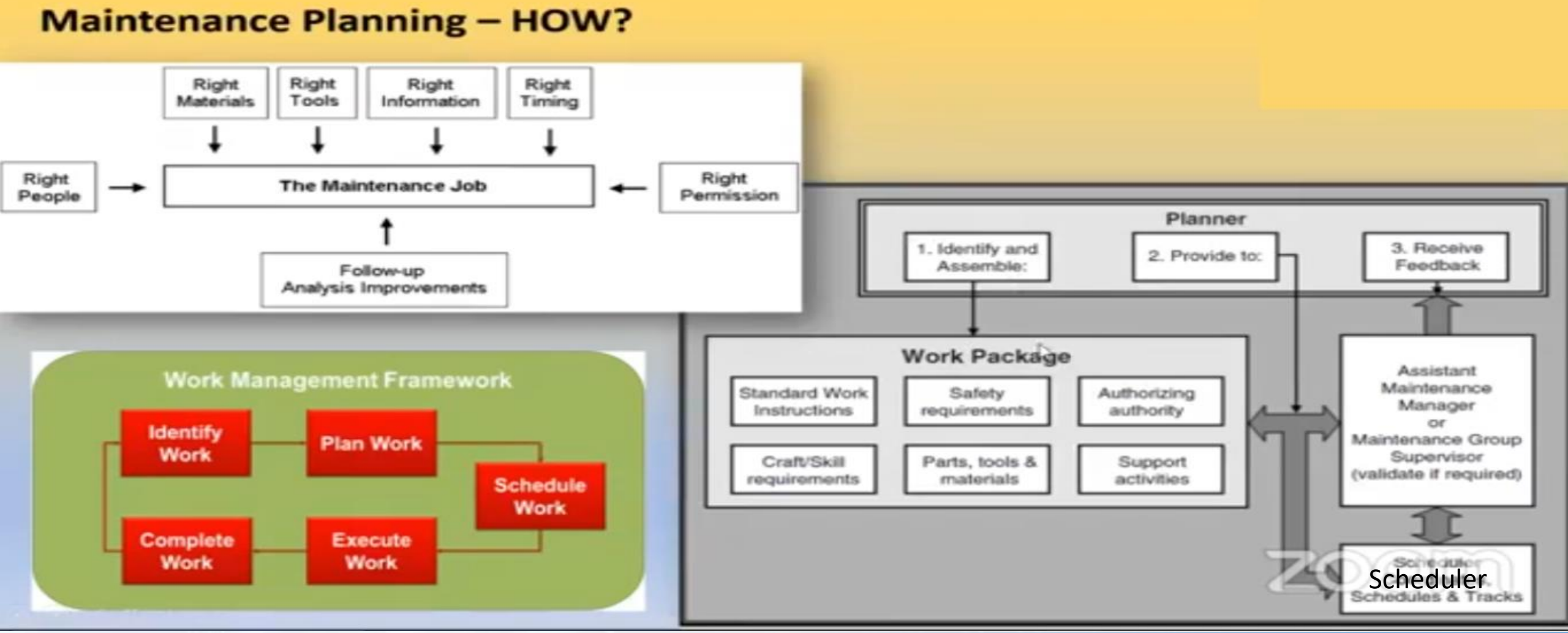
- That's why we have to start with understanding Maintenance, and
- Maintenance Planner has to have maintenance experience

Maintenance process

How planning maintenance



How planning maintenance



Maintenance back log

Backlog Management

SMRP

SMRP Best Practices
MAINTENANCE & RELIABILITY BODY

WORK MANAGEMENT METRIC

5.4.8 PLANNED BACKLOG

Published on April 16, 2009
Revised on August 24, 2016

DEFINITION

This metric is the combination of the quantity of work that has been fully planned for execution, but is not ready to be scheduled and work that is ready to be performed. Also known as ready work.

OBJECTIVES

The objective of this metric is to measure the quantity of work yet to be performed in order to ensure that labor resources are balanced with the available work and to identify potential gaps in resource availability. It can also be used to identify planning resource issues.

FORMULA

Planned Backlog (weeks) = (Planned Work + Ready Work) / Crew Capacity

Backlog

The total number of estimated labor hours, by trade and priority, of work required to complete all identified but incomplete planned and scheduled work. Used as an index in determining how well maintenance is keeping up with the rate of work generation. Used also to help establish the proper size and composition of the work force.

WORK MANAGEMENT METRIC

5.4.9 READY BACKLOG

ne 14, 2009
ust 12, 2015

DEFINITION

This metric is the quantity of work that has been fully prepared for execution, but has not yet been executed. It is work for which all planning has been done and materials procured, but is waiting to be scheduled for execution.

