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Enterprise Architecture Framework for the Namibian Government_Wide

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Presented by: Irja N. Shaanika
Supervisor: Prof Tiko Iyamu
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Declaration

I, Irja Naambo Shaanika, born on 28 March 1989 at Iitananga, Namibia, hereby declare that the work contained in the report presented for the degree of the Master of Informatics at the Polytechnic of Namibia, entitled:

Enterprise Architecture Framework for the Namibian Government_Wide

is my original work, and that I have not previously, in it's entirely or in part, submitted it to any other university or higher education institution for the award of a degree.

_____ _____

Irja N. Shaanika Date

DEDICATION

This thesis is dedicated to my parents for their unconditional love and support.

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Heartfelt thanks go to my parents, Mr and Mrs Shaanika who love me, pray for me and always encourage me. I thank each one of them for the investment they have made in me. I am grateful to them for laying the strong foundation on which much of that I do is built upon.

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LIST OF ACRONYMS AND ABBREVIATIONS

1. **AT: Activity Theory**

2. **DoDAF: Department of Defence Architecture Framework**
3. **EA: Enterprise Architecture**
4. **FEAF: Federal Enterprise Architecture Framework**
5. **ICT: Information and Communication Technologies**
6. **IS: Information Systems**
7. **IT: Information Technology**
8. **NGW: Namibia Government _Wide**
9. **OPM: Office of the Prime Minister**
10. **TEAF: Treasury Enterprise Architecture Framework**
11. **ToGAF: The Open Group Architecture Framework**

ABSTRACT

Every organisation tries to operate in a dynamic environment; as a result, no organisation intends to stay the same. Thus the organisation's survival depends on how fast and well they react and respond to change. The changes are expected to come from both business and technological perspectives. Change is implored and implemented through different approaches, such as Enterprise Architecture (EA).

Organisations adopt EA as a way to map and describe organisational structure, business activities, and how information and technologies can be used to support, enable and automate business processes. Enterprise architecture plays an important role in guiding organisations' operations and implementation of new technologies in dynamic environments. However, with all the benefits that EA brings to organisations, they are still challenged by their operations.

The study employed the qualitative method as the research strategy. Qualitative method was selected primarily because of its explanatory nature. Also, it enables researchers to study phenomenon in their natural settings, which was critical in this research. The researcher avoids assumptions and expectations but rather study the environments as they are presented in order to understand them.

The study used a case study approach and semi-structured interviews for data collection. Activity Theory (AT) was applied during data analysis and it provided a third eye needed to understand the technical and non-technical factors that could impact the development and implementation of EA.

Based on the interpretation of the findings from the analysis of data, the Namibian government wide enterprise architecture framework was developed. The framework act as guidance in the selection, development, implementation and maintenance of information system and technologies in the Namibian Ministries computing environment,

CHAPTER 1
INTRODUCTION

1.1 Introduction

Enterprise architecture is of paramount importance to organisations. It provides guidelines for developing and implementing their supporting information technologies. Individuals, including organisations define enterprise architecture differently, informed and guided by their objectives and understanding. Schekkerman (2009), highlights that EA depends on how it is defined and scoped. The definition shapes how it is developed and implemented. Iyamu (2011) argues that a lack of understanding leads to incompatibility and confusion about the views on the definitions, objectives, processes and phases that are required for the development and implementation of EA.

EA is defined as an integrated and holistic vision of a system's fundamental organization, embodied in its elements (people, processes, applications, and so on), their relationships to each other and to the environment, and the principles guiding its design and evolution (IEEE Std 1471-2000 IEEE Recommended Practice for Architectural Description of Software-Intensive Systems, IEEE, 2006). According to Kaisler, Armour, and Valivullah (2005), EA identifies the main components of the organization, its information systems, the ways in which these components work together in order to achieve defined business objectives, and the way in which the information systems support the business processes of the organization. Kamogawa and Okada (2009) asserted that the compelling need of EA is to enable strategic business goals and organisations derive strategic outcomes from EA in terms of operational excellence. A well-defined and documented enterprise architecture enables organisations to manage their technological infrastructure and to plan for obsolesces and business processes' change management. EA therefore depicts the components within an enterprise and describes how they relate and interact with each other. Flaxer, Nigam, and Vergo, (2005) argues that each component serves a unique purpose and collaborates with other components within the enterprise.

EA embraces all organisational needs, thus it is important for the organisation's needs to be well defined, including its future needs. Different aspects, business processes and domains are expressed to create an overview of enterprise architecture (Lankhorst, 2005). It is

therefore argued that an enterprise architecture approach can help align business and IT resources and confirm them to fundamental principles and common methodologies governing the entire information systems development process (Shah & Kourdi, 2007).

According to The Open Group, enterprise architecture is composed of business architecture, information architecture, application architecture, and technology (IT) architecture. Each of these domains is a separate architectural discipline and enterprise architecture is the glue that integrates these domains (Pereira & Sousa, 2004). The different domains of EA are interrelated and depend on each other.

The business architecture is the first step to developing enterprise architecture. The business architecture is the result of defining the business strategies, processes, and functional requirements (Pereira & Sousa, 2004). The organisation's vision is defined at this architecture domain because the business vision explains the organisation's current situation and where it wants to be in the future. The business architecture defines and outlines the organisation's goals, mission and objectives. It sets out the organisation's activities and processes to be carried out in order for the goals and objectives of the organisation to be achieved. Organisational activities and processes are carried out by employees and stakeholders with the support of information systems personnel.

The BA provides the foundation that leads to the development of EIA, EAA, and ETA. Iyamu (2011) explains that EBA defines the business design for sustainable competitive advantages and it leads to the information and application architectures.

In an organisation, information is constantly being exchanged between customers, employees and stakeholders. The enterprise information architecture (EIA) defines and establishes the information domain of the enterprise architecture. Rood (1994) explains that EIA depicts the subject areas of information need used by an enterprise and it may include the entities and the relationships of those entities within the subject area. According to Iyamu (2011), EIA provides categorisation, classification and definition of information required to perform the organisation's process and activities. EIA defines an organisation's information needs and how this information is communicated, managed and accessed by its users. A clear vision of enterprise information is important in order to model by whom data is used and how it flows within the entire organisation and this will help the organisation to design and control the

enterprise information. Understanding what information, where information is needed, where it flows and how it is manipulated throughout the enterprise and across its boundaries is necessary if the collection and sharing of the information is to be automated and supported by information technology. Organisational information is created by processes and tasks and is shared with other processes and tasks (Pereira & Sousa, 2004). EIA aims to support information sharing and accessibility so that the right information is at hand to enable organisation to make informed decisions. Enterprise Information architecture helps reduce information duplication and inconsistency in an enterprise.

The application architecture is concerned with the development, deployment and manageability of applications used in the organisation. Sharma, Stearns and Ng (2001), state that EAA assists organisations to develop and integrate existing applications and to add new technologies and applications for supporting business processes. Employees interact with information systems through applications and applications also interact with other applications. Vasconcelos et al., (2004) explain that communication channels must be constructed between applications before communication can take place. Thus application can be viewed as a medium through which communication is carried out. Applications, according to Sun and Chen (2010), are needed for data management and business support.

After defining business processes and activities, information and applications needs, organisations need to define how they will be supported by technologies. The organisation's technological needs and objectives are defined by the enterprise technical architecture (ETA). Enterprise technical architecture defines how an organisation acquires, deploys and utilises its hardware, networks and software infrastructures. According to Iyamu (2011, p. 88), "technical architecture models the technology environment including infrastructure configuration standards and guidelines for the selection, deployment, integration, configuration and management". Sun and Chen (2010) pointed out that ETA provides the patterns to ensure that the organisation can deliver and continue supporting information technology operations after building and securing them. They further elaborate that, it provides principles for the information technology lifecycle management. An in-depth understanding of the organisation's technological needs and their impact on business activities and processes is necessary for the successful development and implementation of the ETA.

EA is aimed to support and guide decision making. The business and IT objectives are continually changing. Businesses are constantly facing pressures from their internal and external environments. Schekkerman (2009) explains that EA is part of the extended enterprise environment and a good EA should therefore also consider the external environments variables. Thus the enterprise architecture needs to be constantly maintained in order to support changes from both environments.

The successful implementation of EA requires an understanding of business requirements. Any organisation benefits from having a clear understanding about its products, services and technology as this will assist in planning and monitoring innovations.

Enterprise architecture is an overview of the organisation's goals and objectives and how information technology supports and enables such goals and objectives to be achieved. For Lankhost (2005), enterprise architecture is important because of its ability to provide a holistic view of the organisation. Enterprise architecture, as explained by Sun and Chen (2010), guides the construction and development of business processes and the construction and development of supporting information systems. Without enterprise architecture organisations have no guidelines for future survival. This is supported by Abd et al., (2006), who state that organisations which plan for EA have great advantages over those organisations that don't, because planning for EA and other information systems will create global competition for all products and services. It is difficult to achieve business success without enterprise architecture (Lankhorst, 2005). Enterprise architecture enables the necessary alignment between business processes, activities and information technology.

Several EA frameworks exist. A framework is necessary to be able to capture a vision of the entire organisation with all its dimensions (Schekkerman, 2009). *Zachman Framework, Department of Defence Architecture Framework (DoDAF), Federal Enterprise Architecture Framework (FEAF), Treasury Enterprise Architecture Framework (TEAF) and The Open Group Architectural Framework (TOGAF),* are some of the EA frameworks (Urbaczewski & Mrdalj, 2006)**.** These frameworks differ in content because they are designed for different organisations' needs. Urbaczewski and Mrdalj (2006) argue that frameworks may overlap and address similar views but frameworks are designed to address specific needs or concerns. No organisations have the same goals and objectives as other organisations. EA Frameworks are only used as guiding tools to assist organisations in developing and implementing

enterprise architectures. Schekkerman (2009), elaborates that EA is supported by frameworks that enable the coordination of many components that make up an enterprise in a holistic way.

What the Namibian government Ministries' environment looks like?

The Office of the prime minister, established after independence, is the state agency of the Republic of Namibia responsible for the regulation and development of information technologies among the Namibian government Ministries. Every ministry has its own unique mission, objectives and goals governing its operations.

When a specific information technology need arises in a certain ministry, the office of the prime minister is first consulted for pre-implementation and implementation support. The Office of the Prime Minister (OPM) works closely together with the ministry of Information and Communication Technology (ICT) for planning, coordinating and directing efforts to initiate and launch information technology programs and projects aimed at the economic development of the country.

The pre-implementation and implementation of IT services and activities is carried out by the Ministries' workforce and in case of lack of expertise about certain projects within the Ministries, the ministry often turns to private enterprises for IT outsourcing.

1.2 Background

The Namibian government, like many other developing countries' are consistently accused of poor service delivery, by its citizens. This is largely attributed to lack of methodological or strategic approach. For example, the selection, development and maintenance of ICT artefacts have been a challenge for many of the ministries in Namibia, in recent years. This has led to the costly and poor services delivery to the citizens. Thus, this study was untaken to empirically provide architectural framework that will guide the government in their business and ICT activities, to improving the services that they deliver to its citizens and business partners.

A lot of work in the area of business and IT alignments has been written. However managements still encounter challenges between business and IT. Challenges are known to be technical and non-technical. None-the-less most often non-technical factors are ignored.

The study relied on literature presented by other researchers who have researched and studied about ICT and EA in organisations to support its objectives.

Information Technology

Nowadays the impact of information technology can be felt in everyday life. Information technology as defined by Er (1989), is a term used to refer to a set of modern technology, including computing technology, microelectronics, and telecommunication technology. Montealegre (1997) describes IT as the tool that encompasses all forms of technology used to create, store, retrieve, process, exchange, and use information in its various forms. According to Kuhn and Giuse (2001) it is the appropriate term for defining both telephony and computer technology in the same word.

Information technology makes many previously impossible tasks possible. Malone and Rockart (1992), argue that although mankind has processed information since the early ages, early technologies were too slow to exert a pervasive impact on the then society. Kuhn and Giuse (2001) explain that the emergence of computing technology and microelectronics, coupled with advanced telecommunications, offer unlimited benefits to individuals as well as to organisations.

In organisations, IT is used to automate and support business processes necessary for achieving organisational goals and objectives. IT enables data and information to be rapidly processed and globally accessible (Xiaowu & Yan, 2009). The integration of IT and business processes supports an effective collaboration among organisational units, customers and its business partners. Oshio and José Barbin (2010) have reasoned that process integration speeds up the overall flow of information within the organisation.

However, information technology on its own does not deliver success. According to Montealegre (1997) with massive benefits experienced from using IT, enterprises also face and encounter challenges when using IT. Kissimoto and José Barbin (2010), explain that the implementation of IT is not a simple task because of its dynamics and complexity involving different components of the organisation. Indeed this is supported by Er (1989), who argues that the introduction of IT into organizations often meets with mixed reactions. This could be due to finance and other resources invested to it. Er (1989), emphasises that it is very important to understand the full impact of IT on organisations.

Organisations should take into considerations that technology is an enabler of business operations, for it to succeed it needs people (Kuhn & Giuse, 2001). Hence the management has the duty to make sure that the technology in place fits the organisational culture, and their employees are able to adapt to the changes and use the technologies in place, posits Flaxer, Nigam and Vergo (2005).

Enterprise architecture

Enterprise architecture is defined as "*the organising logic for business process and IT infrastructure, reflecting the integration and standardisation requirements of the company's operating model*" (Ross, Weill, & Robertson, 2006,p. 9). The Open Group explains that EA is about understanding all the different elements that build up the enterprise and how those elements inter-relate.

The purpose of EA is to provide guidance for business processes and their associated information systems towards achieving the organisational goals. Lankhorst (2005), states that EA captures the enterprise's business processes, IT, and its evolution. EA provides a holistic view which supports organisational design, business reengineering, systems design, technology infrastructure and data analysis (Kaisler, Armour & Valivullah, 2005). According to Lankhorst (2005), defining EA enables organisations to reduce duplications and inconsistencies in business processes and thus maximising the alignment of IT with business processes in order to reduce complexity and costs. A well-defined EA enables effective communication in organisations; therefore organisations will be capable of making better and informed decisions.

Schekkerman (2009), explains that enterprises have been motivated by the simple reality that they need EA to be competetive and for future business continuity. According to Schekkerman (2009), this might be a positive move, however, enterprises experince challenges in developing and implementing EA. It is noted that these challenges are rarely technical (Kaisler et.al, 2005). They explained that organisational, cultural and technical infrastructure aspects all require investment and consideration for the successful implementations of EA.

Enterprise

According to Schekkerman (2009), an enterprise can be defined as any collection of organisations that have a common set of goals and principles. Schekkerman (2009, p. 22), further elaborates that "an enteprise can be a whole corporation, a division of a corporation, a government organisation, a single department or a network of geographically distant organisations linked together by common objectives". An enterprise is made up of people, data, processes, strategy, organisational culture, organizational structure and technologies with guidelines and boundaries governing their relationship and interaction between them. The interactions between the enterprise components are essential for the enterprise survival, as the organisation's goals and objectives are attained through the components' interaction.

According to Martin et al., (2009), enterprises strive for competitiveness. However not everything is merry, as they do encounter challenges in their daily operations. Challenges result from environmental trends in which organisations operate from. In the view of Shah and Kourdi (2007), business trends comprise globalization, mergers and acquisitions, e-commerce, and customer-relationship and supply-chain management. The same authors noted that IT trends comprise advances in internet technologies, hardware platforms, and application and workflow servers.

1.3 Problem statement

The main goals of the government are to have computing environments which provide consistency, uniformity, and enable the reuse of artefacts. This is achieved through strategic approaches or methods such as EA. EA is primarily used to support and enable integrations of systems and technologies; efficiency and effectiveness of processes and activities; and collaborations among units and enterprises. Unfortunately, such a strategic approach does not exist at the moment in the Namibian government environment. As such, there are disparities in the governance of information systems and technologies and their collaborations in the computing environments at the government-wide level. In the context of this study, government-wide means the combination of the government Ministries which include enterprises and agencies. The disparities and the lack of collaborations and reuse of artefacts cause challenges in the deployment (development and implementation) of information systems and technologies.

This is mainly caused by the lack of enterprise architecture frameworks within the government enterprises. As a result, this has led to re-engineering, developments and implementation of organisational activities to be performed in a random manner. This contributes to the ineffective implementation and management of information systems, as well as lack of guidelines for defining hard and soft boundaries, the interfaces and the alignments of all components of the enterprise. As a result, organisations fail to plan and anticipate the business processes and technical innovations and this has caused IT to become a costly investment for the government.

Based on the research problem as articulated and presented above, the research aim and objectives were formulated.

1.4 Research aim

The aim is to develop a Namibian government-wide framework that can be applied by the Ministries' organisations to plan, develop and implement information systems and IT needed to support their business operations. The primary aim is to create adaptive and flexible integration, standardisation and re-engineering-oriented systems and technologies for the Namibian government-wide enterprises.

1.5 Research objectives

The objectives of the study are as follows:

1. to identify and examine the factors that could impact the development and implementations of enterprise architecture in the Namibian government-wide Ministries;
2. to examine how EA could be used to integrate systems and technologies within the government Ministries in Namibia; and
3. to assess and understand the role of EA in the Namibian government-wide Ministries.

1.6 Research questions

Research questions were formulated to assist in achieving the above objectives, as follows:

1. What are the factors that can impact the development and implementation of enterprise architecture in the Namibian Ministries' environment?
2. How can EA be used to integrate systems and technologies within the government Ministries in Namibia?

3. What is the role of EA in government Ministries?

1.7 Benefits of the research

The study offers benefits to both academics and corporates from practical and theoretical perspectives.

The study also contributes to existing literature. There has been limited academic studies on EA, especially in developing countries. Most of the higher education institutions in Africa do not offer courses tailored for EA and some institutions are challenged with EA curriculum developments. EA is defined, implemented and managed according to the employees' knowledge and understanding.

The study findings can help managers and stakeholders to gain a better understanding of factors (technical and non-technical) impacting the deployment of technologies and to make informed decisions. To reach alignment of ICT investments and business goals, there is a need for communication between business strategy and IT strategy. The findings of this study can also bring useful information in reducing the gap between business and IT units.

1.8 Theoretical underpinnings

Theories are used in studies as lenses through which researchers can analyse and interpret research findings. According to Walsham (2006), a theory can be used as an initial guide to a study design and as part of an iterative process of data collection and analysis.

