

IMPLEMENTING ITIL- SERVICE SUPPORT IN THE INFRASTRUCTURE AND SERVICE UNIT OF
CICT, UTM

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A project report submitted in partial fulfillment of the

requirements for the award of the degree of

Master of Science (Information Technology – Management)

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Faculty of Computer Science and Information System

Universiti Teknologi Malaysia

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Dedicated to my mother and father whose love, encouragement and values will always guide and inspire me and to my dear husband and my lovely sister.

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ABSTRACT

ITIL implementation is rapidly growing in the organizations. One of the major parts of ITIL framework is service support which is including of several processes especially Configuration Management, Helpdesk Management and so on. In addition, there are several ITIL-based frameworks such as Microsoft Operation Framework (MOF) that they are trying to show some guidelines to implement those best practices processes too. Centre Information Communication Technology (CICT) is the heart of UTM in terms of information technology and related platforms. Infrastructure and Service Department is one of the sub-organizations of this centre that it includes four different units with their specific tasks. The aim of this research is to provide a framework to guide this department to document and standardize department's activities based on ITIL best practices. The proposed ITIL framework will try to improve the quality of services at Infrastructure and Service Department of UTM. The proposed framework includes KPI', Steps, Scope of work and other related information to prepare guideline to implement ITIL-Service Support at Infrastructure and Service Department of UTM. In order to achieve to this objective the needed information gathered from several resources such as interview, observation,

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questionnaire and available documents. Moreover, this research includes a tool to automate these ITIL-service support activities that calls ADU@ITIL system.

ABSTRAK

Perlaksanaan ITIL kini pesat berkembang dalam organisasi. Salah satu bahagian utama dalam kerangka ITIL ialah sokongan perkhidmatan yang merangkumi pelbagai proses seperti Pengurusan Konfigurasi, Pengurusan MejaBantu dan sebagainya. Selain dari ini, terdapat pelbagai kerangka berdasarkan ITIL seperti Kerangka Operasi Microsoft (MOF) yang juga cuba memaparkan garis panduan untuk melaksanakan proses amalan terbaik. Pusat Teknologi dan Komunikasi Maklumat (CICT) merupakan nadi UTM dari segi teknologi maklumat dan platform yang berkait. Jabatan Perkhidmatan dan Infrastruktur adalah salah satu sub-organisasi pusat ini, dan terdiri dari empat unit berasingan masing-masing dengan tugas tertentu. Tujuan penyelidikan ini ialah untuk membentuk satu kerangka sebagai panduan untuk jabatan ini mendokumenkan serta menentukan piawaian aktiviti jabatan berdasarkan kepada amalan terbaik ITIL. Kerangka ITIL yang dicadangkan akan cuba memperbaiki kualiti perkhidmatan Jabatan Perkhidmatan dan Infrstruktur UTM. Kerangka cadangan memasukkan KPI, Langkah dan Skop Kerja serta maklumat yang berkaitan dalam penyediaan garis panduan untuk melaksanakan Sokongan Khidmat-ITIL di Jabatan Perkhidmatan dan Infrastruktur UTM. Untuk mencapai objektif ini, maklumat yang diperlukan dikumpul melalui pelbagai sumber seperti temubual, pemerhatian, soal selidik dan dokumen yang sedia ada. Seterusnya, penyelidikan ini memasukkan juga sebuah

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perkakas untuk mengautomasikan aktiviti sokongan khidmat-ITIL yang dipanggil sebagai sistem ADU@ITIL.

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CHAPTER 1

PROJECT OVERVIEW

1.1 Introduction

This chapter includes the initial stage of research related to researcher's project. The first outline is Problem Background of the problem which will emphasize the most problems in the CICT. Then it will describe Problem Statement of the project which includes two main questions that should be answered. After that it will focus on Project Objectives of this research that includes proposing an ITIL-Service Support framework for Infrastructure and service department of CICT and one tool to support it. Then it will clarify the Project Scope of the research and what should be delivered at the end of the project. At the end of this chapter Importance of this Study for defined scope will be claimed.

1.2 Problem Background

Service quality is a challenge in the university and as well CICT. All university authorities emphasize on improves service quality (SQ) in the university and CICT. One of the main objectives of CICT is to become a high quality information technology reference centre. Moreover, because their staffs are more educated in terms of IT technologies and also all other parts of university affect by CICT. So, they need to improve SQ in their organization and ITIL-Service Support is one major framework to follow.

However, one of the ways that can improve the SQ in the CICT is using the ITIL framework that this framework trying to increase the quality with some processes likes service delivery and service support, but there are some considerations on implementing ITIL in the CICT these considerations are include:

- User resistance
- Lack of technology
- User training
- Cultural and Organizational limitations

The CICT managers just decide to start implementation of ITIL in a part of CICT but they phased with above considerations.

1.3 Problem Statement

In order to address the research problems stated in the problem background section, the main problem is focused on:

How to implement ITIL service support in the infrastructure and service department of CICT in order to improve service quality in it?

This main problem will be answering the following research questions:

1) How to prioritize and select ITIL service support processes to implement in the infrastructure and service department of CICT?

Basically, Some consultants believe that ITIL-implementer should start to implement this framework from Incident management, then problem management and etc.(Ricardo Mansur,2007). Some another believes that ITIL implementation should be started from configuration and change management and after that Release Management (Hardik, 2007). Another specialists subject to start with change management because it comes before configuration management during ITIL implementation. They saying: else what keeps the CMDB up to date? Also, configuration management and the CMDB are the most complex, lengthy and expensive of all the processes to implement. Therefore they do not suggest starting with them (Dwight Kayto, 2007). In addition, some of the experts saying that: The easiest way to implement ITIL is to start with “Service Desk” and Incident Management. Their reason is: In this case implementers will give some quick wins. Because at first they need quick wins to confirm business that ITIL is a useful IT assess for them (Vimal, 2007). Furthermore, some professionals mention that they should implement CCR (Change, Configuration and Release) all together. They believe that, we should start with collecting all the data for the Configuration management and set a deadline for the configuration to create a baseline from where we can implement Change Management. And then continue the process till

Release management (Vimal, 2007). There are several issues too (Martin Atherton, 2007; Ralph Gray, 2007; Ralph Gray, Hertford, 2007).

In addition, there are different view points to implement all or some ITIL processes in the organizations based on needs, size and management view point, some or all of these processes should be selected to implement in the infrastructure and service department of CICT.

2) What is a tool to support the ITIL service support in the infrastructure and service department of CICT?

1.4 Project Objectives

- To study the current status of quality services at Infrastructure and Service Department of CICT in terms of ITIL-Service Support implementation.
- To propose a guideline to implement ITIL-Service Support framework in the Infrastructure and Service Department of CICT.
- To develop a tool to support the most important parts of proposed framework.

1.5 Project Scope

- i) The study only covers the infrastructure and service department of CICT.
- ii) The end product will be a documentation that describes how ITIL service support should be implemented in the infrastructure and service department of CICT.

1.6 Importance of Study

This project will give a positive impact to the IT professionals at the infrastructure and service department of CICT .It helps IT professionals to follow a guideline to improve the quality of services in the Infrastructure and services department of the CICT. This is also developing a tool to support the main ITIL service support processes in the infrastructure and service department of CICT to improve quality of service.

1.7 Summary

Service quality has an increasing role in every organization and CICT is an IT department in the UTM that tries to improve its service quality as well. ITIL service Support can give this opportunity to this department to increase its service quality and give better services to other departments and users in the UTM.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will cover three parts. At first, an overview of ITIL framework especially service support implementation's viewpoint. Then an extension of ITIL by industry leaders will be introduced. At the end, a university case study that already ITIL implemented on it will be showed.

Quality is defined as “the level of conformance of the final deliverable to the customer's requirements”.(Method 123,2003) and The most commonly used definition of Service Quality is “the extent to which a service meets customer's needs or expectations”.(Wisniewski, M. and Donnelly, M.1996). Quality of Service (QoS) has an important role in the organizations, now. There are several frameworks, standards and tools for QoS in every aspect of managing organizations. Also, IT organizations have their own frameworks and tools. The most widely used IT-Service Quality framework is Information Technology Infrastructure Library (ITIL). This framework is a de-facto standard which introduced and distributed by Office of Government Commerce (OGC) in UK and includes all IT parts of organizations.(ITIL forum,2007) At present ITIL is the most widely accepted approach to IT Service Management in the world. It has an iterative,

multidimensional and lifecycle form structure. ITIL has an integrated approach as required by the ISO/IEC 20000 standard which already introduced in the world. (Jan van Bon, M.Pieper, A.Veen, T.Verheijen, 2007).

However, implementing such framework has its own challenges. Based on IT consultants (pink elephant, 2005; McGarahan, 2005) ITIL implementation needs management commitment, Cultural change in the organization, Cost and other such considerations. So, it is clear that every implementation in the organizations is not successful. It needs a long-term planning and management schedule to have a successful ITIL implementation in the organization. Small and big is another consideration but every company or organization has its own status and implementers should pay attention to it. Therefore, Centre of Information and Computes Technology (CICT) of UTM has its own status and implementers should pay attention to it when they want to implement ITIL.

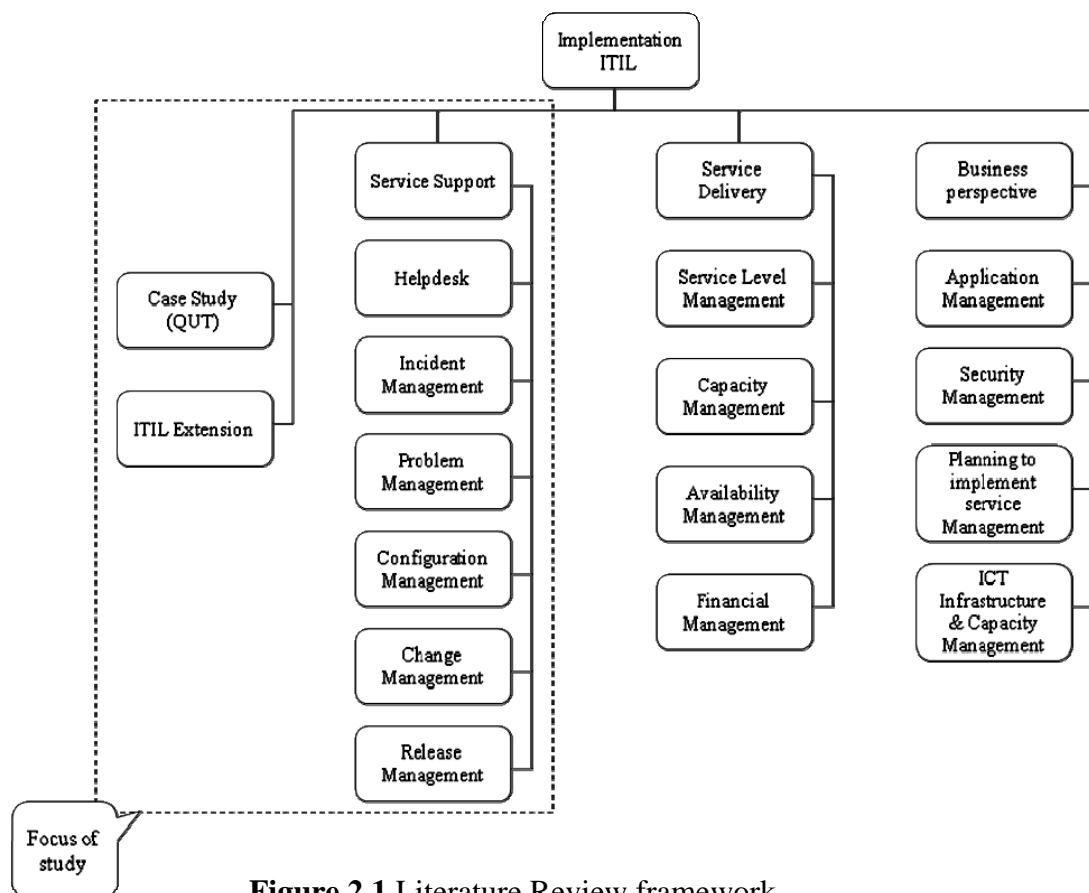


Figure 2.1 Literature Review framework

2.2 ITIL

ITIL was originally created by the CCTA under the auspices of the British government (Wikipedia, 2007), and ITIL is a registered trademark of the UK Government's Office of Government Commerce (usually known as the OGC).

ITIL is the application of the science of management to information technology. This knowledge is captured in a library of over forty books that outline a process based set of best practices for IT Service Management. Yearsley (2006) believes the ITIL framework is a proven set of guidelines for IT managers to maintain control and optimum efficiency within their data centers. No matter what part of the world or what type of organization, the principles of ITIL can help ensure that IT services are delivered in the best possible way in order to serve the overall goals of the organization.

The contents of two most commonly used sets within the previous release; Service Support and Service Delivery are broadly still present. These were as follows: Incident Management; Problem Management; Configuration Management; Change Management; Release Management; Service Desk; Service Level Management; IT Financial Management; Capacity Management; Availability Management; IT Service Continuity Management; IT Security Management. It can be said that ITIL is all about which processes need to exist within an organization for the management of the IT infrastructure to the optimal level of IT service quality at a justifiable cost. (Pink Elephant, 2004) OGC (2006) emphasize that the benefits of ITIL could be have following benefits: to provide the highest possible quality support, to the Client community for problems, inquiries and service requests, to reduce the workload associated with solving recurring problems and answering the same questions, to provide a Service Catalogue of documented IT services supported by efficient processes and to enhance IT's credibility by delivering a best practices service.

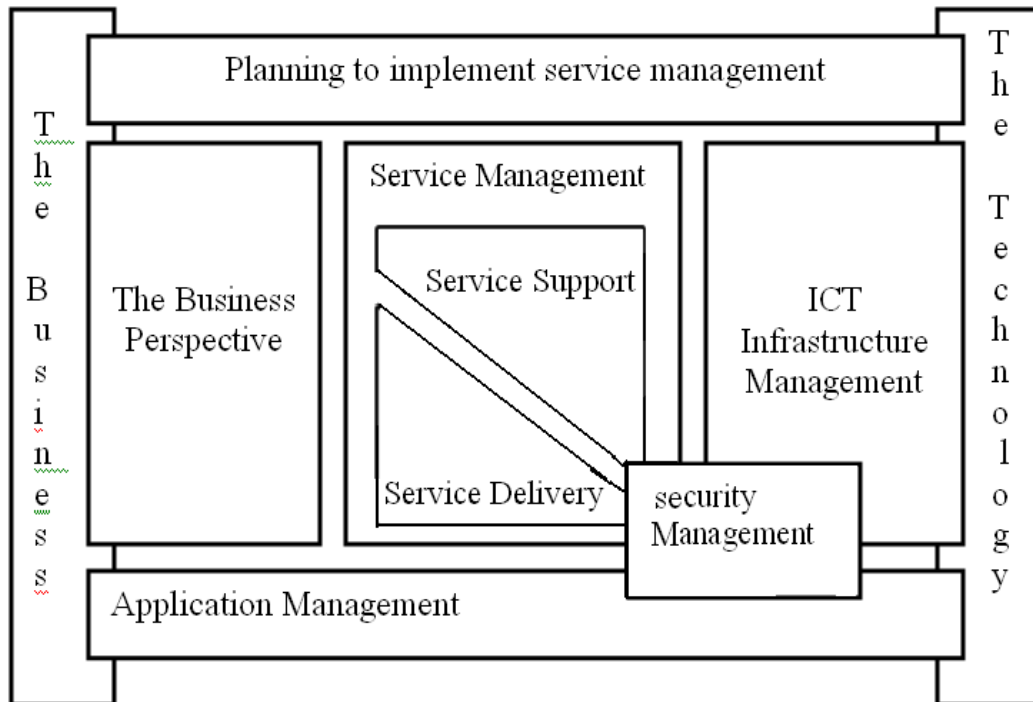


Figure 2.2: ITIL framework (OGC, 2000)

2.2.1 ITIL Ver. 3

ITIL (Information Technology Infrastructure Library) is a de-facto standard which was introduced and distributed by Office of Government Commerce (OGC) in UK and includes all IT parts of companies [14]. At present ITIL is the most widely accepted approach to IT Service Management in the world. It has an iterative, multidimensional and lifecycle form structure. ITIL has an integrated approach as required by the ISO/IEC 20000 standard with following guidance: (Sharon, 2007).

2.2.1.1 Service Strategy

The Service Strategy provides guidance on how to design, develop and implement service management from organizational capability perspective and strategic asset. It provides guidance on the principles underpinning the practice of service management which are useful for developing service management policies, guidelines and processes across the ITIL service lifecycle. Service Strategy guidance is applicable in the context of other parts of ITIL lifecycle. Service Strategy covers these parts of IT systems: the development of markets, internal and external, service assets, service catalogue and implementation of strategy through the service lifecycle.

Service Strategy includes these processes:

- Financial Management
- Service Portfolio Management
- Demand Management (Sharon, 2007)

2.2.1.2 Service Design

It is guidance for the design and development of services and service management processes. It covers design principles and methods for converting strategic objectives into portfolios of services and service assets. The scope of Service Design includes the changes and improvements necessary to increase or maintain value to customers over the lifecycle of services, the continuity of services, achievement of service levels and conformance to standards and regulations. It guides companies on how to develop design capabilities for service management.

Service Design includes these processes:

- Service Catalogue Management

- Service Level Management
- Capacity Management
- Availability Management
- IT service Continuity Management
- Information Security Management Supplier Management, Application Management
- Data and Information Management Business Service Management (Sharon,2007)

2.2.1.3 Service Transition

It is guidance for the development and improvement of capabilities for transitioning new and changed services into operations. Service Transition provides guidance on how the requirements of Service Strategy encoded in Service Design are effectively realized in Service Operation while controlling the risks of failure and disruption. This part of ITIL framework combines practices in release management, program management and risk management and places them in the practical context of service management. Service Transition processes are:

- Change Management
- Service asset and Configuration Management
- Release and deployment Management
- Knowledge Management
- Stakeholder Management
- Transition Planning
- Support and Service Evaluation (Sharon, 2007)

2.2.1.4 Service Operation

Service Operation tries to embody practices in the management of Service Operation. It includes guidance on achieving effectiveness and efficiency in the delivery and support of services so as to ensure value for the customer and the service provider. Strategic objectives are ultimately realized through Service Operation, therefore making it a critical capability. Its processes are:

- Event Management
- Incident Management
- Request Management
- Problem Management
- Access management (Sharon, 2007)

2.2.1.5 Continual Service Improvement

This is including of instrumental guidance in creating and maintaining value for customers through better design, introduction and operation of services. It combines principles, practices and methods from quality management, Change Management and capability improvement. Companies learn to realize incremental and large-scale improvements in service quality, operational efficiency and business continuity. Its processes are:

- The 7-Step Improving Process
- Service Level Management (Sharon, 2007)

2.3 Seven Service Segments

Based on framework that OGC (1985) suggested ITIL framework breaks down IT services into seven components:

1. Business Perspective
2. Application Management
3. Service Delivery
4. Service Support
5. Security Management
6. ICT Infrastructure Management
7. Planning to implement service management

2.3.1 Business Perspective

Kasse(2005) researches shows that the IT's activities have value only to the degree they support the organization's business goals. This area covers the interaction between Business and IT and how business requirements are gathered and translated into IT resource requirements. Business Perspective owns the processes that ensure all work performed by IT have been reviewed, approved by management and prioritized.

2.3.2 Application Management

The second ITIL service describes an approach to the Software Development Lifecycle. It covers creating the application specifications; designing the application; writing and testing the code; deploying the application; routine operation of the application; and, finally, reviewing the application once it is in operation to determine ways to improve its efficiency and cut costs (HMSO pub, 2006).

2.3.3 Service Delivery

Based on suggested ITIL framework with OGC (1985) the Service Delivery breaks down in to four major sub-disciplines:

2.3.3.1 Service Level Management

The major components of SLM are the Service Catalogue, Service Level Agreements (SLAs) and Operational Level Agreements (OLAs). The foundation of SLM is the Service Catalogue, which defines each service provided by the IT organization, including the deliverables, the limits of service, and how service delivery performance is measured. The Catalog services form the basis.

2.3.3.2 Capacity Management

Once an organization has defined the services it needs, it can then begin calculating exact items it needs to achieve those service levels. This leads into the next area: Capacity Management. Together with the business units, finance, and service support, the capacity planners build the annual infrastructure growth plan. Capacity planning gets involved very early in the application life cycle to assist in determining the implementation and ongoing support costs of applications or releases.

2.3.3.3 Financial Management

Financial Management can be defined (Steve Worth,2006) as a service which is including the budgeting which is short and long-term planning of the expenditures needed to maintain and improve services that align with business plans. Also IT accounting that cost analyses of future projects, gaining approval of expenditures and staying on budget. And chargeback that tries to recover costs from Customers for services provided.

2.3.3.4 Availability Management

Information Technology and Management Support Division (2005) introduce this area as a review business that requirements for availability of business systems, catalogues them and ensures proper contingency plans are in place and stand on a regular basis to ensure business services are restored as quickly as needed in the event of an IT infrastructure component failure. It includes establishing high-

availability, redundant systems to support mission critical applications, but not overspending on less-critical systems.

2.3.4 Service Support

Based on suggested ITIL framework with OGC (1985) Service Support is supporting those services that were established by the Service Delivery crew. This includes:

- 1-Help Desk or Service Desk
- 2-Incident Management
- 3-Problem Management
- 4-Configuration Management
- 5-Change Management
- 6-Release Management

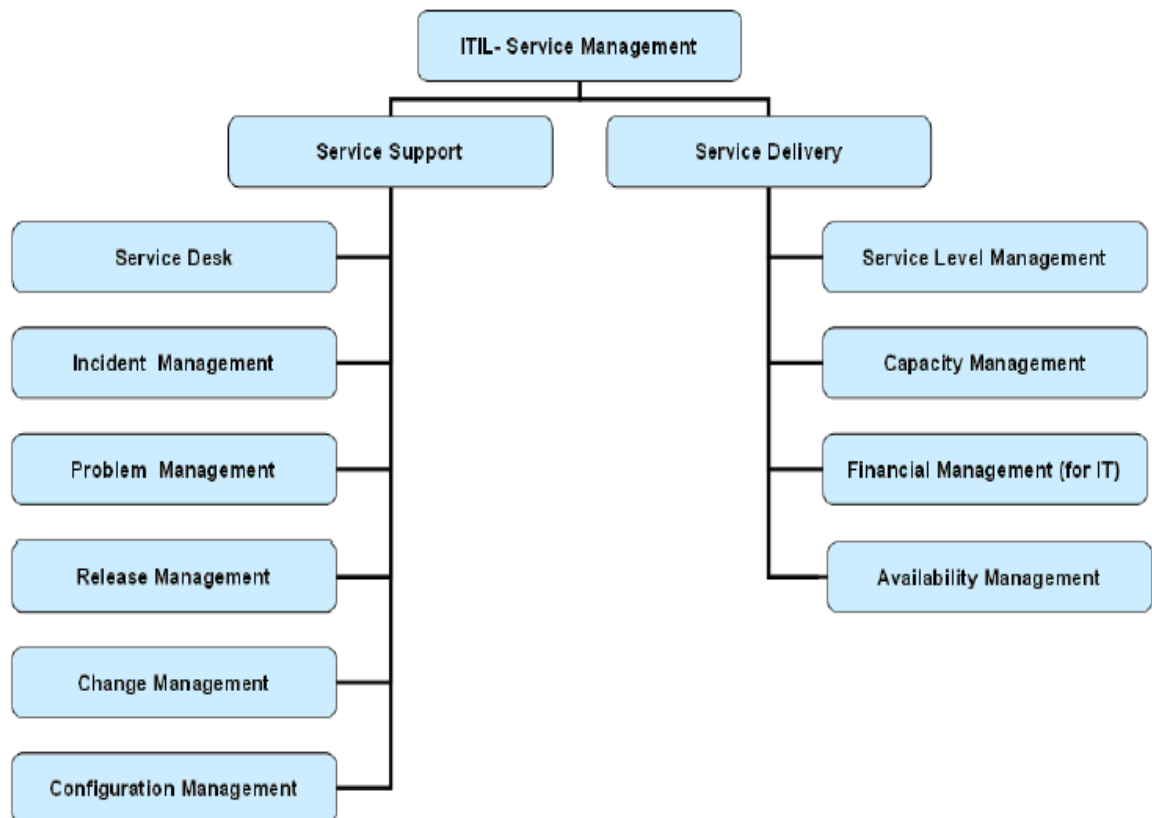


Figure 2.3: Service support and Service delivery (OGC, 2000)

2.3.5 Security

Dr. Paul Overbeek(2004) claims that security has become a key concern of everyone in the IT field and there are many organizations and consultants offering their opinions on best practices in this arena. ITIL Security practices outline a continuous improvement process to identify risks to information and the processing infrastructure, establish security processes and procedures to mitigate them, communicate them to the affected areas in the organization, train people how to use them, monitor them, report anomalies for enforcement/corrective activities and review existing policies and procedures for improvement.

2.3.6 ICT Infrastructure Management (ICTIM)

ICT Infrastructure Management lies at the opposite end of the spectrum from Business Perspective. ITIL implementers (TeamQuest, 2005; HP, 2005; Tech Partners Consulting, 2003) believe that it forms the bridge between Service Management and Technology. The goal of this area is to use proven, repeatable processes to provide a stable operating environment for all IT functions. The four areas that make up this service are including design and planning, deployment operations and technical support.

These processes cover the actions of the highly trained technology specialists who provide technical assistance and problem resolution to other IT service areas (OGC,2005).

2.3.7 Planning to implement service management

This service overlaps Application Management and most of the other services in the ITIL. Software is a major asset for a company when looking at its cost, and an even greater one when looking at its ability to forward business objectives. But, when outdated, miss-configured or un-patched, it can also be a huge liability. This service covers processes to maximize software as an asset while minimizing its risks (Great Britain, 2005).

2.4 ITIL service support

Service Support focuses on ensuring that the customer has access to appropriate services to support their business functions. Service Support focuses on operational day-to-day services and covers (OGC, 1995).

2.4.1 Help Desk or Service Desk Management

Based on The Service Desk definition of OGC it provides the primary window for customer and end-user contact with the service organization on a day to day basis. In addition knowledge transfer website (2007) defines an interface, often referred to as a "single point of contact" between IT and its Users. Therefore, it can be concluded that help desk is main contact point of user to business and it tries to insure that no call or Incident is lost, forgotten or ignored and that service is returned as quickly as possible. The Service Desk provides a single point of contact between customers, users, IT services and third party support organizations.

Hoverer, the service desk is responsible for incident control and service request fulfillment as defined by the Incident Management process. It is the owner of all incidents and is responsible for managing the resolution process of all registered incidents. It can be seen that the service desk function is managed by the service desk manager, and the goals of Service desk are includes: to support business activities and drive service improvement , to be primary point of contact , to manage the Incident lifecycle , to manage service requests , to maintain ownership of a user Incident through to completion (OGC,2007).

2.4.2 Incident Management

There are several different definitions for incident. OGC(1986) defines: incident is any event which is not part of standard operation and which causes or may cause an interruption to or a reduction in the quality of services. In addition, some researchers believe Incident Management is the performance of reactive and proactive services to help prevent and handle computer events and incidents (DHS National cyber security Division,2007; Sun Services,2007). However Incident Management is a reactive task, i.e. recording or eliminating the effects of actual or potential disturbances in IT services, thus ensuring that users can get back to work as soon as possible. For this reason, incidents are recorded, classified and allocated to appropriate specialists; incident progress is monitored; and incidents are resolved and subsequently closed. All calls to service desk can be recorded and monitored as incidents.

The objective of the Incident Management process can be defined as restore normal service operation as quickly as possible and to minimize the adverse impact on business operations, ensuring that the highest possible levels of service quality and availability are maintained.

In the infrastructure and service department of CICT helpdesk should be responsible for this process and maintains ownership of all incidents and service requests. Therefore, this process should at least, address following objectives include recording all incidents and service requests must be logged. This is critical for workload planning, trend analysis and service level performance tracking, classification which means class codes form the primary reporting matrix of the environment. All incidents and service requests must be placed in a class. Classification also allows staff to specify the service or equipment type, associated SLAs (if any), and selected staff or group to delegate to, prioritizing should be done by the impact on the business and the urgency. (Bartolini, 2007) Impact should be a measure of business criticality of an incident. The number of people or systems

affected often measures it. Urgency measures the necessary speed required for solving an incident or service request of a certain impact, resolution should be performed with the aid of appropriate tools such as access to manuals and documentation as well as access to a Known Error database and Service Desk staff should be responsible for closing incidents after confirming its satisfactory resolution with customers (Elyse, 2006). Access to incident closure should be restricted and controlled. However the Incident Manager is responsible for the Incident Management process and is often an operational hands-on role.

The Incident Management process should be tried to satisfy the following Objectives:

Return to the normal service level as soon as possible; With the smallest possible impact on the business activities; Keep effective records of incidents to measure and improve the process, provide appropriate information to other services management processes, Report on incident progress.

However, based on McCormack (2004) there are several factors that decide success of Incident Management implementation in every organization which are:

- An up-to-date Configuration Management database (CMDB) to help estimate the impact and urgency of incidents. Alternative this information can be obtained from the user, but it will be less complete, it might be highly subjective, and it will take more time to collect.
- A knowledge base, for example an up-to-date problem/known error database to assist with recognizes incidents, and what solutions and workarounds are available. This should also include supplier and other appropriate third-party databases.
- An adequate automated system (tool) for recording, tracking and monitoring incidents.

- Close ties with service level management to ensure appropriate priorities and resolution times.

Based on experience of experts (TeamQuest, 2005; HP, 2005; Tech Partners Consulting, 2003) Incident Management can be successful if the responsibilities and authorities associated with the activities that have to be performed are clearly described to provide flexibility it may be useful to use an approach based on roles. Especially the role of incident manager is very important, because it is responsible for monitoring the effectiveness and efficiency of the process; controlling the work of the support groups; Making recommendations for improvement; Developing and maintaining the Incident Management system (OGC, 2007).

2.4.3 Problem Management

ITIL defines a problem as an unknown underlying cause of one or more incidents. (OGC, 1986). Also knowledge transfer (2007) defines a problem as the unknown root cause of one or more existing or potential Incidents. Problems may sometimes be identified because of multiple Incidents that exhibit common symptoms. Problems can also be identified from a single significant Incident, indicative of a single error, for which the cause is unknown. Occasionally Problems will be identified well before any related Incidents occur.

However Problem Management seeks to minimize the adverse impact of incidents and problems on the business that are caused by errors within the IT infrastructure and to prevent the recurrence of incidents related to these errors. This is achieved by discovering the root cause of incidents and then initiating actions to improve or correct the situation.

