



Planning for Safety: The Importance of Production and Maintenance Planning in Process Safety Management

WILLEM PRINSLOO



FOR EXPLOSIVES, THINK BME.



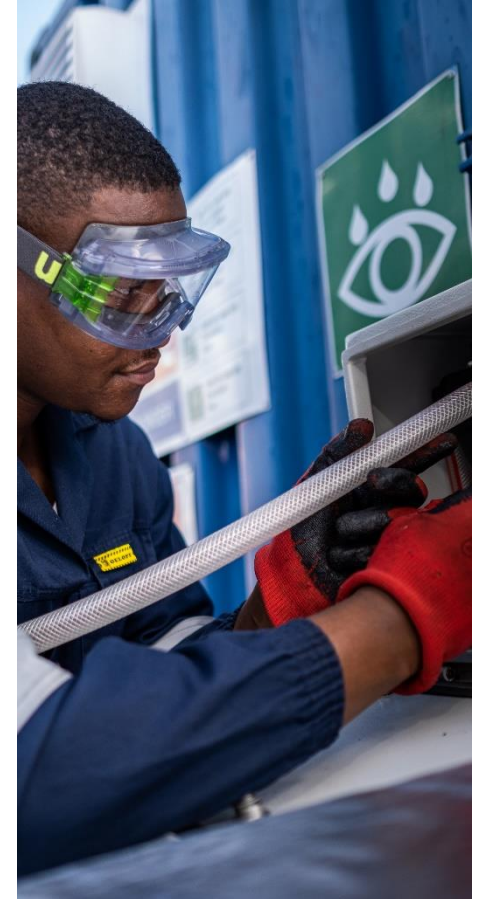
CONTENT

- 1 INTRODUCTION
- 2 DEFINITIONS
- 3 PLANNING
- 4 IMPLEMENTATION
- 5 CONCLUSION

INTRODUCTION

- **Objective:**

- To highlight the critical role of production and maintenance planning in process safety management.
- To provide actionable insights for improving safety systems, with a focus on reducing the probability of human error



DEFINITIONS



Process Safety Management

- "Process Safety Management, or PSM, refers to a framework of procedures and practices designed to prevent accidents and incidents in industrial processes."



Maintenance Planning

- Maintenance planning is the systematic process of organizing and scheduling maintenance activities to ensure the optimal performance and longevity of equipment and facilities.



Production Planning

- Production planning is the process of strategically organizing the production and manufacturing activities within an organization to ensure that products are produced efficiently, on time, and within budget.



Human Error

- Human error refers to unintended actions or decisions made by individuals that lead to deviations from expected performance or safety standards. In the context of process safety management, human error encompasses mistakes, omissions, or incorrect actions by personnel that can result in accidents, incidents, or unsafe conditions.

- **Key Points:**

- Definition and types of human error (intentional/unintentional omission, intentional/unintentional commission, competency)
- Importance of addressing human error in safety planning

