

Promotional Materials (Internal Only)

Root Cause Analysis

12/05/2023

Training Description: This session is designed for auditors to learn how to remediate problems for good. Attendees will learn about how to perform root cause analysis and practice on a problem they are currently facing on an audit engagement.

Participants will:

- Obtain an understanding of root cause analysis
- Identify tools and techniques for remediating problems

Participants will earn 2 CPE credits

Field of Study: Specialized Knowledge

Additional Information

Prerequisites: There are no prerequisites for this session. Advanced Preparation: None Program Level: Basic Delivery Method: Group Live

Christine Lamm, Director - Continuous Improvement Center of Excellence



Background Bio 1

Christine has worked in the gases/chemicals and pharmaceutical distribution industries working in the information technology and continuous improvement functions. She was accountable for the improvement of processes required for the effective and efficient delivery enterprise products and capabilities and the planning of their implementation in alignment with industry standard best practices. She collaborated with areas of IT and the enterprise to provide expertise, training, direction, and/or direct service to coordinate identified improvement opportunities. Before AB, Christine worked at Air Products and Glemser Technologies.

Credentials

- MS Management Information Systems DeSales University
- BS Computer Science/Information Systems Cedar Crest College
- Lean Six Sigma Black Belt AP
- Certified SAFe 5 Lean Portfolio Manager
- Certified SAFe 4 Agilist

John Short, Senior Continuous Improvement Manager



Bio 2

With over 25 years of process improvement experience through six roles at General Electric, Citigroup, Johnson & Johnson, and GuideWell (Florida Blue), John has an extensive history of delivering significant improvements with over \$40MM in estimated saving and over \$40MM in increased revenue. These benefits have come in a very diverse set of environments including manufacturing, engineering, software development, quality, marketing, and healthcare insurance. I've been heavily involved in delivering the Lean Competency System's Lean Awareness training, mentoring team members for the Level 1c certification, and managing the creation of lean templates and guides to support the course materials. John has co-taught numerous Lean Awareness courses with over 500 people and mentored 30 people through their certification, saving over \$1.6MM in cost avoidance.

Credentials

Background

- M.S. Materials Science and Engineering, Case Western University
- B.S. Materials Science and Engineering, Case Western University
- Lean Level 2b Lean Competency System
- Lean Six Sigma Black Belt GE (2), Johnson & Johnson
- Change Management Practitioner Prosci

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Root Cause for Results

Continuous Improvement COE December 4, 2023

Agenda

- 1. Review of Root Cause
- 2. Identification of Problems
- 3. Data Analysis to Focus Efforts
- 4. Root Cause Methods/Problem Solving
- 5. Impact Analysis
- 6. Actions for Success
- 7. Activity/Case Studies

"Whatever is worth doing at all, is worth doing well"

 Phillip Dormer Stanhope, Earl of Chesterfield, 1746

Where ? What? Root When? How Cause Why Who?

2/04/2023 Confidentia

Review of Root Cause

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When We Have Problems, What Do We Do?



Imagine your foot hurts, do you:

A) Take an over-the-counter pain medication (treat the symptom)

OR

 B) Take a closer look at your foot and see that you were standing on a tack (root cause) and remove the tack (solve the problem)

AND

C) Sweep the floor to remove tacks and other sharp objects (prevent the problem) and wear sandals (avoid the problem)

"We cannot solve our problems with the same thinking we used when we created them."

- Albert Einstein

What is Root Cause?

Root Cause Analysis is an in-depth process or technique for identifying the **most basic factor(s)** causing a variation in performance (that is **the problem**)

- ✓ Focus on systems and processes
- ✓ Focus is NOT on individuals...stay objective
- ✓ Remember it is the process not the people driving the problem!



Many possible "root causes"

If you don't address the root cause(s)... the problem will come back (or not go away)!

Why Perform Root Cause?



