WORKFLOW FOR CONDUCTING A PROPER ROOT CAUSE ANALYSIS (RCA)

INTRODUCTION

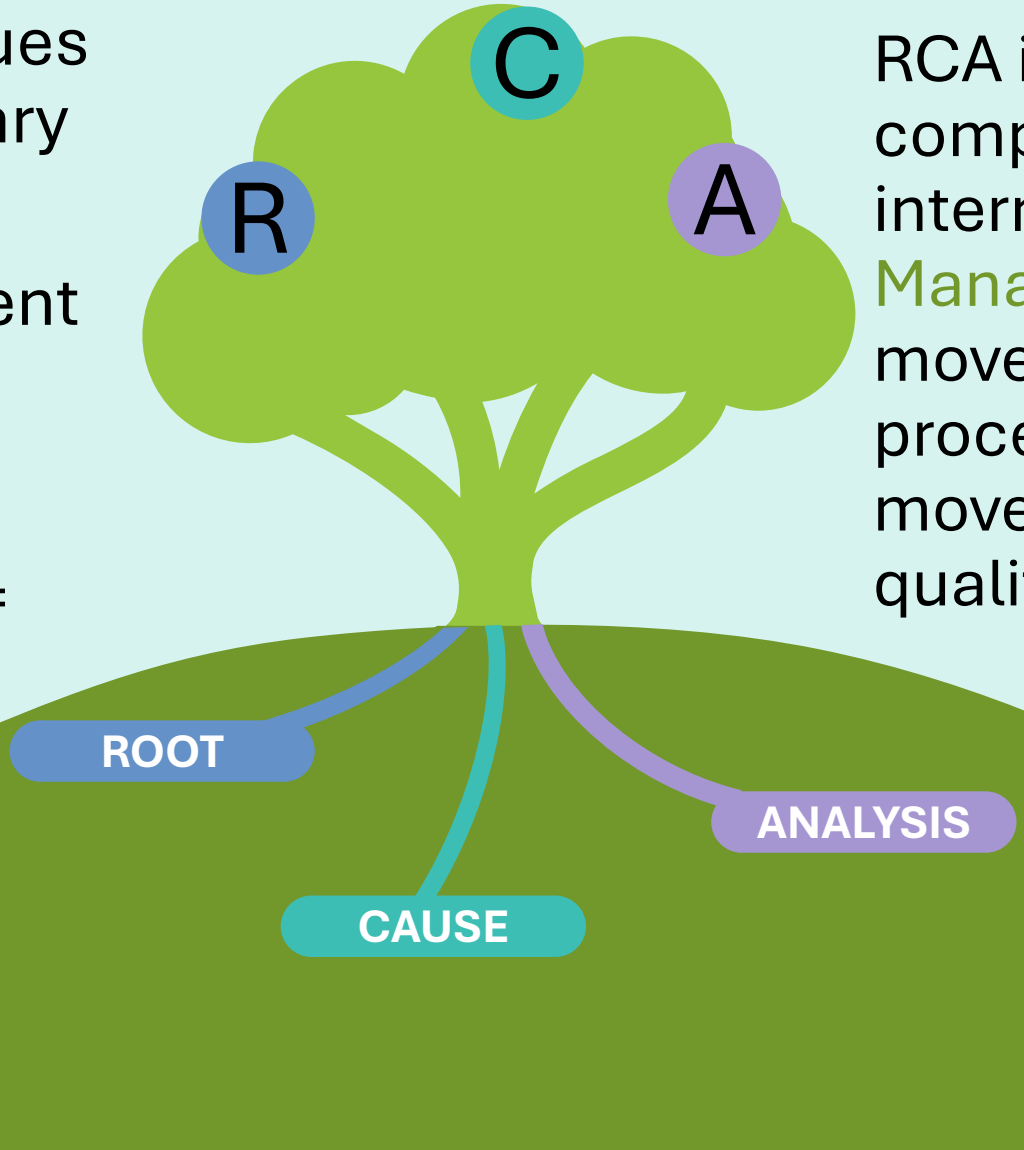
Root cause analysis is simply a tool designed to help incident investigators describe **WHAT** happened during a particular incident, to determine **HOW** it happened, and to understand **WHY** it happened. Only when investigators can determine **WHY** a failure occurred will they be able to specify workable preventive measures.

