



ERP in Maintenance Management

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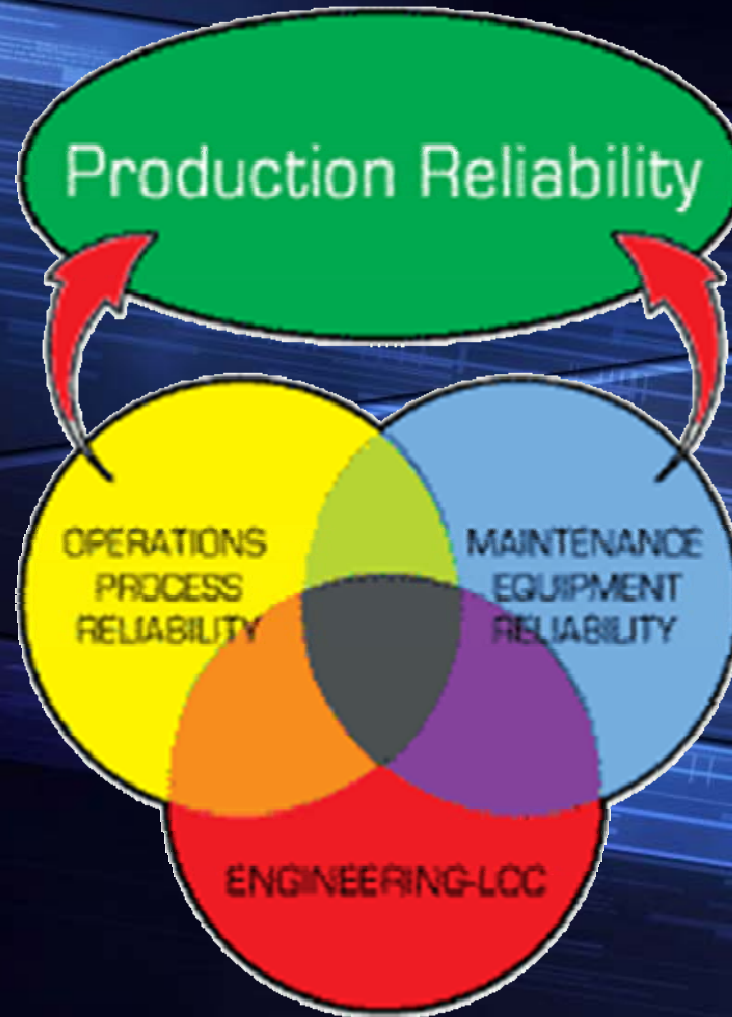
- Chernobyl (Ukraine 1986)
 - The accident killed 56 people, 28 of whom died within weeks from radiation exposure. It also caused radiation sickness in a further 200-300 staff and firefighters
 - About 130,000 people received significant radiation doses
 - About 4000 cases of thyroid cancer in children

Incidence



- The Northeast Blackout (America 2003)
 - estimated \$13 billion in productivity
 - Some 50 million users were affected over several days in eight U.S. states and Ontario, Canada
- The disaster of the space shuttle Columbia

Why need Maintenance Management?



Why need Maintenance Management?



- The goal for any plant is to increase overall production reliability, meaning the maximization of output with current resources by reducing waste in equipment reliability and process reliability. Equipment and process reliability jointly create reliable production.
- It is also important to consider health, safety and environment (HSE) issues related to malfunctioning equipment.

Corrective Maintenance



- Corrective maintenance is probably the most commonly used maintenance approach, but it is easy to see its limitations. When equipment fails, it often leads to downtime in production. In most cases this is costly business. It is also important to consider health, safety and environment (HSE) issues related to malfunctioning equipment.
- Corrective maintenance (repair), is conducted to get equipment working again.

Preventive Maintenance(1)



- Preventive maintenance is conducted to keep equipment working and/or extend the life of the equipment.
 1. The care and servicing by personnel for the purpose of maintaining equipment and facilities in satisfactory operating condition by providing for systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects

Preventive Maintenance(2)



- Preventive maintenance is conducted to keep equipment working and/or extend the life of the equipment.
 1. Maintenance, including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring.

Preventive Management



- Prevent problems: sounds easy but in fact preventive management involves a whole range of skills, including alertness, keeping up the pace, establishing routines and procedures.
- You can't prevent all problems - you will have to learn by experience.

