

IMPLEMENTATION OF INFORMATION TECHNOLOGY  
INFRASTRUCTURE LIBRARY (ITIL) PROCESSES

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# IMPLEMENTATION OF INFORMATION TECHNOLOGY INFRASTRUCTURE LIBRARY (ITIL) PROCESSES

## **Abstract**

Several frameworks, tools and standards have been included in IT management systems, in organizations such as COBIT, CMMS. These days IT management is focusing particularly on the de facto standard ITIL for implementing IT service management. The Information Technology Infrastructure Library (ITIL) is a public framework that describes good practices in IT service management. It has been drawn from both the public and private sectors internationally. ITIL helps organizations to become aware of the business value their IT services provide to internal and external stakeholders.

This thesis describes IT Service Management, the history and components of ITIL. In addition, it contains a case study about analyzing some processes of ITIL for a technology company, which has 500 employees all over Turkey headquarter located in Istanbul. We implemented six ITIL process steps in this company. We described the implementation details, steps, and Key Performance Indicators (KPI) for each of these processes. In this work Incident Management, Configuration Management, Problem Management, Change Management, and Service Level Management processes were implemented and the KPIs of these processes with other benefits and performance results were reported.

**Keywords:** IT Service Management, ITIL (Information Technologies Infrastructure Library), Service Desk, Incident Management, Configuration Management, Problem Management, Change Management, SLM

# BİLGİ TEKNOLOJİLERİ ALTYAPI KÜTÜPHANESİ (ITIL) SÜREÇLERİNİN UYARLANMASI

## Özet

COBIT ve CMMS gibi birçok çerçeve, araç ve standart kuruluşların Bilgi Teknolojileri (BT) yönetim sistemlerine dahil olmaktadır. Bugünlerde; BT yönetimi, BT servis yönetimi uygulamalarını gerçekleştirmek amacıyla özellikle fiili bir standart olarak kabul edilen Bilgi Teknolojileri Altyapı Kütüphanesi (ITIL) üzerine odaklanmaktadır. Bilgi Teknolojileri Altyapı Kütüphanesi (ITIL), BT servis yönetimi alanında başarı sağlamış pratikleri anlatan genel bir çerçevedir. Uluslararası alanda hem kamu da hem de özel sektörlerde yer edinmiştir. ITIL kuruluşların iç ve dış paydaşlarına sağladıkları BT servislerinin iş değerinin farkına varmalarına yardımcı olmaktadır.

Bu tezde Bilgi Teknolojileri Servis Yönetimi tanımlanmış, Bilgi Teknolojileri Altyapı Kütüphanesinin tarihi ve bileşenleri anlatılmıştır. Ayrıca, 500 çalışanı olan bir teknoloji firmasında ITIL süreçlerinin analiz edilmesi ile ilgili örnek bir çalışma içermektedir. Bu çalışmada; Olay Yönetimi, Konfigürasyon Yönetimi, Problem Yönetimi, Değişiklik Yönetimi ve Hizmet Seviyesi Yönetimi süreçlerinin analizleri yapılarak belirtilen süreçler ile ilgili anahtar performans göstergesi değerleri raporlanmıştır.

**Anahtar Kelimeler:** BT Servis Yönetimi, ITIL (Bilgi Teknolojileri Altyapı Kütüphanesi), Servis Masası, Olay Yönetimi, Konfigürasyon Yönetimi, Problem Yönetimi, Değişim Yönetimi, SLM (Servis Seviyesi Yönetimi)

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This thesis is dedicated to:

My Lovely Daughter

My Husband

My Family

For their endless support,

For their love...

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## List of Abbreviations

BPO	Business Process Outsourcing
CAB	Change Advisory Board
CAB/EC	Change Advisory Board/Emergency Committee
CI	Configuration Item
CMDB	Configuration Management Database
CMS	Configuration Management System
CMS	Change Management System
COBIT	Control Objectives for Information and related Technology
CSF	Critical Success Factor
CSI	Continual Service Improvement
ISO	International Organization for Standardization
IT	Information Technology
ITIL	IT Infrastructure Library
ITSM	IT Service Management
KE	Known Error
KPI	Key Performance Indicator
OGC	Office of Government Commerce
OLA	Operational Level Agreement
RC	Root Cause
RFC	Request for Change
ROI	Return on Investment
SACM	Service Asset and Configuration Management
SD	Service Design
SDP	Service Design Package

SIP	Service Improvement Plan
SKMS	Service Knowledge Management System
SLA	Service Level Agreement
SLM	Service Level Management
SLP	Service Level Package
SO	Service Operation
SS	Service Strategy
ST	Service Transition
TOC	Total Cost of Ownership
VOI	Value on Investment

## **Chapter 1 Introduction**

Nowadays, IT has become one of the indispensable elements of the companies and IT service management has become more important in worldwide. ITIL (Information Technology Infrastructure Library) is the most widely accepted approach to IT Service Management and it can effectively help us to conduct the IT service management.

ITIL is a process-based methodology that delivers a set of IT service management best practices that can help organizations or enterprises align their IT with its business requirements, improve service quality, and lower the long-term cost of IT service provision. ITIL was developed by the British government in the late 1980s and it has gone through several evolutions and it was most recently refreshed with the release of version 3 in 2007.

ITIL is an information library that is created by the best applications and experiences. The results which emerges by ITIL applications and adaption of the organizations that are measured and reported with performance indicators enables more effective resource use, continued well off and high quality IT services.

ITIL v3 consists of five components that are Service Strategy, Service Design, Service Transition, Service Operation, and Continual Service Improvement. These components contain a number of related and integrated processes.

ITIL is a service methodology that has been developed to manage informatics services comprehensively and with the best quality. ITIL comprises a series of methods adhering to international standards, and is a means for conducting service

management efficiently while making the details of service supplying processes transparent for users. The way that the ITIL approach is adopted to the service management processes is determined by the culture, structure and technology of each organization by the organization itself.

The goal of the thesis was the implementation of following processes based on ITIL:

- Service Desk
- Incident Management
- Configuration Management
- Problem Management
- Change Management
- Service Level Management

Firstly, we analyzed the status of the company and defined the needs of the company. The company is a technology company, which has 500 employees all over Turkey. We implemented six ITIL process steps in this company. We implemented this project for internal customers of this company.

**Service Desk:** The primary objective of Service Operation is to enable effectiveness and efficiency in delivery and support of IT services. The service desk is a key service operation, which provides a single, central point of contact for all users of IT. The Service Desk enables a Call Center Agent to record and track user calls. The main goal of the service desk is taking all calls from users and giving first line support. Calls can be a request, an incident, or a complaint.

**Incident Management:** Restores normal service operation as quickly as possible and minimizes the adverse impact on business operations. Incident Management process has many steps like logging, classification, investigation and diagnosis, resolution and closing.

**Configuration Management:** Module enables to manage and track configuration items within IT infrastructure. A configuration item (CI) is any component of an

information technology infrastructure that is under the control of configuration management.

**Problem Management:** Minimize the effect on the business of problems caused by errors in the infrastructure. In addition, problem management proactively prevents the occurrence of incidents and problems and it provides permanent solution for recurrent incidents.

**Change Management:** Controls the entire change lifecycle – from request to approval, planning, implementation, monitoring and evaluation. The primary objective of Change Management is to enable changes to be made with minimal effect to IT Services.

**Service Level Management:** Maintain and improve the service quality through a constant cycle of agreeing, monitoring, reporting and improving the current levels of service.

The thesis describes the implementation details and steps all of the above services for this company by giving the following for each of these processes:

- Use-case Diagrams
- Activity Diagrams
- Benefits
- Key Performance Indicators (KPI)
- Roles & Responsibilities
- Responsibility Assignment Matrix (RACI Matrix)

In this thesis, we also give how the company works before the processes were implemented and what are the benefits of the implementation by gathering many key performance indicator results for benchmarking. The rest of the thesis is organized as follows:

Chapter 2- IT Service Management; This chapter gives information about IT service Management, ITIL v3, and ITIL v3 Components Service Management

Chapter 3- ITIL Implementation Case Study; this chapter contains information about implementation of ITIL processes in a company in Turkey.

Chapter 4- Related Works; this chapter contains the academic researches about ITIL.

Chapter 5- Conclusion; the chapter contains evaluation, results and future works about the thesis.

## Chapter 2 IT Service Management

### 2.1 What is Service Management?

The objective of service management is the coordination of specific, technical and organizational resources to provide benefit to the customer through services.<sup>[1]</sup> ITIL is a framework and contains specialized organizational capabilities available for the generation of benefit to the customer as services.

The official ITIL® definition of IT Service Management is “*A set of specialized organizational capabilities for providing value to customers in the form of services*”<sup>[2]</sup>. IT Service Management includes processes, methods, functions, roles and activities that a service provider uses to enable it to deliver services to its customers.

Service management is concerned with more than just delivering services. Each service, process or infrastructure component has a lifecycle, and service management considers the entire lifecycle from strategy through design and transition to operation and continual improvement<sup>[3]</sup>.

The service provider can create an effective service management system with adopting a good practice. Good practice can come from many different sources, including public frameworks (such as ITIL, COBIT, and CMMI), standards (such as ISO/IEC 20000 and ISO 9000), and proprietary knowledge of people and organizations<sup>[4]</sup>.

## **2.2 What is ITIL?**

The Central Computer and Telecommunication Agency (CCTA), now called the Office of Government Commerce (OGC), created ITIL, Information Technology Infrastructure Library, in late 1980s. By the mid-1990s, ITIL had become the worldwide de facto standard in service management. The purpose was to improve the quality of IT services provided to the British government. ITIL as an approach independent of vendor technology to organizations with differing technical and business needs.

ITIL defines activities, roles and input/output of each of the processes found in an IT organization but does not describe that how these activities should be implemented. ITIL gives number of important IT practices and provides checklists, tasks and procedures for IT organizations.

ITIL has the following benefits for an organization<sup>[5]</sup>:

- increased user and customer satisfaction with IT services
- improved service availability, directly leading to increased business profits and revenue
- financial savings from reduced rework, lost time, improved resource management and usage
- improved time to market for new products and services
- Improved decision-making and optimized risk.

A series of books on ITIL has been issued since 1989 by OGC; ITIL is a registered trademark of the OGC.

The first version of ITIL consisted of thirty associated books covering all aspects of IT service provision. Then these books revised and replaced by seven books in ITIL V2.

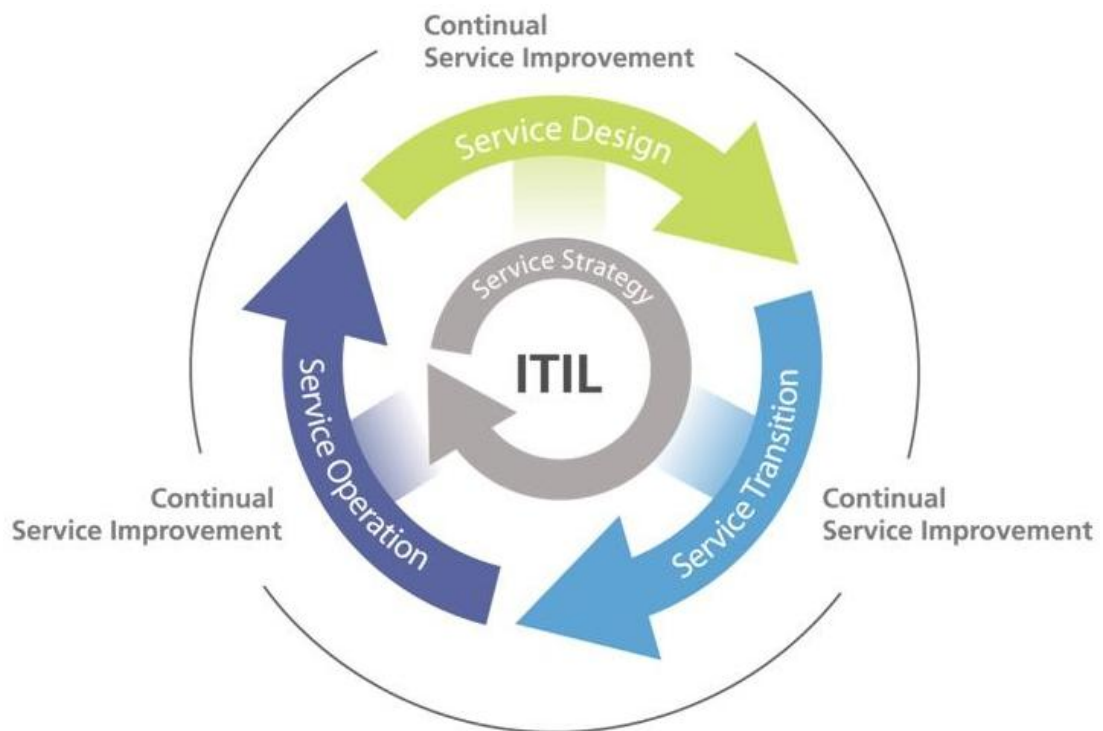
This second version of ITIL became universally accepted and it was use in many countries by thousands of organizations as the basis for effective IT service



provision. In 2007, ITIL V3 published consisting of five core books covering the service lifecycle, and an Official Introduction.

The five core books cover each stage of the service lifecycle (Figure 1), from the initial definition and analysis of business requirements in Service Strategy and Service Design, through migration into the live environment within Service Transition, to live operation and improvement in Service Operation and Continual Service Improvement.

Figure 2.1 The Service Lifecycle



History of ITIL by years:

- In the 1980s, Central Computer and Telecommunications Agency developed a set of recommendations. It is recognized that without standard practices, government agencies and private sector contracts were independently creating their own IT management practices.

- In 1989-1996, the number of books quickly grew within ITIL v1 to over thirty volumes.
- In the early 1990s, large companies and government agencies in Europe adopted the framework. As it grew in popularity, both in the UK and across the world, IT itself changed and evolved, and so did ITIL<sup>[6]</sup>.
- In 2000, The CCTA merged into the OGC and Microsoft used ITIL as the basis to develop their proprietary Microsoft Operations Framework (MOF). In addition, the world's first ITIL aligned standard is published: BS15000.
- In 2001, ITIL v2 was released. The Service Support and Service Delivery books were redeveloped.
- In 2002, the BS15000 service management standard revised.
- In 2007, ITIL v3 was published.

### 2.3 ITIL V3

ITIL v3 has three components: Core, Complementary, and Web.

**Core:** The Core component has five books covering the lifecycle of IT services. The ITIL Core consists of five publications.

- Service Strategy
- Service Design
- Service Transition
- Service Operation
- Continual Service Improvement

**Complementary:** The Complementary component includes specific content targeting particular situations, industries, and environments. The complementary component will change as required, perhaps annually or quarterly. A recent example is the newly revised "ITIL in Small IT Units", which continues into ITIL v3<sup>[7]</sup>.

The guidance in the Complementary provides guidance on interacting with various other best practices and standards. For example, ITGI and OGC released a joint paper to explain how COBIT and ITIL should be used together to provide a hierarchy of guidance.

**Web:** The Web component provides a dynamic on-line resource and provides web-based support for ITIL users such as process maps, definitions, templates, business cases, and case studies.

## **2.4 ITIL V3 Components Service Management**

### **2.4.1 Service Strategy**

A strategic asset in a Service Strategy can be defined as the products and services contained in a service lifecycle. The Service strategy volume provides guidance on how to design, develop, and implement service management not only as an organizational capability but also as a *strategic asset*<sup>[8]</sup>.

The primary objectives of Service Strategy are to<sup>[9]</sup>:

- Design, develop and implement service management as a strategic asset and assisting growth of the organization.
- Develop the IT organization's capability to manage the costs and risks associated with their service portfolios.
- Define the strategic objectives of the IT organization.

Fulfilling the primary objectives of Service Strategy would demonstrate that the IT organization has a clear understanding on supporting a better business growth, improving the efficiency and realizing the strategies that not to be missed.

The guidance answers questions of the following kind<sup>[10]</sup>:

- What services should we offer and to whom?
- How do we differentiate ourselves from competing alternatives?
- How do we truly create value for our customers?
- How do we capture value for our stakeholders?

- How can we make a case for strategic investments?
- How can Financial Management provide visibility and control over value creation?
- How should we define service quality?
- How do we choose between different paths for improving service quality?
- How do we efficiently allocate resources across a portfolio of services?
- How do we resolve conflicting demands for shared resources?

#### **2.4.1.1 Basic Concepts**

##### **2.4.1.1.1 The four Ps of Strategy**

The entry points to service strategy are referred to as the ‘Four Ps’. These are<sup>[11]</sup>:

- perspective: the distinctive vision and direction
- position: the basis on which the provider will compete
- plan: how the provider will achieve their vision
- pattern: the fundamental way of doing things – distinctive patterns in decisions and actions over time.

##### **2.4.1.1.2 Service Value**

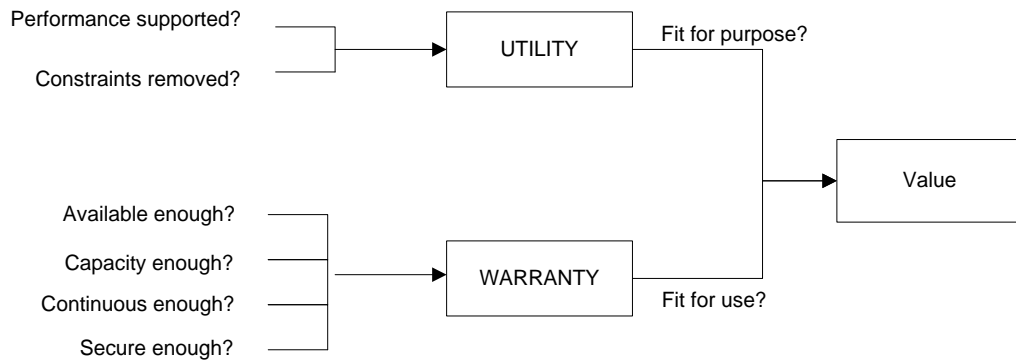
Service providers need to take special appreciation of the concept of value creation and communication, due to the many misunderstandings about technology on behalf of customers. To support this need, one of the major elements of the Service Strategy lifecycle is the creation of value through Services and Service Packages.

**Utility** describes the positive effect on business processes, activities, objects and tasks<sup>[12]</sup>. Utility called as “fit for purpose”.

**Warranty** describes how well these benefits are delivered to the customer<sup>[12]</sup>. It describes the Service’s attributes such as the availability, capacity, performance, security and continuity levels to be delivered by the provider. Warranty called as “fit for use”.

Utility is what the customer gets, and warranty is how it is delivered.

Figure 2.2 Creating Service Value



#### 2.4.1.1.3 Service Package and Service Level Package

A **Service Package** provides a detailed description of package of bundled services available to be delivered to Customers<sup>[13]</sup>. The contents of a Service Package includes:

- The core services
- Supporting services
- The Service Level Package

**Service Level Packages** are effective in developing service packages with levels of utility and warranty appropriate to the customer's needs and in a cost-effective way<sup>[14]</sup>.

- Availability & Capacity Levels
- Continuity Measures
- Security Levels

#### 2.4.1.1.4 Service Assets

Service Assets are resources and capabilities of a service provider. Service provider must allocate service assets in order to offer a service.

- Resources are the raw materials which contribute to a service, such as money, equipment, time, staff, etc.

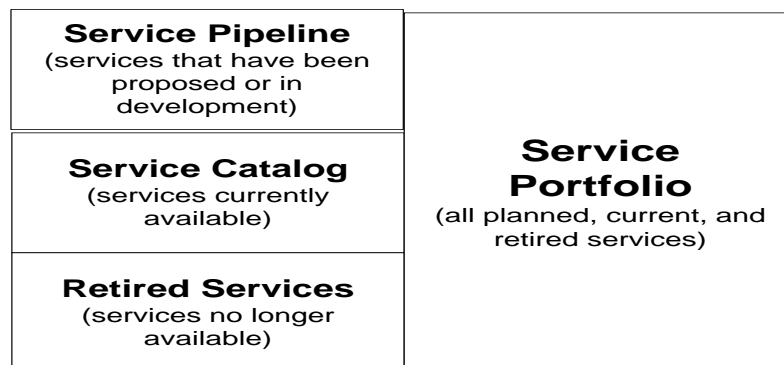
- Capabilities are the specialized skills or abilities an organization applies to resources in order to create value. Capabilities include such things as skills, organization, processes, management, etc<sup>[15]</sup>.

#### 2.4.1.1.5 Service Portfolio

The Service Portfolio consist of all services under management by a Service Provider. It consists of three major parts: Service Pipeline, Service Catalog, and Retired Services. Services in the Service Portfolio may be:

- Under consideration
- In design
- In development
- In testing
- In operation
- Retired

Figure 2.3 Service Portfolio



#### 2.4.2 Service Design

Service Design is a stage in the service management lifecycle. The main purpose of the Service Design stage of the lifecycle is the design of new or changed service for introduction into the live environment<sup>[16]</sup>. The primary effort of this stage is to setup the design and development of the service for the Service Transition stage.

The main goals and objectives of Service Design are to<sup>[17]</sup>:

- design services to meet agreed business outcomes

- design processes to support the service lifecycle
- identify and manage risks
- design secure and resilient IT infrastructures, environments, applications and data/information resources and capability
- design measurement methods and metrics
- produce and maintain plans, processes, policies, standards, architectures, frameworks and documents to support the design of quality IT solutions
- develop skills and capability within IT
- contribute to the overall improvement in IT service quality.

The Service Design phase in the lifecycle begins with the definition of the needs of a service to meet business requirements and ends with the development of a service solution to meet the needs of the business. Service Design Package produced in this phase and the Service Design Package passed to Service Transition to evaluate, build, test and deploy the new or changed service.

#### **2.4.2.1 Basic Concepts**

##### **2.4.2.1.1 Service Design Packages**

SDP should be produced during the design stage, each service addition or major change to a service or removal of a service changes the “Service Design Package” itself. Define all aspects of the service and its requirements through all of the subsequent stages of its lifecycle. A Service Design Package is produced for each new IT Service, major change, or IT Service Retirement. Then this package is passed from Service Design to Service Transition with all the details of service aspects and its requirements. The SDP should contain:

- Business Requirements
- Service Applicability
- Service Contacts
- Service Functional Requirements
- Service Level Requirements
- Service Program
- Service Transition Plan

- Service Operational Plan
- Service Acceptance Criteria
- Service Design & Topology
- Organizational Readiness Assessment

#### **2.4.2.1.2 Service Catalog**

The Service Catalog is the subset of the Service Portfolio which contains the services currently available to the users. The Service Catalog is often the only portion of the Service Portfolio visible to customers.

#### **2.4.2.1.3 The Four P's of Service Design**

Good service design depends on the effective and efficient use of the Four Ps of Design:

- 1. People:** Human resources to support the service
- 2. Processes:** The roles and activities performed to supply the IT services.
- 3. Products:** Technology and other infrastructure required to support the service (services, technology and tools).
- 4. Partners:** Third parties, which provide services required to support the service (suppliers, manufacturers and vendors).

#### **2.4.2.1.4 The Five Aspects of Service Design**

The design phase should cover five important aspects:

1. New or changed service solutions: A structured design approach is necessary in order to produce a new service for the right costs, functionality, and quality, including all of the functional requirements, resources and capabilities needed and agreed.<sup>[18]</sup>
2. Service management systems and tools, especially the Service Portfolio: The service portfolio is the most critical management system for supporting all of the processes. It describes all the services and the status of these services.



3. The technology architectures and management systems: To ensure that all the technology architectures and management systems are consistent with the new or changed service and have the capability to operate and maintain the new service.<sup>[19]</sup>
4. The processes: Processes needed to design, transition, operate and improve the services.
5. The measurement methods and metrics: Provide measurement methods to provide the required metrics on the new or changed service.

#### **2.4.2.1.5 Service Design Models**

Before adopting a design model for a major new service, a review of the current capability and provisions with respect to all aspects regarding the delivery of IT services should be conducted.<sup>[20]</sup>

This review should focus on the following elements:<sup>[21]</sup>

- Business drivers and requirements
- Scope and capability of the current service provider
- Demands, goals and requirements of the new service
- Scope and capability of current external suppliers
- Maturity of the organizations currently involved and their processes
- Culture of the organization
- IT infrastructure, applications, data, services and other components
- The level of corporate and IT governance
- Available budgets and resources
- Staff levels and skills.

#### **2.4.2.1.6 Value To Business**

The following benefits result from good Service Design practice:<sup>[22]</sup>

- Reduced Total Cost of Ownership (TOC)
- Improved quality of service

- Improved consistency of service
- Easier implementation of new or changed service
- Improve service alignment
- More effective service performance
- Improved IT governance
- Improve information and decision making
- More effective Service Management and IT processes

### **2.4.3 Service Transition**

Service Transition delivers service design package which received by service design stage to service operation stage. A Service Transition includes the management and co-ordination of the processes, systems, and functions required for the building, testing and deployment of a “release” into production, and establish the service specified in the customer and stakeholder requirements.<sup>[23]</sup>

The objective of Service Transition is:<sup>[24]</sup>

- Development and improvement of capabilities for transitioning new and modified services into operation.
- To ensure that new and changed services meet customer requirements and do not adversely impact the IT infrastructure or business processes.
- To reduce the variation between estimated and actual costs, timeframes, risks and impact scales.
- To build, configure, test and deploy quality Releases into operation in the most efficient manner while also minimizing disruption to the business and customers.

Service Transition contains following steps:

- Planning and preparation
- Building and testing
- Pilot
- Planning and preparation of the deployment
- Deployment and transition
- Review and close

### **2.4.3.1 Basic Concepts**

#### **2.4.3.1.1 Change**

ITIL defines a change as the addition, removal, or modification of anything that could have an effect on an IT service.

#### **2.4.3.1.2 The seven Rs of Change Management**

The following questions must be answered for all changes. Without this information, the impact assessment cannot be completed, and the balance of risk and benefit to the live service will not be understood.<sup>[25]</sup>

- Who RAISED the change?
- What is the REASON for the change?
- What is the RETURN required from the change?
- What are the RISKS involved in the change?
- What resources are REQUIRED to deliver the change?
- Who is RESPONSIBLE for the build, test and implementation of the change?
- What is the RELATIONSHIP between this change and other changes?

#### **2.4.3.1.3 Release**

A release is a collection of changes, which must be implemented together in order, accomplish a specific objective or set of objectives.

#### **2.4.3.1.4 Configuration Management System**

A set of tools and databases that are used to manage an IT Service Provider's Configuration data. The CMS also includes information about Incidents, Problems, Known Errors, Changes and Releases; and may contain data about employees, Suppliers, locations, Business Units, Customers and Users. The CMS includes tools for collecting, storing, managing, updating, and presenting data about all Configuration Items and their Relationships. The CMS is maintained by Configuration Management and is used by all IT Service Management Processes.<sup>[26]</sup>

#### **2.4.3.1.6 Value To Business**

The following benefits result from good Service Transition practice:<sup>[27]</sup>

- Improve a service provider's ability to effectively handle high volumes of change and releases across its customer base.
- Increased success rate of Changes and Releases
- More accurate estimations of Service Levels and Warranties
- Less variation of costs against those estimated in budgets
- Less variation from resources plans.

#### **2.4.4 Service Operation**

The Service Operation phase focused on services operates within agreed parameters. Service Management is a set of specialized organizational capabilities for providing value to customers in the form of services.<sup>[28]</sup> Service Operation is the only lifecycle phase in which value is actually realized by customers.

The primary objective of Service Operation is to enable effectiveness and efficiency in delivery and support of IT services.

The scope of Service Operation includes:

- The services themselves
- Service Management processes
- Technology
- People

#### **2.4.4.1 Basic Concepts**

##### **2.4.4.1.1 Functions, Groups, Teams, Departments and Divisions**

The Service Operation book uses various terms to refer to the way in which people are organized to fulfill processes or activities. These are:

- Function
- Group
- Team
- Department

- Division
- Role

#### **2.4.4.1.2 Balance**

It is only during this stage of the service lifecycle that services actually deliver value to the business, and it is the responsibility of Service Operation staff to ensure that this value is delivered. Every function, process and activity in a service is designed to provide a predetermined and agreed service level. However, since all the service components have to be delivered under constantly changing circumstances, Service Operation takes role in dealing with any possible conflict and achieving a balance between conflicting sets of priorities.

It is important for Service Operation to balance conflicting goals:<sup>[29]</sup>

- internal IT view versus external business view
- stability versus responsiveness
- quality of service versus cost of service
- reactive versus proactive activities.

#### **2.4.4.1.3 Communication**

Communication is extremely important during the Service Operation phase. It is not considered as a separate process; however, a checklist of the communication type takes a critical role for an effective Service Operation.

Types of communication include:

- Routine Operational Communication
- Communication between shifts
- Communication in projects
- Communication related to changes
- Communication related to exceptions
- Communication related to emergencies
- Training on new or customized processes and service designs
- Communication of Strategy and Design to Service Operation teams

#### **2.4.4.1.4 Service Request**

A service request is a request from a user for information or advice, or for a standard change, or for access to an IT service.<sup>[30]</sup>

#### **2.4.4.1.5 Incident**

An unplanned interruption to an IT service or reduction in the quality of an IT service. Failure of a configuration item that has not yet impacted service is also an incident.<sup>[31]</sup>

#### **2.4.4.1.6 Problem**

Problem as the unknown cause of one or more incidents.