Define RCA

RCA involves a range of tools, approaches, and techniques used to uncover the primary causes of problems.

The goal of RCA is to prevent recurring issues from happening by eliminating their root causes. The process follows a chain of causes and effects to pinpoint the origin.

Toyota founder *Sakichi Toyoda* originally developed RCA to improve the efficiency of the auto making manufacturing process.



RCA is a critical component of their international Total Quality Management (TQM) movement, the corporate process improvement movement and the drive for quality control.

Benefits

Benefit 1

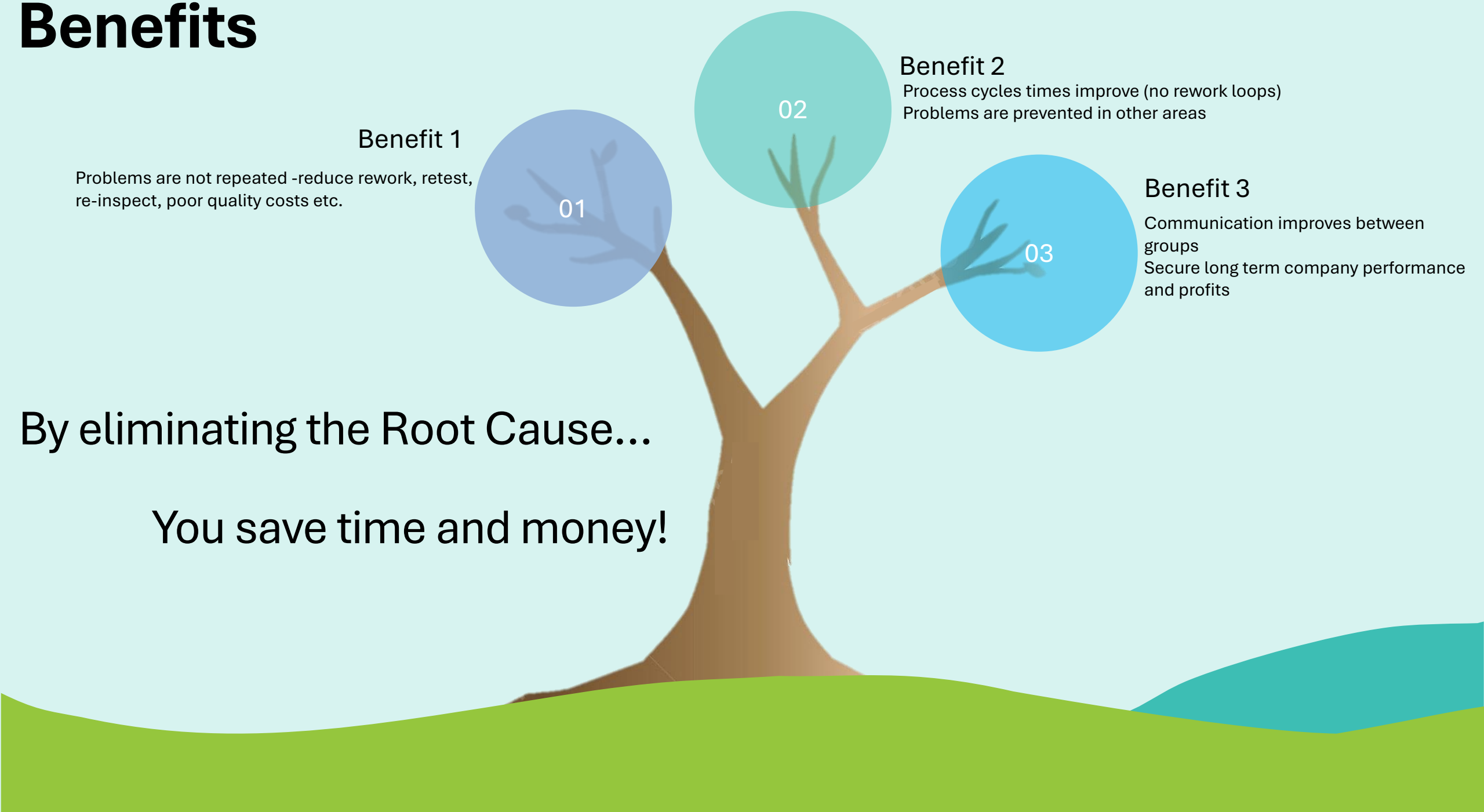
Problems are not repeated -reduce rework, retest, re-inspect, poor quality costs etc.