Root Cause Analysis (RCA) Process

- 1) Define and Align on the Problem
 - 1) Know what the problem is and the impact to the business/customer
 - 2) Agree with key stakeholders that this is a priority and deserves attention

Standard focus

areas

- 2) Collect Data
 - 1) Quantify the problem
 - 2) Determine key facts and timelines of events
 - 3) Understand key segmentation variables to know where to focus
- 3) Build a Working Causal Hypothesis with the Root Cause(s)
 - 1) Illustrate how the failure occurred with key facts
 - 2) Support with data and firsthand interviews
 - 4) Generate Corrective Actions based on Hypothesis and Root Cause(s)
 - 1) Use Impact/Effort matrix to prioritize corrective actions
 - 2) Align resources with management support to implement
 - 5) Validate and Control Improvements
 - 1) Obtain data to validate/refute hypothesis on problem and root cause(s)
 - 2) Update systems, procedures, training, etc. to maintain improvement.

Define the Problem and Collect data to drive more effective RCAs

Key Components of an Effective RCA

ROOT CAUSE(S)

Driving Factors causing the PROBLEM

Problem

7 of the 13 inventory management controls were not being adequately performed by DC management

Root Cause

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There was no defined owner that provides instruction and governance over the operational controls for the DCs

ACTION(S)

Based on the cause-and-effect relationship, what are we changing to improve the process and reduce the problem?

The **Director of Operations Learning Journey was created** to ensure awareness to SOX and key operational control requirements

Support for updating SOX guidance documents was provided by Internal Controls and collaboration increased between teams

An **email communication was sent** to distribution center leaders distributing the learning journey and expectations

Training and coaching was provided to the identified DC on their controls as they came into compliance

EFFECT

Did the actions result in a measurable reduction in the problem?

When the open audit finding was closed – the identified DC was fully compliance with the controls requirements and new Directors of Operations have elevated their understanding of the expectations for operational controls compliance

The Vital Importance of Cause and Effect



INSANITY

- Lots of action wastes precious resources and time!
 - Eventually the lack of results will bring painful changes...



- Finding the drivers for cause and effect is critical to making improvements
- As auditors we play a critical role in finding the drivers for the process owners so that they can make the required changes
- The drivers will enable the process owners to FOCUS their efforts on what will make an impact!

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Polling Question #1

Which of the following is not a step in the Root Cause Analysis (RCA) Process?

- Validate and Control Improvements
- Collect Data
- Create a Story Board
- Define and Align on the Problem

Correlation vs. Causation – A Cautionary Tale...

Correlation: A connection between two things

Example: There is a proven correlation between income and education level

Causation: The process of causing something to happened or exist

Example: Turning the gas gage higher made the water boil (Think cause and effect)

How Ice Cream Kills! Correlation vs. Causation - YouTube



Less margarine leads to happier marriages?

Japanese cars cause more suicides?

https://www.tylervigen.com/spurious-correlations

Identification of Problems



2/04/2023

What is a Problem?

A problem is a **GAP** between an undesirable current state (from a customer viewpoint) and desired future state. This gap is created by a single or multiple factors that must be addressed to change to the future state



Current State	Future State	
"The policy steps are not being followed"	"People know what is expected and are following the required steps"	
"The data is not complete and accurate"	"They proved to us how their data is complete and accurate"	As a find
"It is not clear who owns and is accountable for this activity"	"Ownership, governance, and accountability is clear!"	state suce
"There are too many human errors in the process"	"The process is more efficient and mistakes are minimized or eliminated"	

As auditors we are looking to find those undesirable current states that are limiting our success as a business

Writing Problem Statements

A good problem statement will be 3-5 sentences that include the answers to the following questions:

- What is the problem that needs to be solved? Describe the highlevel situation that is the problem without going into root causes.
- **Why** is it a problem? What is the business and/or customer impact that is driving you and the team to improve this?
- Where is the problem observed? What location, process, system incorporates where the problem is occurring?
- Who is impacted? Which teams are impacted? Are there other sites that could have the same problem?
- When was the problem first observed? Does this coincide with any other events?
- **How** is the problem observed? What are the key symptoms observed when the problem happens.
- **How many** items or events are involved in the problem? Quantify the size of the problem by counting defects, late shipments, etc.