Activity Theory (AT) was selected to underpin this study. The theory provides a conceptual framework for understanding and analysing human activity. The components of AT as discussed by Engeström (1990), are tools, objects, division of labour, community, rules and subject. The theory is portrayed as a triangle as shown in figure1 belolow:

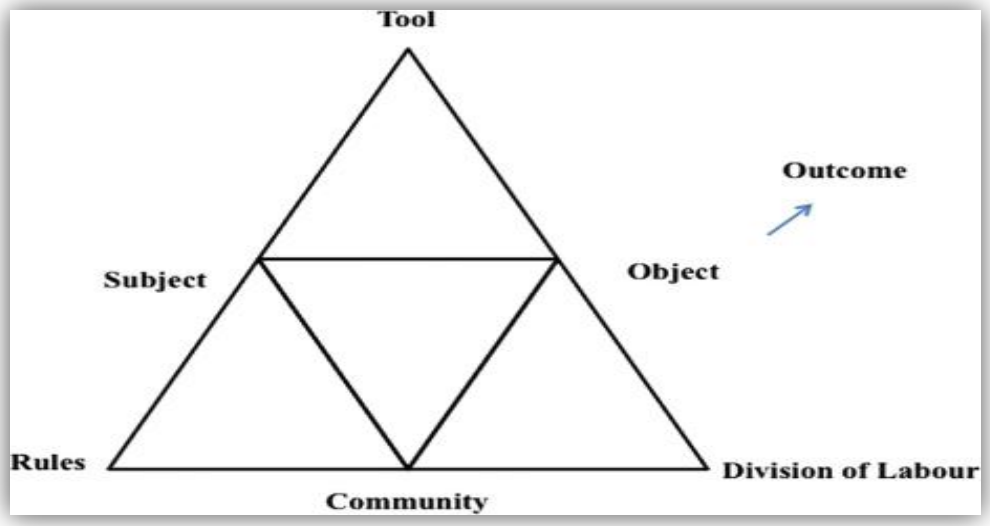

Figure 1.1: Activity Theory (Engestrom et al., 1990)

According to McMichael (1999), activity theory is used to study the activities of people as they interact with each other in an attempt to achieve a desired outcome. AT is used to understand and explain the logic behind human activities.

AT has been advocated and used in many researches which combine the social and technological aspects of human life such as in fields of psychology, sociology, education, human computer interaction and organisational theory **(**McMichael, 1999**).** AT is applied in Information Systems (IS) studies, because IS are part of social environments designed and managed by people by means of tools.

In their book *Perspectives on activity theory*, Engeström, Miettinen and Punamäki (1999), explain that human activity is composed of three levels: activity, action and operation. Adding to that, Moawad, Liu and El-Helly (2003) posit that an ctivity is decomposed into actions and each action is decomposed into operations. According to Nardi (1996), each activity is performed through cooperative or individual actions or chains of actions that are related to one another for aiming at the same goal.

The subject is the agent that acts upon the object of the activity (McMichael, 1999). An agent can be technical or non-technical. An object is defined as the element or problem to which the actions will be directed. Furthermore, Nard (1996), explains that the object is moulded and transformed into outcomes. According to Moawad et.al, (2003), the relationship between the subject and the object is always mediated by one or more tools. Er, Kay and Lawrence

(2010), state that depending on the context of study, tools (artefacts) can take various forms, adding that they may range from instruments, signs, procedures, machines, language, methods and laws.

The community is made up of individuals and can include subgroups that share the same general object and construct themselves as distinct from other communities (Er, Kay, & Lawrence, 2010). Nardi (1996) argues that the influence the community has on activity is applied through rules. Subjects abide to rules when carrying out activities. Rules are also implicit and explicit (McMichael, 1999).

According to McMichael (1999), division of labour refers to the division of tasks among the members of the community and it includes also division of power and status. Division of labour refers to how tasks are shared within the community.

AT is used in studies of IS to provide an understanding of how humans interact with other actors in their environments when developing and implementing technologies. Therefore, AT enables decomposing a complex activity during analysis so that a detailed understanding of the nature of works and responsibilities of those involved in the activity can be obtained (Nardi, 1996). In addition, it also helps to establish the kinds of components and processes incorporated within an activity and help to define the relationships existing among the subjects (Er, Kay, & Lawrence, 2010).

1.9 Research methodology

Research methodology explains the approaches which the study undertook in order to achieve the defined research objectives. According to Mkhomazi and Iyamu (2013, p. 526), research methodology consists of methods, techniques and approaches which provide guidance to research. In research methodology, we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them Kothari (2009).

It was therefore important to choose the appropriate research methodology that best answers the study research questions as the application of a wrong methodology could have hindered the overall chances of attaining research objectives. The research strategy, design, data collection techniques and analysis discussed below were selected according to the study objectives.

There are two research methods used in research enquiries, namely qualitative and quantitative research. The differences between qualitative and quantitative are immense. The differences are reflected by research questions, objectives and types of data collection techniques.

1.10 Research strategy: Qualitative method

The study adopted a qualitative research method. The qualitative research strategy was primarily selected because of its suitability to assist the researcher in answering the study research questions hence enabling the achievement of study objectives.

A qualitative method is interpreted as a research method that emphasizes words rather than quantification in the collection and analysis of data (Bryman, 2012). Accordingly, a qualitative method does not depend on statistical quantification, but attempts to capture and categorize social phenomena and their meanings (Webley, 2010). In light of the above, Myers (2013) elaborates that the qualitative methodology relies on human perceptions and understanding. It does not apply established formulas to analyse and interpret the social world but relies on human subjective understanding. This view is defined as subjectivism (Bahari, 2010)

Qualitative research is about the interpretation of the social world, especially of cultures and people's life-ways, rather than seeking causal explanations for cultural practices (Silverman, 2013). The method studies people's subjective opinions about their environment and its components. Therefore qualitative researchers have argued that it is impossible to understand why things happen in organisations without talking to people about it (Bryman, 2012). Thus according to Myers (2013) "the key benefits of qualitative research are that it allows researchers to see and understand the context within which decisions and actions take place" (p. 5).

1.11 Research design: A case study approach

Also based on the research objectives, a case study research approach was opted for as a research design. A case study is a detailed study of a single social unit (Myers, 2013). The unit under study has characteristics that uniquely identify it. A case study can be of an individual, groups, organisation or a society. Selecting a case enables a researcher to have a focus and an in-depth study of a specific object that is part of the general population. Thomas

(2011) states that a case study is not a method in itself, rather it is a focus and the focus is on one thing, looked at in depth and from many angles (p. 9). Hesse-Biber and Leavy (2011) point out that the uniqueness of a case study approach is that it provides the researcher with a holistic understanding of a phenomenon within its social context.

The Namibian government was used as the case study. Four Ministries, including the Office of the Prime Minister were selected to represent the government. Each Ministry provides unique services and products hence each Ministry has unique objectives. The selection of the cases was mainly because of their sizes and their roles in the computing activities within the government of Namibia.

1.12 Data collection

There is no research without data collection. It is through the collected data that the researcher resolved the research problem by analysing and interpreting data about the topic under study. The qualitative research method offers a variety of data collection techniques as discussed below.

i. Interview

Interview is a common qualitative data collection technique. Yet interviewing is a complex social process and there are many different types of interviews that vary in the degree to which they are structured, the number of participants, and the way they are administered (Draper & Swift, 2010). In terms of structure, there is an unstructured, structured and semi-structured interview.

a. Unstructured

In an unstructured interview, the researcher has no order or pattern to follow. The topic of discussion is introduced to the interviewer, who then shares his views and opinions with minimum interferences from the researcher. The discussion of the interview is determined by the respondent's line of conversation.

b. Structured

On the other hand, with the structured interviews the interviewer provides the interviewee with a set of pre-defined questions and set of answers to select from. With this form of interview, the interviewer does not intervene in the respondent's answers. Therefore unanticipated responses and concerns cannot be captured (Draper & Swift, 2010).

c. Semi-structured

The study's primary data collection technique was semi-structured interviews. The semi-structured interview lies between unstructured and structured interviews. According to Draper and Swift (2010), with semi-structured interviews , the interviewer has a clear list of issues to be addressed and questions to be answered but the question structure, phrasing and placement are flexible. The technique promoted flexibility and data richness as the researcher was able to ask additional questions in response to what was considered as significant comments from the interviewee. Follow up questions were used, where interviewee responses required further probing, henceforth enabling elaboration of interviewees' different opinions and views.

Interviews were recorded using a voice recorder. Before recording, permission of the interviewees was requested. The recorded data was then transcribed.

ii. Documents

The study also used documents as a data collection technique. Documents contain formal data about specific social settings. Silverman (2011) adduces that documents are social facts in that they are produced, shared and used in a socially organised ways. The author further argues that the researcher has to approach documents for what they are and what they are used to accomplish.

Various organisational documents were gathered. They included IT division structures, ICT policies and e-governance manuals. Documents contained useful data that supported respondents' opinions and views where necessary.

1.13 Data analysis

Data analysis entails the whole process of creating meaning from the collected data. Bryman (2012) explains that data analysis is concerned with reducing the large amount of data the researcher has collected.

The study applied Activity Theory as a lens for data analysis. The theory provided a third eye which enabled the understanding of what, how and why non-technical and technical factors impact the deployement of EA in the government Ministries.

1.14 Chapter outline

The thesis is structured into seven chapters as follows:

Chapter 1: Introduction

This chapter introduces the entire research work that was carried out. It outlines the study background, research problem statement, research objectives and questions. The chapter also provides an overview of what the study entails.

Chapter 2: Literature Review

This chapter presents the literature review based on existing work related to the subject of the study. Also discussed in the chapter is the underpinning theory that was used for data analysis.

Chapter 3: Research Methodology

This chapter presents the research methodology undertaken in achieving the study aims and objectives. Research strategy, design and data collection techniques and justification for applying them are discussed.

Chapter 4: Overview of Case Studies

In chapter 4, the case studies are documented. Four Ministries were used as case studies, including the Office of the Prime Minister. Both Ministries provided a conducive environment for the study to be carried out. Included in the documentation are the organisation's IT departmental structure, roles and responsibilities of the employees.

Chapter 5: Data Analysis

This chapter focuses on the analysis of the collected data. The chapter presents how Activity Theory was used to analyse the collected data.

Chapter 6: Findings and Interpretation

Based on the data analysis carried out in chapter five, this chapter presents the study findings and interpretation. To attain an understanding of the findings, the interpretive technique was used for interpretation.

Chapter 7: Recommendation and Conclusion

The chapter provides the study recommendations and conclusion. This chapter combines the content of all the chapters. Included in the chapter is the study's contribution to the body of knowledge and areas for further research. Contributions from both theoretical and practical perspectives are presented as well.

1.15 Ethical considerations

Research is a process goververned by ethics. Research ethics ensure that researchers adhere to standards and policies of the organisation they are representing as well as the organisation they are collecting data from. Ethical standards promote the values that are essential to collaborative work, such as trust, accountability, mutual respect and fairness (Gajjar, 2013) .

i. Cases consent

Before data collection, the selected cases were approached for their permision. The cases were approached with a formal letter from the university introducing the researcher and the purpose of the study. The letter served as evidence that the study was acandemic based and will abide to the univesity's research code of ethics. All four Ministries granted the researcher permision to conduct the study within their environments.

ii. Interviewees' informed consent

Participants interviewed were informed about the study prior to the interview process by concerned management. This was primarily to allow them to welcome the researcher. Also before the inteview process, the researcher briefed the interviewees on topics to be covered and interviwees agreed to partake in the study at their own free will.

iii. Interviewees' right of privacy

Since capturing all that was said during the interview was not possible, interviewees were asked for permission for the interview process to be recorded. The data collected was only used for this study and was only shared between the researcher and the supervisor. The interviewee's identity was also not revealed under any circumstances, rather they were numerically coded.

1.16 Limitations

Limitations are challenges that may hinder the researcher from attaining the defined research objectives. According to Bryman (2012), social research is a complex process associated with challenges. Timeframe was the main challenge as it was difficult to collect data from all the government Ministries due to their geographical dispersion as not all Ministries are based in Windhoek. As a result three Ministries were selected for data collection.

The other challenge was getting personel who were knowledgeable about enterprise architecture in the government Ministries. There were no roles and resposibilities such as chief architects, business or IT architects; rather roles such as system administrators, analyst, programmers and IT technicians were common within the Ministries.

1.17 Conclusion

The chapter introduced the study to the readers and provided a holistic reflection of how the study was practically carried out. It provided the readers with a holistic view of the structure. The structure promoted and guided the study direction and ensured that all topics are covered for the achievement of the defined objectives.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature which was conducted in the areas that relate to the study, enterprise architecture and government-wide enterprise architecture. The chapter consists of five main sections which include information and communication technologies (ICT), enterprise architecture (EA), and government-wide EA. Also covered in the chapter is the Activity Theory, which underpinned the study. Finally, a conclusion is drawn.

2.2 Information and Communication Technologies (ICT)

The utilization of information and communication technologies (ICT) by organisations of any industry continues to increase in significance. This is attributed to the fact that ICT has enormously changed the ways in which organisations perform their business activities over the years. ICT artefacts are implemented in many organisations for various reasons, such as, to support employees and automate business processes. These efforts are known to be crucial as they lead to organisations' competitiveness and sustainability. Hence ICT is considered critical to many organisations, for both their strategic and operational activities.

The implication of not defining and aligning ICT capabilities, business processes and organisational structure can hinder organisational performance. This will lead to inefficient processes, data redundancies, leading investments on ICT to be declared wasteful and causing the organisation to be incapable of delivering its values.

Information and Communication Technology (ICT) can be defined as the automation of processes, controls and information production using computers to ensure a smooth running of activities (Agbolade, 2011).

ICT according to Dan (2011), has become an indispensable tool within organisations for carrying out duties. Dan (2011) notes that from basic data to complex document processing, people are using a variety of ICT tools to process information and complete their work. Hence, according to Brynjolfsson and Hitt (2000), the majority of organisations are being significantly impacted by computerisation.

ICT is used for enabling and supporting organisational activities. A lot of researchers have studied how ICT can create competetive advantage for organisations (Porter, 1985; Callon, 1996, and Davenport, 2013). Brynjolfsson and Hitt (2000) reported that ICT has signficantly reduced the costs of coordination, communication and information processing. This is supported by Clemons, Reddi and Row (1993), who argue that advances in computing and ICT have affeccted the costs of coordination among businesses and their business partners. According to Ji and Sun (2009), this coordination is enabled by ICT capabilities such as extranets and intranets that support the sharing of information between organisations.
ICT enables organisations of all sizes to radically improve interactions with customers and other business (Ji and Sun, 2009). Furthermore, it enables organisations to produce customised products and services and carry out business efficiently. Additionally**,** Usrey and Radhakrishnan (2008) acknowledge that ICT facilitates business process re-engineering, resulting in more efficient and more effective value chain activities.

Despite strong beliefs that ICT is fundamental for organisation competitive advantage, ICT in organisations relies upon a lot of factors to succeed. Such factors are technical and non-technical factors. According to Davenport (2013), ICT cannot succeed by itself nor is it the only powerful resource. It can enable or constrain organisational processes (Davenport, 2013). ICT in organisations, if not well defined and managed in accordance with organisational structures and processes, it can lead to inefficient processes, thereby slowing down overall organisation performance. Jin, Peng and Kung (2010) point out that information system is a necessary condition to provide a competitive advantage but the key is realising how to integrate IT applications and business strategy, organisational business processes and management control, hence the need for organisations to understand critical factors influencing ICT success.

Because of the benefits associated with ICT, many organisations are implementing ICT in their organisations. However the majority of organisations fail to understand that simply implementing ICT will not lead to success (Davenport, 2013). Organisational support and management of ICT determine its success. It is emphasized that before the selection and implementation of ICT, it is crucial to study the organisation's environment, resources (infrastructure, skills, people), activities and processes in order to have an understanding of

how they will be supported by ICT (Spremic, 2010; Gutierrez, Orozco, & Serrano, 2009); as well as how these factors will impact ICT performance (Iyamu & Adelakun, 2008).

People

ICT is defined, selected, deployed and maintained by people as they carry out their tasks. However in most cases, the impact and influence of people is ignored. Dan (2011) posits that knowledge workers reported that organisations often glorify information technology and ignore humans. Clemons, Reddi and Row (1993) argue that while information technology can facilitate and support the integration and coordination of business processes, it is ultimately the people that determine its success. People determine how technologies are used, who uses them and when they are used (Iyamu, 2013). Factors such as organisational needs, structure, technical skills and interpretation of technoloy impact such decisions (Iyamu, 2013).

Organisational needs for ICT are derived from examaning the business goals and objectives. It is defined according to the activities and processes requiring ICT support and automation. Callon (1996) states that organisations do not implement ICT without a purpose. This purpose determines what needs ICT will be fulfilling.

The interpretation of technology refers to how people make sense out of the technology they are using. Iyamu and Adelakun (2008, p. 4) argued and explained that people act on the basis of their interpretations and this drives and determines the capabilities of the technology, the process of using the technology and the outcomes of the technology. The organisational stock of knowledge plays an important role in the inteprtation of technology. When people develop, implement and use technology, they do this according to what they know, in the process they also aquire new knowledge and share it with the others that need to understand how technologies operate inorder to solve problems.

Both technical and non-technical skills are essential for the ICT success. People require technical skills to negotiate, select, develop, implement and maintain appropriate hardware, software and applications. Lack of technical skills lead to acquisitions of inappropriate ICT resources that will not be supporting organisational processes and activities; thus people end up abandoning such technologies.

Non-technical skills enable people to utilize ICT infrastructures in order to carry out their activities. Davis (1989) explains that when right technologies are developed and

implemented, employees must be able to use them. Morris (2003) illustrates that for ICTs to improve productivity they must be accepted and used by employees for what they are meant to do. It is of paramount importance to involve users in all phases of acquiring ICT infrastructures so that they can feel ownership of the technologies.

Also management support is required for successful ICT operations. According to Powell and Dent-Mitcallef (1997) management needs to articulate the need for ICT and communicate its functionality within the context of the organisational strategy and structure. Erosa and Arroyo (2009) indicate that management has the responsibity to ensure the proper alignment of employees' competencies with ICT strategy in order to derive value from it. ICT is unlikely to succeed if it lacks support and commitment from management. It is believed that management commitment enhances ICT success by making resources available for implementation and maintenance (Powell, & Dent-Mitcallef, 1997).

Processes

A process can be defined as an order of activities performed to achieve an output. The development and implementation of ICT are conducted through processes which are formulated by people (Iyamu, 2013).

The development processes are concerned with defining and understanding the steps and guidelines for acquiring ICT as well as the factors impacting them. On the other hand, implementation processes are concerned with processes to be carried out when implementing the developed ICT.