Benefit 2

Process cycles times improve (no rework loops)
Problems are prevented in other areas

Benefit 3

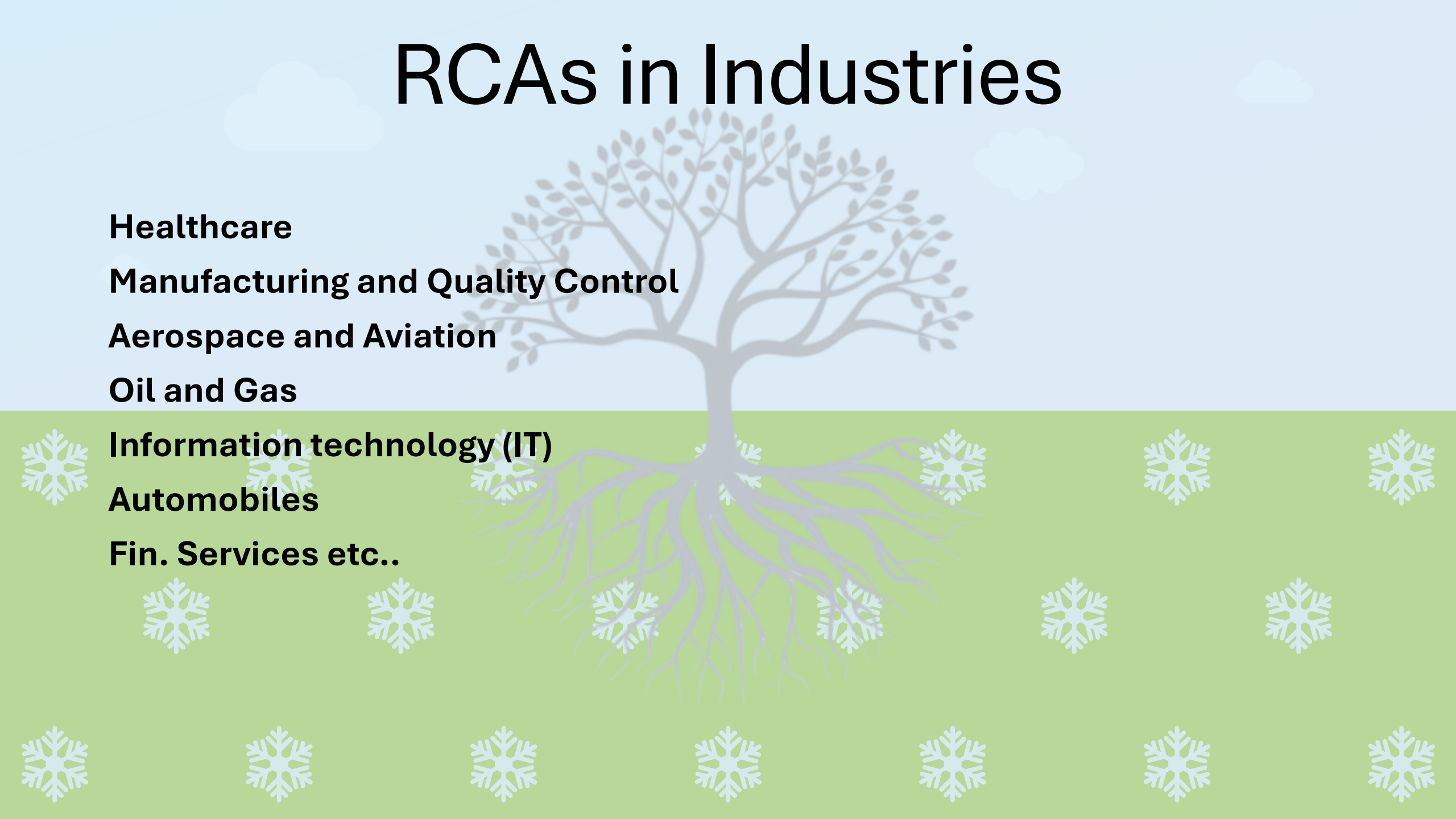
Communication improves between groups
Secure long term company performance and profits



By eliminating the Root Cause...

You save time and money!

RCAs in Industries



Healthcare

Manufacturing and Quality Control

Aerospace and Aviation

Oil and Gas

Information technology (IT)

Automobiles

Fin. Services etc..