#### **2.4.4.1.7 Known Error**

A known error is the known cause of an incident for which a workaround also exists.

#### **2.4.4.1.8 Event**

An event can be defined as any detectable or discernible occurrence that has significance for the management of the IT Infrastructure or the delivery of IT service and evaluation of the impact a deviation might cause to the services. Events are typically notifications created by an IT service, Configuration Item (CI) or monitoring tool.<sup>[32]</sup>

#### **2.4.4.1.9 Value To Business**

The following benefits result from good Service Operation practice:

- Effectiveness and efficiency in IT Service delivery and support
- Increased return on investment
- More productive and positive users of IT services

### **2.4.5 Continual Service Improvement**

Continual Service Improvement is responsible for managing improvements to process and services. CSI focuses on the activities and processes to improve the quality of services. The primary purpose of CSI is to continually align and realign IT

services to the changing business needs by identifying and implementing improvements to IT services that support business processes.<sup>[33]</sup>

The objectives of CSI are:<sup>[34]</sup>

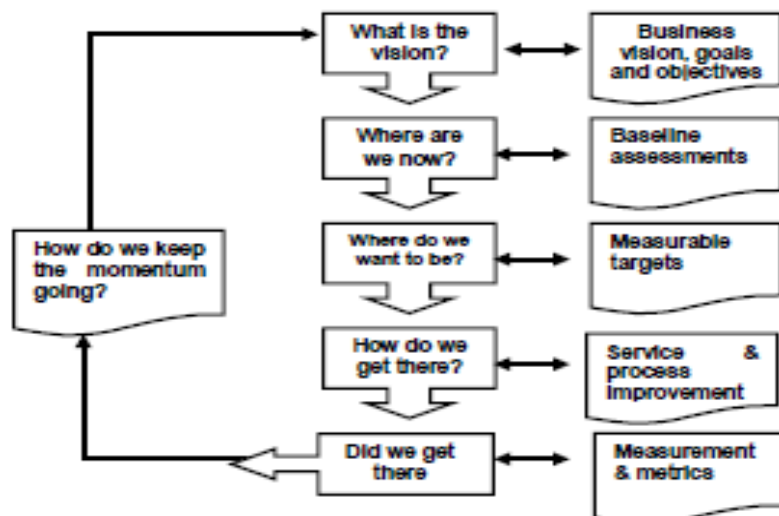
- Review, analyse and make recommendations on improvement opportunities in each lifecycle phase: Service Strategy, Service Design, Service Transition and Service Operation
- Review and analyse Service Level achievement results
- Identify and implement individual activities to improve IT service quality and improve the efficiency and effectiveness of enabling ITSM processes
- Improve cost effectiveness of delivering IT services without sacrificing customer satisfaction
- Ensure applicable quality management methods are used to support continual improvement activities

#### **2.4.5.1 Basic Concepts**

##### **2.4.5.1.1 The Continual Service Improvement Model**

The CSI Model aims to align IT services to everchanging business needs by identifying and materializing improvements throughout the service lifecycle. The 7-step improvement process is an integral process of CSI, which covers the steps required to determine what to measure, why to measure it and to define successful outcomes implement processes with clearly defined goals, objectives and measures. Figure 3.3 shows the seven-step improvement process.

Figure 2.4 The 7-Step Improvement Process



Relationships within the Service Lifecycle:

**What is the Vision?** Service Strategy, Service Portfolio

**Where are we now?** Service Portfolio, Service Level Management, and Financial Management

**Where do we want to be?** Service Portfolio, Service Measurement and Reporting

**How do we get there?** CSI and all ITIL processes.

**Did we get there?** Service Measurement and Reporting

**How do we keep the momentum going?** Continual Service Improvement.

#### 2.4.5.1.2 Service Improvement Plan (SIP)

A SIP is a formal plan to implement improvements to a process or IT service. A Service Improvement Plan is the primary output of periodic service reviews carried out part of the Service Level Management process.

#### 2.4.5.1.3 Value to business

There are four commonly used terms when discussing service improvement outcomes:<sup>[35]</sup>

- Improvements
- Benefits
- ROI (Return on Investment)
- VOI (Value on Investment)



## **Chapter 3 ITIL Implementation Case Study**

### **3.1 Case Study**

The goal of this project was implementation of service desk, incident management, configuration management, problem management, service level management, and change management processes based on ITIL.

In this study, firstly we analyzed the status of the company and defined the needs of the company. After, we decided the processes that will be implemented and then we analyzed and defined processes, user roles, KPIs processes for each processes.

#### **3.1.1 The Company Profile**

The company is a technology company, which has about 500 employees and two locations.

The company has a call center. Call center gives support to internal users and external customers. We implemented this project for internal customers of this company. Internal users can contact with call center for IT problems and administrative affairs. Call center gives 7x24 first line support to all users. If call center does not resolve the user's issue, they escalate the issue to IT department. The IT department gives service to users with about fifteen members of different teams in two locations. IT department gives 9x5 supports and provides system, database, printer, hardware and software support to the users.

### **3.1.2 Analysis of the current situation**

Before ITIL implementation, IT department gave support by phone or e-mail. Users used to contact directly IT department. The call center gave support only external customers.

Before the project, IT department had many problems like:

- They did not record phone calls and the support categories.
- Their services were not well defined.
- They do not have any history about your support and support activities.
- They did not have any performance reports about support team.
- They did not know real call counts and average resolution time of these calls.
- They did not have any defined support process.
- They did not trace the configuration items and their change history.
- The approval process was manual.

### **3.1.3 Project Steps and Process Analyze**

We arranged meetings to analyze of the status and problems to provide solution of these problems. Firstly, we started with process from ITIL service operation domain.

The implementation process itself was divided into two phases:

- In the first phase, analyzed the status and design of the Service desk, Incident, Problem, Change, Service Level Management processes.
- In the second phase, we continued to implementation of this process with a tool.

In analysis phase, we defined services, users, roles, responsibilities and process flows for each process.

In the implementation phase, we used a tool for implementations of these processes depend on the analysis documents.

### **3.1.4 Service Desk**

ITIL v3 contains five core publications one of them is Service Operation. The primary objective of Service Operation is to enable effectiveness and efficiency in

delivery and support of IT services. The service desk is a key service operation, which provides a single, central point of contact for all users of IT. The Service Desk enables a Call Center Agent to record and track user calls. The main goal of the service desk is taking all calls from users and giving first line support. Calls can be a request, an incident, or a complaint.

#### **3.1.4.1 Service Desk Users**

Service Desk function system has three types of users:

**End User:** The user who has a request, an incident or a complaint. End user contact service desk to create or update a call.

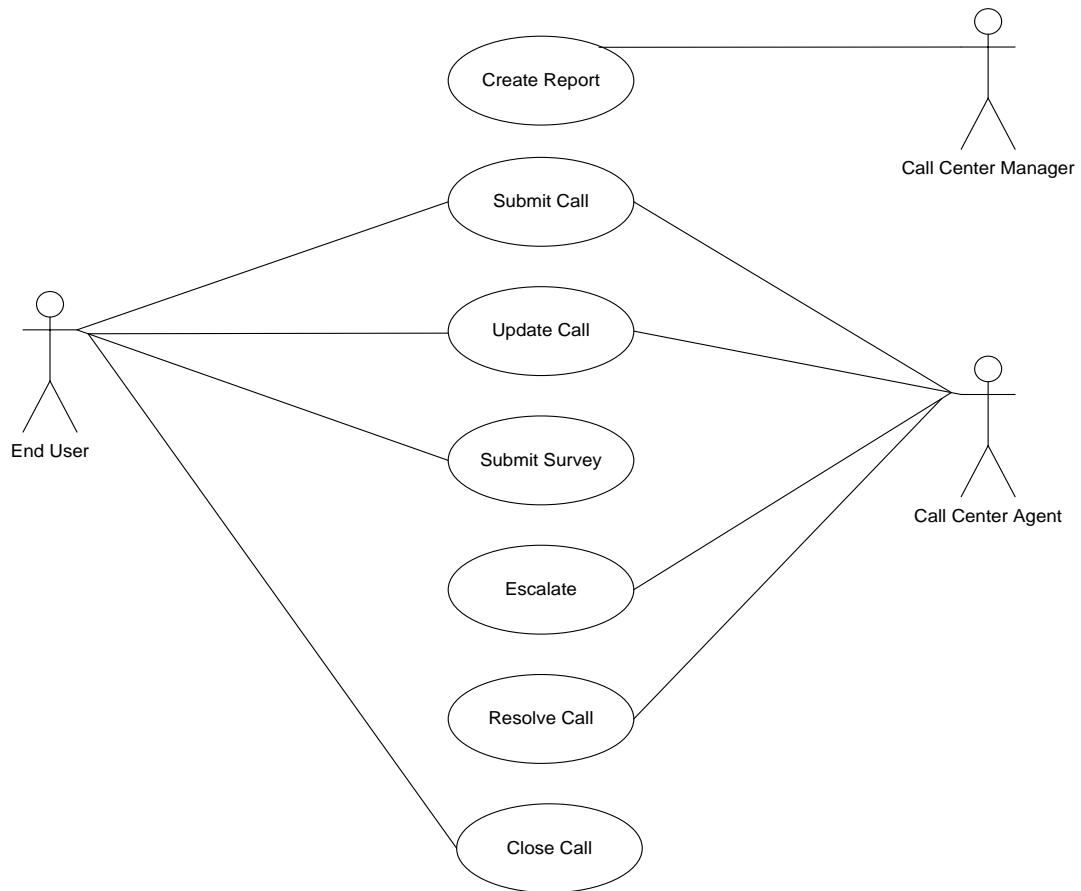
**Call Center Agent:** The operator who gives first line support to the end users. They create a call for a user and they try to provide a solution to the user's call. If they do not provide a solution, they escalate the call to IT department. The goal of the call center agent is to ensure that either the new call is resolved within the time limits agreed upon and then it is closed, or if it cannot be resolved, it is escalated.

**Call Center Manager:** The operator who is responsible for all the service desk functions and controlling the SLAs and reports of given services.

#### **3.1.4.2 Service Desk Activities**

The following functional requirements were identified for the service desk system (see Figure 4.1). A Standard Unified Modeling Language notation (a use case diagram) was used to demonstrate functional requirements and how these requirements are related to system stakeholders.

Figure 3.1 A Use Case Diagram for Service Desk



Service Desk Management System requirements are;

- **Submit Call:** End Users and Call Center Agents must be able to submit a new call.
- **Update Call:** End Users must be able to update their calls and Call Center Agents must be able to update all calls.
- **Submit Survey:** End users must be able to submit survey.
- **Escalate:** A call needs to be escalated by a Call Center Agent to the second-level support if Call Center Agent cannot find a solution to the request in a specified time.
- **Resolve Call:** Call Center Agent must be able to resolve the calls if his/her qualification is sufficient in order to resolve.
- **Create Report:** Call Center Manager must be able to take call reports and track SLAs.

- **Close Call:** Call must be able to close by the operator who must resolve in specified time.

### 3.1.4.3 Roles & Responsibilities

The following table describes the roles and responsibilities of the Service Desk users.

Table 3.1 Service Desk User Roles

Role	Responsibilities
End User	<ul style="list-style-type: none"> <li>• Reporting all IT-related issues to the call center by using web portal or by phone.</li> <li>• Validating solutions for resolved calls.</li> <li>• Closing resolved calls.</li> <li>• Submitting survey for resolved calls.</li> </ul>
Call Center Agent	<ul style="list-style-type: none"> <li>• Receiving, updating calls.</li> <li>• Escalating calls</li> <li>• Providing status updates to users.</li> <li>• Reporting and verify a solution to a user.</li> </ul>
Call Center Manager	<ul style="list-style-type: none"> <li>• Taking reports about calls</li> <li>• Managing the service desk process</li> </ul>

### 3.1.4.4 RACI Matrix

A Responsible, Accountable, Consulted, and Informed (RACI) diagram or RACI matrix is used to describe the roles and responsibilities of various teams or people in delivering a project or operating a process. It is especially useful in clarifying roles and responsibilities in cross-functional/departmental projects and processes.

The RACI Matrix for Service Desk in Table 3.2.

Table 3.2 RACI Matrix for Service Desk

Activity	User	Call Center Agent	Call Center Manager
Call Recording	R	R	A

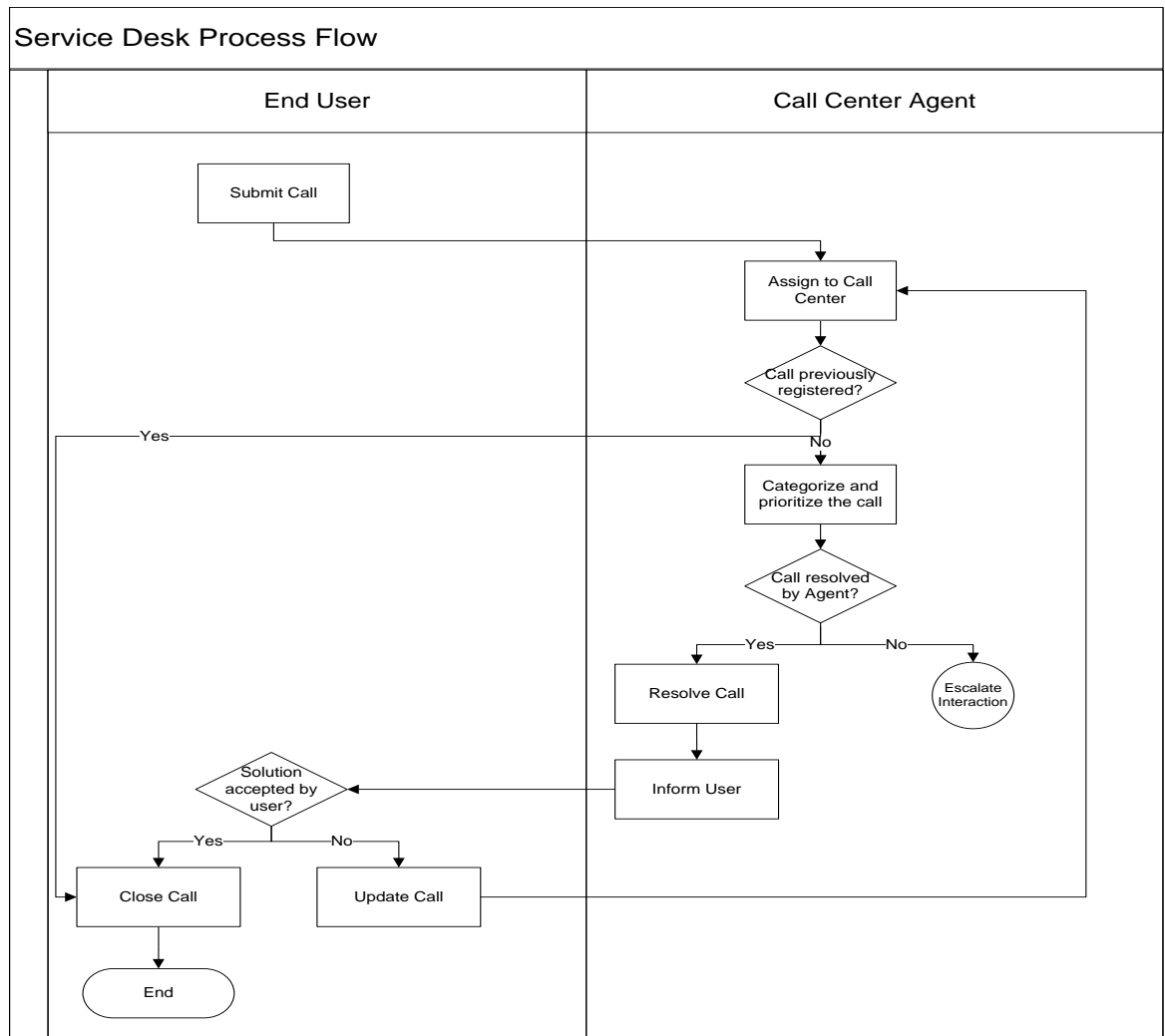
Call Handling	R	R	A
Call Verification	R	I	A
Call Closure	R/I	R	A

### 3.1.4.5 Service Desk Process Flow

The Service Desk process is as follow:

- End users can contact with call center and call center creates a call. In addition, users can submit a call by web.
- If a user creates a call from the web, the call received by Service Desk. Call center agent controls the contact's previous calls. If the user has the same call, call center agent informs the user and closes the call. If there is not such similar call in the system, then the call center agent categorizes and prioritizes the user's call.
- If the call is recorded by a call center, then call center agents control the user has the same call and if there is not such call then fills the necessary information and categorization of the call.
- If call center agent can resolve the call, agent informs the user and closes the call. If she/he cannot resolve the call, the call is escalated to the second level depends on the call location.

Figure 3.2 Service Desk Process Flow



### 3.1.4.7 Benefits

Service Desk a key Service Operation function, which coordinates the inefficient and effectiveness of delivery of services to end users and enables various improvements including the followings:

- Improved user satisfaction
- Increased accessibility through a single point of contact and information
- Better quality and faster turnaround of user calls
- Improved teamwork and communication
- Improved usage of IT resources and increased productivity of all users

### 3.1.4.8 Service Desk KPIs

Table 3.3 Calls by Type

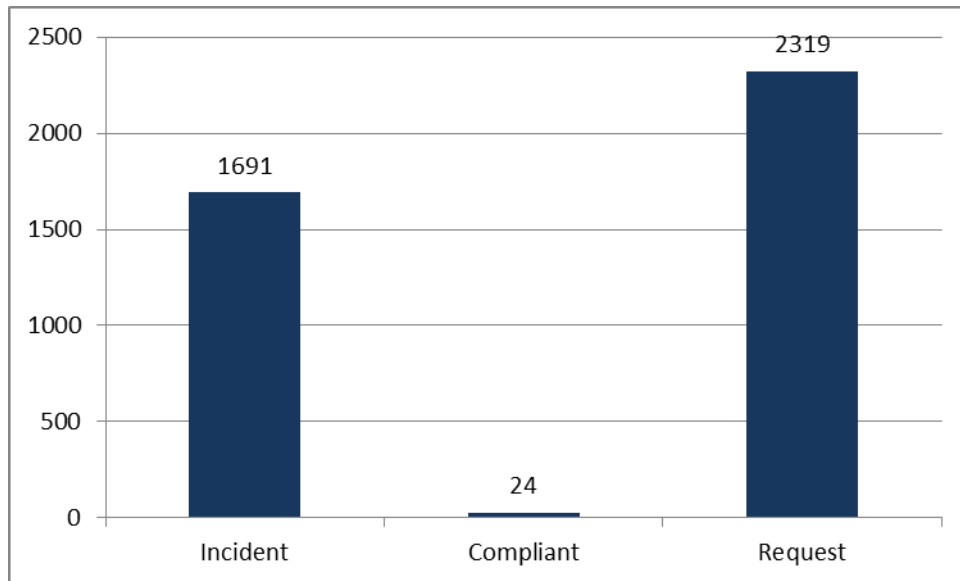


Table 3.3 shows that service desk call types between October 2010 and March 2011. A call can be an incident, a compliant or a request.

Table 3.4 Calls by Severity

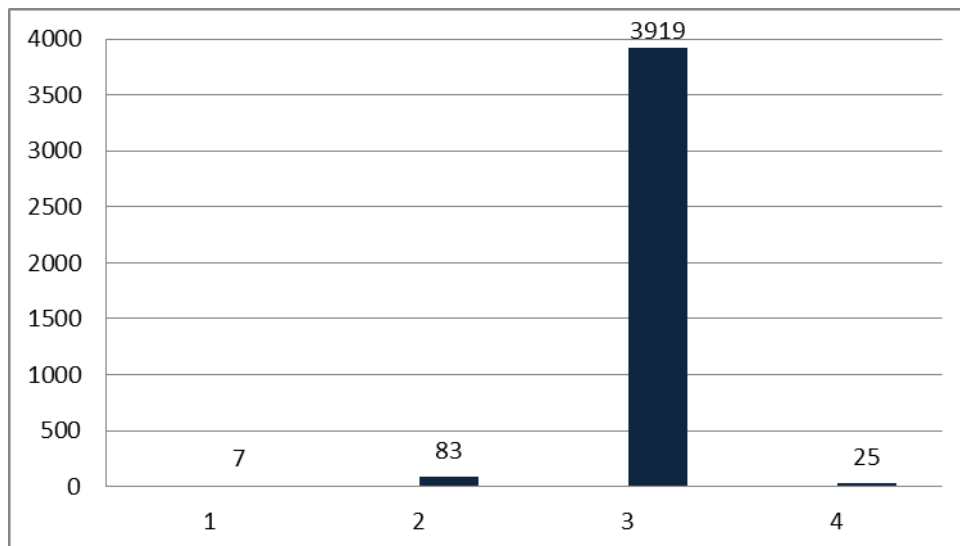


Table 3.4 shows that service desk calls' severity values between October 2010 and March 2011. Severity determines by users and the values are Severity 1-Critical, Severity 2-High, Severity 3- Normal, Severity 4 – Low.



Table 3.5 Calls by Impact

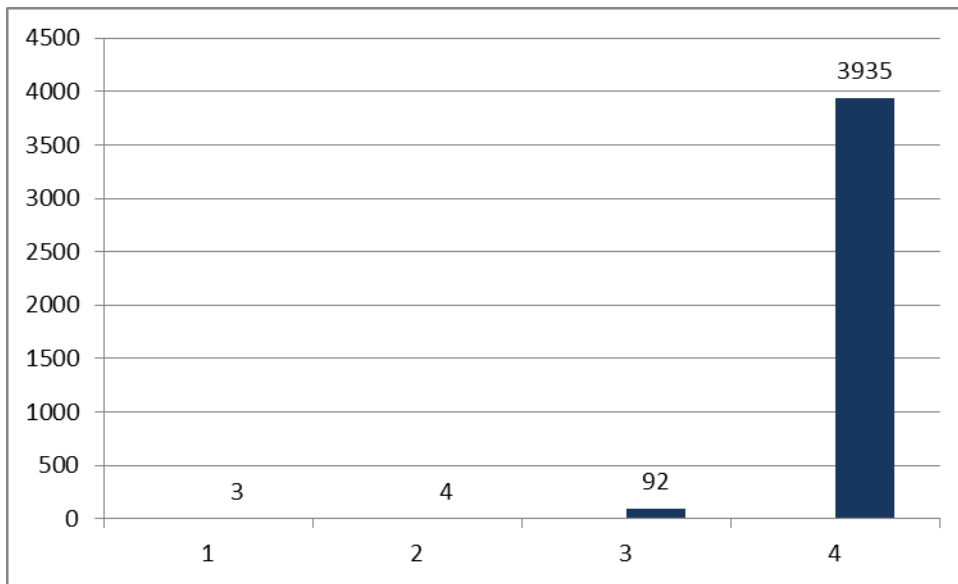


Table 3.5 shows that service desk calls' impact values between October 2010 and March 2011. Impact values determines by call center agents and the values are 1- Company, 2-Department, 3-Multiple Users, 4 – A User.

Table 3.6 Calls by Priority

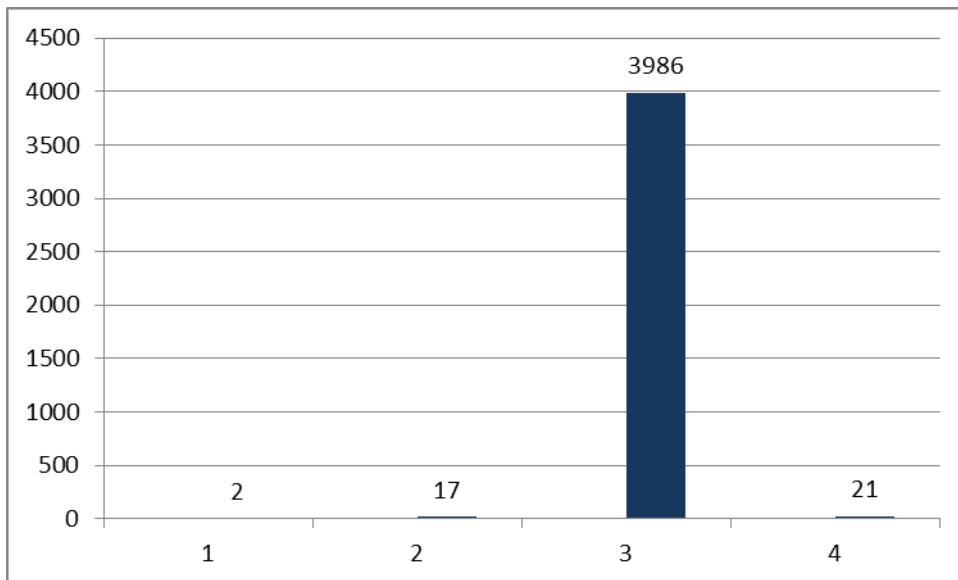


Table 3.6 shows that service desk calls' priority values between October 2010 and March 2011. The priority is determined from the average of the severity and the impact values. Priority values are Priority 1- Critical, Priority 2- High, Priority 3- Normal, Priority 4 – Low.

Table 3.7 Severities by Months

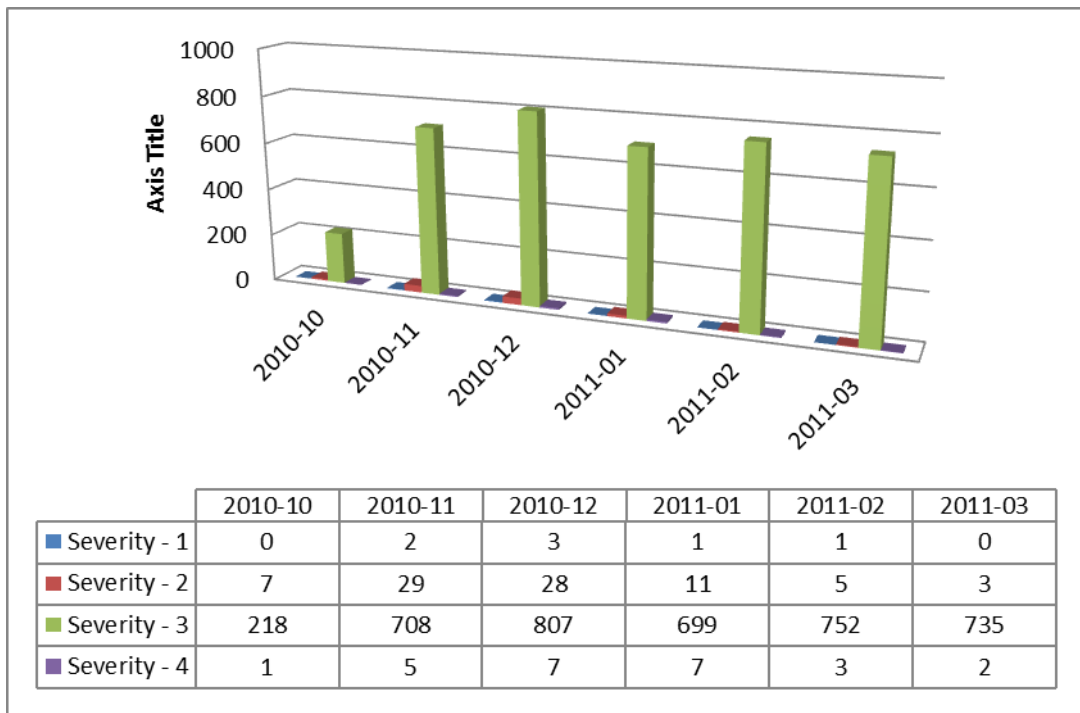


Table 3.7 shows the distribution of severity by months between October 2010 and March 2011.

Table 3.8 Calls by Departments

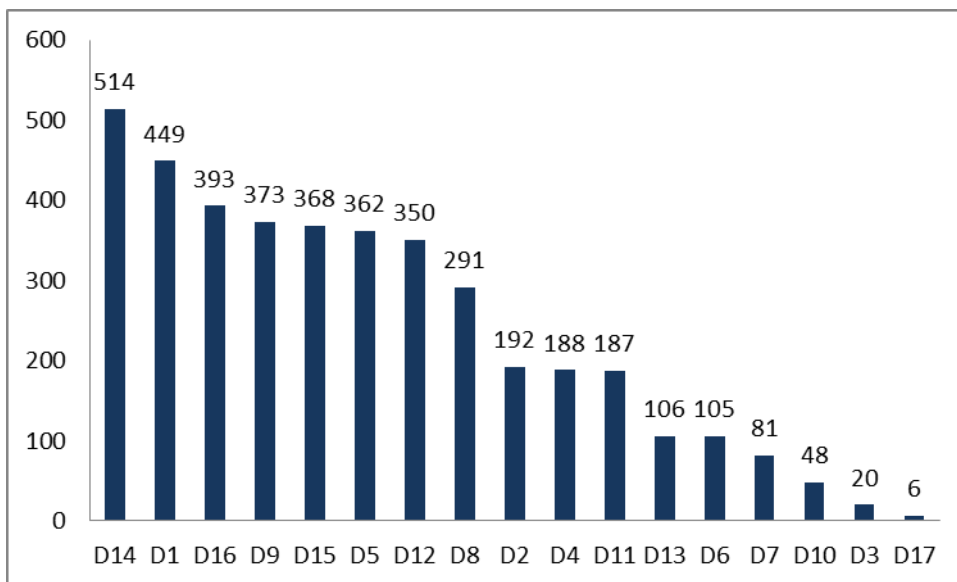


Table 3.8 shows the distribution of calls by departments between October 2010 and March 2011.