Table 1: Five Categories of Human Error

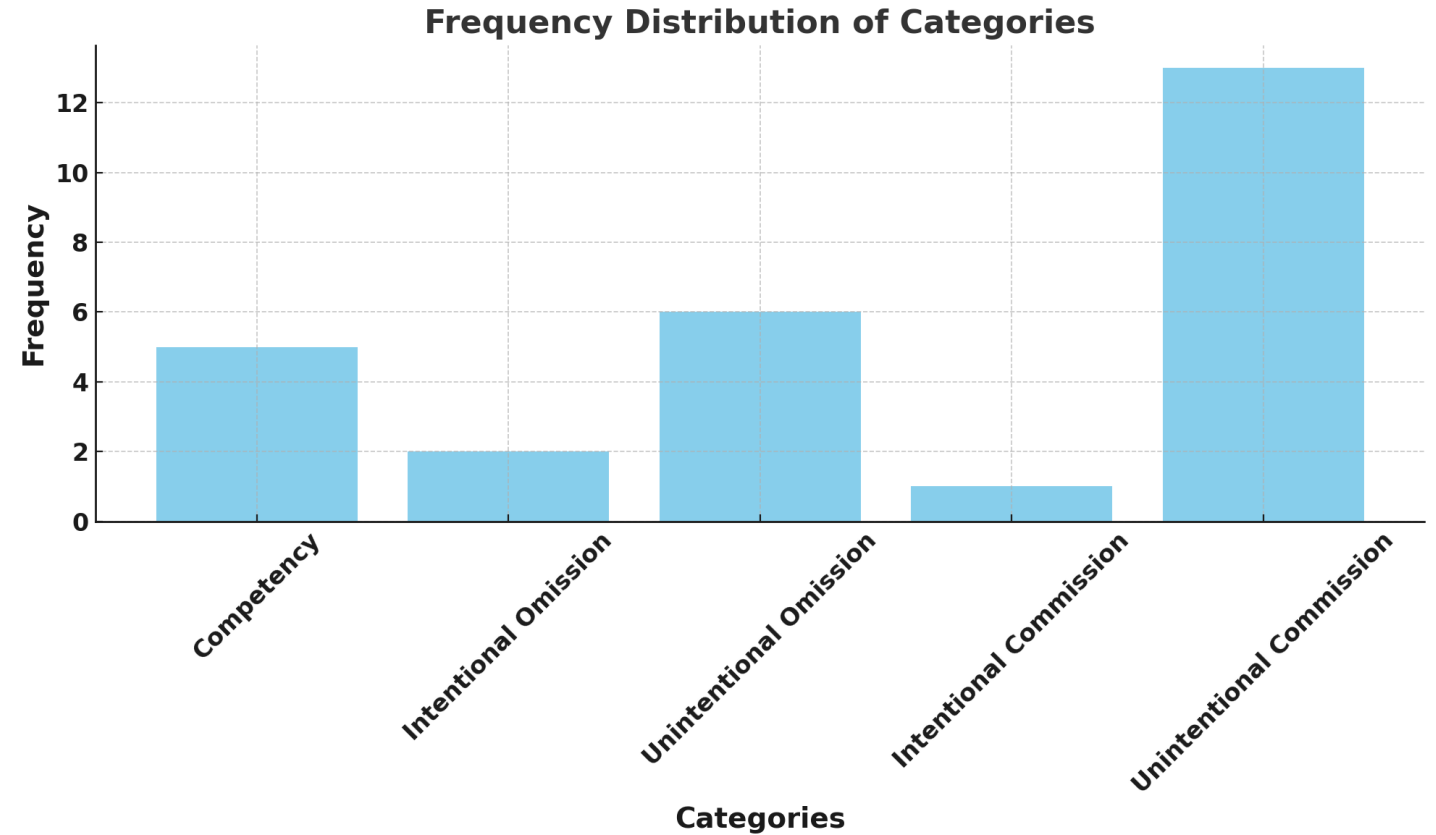
Types of Human Error	Definition
Intentional Omission	Error caused by people intentionally omitting steps in the procedures
Unintentional Omission	Error caused by people accidentally omitting steps in the procedures
Intentional Commission	Error caused by individuals/ groups intentionally altering the procedures or performing them incorrectly
Unintentional Commission	Error caused by individuals/ groups accidentally altering the procedures or performing them incorrectly
Competency	Error caused by individuals who aren't capable of performing a task or recognizing hazardous situations

(Gambetti, Casalli, & Chisari, 2012)

UNDERSTANDING HUMAN ERROR

• Typical Processes:

- Receiving and installing equipment
- Commissioning
- Operating the process
- Starting up and shutting down the process
- Troubleshooting
- Maintaining, inspecting and repairing the process