A problem statement should describe an undesirable gap between the current state and the desired future state

A problem statement should include measures of the problem that quantify that gap but SHOULD NOT include possible causes or solutions

Key components of an effective problem statement include:

- Gap: Identify the key differences between the current and future state
- Timeframe, location, trend: Describe when and where the problem was first observed and what kind of trend it is following
- Impact: Quantify the gap (cost, labor hours, time, quality, etc.)
- Importance: Why is this important to the organization to better understand the urgency

Building a Good Problem Statement

The changes to the business environment in the previous two quarters have negatively impacted our customers and our customer support representatives as seen in our process metrics over the last three months. Call handling times, wait times, and call abandon rates have all increased by 10%, 15%, and 25% respectively degrading service to our customers. Employee satisfaction survey results have decreased by 25% with comments pointing to increased call complexity and timeconsuming case administration



Building a Good Problem Statement

Between March 31st and December 31st, 2021, 15,325 orders required 12,120 hours of rework before they could be shipped according to the Customer Experience report.

What makes this a good example?

Since we adopted the new process for paying invoice, it has been too complicated, and the time required has increased dramatically. We can fix this by reverting to the old process

What make this a poor example?



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Polling Question #2

What are the key questions that should be answered in writing a good problem statement?

- What, why, where, who, when, and how many
- What, why, when, and how many
- What, why, this, where, and that
- why, where, who, what, and when

Data Analysis to Focus Efforts

Why Collect Data?

"In God We Trust, All Others Bring Data" - W. Edwards Deming



- Data helps to **objectively** support your definition for what the problem is through creating a **baseline**.
- Avoid gathering too much data to avoid "analysis paralysis" and waste valuable resources for data you will not use
- Validate that your data is correct, and your stakeholders are aligned to what is being analyzed
- Validate your improvements through monitoring the data after changes have been implemented. Be sure to continue to monitor for a long enough time to make sure everyone is working the new process (i.e. 30, 60 or 90 days)

Data Analysis in Combination with Questions Will Show WHERE TO FOCUS

How To Collect Data?

- The procedure of collecting, measuring and analyzing accurate insights into the questions you are trying to answer
- Define a clear strategy for collecting reliable data efficiently
- Develop a common reference document for all team members to promote clear communication about the purpose and methods for data collection

Data Collection Plan										
Metric Priority	What Do We Want To Measure (Time, Cost Quality)	Metric Definition (% of defects per iteration, cycle time, etc.)	What Categories Are Needed? (by configuration item, by assignee, etc.)	What Process(es) are measured by this metric?	Input or Output Metric	Who Owns Analysis Of The Data?	What Is The Metric Calculation ?	When Should The Data Be Collected and Reported?	Where Is The Data Stored?	
High	On Time Delivery	Less than 30 min after agreed delivery time	Station, Customer, Driver, Dispatcher	Driver efficiency, Dispatch effectiveness	Output	Station Dispatch Manager	Last Updated Delivery Time- POD <30 min	Daily	Enterprise Data Warehouse	

Data In the Problem-Solving Process

The greatest asset to any organization is the ability of **EACH** of its employees to **employ critical thinking and creativity to improve processes.** Although there are improvement models intended to fuel creativity, if done incorrectly they smother creativity and innovation. Developing and testing theories to truly understand what is going on and develop cause and effect relationships are keys to success. Thought maps improve communication, idea generation, tool application effectiveness and ultimately problem improvement efficiency.



Is it the Right Data?

It describes and quantifies:

The problem that you are trying to improve (i.e. the Project Y)
 Related conditions or segments that might provide clues about the causes (i.e. the project Xs to establish a cause-and-effect relationship)

> The data type matches your project defect type:

✤ If your project defect is described as a continuous variable, gather continuous data.