However, both processes (development and implementation) should support business processes. Having ICT development and implematation processes that do not support business process leads to misalignment between business and IT. Iyamu and Mphahlele (2014) assert that alignment between the business and IT units is intended to contribute towards organisational oneness and success. As a result, a lot has been researched on the alignment topic (Henderson & Venkantraman ,1993; Xueying & Xiongwei, 2008; Silvius, de Waal & Smit, 2009). However IT and business alignment still remain a challenge in organisations. This may be attributed to the fact that both business and ICT are not stable aspects. Silvius et al., (2009) argue that a practical issue with aligning IT to business strategies is caused by the increasing dynamics in markets.

Technology

Everything an organisation does involve technology of some sort (Porter, 1985). Erosa and Arroyo (2009) assert that technology is a pontetial source of competetive advantage. ICT is part of the organisation's technologies.

ICT like any other organisational technologies is complex and dynamic. It includes both software and hardware. Because of its complexity and dynamic nature, ICT requires management and support for it to excel. ICT management and support is not the responsibility of the IT unit only but rather the whole organisation's responsibility. This is because its success and failure impacts the entire organisation.

In organisations, ICT is managed and supported in accordance with the defined IT strategy. IT strategy defines the processes and guidelines for developing and implementing ICT. Iyamu and Adelakun (2008) define IT strategy *"as the technical design which serves as the road map over a period of time for the implementation of information technology and information systems by people using a formal process."* According to the authors, IT strategy determines the technological solutions based on the organisation's goals and objectives.

IT strategy is defined to support and enable business strategy. It is noted that organisations will be more successful if they are able to create unified business and IT strategies (Iyamu, 2011). Furthering these points, Khan and Zedan (2010) argue that the effective and efficient use of IT requires business strategies and IT strategies to be aligned. An effective IT strategy serves as a guideline about how organisation's IT unit can acquire ICT that is able to support business needs.

ICT is a crucial aspect for organisational operations. It supports and enables the automation and integration of the organisation's processes needed for business efficiency. ICT as a means of attaining a competitive advantage has led to organisations defining and implementing different approaches such as enterprise architecture (EA) that will enable them to plan and manage their ICT. It is noted that ICT professionals, including managers face challenges regarding the integration, development, technology planning and management of software, hardware, and processes (Iyamu, 2013). Hence both public and private organisations are recognising the need for having EA.

1.3 Enterprise Architecture

Enterprise Architecture (EA) is the practise that describes and controls an organisation's components, structures, processes, application systems and technology in such an integrated way (Lankhorst, 2005). Agievich, Taratukhin, Becker and Gimranov (2013) describe EA as a blueprint of how an organisation achieves its current and future business objectives using ICT. EA provides a mechanism for defining organisational processes and activities and how they can be enabled and supported by ICT.

Sun and Chen (2010) assert that EA captures the essentials of the business, ICT and its evolution. Therefore EA enables organisations to define their current needs, at the same time planning for the future need. Khan and Zedan (2010) argue that business and ICT are continually changing. EA is used as a supporting tool for these changes. Porter (1985) explains that these changes occur because the business environment changes and new technological opportunities arise because of new insights as to what is essential to the business. Hence EA is regarded as a business and ICT management tool (Plazaola et.al., 2008).

Enterprise deploys different types of information systems and other supporting technologies. Such technologies are known to enhance the organisation's competitive advantage, leading to faster time to markets (Iyamu, 2013). However, because of the complexities associated with some information technology systems and other supporting technologies, management sees EA as a strategy to mitigate such complexities (Hendrickx & Daley, 2011).

EA classifies enterprise components into distinct domains. They range from technical to non-technical domains. These EA domains are known as, Business Architecture (BA), Information Architecture (IA), Application Architecture (AA) and Technical Architecture (TA) (Xueying & Xiongwei, 2008; Plazaola et al., 2008; Iyamu, 2013). Within enterprises, resources and responsibilities are assigned to these domains and transformations are then coordinated within domains (Hess, Lautenbache, & Fehlner, 2013).

According to Song and Song (2010) each architectural domain is composed of distinct architecture building blocks. Sun and Chen (2010) point out that each domain consists of its architectural representations, definitions of architecture entities, their relationships, and

specification of function and purpose. However as explained by Iyamu (2013), the architectural domains are not independent of each other. The operation of one domain is influenced by the operations of the other domains. These domains describe the components that build up an entire enterprise and they work together for the achievement of business goals. EA considers all domains significant in the organisation and the relationship among them defines enterprise success. It is through the analysis of the domains' relationships that EA becomes a valuable management tool (Xueying & Xiongwei , 2008).

It is stressed by Lankhorst (2005) that every organisation benefits from having a clear understanding of its structures, products and technology and how they are tied together for the overall performance of the organisation. Thus organizations with proper planning of their EA will create a global competition for all products and services, and have great advantages over those organizations that do not (Razak et al., 2006). With EA in place, organisations are capable of defining their operating model, technological needs and how they will be complementing each other. Such efforts lead to organisations having strategies aligned with ICT strategy.

EA is viewed as a tool for achieving the alignment between business and ICT (Saat, Franke, Lagerström and Ekstedt, 2010). Business and ICT alignment is an important strategy for the realisation of organisational effectiveness (Flaxer, Nigam, & Vergo, 2005). Xueying and Xiongwei (2008) explain that such an alignment makes ICT fulfil the business needs. It is argued by Khan and Zedan (2010) that a lack of communication and understanding between business process and IT result in misalignments. EA facilitates communication between business and IT, creating an understanding necessary for supporting alignment efforts between business process and ICT.

EA is an important asset in positioning new developments within the context of the existing processes, ICT systems and other assets of an organisation (Hendrickx & Daley , 2011). Hence EA prepares and equips organisations with the capabilities needed for identifying and managing business and ICT changes. The changes occur due to markets, process changes and technological innovation. Rouhani et al., (2013) supports the argument that a well implemented EA helps an organisation innovate and change by providing both stability and flexbility.

The implementation stage is a critical component of EA (Iyamu, 2013). The implemented EA is expected to support and guide the organisation's operations. It is discussed by Shah et al., (2004) that making enterprise architecture usable and applicable requires significant effort when implementing it. Iyamu (2013) writes that EA implementation is highly influenced by technical and non-technical factors.

Non-technical factors such as people in the enterprise will always remain fundamental. Song and Song (2010) explain that EA is about important assets in an organisation, which include people. Bernus, Nemes and Schmidt (2003) emphasize that no matter how sophisticated and integrated an enterprise can be, people will always make the final decision.

Typically, people assume different roles during enterprise development and implementation. Their roles include in capacities as project managers, network specialists, risk advisors and architects. It is crucial to understand when, by whom and how decisions are made in the enterprise (Bernus, Nemes, & Schmidt, 2003). Assigning individual responsibilities enables people to be held accountable for their actions.

i. Enterprise Architecture Domains

This section covers enterprise architecture domains, business to technical:

Business Architecture

The business architecture is the first and vital domain of EA. It provides requirements necessary for the operations of the other domains. Business architecture defines an enterprise from a business perspective (Hendrickx & Daley , 2011). It contains business strategies, performance metrics, business processes, and their relationships (Kang, Lee, & Kim, 2010). According to Iyamu (2011), BA relies on the organisational strategy to execute its mandate. The strategy is defined based on the organisation's vision and mission. Lankhorst (2005) posits that according to its mission and vision, an organisation will determine the policies and strategies needed to meet the present and future needs.

Therefore BA describes the core components of business processes that support the mission of the organisation (Alonso et al., 2010). This includes human resources, marketing, sales, production, research and financial management componets. Hence, according to Harishankar

and Daley (2011), BA identifies and defines elements and connections to ensure that the strategic intent of the business is effectively executed.

It is acknowledged that the aim of BA is to gain a holistic understanding of the business direction, context and strategies (Harishankar & Daley, 2011; Hendrickx & Daley, 2011). Thus its definitions consistently call for the infusion of the overall strategy and direction into the design and operation of an enterprise (Alonso et al., 2010).

The business processes can be described by the decomposition of processes derived from business activities which determine the information needs. The domain leads to the formulation of information and application architecture domains.

Information Architecture

All organisational activities and processes require information to be carried out. Thus the organisation depends on information to make informed decisions. Information, in its various forms is a very important aspect in defining the organisation's information requirements. The organisation's information and data needs are described in IA (Harris, 2008). According to Iyamu (2011), IA defines policy, governance and information products necessary for information sharing. Schekkerman (2009) elaborates that precise and high quality information makes it easier for an organisation to respond to changes and make informed decisions. It is therefore fundamental for enterprises to define and deploy IA that supports information accessibility and eradicating information inconsistencies accros its business units. The relationships between the various flows of information are also described in this domain and it illustrates where information is needed and how information should be within the enterprise (Alonso et al., 2010).

Additionaly, IA also describes the structure of the enterprise's logical and physical data assets and data management resources (Xueying & Xiongwei, 2008). Iyamu (2013) asserts that IA provides guidelines and standards for the organisation's metadata, strategic data and operational data.

Information is shared within the organisation as well as among its business partners and customers. Therefore IA is used to identify major information categories used within an enterprise and their relationship to their business processes (Razak, Dahalin, & Dahari, 2007).

Pereira and Sousa (2004) adduce that, with well defined IA, the organisation spends less time searching for information that their systems could provide.

Information is communicated and shared through applications. As a result, IA lays the foundation for the designing and developing of application architecture (Razak, Dahalin, & Dahari, 2007).

Application Architecture

Application Architecture (AA) is concerned with the development, implementation and usage of enterprise applications (Iyamu, 2013). AA is explained by Xueying and Xiongwei (2008) as a blue print of the individual applications systems to be deployed, their interactions and relationship with the core business processes. The architecture also serves as a transparent communication and design tool to the applications developers (Hafner and Winter, 2008).
Vasconcelos et al., (2004) contend that AA defines applications needed for data management and business support. The management of organisational data influences data integrity and consistencies across the organisation. Alonso et al., (2010) elaborate that AA caters for application components, such as specifications, requirements, applications, modules, databases and procedures that produce, distribute and support information according to the business requirements. Applications are developed and deployed through technology, thus this domain leads to the formulation of technical architecture.

Technical Architecture

As ICTs become a crucial aspect of organisations, technical architecture starts to play a very important role in enterprise architecture perimeters (Sun and Chen, 2010). This architecture is concerned with the technical aspects in an enterprise.

TA addresses aspects from strategic planning to implementation of technology infrastructures (Iyamu, 2013). Hafner and Winter (2008) explained that TA represents an enterprise wide model of hardware, software and communications components as well as their dependencies.
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Furthermore, TA outlines the lifecycle and appropriate use of all hardware and software products in the organisation (Iyamu, 2011). Acknowledging this, Sun and Chen (2010) posit that TA provides a consistent set of principles for ICT lifecycle management of an enterprise, hence making ICT service delivery to be well controlled.

TA's aim is to enable organisations to derive value from their technical resources. The architecture is concerned with developing and implementing an IT strategy that is aligned with business strategies. Therefore TA defines the information technology model needed to support and enable the business applications, processes and activities.

ii. Development and Implementation of EA

EA is not a one-time project. Iyamu (2013) defines EA as a process developed and maintained through iterative stages. Xueying and Xiongwei (2008) uphold that EA should be used and maintained overtime. According to Kaisler et al., (2005) maintenance is essential to EA because operational consistency must be preserved while the organization continues to evolve the architecture.

EA promotes the belief that an enterprise, as a complex system, can be designed and managed in an orderly manner, achieving better overall performance (Rosasco and Dehlinger, 2011). However, the development and deployment of EA has an impact on organisational performance.

The development and deployment of EA is carried out through its architectural domains, namely business, information, application and technical architectural domains. Alonso et al., (2010) remark that the domains development and implementation are guided by organisational goals and objectives. According to Iyamu (2013), the development and implementation of EA is based on how the organisation defines and understands the concept.

iii. Benefits and challenges

EA can be thought of as an instrument in managing enterprise daily operations and its future development (Sun and Chen, 2010). When defined and implemented in accordance with the organisation's strategy, goals and objectives, EA delivers unlimited benefits to organisations. Xueying and Xiongwei (2008) states that by understanding the benefits of EA and clearly defining enterprise strategy and EA objectives, the organisation can be sure to build all of the architecture components. The aurthors argue that EA leads to benefits such as process effectiveness, opportunity creation, automation efficiency and operational efficiency (Xueying and Xiongwei, 2008, p. 3).

Moreover, EA provides the technological and process infrastructure necessary for defining the ICT strategy and business processes alignments and implementations (Shah & El Kourdi, 2004). A study by Rosasco and Dehlinger (2011) on business process reported that EA enables productive alignments of business processes and ICT, therefore leading to effective communications between the enterprise's components.

The organisation would perform poorly in the absence of business processes and ICT alignment. Because, EA provides a holistic view of an enterprise, it enables the management to understand where their enterprise is going and the necessary processes needed to get there. According to Rosasco and Dehlinger (2011), this provides a platform for defining a business strategy that is compatible with the ICT strategy.

Furthermore, it is argued that EA can reflect extreme changes in the business environment (Kamogawa and Okada, 2009). Lee et al., (2013) assert that EA can be used to assess the benefits and impact of new systems and emerging technologies. The assessment determines how new technologies will be supporting existing processes and what changes are needed to the process so that they are up to standard with new technologies.

With all massive benefits associated with EA, EA also encounters challenges. Challenges are experienced in phases of defining, developing, deploying and maintaining EA. According to Iyamu (2010), EA experiences both technical and non-technical challenges.

iv. Enterprise Architecture Frameworks (EAF)

The development of EA is no easy task, none the less various frameworks exist which are used by organisations. Mohamed et al., (2012) uphold that the Enterprise Architecture Framework (EAF) is considered as a conceptual structure of what the enterprise architecture should contain and how to create it**.** In light of the above, Schekkerman (2009) acknowledges that EA is a program supported by frameworks. Thus Rosasco and Dehlinger (2011) argued that, EA frameworks have been used to understand the business strategy and synthesize the supporting IT strategy. Elaborating further, Song and Song (2010) write that the EA framework gives a comprehensive description of all relevant elements of EA, provide a principle, structure and classification schema that can be used as a reference for architecture development.

Enterprise architecture framework (EAF) is a foundation for developing and representing architectures (Odongo, Kang, & Ko, 2010). Many EA frameworks are in use today, they range from the Zachman Framework, The Open Group Architecture Framework (TOGAF) and Gartner Group Inc., the Federal Enterprise Architecture (FEA) (Tang et.al., 2004; Mohamed et.al., 2012; Al-Nasrawi & Ibrahim, 2013; Lee et.al., 2013). Kamogawa and Okada (2005) assert that organisations do not have to develop enterprise architecture by themselves from the beginning; instead they can refer to the existing EA frameworks. Hence organisations develop EA differently according to EA frameworks, argue Hafner and Winter (2008).

The applicability and suitability of each EAF differs (Tang, Chen, & Han, 2004). Each differs in content and target audience (Mohamed et al., 2012) and organisations need to customise EA frameworks to fit their own culture, policy and procedure (Song and Song, 2010). It is argued that the selection of a suitable framework is no easy task (Tang et al., 2004). They further argue that organisations should evaluate and compare the goals, inputs and outputs of different frameworks to determine the right one. Mohamed et al., (2012) agrees that the analysis provides an identification of differences between the frameworks based on architecture perspective. A study by Odongo et al., (2010) provides a criteria for selecting frameworks. The study was based on the survey conducted to understand the relationships, commonalities, dissmilarities and incompletenesses among frameworks.

Zachman Enterprise Architecture Framework (ZEAF)

The Zachman framework is considered the first enterprise architecture framework (Mohamed et al., 2012). ZEAF has been widely adopted by the architecture community and it is incorporated into other architectural frameworks (Wegmann, Kotsalainen, & Matthe, 2008).

According to Al-Nasrawi and Ibrahim (2013, p. 19), this framework is influenced by principles of classical architecture that establish a common vocabulary and a set of perspectives for describing complex enterprise systems. Zota and Fratila (2012) also highlight that the zachman framework aims to describe a system from the perspective of every stakeholder in the organization looking at it from every possible angle. To achieve its goals, the framework is depicted as a 6 x 6 matrix with rows and columns. Rows represent different perspectives of those involved in the system's development process.

On the other hand, columns are referred to as abstractions and they represent different aspects of the enterprise (Al-Nasrawi and Ibrahim, 2013). As explained by Mohamed et al., (2012) a perspective is a row in a table representing how a stakeholder in a project team would view the system; and the various stakeholders are planner, owner, designer, builder, programmer and user. The various stakeholders are of importance as they define the system's requirements and ensure that such requirements are delivered. The Zachman framework is illustrated in figure 2.1 below:

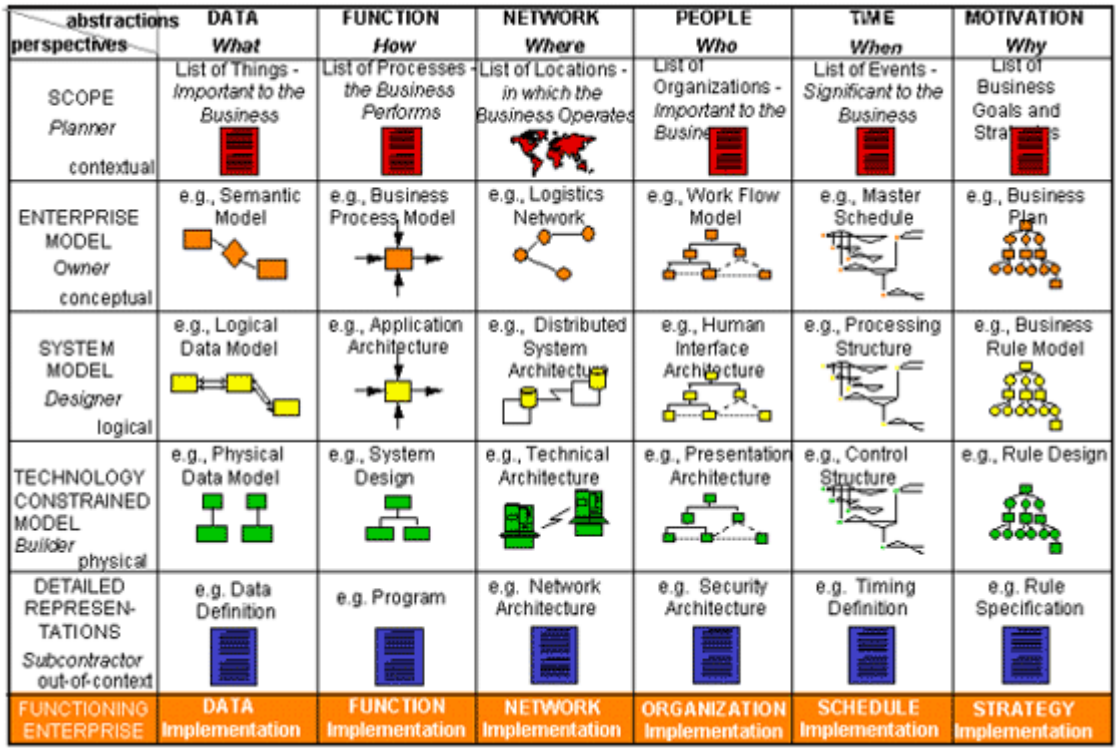

Figure 2.1: Zachman Framework source (Nikolaidou and Alexopoulou, 2003)

Al-Nasrawi and Ibrahim (2013) discusess the rows and columns as follows:
The rows represent the perspectives of the stakeholders that are:

I. **Scope (context)**: The planner is concerned with defining the system's vision, mission, and its boundaries as well its constraints.
II. **Business model (concept):** The owner defines the goals, business structures and processes that will be used to support and enable the mission of the system or enterprise.
III. **System model (logical):** The designer works with system requirements and ensures that the activities and functions implement the business model.

