Problem Management

Standard Practices Document

GAVS

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Change History

Version No.	Release Date	Process Improvement Proposal Reference No.	Summary of Changes	Prepared By	Approved By
2.0	30-Dec-2019	Process 2.0	Initial draft	Rama Vani Periasamy	Sekar T
2.1	9-Jun-20	Update	Updated as per ISO 20000-1:2018 Reference	Santhiya P	Sekar T
2.2	6-July-20	Update	Added Sections A: 2 (Definition), modified Section B: 1 (user Roles and Functions), updated Section B: 2 (RACI Matrix), modified Section C: 2.1 to 2.5	Gouri Mahendru	Sekar T

Standards/Model Reference

Standard/Model	Process Area Reference/ ISO Clause(s) No.
ISO 27001:2013	▪ N/A
ISO 20000-1:2018	▪ 8.6.3 – Problem Management

Glossary and Acronyms

Sr. No.	Glossary / Acronyms	Description
1.	ITIL	Information Technology Infrastructure Library
2.	ITSM	Information Technology Service Management
3.	SLA	Service Level Agreement
4.	OLA	Operational Level Agreement
5.	CI	Configuration Item
6.	RCA	Root-Cause Analysis
7.	CMDB	Configuration Management Database
8.	MIM	Major Incident Management

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Section A: Introduction

1. Overview

The purpose of this document is to provide a detailed overview of the problem management process. The document consists of detailed process flow diagrams, with procedures and corresponding RACI (Responsible, Accountable, Consulted and Informed) matrix and governance, control mechanisms.

2. Definition

In ITIL® 4, **Problem** is defined as "unknown cause of one or more incident".

Problem Management ensures identification of problems and performs Root Cause Analysis. It also ensures that recurring incidents are minimized, and problems can be prevented.

Problem Manager is the process owner of this process.

Key Points –

- Problem Management comprises of activities required to diagnose the root cause of the incident and to determine the resolution to those problems.

- When a problem is resolved after root cause analysis, it becomes known error.

- Problem Management also records information regarding problems in a system called Known Error Database (KED).

Problem Management consists of following two processes –

- Reactive Problem Management is executed as part of Service Operation.

- Proactive Problem Management initiated in service operation but generally driven as part of Continual Service Improvement (CSI).

The Problem Management process is initiated as a result of one or more of the following triggers:

As a reaction to one or more incidents with similar symptoms occurring for which the cause is not currently known. This may be recognized by,

- The Service desks

- Second line

- Third line

- Suppliers

- Customers

- Users

- Other source or stakeholder

From information provided by the service transition stage regarding problems that have not been resolved prior to live running e.g. bugs in software or issues with configuration items.

As a result of a proactive analysis of previous incidents or message logs carried out with the intention of identifying common factors and trends worth investigating.

3. Process Goals & Objectives

The Problem Management process goals and objectives defines why Problem Management is important to overall vision for delivering and supporting effective and efficient IT Services. This section establishes the fundamental goals and objectives that underpin Problem Management.

The process goal is a broad statement that defines what the organization wants to achieve by successfully implementing Problem Management. The process objectives are more specific statements than the purpose and are characterized by a set of tasks in pursuit of reaching the goals.

The primary goals of Problem Management are to:

- Prevent problems and resulting incidents from happening.

- Eliminate recurring incidents.

- Minimize the impact of incidents that cannot be prevented

The objectives of the Problem Management process are to:

The primary objectives of Problem Management are to prevent problems and resulting incidents from happening, to eliminate recurring incidents and to minimize the impact of incidents that cannot be prevented. This leads to increased service availability and quality.: There are two approaches to Problem Management, proactive and reactive:

- Reactive Problem Management identifies problems based upon review of multiple events (incidents) that exhibit common symptoms or in response to a single incident with significant impact.

- Proactive Problem Management identifies problems by reviewing incident trends and non-incident data to predict that an incident is likely to (re-)occur.

4. Scope

Scope refers to the boundaries or extent of influence to which Problem Management applies.ThissectionprovidesthescopeforProblemManagementinregardtotheprocess itself, Customers, Service Providers and IT Service and Service Components and environment.

The Problem Management process scope will cover all IT Services, Processes and Documentation. All Problem Management activities referred to in this document should be implemented in full, operated as implemented, measured, and improved as necessary.

5. Policy

The following policy is established for Problem Management:

- All client engagements must use the currently approved documented Problem Management process and standardized methodology, and problems will be reported, recorded, managed, and appropriately communicated through the approved Problem Management tool.

- All IT Managers will be responsible for ensuring the Problem Management process is followed.

- ITSM managers or team leads will commit appropriate resources to conduct Problem Management activities, such as Root Cause Analysis (RCA), Change Management post implementation reviews (PIR) (where applicable), validation or creation of workarounds, and proactive trend analysis reviews as requested by the Problem Manager(s).

- Any Problem that requires a change request (CR) to aid in its resolution can only be closed after the successful implementation of the CR and validation that no further incidents are occurring as a result of the identified error.

- Upon resolution of the problem, a Knowledge Article must be submitted that identifies a known error and includes the resolution or workaround.

6. Benefits

There are several qualitative and quantitative benefits that can be achieved, for both the IT Service Providers and the Customers, by implementing an effective and efficient Problem Management process. The Problem Management Project Team has agreed that the following benefits are important and will be assessed for input to continuous process improvement throughout the Problem Management process lifecycle.

6.1 Benefits to the IT Service Provider

- Better first-time fix at the Service Desk

- Departments can show added value to the organization

- Reduced workload for staff and Service Desk (incident volume reduction)

- Better alignment between departments

- Improved work environment for staff

- More empowered staff

- Improved prioritization of effort

- Better use of resources

- More control over services provided

6.2 Benefits to the Users

- Improved quality of services

- Higher service availability

- Improved user productivity

- Risk Reduction

7. Key Terms and Definitions

7.1 Problem

A Problem is an undesirable situation, indicating the unknown root cause of one or more existing

or potential incidents. A problem is the underlying cause of an incident and can be identified in the following ways:

It is identified as soon as an incident occurs that cannot be matched to existing or recorded problems for which a root cause is to be sought.

It is identified as a result of multiple Incidents that exhibit common symptoms.

It is identified from a single significant Incident, indicative of a single error, for which the cause is unknown, but for which the impact is significant (a Major Incident).

7.2   Proactive Problem Management

Proactive Problem Management is one of two important Problem Management processes. It is used to detect and prevent future problems/incidents. Proactive problem Management includes the identification of trends or potential weaknesses. Proactive Problem Management is performed by the Service Operations group.

7.3   Reactive Problem Management

Reactive Problem Management is one of two important Problem Management processes. It is used to analyze and resolve the causes of incidents. Reactive Problem Management is performed by the Service Operations group.

7.4   Knowledge Base

A database that contains information on how to fulfill requests and resolve incidents using previously proven methods / scripts.

7.5   Known Error

A Known Error is a problem that has an identified root cause and for which a workaround or (temporary) solution has been identified. This term is also describing a fault in the infrastructure that can be attributed to one or more faulty CI's (Configuration Items) in the Infrastructure and causes, or may cause, one or more incidents for which a work- around and/or resolution is identified.

Known Errors are stored in a database called Known Error Database (KEDB).

7.6   Problem Repository

The Problem Repository is a database containing relevant information about all problems whether they have been resolved or not. General status information along with notes related to activity should also be maintained in a format that supports standardized reporting.

7.7   Root Cause

The root cause of an incident is the fault in the service component which made the incident occur.

7.8   Request for Change

A Request for Change (RFC) proposes a change to eliminate a known error and is addressed by the Change Management process.

7.9   Service Level

A Service Level is a measured and reported achievement against one or more Service Level the designated person, team or group. Some process roles may be full- time jobs while others are a portion of a job. One person or team may have multiple roles across multiple processes. Caution is given to combining roles for a person, team or group where separation of duties is required. For example, there is a conflict of interest when a software developer is also the independent tester for his or her own work.

7.10   Service Level Agreement (SLA)

SLA is an agreement between an IT Service Provider and a Customer. The SLA describes the IT Service, documents service level targets, and specifies the responsibilities of the IT Service provider and the Customer. A single SLA may cover multiple IT Services or multiple Customers.

