

**UNIVERSITY OF KWAZULU-NATAL**

**SHOULD END-USERS BE PART OF THE  
FORMULATIONS AND MEASUREMENT OF  
IT SERVICE LEVEL AGREEMENTS?**

**By**

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## ABSTRACT

The IT budgets in companies are rapidly increasing and the company leaders are under increasing pressure to show the return on IT investments, while exploiting IT to gain competitive advantage and to compete in the complex technology business world. IT service management is a growing phenomenon that is increasing in popularity, as the research shows the growing number of frameworks and companies that are adopting these frameworks such as ITIL and COBIT.

This dissertation is based on a research questionnaire that sets out to determine whether end-users should be included in the SLA formulation and measurement. The importance of the research topic is explored and the growing interest in IT service management is highlighted. The literature review presents the purpose of IT SLA and the extensive use of IT SLA's while also providing guidelines on the level of involvement of end-users in the SLA formulation and measurement.

The research is carried out at the National Bioproducts Institute (NBI), a national pharmaceutical company based in Pinetown, Kwazulu Natal. The research utilises web-based which were sent to all users at various levels of the organisation with the aim of assessing varying views and opinions: of managers and end users.

There is extensive information available on the need to compile and manage an IT SLA. However, there is little said about the role of computer end-users. The research indicated that computer end-users are informed of the need and purpose of the IT SLA. The survey also indicates that end-users can improve the IT SLA if they are included in the SLA formulation and measurement process. The NBI workforce is made up mostly of the Generation X group, who are adopters of IT with the need to be part of the IT service delivery. This further emphasizes the benefit of including the computer end-user in the SLA process.

The study reveals that the NBI IT service delivery can be optimised by including the end-user. The IT SLA should be made available to all computer end-users, allowing end-users to participate in compiling and measuring the IT service whilst still ensuring that the management team control which service to offer and at what cost. NBI should consider the benefits and carefully determine the best way of optimising the IT service by extending the SLA process to end-users.

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## GLOSSARY OF TERMS AND ABBEREVIATIONS

The terms are generally accepted industry terms with the exception of SAP, PRINCE2 and NBI for which references have been provided.

<b>ABBREVIATION</b>	<b>TERMS</b>	<b>DEFINITION</b>
LIMS	Laboratory Information Systems	A Laboratory Information Management (LIMS) is a software system that is used for the management of samples and other laboratory functions such as quality assurance and Quality Control
ERP	Enterprise Resource Planning	Enterprise Resource Planning is a computer system that is used to manage, store, and process transactions about the functions of a business.
SAP	Systems, Applications and Products in Data Processing	SAP is an ERP application that supports businesses and business processes by accepting input data, processing this data and providing the required information for business users.  (Web 1)
SCADA	Supervisory Control And Data Acquisition	SCADA refers to control and computer systems used mostly in Manufacturing industries. The systems monitor and control industrial infrastructure to perform the required actions which are programmed or inputted.

PLC	programmable logic controller	A programmable logic controller is used for the automation of electromechanical processes by controlling machinery on factory manufacturing plants, loading equipment, heavy duty moving equipment etc. PLCs are used in several industries and machines
ADSL	Asymmetrical Digital Subscriber Line	Asymmetric Digital Subscriber Line is a form of data communications technology that enables faster data transmission over copper lines.
ITSM	Information Technology Service Management	IT service management is a discipline for managing (IT) systems to delivery and manage the IT function. ITSM is mostly process orientated and emphasises the use of technology rather than the technology that should be implemented.
PRINCE2	PRojects IN Controlled Environments II	PRojects IN Controlled Environments is a methodology for managing projects and covers the management, control and organisation of a project. "PRINCE2" is the second major version of this methodology.  (Web 2)

MOF	Microsoft Operations Framework	Microsoft Operations Framework (MOF) is made up of several guides that assist in establishing and implementing reliable, cost-effective services. MOF was created to provide guidance across the entire IT life cycle.
COBIT	Control Objectives for Information and related Technology	The Control Objectives for Information and related Technology is a framework of best practices for the management of IT. The framework is made up of measures, indicators and processes that can be utilised to maximise the benefits derived through the use of information technology, to provide appropriate control and governance of IT.
CCTA	Central Computer and Telecommunications Agency	The Central Computer and Telecommunications Agency (CCTA) was a UK government agency providing computer and telecoms support to Government departments.
OGC	Office of Government Commerce	The Office of Government Commerce is part of the UK Government The purpose of OGC is to provide guidance on service provision and the provision of frameworks that support public sector organisations

FCR	First Call Resolution rate	First Call Resolution rate refers to the number of calls that are resolved on first contact with a service desk?
ASA	Average Seconds to Answer	Average Seconds to Answer is the average of the amount of time that has been taken to answer all calls in a given period.
NBI	National Bioproducts Institute	National Bioproducts Institute is a section 21 pharmaceutical company that is located in Pinetown, Kwazulu Natal.  (Web 3)

# Chapter One

## 1 Introduction

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### 1.1 Introduction

The introduction of Information Technology (IT) service management came about owing to the complexity of IT and related systems, and the need to better manage these systems in a way that was understood by business stakeholders. Winniford, Conger & Erickson-Harris (2009) said that the increasing layers of technologies and the complexity in IT systems bundled with the huge costs of implementing and managing these technologies, prompted businesses to find a more coherent management approach towards IT.

Galup, Dattero, Quan & Conger (2009) said that the earlier management approach was a service level agreement with the IT service provider to deliver a service that was pre-determined and measured by the IT department. These service agreements were written using IT terminology such as dropped packets, latency, etc. and they defined operational level IT functions. Today we find that agreements are created using business language that is easy to understand and can be matched to the objectives of the business.

The IT Service Level Agreement (SLA) underwent a few changes to its definition which created interest in the concept and the need to improve on the IT service function. The recognition of service management was evident in the growing adoption of frameworks such as the Information Technology Infrastructure Library (ITIL) and Control Objectives for IT (COBIT) for the management of IT services (web 4).

The IT service management frameworks overlap with similar objectives; however, there is little research available on the implementation and adoption of such frameworks with emphasis on the end-user. The role of end-users is not clearly defined in the frameworks as the focus is on the business requirements as defined by the business owners and department managers (Speth 2009).

This research sets out to determine the effects of the current IT SLA at the National Bioproducts Institute with emphasis on the end-user. The research will assess the need for

end-users to participate in the SLA formulation and monitoring. It will also assess the success of the current SLA.

## **1.2 IT Service Level Agreement**

The main objective of the IT Service Level Agreement is to match the IT capacity, costs and requirements to the business requirements. The SLA is a mutually accepted contract for IT divisions to deliver a pre-defined set of services to the business, which is measured and monitored with the purpose of improving the overall IT service. The SLA should be written in business language using business metrics for the measurement of the service (Galup *et al*, 2009). The success and objectives of the IT service are output-based and determined by the needs of the business.

The level of the IT service and how the IT function is delivered should not be the sole decision of IT or the business. Both business and IT should agree on an acceptable level of service which should be reflected in the IT SLA. ITIL is adopted as the global industry standard for delivering IT services and sets the platform for managing the IT function together with the business owners (web 5). Companies who adopted ITIL have realised the benefits of ITIL by optimising the IT function, reducing costs, improving business productivity and creating a proactive partnership between IT and Business which addresses the real business problems (Orr, Turner, Kunka & Bullen, 2008).

The ITIL framework is made up of 5 core publications: Service Strategy, Service Design, Service Operation, Service Transition and Continual Service Operation, with the emphasis on managing the service delivery which is output-based (Vinogradsky 2008). An agreement is required to set the limits in terms of what is expected and how the service should be delivered. The SLA defines what is included and what is excluded from the service-offering and provides a mechanism for amending the service as required by both parties. The service level agreement is defined in further detail in chapter 2, the literature review.

## **1.3 What is the importance of an IT Service level agreement?**

Meyer (2008) indicated that in previous years, IT was managed as a push service or push technology. The IT budgets were based on implementing technologies with the primary

objective of saving costs. This has changed: IT is now viewed as an essential service that should be delivered in line with customer and business needs and it should deliver on business goals.

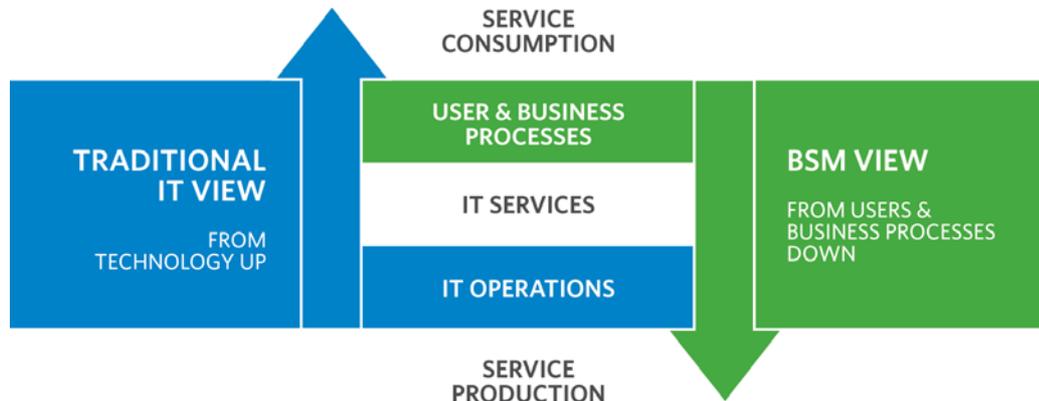


Figure 1.1 - Service Consumption

(Meyer, 2008)

Meyer (2008) said that IT has evolved from managing the IT processes that produce services to a framework for managing the IT services that meet the needs of service consumers. He went on to say that this change reflects a change from IT service management to business service management, which maps IT services to business goals. This change was as a result of business requiring clearer justification for IT expenditure with proper business reasons for IT investments. The traditional view of IT was one of IT implementing technologies for “consumption” by the business; however, this view has evolved to a demand-driven approach where the business requirements determine the IT expectations as shown in figure 1.1.

The SLA is a necessary tool for managing the IT service and the companies that create the expert capabilities to leverage its IT capacities may gain the competitive edge over their competitors by reducing costs and maximising the IT investment to both its internal and external customers (Morgan & Yallop, 2003).

#### **1.4 Research environment at the National Bioproducts Institute (NBI)**

The NBI is a pharmaceutical company which is located in Pinetown. The wide area network consists of 2 sites: the main site is in Pinetown and there is a smaller office site in Johannesburg.

The IT department is responsible for providing, supporting and maintaining of IT and related systems. The core systems are the SAP (Systems and Applications in data Processing), the LIMS (Laboratory Information Management Systems) and the manufacturing systems; all of which are supported in-house by the IT department. Complex support for the core systems is outsourced and managed on a needs basis by entering into support agreements with external service providers.

The network infrastructure, desktop support, telephone system, helpdesk system and Microsoft infrastructure is outsourced and managed via a SLA with the service provider. Helpdesk tasks are assigned a priority which then determines the completion time for the task. The helpdesk priorities were communicated to end-users at the time of implementation and are displayed on the helpdesk each time a task is logged. The helpdesk system is designed to report on service level performance, which is based on fixing problems within the specified time.

The SLA is compiled by the NBI management and the service provider jointly, based on the business requirements at NBI. The IT department reports on the IT service performance quarterly, which is reviewed by the NBI management.

The systems in use at NBI are as follows:

Server Hardware                      IBM Hardware for server and back-up systems

ERP system                              SAP system

Manufacturing systems              LIMS systems

SCADA (Supervisory Control and Data Acquisition) and PLC (Programmable Logic Controller) systems for automation of processes

Network infrastructure              Cisco hardware

ADSL line for WAN connectivity

Diginet for internet and external email access

## PRI line for telecommunications

Desktop systems                      Dell Hardware  
Microsoft Operating Systems      Microsoft Office

### **1.5 Objectives of the Research**

The current process for compiling IT Service level agreements does not provide for end user participation or end user input; however end users are key stakeholders in the IT service delivery. The study sets out to determine whether end users should be included in the SLA formulation. The following are objectives of the research:

- ✓ To determine the effectiveness of the IT SLA as determined by computer end-users
- ✓ To assess whether end-users should participate in the SLA formulation, SLA performance monitoring and end-user acceptance of the current SLA.
- ✓ To evaluate management's view on the current process for the SLA formulation and monitoring and whether the process should be changed to include end-users.
- ✓ To provide recommendations for the SLA implementation process at NBI and the level of involvement of end-users.

### **1.6 Limitations of the Research**

The research is limited to an organisation within the pharmaceutical industry in South Africa and may not be applicable to other organisations in substantially different industries. This is further exacerbated by the fact that NBI is the only manufacturer of plasma-derived products in South Africa. The NBI computer infrastructure however, consists of branded hardware which is used by a wide range of organisations in South Africa. The hardware in use is Cisco, IBM and Dell, while the software is the Microsoft Operating System, Microsoft Office Suite, LIMS and the SAP system.

The IT Service Management is recognised as a standard for managing the IT function and has been adopted by a large number of organisations across various industries. The results could create awareness among other companies of the end-user's participation in IT service level agreements. The findings, however, may be limited to companies of similar size and structure to NBI and further research may be required to cater for the varying types of organisations.

The company has approximately 110 desktop computers which are supported by 1 Support Technician who is also responsible for first-line support of the backend Microsoft Infrastructure. The SAP system is supported by 2 in-house staff, while SAP projects are done by an on-site SAP consultant who is employed on a needs basis.

There is extensive information about IT service management available on the internet, in journals and textbooks. The literature provides little direction on the end-users' participation in the SLA implementation and monitoring process; however, various authors (see for example Morgan & Yallop, Meyer, Gordon and Gordon) offer options for managing SLA and the extent of end-user involvement. This information will be reviewed and presented in the research.

## **1.7 Research Methodology**

The research uses a quantitative survey design to gather data which is then analysed and presented to answer the research objectives. A literature review was conducted using textbooks, journal articles and the internet.

### **1.7.1 Target Population**

The target population was users at the National Bioproducts Institute who were part of the "All\_users" Microsoft Outlook Distribution group at the time the email was sent, and is made up of approximately 110 users. This group included all NBI computer-users and long-term contractors. Long-term contractors are people who are employed for 5 days a week for more than 6 months.

### **1.7.2 Sample Size**

The survey received 64 responses which was the sample population. This made up 58.2 % of the total population.

### **1.7.3 Data collection**

The questionnaires were uploaded to the internet web site <http://www.surveybob.com/surveybob/s/7da57822-a920-4097-9291-59c281065465.html> and the link was included in the email to all users requesting participation. Users were initially given 2 weeks to complete the questionnaire and thereafter an extended 2 weeks was allowed as certain users experienced difficulty accessing the site. The internet access restriction was removed and thereafter all users were able to access the web site.

### **1.7.4 Analysis of data**

The responses on the web site were exported into a Microsoft Excel file format. The raw data was then coded and organised using Microsoft Excel® 2007 SP2. Microsoft Excel was also used to create the graphs and tables. The Statistical Package, SPSS 15.0 release 15.0.1.1, for Windows Integrated Student version, was used for the data analysis. The coded data was uploaded into SPSS and then analysed to identify relationships amongst the variables.

## **1.8 Structure of Study**

### **1.8.1 Chapter One - Introduction**

Chapter one provides the general background to the research, the relevance of the research topic, the research environment where the study was undertaken, the objectives and limitations of the research, and the research methodology used.

### **1.8.2 Chapter Two – Literature Review**

Chapter two introduces the research topic and highlights the importance of the research. The industry's best practices are explained and the relevance of the topic is discussed. The motivation for the research topic is explained. The objectives of service level management are explained and the stakeholders are determined. The information for this chapter is mostly from textbooks, the internet and journal articles.