IV. **Technology model (physical):** The builder considers the constraints: humans, processes, technology and materials.

V. **Detailed representation (component):** Presents the individual and independent components that can be involved in the implementation process.

VI. **Functioning system (user):** depicts the user's perspective of the operational system that is under consideration.

The columns depict the abstraction of the framework which deals with the six fundamental questions:

I. **What (data):** describes the entities that are important to the business viewed from each perspective.

II. **How (functions):** defines according to each perspective how activities and processes are carried out.

III. **Where (networks):** Shows locations and interconnections from which activities and processes are carried out from.

IV. **Who (people):** represents the people within the enterprise and metrics for assessing their capabilities and performance. The question deals with the division of labour and organisational structure.

V. **When (time):** represents time, or the event relationships that establish performance criteria.

VI. **Why (motivation):** describes the rationale of the people, the behaviours and decisions they undertake with regards to the organisation.

The Open Group Architecture Framework (TOGAF)

TOGAF is a standardised architecture framework developed by the Open Group (Jin, Peng and Kung, 2010, p. 293). Mohamed et al., (2012) states that The Open Group Architecture Framework (TOGAF) is an architectural framework which provides a comprehensive approach for the design, planning, implementation, and governance of enterprise information architecture. The framework was originally developed to support the technology architecture but it has evolved and now supports all the components of the enterprise (Jin, Peng, & Kung, 2010). The TOGAF divides the enterprise architecture into business, information, application and technical architectural domains.

The core content of TOGAF is based on its Architecture Development Method (ADM) (Jin et al., 2010). The ADM guides the iterative development of the four architectural domains. Jin et al., (2010) define ADM as an iterative and flexible process that can be used in conjunction with other enterprise architecture. Al-Nasrawi and Ibrahim (2013) point out that ADM allows organisations to transform their organisation in a controlled manner in response to business goals and opportunities. The method consists of eight stages as depicted below.

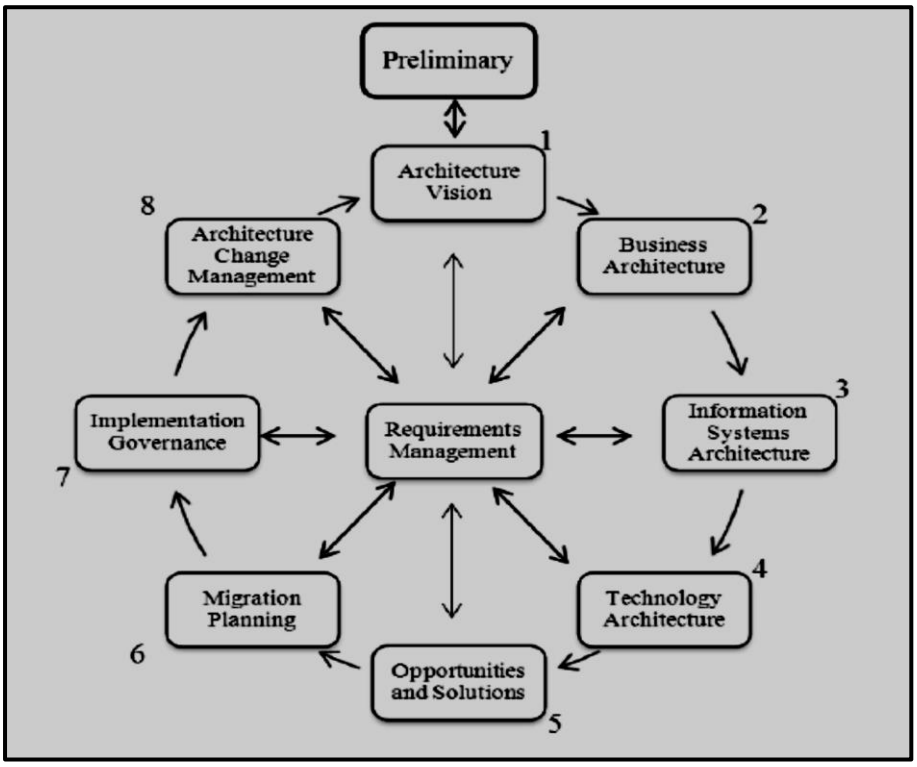

Figure 2.2: TOGAF ADM (Luccem & Harrach 2013)

According to Al-Nasrawi and Ibrahim (2013) these stages are carried out within an iterative cycle of continuous architecture definition and realization. The stages are illustrated bellow (Jin, Peng, & Kung, 2010):

i. **Preliminary:** Define the organisation's current architecture using the framework and concepts of EA.
ii. **Architecture Vision:** Aims at determining the purpose of enterprise architecture work, creating a baseline describing the target environment.

iii. **Business Architecture:** Depicts the current architecture of business and analyses gaps between it and the desired one.

iv. **Information Systems Architecture:** This stage for the current and future environment delivers applications and data architecture by using target architecture which began in the architecture vision stage and baseline, the results of business gap analysis and the plans outlined under framework description.

v. **Technology Architecture:** Defining the service standards and basic building, describing the capabilities which are used to support business, data and logic software and hardware of application services deployed.

vi. **Opportunities and Solutions:** Clarifying the opportunity of the target architecture shown and outlining the possible solutions.

vii. **Migration Planning:** The implementation of the proposed project will be divided into priority and formatting a detailed implementation and migration plan.

viii. **Implementation Governance:** Establishing the relationship between governance framework (TOGAF) and development organizations, and achieving the selected items under the formal governance architecture. The final output of this phrase is the solution that is consistent with architecture.

ix. **Architecture change management:** Architecture change management provides business processes with continuous monitoring, change and flexibility to make a rapid response for the rapid technology development and business environment changes.

x. **Requirements Management:** As the centre of ADM processes and the dynamic process, requirements management can apply to all stages of the ADM cycle and addresses the needs of identification, storage and delivery at that stage.

Gartner Group Inc.

The Gartner EA is based on creating a common vision between three constitutes, namely the business owners, the information specialist and technology implementers (Rouhani, Mahrin, Nikpay, & Nikfard, 2013). Hence its primary focus is on business, information and technology architecture perspectives (Al-Nasrawi & Ibrahim, 2013). This methodology argues that enterprise projects should be initiated with an understanding of where it wants to be in the future and not based on its current situation.

Gartner divides their EA methodology into two steps: the EA process model and the EA framework (Al-Nasrawi & Ibrahim , 2013). The EA process model is a multiphase, iterative

and nonlinear model. It is used to bridge the gap between the future and the current state of the organisation while on the other hand the Gartner EA framework is used to define the components of the EA and the relationships between them (Al-Nasrawi & Ibrahim, 2013)..

2.3 Government-wide EA

Governments around the world are acknowledging the delivery of services to their citizens and business partners using the internet. The majority of countries are transforming their governments into e-governments (Janssen & Kuk, 2006; Marawar, Kale, and Araspure, 2010; Mohamed et.al., 2012).

According to Lee et al., (2013) the conception of Government-wide EA is the result of e-government considerations. Notably, EA is promoted as a key tool in the transformation and modernisation of country governments (Madsen and Heje, 2009).

Reasons for EA adoption may vary from one government to government. However, the underlying aim is to provide a better structure to manage IT-related projects and development activities across government agencies (Janssen & Kuk, 2006). Mohamed et al., (2012) posit that reasons for EA adoption include reducing the cost of IT and business operations by identifying duplications and opportunities for reuse and enabling interoperability and providing technical and managerial standards for agencies.

Government-wide EA's aim is for each ministry' investments in ICT to be aligned with government-wide policy goals (Lee et al., 2013). The author argues that, government Ministries experience challenges in planning, developing and implementing their information systems and their supporting technologies. Government-wide enterprise architecture is seen as the strategy to eliminate inconsistencies and duplication efforts of information systems across government Ministries. It enables improved citizens and business relationships, where by citizens can interact with Ministries as intergrated businesses (Janssen and Cresswell, 2005).

2.4 Activity Theory

Activity theory (AT) was originally developed during the early twentieth century as a psychological theory (Yamgata-Lynch, 2010).The theory focuses on studying and understanding the context of human activities within their socio-environment. According to

AT, an activity consists of a subject and an object, mediated by a tool (Engeström, Miettinen, & Punamäki, 1999). AT also includes community, rules and division of labour. Uden (2007) examined community, rules and division of labour as elements denoting the social context within which the activity is carried out.

AT theory depicts the activity context as a network of these different elements (subject, object, tools, and division of labour, community and rules) that influence each other, in a triangle model (Engeström et al., 1999).

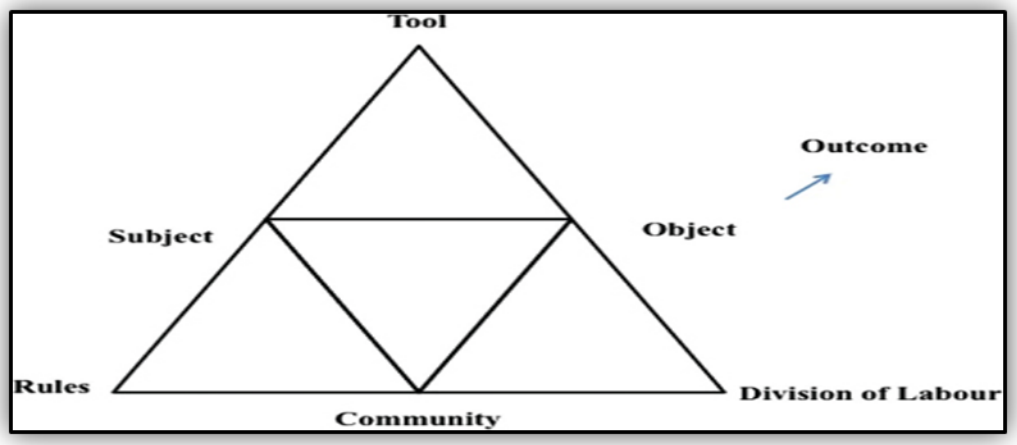

Figure 2.3: AT Model (Engestrom et al., 1999)

Subject

Subject is the technical or non-technical actor, engaged in the activity (Uden, 2007). McMichael (1999) defines the subject as the agent who acts upon the object of the activity. A subject can refer to an individual or group of actors performing the activity.

Object

Objects can be a material thing, less tangible or totally intangible (e.g. idea) as long as it can be shared by the activity participants (Uden, 2007). According to Nardi (1996) activity is directed at an object which motivates activity. Engestrom (1999) explains activities as object-oriented. However, it has been emphasized not to confuse this object-oriented with the same term used in computer programing (McMichael, 1999 ; Er et al., 2010 ; Holt & Morris, 1993). Engestrom (1999) noted that an object provides the activity with specific direction.

Instruments (tools/artefacts)

Uden (2007), states that tools can be physical, such as a hammer or psychological, such as language, culture or ways of thinking. Additionally, Moawad et al., (2003) explain that tools can be signs, procedures, machines, methods or laws.

According to Holt and Morris (1993), tools mediate the subject activity towards the object. Tools are used by subjects when performing activities.

Community

Community is defined as an interdependent aggregate of individuals who share a set of social meanings (Holt & Morris, 1993). Yamgata-Lynch (2010) describes community as a social group with which the subject indentifies, while participating in the activity. It is important to consider also that individuals involved in a particular activity are simultaneously members of other activity groups in other communities that have different objects, tools and social relations (Uden, 2007). The individuals' participation and contribution in a community is influenced by their involvement in other communities.

Rules

Activities are carried out in communities in accordance with rules. Yamgata-Lynch (2010) posits that in the analysis of activties, different kinds of rules, laws, norms and cultural practices of the community in which the activity occurs are also taken into consideration. Rules govern subjects as they carry out their activities and their interaction with other components of the community (Holt and Morris, 1993). Therefore, rules are neccesary for maintaining order in communities. Without them it would be difficult to achieve defined objectives in communities. Rules can in varying degrees, constrain or liberate the activity (Yamgata-Lynch, 2010).

Division of labour

Division of labour represents task specialisation by individual members or groups (Holt & Morris, 1993). Elaborating further, Uden (2007) states that the division of labour is concerned with how tasks are divided between community members and also the division of power and status. Division of labour is crucial, as this enables the sharing of activities among community members and for every subject to have responsibility when performing an activity.

Outcome

Outcome is the results of activities and operations. All AT elements contribute significant impacts to the outcome of the activity. Depending on the settings under study these impacts can be positive or negative.

Activity

In AT, the activity is the unit of analysis (Kaptelinin and Nardi, 1997). Nardi (1996) emphasises that the unit of analysis is not referring to the individual or the environment, but a relation between the two. As McMichael (1999) argues, unless the whole activity is the unit of analysis, the analysis is incomplete. According to Kaptelinin and Nardi (1997), activities are realised as multiple, individual and cooperative actions which can't be understood unless they are related to the overall objective and motive of the activity system. Every aspect having an impact on the activity is considered for the successful analysis of the activity.

However, Moawad, Liu and El-Helly (2003) explain that an activity is decomposed into actions which are further decomposed into operations. Operations are the ways actions are carried out. Based on their further explanation, an activity is drived by a motive with actions directed by a goal and its operation influenced by a condition (Moawad et al., 2003). This relationship is illustrated in figure 2.4 below.

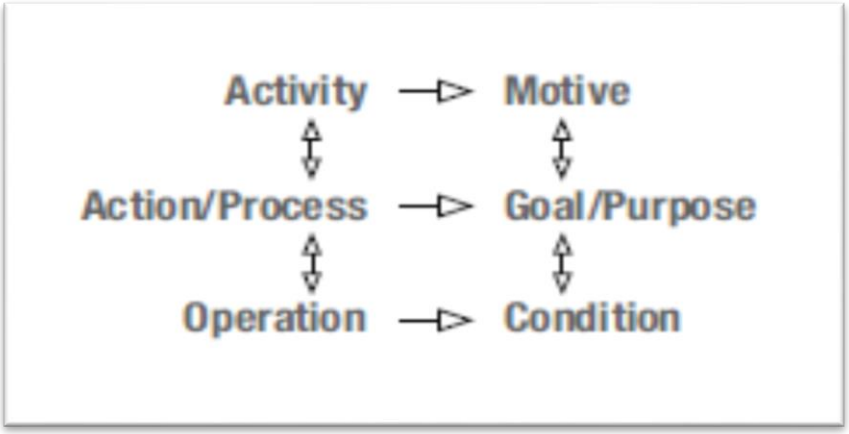

Figure 2.4: Activity Hierachical Structure (Tell & Ali baber,2012)

Kaptelinin and Nardi (1997) argue that actions are conscious. Hence Nardi (1996) notes that consciousness is a basic principle of activity theory, as the theory seeks to understand the

unity of consciousness and activity. Consciousness is described by Kaptelinin and Nardi (2006. p. 9) as "the enactment of our capacity for attention, intention, memory, learning, reasoning, speech, reflection and imagination". Supporting these, Moawad, Liu and El-Helly (2003), write that before actions are performed, they are planned consciously.

Iivari and Linger (1999) describe action as goal-directed behaviour that can only be properly understood in the context of a larger activity. Actions have operational aspects, which are the way the action is actually carried out (Holt & Morris, 1993). However, Nardi (1996) notes that as time passes and a subject keeps performing the same operations, these operations become routinized and done unconsciously with practice.

According to Kaptelinin and Nardi (2006), Activity Theory holds that, the constituents of activity are not fixed, but can dynamically change as conditions change. Moreover, McMichael (1999) explains that the subject of an activity is always active, never passive and continually evolving as they continually invent the context of their activity.

Moawad et al., (2003) express that activities evolve in a non-linear way. Acknowledging this, Engestrom (1999, p. 4) describe activities "as open systems", explaining that when an activity system adopts a new element from the outside (e.g new technology), this often leads to an aggravated secondary contradiction where some old element (e.g. rules or the division of labour) collides with the new one. Nardi (1996) reportes that such contradictions do not only generate disturbances and conflicts, but also innovate attempts to change the activity.

Contradictions are not to be viewed in the same manner as problems or conflicts (Nardi, 1996). Hence Wangsa, Uden and Mills (2011) argue that the notion of contradiction in AT provides the analysis of problems and conflicts which would manifest themselves when the activity takes place. Contradictions according to Uden (2007) manifest themselves as problems, ruptures, breakdowns, and clashes. Hence Engeström, Miettinen and Punamäki (1999) discuss contradictions as historically accumulating structural tensions within and between activity systems. Uden (2007) conluded that AT does not see contradictions as problems, but as sources of development.

Engeström, Miettinen and Punamäki (1999) argue that each activity has its own history. This history is caused by the changes and developments in activities. The historical aspect enables

the background examination of the activity, thus leading to an understanding of the activity's current state (Uden, 2007). Wangsa et al., (2011) note that such an examination is best carried out in the environment or context in which the activity is normally executed.

Kaptelinin and Nardi (1997), describe activities as either internal or external. It is emphasised that one cannot analyse internal activities separately from external activities, because they transform into each other (Nardi, 1996). Internal activities are the result of transforming external activities and vice versa.

Activity is mediated by instruments (tools) (McMichael, 1999). According to Nardi (1996), tool mediation is a way of transmitting cultural knowledge. Er et al., (2010) illustrate that subjects perform their activities through tools mediation in order to achieve their object. Figure 2.5 depicts the mediation process.