7.11   Operational Level Agreement (OLA)

An Agreement between an IT Service provider and another part of the same organization. An OLA supports the IT Service provider's delivery of IT Services to Customers. The OLA defines the goods or Services to be provided and the responsibilities of both parties.

7.12   Underpinning Contract (UC)

A contract between an IT Service Provider and a Third Party. The Third Party provides goods or Services that support delivery of an IT Service to a Customer. The Underpinning Contract defines targets and responsibilities that are required to meet agreed Service Level Targets in an SLA.

Section B: Roles and Responsibilities

1. User Roles and Functions

The responsibilities of various user roles in Problem Management are listed as follows:

Roles	Responsibilities
Problem Management Process Owner	- Define the Business Case for the Problem Management Process - Ensure end-end responsibility for the Problem Management Process - Ensure the Problem Management process is fit-for- purpose - Ensures that the process is defined, documented, maintained and communicate data in Enterprise level - Ensure there is optimal fit between people, process and technology - Ensure proper Key Performance Indicators are set - Ensure reports are produced, distributed, and used - Drive forward the integration of the Problem Management process with other Service Management processes - Undertakes periodic review of all ITSM processes from an enterprise perspective and ensures that a methodology is in place to address short comings and evolving requirements - Attend top-level management meetings to assess the impact of organizational decisions on the Problem Management environment
Problem Manager(s)	- Ensure the Problem Management process is conducted correctly - Ensure the Problem Management Key Performance Indicators (KPIs) are met - Ensure the Problem Management process operates effectively and efficiently - Ensure process, procedure and work instruction documentation is up to date - Be the operational process executer - Be the owner of registered problems - Enter all relevant details into the Problem record, and ensure that this data is accurate - Provide management and other processes with steering information - Maximize the fit between people, process and technology - Promote the (correct) use of the process - Execute and co-ordinate Proactive Problem Management - Execute and co-ordinate Reactive Problem Management - Ensure correct closure and evaluation of Problems - Ensure the Problem Management process, procedures; work instructions, and tools are optimal from a department/section point of view - Carry out Problem Management activities according to the process, procedures, and work instructions - Obtain the technical and organizational knowledge required

Roles	Responsibilities
	to perform the activities
Support Group Staff	• Ensure they are fully conversant with and follow the Problem Management process, procedures and work instructions • Ensure Problems and Known Errors are processed in a timely manner • Diagnose the underlying root cause of one or many incidents • Ensure that work on the Problem is accurately recorded in the Problem record • Ensure that optimal solutions are devised to rectify Known errors
Service Desk	• • Documenting all relevant incident/service request details, allocating categorization and prioritization codes • Providing first line investigation and diagnosis • Utilizes the known error database in diagnosis of incidents/service requests • Resolving incidents/service requests when first contacted whenever possible • Escalating incidents/service requests when they cannot resolve them within a reasonable amount of time • Closing all resolved incidents, requests and other calls • Update incident management records with accurate incident detail and history in a common repository that is linkable to Problem and Change Management • Provide updates to the know error database as necessary • Communication with users, keeping them informed of incident progress
Problem Owner	• Ensures required stakeholders are involved in the problem management activities • Engages required support staff from other organizations, campus, vendors, etc. • Manages and co-ordinates activities necessary to identify root cause, develop workarounds, preventative actions and long-term solutions for assigned problems • If elimination of the root cause requires modification of an item under change control, the Problem Owner ensures that an RFC with an assigned Change Owner is initiated to manage implementation of the permanent solution and informs the Problem Manager upon implementation of the solution. • Ensures that support staffs in their organization have adequate skill levels and training in ITIL and Problem Management techniques. • Ensures that the Root Cause Analysis is done within 7 days of the occurrence of the problem.
Technician	• Participates in the technical investigation of the problem, under the guidance of the Problem Manager • Maybe involved in the implementation of changes to resolve the problem • Assists the Problem Manager in data analysis to identify

Roles	Responsibilities
Problem Analyst	suspected problems • Assists in identifying required participants (SME's)from other groups to the Problem Owner and/or Problem Manager • Under the direction of the Problem Owner ,requests information from supporting SME's and uses standard problem analysis techniques to facilitate identification and validation of the root cause • In collaboration with SME's and Service Owners • Facilitates development of work around and short-term corrective actions for known errors • Facilitates development and testing of permanent solution • Records and updates problem and known error records with appropriate information • Assists the Problem Manager in validating that the root cause has been eliminated upon implementation of the recommended solution • Assists the Problem Manager in collaboration with the SMEs & Service Owners that the Root Cause Analysis is completed & submitted within 7 days of the occurrence of the problem.

2. RACI Matrix

The following RACI chart outlines which positions are Responsible, Accountable, Consulted, and Informed for each service desk process.

Sr. No.	Activity Description	Service Desk	Problem Manager	Technician	Change Manager
1	Problem Detection	R	A/R		
2	Problem Logging	R	A/R		
3	Categorization		A/R		
4	Allocation of Priority	I	A/R	C	
5	Investigation and Diagnosis	C	A	R	
6	Workarounds	I	A	R	
7	Change Requests		A	R	I
8	Resolution and Closure	I	A	R	I
9	Major Problem Review	C	A/R	C	

Section C: Process Flow

1. Problem Management Process flow

This section describes the Problem Management Process from a high level. Each sub process described in this section will be detailed in a sub process specific section within this document
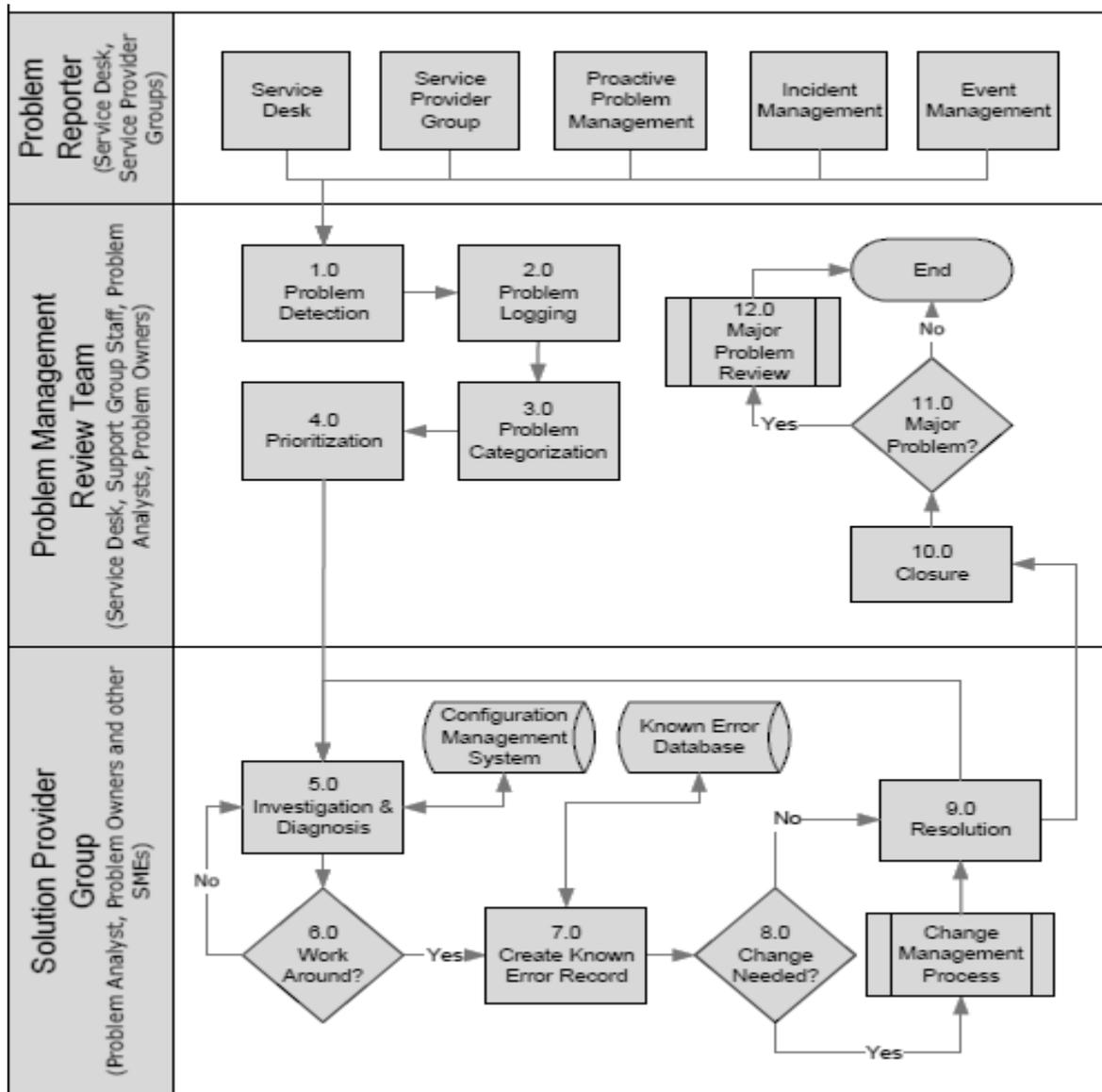