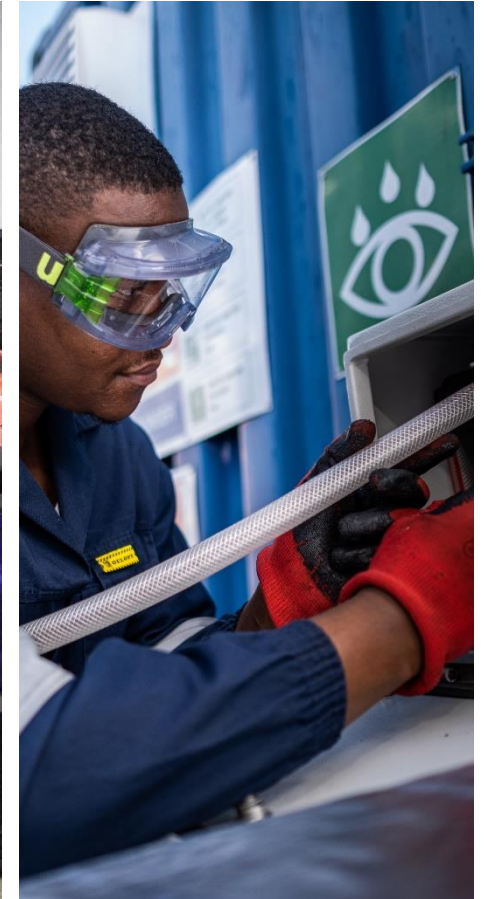


UNDERSTANDING HUMAN ERROR

7

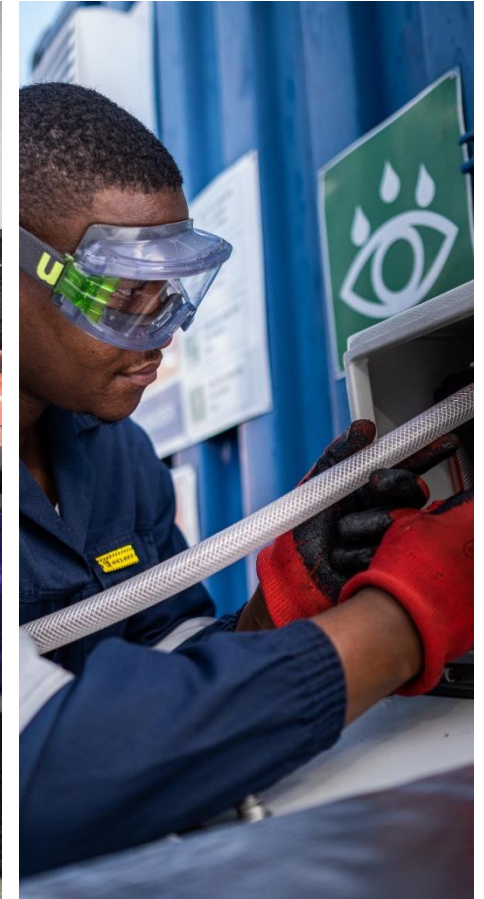
How pressure contributes:

- **Cognitive Overload:**
 - High pressure increases cognitive load, making it harder to process information.
- **Stress and Fatigue:**
 - Stress and fatigue impair concentration and memory.
- **Time Constraints:**
 - Rushing tasks under time pressure leads to skipped steps and errors.
- **Reduced Attention to Detail:**
 - High pressure narrows focus, causing missed details.
- **Emotional Responses:**
 - Anxiety and frustration interfere with logical thinking



CASE STUDY

- **Highly optimized** for continuous throughput
- **24/7 Operation**
- **Routine** loading and off-loading cadence
- **Batch** process, with several different product lines
 - Change-overs are intensive
 - Different raw materials
 - Different specifications
 - Not all products are produced to stock
 - Deliveries are time critical
- **Highly sensitive** to process disturbances
- **Maintenance Intensive**



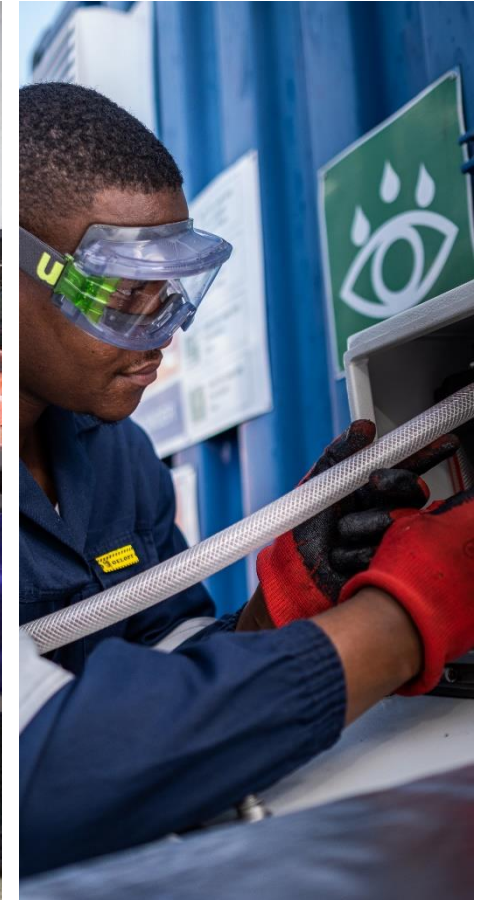
Question

Would procedure and document review play a role in planning?

Which departments will play a role in planning?