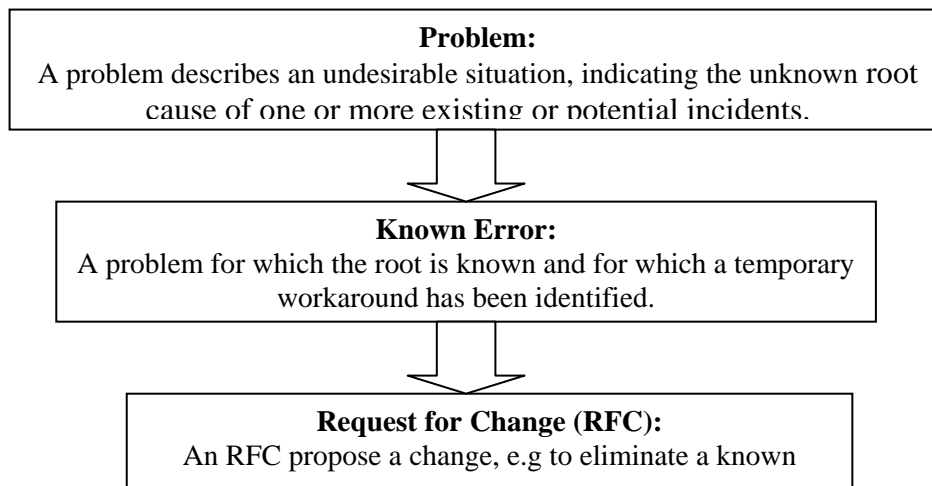


Figure2.4: Problem Management Process (OGC, 1986)

The Problem Management process should be tried to satisfy the following two major activities includes problem control that is a process which needs to be in place to identify the root cause of incidents and provide Service Desk with workarounds where workarounds have not already been found or improve existing workarounds. And classified, prioritized and managed that when the root cause and a workaround is identified, the problem becomes a known error and the next process step applies. Problem Control activities are shown in Figure 2.5

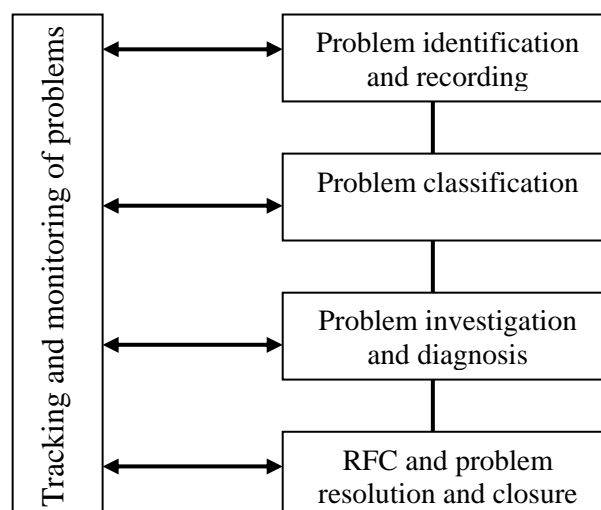


Figure 2.5: Problem Control Activity Diagram (OGC, 1995)

However the OGC (1995) believes that the Problem Management should be try to resolve the underlying root cause of incidents and consequently prevent incident from recurring. Problem Management includes proactive and reactive activities (Vjieran Strahonja et. al.2007). Reactive Problem Management aims to identify the root cause of past incidents and presents proposals for improvement or rectification. Proactive Problem Management aims to prevent incidents from recurring by identifying weaknesses in the infrastructure and making proposals to eliminate them.

In addition ITIL implementers (TeamQuest, 2005; HP, 2005; Tech Partners Consulting, 2003) believe the benefit of Problem Management can be counted as improved IT service quality and management- as failures are documented and /or eliminated, increased user productivity by improving service quality, increased support personnel productivity as solutions are documented, incident management agents can resolve incidents more quickly and efficiently, improve IT service reputation because the stability of the services is increase, customers are more likely to entrust the IT organization with new business activities, enhanced management and operational knowledge and learning: Problem Management stores historical information that can be used to identify trends, and which can then lead to measures to prevent avoidable new incidents. Historical information is also useful for investigation and diagnosis, improve incident recording: Problem Management introduces for incident recording and classification to identify problems and their symptoms effectively. This also improves incident reporting and higher first-line resolution rate: as Problem Management makes workarounds and solutions to incidents and problems available in a knowledge base, first-line support is more likely to be able to resolve incidents.

2.4.4 Configuration Management

Based on OGC (2007) ITIL defines a Configuration Item (CI) as a component of an infrastructure or an item associated with an infrastructure that is under the control of Configuration Management. In addition, knowledgetransfer.net explains that a CI is any component of an IT Infrastructure, including a documentary item such as a Service Level Agreement or a Request For Change, which is (or is to be) under the control of Configuration Management and therefore subject to formal Change Control. The lowest level CI is normally the smallest unit that will be changed independently of other components. CIs may vary widely in complexity, size and type, from an entire service (including all its hardware, software, documentation, etc.) to a single program module or a minor hardware component. All existing or potential service Problems will be capable of being linked to one or more CIs. And IEEE Std-729-1983 emphasize that Configuration is the process of identifying and defining the items in the system, controlling the change of these items throughout their lifecycle, recording and reporting the status of items and change requests, and verifying the completeness and correctness of items. OGC(2000) claims Configuration Management aims to provide reliable and up-to-date details about the IT infrastructure, and also Bitpipe (2008) defines Configuration Management is the detailed recording and updating of information that describes an enterprise's computer systems and networks, including all hardware and software components. Such information typically includes the versions and updates that have been applied to installed software packages and the locations and network addresses of hardware devices.

ITIL implementation emphasize all CIs should be registered in a single Configuration Management Database (CMDB). They saying Configuration Management requires the establishment of proper Change Management as it is through Change Management that the Configuration Management database is kept up to date.

It can be mentioned that the major activities in Configuration Management involve the capturing of all CIs and their relationships, the control of CIs by registering all CIs and versions, updating records and performing license control while maintaining the integrity of configurations. Configuration Management also performs status accounting and reporting, performing periodic audits to verify the correctness of the CMDB. The objective of the Configuration Management (Osatis, 2008) is to keeping reliable records of details of IT components and services provided by organization and providing accurate information and documentation to support the other Service Management process.

Based on OGC (2006) several major activities should be done to implement Configuration Management activities that are: planning which determines the strategy, policy and objectives of the process, analysis of available information, identifying tools and resources, creating interfaces with other processes, projects, and suppliers. Identification, which is sets up the processes to keep the database up-to-date. The activities include developing a data model for recording all IT infrastructure components, the relationships between them and information about their owner or person responsible for them, status and available documentation. Procedures for new CI have and for changes to CI's must also be developed. As the demands for information are changing continuously, the identification of configuration data is also changing continuously. Control that ensure that the CMDB is always up-to-date by only admitting , recording and monitoring authorized and identified CI's Control ensures that no CI is added, changed, replaced or removed without appropriate documentation, such as an approved RFC with an updated specification. Status accounting that stores current and historical detail about the status of CI's during their life cycle. status monitoring can be used to identify changes in the status such as 'under development', 'being tested', 'stock', 'live use' and 'phased out'. Verification that verifies the Configuration Management Database by audits of the IT infrastructure to confirm the existence of recorded CI's and to check the accuracy of the records. Reporting that provides information to other processes and reports about the trends and developments in the use of CI's. There are several different view points of CI finding (Sharifi, 2008). However they mention CI as follows:

information about the quality of the process, number of observed differences between the records and the situation found during an audit (deltas), number of occasions on which a configuration was found to be unauthorized, number of occasions on which a recorded configuration could not be located, attribute level differences uncovered by audits, time needed to process a request for recording information and list of CI's where more than a given number of incident or changes were recorded.

ITIL implementers (TeamQuest, 2005; HP, 2005; Tech Partners Consulting, 2003) highlight some tasks for Configuration Management that are: Proposing changes to the scope and level of the Configuration Management; Ensuring that the Configuration Management process is communicated throughout the organization; Providing personnel and training for the process; Developing the identification system and naming conventions; Developing the interfaces to other processes; Evaluating existing systems and implementing new systems; Planning and implementing the population of the CMDB; Creating reports on effectiveness, conformance and value; Organizing configuration audits (OGC,2007).

2.4.5 Change Management

OGC (1995) claims that Change Management aims to manage the process of change and consequently limit the introduction of errors and so incidents related to changes. In addition, (SearchCIO-Midmarket.com,2008)defines Change management is a systematic approach to dealing with change, both from the perspective of an organization and on the individual level. A somewhat ambiguous term, change management has at least three different aspects, including: adapting to change, controlling change, and effecting change. And Indiana university Information technology department (2008) defines Change Management as a process of communicating, coordinating, scheduling, and monitoring change to UITS resources.

The main goal of UITS Change Management is to ensure the appropriate communication of change events, but it also provides a process that protects UITS from changes that are potentially disruptive, in conflict or of unacceptable risk.

The scope of Change Management can be covered by hardware, system software, live application software and all associated documentation. However Change Management will then apply when projects are completed and handed over for day to day operational support by the IT organization.

Based on OGC (1986) and other implementers (CGI,2006) the objective of Change Management is to ensure that standardized methods and procedures are used for efficient and prompt handling of all changes in order to minimize the impact of change related incidents on service quality and consequently to improve the day-to-day operations of the organization. Therefore all changes can be traced. In addition ,the benefits of Change Management are include: reduced adverse impact of changes on the quality of IT services, better estimates of the costs of proposed changes, fewer changes are reversed, and back-outs that are implemented proceed more smoothly, enhanced management information is obtained about changes, which enables a better diagnosis of problem areas, improve user productivity through more stable and better IT services, increase ability to accommodate frequent changes without creating an unstable IT environment (OGC,2007).

It can be mention that the Change Management process approves or rejects each RFC. The process is facilitated be the Change Manager, but the actual decision about more significant changes are taken by the Change Advisory Board (CAB). The CAB has members for many parts of the organization, as well as customers and suppliers. Configuration Management is responsible for providing information about the potential impact of the proposed change.

Inputs for Change Management are include RFC's, CMDB information (specifically the impact analysis for changes), Information from other processes (Capacity Database, budget information, ect.), Change planning (Forward Schedule of Change: FSC), and process out puts are includes updated change planning (Forward Schedule of Change: FSC), triggers for configuration management and release management, CAB agenda, minutes and action items, change management reports.

Based on OGC (2000) ref the activities that are applicable in Change Management are responsibility for ensuring that all sources of changes can submit RFC's and tat they are adequately recorded, filtering the RFC's and accepting them for future consideration, sorting the RFC's by category and priority, consolidating change; planning and approving their development and implementation; ensuring the required resources are available; and involving CAB where necessary to achieve the above, coordination: coordinating the building, testing and implementation of the change and determining if each change was successful and lessons to improve the process.

ITIL implementers claim that (TeamQuest, 2005; HP, 2005; Tech Partners Consulting, 2003) Change Management aims to strike a balance between flexibility and stability. Reports can be provided on the following issues to show the current situation of the organization number of changes implemented in a period (overall and per CI-category), List of the causes of changes and RFC's, Number of successfully implemented changes, Number of back outs and their reasons, Number of incidents related to implemented changes and Graphs and trend analysis for relevant periods.

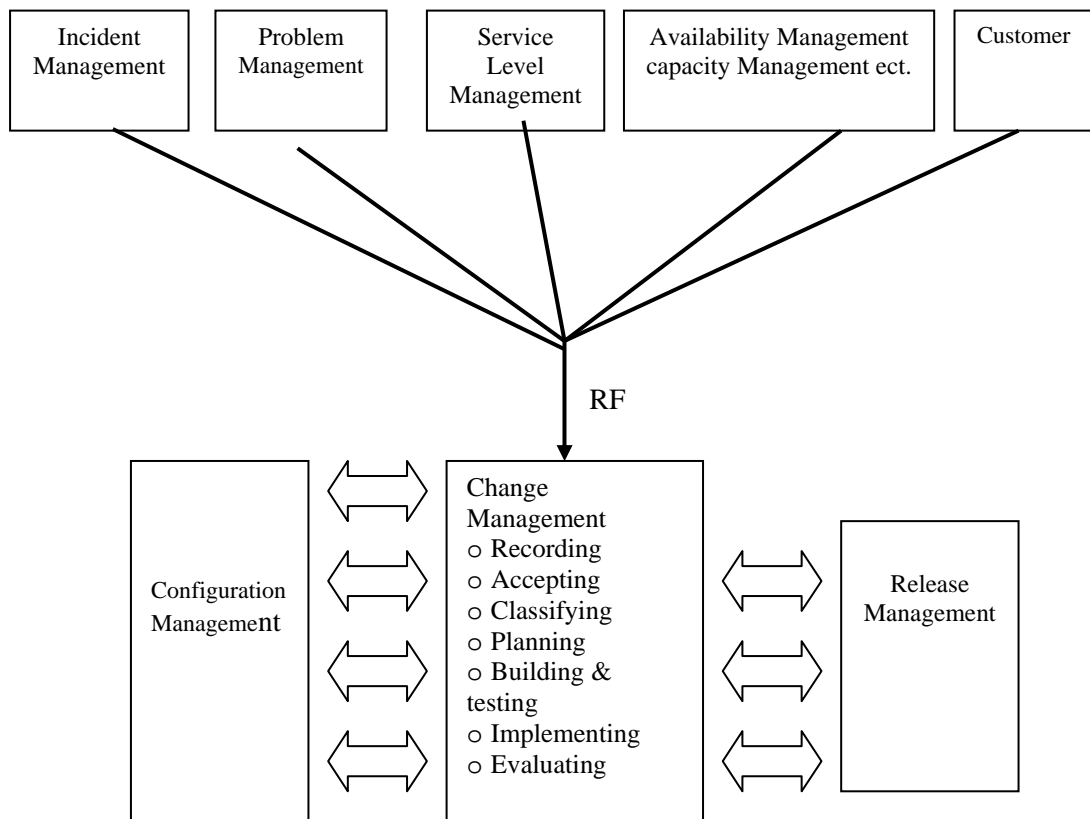


Figure 2.6: Change Management source position

2.4.6 Release Management

OGC (2000) defines a release as a collection of new and/or changed Configuration Items (CIs), which are tested and introduced into the live environment together.

Release Management (knowledgetransfer.net, 2008) takes a planned project style approach to implementing changes in IT services, which addresses all technical and non-technical aspects of the changes. The Service Management process that encompasses the planning, design, build, configuration and testing of hardware and software releases to create a defined set of release components. Release activities also include the planning, preparation, scheduling, training, documentation,

distribution and installation of the release to many users and locations. Release Management uses the controlling processes of Change and Configuration Management. And OGC claims that Release Management aims to ensure the quality of the production environment by using formal procedures and checks when implementing new versions. Release Management is concerned with implementation. Release Management works closely with Configuration Management and Change Management to ensure that the common CMDB is update with every release. Release Management also ensures that the contents of release are update in the Definitive Software Library (DSL). The CMDB also keeps track of hardware specification installation instruction, and network configuration.

Based on OGC(2000) the activities in release management are include following items: release policy and planning; Release design, building and configuration; Testing and release acceptance; Rollout planning; Communication, preparation and training; Release distribution and installation.

However, successful Release Management depends upon the input from and cooperation with other ITIL processes. CGI (2006) highlights the objectives of release management are planning, coordinating and implementing (or arranging the implementation) of software and hardware, designing and implementing efficient procedures for the distribution and installation of changes to IT systems, ensuring that the hardware and software related to changes are traceable, secure and that only correct, authorized and tested versions are installed, Communicating with users and considering their expectations during the planning and rollout of new releases, determining the composition and planning of a rollout, together with Change Management, implementing new software releases and hardware in the operational infrastructure, under control of Change Management and supported by Configuration Management. A release may include any number of release CI's, not only hardware and software, but also documentation such as reports, plans and user and support manuals and ensuring that the original copies of software securely stored in the Definitive Software library (DSL) and that the CMDB is updated. The same applies with respect to the hardware in the DHS (OGC, 2007).

ITIL implementers (TeamQuest, 2005; HP, 2005; Tech Partners Consulting, 2003) emphasize that the main components controlled by Release Management are in-house developed applications software, externally developed software including standard off the shelf software as well as customer written software, utility software, systems software, hardware and hardware specifications.

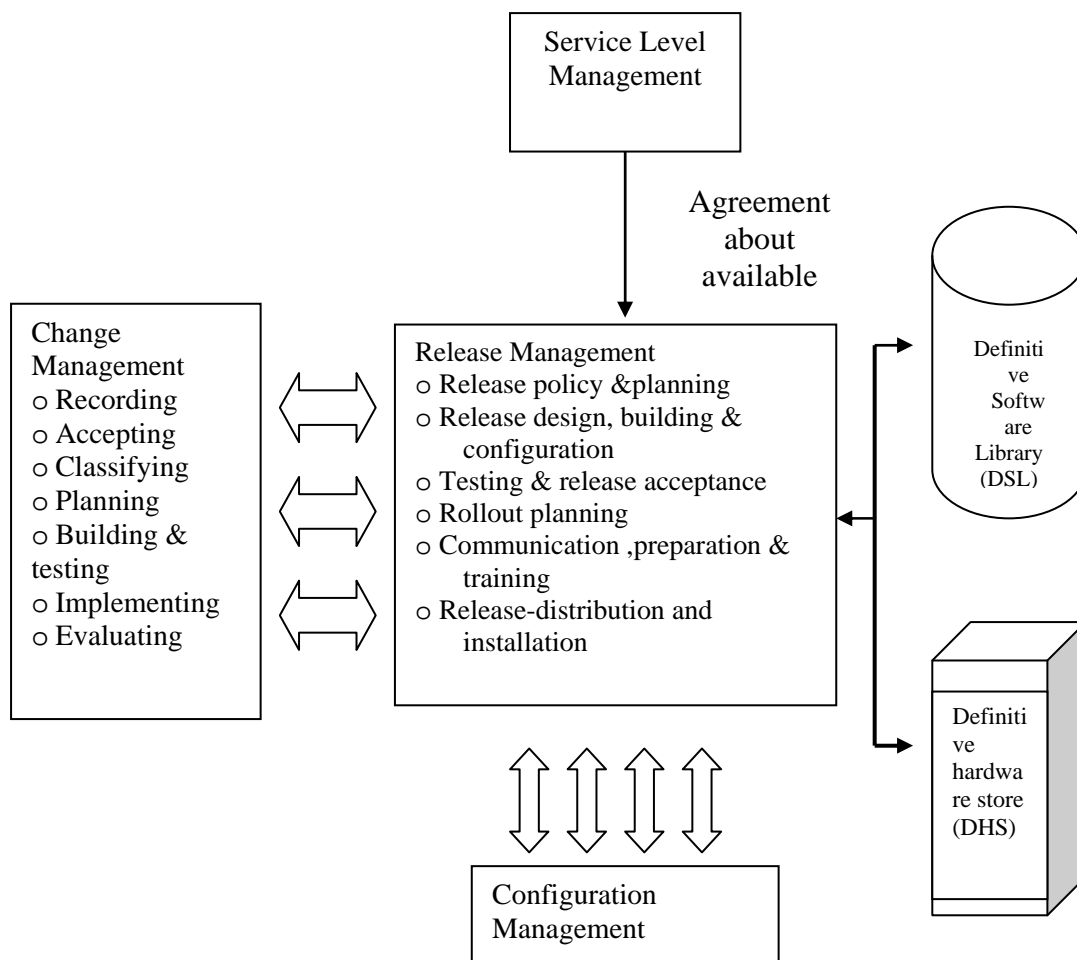


Figure 2.7: Release Management

2.5 ITIL Extensions

2.5.1 Microsoft Operations Framework (MOF)

Van Bon (2002) explains MOF as one of the several organization frameworks that have been developed by Microsoft. All are focused on supporting the complete IT lifecycle. Microsoft has distinguished phases in this lifecycle for Planning, Preparation, Building and Deployment and Operations. For each phase a framework is available. These are respectively, Planning Services, Readiness Framework, Solutions Framework, and Operations Framework.

The MOF can best be described as a set of models, guidelines, and best practices. The similarities with ITIL are striking. For application hosting and management of distributed environments, OF offers valuable enhancements to ITIL, such as NetIQ. Microsoft's acquisition of NetIQ's Operations Manager is an example of MOF supporting technology for Windows environments.

Microsoft articulated MOF (Microsoft Operations Framework) as an extension of ITIL, to address the growing dependence of business on mission critical IT systems (Pultorak, 2002).

Microsoft products being so widely used in the industry were displaying varied performance satisfaction, as it was dependent on the way they were organized and managed. MOF was introduced to enable organizations using Microsoft products to articulate where they were and where they were heading in the business. MOF extends ITIL to support distributed IT environments (distributed computing) and emerging IT trends such as mobile-device computing, application hosting and E-commerce systems. One of the biggest dissemination, MOF is specifically designed for Microsoft products.

MOF constitutes of three core models: MOF process model, MOF team model and MOF risk model as shown in the Figures 2.8, 2.9 and 2.10 below.

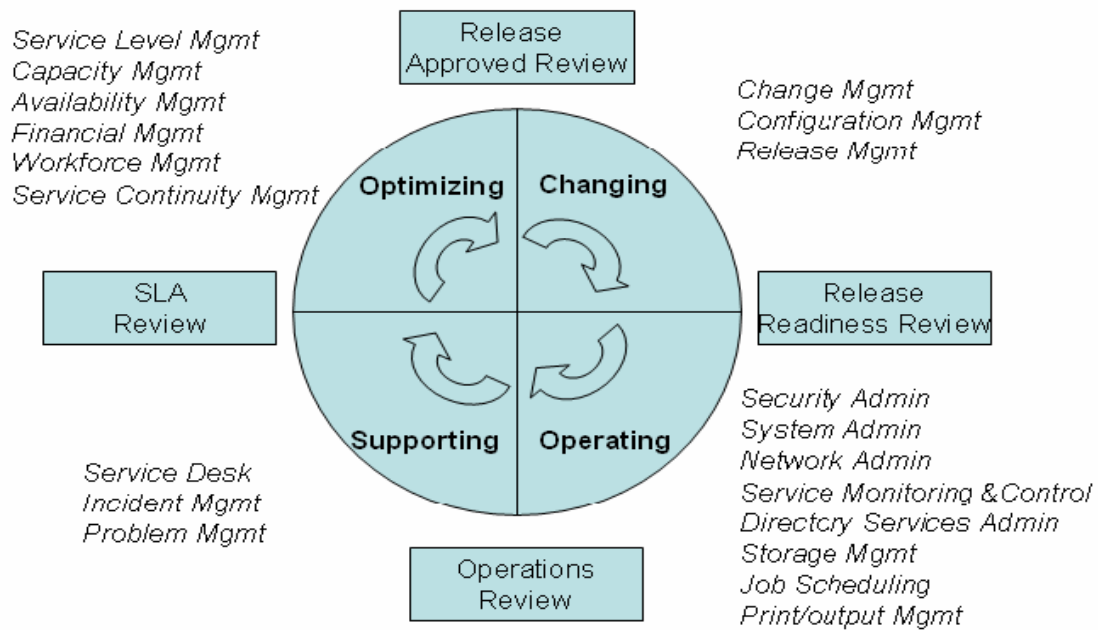


Figure 2.8: MOF Process Model (Van Bon, 2002)

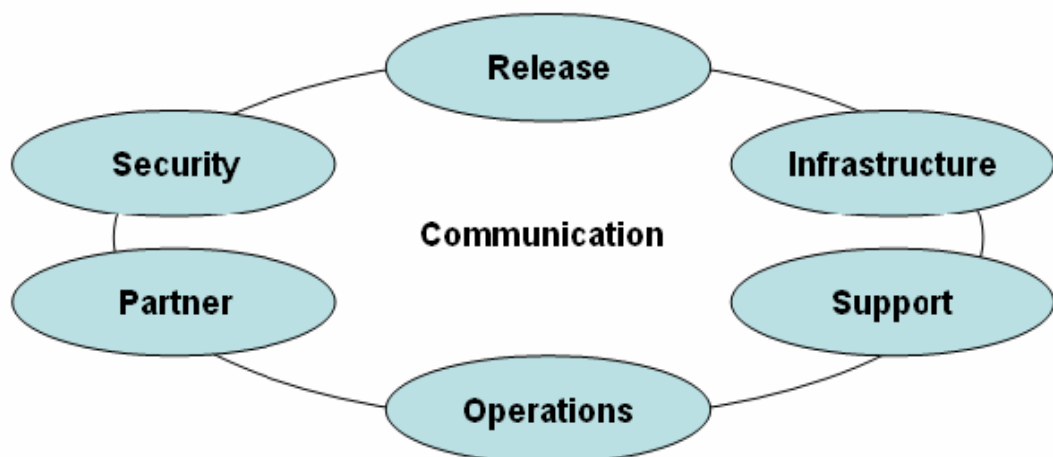


Figure 2.9: MOF Team Model (Van Bon, 2002)

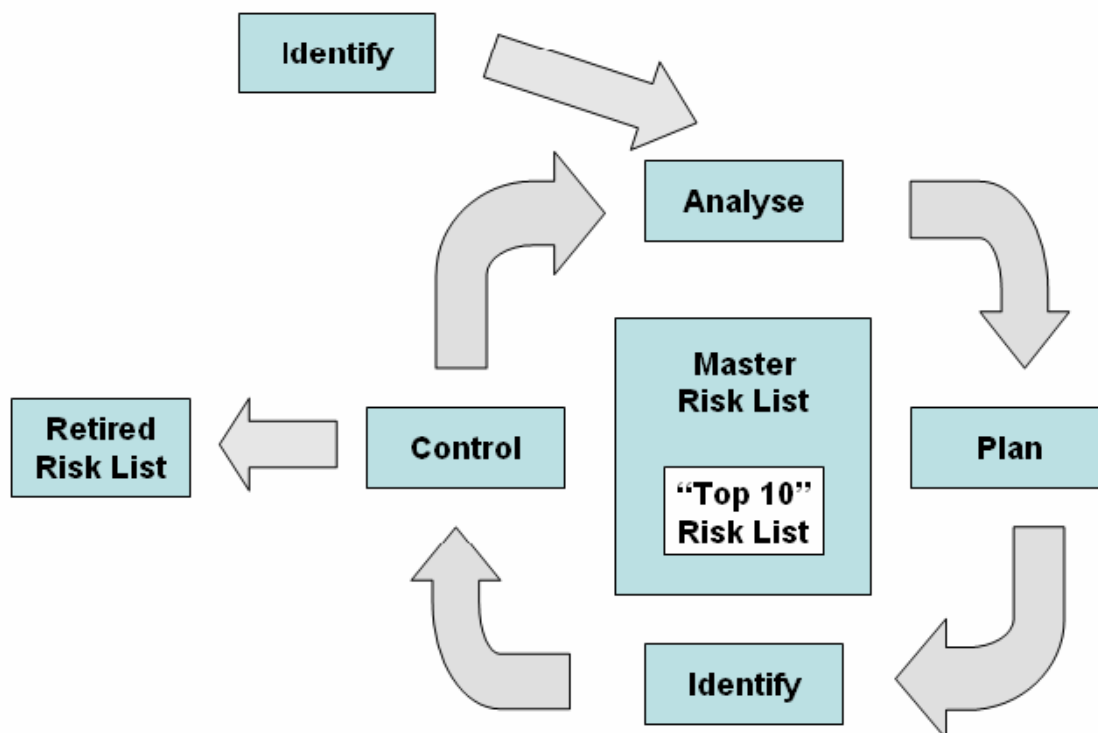


Figure 2.10: MOF Risk Model (Van Bon, 2002)

Service delivery and Service support processes in ITIL are called as Service management Functions (SMFs) in MOF. There are few changes made in MOF, which basically extends ITIL and hence making contributions to IT service management. These contributions can be generally categorized as below:

- o New and deeper SMFs: MOF uses the ITIL processes to extend them to include Microsoft specific practices and additional industry best practices. It also offers service solution as the central unit of work. Secondly it depicts operation as quadrants of concurrent operational activity with explicit review activities. Thirdly, operations as ordered activity along a life cycle that link with developing a design for operability.

- o Team and risk models to complement the Process Model. Firstly MOF offers a clear mapping of order of implementation not just to process, but also to common

sets of operations activity, which isn't available in ITIL. Secondly, ITIL discusses risk in each IT operation process; MOF elevates management risk to its own process model enabling IT managers to consider risk assessment as an ongoing process.

o More perspective, relevant, adaptable operations guidance: Since more and more Organizations are becoming distributed; MOF offers templates, examples and sidebar to satisfy the specific needs of the IT service providers. IT is also available electronically providing ease of use and customization.

2.5.2 Hewlett Packard IT service management (HP ITSM)

HP's IT service management reference model is an extension of ITIL which is a balanced combination of HP's experience in service management, ITIL and industry best practices.

According to Smitherman (2004) HP ITSM has additional processes not available in ITIL and it focuses on IT as business rather than IT within business.

Sallé (2004) describes HP's ITSM as a coherent representation of IT processes and common language for defining IT processes requirements and solutions. HP function as a high level fully integrated IT process relationship map, in which the model can be adopted by an organization regardless of its size and type. HP updates ITSM framework on a regular basis according to the changing needs in IT services. Recently, the new released version 3.0 comes with the security management to support the E-businesses needs. HP uses this model for interdivisional communication and both product and service development.

HP ITSM model (Van Bon, 2002) is used to guide customers as they refocus their efforts on service management instead of technology management and on customers instead of users, and on the integration of processes, people and technology. The HP reference model defines five process groups with processes in each group. These groups are service delivery assurance; business IT alignment; service design and management; service development and deployment; and operations bridge, as shown in the Figure 2.11 (Drake, 2002) below.

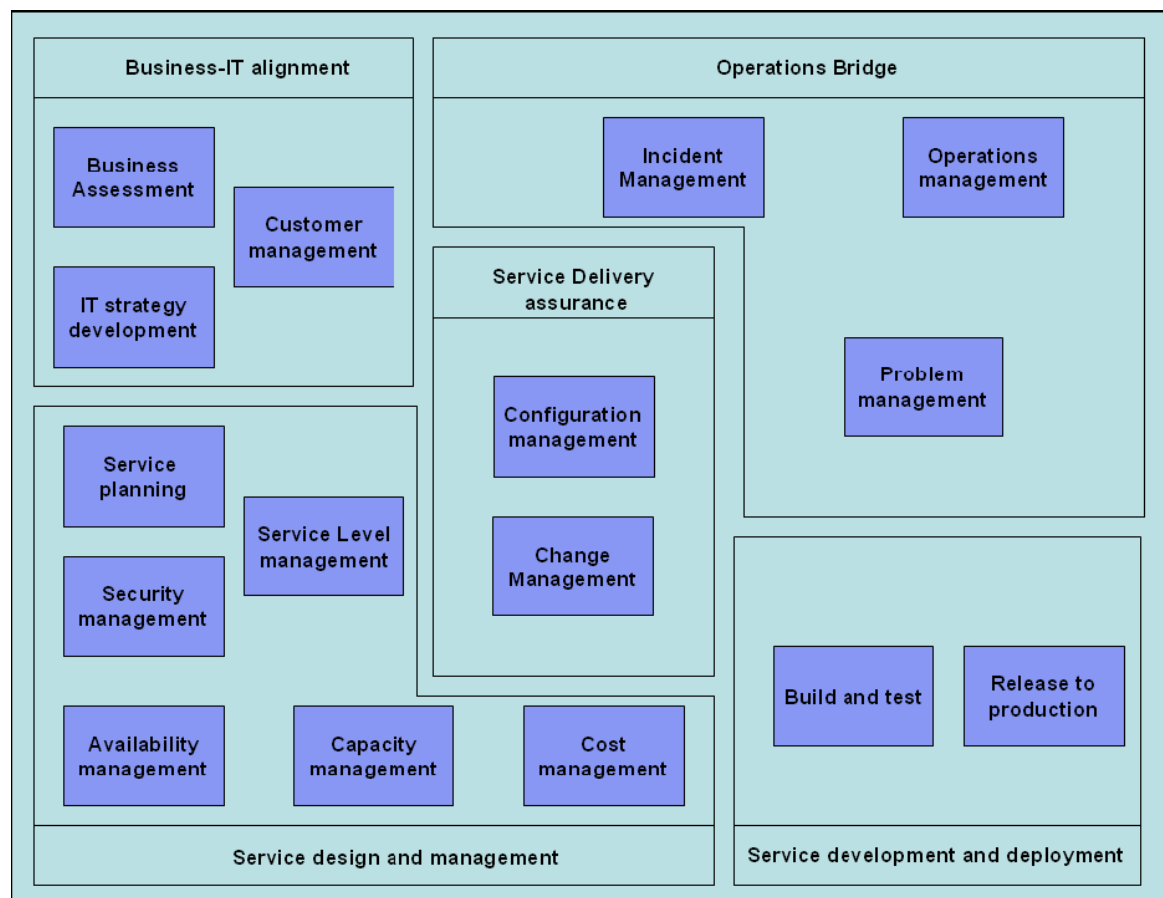


Figure 2.11 : HP IT service management reference model processes (Darke, 2002)

With the implementation, HP ITSM offers the flexibility for organizations to adopt their own particular process. Therefore there is no first and last process similar to ITIL processes (Van Bon, 2002).