Figure 1: Problem Management Process Flow

1.1. Problem Management Process Descriptions

Sr. No	Procedure	Description
1.	Problem Reporting	**Role: Problem Reporter** • Problems can be reported by any group within the IT Enterprise organization that can recognize a situation that is likely to create incidents. • The Service Desk or the Service Provider Group may recognize there is a problem because of multiple related incidents. Other groups may do trend analysis to identify potential recurring issues.
2.	Problem Detection	**Role: Problem Management Review Team** • Analysis of incidents as part of proactive Problem Management may result in the need to create a Problem Record so that the underlying fault can be investigated further. Problems may be identified from the following activities: It is likely that multiple ways of detecting problems will exist in all organizations. These will include: • Suspicion or detection of an unknown cause of one or more incidents by the Service Desk, resulting in a Problem Record being raised – the Service Desk may have resolved the incident but has not determined a definitive cause and suspects that it is likely to recur, so will raise a Problem Record to allow the underlying cause to be resolved. Alternatively, it may be immediately obvious from the outset that an incident, or incidents, has been caused by a major problem, so a Problem Record will be raised without delay. • Analysis of an incident by a technical support group which reveals that an underlying problem exists or is likely to exist. • Automated detection of an infrastructure or application fault, using event/alert tools automatically to raise an incident which may reveal the need for a Problem Record. • Incident Matching • Trend Analysis
3.	Problem Logging	**Role: Problem Management Review Team** • Regardless of the detection method, all relevant information relating to the nature of the Problem must be logged so that a full historical record is maintained. A cross-reference must be made to the incident(s) which initiated the Problem Record. Typically, the following details are input during Problem Logging: • Unique reference number User details • Service details • Equipment details • Date/time initially logged

Sr. No	Procedure	Description
		• Priority and categorization details • Cross reference to related Incidents • Configuration Item details • Priority and Categorization details • Description of incident symptoms that resulted in Problem identification • Details of diagnostic or attempted recovery action taken
4	Problem Categorization	**Role: Problem Management Review Team** • Problems must be categorized in the same way as incidents using the same codes defined in the Service Catalog, so that the true nature of the problem can be easily tied to the supported service, related incidents and for management reporting.
5	Problem Prioritization	**Role: Problem Management Review Team** • Problems must be prioritized in the same way and for the same reasons as incidents – but the frequency and impact of related incidents must also be considered. Before a problem priority can be set, the severity and impact need to be assessed. See the section labeled "Priority Determination". • Once the severity and impact are set, the priority can be derived using the prescriptive table.
6	Investigation & Diagnosis	**Role: Solution Provider Group** • Properly investigate, diagnose, test and verify the root cause of the Problem and determine the associated Configuration Item (CI). • The speed and nature of this investigation will vary depending upon the priority. Problem analysis, diagnosis and solving techniques should be used to facilitate finding the root cause.
7	Workarounds	**Role: Solution Provider Group** • The Known Error Database (KEDB) can be searched to match the Problem against any known errors and possible workarounds. • Existing workarounds should be identified and assessed as possible resolutions for Incidents related to the Problem. • This activity will also define new workaround(s), if feasible, to take the place of existing workaround(s), or to define a workaround if one does not exist. • In cases where a workaround is found, it is important that the problem record remains open and details of the workaround are always documented within the Problem Record.
8	Create a Known Error Record	**Role: Solution Provider Group** • Once the root cause has been determined, Configuration Item (CI) has been discovered and a workaround or permanent fix is identified, a Known Error • Record must be raised and recorded in the Known Error database

Sr. No	Procedure	Description
		so that if further incidents arise, they can be identified and related to the problem record. • Entry to the known error database must be made within 7days of fix/workaround identification.
9	Change Needed Decision	**Role: Solution Provider Group** • Once enough information is known about the root cause of a Problem. • A decision will need to be made regarding the need to create a Request for Change (RFC). • If an RFC is to be created, it will need to be submitted, scheduled, and approved following the predefined Change Management procedures.
10	Problem Resolution	**Role: Solution Provider Group** • As soon as a resolution is found, it should be applied to resolve the Problem. • This resolution may lead to initiation of an RFC and approval through that process before the resolution can be applied. • In some cases, the cost and/or impact of resolving the Problem cannot be justified. • In that case a decision may be made to leave the Problem open and continue to resolve subsequent Incidents using a validated workaround.
11	Problem Closure	**Role: Solution Provider Group** • When a change has been implemented, confirmed resolved and the Post Implementation Review (PIR) has been conducted, the Problem Record should be formally closed. • A check should be performed at this time to ensure that the Problem record contains a full historical description of all events and if not, the Problem record should be updated. • Once a Problem record has been formally closed, any related Incident Records that are still open, should also be closed and the status of any related Known Error Records should be updated to show that the resolution has been applied.
12	Major Problem Decision	**Role: Problem Management Review Team** • Once a Problem has been resolved, a decision must be made regarding whether, the Problem qualifies as a Major Problem. • If a Problem is identified as a Major Problem, a formal Major Problem Review will be scheduled and performed to review the existing process, any changes that may be needed and how to prevent this or similar Problems from occurring in the future.
13	Major Problem Review	**Role: Service Provider Group Managers & CTO** • When a Problem warrants a Major Problem Review, a meeting will be convened to identify what was done right, what was done

Sr. No	Procedure	Description
		wrong, what could be done better next time, and how to prevent the Problem from happening again.

2. Problem Management Sub-Process

This section explains activities, and corresponding inputs and outputs of Incident Management process.

2.1. Problem Identification/Detection

The Problem Detection process starts when the Problem Coordinator determines that a problem needs to be opened in order to investigate an existing or potential problem. This process can be started in response to a single incident, a series of related incidents, or a single interaction. The process may also result from the proactive investigation of a potential problem.

There are two types of Problem Identification: Proactive and Reactive

2.1.1. Proactive

On a quarterly basis to coincide with the production of the IT Service Report, an analysis of logged incidents will be performed in order to identify areas in which possible problems exist. Based on this analysis, problem records will be raised, and any required actions will be agreed to address them e.g. user training.
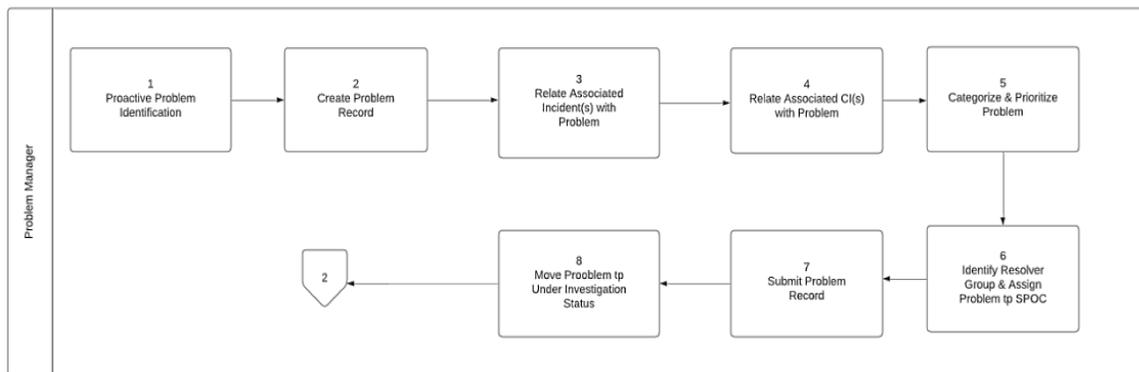
Figure 2: Problem Identification Process - Proactive