- ✤ If your project defect is described as a discrete variable gather discrete data.
- > It has enough detail so it can be analyzed in ways that answer your questions
- The data can be obtained electronically vs. manually (even though you may have to collect it manually)
- With critical thinking you can expand and modify your original theories or hypotheses about what is going on and list potential root causes.

Having the "Right Data" will enable you to step through the problem-solving steps

Pareto Chart

- A Pareto chart is a bar graph leveraging the 80/20 rule
- The lengths of the bars represent frequency or cost (time or money), and are arranged with longest bars on the left and the shortest to the right
- In this way the chart visually depicts which situations are more significant
- This cause analysis tool is considered one of the seven basic quality tools
- When to use a Pareto Chart:
 - When analyzing data about the frequency of problems or causes in a process
 - When there are many problems or causes and you want to focus on the most significant
 - When analyzing broad causes by looking at their specific components
 - When communicating with others about your data



Using Excel to Build a Pareto Chart

A	AutoSave		5- (Bool				O Search	
Fi [Pire	ile H	commended PivotTables	rt Pi	ige Layout	Formulas	i D d-ins d-ins v 🚺 d-ins	Recomm	vendec rts	Help	Inquire	Power Piv
		+ 1 2	<	fr Ca	use						
	A	В	C	D	E	F	G	Н	3	J	К
1	Cause	Occurrenc	e								
2	A	950									
3	В	700									
4	c	350									
5	D	200									
б	E	100									
7	F	50									
8	G	25									
9											
10											





- Open Burger Pareto Analysis Data. Go to Raw Data Tab. Data will be in two columns with a category and a frequency (number). Highlight the data by holding the mouse and dragging it over the cells.
- 2 Click Insert, Click Insert Statistic Chart (Looks like a bar chart)
- Select Pareto Chart
- Pareto Chart can be modified as needed (e.g., add a title)

NOTE: The file contains the formulas that are shown in the pareto analysis for your reference

Run Chart Rules Reference

Rule 1 – Shift: Are there 6 or more consecutive data points above or below the median? (Use 8 points if you have 20 or more total data points.) Don't count points on the median.

25

20

15

10

25 20 15 10 5 0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Rule 3 – Number of Runs: Are there too few or too many runs? A run consists of one or more consecutive data points on the same side of the median. It doesn't include data points that fall on the median.

Data line crosses the median once for a total

of 2 runs, which is too few

for 10 data points.

Median 11

Rule 2 – Trend: Are there 5 or more sequential data points all going up or all going down? (Use 6 points if you have 20 or more total data points.) If two consecutive points are the same value, only count once.



Rule 4 – Astronomical Data Point: Are there any data points that stand out as being very far away from the others, which people close to the work would agree appear highly unusual?



		Expected	Runs Tak	ole: Count	useful obs	ervations	only - Igno	ore points	on mediar	n!	
Useful Obser.	Lower # Runs	Upper # Runs									
10	3	9	23	7	17	36	13	25	49	19	32
11	3	10	24	8	18	37	13	25	50	19	33
12	3	11	25	8	18	38	14	26	51	20	33
13	4	11	26	9	19	39	14	26	52	20	34
14	4	12	27	10	19	40	15	27	53	21	34
15	5	12	28	10	20	41	15	27	54	21	35
16	5	13	29	10	20	42	16	28	55	22	35
17	5	13	30	11	21	43	16	28	56	22	36
18	6	14	31	11	22	44	17	29	57	23	36
19	6	15	32	11	23	45	17	30	58	23	37
20	6	16	33	12	23	46	17	31	59	24	38
21	7	16	34	12	24	47	18	31	60	24	38
22	7	17	35	12	24	48	18	32		-	

Run Chart

- A run chart is a line graph of data plotted over time
- By collecting and charting data over time, you can find trends or patterns in the process
- Because they do not use control limits, run charts cannot tell you if a process is stable, however, they can show you how the process is running
- The run chart can be a valuable tool at the beginning of a project, as it reveals important information about a process before you have collected enough data to create reliable control limits

Using Excel to Build a Run Chart







- Enter data in two columns: Date and Frequency. In the Date column enter the dates of the observations. In the Frequency column enter the number of times issues occurred. In the Median column, calculate the median.
- Olick on Recommended Charts
- In the pop-up window on the Recommended Charts tab, select the line chart which is usually the first option. If this is not an option on the Recommended Charts tab, click on the All Charts tab then select Line. Click OK.
- **3** Run (Line) Chart can be modified as needed (e.g., add a title)
- Click on the report to highlight. Click on the main measurement line. Click on the + in upper right-hand corner. Then select Trendline.