HP has been known to be one of the first IT leaders to have developed the ITSM framework (Sallé, 2004). However, some anomalies with the release year of HP ITSM framework were seen in the literature reviewed. Van Bon (2002, p84) asserts that the release year for HP ITSM framework was year 2000, however Sallé (2004, p15) claims that HP released the first version of ITSM in 1997.

Smitherman (2004) provides a detailed review of how HP's IT management tool HP Openview complies with ITIL. He claims that HP Openview provides a true end-to-end strategy to realize the ITIL detail. HP solution maps its elements closely with ITIL processes in two sections of Service Delivery and Service Support. As in ITIL, HP Openview also views Service Desk as the central point corresponding to the common management database. Finally, he claims that HP Openview provides a solution that bridges the gap between IT and business assurance.

The integration of HP ITSM framework with other frameworks is also researched and suggested in a recent published work. Sallé and Rosenthal (2005), in their paper assess HP IT Program (ITP) using COBIT framework. Identifying that COBIT does provide KPIs (Key Performance Indicators) and KGIs (Key Goal Indicators) for control structure however it fails to specify implementation of each for the processes that could be done using ITP from HP. The authors conclude that a combination of COBIT framework with HP ITSM framework provides the IT management a strong solution to synchronise IT with business objectives.

2.5.3 IBM's Systems Management Solution Lifecycle (SMSL)

IBM known as one of most prominent market leader in Information Technology has always been a key contributor to the development and enhancement of ITIL. Since the early years of ITIL emergence, IBM has provided key inputs from

its knowledge and expertise on service management and recently was involved in quality assurance with OGC's publication on "Planning to implementing service management" (IBM, 2002). Another project taken up by IBM on ITIL, related to Project management co-authored with Microsoft.

Besides this, IBM has certified staff as ITIL service management instructors and exam reviewers. As a model, IBM has managed to adopt all the important ITIL processes into IBM's Systems Management Solution Lifecycle as shown in the Figure 2.12.

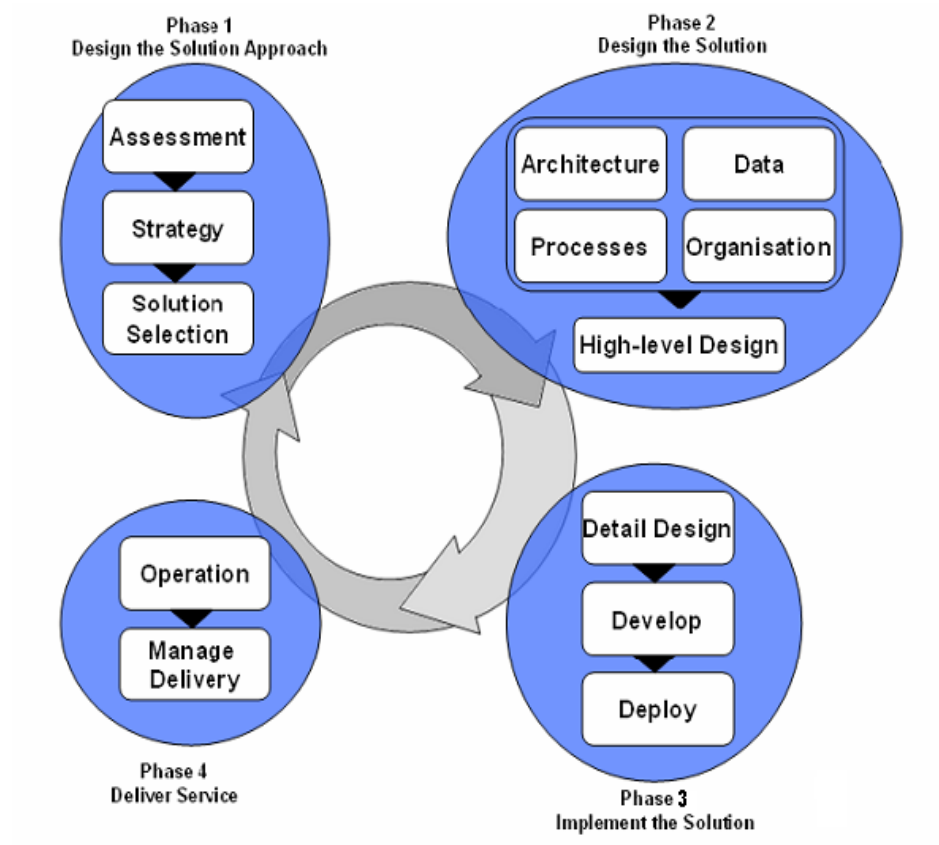


Figure 2.12: IBM Systems Management Solution Lifecycle (IBM, 2002)

To define its capabilities to support ITIL implementation, IBM defines them as a combination of skills assets and methods. Just like other vendors IBM also

provide consultancy services with ITIL certified staff to assesses IT capabilities of organization and create an appropriate service management strategy for them. They also provide design solutions to integrate the critical elements of service management that are aligned with ITIL processes. During implementation the IBM practitioners verify the ITIL concepts and best practices to be aligned.

A tool with IBM Infrastructure Resource Management services called IRM Accelerator has a set of pre-defined solutions including incident management, configuration management, change management and problem management which are derived from ITIL processes. As an enhancement, IBM has extended the configuration management processes from ITIL defined set.

The new processes are a part of IRM Asset Management Solution, which defines the lifecycle of an asset. This enables organizations to effectively manage infrastructure operations and to drive down ownership costs, but still maintain and improve service levels thus enabling new business capabilities. IBM is also making alliance with its clients such as Peregrine Systems; to incorporate and introduce new ITIL based solutions. IBM has been recognized as the Vendor of Record (VOR) with government of Ontario for providing ITIL process development, documentation and implementation services, ITSM project management services and ITIL training and skill development services (IBM, 2002).

IBM has also developed a wide range of tools and techniques for use with the IT Process Model in the analysis of IT organizations. Within IBM Service management framework design, IT Process Model (ITPM) can also be used as basis for designing the management framework.

ITPM is a model for controlling IT in organizations. Many Dutch organizations have used IT Process Model in conjunction with ITIL to structure their IT management. Hertroys and Rooijen (2002) affirm that IT Process Model and

ITIL complement each other. IT Process Model provides control of IT, indicating the relationships and information flows between processes, where ITIL describes the best practices and how these processes can be implemented.

2.6 A Case Study: Queensland University of Technology (QUT)

The following review is based on the document published on the ITIL implementation in Queensland University of Technology (QUT), in Queensland, Australia. QUT implemented ITIL to effectively and efficiently be able to manage and respond to the different risks faced by the IT infrastructure within QUT (McCormack, 2004).

In QUT, one of the most critical objectives of ITIL implementation was to prepare the environment for change. QUT organizational structure is based on devolved structure with 30 discrete IT areas supporting nine faculties and six divisions for 3,300 staff and 40,000 students.

The project not just required the involvement of the technical staff, but business managers and process owners were also included to integrate better the business processes. The biggest challenge faced by the university was to implement the same processes throughout the whole university.

2.6.1 Adoption Factors

For QUT, ITIL implementation was aimed twofold: firstly to be able to propagate to every devolving corner and secondly be simple enough to be understood by each member of IT staff (almost 300 staff). The implementation was initiated based on the review of the current situation and the identified gaps in the current systems. Besides this there were various factors that motivated the adoption of ITIL.

Technologically, QUT felt a need to improve operational responsiveness; operationally the IT services wanted to collaborate collectively with the business to achieve benefits at the organizational level; and environmentally, IT services wanted to deal with environmental threats eg. risks and vulnerability assessments.

Organizationally, ITIL emerged as the optimum choice facilitating the need for generic framework for all IT areas in the university independent of the technology, which was well provided by ITIL. Secondly, ITIL provided enough details to cover fully the requirements for self-assessment benchmarks. Thirdly, ITIL was simple enough to be distributed and adopted easily by 300 IT staff.

2.6.2 Implementation Issues

2.6.2.1 Pre-implementation Analysis

The pre-implementation review embarked on the IT managers a task to integrate and coordinate communications channels in the dissolved IT structure in whole of QUT. QUT operates in a federated environment and ITIL was used to help

to integrate the devolved IT teams. There was no move to develop a central structure, but to make the federated structure work more seamlessly across the boundaries. In order to resolve this issue, QUT implemented many strategies to introduce a matrix communication structure across the university that was built on the existing business relationships.

Steps were taken both at strategic and operational level to improve the level of communication. Strategically, prior to ITIL initiation, an IT Consultative group was already in place, with representations from each area, to formulate IT direction and thus promoting standardization and collaboration across university. Though the IT Consultative group was not formed as a part of the ITIL project, it proved to be essential in the success of the ITIL project. At the operational level, ITIL provided the right framework to follow to define these communication channels.

2.6.2.2 Processes implemented

ITIL implementation in its initial phases started off with two processes: incident management and problem management along with the service desk function. These processes offered an immediate solution for both the IT services and the business. Project was initiated beginning with self-evaluation.

IT services department in QUT had been two-way communication with the faculty and division spanning all levels including information sessions and updates for the whole staff. This provided a very strong strategic communication; however there was dire need to establish a similar operational communication to deal with environmental threats and to collaborate in order to benefit at the organization level.

2.6.2.3 Order of implementation

The ITIL implementation was planned in stages with initially Incident management and problem management processes along with Service desk function implemented. As per McCormack's (2004) initial publication, it was planned that the next phase was the implementation of Security Management however; on discussion with McCormack (through email) the next phase includes Change, Release and Configuration Management. This phase is expected to complete by May 2006. Incident and problem management were selected as the first processes as they would provide the much required quick win and also delivering benefits from IT and business perspective.

2.6.2.4 Hiring external consultants

QUT did manage to approve the funding for a project manager after the training for some IT staff was completed. Initially the project manager position was advertised externally, however, an internal staff filled it in. There were no external consultants that were used in the whole ITIL implementation project.

2.6.2.5 Tool Selection

For Service Desk function, a software tool is required that is ITIL compliant and aligns with the needs of the organization. In case of QUT, new tool was not acquired, however a separate project was initiated to align existing tool to ITIL. Nevertheless, on further discussion with Mark McCormack I was told that with the

maturity of processes, it is felt now that the tool is not meeting the needs of the University, hence, there are plans to replace it in year 2006.

2.6.2.6 Staff Training

Implementation of ITIL started with the support of the IT consultative group and training of 32 staff members for ITIL foundation course. Majority of the staff was from the consultative group, as that would provide the decision makers all the necessary information to go forward with ITIL in QUT. A team was formed with representation from every section of the university in order to make the change process smoother. A further 193 staff was trained with the same certifications.

2.6.2.7 Acceptance of Cultural Change

A Special Interest Group was created that benefited QUT in introducing ITIL they were able to see first hand the benefits of the new system. This special interest group still remains active and driven by the project manager. This group was a voluntary effort of the faculty and staff.

Staff members were assigned with process leaders to act as a point of reference for any discussions in the subject. The reframing of the interest group brought the following change in the organizational structure within the IT services across QUT (McCormack, 2004) as shown in Figure 2.13 ITIL Support group in QUT.

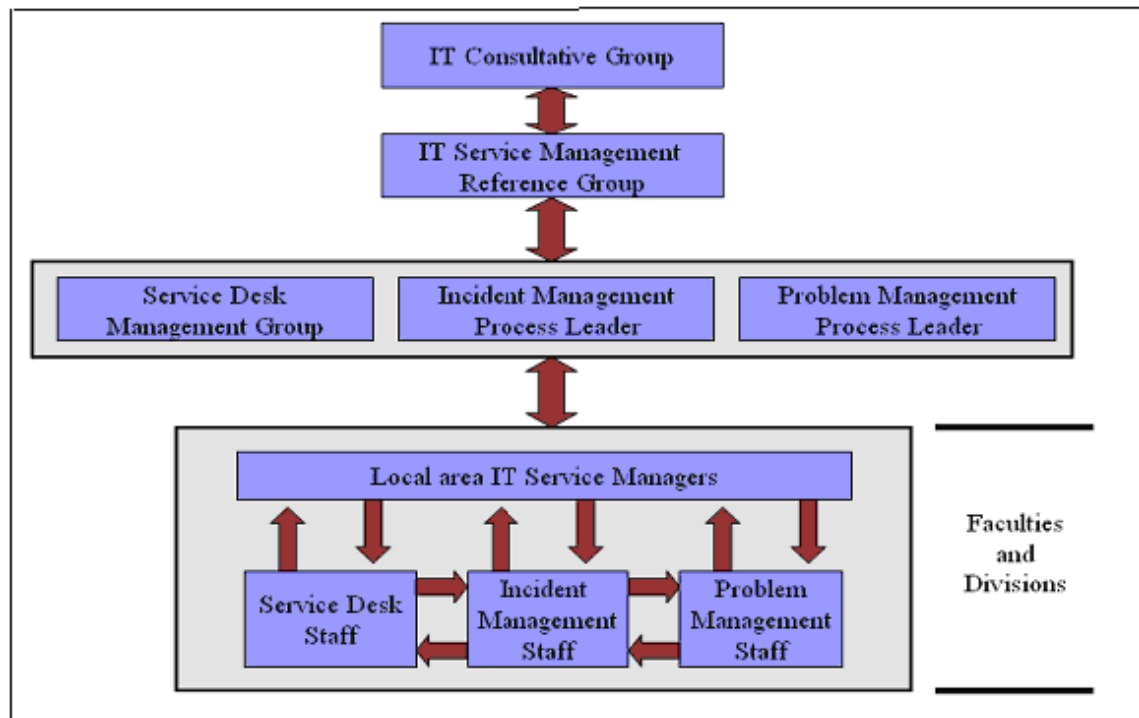


Figure 2.13: ITIL Support group in QUT (McCormack, 2004)

In order to build the ever-devolving structure of the organization, separate reference material on Incident and Problem management catered for the service managers. The second part of the reference material consisted of specific rules for all the IT staff. These reference materials were put together as implementation kits containing:

- o A step-by-step guide on steps to implement Incident and Problem Management process each with references on resources to complete the implementation, measure progress and provide feedback.
- o An IT service management Reference Guide included overview of IT service management and how it fits with QUT structure in addition to ITIL self assessments allowing benchmarking against other organization implementing ITIL. In order monitor progress central tracking system information was also provided.
- o Incident and Problem Management Reference Guides containing process maps for each processes and process rules with summarized main requirements of each subsection.

Communicating change across QUT contributed to another double-sided document listing all the process rules of Incident and Problem management across the whole IT Staff. The process rules were kept brief to aid communication. Process rules usage also allowed incremental change before the full adoption of ITIL. In the successful implementation of ITIL in QUT, three major resources have been helpful including itSMF (IT service management Forum), IT service management User Group (created by QUT) and QUT Email list. IT service management User group is a group of state government, local government and university contacts that are implementing ITIL, which forms a basis for information sharing.

2.6.2.8 On-going assessments & metrics

The only reference for the ongoing assessments was made in the IT service management guides created for each divisional IT services. These included sections on reporting on areas to measure their compliance with the processes. The use ITIL self-assessments were also mentioned so that they could measure themselves against other universities. In order to establish a system accessible by everyone, relevant information was provided how each team could access the static form the central job tracking system. Mark mentioned that areas are measured annually on each process implemented. Meanwhile, no clear reference was made as if the assessments are how often these assessments were to be made and is all the teams has to be audited on the basis of these assessments.

QUT's plan to implement a unified system proved very beneficial and true to ITIL. This collaboration within the university assisted the university to fill in the gap of lack of information. Secondly, process rules kept brief to develop communication among the staff on the change process. Thus, allowing the changes to happen progressively from individual work to full adoption. However, the university felt the

need for more information availability on ITIL implementation in university environment. According to QUT, the only information available was very generic and made ITIL projects much harder.

Note that this university case study is summarized master thesis of one Australian student that referred on five chapters.

2.7 Summary

The IT Infrastructure Library documents industry best practice guidance. ITIL is a framework that describes the goals, general activities, inputs and outputs of the various Service Management processes, which can be incorporated within IT organizations.

ITIL provides detailed process definitions for many IT functions that can be adapted to IT organization. The main focus of ITIL processes is on IT Service Management. ITIL consists of a set of 11 Processes and 1 Function all working together to deliver effective IT Service Management. The focus of this study is on ITIL service support.

In addition, ITIL has several extensions from Microsoft, IBM and Hp that a summary of them mentioned above. At the end of this literature review a case study of ITIL implementation in Queensland University of Technology provided.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Methodology can be defined as organized, documented set of procedures and guidelines that includes the frameworks, techniques, methods, patterns and procedures used to accomplish a set of goals and objectives. In this chapter, the methodology applied for this project and project framework is discussed.

3.2 Research paradigm, research approach, research of inquiry

In the study of IS, researchers will usually consider one or some research paradigms as a guidance of their research. Based on Creswell (2003), there are four main types of research paradigms; post-positivist, constructivist, advocacy or participatory and pragmatic. The characteristics of the paradigms are presented in the table 3.1.

Table 3.1: Research paradigms, approach and strategies of inquiry (Creswell, 2003)

Research paradigms/knowledge claims	Post-positivist	Constructivist/Advocacy Or Participatory	Pragmatic
Research approach	Quantitative	Quantitative	Mix methods
Research strategies of inquiry	Surveys, experiments	Phenomenology, Grounded theory, Ethnography ,case study And narrative	Sequential, Concurrent, Transformative

In this study, consideration regarding the research paradigm points to Participatory research paradigm. It is because of some reasons:

- The nature of this study appears to suit the Participatory paradigm characteristics. There are some reasons for this argument.
- This study is focusing on implementation ITIL service support in the infrastructure and service department of CICT.
- This study will be done as a case study in the infrastructure and service department of CICT.

This study has two parts. In its first part, several instruments like questionnaire and interview will be used. Then it will complete with develop a tool to record all incidents in the infrastructure and service department of CICT.

3.3 Research Design

The research is structured in these phases:

Phase 1: Literature Review and Initial Findings

Phase 2: The Case study (the infrastructure and service department of CICT).

Phase 3: Develop a tool to record all incidents in the infrastructure and service department of CICT

Phase 4: Thesis writing and research completion

The operational research framework is used in the explanation which includes research activities, objectives, methods and deliverable for each phase.

3.3.1 Phase 1: Research planning and Literature review

The primary objectives of this phase are to observe and identify the problem areas. Based on the problems, the organization as a case study is selected. For this project, the Infrastructure and service department of CICT at UTM is selected as a case study. Research is done based on the problem that exists in the organization. The table 3-2 is the activities that involve in this phase:

Table 3.2: Operational research framework for phase 1

Phase 1: Literature Review and Initial Findings			
Activities	Objectives	Methods/Tools	Deliverables
1. Research initiation	<ul style="list-style-type: none"> To identify research problem, objectives and scope 		<ul style="list-style-type: none"> Problem, Objectives and Scope
2. Development of research plan	<ul style="list-style-type: none"> To identify appropriate methods for conducting the research 		<ul style="list-style-type: none"> Operational research framework Detail research design
3. Review of the Literature	<ul style="list-style-type: none"> To identify the concepts and ideas related to ITIL and its implementation 		<ul style="list-style-type: none"> Download papers related on ITIL implementation,
4. Initial Findings	<ul style="list-style-type: none"> To design an interview 		<ul style="list-style-type: none"> Interview transcript Initial findings related to ITIL implementation in the infrastructure and service department of CICT

3.3.2 Phase 2: The Case Study

During this phase, we built models to represent the real world and to understand the desired business processes and information used to those processes.

Basically, this phase involves decomposition by taking a complex problem with complicated information requirements and breaking it into smaller and more understandable components. The purpose of this analysis phase is to understand the needs and requirements of this project and system. The primary activities that are considered part of this phase are gather information, define system and prioritize system requirement.

3.3.2.1 Gather Information

Gathering information is done to get information about the organization and to deeply understand the topic and past research that have been done. Literature review is done by gathering and referring information from general, primary and secondary sources. During the case study, the researcher will adopt multi-methods and will use various instruments like sound recorder.

- **Interview**

To collect the data, face-to-face interviews involving the implementers of ITIL service support. During the interviews, detailed information related to implementing important service support processes of ITIL will be explained by participants. In addition, interviews allow the researcher to control overall the line of questioning.

- **Document review**

Any documentation related to implementing ITIL service support in the infrastructure and service department of CICT such as official documents, organization structures, mission and vision, all reports and behaviors of staffs will be study.

- **Observation**

General observation which includes watching, listening and taking notes of what is going in the relation with implementing ITIL service support in the infrastructure and service department of CICT will also be carried out. It is also treated as a secondary resource in the data collection. Hence, it is hoped that observation to be taken place will provide greater insights in order to complement the actual survey technique like questionnaires.

In this study, the researcher will do only general observation technique since the discussion or the interview session.

- **Questionnaire**

During the case study research, two questionnaires will be produced and distributed to gather needed information related to every level of staff responsibility. These questionnaires have several questions related to their activities in their positions. These answers give more help to find out more accurate information related to this case study.

3.3.2.2 Framework Verification

The first level verification refers to the verification of the framework constructed. The researcher will identify appropriate candidates to verify the proposed ITIL framework and seek approval from the project panels. Upon approval from the panels, the framework will be verified.

Table 3.3: Operational research framework for Phase 2

Phase 2: The infrastructure and service department of CICT analysis			
Activities	Objectives	Methods/Tools	Deliverables
1.Design	<ul style="list-style-type: none"> To design Questionnaire 		<ul style="list-style-type: none"> Questionnaire design
2.Data collection	<ul style="list-style-type: none"> To conduct with CICT staff 	<ul style="list-style-type: none"> Interview and questionnaire 	<ul style="list-style-type: none"> Interview transcript & questionnaire transcript
3. framework design	<ul style="list-style-type: none"> To prepare the proposed framework 		<ul style="list-style-type: none"> Proposed Framework
4. Framework approval	<ul style="list-style-type: none"> To approve framework 		<ul style="list-style-type: none"> Approve framework

3.3.3 Phase 3: Tool development

In this phase, the requirements about the system will be define. For the purpose of this project, the object oriented approaches that will be used is Unified Modeling Language (UML). UML is a language for specifying, constructing, visualizing and documenting the system and its components. This technique is developed by Jim Rumbaugh and Grady Booch in the year 1994 and the Use Case were added in 1995 by Ivar Jacobson (Jacobson, 1998). In software architecture,

there are four views that need to be considered in developing a software system. Use case views the system from four different points of view, which are design view, component view, process view and distribution view.

Based on the Use Case, the modeling could be done using the UML notation. Three diagrams are used to define the application requirements in order to develop ADU@ITIL tool during analysis phase are:

- i) Activity Diagram
- ii) Use Case Diagram
- iii) Sequence Diagram

3.3.3.1 Hardware

Hardware refers to the physical peripherals that suitable in operate the data processing works that include input and output device, processor and storage. The hardware which will be used could affect the system's ability. There are a number of criteria that need to be taken into consideration in selecting the hardware. The system's ability refers to the system's performance from the perspective of speed, storage capacity and secondary storage. Listed below is the minimum specification that is needed to develop the system.

i) Client Specifications

- Pentium Processor or higher
- Processing Speed : 200 Mhz
- RAM : 32 MB

- Hard Disk Space :1.0 GB
- Floppy Disk Drive : 1.44 MB
- CDROM Drive: 16 X max
- Monitor : 14 inci SVGA
- Printer
- Network Interface Card
- Mouse
- Keyboard

ii) Server Specification

- Pentium Processor or higher
- Processing Speed: 120 Mhz
- RAM: 32 MB
- Hard Disk Space: 1 GB
- Floppy Disk Drive : 1.44 MB / 3.5"
- CDROM Drive: 16X max
- Monitor: 14 "SVGA
- Network Interface Card

- Ethernet Card and cable
- Mouse and keyboard

3.3.3.2 Software

The software specifications used for developing the proposed ITIL based system are:

3.3.3.2.1 PHP

PHP is an HTML embedded scripting language. PHP is use for building Web pages and it is better, faster and easier to learn than others scripting language like CGI, ASP and ColdFusion. Other reasons are:

- **PHP is free**

PHP is open source in nature therefore people can learn and use it without incurring any cost.

- **PHP is much easier to learn and use**

PHP uses a friendly syntax. People without any formal programming background can write PHP scripts with ease after reading one good PHP book.

- **PHP has built-in support for numerous types of databases**

Today, there are many existing various database servers or Database Management System (DBMS) which function on different platform. PHP has built-in support for most of them like dBase, FilePro, MySQL, Oracle and Sybase. For Access or SQL Server, PHP's ODBC (Open Database Connectivity) function needs to be used along with the database's ODBC drivers to interface with the database.

3.3.3.2.2 MySQL

The database used is MySQL. The features are as follows:

- **Easy-to-Use Business Intelligence (BI) Tools**

Through rich data analysis and data mining capabilities that integrate with familiar applications such as Microsoft Office, SQL Server 2000 enables developers to provide all of your employees with critical, timely business information tailored to their specific information needs. Every copy of SQL Server 2000 ships with a suite of BI services.

- **Self-Tuning and Management Capabilities**

Revolutionary self-tuning and dynamic self-configuring features optimize database performance, while management tools automate standard activities. Graphical tools and wizards simplify setup, database design, and performance monitoring, allowing database administrators to focus on meeting strategic business needs.

• Data Management Applications and Services

Unlike its competitors, SQL Server 2000 provides a powerful and comprehensive data management platform. Every software license includes extensive management and development tools, a powerful extraction, transformation, and loading (ETL) tool, business intelligence and analysis services, and new capabilities such as Notification Services. The result is the best overall business value available.

3.3.3.2.3 Macromedia Dreamweaver MX

Macromedia Dreamweaver MX is the professional choice for building web sites and applications. It is also suitable for building dynamic web-based applications. Macromedia Dreamweaver MX can be integrated with other Macromedia tools. It provides a powerful combination of visual layout tools, application development features, and code editing support, enabling developers and designers at every skill level to create visually appealing, standards-based sites and applications quickly. From leading support for CSS-based design to hand-coding features, Dreamweaver provides the tools professionals need in an integrated, streamlined environment. Developers can use Dreamweaver with the server technology of their choice to build powerful Internet applications that connect users to databases, web services, and legacy systems. Macromedia Dreamweaver is used in developing the system because:

- Easy to use menus: The Dreamweaver interface provides extensive menu driven options with the help of which a developer can create powerful and complex websites easily.
- Supported Technologies: Dreamweaver enables the use of technologies such as PHP, ASP and more so that time and effort spent is saved in creating complex codes for programming.

- **Extension Manager:** Dreamweaver provides an extension manager, with the help of which a developer can download code snippets and various behaviors from the macromedia website <http://www.macromedia.com> that helps to integrate technologies like Shopping carts, Dynamic HTML menus, Javascripts and more.

3.3.3.2.4 Rational Rose 2000

Rational Rose is a CASE (Computer Aided Software Engineering) tool that facilitates object-oriented analysis and design, better known as OOAD. For this project, Rational Rose 2000 is selected software used for system design. It is visual modeling tool to produce all the Unified Modeling Language (UML) diagrams.

Rational Rose 2000 which encourages modeling based system development can increase the productivity of a developer. The development processes employing this software is capable of producing quality systems as the end result. Rational Rose is used in the development of system because (Charvat, 2004):

- **Easy to use:** Rational Rose provides a simple and easy to use interface
- **Is used throughout the software development process:** From defining the user requirements to implementation, Rational Rose is used at any stage in the life-cycle process.
- **Helps in creating project documentation:** Use the models created in Rational Rose as a basis for documentation in system development.

3.3.3.2.5 Develop Prototype

A prototype system will be developed based on the analysis and design phases. This phase basically involves programming and coding of the system. In the end of this phase, the overall architecture of the system is developed. All the activities are achieved by referring to the object-oriented methodology such as use case diagram, activity diagram and sequence diagram.

Essentially, a prototype is enables to fully understand how easy or difficult it will be to implement some of the features of the system. It can give users a chance to comment on the usability and usefulness of the user interface design and to access the fit between the software tools selected the functional specification and the user needs. Prototyping is the process of putting together a working model (a prototype) in order to test various aspects of the design, illustrate ideas or features and gather early user feedback. The purpose of prototyping is to eliminate the possibilities of uncertainty and misunderstanding, and to verify a solution at an early stage of design.

3.3.3.2.6 Build Final System

Once prototype is accepted, the development of final system will begin. The additional implementation will be added onto the system based on prototyping.

3.3.3.2.6.1 Perform Testing and User Acceptance Test

Testing and User Acceptance Test will be conducted after develop the final system.

- **Testing**

The purpose of testing is to ensure that the system does not malfunction in obvious ways and that system fulfils the user requirements. For the purpose of this project; unit, integration and system testing will be implemented. For unit testing strategy, black box testing is selected. The concept of black box testing is used to represent a system whose inside workings are not available for inspection. In a black box, the test item is treated as black, since its logic is unknown. Writing a user manual is an example of a black box approach to requirements. The user manual does not show the internal logic, because the users of the system do not care about what is inside the system.

Furthermore, in black box testing, various inputs are trying and resulting output is examined. Black-box testing works is suitable in testing objects in an object-oriented environment. The black-box testing technique also can be used for scenario-based tests, where the system's inside may not available for inspection but the input and output are defined through use-cases or other analysis information.

- **User Acceptance Test**

User acceptance test is a system test performed to determine whether the system fulfils user requirements. Acceptance testing is typically the last round of testing before the system is handed over its users. According to Bahrami (1999), user satisfaction test or user acceptance test is the processes of quantifying the usability test with some measurable attributes of the test, such as functionality, cost, or ease of use. Gause and Weinberg (1989) have developed a user satisfaction test that can be used along with usability testing. The principles objectives of user satisfaction test are:

i) As a communication vehicle between designers, as well as between users and designers.

ii) To detect and evaluate changes during the design process

iii) To provide a periodic indication of divergence of opinion about the current design

iv) To enable pinpointing specific areas of dissatisfaction for remedy

iv) To provide a clear understanding of just how the completed design is to be evaluated Bahrami (1999) pointed out that a well-targeted sample to conduct this user acceptance test is six to ten participants that can identify 80-90 percent of most design problems.

Table 3.4: Operational research framework for Phase 4

Phase3: Tool development			
Activities	Objectives	Methods/Tools	Deliverables
1.Design	<ul style="list-style-type: none"> • To design a database • To design a tool 		Prototype
2.Develop	<ul style="list-style-type: none"> • To develop respective tool 		Tool

3.3.3 Phase 4: Thesis writing and research framework

Report writing was the last part of the study which includes the documentation of the system and user manual. In the report, the details of the discussion as well as its finding were presented.

Table 3.5: Operational research framework for Phase 4

Phase4: Thesis writing and research framework			
Activities	Objectives	Methods/Tools	Deliverables
1.Findings completion	<ul style="list-style-type: none"> To compile and finalize all the findings 		<ul style="list-style-type: none"> Complete findings
2.Writing and submission of the research	<ul style="list-style-type: none"> To prepare research report 	<ul style="list-style-type: none"> MS Word 	<ul style="list-style-type: none"> Completed thesis
3.Evaluation of the research	<ul style="list-style-type: none"> To prepare for the viva 	<ul style="list-style-type: none"> MS Power Point 	<ul style="list-style-type: none"> Presentation materials

3.4 Summary

This chapter explains the research methodology to be used in order to meet the intent objectives of this study. The research is structured in these phases: Phase 1: Literature Review and Initial findings; Phase 2: The infrastructure and service department of CICT analysis; Phase 3: Develop a tool to record all incidents in the infrastructure and service department of CICT; Phase 4: Thesis writing and research completion.

CHAPTER 4

FINDINGS

4.1 Introduction

The project is intended to be used to implement ITIL-service support in infrastructure and service department of Centre of Information Technology and Communication (CICT). This chapter will study the mission, vision, structure and responsibilities of CICT especially the scope of this project. Furthermore it explains the current system (As-is system) in this department.

This chapter also explains the proposed framework with process models. The requirements also are listed out and formulized the proposed framework to implement ITIL-service support in the scope of project.