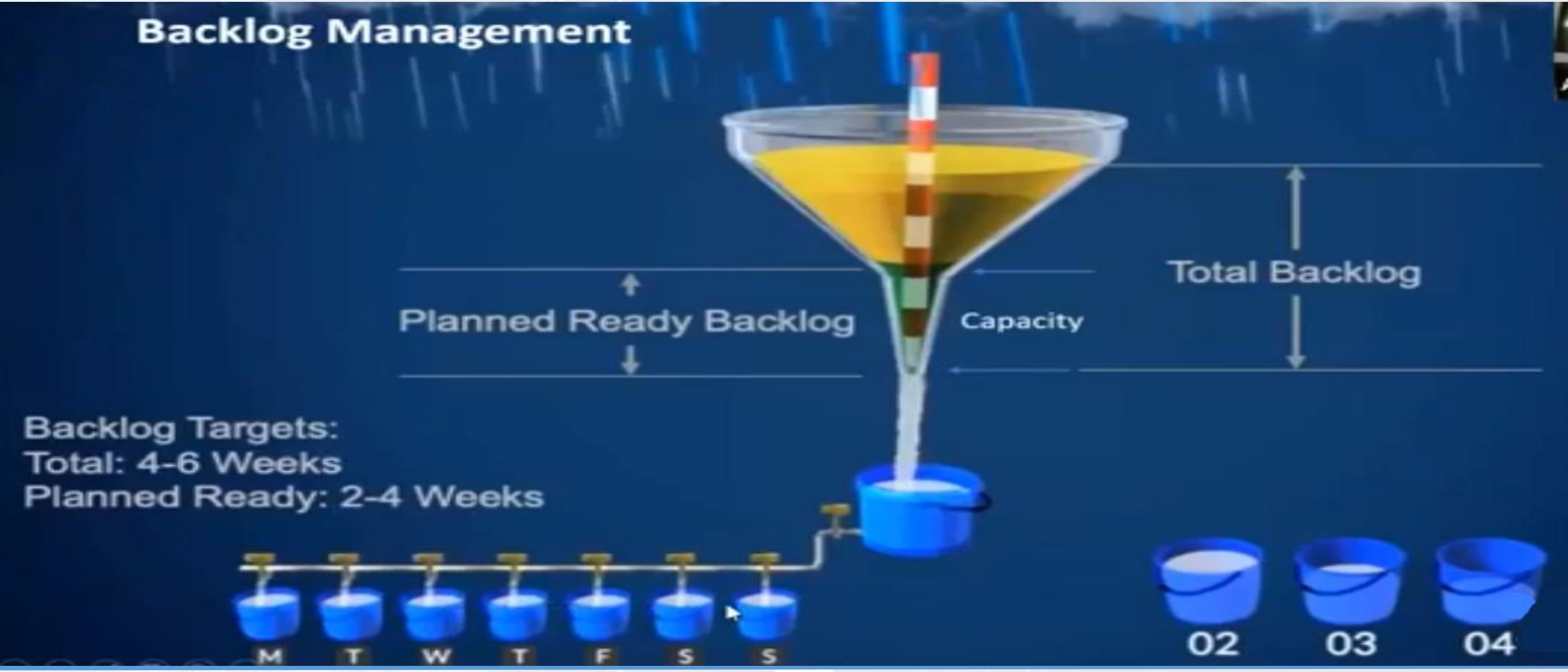
OBJECTIVES

This metric measures the quantity of work yet to be performed to ensure labor resources are balanced with the available work.

FORMULA

Ready Backlog = Ready Work / Crew Capacity

Maintenance back log



Roles and responsibilities

Roles and Responsibilities

Qualities

Qualities of a Good Planner

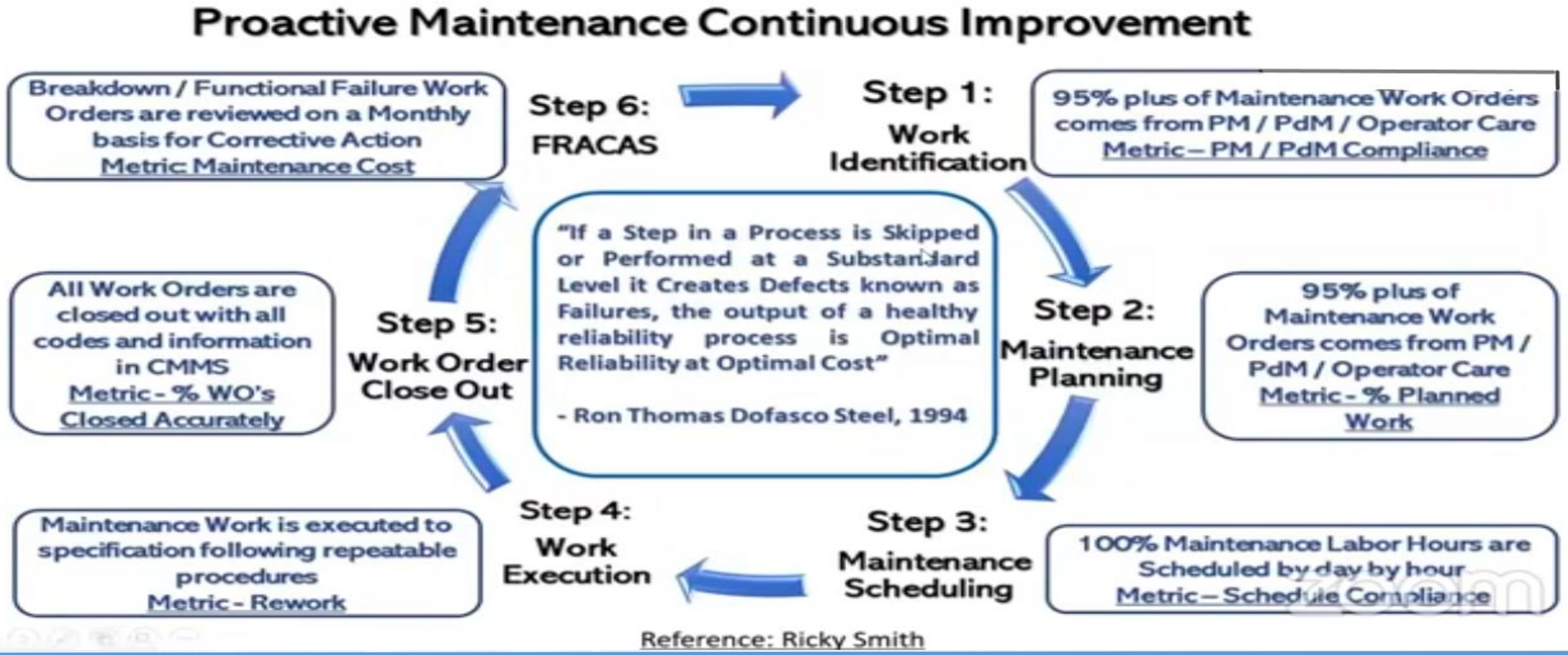
- Planners should have craft skills
- Should be an experienced tradesperson
- Good data skills
- Good analytical skills
- Superb people skills, planners have responsibility without authority
- Write accurate work descriptions in the job plan
- Research skills to find information
- Top tradesperson
  - Have seniority
  - Able to earn respect of craft people