Run Chart Example





Polling Question #3

A Pareto Chart is based on what rule?

- 20/10
- 1-50
- 80/20
- Three fourths

Root Cause Methods

Main Categories of Root Cause Investigation

Detective or "Columbo" Method "Rocket Scientist" Method Barrier Analysis

Investigations Can Use Combinations of All Three

Detective or "Columbo" Method

Every episode Columbo would:

- 1. Ask "dumb" questions
- 2. Gather clues relentlessly
- 3. Consider everyone a suspect
- 4. Use clues to eliminate suspects
- 5. Develops proof to stand up in court
- 6. Arrests the suspect



- Ability to gather multiple facts about events and use logic to prove/disprove hypotheses about each suspect until the criminal was apprehended
- Good for complex processes
 involving people

Detective or "Columbo" Method - Example



Event

An employee working at a distribution center falls off a ladder and is taken to a local hospital to treat injuries sustained from the fall

Investigation

A team would gather evidence from the scene. This could include photographs, video footage, witness statements, and any physical evidence related to the incident. Just like detectives at a crime scene, they would carefully document and preserve all relevant evidence.

Next, the team would interview witnesses and individuals involved in the event. These interviews are conducted with careful questioning techniques to elicit accurate information and identify potential inconsistencies or gaps in the accounts provided. Detectives often use these interviewing skills to uncover hidden motives or actions that may have contributed to the incident.

The investigators would then analyze all collected information and piece together the sequence of events leading up to the accident. They might create timelines or flowcharts to visually represent this sequence, just as detectives organize their findings on bulletin boards or whiteboards.

Finally, once all relevant information has been gathered and analyzed, investigators can determine the root cause(s) of the accident. Similar to how detectives identify culprits by establishing motive, opportunity, and means, investigators identify factors such as equipment failure, procedural deficiencies, human error, or other contributing factors that led to the accident.

"Rocket Scientist" Method

A "Rocket Scientist":

- 1. Has expertise, knows the system
- 2. Reflects on available data
- 3. Brainstorms for possible causes
- 4. Selects the most likely cause
- 5. Runs a test or pilot to verify selection
- 6. Implements corrective action
- 7. Validates final actions



- Ability to systematically drill down into causes to focus on the primary driver(s)
- Good for systems, machines that rely heavily on cause and effect

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Polling Question #4

Which of the following is not a category of root cause investigation?

- "Rocket Scientist" Method
- Detective or "Columbo" Method
- Barrier Analysis
- The Scooby Doo Method

Five Whys

- Get beyond the obvious symptoms to discover the root cause
- Don't brainstorm creative solutions to solve the wrong problem; first brainstorm the cause of the problem
- Grasp the situation what is the actual problem in performance
- Go to the Gemba get the facts first-hand, analyze them thoroughly and objectively
- Investigate the cause determine root cause of why the problem is occurring



Jefferson Memorial - Short Version Jefferson Memorial - Longer Version

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Categorization

What happens when we have lots of "5 Why" streams of root causes? Answer: We categorize them!