### **1.8.3 Chapter Three – Research Methodology**

This chapter outlines the methodology that is applied to the data analysis. The research uses quantitative research techniques which are further explained. The data collection techniques and data instruments are stipulated. The data collection procedure is explained and the ethical considerations that were taken into account are detailed in this chapter.

### **1.8.4 Chapter Four – Results of Study**

The research questions and the investigative questions are discussed. The data is modelled and correlated using different techniques to identify trends and provide useful information. The results are explained using graphs, tables and Gartner-like quadrants. The demographics of the sample population are referenced against the demographics of South Africa from information obtained from the <http://www.statssa.gov.za/>. The research question and objectives are assessed and the answers to these questions are analysed and presented.

### **1.8.5 Chapter Five – Conclusion**

The final chapter provides the recommended approach that the NBI should adopt with the process of compiling, and monitoring of the IT SLA. The chapter highlights the benefits of adopting the recommended approach and the reason for the recommendation.

## **1.9 Conclusion**

The IT SLA is recognised as an essential part of any IT department's commitment to providing an IT service of the best standard. The question that arises is the role of end-users in the compiling, implementing and monitoring of the IT SLA. The research sets out to provide answers to the research questions and is carried out at the National Bioproducts Institute (NBI). The research instruments used are web-based surveys. The raw data were analysed and presented using Microsoft Excel® 2007 SP2 and SPSS 15.0 release 15.0.1.1.

The following chapter presents the literature review defining the IT service level agreement, the purposes of the SLA and the objectives of having an SLA. The chapter goes on to outline the motivation for the research.

## CHAPTER TWO

### 2 Literature Review

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#### 2.1 Introduction

The IT Service Management (ITSM) is a framework that aligns IT activities and IT goals with the goals of business users and business processes. ITSM emphasizes processes and uses best practices to deliver Information Technology (IT) services of the highest quality. An essential tool for the ITSM function is the Service Level Agreement (SLA). An SLA document defines the level of each service to be delivered, and how these services will be measured and monitored. The SLA is a mutually agreed “contract” between the parties and often includes a resolution mechanism for non-performance or related issues (Denny, 2009).

A SLA document forms part of the service level management process and is recognized as an essential instrument in the IT service management function of the Information Technology Infrastructure Library (ITIL) framework. The ITIL is a public framework of best practices for the management of the IT service (Web 5). ITIL is recognized as the defacto standard for managing IT services. The framework was developed by the British government’s telecom agency and was formed by selecting the best practices of the IT service management function. A key driver in establishing the framework is the evolution of IT’s role in Business. The IT role in organisations has transformed from that of an IT service delivery division to that of an IT division of strategic importance that has the potential to gain competitive advantages.

The IT function in organisations requires huge investments in technology and it is essential for managers to ensure that the return on the IT investment is maximised. The technology lifespan is often short as technologies are frequently replaced with newer, improved technologies and for this reason it is essential for managers to maximise the returns on the IT investment within a short period of time. The management of IT operations and IT assets is vital as it makes up 60-90 % of the total cost of ownership and use of the IT assets (Galup *et al*, 2009).

The IT customers and stakeholders exist at all levels of the organisation, from the executive management whose needs are management information systems, to the basic end-user who captures data. The management's need for IT is strategic and focuses on long-term goals to ensure that the IT goals and objectives are in line with the company objectives. The end-user requirements emphasize the operational day-to-day requirements for data-capturing and information processing. Customers provide the best reference point for assessing the requirements and the levels of each service that is considered acceptable. The computer end-users play a key role in the way the IT service management is structured and delivered and therefore the end-users should be considered when determining the type of service and the level of each service that an IT division should provide, thereby supporting the need to include end-users in the SLA formulation (Cullen & Wilcocks, 2003).

During the past 2 decades the IT function has changed its role from one of delivering and installing technology to one of improving the quality of IT services, with the aim of building and strengthening relationships with stakeholders. This is achieved by ensuring that customers and IT have a mutual understanding of what is expected and how these expectations will be met through formal and informal agreements that detail how the relationship will be managed (Galup *et al*, 2009).

The (ITIL) framework has a separate section that deals with IT service management and one of the ITIL recommendations is the implementation of SLA's. A common risk of implementing the ITIL framework is the inability to correctly formulate the customer requirements. At the other extreme one has to also guard against having an agreement that is too ambitious and doomed to fail. The inclusion of end-users in the formulation and measuring of service agreements could ensure that these pitfalls are avoided. This should also create a forum for building stronger relationships between end-users and the IT function (web 6).

## **2.2 Importance of the research area**

The responsibility of management is to coordinate company resources to ensure businesses become successful, to increase operational efficiencies, achieve business objectives and contain costs. Managers rely on information and communication to achieve these

objectives through the processing, analyzing and disseminating of information. The use of information technology provides the means to achieve these objectives via information systems, communication and collaboration tools such as email and internet, sharing tools such as file servers and access to information via the internet (Gordon & Gordon, 2004).

Frenzel (1992) discovered that companies in the 1990's who adopted information technology were undergoing transformation in company structures. The level of management in these companies was reduced from 5 to 3 levels; reporting structures of these companies was moving to flatter structures with reliance on IT for providing information to better manage the company. The IT function is becoming entrenched in the operations and functioning of businesses and therefore it has become a requirement for companies not only to adopt the technology, but also to ensure that the technology is managed to achieve maximum benefit.

The implementation of the technology does not necessarily provide the competitive advantage or added benefits unless the functions that the technology provides are able to benefit the users of the technology. To maximise the investment in IT is to maximise the use of the technologies to as many users as is deemed necessary by the business. The users of technology must be satisfied that the technology is benefiting them, is available when needed and meets their requirements to perform their job functions. The rapid changes in technology stimulate the change in user expectations, increase demand for new technology by users and ensure that users constantly evaluate current and new technology (Carter-Steel, 2009).

As users become aware of the possibilities and limitations of information technology, they tend to become more critical of the internal IT function and in doing so increase their expectations of IT (Lederer, 1998).

In assessing the needs of computer end users, Zhang & Galletta (2006) found that computer-users expect a system that is easy to use and free from errors, but also available when required. This expectation is not always possible as computer systems have to be maintained, upgraded, updated and backed-up, which often requires down time. Unplanned down time during working hours equates to loss of productivity and increase in labour costs to make up for the down time. The decision on when and for how long IT systems

can be taken off-line should not be determined by IT alone, but should rather include end-users. The IT function is required to come up with ways to provide a 24/7 service while maintaining, upgrading and backing-up data to meet the expectations of end-users, and delivering the IT service required.

The stakeholders that spend the most time processing transactions and capturing data are the end-users whose jobs cannot be performed without the availability of a computer; therefore it is essential that the expectations of these end-users is not ignored when making IT service decisions. In his article ITSM overview and IT Service management, Speth (2009) mentions that that the Service Level Agreement (SLA) forms a key component of the ITIL service design in ensuring that IT service delivery and its related performances are measured and delivered in a consistent manner that meets the needs of the business and its customers.

IT governance is concerned with 3 issues: decisions concerning IT infrastructure design, IT project management (which deals with the implementing of technology and related services) and the IT user-management, which refers to the daily delivery of IT services. Carter-Steel (2009) suggests that the daily delivery of IT services requires controls, measures and agreements by all stakeholders about the expected level of each IT service to be delivered and made available. The Service Level Agreement details how the daily IT operations will deliver on customer's daily needs.

The evolution of IT service delivery and the advancements in the various frameworks is evidence of the demands that businesses have placed on IT departments to deliver quality IT services in the most cost-effective way. The creation of bodies such as The Information Technology Service Management Forum (itSMF), which recognises and promotes the development and use of IT service management, is an indication of the attention that IT service management has gained in recent years. The itSFM membership is continuously growing with members ranging from large multinationals to individuals and small enterprises, with members from both the public and the private sector. According to Galup *et al*, (2009) the increase in the number of individuals attempting the ITIL service management certification grew from approximately 40 000 in 2000 to 160 000 in 2007, an increase of 300 %.

### **2.3 IT Service Level Agreement (SLA) Definition**

The Service Level Agreement (SLA) is the mutual agreement by two or more parties for the delivery and acceptance of a certain standard of IT service and how this service will be monitored and managed. The agreement is negotiated by the parties; therefore there is no greater power of one party over the other, as both parties have the choice to accept or reject the agreement without any consequence (web 7).

The SLA details the in-scope and out-of-scope services, how the services will be provided by the service provider and how such services may be utilised by the end-user (McDonald & Longwell 2009). Each type of service should detail how the specific service will be provided and ideally this would be deemed to be the “level of each service” that is accepted and agreed.

A typical SLA document will contain the recipients of the service, details of the service levels and how these will be measured and monitored to provide guidelines on the escalation for service issues. The SLA may also include any penalties for non-performance and it may provide guidelines for continuous improvement (Morgan & Yallof 2003).

The SLA, which is output-based, should relate to the services that the customer receives and not to how the service is provided. The expectations of the recipient of the service should be defined and clear responsibilities should be assigned to the supplier of the service and to the customers (web 7).

The dictionary by Farlex defines the SLA as an agreement between 2 parties where the level of service is formally defined. The SLA document focuses on business and is written in business language rather than IT language. More recently SLA's have been used as internal company documents for IT to manage the service delivery to the various departments within the company. The SLA provides input into the IT charge to various divisions and may include financial penalties for non-performance (web 8).

Cullen & Wilcocks (2003) said “the SLA is the defining of what the successful service will be”. The agreement determines the responsibilities and obligations of the parties involved and set out how the services are to be provided by the supplier and how the service will be demanded by the customer.

Service level agreements outline the level of service that IT has agreed to provide to the customers or stakeholders, which includes the rights and remedies in the event of failure by the service provider. The SLA outlines the resolution process and escalation procedure for non-delivery and may also include the method for calculating any penalties for breach of the agreed service level (Cullen & Wilcocks 2003).

SLA's are the basis for procedures, tools and people who provide the service. It is necessary to know how the service is structured and delivered so that the service can be measured against set benchmarks and costs. The management of IT must be expressed in business language and should not use technical terms to describe the service. The management of the IT service must deliver on business objectives and business goals and have specific measurements to show that it is meeting the desired business objectives (Frenzel, 1992).

SLA documents should be realistic and document the level of each service in terms that are understood by the business. Before entering into an SLA, IT should gather information about the performance before agreeing to the acceptable level of service. Common problems of SLA's, are: committing to agreements without understanding the metrics for measuring performance, the inability of customers to formulate requirements, also drawn agreements that are too ambitious and unachievable. Other problems relate to inaccurate information on the IT inventory and IT capacities, and unclear definition of the responsibilities of each party. A common problem is that end-users do not know their requirements. Also, the agreement caters for business requirements that deliver on long-term business objectives, but fail to address the immediate needs of end-users. The SLA also aims to set out the guidelines for the relationship between IT and business with the intention of building stronger relationships and ensuring that each party is committed to the relationship. A service level agreement should not be the ultimate state of how IT services should be provided, neither should it meet a specific goal of the business, but it should rather be a living document that aims constantly to maintain the relationship by means of continuous improvement (Cullen & Wilcocks, 2003).

## **2.4 ITSM Best Practices**

Information Technology Service Management (ITSM) places emphasis on the operations of IT where the IT function is one of service delivery. The ITSM is made up of 3 main concepts: Service, Quality and Customers. The customers are often also referred to as the computer end-users. The ITSM function needs clearly to understand the services that are provided and the related quality of each service as determined by the receiver. The ITSM addresses the business need; any level of service must be agreed by the business and the provider of the IT service (web 9).

There are several ITSM frameworks; however, the Information Technology Infrastructure Library (ITIL) is cited as one of the best frameworks to use for the management of IT services (Carter-Steel 2009). Other more well known and successful frameworks include the PRINCE 2 (Projects In Controlled Environments), Microsoft Operations Framework (MOF), and (COBIT) Control Objectives for Information and Related Technology (web 10). Leading IT service companies such as Dimension Data, a multinational IT company, have adopted several components of ITIL to create a support model for their clients (web 10).

The ITIL framework dates back to 1980 when a British Governing Body, the Central Computer and Telecommunications Agency (CCTA) created a framework of best practices for the delivery of IT services which was managed by the Office of Government Commerce (OGC). Figure 2.1 provides an overview of the evolution of the ITIL framework from the time of inception.

The ITIL is accepted by the large majority of IT departments and IT companies as the best practices standard for the management of IT services. The evolution of ITIL grew owing to its popularity, the demand for a framework of best practices and the need for continuous improvement of the IT service delivery. The ITIL Version 1 was replaced by ITIL Version 2 in 2000. The changes in ITIL Version 2 were influenced by the introduction of the itSMF user group for IT. In 2007, ITIL Version 3 was published and provided amendments to cater for the rapidly changing needs of IT service management. ITIL V3 used a life cycle approach for the planning, designing, deploying, providing and improving of IT services. The ITSM auditing standard, (ISO) 15000:2004 was superseded by ISO 20000 in 2005,

just prior to the launch of ITIL Version 3; and played a key role in defining the framework for ITIL V3 (Carter-Steel 2009).

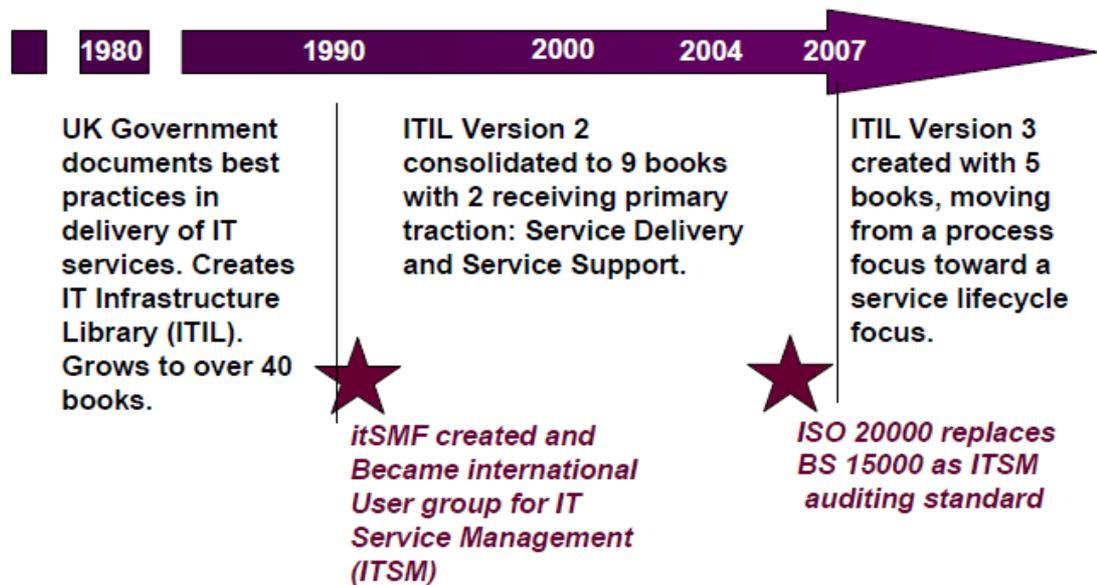


Figure 2.1 - Session 1 - ITSM Overview Strategy V3 3, (Speth 2009).

ITIL uses the industry best practices and is process-oriented. ITIL has characteristics that are common across industries and uses a bottom-up approach that is focused on service management. ITIL does not dictate how the IT services should be managed, but instead provides the framework, processes and guidelines on how to achieve successful IT service management (web 5).

The ITIL framework distinguishes between users and customers: customers are the people who implement, install and finance the IT services and users are the recipients and end-users of the IT service. The ITIL framework has become the worldwide de facto standard for IT service management. The framework is built around the IT service delivery using an approach that starts by defining the user's requirements and expectations. The Service Level Agreement forms a key instrument of the ITIL framework and it integrates all aspects of the framework for the implementation, configuration, capacity, and service management of the IT service delivery (Carter-Steel 2009).

