



# Root Cause Analysis Process

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## 1. Root Cause Analysis (RCA) - Process Definition

The Root Cause Analysis (RCA) process establishes the actual cause, not symptoms, of a problem. It defines and tracks the actions required to eliminate or mitigate the actual cause of a problem. The process also maintains the documentation related to the analysis of the root cause.

## 2. Objective

The goal of a RCA process is to identify the actual cause of major problems and provide preventive measures to eliminate recurrence of major problems. It also identifies secondary problems that prolonged the duration of a problem.

## 3. Applicability

This process applies whenever a Root Cause Analysis is required. It may be required as the outcome of failed production implementations and service disruptions to the production environment.

## 4. Summary Description

### 4.1 *Triggering Event(s)*

- At the request of a customer or DTI Management
- Severity 1

#### 4.1.1 *Exceptions to Triggering Event(s)*

- Documented known errors where there is no readily available solution.
- Reoccurring events where the solution is known but will not be implemented in the short term.

### 4.2 *Primary Result(s)*

- Identifying the root cause of a Service Outage
- Identifying the root cause of a trend

### 4.3 *Process Prerequisites and Requirements*

The process prerequisites can be any of the following:

- Change Records with a status of unsuccessful.
- Incidents
- Emergency changes to the production environment
- Detailed past history of the issue



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The process requirements are:

- The RCA Lead tracks any DTI action items as part of the problem ticket.
- RCA's are started immediately after the triggering event and RCA's are completed within 1 week.

## **4.4 Inputs**

The process inputs can be any of the following:

- CAB Meeting minutes and Change Requests
- Incident tickets
- Any pertinent information related to the problem

## **4.5 Outputs**

- RCA Report
- Customer RCA Summary Report
- Corrective Action Plan

## **4.6 Key Performance Measures**

- Cost: Measure of the cost to complete each Root Cause Analysis process instance.
- Quality: Measure of times same problem re-occurs after a Root Cause Analysis.
- Timeliness: Measure of success to complete the Root Cause Analysis documentation within five days of assignment.
- Efficiency: Measure of hours and number of resources expended.
- Cycle time: Measure of time to complete the process from the end problem resolution, to complete the RCA report.

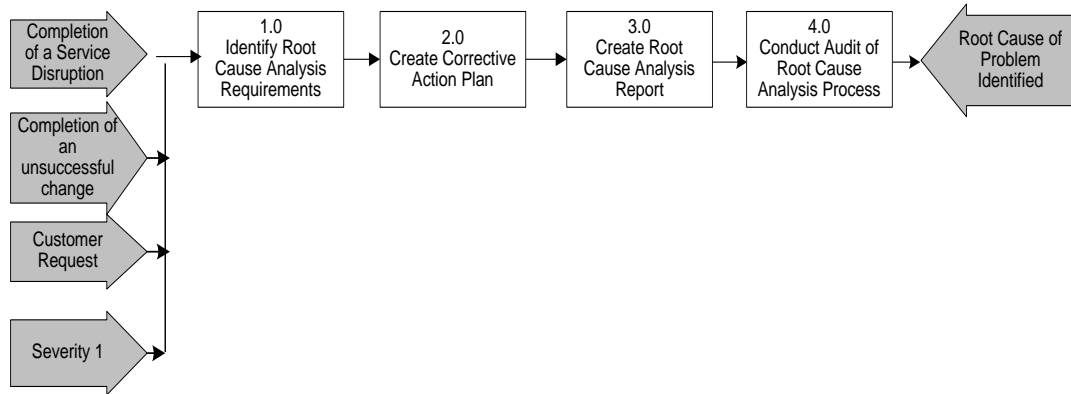
## **4.7 Process Flow**

The Root Cause Analysis process may be triggered at the conclusion of any service disruption in production or failed implementation. Additionally, the RCA Process can be utilized on any issue where a detailed analysis is required.