People	Process	Technology	Culture	Information
 Motivation and competencies of the people involved Example: Training issues 	 The conceptual soundness, fit and speed of the approach followed Example: Assigning user access issues 	 The hardware, software, architecture and information flows used Example: Network bandwidth issues 	 Leadership support and organizational incentives Example: Disregard for Risk 	 Accuracy, timeliness, content and completeness of documents and data Example: Info in form is incorrect

Cause and Effect Diagram

- The Cause and Effect (aka Fishbone, Ishikawa) diagram identifies many possible root causes for a problem
- Agree on a problem statement (effect) and write it in the head of the fish
- Brainstorm categories (spines) or use one of the following: Method, Mother Nature, Manpower, Measurement, Machine, Materials
- Use 5 Whys to fill out the diagram
 - First why first branch off category spine
 - Second why branch of first branch
 - Third why branch off second branch
 - So on until a potential root cause is identified
- When the team runs out of ideas, focus attention to places on the chart where ideas are few



"Miracle on the Hudson" - Root Cause Analysis



"Miracle on the Hudson" Flight 1549

Step 1 is the Definition of the Problem. It's written in an outline format so that it's easy to capture and easy to read. The problem is always defined by the specific impact to the organization's overall goals (the deviation from the ideal state). In the case of Flight 1549 the impact to safety was a positive. All 155 people onboard survived, but it could have been catastrophic. There was also the loss of a \$70M aircraft.

Zero Fatalities on the Ground



Use of 5 Whys to create a "Tree Diagram" of the root cause

The Two Major Paths of Logic – Inductive and Deductive Logic



Most Problem Solving Uses BOTH types of logic

Key Words for Inductive and Deductive Logic

Inductive	Deductive				
Probably	Certainly				
Most Likely	Definitely				
It is plausible to suppose that	Absolutely				
It is reasonable to assume that	Conclusively				
One would expect that	It logically follows that				
It is a good bet that	It is logical to conclude				
Chances are that	This logically implies that				
Odds are that	This entails that				

Use both types of logic to define the problem and root causes



How are protections or barriers defeated to impact the target?

Barriers are setup to protect people or things due to **threats** (either perceived or real) Targets are what we want to protect (either people or things) Understanding how the barriers were compromised is key to understanding the impact on the person or thing

Barrier Analysis - Example

One real life barrier analysis example is International Child Care's child survival project in the Dominican Republic. The project found high incidence of diarrhea in sugar cane camps, and **low levels of water purification the apparent cause**. The actual barriers to providing clean water however, remained much complex than simply providing water purifying mechanisms. perceived susceptibility, or whether the community members believed they could get diarrhea.

The investigators asked questions related to:

•perceived severity, or the extent to which community members considered the matter serious enough

•perceived action efficacy, or whether the community members believed the methods such as purification of water by boiling, using bleach, and using iodine works

•perceived social acceptability, of how the friends and neighbors considered the practice of purifying water

•perceived self –efficacy, or whether the community members found it easy to purify water

The findings identified the underlying cause for people not purifying water, and thereby succumbing to diarrhea was **their inability to remember how to purify their water**. Some people received complex and contrasting instructions on how to purify water. Some people received **rumors of some serious side-effects when purifying water using bleach**. Some people **did not like the taste of bleached water and did not know of alternate methods** such as boiling, or using iodine to purify water, and others were **simply too lazy to boil water**.

Barrier Analysis

Apparently easy fix but the threat of the water purification was seen as greater than the bacteria in the water



Impact Analysis

What is Impact Analysis?

Each finding with a corrective action(s) associated with it will have an **impact** on the problem to solve and an **effort** to implement.

Key for internal audit to understand the **impact**. The business area can assess the effort.



Impact Analysis – How To



- 1. Get a list of all the countermeasures (corrective actions)
- 2. Understand what impact they will have on the key process
- 3. Work with the business to evaluate the effort to implement
- 4. Put them into the appropriate categories
- 5. Check to see if there is alignment on the priorities

FMEA

- A step-by-step approach for identifying all possible failures in a process, product, or service
- Identify the following:
 - How can the process, product, or service fail (failure modes)?
 - If it does fail, what are the consequences (effects)?
 - What are the potential causes for a specific failure?
 - What controls are currently in place to detect the failure?
- The purpose of the FMEA is to take actions to eliminate or reduce failures, starting with the highest-priority ones