Root Cause Analysis Workflow

Identify and Define the Problem

- **Goal**: Clearly articulate the issue to focus the RCA.
- **Steps**:
  - Describe the problem in specific, measurable terms (e.g., "Machine X broke down on 12/15/2024 at 10:00 AM").
  - Identify what is happening (symptoms) and what the desired state is (goal).
  - Set boundaries: Where, when, and how does this problem occur?

Assemble an RCA Team

- **Goal**: Gather expertise from diverse perspectives.
- **Steps**:
  - Select members with knowledge of the process, tools, and systems involved.
  - Include operators, supervisors, technical staff, and stakeholders if necessary.

Define team roles (e.g., facilitator, scribe, investigator).

Root Cause Analysis Workflow 3

Gather and Analyze Data

- **Goal**: Collect evidence to understand the problem's scope and impact.
- **Steps**:
  - Review documentation (logs, reports, audit trails).
  - Conduct interviews with involved personnel.
  - Inspect physical evidence or locations.

Create a **timeline** of events to visualize what led up to the problem.

Identify Potential Causes

- **Goal**: Brainstorm and categorize possible causes.
- **Tools & Methods**:
  - **5 Whys Technique**:
    - Ask “Why?” repeatedly until you reach the root cause.
  - **Fishbone Diagram (Ishikawa)**:
    - Organize causes into categories like People, Process, Technology, Materials, Environment, etc.
  - **Fault Tree Analysis (FTA)**:
    - Diagram logical steps leading to the failure.

Determine the Root Cause

- **Goal**: Pinpoint the fundamental issue that triggered the problem.
- **Steps**:
  - Use evidence to validate or eliminate potential causes.
  - Focus on systemic issues rather than one-off errors.

Cross-check findings with the team to ensure accuracy and agreement.

Develop Corrective Actions

- **Goal**: Create specific, actionable solutions that address the root cause.
- **Steps**:
  - Ensure corrective actions are **SMART** (Specific, Measurable, Achievable, Relevant, Time-bound).
  - Involve team members in evaluating feasibility.

Include contingency plans to handle risks or barriers.

Implement and Monitor Solutions

- **Goal**: Execute and evaluate corrective actions.
- **Steps**:
  - Assign responsibilities and timelines for each action.
  - Monitor outcomes through regular progress reviews.

Measure effectiveness using KPIs or benchmarks.

Document and Share Findings

- **Goal**: Capture learnings to prevent recurrence and promote improvement.
- **Steps**:
  - Write a comprehensive RCA report (include problem details, analysis, findings, corrective actions, and results).
  - Share findings with relevant stakeholders.

Update procedures, training, or policies based on RCA outcomes.

Follow-Up and Review

- **Goal**: Ensure the problem is resolved and doesn't recur.
- **Steps**:
  - Conduct a follow-up after a set period to verify that actions were effective.
  - Review related processes for potential improvements.

Close the RCA process only when sustained results are observed.

Scenario:

Problem: The production line is experiencing frequent machine downtimes.

5 Whys Technique

Why is the production line experiencing frequent downtimes?
Because the machine keeps breaking down.

Why does the machine keep breaking down?
Because the motor is overheating.

Why is the motor overheating?
Because the cooling system isn’t functioning properly.

Why isn’t the cooling system functioning properly?
Because the coolant pump is malfunctioning.

Why is the coolant pump malfunctioning?
Because it hasn't been maintained regularly.

Root Cause: The coolant pump is not maintained regularly.