Condition-based maintenance (CBM)



- CBM is based on using real-time data to prioritize and optimize maintenance resources. Observing the state of the system is known as condition monitoring. Such a system will determine the equipment's health, and act only when maintenance is actually necessary

Predictive Maintenance



- (PdM or CBM) techniques help determine the condition of in-service equipment in order to predict when maintenance should be performed. This approach offers cost savings over routine or time-based preventive maintenance, because tasks are performed only when warranted.

Reliability-Centered Maintenance



- RCM, is a process to ensure that assets continue to do what their users require in their present operating context.
- RCM, emphasizes the use of predictive maintenance (PdM) techniques in addition to traditional preventive measures. When properly implemented, RCM provides companies with a tool for achieving lowest asset Net Present Costs (NPC) for a given level of performance and risk.

Evaluation Criteria for RCM Processes



- What is the item supposed to do and its associated performance standards?
- In what ways can it fail to provide the required functions?
- What are the events that cause each failure?
- What happens when each failure occurs?
- In what way does each failure matter?
- What systematic task can be performed proactively to prevent, or to diminish to a satisfactory degree, the consequences of the failure?
- What must be done if a suitable preventive task cannot be found?

Risk based Inspection



- **RBI** is a risk-based approach to inspection in the Oil and Gas industries. This type of inspection analyzes the likelihood of failure and the consequences of the same, often in industrial pipe work
- **RBI** will assist a company to select cost effective and appropriate maintenance and inspection tasks and techniques, to optimize such efforts and cost, to shift from a reactive to a proactive maintenance regime.