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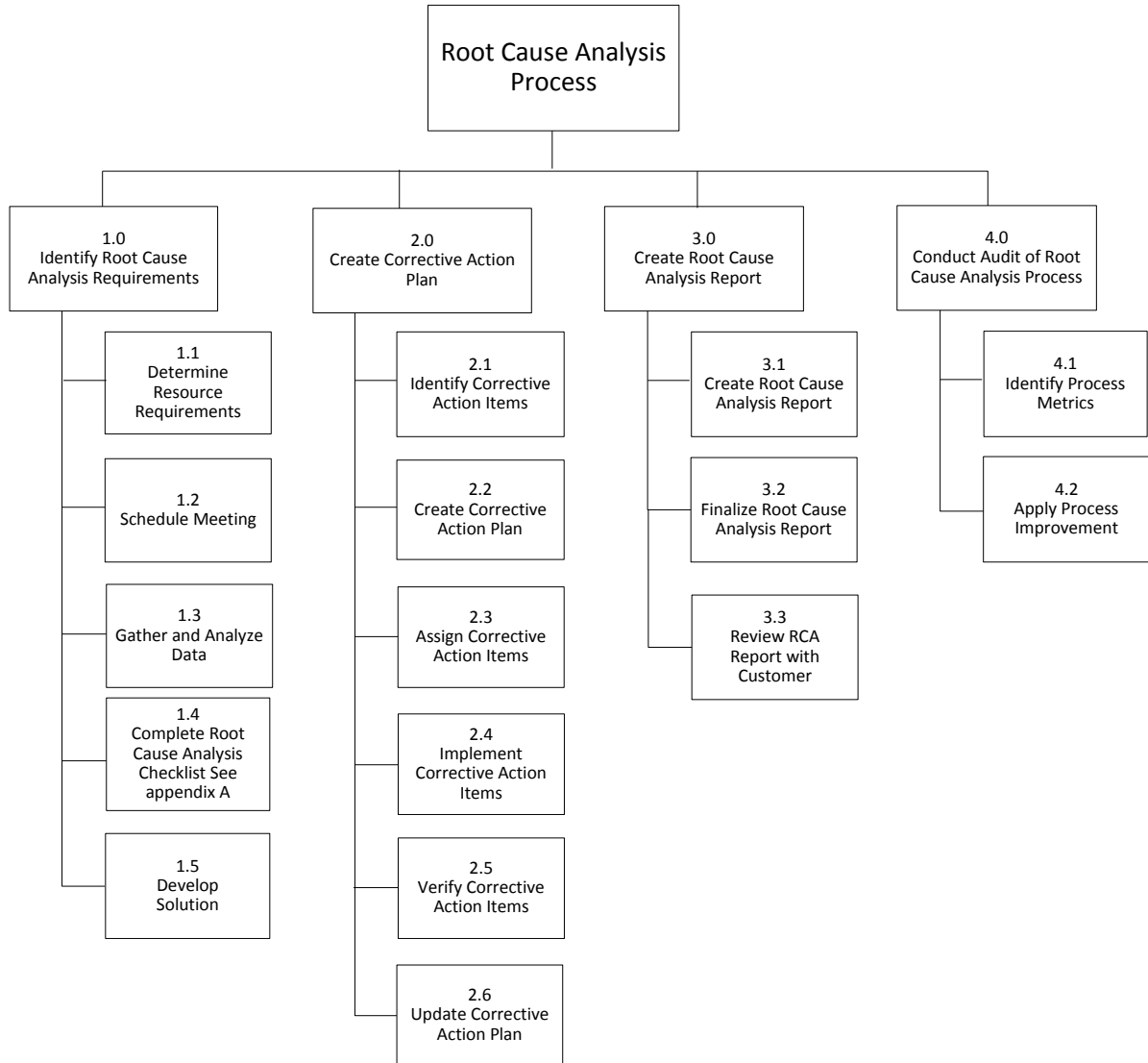


## 4.8 Process Hierarchy

The process hierarchy below is the result of further depicting the significant activities of the Root Cause Analysis (RCA) Process.



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## 4.9 Roles and Responsibilities

The roles and responsibilities of the participants are outlined in the following matrix.