The reports that will be produced for analysis will include (but not limited to):
- Number of incidents by category (e.g. problems with MS Word)
- Number of incidents by user
- Number of incidents by business team
- Number of incidents by priority
- Number of incidents by configuration item
- Daily distribution of incidents across the quarter
- Hourly distribution across the quarter

2.1.2. Reactive

The proactive Problem Detection process should include reference to information that assists analysis, such as:

- Asset and configuration
- Change management
- Published workaround information from suppliers
- Historical information about similar problems
- Monitoring event logs and other data collected by system management tools

The incident(s) or interaction(s) that initiated the problem should be referenced, and relevant details copied from the incident(s) or interaction(s) to the problem. If the Incident Analyst has identified a workaround or temporary fix, this should be included as well.
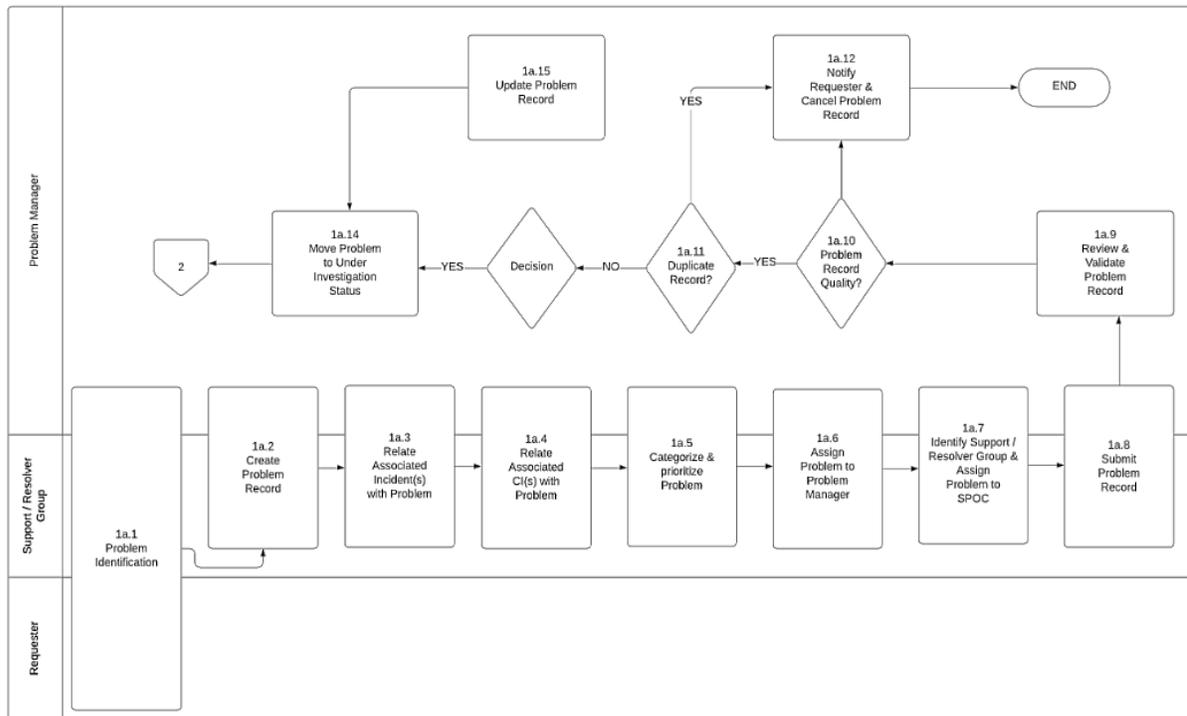

Figure 3: Problem Identification Process - Reactive

Problem Detection, Logging and Categorization process:

Sl. No.	Procedure or Decision	Description	Roles
2.1.1	Review closed incidents	Periodically, the Problem Coordinator must review the closed incidents to detect new problems or to match incidents to existing problems that have not been resolved. Analysis of incident data may reveal similar or reoccurring incidents, which means that a permanent fix must be found. Select incidents since the last review by using the following criteria: • Major incidents (high impact) • Incidents resolved through a workaround or a temporary fix that is not matched to a problem. • Suspected problems (as identified by stakeholders) • Candidates for problems All closed incidents that are not resolved through a permanent fix, temporary fix, or workaround must be matched to existing problems. Or, a new problem must be created. Incident management staff may have linked incidents to existing problems already (for example, if a workaround has been applied).	Problem Coordinator
2.1.2	Incident caused by outstanding problem?	If the incident is caused by an outstanding problem, the workflow moves to 2.1.3. If the incident is not caused by an outstanding problem, the workflow moves to 2.1.4. It is important to link incidents to existing problems to monitor the number of reoccurring incidents. This helps you to identify problems that are not resolved. The incident count is the number of times that this problem has resulted in an incident and is updated in the problem. The incident count influences the prioritization of problems by indicating the frequency of occurrence and thus the business impact of this issue.	Problem Coordinator
2.1.3	Relate incident to outstanding problem	If the incident is caused by an outstanding problem, the incident must be linked to the problem. If required, the problem is updated and	Problem Coordinator

Sl. No.	Procedure or Decision	Description	Roles
		the Problem Analyst is notified (for example, when a workaround has been applied).	
2.1.4.	Create new problem ticket	Create a new problem ticket that captures all the relevant data, such as: • User details • Configuration Item (CI) details • Date and time the problem was initially logged • Description • Details of all diagnostic or attempted recovery actions taken so far The Problem Coordinator can estimate the resources and costs that are required to resolve a problem during any stage of the Problem lifecycle. These details are entered in the problem record and are used to decide the next course of action for the ticket.	Problem Coordinator
2.1.5.	Categorize problem	The Problem Coordinator categorizes the problem into a specific domain (for example, hardware, software, or security). Problems can be categorized in the same way as incidents, so that the true nature of problems can be easily traced in the future, and meaningful management information can be obtained. Other information (such as the estimated cost and estimated effort) is entered, if it is available at this stage. These fields can be updated at a later stage if new information becomes available. If the problem is not categorized in the appropriate category, the Problem Coordinator can change the category, which initiates a new workflow.	Problem Coordinator
2.1.6.	Link incidents to problem record	The Problem Coordinator links all related incident records to the problem record. The Problem Coordinator also captures other information, such as the impact (from SLM), urgency, and subcategory of the problem.	Problem Coordinator

Sl. No.	Procedure or Decision	Description	Roles
2.1.7.	Prioritize problem and identify major problem	The Problem Coordinator identifies whether it is a major problem based on the impact and the organization's priority.	Problem Coordinator
2.1.8	Problem investigation to be Deferred?	If the problem investigation must be deferred, move the problem to the appropriate status. If the problem investigation does not need to be deferred, go to 2.1.9.	Problem Manager
2.1.9.	Defer the problem investigation	The Problem Manager defers the problem investigation for a specific period. The reason for deferring the problem is detailed in the ticket. Periodically, the Problem Manager reviews the deferred problems to determine the appropriate action. Reasons for deferring problem include the following: • The likelihood of recurrence is low • The cost of resolving the problem is very high There is currently no plan to investigate the problem	Problem Manager
2.1.10	Assign Resources	The Problem Coordinator determines the skills and personnel that are required to resolve the problem and assigns personnel to resolve the problem.	Problem Coordinator

2.2.   Investigation and Diagnosis

The Problem Investigation and Diagnosis process helps identify the root cause of the problem. Where appropriate, the problem management process should develop and maintain workarounds that enable the incident management process to help service restoration. Different specialists can be involved in this root cause analysis. If necessary, refer to external resources to verify whether the problem has already been identified and published by vendors. Decide the target dates for the problem investigation.