Table 3.9 Calls by Service (2010)

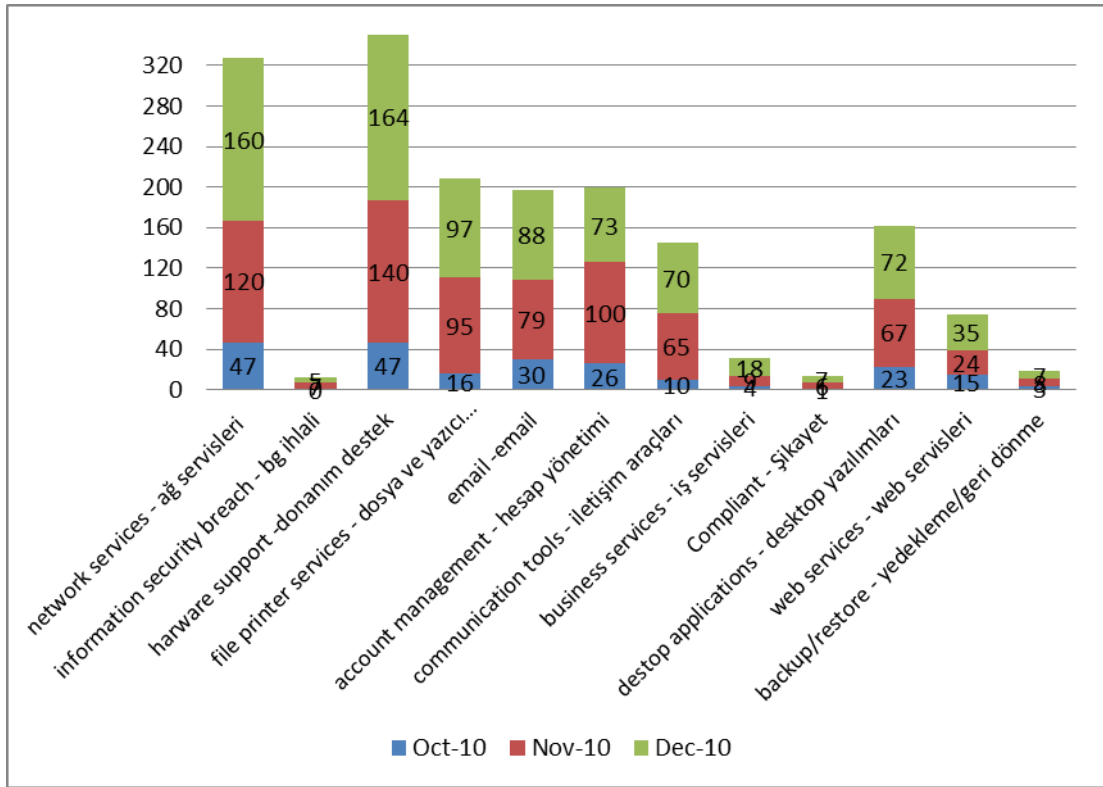


Table 3.9 shows the monthly distribution of calls per service basis between October 2010 and December 2010.

Table 3.10 Calls by Service (2011)

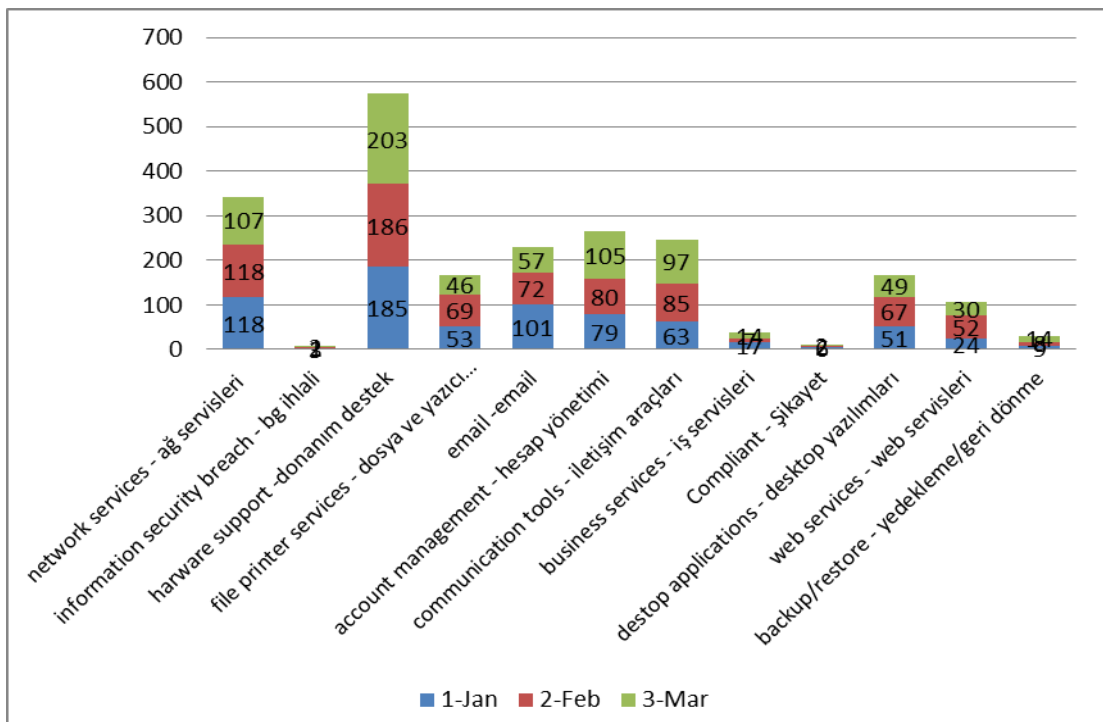


Table 3.10 shows the monthly distribution of calls per service basis between January 2011 and March 2011.

Table 3.11 Calls by Month

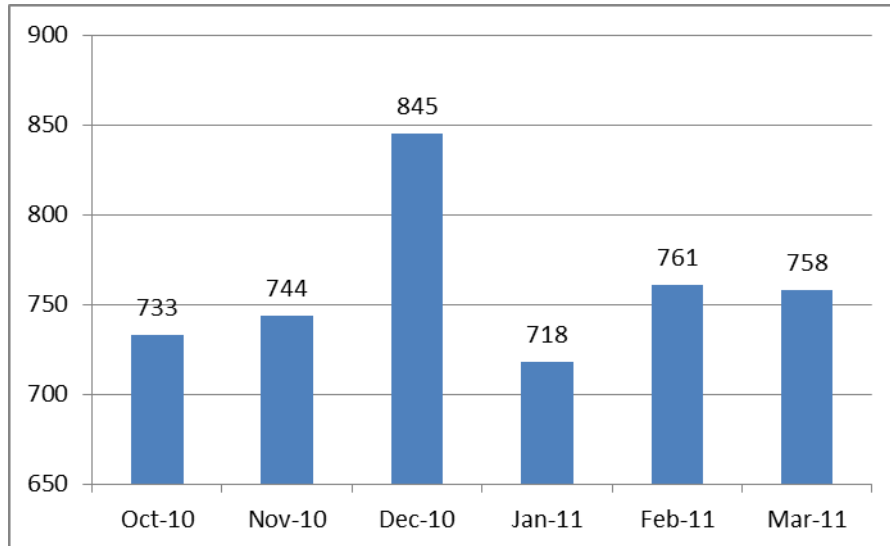


Table 3.11 shows the monthly distribution of calls between October 2010 and March 2011.

Table 3.12 Calls by Day (2011)

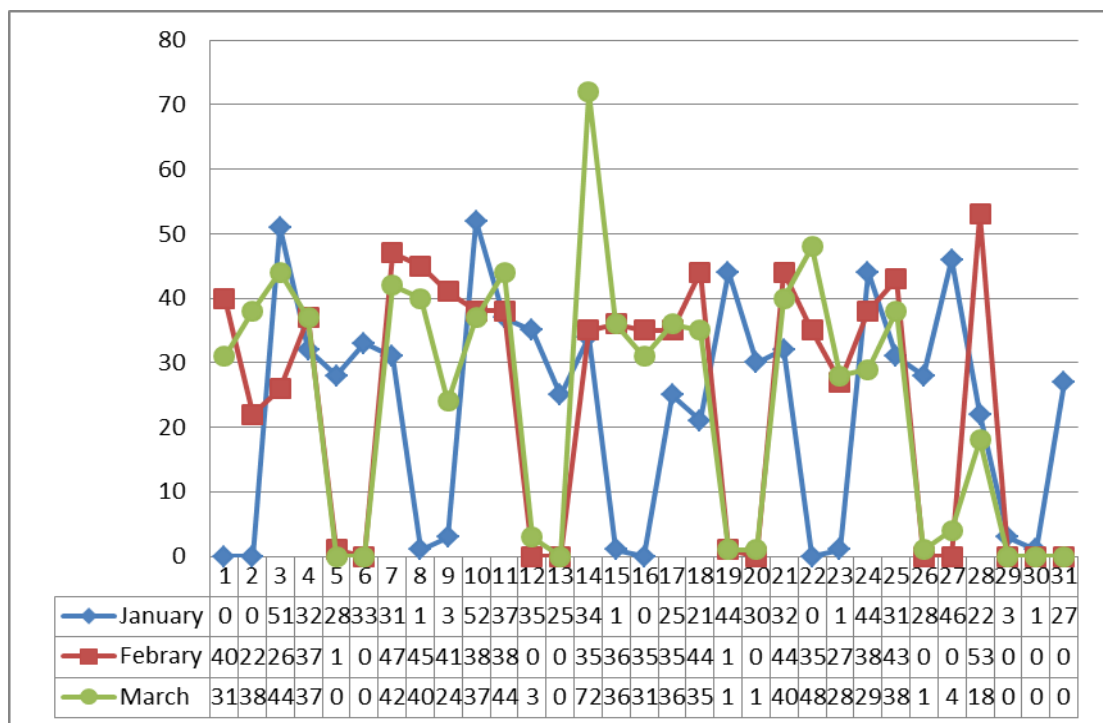


Table 3.12 shows the daily distribution of calls between January 2011 and March 2011.

Table 3.13 Calls by Opening Hour

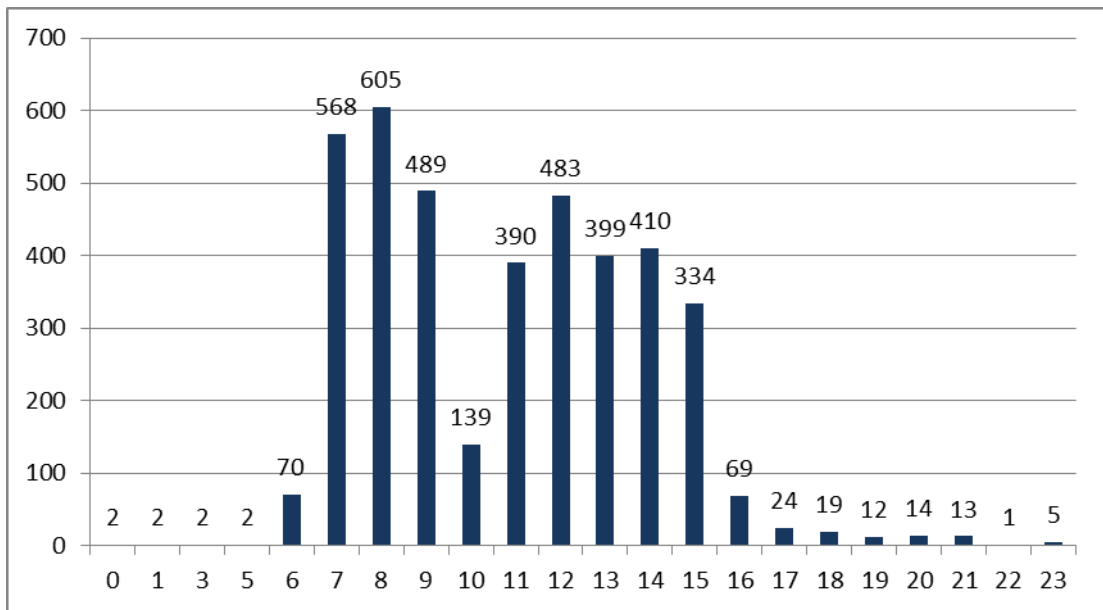


Table 3.13 shows the number of calls by opening hour between October 2010 and March 2011.

Table 3.14 Call Response Time by Second

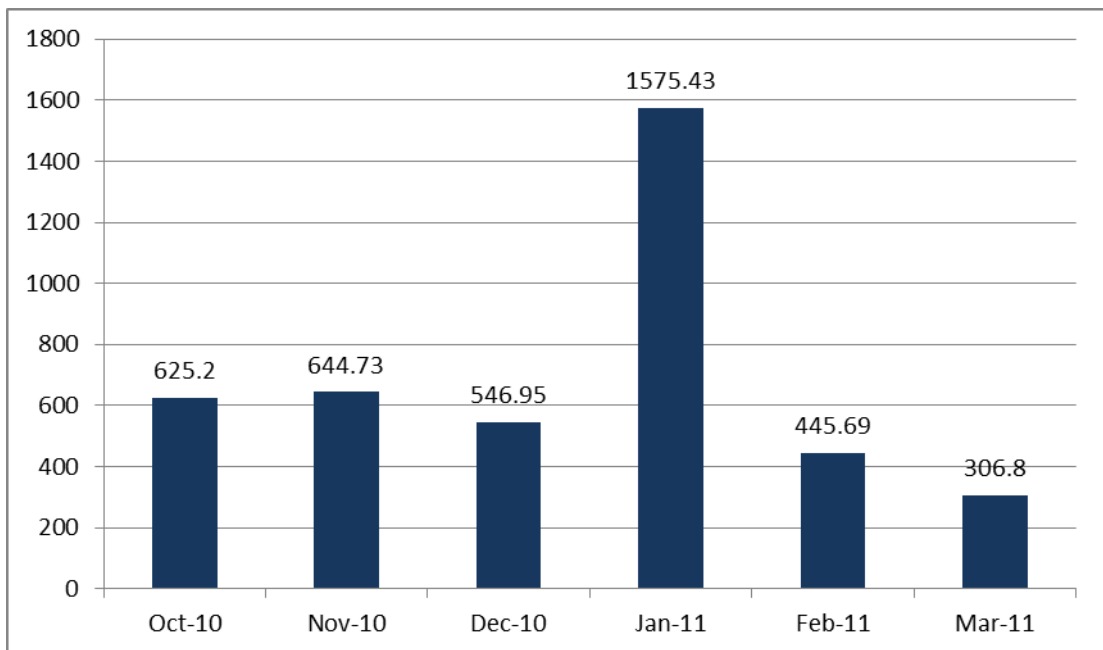


Table 3.14 shows call center agents' response time to calls in seconds between October 2010 and March 2011.

Table 3.15 Survey Completion Rate

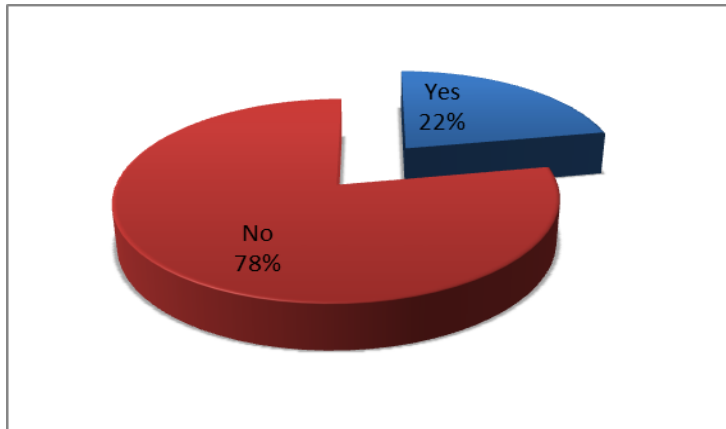


Table 3.15 shows the survey completion rates.

Table 3.16 Survey Question 1: “Which type of solution was provided?”

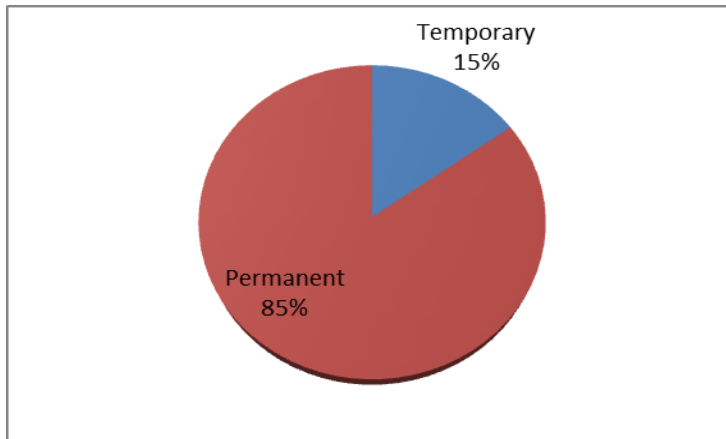


Table 3.16 shows the first question answer rates. The question is “Which type of solution was provided?”

Table 3.17 Survey Question 2: “Can you evaluate the quality of service?”

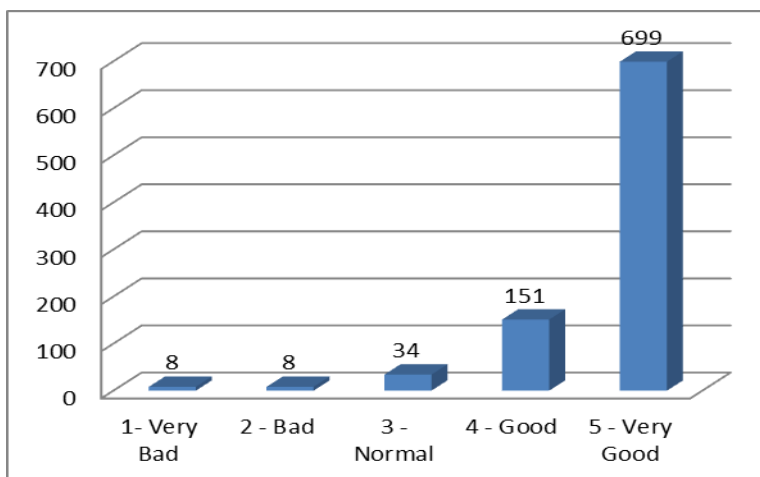


Table 3.17 shows the second answer rates. The question is “Can you evaluate the quality of service?”

Table 3.18 Survey Question 3: “Was the solution time sufficient for you?”

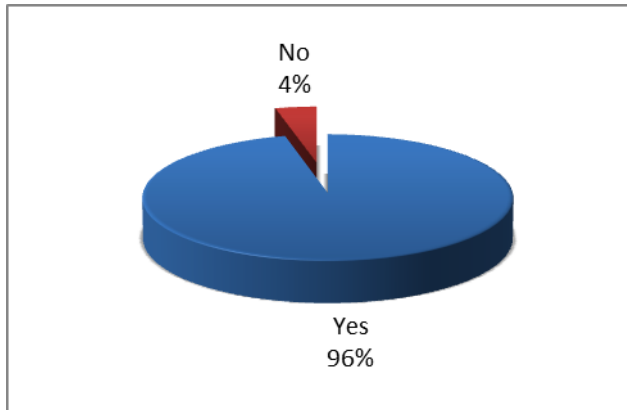


Table 3.18 shows the third question answer rates. The question is “Was the solution time sufficient for you?”

### **3.1.5 Incident Management**

Incident Management is a one of the processes of Service Operation. Incident Management restores normal service operation as quickly as possible and minimizes the adverse impact on business operations.

Incident Management process can be start with a user call or by support people who provide second level support, or an event which populated by event management. If call center agent does not provide a resolution, an incident created by call center agent and the call escalated to second level support. A second level support team members can create an incident to resolve a detected problem. In addition, an incident can be created with an event that is triggered by event management tool.

Incident Management process has many steps like logging, classification, investigation and diagnosis, resolution and closing.

#### **3.1.5.1 Incident Management Users**

Incident Management process has following user types:

**Call Center Agent:** The operator who creates and assigns incidents and tracks the calls by its authority, update, escalate, and resolving information.

**Incident Analyst:** The second level support user who is responsible for incident tickets that are assigned to the second level support.

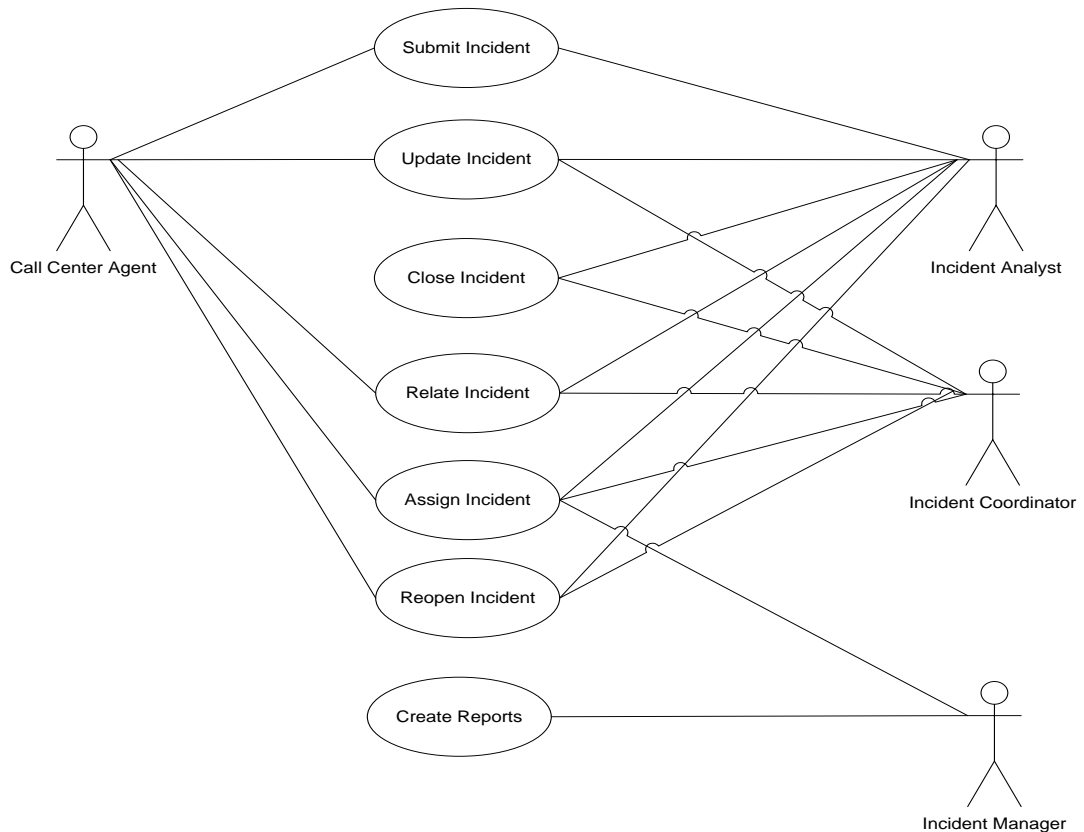
**Incident Coordinator:** The user who is responsible for assigning and handling incident tickets.

**Incident Manager:** Incident management process owner.

### 3.1.5.2 Incident Management Activities

The following functional requirements were identified for the incident management (see Figure 3.3). A Standard Unified Modeling Language notation (a use case diagram) was used to demonstrate functional requirements and how these requirements are related to system stakeholders.

Figure 3.3 A Use Case Diagram for Incident Management





Incident Management System requirements are:

- **Submit Incident:** If call center agent cannot resolve a user’s call, they create incident for this call. Also, second level support team members must be able to submit incident if they notice an issue.
- **Update Incident:** Call center agent and second level support team members must be able to update incidents.
- **Relate Incident:** Call center agent has many calls with same problems then they must be able to create incidents for each call and they relate them. Second level support team also must be able to relate incidents with each other.
- **Assign Incident:** Call center agent and second level support team members must be able to assign incidents. Also, second level support team members must be able to reassign incidents when the wrong assignment was done by the support team. If support team member cannot resolve the incident, they must be able to reassign the incident.
- **Reopen:** Call center agent and second level support team members must be able to reopen an incident if the problem is not resolved.
- **Close Incident:** Second level support team members must be able to close the incident records when the problem is resolved.
- **Create Report:** Incident management process owner must be able to take incident reports.

### 3.1.5.3 Roles & Responsibilities

The following table describes the responsibilities of the Incident Management user role descriptions.

Table 3.19 Incident Management User Roles

Role	Responsibilities
Call Center Agent	<ul style="list-style-type: none"> <li>• Escalating the call and create an incident.</li> </ul>
Incident Analyst	<ul style="list-style-type: none"> <li>• Reviewing assigned incidents.</li> <li>• Investigating and diagnosing the incident.</li> <li>• Implementing incident resolution.</li> <li>• Verifying that the incident is resolved</li> </ul>

	<ul style="list-style-type: none"> <li>• Closing the incident which is resolved by them.</li> </ul>
Incident Coordinator	<ul style="list-style-type: none"> <li>• Reviewing and accepting or rejecting incidents assigned to the support group.</li> <li>• Handling incidents escalated by an Incident Analyst of the support group.</li> </ul>
Incident Manager	<ul style="list-style-type: none"> <li>• Checking and controlling incident management process</li> <li>• Taking necessary actions for unresolved or breached incidents.</li> <li>• Taking reports about incident management process</li> </ul>

### 3.1.5.4 RACI Matrix

The RACI matrix for Incident Management in Table 3.20.

Table 3.20 RACI Matrix for Incident Management

Activity	Call Center Agent	Incident Analyst	Incident Coordinator	Incident Manager
Incident logging	R		I	A
Incident assignment		R	R	A
Incident investigation and diagnosis		R	C/I	A
Incident closure	I	R	C/I	A
Incident escalation		I	R	A

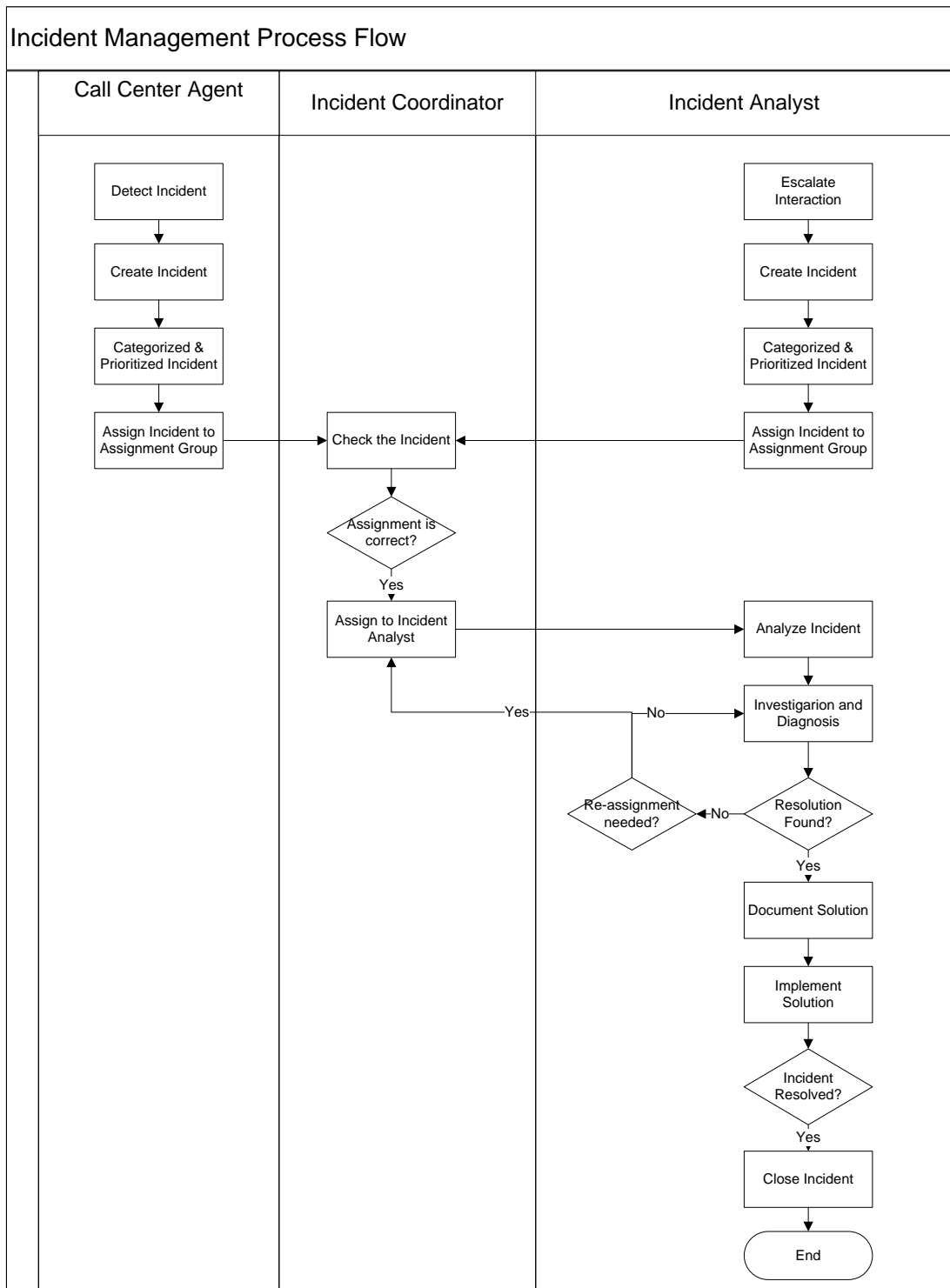
### **3.1.5.5 Incident Management Process Flow**

Incident management process may start with an event or end user call. If incident analyst detects a problem, he/she can create an incident. Moreover, if call center agent cannot resolve a call then the agent creates an incident and escalates the call to the second level support. After an assignment group receives an incident, the incident coordinator assigns this incident to an incident analyst. Incident analyst is responsible for resolving this incident.