The ITIL version 3 framework is made up of a series of 5 books as follows:

- Service Management

- Service Design
- Service Transition
- Service Operation
- Continual Service Management

Figure 2.2 illustrates the lifecycle approach that ITIL uses. The 5 areas of ITIL V3 form a continuous service life cycle from the business requirements stage to the final delivery of the service to the customer.

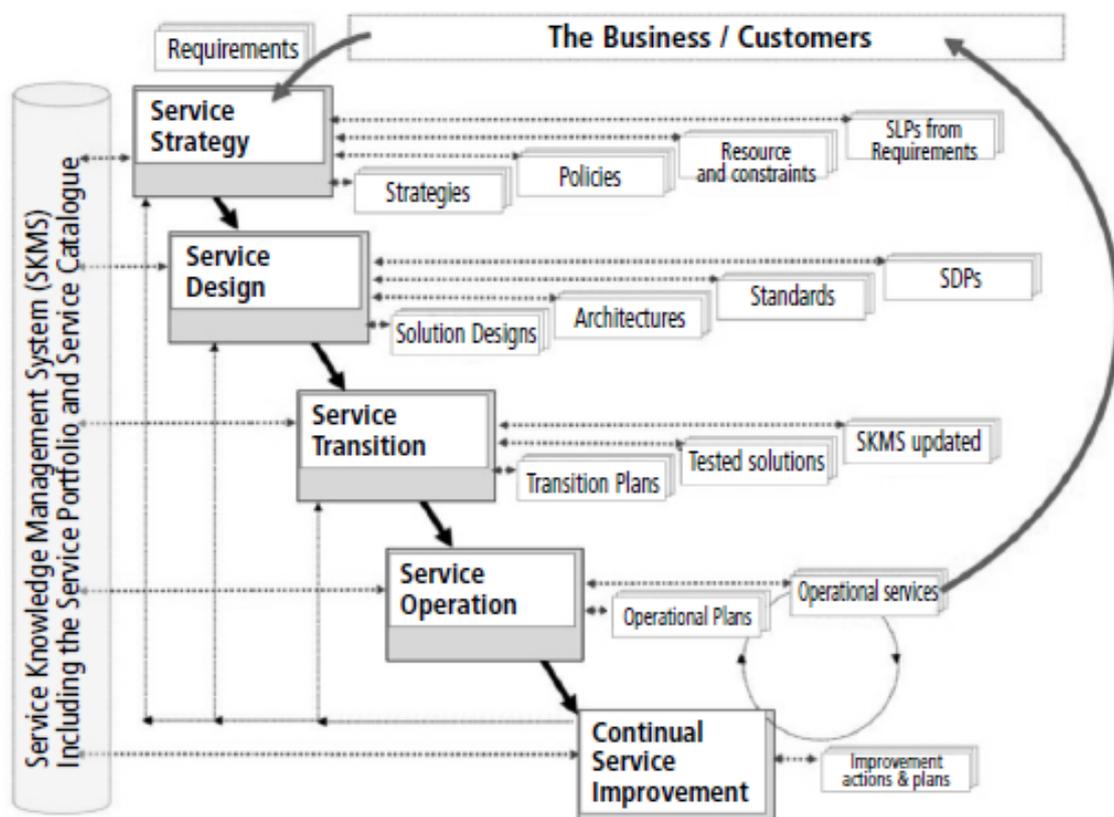


Figure 2.2 - ITIL Life Cycle Approach,

(Web 5)

The service operation is the stage where the requirements are implemented and the last stage in the cycle is continual service improvement. The cycle is an infinite process, as continuous improvement is a never-ending process in improving quality.

The service management function is essential in the service design. The SLA is a vital requirement for IT service management and defines the appropriate service targets that IT

has agreed to deliver to the business. The SLA should be measured; therefore appropriate metrics must be in place to provide for accurate and meaningful reports on the service performance. Continual service improvement deals with the ability to continuously improve the SLA. Improving the SLA is not limited to improving the service level, but also includes the lowering of costs while achieving or exceeding the agreed service levels (web 11).

The service management is made up of seven related processes as follows:

- Service Desk & Incident Management
- Availability & Capacity Management
- Problem Management
- Change Management
- Configuration Management
- Financial Management for IT Services
- IT-Service Continuity Management

(Web 6)

The acceptable level of services for each of the areas of ITIL is agreed by the supplier and the stakeholders in the Service Level Agreement. The SLA encompasses the key areas of ITIL and it is essential for all stakeholders to share a common understanding of how each level of service will be delivered, measured monitored and utilised.

## **2.5 Objectives of IT SLA**

According to Sparrow, 2003 the purpose of an SLA is to display, measure, assess and clarify the service provided. An IT service should be determined by the requirements of the stakeholders and not by the technologies used. The IT SLA should not be compiled and managed by IT alone, but should include stakeholders who are able to translate business requirements into IT requirements. The stakeholders are not only the end-users, but also include the management team and any other user of the technology such as customers, who may use the company's IT for accessing the ERP system and for placing orders online using e-commerce. Each of the stakeholders will have varying requirements; the management may require system information for long-term planning and ongoing monitoring of long-term goals whereas the customers may have an immediate need for e-

commerce capabilities that are easy to use and available when required. It is the responsibility of IT to determine the best technology at the right cost that is capable of meeting the requirements of the various stakeholders (Sparrow, 2003).

The purpose of the IT SLA as defined by Frenzel (1992) is one of building mutual trust and confidence between the parties. The SLA defines the guidelines for the relationship; however, the successful management of the SLA starts by determining and agreeing on mutually acceptable levels of service which then set the ground rules for a successful relationship between IT and the users of the service.

Frenzel (1992) in his conclusion in the book *Management of Information Technology* stated that the purpose of the IT organisation is to deliver IT services to clients at agreed service levels. The clients or customers of a SLA agreement can have varying requirements. The accounts staff for example may require access to the company's financial system in real time; the sales consultants may require remote access to the sales system and customers may require access to the company's ordering system. Customers are key stakeholders and can influence business to adopt certain technologies that provide the competitive advantage. The adoption of e-commerce and the rapid changes in globalisation are a result of the innovative changes in technology. Customers' changing needs and demands must be considered by the business when drafting SLA's.

An example of a typical SLA is from the University of Kansas. The SLA objectives for the University of Kansas are to:

- define and describe the level of each service,
- determine who is given access to each service,
- determine the time period that the SLA covers,
- calculate the costs for the initial overall service and the costs for any additional services,
- establish how the service will be provided and the method for monitoring and measuring the service,
- decide when and how the SLA will be reviewed and to

- find ways and methods of dealing with changes to the SLA during the contract period (<http://www2.ku.edu/~pdm/itil/slm/sla/index.shtml>).

A critical issue in SLA formulation is whether the SLA should describe the level of service that IT can deliver or whether it should describe achievable services that are satisfactory to the users. Frenzel (1992) stated that affordable IT costs and the related services should be determined through the management processes and financial/budget planning. The level of IT service has a direct impact on costs and therefore the management should establish a balance between the level and type of service and the cost of achieving the desired level. Frenzel (1992) went on to mention that the most common methods for determining investment in IT are the return on investment and the cost benefit analysis methods.

An SLA cannot cater for every possible situation that may arise, however SLA's are an effective way to ensure that IT delivers on its promises. The responsibilities of all parties, as well as the consequences for failure to adhere to them should be included in the SLA. The resources and capacity required to support an SLA should be defined and measured against available resources and available capacities to ensure that the SLA is achievable. The SLA should be reviewed annually and the most common practice is to review each SLA agreement on the anniversary of its implementation or acceptance. During the review of the SLA, the performance for the previous year should be taken into account together with the needs of the business for the next business cycle, to ensure that the IT capabilities are adequate and the business requirements are met. The SLA should not be a once-off exercise, but instead, the process should be constantly reviewed as the business and technology environment change (Galup *et al*, 2009).

The SLA is about relationships for the provision of outsourcing services with mutually accepted rules, measurement methods and monitoring metrics. Morgan & Yallop (2003) said that the SLA is a guide or protocol for how all stakeholders will work together for the delivery of the relevant services. The SLA details the rules of the relationship, what the services will provide and how this will be done and the mechanisms to escalate service provisions as well as to make changes to the agreement.

An SLA should indicate how performance will be measured and it should include the escalation process for non-performance. The measurement must be meaningful to the

stakeholders and must reflect the business expectations. Financial penalties or incentives for good performance can be included; however, these indicators need to be clear and unambiguous (Biddick 2009).

The measurement for performance should use metrics that reflect the business expectations, that are specific and be measured objectively, for example, the 3 most common metrics for assessing helpdesk performance are:

- Average speed to answer (ASA) which is the difference between the time the customer phones and the time the call is picked up by the helpdesk person
- First Call Resolution rate (FCR) - the percentage of calls that are resolved within an agreed time frame
- Abandonment rate - the percentage of customers who abandon their call before the call is picked up.

(McDonald & Longwell, 2009)

## **2.6 SLA Stakeholders**

The direct users of the computer system are the users who have the largest investments in ensuring that IT delivers on the services. In order to meet the user expectations it is essential to ensure that the users of the service are involved in the compilation and review of the service level agreement. Sparrow (2003) said “it is important that the agreed service levels and targets are widely disseminated at operational level within your organisation” The end-users cannot assess or accept a service if they are not made aware of the service levels provided. By creating the awareness of the SLA, users understand the targets for each service provided. The literature provides answers to the research question supporting the need for end-users to participate in the SLA and monitoring of service delivery (Sparrow 2003).

Each IT service is usually rated differently by individual end-users, however, the service level agreement cannot cater for all users; for example, the Research and Development division of a company may place a greater importance on the internet for research, accessing information and collaboration, whereas the Finance division will place greater

importance on the availability of the financial system. In trying to please everyone the service provision may finally not address the needs of anyone at the desired level.

## **2.7 Motivation for research**

The IT budget in companies is a significant portion of the company's total budget and therefore IT should deliver the desired benefit and maximise the returns from the IT investment. The IT service should be managed and measured so that the benefits reflect the expectations and needs of the business owners and business users while continuing to meet the objectives of the organisation.

During his introduction of IT service management, Galup *et al*, (2009) identifies IT services as crucial, strategic, organisational assets and suggests that organisations invest appropriate levels of resources into the support, delivery and management of these IT services. The IT service must be managed in an appropriate way if the business wants to become successful, increase operational efficiencies, reduce costs, and achieve business objectives. A service can only be managed if it is meeting the expectations of the customers and therefore it is crucial to ensure that an understanding exists between the users of IT and the providers of IT in how the service will be delivered to achieve certain defined service levels (web 5).

IT service management is not a state that one has to aspire to attain, but instead it is an infinite process. One of the ITIL processes is continuous improvement which extends beyond the expected improvement of the process. If IT is achieving the required service levels, IT should then find ways to reduce costs while delivering the same level of IT service. The ITSM is an emerging discipline that companies are adopting in order to achieve greater cost savings, greater efficiencies and ultimately to achieve business goals (Galup *et al*, 2009).

In the USA, the IT operational budget per user as adjusted for inflation was \$7,284 in 2009; \$6,924 in 2008; \$7,583 in 2007; and \$8,010 in 2006. "The IT spending per user is a significant cost that demands the attention of managers and directors to ensure that expenditure is used effectively and efficiently and in the best interests of shareholders (web 12).

This study will assist in answering the following:

- Do the end-users at NBI understand the purpose and importance of an IT Service Level Agreement?
- Do end-users feel that the IT SLA is effective when compiled exclusively by the management
- Do end-users know how to use the service level agreement to maximise the IT service delivery?
- Do managers feel that end users should be included in the SLA formulation?
- Do managers and end users feel that the SLA can be improved by extending the formulation to end users?

## **2.8 Conclusion**

The role of IT is integrated into the operations of companies at all levels, so much so that companies cannot operate without the use of technology in some or all areas of the business. The IT budgets are continually increasing and becoming a significantly larger portion of a company's total expenditure. The increasing investments in IT should be managed to ensure that returns are realized. At Microsoft's 2004 IT Forum Conference it was highlighted that the potential for savings can reach 48 % by the application of IT service management principles. An example that is often cited is the Proctor and Gamble example in which the companies achieved savings of 125 Million dollars by implementing an IT service management process using the ITIL framework (Galup *et al*, 2009).

In Information systems management Journal Winniford *et al*, (2009) stated that the management of IT makes up 70-90% of the total cost of the IT ownership costs. The Service Level Agreement is the ITSM reference document that details how the parties to the agreement will collaborate to achieve certain service levels. The end-users are the recipients of the IT service and therefore they should be allowed to voice their requirements and be satisfied with the IT service delivered. This does not mean that the company must adhere to their requirements at any cost; the company should instead determine what service level is possible, given the IT resources available. The management in companies needs to establish a balance between the business needs for IT services and

the cost of the service. The role of end-users in the SLA formulation and monitoring may provide useful input in ensuring companies deliver on real business requirements at the right costs.

## CHAPTER THREE

### 3 Research Methodology

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#### 3.1 Introduction

The research is exploratory and seeks to understand whether computer end-users should participate in the compilation of the IT Service Level Agreement. The research methods employed in this case study set out the guidelines that assist in obtaining answers to the research questions.

There is no single design or fixed rule that is prescribed for specific research initiatives. This does not necessarily mean that the researcher has no information on how to proceed and has to devise new methods for every research topic. On the contrary, the researcher has several alternative methods for designing the research; by experience a researcher is able to select the best framework to suit the research problem (Zikmund, 2003).

The IT investment by companies is relevant enough for companies to start questioning the benefit that IT provides and to ensure that returns are realised and future benefit is achieved. The management of IT makes up a significant portion of the IT budgets. Galup *et al*, (2009) found that the IT operational costs make up 60 % – 90 % of the total cost of ownership of the IT. The use of Service Level Agreements allow IT to deliver a satisfactory service to end-users. The literature suggests that end-users are key components in the IT service delivery, however, there is no consistency in determining whether end-users should be included in the formulation of the IT Service Level Agreement to ensure that their IT needs are taken into account. The literature suggests that management should formulate the agreement, and end-users should provide feedback on the SLA performance, (see for example Morgan & Yallop, Meyer, Gordon and Gordon).

This research question is in 2 parts - the first part is to determine the effectiveness of IT SLA's as defined by the end-users and the second is whether end-users should be part of the formulation and measurement of IT SLA's. The study uses a quantitative technique in

trying to obtain an outcome to the research questions and to answer the related research questions.

The research is based on a single company that was primarily located on a single site. The people who responded to the survey will be the total population. The sampling logic is that by administering a survey to a sample population, we can draw conclusions about the entire population of the company (Blumberg *et al*, 2008).

Quantitative research will be used to establish whether end-users should be included in the formulation of the Service Level Agreement. Quantitative research emphasizes quantification in the collection and analysis of data that uses a deductive approach when viewing the relationship between theory and research (Bryman & Bell, 2007).

### **3.2 Quantitative Research**

Quantitative research will be used in determining whether end-users should be included in the formulation of the IT Service Level Agreement. It is also used to determine the understanding that users have of the company's current IT Service Level Agreement and lastly whether users understand their rights with regard to the SLA. The research study was performed at the National Bioproducts Institute (NBI), a section 21 not-for-profit pharmaceutical company that is located in Pinetown. The NBI is the only distributor of a wide variety of plasma-derived products. Plasma is the clear component of blood and is supplied by the South African National Blood Services, a not for profit company that collects and issues blood and blood-related products (web 3).

NBI has an internal IT department that supports certain systems that are defined as critical by NBI, while the general desktop support and support of non-critical systems are outsourced. The complex support and major changes of the main IT systems are also outsourced and supported externally. They include the ERP systems and the database systems. The NBI uses SAP (Systems and Applications and Processing in data products) as its main ERP and payroll system. In addition, NBI uses the LIMS (Laboratory Information Management System). Both of these systems are identified as critical by NBI. In 2009 NBI created an IT SLA, however, the implementation and monitoring of the SLA has not yet occurred and is only expected to be effective in 2011. The creation of the SLA did not

include end-users and the SLA does not provide for end-user involvement in the monitoring and measurement of the SLA.

