PRACTICAL PROBLEM SOLVING

Introduction

This common problem solving process is used to analyze and solve any problem where the root cause in unknown.

There are four major parts of the process:

- Grasp the Situation
- Cause Investigation
- Problem Correction
- Prevention through Errorproofing

♦ Grasp the Situation

During the first part of the process, you:

- Identify the Problem
- Clarify the Problem
- Locate the Point of Cause (PoC)

♦ Cause Investigation

In the second part of the process, you:

- Conduct a “5-Why” investigation to identify the root cause
  - for the specific problem
  - for why the problem was not detected
  - for why the “system” allowed the problem to occur

♦ Problem Correction

In the third part of the process, you:

- Take specific action to correct the problem. At a minimum, short-term temporary measures are required to protect the customer.

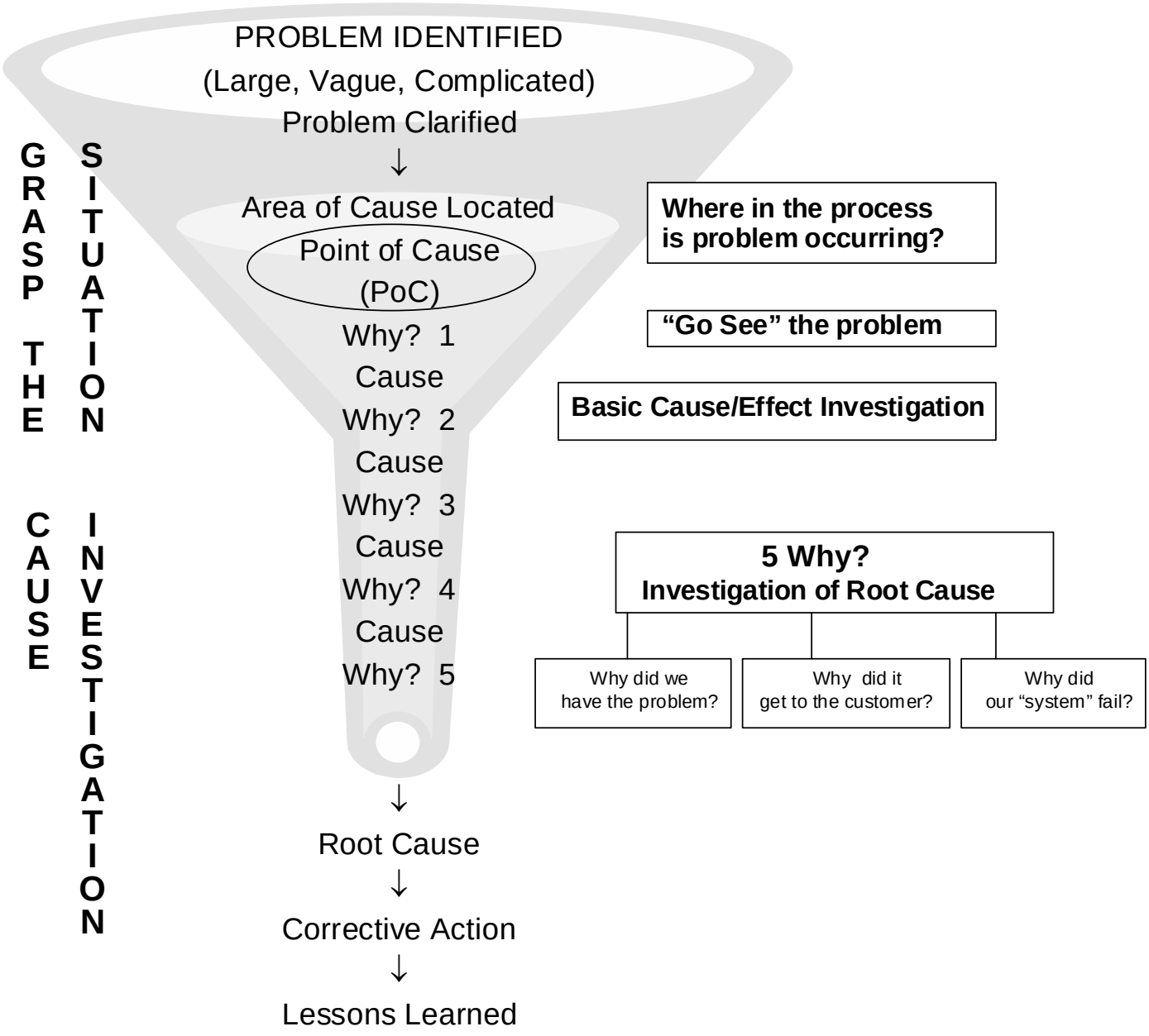
♦ Prevention Thru Error proofing

In the fourth part of the process, you:

- Take specific action to make sure the problem cannot recur, typically through error proofing
- Capture Lessons Learned

PRACTICAL PROBLEM SOLVING MODEL

5 Why Funnel



BASIC STEPS OF
PRACTICAL PROBLEM SOLVING

Part I – Grasp the Situation

- **Step 1: Identify the Problem**
  In the first step of the process, you become aware of a problem that may be large, vague, or complicated. You have some information, but do not have detailed facts. Ask:

  - What do I know?

- **Step 2: Clarify the Problem**
  The next step in the process is to clarify the problem. To gain a more clear understanding, ask:

  - What is actually happening?
  - What should be happening?

- **Step 3: Break Down the Problem**
  At this point, break the problem down into smaller, individual elements, if necessary.

  - What else do I know about the problem?
  - Are there other sub-problems?

- **Step 4: Locate the Point of Cause (PoC)**
  Now, the focus is on locating the actual point of cause of the problem. You need to track back to see the point of cause first-hand. Ask:

  - Where do I need to go?
  - What do I need to see?
  - Who might have information about the problem?

- **Step 5: Grasp the Tendency of the Problem**
  To grasp the tendency of the problem, ask:

  - Who?
  - Which?
  - When?
  - How often?
  - How much?

  It is important to ask these questions before asking “Why?”

Part II: Cause Investigation

- **Step 6: Identify and confirm the direct cause of the abnormal occurrence.** If the cause is visible, verify it. If the cause is not visible, consider potential causes and check the most likely causes. Confirm the direct cause based on fact. Ask:

  - Why is the problem occurring?
  - Can I see the direct cause of the problem?
  - If not, what do I suspect as potential causes?
  - How can I check the most likely potential causes?
  - How can I confirm the direct cause?

- **Step 7: Use 5-Why investigation to build a chain of cause/effect relationships that lead to the root cause. Ask:**

  - Will addressing the direct cause prevent recurrence?
  - If not, can I see the next level of cause?
  - If not, what do I suspect as the next level of cause?
  - How can I check and confirm the next level of cause?
  - Will addressing this level of cause prevent recurrence?

    If not, continue asking "Why?" until you find the root cause.