Planners Must Add Value

- Planners battle and eliminate losses and delays from maintenance and its related activities
- The planners' efforts are measured by:
  - Quality of the Job Plan Library
  - The size of the waiting for schedule backlog (measured in weeks – 2 weeks minimum)

Qualities

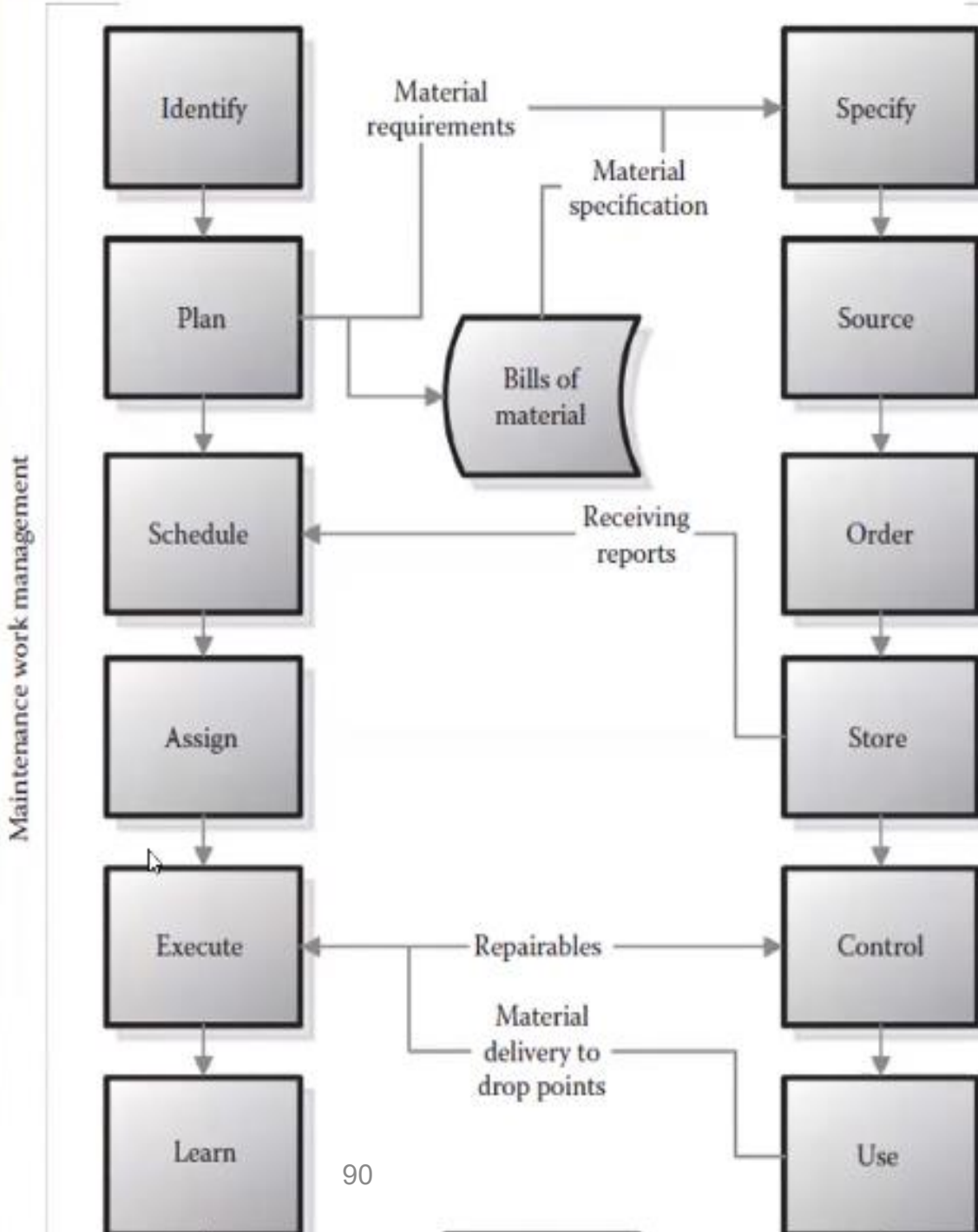
KPI



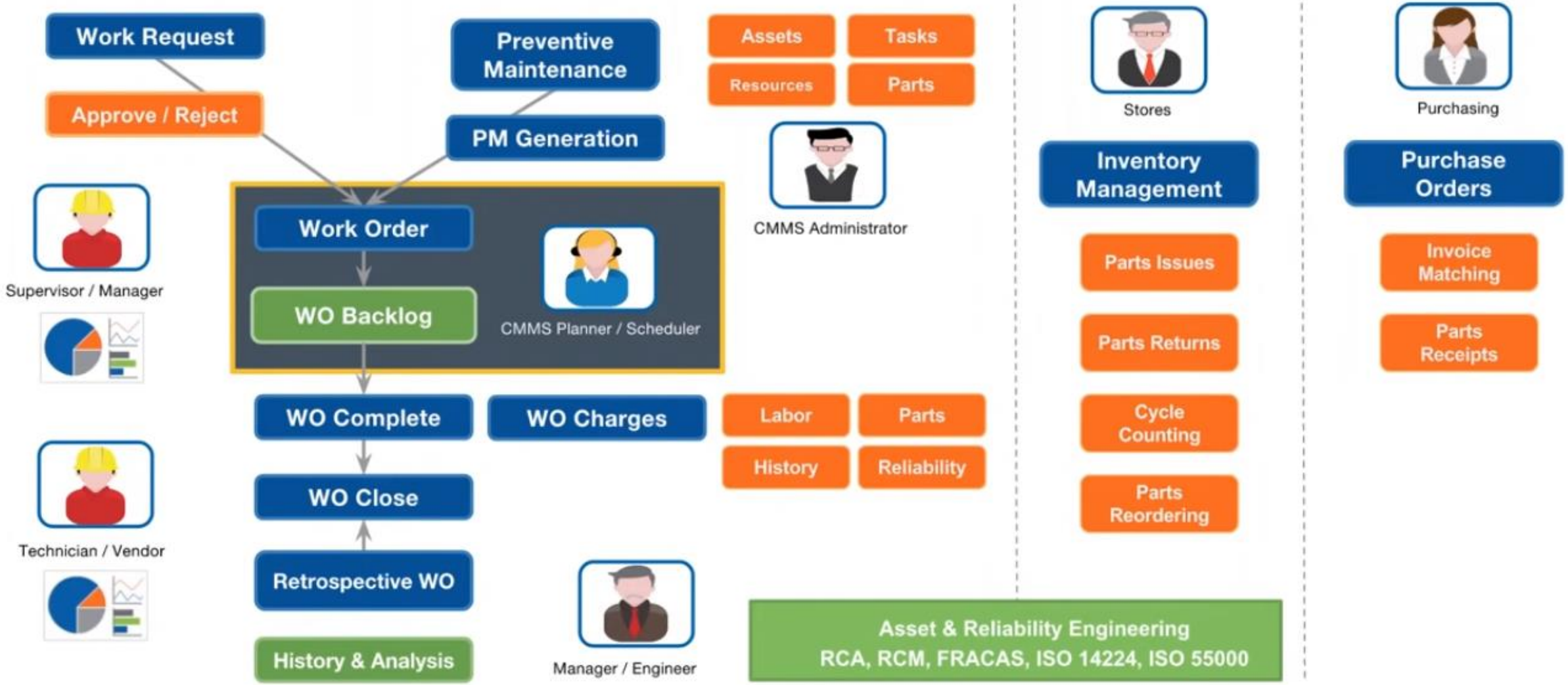
Reference: Ricky Smith

Planning, Scheduling and Materials Management

- A key to success in work management is the **timely provision** of the materials and parts for maintenance work.
- The lack of even one part can delay the job, add to the cost and increase total downtime for the asset itself and possibly for the process it belongs to.
- **The consumption of maintenance, repair and overhaul (MRO) supplies—spare parts**, components, consumables, lubricants, fasteners and all other maintenance materials—**typically accounts for about one-half of most companies' maintenance budget in North America.**
- Good materials management is another essential—without the right spare parts, many jobs cannot be done.
- There is no point planning and scheduling work if you cannot rely on materials management to provide the parts when you need them.
- **If you want excellence in maintenance, you need excellence in materials management.**
- Your **work management** and **materials management** processes must be **integrated** closely, or you cannot achieve the benefits that work management can deliver.