The results of the survey will provide NBI with valuable information on the user perception of the current IT service level, whether computer users are familiar with the escalation procedure and SLA's for IT services and whether end-users should be included in the SLA formulation and monitoring process.

### **3.3 Population description and sample size**

The population is made up of computer users that are employed by the National Bioproducts Institute. A computer end-user is any person who accesses the company computer and computer network to perform his job functions. There were approximately 110 computer users at the Pinetown site head office at the time of the survey. The NBI has smaller remote sites in Johannesburg and Cape Town where approximately 1 – 4 users are located. Owing to the small population size, census was carried out on the population.

### **3.4 Data Collection Techniques and Instruments**

The study used web-based self-completion questionnaires that were sent to all computer users in the company. The request to participate in the study was sent via email to all users and the monitoring of responses was managed by accessing the web site, (web 13).

The use of web-based self-completion questionnaires has the following advantages:

- Speed of administration ,when compared with other instruments such as focus groups
- Lower cost to administer, when compared with other methods such as interviewing
- Absence of interviewer effects. Interviews have the disadvantage of affecting the response by the interviewer's proximity to the respondent. The combination of characteristics such as the interviewer's background, gender, ethnicity, may provide a bias in the respondent's response.
- Self-completion questionnaires are convenient for respondents, as they are not time – specific, allowing respondents to complete the questions at their own speed.

- The online questionnaire requires participants to complete all questions before allowing the user to complete the survey. This ensures that all questions are answered
- Online web surveys can easily be made into attractive formats that can enhance the user's experience.

(Cooper & Schindler, 2003)

Some of the disadvantages of using self-completion questionnaires are the respondent's inability to ask other questions and to gather additional data as well as to clarify answers and to probe questions. Other disadvantages include the low response rate and the limitation to online populations who need to be motivated to give up their personal time to participate in the survey (Bryman & Bell, 2007).

The Likert scale is a commonly used variation of the summated scale. The scale consists of statements that are either favourable or unfavourable. The respondents are asked to select a response for each question showing the degree of agreement or disagreement or otherwise selecting a neutral option. The response is given a numerical score to reflect its degree of favourability or un-favourability and the most favourable is usually given the highest score. A typical Likert scale usually has 5 responses as follows:

- Strongly disagree
- Agree
- Undecided
- Agree
- Strongly agree.

Likert scales assist in comparing one person's score with a distribution of scores from a well-defined group, as it has interval data. The questionnaire uses a combination of the Likert scale, the dichotomous or simple category scale, the multiple-choice single-response scale and the checklist or multiple-choice single-response scale (Bryman & Cramer 2009).

The dichotomous scale offers two mutually exclusive options which are illustrated in question 1 of the questionnaire, where the options are either Male or Female. The

multiple-choice single-response scale is used to seek only 1 answer from a range of multiple options. The multiple-choice multiple-response scale offers multiple options from which the user can select one or more options that are true for the question. All of the scales used in the questionnaire produce nominal data (Blumberg *et al*, 2008).

The scale used in the survey at the National Bioproducts Institute is illustrated in Figure 3.1:

Questions 9, 11, 13 – 17, 19 – 21	Likert scale
Question 1	Simple Category Scale (dichotomous scale)
Questions 2 – 6, 8, 10, 12, 18	Multiple-choice single-response scale
Question 7	Multiple-choice multiple-response scale (Checklist)

Figure 3.1 - Scales used at NBI

The Likert scale used for the survey is illustrated below:

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

### 3.5 Primary Data

The primary data will be collected using web-based questionnaires. Web-based surveys are self-administered questionnaires posted on a web site. Respondents are able to access the web site at a time that is convenient to them and to answer the question at their own speed. Zikmund (2003) said that many survey researchers are of the opinion that the web-based survey is the wave of the future.

### **3.5.1 Secondary Data**

Secondary data was sourced from journal articles, research papers, and from web sites. There is little research available on whether end-users should participate in the formulation of the Service Level Agreement. The literature available suggests that end-users should be involved in the monitoring and reporting of processes; however, the creation of the Service Level Agreement is still mostly a management function. The manager's function may be viewed as management's responsibility for approving the SLA, but this does not exclude end-users from providing input in the compiling and monitoring of the SLA (Denny, 2009).

Although research is available on the IT service management in general, little attention has been given to the end-user role in the SLA.

### **3.6 Data collection procedure**

The data collection process commenced once the University of Kwazulu-Natal had approved the ethical clearance application form, which included the questionnaire and research topic. The Executive Director of the National Bioproducts Institute consented to the undertaking of the research topic at the company

The questions for the survey were uploaded to the web site, [www.surveymob.com](http://www.surveymob.com). An email was sent to all users at the NBI, informing users of the purpose of the survey and requesting users to participate in the survey. The email informed the recipients that participation was voluntary and that all responses were anonymous. The email included the following link prompting users to click on the link to access the questionnaire: <http://www.surveymob.com/surveymob/s/7da57822-a920-4097-9291-59c281065465.html>.

The email included the informed consent document notifying users of the purpose of the research and requesting voluntary participation. The email indicated that the survey should be completed within 4 weeks of receiving the mail.

After the initial 4 weeks, the responses received had made up 40% of the total population. After enquiring from the users if they were able to complete the questionnaire, it was ascertained that several users were unable to access the link owing to the rules of the

organisation that prevented certain users from accessing the internet. Access to the survey web site was requested for all users and access was granted within 5 days.

A follow-up mail was sent to all staff who were on the All\_users distribution list, requesting participation in the survey and an additional 4 weeks was allowed for users to complete the survey. The responses increased to 55 % within 2 weeks and by the last week there were 64 responses which made up 58.2 % of the total population of 110.

### **3.7 Data reliability and validity**

The 2 main criteria for evaluating measurements are reliability and validity. Reliability is the extent to which measurements are free from error and therefore yield consistent results. Validity is the ability of a scale or measurement to measure what it is intended to measure. Reliability is a requirement for a measurement to be valid; however, a reliable instrument may not be valid. Validity and reliability are important aspects of any study (Zikmund, 2003).

In the research survey, the validity cannot be exclusively concluded as the respondents are required to provide their opinions based on their knowledge of the IT Service Level Agreement. The survey is therefore a combination of empirical testing and understanding that will infer the result.

The test-retest method requires the administering of the questionnaires to the same respondents at different times to test for stability. The split-half method is one of the most basic methods for testing internal consistency. A researcher takes one-half of the results and checks them against the remaining half of the results (Zikmund, 2003).

### **3.8 Ethical considerations**

The email sent to users requested consent from the users and informed users that the responses were anonymous. This provides confidentiality in the survey as users may have been concerned that the information provided would be linked back to the individuals, thereby influencing their choices.

Remenyi *et al*, (2003) said that the level of end-user's participation in the questionnaires indicates the end-user's acceptance of the research topic and the confidence end-users have that the responses are anonymous.

### **3.9 Conclusion**

The research topic is a research question that sets out to determine the effectiveness of IT SLA's as defined by end-users and whether end-users should participate in the SLA formulation. The research is carried out at a pharmaceutical company, National Bioproducts Institute, which is located in Pinetown. Qualitative research methods are used to collect and analyse the data and the data was collected using web surveys. The benefits of using web surveys have been realized in the approach taken, as paper-based questionnaires would have required extended timelines and a significant overhead for the administration of the research. The research method was structured and the user-responses were anonymous.

The following chapter analyses the data and details the trends and relationships that can be found in the data in answering the research question and achieving the research objectives.

## CHAPTER FOUR

### 4 Results of Study

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#### 4.1 Introduction

The objective of data collection is to perform data analysis and identify relationships between the data, assess accuracy in the data collection and identifying patterns in the data. The collected data is in a raw format which does not provide useful information and requires analysis and data-reorganising to be performed in order to transform the data. The analysis process leads to information about the data and research topic. The first step in analysing raw data is the data preparation, which is made up of data-editing, data-coding and then data entry (Bryman & Bell 2007).

The data processing step converts data from a raw form into classified forms and checks the integrity of the data, which then makes data analysis easier (Pallant 2007). The editing of data identifies errors and omissions in the data and allows the researcher the opportunity to exclude incorrect data while ensuring that a maximum level of data quality is retained.

After data-editing, the next step is the coding of the data. In the coding process, the responses are assigned numbers or symbols so that data can be grouped into classes or categories (Cooper & Schindler 2003). The responses for strongly agree, agree, neither agree nor disagree, disagree and strongly disagree were assigned the numbers 1, 2, 3, 4, 5, respectively.

#### 4.2 Analysis of Data

The research question seeks to assess the effectiveness of IT service level management and the need for end-users to be part of the IT SLA. In answering these questions, we need to determine whether computer end-users understand the purpose of the IT SLA and whether end-users feel that they should be included in the formulation of the IT SLA.

The data was coded using Microsoft Excel® 2007 SP2, a spreadsheet program that stores and organizes data. Microsoft Excel® 2007 SP2 was also used to create bar graphs, the Gartner-like quadrants and tables to illustrate the results.

SPSS 15.0 release 15.0.1.1, for Windows Integrated Student version is the statistical package that was used to analyse the data. The relationships were analysed using cross-tabulation. The coding of the data was carried out in Microsoft Excel® 2007 SP2 and uploaded to SPSS. The SPSS survival manual was used to guide the coding and data analysis process (Pallant, 2007).

The relationships between the data were also analysed using the Gartner quadrant. The Gartner quadrant is a research analysis tool that separates data into 4 quadrants to assess the trends or patterns for analysing research questions or finding answers in data patterns (web 14).

The analysis of the data is in 3 sections, namely; demographics, assessing end-user understanding of IT SLAs and assessing whether end-users should be part of the SLA formulation and monitoring process. The demographics place the company in context for the readers to compare with similar organisation and to provide the background of the population for future research. The assessment of end-user understanding of IT SLA's shows the level of understanding of IT SLA's by end-users. The last section sets out to determine whether end-users should form part of the IT SLA process, which is the research question.

### **4.3 Results of Data Analysis**

In the following subsections the data will be analysed using the headings demographics, assessing end user understanding of IT SLA's, and should end users form part of the SLA formulation. The findings will be presented and discussed.

### 4.3.1 Demographics

The Demographics will be discussed in sub sections to analyse the relationship between Gender and Age, the length of service of employees, Education, race and gender and age against people who enjoy working with PC's.

#### 4.3.1.1 Gender Across Age.

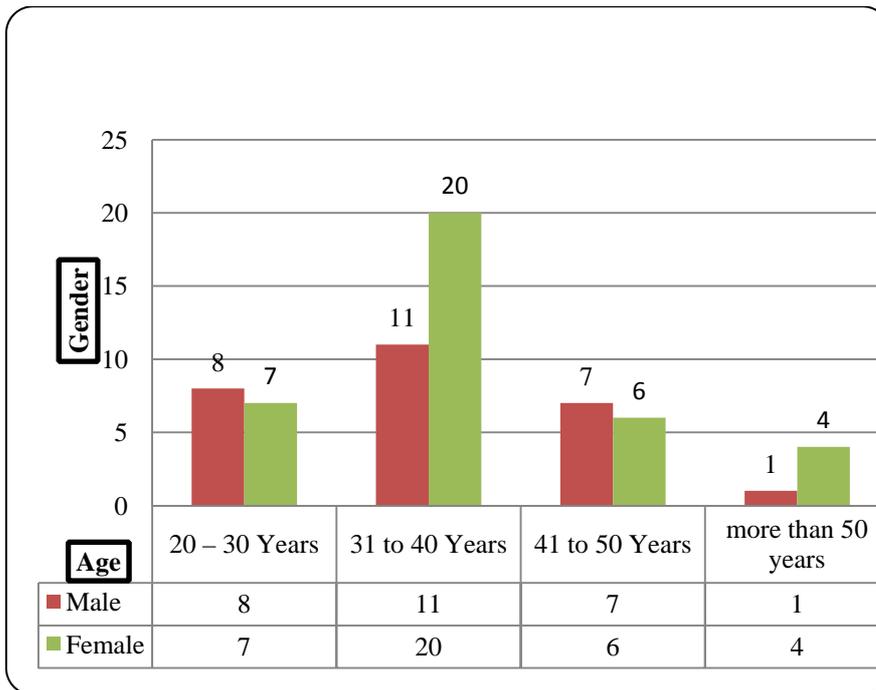


Figure 4.1 - Gender across Age distribution

Each of the age groups, 20 – 30 years and 41 to 50 years, has a fairly even split between the number of females to males. The age group 20 – 30 years, has 53.3 % males and 46.7 % females and the age group 41 to 50 has 53.8% males and 46.2 % Females. The South African Census community survey, 2007, has a similar 50/50 split across gender for the entire population, where there were 48% males and 52% females from a total population of 48.5 million. The sample population age group “more than 50 years old” is made up of 1 male and 4 female (web 15).

The sample population is mostly made up of the age group 31 to 40 years, which makes up 48% of the sample population. The 31 to 40 years age group is made up of 11 males (35

%) and 20 females (65%). The people in this group are classified as the Generation X generation as they were born between 1965 and 1980. Generation X people embrace technology and find technology an important survival kit, with IT being an important aspect of their lives. Research has shown that the Generation X community is more likely to adopt and embrace technology (web 16).

**4.3.1.2 Length of service of employees (Q 4)**

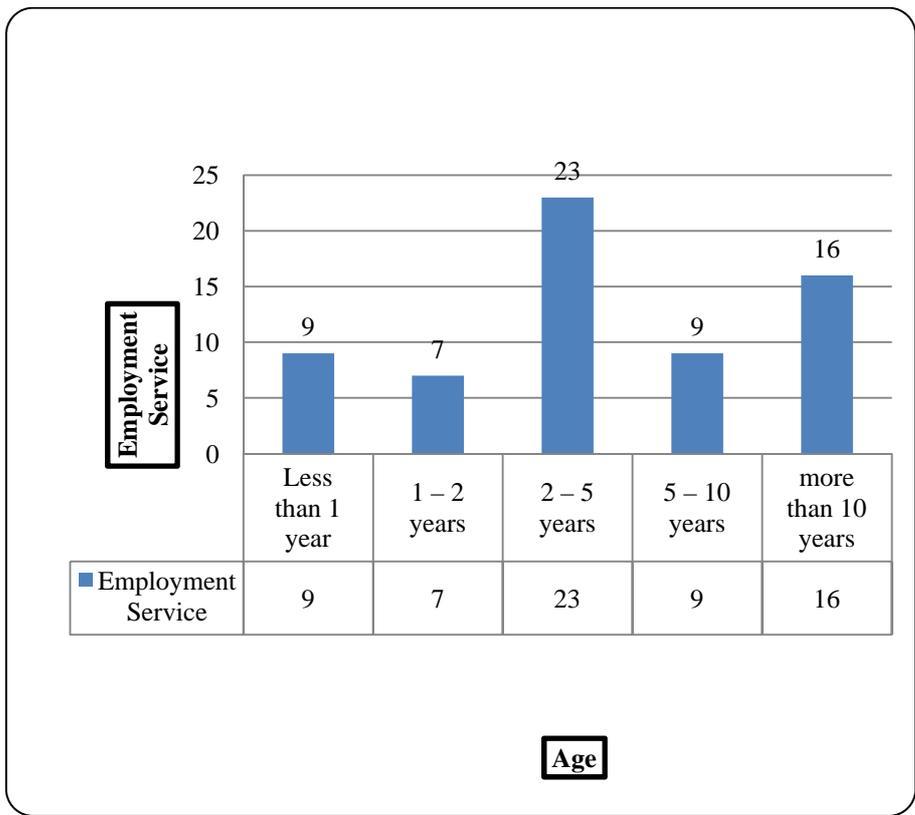


Figure 4.2 - Employment Service

Twenty Five percent of the population has worked for NBI for more than 10 years, while a further 14 % has worked at NBI for 5 – 10 years. The long service is possibly related to the specialised operations of NBI, as NBI is the only South African manufacturer of the varying range of plasma-derived products requiring specialised skills for the manufacturing division, which is the largest division in the company. In addition, NBI has a biotechnology division that invests in research and development, requiring a unique set of

skills that is not easily available in the job market owing to the low demand for these jobs. The NBI employment retention strategy may also contribute to the long service that employees enjoy at NBI.