4.2 Introduction to CICT

The Centre of Information Technology and Communication (CICT) were established in 1975 by the name of Computer Centre. The aim of CICT is to assist the university's administrative computing as well as to provide consultancy in government agencies computerization such as the Teachers' Training Division, the Malaysian Examinations Council and the Public Services Department. The lack of expertise in information technology had prompted UTM to set up the Computer Science Department in 1981, which offered courses in Computer Science. Subsequently, the CICT and the Computer Science Department merged to become the Computer Science Division of the Science Faculty.

In 1984, the Computer Science Division was upgraded to Institute of Computer Science. The role of the Institute was reviewed in 1991, resulting the existence of the Faculty of Computer Science and Information System and the reestablishment of the Computer Centre (PKUTM). This enables the two entities to be more focused on their respective roles. However, Computer Centre of UTM, is now known as "Centre of Information Technology and Communication" or CICT, effectively from 19th January 2004.

4.2.1 CICT Vision and Mission

The vision of CICT is *“To be the prime mover for information technology in the development of UTM.”*

While the mission of CICT is *“To become a leader in excellent and innovative information technology services.”*

4.2.2 CICT Objective

CICT objectives are as presented below:

- i) To provide the information of communication technology to UTM community.
- ii) To expand the use of information technology to all UTM activities.
- iii) To provide information technology infrastructure and facilities.
- iv) To become information technology reference centre.
- v) To become a centre for the development of software and application.

4.2.3 CICT Organization Structure

The organization structure of CICT is as presented in Figure 4.1

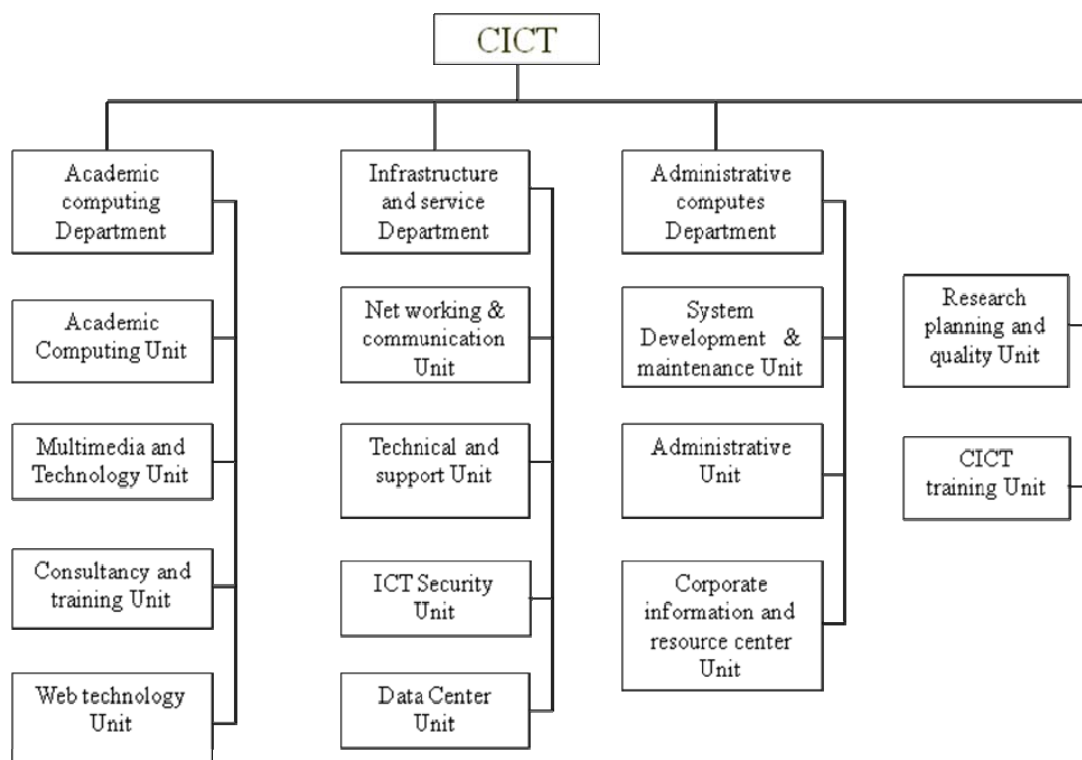


Figure 4.1 CICT Structure

4.2.3.1 Academic Computing Division

Table 4.1 represents the Academic Computing Division goals and objectives.

Table 4.1: Academic Computing Division goals and objectives

Divisions	Goals	Objectives
Academic Computing Division	<ul style="list-style-type: none"> • To give/provide & to encourage ICT solutions in academic activities which is cost effective • To support academic activities via Multimedia Technology and Advanced Computing (HPC) • To increase and strengthen ICT services in academic activities 	<ul style="list-style-type: none"> • To strengthen structure and competency of division • Continuous cooperation with other units and divisions in academic activities • To provide repository for alternative software which is cost effective • To provide teaching & learning solutions which is flexible and effective • To develop and to implement the policy for academic users.

While Table 4.2 below represents the units function at Academic Computing Division.

Table 4.2: Units and its functions at Academic Computing Division

Units	Functions
Advanced Computing	<ul style="list-style-type: none"> • Cooperation with faculties & RMC • CICT designate consultant amongst academics or association leaders to overview HPC needs in UTM • Focused/Interest users : Engineering Graphic Rendering, VR, Protein Sequencing, CFD & CSM, Clustering and Grid Computing
Multimedia & Teaching Technology	<ul style="list-style-type: none"> • Cooperate with UNIPEN developing E-Learning • Using Open Source Solutions Video Conferencing and Teleclasses (ELU) • Virtual Lab for engineering & science Cooperate with faculties to introduce/promote OSS-based Student's Swiss Knife' (SDK, Libraries, Typesetter, Office Suite, Graphics Tools)
Academic Training & Operation Support	<ul style="list-style-type: none"> • Messaging Services • Academic and Research Portal (RePort) • services • OSSI-UTM (Desktop Applications, OS, Training) • Info Repositories ((FTP, Mirrors) • Digital Library (cooperate with PSZ & Penerbit) • IP technology (OSS-based DNS, Radius, • LDAP, NIDS, HIDS, VPN - MAMPU • propaganda/proposition)

4.2.3.2 Infrastructure & Service Division

The goal and objectives of Academic Computing Division as presented at Table 4.3:

Table 4.3: Infrastructure & Service Division goals and objectives

Divisions	Goals	Objectives
Infrastructure & Service Division	<ul style="list-style-type: none"> • To provide latest ICT infrastructure with the optimize cost • To strengthen ICT infrastructure with Integrity. • To make ICT infrastructure available and accessible throughout multiple method 	<ul style="list-style-type: none"> • To strengthen structure and competency of division • To improve ICT infrastructure at UTM • To increase ICT security • To strengthen service quality to the users

While Table 4.4 below represents the units and function at Infrastructure and Service.

Table 4.4: Units and Functions at Infrastructure & Service

Units	Functions
Maintenance and Repair Unit	<ul style="list-style-type: none"> • Infrastructure requirement at UTM Complain and helpdesk service • Technical support (Repair and maintenance) • Virus Support(Anti-virus software)
server, Communication and Security Unit	<ul style="list-style-type: none"> • Main server and Disaster Recovery • Communication and Security

4.2.3.3 Administrative Computing Division

The goal and objectives of Academic Computing Division as presented in Table 4.5 below:

Table 4.5: Goal and objectives of Academic Computing Division

Divisions	Goals	Objectives
Administrative Computing Division	<ul style="list-style-type: none"> •To provide a services that meet users requirement •To develop a application system according to standard •To provide a reliability and secure information •To manage efficiently and centralized information and knowledge •To ensure that system development is secured and safe from hacker problems 	<ul style="list-style-type: none"> • To develop a system that is from mainframe platform to the new platform system • To provide a available system to the entire UTM • To provide a standard or method in system development • To integrate information from different database platform by generate a centralized database • To provide a single sign-on ID with variety of system • To follow government and ICT policy to use an Open-Source Software

Currently, there are four units at Administrative Computing Division. There are

- System Development
- System Maintenance
- Database Management
- Information and Knowledge Management

4.2.3.4 ICT Training and Consultancy Unit

The goal and objectives of ICT Training and Consultancy Unit as presented at Table 4.6:

Table 4.6 Goal and objectives of ICT Training and Consultancy Unit

Divisions	Goals	Objectives
Administrative Computing Division	<ul style="list-style-type: none"> • To become quality and well known training center • To develop a electronic reference online center • To earn income through training and consultancy activities • To train staff and local community to become competence in ICT 	<ul style="list-style-type: none"> • To increase staff competency through staff • To plan training program based on competency • To provide a conducive training place • To provide a training module based on current requirement • To provide an expert instructor • To increase ICT competency to staff and local community

Currently, there are two units in ICT Training and Consultancy, which are Training Unit and Consultancy Unit.

4.2.3.5 ICT Research and Planning Special Unit

Currently, there are three units at ICT Research and Planning Unit, which are IT R&D, Web and Knowledge Management unit and Strategic Planning and Information System Unit.

The goal of ICT Research and Planning Special Unit are:

- Exploring IT technology that can be used for useful application
- Helping problem solution in application development
- To build an effective information dissemination for campus community
- To provide information technology planning as a guide in developing information technology development application.

4.3 Staff's qualification and Environmental analysis

4.3.1 Introduction

In order to have a clear imagine of infrastructure and service department of CICT status, two different questionnaires have been developed by researcher. The first one is for heads of these departments' units and other managers. Unfortunately, one of the top and effective managers did not fill issued questionnaire but other managers had a good transaction and collaboration with the researcher. The second questionnaire is developed for technicians and common staff in this department. The staffs were a lot and the researcher was enforced to select one or two of them from every unit. The results were quite interesting and it was a good roadmap for designing ITIL implementation framework.

4.3.2 Questionnaires Analysis and the results

Major heads of the units in the infrastructure and service department of CICT that they are relative to implementing ITIL have bachelor and their experience in current position is less than 10 years. So, it can be concluded that the heads of the units in the infrastructure and service department of CICT have enough capability for implementing a new standard but their experience is not enough and they need more training.

In addition, according to the questionnaire, the heads of the units agreed with the implementation of a new framework to increase the quality of CICT, IT services. So, it can be concluded that the CICT staffs are ready to accept new behavior in the organization. But the repliers have different viewpoint, on the most helpful methods on acceptance and implementation of ITIL service support in the infrastructure and service department of the CICT. It can be shown in Figure 4.2 that the mid-level managers believe that training and roadmap guideline has more helpful effects on the implementing ITIL service support in the infrastructure and service department of CICT.

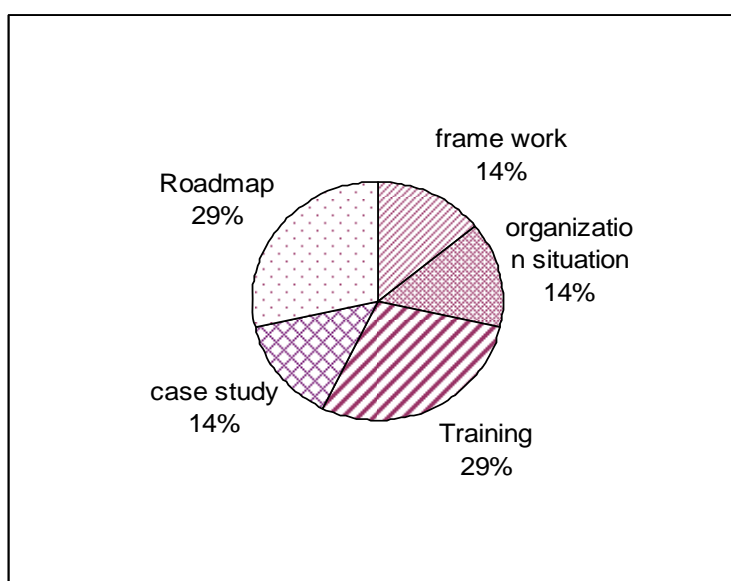


Figure 4.2: Helpful Effects on the implementing ITIL

So project implementers should try to train the staff and use the roadmap that details how ITIL service support can be implemented in the organization and also use a successful ITIL service support implementation case study at university context.

The study shows that the majority of the domain's staffs are familiar with at least one standard or framework. Based on the following diagram (Figure 4.3) 75% of heads of units have experience in implementing standards and 25% of them do not have any experience about that (questionnaire). It can be proposed to have some training class and especially short term workshops to prepare the staff for new framework.

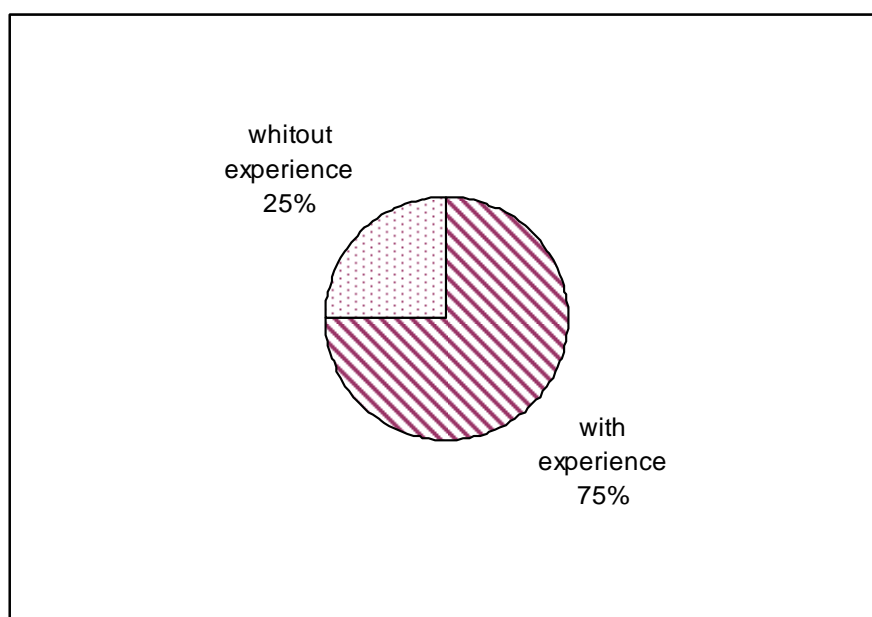


Figure 4.3: Staffs Experiences

Referring to questionnaire all heads of the units are dealt with implementing ITIL service support in their units but they are in the initial stage of implementing this framework and they believe that implementing ITIL service support will increase the quality of IT services in the CICT. The biggest challenge that they are facing to implement this framework is internal resistance (Figure 4.4).

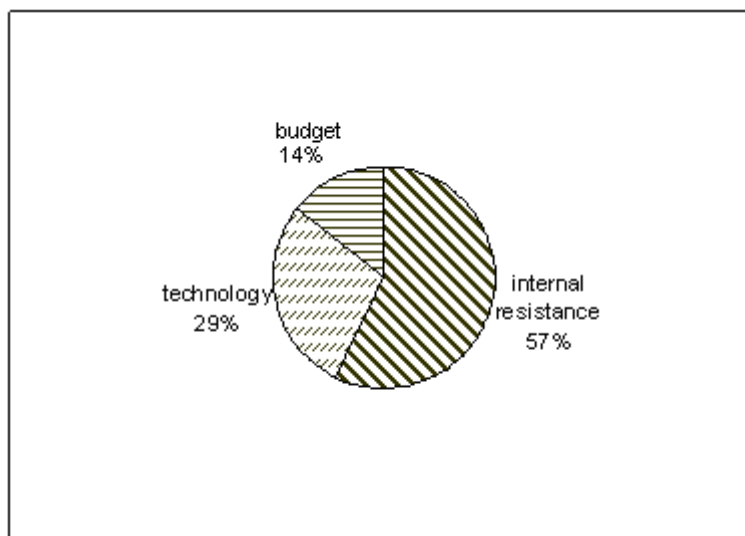


Figure 4.4: ITIL Implementation Problems

Moreover, they believe that the best option for implementing ITIL service support is summarizing all processes of ITIL service support framework in the infrastructure and service department of CICT. (Figure 4.5)

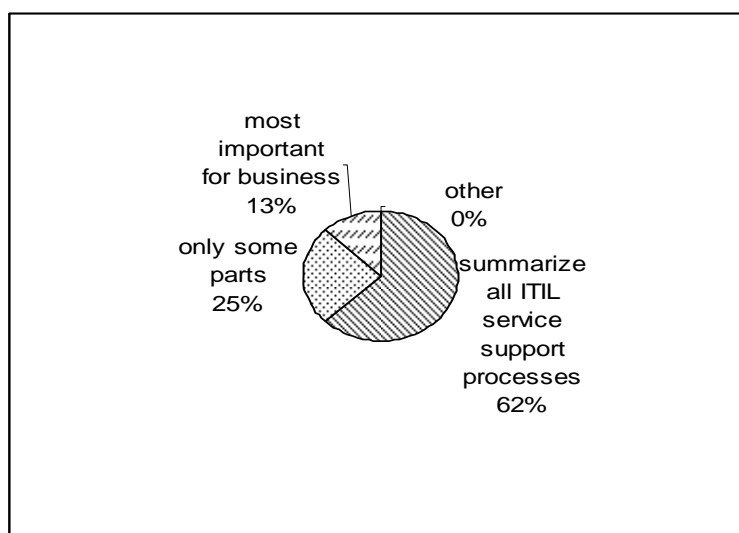


Figure 4.5: ITIL Service Support Implementation Considerations

Based on collected data in the infrastructure and service department of CICT, the majority of technician on the ITIL service support implementation domain are

diploma and their experiences are less than 6 years. They usually record their activities but still some of them are not interested in recording their activities. Moreover, all of them make sense to need a change on their procedures and tasks.

According to the results of the questionnaire 67% of technicians are interested to collaborate with implementing ITIL service support framework and 33% do not have any attract to collaborate with that (Figure 4.6).

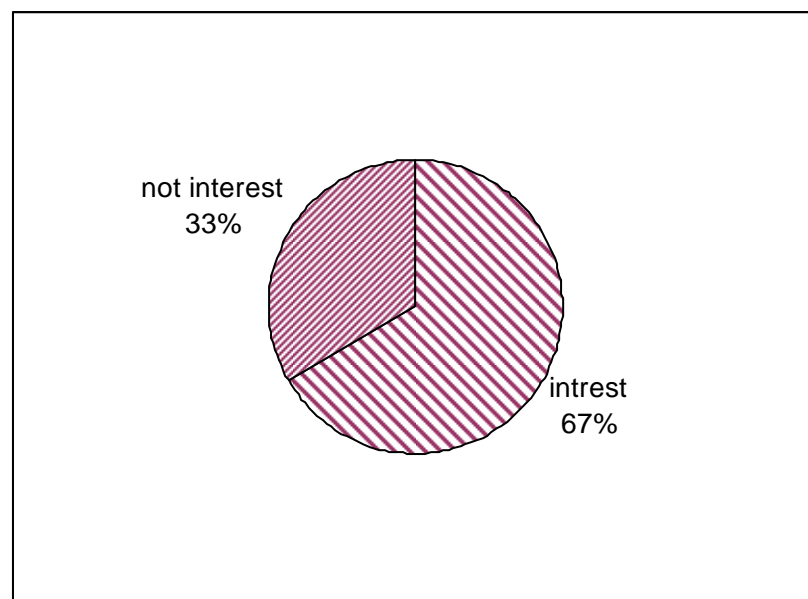


Figure 4.6: Interests of staff

So, there is some prevention to implement ITIL- service support procedures between staffs.

In addition, the study shows Staffs like to use the other staff experiences to solve the problem so it can be concluded that there is a strong relationship between staffs and this is a good chance to be used for making an interest group to share their new experiences in this area.

4.4 As-Is Process

4.4.1 Introduction

As already mentioned, this department consists of four different units which are trying to deliver the best services to the customers whom are staff and students. So, service delivery and service support components of ITIL can play a very important role in the infrastructure and service department of CICT. This department has several different stakeholders who are from business perspective like some of faculties, the customers from student and staff perspective and third parties. This department tries to integrate all perspectives in to the departments' internal processes and as a result this IT center's management is very critical to manage. This department is in level one or two of service oriented organization now and the authorities are trying to target to level three of maturity so in the service oriented organization they defined the service level to the customers. They are trying to achieve that the right technology serves the right process during right time.

4.4.2 Helpdesk (Service desk)

The helpdesk in the infrastructure and service department of CICT is consist of two parts the main part is responsible for recording and answering the incident which all customers send or ask from this unit to take action and second one which is in the technical and support unit and is responsible just for incident related to this unit.

The helpdesk is the main contact point between CICT and customers. The customer -who includes managers, staffs and students of the university- connect to the

main help desk via call, send mail, fax, send complaint to the web site or by the letter and also maybe face to face customer send a report about the incident to the helpdesk.

If helpdesk can solve the users problem, it directly replies the answer to the customer, otherwise the helpdesk records the incident in the ADU@IT system and sends the incident to the related unit and also sends the feedback to the customer.

New and unsolved incident in the ADU@IT system automatically is showed in red color also the system automatically dedicate every incident to respective technician based on sequence.

If the technician of the related unit did not solve the incident, after he received the incident, the helpdesk will call him to ask the cause of the delay and will send the feedback to the customer too.

After solving the incident the technician should write what the cause of this incident was and how he solved it also the color of the incident automatically becomes blue. The helpdesk is responsible to announce the customer and then the process finishes. The specifications of the ADU@IT system include:

- Web base system
- Secure system (just for specific staff and administrate)
- Automatically assign task to technician
- Multilevel users with various access level
- Print out the different period of received incident

The second helpdesk do the action the same as main helpdesk process but just in the technical and support unit (Figure 4.7).

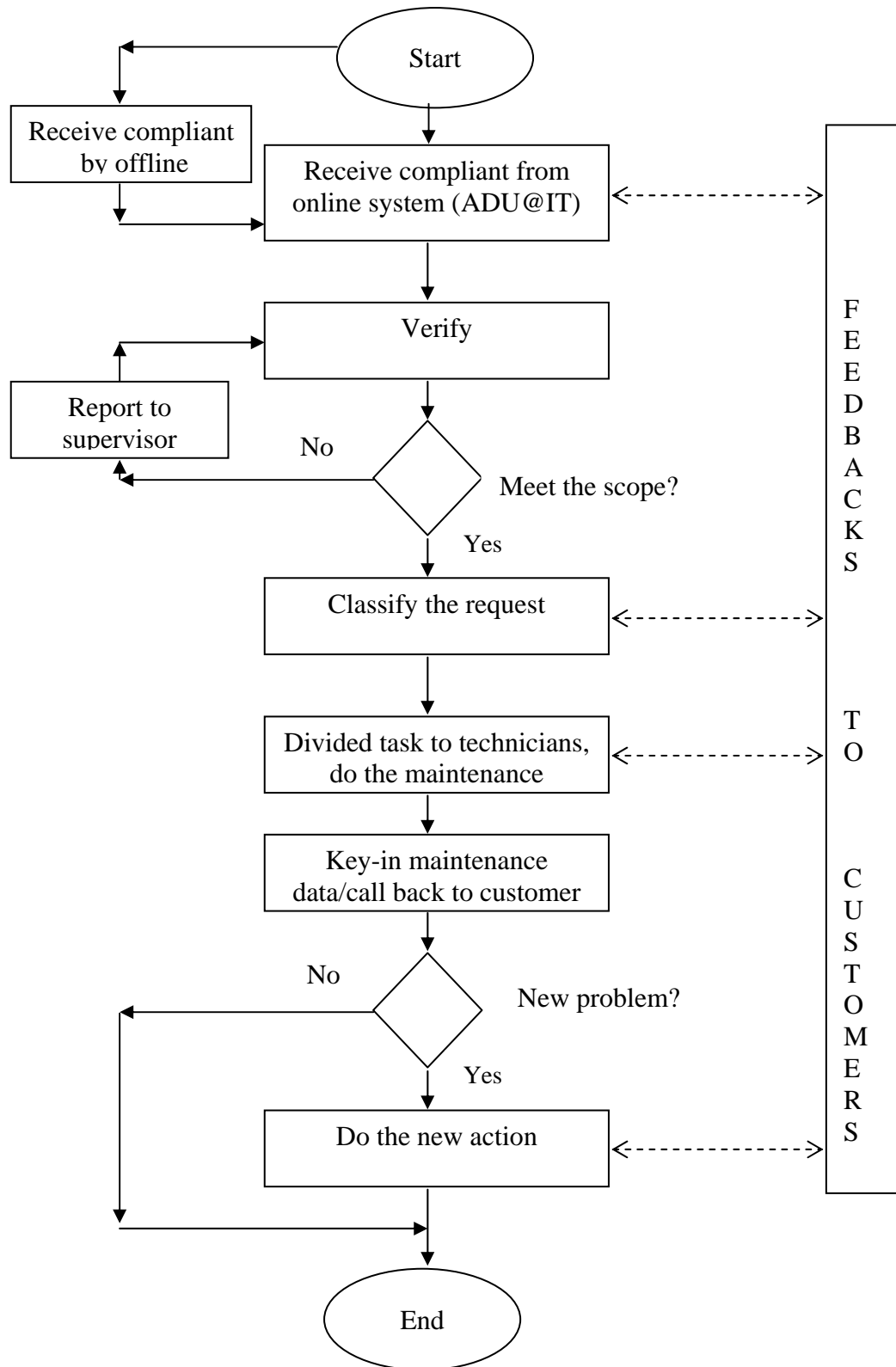


Figure 4.7: ADU@IT system

4.4.3 Incident Management

There are four different units in the infrastructure and service department of CICT. In every unit, every head has its own method to solve the incident and they do not have any special process to follow it. For example, some of them record the result of solved the incident and some of them do not. In addition, there is not any performance assessment for them. However, the details activities of every one of these units are describing here.

4.4.3.1 Network unit

This unit is responsible to manage the network infrastructure in the UTM for both the academic and administration this is including the college network, so the head of this unit has take care of all the equipment that involve the network security and the network management and monitoring.

This is also including the network infrastructure cabling and the network wireless in the college area.

When an incident happens which is related to this unit the helpdesk sends the incident to this unit via mail, call or sometimes by the letter to the head of this unit when the head saw the report about the incident send technician to solve the incident and want them to send the report that what the incident was and how they solved this incident.

Some times the customer directly sends the incident to the head of the unit and he tries to solve the problem. In that case, the head does not send the report to the helpdesk and just collects the report as a document for himself. If the technician delays to solve a problem, the head of the unit will ask him about the cause.

4.4.3.2 Main server unit

This unit is responsible for maintaining main servers, application servers, data server and other servers that are related to the university.

When an incident happens which is related to this unit, the helpdesk sends the incident to this unit by mail, call or sometimes by the letter to the head of this unit.

The head of the main server unit is responsible to solve the incident so he sends the incident to his technician and monitors them. If they don't solve the incident, he will inform the helpdesk and also he will express the problem to executive committee which is included of the head of the units, the head of the departments, head of the CICT and they will decide about that problem.

4.4.3.3 Infrastructure and service unit

This unit has its own helpdesk that the customer directly connects to it and reports the incident to the helpdesk which is maybe by e-mail, call or letter and also the main helpdesk sends the incident which is related to this unit to the helpdesk of

the technical and service unit this helpdesk also has its own system that sends every incident to the technician and the helpdesk records the incident and will complete the report after solving the incident.

4.5 Summary

The overall situation of current status of the infrastructure and service department of CICT can be shown in a table as below (Table 4.7).

Table 4.7 Current status of the Infrastructure and Service Department of CICT

NO.	Title	What is the problem?	What is command for it?(propose)
1.	Cultural Resistance(Internal Resistance)	57% of the staff do not want collaborate with new framework	Make an interest group
2.	Lack of knowledge and experience	25% of staff do not have experience on implementing any framework	Staff training such as : workshop, training meeting and class
3.	Lack of process	There is not any proper and well known procedure	A process flow that proposed in this project
4.	Helpdesk	There are two helpdesk on the organization now	It should be one main helpdesk
5.	Lack of activity recording culture	Some staff don't record their activity	Every person must record his activity
6.	Lack of ITIL concept	There is not any proper ITIL concept for the scope	Develop ITIL service support process flows for the CICT system

CHAPTER 5

PROPOSED FRAMEWORK

5.1 Introduction

This chapter takes close view at the proposed ITIL service support framework for Infrastructure and Service Department of CICT.

There are several frameworks which are developed by companies such as, Microsoft Operations Framework (MOF) from Microsoft, Hewlett Packard IT service management (HP ITSM) from HP and IBM's Systems Management Solution Lifecycle (SMSL) from IBM. The best framework that can be proposed for CICT departments is MOF because, although this framework is Microsoft production based but it is iterative and adaptable framework with current structure of CICT organization. In addition, Queensland University of Technology (QUT) selected as a case study benchmark because at first both of them have same context, university based, and their focus is only on service support processes of ITIL framework.

However, the proposed ITIL framework which will be presented here, is consists of four different phases with their processes and activities. The analysis and

observation of the infrastructure and service department of CICT environment helped to try to propose the best match and fit framework for this department.

5.1.1 Microsoft Operations Framework (MOF)

MOF is one of the several organization frameworks that have been developed by Microsoft which focuses on supporting the complete IT lifecycle. Microsoft has distinguished phases in this lifecycle for Planning, Preparation, Building and Deployment and Operations that is applicable with CICT organization.

The MOF can best be described as a set of models, guidelines, and best practices. The similarities with ITIL are striking especially MOF process model shown in the Figure 5.1.

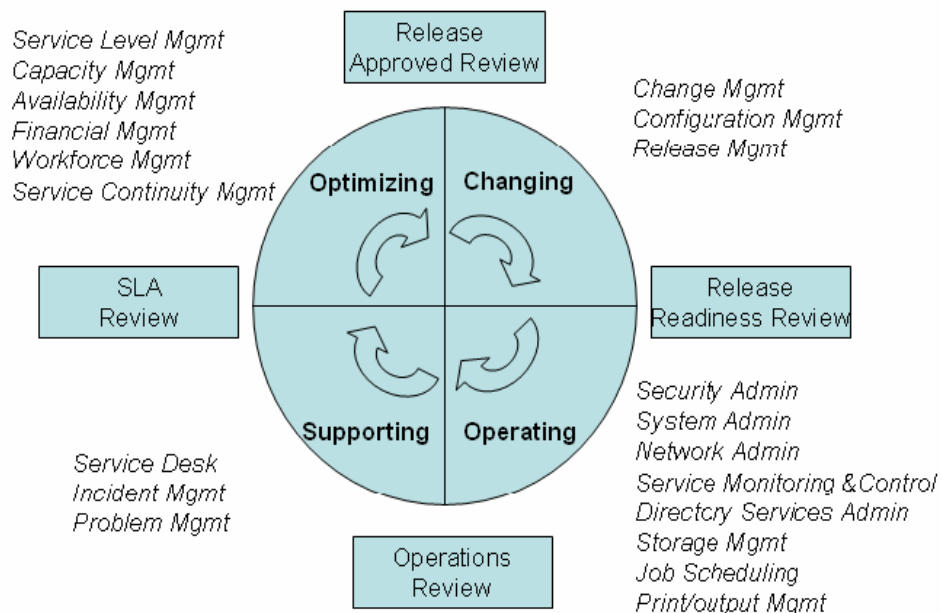


Figure 5.1: MOF Process Model (Van Bon, 2002)

Service delivery and Service support processes in ITIL are called as Service management Functions (SMFs) in MOF. There are few changes made in MOF, which basically extends ITIL and hence making contributions to IT service management. This research focus is on service support. The researcher catches revelation from MOF process model to develop proposed ITIL framework because this framework is iterative and also easy to understanding framework for current situation of CICT organization.

5.1.2 Queensland University of Technology (QUT) case study

The aim of implementing ITIL has been to have an effective and efficient organization to manage and respond to the different risks faced by the IT infrastructure within QUT (McCormack, 2004). In QUT, one of the most critical objectives of ITIL implementation was to prepare the environment for change. QUT organizational structure is based on devolved structure with 30 discrete IT areas supporting nine faculties and six divisions for 3,300 staff and 40,000 students.