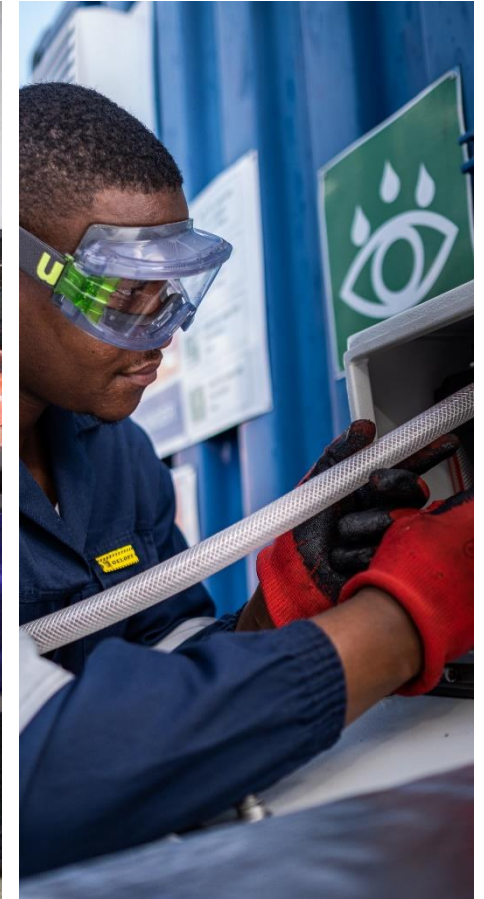
Key Components of Production Planning

- **Risk Identification:** Implements mitigation measures based on identified risks for human error.
- Risks Included in Process/Planning Procedures
- **Resource Optimization:** Ensures efficient use of resources – reduces disruptions and pressure on employees
- **Clear Communication:** Delivery dates and schedule communicated and visible to all stakeholders
- **Scheduling:** Balances workload, reduces stress and fatigue.



Key Components of Maintenance Planning

- **Regular Inspections:** Systematic checks to identify and rectify potential issues before they become serious.
- **Aligned Maintenance Schedules:** Detailed timelines for when maintenance tasks should be performed.
 - **Reduced Disruptions:** Plan maintenance activities in a way that minimizes safety disruptions, especially during changes or transitions
- **Resource Allocation:** Ensuring the availability of skilled personnel, necessary tools, and replacement parts.



Components of Contractor Planning

- **Scheduling Onboarding:**

- Plan onboarding sessions to align with project timelines.

- **Communication Plans:**

- Include regular safety meetings in the project schedule.
- Establish communication protocols within production and maintenance plans.

- **Risk Management:**

- Incorporate contractor-related risks into the overall risk management plan.

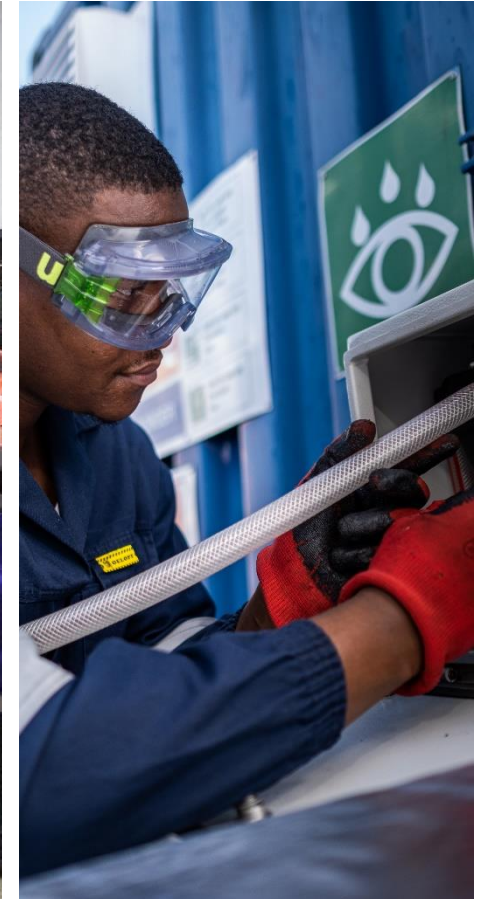
- **Training and Certification:**

- Align training schedules with production and maintenance activities.