#### 4.3.1.3 Enjoy working with PC's (Q 9) across Age (Q 2)

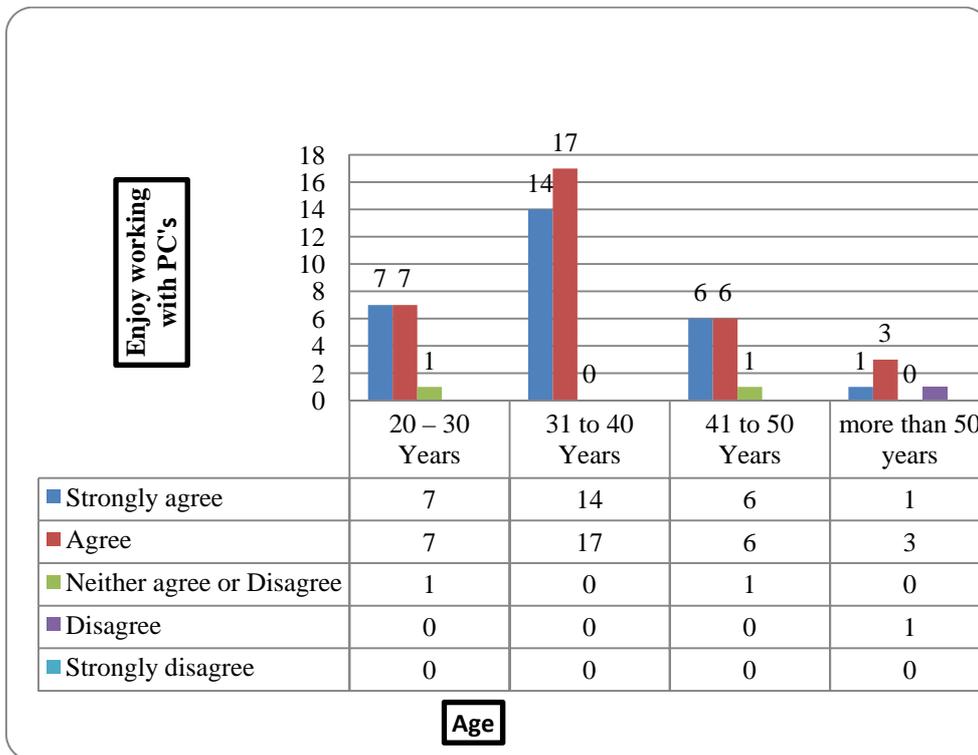


Figure 4.3 - Enjoying working with PC's across Age

When comparing age groups, the age group 31 to 40 years, also known as Generation X, had the largest number of respondents who enjoyed working with PC's. There were 31 respondents (48.4% of the sample population) who enjoyed working with PC's, which is an attribute of the Generation X group. The Generation X can be motivated by making technology a part of their daily jobs and by including Generation X in technology projects and technology decisions. Including this generation of people in IT decisions may provide useful input on how to address IT problems, how to structure IT services or what technology should be made available for end-users (web 17).

From the total of 13 people in the age group greater than 41 to 50 years, 12 (92.3%) enjoyed working with PC's, and 1 (7.7 %) disagreed that they enjoyed working with PC's. This age group is classified as the baby boomers' generation. Technology has not always been a part of their lives and therefore this generation tends to look at the larger business picture and prefers not to keep up with the technological pace or adopt technology easily. The NBI baby boomers enjoy working with computers which is positive for NBI, a company that embraces technology in all aspects of the business.

From the total of 5 people in the age group greater than 50 years, 4 (80%) enjoyed working with PC's, and 1 (20 %) disagreed that they enjoyed working with PC's. The older generation is usually resistant to technology; however, the NBI population enjoys working with computers, which will have a positive impact on NBI (Andriole 2007).

The majority of NBI users enjoyed working with computers, which may be attributed to the high level of automation in the manufacturing plant and the extensive reliance and use of technology at NBI or on the recruitment practices at NBI. Although one cannot generalise, it is encouraging that the majority of users at NBI find working with computers enjoyable.

#### 4.3.1.4 Education (Q 6)

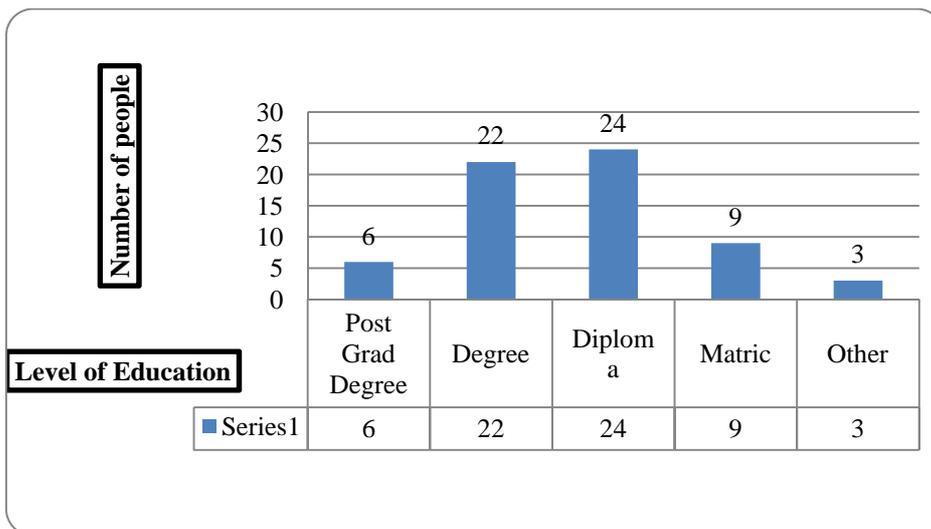


Figure 4.4 – Level of Education

In figure 4.4, the “Other” refers to any qualification that is lower than a Matriculation. From the total employable labour force of South Africa, 1.9% have degrees and only 0.6 % have postgraduate degrees as per the 2007 census. NBI has 52 respondents (81.3%) of whom have a post matric qualification, 22 respondents (34.4%) who have university degrees and 6 respondents (9.4 %) who have postgraduate degrees (web 18). The high education level is reflective of the NBI recruitment policies, the importance that NBI has placed on training and development and the specialised industry within which NBI operates. The manufacturing process at NBI is regulated by the Medicines Control Council of South Africa which requires NBI to have qualified pharmacists for various job functions such as regulatory compliance, quality assurance, product release and certain aspects of manufacturing such as the supervision of the filling operations. Furthermore, the manufacturing process at NBI is very much technology-driven, using automation and technology across several areas of the manufacturing operations, thereby requiring a workforce with a higher education level and skill level.

#### 4.3.1.5 Race (Q 3) vs. Gender (Q 1)

Race	Males		Female		Total	
	NBI Sample	Stats SA	NBI Sample	Stats SA	NBI Sample	Stats SA
African	18	2504036	11	2838336	29	5342372
Coloured	0	45772	3	50927	3	96699
Indian	8	297596	12	310082	20	607678
White	1	156908	11	164517	12	321425
<b><u>TOTAL</u></b>	<b><u>27</u></b>	<b><u>3004312</u></b>	<b><u>37</u></b>	<b><u>3363862</u></b>	<b><u>64</u></b>	<b><u>6368174</u></b>
African	67%	83%	30%	84%	45%	84%
Coloured	0%	2%	8%	2%	5%	2%
Indian	30%	10%	32%	9%	31%	10%
White	4%	5%	30%	5%	19%	5%
as a % of Total population	42%	47%	58%	53%		

Figure 4.5 - Race vs. Gender

(Web 15)

Figure 4.5 is a comparison of the sample population compared with the Statistics South Africa Labour Force for employed people in the Kwazulu Natal Area grouped by Gender and Race (web 19).

The NBI has a significantly larger percentage of Indians employed compared with the statistics data. This could be a result of the physical location of NBI in Kwazulu Natal. NBI is located in Pinetown, which is in close proximity to suburbs such as Westville, Bellville and Chatsworth, which have a large concentration of Indians. Based on the race distribution map from the 2001 census, the majority of Indians in Kwazulu Natal are located in close proximity to Durban. The yellow areas in the diagram are the areas with the high concentration of Indians, The areas around Pinetown have the most yellow shaded areas as indicated in the diagram below:

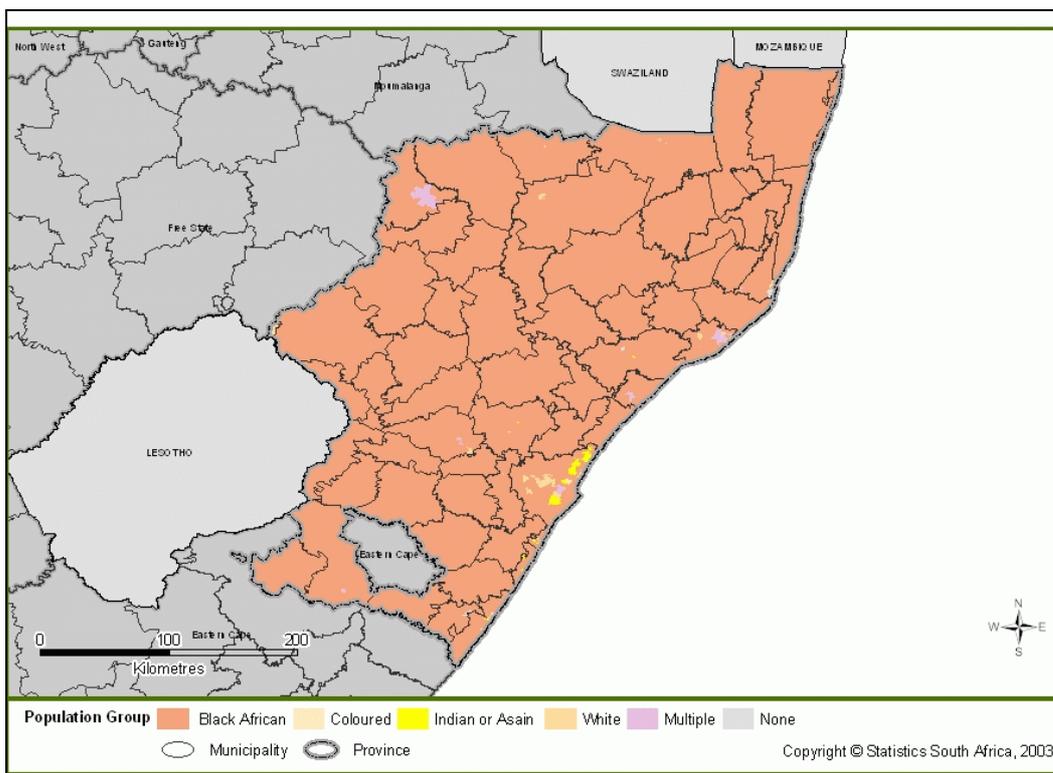


Figure 4.6 - Concentration of population groups in Kwazulu Natal

(Web 19)

The percentage split across NBI males and females is similar to the statistical census from 2007. The NBI sample has 42 % males compared with the stats SA of 47% males in KZN. The NBI sample has 58 % females compared with the stats SA 53% females in KZN. NBI has a low percentage of white males and a slightly higher population of white females which is reflective of NBI’s employment practices.

### 4.3.2 Assessing End-user understanding of IT SLA’s

The following sections will discuss the findings and determine the end user understanding of IT SLA’s.

#### 4.3.2.1 Time spent on PC’s (Q 8) across Applications used (Q 7)

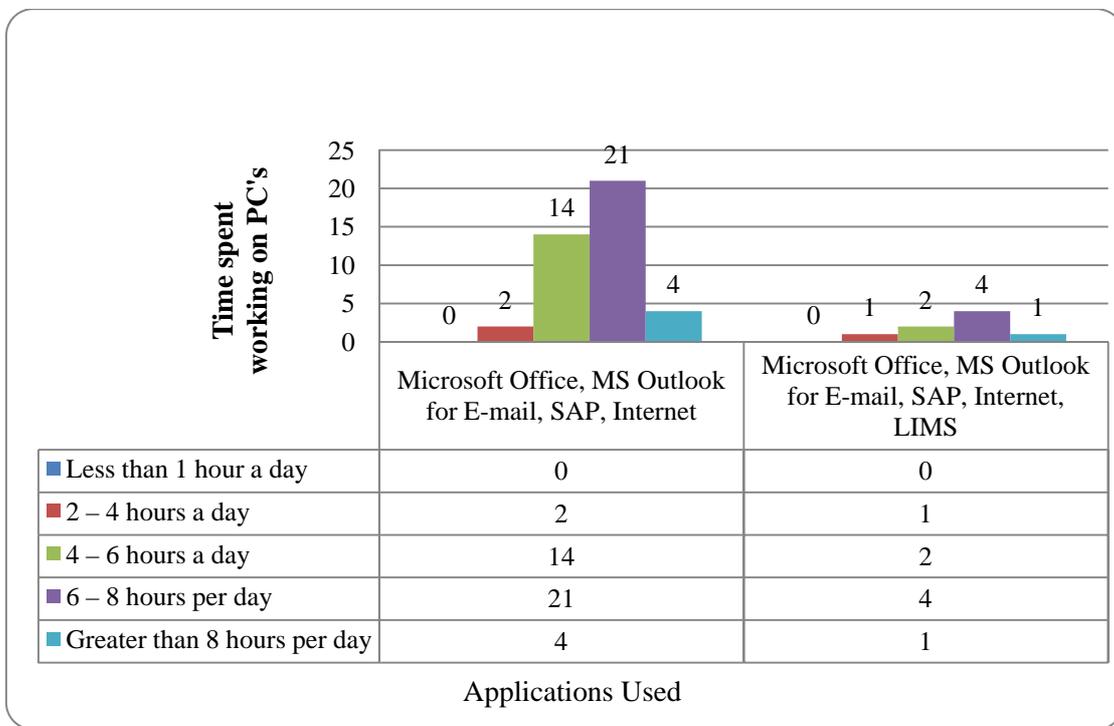


Figure 4.7 - Time Spent using Computers vs. Applications used

Figure 4.7 is an analysis of the respondents who used the NBI list of critical applications. These respondents are 76.5 % (49 respondents) of the sample population. The critical applications are the SAP and LIMS systems. SAP is the NBI ERP (Enterprise Resource Planning) system and the LIMS is the laboratory system that records tests for raw materials and other laboratory testing. All respondents use the Microsoft Office suite; however, only a portion of the population uses the ERP systems. The priority on the current SLA is to

ensure the availability of the ERP and LIMS system as these systems are business-critical to the operations of NBI, while the Microsoft systems have a lesser importance. In the event of a failure of all NBI computer systems, the SLA requires the SAP system to be attended to first, followed by the LIMS system and thereafter the Microsoft application servers can be started up, which confirms that the IT SLA is based on the business requirements.

There are 30 respondents, 46.9 % of the total population that use the computer for more than 6 hours per day for the critical applications, indicating the extensive use of the computer system by end-users.