The more and less situation can be seen at the infrastructure and service department of CICT. The major effort is prepare the environment for change. This department is responsible for maintenance and manage IT stuff in the university. For QUT, ITIL implementation was aimed twofold: firstly to be able to propagate to every devolving corner and secondly be simple enough to be understood by each member of IT staff (almost 300 staff). The implementation was initiated based on the review of the current situation and the identified gaps in the current systems. The infrastructure and service department of CICT decides to manage all IT connections especially Human Resource based in the university. Moreover, there is a need to have new enhanced ITIL based tool to settle the IT problems in this scope.

5.2 Proposed ITIL framework

5.2.1 Introduction

This proposed ITIL framework is consisting of four phases. The first phase is pre-implementation phase which describes the cultural issues of changing new environment. This phase tries to describe the prerequisites that are needed to increase interest and knowledge of the scope's staff. The second phase is focus on Helpdesk Process and Incident Management Implementation in the infrastructure and service department of CICT. The third phase is describing Problem Management Implementation and the last phase is focus on change management and release management. Configuration Management is the heart of this proposed framework that manages Configuration Management Data Base and it will be made during all four phases with incremental approach.

This department currently has an ADU@IT system to manage received incidents to this department. In addition the managers do not have any interest to new proposed ITIL framework (ITIL ver 3.0). They just expect a real process and system that can solve their current problems. As a result, they focus on ITIL- service support component of ITIL ver2.

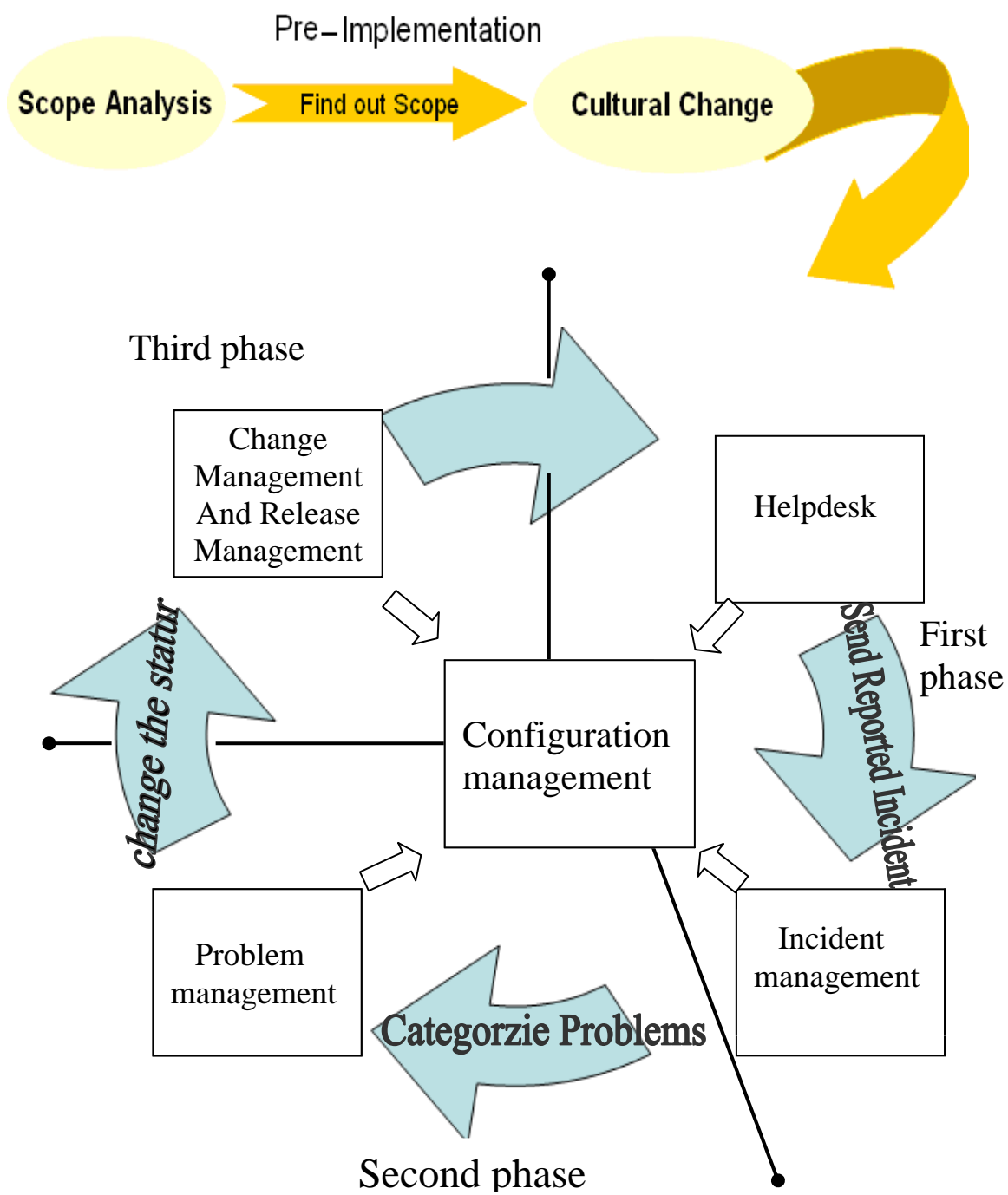


Figure 5.1: Proposed ITIL Framework,CICT

5.2.2 Pre-Implementation Phase

5.2.2.1 Introduction

This phase starts with scope definition. Then it focuses on cultural issues on ITIL implementation. After that it suggests a Workgroup to share founded experiences with other staff and put some workshops and classes to increase knowledge and interests of them.

5.2.2.2 Scope definition

Every project starts with a procurement document that one of the most important parts of it is scope definition. Scope definition is very important because it shows how big the project is; which parts of organization should be dealt with project and how many persons should be involved from the organization in the project. Therefore at first, implementer must define the scope of the project .It means project analyzers should analysis the organization and define project bounders. The analyzers should try to find out the key power users in the organization. Key power users are including:

- Managers who have major power in the organization
- Middle managers in the scope
- The most active and interested worker or staff who interest to collaborate with project

Success or fail on the project completely depends on good relationship with key power users. Some times during ITIL-service support implementation top managers or project implementers should consider some advantages and facilities for

key power users who collaborate on the project. However, key power users' responsibilities and commitment is very important during project initiation until it finishes.

5.2.2.3 Cultural change

After this process next big challenge appears. It is cultural change in the organization's scope. The staff of the organization must accept the new situation and follow it till the implementation of the new framework becomes successfully completed. Head of the Infrastructure and service department of CICT believes that, staffs commitment is very hard in the governmental organizations. Because the governmental staffs have their fix position and more or less same salary .It means that if they work very hard or if they just do their common activities they will earn same income. As a result, they do not have any interest to change their behavior in the organizations. They prefer to perform only their obligations responsibilities not the extra tasks therefore here there is a big challenge for the organizations especially for the organizations' managers to involve them into the changing environment.

UTM University is a governmental organization which has the same situation. CICT is a smaller case that its senior staffs have no any interest to comply with new technologies such as ITIL framework. So, it is better to prepare the scope's staff of this department before doing any change on their roles and activities and also prepare a suitable plan for implement a new framework. Therefore, it can not be suggested to implement a new framework with big bang approach and definitely this approach will actuate the project in to fail.

So, researcher's suggestion to prepare the ITIL- service support framework for infrastructure and service department of CICT is, at first find out the focus of the project. The aim of finding the key power users in the infrastructure and service department of CICT is to help project implementers to become more familiar with

the organization. Moreover, they should make an interest group that can collaborate with ITIL service support implementers to implement this framework in the infrastructure and service department of CICT. This group should have voluntary members from the staffs of the scope.

There is one exception, here. Usually the new or refresh staffs are more interested in implement the new technologies and frameworks, because they still do not adopt with the current system or they have more knowledge compare with senior staffs about new opportunities. So, their tasks and responsibilities can be changed faster than others. It is better that project researcher start to implement ITIL service support with this group and this group should be responsible to encourage them to joint into their group to share their knowledge and experiences. In addition, project managers can use their experiences and suggestions for better implement ITIL-service support in the infrastructure and service department of CICT because these staffs have close relationship with the other staffs and they can help to better implement ITIL-service support in the infrastructure and service department of CICT.

It seams, it is better to hire external consultants to collaborate with this department to implement ITIL- service support framework and related activates in the infrastructure and service department of CICT in order to increase successfully rate of project.

5.2.2.4 Making Workgroup from interest participants

Based on the experience of QUT case study, it is very beneficial to make a special interest group to introduce ITIL service support to other staff and encourage others to join to this group when they see the benefits of ITIL service support

framework during their common activities. It is better to make virtual environment such as IT service management user group or special e-mail list to collect interested staff and use their experiences in a collaborative manner.

This special interest group should be remain active and driven by the project manager until ITIL service support implementation successfully completed and organization became enough matured.

5.2.2.5 Adoption Factors

Based on the observations it can be proposed that the implementation should be initiated based on the review of the current situation of CICT infrastructure and service department and the decertified gaps in the current systems.

Organizationally, ITIL service support emerged as the optimum choice facilitating the need for generic framework for all IT areas in the infrastructure and service department of CICT independent of the technology, which was well provided by ITIL- service support. Secondly, ITIL service support provided enough details to cover fully the requirements for self-assessment benchmarks. Thirdly, ITIL service support was simple enough to be distributed and adopted easily by around 30 IT staffs.

Technologically, based on the interviews, head of infrastructure and service department of CICT felt a need to improve operational responsiveness and environmentally could be able to deal with environmental threats such as risks and vulnerability assessments.

5.2.2.6 Staff Training

Implementation of ITIL- service support should be started with the support of key power users of the CICT infrastructure and service department. It can be estimated that key power users in this department are around 7 staffs. According to the special questionnaire for key power users, they believe that training and roadmap guideline has more helpful effects on the implementing ITIL service support in the infrastructure and service department of CICT.

5.2.2.7 Configuration Management

5.2.2.7.1 Introduction

OGC(2005) claims that the objective of configuration management is to assist with managing the economic value of the IT services by maintaining a logical model of the infrastructure and IT services , and providing information about them to other business processes. So, it can be concluded that configuration management could be has two objectives for this department deepening reliable records of details of IT components and services provided by the organization and providing accurate information and documentation to support the other service management processes. This process is an incremental activity in this proposed framework and it should be completed during every phase time to time to have a comprehensive database at the end of this framework implementation. So, this process will be defined here and then it will be completed and described during every processes of ITIL-service support framework.

5.2.2.7.2 Process activities

This process is heart of ITIL-service support framework in infrastructure and service department of CICT. So, it is too important to have a strong process to plan, design and implement configuration management as a part of ADU@IT system. Based on best experiences of OGC (2000); QUT (2005) university, this process should include these activities:

- **Planning:** to determine the strategy, policy and objectives of the process, analysis of available information, identifying tools and resources, creating interfaces with other processes, projects and suppliers in the infrastructure and service department of CICT.
- **Identification:** to set up the processes to keep the database up-to-date. The activities should include developing a data model for recording all IT infrastructure components, the relationships between them and information about their owner or person responsible for them, status and available documentation. It is better to be developed some procedures for new Configuration Items (CI's) and for change to CI's. As the demands for information are changing continuously, the identification of configuration data is also changing continuously.
- **Control:** to ensure that the Configuration Management Data Base (CMDB) is always up-to-date by only admitting; recording and monitoring authorized and identified CI's. Control activity should be ensured that no CI is added, changed replaced or removed without appropriate documentation, such as an approved RFC with an updated specification.
- **Status accounting:** to store current and historical detail about the status of CI's during their life cycle. Status monitoring can be used to identify changes in the status such as under development , 'being tested', 'stock', 'live use' and 'phased out'.
- **Verification:** to verify the CMDB by audits of the IT infrastructure in order to confirm the existence of recorded CI's.

- Reporting: to provide information to other processes and reports about the trends and developments in the use of CI's. Figure 5.2 shows the activities of Configuration Management and table 5.1 describes the complete details of this process.

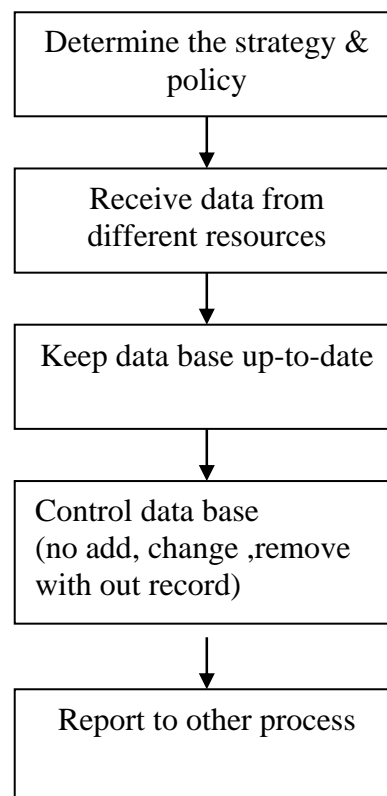



Figure 5.2 Configuration Management Activities

Table 5.1: Configuration Management Process

 <p style="text-align: center;">CICT</p>	<p>Document Title: Configuration Management</p> <p>Document Number: ISD-03</p>	<p>Page Number:1 From:1 Ver :1.0 Last Update:1/8/2008</p>
<p>1.0 Objective:</p> <ul style="list-style-type: none"> • To record all incidents, Hardware and Software staff in the organization as CI • To provide accurate information and documentation to support the other service management processes <p>2.0 Scope:</p> <ul style="list-style-type: none"> • All units of infrastructure and service department of CICT <p>3.0 Terminology:</p> <ul style="list-style-type: none"> • CI: This is stand of Configuration Item and refers to any staff in the scope • CMDB: This is stand of Configuration Management Data Base and refers to database of the system <p>4.0 Process Flow Details:</p> <p>4.1 Determining the strategy, policy and objectives of the CICT related to this subject</p> <p>4.2 Analyzing of the available information, identifying resources, and creating interfaces with other processes, projects and suppliers in the infrastructure and service department of CICT.</p> <p>4.3 Identifying the set of the processes to keep the database up-to-date. And developed some procedures for new Configuration Items (CI's) and for change to CI's.</p> <p>4.4 Keeping CMDB always up-to-date by only admitting; recording and monitoring authorized and identified CI's.</p>		

4.5 Controlling the activities to be ensured that no CI is added, changed, replaced or removed without appropriate documentation.

4.6 Status accounting of the current and historical detail about the status of CI's during their life cycle.

4.7 Verification of the CMDB by audits of the IT infrastructure in order to confirm the existence of recorded CI's.

4.8 Reporting information to other processes about the trends and developments in the use of CI's.

5.0 KPI's :

- Time that needed to process a request for recording information
- Number of observed differences between the records and the situation found during an audit
- Number of occasions on which a CI was found to be unauthorized
- Number of occasions on which a recorded CI could not be located
- Statistical information about the structure and composition of the IT infrastructure

6.0 Actor

There is no any specific staff to manage and record these above activities. Every one of the staff in the scope of work should input, trace and up-to-date their tasks time to time. Another office should be responsible to audit this process activities time to time.

5.2.2.7.3 CMDB and CI's

There should be a comprehensive database at ADU@IT system to record all information from the financial records and existing IT infrastructure records,

supplemented with technical data from suppliers. Every item in CMDB is called CI, based on ITIL framework. For every CI some information such as below should be recorded: new CI status include in development status, tested or accepted; existing CI information such as recorded, RFC open for every CI; archived CI such as phased out, removed ,stolen, expired and destroyed.

5.2.2.8 ADU@ITIL system Effectiveness

The critical factor to have a successful ADU@IT system is that the database should be up-to-date all the times. When introducing ADU@IT system, it can be suggested that the implementation of ADU@IT system divided in to some stages. It is better to do not introduce extensive scopes of ADU@IT system at once because the infrastructure and service department of CICT can not cope with it. The records maintained before the introduction of the process should be phased out to prevent duplication. When introducing the process, it is important to promote some clear benefits of ADU@IT system until the staffs can see the advantages of using this process very quickly and this encourages the staffs to use the ADU@IT system.

Some performance indicators that should be available after implementing ADU@IT system are: Information about the quality of the process; time needed to process a request for recording information; number of observed differences between the records and the situation found during an audit; number of occasions on which a CI was found to be unauthorized; number of occasions on which a recorded CI could not be located; statistical information about the structure and composition of the IT infrastructure.

5.3 First Phase: Helpdesk Process and Incident Management Implementation

5.3.1 Introduction

During this phase two very dependent processes should be implemented which are helpdesk and incident management. The main table to receive all complains is helpdesk that it tries to manage these complains and then send them to respective incident manager in every unit.

5.3.2 Helpdesk Process Implementation

5.3.2.1 Introduction

The first actual ITIL-service support process that should be implemented is Helpdesk process in the infrastructure and service department of CICT. This process should be implemented after implementing the Pre-Implantation phase in the department; the organization is ready for implementing the next step of the ITIL service support implementation. At present, there are two helpdesks in this department .the first one is the main helpdesk that is responsible for answering to the all customers, record the incidents, send the incidents to the related units, tracking and send feedbacks to the customers. In addition, some times they solve incident directly without recording it. The second helpdesk belongs to the technical and service unit and the process of this helpdesk is the same with main helpdesk but in the small scale. In order to achieve the desired helpdesk implementer should be able to implement a complete main helpdesk, it means eliminating the second helpdesk in the technical and service unit and integrating all activities in one major helpdesk It can be said that the benefit of this change is to have an integrate helpdesk as only

main contact to receive, monitor and control all incidents and prevent from time consuming and also reworking in the infrastructure and service department of CICT.

Helpdesk personnel requirement should be three person two person who are responsible for answering the customers requests, record the incidents and send the incident to the related unit and one person as a supervisor to monitor the helpdesk staffs activities , track the incident and send feed back to the customers also send the report to the manager.

5.3.2.2 Helpdesk activities

The major activities that should be done during this process can be proposed as below:

- Responding to calls and recording the incident

All calls should be logged to facilitate progress monitoring and provide metrics for process control and all incidents should be recorded in the ADU@IT system. The helpdesk should try to reply to the customers (fire fighting).

- Reporting to incident management

If the helpdesk can not solve the incident, send it to incident management of every unit. And send feedback to the customer.

- Providing information

The helpdesk should be serving as the main source of information to users. All efforts should be made to inform users about current or expected errors.

- Reporting to Managers

The helpdesk should be regularly sending a report to head of infrastructure and service department of CICT. This report should include percentage of incidents closed without resorting by other units; the number of calls handled per month;

average incident resolution time. Figure 5.3 shows the activities of Helpdesk and table 5.2 describes the complete details of this process.

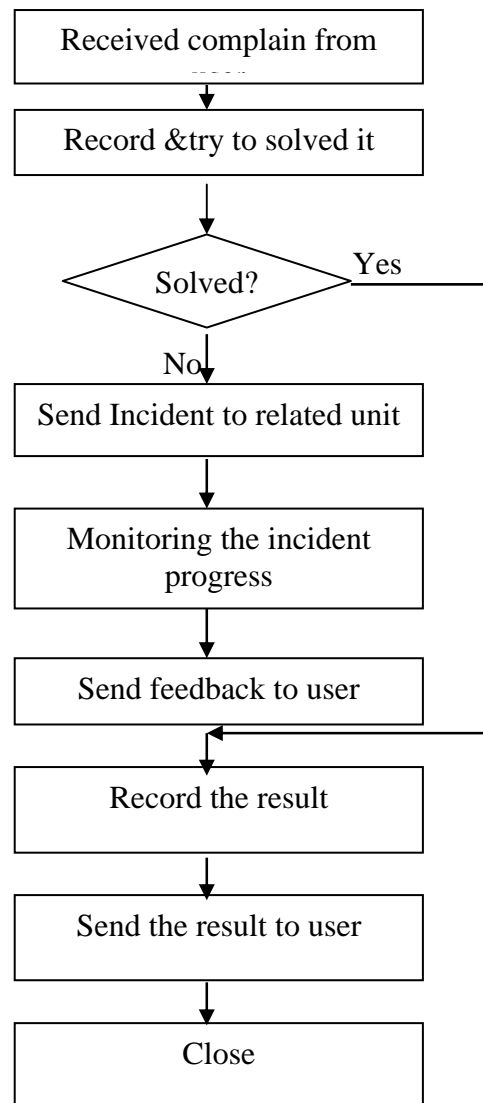



Figure5.3: Helpdesk Activities

Table 5.2: Helpdesk Process

 <p style="text-align: center;">CICT</p>	<p>Document Title: Helpdesk process</p> <p>Document Number: ISD-01</p>	<p>Page Number:1 From:1 Ver :1.0 Last Update:1/8/2008</p>
<p>1.0 Objective:</p> <ul style="list-style-type: none"> • To solve minor complains of the users • To manage the incidents and send them to related unit • To monitor the status of received complains in the organization <p>2.0 Scope:</p> <ul style="list-style-type: none"> • Four units inside the Infrastructure and service department of CICT <p>3.0 Terminology:</p> <ul style="list-style-type: none"> • Complain: Any request from staff and students in the system • Incident: The received complain in the ITIL concept calls Incident • Helpdesk: A system which is includes a tool to receive and record the incidents and manage them. <p>4.0 Helpdesk activities:</p> <p>4.1 Receiving the complains and recording them as incident</p> <p>4.2 Reporting the incident to related unit</p> <p>4.3 Providing information to the users about current or expected errors</p> <p>4.4 Reporting to the head of the department monthly</p> <p>5.0 KPI's/CSF's:</p>		

- Is the telephone or e-mail answered quickly?
- Is the service restored within an acceptable time?
- Are the customers given good advice?

6.0 Actor

- The help desk staff to manage the incidents and send them to related unit
- Supervisor to monitor the incidents and report to managers

5.3.2.3 Helpdesk Effectiveness

Some considerations should be seen by managers to measure the efficiency of helpdesk the major key performance indicators can be as below:

- Is the telephone or e-mail answered quickly?
- Is the service restored within an acceptable time?
- Are the customers given good advice?

5.3.3 Incident Management Implementation

5.3.3.1 Introduction

The infrastructure and service department of CICT has four units therefore; every unit of this department should have four distinct incidents management. At present incident management in this department is fire fighting based it means once an incident received to one of these units, there is no any dedicated person to manage and solve the incident.

In every unit, every head has its own method to solve the incident and they do not have any special process to follow it. In this framework the researcher tries to propose a standard process based on the best practices suggested by OGC (2000). Implementation of ITIL service support in the infrastructure and service department of CICT clearly will have some benefits such as more timely resolution incident, improve monitoring, better and more efficient use of personnel, no lost or incorrectly registered incidents and service request and improve users and customers satisfaction.

5.3.3.2 Incident Management Activities

When the Helpdesk send the related incident to the incident management in related unit, incident manager should be responsible to try solving the incident .It is better that incident manager follow these steps, at first, incident manager should classify the received incident by type, status, impact, urgency and priority . Incident classification aims to determine the incident category to facilitate monitoring and reporting.

Second, check to see if the incident is known or there is a solution, using it directly and immediately to resolve the incident. Else the person in charge should try to investigate the incident or send it to the technicians in the unit and ask them to solve it. After they solve the incident and find the cause of it the incident manager responsible to record the cause of incident and also the solution of it to the ADU@IT system (as configuration management system) and the incident will be closed. When incident management diagnosis same cause for some of the recorded incidents it should send them to the problem management as a problem and also record the problem to the ADU@IT system.

The entire incident cycle should be monitored by helpdesk, in this process the helpdesk supervisor is responsible for progress monitoring and for informing the user about the statuses of their incident and activities of technician should be monitored by incident manager. Figure 5.4 shows the activities of Incident Management and table 5.3 describes the complete details of this process.

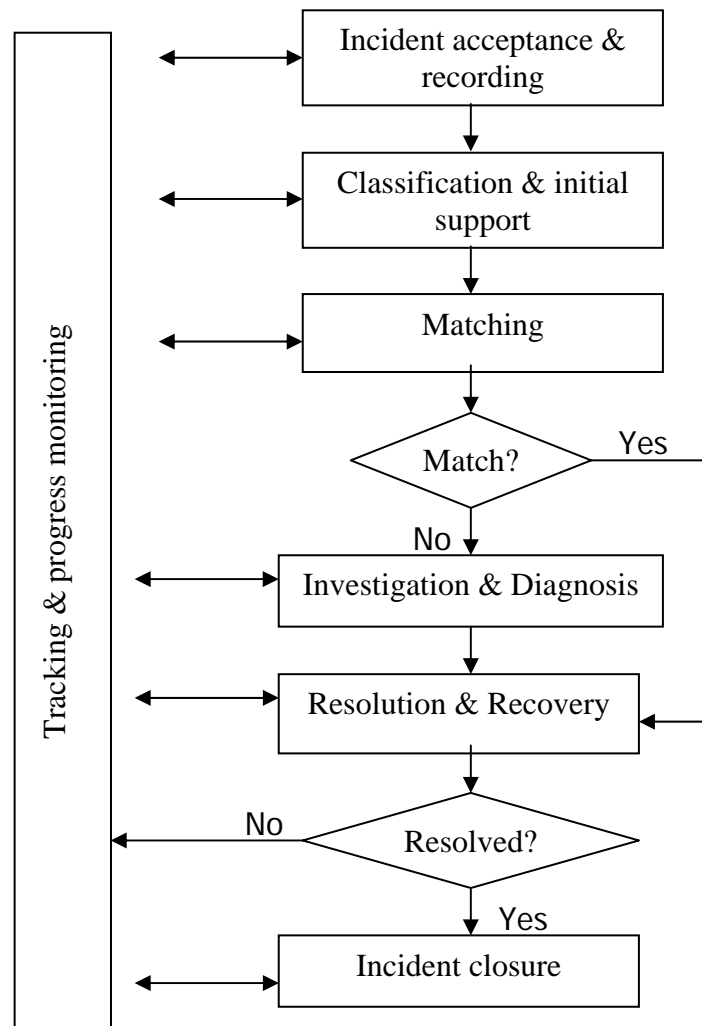



Figure 5.4: Incident Management Activities

Table 5.3: Incident Management Process

 <p style="text-align: center;">CICT</p>	<p>Document Title: Incident Management</p> <p>Document Number:ISD-02</p>	<p>Page Number:1 From:1 Ver :1.0 Last Update:1/8/2008</p>
<p>1.0 Objective:</p> <ul style="list-style-type: none"> • To fire fight any incident received from helpdesk <p>2.0 Scope:</p> <ul style="list-style-type: none"> • every unit of infrastructure and service department of CICT department <p>3.0 Terminology:</p> <ul style="list-style-type: none"> • Firefight: Try to solve the received incident as much fast as unit can • Problem: Several incidents with same cause <p>4.0 Helpdesk activities:</p> <p>4.1 classifying the received incident by type, status, impact, urgency and priority</p> <p>4.2 checking to see if the incident is known or there is a solution, using it directly and immediately to resolve the incident, else the person in charge should try to investigate the incident or send it to the technicians in the unit and ask them to solve it.</p> <p>4.3 Announcing the result to the helpdesk</p> <p>4.3 Recording the result of the received incident in the database</p> <p>4.0 KPI's:</p> <ul style="list-style-type: none"> • Incidents resort by technician in the unit without visiting the user • The number of incident that rotted correctly during special period • The total number of incidents per month • The average resolution time per month 		

5.0 Actor

- The head of the every unit to receive, forecast the tasks between technicians and check their status
- The technicians to trace the incident and solve them

5.3.3.3 Incident Management Effectiveness

In order to make sure that incident management is successful, CICT infrastructure and service department authorities should have an up-to-date ADU@IT system to help estimate the impact and urgency of incidents; an adequate automated system for recording, tracking and monitoring incidents.

In addition, the author of this thesis suggest the below indicators and parameters in proposed framework. Incidents solved by technician in the unit without visiting the user; the number of incidents per month; average resolution time per month.

The responsibility of incident manager in every units in infrastructure and service department of CICT is monitoring the effectiveness and efficiency of the process; controlling the work of the technicians in that unit making recommendations for improvement and also developing and maintaining the incident management system.

5.4 Second phase: Problem Management Implementation

5.4.1 Introduction

The infrastructure and service department of CICT has four different units. During last phase implementation, for every unit a different incident management process implemented. After incident investigation by every unit the incidents with same causes should be categorize to find out a comprehensive solution for them. These kinds of incidents calls problem. So, the objective of this process implementation is to resolve the underlying root cause of incidents and consequently prevent incidents from recurring. If this process implemented very well, there will be no more incidents in future. There should be a dedicated person in every unit of this department to be responsible for this process.

5.4.2 Process activities

The problem management process is a reactive process that aims to identify the root cause of past incidents and presents proposals for improvement or rectification.

The inputs of the problem management should be this information: incident details, supplier details about the products used in the infrastructure, including technical details and known errors within those products.

Moreover, from the AUD@IT system should be extracted the configuration details from the respective data base. The major activities during this process that the person in charge should do them are:

- Problem control: defining, investigating and diagnosing the problem to transform it to known error.
- Error control: monitoring and controlling known errors to resolving them structurally through the Change Management Process.
- Proactive Problem Management: preventing avoidable incidents by improving the infrastructure and raising Request For Change (RFC).
- Providing information and reports for head of infrastructure and service department.

The outputs of this process should be a data base which can be part of ADU@IT system; A Request For Change (RFC) and a report to infrastructure and service department. Figure 5.5 shows the activities of Problem Management and table 5.4 describes the complete details of this process.

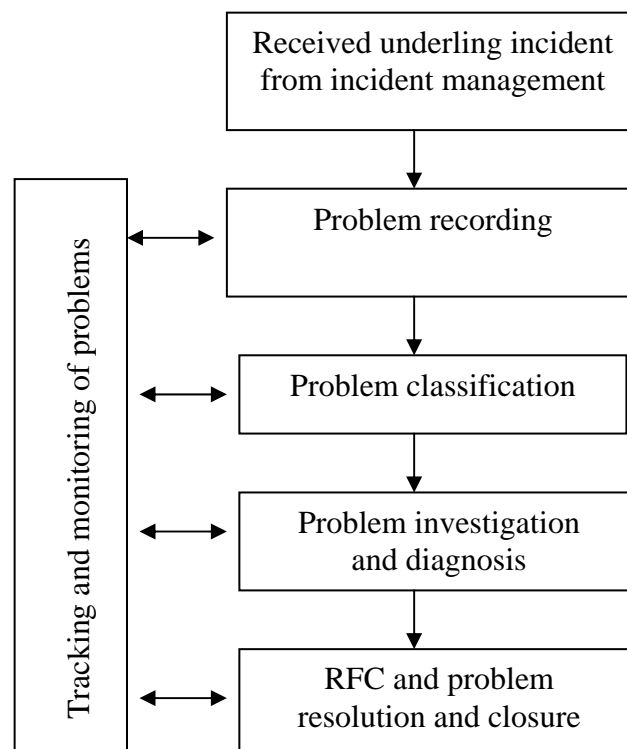



Figure 5.5: Problem Management Activities

Table 5.4: Problem Management Process

 <p style="text-align: center;">CICT</p>	<p>Document Title:</p> <p>Problem Management</p> <p>Document Number:ISD-04</p>	<p>Page Number:1</p> <p>From:1</p> <p>Ver :1.0</p> <p>Last Update:1/8/2008</p>
<p>1.0 Objective:</p> <ul style="list-style-type: none"> • Resolve the underlying root cause of incidents and consequently prevent incidents from recurring <p>2.0 Scope:</p> <ul style="list-style-type: none"> • All units of infrastructure and service department of CICT <p>3.0 Terminology:</p> <ul style="list-style-type: none"> • Executive Committee: The committee board which is include heads of units, head of department and person in charge for particular problem • RFC that is stand of Request For Change and this is a request form that should be send to change management <p>4.0 Process Flow Details:</p> <p>4.1 Receiving inputs from incident management which includes incident details</p> <p>4.2 Extracting the configuration details from the respective data base</p> <p>4.3 Controlling Problem which includes defining, investigating and diagnosing the problem to transform it to known error.</p> <p>4.4 Controlling Error which includes monitoring and controlling known errors to resolving them structurally through the Change Management Process.</p> <p>4.5 Problem Management Reactivation that tries to prevent avoidable incidents by improving the infrastructure and raising RFC</p>		

4.6 Providing information and reports for head of infrastructure and service department

5.0 KPI's:

- Have well-defined process framework and set of process objectives and resources
- % of problems with a root cause identified for the failure
- Percentage of problems resolved within the required time period.
- Average amount of time (e.g. in days) between the registration of problems and their closure.
- The number of problems closed, relative to the number of problems opened in a given time period. So if the actual value for this KPI is less than 1, the volume of problems in the backlog is growing.