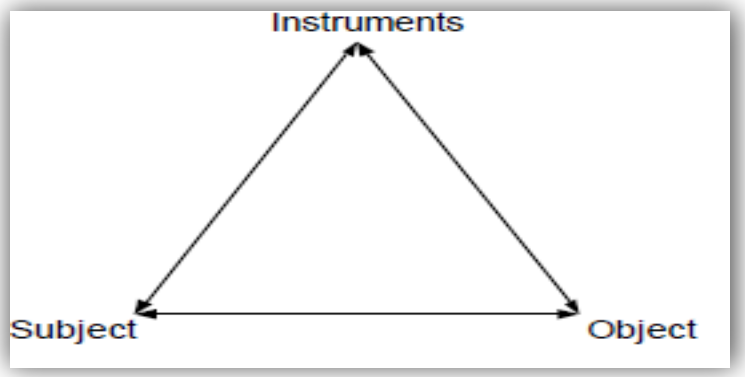

Figure 2.5: Tool mediation (Er, Kay, & Lawrence, 2010)

This mediation is described by Er, Kay and Lawrence (2010) as man-made. According to them, the tools which influence a subject have been developed by the subject or other people who have worked in the same context before. Thus, according to Nardi (1996), tools are created and transformed during the development of the activity itself.

McMichael (1999) reports that all human activities involve the use of instruments tools which mediate a subject's actions. The utilisation of tools changes the structure of the activity and can result in new goals being satisfied. Additionally, according to Nardi (1996) both the subject and the community are modified through the mediated activity.

2.5 Conclusion

ICT has become a crucial aspect of modern organisations, public or private. It has changed the way organisations operate by enabling and supporting their strategic and operational activities. As organisations reap ICT benefits, they also encounter challenges from ICT.

From literature review, the lack of alignment between business strategies and IT strategies is indicated to be a main challenge. Misalignment leads to unproductive organisations as there is a lack of communication and understanding between the two strategies. Therefore, through EA approach, organisations aim to mitigate such challenges. EA provides the capability that enables organisations as whole units to manage their ICT artefacts and to ensure that organisations obtain maximum value from their ICT investments. EA provides a platform for an organisation to be a manageable object through its various domains.

During the selection and implementation of ICT, technical and non-technical factors have significant impacts on the outcome of these activities. They can positively or negatively impact ICT success in organisations. It all depends on how organisations understand and manage these factors. The application of AT in information systems studies helps researchers understand what and how technical and non-technical factors impact the selection and implementation of ICT. The theory is used to study subjects and their actions as they interact with other subjects in their communities. Information systems are socio-technical activities that are created by humans using different types of tools.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

This chapter focuses on the research methodology that was used in this study. A research methodology consists of approaches, methods, and techniques which cover and explain the steps undertaken by the researcher to define the problem under study through which data is collected and analysed and the interpretations of findings. As pointed out by Mkhomazi and Iyamu (2013), the role of a research methodology is critical as it defines the components of the study through which research objectives are achieved. The methodology was based on the objectives of the study, which is to:

1. to identify and examine the factors that can impact the development and implementation of Enterprise Architecture in the Namibian government-wide Ministries;
2. to examine how EA can be used to integrate systems and technologies within the government Ministries in Namibia; and
3. to assess and understand the role of EA in the government-wide Ministries.

The remainder of this chapter is structured into six sections. The first section is an overview of the research strategy used to carry out the research. The second section covers the research design applied, which is a case study. In the third section the data collection process is presented. The fourth section provides an overview of how the data was interpretively analysed. The fifth section is about research ethical considerations. Finally a conclusion of the chapter is drawn.

3.2 Research strategy

The strategy employed in the study was the use of a qualitative research method. This was based on the study's objectives and questions. The goal of qualitative research is to understand issues or particular situations by investigating the perspectives and behaviours of the people in these situations and the context within which they act (Kaplan & Maxwell , 2005, p, 50). According to Silverman (2013), qualitative research is about the interpretation of the social world, especially of cultures and people's life-ways rather than seeking causal

explanations. Qualitative research is concerned with interpreting and understanding people's opinions and views subjectively. To accomplish this, a qualitative research is conducted in natural settings and it uses data in the form of words rather than numbers.

The use of the qualitative research method in Information Systems (IS) studies has rapidly increased in the last decade. Many reseachers in the field of IS use qualitative research methods to study and understand the social world and contexts in information systems. It is argued by Myers and Avison (2002) that qualitative research is accepted as being able to provide important insights into information systems phenomena. The use of qualitative research methods guides researchers in studying and understanding the technical and non-technical aspects of information systems.

The qualitative approach was employed based on its premises in the field of IS, that is most suitable for interrogating complex issues such as this study and it was a better fit for the type of objectives set and questions that are to be answered. Qualitative methods allow the researcher to record and understand people in their own terms, whereby depth and detail emerge through direct quotations and explanations (Yunos & Ahmad, 2014). The nature of the study requires that materials are drawn from different sources. The qualitative method guided the selection of the sources.

In the qualitative method, there are research approaches and techniques that are linked to it, in terms of the types of data. Different approaches and techniques, such as interviews are used to collect qualitative data, and this can be done within a specific context or particular case, to understand the natural setting.

The qualitative method was applied through a case study approach to study how information systems and technologies are developed, implemented and used. Semi-structured interviews and documents were used to collect data about the case study. The data collected was interpretevely analysed.

3.3 Research design

Based on the objectives of the study, the qualitative method was selected, through which an understanding of a case was sought. Within that context, the case study research approach was selected as the research design.

A case study is a detailed study of a single social unit (Myers, 2013). The unit under study has characteristics that uniquely identify it. A case study can be of an individual, groups, organisation or a society. Selecting a case enables a researcher to have a focus and an in-depth study of a specific object that is part of the general population. Thomas (2011) states that a case study is not a method in itself, rather it is a focus and the focus is on one thing, looked at in depth and from many angles (p. 9). Hesse-Biber and Leavy (2011) pointed out that the uniqueness of a case study approach is that it provides the researcher with a holistic understanding of a phenomenon within its social context.

The Namibian government was used as the case study. Four Ministries, including the Office of the Prime Minister were selected to represent the government. This is mainly because of their sizes, and their roles in the computing activities within the government of Namibia. Details are presented in chapter four.

3.4 Data collection

Data was collected by means of semi-structured interviews and documentation from the individual Ministries. A semi-structured interview was used as a primary data collection technique because it allows for flexibility and richness of data. Because of the physical presence of the researcher, interviewees were able to ask for clarity on questions they did not understand during the interview process. Such clarity ensures that the participants give relevant information pertaining to the questions.

The interviewees involved junior and senior business and technical managers from the organisations. This was to ensure that interviewees were knowledgeable and capable of discussing the areas pertaining to their positions. For privacy purposes, interviewee names were not mentioned or revealed in any part of the study, rather the positions they occupy within the organisations were used. Data from the interviews was not and will not be used for any other purposes other than for this research. This also motivated interviewees to fully express their opinions.

During the interviews, the researcher used a predefined set of questions. The set of questions were of importance to the researcher as they were used as a guiding tool for maintaining

consistence and uniformity of the questions asked to the interviewee. The set of questions were extracted from the three main research questions namely:

(1) What are the factors that can impact the development and implementation of enterprise architecture in the Namibian government Ministries environment?
(2) How can EA be used as tool for the integration of information systems and technologies within the government Ministries in Namibia?
(3) What is the role of Enterprise Architecture in the government Ministries?

From each main research question, sub-questions were derived in order to gather more data pertaining to the specific research question. It was necessary to derive sub questions from the main research questions as presenting the main research questions could be viewed too broad and generic to the interviewees. From the first research question, ten sub-questions were formulated; from the second research question, two sub-questions were formulated and three sub-questions were formulated from the third research question. All sub-questions had follow-up questions. Follow-up questions played a significant role in this research. By means of follow-up questions the researcher probed the interviewees to elaborate more on the topics they mentioned and which the researcher felt were of relevance to the study.

All interviews were conducted at the interviewee Ministries at the agreed time. In cases where an interviewee was not available at the agreed time, interviews were re-booked. The researcher took notes during the interview process but because of the inability to note down everything that was being said, the interviews conversations were recorded using a voice recorder. Interviewees were asked for permission to be recorded before the whole interview process began. Some of the interviewees objected the recording process but later participated after it was explained that neither their identity nor their Ministries' names would be revealed; rather only interview labels would be used.

In cases where the interviewee was interrupted during the interview process, the voice recorder had to be paused and replayed after disruptions. This was to allow the interviewer to only record research related interview conversation.

After each interview, the recorded data was later transcribed by the researcher. Transcription involves getting the dialogue from which it was recorded and into a document for formatting (Grbich, 2013). Tools used for transcribing was Microsoft word document and voice recorder

which was constantly replayed back and forth in order for the researcher to grasp and write down what had been recorded. All interviews were conducted in English. The decision to stop the data collection process was taken when no new information was forthcoming during the interview process and a state of saturation was reached. A total of 19 employees were interviewed. The following table illustrates the interviews conducted from the different Ministries.

	Organisations			
Interviewees(Respondents)	OPM	Ministry of ICT	Works and Transport	Ministry of Justice
Senior				
Director	2	-	-	-
Deputy Director	-	1	1	1
Chief analyst programmer	1	-	1	-
Chief system administrator	1	1	1	1
Junior				
System administrator	-	-	1	-
Analyst programmer	1	1	1	1
Technician	-	1	1	1
Total	5	4	6	4
	Total Interviewees 19			

Table 1: Number of interviews conducted

Data was also collected through the documents technique. Documents refer to written texts which cannot be subjected to an interview, yet their interpretation holds meaning of the underlying social world (Onwuegbuzie, Leech, & Collins, 2010). Additionally, Silverman (2013) points out that documents are social facts in that they are produced, shared and used in a socially organised way. Documents provided supporting data that interviewees were unable to provide and explain in more detail due to limited time. Documents were requested during the interview process from the interviewees. Obtained documents were in soft and hardcopy format. All documents obtained were in English.

The documents acquired were reviewed in two ways. Firstly, the documents were reviewed to check if they support the interviews transcribed data or they are contradicting each other. Secondly, the documents were also reviewed against the research objectives. This process was necessary as it enabled the researcher to acquire data from documents that can be used in order to achieve the research objectives. The table below illustrates the different types of documents obtained.

	Organisations			
Documents Obtained	OPM	Ministry of ICT	Works and Transport	Ministry of Justice
IT policy vol. 3 Public service	1	-	1	-
IT policy for the Republic of Namibia	1	-		-
E-governance policy	1	-	-	-
Namibian Public Service e-Government Strategic Action Plan	1	-	-	-
Oracle E-Business Suite HCMS Training Manual	-	1	-	-
Oracle E-Business Suite R12 Step by Step Configuring Guide	-	1	-	-
MOJ ICMS Project Team Structure	-	-	-	1
Tender Specifications for the Integrated Case Management System for the Ministry of Justice	-	-	-	1
Total	**4**	**2**	**1**	**2**
	Total Documents: 9			

Table 2: Documents obtained

After the data collection process, the transcribed data from the different organisations was put together in one document and arranged according to their respective organisations. The overall data was cleaned by correcting grammar, wrong spellings, inserting appropriate punctuations and formatting the whole document to ensure uniformity and consistency across the entire document. At the beginning of each interview appeared the interviewee name, the title of the position they hold within the specific Ministry and the date on which the interview was conducted. Alongside each line of the document, line numbers were inserted in the document margin, because the data would be referenced according to their corresponding line numbers in the study. Data cleaning and formatting was carried out to ensure that the researcher had well organised and readable data to be used for the data analysis process.

3.5 Data analysis

According Bryman (2012) data analysis is concerned with reducing a large quantity of information that the researcher has gathered. It is a process of analysing and sifting through raw data in order to select relevant data. Data relevance is determined by the study research questions and objectives. In this study, the data was analysed using the interpretive approach and guided by the Activity Theory (AT).

The interpretivism approach was applied as it allows the researcher to analyse the interviewees' subjective reasoning (Rowley, Jones, Vassiliou, & Hanna, 2011). The core idea of interpretivism is to understand the subjective meanings of persons (Goldkuhl, 2012). To attain this, the researcher uses his or her skills as a social being to try and understand how others understand the world around them (O'Donoghue, 2006). The interpretive approach was used to understand how employees interacted in the selection, implementation, management, and use of systems and technologies across the Namibian government's computing environments.

The six components of the AT were followed in the interpretive analysis of the data. The six elements include tools, subject, object, community, rules, and division of labour. AT is discussed in detail in chapter two. Each of the components brings a fresh perspective in examining and having a better understanding of the computing environments of the Namibian government. The perspectives of the components include:

i. The Tool components helped to exhume and understand some foundations, such as the tools (relating to IT) that are currently deployed and used; where are the tools deployed and used; how were the tools deployed and used; and why were the tools deployed and used in the government computing environment.

ii. The Subject components helped to examine and understand the subjects that existed in the environment. This includes how the subjects were interconnected and interacted with each other in the process of supporting and enabling goals and objectives.

iii. The Object components: through this component, the existence of Objects was established. Also fresh in discovery was the ultimate role of the objectives in the environment, whether personal or organisational, relating to the systems and technologies' deployment and use.

iv. The Rule component: this component helped to examine how rules and regulations were promulgated and used, either through negotiation or obligatory passage point, in the selection, implementation, and management of systems and technologies.

v. The Community components helped to explore the different networks of people that existed in the environment. This was to understand how systems and technologies were enacted through the various existing networks to addressing the different networks of the organisations (Ministries).

vi. The Division of labour components were used to analyse how roles and responsibilities, including tasks allocation were negotiated and carried out to achieve the organisational needs. This helped to examine the roles of the focal actor and the rest of the actors within the environments.

A detailed overview of how the above elements are used in the analysis of the collected data pertaining to the government Ministries' computing environment is presented in chapter 5.

3.6 Ethical considerations

Research is a process goververned by ethics. Research ethics ensure that researchers adhere to standards and policies of the organisation they are representing as well as the organisation they are collecting data from. Ethical standards promote the values that are essential to collaborative work, such as trust, accountability, mutual respect and fairness (Gajjar, 2013). Ethics were considered in this study to guide the researcher's actions and behaviours when conducting the research.

Before carrying out field work, the researcher sought permission from the respective Ministries. This was done to ensure that the Ministries were aware of and welcomed the researcher in their environment to conduct the research.

The data collected was and will only be used for the study purpose and was only shared between the researcher and the supervisor. Through-out the research, the interviewees' identities were also not revealed under any circumstances, rather interviewee labels were used.

3.7 Conclusion

Research methodology provides guidance to the researcher. It defines the necessary steps undertaken to study a phenomenon. The qualitative research method used in this study was selected on the premises that it best supports the research objectives and questions.

The researcher needs to understand the criticality of the research strategy and design so as to apply the correct steps in resolving the research problem under study. A lack of understanding leads to a wrong use of methods that can negatively impact the research under study. The application of the case study approach signifies a specific unit which is the focal point to be studied, therefore which data collection will be based on. Data was collected by means of semi-structured interviews and documentation techniques. The interpretivism approach which was guided by Activity Theory (AT) was used for data analysis.

CHAPTER 4
OVERVIEW OF CASE STUDIES

4.1 Introduction

This chapter gives an overview of the cases studied. Based on the research objectives, a case study approach was undertaken. Four government Ministries, namely the Office of the Prime Minister (OPM), Ministry of Information and Communication Technology (ICT), Ministry of Works and Transport, and Ministry of Justice were used as case studies. The four Ministries were viewed as one case study. As such the data collected from the Ministries were collectively analysed.

The remainder of this chapter is structured into four sections. Section one gives a brief overview of the field work carried out. Section two provides detailed information about the four Ministries used as case studies. In section three the cases' organisational culture is discussed. And finally the chapter conclusion is presented.

4.2 Fieldwork

Data was collected by means of semi-structured interviews and documentation technique from the four Ministries. The justification for using semi-structured interviews as the data collection method was for two main reasons - richness and flexibility. The technique allows for instant probing by both interviewer and interviewee. This enables clarification from both parties. The documentation technique was also used to gather data that was recorded and that which the interviewees could not fully explain due to time limits.

Interview questions, which acted as guidelines were set up. The questions helped to maintain consistency and uniformity across the interview process. The interviews were carried out in the Ministries workplaces. Before the interview took place, the interviewees were briefed about the topics to be covered during the interview process. Permission was granted to record the interview conversations. The recorded interviews were later transcribed. The transcribed data together with the documents obtained were interpretively analysed.

4.3 Case studies

The researcher consulted the four Ministries to carry out research within their computing environments with a formal letter from the university. Each Ministry has its own objectives and goals as they carry out different activities. The four Ministries were mainly selected because of their sizes and their roles in the computing activities within the government of Namibia.

The diagram below illustrates the association between the cases during the time of the study. The case studies documentation is guided by the diagram. Case studies are discussed as follows.

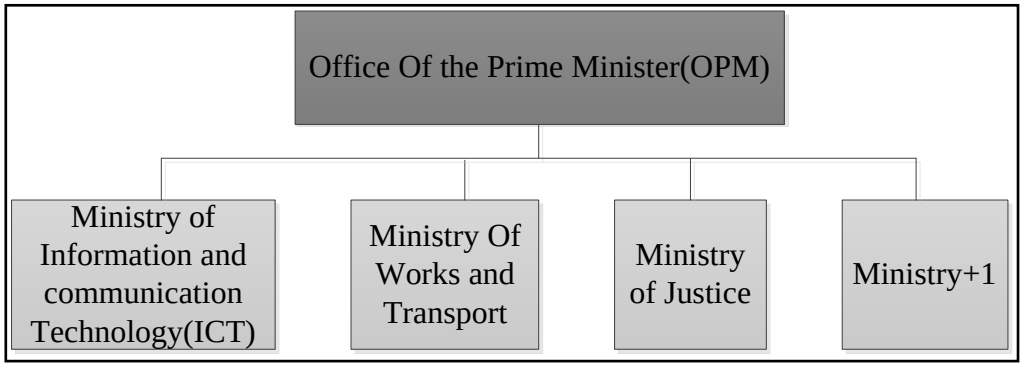

Figure 4.1: Association of cases

4.3.1 Case study one: Office of the Prime Minister (OPM)

The Office of the Prime Minister, referred to as OPM, was established in 1990 after the attainment of independence. The OPM is mandated by Article 36 of the Constitution of the Republic of Namibia to lead Government business in Parliament, coordinate the work of cabinet, advise and assist the president in the execution of government functions.