**4.3.2.2 End-user understanding of the purpose of the IT SLA (Q 13) vs. User understanding for service escalation process (Q 14)**

<b>Understand the purpose of an IT SLA</b>						
		<b>Quadrant 1</b>			<b>Quadrant 2</b>	
	<b>Strongly Agree</b>	0	0	0	1	7
	<b>Agree</b>	0	1	6	24	6
	<b>Neither agree or disagree</b>	0	3	7	2	1
	<b>Disagree</b>	0	3	2	1	0
	<b>Strongly Disagree</b>	0	0	0	0	0
		<b>Quadrant 4</b>			<b>Quadrant 3</b>	
		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>

Figure 4.8 – Gartner-like quadrant - Understanding the purpose of SLA against Understanding the IT Escalation process

The Gartner-like quadrant provides a visual layout of data for quick information analysis and the identification of trends or patterns in researching a particular problem or research question (web 20). Figure 4.8 sets out to determine whether end-users understand how to escalate service requests and the purpose of an IT SLA. The greater the understanding of the IT SLA, the greater the understanding for process escalation, as the escalation process is included in the current SLA. The lesser the understanding of IT SLA, the lesser the

knowledge of IT escalation. One of the objectives of the research is to determine whether end-users are familiar with SLA's.

In Quadrant 2 we find 38 respondents (59.4%) who agreed on both questions, highlighting that end-users have an understanding of the current IT SLA. This displays the end-user understanding and knowledge of the current IT SLA.

Quadrant 4 only has 3 respondents (4.7 %) who disagreed on both questions and these could be new respondents who did not undergo NBI induction and are new to the company. These respondents could also be those whose jobs are less affected by the absence of a computer, or who use the computer for shorter periods. These respondents are probably less interested in knowing how to escalate calls or to understand the impact that the SLA would have on their need for computers.

**4.3.2.3 Cross-tabulation of No of IT tasks logged (Q 10) vs. Users who perform basic troubleshooting (Q 11)**

		IT tasks logged Per month		Total
		< 2 tasks per month	3-5 Tasks per month	
Perform basic troubleshooting	1	8	5	13
	2	20	10	30
	3	8	4	12
	4	6	2	8
	5	1	0	1
Total		43	21	64

Figure 4.9 – Cross Tabulation of IT tasks logged vs. Users who perform basic troubleshooting

The basic troubleshooting of problems is limited to physical checking for any visible problems and the operating system troubleshooting is restricted to the Power User Access that users are assigned on computers. Power User Access is a default group of users created on later Windows operating systems, which provides users with greater access than the normal user group, but less access than the administration group. Although the power users group can perform various advanced functions, the group is not capable of performing programming changes and system administration (web 21).

There are 43 respondents (67 % of the sample population) who agreed that they perform basic troubleshooting, while only 9 users (14.1 %) did not perform troubleshooting of problems. The attempt by users to fix IT problems before logging tasks displays the high IT skill level of the NBI computer end-users. Most often the tasks logged by this group of respondents will be complex, as the basic fault resolution has already been carried out by the end-user. The complex tasks will require IT support technicians to have a high level of skills and knowledge for supporting these end-users.

From the 43 respondents who perform basic troubleshooting, 28 (65.1% of 43) respondents log fewer than 2 tasks per month. These respondents may be resolving their task without the need to log the task. The remaining 15 respondents (34.9 % of the total 43 respondents) log 3 – 5 tasks per month. These respondents could be experiencing more complex problems or they may be less capable than the 65.1 % of the group in resolving their IT problems. It may be useful for NBI to know about the calls that end-users resolve. This information could assist NBI to determine root causes of problems thereby limiting the number of common problems or to educate the users on the correct way to resolve more complex IT tasks, thereby empowering the end-users. The empowering of users will be limited to the power user authorisation level. NBI should consider the options, or process for the gathering of information about the IT problems that are resolved by users and not logged.

The high IT skill level of end-users may be useful to NBI when compiling IT SLA's. The high skill is evident in the number of users who perform basic troubleshooting before requesting assistance from IT as indicated in Figure 4.9. The inclusion of the end-users may assist the IT department in structuring the SLA to cater for the IT skill level of end-users. This could include programs to educate and train users on basic and advanced IT

problem-solving. The high IT skill level among end-users may prompt the IT division to employ IT technicians with a higher skill level who can resolve complex problems.

The logging of tasks that are resolved by end-users could assist IT in preventing problems from escalating to more complex problems that affect a wider range of users, by providing early warning signs of problems. ITIL recommends that all calls are logged for accurate capacity- planning, reporting and resource scheduling (web 9)

#### 4.3.2.4 How to determine Service Levels (Q 12) vs. SLA meets the needs of the business (Q 16)

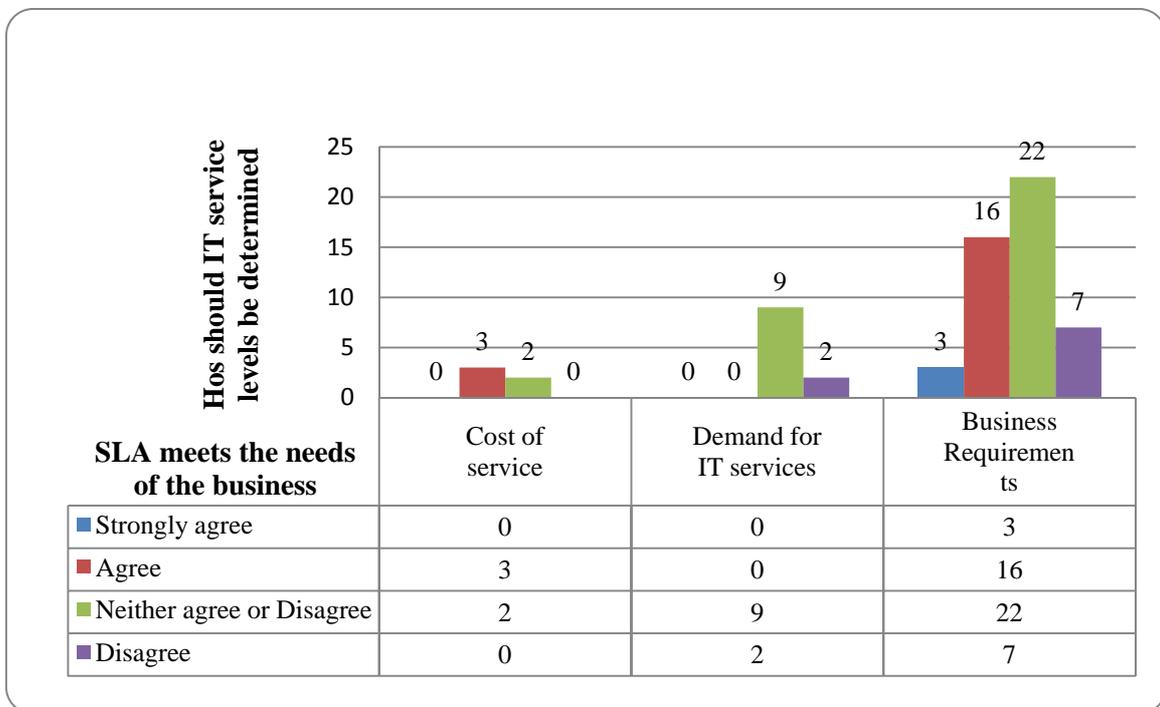


Figure 4.10 - How should the IT service level be determined vs. SLA meets the needs of the business

Figure 4.10 indicates that 48 respondents (75% of population) selected business requirements as the basis for determining IT service levels. According to Henderson & Venketraman (1993), IT departments should focus more on business requirements and less on driving technology, which is similar to what the majority of end-users feel. ITIL stipulates - that the SLA be aligned to business needs that underpin core business processes. The current NBI IT SLA is based on business requirements as the SAP ERP system and the LIMS systems receive priority over other systems in problem resolution.

End-users support this model, highlighting their level of understanding for managing IT service delivery (web 22).

There were 22 respondents (34.4 % of the sample population) who agreed that the SLA is meeting the needs of the business, however, 3 respondents from this group felt that the SLA should be based on cost. NBI has a total of 28 NBI managers employed, and only 16 of these 28 managers completed the survey as per figure 4.10. It is likely that the 19 who selected that the SLA should be based on business needs are from the management team, as this group is currently included in the SLA formulation. While 9 disagreed, 33 neither agreed nor disagreed that the SLA was meeting the needs of the business, as end-users who are not managers are not currently included in the formulation and measurement of the IT SLA. The question that arises is whether end-users feel that they should be included in the SLA formulation, which is answered in section 4.3.3.

#### 4.3.2.5 Understanding how the SLA is measured (Q 17) vs. the priority for IT Tasks (Q 18)

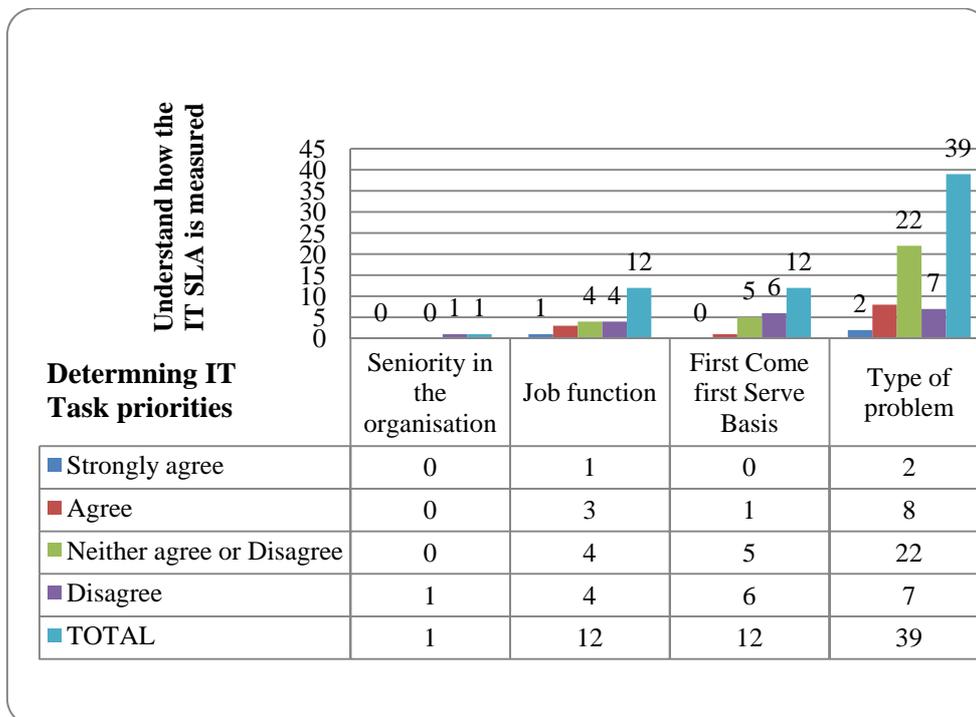


Figure 4.11 - Understanding of IT SLA's across determining task priorities

The IT tasks at NBI are currently based on the type of problem that is pre-determined by the helpdesk and determined by the categories selected when logging a call, for example, a

task to fix a printer is automatically assigned a lower priority than a task to fix a multifunctional device that is shared across several users. The type of problem is based on the business requirements, as the helpdesk system also assigns SAP and LIMS calls a higher priority by default.

There were 15 respondents (23.4%) who agreed that they understood how the SLA is measured. This confirms NBI's current practice, where only managers are included in the formulation of the SLA document and metrics for measuring the SLA, as the 15 respondents are most likely the managers who are currently part of the SLA formulation and measurement process. Thirty-nine of the users (60.9%) selected that problems should be based on the type of problem, which indicates that end-users agree with the industry standard of how to allocate tasks. The SLA understanding and knowledge of SLA's is high among the respondents. The research objective sets out to determine how knowledgeable end-users are about IT SLA's which is displayed in the analysis above, indicating that end-users are familiar with SLA's.

#### **4.3.3 Should end-users be part of the IT SLA formulation?**

This section is one of the key research objectives and is determined by analysing the following relationship:

- Job function versus the need for end to be represented in the IT SLA formulation
- job function versus end users can improve the IT SLA,
- users who are satisfied with the current IT service level versus end users should participate in the IT SLA formulation and
- the need for a forum that represents end users versus job function.

The following section provides the data analyses and the discussion on the findings.

**4.3.3.1 Job function (Q 4) vs. the need for end-users to be represented in the formulation of the IT SLA (Q 19)**

		End users should participate in SLA				Total
		<u>Strongly Agree</u>	<u>Agree</u>	<u>Neither agree nor disagree</u>	<u>Disagree</u>	
<b>Job Function</b>	Manufacturing Operations	4	6	4	0	14
	Quality Operations	3	6	2	0	11
	Technical/Specialist	2	2	1	1	6
	Admin/Finance/HR	2	10	5	0	17
	Supervisor	1	4	1	0	6
	Manager	3	3	1	0	7
	Director/Senior Manager	0	2	1	0	3
	Total	15	33	15	1	64

Table 4.12 - Job function vs. End user representation in SLA Formulation

The NBI managers are made up of departmental managers, area supervisors, executive managers and 2 directors. Technical Specialist refers to staff from specific business disciplines in the manufacturing area such as scientists in the R&D, specialist pharmacists and laboratory specialists. The IT department falls within the support services division of admin/finance and HR.

The research question determining whether end-users should be included in the IT SLA formulation is supported by the NBI management where 13 of the 16 managers (81.3%) who responded agreed that end-users should be included in the SLA formulation. The non-management team share the same view as the NBI management with 35 of the 48 non-managers (72.9%) agreeing that end-users should be included.

The SLA at NBI is currently formulated and monitored by the NBI management; and the figure above confirms the end-users' desire to participate in the IT SLA formulation. Before including end-users in the IT SLA formulation, we need to assess whether including end-users adds any value or improves the SLA, which is assessed in the following sections.

**4.3.3.2 Job Function (Q 4) vs. End-users can improve the IT SLA (Q 20)**

		End-users can improve IT SLA				Total
		Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
<b>Job Function</b>	Manufacturing Operations Quality	3	9	2	0	14
	Operations	2	6	2	1	11
	Technical/Specialist	1	3	1	1	6
	Admin/Finance/HR	5	6	6	0	17
	Supervisor	0	4	2	0	6
	Manager	3	3	1	0	7
	Director/Senior Manager	0	3	0	0	3
	<b>Total</b>	14	34	14	2	64

Figure 4.13- - Job function vs. end-users can improve if the IT SLA is allowed to participate

The research objective is to assess the value of including end-users in the IT SLA. In Figure 4.13, the NBI management team agreed that end-users can improve the SLA if allowed to participate in the formulation and measurement. From the total of 16 manager-respondents, 13 were in agreement while 3 respondents selected neither agree nor disagree. None of the management disagreed that end-users would improve the IT SLA, which strengthens the argument that end-users will improve the IT SLA, thereby answering the research objective.

From the 48 non-managers (75 % of the total population), 2 non-managers (4.2 % or 2 of 48 non-managers) disagreed that end-users can improve the SLA, while 11 (22.9 % of non-managers) were neutral, and the remaining 35 (72.9 % of non-managers) were in agreement that end-users can improve the SLA. The NBI end-users, both managers and

non-managers mostly agreed that end-users can improve the IT SLA, thereby supporting the need to include NBI end-users in the SLA formulation and monitoring.

**4.3.3.3 Satisfied with the current level of IT service (Q 15) vs. end-users should participate in the IT formulation (Q 19)**

End Users should participate in the SLA formulation	Satisfied with current level if IT service				
	1		2		
	Strongly Agree	0	3	6	2
Agree	0	5	5	21	2
Neither agree or disagree	0	2	1	11	1
Disagree	0	0	0	1	0
Strongly Disagree	0	0	0	0	0
	4		3		
	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree

Figure 4.14 – Gartner-like quadrant - Satisfied with the current service level vs. End-user should participate in the SLA formulation

We should find the respondents in quadrant 1 and 2 in which the respondents agree that end-users should be included in the SLA process. In quadrant 2 the respondents agree on both questions, which re-enforces that even though users are satisfied with the IT service, they are still in favour of including end-users to improve the current IT SLA. The respondents who are dissatisfied with the SLA should also choose to participate in the SLA formulation in an effort to improve the SLA in meeting their needs. We find these users in quadrant 1.