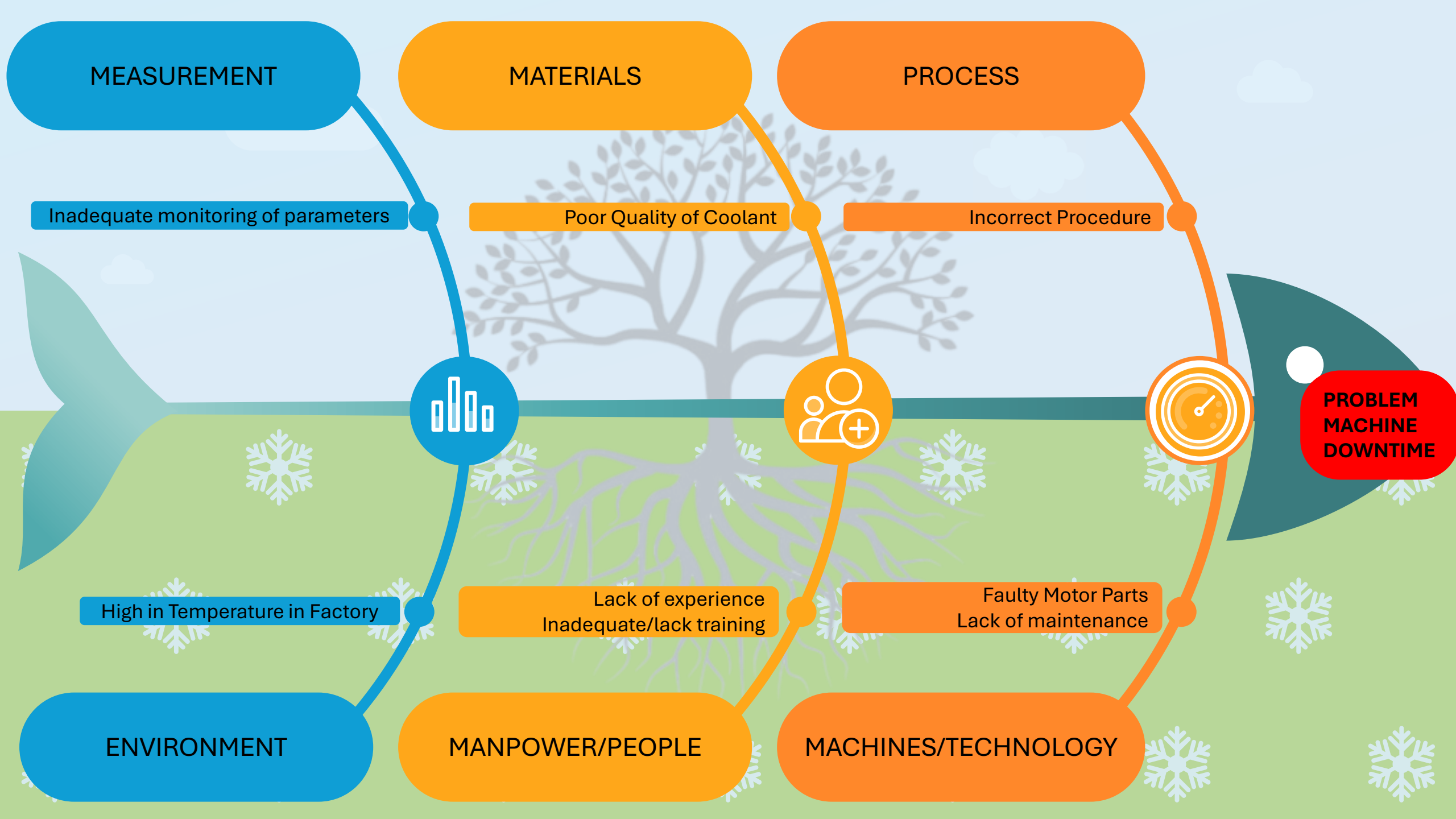
Fishbone Diagram (Ishikawa)

The Fishbone diagram organizes possible causes into categories. For the production line issue, we can create categories as follows:

Categories:

- **People**
- **Process**
- **Technology**
- **Materials**
- **Environment**
- **Measurement**

- **People**: Lack of training on maintenance.
- **Process**: Incorrect procedures for machine upkeep.
- **Technology**: Faulty motor or sensor systems.
- **Materials**: Poor quality coolant.
- **Environment**: High factory temperatures affecting machinery.
- **Measurement**: Inadequate monitoring of parameters


MEASUREMENT
MATERIALS
PROCESS
Inadequate monitoring of parameters
Poor Quality of Coolant
Incorrect Procedure
PROBLEM
MACHINE
DOWNTIME
High in Temperature in Factory
Lack of experience
Inadequate/lack training
Faulty Motor Parts
Lack of maintenance
ENVIRONMENT
MANPOWER/PEOPLE
MACHINES/TECHNOLOGY

Fault Tree Analysis (FTA)

In Fault Tree Analysis, we break down the failure into logical steps, tracing it from the top event (machine downtime) down to its causes.