Process Step	Potential Failure Mode	Potential Failure Effect	SEV ¹	Potential Causes	OCC ²	Current Process Controls	DET ³	RPN⁴	Action Recommended
What is the step?	In what ways can the step go wrong?	What is the impact on the customer if the failure mode is not prevented or corrected?	How severe is the effect on the customer?	What causes the step to go wrong (i.e., how could the failure mode occur)?	How frequently is the cause likely to occur?	What are the exist- ing controls that either prevent the failure mode from occurring or detect it should it occur?	How probable is detection of the failure mode or its cause?	Risk priority number calculated as SEV x OCC x DET	What are the actions for reducing the occurrence of the cause or for improving its detection? Provide actions on all high RPNs and on severity ratings of 9 or 10.
ATM Pin	Unauthorized access	Unauthorized cash withdrawal Very dissatisfied customer	8	Lost or stolen ATM card	3	Block ATM card after three failed authentication attempts	3	72	
Authentication	Authentication failure	Annoyed customer	3	Network failure	5	Install load balancer to distribute work- load across network links	5	75	
	Cash not disbursed	Dissatisfied customer	7	ATM out of cash	7	Internal alert of low cash in ATM	4	196	Increase minimum cash threshold limit of heavily used ATMs to prevent out-of-cash instances
Dispense Cash	Account debited but no cash disbursed	Very dissatisfied customer	8	Transaction failure Network issue	3	Install load balancer to distribute work- load across network links	4	96	
	Extra cash dispensed	Bank loses money	8	 Bills stuck to each other Bills stacked incorrectly 	2	Verification while loading cash in ATM	3	48	

FMEA - Example

Finding	Area/Process	Severity	Occurrence	Detection	RPN	% Risk
Finding 1	Area A	7	7	4	196	40.2%
Finding 2	Area A	8	3	4	96	19.7%
Finding 3	Area B	3	5	5	75	15.4%
Finding 4	Area C	8	3	3	72	14.8%
Finding 5	Area D	8	2	3	48	9.9%
				Total Risk	487	

- Quantify total risk based on the FMEA tool
- Monitor risk over time as findings are resolved
- Understand residual risk and if it is worth it to work on



Polling Question #5

What are the two components to an impact analysis?

- Budget and Impact
- Impact and Effort
- Budget and Effort
- Planning and Budget

Root Cause Best Practices

Best Practices

1.Clearly define the problem or issue at hand.

2.Gather and analyze relevant data to identify patterns and trends.

3.Use tools like the fishbone diagram or 5 Whys to dig deeper into the problem.

4. Involve cross-functional teams for diverse perspectives.

5. Encourage open communication and active listening among team members.

6. Prioritize addressing root causes over treating symptoms.

7.Document all findings, actions, and decisions throughout the process.

8.Conduct thorough research to gain a comprehensive understanding of the problem. 9.Look beyond individual errors and consider systemic factors.

10 Validate accumptions through testing and experiments

10.Validate assumptions through testing and experiments.

11.Focus on prevention rather than reaction by implementing preventive measures.

12.Continuously monitor and review processes to identify recurring issues.

13. Train employees on root cause analysis techniques and methodologies.

14.Foster a blame-free culture that encourages learning from mistakes.

15.Utilize technology tools to streamline data collection and analysis processes.16.Engage leadership support in allocating resources for root cause analysis efforts.

17. Monitor industry best practices for insights into similar problems and solutions.

18.Implement corrective actions based on identified root causes promptly.

19. Establish metrics to measure the effectiveness of implemented solutions.

20.Regularly review lessons learned from previous root cause analyses.

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Polling Question #6

Which of the following is not a best practice for root cause analysis?