RESPONSIBILITIES		roleROLES					
		Root Cause Analysis Process Owner	Root Cause Analysis (RCA) Team	Root Cause Analysis (RCA) Lead	Service Owner	Subject Matter Experts (SMEs)	Customer Representative
1.0	<b>Identify Root Cause Analysis Requirements</b>						
1.1	Determine Resource Requirements	P					
1.2	Schedule Meeting			P			
1.3	Gather and Analyze Data		P	L		C	
1.4	Complete Root Cause Analysis Checklist		P	L			
1.5	Develop Solution		P	L		P	
2.0	<b>Create Corrective Action Plan</b>						
2.1	Identify Corrective Action Items		P		C	C	
2.2	Create Corrective Action Plan		P		C	C	
2.3	Assign Corrective Action Items		P		C	C	
2.4	Implement Corrective Action Items				P		
2.5	Verify Corrective Action				P		
2.6	Update Corrective Action Plan	C			P		
3.0	<b>Create Root Cause Analysis Report</b>						
3.1	Create Root Cause Analysis Report		C	P	C	C	
3.2	Finalize Root Cause Analysis Report	A	C	P	C	C	
3.3	Review Root Cause Analysis Report with Customer						P
4.0	<b>Conduct Audit of Root Cause Analysis Process</b>						
4.1	Identify Process Metrics	P					
4.2	Apply Process Improvement	P					

**Legend**  
 A - Approves  
 C - Contributes  
 L - Leads  
 P - Performs  
 R - Reviews

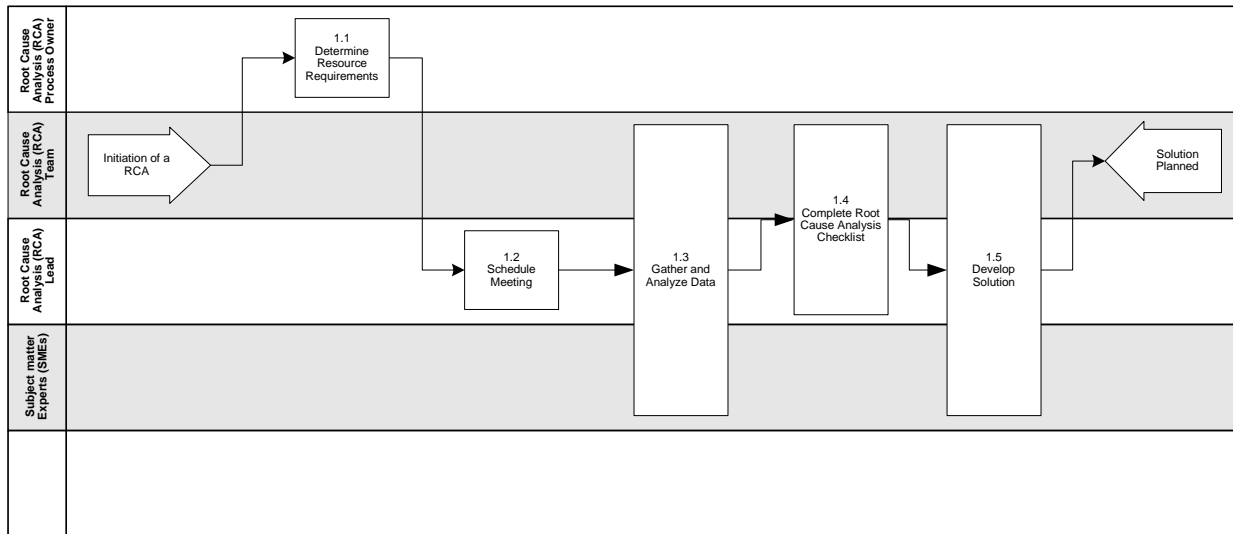


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## 5. Root Cause Analysis - Detailed Descriptions

This section contains the detailed description for each process thread of the Root Cause Analysis Process. This detailed description consists of a process map for the process thread and a brief description of each activity box in the process map.

### 5.1 Process Map – Identify Root Cause Analysis Requirement



### 5.2 Process Activity Description – Identify Root Cause Analysis Requirements (Activity 1.0)

A brief description of each activity in the process thread ‘Identify Root Cause Analysis Requirements’ is provided below. The activity box numbers are in the parentheses of each heading. The responsibility for this section is the RCA Lead.

#### 5.2.1 Determine Resource Requirements (Activity 1.1)

The RCA Lead is responsible for determining whether a RCA is to be performed by a specific individual or a team. Each specific individual or team uses their reports and any diagnostic tools required to complete a successful RCA.