In this fault tree:

- The **top event** is "Machine Downtime."
- This leads to two primary categories of failure: **Cooling System Failure** and **Mechanical Issue**.
- The **Cooling System Failure** traces down to a neglected pump maintenance, causing pump failure.
- The **Mechanical Issue** could involve motor overheating or a sensor failure.

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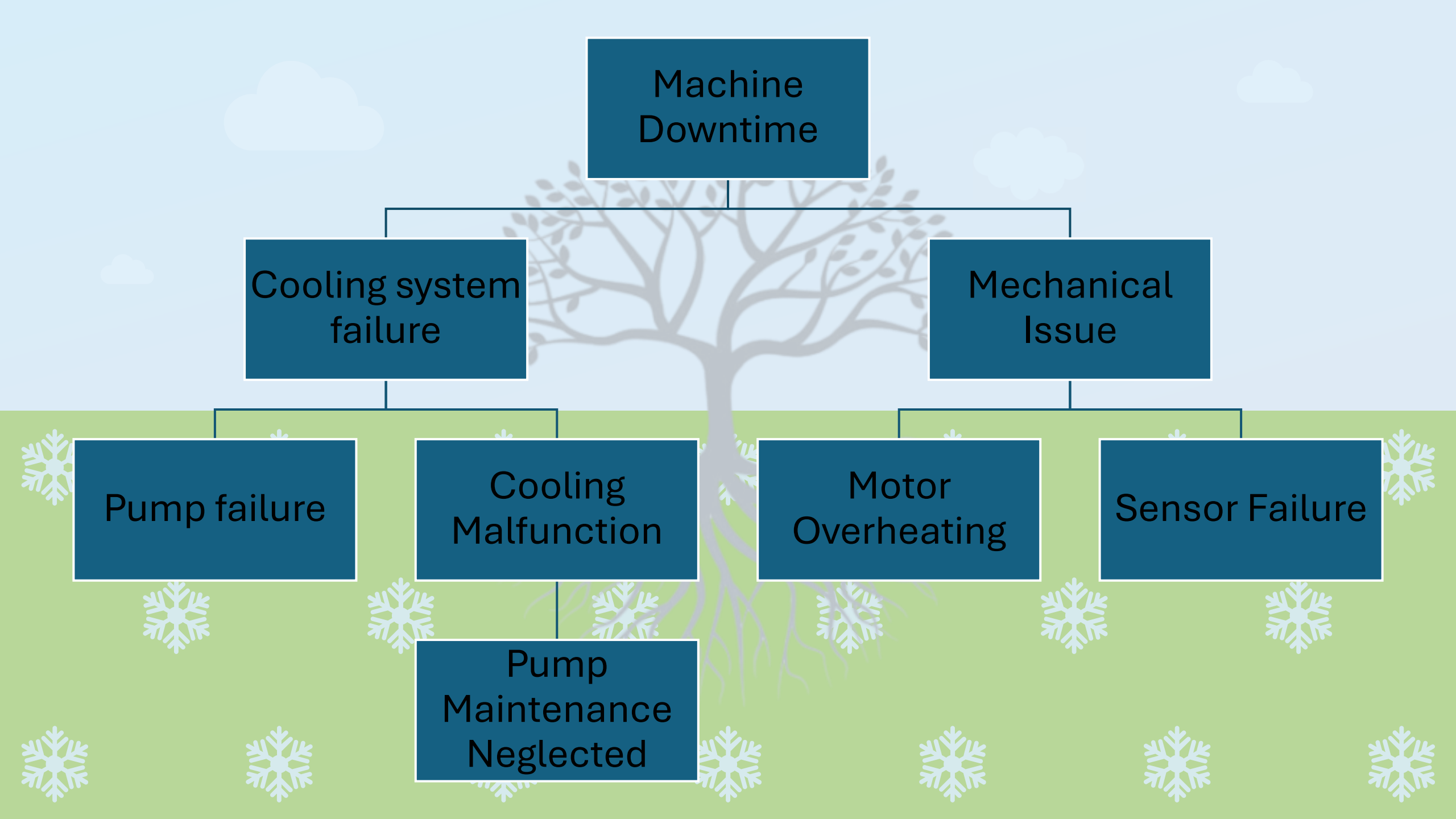
Machine Downtime
Cooling system failure
Mechanical Issue
Pump failure
Cooling Malfunction
Motor Overheating
Sensor Failure
Pump Maintenance Neglected

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NOW, GO MAKE A DIFFERENCE

THANK YOU