The following figure illustrates the Problem Investigation and Diagnosis workflow:
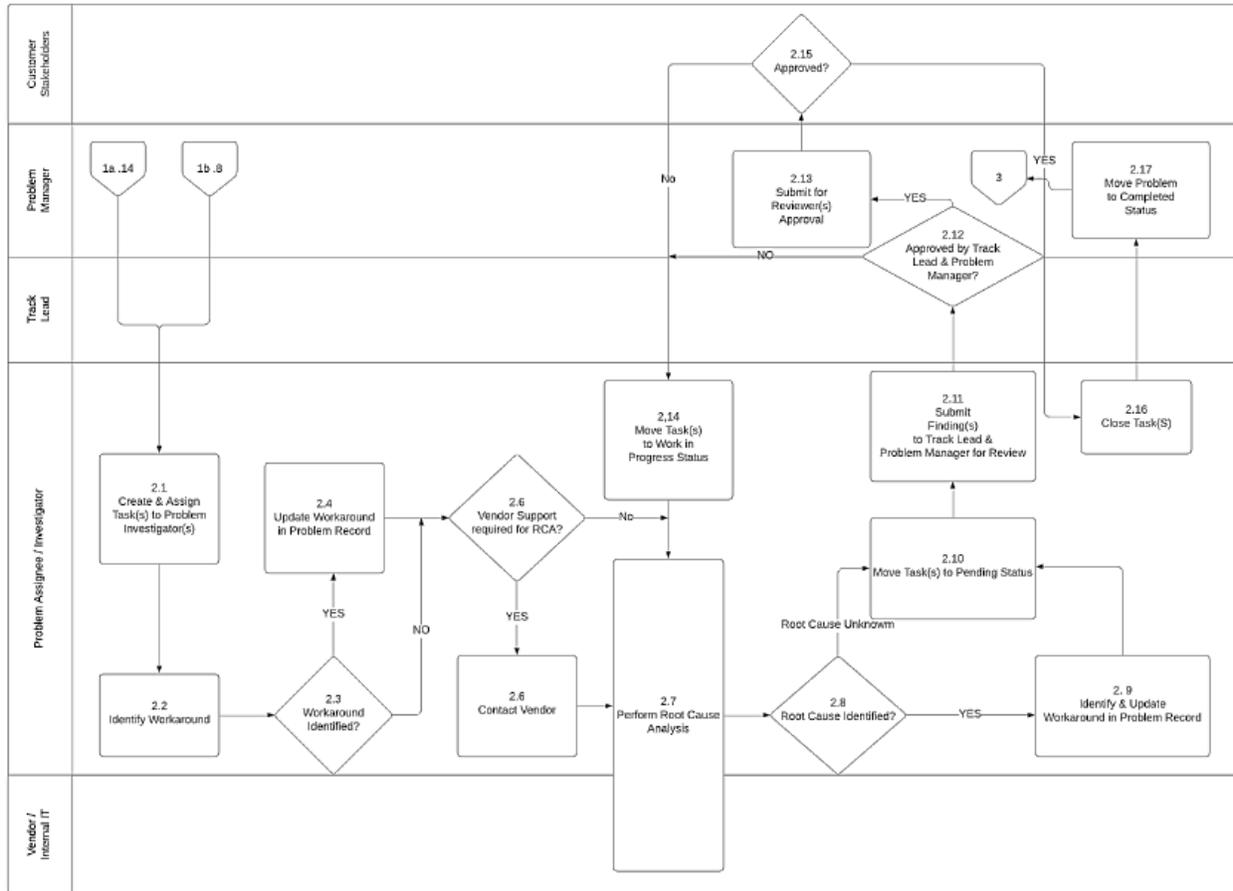

Figure 4: Problem Identification and Diagnosis Process

Problem Investigation and Diagnosis process:

Sl. No.	Procedure or Decision	Description	Roles
2.2.1	Coordinate investigation and diagnosis	The Problem Coordinator verifies the schedules of resources and assigns the resources to the problem resolution. The assigned resource starts their investigation. The Problem Coordinator coordinates the tasks that required to resolve the problem and maintains communication with all stakeholders.	Problem Coordinator
2.2.2	Schedule the problem and establish milestones	The Problem Coordinator estimates the cost and effort required to resolve the problem and determines the target dates for the problem resolution milestones. Target dates are determined by the priority of the problem and by the impact of the problem on affected services. Additionally, this phase of planning considers whether an effective workaround or fix is available.	Problem Coordinator
2.2.3	Validate the problem	The Problem Analyst ensures that the problem record is valid. The Problem Analyst determines whether the problem record is a duplicate or new problem. Then, the Problem Analyst continues with root cause analysis. If the problem is a duplicate, it is linked to the problem that it is a duplicated of, and the workflow moves to 2.2.5. If the problem is not a duplicate, the workflow moves to 2.2.4.	Problem Analyst
2.2.4	Close duplicate problem	The Problem Analyst closes the problem as a duplicate and enters the necessary closure comments into the ticket.	Problem Analyst
2.2.5	Perform root cause analysis	The Problem Analyst performs root cause analysis of the problem. Root cause analysis can include the following methods: • Chronological Analysis • Pain Value Analysis • Kepner and Tregoe • Brainstorming • Ishikawa Diagrams • Pareto Analysis	Problem Analyst
2.2.6	Investigate and diagnose	The Problem Analyst analyzes the known data to identify and isolate the root cause of the problem. If a	Problem Analyst

Sl. No.	Procedure or Decision	Description	Roles
		potential root cause is identified, it is verified. If more resources are required to do this, they are requested through the Problem Coordinator, who requests them from the Problem Manager and Problem Coordinator. Additionally, the Problem Analyst tries to identify a workaround. Potential workarounds are tested to verify that they work. If successful, a workaround is documented in the problem record. The same is intimated to Service Desk and Incident Analysts	
2.2.7	Create and assign investigation tasks	The Problem Analyst creates and assigns problem tasks to the resource who is responsible for root cause analysis. The Problem Analyst enters the due date for the assigned task. Additional resources (for example, suppliers and other specialists) can be used for this analysis. The Problem Analyst monitors the outstanding problem tasks.	Problem Analyst
2.2.8	Root cause identified?	If the root cause is not identified, the Problem Analyst must determine whether there is a workaround for the problem. If a root cause is identified, the Problem Analyst updates the problem record with the details.	Problem Analyst
2.2.9	Update problem record with root cause	The Problem Analyst updates the problem record to indicate that a root cause has been found. The problem record is updated with any affected CIs.	Problem Analyst
2.2.10	Workaround identified?	If a workaround is identified, the workflow moves to 2.2.11. If no workaround is identified, the workflow moves to 2.2.16.	Problem Analyst
2.2.11	Verify workaround	The Problem Analyst creates a problem task and assigns it to the Investigation category in order to test the suitability of the identified workaround for resolving related incidents.	Problem Analyst
2.2.12	Workaround successful?	If the workaround is successful, the workflow moves to 2.2.13. If the workaround is not successful, the workflow moves to 2.2.16.	Problem Analyst
2.2.13	Update problem record with workaround	Update the workaround (in the known error and the problem) and inform stakeholders.	Problem Analyst

Sl. No.	Procedure or Decision	Description	Roles
2.2.14	Root cause or workaround determined?	The Problem Coordinator validates the results of the problem task. If the root cause is determined, the workflow moves to 2.2.15. If the root cause is not determined, the workflow moves to 2.2.16, and then determine whether additional resources are needed or whether escalation is required.	Problem Coordinator
2.2.15	Update any related open Incidents	Review any related open incidents and advise the assigned Incident Analyst that a root cause and/or workaround has been identified. (An update will be made to the Activity Log in the incident record when the problem record is saved with an updated workaround).	Problem Coordinator
2.2.16	Caused by outstanding known error?	Determine whether the root cause for this problem is related to an outstanding known error. If yes, continue with 2.2.17. If no, forward the problem to the Problem Resolution phase, and then create a new known error record .	Problem Coordinator
2.2.17	Relate problem to outstanding known error	The problem is moved to the Problem Resolution phase and linked to the existing known error record. The resolution of the problem is dependent on the resolution of this known error.	Problem Coordinator
2.2.18	Verify whether to continue investigation	The Problem Analyst determines whether to continue with the investigation, start problem resolution, or recommend abandonment.	Problem Analyst
2.2.19	Continue, defer, or abandon investigation?	If the Problem Analyst decides to continue the investigation, the workflow moves to 2.2.6. If the Problem Analyst determines they do not have the capabilities to investigate and determine the root cause of the problem (that is, they do not have the skill level or the available time), the Problem Analyst documents the reason that a root cause is not found, the Problem Coordinator is informed, and the workflow moves to 2.2.18. If the problem can be abandoned, the workflow moves to 2.2.19. If the problem can be deferred, the workflow moves to 2.2.20.	Problem Analyst

Sl. No.	Procedure or Decision	Description	Roles
2.2.20	Re-assign resources	The Problem Coordinator needs to re-assign the problem to other resource to continue the problem investigation. The problem is moved back to Categorization phase with the Assign status again, and the workflow moves to 2.1.10.	Problem Coordinator
2.2.21	Abandon the problem	The Problem Analyst abandons the problem ticket.	Problem Analyst
2.2.22	Defer the problem investigation	The Problem Analyst defers the problem investigation for a specific period. The reason for deferring the problem is detailed in the ticket. Periodically, the Problem Manager reviews the deferred problems to determine the appropriate action. Reasons for deferring problem include the following: • The likelihood of recurrence is low • The cost of resolving the problem is very high There is currently no plan to investigate the problem	Problem Analyst

2.3. Identify and Implement Solution

After the Problem Management Investigation phase has identified the root cause of an incident, the Problem Resolution phase starts. In collaboration with specialist staff, the Problem Analyst assesses the means of resolving the problem. If necessary, the Problem Analyst requests for an RFC according to change management procedures and links the RFC to the problem record.