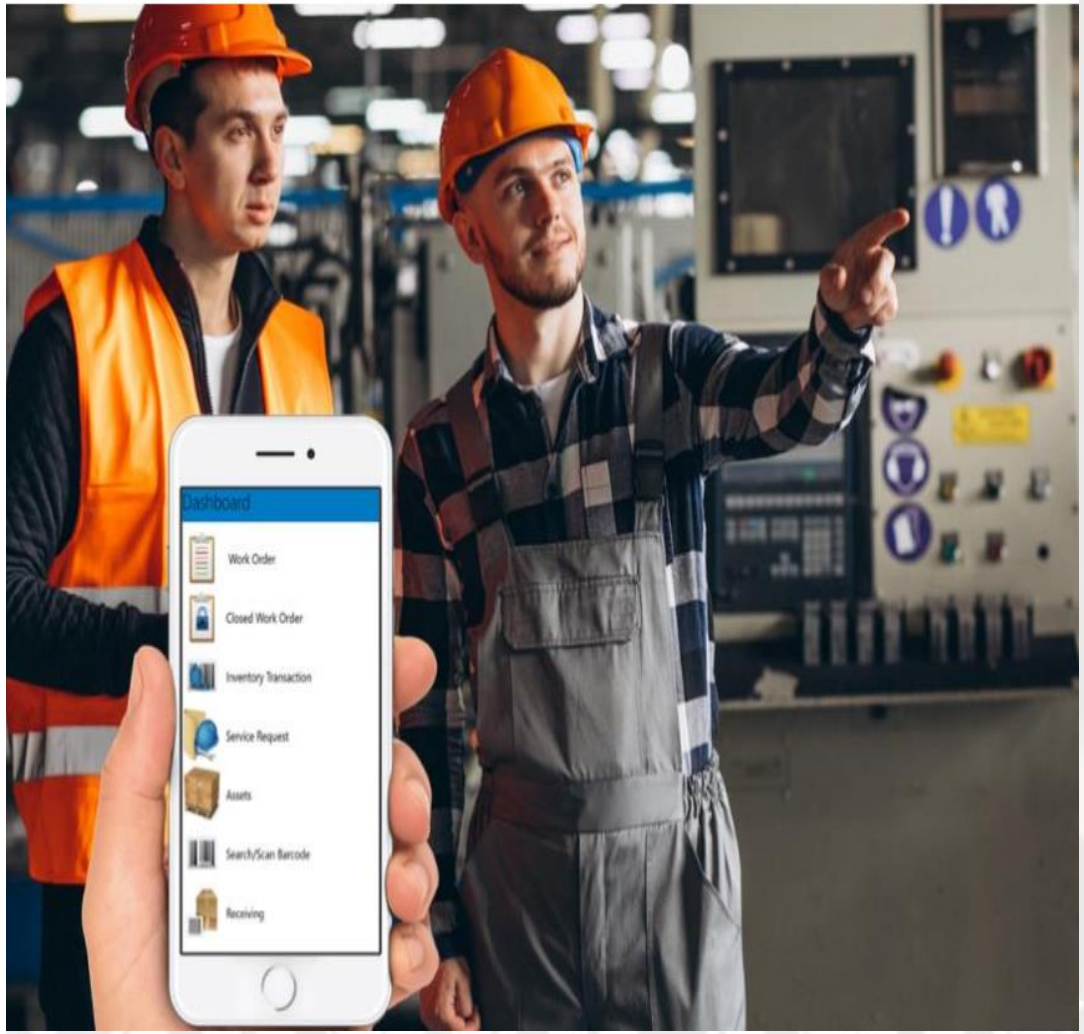
Typical CMMS Environment



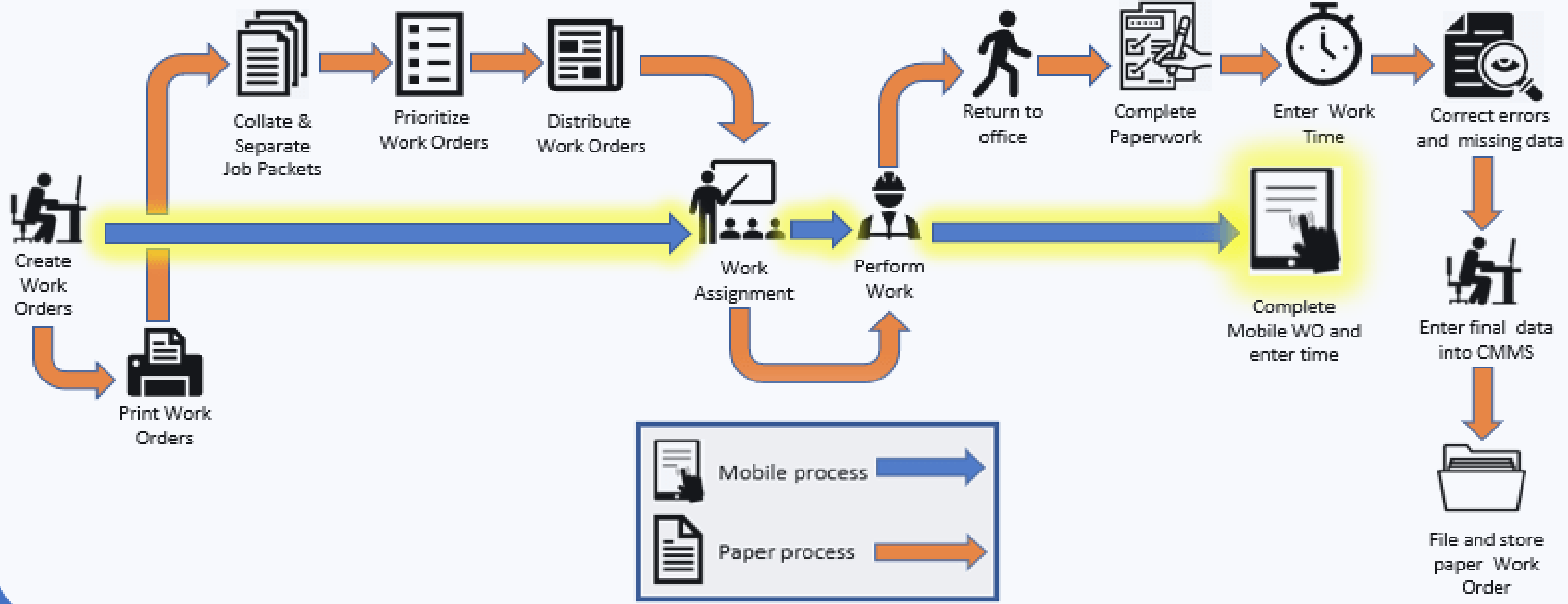
What is a CMMS ?