6.0 Actor

- Executive committee is the actor that plays key role to investigate the problem and try to define it. Depends on the problem they should decide to dedicate a person to flow the proper activities to solve the problem and report the result to executive committee.

5.4.3 Critical Success Factors

In order to have a successful problem management process in the CICT infrastructure and service department, a well-defined process framework and set of process objectives and resources, a set of comprehensive and well-documented procedures and comprehensive data from incident management, helpdesk and ADU@IT system is needed.

5.4.4 Problem Manager Responsibilities

The problem manager in the CICT infrastructure and service department should be responsible for developing and maintaining problem management processes; obtaining the resources for activities; resolving the known problems and reporting them and analyzing and evaluating the effectiveness of problem management activities.

5.5 Third phase: Change Management Implementation

5.5.1 Introduction

The OGC (2000) claims that objective of Change management are to ensure that standard methods and procedures are used with the lowest possible impact on service quality. It is clear that this process is able to reduce adverse impact of changes on the quality of IT services and improved user productivity through more stable and better IT services. In addition, the OGC (2000) claims that objective of release management are planning, coordinating and implementing of software and hardware ; designing and implementing efficient procedures for the distribution and installation of changes to IT system; ensuring that the hardware and software related to changes are traceable , securing that only correctly authorized and tested versions are installed; communicating with users and considering their expectations during the planning and rollout of new releases; determining the composition and planning of a rollout , together with change management; Implementing new software release and hardware in the operational infrastructure ,under control of change management and supported by configuration management. A release may include any number of related CI's not only hardware and software, but also documentation such as reports, plans and user and support manuals; Ensuring that the original copies of software are

securely stored in the definitive software library (DSL) and that the CMDB is updated. The same applies with respect to the hardware in the DHS.

5.5.2 Process Activities

Once the RFC came from problem management of every unit of the infrastructure and service department of CICT, there should be a Change Advisory Board (CAB) or executive committee to decide RFC should be rejected or accepted. The members of CAB should be at least including: heads of every units, head or representative of the infrastructure and service department and representative of dean of CICT. Some times it is suggested that they ask consumers to send their own representatives. Moreover, the representative of ADU@IT system should be able to provide information about the potential impact of the proposed change.

The inputs for this process should be some reports and information like RFC's, ADU@IT information, financial and etc. Then, this information will be discussed during CAB meetings. The members should be ensuring that all resources for change are available. Then the RFC's should be categorized and prioritized. After that, they should plan and approve their development and implementation of respective RFC. Then coordination and implementing of the change should be done. At the end the change should be evaluated that it has been successful or not.

The output of this process should be an updated change planning, reports to ADU@IT system and release management process and change management reports. Figure 5.6 shows the activities of change Management and table 5.5 describes the complete details of this process.

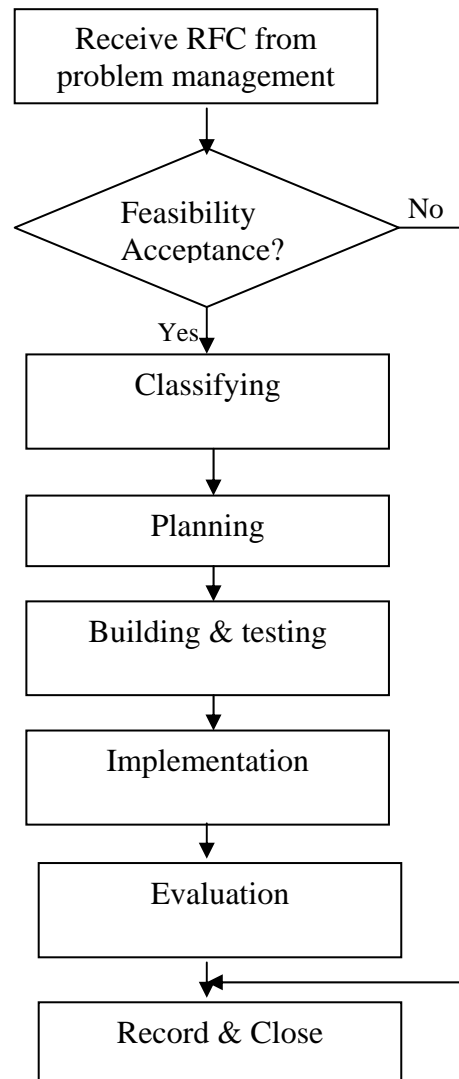



Figure 5.6: Change Management Activities

Table 5.5: Change Management Process

 <p>CICT</p>	<p>Document Title: Change Management Document Number:ISD-05</p>	<p>Page Number:1 From:1 Ver :1.0 Last Update:1/8/2008</p>
<p>1.0 Objective:</p> <ul style="list-style-type: none"> To ensure that standard methods and procedures are used with the lowest possible impact on service quality 		

2.0 Scope:

- All units of infrastructure and service department of CICT

3.0 Terminology:

- CAB is stand of Change Advisory Board that discuss and defines the change that should be done

4.0 Process Flow Details:

4.1 Receiving reports and information like RFC's, ADU@IT information, financial and etc

4.2 Categorizing and prioritizing the known errors

4.3 Planning and approving their development and implementation of respective RFC

4.4 Coordination and implementing of the change

4.5 Evaluation of the implemented change which is it successful or not

5.0 KPI's:

- Number of changes completed per time per unit
- Number of rejected changes
- Number of incidents resulting from changes
- Number of back out related to changes
- Cost of the implemented changes
- Number of changes within resource and time estimation

6.0 Actors:

- The members of CAB should be at least including: heads of every units, head or representative of the infrastructure and service department and representative of dean of CICT

5.5.3 Change Management report

Change manager should provide a report to the head of CICT infrastructure and service department monthly and to the dean of CICT every time that he requests. This report at least should be included the number of changes implemented during a special period ; list of the causes of changes and RFC's; number of successfully implemented changes ; number of incidents related to implemented changes; number of back outs and the reasons and graphs and trend analysis for relevant period.

5.5.4 Performance Indicators

Some indicators that show the effectiveness and efficiency of change process in the infrastructure and service department of CICT can be the number of changes completed per time per unit; number of rejected changes; number of incidents resulting from changes; number of back out related to changes; cost of the implemented changes and the number of changes within resource and time estimation.

Release Management process is also one of the ITIL-service support processes which should be implemented in this department. In order to decrease bureaucracy in this department it can be proposed that only executive committee should be responsible of this process. It is important to manage every release activity but these kinds of releases are not much and there is no need to design and follow very complicated process. So, executive committee can propose release program in this department.

The attached appendices which are Interview Questions, Appendix A, Managers Questionnaire, Appendix B, Staff Questionnaire, Appendix C, helped to issue such framework for respected department.

5.6 Summary:

This chapter described the MOF framework as a guideline framework to propose an ITIL based framework for infrastructure and service support department. Moreover, it described OUT ITIL implementation as a detailed ITIL based implementation case study.

Then it focused on Proposed ITIL-service support framework for infrastructure and service support department of CICT. This ITIL based framework divided to four deferent phases which every one was including one or two different service support processes.

CHAPTER 6

TOOL DEVELOPMENT

6.1 Introduction

This chapter focuses on developing an ITIL-based tool for Infrastructure and Service Department of CICT. At first, the current ADU@IT system of this department will be described. Then, the proposed ADU@ITIL system will be introduced.

6.2 Current System Specifications

The specifications of current system of ADU@IT system of Infrastructure and Service Department of CICT which were developed on September of 2005 are as below:

6.2.1 Helpdesk System

Current system is developed in house by CICT using MS Active Server Page (ASP) technology and MS Access as the database. The system developed taken care most of the CICT requirements but lacks of dynamic. In accordance to CICT move toward open source and to further enhance the helpdesk system, the system needs an upgrade.

6.2.2 Inventory System

As the helpdesk system, current inventory system also developed in house by CICT using MS Active Server Page (ASP) technology and MS Access as the database. The system developed taken care the basic requirement of the system. There was a little information for inventory system specifications given by CICT.

6.2.3 Database

Current system uses MS Access to store all data related to the system. The following table (Table 6.1) is for current online helpdesk system.

Table 6.1 current online helpdesk system

No.	Table Name	Description
1	ADUAN	Holds the request information
2	BAHAGIAN	Lookup table for division information
3	BULAN	Lookup table for month
4	JENAMA	Lookup table for brand information
5	JENISALAT	Lookup table for equipment
6	JURUTEKNIK	Technician information
7	JURUTEKNIK2	Technician information
8	KODJABATAN	Department lookup table
9	LAWAT	IP address audit trail log
10	MASALAH	Problem lookup table
11	PERISIAN	Software lookup table
12	STAF	Staff information table
13	STAFKOD	Staff locations information
14	STAFMEL	Staff email information
15	STATUS	Status lookup table
16	TAHUN	Year list
17	USER_ID	User information

6.3 ADU@ITIL system

6.3.1 Introduction

ADU@ITIL is a new solution that is designed to enhance, improve and make use of the open source technology. It consists of major ITIL-service support processes which are Helpdesk, Incident management, Configuration management. The attach Appendix D shows ADU@ITIL Site Map.

This solution is suggested to run on a Windows XP or latest one, the Apache2 as the web server and using MySQL database as the database engine. PHP scripting language was chosen for front end web scripting and back end engine.

6.3.2 System Enhancement

Following specifications are some modules need to be enhanced compare to current system or it is needed to develop new modules. The following section describes requirements in order to achieve a better ADU@ITIL system for CICT. These System Feature enhancements are including:

- Revamped GUI(Graphical User Interface)
- Support for four units

6.3.2.1 Revamped GUI (Graphical User Interface)

Among the major challenges of current system the flow of the system is hard to be understood by the user. The revamped GUI of the system will try to address the following issues:

- Update overall look and feel of the system
- User friendly navigation system
- Smooth flow of the system navigation
- Similarities of navigation system with current system to avoid user configuration

6.3.2.2 Support for Four Units

With this features enhanced, the ADU@ITIL helpdesk system can cater for complaints that user wants to report. There are some categories that can help helpdesk and users to make better and quicker decisions. The answer for the question can be defined as some List boxes.

6.3.3 Analysis Conceptual Design

This conceptual design represents the structure of the system to-be as perceived by the users. A use case diagram, class diagram and sequence diagram are developed to further understand ADU@ITIL system.

A Use-Case Diagram is a methodology used in system analysis to identify, clarify and organize system requirements. The use case is made up a set of possible sequences of interactions between systems and users in a particular environment and related to a particular goal. The use case should contain all system activities that have significance to the users. A use case for ADU@ITIL system is shown as Figure 6.1 and class diagram is shown as Figure 6.2 A use case description and sequence diagram is as attach in Appendix F and Appendix G.

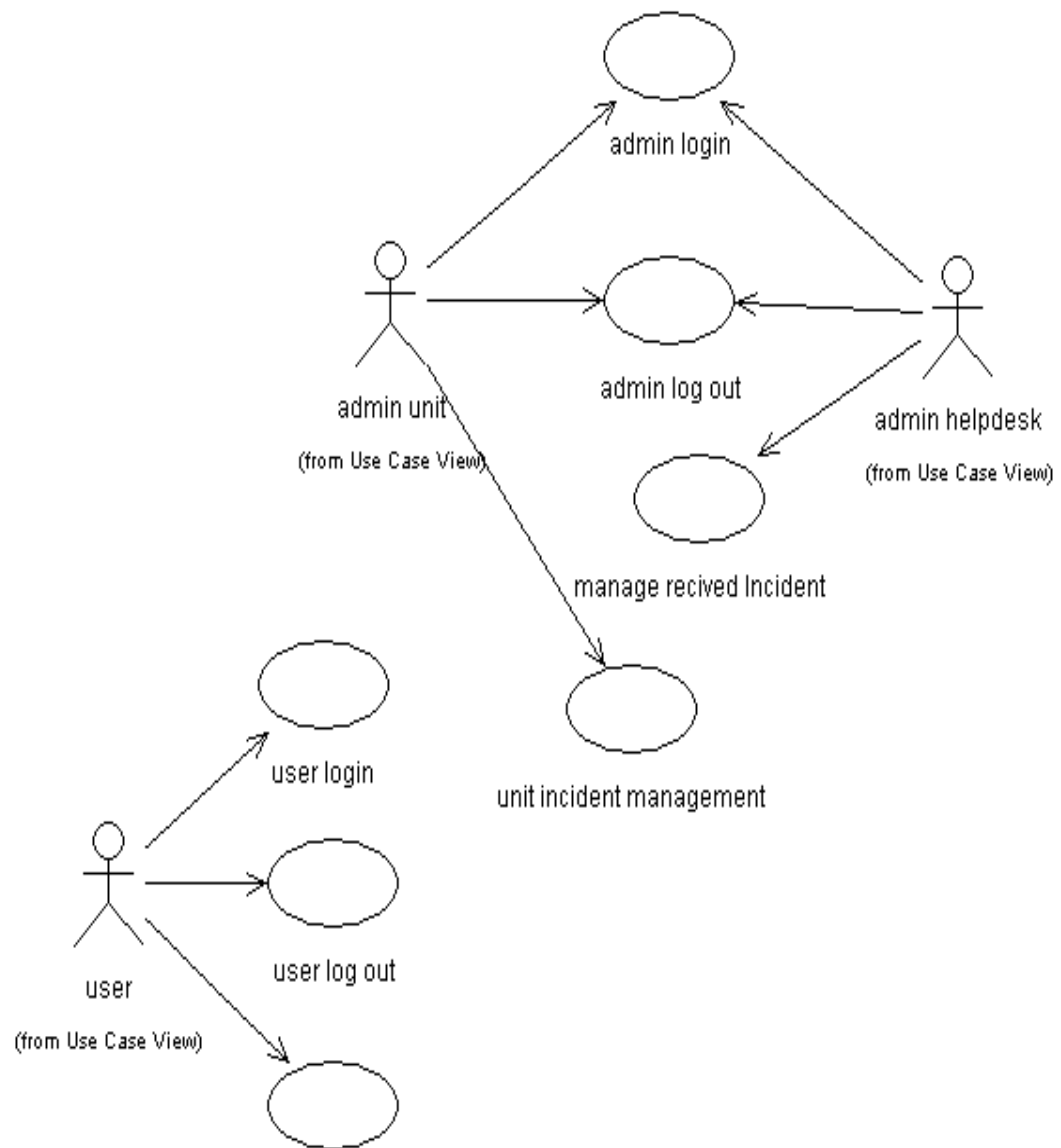


Figure 6.1: Use Case Diagrams for ADU@ITIL system

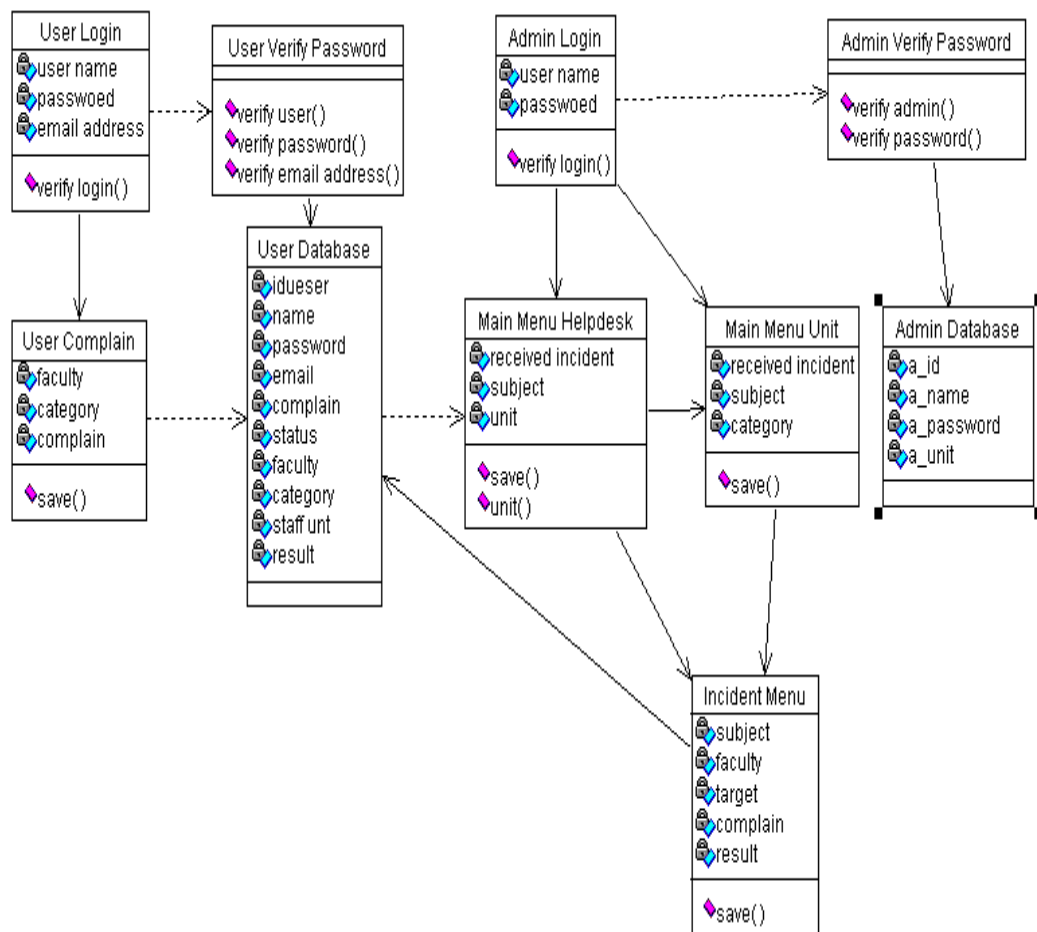


Figure 6.2: class diagram for ADU@ITIL system

6.3.4 Interface Design

One of the important features in a system is human. Human that interacts with system will produce another feature in the system, which is the interface features. The interaction between system and human could be seen as a process of sending request for information by human to the system in order to execute the system's functions. Besides that, the interface is related to the data and the database with the aim of getting the required data. Hence, an interesting interface development is needed to ensure that the system could interact with the user based on the real system flow, which means the interface design should highlight on user friendly features. Interface design for ADU@ITIL system is as attached in Appendix H.

6.3.5 Database Design

The database design is important in order to avoid data redundancy that will maximize the storage used in the database. It is also to ensure that the information update process could be done efficiently. The database design is attached in Appendix I.

6.3.6 Stakeholders

Stakeholders are all people who have any responsibility in the scope which is infrastructure and service department of CICT and any user of IT infrastructure at UTM University.

6.3.7 System Components

6.3.7.1 Helpdesk

The helpdesk receives the request from several ways, which are UTM website, e-mail, fax, face to face and phone call. The request can be tracked until it is closed.

6.3.7.2 Incident Management

Infrastructure and service department of CICT includes four different units with their own responsibilities. Helpdesk supervisor decides to send complaints (Incidents) to respective unit. Then technicians try to solve this incident and write the details of their activities and experiences. Or head of the unit decides to return back it to helpdesk for future decisions.

6.3.7.3 Configuration Management

For having updated data, it is very critical for the system to follow accurate and reliable proposed process to receive and record data. Moreover, due to the nature of people getting promoted or transferred to the other department, the data in the system also changes accordingly.

6.4 Testing

6.4.1 Introduction

The testing plan is a critical part of system development and maintenance. Development of test plans during system analysis and design and before implementation is crucial to the production of a high quality system. The purpose of testing is to ensure that the system does not malfunction in obvious ways and that system fulfils the user requirements. As an important stage, researcher has conduct

stages of testing such as unit testing, integration testing, system testing and acceptance testing.

Before actually implementing the new system into operations, a test run of the system is done removing all the errors, if any. It is an important phase of a successful system. After codifying the whole programs of the system, a test plan should be developed and run on a given set of test data. The output of the test run should match the expected results.

6.4.2 Testing Plan

For this project, the accurate technique to implement the test plans is by concern the four stages of testing. The reason by applying that in ADU@ITIL is to ensure the quality of the system before it can be implemented in real environment.

6.4.2.1 Unit Testing

When the programs have been coded and compiled and brought to working conditions, they must be individually tested with the prepared test data. Any undesirable happening must be noted and debugged (error corrections).

6.4.2.2 Integration Testing

In this method of testing, it concerns all user interface and use-case testing both in application interface and system management parts to ensure that the interface would work accurately. The system started the test with the each interface function of ADU@ITIL. After that, it is tested in every sub component or functions of the system.

For system interface part, the system interface testing became an important function where it will ensure that all the data is saved correctly and there is no loss of data or data base anomalies in the system. As part of testing, the system will be looking for any signs of the collision between the interface components and those of the user as a reason to ensure there is no confusion among the application on the system when they are running simultaneously. At the end of the test all the results should be positive. All of the system components should work properly.

6.4.2.3 System Testing

At this stage the test is done on actual data. The complete system is executed on the actual data. At each stage of the execution, the results or output of the system is analyzed. During the result analysis, it may be found that the outputs are not matching the expected out of the system. In such case, the errors in the particular programs are identified and are fixed and further tested for the expected output.

When it is ensured that the system is running error-free, the users are called with their own actual data so that the system could be shown running as per their requirements. This test is performed to validate the system where the entire system

being created and will test all the component of the system together. Every button, tab or menus are tested to ensure that how well the system meets user requirement. In this test method other types of the testing were using in this systems.

i) Requirement testing

In this level, every part in the system had been tested in order to tests whether requirements were met.

ii) Usability testing

As user interface is an important part of the system, usability testing should consider in sight of a good interface design.

iii) Security testing

The actual unit testing can be carried out by a variety of methods, including the black box and white box testing methodologies. For this project, the researcher decided to use black-box testing methodologies. Black-box or functional testing is one in which test conditions are developed based on the program or system's functionality; that is, the tester requires information about the input data and observed output, but does not know how the program or the system works. The tester focuses on testing the program's functionality against the specification

Input data is tested and validated to know whether or not it is accepted by the system. This is to ensure data integrity and security. Example of the security testing is the used of user login. If the user name or password is not valid, then error message will be displayed. Every user is granted access to different system functions based on the user's responsibilities.

a) Password Login

System analyst will try to log in using invalid user name or valid user name and invalid password.

b) Administration Access

The system only allows admin and manager to done his or her works for example every incident manager from every unit can only access to his or her own menu. So, researcher will test admin login to ensure that there is no unauthorized user that able from accessing certain data on the system.

6.4.3 User Acceptance Test

User Acceptance Testing (UAT) is the final stages of a system development project and will often occur before the customer accepts a new system. User of the system will perform these tests which, ideally, developers have derived from the User Requirements Specification, to which the system should conform. In this phase, ADU@ITIL is fully tested by some of the person in charges at helpdesk and related units.

Test results and error reports are documented of each test, and the reports returned to the researcher describing the problems or errors discovered during testing. Researchers will correct the system and user manual.

i) User Acceptance for proposed ITIL-service support Framework

Proposed ITIL-service support Framework had been verified by the person in charge in the department. Based on the user acceptance result of framework, participants found that it is good to implement this framework.

ii) User Acceptance of ADU@ITIL

Based on the users UAT result, they found that it is easier since the system gather all the incidents in the database. By importing these incidents in an integrated system, all of the authorities can access to same data and they can manage the incidents very soon. User Acceptance Test sheet is as attached at Appendix J.

6.5 Programming Coding

Programming coding of the main function of ADU@ITIL that are register complains by the users, receive and manage complains and incidents as attached at Appendix K.

6.6 User Manual

User manual is system interface and step-by-step guideline for the users to use the system. User manual is as attached at Appendix L.

6.7 Summary

The current system that calls ADU@IT system is MS ACCESS based and has no good interface and proper activity. Proposed ITIL based tool is consist of several ITIL- service support processes which can help to manage users' complaints and record and trace them. Unit and system testing is conducted to make sure that the system run effectively and error free. For unit testing, black-box testing is conducted to test the functionality of the system. Users' comments and suggestion are gathered and improvements have been made to the system such as system design.

CHAPTER 7

ORGANIZATIONAL STRATEGY

7.1 Introduction

This chapter at first describes how proposed ITIL framework should be implemented in the Infrastructure and Service department of CICT. Then it describes how the end products of this project as developed by the researcher will be implemented by infrastructure and service department of CICT. The end product which is the ADU@ITIL system that will go through following steps as described in this chapter and it can be seen in the Figure 7.1.

7.2 Proposed Framework Implementation

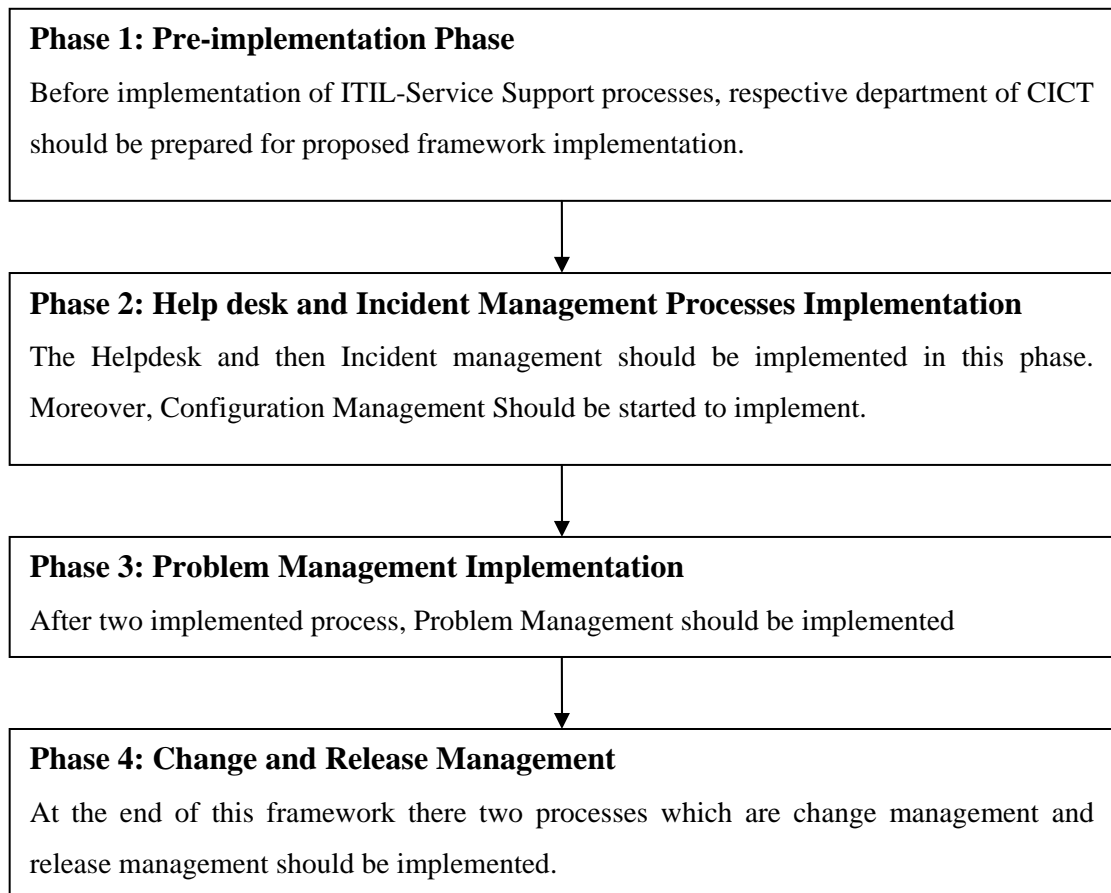


Figure 7.1: Framework Implementation Steps

The details of each step will be discussed as follow:

7.2.1 Phase 1: Pre-implementation Phase

Before, to start to implement ITIL-Service Support processes, the Scope of the project should be defined. It means that the boundaries of the project should be high lighted. Then the organization should be prepared for cultural changes. It is

better to make interest groups from staffs to be participant to prepare the organization for new changes. The duration of this process should be less than 4 months.

7.2.2 Phase 2: Help desk and Incident Management Processes Implementation

The first actual ITIL-Service Support process that should be implemented is Helpdesk process in the Infrastructure and Service Department of CICT. This process should be implemented after implementing the Pre-Implantation phase in the department. The Infrastructure and Service Department of CICT has four units therefore; every unit of this department should be having, four distinct incident management. Also the configuration Management should be to start to implement from this stage. And during other phases it should be completed time to time. The duration of implementing these two processes should be less than 4 month for every process.

7.2.3 Phase 3: Problem Management Implementation

When every same caused incident highlighted, this process should be started to implement to minimize occurred same incidents. There is need to one person to follow and find the roots of reported incidents to investigate and find the solution for it. The duration of implementing it should be less than 6 months.

7.2.4 Phase 4: Change and Release Management

Problem manager should request from executive committee to have meeting every month or at emergency cases every time to have session and discuss on the changes that its needs. The executive committee should come and try to manage some proper activities to do and they should be documented time to time. Duration of this implementation should not exceed more than 6 months.

7.3 System Implementation

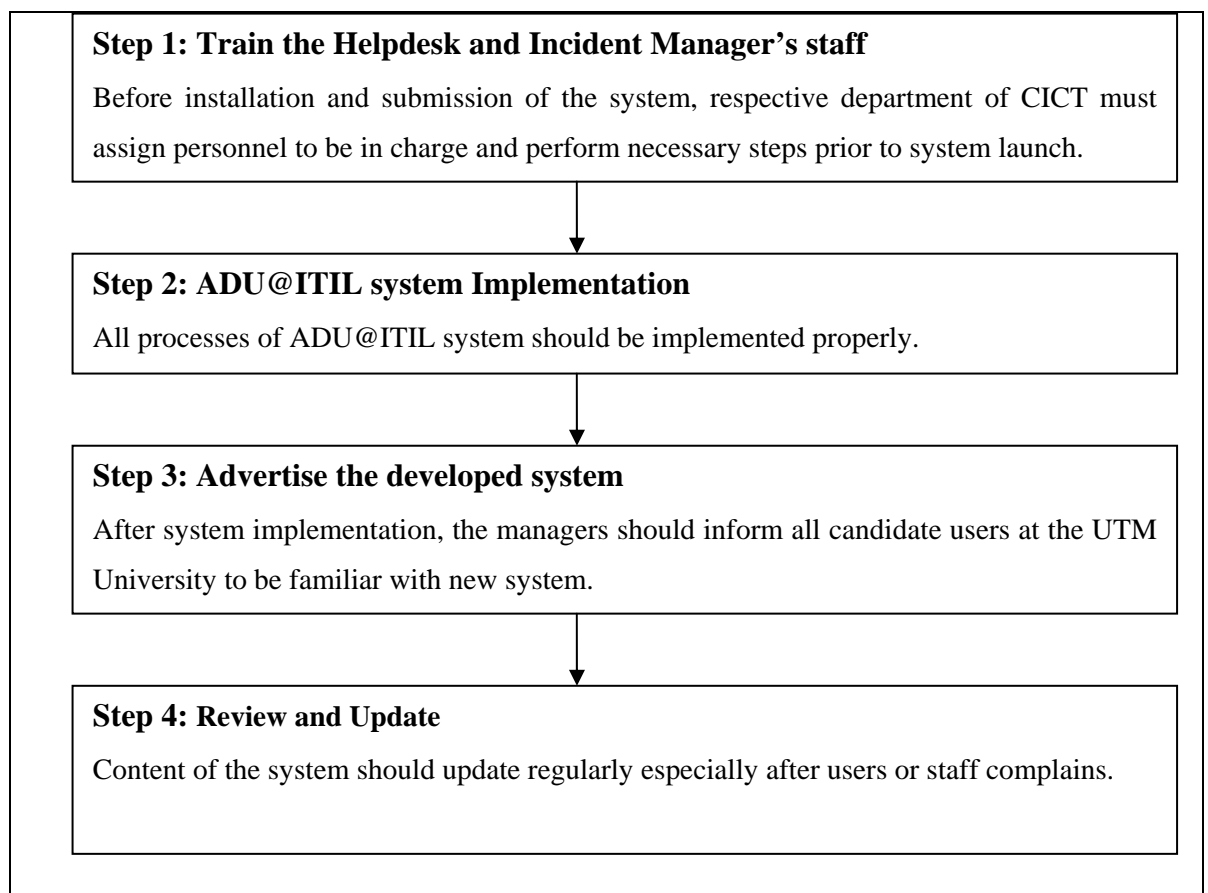


Figure 7.2: System Implementation Steps

The details of each step will be discussed as follow:

7.3.1 Step 1: Train the Helpdesk and Incident Manager's staff

Upon installation and submission of the system, Infrastructure and service department of CICT must assign personnel to be in charge and perform necessary steps prior, during and after system launch. It is recommended that the helpdesks should be combined with each other. Moreover, every unit should dedicate one person to be in charge for this system.