If we analyze the Incident Process;

- Incidents can be opened in two different ways. One of them is that incident analyst detects a problem then he/she creates an incident to resolve the problem. The other way is if call center agent cannot resolve a call then agent creates an incident and escalates the call to the second level support.
- After an incident is opened, it is categorized and prioritized by the user who opened the incident. Then the incident is assigned to an assignment group that is responsible to resolve the incident.
- The Incident Coordinator controls that there is sufficient information available in the incident ticket in order to diagnose the incident and verify that the incident is assigned to the correct support group.
- If the incident is not assigned to correct group then the coordinator rejects the incident and assigns to call center agent. If the incident is assigned to correct group then the coordinator receives the incident and assigns this incident to an incident analyst.
- If incident analyst needs more information about this incident, then searches for additional information and afterward starts to diagnosis and investigation.
- If the analyst finds a solution for this incident moreover if he/she has permission to implement the solution, he/she implements the solution. If the analyst cannot find any solution or does not have permission to implement this solution, then he/she reassigns the incident to another group or analyst.
- After the implementation of the proposed solution, if the incident is still not resolved yet, then the analyst reassigns the incident to another group or analyst. On the other hand, if the solution provided by incident analyst solves the problem, then the incident analyst closes the incident.

Figure 3.4 Incident Management Process Flow



### 3.1.5.6 Benefits

Incident management process provides the following benefits:

- Incident Analysts are able to report the daily activities and their workload.
- Incident Analysts, Coordinators and Incident Manager are able to follow all activities of incident.
- Incident Analysts work only on incidents related with their specialty.
- Incident Process Owner and Incident Coordinators are able to take report by category, user, department, priority and daily, monthly and resolution times for all incident records.
- Incident Analysts are able to find accurate solutions faster, if they encounter similar incident records.

### 3.1.5.7 KPIs

Table 3.21 Incidents by Priority

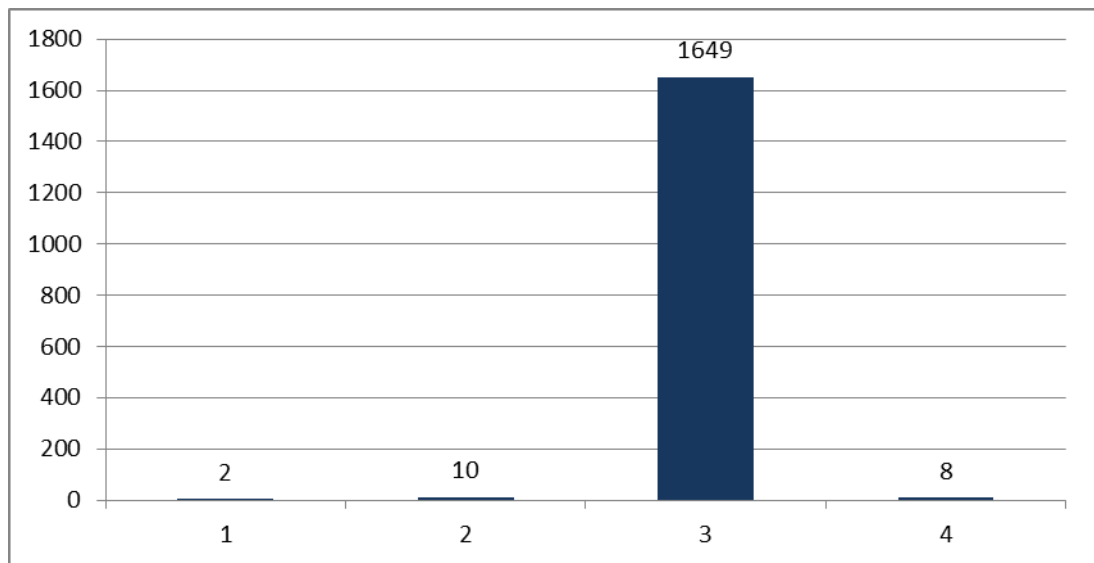


Table 3.21 shows the incident priority values between October 2010 and March 2011. The priority values are Priority 1- Critical, Priority 2- High, Priority 3- Normal, Priority 4 – Low.

Table 3.22 Incidents by Location

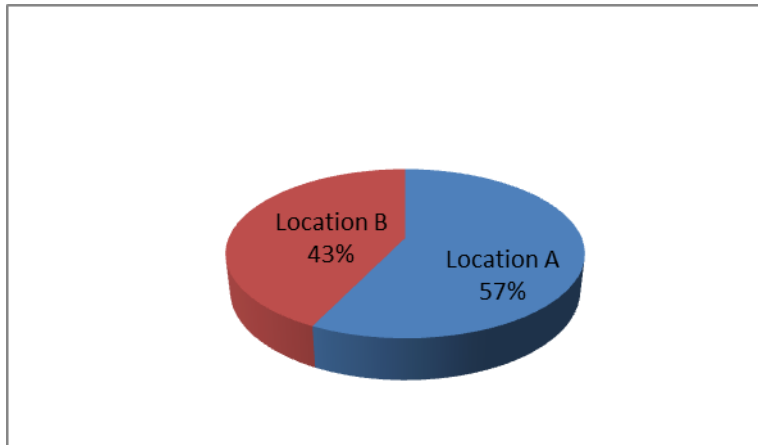


Table 3.22 shows the incidents by location between 20 October 2010 and March 2011. A1, A2... B8 refers operator names.

Table 3.23 Incidents by Service

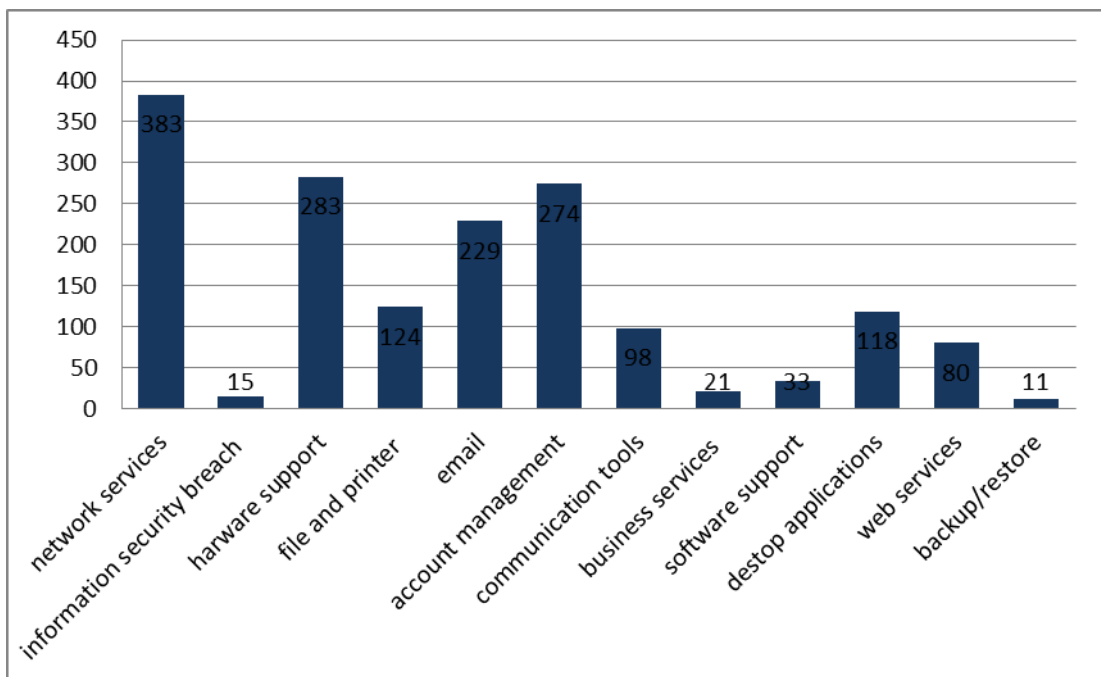


Table 3.23 shows the incidents by service between 20 October 2010 and March 2011.

Table 3.24 Incidents by Assignee

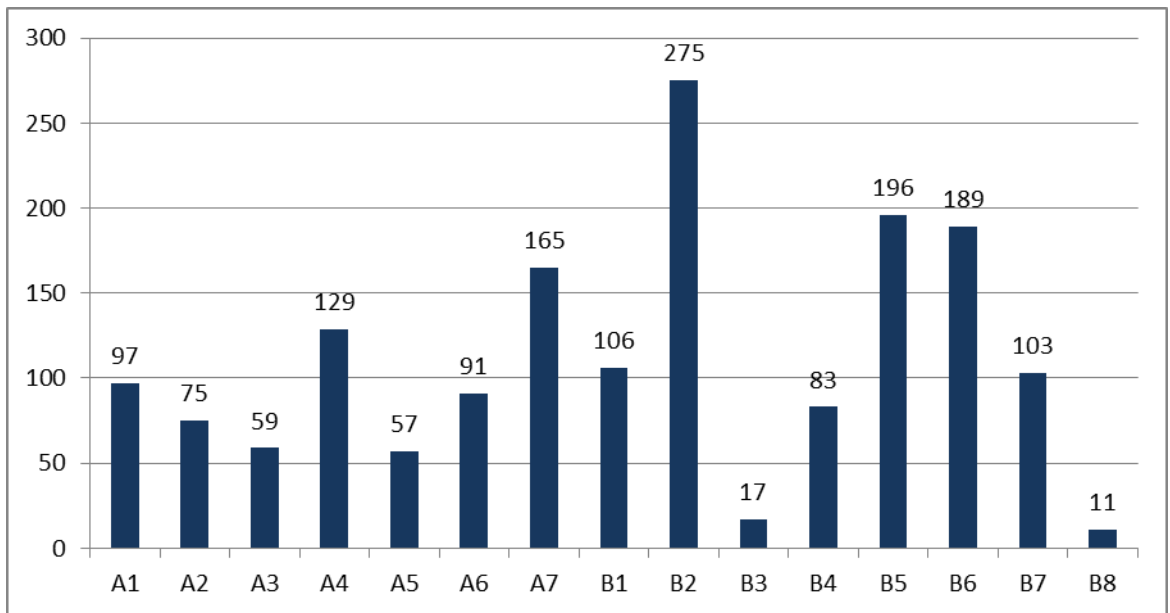


Table 3.24 shows the incidents by assigned operator between 20 October 2010 and March 2011. A1, A2... B8 refers operator names.

Table 3.25 Incidents Assignment by Month

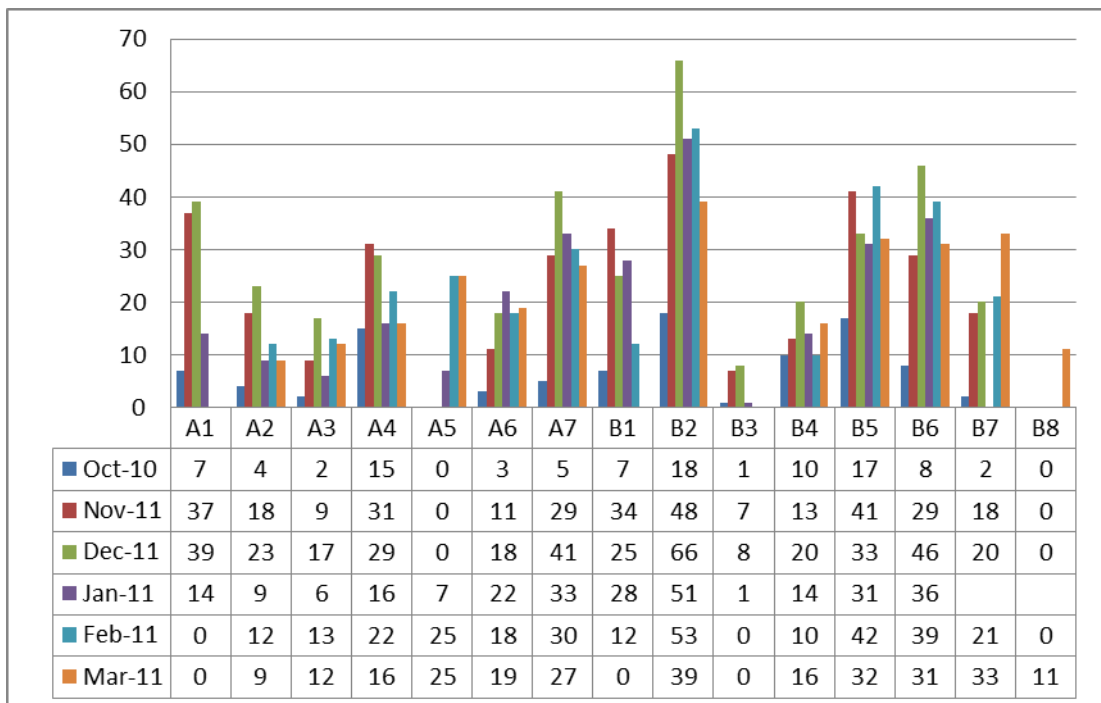


Table 3.25 shows the incidents by assigned operator per month between 20 October 2010 and March 2011. A1, A2... B8 refers operator names.

Table 3.26 Incidents by Closed Operator

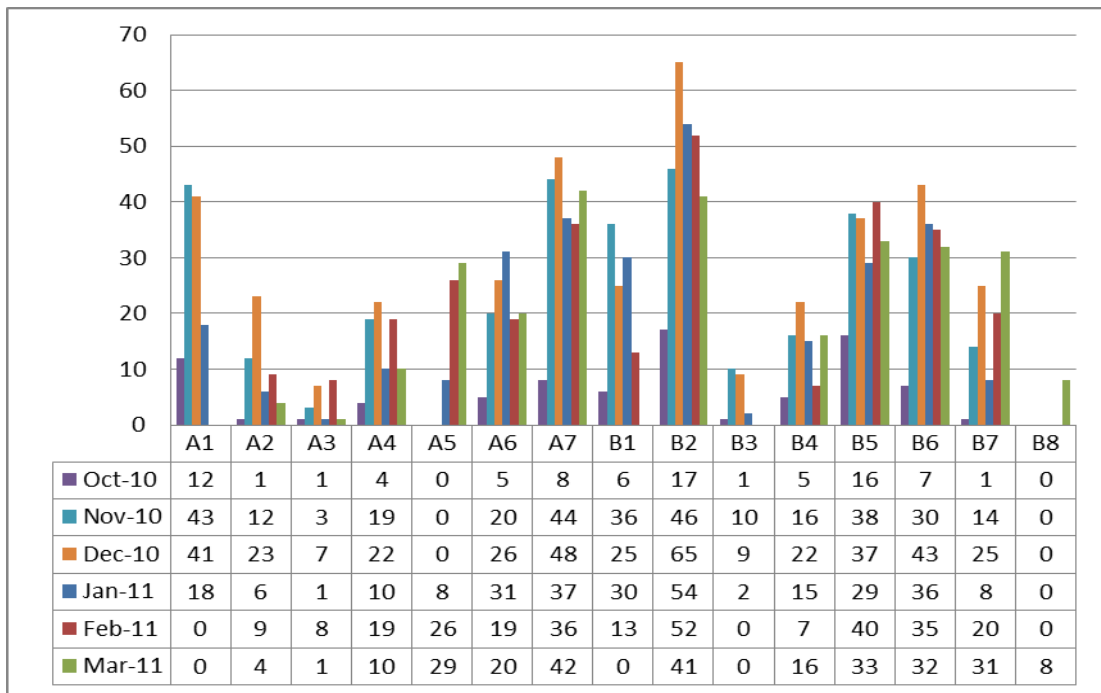


Table 3.26 shows the number of incident closed by operators between 20 October 2010 and March 2011. A1, A2 ... B8 refers operator names.

Table 3.27 Incidents by Resolution Codes

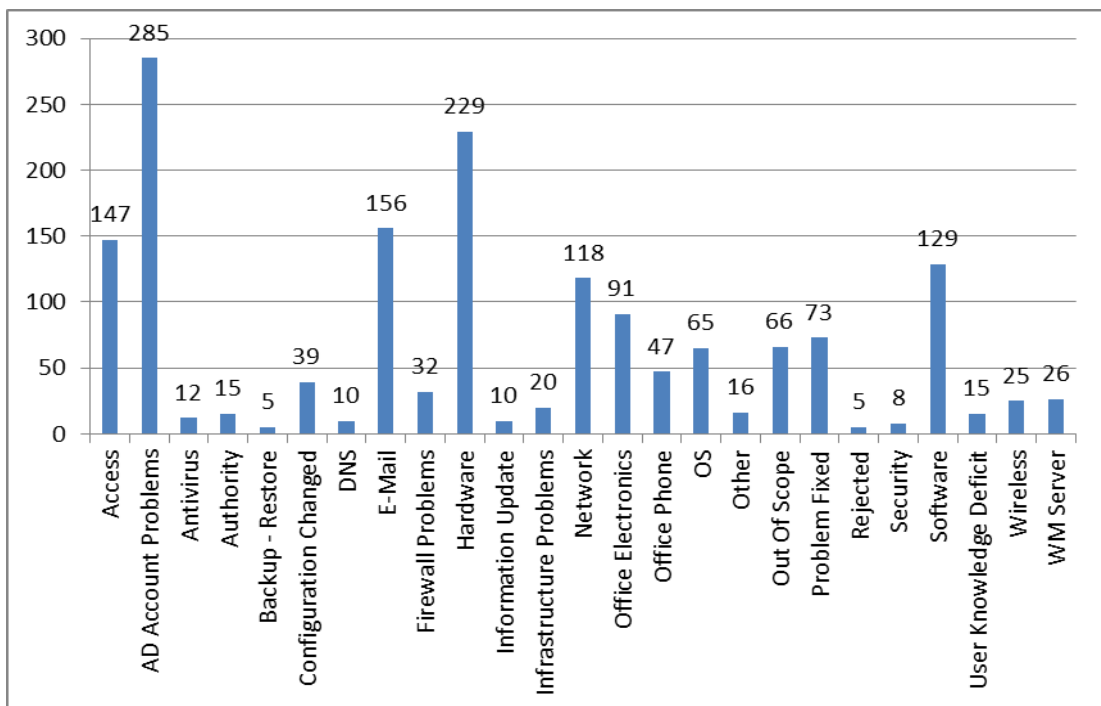


Table 3.27 shows the resolution codes between 20 October 2010 and March 2011. Operators must define a resolution code when they close an incident.



Table 3.28 The Average of Response Times by Severity

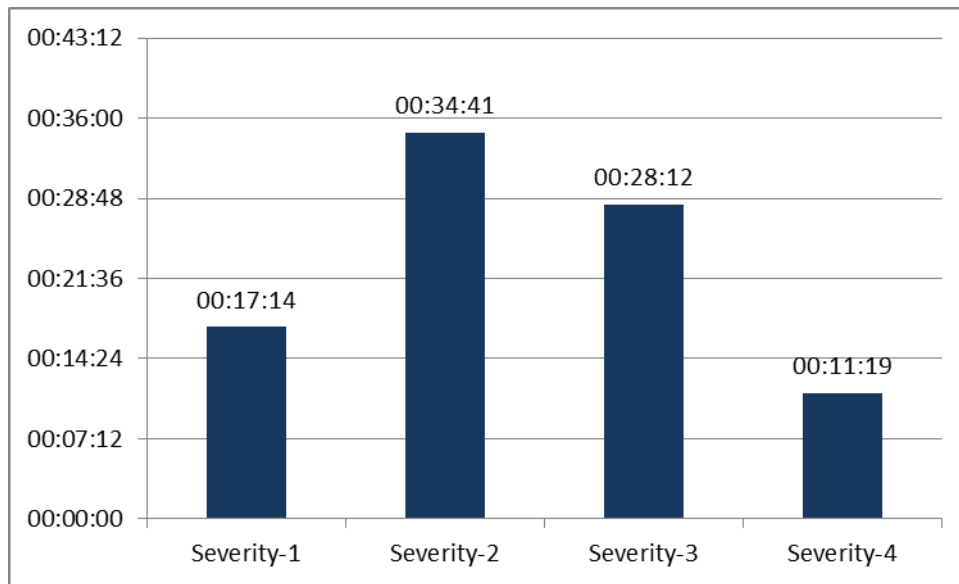


Table 3.28 shows the average of response times by severity codes between 20 October 2010 and March 2011.

Table 3.29 The Average of Solution Times by Severity

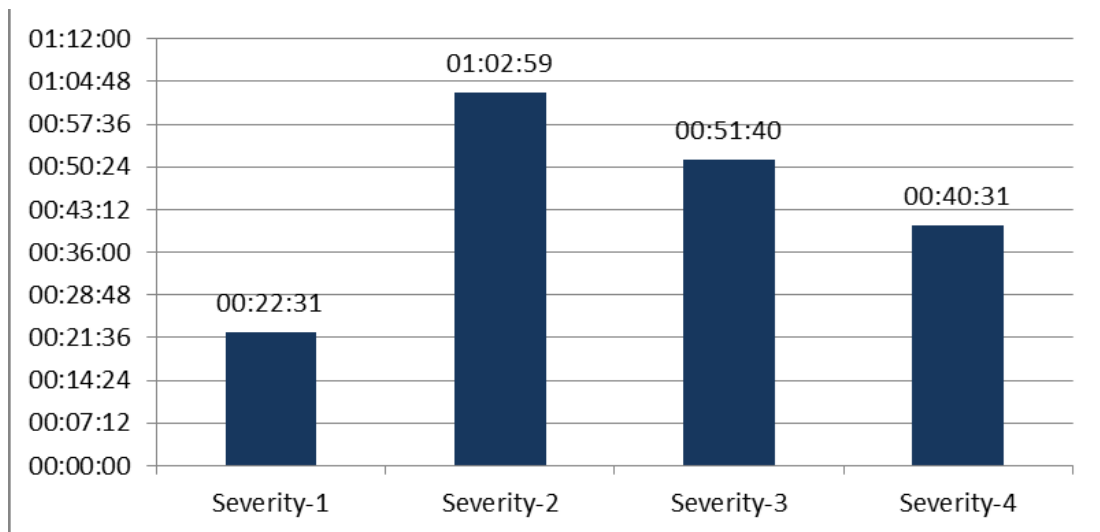


Table 3.29 shows the average of response times by severity codes between 20 October 2010 and March 2011.

Table 3.30 The Distribution of Response Time Based on Severity and Month

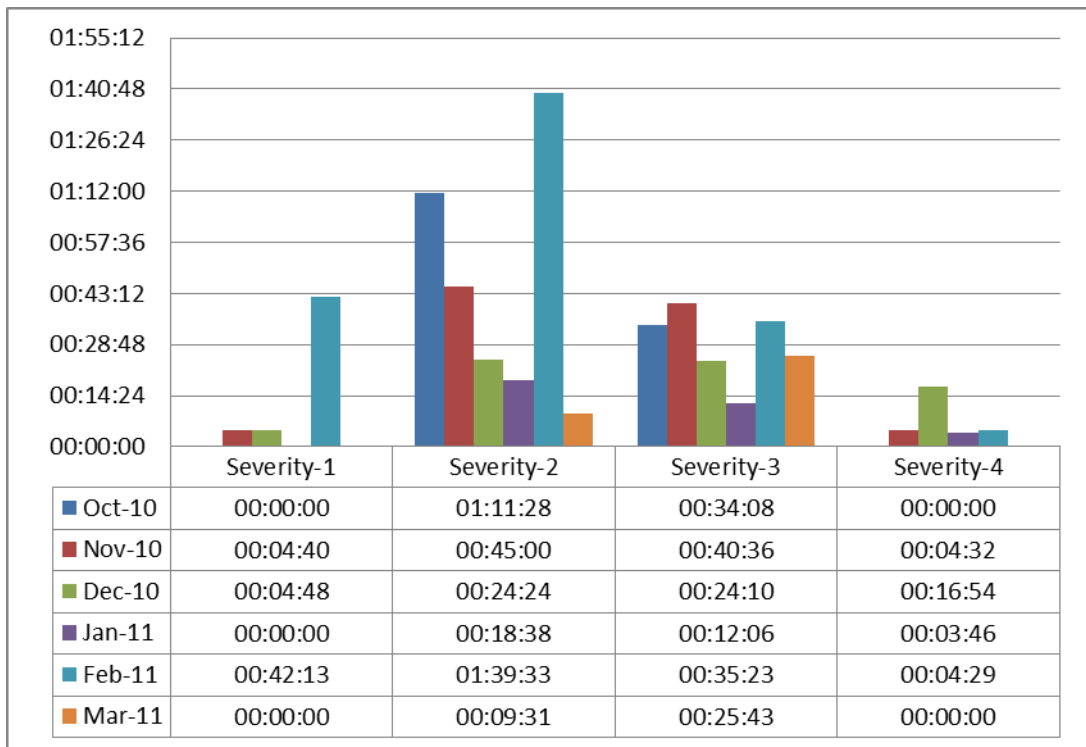


Table 3.30 shows the distribution of response times based on severity and month

Table 3.31 The Distribution of Solution Time Based on Severity and Month

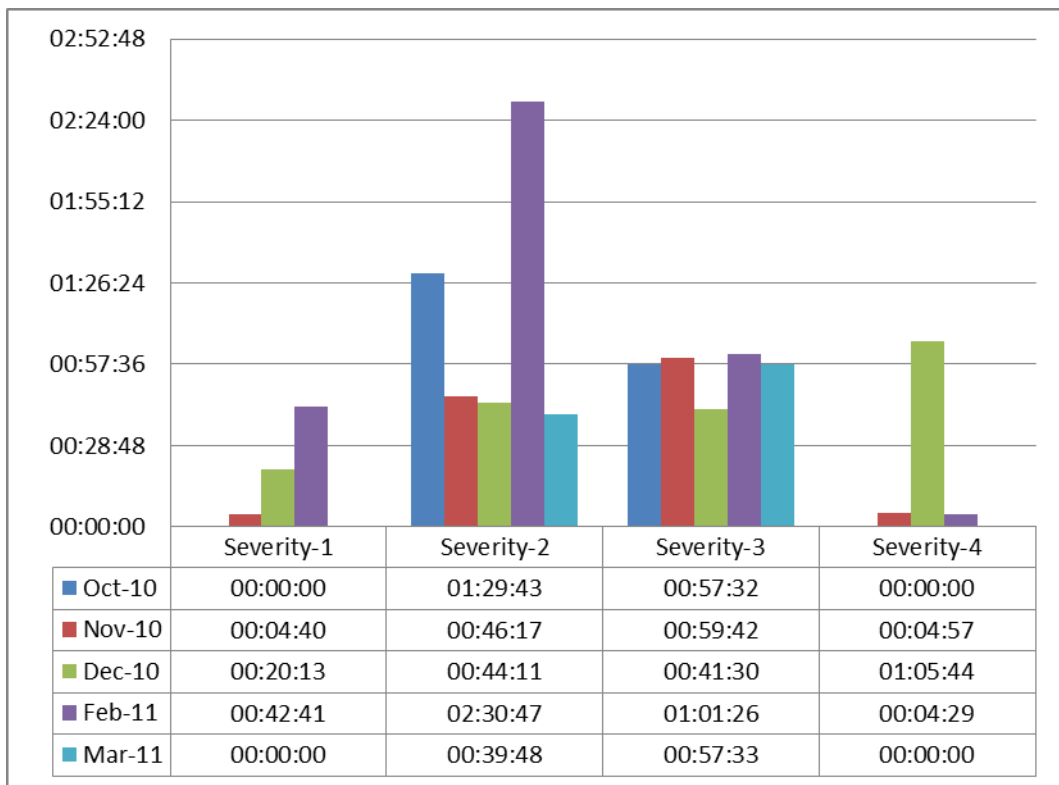
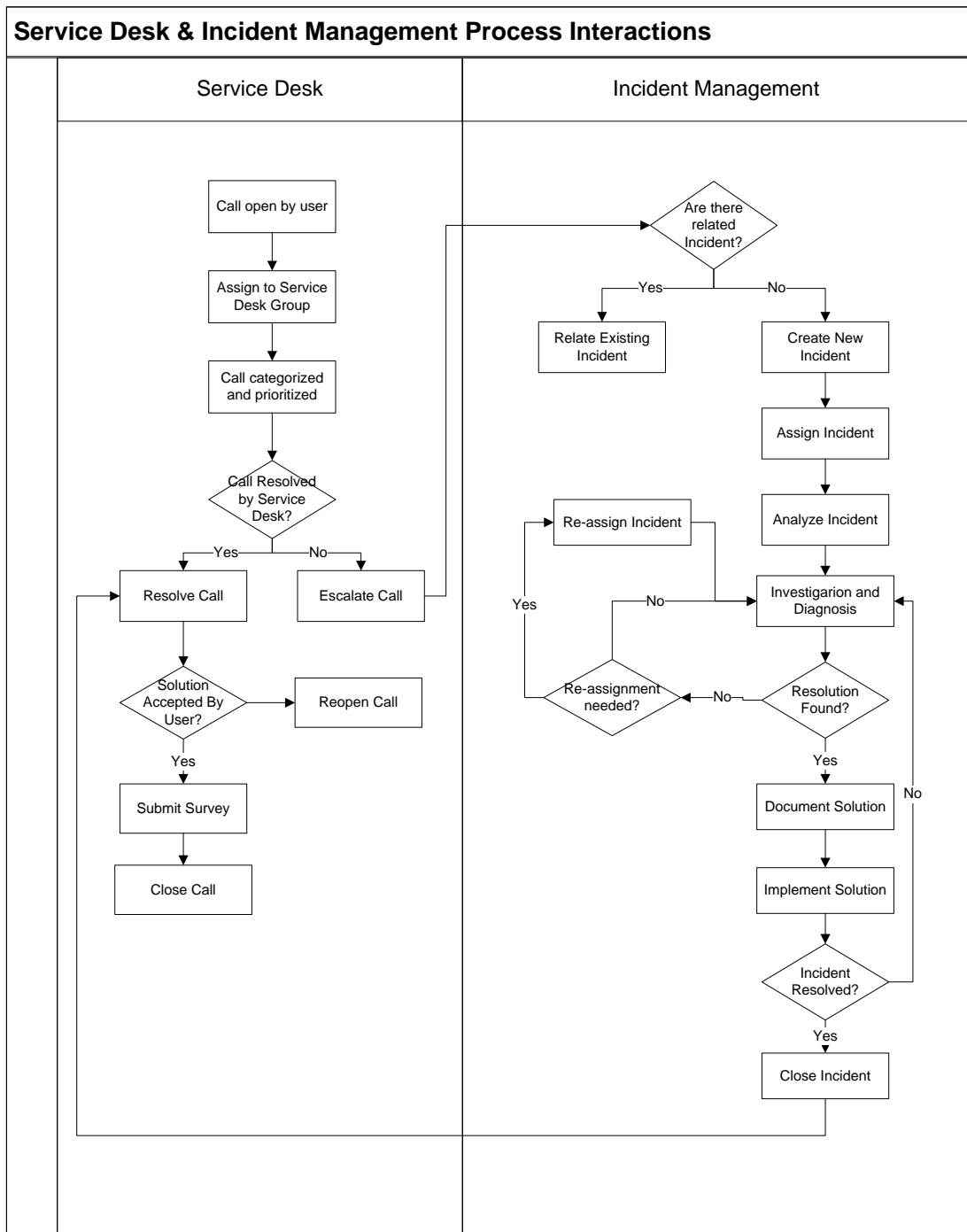


Table 3.31 shows the distribution of response times based on severity and month

### **3.1.6 Relationships between Service Desk and Incident Management Process**

Service Desk and Incident Management processes have detached with certain line. End users can only interact with Service Desk. End users can open, update and close the calls. All the calls opened by users are assigned to the call center agents. Moreover, the call center agents create calls according to the received calls via phone. Then, call center gives to first line support to the users. If call center cannot resolve the call, they create incidents and escalate the calls to the second level support. Incident analysts who are the second level support users work on incident record. After incident analysts resolve the incident, incident analysts close the incident records. After incidents are closed, call records status changes to resolve automatically. In this point, there may be many options depending on the design. In our project, we designed that after incidents are closed call records will be closed by the user in three days with submitting a survey. If the user does not close the call in three days, the call record is closed by system automatically. If user does not accept the solution, users can reopen the call record and incident records; status of the calls is also set to reopen and they are assigned the same operator, which closed the incident record.