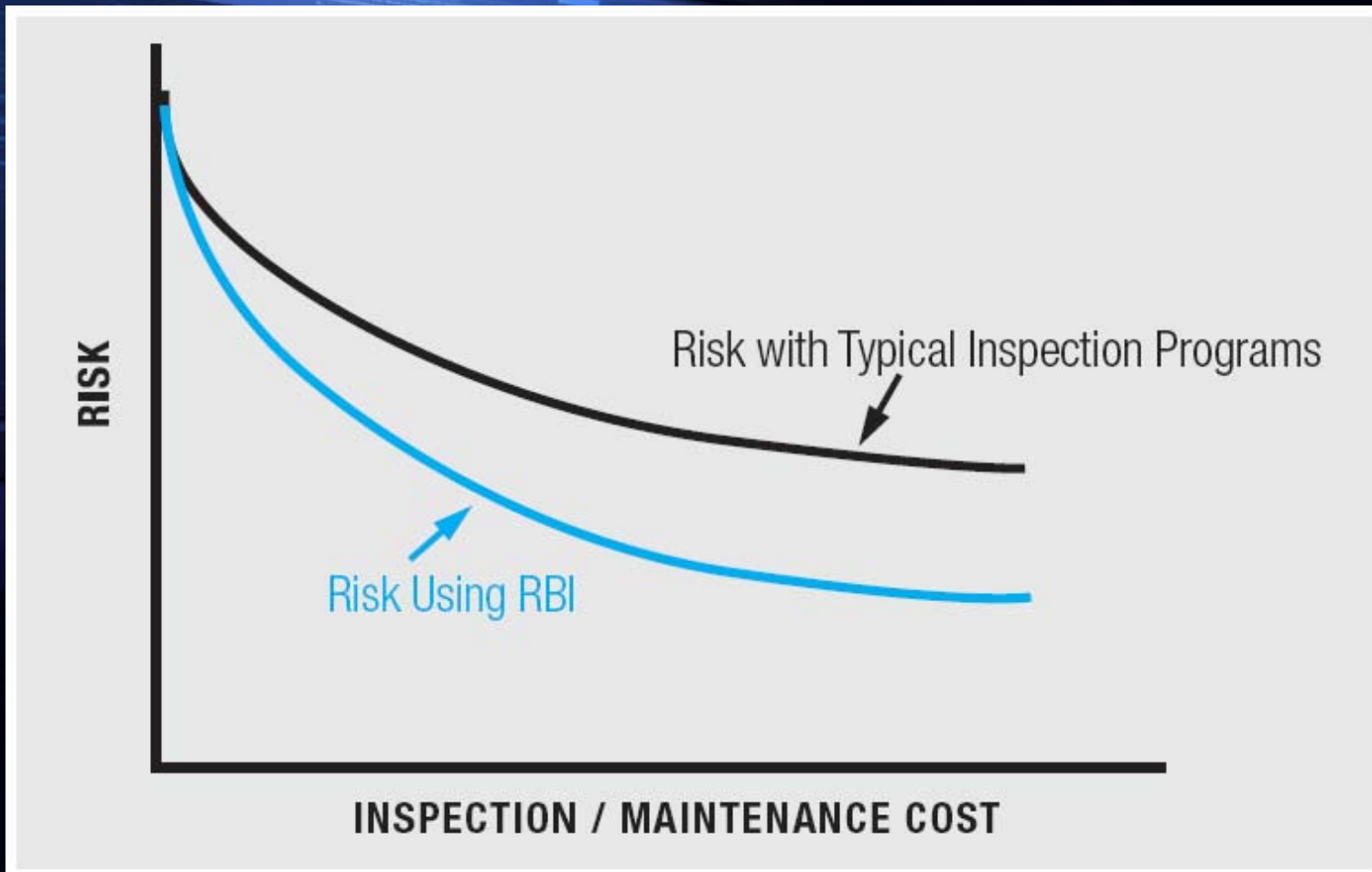
RBI purposes



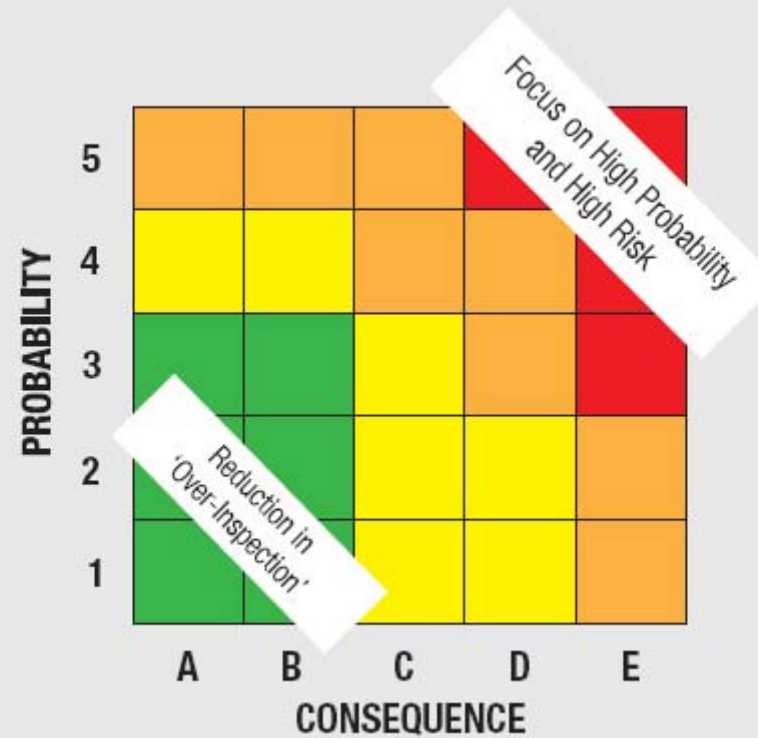
The purposes of RBI include:

- To move away from time based inspection governed by minimum compliance with rules, regulations and standards for inspection.
- To apply a strategy of doing what is needed for safeguarding integrity and improving reliability and availability of the unit by planning and executing those inspections that are needed.
- To provide economic benefits such as fewer inspections, shorter shutdowns, longer run length, and less frequent shutdowns.
- To safeguard integrity.