Basic RCA guidelines for determining if a team is required are:

- Problem has a high level of complexity
- Problem crosses multiple disciplines or platforms
- Problem is part of a previous RCA



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- Problem is part of an identified problem trend

The problem is initially assigned to an individual, but if through gathering and analyzing the data it was determined that the individual requires assistance, a team is assigned to complete the problem analysis to obtain proper resolution

## **5.2.2 Schedule Meeting (Activity 1.2)**

If it is determined the RCA requires a team, the RCA Lead schedules an RCA meeting. The RCA Lead is responsible for all communications regarding the RCA.

The RCA Lead is to:

- Establish a time and place for conducting the RCA session
- Identify all participants for the session, which should include:
  - All personnel associated with the recovery and crisis management
  - Scribe
  - Subject Matter Experts (SMEs)
  - Representation from the Management that owns the area in which the problem occurred
- Prepare an agenda with objectives for the meeting
- Notify all participants of the day, time and location; also include the purpose and objectives of the meeting along with an agenda

## **5.2.3 Gather and Analyze Data (Activity 1.3)**

The individual or team assigned to the RCA is responsible for gathering and analyzing the problem data. The data from the individual team meeting (if one occurred) provides answers to the following questions:

- How the problem was detected
- What symptoms were associated with the problem
- Impact to Customer
- How the problem was triggered
- What the time-line/chronology of events was during the problem, to include any of the steps taken during recovery and crisis management



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## 5.2.4 Complete Root Cause Analysis Checklist (Activity 1.4)

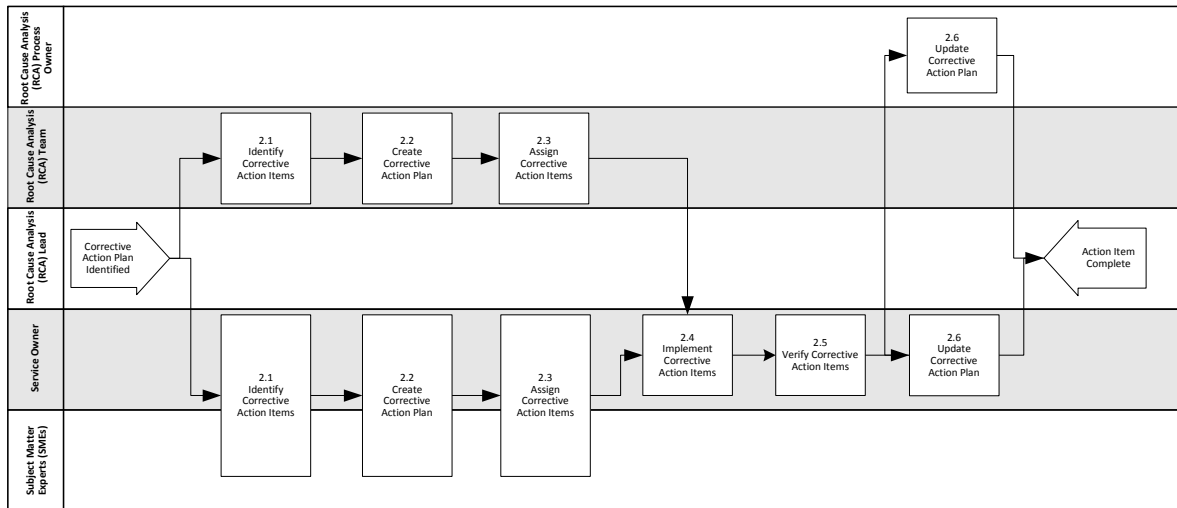
5.2.5 To ensure that the RCA Team gathers consistent data as well as to separate the cause from the symptom, the team needs to review Root Cause Analysis Checklist (see Appendix A). Develop Solution (Activity 1.5)

RCA Team members brainstorm solutions following the analysis of the problem and focus on idea generation and corrective action determination including any action or alternative solution that reduce the impact or shortened the duration of the problem.

Solutions focus on the following key elements:

- Eliminating the root cause of the problem
- Mitigating actions, events, and architecture or infrastructure related issues responsible for extending the outage

## 5.3 Process Map – Create Corrective Action Plan







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## **5.4 Process Activity Descriptions – Create Corrective Action Plan (Activity 2.0)**

A brief description of each activity in the process thread 'Create Correction Plan' is provided below. The activity box numbers are in the parentheses of each heading.