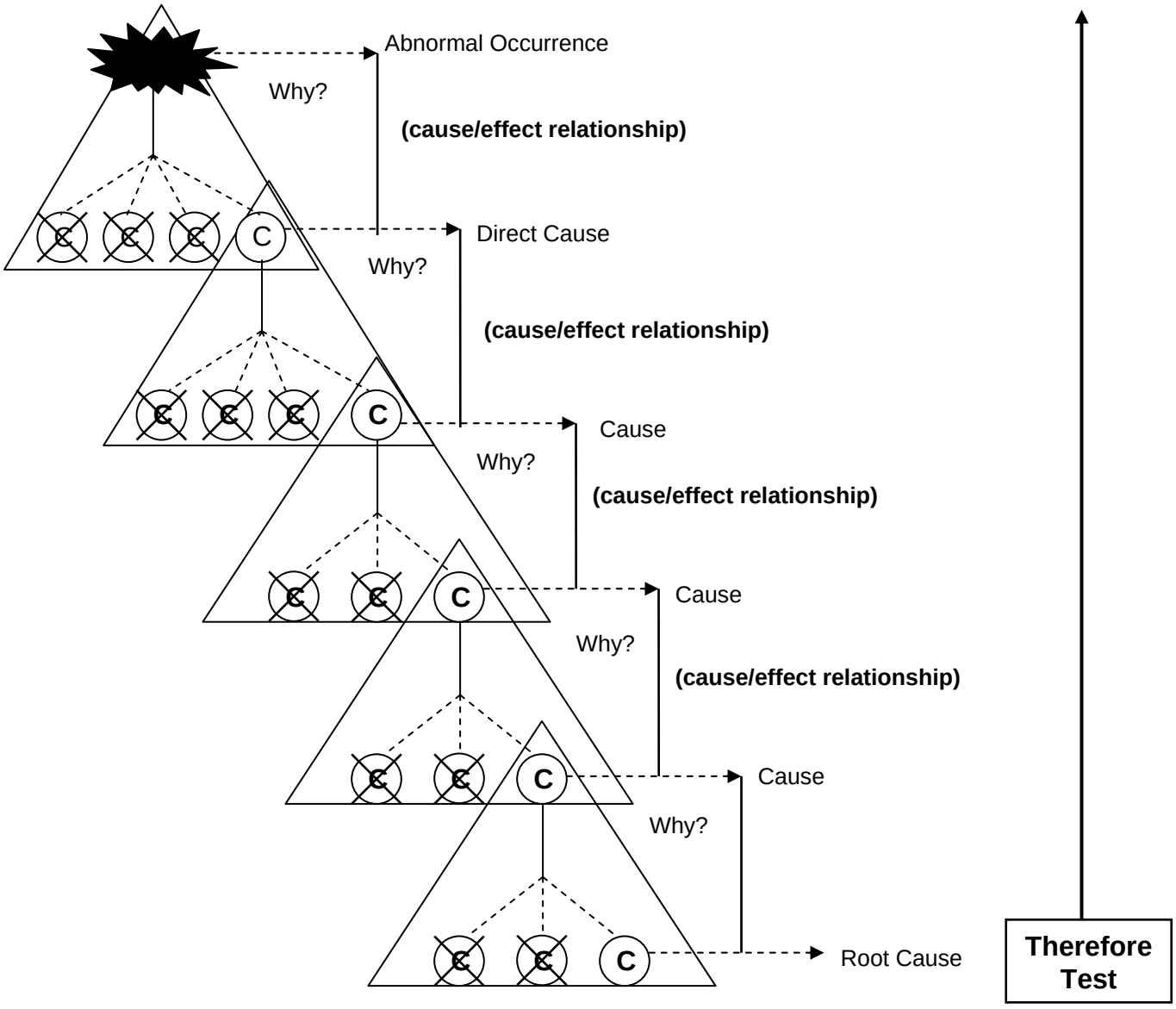
  Stop at the cause that must be addressed to prevent recurrence. Ask:

  - Have I found the root cause of the problem?
  - Can I prevent recurrence by addressing this cause?
  - Is this cause linked to the problem by a chain of cause/effect relationships that are based on fact?
  - Does the chain pass the "therefore" test?
  - If I ask "Why?" again, will I be into another problem?

  Be sure you have used 5-Why Investigation to answer these questions:

  - Why did we have the problem?
  - Why did the problem get to the customer?
  - Why did our "system" allow it to occur?

5 WHY CAUSE INVESTIGATION



Step 8: Take Specific Action to Address the Problem

Use temporary measures to eliminate the abnormal occurrence until the root cause can be addressed. Ask:

- Does it contain the problem until a permanent solution can be implemented?

Implement corrective actions to address the root cause to prevent recurrence. Ask:

- Does it prevent the problem?

Follow-up and check results. Ask:

- Is the solution working?
- How do I know?

PRACTICAL PROBLEM SOLVING CHECKLIST

To be sure you have followed the problem solving model, use this checklist as you complete the problem solving process.

☐ **Grasp the situation**

___ Pick-up the problem.

___ Clarify the problem.

___ Break down the problem.

___ Locate the Point of Cause (PoC).

___ Grasp the tendency of the problem.

☐ **Cause Investigation**

___ Identify/confirm the direct cause.

___ Ask 5 Why's to identify the root cause.

___ Ask 5 Why's for “Why the problem was not detected and reached the customer?”

___ Ask 5 Why's for “Why did the system allow the problem to occur?”

☐ **Problem Correction**

___ Implement corrective action; at a minimum, implement temporary measures

☐ **Prevention**

___ Errorproof the root cause.

___ Capture Lessons Learned.

ACTIVITY:
INDUSTRIES CASE STUDY

Directions:

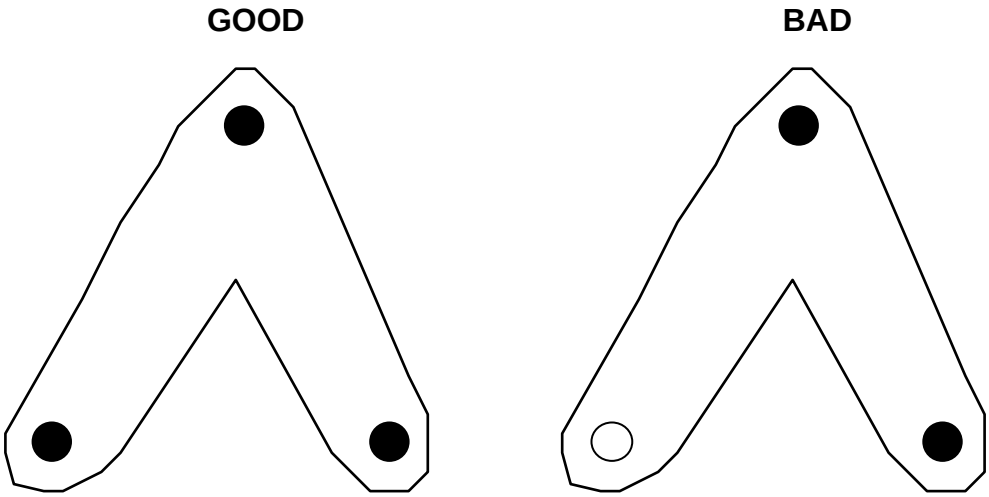
- Use the Problem Solving Process to evaluate the Industries Case Study below and on the following pages. Review the 5-Why Investigation results on Page 11.
- Use the worksheets on Pages 13 and 14 to record your work.
- Use only the information provided.
- Do not try to re-engineer the rivets or solve the technical problems in the case study. The purpose of this activity is to use the Problem Solving model to organize the given data.

INDUSTRIES CASE STUDY

Background

John Doe is the Quality Manager at XYZ Industries. XYZ is a component supplier that manufactures metal stampings and light assembly products. The company has a reputation for supplying high quality parts on a consistent basis. Seldom has there been a customer complaint. XYZ has Quality representatives called Customer Support Engineers (CSE's) at every customer assembly plant. The CSE's report any problems to John for investigation and follow-up.

At 7:00 a.m. this morning, John received a call from Janet, CSE at the Winding River Assembly Plant. Janet informed him that the customer had found five defective stabilizing brackets on second shift last night. She checked the remaining inventory and there were no defects in the remaining 326 pieces. The manufacturing sticker on the back of the brackets indicated that they were made by the second shift operator. Normally, the stabilizing bracket is fastened to the regulator motor with three rivets. The five defective brackets had only two rivets in them. The lower set of rivets on all five brackets was missing a rivet. This was the first time that the problem occurred.



John set-up containment procedures at the plant warehouse to sort for discrepant materials. As of this morning, two more defective brackets had been found in the remaining 2019 pieces of inventory at Flex.

Cause Investigation

John went out to the floor to talk with the team leader of the two rivet lines (East and West) and the area quality assurance auditor. He informed Sam (the team leader) of the quality problem and asked him to identify the line which runs the stabilizing bracket assembly. Sam directed John to the East line which runs Winding River assembly brackets only.

At the East Line, he spoke with Judy (the QA Auditor for the area) and asked to see the quality log sheets. John and Judy reviewed the Nov. 11th log sheet and could not find anything out of the ordinary. He asked her to set-up in-house containment procedures to sort for any discrepant material in the finished goods area.

Next, John tried to locate the second shift operator whose clock number was on the defective parts. Since that operator was gone, John spoke with the current machine operator (Ben). He asked Buddy about any recent difficulties with the rivet machine. Buddy said that he hadn't noticed anything out of the ordinary. Buddy also mentioned, however, that there had never been any quality bulletins posted in the two years that this particular part has been running.

John decided to stay in the area to watch the machine run for a while. After about 15 minutes, he watched Buddy dump rivets into the feeder bowl to prepare for the next run.

Shortly after restarting rivet operations, Buddy walked over to another riveter and came back with a steel rod. Buddy poked around the rivet chute and then continued working. John approached Buddy and asked him about the steel rod. Buddy replied that from time to time the chute gets jammed and he has to clear it out. This happens two or three times during a shift. He didn't mention this in his earlier conversation with John because the problem has existed ever since he started working with this machine. The previous operator showed him how to clear the chute. All the rivet machines are like this.

John called the Machine Repair Department and asked that someone look at the rivet track. A slight gap in the track was found and removed, and Buddy continued to work.

Two hours later, John got a call from Buddy saying that the track was still jamming. As far as John could see, only rivets were in the bowl. Next, John looked into the rivet supplier containers. There was some foreign material in the blue container, but none in the red container. The label on the blue container showed that it was from Riley Rivet, Inc., and the label on the red container indicated that it was from Friendly's Fasteners. Obviously, the foreign material was entering the rivet feeder bowl and jamming the track.