The OPM manages the procurement processes of ICT resources, the development and implementation of ICT policies and standards for the Namibian government Ministries. Assigning power to the OPM to oversee ICTs across the various Ministries is recognised as a strategic move to reduce inconsistencies and duplication of efforts across the Ministries. As a result, all Ministries are dependent to and report to the Office of the Prime Minister (OPM) on all matters pertaining to ICTs within their environments.

i. OPM Computing department objectives

The department concentrates on ensuring that the government Ministries are up-to-date with the latest technology by advising the Ministries on the ICT best practices and developing and implementing compatible as well as integratible technologies. The department's objectives are as follows:

- to provide Service concerning the development and maintenance of up-to-date and viable computer information based on both political and administration matters;

- to facilitate the processes of formulation of policy and implementation of programs within the Office of the Prime Minister and the Public Service as a whole;

- to provide operational data Service; develop and maintain systems; investigate Offices/Ministries/Agencies' (OMAs) computer related needs; recommend appropriate systems; control the acquisition of hardware and software in the entire Public Service through the Tender Board; draw up hardware/software specifications for the invitation of tenders and evaluate the delivered goods and services.

ii. OPM Computing departmental structure

The computing department's objectives are achieved through the departmental structure. The departmental structure illustrates how the computing roles and responsibilities are arranged and how policies and processes are communicated within the department. The structure follows a hierarchy set-up. As one moves down the hierarchy, the roles and responsibilities are associated with less power and authority. The departmental structure is illustrated below:

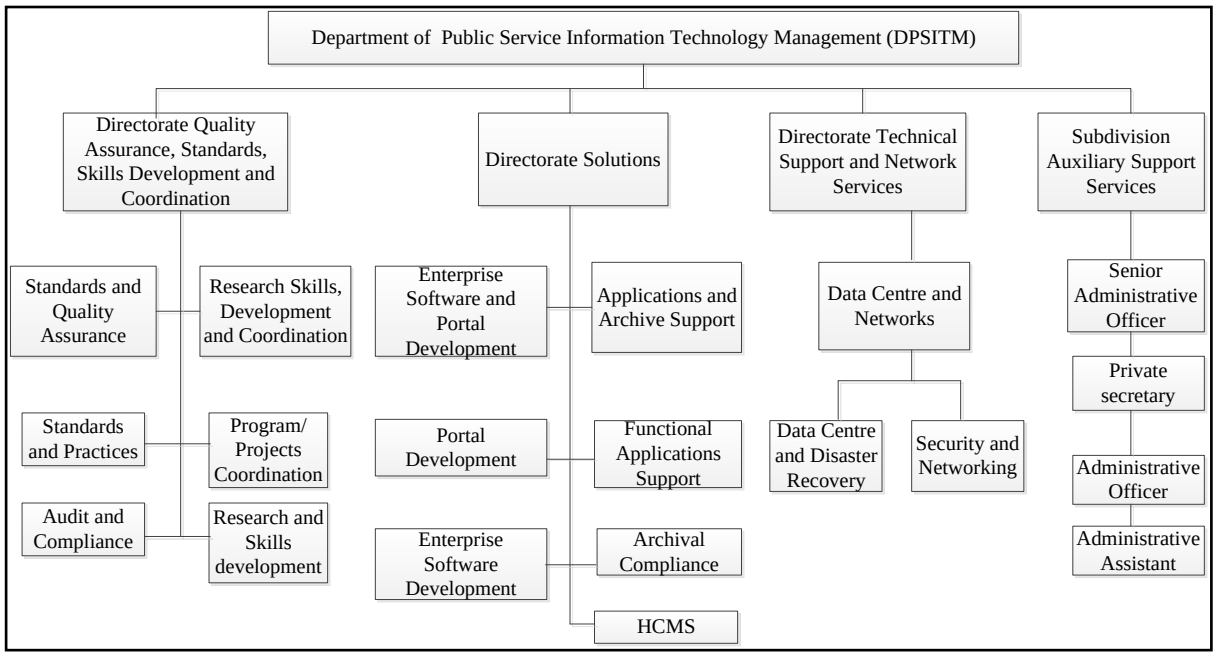

Figure 4.2: OPM IT departmental structure

According to the departmental structure illustrated above, the directorates and divisions' roles and responsibilities are summarised below:

Department of public service information technology management (DPSITM)

This department exists to keep the Government on top of the latest information and communications technology developments, in order to have a faster and smoother flow of digital information within the Government system. The department is headed by the permanent secretary (PS) who sets the strategic direction for the department, coordinates policy implementation and ensures the effective administration of the department through various directorates and subdivisions.

Directorate of quality assurance, standards, skills development and coordination

The directorate is responsible for managing IT quality and developing IT standards, guidelines and policies for the public service. The directorate's role is to promote the acquisition of quality computer hardware and software. When all government Ministries are purchasing computer hardware and software, they get specifications from this division. This is to ensure a standard model for acquiring hardware and software.

The directorate is also responsible for skills development across the Ministries. They promote computer professional competency by arranging for ICT training for the IT workforce. Training and skills transfer is considered very crucial for the department as such that it takes up much of the department's financial budget. This is to ensure that the IT workforce is skilful and competent enough to manage the information systems and technologies needed for achieving the Ministries' objectives.

Programs/project management

Every project carried in the Ministry is assigned to a manager. The project manager is mainly responsible for the project planning, execution and control. He/she directs team members to execute the project and check the project progress.

Standards and practices

The department's role and responsibility is to develop IT standards and practices. The standards and practices are used to guide and maintain consistencies in the deployment of IT artefacts.

Audit and compliance

The department consists of auditors and compliance officers. The department's role and responsibility is to ensure that business processes and activities comply with the defined policies, practices and standards. The auditor and compliance officers advise the Ministries on the inconsistencies and irregularities occurring within their computing environments.

Directorate of enterprise solutions

The directorate for enterprise solutions is responsible for the development and implementation of systems and applications. The directorate's sub-divisions work closely together with applications and solutions users to get the best view of what is expected. The following are the directorate's sub-divisions:

a. Enterprise software and portal development

The division's role is to develop and implement the various Ministries' specialised applications and websites portal. Therefore one finds software developers, analyst programmers and business analysts at this division. The specialists are responsible for business and technical requirements collection and analysis needed to provide

guidance for their development processes. Their work includes conceiving, designing, and maintaining databases and telecommunications integrated with other systems; translating specifications into computer language, testing results, designing or assisting in the design of file structures. Incumbents are expected to bring projects to a conclusion, including the development of operating procedures, instructions and training and the required documentation. The development of the application and information systems is done according to the pre-standards set by the quality assurance directorate.

b. Applications and archive support

The division is responsible for managing applications, documentations and the retrieval and archiving of documents in the organisation.

Directorate of technical support and network services

The technical support and network services directorate manages the subdivisions responsible for the computer hardware implementation, troubleshooting and maintenance of the internet and network services in the Ministries. The directorate's purpose is to ensure that the technical infrastructures acquired meet the specifications and standards defined. The directorate's mandate is carried out through the following sub-divisions:

a. Data centre and disaster recovery

The division is concerned with data management as well as the recovery of the organisational data. On a daily basis organisations face challenges from natural disasters as wells as viruses and other intentional attacks that could be threats to their data and information. Hence the division's responsibility is to ensure that backup systems are in place and operational.

b. Security and networking

The security and networking sub-division is responsible for managing networking security in the organisation. It ensures that the network connections are up and running and they are secure and reliable to support communication and collaboration activities. The sub-division employs network administrators and network specialists to realise its objectives.

Division of auxiliary support and services

The division consists of administration officers and their respective secretaries. The division is responsible for the IT division enquires, processing, attending to incoming calls, filling divisional documents and ensuring that the departmental administrative stationeries are at hand.

4.3.2 Case study two: Ministry of Information and Communication Technology (ICT)

The Ministry of ICT was established in April 2008. The role of this Ministry is to lay the foundation for the accelerated use and development of ICT in Namibia. The Ministry works together with other enterprises (public and private) in the country for the development of ICT policies and standards for the government at large (public and private sectors). The Ministry's services include media broadcasting, broadcasting technologies and film productions. The Ministry is responsible for the following key activities:

- provide information to communities and the media;
- facilitate ICT infrastructure development;
- provide policies and regulatory frameworks for the ICT sector;
- conduct research and the development for ICT innovation.

i. Ministry of ICT's objectives:

- to ensure the free flow and access to information to the community and media through the production and provision of multimedia materials and campaigns, as well as being the government's official spokesperson, thus creating a knowledge based society;
- to develop ICT policies and enhance ICT infrastructure development through the expansion and upgrading of modern and reliable infrastructure in order to create an enabling environment and bridge the digital divide;
- to ensure that the media sector benefits the economy through marketing Namibia as a preferred film destination and developing the local film industry for employment creation and economic growth.

ii. Ministry of ICT IT department Structure

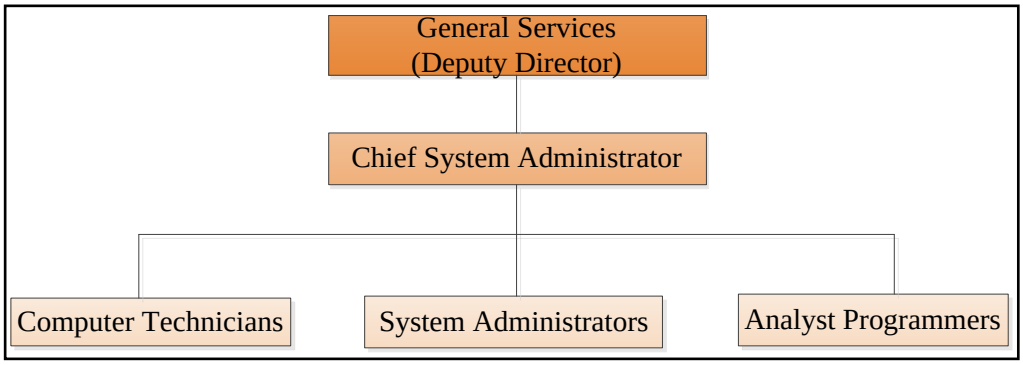

Figure 4.3: Ministry of ICT IT department structure

The Ministry's IT department structure as illustrated in figure 4.3 above is perceived to be small. This could be attributed to reasons that the Ministry was recently established. The IT department was made up of six employees at the time of the study. The employees' roles and responsibilities are summarised below:

General services (Deputy Director)

The general services deputy director manages the general services of all departments in the Ministry. The deputy director monitors the various departments' involvements in projects allocated to them and ensures that the employees carry out their tasks for departmental objectives achievement. In the IT department, in the absence of the chief system administrator, the employees report to him.

Chief System Administrator

In the Ministry, the chief system administrator's responsibility is to make sure that all IT policies are adhered to within the Ministry. He/she manages the IT infrastructures and communicates about the IT projects needs that arise in the Ministry to the OPM. Employees in the department report to the chief system administrator and he/she authorises the employees' actions. However, in the organisation, the chief system administrator reports to the deputy director.

System administrators

The system administrators report to the chief system administrator. His/her responsibilities are to troubleshoot performance issues and resolve problems relating to the operation of the network. System administrators define the information systems' configuration standards for networks, file servers, application servers, computers, notebooks, and software applications. They also train personnel and others on network operations.

Analyst programmers

The analyst programmers are responsible for the organisation's website development and maintenance. Also analyst programmers are responsible for user requirements collection, systems and applications specifications and documentation. They perform systems analysis and applications programming as well as assisting in the overall analysis and design of information technology systems.

Computer technicians

Computer technicians support and maintain the hardware and software in the organisation. Their responsibilities include day to day computer trouble shooting, fixing computers' hardware or software and the installation of hardware and software. In the Ministry, the technicians are also responsible for assisting users who have difficulties with using computers.

4.3.3 Case study three: Ministry of works and transport

The Ministry of Works and Transport is responsible for sectorial policy and regulation, and has a mandate to ensure infrastructure development and maintenance on transport and state asset management through operational excellence and a prudent management of resources. To manage the wide range of customers, the Ministry has a dispersion of different departments across the country. In an attempt to achieve its objectives, the organisation has an IT department to support their business process and activities.

i. IT department objectives

The Ministry's IT departmental objectives are as follows:

- significantly enhance the capability of electronic data communication and management in the Ministry;

- continuously improve IT infrastructures;
- improve the Financial Management System for the Ministry;
- reform the ICT infrastructure to be in line with the requirements of the internal and external stakeholders;
- reduce operational costs of the IT division;
- ensure internal and external customer (stakeholders) satisfaction; and
- building-staff development.

ii. IT department services

The department renders IT services such as network services, database development services, technical support services and the end user support services to all Departments in the Ministry, as well as the regional offices. Apart from these services, the division serves as a facilitating drive utilized to disseminate Ministerial information to the Ministry's audiences (individuals and organizations across the globe) through the Ministry's web site (www.mwt.gov.na) and inform them about government policies and programmes, and solicit their active and direct contribution to the process of e-governance.

iii. IT departmental structure

Figure 4.4 depicts the Ministry's IT departmental structure. The structure consists of eight employees. To achieve the departmental goals and objectives, the employees carry out activities and processes according to their roles and responsibilities as illustrated below:

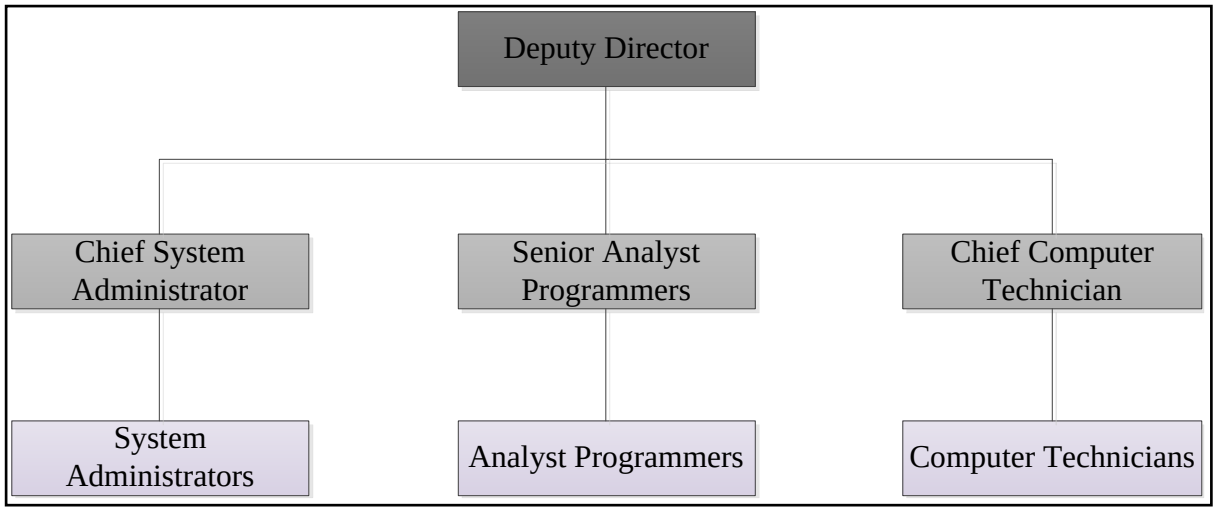

Figure 4.4: Ministry of Works and Transport IT departmental structure

Deputy director

In the Ministry of works and transport, the deputy director is responsible for the management of the IT division. The deputy director's responsibilities include the management of the department's financial budget and ensuring that the department is equipped with the right resources. The deputy director ensures that all relevant information is communicated to the department's employees and relevant stakeholders.

Chief systems administrator and system administrator

The chief systems administrator and systems administrator work together in order to carry out their tasks. Their responsibilities are to ensure that the internet connectivity and networks needed to support the information systems and technologies are functioning and secure enough for the organisational operations. They define and set up the hardware and software specifications that meet the user requirements and ensure that the acquired technologies are of such specifications.

Senior analyst programmer and analyst programmer

The senior analyst programmer and analyst programmer work together to develop and implement applications and systems in the Ministry. Their responsibilities include application and systems reuse, redesign and integrations. The senior analyst programmers also work closely with the system users to understand their requirements and to conduct financial studies for the justification of information technology systems; and to assist lower level employees in the development and maintenance of information technology subsystems and programs.

Chief computer technician and computer technicians

In the Ministry, employees often encounter challenges with their IT artefacts such as hardware malfunctioning and software updates. The technicians' responsibilities are to install, maintain, troubleshoot and upgrade computer hardware, software, personal computers, networks, peripheral equipment and related work as required.

4.3.4 Case study four: Ministry of Justice

The mandate of the Ministry of Justice is to administer justice in the Republic of Namibia. It is responsible for a variety of services such as the administration of justice through the courts,

the provision of legal aid in terms of the Namibian Constitution, the development and reform of law, the drafting of legislation on behalf of Government, the protection of fundamental human rights and freedoms, the administration of deceased estates and estates of incapable persons, international cooperation in criminal matters, the prosecution of crime, the representation of Government Offices/Ministries/Agencies in civil matters, and the general rendering of legal advice to His Excellency, the President and the Government.

i. Computing department's objectives

The department's objective is aligned with the strategic objective of the Ministry which is to:

- Ensure an enabling environment and high performance culture (on-time access to ICT facilities and infrastructure).

The goals and services it offers are as follows:

- system/user support;
- setting up a proper network infrastructure;
- user awareness;
- normal daily server/network administration;
- implementation of projects;
- user training is newly introduces systems; and
- introduction and implementation of ICT policy and ICT Master plan for the Ministry of Justice.

ii. Ministry of Justice IT department structure

The IT department's structure as illustrated in figure 4.5 comprised of ten employees at the time of the study. Five of the employees are computer technicians and their roles and responsibilities include software and hardware installations, trouble shooting and maintenances. Other roles and responsibilities that are part of the departmental structure as well are illustrated below:

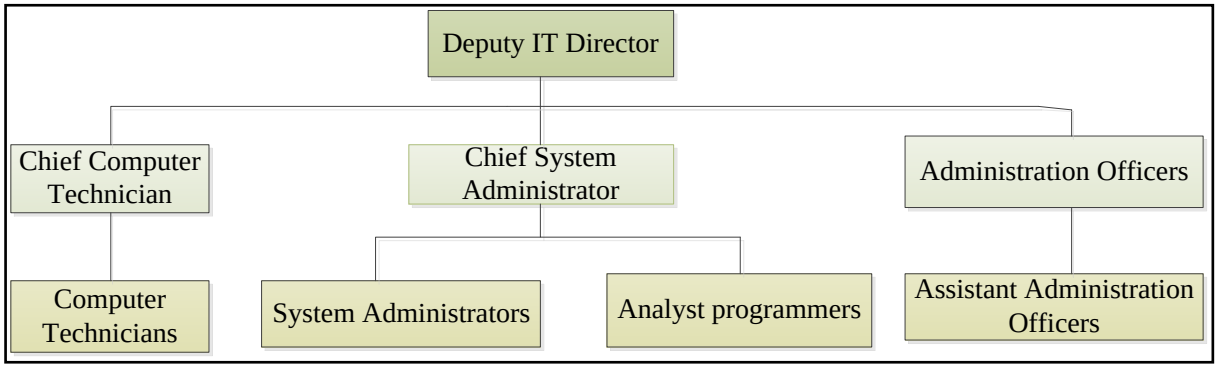

Figure 4.5: Ministry of Justice IT departmental structure

Deputy IT director

Similar to the Ministry of works and transport, the deputy director in this Ministry is also responsible for managing the IT department. He/she manages projects' scopes and resources and ensures that project deadlines and objectives are met. All employees in the department report to the deputy director. As a result he/she monitors their performance and ensures that they carry out their roles and responsibilities.