The Problem Resolution phase comprises activities that identify and apply a solution to a problem.

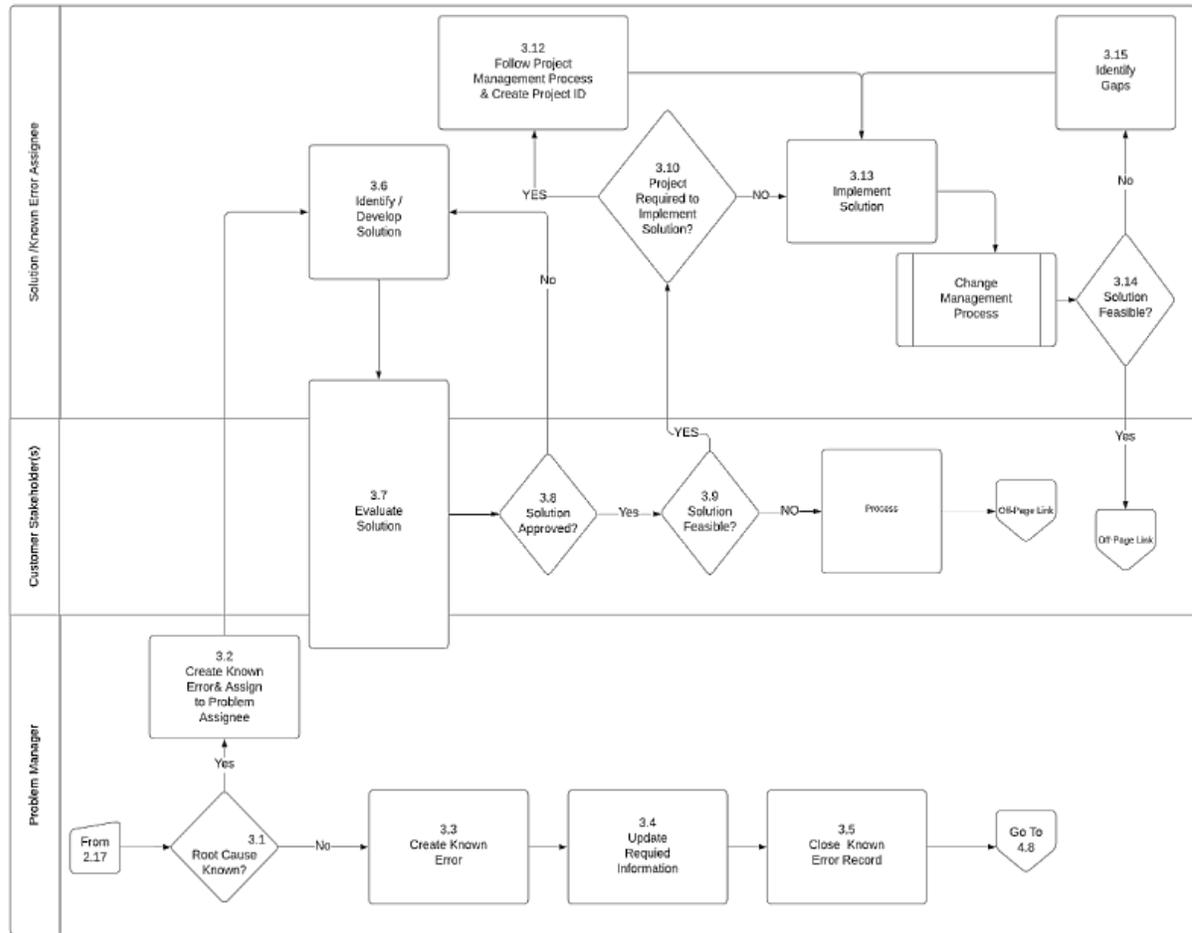The following figure illustrates the Problem Resolution workflow:

Figure 5: Problem Identify and Implement Solution Process

Problem Resolution process:

Sl. No.	Procedure or Decision	Description	Roles
2.3.1	Attempt to identify permanent fix	The Problem Analyst attempts to identify a permanent fix for the problem record. Workarounds may be found at this point, if they were not found in the previous phase. The workarounds are tested and documented, if successful. Sometimes, other teams or vendors are involved in identifying the fix for the problem. The problem ticket may incorporate many tasks that are assigned to various analysts or teams who are working towards the problem resolution.	Problem Analyst
2.3.2	Create Known Error	If needed, create a known error record from the problem record for reference and to contribute to the known error knowledge base.	Problem Analyst
2.3.3	Fix found?	If a permanent fix is identified, it is documented. If a permanent fix is not identified, it is verified for closure or deferral.	Problem Analyst
2.3.4	Document permanent fix details	The Problem Analyst documents the permanent fix details in the problem record and updates the Knowledge Management Database with the permanent fix details. Then, the workflow moves to 2.3.8.	Problem Analyst
2.3.5	Verify whether to defer the problem	The Problem Analyst decides whether to defer or cancel the problem. If the problem is waiting for vendor resolution or for resource or budget approval, the problem is deferred, and the workflow moves to 2.3.6. If the problem is canceled, the workflow moves to 2.3.7.	Problem Analyst
2.3.6	Defer the problem record	The Problem Analyst defers the problem record for a period.	Problem Analyst
2.3.7	Cancel the problem	The Problem Analyst closes the problem ticket and marks it as canceled.	Problem Analyst
2.3.8	Resolve problem	In collaboration with specialist staff, the Problem Analyst assesses the means of resolving the problem. If necessary, they complete an RFC according to Change Management procedures, and link the RFC to the problem record.	Problem Analyst
2.3.9	Verify problem resolution	The Problem Manager reviews the history of the problem and its resolution, and then makes a final decision as to whether the problem is corrected. If the problem is corrected, the workflow moves to 2.3.10.	Problem Manager
2.3.10	Develop problem correction plan	The Problem Analyst develops a plan that details all the corrective actions that must be performed to fix the problem.	Problem Analyst

Sl. No.	Procedure or Decision	Description	Roles
		The Corrective Action Plan must include documenting the results of any monitoring that may have been implemented to monitor the problem resolution.	
2.3.11	Process corrective actions for problem	The Problem Analyst processes the problem record and prepares to implement the corrective actions. Problem tasks may be created and assigned to the Resolution category in order to execute the corrective actions.	Problem Analyst
2.3.12	Implement corrective plan	The schedule to implement the fix is identified and updated in the correction plan. The correction plan is executed.	Problem Analyst
2.3.13	Decide whether to rework	The Problem Analyst checks the implementation result and decides whether to rework the problem correction or abandon the problem fix.	Problem Analyst
2.3.14	Rework on finding permanent fix	If the plan must be reworked, the Problem Analyst updates the problem status to Work in Progress. Then, the workflow moves to 2.3.1.	Problem Analyst
2.3.15	RFCs required for corrective actions?	The Problem Analyst determines if any CIs must be modified in order to implement the resolution. If RFCs are required to resolve the problem, the Problem Manager is informed, and the workflow moves to 2.3.16. If RFCs are not required to resolve the problem, the Problem Analyst can apply non-CI or pre-approved changes, and the workflow moves to 2.3.17.	Problem Analyst
2.3.16	Create RFCs to correct problem	The Problem Manager creates RFCs, links them to the problem, and inform Change Manager if required. The Problem Manager monitors the RFCs that are required to correct the problem.	Problem Manager
2.3.17	Apply corrective actions	Some Problem resolutions require both non-CI-related activities and activities that affect CIs. The Problem Analyst applies non-CI corrective actions to fix the error.	Problem Analyst
2.3.18	Check status of all corrective actions	The Problem Analyst checks the status of all the corrective actions that are applied to the problem record.	Problem Analyst
2.3.19	RFC successful?	The Problem Manager checks the RFCs from the Change Management process to verify that they are successful. If the RFCs are successful, the status of all corrective actions are checked. If the RFCs are not successful, abandonment of the RFCs is recommended.	Problem Manager
2.3.20	All corrective actions complete?	If all corrective actions are complete, the Problem Analyst begins to monitor the resolution.	Problem Analyst