Figure 3.5 Service Desk & Incident Management Process Interactions



### **3.1.7 Service Catalog**

A Service Catalog contains a comprehensive list of products and services available to internal users, depending on their business role.

In our project, we defined following service catalog for IT department. All internal users can take these services. Users must select a service for their calls and they are intended to request following services with in defined SLAs.

- E-Mail Services
- Network Services
- Information Security Breach
- File and Printer Services
- Web Services
- Desktop Application Services
- Account Management
- Hardware Support Services
- Software Support Services
- Business Services
- Backup/Restore
- Communication and Monitoring Tools

When user creates a request then call center escalates the user call to IT department and creates an incident for this request. Requests are saved as an incident with a different category. Therefore, we can separate incidents and requests using this category.

#### **3.1.7.1 KPIs**

Table 3.32 Requests by Priority

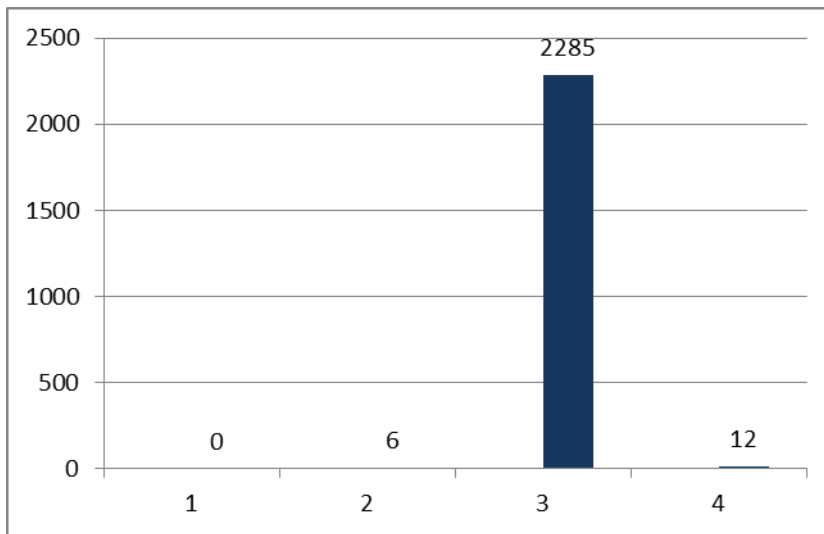


Table 3.32 shows the request priority values between October 2010 and March 2011. The priority values are Priority 1- Critical, Priority 2- High, Priority 3- Normal, Priority 4 – Low.

Table 3.33 Requests by Service

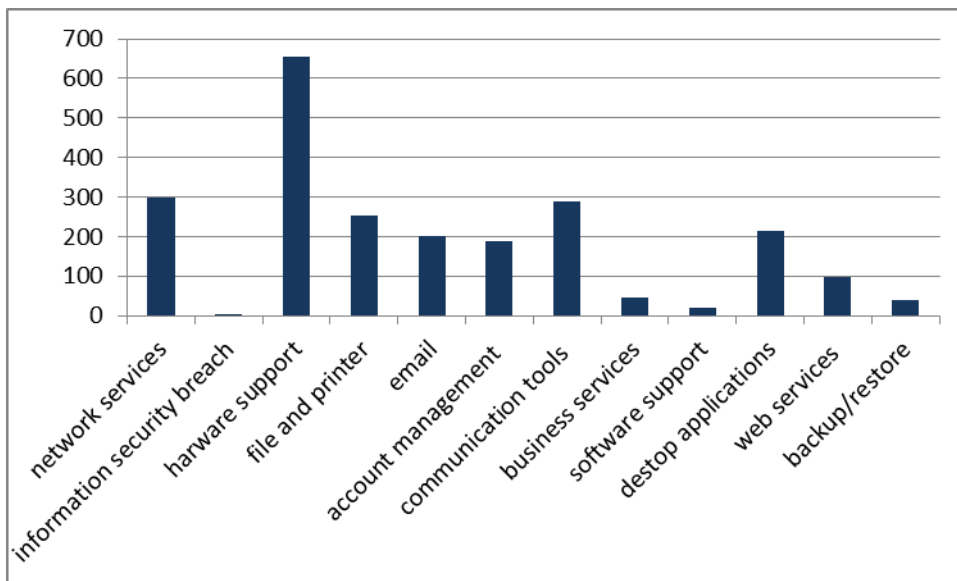


Table 3.33 shows the requests by service between 20 October 2010 and March 2011.

Table 3.34 Requests by Assigned Operators

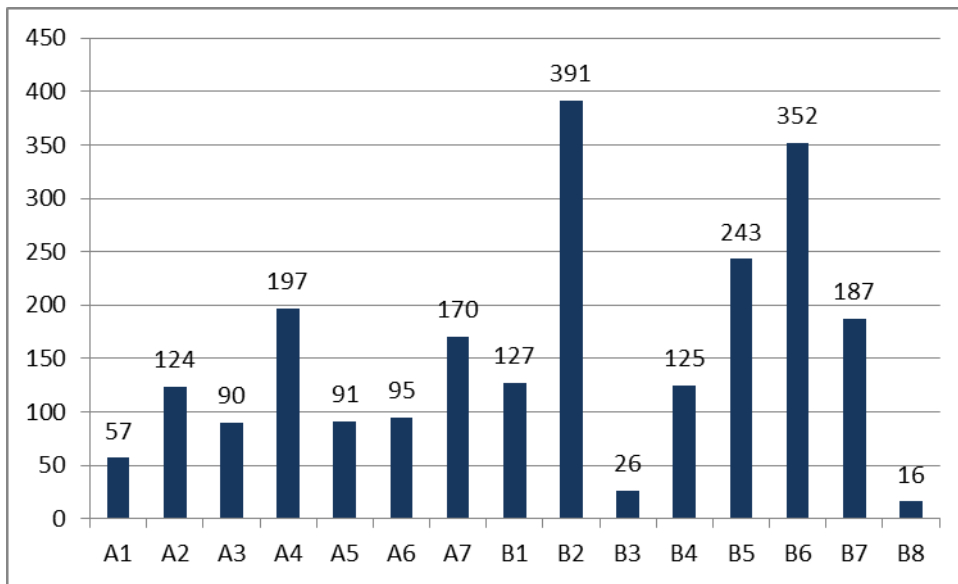


Table 3.34 shows requests by assigned operators between 20 October 2010 and March 2011.

Table 3.35 Distributions of Requests by Month

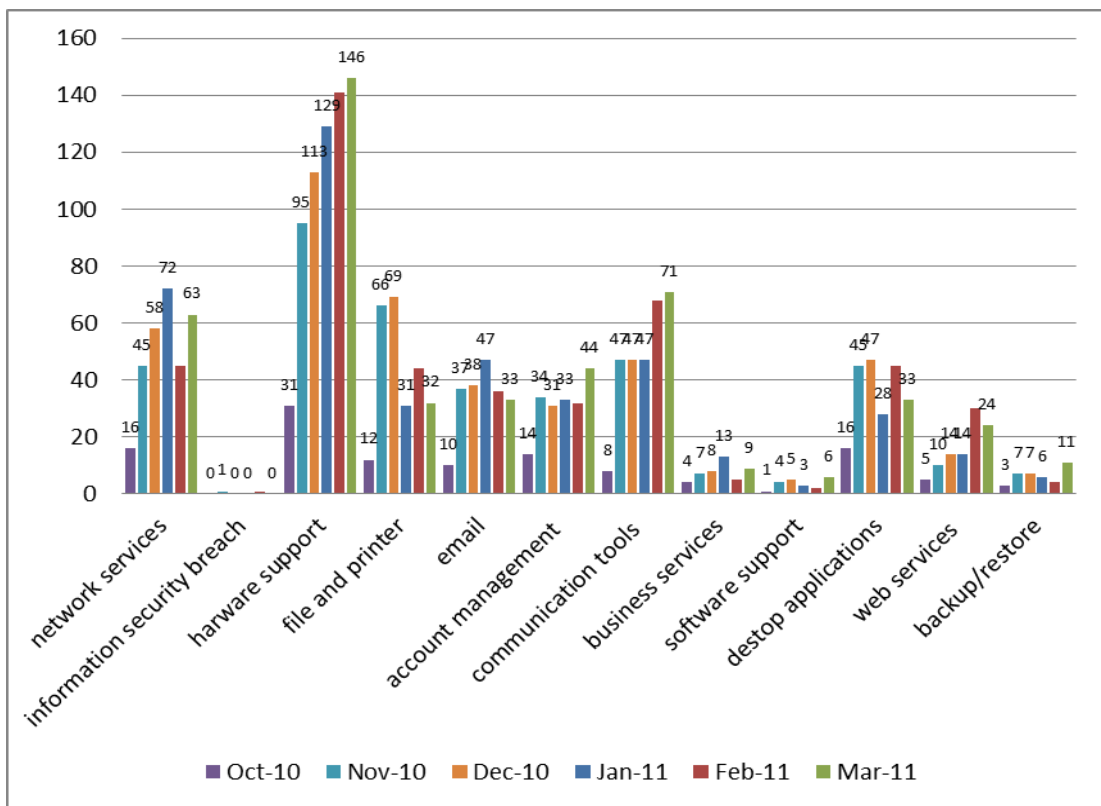


Table 3.35 shows the distribution of request by month 20 October 2010 and March 2011.

Table 3.36 The Average Response Times by Severity

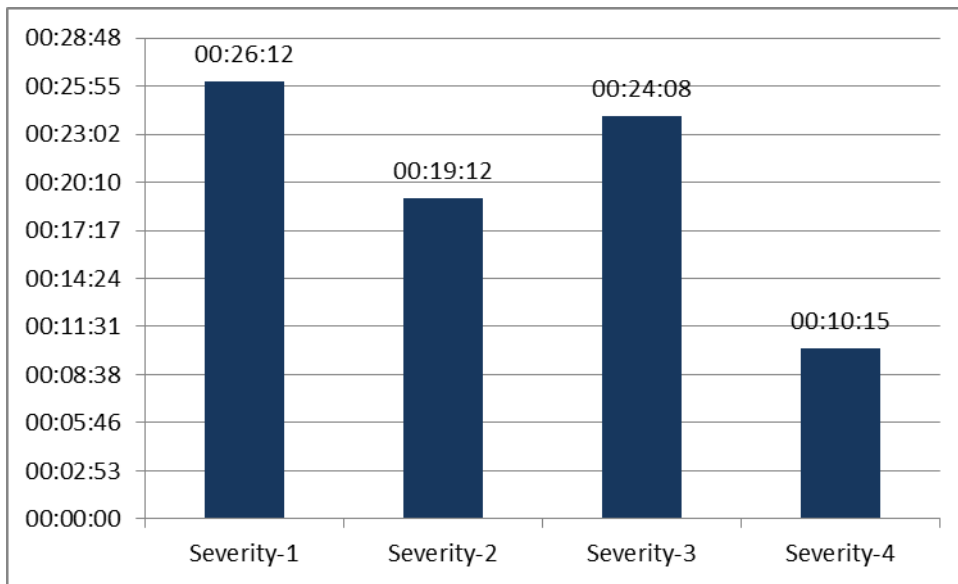


Table 3.36 shows average of the response times by severity between 20 October 2010 and March 2011.

Table 3.37 The Average Solution Times by Severity

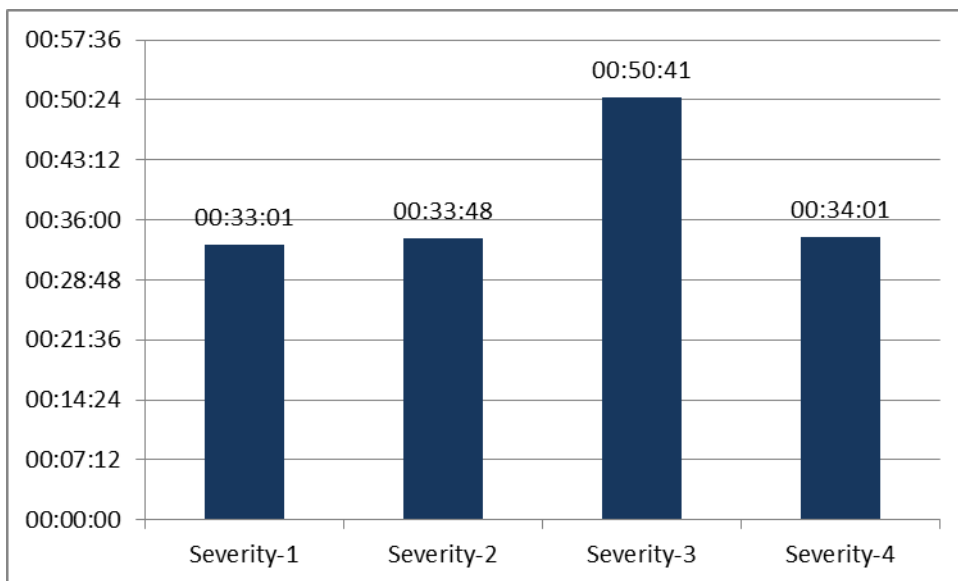


Table 3.37 shows average of the solution times by severity between 20 October 2010 and March 2011.



Table 3.38 The Distribution of Response Time Based on Severity and Month

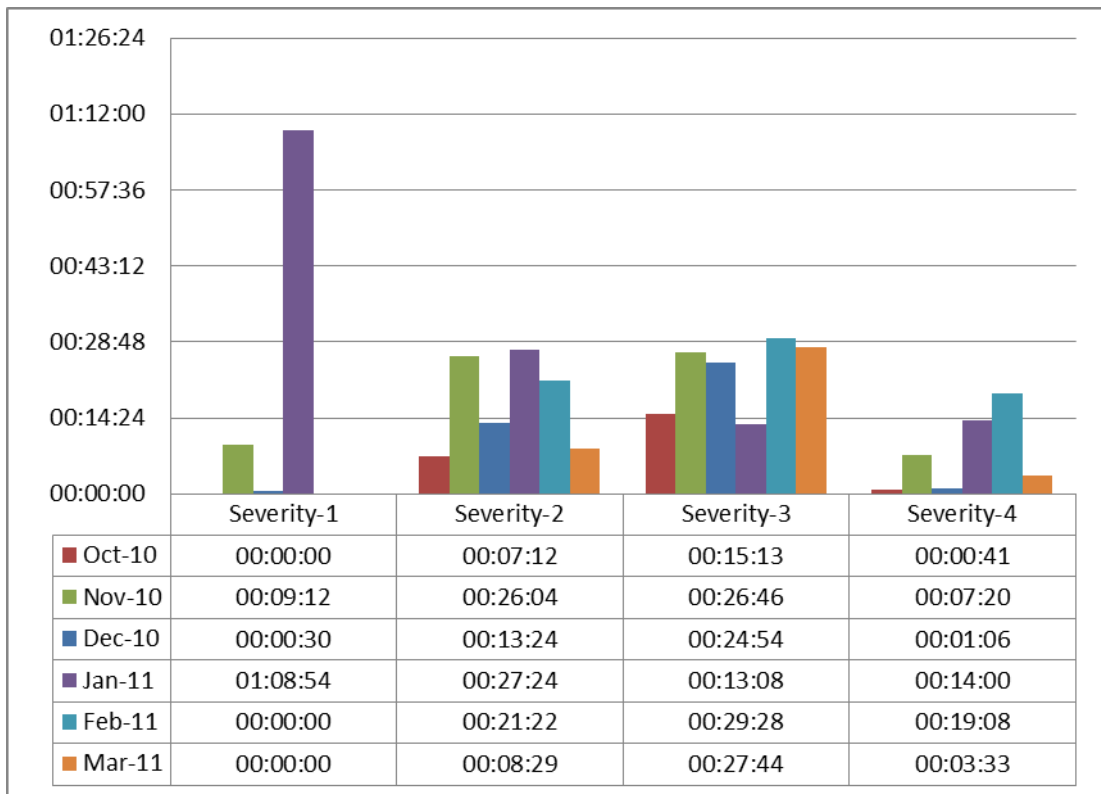


Table 3.38 shows the distribution of response times based on severity and month

Table 3.39 The Distribution of Solution Time Based on Severity and Month

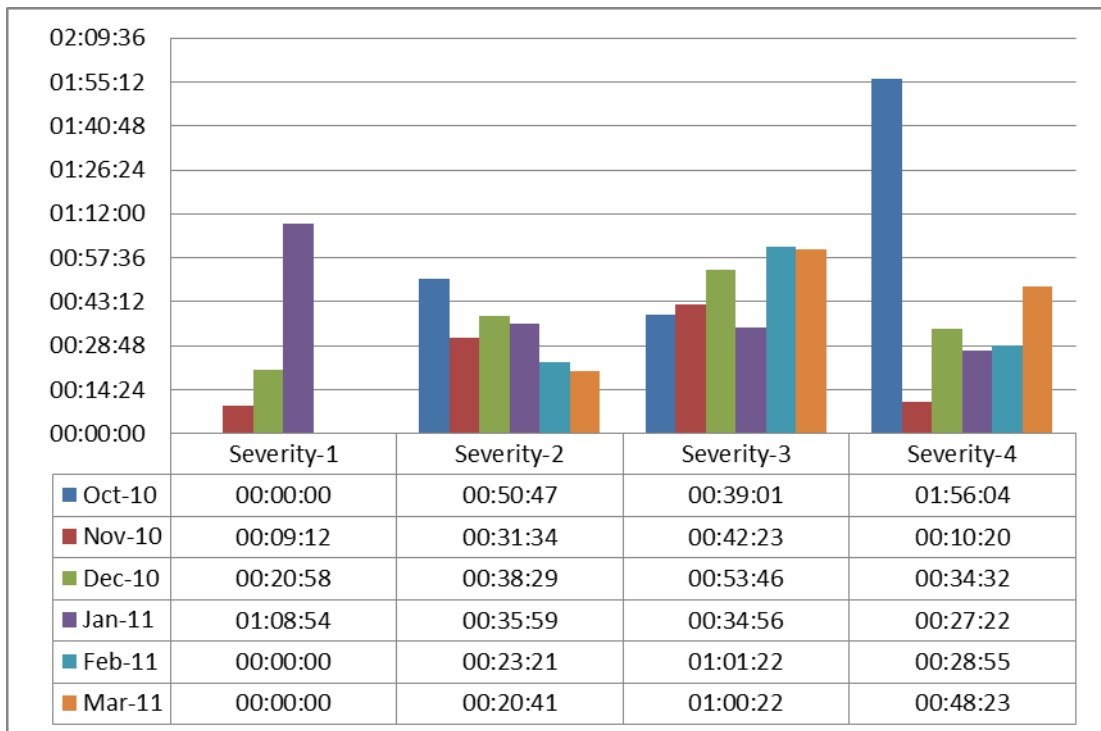


Table 3.39 shows the distribution of response times based on severity and month

### 3.1.8 Configuration Management

The Configuration Management module enables to manage and track configuration items within IT infrastructure. A configuration item (CI) is any component of an information technology infrastructure that is under the control of configuration management. All configuration items are stored in Configuration Management Database (CMDB).

In our project, we used a discovery tools in order to discover all CIs in IT infrastructure. Through the discovery tool, we provide up-to-date CI information.

The Configuration Management process is divided into three separate process flows:

- **Data Collection:** The Configuration Management process begins with an inventory of all IT components. The purpose of the physical inventory is to determine “What do we have?” The physical inventory can be performed manually or automatically. We provide the physical inventory with auto-discovery tool and manual imports for not discoverable CIs.
- **Data Review and Validation:** This phase contains to update the CI information which is not discovered by tool.
- **Maintenance:** Maintenance ensures that an organization’s infrastructure is stable.

#### 3.1.8.1 Configuration Management Users

Configuration Management user types:

**Configuration Administrator:** The user who is responsible for tracking and managing configuration management database.

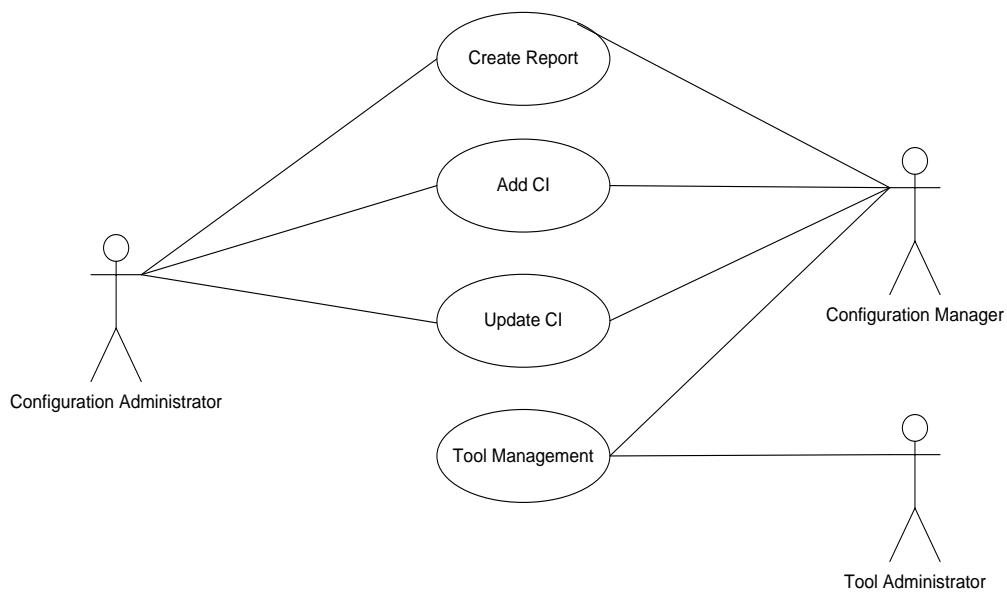
**Configuration Manager:** Configuration Management process owner.

**CM Tool Administrator:** The user who is responsible for managing the CMDB tools.

### 3.1.8.2 Configuration Management Activities

The following functional requirements were identified for the configuration management. (see Figure 3.6). A Standard Unified Modeling Language notation (a use case diagram) was used to demonstrate functional requirements and how these requirements are related to system stakeholders.

Figure 3.6 A Use Case Diagram for Configuration Management



**Add CI:** when a new CI is added, IT infrastructure a tool discovers it. If it is not discovered by tool, then configuration administrator adds it to CMDB.

**Update CI:** Configuration manager and configuration administrator are able to add additional information to CI.

**Tool Management:** Control and maintenance of the tool and discovery results.

### 3.1.8.3 Roles & Responsibilities

The following table describes the responsibilities of the Configuration Management user role descriptions.

Table 3.40 Configuration Management User Roles

<b>Role</b>	<b>Responsibilities</b>
Configuration Administrator	<ul style="list-style-type: none"> <li>• Reviewing updates in the Configuration Management system (CMS)</li> <li>• Evaluating the pre-modification and post-modification configuration states.</li> <li>• Verifying that CI information is correct and complete.</li> <li>• Verifying that Configuration details are updated in the Configuration Management database.</li> </ul>
Configuration Manager	<ul style="list-style-type: none"> <li>• Managing the Configuration Management plan and policies.</li> <li>• Verifying that there is no existing CI type that satisfies the needs of the change and that the proposed data model change does not conflict with other parts of the model.</li> </ul>
Tool Administrator	<ul style="list-style-type: none"> <li>• Configuring the data model, policies, and CI types in tools.</li> </ul>

#### 3.1.8.4 RACI Matrix

The RACI matrix for Configuration Management Table 3.41.

Table 3.41 RACI Matrix for Configuration Management

<b>Activity</b>	<b>Configuration Administrator</b>	<b>Tool Administrator</b>	<b>Configuration Manager</b>
Configuration Management Planning		R	A/R
Configuration Identification	R		A/C
Configuration Control	R		A/C
Configuration Reporting	R	R	A/I
Configuration Verification	R	R	A/C

### 3.1.8.5 Configuration Management Process

All CI information is stored in Configuration Management Database. CI's can be added to CMDB with manual import or with discovery.

The following process is defined to add a new configuration item to the CMDB.

If a CI can be discovered with a tool;

- The tool discovers the CI and its attributes and adds the CI to the CMDB automatically.

If a CI cannot be discovered, it must be added manually.