### **5.4.1 Identify Corrective Action Items (Activity 2.1)**

The RCA team members with support from service owners identify corrective actions with the intent of eliminating the Root Cause of the problem, as well as proactive prevention of similar problems.

### **5.4.2 Create Corrective Action Plan (Activity 2.2)**

This activity includes the completion of a Corrective Action Item Plan. The Corrective Action Plan molds the identified corrective action items into a cohesive plan, which includes the identification of any dependencies between action items.

### **5.4.3 Assign Corrective Action Items (Activity 2.3)**

This activity includes the assignment of an individual or team, deliverable requirements, and recommended completion due dates.

### **5.4.4 Implement Corrective Action Items (Activity 2.4)**

Action item owners are accountable for their assigned corrective actions. Any problems or issues that occur during the performance of a corrective action are noted and communicated, as appropriate, through standard escalation channels to the RCA Lead, to RCA team, or through the RCA Report.

### **5.4.5 Verify Corrective Action Item (Activity 2.5)**

Once the corrective action item is complete, the Service Owner of the action item verifies the resolution of the problem or problem subset.

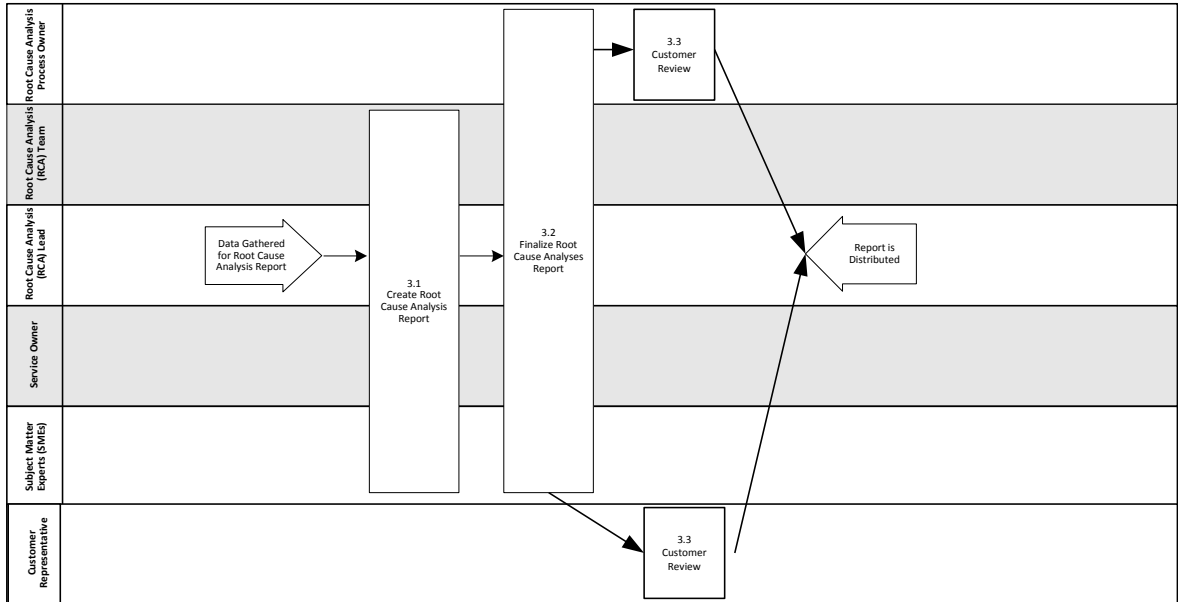
### **5.4.6 Update Corrective Action Plan (Activity 2.6)**

Once the success of the action item is verified, the service owner updates the action item database or contacts the RCA Lead to update the appropriate database. Also included in this update are details of the success or failure of the action in relation to the problem's original resolution. If the action items do not resolve the problem, the RCA process is reinitiated.



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## 5.5 Process Map – Create Root Cause Analysis Report



## 5.6 Process Activity Descriptions – Create Root Cause Analysis Report (Activity 3.0)

A brief description of each activity in the process thread ‘Create Root Cause Analysis Report’ is provided below. The activity box numbers are in the parentheses of each heading.