Sl. No.	Procedure or Decision	Description	Roles
2.3.21	Verify the problem	The Problem Analyst verifies the resolution and the corrective actions to determine whether the problem can be abandoned or deferred.	Problem Analyst
2.3.22	Cancel problem?	If the resolution to the problem needs to be canceled, the process moves to 2.3.23. If the resolution does not need to be canceled, the corrective action continues.	Problem Analyst
2.3.23	Cancel the problem and resolution	The Problem Analyst closes the problem ticket and sets it to the "canceled" state.	Problem Analyst
2.3.24	Review problem resolution	The Problem Analyst reviews the history of the problem and its resolution, and then determines whether the problem is corrected.	Problem Analyst
2.3.25	Confirm problem correction	The Problem Analyst reviews the problem history and resolution data, and then confirms that the affected personnel no longer experience the problem.	Problem Analyst
2.3.26	Problem corrected?	If the problem is not corrected, the problem is set to the "unresolved" state and closed. Then, the workflow moves to 2.3.28. If the error is corrected, the workflow moves to 2.3.27.	Problem Analyst
2.3.27	Update problem record as resolved	The Problem Analyst sets the problem record to the "resolved" state. The Problem Analyst closes the problem ticket or sends it to Problem Manager for review and closure.	Problem Analyst
2.3.28	Update known error with resolution and close known error	The Problem Analyst updates the related open known error record with the problem resolution, and then closes the known error.	Problem Analyst
2.3.29	Close unresolved problem	The Problem Analyst sets the problem record to the "unresolved" state and closes it. Sometimes, the problem record may be reworked. In such cases, the ticket is assigned to other teams, or the ticket's status is modified.	Problem Analyst

2.4. Problem Closure

After a problem has been resolved, it is automatically forwarded from the Problem Resolution phase to the Problem Review phase. In this phase, the problem(s) must be reviewed to determine and validate whether it has been resolved.

After a problem has been reviewed and closed, it is forwarded from the Problem Review phase to the Problem Closure phase. The problem record must be formally closed when any change has been completed and successfully reviewed, and the resolution has been applied.

A problem review should be scheduled whenever an investigation into unresolved, unusual, or high-impact problems justifies it. The purpose of the problem review is to seek improvements to the process, and to prevent the recurrence of incidents or mistakes.

Problem reviews typically include the following elements:

- Reviews of individual incident levels and problem status against service levels

- Management reviews to highlight those problems that require immediate action

- Management reviews to determine and analyze trends, and to provide input for other processes, such as user education and training

Problem reviews should include identifying the following elements:

- Trends (for example, recurring problems and incidents)

- Recurring problems of a classification component or location

- Deficiencies caused by lack of resources, training, or documentation

- Non-conformance (for example, against standards, policies, and legislation)

- Problems identified as known errors in planned releases

- Staff resource commitment in resolving incidents and problems

- Recurrence of resolved incidents or problems

Improvements to the service or to the problem management process should be recorded and entered a service improvement plan. This information should be added to the problem management knowledge base. All relevant documentation should be updated (for example, user guides and system documentation).

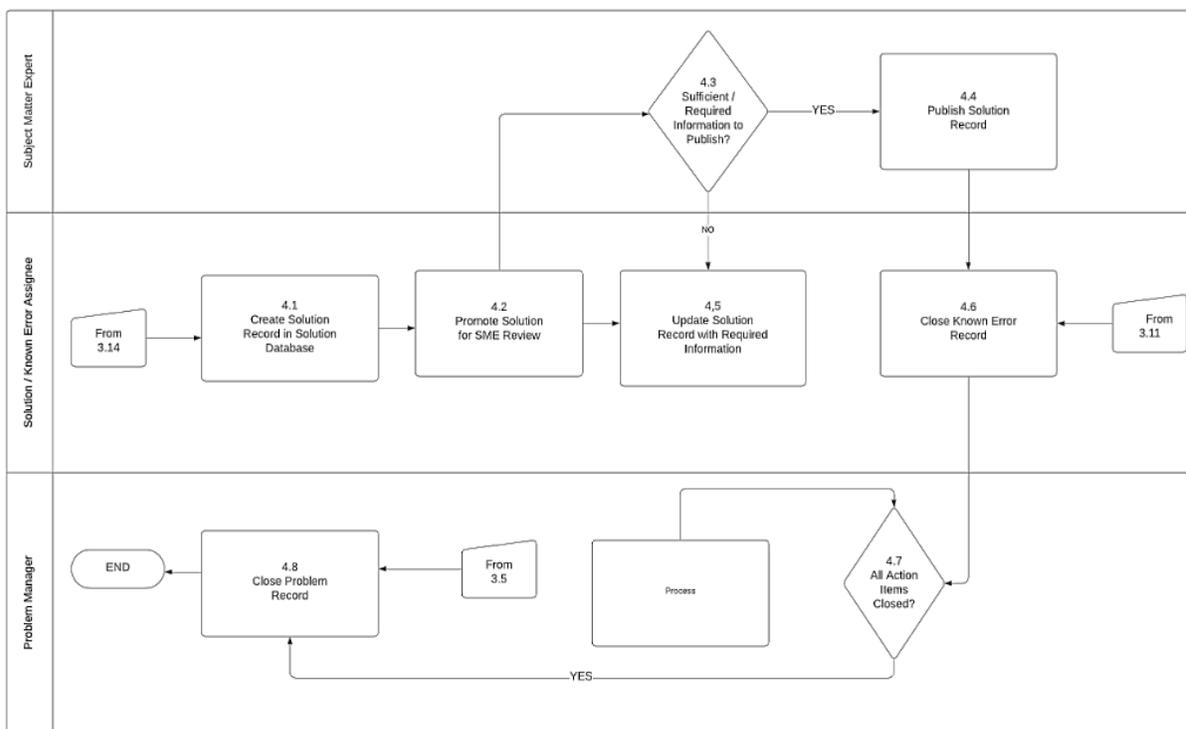The following figure illustrates the Problem Review and Closure workflow:

Figure 6: Problem Closure Process

Problem Closure process:

Sl. No.	Procedure or Decision	Description	Roles
2.4.1	Review the problem	The Problem Manager reviews the problem to determine whether it can be closed and to determine the reason for the closure.	Problem Manager
2.4.2	All problem tasks closed?	The Problem Manager checks whether there any problem tasks are not closed. If there are open tasks, the task owner is requested to close or to cancel it.	Problem Manager
2.4.3	Associated RFCs for known error closed?	The Problem Manager checks whether there any associated RFCs are not closed. If there are open RFCs, the RFC owner is requested to close or to cancel it.	Problem Manager
2.4.5	Major problem?	If the problem is major, a formal major review is conducted. If the problem is not major, a regular review is conducted.	Problem Manager
2.4.5	Review major problem	After every major problem (as determined by the organization's priority system), a review must be conducted to determine the lessons learned. Specifically, the review should examine the following items: • Actions correctly performed	Problem Manager

Sl. No.	Procedure or Decision	Description	Roles
		• Actions incorrectly performed	
		• What can be done better in the future?	
		• How to prevent recurrence of the problem	
		• Whether there has been any third-party responsibility	
		• Whether any follow-up actions are needed.	
2.4.6	Create lessons learned document	A "lessons learned" document is created and placed in SKMS, and all stakeholders are informed. The Problem Manager sends necessary details for service or process improvement to the Service Improvement Process, if required.	Problem Manager
2.4.7	Conduct problem review	The Problem Manager initiates problem review activities and coordinates the formal review process. All parties involved in the problem resolution are included in the review, which summarizes what went well, what could be done better next time, what went wrong, and why some things went wrong.	Problem Manager
2.4.8	Close the problem record	The Problem Manager closes the problem record by providing appropriate the closure code and comments.	Problem Manager
2.4.9	Open Known Errors associated?	If there is an open known error associated with the problem, choose whether to close the known error as well as closing the problem.	Problem Manager
2.4.10	Close the Known Error records	The Problem Manager closes the associated known error.	Problem Manager

2.5. Problem and Known Error Monitoring

Problem management monitors the continuing impact of problems and known errors on user services. In the Problem and Known Error Monitoring process, the Problem Manager periodically reviews the problem and known error records and monitors the progress of activities in those records against the target dates that are agreed with stakeholders.