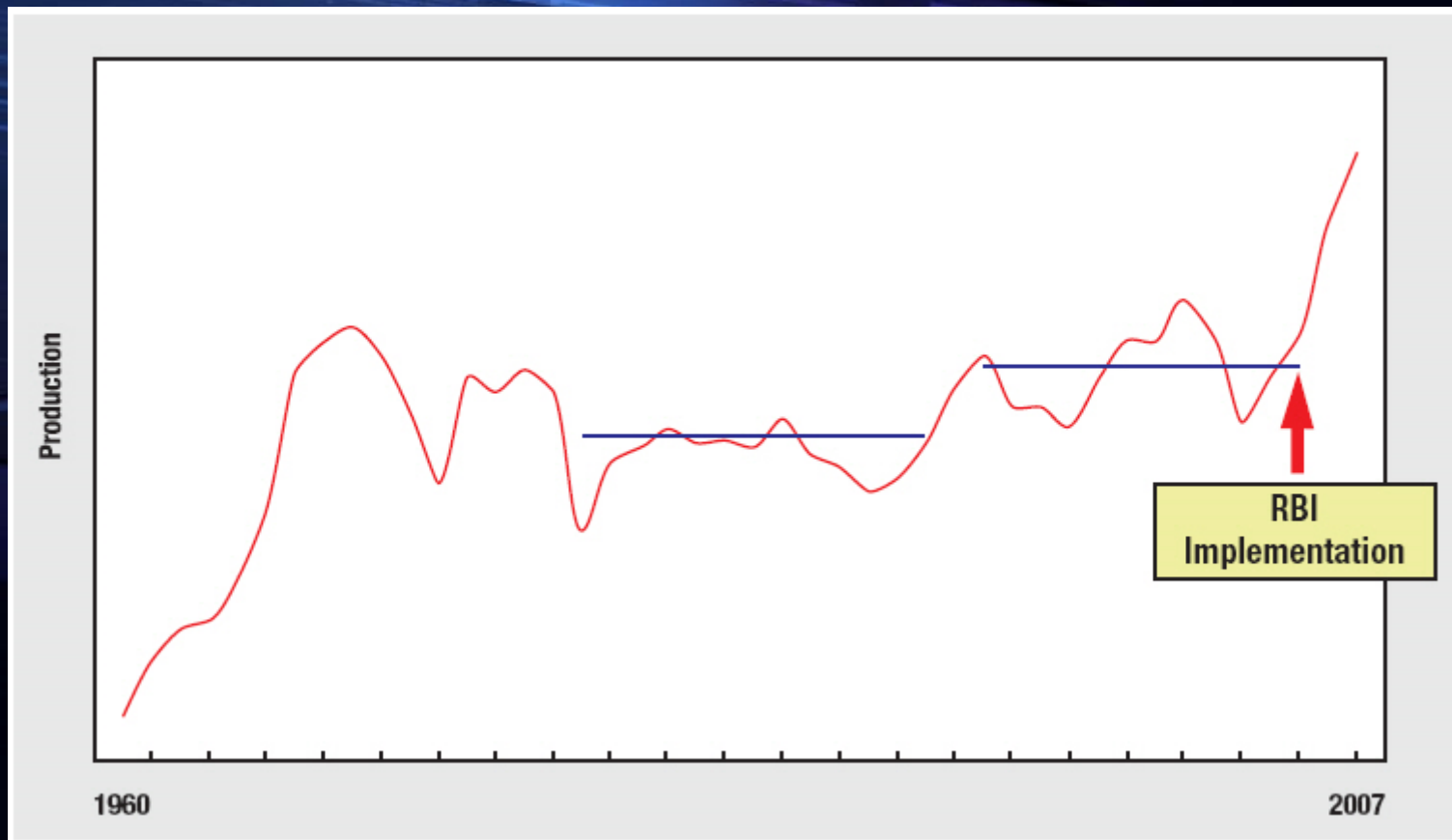
Management of Risk Using RBI



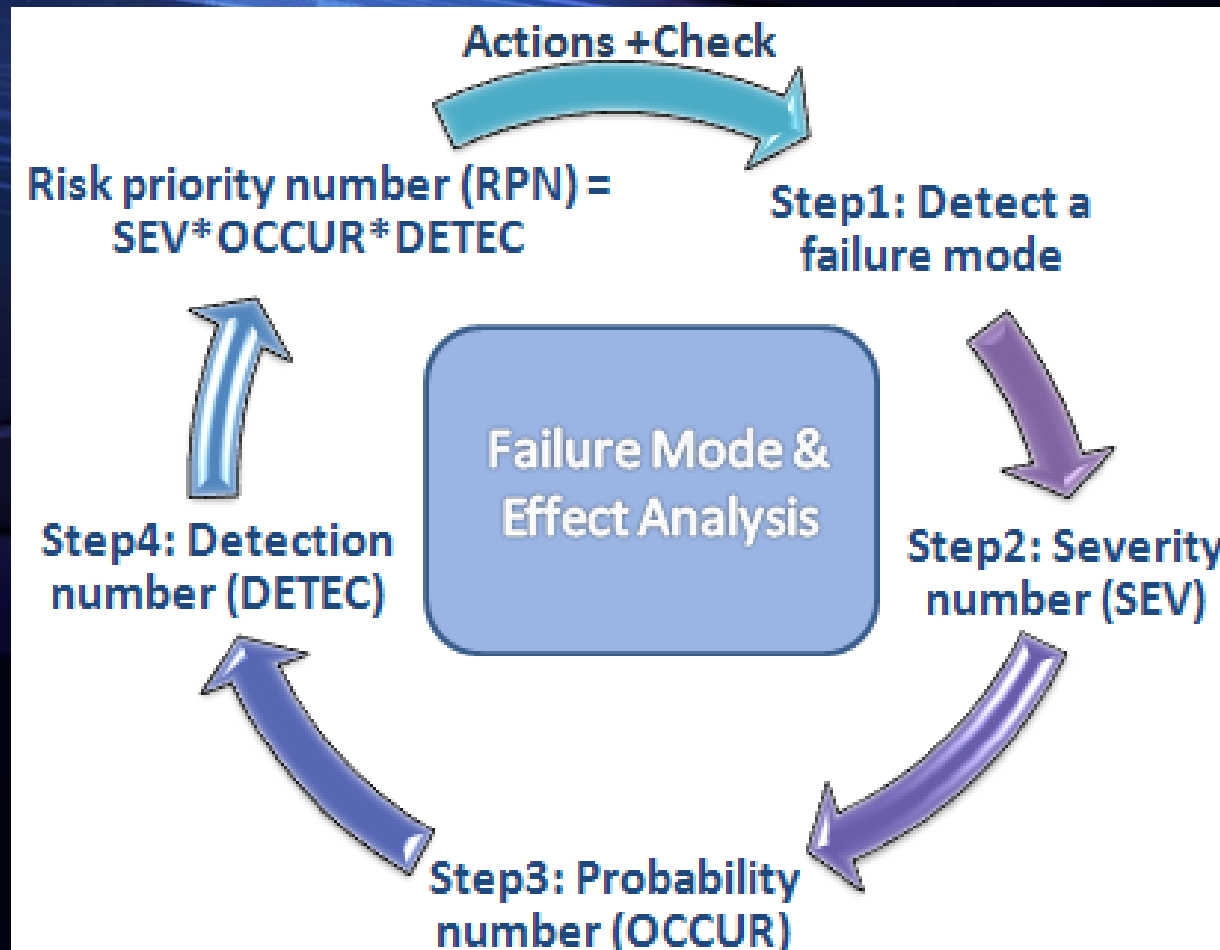
Risk as Probability times Consequence of Failure



Production Growth achieved after RBI Implementation



Failure modes and effects analysis (FMEA)



Basic terms



- *Failure mode*: "The manner by which a failure is observed; it generally describes the way the failure occurs."
- *Failure effect*: Immediate consequences of a failure on operation, function or functionality, or status of some item
- *Indenture levels*: An identifier for item complexity. Complexity increases as levels are closer to one.

Basic terms



- *Local effect*. The Failure effect as it applies to the item under analysis.
- *Next higher level effect*. The Failure effect as it applies at the next higher indenture level.
- *End effect*. The failure effect at the highest indenture level or total system.

Basic terms



- *Failure cause*: Defects in design, process, quality, or part application, which are the underlying cause of the failure or which initiate a process which leads to failure.
- *Severity*: "The consequences of a failure mode. Severity considers the worst potential consequence of a failure, determined by the degree of injury, property damage, or system damage that could ultimately occur."

Risk Based Inspection



- Risk Based Inspection significantly reduces maintenance efforts and increases plant reliability and availability at the same time.
 - is a consequent development of traditional maintenance strategies that minimizes maintenance expenses,
 - belongs to the knowledge based methodologies focusing on safety and plant availability on demand by increasing on-stream time due to less turn-around time and a consequent reduction of unexpected failures,