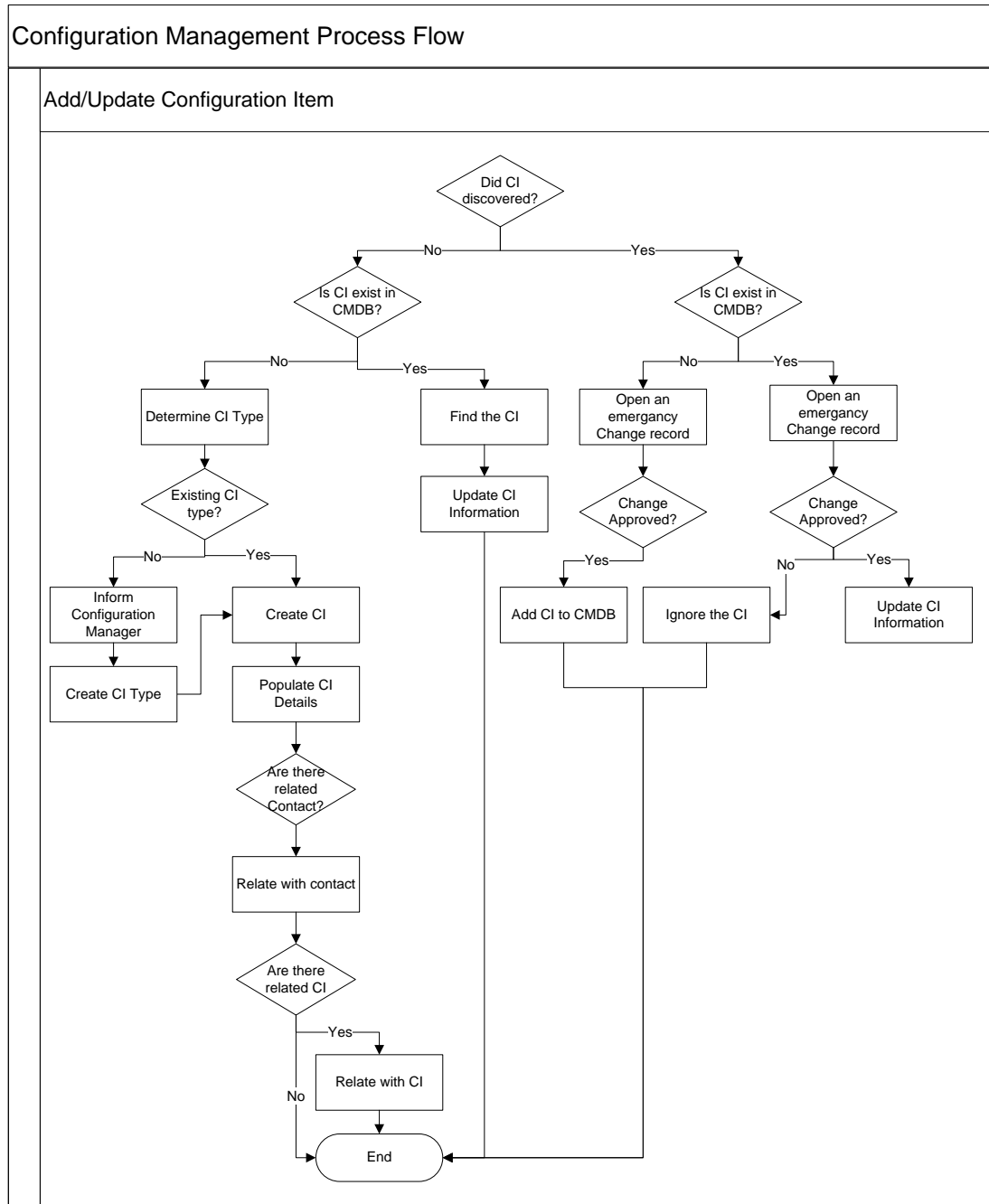
- First, the configuration administrator defines the CI type. If CI type does not exist in CMDB, the configuration administrator informs the configuration manager and configuration manager defines the CI type. Then, configuration administrator populates the CI information such as status, support group, model, and vendor.
- After the population of the CI information, configuration administrator should relate the CI and the user if a user uses this CI.
- In addition, we can relate CI's with each other to show relations. For example, if we relate a service and related CIs, we are able to track that when a CI is down which services will be affected.
- After the relation, the CI is added to CMDB and the process is ended.

The following process defines to update a configuration item in CMDB.

- After a discovery, some configuration item information is able to update. In order to update CI information in CMDB, we open a change record in change management. If the change is approved then the tool updates the CI information. Consequently, we prevent unplanned changes through this process.
- For manual update, we do not use change management or any approval process, because only configuration administrators or configuration manager

can update CI information. Moreover, with audit history we can track all former updates about all CIs.

Figure 3.7 Configuration Management Process



### 3.1.8.6 CI Types

General CI types are:

- Application
- Business Service
- Computer
- Display Device
- Furnishings
- Hand Held Devices
- Mainframe
- Network Components
- Office Electronics
- Software License
- Storage
- Telecommunications

In the project we used following CI types.

Table 3.42 Configuration Management CI Types

Business Service	Business Service
Computer	Desktop Host Server Unix Server Windows Servers
Display Device	Projector
Hand Held Devices	Blackberry
Network Components	Firewall Switch Router
Office Electronics	Printer

### 3.1.8.7 Benefits

Configuration management process provides the following benefits:

- All configuration items can be recorded, updated and tracked by configuration manager or configuration administrators.
- All CI history can be tracked.
- CI, CI relations, and the effect of each other can be reported.

### 3.1.8.9 KPIs

Table 3.43 Configuration Items by Types

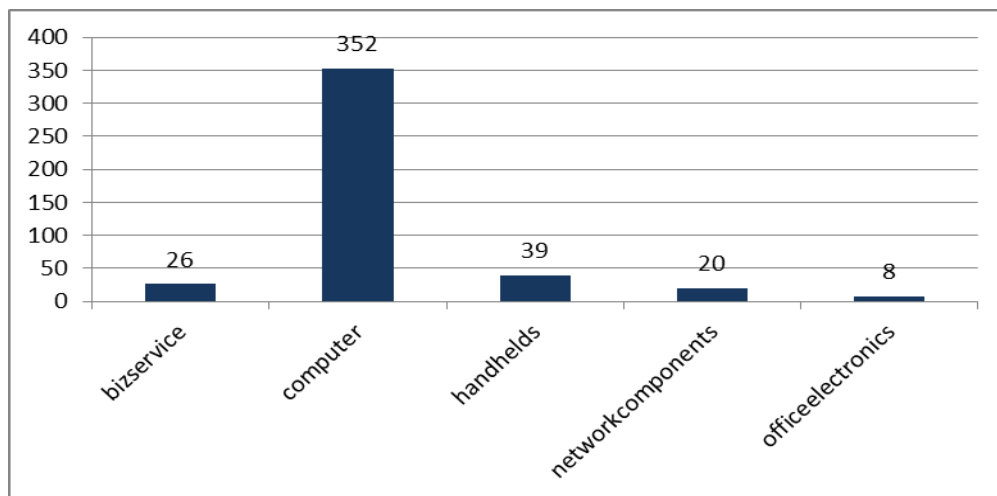


Table 3.43 shows recorded configuration items in configuration management database by types.

Table 3.44 Configuration Items by Sub Types

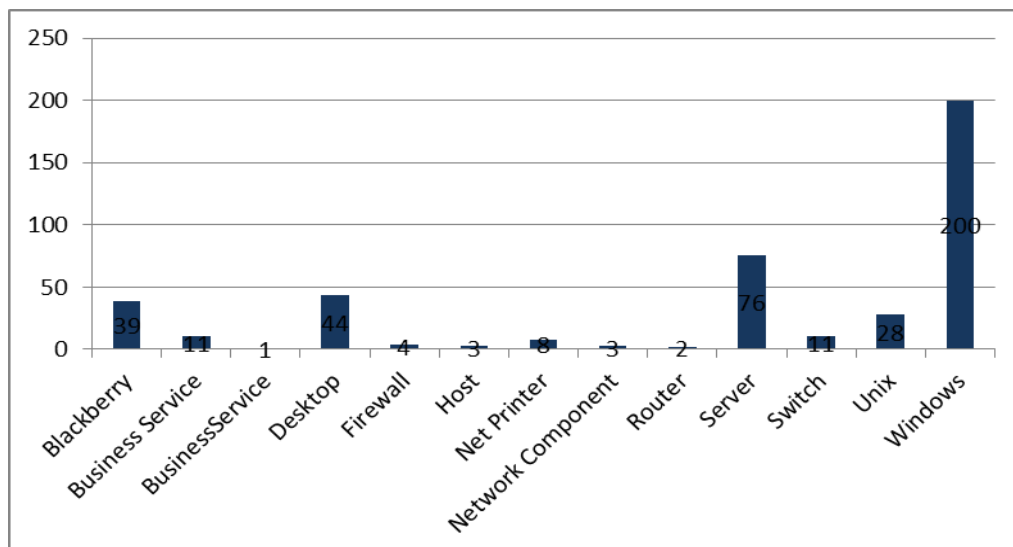




Table 3.44 shows recorded configuration items in configuration management database by sub types.

Table 3.45 User Computers by Series

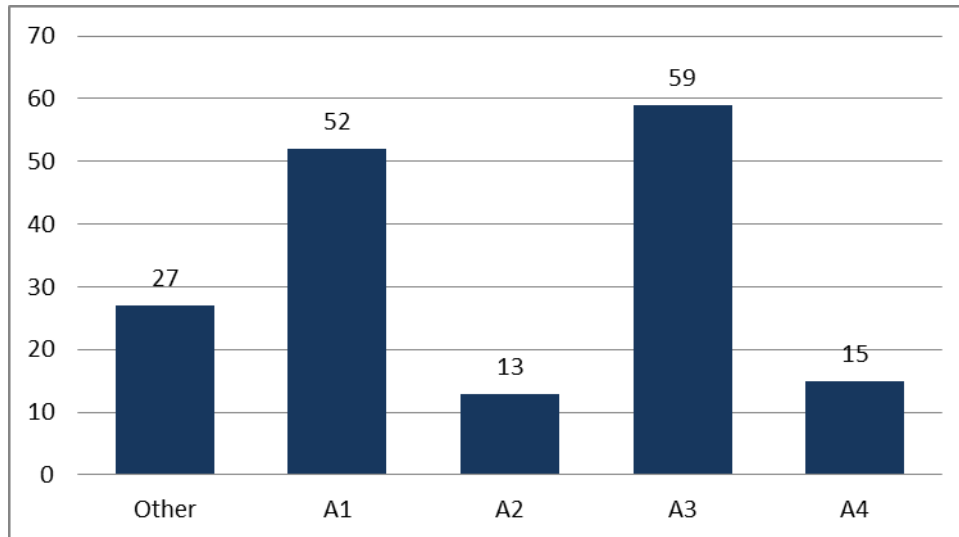


Table 3.45 shows user computers by series. Many users use same brand computers with different models and series.

### 3.1.9 Problem Management

Problem Management is a one of the processes of Service Operation. The goal of problem management is to minimize the effect on the business of problems caused by errors in the infrastructure. In addition, problem management proactively prevents the occurrence of incidents and problems and it provides permanent solution for recurrent incidents.

Problem Management includes the activities required to diagnose the root cause of incidents and to determine the resolution to related problems. It is also responsible for ensuring that the resolution is implemented successfully or not. A 'Problem' is the unknown cause of one or more incidents, often identified as the result of multiple similar incidents. A 'Known error' is an identified root cause of a Problem.<sup>[36]</sup> Problem Management includes the activities to prevent the recurrence of incidents or known errors.

**Problem Control:** The purpose of problem control is to identify problems within an IT environment. Problem control identifies the root cause of a problem and provides information about workarounds.

**Error Control:** The purpose of error control is to track of known errors and to determine the resource effort to resolve the known error.

Problem Management process contains the following phases.

- Problem logging, and categorization
- Problem prioritization and planning
- Problem investigation and diagnosis
- Problem Resolution
  - Known error logging and categorization
  - Known error investigation
  - Known error resolution
- Problem closure and review

### **3.1.9.1 Problem Management Users**

Problem Management process user types:

**Problem Analyst:** The user who investigates and diagnoses assigned problems and known errors for workarounds and/or root causes. Problem analyst implements corrective actions and closes known error.

**Problem Coordinator:** The user who is responsible for coordinating and handling problems.

**Problem Manager:** The user who is responsible for problem management process.

### **3.1.9.2 Problem Management Activities**

The following functional requirements were identified for the problem management (see Figure 3.8). A Standard Unified Modeling Language notation (a use case diagram) was used to demonstrate functional requirements and how these requirements are related to system stakeholders.

Figure 3.8 A Use Case Diagram for Problem Management



Problem Management requirements are;

- **Problem Logging and Categorization:** A new problem is submitted by Problem coordinator or problem manager.
- **Prioritization and Planning:** The problem is prioritized and the resolution activities are planned.
- **Investigation and Diagnosis:** The root cause of the problem is identified. Different specialists may be involved for this root cause analysis.

- **Problem Resolution:** After the identification of root cause of the problem, the Problem Resolution phase starts. The Problem Resolution includes known error activities, from creating to finding a solution for a known error.
- **Known Error Logging:** A new known error is submitted by Problem Coordinator.
- **Known Error Investigation:** The aim of the known error investigation is defining a temporary fix or permanent solution for the known error.
- **Known Error Resolution:** In Known Error Resolution phase, solution is found by Problem Analyst. Then, Problem Coordinator validates the solution.
- **Problem Closure:** The problem must be reviewed in order to determine whether all related errors have been resolved and to validate that the problem is resolved.

### 3.1.9.3 Roles & Responsibilities

The following table describes the responsibilities of the Problem Management user role descriptions.

Table 3.46 Problem Management User Roles

Role	Responsibilities
Problem Analyst	<ul style="list-style-type: none"> <li>• Investigating and diagnose assigned problems for root causes.</li> <li>• Investigating and diagnosing assigned known errors and find solutions and workarounds.</li> <li>• Implementing resolution to close known error.</li> </ul>
Problem Coordinator	<ul style="list-style-type: none"> <li>• Take report to decide if new problems need to be registered.</li> <li>• Register problems.</li> </ul>

	<ul style="list-style-type: none"> <li>• Assign work to Problem Analysts.</li> <li>• Register known errors and assign known error to Problem Analyst.</li> <li>• Validate a problem is solved.</li> </ul>
Problem Manager	<ul style="list-style-type: none"> <li>• Prioritizing and planning problems.</li> <li>• Deferring Problems if needed.</li> <li>• Monitor problem resolution.</li> <li>• Take and publish reports about problem management process</li> </ul>

### 3.1.9.4 RACI Matrix

The RACI matrix for Problem Management in Table 3.47.

Table 3.47 RACI Matrix for Problem Management

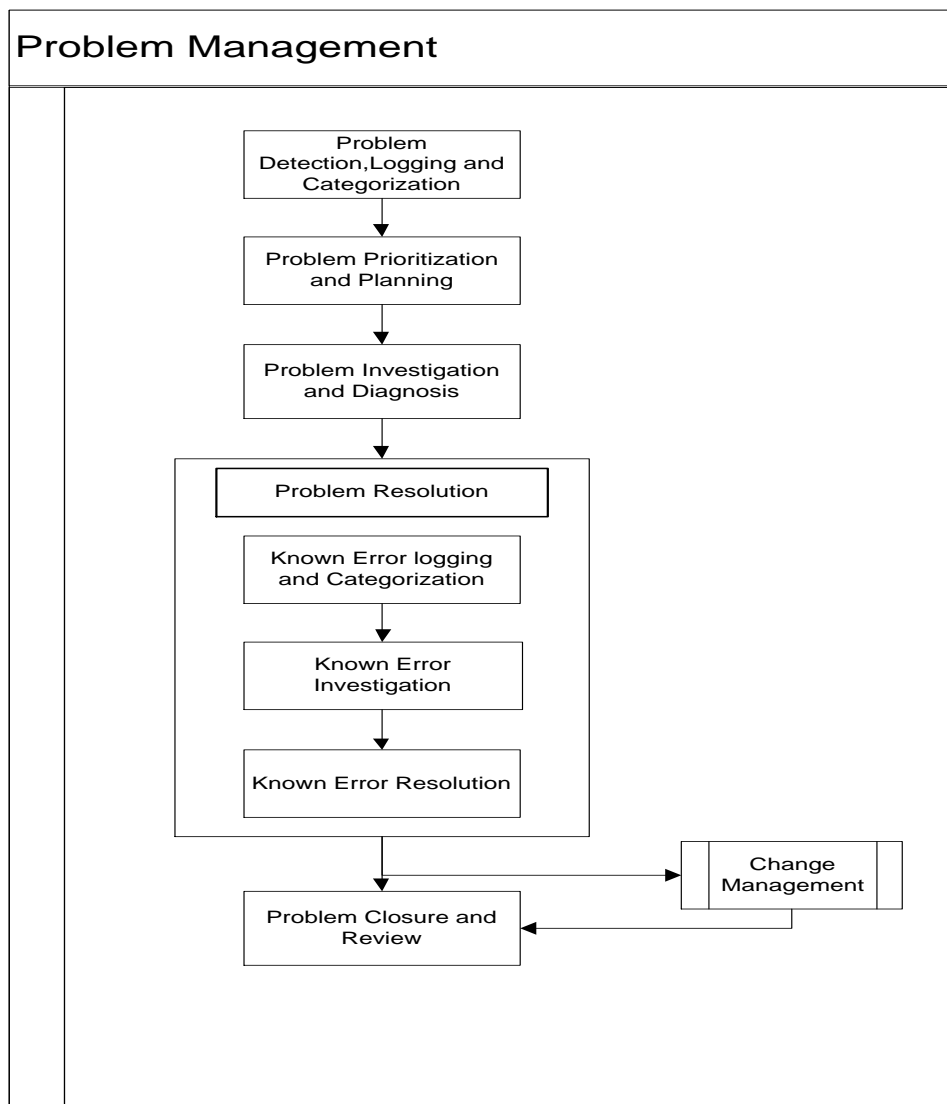
Activity	Problem Analyst	Problem Coordinator	Problem Manager
Problem Logging and Categorization:		R	A/R
Problem prioritization and planning		C	R
Problem investigation and diagnosis	R	R	A
Known Error Logging and Categorization		R	A
Known Error Investigation	R		A
Known Error Resolution	R	R	A
Problem Closure and Review		R	A/R

### 3.1.9.5 Problem Management Process

Problem Management process has following phases.

- Problem logging, and categorization
- Problem prioritization and planning
- Problem investigation and diagnosis
- Problem Resolution
  - Known error logging and categorization
  - Known error investigation
  - Known error resolution
- Problem closure and review

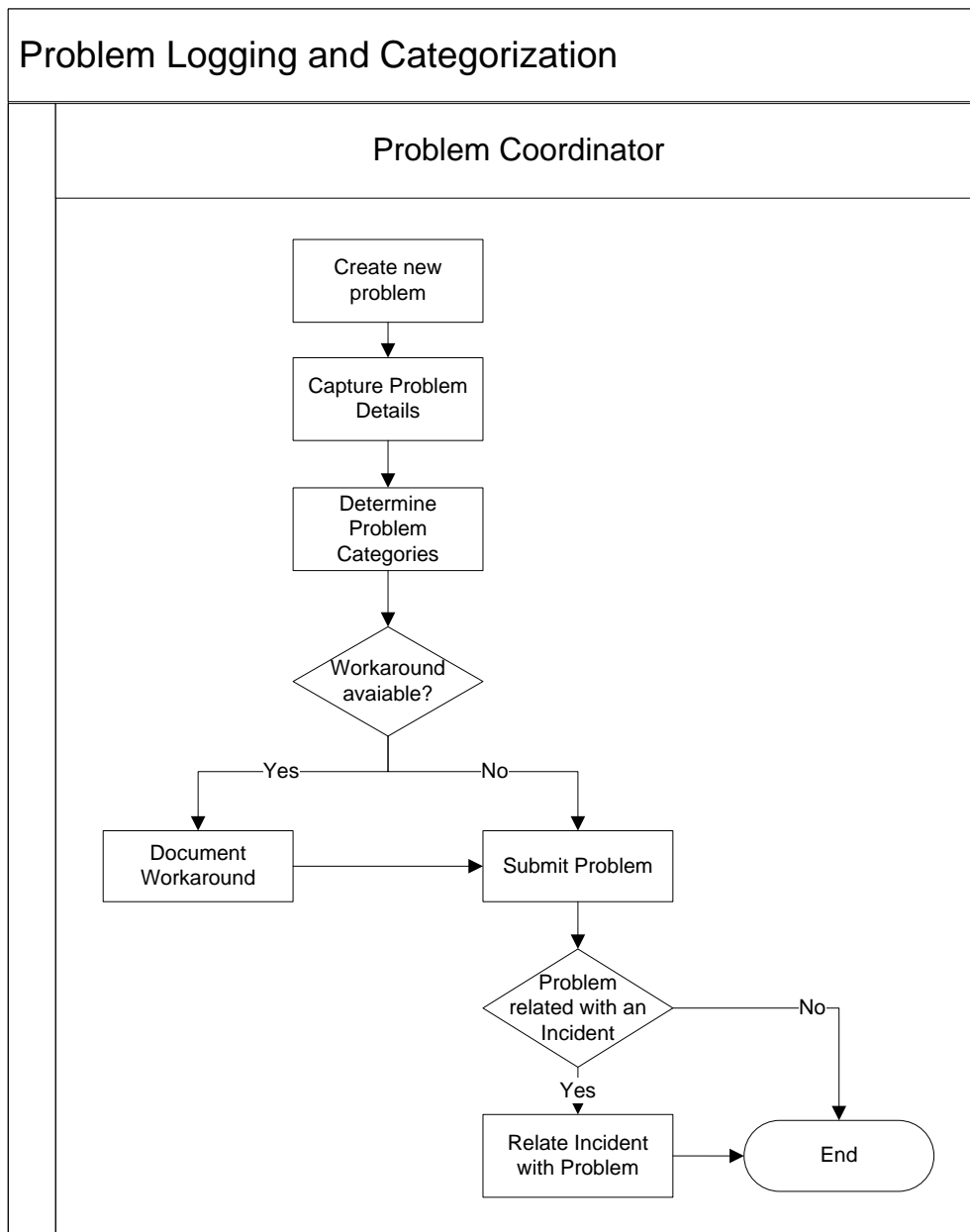
Figure 3.9 Problem Manangement Process



### 3.1.9.5.1 Problem Logging, and Categorization

Problem coordinator or problem manager decide whether a problem record needs to be opened to find solution a problem. This process may be started to find a solution an incident or a series of related incidents, and it may be started as the result of proactive investigation of a potential problem. Problem records are opened and then categorized by problem coordinator or problem manager. If a workaround is available for the problem, the workaround is populated and the problem is updated. If it is related with one or more incidents then it is related with each incident.

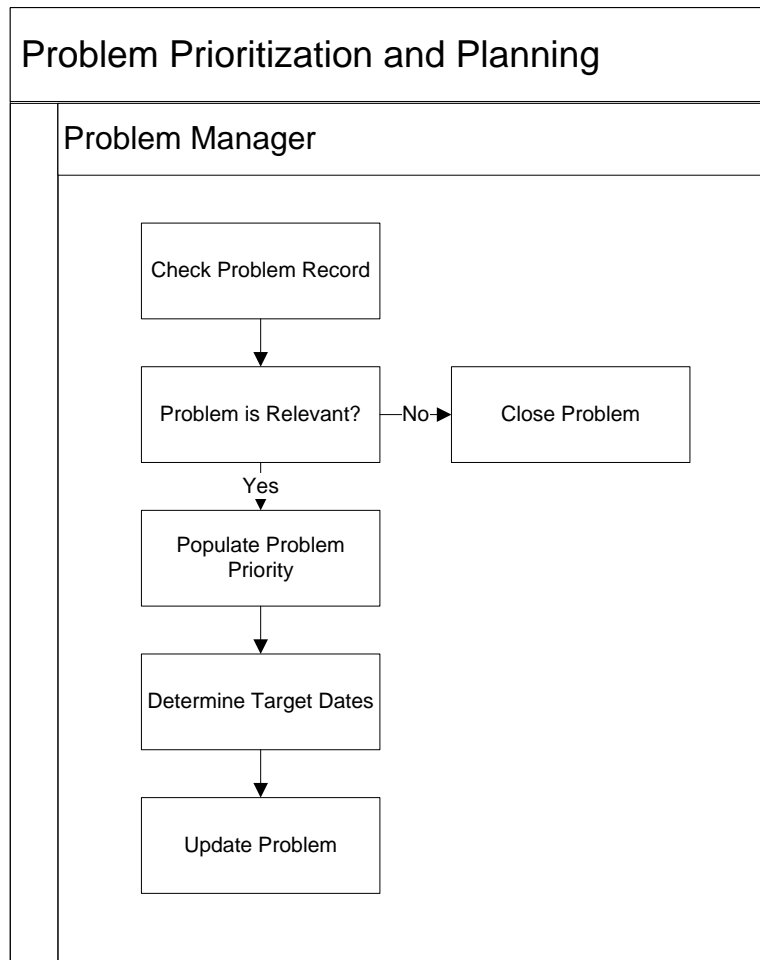
Figure 3.10 Problem Logging and Categorization



### 3.1.9.5.2 Problem Prioritization and Planning

In this phase, problem manager defines the priority of the problem and plans the solution times of the problem.

Figure 3.11 Problem Prioritization and Planning

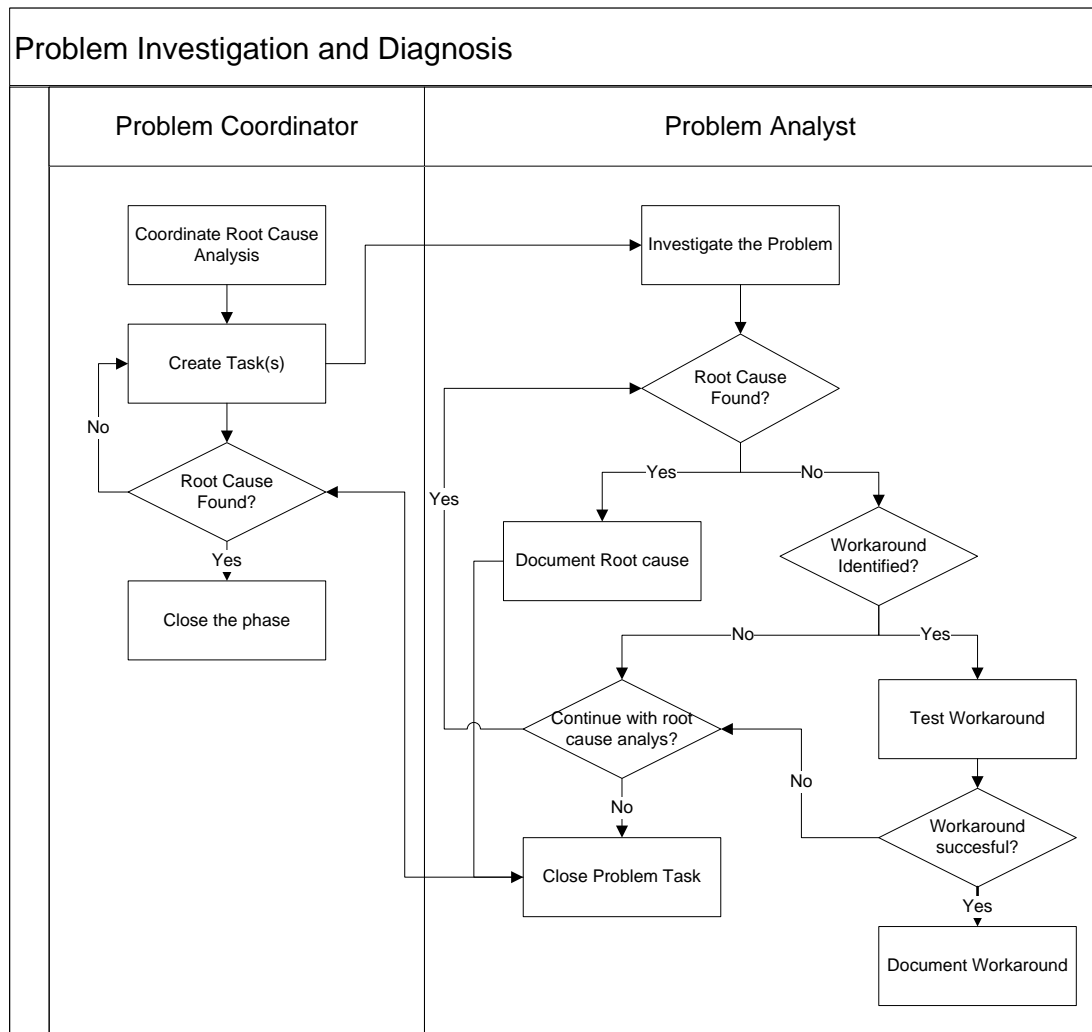


### 3.1.9.5.3 Problem Investigation and Diagnosis

The root cause of the problem is identified in problem investigation and diagnosis phase. Problem Coordinator assigns one or more task to specialists for identifying the root cause of the problem.



Figure 3.12 Problem Investigation and Diagnosis



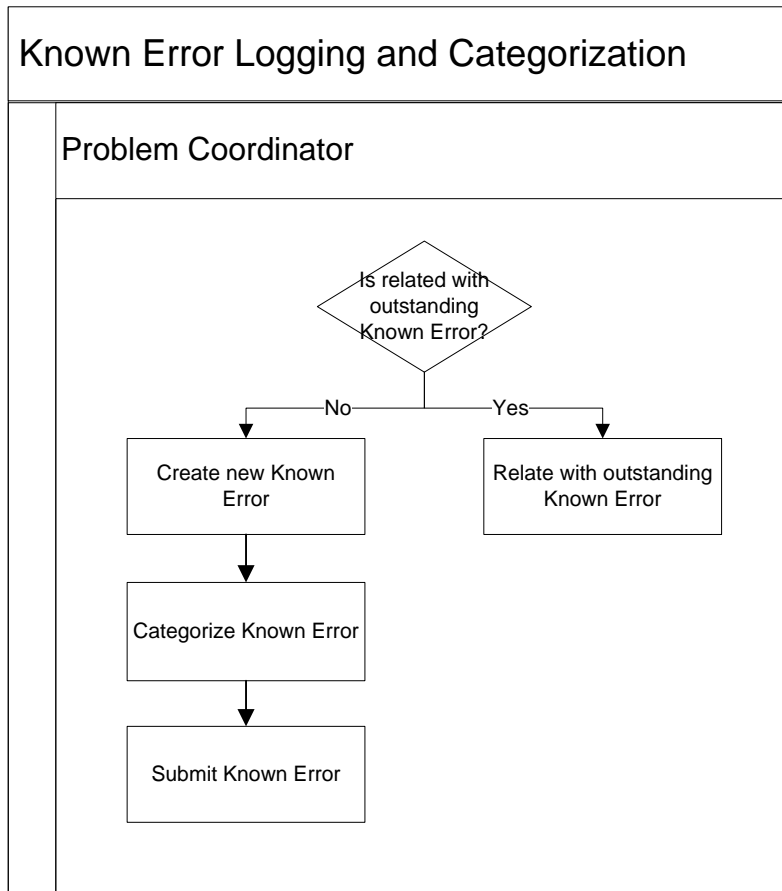
### 3.1.9.5.4 Known error Logging and Categorization

The purpose of this phase is to find a solution and resolve the problem. Problem resolution phase contains known error activities.