Components of Communication/Coordination

- **Clear Protocols:**
 - Establish clear communication protocols.
 - Ensure all team members understand their roles and responsibilities.
- **Regular Meetings:**
 - Schedule regular safety meetings.
 - Discuss ongoing and upcoming maintenance tasks.
- **Information Sharing:**
 - Facilitate the sharing of critical information.
 - Use centralized platforms for documentation and updates



JOB ORGANIZATION AND PROCEDURES

Implementation Guideline

•Clear Procedures:

- Develop and document clear procedures for all tasks.
- Ensure procedures are easily accessible to all employees.
- Planning should be part of procedures

•Role Assignment:

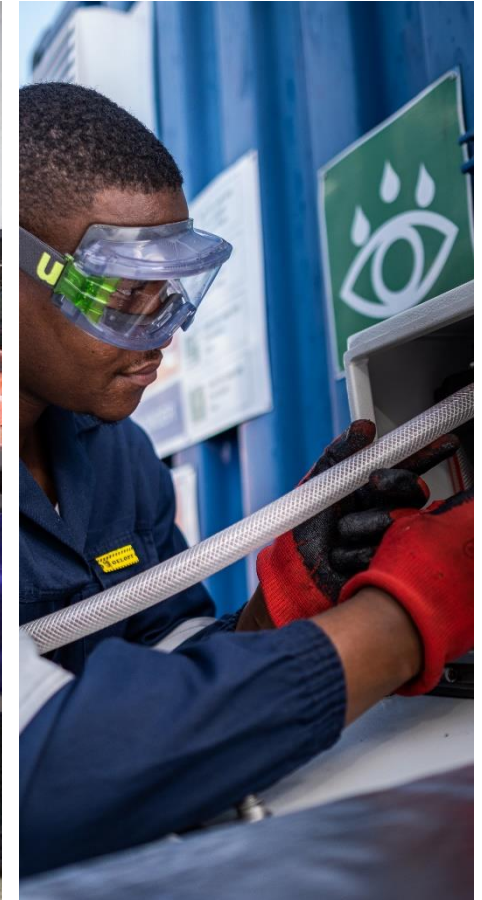
- Clearly define roles and responsibilities.
- Ensure each team member understands their duties in terms of planning and execution

•Training Programs:

- Implement regular training programs specifically on planning.

•Integrate Planning and Risk Management:.

- Address associated risks in policies and protocols.
- Dedicated procedures that address risks with unplanned/unscheduled activities should exist.



Question

How well does your planning department and schedulers understand and address the risks associated with human error in your plant?

How are these risks incorporated into your production plans and schedules?

How does your plants handle and mitigate the risks associated with unplanned production/maintenance activities?

CASE STUDY (CONTINUED)

- Optimized Scheduling:**

- Develop detailed production schedules that account for the routine loading and off-loading cadence.
- Plan for batch processing with clear timelines for each product line, ensuring smooth transitions between different raw materials and specifications.

- Efficient Changeovers:**

- Implement standardized procedures for changeovers to minimize downtime and ensure consistency.
- Train staff on efficient changeover techniques to handle the intensive nature of these activities.



CASE STUDY (CONTINUED)

- Communication and Coordination:**

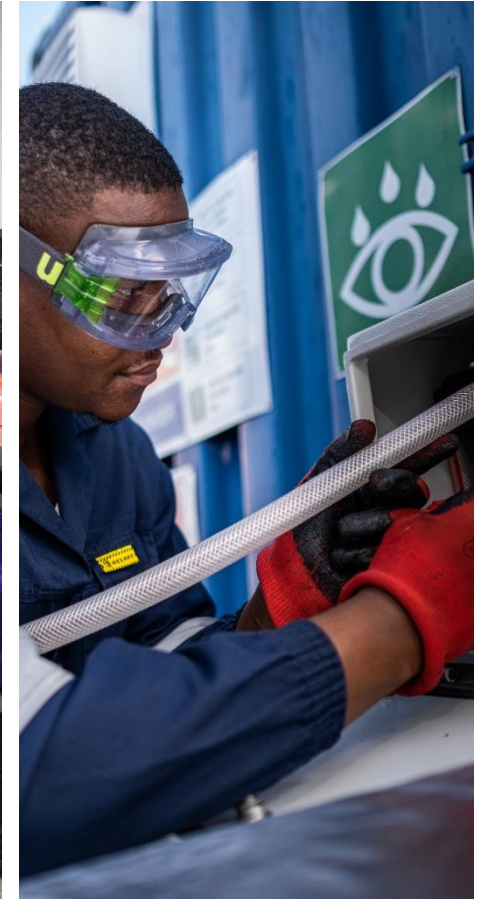
- Establish clear communication channels between maintenance, logistics and production teams to ensure alignment of schedules.
- Hold regular coordination meetings to discuss upcoming maintenance activities and their impact on production.