7.3.2 Step 2: ADU@ITIL system Implementation

All processes of ADU@ITIL system should be implemented properly. Big bang approach can be used to implement this tool because the scope of the system is small enough to install and use this system.

7.3.3 Step 3: Advertise the developed system

After system implementation, the managers should inform candidate staffs about new system. University web site is a good media. Moreover, some workshops and brochures should be planed to hire staff and students to attract using proposed system.

7.3.4 Step 4: Review and Update

Content of the system should be updated regularly especially after users or staff complaints. It is a fact that environment is changing all the time and the proposed system should be changed based on new organizational needs.

7.4 Summary

Implementation strategy of proposed tool implementation is including four different steps that should be properly done to improve the quality of services in this department.

CHAPTER 8

CONCLUSION

8.1 Conclusion

This chapter will revisit objectives of this project whether it is successfully achieved or not. This chapter discusses the system's strength, system's limitation, contribution to academic and management; and future enhancement.

8.2 Achievements

It can be concluded that this project has achieved the following objectives:

- i) To study the current status of ITIL implementation in the infrastructure and service department of CICT.

- ii) To analysis the staffs' information about ITIL and other frameworks.
- iii) To develop ITIL based framework that able to issue suitable solution for every ITIL process implementation in the department.
- iv) To develop ADU@ITIL system to automate respective activities in the department based on proposed tool.

8.3 System's Strengths

The development of theses framework and system offers numerous rewards for Infrastructure and service department of CICT which are listed below:

- i) Proposed framework can issue well-defined process for ITIL-service support implementation.
- ii) Proposed framework can eliminate ad-hock quality services and manage staff's activities in the infrastructure and service department of CICT.
- iii) Proposed framework includes a guideline to implement service-support processes in the infrastructure and service department of CICT.
- iv) KPI benchmarks are available for every process.
- v) ADU@ITIL system can receive and record users complaints.
- vi) ADU@ITIL system can up-to-date any received incident and manage it.
- vii) ADU@ITIL system eliminates paper based activities and it increases the speed of activities.
- viii) ADU@ITIL system records technicians' experiences that can be used in the future.

8.4 System's Limitation

For the time being, the system only can receive and record user's complaints. It does not have any proper report for the top-managers of CICT. Moreover it does not cover all service-support processes. However, CICT staff's can write down reports manually.

8.5 Future Enhancement

The suggestions for future enhancement are proposed as below:

- i) Implement proposed framework with other researchers in the Infrastructure and Service department.
- ii) Chat features – this will enable expertise to have informal meeting through chatting.
- iii) Suggesting and track solutions for every incident.
- iv) Investigate root of new incidents to find out same cause of incidents.
- v) Add some more features to the ADU@ITIL system.

8.6 Commercialization

Based on the feedbacks, it is concluded that the system can be commercialized. This system also can be applied to multiple types of disciplines but before that it needs some enhancements.

However, if another industry or organization wants this system, it is advisable that the company [should] try to enhance and improve tools capabilities.

8.7 Summary

The researcher hopes that the proposed Framework will be useful especially for the Infrastructure and service department of CICT at the real level of implementation ITIL- Service Support processes. By developing ADU@ITIL, the researcher wishes that it helps users to send their complaints to the main office and managers to manage and upgrade received complaints. This project has brought excellent achievement for the researcher in understanding human as an asset in organization and how IT can be used as enabler to improve quality of services through ITIL- Service Support implementation. Throughout the process of doing this project, researcher has gain remarkable knowledge and experience on how to conduct a good research especially in formulating ITIL- Service Support processes.

However, researcher has to face several hurdles in completing this project that are time, staff collaboration and technical skill limitation. The time of doing project during this project was limited [the time specified for this project was limited]. However, with the proper planning of time, staff collaboration and resources, the objectives and requirement of this project could be done more and more better.

APPENDIX A:
Interview Questions

- 1- What is your responsibility?
- 2- Do you have any defined and suitable process for your responsibilities?
- 3- Which documents are you using and filling?
- 4- With which departments and units are you working?
- 5- Do you believe to any new framework for your department?
- 6- Do you use any proper tool?
- 7- Which suggestions do you have to increase the service qualities of your department?
- 8- How users inform you any incident?
- 9- How do you solve the incident?
- 10- Do you have especial process for solve the incident?
- 11- What you thing its need for solve the incident better and faster?
- 12- Are you record the incident?
- 13- Do you record the solutions of solved incidents?
- 14- Do you report to the manager?
- 15- How you report to the manager?
- 16- Which framework are you using for your department?
- 17- Which kinds of challenges do you think for implementing new framework?
- 18- Do you have any suggestion to optimize new framework implementation for the organization?

APPENDIX B:

Managers Questionnaire

TO WHOM IT MAY CONCERNS

Dear Sir/Mdm,

I am a Master Student from the faculty of computer science at university technology Malaysia (UTM) under the supervision of Asso. Prof. Dr. Azizah Bt. Abdul Rahman.

1. This survey is part of an ongoing research on proposes a guideline for implementation service support processes of ITIL on the infrastructure and service department of CICT. We greatly appreciate your willingness to spend a few minutes of your valuable time to complete the questionnaire. We assure you that the information obtained from the questionnaire will be kept confidential and will be used for research purposes only.

2. The information obtained will be used to tailor the research towards the needs of Service Quality implementers in CICT. As such, we humbly ask you to thoroughly read and understand each question before answering them. Your thoughtful feedback will significantly contribute to the relevance of this research. Any queries pertaining to this questionnaire can be directed to the results.

3. Your support and cooperation in giving the needed feedback is very much appreciated. Kindly return the answered questionnaire later on during the end of my observation.

For that, we thank you in advance.

However, the **objectives** of this survey are:

- To get the opinion of the management of service in the CICT
- To know the capacity of the readiness for change the IT organization

Truly yours,
Masarat Ayat

Questionnaire

A survey to investigate all experiences related to Implementing ITIL service support and other service quality standards in the Infrastructure and service department of CICT

This Booklet consist of 5 hardcopy pages including the cover page

Faculty of computer science, UTM campus

PLEASE ANSWER ALL QUESTIONS

The following information is very important in helping us to understand the pattern of participants' responses. Rest assured that responses would be kept confidential and anonymous. **Tick (√) one** of the choices for each question with multiple-choices answer.

A. Personal questions:

1. Which certificate do you have?

Bachelor

Master

PHD

2. How long are you working in the CICT.

Less than 1 year

Between 1 to 5 years

Between 6 to 10 years

More than 10 years

3. How long have you been working in your current position?

Less than 1 year

Between 1 to 5 years

Between 6 to 10 years

More than 10 years

4. Do you believe that a best practice framework can deliver value for CICT?

Yes

No

Please explain more _____

B. General quality questions

5. What reasons would you find helpful to move forward on a best practice?

framework in your organization (Select all that apply)

Assessment where is your organization today

ROI analysis

Executive Training Staff Education

Case study on a successful implementation

Roadmap that details how you can implement

Other (please Specify) _____

6. Which following certifications have you personally obtained?

ITIL (please specify which level and version)

ISO 9000

ISO 20000

ISO 27002

SIXSIGMA

Other (Please Specify) _____

7. During implementing every of the above standards, did you ever involved or not?

Yes

No

If **Yes** can you please, specify and describe which experiences did you find during its implementation.

C.ITIL related questions

8. What is/was your position during ITIL implementation?

Consultant

Senor Manager

Manager

Implementer

User

9. What is the benefit of implementing ITIL

reduce the extra process

Increase the quality

save in the time

doing work faster

Any other idea _____

10. Has CICT assigned an individual planning to research and implement ITIL standard approach in the organization?

Yes, but we do not start to implement this standard, yet.

Yes, and we are evaluating the options for implementing a standard (please specify)

Yes, we are in the initial planning stage of implementing this standard.

Yes, we are currently implementing a best practice framework.

Yes, We already implemented this standard.

No, CICT has not any decision to implement such standard

11. Which resources are helpful to success on ITIL implementation

Staff training

Executive training

Case study on a successful ITIL implementation in a special organization

A detail roadmap of ITIL implementation

Other (Please specify) _____

12. What did/do you see as the biggest challenge to implement this standard?

Education

Technology

Budget

Demonstrating ROI

Internal resistance

Executive Support

Other (Please Specify)

Please more explain your observation and experiences during your implementation.

13. How should ITIL implement in the CICT

Only some parts of it

Summarize all processes

Only some process that are more important for business

Other (Please explain more specify) _____

APPENDIX C:

Staff Questionnaire

TO WHOM IT MAY CONCERNS

Dear Sir/Mdm,

I am a Master Student from the faculty of computer science at university technology Malaysia (UTM) under the supervision of Asso. Prof. Dr. Azizah Bt. Abdul Rahman.

1. This survey is part of an ongoing research on proposes a guideline for implementation service support processes of ITIL on the infrastructure and service department of CICT. We greatly appreciate your willingness to spend a few minutes of your valuable time to complete the questionnaire. We assure you that the information obtained from the questionnaire will be kept confidential and will be used for research purposes only.

2. The information obtained will be used to tailor the research towards the needs of Service Quality implementers in CICT. As such, we humbly ask you to thoroughly read and understand each question before answering them. Your thoughtful feedback will significantly contribute to the relevance of this research. Any queries pertaining to this questionnaire can be directed to the results.

3. Your support and cooperation in giving the needed feedback is very much appreciated. Kindly return the answered questionnaire later on during the end of my observation.

For that, we thank you in advance.

However, the **objectives** of this survey are:

- To know the capability and availability of CICT infrastructure department to collaborate on implementing ITIL service support
- To investigate the collaboration status between staff

Truly yours,
Masarat Ayat

Questionnaire

A survey to investigate all experiences related to Implementing ITIL service support and other service quality standards in the Infrastructure and service department of CICT

This Booklet consist of 4 hardcopy pages including the cover page

Faculty of computer science, UTM campus

PLEASE ANSWER ALL QUESTIONS

The following information is very important in helping us to understand the pattern of participants' responses. Rest assured that responses would be kept confidential and anonymous. **Tick (√) one** of the choices for each question with multiple-choices answer.

A. Personal question

1. Which certificate do you have?

Diploma

Bachelor

Master

PHD

2. What is your responsibility in CICT? _____

3. How long do you working in this position?

Less than 1-year

Between 1 to 5 years

Between 6 to 10 years

More than 10 years

4. Please, describe the formal activities that you do at your formal position.

B. Formal activities

5. Do you record your activities?

Yes

No

If yes describe how and where do you record. _____

6. Do you make sense any to need a change to your activities to increase unit productivity?

Yes

No

7. Suppose to implement an IT framework to increase quality of department do you interest to collaborate with it?

Yes

No

8. Do you have any idea to share regarding to increase the quality of your unit activity?

9. Do you use the other staff experiences to solve the problem?

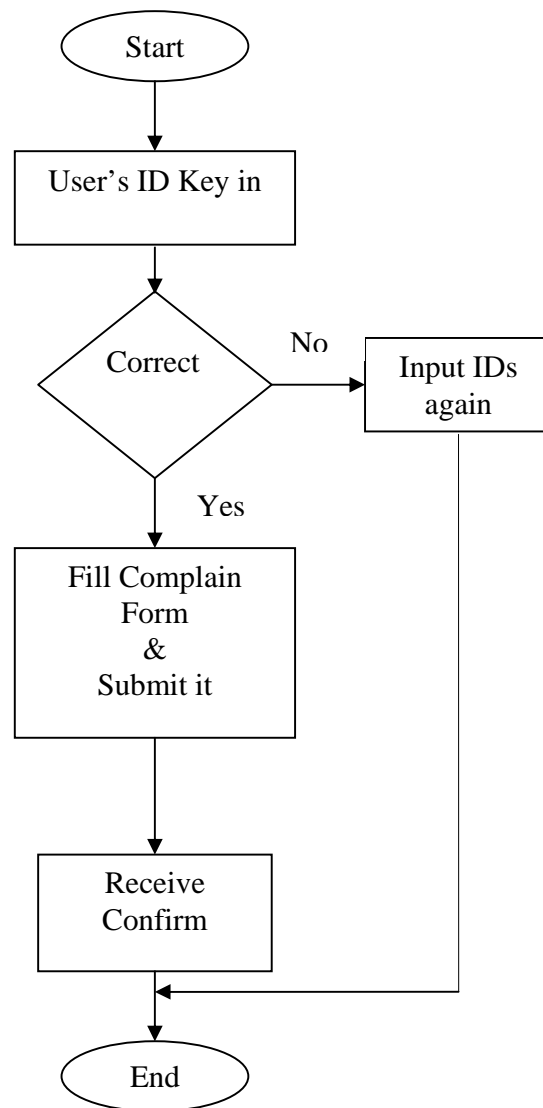
Yes

No

if yes, describe how do you can use the other staff experiences for solve a problem?

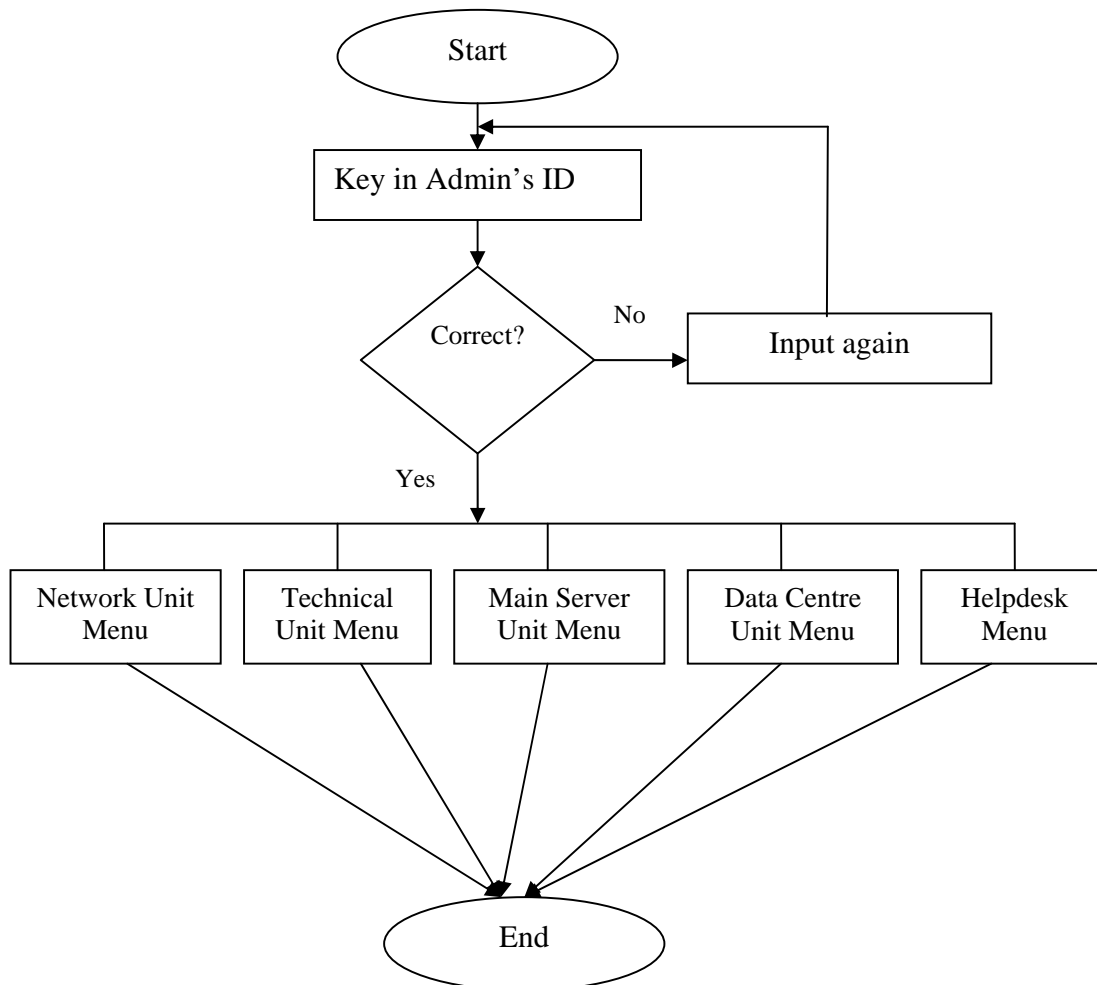
APPENDIX D:

ADU@ITIL User Side Site Map



APPENDIX E:

ADU@ITIL Administration Side Site Map



APPENDIX F:

Use-Case Descriptions

1. User Login Use-Case

Use Case Name: user Login

Description: This use case describes how a user logs in to the system.

Actor: user

Pre-Condition: The login page is loaded and displayed.

Normal Flow:

1. Users fill in their user name, password and email address.
2. User clicks on the Login button.
3. If their user name, password and email address are correct, the system will redirect to complain form.

Post Condition: User is logged into the ADU@ITIL System.

2. Complain Submission Use-Case

Use Case Name: complain Submission

Description: This use case describes how a user fill in the complain form.

Actor: user

Pre-Condition: The index page is displayed.

Normal Flow:

1. User fill in the fields of complain form and other required fields.
2. User clicks on submit button and the system will preview all the information that have been submit by user.

Post Condition: ADU@ITIL System send a confirm email to users.

3. Admin Login Use-Case

Use Case Name: Login Admission

Description: This use case describes how an admin logs in to the system.

Actor: Admin

Pre-Condition: The login page is loaded and displayed.

Normal Flow:

1. Admin fills in the user name and password form
2. Admin clicks on the Login button
3. If its user name and password are correct, the system will redirect to Main Menu.

Post Condition: Admin is logged into the ADU@ITIL System.

4. Helpdesk Management received Incident Use-case

Use Case Name: Helpdesk manage received Incident

Description: This use case describes how helpdesk manages the incident.

Actor: Admin helpdesk

Pre-Condition: The Incident main menu is loaded and displayed.

Normal Flow:

1. Helpdesk admin checks the incident.
2. Helpdesk admin tries to solve to complain.
3. If helpdesk admin helpdesk solve the incident
 - a) Record the solution.
 - b) Send result to user
5. Else Admin helpdesk send incident to the respective unit.

Post Condition: send result to user and send incident to related unit.

5. Unit Admin Manage received Incident Use-Case

Use Case Name: Unit Admin Manage received Incident

Description: This use case describes how unit administrator manages the incident.

Actor: Unit Admin

Pre-Condition: The Incident main menu is loaded and displayed.

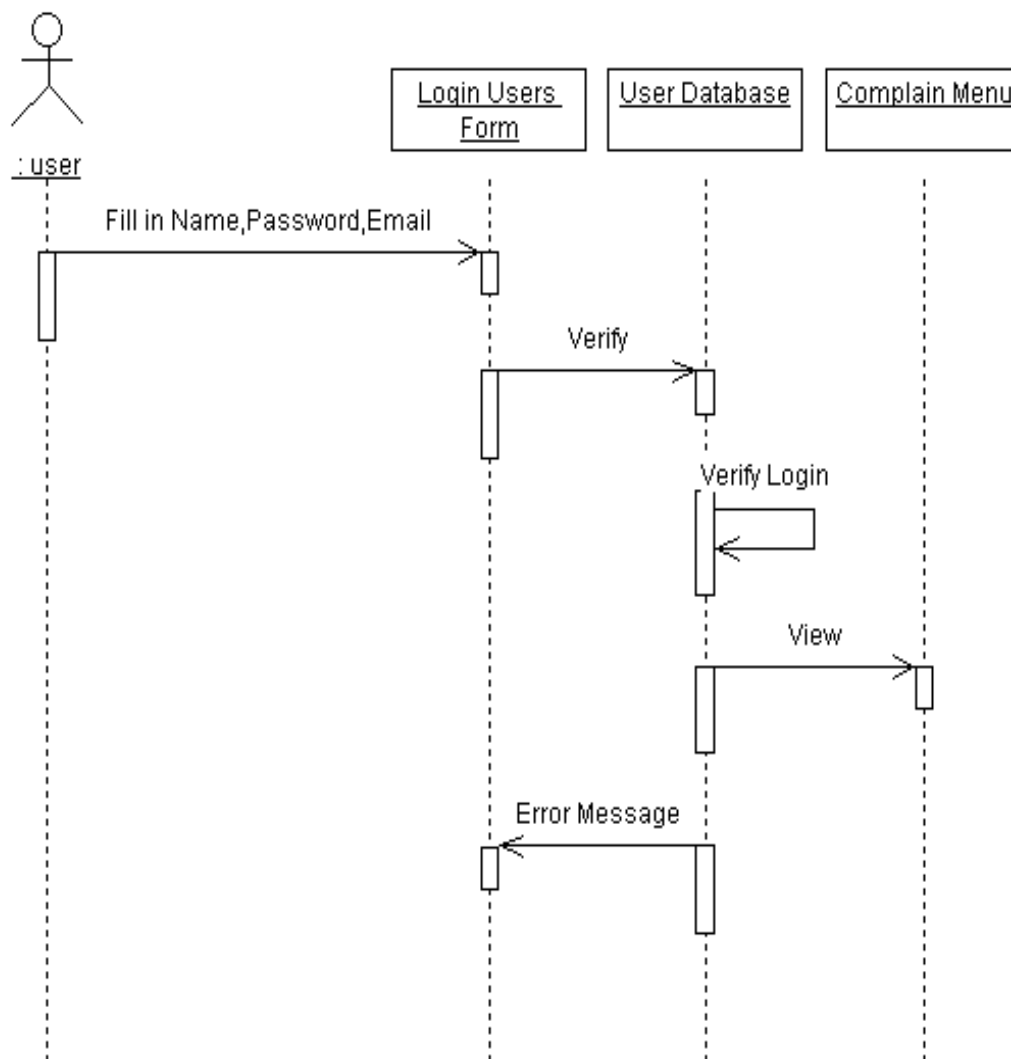
Normal Flow:

1. Unit admin check the incidents.
2. Unit admin solved the incident.
3. Unit admin record the solution.
4. Send result to helpdesk admin.

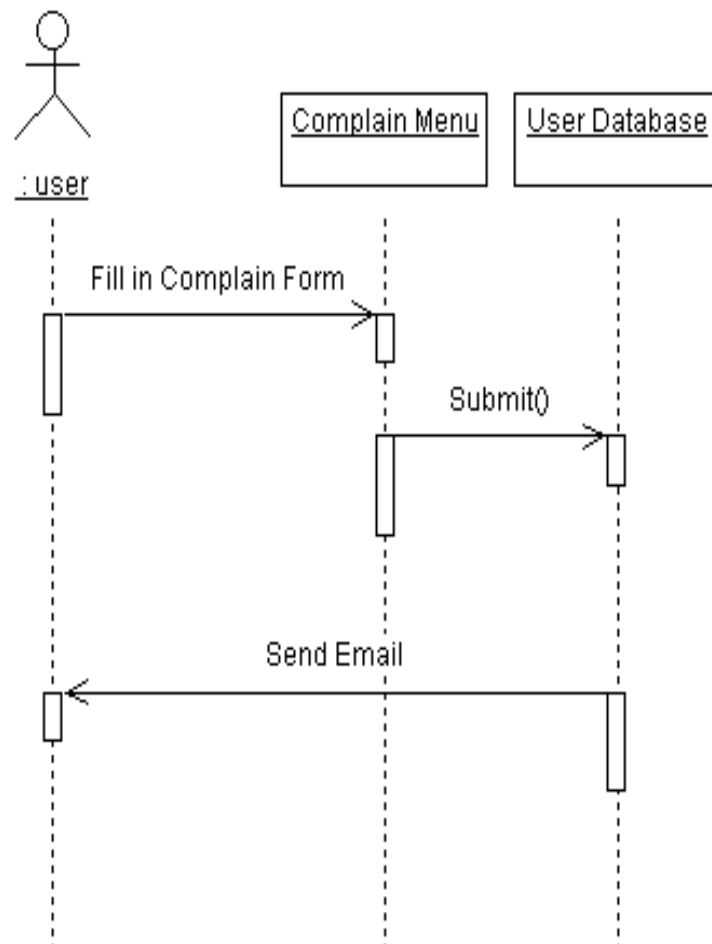
Post Condition: send result to helpdesk main menu