Quadrant 2 has 29 respondents (45.3 % of sample population) that agreed on both questions. From this group, 16 respondents may include the NBI management group: the survey included 16 managers who are currently included in the SLA formulation. These managers have the opportunity to address any area with which they are dissatisfied before the agreement is finalised. The remaining 13 people who are satisfied with the service but who also feel that they need to know more about the SLA formulation in an effort to improve the IT service delivery.

Quadrant 1 has 8 (12.5 %) users who are dissatisfied with the current IT service levels and want to change this by participating in the SLA formulation and measurement.

A total of 42 users (65.6 %) were satisfied with the service. From this total only 1 respondent disagreed that end-users should be part of the SLA formulation process while 12 respondents were neutral and neither agreed nor disagreed that end-users should be part of the SLA process.

The remaining 29 (45.3 % of total sample) respondents supported the inclusion of end-users in the SLA formulation and measurement process. This is a significant percentage of users and NBI should consider offering end-users the option to participate in the SLA formulation with the intention of improving the IT SLA. The need to include end-users in the SLA formulation should be investigated further by NBI and the outcome of the investigation should be carefully analysed and considered by NBI in an effort to improve the current SLA.

#### 4.3.3.4 The need for IT forum that represents end-users (Q 21) across Job (Q 5)

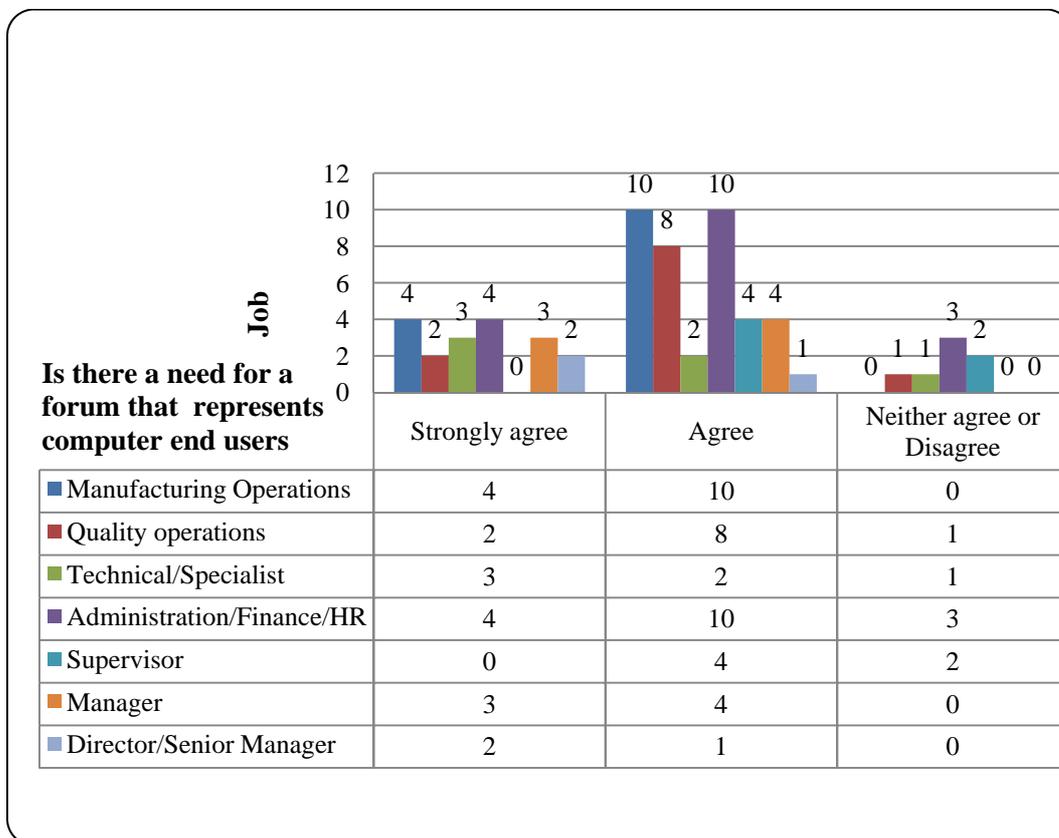


Figure 4.15 - The need for an IT End Forum across Job

Fifty-seven respondents (89%) were in agreement that a forum was required for end-users to be represented and to provide input into the IT SLA, while only 7 respondents (10.9% of total sample) selected neither agree nor disagree. None of the respondents disagreed with Question 21. From the NBI Managers only 2 were neutral while the remaining 14 supported the need for an IT forum for end-users.

The NBI respondents are in support of a forum where they can be represented and have input into the SLA formulation and monitoring. Although this is not a standard practice in companies, the merits of such a forum should be carefully considered by NBI. The forum is one method for end-users to be represented and other methods include the extension of the IT steering committee to include non-manager end-users.

#### **4.4 Conclusion**

The research objective is to determine the effectiveness of IT SLA and the need for end-users to participate in the SLA formulation, acceptance and monitoring.

Based on the research methodologies applied, the demographics and dynamics of the National Bioproducts Institute, the research confirms that

- The IT SLA's are compiled, and monitored by managers, thereby excluding end-users.
- IT SLA knowledge is increasing among users who want to participate in the SLA formulation and monitoring process as indicated in section 4.3.2.2
- IT Service levels can become more effective if end-users are included in the process as shown in 4.3.3.2

The NBI IT SLA is currently compiled and monitored by the management team, which is the practice among most companies. The 5 core areas of the ITIL life cycle start with the identification of customer needs, followed by the IT requirements, service design, implementation and lastly improving and monitoring. The life cycle is mostly carried out by the management team; however, there is an emphasis on customers who are part of each of the ITIL areas. The inclusion of end-users could ensure the correct user requirements are identified, that the service is addressing the business requirements and that monitoring

and improvement is not excluding any area of the business, especially as businesses are continuously changing. Denny (2009) said that the SLA should be the blueprint for the relationship between the supplier and the customer.

Information Technology should not be about driving technology, but rather about how best to deliver a service that meets the need of the business, by bringing together people and processes. The IT service must be measured and end-user success should be the ultimate test for quality of the IT service (Meyer 2008).

The NBI is a technology-focused organisation that depends on IT systems for ERP and automation of manufacturing systems, which may be a major contributing factor to the high IT skill level and IT SLA understanding among the end-users. The higher than average educational level among the users may also contribute to the IT adoption at NBI.

The research analysis reveals that end-users are not just knowledgeable about the IT SLA, but are also capable and willing to be part of the SLA process for the purposes of benefiting the organisation. This was identified in the users' understanding of how SLA priorities should be assessed and how task priorities should be prioritised.

## Chapter 5

### 5 Conclusion and Recommendations

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#### 5.1 Introduction

The research outcomes should be considered by NBI, as the inclusion of end-users could provide an effective IT service that delivers on the IT needs of all users of the service. The literature provides little or no clear indication of who the stakeholders are, or the level of involvement of end-users; however, In addition to the research at NBI, further research is required to provide direction on what is the recommended approach with SLA implementation and monitoring, taking into account the role of end-users.

The frameworks such as ITIL and COBIT are guidelines which allow organisations to determine the best approach for their environment. The guidelines do not imply that end-users should not be excluded in the process; however, these guidelines provide a framework that can be adapted to any environment (Hildreth 2007). The analysis of the survey indicates that end-users are better informed and knowledgeable about IT service level agreements and IT in general, thereby providing for useful input into the SLA process

The inclusion of end-users in the SLA process does not change the decision-making on how to compile and monitor the SLA, as this decision should reside with the management in ensuring that the SLA delivers on overall business objectives and follows the overall strategy of the company (Carter-Steel 2009).

#### 5.2 Assessment of research Objectives

The objectives of the research have been set out in 1.5 of chapter 1. In achieving the objectives of the research the following research questions were identified and the outcomes of each research question are presented below:

### **5.2.1 Research Question 1: Do computer end users know their rights and recourse with regards to the company's IT SLA?**

The research question determines the end user understanding of IT SLA's which is used in determining whether end users are knowledgeable enough to participate in the SLA formulation. Question 13, the end-users' understanding of the SLA and Question 14, the SLA escalation process were plotted using the Gartner-like quadrant. The larger section of the population was found in quadrant 2 where users agreed on both question. This demonstrates the end-users' understanding of the IT SLA. The end-user understanding is further highlighted in figure 4.11 where 60.9 % of respondents selected type of problem for determining task priorities which is the current NBI helpdesk SLA process for prioritising tasks.

### **5.2.2 Research question 2: Should end-users be included in the formulation and acceptance of the company's SLA?**

The question is directly linked to the objective to assess whether end users should participate in the SLA formulation. Figure 4.12 is the cross-tabulation of survey Question 5, job function against Question 19, should end-users be part of the SLA formulation and measurement process? The managers who responded, strongly supported the inclusion of end-users in the SLA formulation process as 81.3 % of the manager respondents were in agreement. The non-managers shared the same view as the managers because 72.9 % of non-manager respondents were in agreement that end-users should be included in the SLA formulation.

The Gartner-like quadrant in Figure 4.14 has 45.3 % of the respondents in Quadrant 2, where respondents agreed with Question 15, users' satisfaction with the current SLA and Question 19, the need for end-users to be part of the SLA formulation.

The need for end-user participation is also evident from figure 4.15 where question 5, job function, is plotted against question 21, the need for a forum that represents computer end-users for the purposes of participating in the SLA formulation and measurement. From the managers who responded, 87% supported the need for an end-user forum while 43 of the 48 non-manager respondents (89.6%) supported the creation of the IT forum.

### **5.2.3 Research question 3 - Can IT service level agreements become more effective if end-users are included in the formulation and measurement process?**

Figure 4.13 is the cross-tabulation of Question 4, job function, and Question 20, end-users can improve the IT SLA if allowed to participate in the SLA formulation and monitoring process. From the sample population, 81.25 % of the managers agreed that the SLA would be more effective if end-users are included and all of the non-manager respondents shared the same view.

In Figure 4.9 we find that 67% of end-users perform basic troubleshooting. This displays the high level of IT knowledge of end-users. The inclusion of end-users who have a high IT knowledge would contribute positively to the IT SLA process. The inclusion would also provide a forum where individuals who understand SLA's are allowed the opportunity to share their views and opinions on how the SLA can be improved.

Figure 4.10 highlights the end-user understanding of IT SLA's as 75% of the respondents selected business requirements as the criteria for determining the IT service levels. Although 51.6 % of users were uncertain whether the SLA was addressing the business requirements, this could be owing to users' not understanding the objectives or needs of the business where IT was concerned.

The research provides a strong argument for including end-users in the SLA formulation as end-users understand the purpose of the SLA. The managers and non-manager believe that by including end-users, the SLA can be a more effective means to ensuring that the IT function is optimised.

### **5.3 Recommendations**

ITSM is a growing trend across all industries and its main aim is to deliver on business objectives and strategies, maximise the investment in IT and align IT with the business. A main contributor to the rapid growth is the huge investment in IT and the lack of understanding among industry leaders of how IT contributes to the bottom line of the business (Galup *et al*, 2009).

An essential tool for managing the IT service is the IT SLA, which has evolved from a technology agreement that detailed IT metrics, to a service agreement that is made up of

service deliverables. The scope of services (what is supported) as well as the level of these services (how the services are provided) are detailed in the SLA (McDonald & Longwell 2009).

The existence of an SLA does not necessarily guarantee the achievement of objectives; however, SLA's are essential in building relationships with stakeholders and optimising IT performance by identifying areas for improvement. A stakeholder that is often omitted from the SLA creation and management process is the computer end-user (Goo *et al*, 2008).

The National Bioproducts Institute should consider the role of end-users as important stakeholders in the IT service management by including end-users in the SLA formulation and monitoring process. The decisions regarding the SLA formulation and monitoring process should reside with the NBI Management, however the end-user input should be considered for the purposes of achieving an effective SLA agreement. The method for end-user inclusion could take the form of an end-user forum or by selecting key end-users that are represented by an IT steering committee. The end-user inclusion is supported by both the managers and non-managers and should provide a means, to building stronger relationships between IT and end-users and, to the establishment of an effective service agreement.

#### **5.4 Areas of Future Research**

The largest cost of managing an IT function does not reside in the purchase of the hardware and software, but instead this cost is in management of the technology. An essential instrument in managing IT service management function is the SLA, a document that is compiled using business language and business metrics to measure performance. The SLA should cater for the needs of stakeholders while optimising the IT capabilities (Winniford *et al*, 2009).

The literature review emphasizes the need for IT service management and the need to have a well structured SLA, however, there is very little indication of end-user inclusion in the IT SLA formulation and monitoring. This analysis of the responses confirms that end-users are omitted from the SLA process, however, the analysis also highlights the need for end-

users to be included in the IT SLA processes. The research does not determine the level of involvement or the authority of end-users in the process; however, the research does indicate that including end-users will provide for an effective SLA.

IT service management is a rapidly growing discipline that has changed the evolution of SLA's. It has a strong focus on service delivery that meets the needs of stakeholders. The definition of stakeholders needs to be revised and further research is needed to define the role of end-users. As companies adopt formal approaches to service management, the question of end-user involvement will arise, prompting further research on the role of end-user. The area of future research should assess the merits of including end users in the IT SLA formulation and identify the benefits to both the business and the end users.

## **5.5 Conclusion**

IT service management is evolving into a discipline for the effective management of IT, by improving the quality of services and building stronger relationships with the various stakeholders. This is highlighted in frameworks such as ITIL and COBIT that have grown in popularity among organisations. The IT Service Level Agreement determines how IT and the business will work together to deliver a service that adds value to the overall business in achieving the business objectives (Galup *et al*, 2009).

Technology leaders have recognized the need to build and grow partnerships with business in defining business value and how IT can create such value. The IT SLA provides the forum where IT and the business define the relationship and how the relationship will be enhanced (Andriole 2007).

The literature review does not provide any guidelines on how to cater for end-users with regard to the SLA creation and measurement; however, the SLA process makes mention of the need to consult extensively with stakeholders of the SLA. The question that is not clear, is whether end-users are considered stakeholders.

The quantitative research, however, clearly displays the end-users' need to be represented or included in the SLA formulation. The NBI should carefully consider the merits of

including end-users, which was fully supported by the managers and non-managers. The effectiveness of this cooperation should then be monitored.

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## APPENDICES

### Appendix 1: Questionnaire:

#### Survey cover sheet

### **UNIVERSITY OF KWAZULU-NATAL GRADUATE SCHOOL OF BUSINESS**

Dear Respondent,

#### **MBA Research Project**

**Researcher:** Rishaad Buckroodeen (082 890 2707)  
**Supervisor:** Professor Manoj Maharaj (031-2608003)  
**Research Office:** Ms P Ximba 031-2603587

I, Rishaad Buckroodeen, am an MBA student, at the Graduate School of Business, of the University of Kwazulu Natal. You are invited to participate in a research project entitled "Should end users be part of the formulation and measurement of IT Service Level Agreements".

Through your participation I hope to understand what the effectiveness of implementing and managing IT service level agreements without end user participation. The results of the survey are intended to contribute to those organisations who want to improve the IT service by identifying the needs of end users through end user participation in IT SLA formulation.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this survey. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Graduate School of Business, UKZN.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me or my supervisor at the numbers listed above.

The survey should take you about 10 - 15 minutes to complete. I hope you will take the time to complete this survey.