Risk Based Inspection



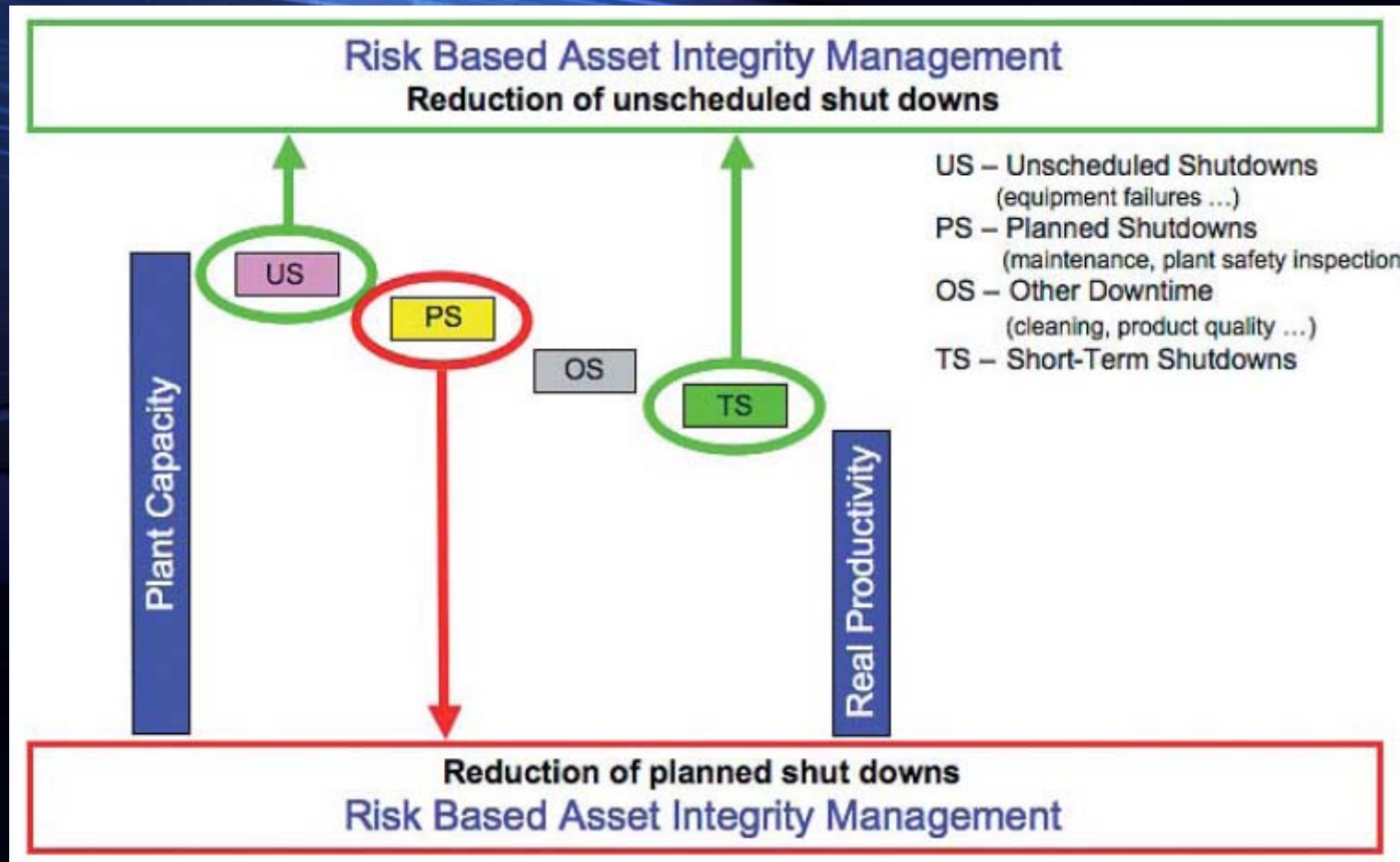
- ❑ is a systematic tool that helps users to make informed business decisions regarding inspection and maintenance expenses,
- ❑ identifies “Weak Points” and “Bad Actors”,
- ❑ enables evolution from a “Bandage Approach” to a sustaining reliability culture,
- ❑ is a recognized way towards “Best In Class Performance” and “Operational Excellence”,

Risk Based Inspection



- ❑ means fostering replacement strategy,
- ❑ is measuring risk as a key performance indicator,
- ❑ implies prioritization in maintenance efforts,
- ❑ extends inspection intervals where local authorities recognize Risk Based Inspection (RBI), and
- ❑ allows determination of external alternative inspection methods to avoid internal entry.

Opportunities in Operations in use of Risk-Based Asset Integrity Management



ERP



(ERP) Enterprise Resources Planning

- Uniform information system
- Handles all processes of an enterprise
- Data are stored only at once
- Data are stored at the moment they have created

Methodology



Integrate various types of MM into ERP using SAP (Tool) and Target Groups are

- Petro Chemical Plants

or

- Nuclear Plants

SAP



- SAP = Systems, Applications and Products in Data Processing
- One of Largest ERP Software Vendor in the World
- 80% Fortune 500 Companies Use SAP
- Over 18,500 Customers in 120+ Countries
- Over 12 million users



Q & A

Thank You !