### 5.6.1 Create Root Cause Analysis Report (Activity 3.1)

The details of the RCA are compiled into a standard RCA format and distributed.

The following data is part of each RCA report:

- **Problem Description:** A short synopsis of the problem
- **Outage Duration:** Hours and minutes by outage date
- **Impact:** An estimate of the number of customers impacted
- **Chronology of Events:** Date, time and name of contact with a description of each event
- **Root Cause Analysis:** In this section, a full description is recorded once the underlying cause of the problem is determined. Action items to resolve should follow Root Cause identification. The



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action items will appear in the RCA Action Items section of the RCA Report.

- **Secondary Problems:** In this section, any additional problems that arise during the recovery of the original failure are documented. These types of problems are identified in the RCA session and include escalation problems, process/procedure problems, component failures, documentation deficiencies, or training issues
- **Recommendations:** Describe recommendations that helped resolve the problem or could prevent its reoccurrence. Recommendations generate action items required to achieve the stated recommendation
- **RCA Action Items:** In this section, list all identified action items of the RCA session. The items include the assigned manager's name, assignee's name, and target date for completion or to be determined date, if being handled by workflow management

## 5.6.2 *Finalize Root Cause Analysis Report (Activity 3.2)*

The RCA is complete when the following items are complete:

- All action items associated with the problem have been completed and verified as successful
- The action item database has been updated
- The RCA report has been generated and distributed to the DTI manager(s) and Team Lead(s) of all personnel involved for review and sign off.
- The CES, Team Lead(s) or DTI manager (s) of the RCA lead will determine if DTI Senior Management needs to be involved in communicating the results of the RCA to the customer.

## 5.6.3 *Review customer RCA summary with Customer (Activity 3.3)*

Upon completion of the RCA and after all the appropriate sign offs have occurred:

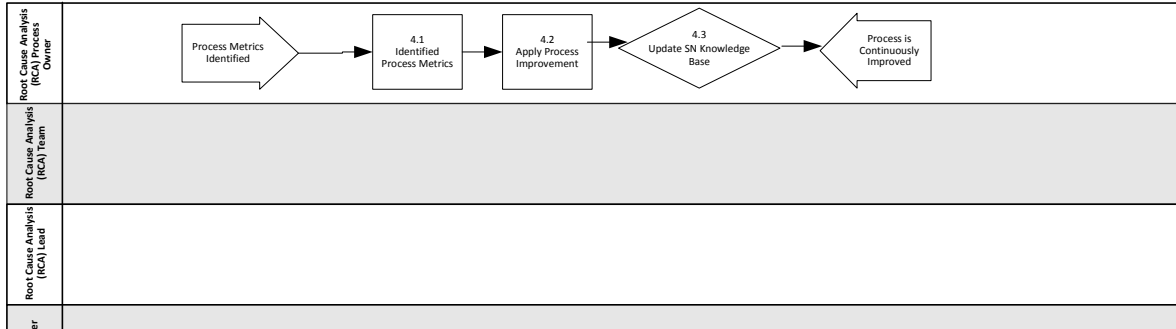
- CES will draft the customer RCA summary
- The CES will send the customer RCA summary and the RCA report to DTI Senior Management and the Change Control Team for review.
- The CES will schedule and conduct a meeting with the customer to review the customer RCA summary unless it has been determined that DTI Senior Management needs to communicate the message.



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In some instances there may be action items that the customer will need to take part in.

## 5.7 Process Map – Conduct Audit of Root Cause Analysis Process



## 5.8 Process Activity Descriptions – Conduct Audit of Root Cause Analysis Process (Activity 4.0)

A brief description of each activity in the process thread ‘Conduct Audit of Root Cause Analysis Process’ is provided below. The activity box numbers are in the parentheses of each heading.

### 5.8.1 Identified Process Metrics (Activity 4.1)

Metrics are used to determine the efficiency of the process.

Key metrics include:

- Number of RCA sessions held by month and by the category of problems
- Percentage of problems that qualify for an RCA session. To validate compliance, this number is compared to the actual number of RCAs that took place
- Number of related problems that have recurred after RCA actions were implemented

### 5.8.2 Apply Process Improvement (Activity 4.2)

The effectiveness of the process is measured by using metrics. Based on the results of the analysis, the feedback received from stakeholders of the process, and the needs of the organization, the process is modified and continuously improved.