Chief systems administrator and systems administrator

The chief systems administrator plays a critical role in the department. He/she works hand in hand with the systems administrator to oversee and support system implementations and maintenances. They conduct research on new technologies and implementation strategies, recommend and implement improvements. Also their responsibilities include server management and network administration.

Analyst programmer

In the Ministry of Justice, the analyst programmers consult with clients to gather information about program needs, objectives, functions, features and input and output requirements. Their responsibilities include processes documentation and user support. They review and analyse system specifications to determine whether all the required elements have been included.

Administration officer

The Administration officer performs the department's administrative activities. Some of his responsibilities include handling departmental incoming calls, filing and archiving the departmental relevant documents. Helping the administration officer to carry out her activities is the assistant administration officer.

4.4 The Ministries' IT departments working culture

The Ministries' computing departments' working culture is shaped by the departmental employees' roles and responsibilities. The recruitment of the employees is according to their education qualifications, skills and competencies in the field of IT. The working environment is perceived to be very dynamic and constantly requiring employees to be up-to-date with the latest technologies on the market. As a result employees are often sent for various types of trainings. Due to the departments' flexibility, in case an employee is not able to perform due

being incompetent in that specific area, they can be moved and assigned to an area where they are able to apply their skills.

The employees' actions are constrained by the departmental as well as the organisational rules and policies. The rules and policies are enforced to ensure that the employees are professional and committed to their responsibilities. Management power dominates the employees' actions as such that they do not carry out activities without the management's acknowledgement. Within the IT departments, communication is considered to be very crucial as it creates awareness and instils confidence among the employees. In most cases employees hold weekly meetings to discuss matters of concern.

4.4 Conclusion

In the present chapter the various Ministries used as case studies are documented. The documentation entailed the cases' organisational background, their IT departmental objectives as well as their IT departmental structures. The departmental structure influenced the organisational culture as well as the employees' roles and responsibilities. As such, as one move down the departmental structures, roles and responsibilities were associated with less power. Employees' responsibilities were guided by the IT department as well as the organisation's policies and standards. Across the various Ministries, IT departmental commonalities and differences existed**.** These could be due to their different objectives and environments in which each Ministry operates. However, the OPM manages the entire Ministries' IT infrastructures as well as their IT resources.

CHAPTER 5
DATA ANALYSIS

5.1 Introduction

This chapter presents the data analysis. The objectives of the study, as stated in chapter one, and repeated in chapter three, were to develop an enterprise architecture framework for the Namibian government-wide Ministries. The data was collected from various sources, and analysis was guided by the Activity Theory (AT), as discussed in chapter two.

The remainder of this chapter is divided into three main sections. The first section is an overview of the theory which underpinned the study. The second section presents the data analysis. The conclusion of the chapter is finally drawn in the last section.

5.2 Activity Theory (AT): overview

This study uses activity theory to analyse the collected data. Activity Theory (AT) is a socio-technical theory that is concerned with the development of social activities. As shown in Figure 5.1 below, AT consists of six main components. According to Golsorkki, Rouleau, Seidl and Vaara (2010), the theory "conceptualises the on-going construction of activity as a product of activity systems comprising the actor, the community within which that actor interacts and those symbolic and material tools that mediate between actors, their community and their pursuit of activity" (p. 127). In activity theory, the actor is referred to as technical and non-technical things and beings. Both technical and non-technical actors have significant roles and contributions to an activity system. Actors use tools to purse their goals, and perform their activities. Uden (2007) stated that tools can be physical entities, such as a hammer or psychological such as language, culture or ways of thinking.

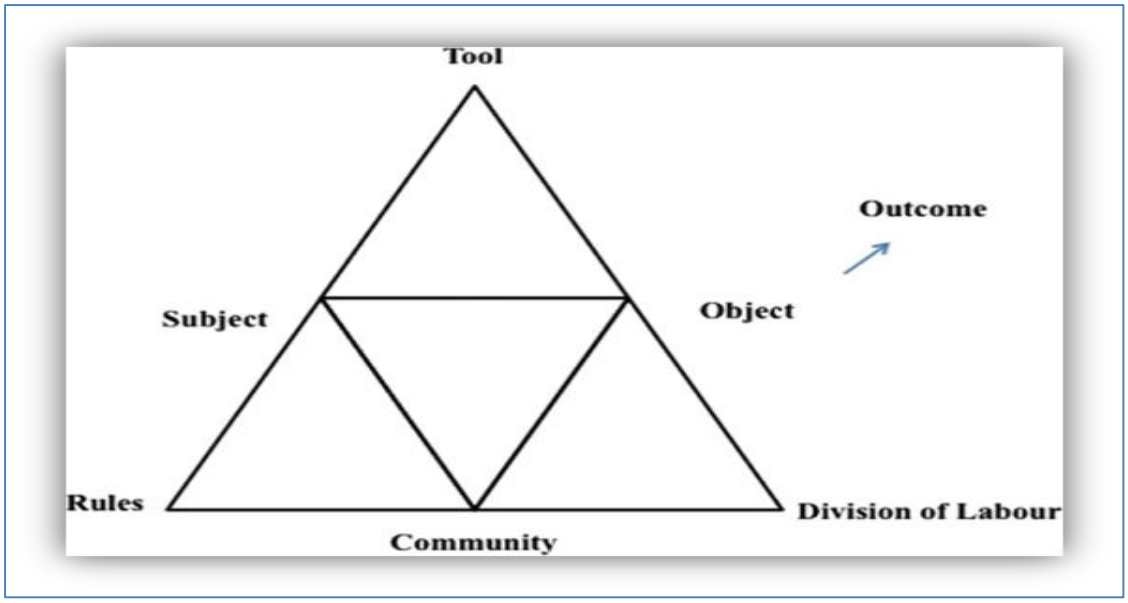

Figure 5.1: Activity Theory (Engestrom et al., 1999)

AT is used in information systems and technology studies primarily because the development, implementation, and management of systems and technologies are regarded as social technical activities. During the development and implementation of information systems and technologies in organisations, many actors are involved. Their involvement is governed by the organisation's rules, cultures, values, and norms. The governance is mainly to ensure and enforce commitment, focus, and order; critical aspects that are needed in order to achieve organisational goals and objectives. However, rules can come in varying degrees, and can constrain or liberate the activity (Yamgata-Lynch, 2010).

Also, information systems and technologies are developed and used according to the actors' knowledge and specialisations. AT defines specialisations as a form of division of labour. Uden (2007) stated that the divisions of labour are concerned with how tasks are divided between community members and also the division of power and status. Due to the powers that actors possess, they can enable or constrain systems and technologies' activities.

AT provided a theoretical lens which was used to analyse the activities and processes of both technical and non-technical actors within the computing environments of government Ministries in Namibia.

5.3 Data Analysis

As mentioned earlier, the Activity Theory (AT) was employed in the analysis of the qualitative data, which was collected from four Ministries of the Namibian government. They include the Ministry of ICT, Ministry of Works and Transport, Ministry of Justice, and the Office of the Prime Minister. The data from the Ministries were combined in the analysis. The six components of AT were followed in the data analysis, as presented in this section.

Activity Theory: Tool

Different types of tools currently (as at the time of this study) exist within the government environments. These tools include both technical and non-technical artefacts.

The technical tools are information systems and technologies, which include business systems (such as Management Information System and document management systems), word processors, operating systems, servers, desktop, laptops, and networking, in the categories of software and hardware.

The non-technical tools include processes, procedures and humans. Processes and procedures were the tools which were followed in addressing the organisations' aims and objectives. Processes require information to be executed. Information in the government Ministries was accessible either in soft or hard format or both. Information in hard format is found in organisational documentations while soft information is found in databases and computer (desktops and laptops) disks. According to one of the employees, who is a deputy director in one of the Ministries, *"there is a government reform initiative that is called or referred to as EDRM (electronic document record management system). The primary aim of the initiative is to manage the documentations within the Ministries"* (RS03, p. 19, 657-659*).* This is evidence and an indication that the government was confronted with challenges in managing its documents.

Technical and non-technical tools were used in different business units across the government's Ministries. The business units were created based on their departmental activities, such as accounting and finance, marketing, information technology, and research and development (R & D). Systems and technologies were designed and developed, or acquired based on the business unit's needs and requirements. One interviewee opined as

follows: *"The selection of technology is in accordance to our business requirements"* (RS09, p. 36, 1229).

In most cases the information systems and technologies that were used in the business units of one Ministry were replicated in other Ministries. Also, some information systems and technologies were used independently in the different locations of the same Ministry. The government Ministries offer services country wide. As a result, most of the Ministries have branches and offices in different locations across the country. This has led to the replication of the use of information systems and technologies including processes and activities in the various geographical locations. As described by one of the Ministries' employees, "*we support the whole of Namibia wherever there is court, we are running windows 7, and we still have window XP running in some offices" (*RS14, p. 59, 2033-2035).

Also, the information systems and technologies used across the Ministries' business units and geographical locations are supported in different platforms. Operating Systems Platforms, such as UNIX, Linux, Oracle, and MySQL were used to support the information management systems and databases. A systems administrator briefly explained one of the platforms they were using in their Ministry (of Transport);*"our websites are hosted on the Linux system platform mainly because it is considered strong in terms of virus protection"* (RS09, p. 36, 1232-1233). Another interviewee who is a deputy director in one of the government Ministries noted, *"IFMs which is the integrated financial management system is based on the oracle platform"* (RS03, p. 7, 233-234).

The government Ministries also make use of the different hardware and desktop platforms which include HP, Lenovo, and MAC. One of the interviewees asserted that *"it is not prescribed in government Ministries that you only use one specific brand or model of hardware"* (RS03, p. 8, 267-268*).* This means that any type of hardware could be selected, and could be allowed in operations as long as it suits the operators of the hardware. This approach is driven by the individuals' knowledge and understanding. It contributes highly to complexities and difficulties in the manageability of the computing environment.

The information systems and technologies that were in use in the government environments were based on the employees' knowledge and expertise of the systems and technologies. A Chief Analyst programmer from one of the Ministries expressed that *"the technology we*

mostly use depends on the skills available. We can't select visual basic and there is no one who can use visual basic" (RS05, p. 26, 886-888).

The systems and technologies were meant mainly for business needs. However, some employees do make use of them for other reasons, such as social media for their personal purposes. One of the Ministry's (of ICT) employees was concerned about how the technologies were used in their organisation, stating that "*there is a policy with regards to accessing the social Media platforms, such as Facebook during working hours. According to the policy the period between 13h00 and 14h00 is allocated to the utilisation of social medias"* (RS03, p. 17, 591-593). The policy was to ensure that the employees were productively busy during normal working hours.

The information systems and technologies usage was driven by the departmental activities and processes. Therefore different employees within the Ministries use technologies differently. For example, some of the employees from the finance business units used the information systems and technologies to carry out the organisation's financial activities and processes. Meanwhile some of the employees from IT business units used the information systems and technologies to develop implement and maintain other technologies within the organisation. However some technologies were used or applicable to all business units in the organisations (government Ministries). These are the standard technologies most likely to be used by all employees for supporting their activities regardless of the business units employees found themselves.

In the use of these technologies, organisations sometimes encountered challenges, such as compatibility and obsolesce. These challenges could be attributed to different factors. The use of the systems and technologies were influenced by their life cycle, manageability, and integrations. Life span means when the technologies were manufactured (or developed), or deployed. Manufacturers define life spam for each of their technologies. For example, IBM defines the life span of servers to be between three to five years. After their life span most systems and technologies are likely to stop functioning or will not function at their optimum level. The life spans are a result of tear and wear aspects of the systems and technologies, hardware and software. Not knowing systems and technologies' life span will lead to government Ministries having obsolesced or non-functional technologies, which will slow down organisational performance. Technologies' life span differs across government

Ministries. According to one of the interviewed chief systems administrators from the Ministry of ICT, *"hardware is replaceable three to five years because they are quick to change and they keep evolving due to compatibility "(*RS01, p. 4, 137-138*).* However one participant expressed that, *"there is no standard within the computing environment of the government Ministries which specifies that software or hardware should be replaced after three years. We therefore continue to make use of the technologies as long as they are considered to be functional for usage"* (RS03, p. 14, 498-500). This has resulted in some Ministries having both old and latest systems and technologies in their computing environments.

Manageability refers to the support and maintenance of the systems and technologies during their life span. Technical and non-technical skills are both required to support and maintain technologies in organisations. Technical skills are of importance to architects or technicians to design, implement, re-develop and maintain technologies needed to support organisational activities and processes. Non-technical skills enable architects to be aware of non-technical factors that could impact the support and maintenance of the technologies.

Integrations challenges were caused by factors such as a lack of systems and technologies compatibility. Integrated systems and technologies provide a unified technology environment which leads to real time communication across the business units. One of the interviewees shared her views as to why they needed system integrations in their ministry "*So if I am running a system and the police department is also running a system and these two systems are not integrated it will still cause that delay as information is not shared on time "*(RS16, p. 87, 3027-3030). In an attempt to have compatible technologies and systems, the government Ministries are advised to develop their systems using one programming language such as Java enterprise and to use certain technology platforms such as Linux.

Some of the challenges arose because of the uniqueness of the technology tools being used. Other challenges that the organisations encountered were because of the business nature of the Ministries. One of the interviewees who manage systems development for the government Ministries expressed his views on the challenges they encountered when it came to integration, as it was influenced by the business' needs, as follows: *"Various applications are governed by different legislations, you cannot just integrate them. Take a typical example of home affairs with the Identity (ID) part of their system. They cannot combine ID*

information to other systems, primarily because it was a constitution written to protect privacy. So I cannot integrate another system, if I do that it will be a privacy violation" (RS04, p. 22, 773-776).

In addition to business needs, information systems and technologies are also used based on their costs. Cost refers to the time and money that a Ministry will be investing on systems development and deployment as well as its maintenance. If the technologies support business needs, but however it's costly to a certain government Ministry, such systems and technologies will likely not be used. In the view of one of the deputy directors from one of the Ministries, "*technology is expensive, so even if you have a number of technologies you might end up choosing second best because of the cost factor*" (RS04, p. 21, 722-723). The selection of various systems and technologies based on costs allows the Ministries to acquire affordable technologies in their computing environments that they will be able to support and maintain according to their financial capabilities. As noted by one of the interviewees, "*if the system that you want is taking up 80% of your budget, then you cannot purchase that system*" (RS0, p. 48, 1639-1640). Factors such as the availability of technical know-how that is required to support and maintain systems, the hardware and software platforms required for systems to operate determine or influence system and technology costs.

Activity theory: subject

Subject from the AT perspective encompasses technical and non-technical actors. Both technical and non-technical actors depend on each other in the fulfilment of goals and objectives. An attempt to separate them creates vacuum. For example, without a technical actor, such as a computer, it is difficult or impossible for the non-technical (such as human) to process thousands of customers' claims. An employee who thought the same stated that, "*You don't sit in the office with no computer and yet we expect you to perform*" (RS03, p. 10, 313-314). The Ministries' computing environment consists of both actors.

Technical actors include information systems and technologies such as financial systems, biometric systems, servers, databases, different types of networks and computers. The technical actors could also be referred to as tools, in that they are used to achieve objectives. This implies that an actor could be used by another actor in the same environment.

The non-technical actors are the employees within the computing environments of the Ministries, including other stakeholders, such as Executing Managers, vendors and consultants from different organisations. Some of the human actors included systems analysts, programmers, accountants, IT directors, IT administrators, chief executive officers and business directors.

Actors that were involved in different types of projects did so through negotiations across the Ministries' business units. The forms of negotiations were in two ways processes: the process to willingly participate or contractually participate. One of the interviewees who deal with systems administrations opined as follows, "*to sit with companies that have tendered will take us up to six months just to come up with a mutual understanding between us and them*" (RS01, p. 2, 37-39). Some employees participated in projects willingly. This was attributed to factors such as personal interest to the project and relationships with the colleagues who were involved in the project. Others participated mainly because of their contractual obligations. Majority of the interviewees agreed that this was the case and one of the interviewees pointed out, "*I was told by my supervisor that it is the standard of the government and they prefer it*" (RS0, p. 46, 1583-1584).

Individual business units were defined by their activities. As a result of the business units' specialisations, different types of actors existed within them. Within the government's computing environments, the various business units depended on each other, in order to execute their mandates. Based on the view of an analyst programmer who manages systems, "*even if it is us IT supporting the system, this system is under a different directorate, it is under lower courts, so they will manage it in lower courts and when they are stuck they involve IT*" (RS14, p. 65, 2258-2260) This has resulted in some of the actors to be engaged in more than one business unit's activities.

Similar to human-to-human interactions, there were technology-to-technology interactions within the computing environment. For example, some technologies such as servers and middleware, including operating systems, were used to enable and support various management information systems. This was not done in a vacuum. They were operationalized and managed by the IT specialists.

Non-technical actors were referred to by their roles (e.g. programmer, business analyst) that they undertake in the various business units. Through the assignment of roles, all actors acquire responsibilities and therefore they can be held liable for their actions and interactions. The roles were defined in accordance to the organisational structure. The organisations' processes, activities and procedures were carried out through the structure, so was the channel of communication by employees including the managers. An employee stated: "*We have a decision making, the project committee, and then we have a project control and we have consultants and the users. And these are the people making the decisions" (RS14, p. 63, 2179-2180).*

Technical factors as well were employed based on their capabilities to fulfil the Ministries' unique goals. To accomplish these goals, the technical actors interacted with other technical actors and as well as with the non-technical actors.