Appendix G: Sequence Diagram

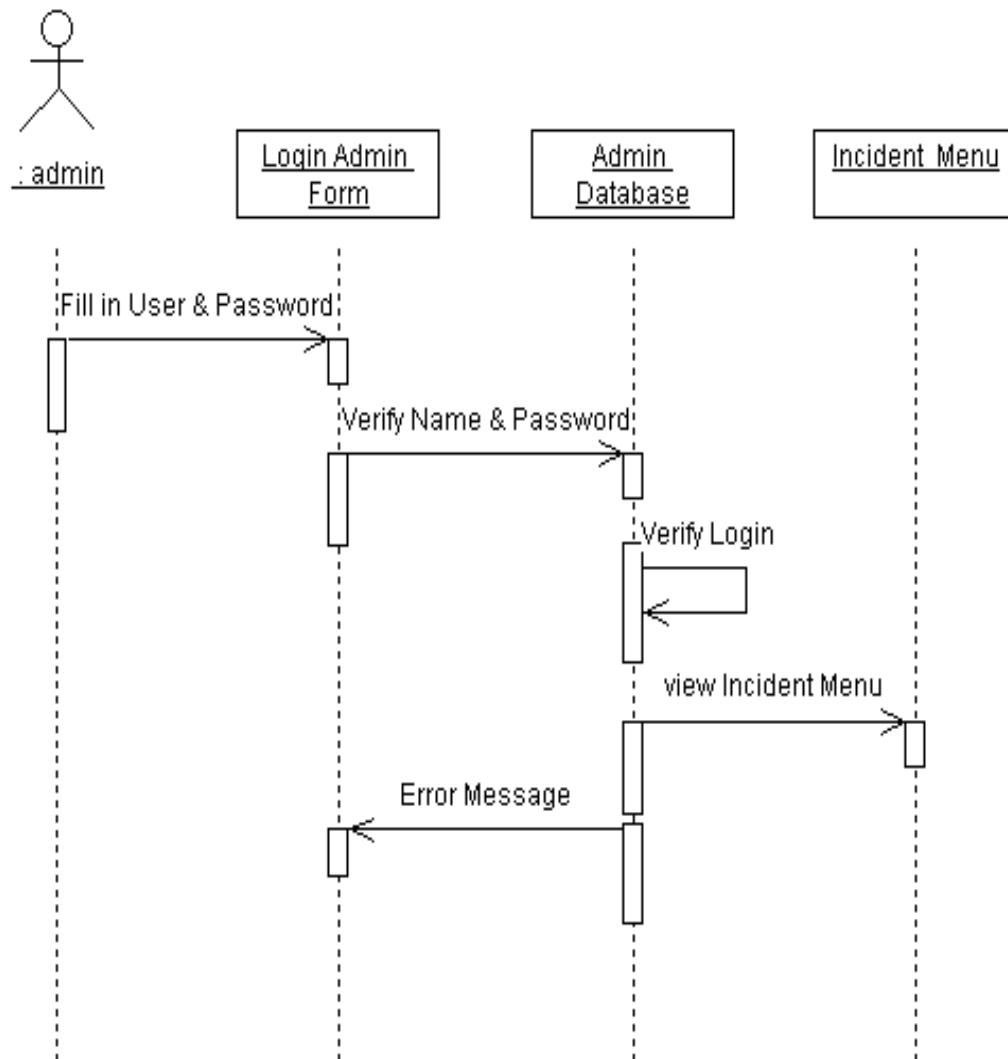
1. User's Login



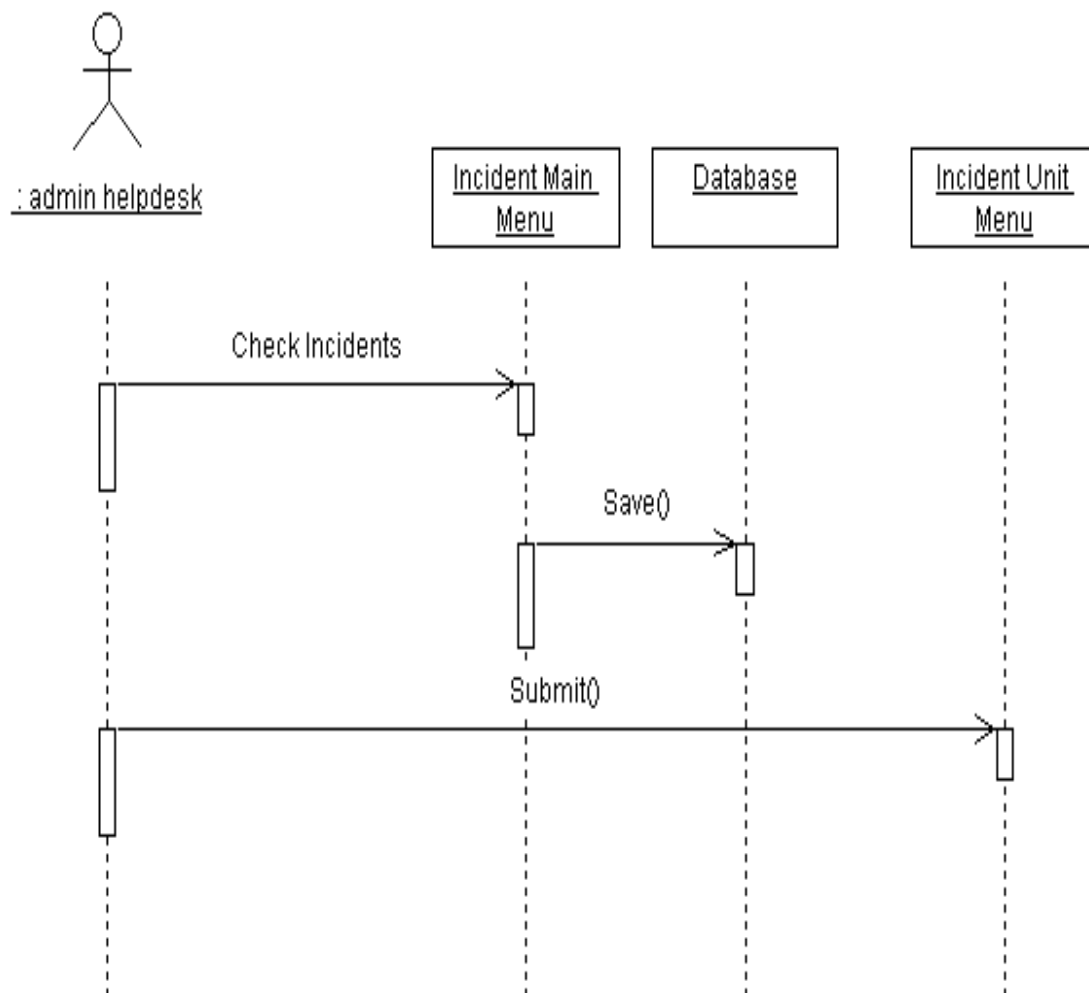
2. User's Complain



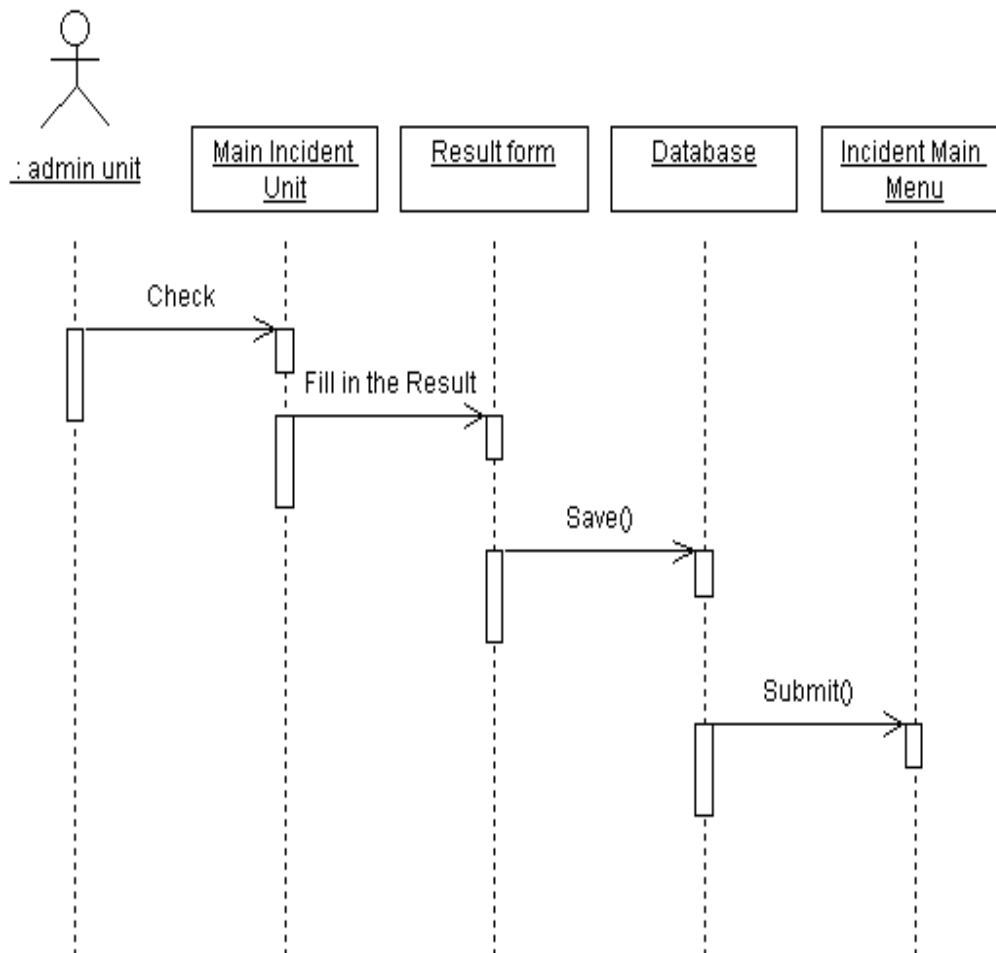
3. Admin's Login



4.Admin Helpdesk



5.Admin Unit

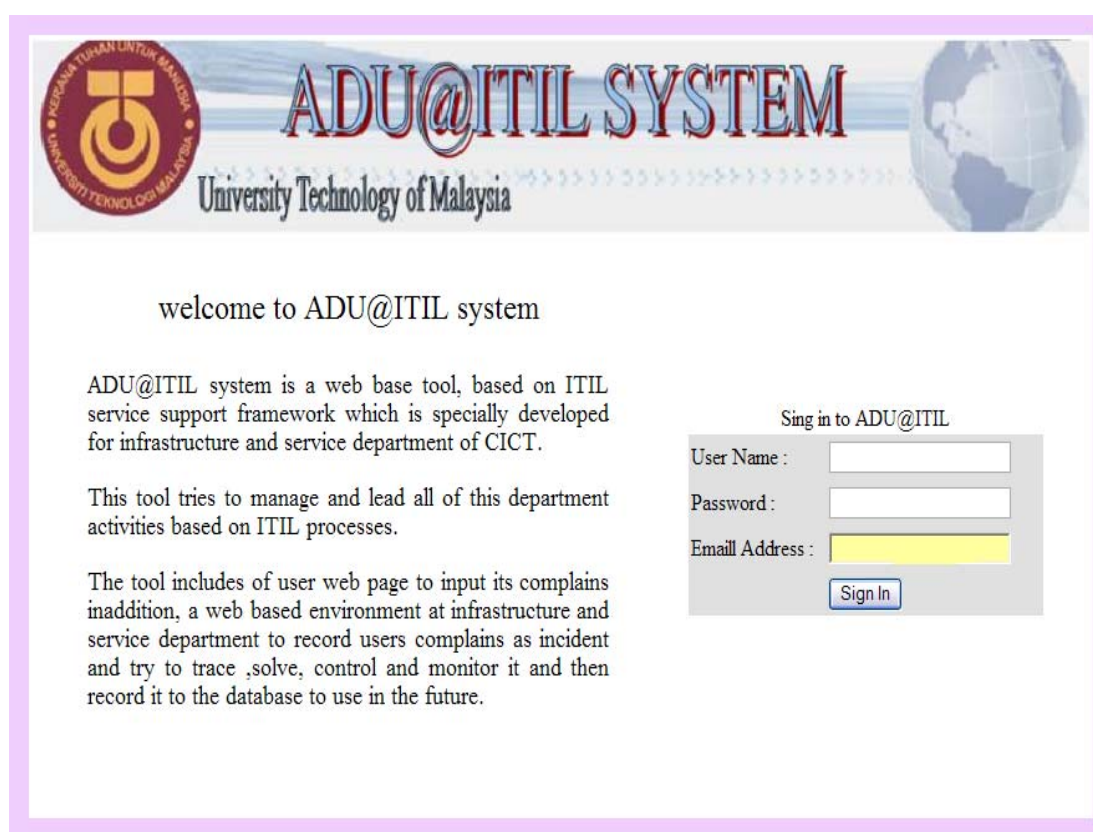


APPENDIX H:

Interface Design

1. User's Main Menu

Main Menu for ADU@ITIL system is includes Login form and a detail description about the system.



The screenshot shows the main menu of the ADU@ITIL system. At the top, there is a banner with the University Technology of Malaysia logo on the left, the text "ADU@ITIL SYSTEM" in a stylized font in the center, and a globe on the right. Below the banner, the text "welcome to ADU@ITIL system" is displayed. To the left, there are three paragraphs of text describing the system. To the right, there is a login form titled "Sing in to ADU@ITIL" with three input fields for "User Name", "Password", and "Email Address", and a "Sign In" button.

welcome to ADU@ITIL system

ADU@ITIL system is a web base tool, based on ITIL service support framework which is specially developed for infrastructure and service department of CICT.

This tool tries to manage and lead all of this department activities based on ITIL processes.

The tool includes of user web page to input its complains in addition, a web based environment at infrastructure and service department to record users complains as incident and try to trace ,solve, control and monitor it and then record it to the database to use in the future.

Sing in to ADU@ITIL

User Name :

Password :

Email Address :

Figure H1: User's Main Menu

2. User's Sign out



Figure H2: User's Log out

3. Admin Login

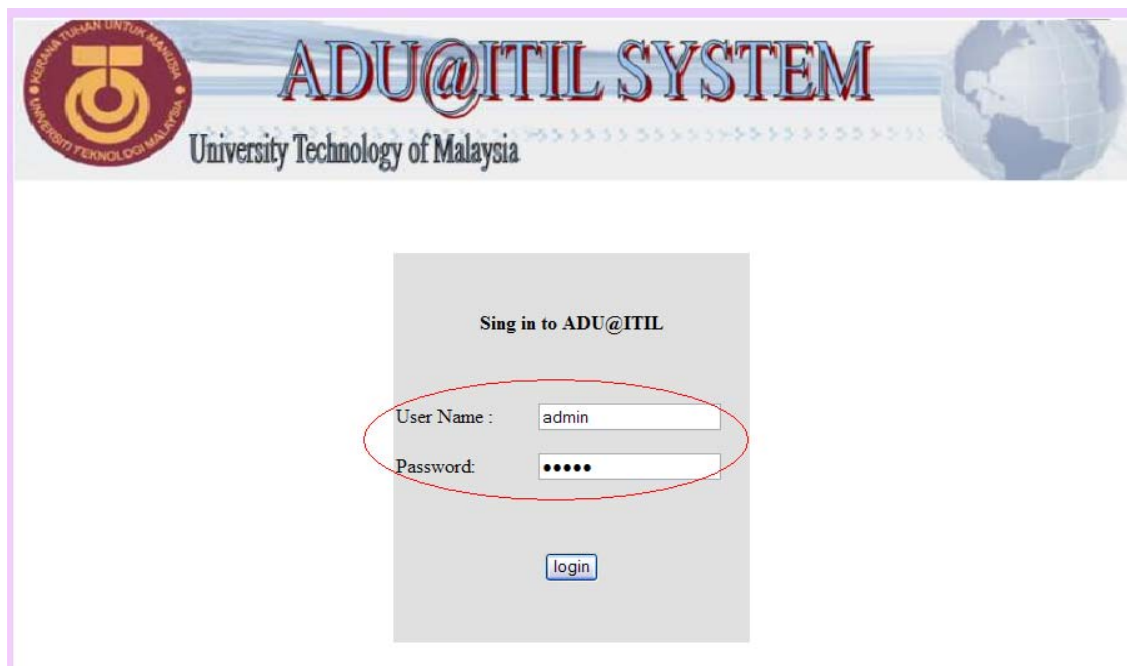


Figure H3: Admin Login

4. Helpdesk Main Menu

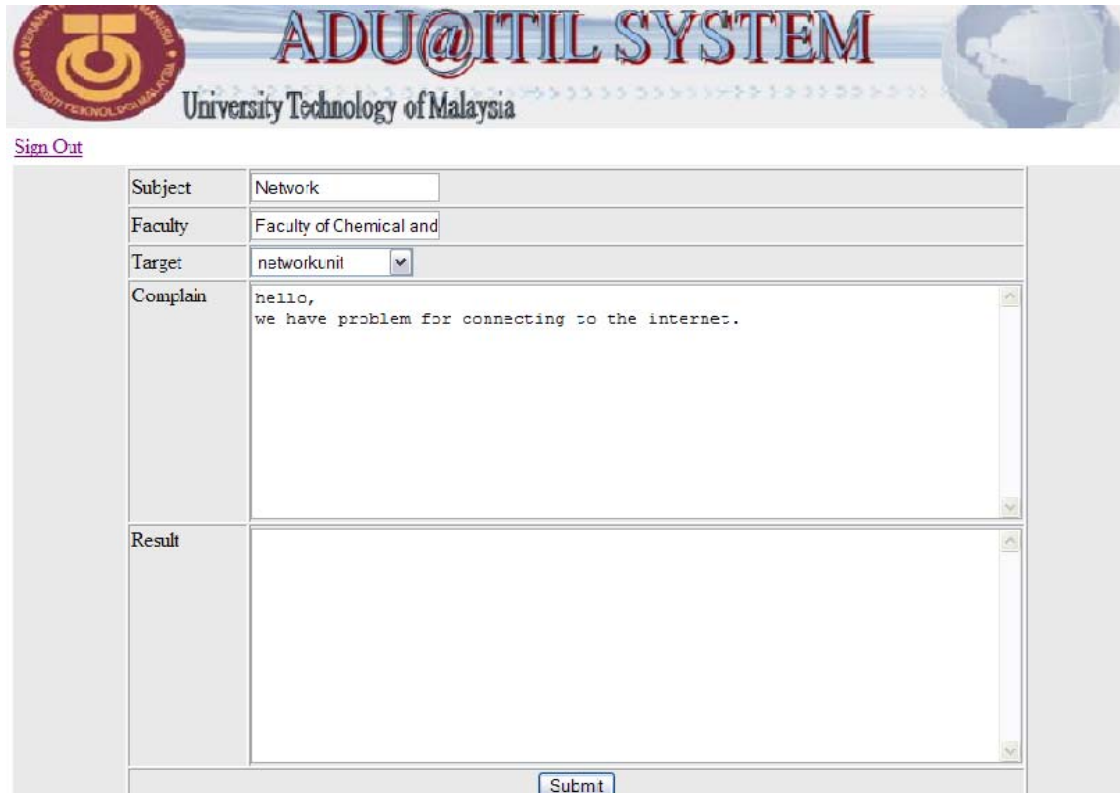


Sign Out

User	Subject	Staff Unit
saeed	Network	networkunit
hdfds	hardware	networkunit
Ali	Network	networkunit

Figure H4: Helpdesk Menu

5. Incident Management Main Menu



Sign Out

Subject	Network
Faculty	Faculty of Chemical and
Target	networkunit
Complain	hello, we have problem for connecting to the internet.
Result	

Submit

Figure H5: Incident Management Main Menu

APPENDIX I:

Database Design

1. User's Table

	Field	Type	Attributes	Null	Default	Extra
<input type="checkbox"/>	<u>ID</u>	int(11)		No		auto_increment
<input type="checkbox"/>	name	varchar(20)		No		
<input type="checkbox"/>	password	varchar(20)		No		
<input type="checkbox"/>	email	text		No		
<input type="checkbox"/>	complain	text		No		
<input type="checkbox"/>	status	text		No		
<input type="checkbox"/>	faculty	text		No		
<input type="checkbox"/>	category	text		No		
<input type="checkbox"/>	staffunit	text		No		
<input type="checkbox"/>	result	text		No		

2. Admin's Table

	Field	Type	Attributes	Null	Default	Extra
<input type="checkbox"/>	<u>ID</u>	int(11)		No		auto_increment
<input type="checkbox"/>	name	varchar(20)		No		
<input type="checkbox"/>	password	varchar(20)		No		
<input type="checkbox"/>	unit	text		No		

APPENDIX J(A):

USER ACCEPTANCE TEST
Proposed ITIL Framework

The purpose of the proposed ITIL framework is to describe a guideline to implement ITIL-service support processes in the infrastructure and service department of CICT. This is researcher appreciate to fill this form based on your experiences.

Name : _____

Position : _____

Department : _____

*Please mark \surd at the respective boxes.

Question	
1) What is your opinion on the proposed framework?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
2) Do you think that the proposed framework can be successfully implemented?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
3) From your point of view, does the framework provide a suitable process of ITIL service support for implement in this department?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
4) What is your idea about every phase?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
5) Do you think the pre-implementation phase is useful to warrantee the success of framework user acceptance?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
6) What is your idea about summarizing ITIL service support framework for this department of CICT?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
7) Are you willing to use this framework in the future?	Yes /No

5-Strongly agree 4-Agree 3-Neutral 2-Agree with Arguments 1-Disagree

8) Any comments/suggestions

APPENDIX J(B):

USER ACCEPTANCE TEST
Proposed ADU@ITIL System

The purpose of the proposed ADU@ITIL System is to implement ITIL-service support processes in the infrastructure and service department of CICT. This is researcher appreciate to fill this form based on your experiences and interaction with this tool.

Name: _____
Position: _____
Department: _____
Date: _____

*Please mark \surd at the respective boxes.

Question	
1) What is your opinion on the system interface?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
2) Do you think that the system is easy to use for user?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
3) Do you think that the system is easy to use for admin?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
4) From your point of view, does the system provide departments needs?	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>

5-Strongly agree 4-Agree 3-Neutral 2-Agree With Arguments 1-Disagree

5)Any comments/suggestions

APPENDIX K:

Programming Coding

1-User's Login

```

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>Wellcome </title>
<style type="text/css">
<!--
body {
    background-color: #EFCDFC;
}
body,td,th {
    font-family: Times New Roman, Times, serif;
}
.style2 {font-size: 14px}
.style3 {font-size: 24px}
.style4 {font-size: 16px}
.style5 {font-size: 18px}
-->
</style>
</head>

<body>
<form id="form1" name="form1" aling ="center" method="post" action="">
  <table width="98%" border="0" align="center" cellpadding="1" bgcolor="#FFFFFF">
    <tr>
      <td height="98" colspan="3" ></td>
    </tr>
    <tr>
      <td colspan="2" valign="top"><p class="style2">&nbsp;</p>

      <p align="center" class="style3">welcome to ADU@ITIL system </p>
      <table width="423" height="261" border="0" align="center" cellpadding="1" cellspacing="1">
        <tr>
          <td bgcolor="#FFFFFF"><p align="justify" class="style5">ADU@ITIL system is a web base tool,
based on ITIL service support framework which is specially developed for infrastructure and service
department of CICT.</p>
          <p align="justify" class="style5">This tool tries to manage and lead all of this department activities
based on ITIL processes.</p>
          <p align="justify" class="style5">The tool includes of user web page to input its complains
inaddition, a web based environment at infrastructure and service department to record users complains
as incident and try to trace ,solve, control and monitor it and then record it to the database to use in the
future. </p></td>
        </tr>
      </table>
      <p>&nbsp;</p></td>
    </tr>
  </table>

```

```

<td width="40%"><div align="center"><?php echo $message; ?></div>
<table width="285" height="112" border="0" align="center" cellpadding="2" cellspacing="0">
  <caption>
    <span class="style4">      <br />
    Sing in to ADU@ITIL</span><br />
  </caption>
  <tr>
    <td width="107" height="28" bgcolor="#E0E0E0"><label><span class="style4">User Name
: </span></label>&nbsp;</td>
    <td width="170" bgcolor="#E0E0E0"><label>
      <input name="tfname" type="text" id="tfname" />
    </label></td>
  </tr>
  <tr>
    <td height="28" bgcolor="#E0E0E0"><label><span class="style4">Password :</span> </label>
      &nbsp;</td>
    <td width="170" bgcolor="#E0E0E0"><label>
      <input name="tfpassword" type="password" id="tfpassword" />
    </label></td>
  </tr>
  <tr>
    <td height="28" bgcolor="#E0E0E0"><label><span class="style4">Email Address</span>
: </label>
      &nbsp;</td>
    <td bgcolor="#E0E0E0"><label>
      <input name="tfemail" type="text" id="tfemail" />
    </label></td>
  </tr>
  <tr>
    <td height="28" colspan="2" bgcolor="#E0E0E0"><label>
      <div align="center">
        <input name="login_btn" type="submit" id="Sign In" value="Sign In" />
      </div>
    </label></td>
  </tr>
</table></td></tr>
<?php
$name = $_POST['tfname'];
$password = $_POST['tfpassword'];
$email = $_POST['tfemail'];
if(isset($_POST['login_btn']))
{
    mysql_connect('localhost','root','');
    mysql_select_db('ADUdb');
    $sql = "SELECT * FROM `user` WHERE `name` = '$name' AND `password` = '$password' AND
`email` = '$email'";
    $result = mysql_query($sql) or die(mysql_error());
    if(mysql_num_rows($result) == 1)
    {
        include("./login_com_usre.php");
    } else {
        $message="The User Name And/Or Password is incorrect!Please try again";
        include("./mainpage.php");
    }
}

```

```
}else {  
include("../mainpage.php");  
}  
?>  
  <tr>  
    <td width="15%">&nbsp;</td>  
    <td width="45%">&nbsp;</td>  
    <td>&nbsp;</td>  
  </tr>  
</table>  
</form>  
</body>  
</html>
```

2-User's Complain

```

<html >
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>Untitled Document</title>
<style type="text/css">
<!--
body {
    background-color: #EFCDFC;
}
body,td,th {
    font-family: Times New Roman, Times, serif;
}
.style2 {font-size: 14px}
-->
</style>
</head>

<body>

<form action="save_1.php" method="POST"aling ="center">
<input name="password" type="hidden" value="<?php echo $password ?>" >
<input name="name" type="hidden" value="<?php echo $name ?>" >
<input name="email" type="hidden" value="<?php echo $email ?>" >

    <table width="95%" border="0" align="center" cellpadding="3" bgcolor="#FFFFFF">
    <tr>
        <td height="100" colspan="3" ><span class="style2"></span></td>
    </tr>
    <tr>
        <td width="15%" valign="top"><p class="style2"><a href="firstpage_user.php" title="sign out">Sign
Out</a> </p>

        <p class="style2">&nbsp;</p>
        <p class="style2">&nbsp;</p>
        <p class="style2"><a href="http://localhost/proje2/about.php" title="about"></a></p>
        <p class="style2">&nbsp;</p></td>
        <td width="63%" align="center" valign="top"><table width="500" border="0" cellpadding="1"
cellspacing="0">
            <caption align="top">
                <span class="style4"><br />
                <br />

                <br />
                <br />
                Please Fill up this Form          </span><br />
                <br />
            </caption>
            <tr>
                <td width="115" bgcolor="#E8E8E8"><div class="style7"><span class="style4">Faculty :</span>
</div>          </td>
                <td width="200" aling ="left"bgcolor="#E8E8E8"><div align="left">
                    <select name="tffaculty">

```

```

                <option>(None)</option>
                <option value="Faculty of Computer Science & Information System">Faculty
of Computer Science & Information System</option>
                <option value="Faculty of Chemical and Natural Resource Engineering">Faculty
of Chemical and Natural Resource Engineering</option>
                <option value="Business & Advanced Technology Center">Business &
Advanced Technology Center</option>
                <option value="Faculty of Electrical Engineering">Faculty of Electrical
Engineering</option>
                <option value="Faculty of Civil Engineering ">Faculty of Civil Engineering
</option>
                <option value="Faculty of Education">Faculty of Education</option>
                <option value="Faculty of Science">Faculty of Science</option>
                <option value="International Business School">International Business
School</option>
                <option value="Faculty of Management and Human Resource
Development">Faculty of Management and Human Resource Development</option>
            </select>
        </div></td>
    </tr>
    <tr>
        <td width="115" bgcolor="#E8E8E8"><div class="style7"><span class="style4">Category:</span>
</div> </td>
        <td width="381" bgcolor="#E8E8E8" aling ="left"><div align="left"><label>
            <select name="tfcategory" size="1">
                <option value="Not sure">Not sure</option>
                <option value="Hardware ">Hardware </option>
                <option value="Software">Software</option>
                <option value="Network">Network</option>
                <option value="Servers">Servers</option>
                <option value="Service">Service</option>
            </select>
        </label></td>
    </tr>
    <tr>
        <td colspan="2" valign="top" bgcolor="#E8E8E8"><p class="style4">&nbsp;</p>
        <p class="style4">please write down your complain : </p>
        <table width="450" height="114" border="0" align="center" cellpadding="1" cellspacing="0"
bordercolor="#666666" bgcolor="#FFFFFF">
            <tr>
                <td height="108"><label></label>
                <label>
                <textarea name="tfcomplain" cols="72" rows="11" id="tfcomplain" ></textarea>
                </label></td>
            </tr>
        </table>
        <p align="center">
            <input type="submit" name="login_btn" value="Submit" />
        </p>
        <p>&nbsp;</p></td>
    </tr>
</table>
<td width="22%" align="right" valign="top"><p align="center">
    <?php
    $name = $_POST['tfname'];

```

```
$password=$_POST['tfpassword'];
```

```
$email=$_POST['tfemail'];
```

```
    print("welcome $name!");
    ?>
```

```

</p>
<p>&nbsp;&nbsp;&nbsp;</p>
<table width="85" height="28" border="0" cellpadding="2" cellspacing="0">
<caption>&nbsp;&nbsp;&nbsp;</caption>
</table> </td>
</tr>
<tr>
<td>&nbsp;&nbsp;&nbsp;</td>
<td>&nbsp;&nbsp;&nbsp;</td>
<td>&nbsp;&nbsp;&nbsp;</td>
</tr>
</table>
</form>
</body>
</html>

```

3- Admin's Login

```

<html >
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>helpdesk login</title>
<style type="text/css">
<!--
body {
    background-color: #EFCDFC;
}
body,td,th {
    font-family: Times New Roman, Times, serif;
}
.style2 {font-size: 14px}
.style5 {font-size: 16px; }
.style7 {font-size: 16px; font-weight: bold; }
-->
</style>
<script language="javascript">
function sendform()
{
    var u=document.getElementById("tfname").value;
    var p=document.getElementById("tfpassword").value;

```

```

        var b=document.getElementById("btnlogin").value;
        if((u=="") || (p==""))
        {
            alert("please enter user name/password");
        }
        else
            frmlogin.submit();
    }
</script>

</head>
<body>
<form id="frmlogin" name="form1" aling ="center" method="post" action="">
  <table width="98%" border="0" align="center" cellpadding="0" cellspacing="1" bgcolor="#FFFFFF">
    <tr>
      <td height="98" colspan="6" >
        <span class="style2"></span></td>

      </td>
    </tr>
    <tr>
      <td colspan="3" valign="top"><p class="style2">&nbsp;</p>
      <table width="285" height="321" border="0" align="center" cellpadding="2" cellspacing="0">
        <caption><div align="center"><?php echo $massage; ?></div>
        </caption>

        <tr>
          <td height="28" colspan="2" bordercolor="#000000" bgcolor="#E0E0E0"><div align="center">
            <p>&nbsp;</p>
            <p><span class="style7">Sing in to ADU@ITIL</span></p>
            <p>&nbsp;</p>
          </div></td>
        </tr>
        <tr>
          <td width="109" height="28" bordercolor="#000000" bgcolor="#E0E0E0"><label><span
class="style5">User Name :</span></label>
            &nbsp;</td>
          <td width="166" bordercolor="#000000" bgcolor="#E0E0E0"><label>
            <input name="tfname" type="text" id="tfname" />
          </label></td>
        </tr>
        <tr>
          <td height="33" bordercolor="#000000" bgcolor="#E0E0E0"><label><span
class="style5">Password</span>:</label>
            &nbsp;</td>
          <td width="166" bordercolor="#000000" bgcolor="#E0E0E0"><label>
            <input name="tfpassword" type="password" id="tfpassword" />
          </label></td>

          <label>
            <p>&nbsp;</p>
            <div align="center">
              <p>
                <input name="btnlogin" type="submit" id="btnlogin" onclick="sendform();" value="login" />

```

```

        </p>
        <p>&nbsp;</p>
    </div>
</label></td>
</tr>
</table>    <p>&nbsp;</p></td>
</tr>
<tr>
    <td width="14%">&nbsp;</td>
    <td width="33%">&nbsp;</td>
    <td width="53%">&nbsp;</td>
</tr>
</table>
</form>
</body>
</html>

```

4- Admin's Main Helpdesk

```

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>helpdesk login</title>
<style type="text/css">
<!--
body {
    background-color: #EFCDFC;
}
body,td,th {
    font-family: Times New Roman, Times, serif;
}

-->
</style>
<script language="javascript">
function sendform()
{
    var u=document.getElementById("tfname").value;
    var p=document.getElementById("tfpassword").value;
    var b=document.getElementById("btnlogin").value;
    if((u=="") || (p==""))
    {
        alert("please enter user name/password");
    }
    else
    frmlogin.submit();
}
</script>

</head>
<body>
<form id="frmlogin" name="form1" aling ="center" method="post" action="">
<table width="98%" border="0" align="center" cellpadding="0" cellspacing="1" bgcolor="#FFFFFF">
<tr>

```

```

<td height="98" colspan="6" >
  <span class="style2"></span></td>

</td>
</tr>
<tr>
<td colspan="3" valign="top"><p class="style2">&nbsp;</p>
<table width="285" height="321" border="0" align="center" cellpadding="2" cellspacing="0">
  <caption><div align="center"><?php echo $message; ?></div>
  </caption>

  <tr>
    <td height="28" colspan="2" bordercolor="#000000" bgcolor="#E0E0E0"><div align="center">
      <p>&nbsp;</p>
      <p><span class="style7">Sing in to ADU@ITIL</span></p>
      <p>&nbsp;</p>
    </div></td>
  </tr>
  <tr>
    <td width="109" height="28" bordercolor="#000000" bgcolor="#E0E0E0"><label><span
class="style5">User Name :</span></label>
      &nbsp;</td>
    <td width="166" bordercolor="#000000" bgcolor="#E0E0E0"><label>
      <input name="tfname" type="text" id="tfname" />
    </label></td>
  </tr>
  <tr>
    <td height="33" bordercolor="#000000" bgcolor="#E0E0E0"><label><span
class="style5">Password</span>:</label>
      &nbsp;</td>
    <td width="166" bordercolor="#000000" bgcolor="#E0E0E0"><label>
      <input name="tfpassword" type="password" id="tfpassword" />
    </label></td>
  </tr>
  <td height="28" colspan="2" bordercolor="#000000" bgcolor="#E0E0E0"><p>
    <label>
      <p>&nbsp;</p>
      <div align="center">
        <p>
          <input name="btnlogin" type="submit" id="btnlogin" onclick="sendform();" value="login" />
        <p>&nbsp;</p>
      </div>
    </td>
  <td width="33%">&nbsp;</td>
  <td width="53%">&nbsp;</td>
</tr>
</table>
</form>
</body>
</html>

```

4- Admin's Main Helpdesk

```

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>helpdesk login</title>
<style type="text/css">
<!--
body {
    background-color: #EFCDFC;
}
body,td,th {
    font-family: Times New Roman, Times, serif;
}
.style2 {font-size: 14px}
.style5 {font-size: 16px; }
.style7 {font-size: 16px; font-weight: bold; }
-->
</style>
<script language="javascript">
function sendform()
{
    var u=document.getElementById("tfname").value;
    var p=document.getElementById("tfpassword").value;
    var b=document.getElementById("btnlogin").value;
    if((u=="") || (p==""))
    {
        alert("please enter user name/password");
    }
    else
    frmlogin.submit();
}
</script>

</head>
<body>
<form id="frmlogin" name="form1" aling ="center" method="post" action="">
<table width="98%" border="0" align="center" cellpadding="0" cellspacing="1" bgcolor="#FFFFFF">
<tr>
<td height="98" colspan="6" >
<span class="style2"></span></td>

</td>
</tr>
<tr>
<td colspan="3" valign="top"><p class="style2">&nbsp;</p>
<table width="285" height="321" border="0" align="center" cellpadding="2" cellspacing="0">
<caption><div align="center"><?php echo $message; ?></div>
</caption>

<tr>
<td height="28" colspan="2" bordercolor="#000000" bgcolor="#E0E0E0"><div align="center">

```

```

        <p>&nbsp;</p>
        <p><span class="style7">Sing in to ADU@ITIL</span></p>
        <p>&nbsp;</p>
        </div></td>
    </tr>
    <tr>
        <td width="109" height="28" bordercolor="#000000" bgcolor="#E0E0E0"><label><span
class="style5">User Name :</span></label>
        &nbsp;</td>
        <td width="166" bordercolor="#000000" bgcolor="#E0E0E0"><label>
        <input name="tfname" type="text" id="tfname" />
        </label></td>
    </tr>
    <tr>
        <td height="33" bordercolor="#000000" bgcolor="#E0E0E0"><label><span
class="style5">Password</span></label>
        &nbsp;</td>
        <td width="166" bordercolor="#000000" bgcolor="#E0E0E0"><label>
        <input name="tfpassword" type="password" id="tfpassword" />
        </label></td>
    </tr>
    <tr>
        <td height="28" colspan="2" bordercolor="#000000" bgcolor="#E0E0E0"><p>
        <label>
        <p>&nbsp;</p>
        <div align="center">
            <p>
                <input name="btnlogin" type="submit" id="btnlogin" onclick="sendform();" value="login" />
            </p>
            <p>&nbsp;</p>
        </div>
        </label></td>
    </tr>
</table> <p>&nbsp;</p></td>
</tr>
<tr>
    <td width="14%">&nbsp;</td>
    <td width="33%">&nbsp;</td>
    <td width="53%">&nbsp;</td>
</tr>
</table>
</form>
</body>
</html>

```