### 5.8.3 Update the SN Knowledge Base (Activity 4.3)



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Based on the root cause of the problem and the frequency of occurrence a decision will be made by the RCA team if a SN Knowledge Article should be open for this event. For events that have occurred several times, a knowledge article will be open by the RCA Lead and referenced in the problem ticket, detailing steps that need to be taken to resolve the problem expeditiously.

## 6. Key Terms, Acronyms

### 6.1 Key Terms and Acronyms

TERM/ACRONYMS	DEFINITION
Scribe	Records all assumptions and documents decisions made during the process.
Subject Matter Experts (SMEs)	Individuals called upon to share their specialized knowledge.
Corrective Action Plan	Identification of actions to be taken along with assignees and completion dates.
CAB	Change review board (meets twice weekly)
RCA	Root Cause Analysis
Senior Management	Refers to the COO, CSO, CTO and CPC
Root Cause Analysis Process Owner	This role is performed by the SN Problem Management Process Owner
Root Cause Analysis Team	The group of individuals in the RCA meeting and contributing to the RCA report
Root Cause Analysis Lead	The individual conducting the RCA meeting
Service Owner	The individual/group responsible for the technology
Subject Matter Expert	The technical staff member who supports the technology
Customer Representative	Agency personnel

## 7. Appendices

Appendix A      Root Cause Analysis Checklist

	Develop an event chronology associated with the outage.
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	Add the activities and actions recorded by the Recovery/Availability manager.
	Add the related activities that preceded the outage.
	Add the related activities that were executed after service was restored.
	Obtain consensus of the event chronology by RCA participants.
	Analyze each of these activities to ensure: <ul style="list-style-type: none"> <li>• Identification of unaccounted time between events</li> <li>• Identification of associated technical and process related problems</li> </ul>
	Evaluate any and all actions that were performed.
	Identify actions that extended the outage duration.
	Identify what actions / design could have possibly avoided the outage.
	Identify what actions / design could have shortened the duration of the outage.
	Identify what actions / design could have minimized the scope of the outage.
	Determine if any of the identified problems occurred previously.
	Ensure a service owner is assigned to an identified problem and the RCA information is added to the problem record.

### ***Problem Recognition Questions***

	How was the problem recognized
	Could the problem have been recognized earlier
	How could the problem have been recognized earlier
	Could the problem have been avoided or minimized if detected earlier
	What action was taken after the problem was recognized
	What actions should have been taken

### ***Problem Notification Questions***

	Were there pre-defined problem notification procedures
	Were the procedures followed
	Was the correct person, department, or group notified
	Did the procedure work well
	Should the notification have been earlier
	Is there a need for improvement

### ***Problem Determination Questions***

	Was there a problem determination procedure
	Was the process followed
	Did the process work



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	Could problem determination have begun earlier
	Were the needed problem determination tools available
	Were the tools used
	Did the tools work
	Do better tools exist
	Is there a need for improvement
	Was there a change involved in the outage
	Did the change cause the outage
	Did the change increase the duration or scope of the outage
	Were there procedural changes made
	Was there confusion because of the change
	Was the change documented
	Was the change scheduled
	Was everyone notified
	Was the change thoroughly tested
	Were associated procedural changes needed after installation

## **Recovery Questions**

	Were there predetermined recovery procedures
	Were the procedures followed
	Were the procedures successful
	Did they take as long as expected
	Can any automation techniques be applied

## **Situation Management Questions**

	Was a situation manager identified
	Was there a problem with the identification and role of the situation manager
	Were the proper escalation procedures followed
	Were the correct support staffs notified
	Should the support staff's response been faster
	Are the escalation criteria and response received in keeping with the committed service level objectives
	Is there a need for improved criteria
	Was a log kept of all actions and decisions
	How effective was the overall management of the situation
	How could this process be improved

## **Problem Resolution Questions**

	Is the technical resolution valid
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	Has the root cause of the underlying problem been resolved
	Has the problem been sufficiently documented in a Problem Record