Sincerely

---

Investigator's signature      R. Buckroodeen

Date    1<sup>st</sup> October 2009

## Questionnaire

1. Gender

- Male
- Female

2. What is your age group?

- Less than 20 years old
- 20 – 30 Years
- 31 to 40 Years
- 41 to 50 Years
- more than 50 years

3. What is your race (The information is required for statistical purposes only)

- African
- Coloured
- Indian
- White

4. What is your length of employment at NBI?

- Less than 1 year
- 1 – 2 years
- 2 – 5 years
- 5 – 10 years
- more than 10 years

5. What is your job function?

- Manufacturing Operations
- Quality operations
- Technical/Specialist
- Administration/Finance/HR
- Supervisor

- Manager
  - Director/Senior Manager
6. What is your highest level of education?
- Post Grad Degree
  - Degree
  - Diploma
  - Matric
  - Other
7. Select all software you currently utilise.
- Microsoft Office
  - MS Outlook for E-mail
  - SAP
  - Internet
  - LIMS
8. How much time do you spend using Your PC?
- Less than 1 hour a day
  - 2 – 4 hours a day
  - 4 – 6 hours a day
  - 6 – 8 hours per day
  - Greater than 8 hours per day
9. I enjoy working with computers
- Strongly agree
  - Agree
  - Neither agree or Disagree
  - Disagree
  - Strongly disagree
10. How many IT service requests do you log per month?
- Less than 2 per month
  - 3 – 5 calls per month
  - 6 – 8 calls per month
  - 9 – 10 calls per month

- More than 10 calls per month

11. I perform basic troubleshooting of IT problems before seeking IT assistance?

- Strongly agree
- Agree
- Neither agree or Disagree
- Disagree
- Strongly disagree

12. How should the level of IT service be determined?

- Cost of service
- Demand for IT services
- Business Requirements

13. I understand the purpose of an IT Service Level Agreement.

- Strongly agree
- Agree
- Neither agree or Disagree
- Disagree
- Strongly disagree

14. I am aware of the process for IT service level escalation.

- Strongly agree
- Agree
- Neither agree or Disagree
- Disagree
- Strongly disagree

15. I am satisfied with the current level of IT service.

- Strongly agree
- Agree
- Neither agree or Disagree
- Disagree
- Strongly disagree

16. The current SLA is meeting the overall needs of the business.

- Strongly agree
- Agree
- Neither agree or Disagree
- Disagree
- Strongly disagree

17. I understand how the current SLA is measured.

- Strongly agree
- Agree
- Neither agree or Disagree
- Disagree
- Strongly disagree

18. Should IT task priorities be based on?

- Seniority in the organisation
- Job function
- First Come first Serve Basis
- Departments
- Type of problem

19. End users of computer systems should participate in the formulation and/or performance measurement of the Company's IT SLA.

- Strongly agree
- Agree
- Neither agree or Disagree
- Disagree
- Strongly disagree

20. Computer end user can improve the IT service level if the users are given the opportunity to participate in the formulation and/or performance measurement of the IT SLA.

- Strongly agree
- Agree
- Neither agree or Disagree
- Disagree
- Strongly disagree

21. There is a need for an IT forum where end users are represented and are able to provide input into the formulation and measurement of the IT service SLA.

- Strongly agree
- Agree
- Neither agree or Disagree
- Disagree
- Strongly disagree

**Comments:**

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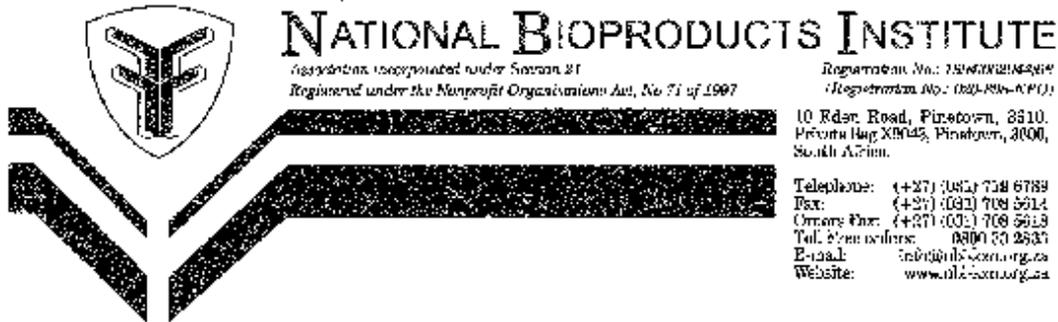
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**End of the Questionnaire**

Thank you for taking the time to complete the questionnaire.

Appendix 2: Authorisation letter from the National Bioproducts Institute:



The Graduate School of Business  
University of KwaZulu Natal  
Private Bag X54001  
Durban  
4000

7<sup>th</sup> September 2009

**Re: Authorisation to perform research at the National Bioproducts Institute**

This serves to confirm approval for Rishaad Buckrooddeen to undertake research at the National Bioproducts Institute and authorizes Rishaad to undertake questionnaire surveys and interviews as required for the completion of his MBA dissertation.

NBI are aware that the information gathered and utilized will be used explicitly for the research purposes.

Please do not hesitate to contact me if there is anything else you may require.

Mr. Duncan Armstrong  
Executive Director  
National Bioproducts Institute  
10 Eden Road  
Pinetown  
3600

Tel: 031-719 6706  
031-719 6789

*NBI is a "not for profit" association  
committed to providing  
safe, cost effective,  
quality products*

Directors: Rev. J. Bhebe-Suthi (Chairman), D. Armstrong (BiolSci), R.N. Bhebe, N. Deyimani,  
Dr S. Gubbie, Prof. A. du P. Heys, B. Keshel, Dr. F. Mputsho, Prof. N.T. Ndlovu, M.A. Ntsho, Dr. B.N. Okeke,  
Dr V.P. Pasalingam, J.A. Puzos, & N. Ruddy, Dr E.R. Soodi, Dr D. Whitt  
Company Secretary: E.E. Biko

Appendix 3: Ethical Clearance Letter



University of KwaZulu-Natal  
Research Office  
Central MHL Centre  
Westville Campus  
University House  
Cuthbert Hills  
Westville  
3629  
South Africa  
Tel No: +27 31 296 3527  
Fax No: +27 31 296 3581  
E-mail: [office@uqn.ac.za](mailto:office@uqn.ac.za)

06 October 2009

Mr R Buckroodien  
Graduate School of Business  
School of Business Administration  
WESTVILLE

Dear Mr Buckroodien

**PROTOCOL: Should end users be part of the formulation and measurement of IT Service Level Agreements?**

**ETHICAL APPROVAL NUMBER: H55/0672/2009 M**

In response to your application dated 01 October 2009, Student Number: **882212718** the Humanities & Social Sciences Ethics Committee has considered the above-mentioned application and the protocol has been given **FULL APPROVAL**.

**PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.**

I take this opportunity of wishing you everything of the best with your study.

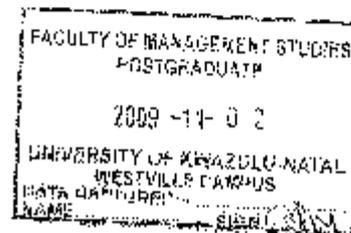
Yours faithfully

A handwritten signature in black ink, appearing to read "Steve Collings".

Professor Steve Collings (Chair)  
HUMANITIES & SOCIAL SCIENCES ETHICS COMMITTEE

SC/sn

cc: Professor M Maharaj  
cc: Mrs C Haddon



# Appendix 4: Raw Data

No	Gender	Age Group	Race	Length of Service	Job function	Education	Applications used	Time spent on PC per day	I enjoy working with	How many IT service requests do you log	I perform basic troubleshooting of IT problems before seeking IT?
1	Female	20-30 Years	Indian	1-2 years	Technical/Specialist	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	Greater than 8 hours per day	Strongly agree	Less than 2 per month	Strongly agree
2	Female	31 to 40 Years	White	Less than 1 year	Technical/Specialist	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Strongly agree
3	Male	31 to 40 Years	Indian	2-5 years	Director/Senior Manager	Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	3-5 calls per month	Strongly agree
4	Male	20-30 Years	African	1-2 years	Manufacturing Operations	Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	Less than 2 per month	Strongly agree
5	Female	31 to 40 Years	Indian	Less than 1 year	Manufacturing Operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	Less than 1 hour a day	Agree	Less than 2 per month	Disagree
6	Female	more than 50 years	White	5-10 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	3-5 calls per month	Agree
7	Female	20-30 Years	African	Less than 1 year	Quality operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	3-5 calls per month	Agree
8	Male	31 to 40 Years	African	Less than 1 year	Administration/Finance/HR	Other	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Agree
9	Female	20-30 Years	African	2-5 years	Quality operations	Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	3-5 calls per month	Strongly agree
10	Female	31 to 40 Years	White	2-5 years	Technical/Specialist	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	Greater than 8 hours per day	Strongly agree	3-5 calls per month	Strongly agree
11	Male	20-30 Years	Indian	1-2 years	Quality operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Disagree
12	Male	20-30 Years	African	1-2 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	Less than 2 per month	Agree
13	Male	20-30 Years	African	1-2 years	Supervisor	Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	3-5 calls per month	Agree
14	Male	41 to 50 Years	African	2-5 years	Quality operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	3-5 calls per month	Neither agree or Disagree
15	Male	20-30 Years	African	2-5 years	Quality operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Agree	Less than 2 per month	Agree
16	Female	20-30 Years	African	Less than 1 year	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	3-5 calls per month	Agree
17	Female	20-30 Years	Indian	2-5 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Agree
18	Female	more than 50 years	Indian	more than 10 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Disagree
19	Female	31 to 40 Years	African	2-5 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	2-4 hours a day	Strongly agree	Less than 2 per month	Disagree
20	Female	31 to 40 Years	Indian	more than 10 years	Quality operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	2-4 hours a day	Strongly agree	Less than 2 per month	Agree
21	Male	31 to 40 Years	African	2-5 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Agree
22	Female	31 to 40 Years	Coloured	Less than 1 year	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	2-4 hours a day	Agree	Less than 2 per month	Neither agree or Disagree
23	Female	20-30 Years	White	2-5 years	Technical/Specialist	Post Grad Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Agree	Less than 2 per month	Strongly agree
24	Female	31 to 40 Years	White	5-10 years	Director/Senior Manager	Post Grad Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Strongly disagree
25	Female	41 to 50 Years	Indian	more than 10 years	Quality operations	Other	Microsoft Office, MS Outlook for Email, SAP, Internet	2-4 hours a day	Agree	Less than 2 per month	Agree
26	Female	31 to 40 Years	Indian	2-5 years	Manager	Post Grad Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	Greater than 8 hours per day	Strongly agree	Less than 2 per month	Agree
27	Female	20-30 Years	African	2-5 years	Manager	Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Agree	Less than 2 per month	Disagree
28	Female	31 to 40 Years	Indian	more than 10 years	Administration/Finance/HR	Matric	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Agree	Less than 2 per month	Agree
29	Female	31 to 40 Years	Coloured	2-5 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Agree	Less than 2 per month	Agree
30	Female	31 to 40 Years	Indian	2-5 years	Supervisor	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	3-5 calls per month	Neither agree or Disagree
31	Female	41 to 50 Years	White	Less than 1 year	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	Less than 2 per month	Strongly agree
32	Female	more than 50 years	White	more than 10 years	Technical/Specialist	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Agree	Less than 2 per month	Neither agree or Disagree
33	Female	41 to 50 Years	Indian	more than 10 years	Supervisor	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	2-4 hours a day	Agree	Less than 2 per month	Agree
34	Female	31 to 40 Years	Indian	5-10 years	Manager	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	Greater than 8 hours per day	Agree	Less than 2 per month	Disagree
35	Female	31 to 40 Years	Indian	2-5 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Agree	Less than 2 per month	Agree
36	Female	31 to 40 Years	Coloured	5-10 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Agree
37	Female	31 to 40 Years	Indian	2-5 years	Manufacturing Operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	Less than 2 per month	Agree
38	Female	20-30 Years	African	1-2 years	Quality operations	Post Grad Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	Less than 2 per month	Agree
39	Female	20-30 Years	African	1-2 years	Quality operations	Post Grad Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Strongly agree
40	Female	31 to 40 Years	White	more than 10 years	Manager	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Strongly agree
41	Female	31 to 40 Years	White	more than 10 years	Quality operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	3-5 calls per month	Strongly agree
42	Male	31 to 40 Years	Indian	1-2 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	3-5 calls per month	Strongly agree
43	Male	31 to 40 Years	African	2-5 years	Manufacturing Operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Agree	Less than 2 per month	Agree
44	Female	31 to 40 Years	African	1-2 years	Supervisor	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	3-5 calls per month	Agree
45	Female	41 to 50 Years	White	5-10 years	Quality operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Neither agree or Disagree	3-5 calls per month	Neither agree or Disagree
46	Male	31 to 40 Years	White	more than 10 years	Director/Senior Manager	Post Grad Degree	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Strongly agree
47	Female	41 to 50 Years	African	2-5 years	Manager	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	Greater than 8 hours per day	Strongly agree	3-5 calls per month	Neither agree or Disagree
48	Female	more than 50 years	White	more than 10 years	Administration/Finance/HR	Matric	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	Less than 2 per month	Neither agree or Disagree
49	Female	41 to 50 Years	Indian	2-5 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Strongly agree	Less than 2 per month	Disagree
50	Male	41 to 50 Years	African	more than 10 years	Manufacturing Operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	Less than 2 per month	Agree
51	Male	20-30 Years	African	2-5 years	Manager	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Neither agree or Disagree	Less than 2 per month	Agree
52	Male	31 to 40 Years	African	Less than 1 year	Technical/Specialist	Matric	MS Outlook for Email, Internet	Less than 1 hour a day	Agree	Less than 2 per month	Agree
53	Male	41 to 50 Years	African	more than 10 years	Supervisor	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	4-6 hours a day	Strongly agree	3-5 calls per month	Strongly agree
54	Female	31 to 40 Years	Indian	more than 10 years	Manufacturing Operations	Matric	Microsoft Office, MS Outlook for Email, Internet	2-4 hours a day	Strongly agree	Less than 2 per month	Strongly agree
55	Female	31 to 40 Years	Indian	more than 10 years	Manufacturing Operations	Matric	Microsoft Office, MS Outlook for Email, Internet	2-4 hours a day	Disagree	3-5 calls per month	Disagree
56	Female	more than 50 years	Indian	more than 10 years	Supervisor	Other	MS Outlook for Email, SAP	2-4 hours a day	Disagree	3-5 calls per month	Disagree
57	Male	31 to 40 Years	African	2-5 years	Manufacturing Operations	Matric	Microsoft Office, MS Outlook for Email, Internet	4-6 hours a day	Agree	Less than 2 per month	Neither agree or Disagree
58	Female	31 to 40 Years	Indian	2-5 years	Administration/Finance/HR	Diploma	Microsoft Office, MS Outlook for Email, LIMS	2-4 hours a day	Agree	Less than 2 per month	Agree
59	Male	31 to 40 Years	African	2-5 years	Manufacturing Operations	Matric	Microsoft Office, MS Outlook for Email, LIMS	4-6 hours a day	Agree	Less than 2 per month	Neither agree or Disagree
60	Male	31 to 40 Years	African	2-5 years	Manufacturing Operations	Diploma	Microsoft Office, MS Outlook for Email, LIMS	4-6 hours a day	Agree	3-5 calls per month	Agree
61	Male	31 to 40 Years	African	5-10 years	Manufacturing Operations	Matric	Microsoft Office, MS Outlook for Email, SAP, LIMS	4-6 hours a day	Agree	Less than 2 per month	Neither agree or Disagree
62	Male	20-30 Years	African	2-5 years	Manufacturing Operations	Matric	Microsoft Office, MS Outlook for Email, SAP, LIMS	4-6 hours a day	Agree	3-5 calls per month	Neither agree or Disagree
63	Female	31 to 40 Years	African	5-10 years	Manufacturing Operations	Diploma	Microsoft Office, MS Outlook for Email, SAP, Internet	6-8 hours per day	Agree	3-5 calls per month	Neither agree or Disagree
64	Female	41 to 50 Years	African	more than 10 years	Manufacturing Operations	Matric	Microsoft Office, MS Outlook for Email	4-6 hours a day	Agree	Less than 2 per month	Disagree