- **CMMS** stands for Computerized Maintenance management System and is software that is **designed to simplify and improve maintenance operations for various industries.**
- CMMS software streamlines and automates maintenance, asset, and preventative maintenance operations.
- With a CMMS the maintenance department can plan, track, measure and optimize everything to do with maintenance on a digital platform.
- **Asset Management**: Track all of your assets, including virtual ones. Know when they were obtained, how they are used and what their original value was.
- **Work Orders**: Automatically generate work orders according to a preset maintenance schedule and respond to service requests.
- **Mobile CMMS**: CMMS Mobile application is multifaceted, providing technicians the ease of completing preventative and demand work orders directly in the field.

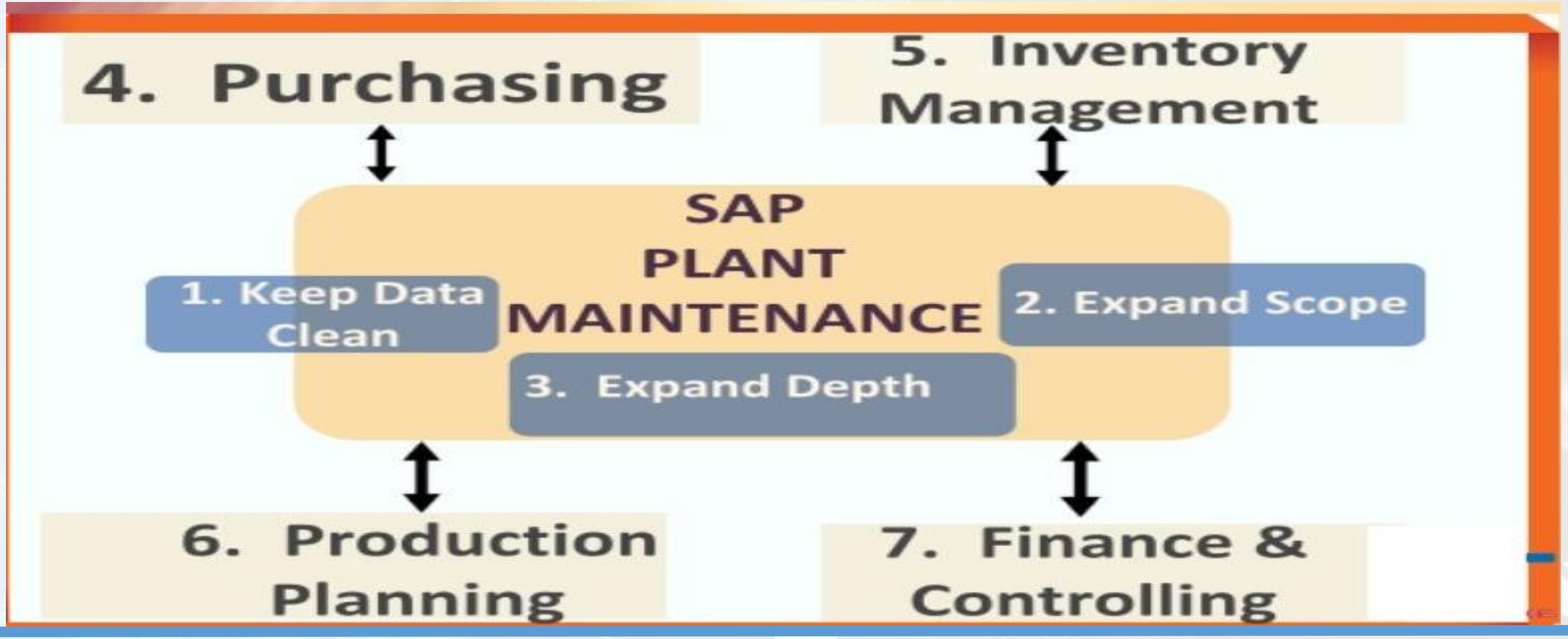
CMMS



Paper vs. Mobile Work Order Process Flow



كيفية بناء نظام رقمي للصيانة



WHAT IS SAP PLANT MAINTENANCE & WHY IS IT IMPORTANT?