- Flexibility in Scheduling:**

- Build flexibility into production schedules to accommodate unforeseen maintenance needs with minimal disruption.

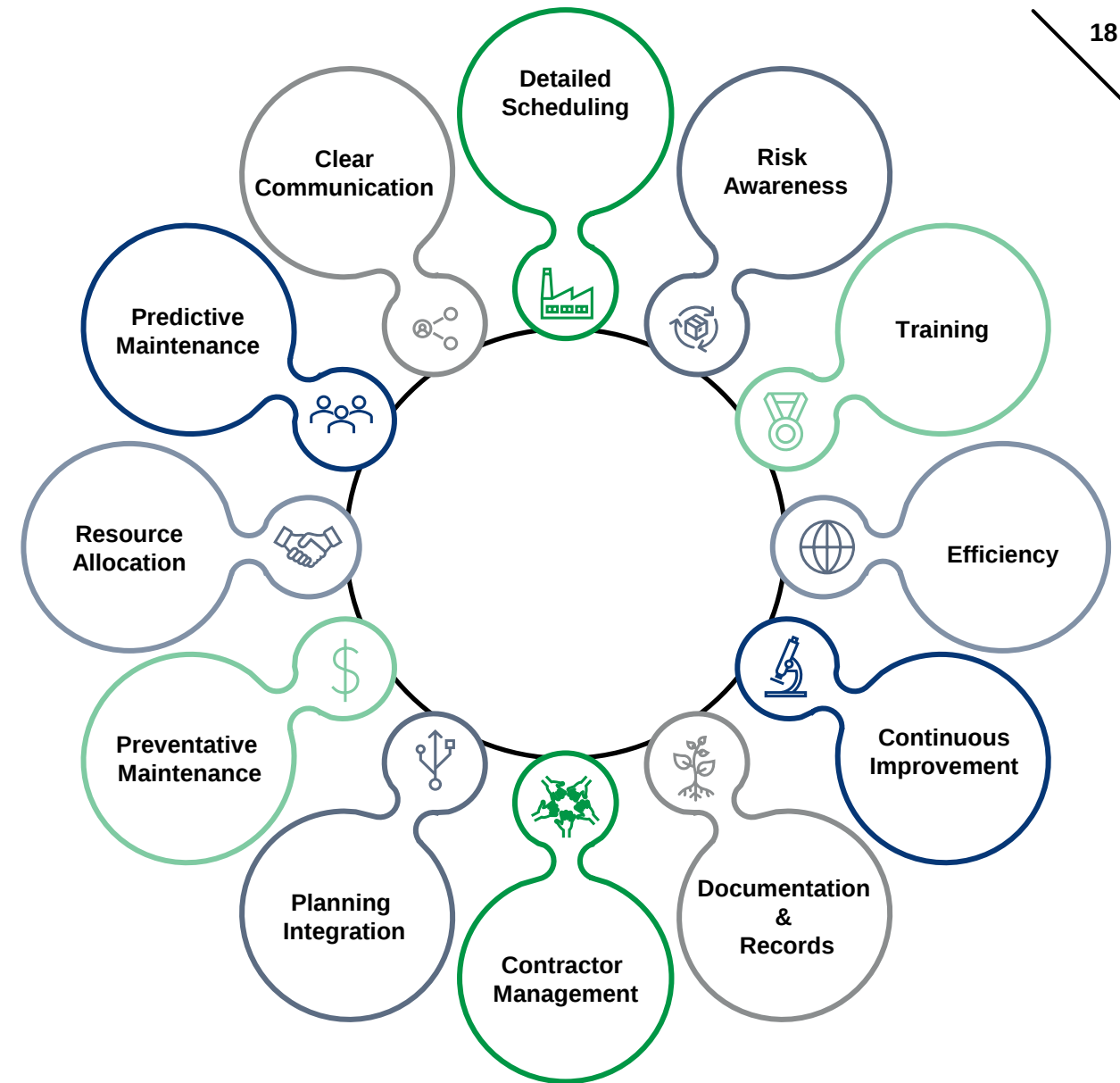
- Continuous Improvement:**

- Use feedback from both maintenance and production teams to continuously improve planning processes.



CONCLUSION

- **12 Aspects** – Planning for safety web
- **Human Error:** Plays a large role in Process safety incidents
- **Planning** doesn't replace fundamental production principles
 - **Supplementary Tool**
 - Can **reduce pressure** on all employees
- **Multidisciplinary Effort:** Between departments
- **Requires Management support**



QUESTIONS?