John called Maintenance and requested that the bowl be cleaned. He also added the cleaning operation to the preventive maintenance schedule on the equipment. He then called both Riley Rivet, Inc. and Friendly's Fasteners. He asked about the cleaning procedures on the returnable containers. Friendly's did a full container purge and clean. Riley just re-introduced the containers back into their system. When John asked why Riley did not clean their containers, he was told that Riley was not aware that such a policy was needed.

Upon further investigation, John learned that Friendly's Fasteners supplies other major automotive companies. Since these companies require that all returnable containers be cleaned, Friendly's instituted the purge as part of its practice for all customers. Riley Rivet, however, depends primarily on XYZ as its major customer. No such policy has ever been required of them.

John called the Material Control Department and requested that a container maintenance policy be drafted which would apply to all their suppliers. He also asked that a machine modification be developed to sense for the presence of rivets. Hopefully, this would error-roof the process.

KEY PLAYERS

John	Quality Manager
Janet	CSE, Winding River Plant
Sam	Team Leader, East Line
Judy	QA Auditor, East Line
Buddy	Machine Operator

5-Why Cause Investigation

Reference No. _____
(Spill, PR/R…)
Date: _____

Define Problem

Missing rivets on brackets shipped to customer

WHY?

Use this path for the specific nonconformance being investigated

Automated rivet machine did not place rivet in position

WHY?

Feedline had obstruction

WHY?

Use this path to investigate why the problem was not detected

Foreign material found in dunnage obstructing feedline

WHY?

Supplier had no maintenance program for dunnage

WHY?

Supplier not aware of requirement about foreign material **A**

Root Causes

No requirement on control plan to sample brackets continuously; only at set-up

WHY?

Not identified on PFMEA as possible failure mode except at set-up **B**

Use this path to investigate the systemic root cause

Potential failure mode not identified on PFMEA

WHY?

Failure modes associated with incoming dunnage not addressed

WHY?

Scope of PFMEA limited to manufacturing process only **C**

Corrective Actions	Date
A - Revise packing specification for dunnage to reflect no foreign material requirement	
B & C - Revise scope of PFMEA to include entire process from dock to dock	
B - Update PFMEA and Control Plan to reflect continuous sampling plan for brackets	
B – Modify machine to sense for presence of rivets	