Every plant **operator** and **manager** should take plant maintenance seriously to avoid

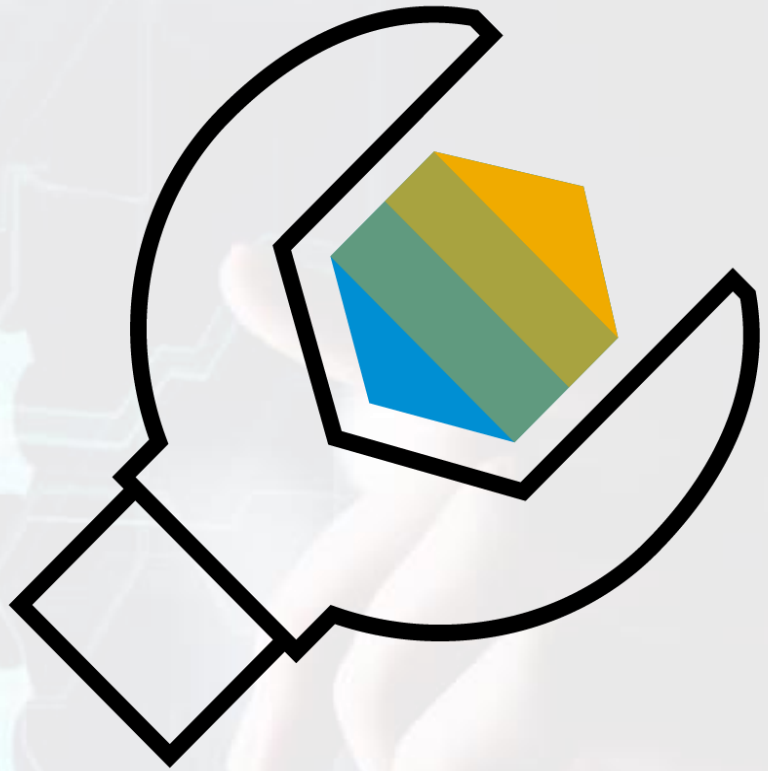
- **unexpected down time**
- **lost production**
- **increased operational costs.**

Plant Maintenance Objectives

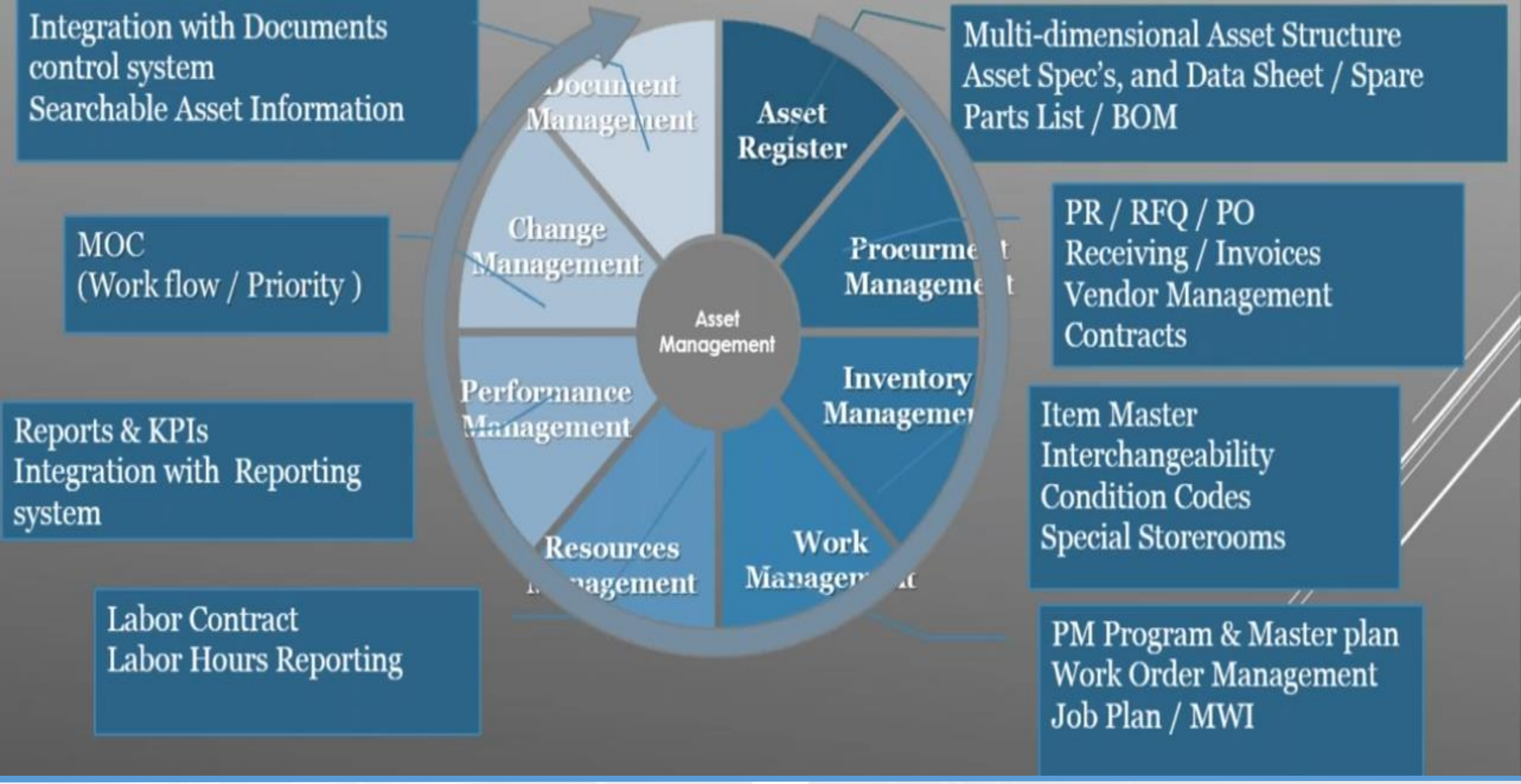
- Plant maintenance ensures that all machines are **kept in optimal condition** – without interruption. Continual support also makes sure that a plant's equipment is always ready for use **by minimizing unanticipated production interruptions** from an undiscovered state.
- The **cost** of **a significant breakdown** in your plant can be staggering. Therefore, plant maintenance helps **avoid equipment breakdown and the loss of productivity.**
- Even more importantly, proper plant maintenance **ensures safety** to all work personnel.