- Involve only the team directly impacted for focused perspectives.
- Foster a blame-free culture that encourages learning from mistakes
- Monitor industry best practices for insights into similar problems and solutions
- Validate assumptions through testing and experiments

Case Study

Case Study Part 1: Issues with Order to Cash Process – Writing a Problem Statement

Key Facts:

- The company is experiencing repetitive issues with the accuracy of customer billing in it's Order to Cash Process
- This issue only started recently and after major changes were made to the ERP system. Key members of the small customer master and pricing maintenance teams departed the company around the same time as the changes occurring.
- Customers are frustrated and call complaint volume has increased 50% for the customer service team
- Sales are down 10% in the last month and customers are starting to order from competitors
- All teams involved in the Order to Cash Process are frustrated

Assignment:

Based on the information above, work within your group and write a problem statement that can be used for root cause investigation. You have X minutes to complete.

Case Study Part 2: Issues with Order to Cash Process – Root Cause Investigation

Assignment:

Define how you would investigate the problem you defined in a problem statement in Part 1, who you would interview (including who you would interview first), what data you would try to get to understand the problem better, and what methods would you use to do the root cause analysis?

Case Study Part 3: Issues with Order to Cash Process – Solutions and Controls

Additional Key Facts Discovered:

- The billing issues are not pervasive across all customers, but impact the company's 2 largest customers. One of these customers has been with the company for several years while the other came onboard 10 days after the major system change occurred.
- Team member X on the master data maintenance team left for a job at another company 2 days after the system update occurred. The team member was responsible for signing off on the user acceptance testing (UAT) for the new way the ERP system is populating customer invoices from pricing master data. The change was driven by an enhancement requested by the existing major customer. While the team member signed off on UAT, a key testing step was not completed that would have identified a system issue with the customer's invoices.
- Team member Y recently joined the pricing team, because it is a small team they have not invested the time to create team procedures and team member Y has only received informal training from their direct manager who came from another company and has been in their role for only 6 months. Team member Y is responsible for updating and changing customer pricing data as new customers are onboarded. Team member Y did not realize that they set up the new customer's pricing incorrectly.

Assignment:

Based on the information above, work within your group and identify the potential solutions and controls that the company could implement to prevent future problems in the order to cash cycle. "Good governance is not fire-fighting or crisis-management. Instead of opting for ad-hoc solutions the need of the hour is to tackle the root cause of the problems."

~ Narendra Modi (Prime Minister of India)

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Appendix

Fault Tree Analysis

The main purpose of the Fault Tree Analysis is to help identify potential causes of system failures before the failures occur. It can also be used to evaluate the probability of the top event using analytical or statistical methods. These calculations involve system quantitative reliability and maintainability information, such as failure probability, failure rate, and repair rate. After completing an FTA, you can focus your efforts on improving system safety and reliability.



Fault Tree Analysis - Example



Course Title: Internal Audit Annual Team Training

Start & End Date: 12/05/2023 - 12/07/2023

Site Name, City, State: Conshohocken, PA

AICPA/NASBA guidelines for Continuing Professional Education (CPE) credits are based on a 50-minute credit hour in qualifying NASBA CPE subject areas; one credit equals 50 minutes. AICPA/NASBA credits are rounded down to the nearest half-credit. All breaks and lunches are omitted from the total CPE minutes.

Certain types of activities do not usually qualify for CPE credit because they are not sufficiently related to the practice of public accounting or because they are not structured as formal CPE programs. For example: business meetings and social functions, coffee breaks, meals and registration/receptions associated with seminars and conferences.

Day 1 - Internal Audit Annual Team Meeting

Topic Title	NASBA CPE Subject Area	Instructor(s) *	Actual Start/End Time	
Root Cause Analysis	Specialized Knowledge	John SHORT Christine Lamm	9:15an 11:16 AM	
LUNCH				
Reducing Your Digital Footprint and Protecting Your Personal Information (Laptop Required)	Information Technology	* Molly Carroll	1:30 pm 2:30 pm	
Charting the Course of Your Professional Development (Panel Discussion)	Personal Development	Stefanie Perry USA ZAVIZANE	- 2:30 - 3:30	

* INSTRUCTOR WAS VIRTUAL - IA ADDED THEIR NAME - TIME FRAME