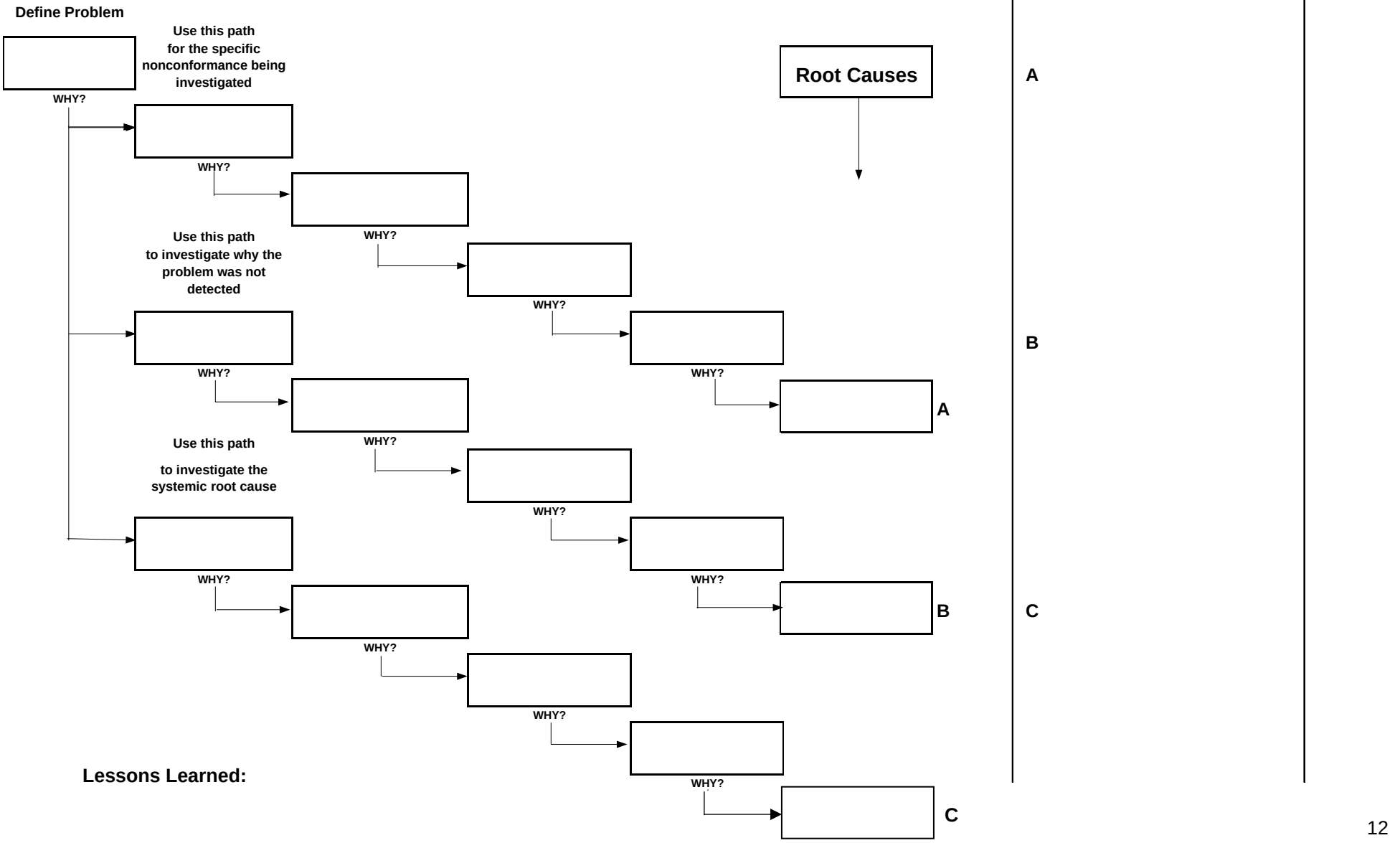
Lessons Learned:

1. Make supplier part of APQP activities.
2. Make PFMEA's comprehensive of entire system

5-Why Template to be used for all 5-Why Investigations

5-Why Analysis

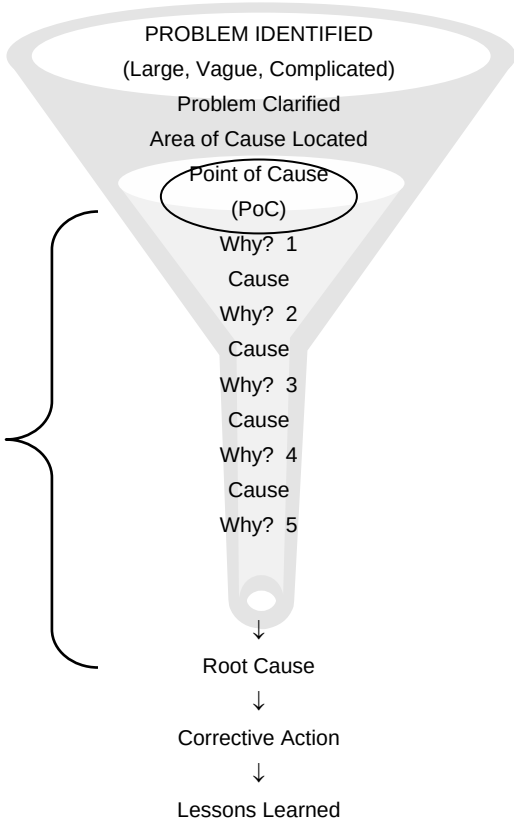
Reference No. _____
(Spill, PR/R…)
Date: _____



Lessons Learned:

XYZ INDUSTRIES WORKSHEET

	GRASP THE SITUATION	
Activity (Step)	**What did they know?**	**What did they do?**
Identify the problem		
Clarify the problem		
Break down the problem		
Locate point of cause (geographic location)		
Grasp tendency of the problem (What questions are you asking?)		



	CAUSE INVESTIGATION	
Activity (Step)	**What did they know?**	**What did they do?**
Identify/confirm the direct cause		
Ask 5 Why's to identify the specific root cause associated with the problem		
Ask 5 Why's for why the problem was not detected and reached the Customer		
Ask 5 Why's for why the "System" allowed it to happen		
Implement temporary measures to protect the Customer		
Implement corrective actions to prevent the problem from recurring		
Follow-up and check results