Service Manager tracks individual problems and their associated known error activities. The Problem Manager evaluates the progress of those activities against the plans and associated budget. If the impact of a problem becomes severe, the Problem Manager escalates the problem. In some cases, the Problem Manager may refer the escalated problem to an appropriate board to increase the priority of the request for change or to implement an urgent change.

The Problem Manager monitors the progress of each problem resolution against service level agreements, and periodically informs the stakeholders of that progress.

Problem and Known Error Monitoring process:

Sl. No.	Procedure or Decision	Description	Roles
2.5.1	Monitor Problems and Known Errors	The Problem Manager reviews the problem and known error records periodically and compiles a list or report of the problem records for review. This list or report includes the following items: • Active problem records (to evaluate progress against the planned schedule and associated budget) • Deferred problem records (to evaluate whether they should remain in deferred status) The review may also be triggered by new releases or by changes being implemented. The Problem Manager identifies the appropriate action for the records. Deferred records are activated or closed. Active records may be deferred or abandoned for various reasons.	Problem Manager
2.5.2	Action required?	If any action is required, it is performed. If no action is required, the monitoring process continues.	Problem Manager
2.5.3	Determine appropriate actions	The Problem Manager identifies the appropriate action for the record. Possible actions include the following: • Record is closed as the problem is not relevant anymore • Record is investigated • Record is deferred	Problem Manager
2.5.4	Review record with stakeholders	The actions for the records are reviewed with the stakeholders.	Problem Manager

Sl. No.	Procedure or Decision	Description	Roles
2.5.5	Investigate/Defer/Close?	Determine whether the problem is still relevant. If a deferred problem record needs to be worked on, it is activated. If the problem is not relevant, the problem record is checked for closure and deferring.	Problem Manager
2.5.6	Defer the problem	The problem record is deferred. The tentative activation date is entered in the problem record. If a problem must be deferred, the activation dates may need to be modified.	Problem Manager
2.5.7	Activate problems	The Problem Manager updates a deferred problem record with scheduling and resource information. The manager also moves the problem record to the appropriate state for the resumption of work. The record is activated, coordinated by the Problem Coordinator, and worked upon by the assigned Problem Analyst.	Problem Manager

Section D: Governance and Process Controls

1. Key Performance Indicators

The following lists the key performance indicators (KPIs) that have been selected for tracking the success of the Problem Management process.

- Percentage reduction in repeat Incidents/Problems

- Percentage reduction in the Incidents and Problems affecting service to Customers

- Percentage reduction in the known Incidents and Problems encountered

- Percentage reduction in average time to resolve Problems

- Percentage reduction of the time to implement fixes to Known Errors

- Percentage reduction of the time to diagnose Problems

- Percentage reduction of the average number of undiagnosed Problems

- Percentage reduction of the average backlog of 'open' Problems and errors

- Improved responses on business disruption caused by Incidents and Problems

- Percentage reduction of the impact of Problems on User

- Reduction in the business disruption caused by Incidents and Problems

- Percentage reduction in the number of Problems escalated (missed target)

- Percentage reduction in the IT Problem Management budget

- Increased percentage of proactive Changes raised by Problem Management, particularly from Major Incident and Problem reviews.

2. Reports

The following table lists the Management reports that help identify trends and allow review of the health of the process. The acid test of the relevance of a report is to have a sound answer to the question, "What decisions is this report helping management to make?"

Sl. No.	Report Name	Notes
1.	Service Interruptions	A report showing all problems related to service interruptions will be reviewed weekly during the operational meeting.
2.	Metrics	Metrics reports should generally be produced monthly with quarterly summaries. Metrics to be reported are: • Total numbers of problems (as a control measure) • Breakdown of problems at each stage (e.g. logged, work in progress, closed etc.) • Size of current problem backlog • Number and percentage of major problems

Sl. No.	Report Name	Notes
3.	Meetings	The Problem Manager will conduct sessions with each service provider group to review performance reports. The goal of the sessions is to identify: • Status of previously identified problems • Identification of work around solutions that need to be developed until root cause can be corrected • Discussion of newly identified problems

3. Escalation Matrix

Escalation matrix allows you to notify the right stakeholders in the event of critical issues. You can notify the right people at the right time about critical activities based on the escalation matrix. The escalation matrix is time zone specific and can be available 24X7.

Please find the link to the escalation matrix template

https://mygavs.gavstech.com/ims/

Section E: ITIL Inter-relationships and Best Practices

1. Relationships with other ITIL Processes

ITIL describes an integrated set of processes which, collectively, describe an overall approach or framework to service management These interdependencies for Problem Management process are described below.

Problem Management is provided inputs from:

1.1 Change Management

To resolve problems, changes are often required to implement workarounds and to resolve known errors. Problem Management can submit an RFC to resolve an error in the IT infrastructure that is causing problems and incidents. Problem management can work using the normal, standard or emergency change process. In either case an RFC must be submitted.

Refer to the Change Management Process here - https://mygavs.gavstech.com/ims/

1.2 Incident Management

Problem management starts once Incident management is completed. A problem record can be created either from one or more incidents or on its own. It deals with analysis of recurring incidents and finding their root cause. Incident management shares information such as incident description, user impacted, asset impacted, criticality. Problem Management uses this information to identify whether it is a known error or not.

Refer to the Incident Management Process here - https://mygavs.gavstech.com/ims/

1.3 Configuration Management

Recurring incidents demand asset health check in order to find out the cause. While Problem Management owns root cause analysis, it is essential to work closely with Configuration Management team to understand asset details, asset owner and its interdependencies with other assets, impact and vendor related information. Problem research team with the help of these details suggests the next steps i.e. to execute a new change in the configuration item, CI or provide a suitable workaround. These two modules are closely connected to each other and Problem analysis phase revolves around Configuration Items (CIs) in order to minimize the impact.

1.4 Knowledge Management

Problem Management leverages Knowledge Management by accessing the central repository and solution database. Knowledge base articles are fundamental to trend analysis. For both proactive and reactive Problem Management, knowledge base articles help in speedy resolution. Relevant knowledge articles are associated to problem record. Known error database along with workarounds are stored in knowledge base as well. KEDB is a subset of broader Knowledge Management system. After a permanent solution is found out, it is stored in Knowledge Management for future reference.

1.5 Continual Improvement

Problem management activities can identify improvement opportunities in all four dimensions of service management. Solutions to problems may be documented in a continual improvement register.

1.6 Interfaces and dependencies

The Process Management process has several interfaces and dependencies with other processes within service management and the business. There are outlined here and are described in further detail in the relevant procedural documentation.

Process	Inputs to problem management from the named process	Outputs from the problem management to the named process
Budgeting and Accounting for IT services	Cost information to help assess the relative priority of problems. Costing of hardware and software components to be used to resolve problems.	Cost of Proposed problem resolutions for input to budget cycle.
Service Level Management	Service Level Agreements to determine impact of problems.	Problem status information for inclusion in service level reports
Availability Management	Areas in which availability needs to be improved	Resolved problems to improve availability
Capacity Management	Performance information as part of investigation of capacity issues	Resolved performance problems
IT Service Continuity Management	Details of service continuity plans for options appraisal	Invocations of service continuity plans in the event of major problems
Configuration Management	Configuration Management System (CMS) records	Linking of problems to CIs
Change Management	Information about changes that may have affected existing problems or created new ones	Changes raised to resolve problems
Release and Deployment Management	Known errors with new releases. Release schedules for changes to fix problems	Information regarding priority of problems for which fixes are included in planned releases
Incident Management	Problems raised as a result of one or more incidents Ongoing information about incidents related to problems	Resolution of problems leading to closure of open incidents, Workarounds, Known errors