A Known Error is a problem for which the root cause is understood and there is a temporary workaround or a permanent fix has been identified. If the problem is caused by more than one error, multiple known errors can be created.

Problem coordinator creates a known error in order to find permanent solution. If a known error already exists in known error database then problem is related with the existing known error.

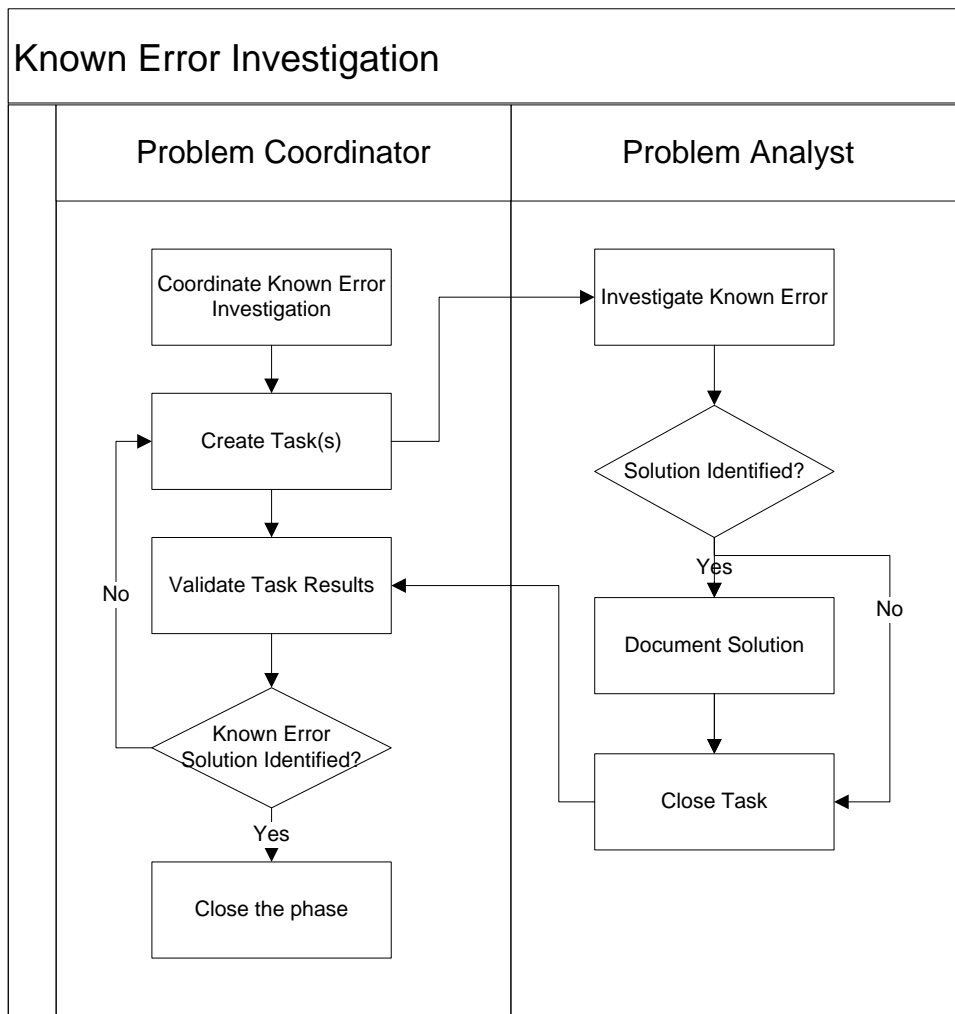
Figure 3.13 Known Error Logging and Categorization



#### 3.1.9.5.5 Known Error Investigation

The aim of this phase is to define solution for the known error. Problem Coordinator assigns one or more task to specialists for identifying the solution of the known error. Different solution alternatives can be evaluated until a permanent solution is found.

Figure 3.14 Known Error Investigation

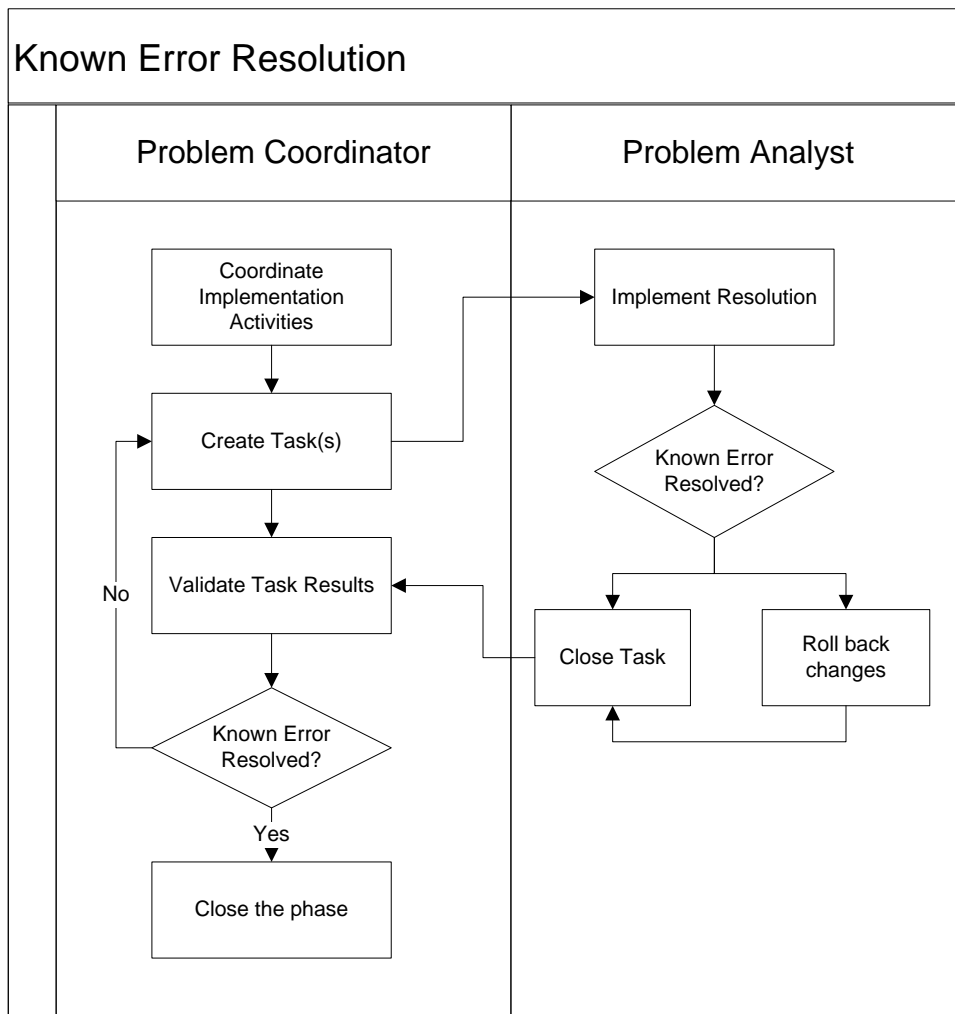


### 3.1.9.5.6 Known Error Resolution

The known error resolution phase begins when a solution has been identified and documented. When the root cause has been identified and validated by the problem coordinator. After the approval of the solution by problem manager, the solution is implemented in known error resolution phase. Problem coordinator coordinates the solution activities and the solution applied by Problem Analyst.

Sometimes a change is needed to resolve the known error. Then, change process is started to implement the resolution. After the implementation of the solution is the known error is closed. After the resolution of the known error, the problem resolution phase is closed.

Figure 3.15 Known Error Resolution



### 3.1.9.5.7 Problem Closure

After a known error has been resolved, the Problem Closure and Review phase is started. In this phase, the problem must be reviewed to determine whether all related errors have been resolved. Subsequently, problem record is closed by the problem coordinator or problem manager.

### 3.1.9.6 Benefits

The benefits of the Problem Management include the following:

- Provides improved service quality and reliability
- Provides permanent solution to recurrent incidents thus reduce number of incidents.

- Increase user productivity based on last experiences.
- Problem Management enables a better first time fix rate of Incidents.

### 3.1.5.7 KPIs

After the implementation of problem management, there are three records in problem management. Therefore, we cannot take problem management record. Some of problem management KPIs are

- Incidents caused by problems
- Average time to diagnose
- Average time to fix
- Problems by services
- Resolved problems
- Unresolved problems

An example of the problem KPI is the distribution of problems by services

Table 3.48 Problems by Services

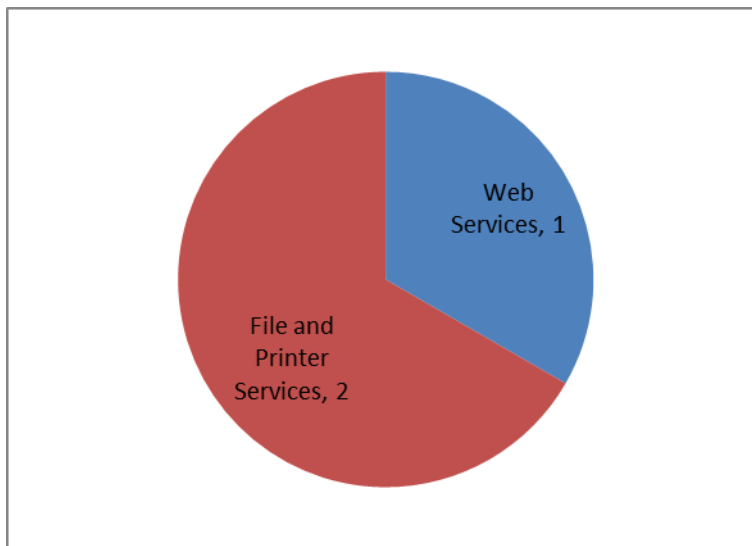


Table 3.48 shows the distribution of problem records by service

### **3.1.10 Change Management**

Change Management is a one of the processes of Service Transition. Change Management controls the entire change lifecycle – from request to approval, planning, implementation, monitoring and evaluation. The primary objective of Change Management is to enable changes to be made with minimal effect to IT Services.

Information about each CI is recorded in Configuration Management System (CMS) and is maintained throughout its lifecycle by Configuration Management process. CIs are under the control of Change Management process. In change management changes are recorded, and then evaluated, prioritized, planned, tested, implemented, documented, and reviewed.

A group called the CAB (Change Advisory Board) is formed with clearly defined roles and responsibilities to monitor and report on the progress of the change processes within the company. Any proposed change must be approved by CAB in change management process.

In this project, we implemented three change processes. One of them is system change process, which is used for infrastructure changes; the other one is client change process, which is used for any user change requests; and the last one is the emergency change process, which is used for emergency changes.

#### **3.1.10.1 Change Management Users**

Change Management user types:

**Change Analyst:** The user who completes assigned tasks and builds, tests, and implements changes based on the change plan.

**Change Approver:** The user who approves or denies change when requested.

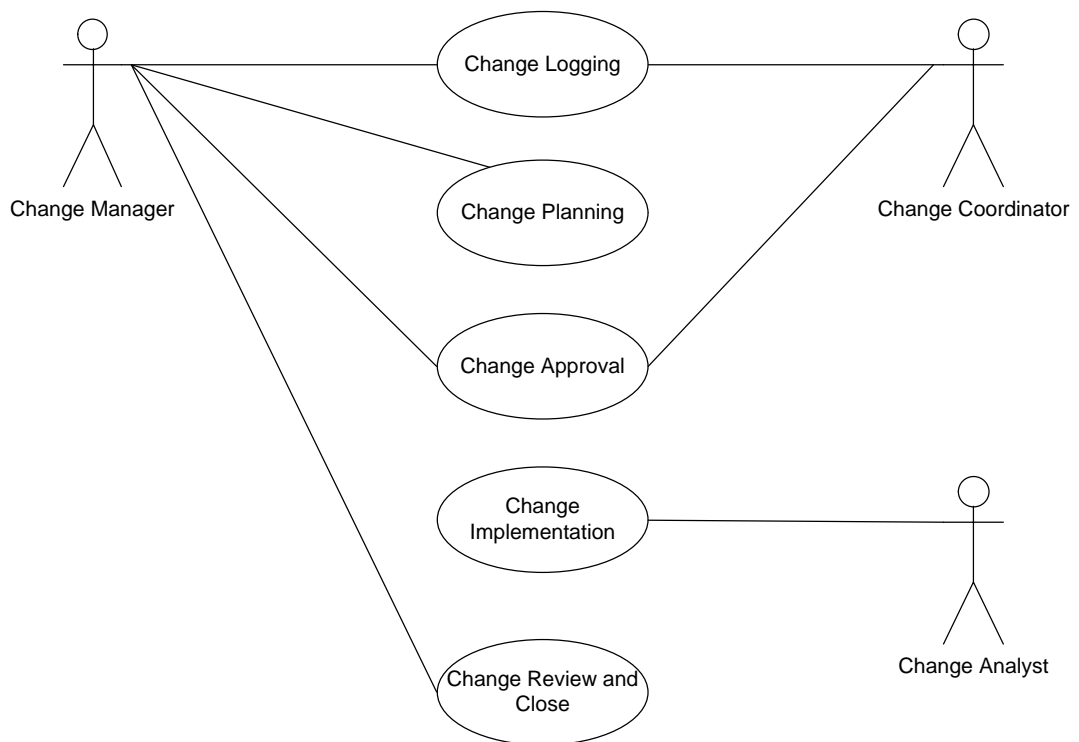
**Change Coordinator:** The user who is responsible for registering changes and controls the change process.

**Change Manager:** Change management process owner.

### 3.1.10.2 Change Management Activities

The following functional requirements were identified for the change management (Figure 3.16). A Standard Unified Modeling Language notation (a use case diagram) was used to demonstrate functional requirements and how these requirements are related to system stakeholders.

Figure 3.16 A Use Case Diagram for Change Management



### 3.1.10.3 Roles & Responsibilities

The following table describes the responsibilities of the Change Management user role descriptions.

Table 3.49 Change Management User Roles

Role	Responsibilities
Change Analyst	<ul style="list-style-type: none"> <li>• Building, testing, and implementing changes based on the change plan.</li> <li>• Executing the backup plan if required.</li> </ul>
Change Approver	<ul style="list-style-type: none"> <li>• Approve or deny Change when requested.</li> </ul>
Change Coordinator	<ul style="list-style-type: none"> <li>• Registering changes</li> <li>• Creating the change tasks for building, testing, and implementing a change.</li> <li>• Verifying that the change is implemented successfully in the production environment.</li> <li>• Evaluating the change handling and closing the change.</li> <li>• Reviewing outstanding RFCs awaiting consideration or awaiting action.</li> </ul>
Change Manager	<ul style="list-style-type: none"> <li>• Verifying initial prioritization of RFC(s)</li> <li>• Planning of the RFC</li> <li>• Verifying completeness of RFC</li> <li>• Accountable for the complete process</li> <li>• Responsible for ensuring that the Change Management process is being followed correctly</li> <li>• Periodically reviewing changes in a Post Implementation Review and determining and executing follow-up actions.</li> </ul>

#### 3.1.10.4 RACI Matrix

The RACI matrix for Change Management in Table 3.50.



Table 3.50 RACI Matrix for Change Management

Activity	Change Analyst	Change Approver	Change Coordinator	Change Manager
Change Logging			R	A
Change Planning	C/I		R	A
Change approval		R	I	R/A
Change Implementation	R		R	A
Change Evaluation and Closure	C		R	R/A

### 3.1.10.5 Change Management Processes

We implemented three change workflows in this project.

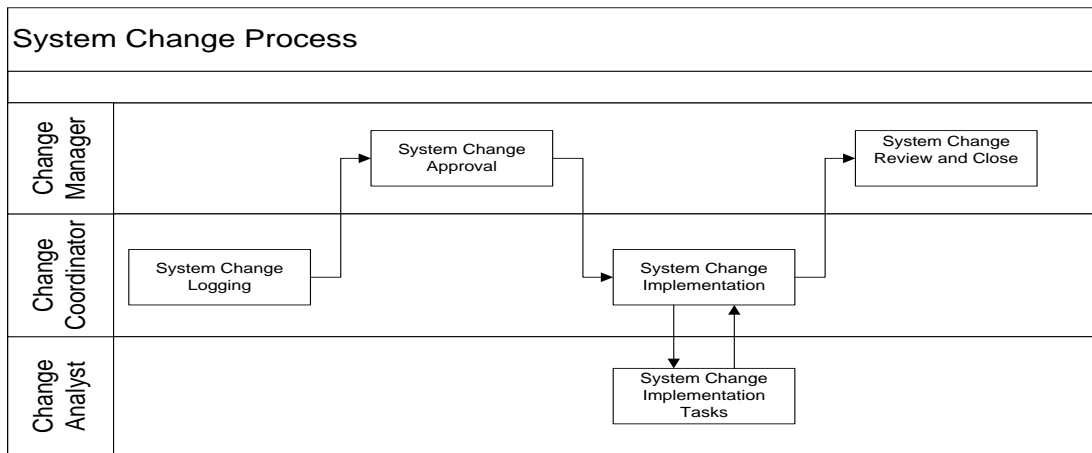
- System change process: Infrastructure related changes are the handled by the system change process.
- Client change process: User related changes are handled by the client change process.
- Emergency change process: Emergency changes are handled by the emergency change process.

#### 3.1.10.5.1 System Change Process

Infrastructure related changes are processed by the system change process. System change process can be triggered by problem management in order to resolve a problem or they can be triggered by incident management in order to resolve an incident.

The following figure shows the change phases and roles.

Figure 3.17 System Change Process Phases and Roles



System change process has following phases:

- **System Change Logging:** System changes only can be logged by change coordinators. When they open a system change, they should input service, related configuration item, severity, impact, completion date, back out method for this change.
- **System Change Approval:** After change is opened by change coordinator, change must be approved by change manager. The Change Manager verifies that the change is logical, feasible, and necessary. If change manager approves change, then plans the change. Change manager defines planned start and end dates. If changes are not necessary or not appropriate to the company standards, change manager can reject it and change record is closed.
- **System Change Implementation:** After the system change approval, change implementation phase starts. In this phase, the change coordinator schedules tasks for the build, test, and implementation phases and assigns those tasks to the responsible Change Analysts. Change Management is responsible for ensuring that changes are implemented as scheduled time. The actual implementation of authorized changes is performed by Change Analysts in the specialist groups.

The Change Analyst verifies that the change task has been assigned correctly and that the information is complete in order to execute the change task. The Change Analyst implements the change, according to the change implementation schedule. If the change has been implemented successfully then change analyst updates the configuration management database and closes the change task. If the change has not been implemented successfully, then change analyst applies the back out method after the approval of the change coordinator.

- System Change Review and Close

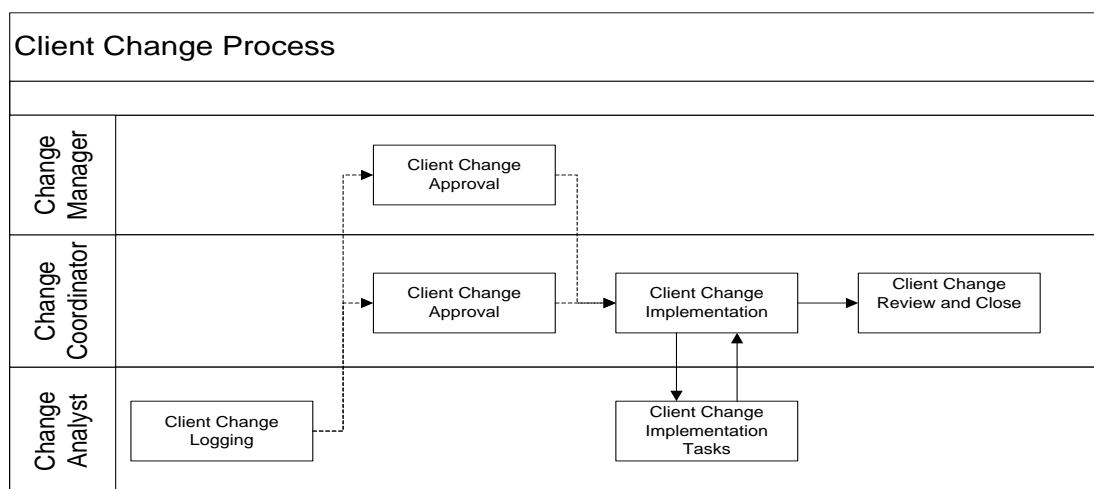
The Change Review process is performed by the Change Manager. After implementation of the change, the Change Manager verifies that the change has been handled correctly and that the administration of the change is complete. In addition, Change Manager reviews change records in order to verify that all related tickets are closed.

### 3.1.10.5.2 Client Change Process

End users' change requests are handled by the client change process. Client change process can be triggered by incident management to resolve an incident or to meet end users' needs.

The following figure shows the change phases and roles.

Figure 3.18 Client Change Process Phases and Roles



Client change process has following steps:

- **Client Change Logging:** Client changes can be logged by change analysts. When they open a client change, they should input service, related configuration item, severity, impact, completion date.
- **Client Change Approval:** After change is opened, change must be approved by change manager or change coordinator. If change is approved then change approver defines planned start and end dates. If changes are not necessary or not appropriate to the company standards, it can be rejected and change record is closed.
- **Change Implementation:** After the client's change approval, change implementation phase starts. In this phase, the change coordinator assigns tasks to the responsible Change Analysts in order to implement the change.

The Change Analyst verifies that the change task has been assigned correctly and that the information is complete in order to execute the change task. The Change Analyst implements the change, according to the change implementation schedule. If the change has been implemented successfully then change analyst updates the configuration management database and closes the change task. If the change has not been implemented successfully, then change analyst applies the back out method if it is needed after the approval of the change coordinator.

- **Change Review and Close**

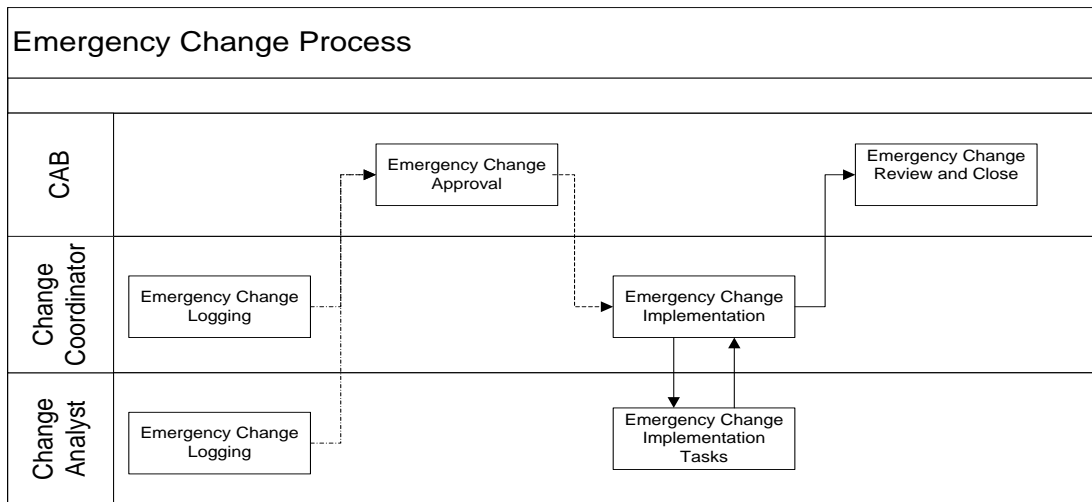
The Change Review process is performed by the Change Coordinator. After implementation of the change, the Change Coordinator verifies that the change has been handled correctly and that the administration of the change is complete. In addition, reviews change handling in order to verify that all related tickets are closed.

### 3.1.10.5.3 Emergency Change Process

Emergency change can be defined as - a change that must be introduced as soon as possible (e.g. to resolve a major incident or implement a security patch). Emergency change process can be triggered by incident management to resolve a major incident or by problem management to resolve a problem.

The following figure shows the change phases and roles.

Figure 3.19 Emergency Change Process Phases and Roles



Emergency change process has following steps:

- **Emergency Change Logging:** Emergency changes can be logged by change coordinator or change analysts. They define service, related configuration item, severity, impact, completion date. In addition, change coordinator defines back out method.
- **Emergency Change Approval:** Emergency changes must be approved by CAB (Change Advisory Board). Change coordinators and change manager is member of CAB.
- **Change Implementation:** After the approval, change implementation phase starts. In this phase, the change coordinator assigns tasks to the responsible Change Analysts to implement the change.

The Change Analyst verifies that the change task has been assigned correctly and that the information is complete in order to execute the change task. The Change Analyst implements the change. If the change has been implemented successfully then change analyst updates the configuration management database and closes the change task.

- **Change Review and Close**

The Change Review process is performed by the Change Manager. After implementation of the change, the Change Manager verifies that the change has been handled correctly and that the administration of the change is complete. In addition, Change Manager reviews change records in order to verify that all related tickets are closed.

### **3.1.10.6 Benefits**

The benefits of the Change Management include the following:

- Improved risk assessment
- Verify change history for audit and compliance purposes.
- Provides better estimations of the quality, time and cost of change.
- Provides improved service quality and reliability

### **3.1.10.7 KPIs**

Table 3.51 Changes by Types

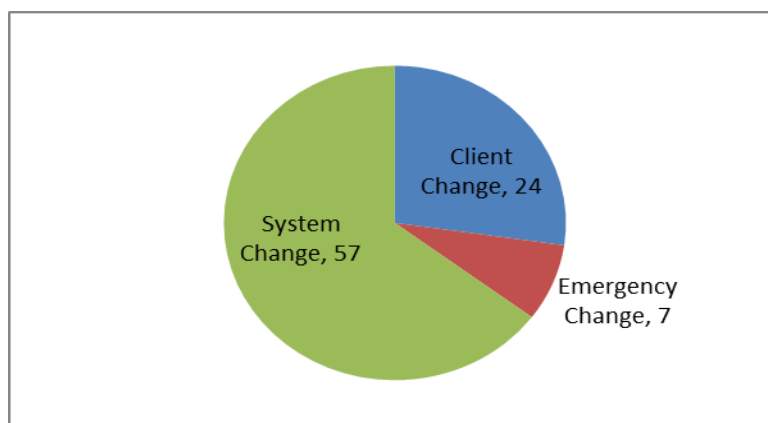


Table 3.51 shows the changes by change types.

Table 3.52 Changes Types by Month

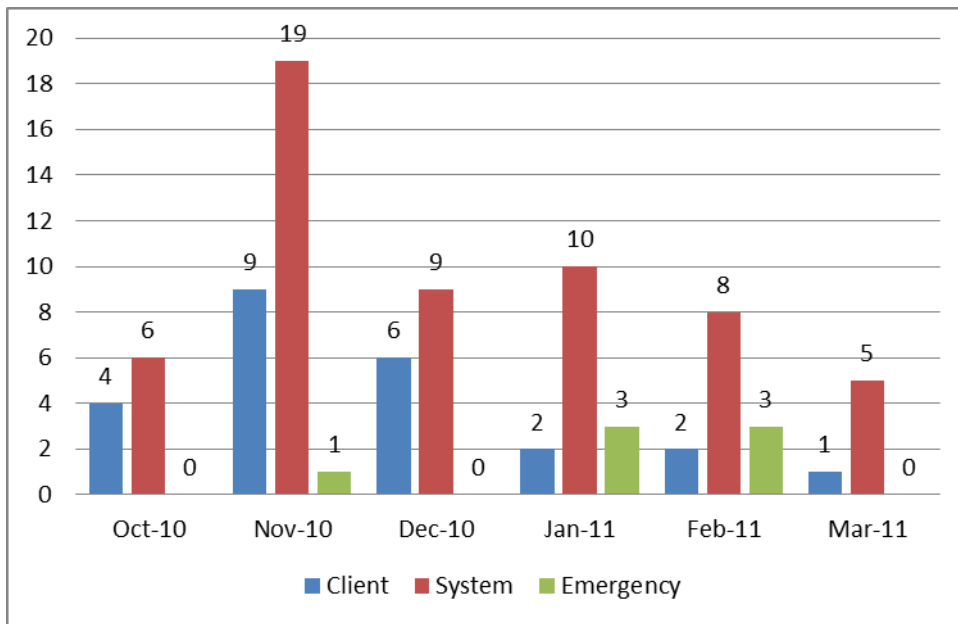


Table 3.52 shows the distribution of change types by month.