Plant Maintenance Strategies

- Corrective Maintenance
- Emergency Maintenance
- Preventive Maintenance



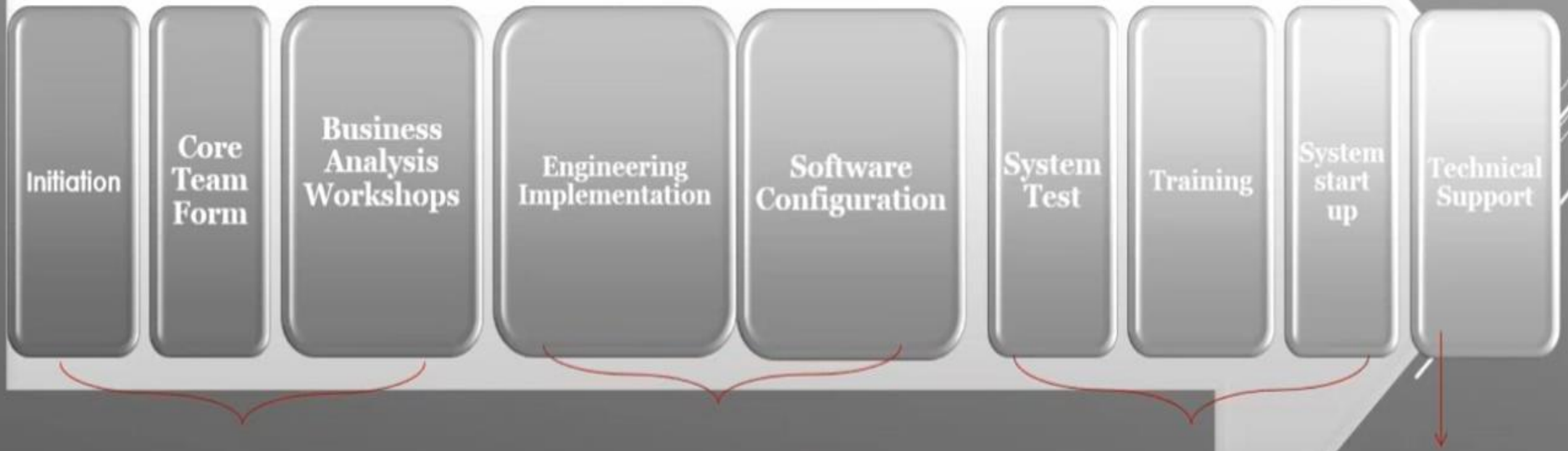

SAP Plant Maintenance
Organization Maintenance
Technical Object Management
Plant Maintenance Information System
Plant Maintenance
Maintenance Order Management
Equipment Measurement Record
Refurbishment Processing
Preventive Maintenance Processing


Integration with Documents control system
Searchable Asset Information
Multi-dimensional Asset Structure
Asset Spec's, and Data Sheet / Spare Parts List / BOM
MOC
(Work flow / Priority)
PR / RFQ / PO
Receiving / Invoices
Vendor Management
Contracts
Reports & KPIs
Integration with Reporting system
Item Master
Interchangeability
Condition Codes
Special Storerooms
Labor Contract
Labor Hours Reporting
PM Program & Master plan
Work Order Management
Job Plan / MWI
Asset Management
Asset Register
Change Management
Inventory
Performance Management
Resources
Work

EAMS RIGHT SELECTION

- System Features and Capabilities
- Interface and Ease of Use
- System experience in industry
- Ability of integration with support system
- System security
- Program Stability
- Vendor Support
- Cost (licenses – technical support hardware- Software)

IMPLEMENTATION TIMELINE



ASSET HIERARCHY

Implement the all asset and equipments with main information based on the ISO 14224 Taxonomy