Table 3.53 Incident Related Changes

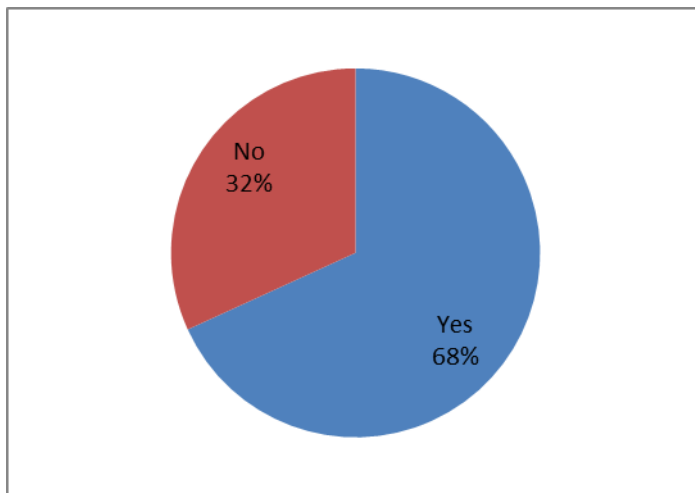


Table 3.53 shows the incident related changes. The report shows that %68 of changes open to resolve an incident.

Table 3.54 Changes by Status

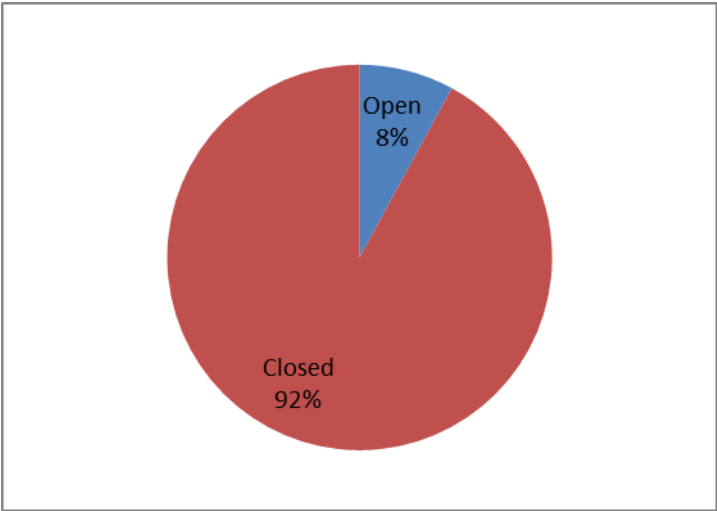


Table 3.54 shows the status of changes.

Table 3.55 Changes by Risk Assessments

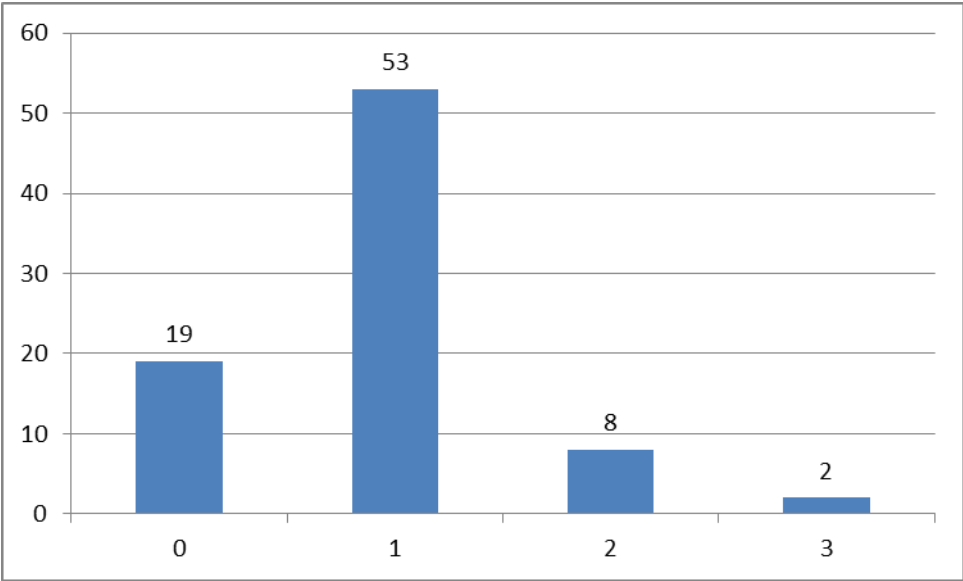


Table 3.55 shows the risk assessments of changes. Risk Assessment values are 0- No Risk, 1- Low Risk, 2-Some Risk, 3- Moderate Risk, 4- High Risk.



Table 3.56 Changes by CIs

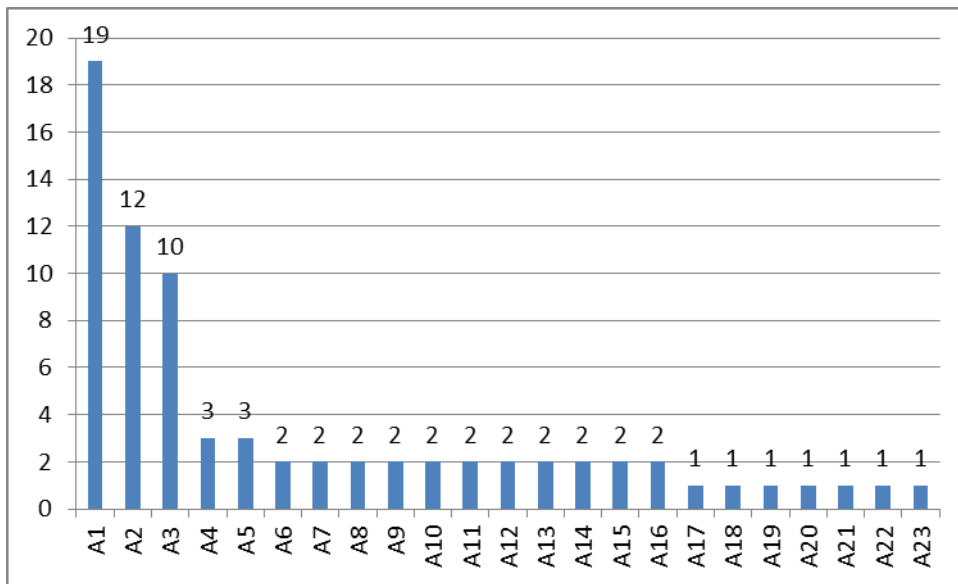


Table 3.56 shows the distribution of changes by server configuration Items. A1, A2 ... A23 refers server names.

Table 3.57 The Average Solution Times of System Changes by Day

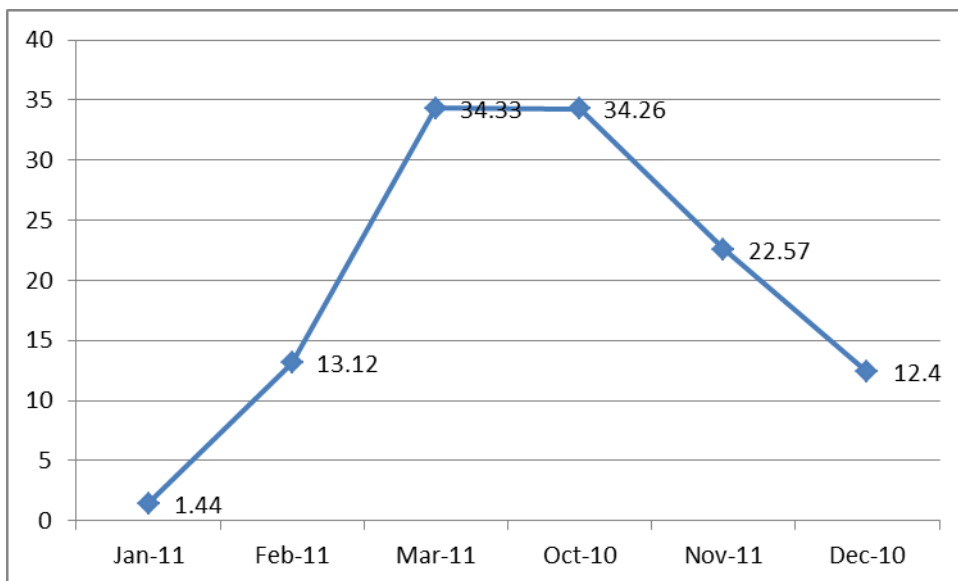


Table 3.57 shows that the average solution times of system changes by day.

Table 3.58 The Average Solution Times of Client Changes by Day

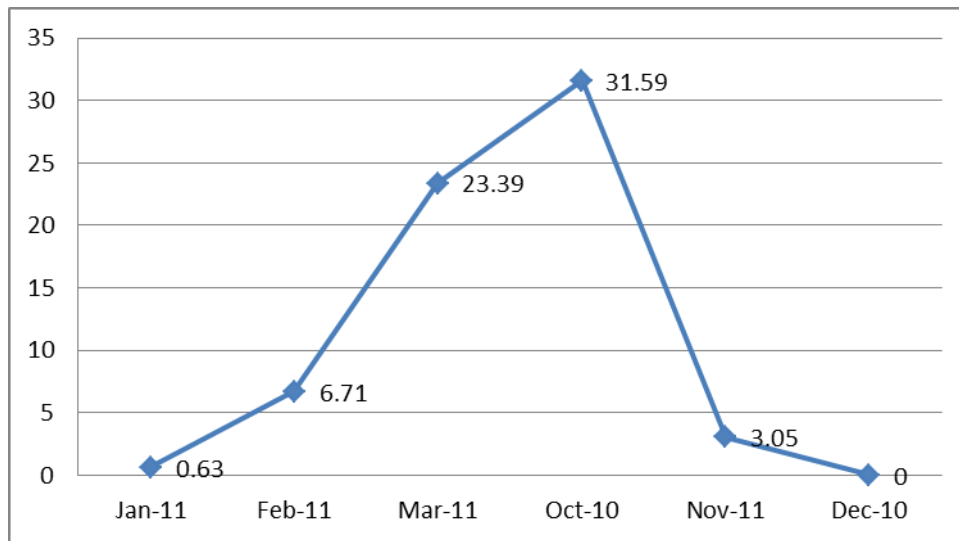


Table 3.58 shows that the average solution times of client changes by day.

### 3.1.11 Service Level Management

The goal for SLM is to maintain and improve the service quality through a constant cycle of agreeing, monitoring, reporting and improving the current levels of service.<sup>[37]</sup>

Service Level Management calculates SLA metrics. Service Management processes measured availability and response time metrics into Service Level Management, which gathers outage and response information from sources such as service desk, incidents to determine the status of related SLAs.

In this project, we implemented SLM for Service Desk and Incident management in order to measure response time objectives. Response time objectives set goals for service desk calls and incidents. They define the amount of time required to move the record from one state to another. For example, the status of an incident must change from Open to Closed within 3 hours.

#### 3.1.11.1 SLA Definitions

In this project, we defined SLA for service desk and incident management processes.

A SLA contains one or more SLOs (Service Level Objects). We defined priority based SLOs. The priority is calculated from the severity and impact values. When user creates a ticket, they define the severity of the ticket. In addition, impact is defined by call center. The average of the severity and impact shows the priority of the ticket.

The following table shows the incident severity and impact values.

Table 3.59 Severity and Impact Values

Severity	Impact			
	Company (1)	Department(2)	Users (3)	User (4)
Critical (1)	1	1	2	2
High (2)	1	2	2	3
Normal (3)	2	2	3	3
Low (4)	2	3	3	4

We defined the following SLOs for the service desk and incident management processes. For example, if a ticket priority is one then it is a request the ticket must be proceed in 30 minutes and it must be closed in 1 hour.

Table 3.60 SLO Definitions

Priority	Request		Incident	
	Response Time (min)	Resolve Time (min)	Response Time (min)	Resolve Time (min)
1	30	60	20	45
2	60	120	45	90
3	180	360	120	240
4	360	720	240	480
5	960	1920	480	960

### **3.1.11.1.1 Suspend States**

The operators can pause the SLA times in the following states:

- **Pending User:** The operator needs more information in order to resolve the incidents, then they update ticket status to pending user and they update the incident. In this situation, the SLO time is stopped until the customer update the ticket.
- **Pending Vendor:** The operator can escalate the tickets to the vendor. For example, in order to resolve an incident sometimes the component change is required. If the operator waits information or any change from the vendor, they set to the incident status to pending vendor. In this situation, the SLO time is paused until the necessary information is provided by the vendor.
- **Problem Open:** Not resolved incidents are escalated to the problem management process to diagnose and provide certain solution. In this situation, incident status is set to problem open and the SLO time is stopped until the problem record is closed.

### **3.1.11.9 Benefits**

Service level management process provides the following benefits:

- Measuring support times and reporting the quality of IT services
- Taking necessary actions for inadequate support activities
- Proactive actions to eliminate unacceptable levels of service
- Proactive actions to improve services which are needed

### **3.1.11.10 KPIs**

Table 3.61 Incident Response Time SLA Results by Month

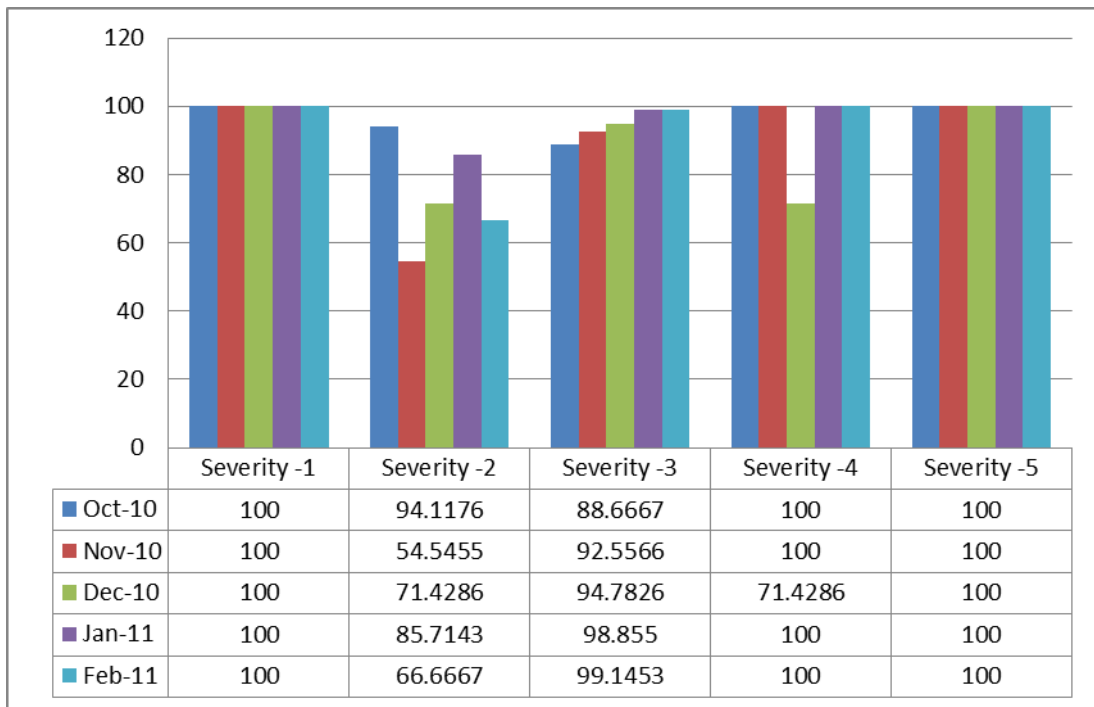


Table 3.61 shows response time SLA results by month

Table 3.62 Incident Solution Time SLA Results by Month

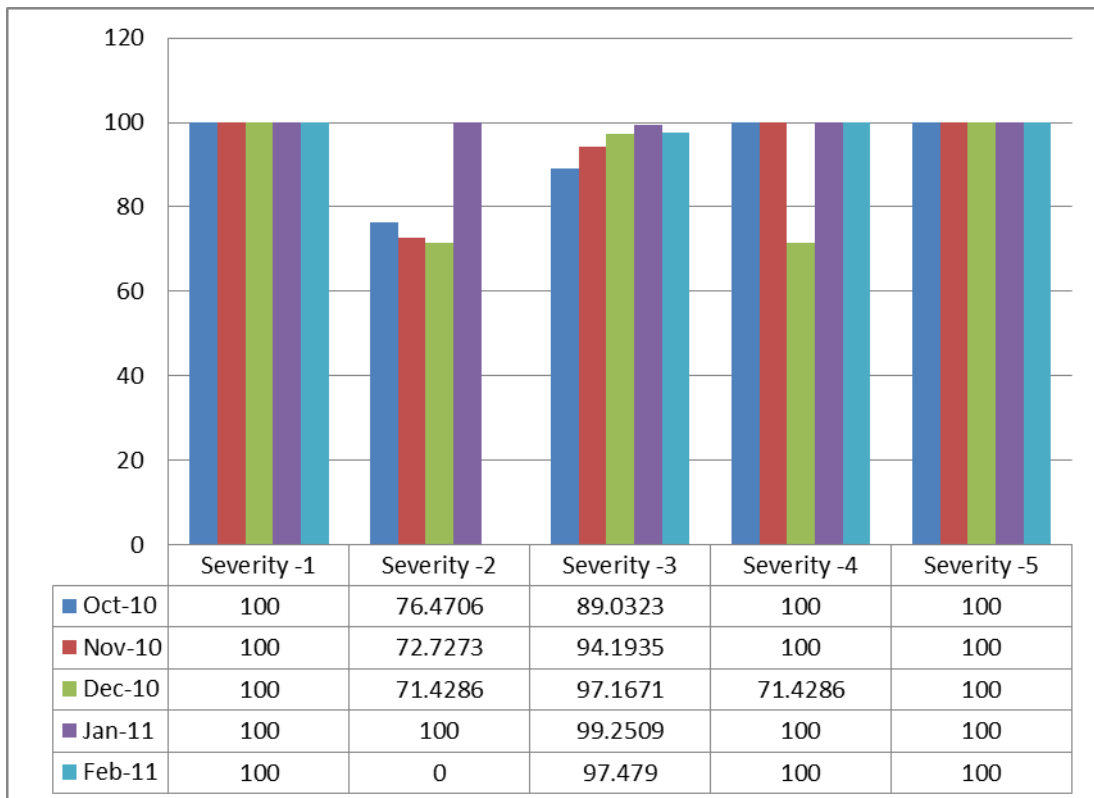


Table 3.62 shows the solution time SLA results

Table 3.63 Request Response Time SLA Results by Month

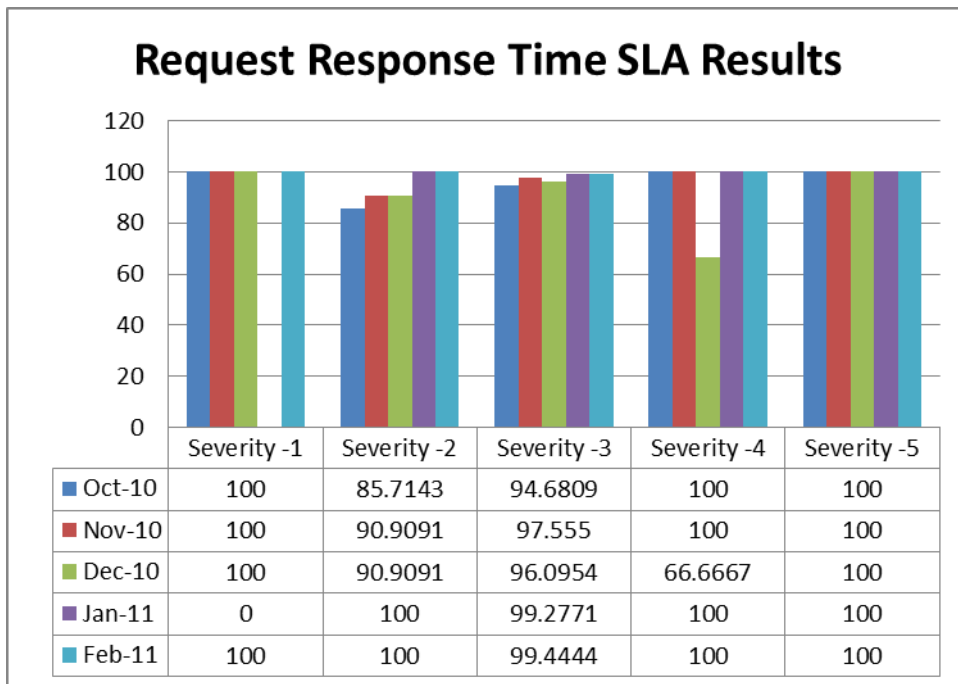


Table 3.63 shows the response time SLA results

Table 3.64 Request Solution Time SLA Results by Month

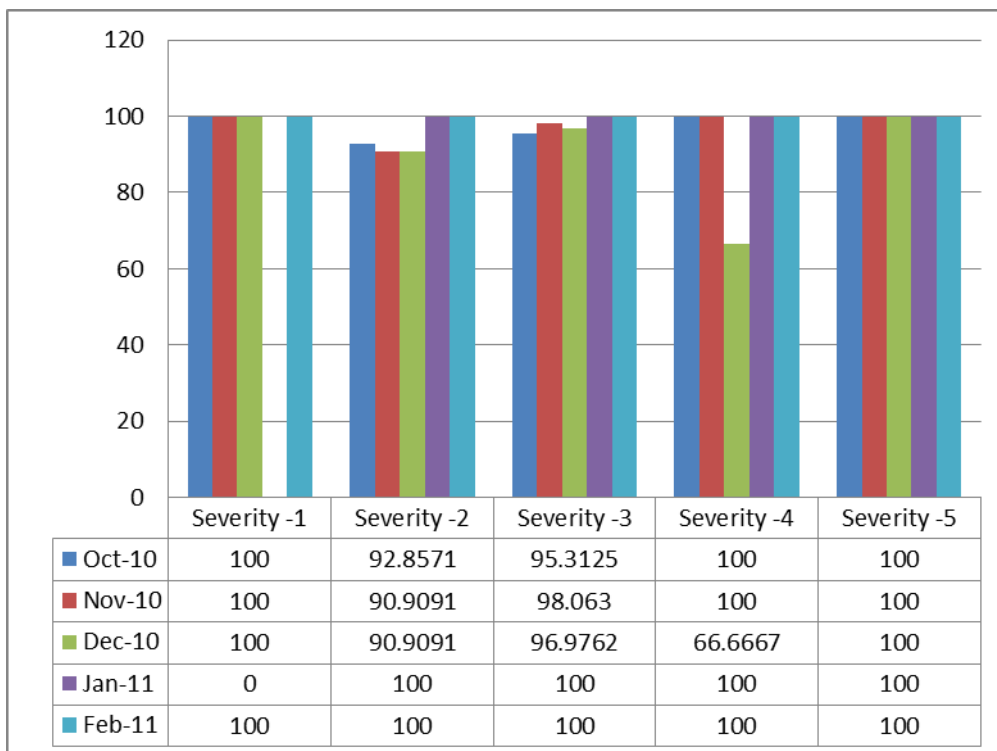


Table 3.64 shows the solution time SLA results

## Chapter 4 Related Works

In this section, the academic researches and general concepts of ITIL will be explained.

“Combining ITIL, COBIT and ISO/IEC 27002 in Order to Design a Comprehensive IT Framework in Organizations”:<sup>[38]</sup>

Sahibudin, Sharifi and Ayat focuses on similarities and differences of ITIL, COBIT and ISO/IEC 27002 standard. In their research, they give information about ITIL and its guidelines, COBIT and its domains and ISO/IEC 27002 standard. They benchmark ITIL processes with COBIT and ISO/IEC 27002. In conclusion, of this research, they said that organizations should use ITIL to define strategies, plans and processes, use COBIT for metrics, benchmarks and audits, and use ISO/IEC 27002 for security issues and minimize the risks.

"Considering Service Strategy in ITIL V3 as a Framework for IT Governance":<sup>[39]</sup>

Nabiollahi and bin Sahibuddin focus on ITIL V3 Service Strategy and IT Governance Framework. In this research, two different opinions discuss about IT Governance Framework. One of them is “IT Governance Framework: Structures, Process and Communications”<sup>[40]</sup>, Symons's paper. Symons claimed that ITIL v2 alone could not cover all elements of IT Governance. The other one is "Issues in IT Governance and IT Service Management- A Study of their adoption in Australian Universities"<sup>[41]</sup>, Grewal focused on the implementation ITIL of process. Based on these discussions, Nabiollahi and bin Sahibuddin give information about ITIL service strategy and they claimed that ITIL v3 service strategy could cover weaknesses of ITIL V2 for establishment of a mature IT Governance Framework.

"Implementing an ITIL-based IT Service Management Measurement System":<sup>[42]</sup> Lahtela, Jäntti, and Kaukola worked on IT service management measurement system and a case study of implementation of IT service management measurement system project. ITIL itself has many process KPIs; however, it does not provide information about measurements of this KPIs in practice. Lahtela, Jäntti and Kaukola implemented a tool named ITSM-MS to solve the lack of KPI measurements of ITIL processes. The ITSM-MS tool was implemented for an IT service provider organization in Finland and has provided real-time measurement information from IT service support processes. The paper contains information about research questions and methods, implementation of the ITSM-MS, and system architecture and the main functions of the ITSM-MS.

"Managing the Impact of IT on Firm Success: The Link between the Resource-based View and the IT Infrastructure Library":<sup>[43]</sup>

Wagner focused on the role of IT in companies' success and related resource based view and ITIL. He aimed to link Resource-based View with the ITIL thereby explaining how IT may affect business processes and how it can be used to create a sustainable competitive advantage. This research contains a case study about implementation of Incident Management process and the results of this implementation. Based on this case study, Wagner claims that ITIL can be theoretically based on the notion of resource-based learning loops and routines.

"Defining Requirements for an Incident Management System: A Case Study":<sup>[44]</sup>

Jäntti tried to find the types of requirements that should be taken in account in building an incident management system. The case organization was IS department of Kuopio University hospital in Finland. He mentioned about process of defining requirements for the incident management system and analysis results. Based on this research results; Basic functional requirements of the incident management system are: Submit request, Check the request status, Create request, Assign request, Update request, Relate request, Configure settings, Create reports, Maintain knowledge base, Maintain workflow, and Maintain registers. In addition, the system should handle service requests, problems and requests for change.

"Lessons Learned in ITIL Implementation Failure":<sup>[45]</sup>



Sharifi, Ayat, Rahman, and Sahibudin focused on the difficulties of the ITIL implementation and major reasons on the failure of ITIL framework implementation in the organizations. The explained reasons are; the lack of management commitment, spending too much time on complicated process diagrams, not creating work instructions, not assigning process owners, concentrating too much on performance, being too ambitious, failing to maintain momentum and allowing departmental demarcation. After the research, Sharifi, Ayat, Rahman, and Sahibudin planned to focus on finding out major reasons for ITIL implementation failure in the SME Malaysian companies.

"IT and Business Process Performance Management: Case Study of ITIL Implementation in Finance Service Industry":<sup>[46]</sup>

Spremic, Zmirak, and Kraljevic made a research about managing IT services in finance industry. They present a case study company, which is a bank in Croatia. They implemented a project in this company and they mentioned project steps, problems during implementation and KPIs of the process. The results of KPIs showed the exact and measurable improvements the company achieved. In addition, they specified the benefits of the ITIL implementation in this research.

"Adoption Factors and Implementation Steps of ITSM in the Target Organizations":<sup>[47]</sup>

Ayat, Sharifi, Sahibudin, and Ibrahim mentioned about clarification of the major issues on the implementation of ITIL in the target organizations. Moreover, they suggested a mature guideline about this issue. They discussed that the most popular factors, which are influencing adoption of ITIL in the target organizations that include technology, organizational issues, environment and effort to achieve alignment of business with IT services. In addition, they explained the major steps to implement ITIL in target organizations like Management Commitment and Involvement, Tool selection, Organization Assessment, Planning, Staff Training, Implementation and Continuous Improvement.

## **Chapter 5 Conclusion**

ITIL (Information Technology Infrastructure Library) is the most widely accepted approach to IT Service Management. ITIL is a process-based methodology that delivers a set of IT service management best practices that can help organizations or enterprises align their IT with its business. These days IT management is focusing particularly on the de facto standard ITIL for implementing IT service management. ITIL v3 consists of five components that are Service Strategy, Service Design, Service Transition, Service Operation, and Continual Service Improvement. These components contain a number of related and integrated processes.

In this work focuses on IT Service Management and ITIL processes and contains a case study about analyzing some processes of ITIL for a company, implementation steps and KPIs for each of these processes. In this case study Incident Management, Configuration Management, Problem Management, Change Management, and Service Level Management processes were implemented and the KPIs of these processes were reported. The results which emerges by ITIL applications and adaption of the organizations that are measured and reported with performance indicators ables more effective resource use, continued well off and high quality IT services.

In the future work, we can consider implementing the other ITIL processes and we can work on process improvements.

## **Curriculum Vitae**

Selma YILMAZ ODABAŞI was born on 13 October 1980, in Istanbul. She received B.S. degree in 2003 in Computer Engineering from Kadir Has University. Since 2008, she has been a service management technical consultant at a private company.

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Vocational High School, Computer Programming, Çanakkale 18 Mart University (1999-1997)

High School, Büyükçekmece Lisesi, Istanbul (1997-1994)

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