The various Information systems and technologies implemented in business units interacted with each other through various means, such as sharing of data, accessibility to information and procedures, even though they were centralised. Integrations of different types systems and technologies enabled an ease of interactions and collaboration amongst processes and activities in the Ministries. Technologies such as hardware (e.g. server) interact with their other hardware through their compatibility and connectivity. When it came to the selection of technologies in their computing environment, one of the IT deputy directors stated, *"the different technologies must be able to communicate and be compatible*" (RS13, p. 53, 1797).

In the Ministries, technical actors also interact with the non-technical actors. Systems and technologies interact with the various employees to reproduce other systems and technologies. For example, Systems and technologies such as programming languages (e.g. visual basic) were used to develop systems (for business units), and implemented through servers and networks. This means that during these activities the technical actors were used by the non-technical actors as tools for carrying out their tasks. A senior programmer from one of the Ministries enlightened on the tools they used for the applications development, "*For web development, we are using open source content management systems and on the software development we are using java net bean 7.3 .1*" (RS01, p. 27, 394-395).

Process and procedures are used by the technical actors during their interaction with both technical and non-technical actors. The various processes and procedures outline the steps undertaken by the systems and technologies when interacting with each other. However, the processes and procedures were not always followed or adhered to by the employees. The reason being that some employees were not aware of the procedures in place; as such it was never communicated to them by their management. An analyst programmer's response to the policies she applies was, "*honestly I don't know. I am just an ordinary employee, I have people above me that sit in those management meetings*" (RS14, p. 62, 2131-2132) and others felt that the use of procedures was not always rewarding. One of the analysts' programmers who felt otherwise about her job procedures stated, "*Of course they are boring, every time you have to install something you have to put the password*" (RS02, p. 7, 223-224).

The use of processes and procedures were intended to ensure consistencies, uniformity and standardisation in the computing environment. According to an interviewee, "*the policies obviously are the frameworks of operation. The policies help build the boundaries through which systems should be operated, procured, implemented and maintained*" (RS03, p. 17, 586-587).

Also, the non-technical actors were recruited in the organisations based on their skills and knowledge. Employees acquire their skills and knowledge through various means such through institutions of high learning and on the job training. Skills and knowledge are applied by the employees as they interact with other employees and with the technical actors. Non-technical actors interact with each other through various means of communication. The communication can be formal or informal, and employees use both or either when carrying out the organisational activities. During interactions, actors use rules and standards to guide their actions and maintain order.

Actors' interactions were sometimes planned in order to determine the types of actors that were needed, why they were needed, and if they have the necessary competencies required to be part of the network. According to the interviewees, "*Permanent secretaries among other things have meetings on a daily basis and they would normally discuss the issues that affect the operations of government*" (RS03, p. 17, 603-605) and (RS01, p. 2, 56-58). "*The users, managers and IT technical persons, will sit together and they will look at the needs, what's the importance of the system, what the system should be doing, how the users should interact*

with the system". However, due to the complexity of the activities and the various actors that were involved, some interactions were not planned or intended, making them occur unexpectedly. Therefore the outcomes of various actors' interactions were not always anticipated, in that there was no guiding standard. According to one of the Ministries analyst programmer, "*There are no criteria or processes we are following. We should put it in place but we don't have one in place*" (RS14, p. 64, 2203-0224). This has a negative impact on how some systems and technologies were selected, implemented, and managed. The interviewee further expressed her dissatisfaction on a lack of standards, "*there was no proper communication; and then there was another project that was running, when these consultants left there was no proper hand over*" (RS14, p. 65, 2240-2241).

In many projects, some actors encountered challenges. As opined by one the interviewees, "*there are challenges and they are everywhere*" (RS02, p. 5, 165). The challenges impacted the actors' performance in the selection, implementation, management, and use of systems and technologies. Some of the challenges were the result of business units' requirements which were not properly articulated, or followed a standardised approach. There were also relationship issues between the actors from the business and IT units. An interviewee expressed her views on management support, "*Most of the times the supervisor or management does not want to avail themselves to the development, they come to us later after the implementation, saying no but it's not what we wanted"* (RS13, p. 56, 1923-1926). This happened primarily because there were no guiding principles and standards.

Challenges encountered by the technical actors include systems and technologies getting obsolete, as well issues with integrations and compatibilities. Technologies obsolete occur when the systems and technologies do not support the business units' functionalities. In the view of one of the Ministries' senior analyst programmer, "*In most cases when you are developing a system, you make sure it is supporting the business then later you see that the business is growing, then the system is no longer satisfying the needs of organisation*" (RS10, p. 42, 1441-1443) These have led to organisations acquiring new technologies that can effectively and efficiently support their business processes. Within the government Ministries' computing environments, new as well as legacy systems and technologies coexist. This was the view of an interviewee; *"if the system is working and technology is still supported, we only improve it*" (RS13, p.57, 1962-1963). Legacy systems are part of the

Ministries' computing environment because of their capability to support the various business needs.

New and legacy systems and technologies encountered communication challenges due to various hardware incompatibilities. Due to incompatibilities, various databases and systems applications encounter challenges of integrations. The IT director asserted that, "*It makes sense to have integrated systems overall than systems that are stand-alone items where they do not speak or work in unison*" (RS03, p. 17, 579-578). Having un-integrated systems and technologies across the business units lead to challenges such as data inconsistencies. A chief systems administrator briefly explained systems challenges that they encounter; "*you can get a system that can be interoperable, however when it comes to data, the system cannot capture certain types of data*" (RS01, p. 1, 23-25).

Non-technical actors encountered various challenges as well. Systems and technologies are constantly changing due to technological dynamics and business requirements. As a result, the organisations are always challenged by how to improve and maintain their employees' skills and knowledge to be at the same pace with the latest technologies. The deputy IT director who was concerned about the availability of skilled employees explained that "*There is a lack of knowledgeable people and secondly is the skill structure that never happens the way it was supposed to. By the time the IT personnel is at the same pace with the company that implemented the technology, there is something new on the market so the IT personnel never catches up with the new technology" (RS01, p. 3, 102-103).* Due to the lack of a skilled workforce within the Ministries' computing environments, some have outsourced part of the systems and technologies' activities as they were not capable of performing. An analyst programmer interviewee elaborated why their Ministry considered outsourcing; "*sometimes we don't have the know-how and the projects are really big*" (RS12, p. 47, 1708). Where outsourcing was viewed as not being the best solution, Ministries had their employees sent for skills development trainings or new skilled employees were recruited to fill the skills gap.

The aims and objectives of the Ministries are carried out through projects. This means that both human and technical actors' actions are needed for the organisation's goals and objectives achievements. Purposely, both human and technical actors are employed in the Ministries in order to carry out their activities as well as supporting and enabling competitiveness. By implication, actors play significant roles in projects within the

Ministries' computing environment. A deputy IT director from one of the Ministries stated that "*when I was discussing about talking to users; they should also include their directors because as a body they could see the overview of the system"* (RS013, p. 56, 1927-1929). The various roles that the different actors perform are of equal significance to other actors within the same project or other projects. The equal significance of the human and technical actors is brought by the premises that both actors involved in an activity have a significant impact on the outcomes of that activity. For that reason, if any of the actors' actions will not be of significance, they will not been part of that network.

In most cases non-technical actors consider themselves to be more important than their counterpart technical actors. The technical actors cannot perform their own action without some sort of human intervention, so as a result the systems and technologies rely on the human actors to carry out their actions. However, on the other hand the human actors need technical actors to carry out their activities with ease.

Activity Theory: Object

From AT perspective, an object is the motive or goal to which an activity is directed to, and from which an outcome is expected. An Object motivates actors' actions as they carry out their activities. The Object can be technical or non-technical. Technical Object includes Systems and technologies. Humans and their ideas are examples of non-technical Objects. The goal is shared by the actors participating in an activity. It is urged by the theory not to confuse the object-oriented aspect of the activity with the object-oriented term that is used in the computer programming field. The term is primary used to describe and discuss why the activity is in existence.

The activities, processes and the general operations of the government were considered to be of importance and sometimes critical. Those were the basis of the motive for selecting, developing and managing various information systems and technologies, such as management information systems, operating systems, and servers across the Ministries. Primarily, the information systems and technologies were used to support and enable the government's activities and processes aimed to improve services. An analyst programmer expressed her views on why their Ministries acquired certain information systems and technologies as follows: "*Some of our activities and processes are currently executed manually, and in order to improve on efficiency and effectiveness, we chose to deploy*

information systems that could help us achieve that goal" (RS14, p. 60, 2071-2072). Another motivation for the deployment of certain technologies, such as the E-Government, was to support and enable ease of information dissemination across the government Ministries' computing environments.

Across the government Ministries, the business units had various motives for deploying information systems and technologies. The motives played a role in how the technologies were developed (or selected), implemented, reused, and maintained. Some of the motives included security and business continuity. An example was the constant maintenance of the system, "financial integrated management system (IFMs)" whose goal was to ensure security and reliability of processing financial activities, in order to mitigate against security vulnerability.

The motivations were articulated by both the technical (IT) and non-technical (business) directors, managers and other stakeholders, such as technologists. One of the employees responsible for systems maintenance at the Ministry of Justice cited an example where non-technical and technical aspects, together had to motivate for a system as follows: *"in our organisation, the Magistrate, Prosecutors, and the IT directors were the ones who motivated for the deployment of the Case Management System (CMS)"* (RS01, p. 62, 2133-2135). Such motivation was done in accordance with the Ministries' business needs.

The motivations from both technical and non-technical actors within the government Ministries were articulated, defined and categorised into organisational goals and objectives. These were further categorised into long term or short term goals and objectives. The long term and short term goals and objectives were considered strategic and operational, respectively. Strategic was the future intent of three (3) to five (5) year periods, and the day-to-day activities were referred to as operational.

The selection, development, implementation and management of information systems and technologies were guided by both the strategic and operational goals and objectives. In the selection, development, implementation and management of information systems and technologies, the motives were communicated and shared among technical and non-technical people in the Ministries. A systems programmer briefly explained how such information was communicated in their Ministry: "*Before a system is implemented we have a regular meeting,*

which happens every Friday, until the implementation of the system is complete. During these meetings we revisit the motives, and discuss the various challenges which could affect the system" (RS14, p. 62, 2150-2151). The regular meetings were to get buy-in and encourage the employees' participation in the projects (system implementation).

Both the technical and non-technical employees were always involved in systems and technologies deployment in the Ministries. For example, the non-technical people defined the systems and technologies' functional requirements which were translated into the technical requirements by the technical people in order to support and enable business needs. The systems and technologies were developed (bought), implemented and managed by the technical personnel so as to achieve the expected outcomes from the information systems and technologies. According to one of the interviewees who was a Chief systems administrator (as at the time of this study) at the Office of the Prime Minster, "*The users present their demand or requirements, which were intended to enable and support efficiency and effectiveness in their activities, and we as the technologists respond to such requirements"* (RS07, p. 32, 1101-1103).

The goals and requirements motivated and influenced the employees' actions when carrying out their activities. The goals guided the employees' operations towards the activities' outcome. Without such guidance it would have been challenging or impossible to motivate the employees towards achieving the Ministries' desired outcomes. However, within the Ministries' computing environments, not all information systems and technologies' goals were compelling to the extent that some projects were terminated and others abandoned, for various reasons, such as lack of track, trace, and accountability. A system programmer from the Ministry of Justice shared her frustrating views as follows: *"There was a consultant working on this system but the contract was terminated by the Ministry so as a result there is no proper documentation to follow*" (RS17, p. 64, 2208-2210).The lack of track and trace was due to the lack of commitment from the employees that were involved in the projects. Another contributing factor was a lack of resources, such as finance and skills which were required to support and enable the organisational activities.

The lack of commitment by some employees was attributed to poor or limited communication between the management and their subordinates. This led to a misunderstanding of the outcomes and expectations from many of the employees. An

interviewee stated: "*I did not know that we were going to have a system. I got to know through a report, in which tasks were assigned to my name. From there on, we were given specifications that contained expectations"* (RS17, p. 63, 2171-2172). Another critical factor was that not all employees that were involved in a project shared the same motives and understanding.

Some employees were motivated by their personal goals and this had an influence on their actions, from the perspective of commitment towards achieving the organisational goals and objectives. This could be attributed to the lack of performance measurement. The lack of performance measurement had an impact on the activities that were performed by both employees and vendors (suppliers included). According to one of the interviewees who was a deputy IT director, the explanation was as follows: "*There was a company that responded and won a tender to supply and install MAC computer software. Unknown to us, the company did not have the capacity and capability to carry out the tasks, their interest was purely monetary gain and not service. As consequence and implication, we had to train some of the employees, so that they could understand and partake in the project"* (RS13, p. 55, 1886-1888).

Activity Theory: Rules

In AT, rules are used to guide actors' performances in their activities. Rules are therefore the policies, regulations, norms, and cultural practices that guide and govern actors in their activities, within context and overtime. This is an interaction amongst actors during the execution of their individual and group tasks.

Rules in the government Ministries' computing environments included policies, regulations, and legislations. Without these rules it would be difficult for the Ministries to govern and manage their activities towards achieving their goals and objectives. For example, without the policy that regulated the technology platforms, the Ministries would have various types of hardware, such as compatible and non-compatible hardware. Some policies were viewed either from the business or IT unit's perspectives, meaning that they were used to govern the specific unit activities. The IT policies focused on the governance and management of activities, such as e-governance deployment, hardware selection and implementation, and software development and replacement. The business policies governed the various

Ministries' business units on strategic and operational activities. Both policies were applied within the computing environment.

The IT policies were formulated and developed by IT directors at the Office of the Prime Minister (OPM) in collaboration with the deputy IT directors and other managements from the various Ministries. An interviewee explained about the Ministry's IT structures as follows: "*The IT in the Ministries is made in a such a way that all the IT directors are at the OPM and the different Ministries are only seconded with deputy IT directors*" (RS09, p. 37,1257-1260). The policies entailed the types of software and hardware that can be developed and implemented in Ministries and how they should be implemented and maintained. The policies were drilled down to the employees at operational levels through different communication channels such as weekly business unit meetings.

Policies and regulations were applied in the selection, development, implementation, maintenance and usage of the information systems and technologies. The policies and regulations governed and regulated the employees' actions when carrying out such activities. According to one of the Ministries' IT deputy directors; "*We do not just select information systems and develop. There are legislative and other international laws that we must consider. The laws guide us when we are carrying out our duties"* (RS13, p. 55, 1814-1818).

When a need for information systems and technology arises within a Ministry, it was first communicated to the OPM for approval in terms of whether the required systems and technologies complied with the defined policies and standards. A Chief Systems Administrator from the Ministry of ICT stated that "*the users, managers and IT technical persons developed the information systems and technologies requirements. This was done with the guidance of the OPM, because for all of the information systems and technologies in the Ministries, they should be approved by the OPM"* (RS01, p. 2, 56-59). In cases where the specifications were not conforming to the policies and regulations, they were either considered for amendment or they were not approved at all.

Policies and regulations were intended to govern and regulate employee actions. However, not all employees acted in accordance to the rules and regulations. Some rules were viewed as not applicable to the business needs. These types of rules were rather developed to benefit those in power, meaning to protect the executive management in their decision making, regarding IT activities. According to an IT Director who was responsible for the Ministries' systems development, "*because many of the Directors were appointed based on their*

political affiliations, a majority of the policies are driven by political principles. When policies are not implementable at the specific time because we are at the specific stage that will not allow the implementation, many politicians complain. What they don't understand is that we technical people do sometimes have challenges with implementation" (RS04, p. 24, 844-849). Other employees did not use the policies because they were not aware that certain policies were in place. The lack of awareness could be attributed to the employees' arrogance (attitude), which made them careless to check or explore which policies were available. Another factor that was attributed to the lack of awareness was communication. Some of the employees claimed that their superiors did not communicate the available policies to them. One of the interviewees who was asked about the policies that were used in her Ministry respondent as follows: "I *do not follow rules and I don't know if there are rules in place, I am just an ordinary employee"* (RS14, p. 70, 2402-2405).

Some regulations and policies enabled and at the same time constrained activities in the selection (development), implementation and management of information systems and technologies in the Ministries. For example, due to the policy that stated that all hardware and software acquisitions should first be approved by the OPM, most of the time the process took long before feedback was communicated back to the respective Ministries, thereby hampering service delivery. As a result, the activities were put on hold while the users waited for the supporting desktops. It was emphasized by one of the system analysts that "*sometimes when we want specific applications such as AUTOCAD software for the engineers; when we consult the OPM they do not always approve the procurements as they were not the usual software applied by the majority within the government Ministries*" (RS12, p. 47,1596-1598).

In the computing environment, the promulgation of policies and regulations was intended to maintain order and consistencies, including the standardization of processes, systems, and technology. Human actors were tasked to enforce and apply the policies and regulations in the various units. An IT director for quality assurance explained the role of policies as follows: "*Policies are there to regulate and to enforce the performance of organisations' activities. They need to be in place so that people may know what to do as well as what not to do*" (RS08, p. 35, 1204-1206). The application of policies was intended to promote the standardisation of activities. According to the director of Systems Development, "*policies give directives from which standards are implemented. For example the policy may state that the information systems must be made interoperable and then interoperability standards will be followed*" (RS04, p. 24, 828-832). Due to the standardisation of activities, employees

carried out activities and interacted with each other according to the defined and documented processes. In the absence of activities standardisation, there will be disparities of activities and processes. One of the interviewed Senior Systems Analyst who shared his views on standardisation of activities stated; "*The standardisation of activities ensured formality within the government Ministries. Otherwise if it was not for standardisation, everyone can just do activities in their own way and we will end up having disorder*" (RS10, p. 43, 1479-1481).

However, standards were not always adhered to in the computing environment of the Ministries. For example, Java programming language was selected and used for system development because they had the skilled personnel in the organisation. This is irrespective of the fact that many of the employees, including the executive management subscribe to standardisation. An employee who is an IT director also shared her view on standardisation of activities*: "It is always a good thing when there are standards involved because there will always be certain quality that will come up. It doesn't matter who the people involved are that work on that project*" (RS06, p. 27, 926-928).

Policies and regulations were viewed to be an important aspect of the Ministries' computing environment. Emphasising on the importance of policies, an IT director from the Ministry of ICT explained as follows; "*Policies are the frameworks of operation, they build the boundaries in which information systems should operate, be procured, implemented and maintained. There is not a working environment without policies as polices are the guiding document*" (RS03, p. 53, 484-587). Not complying with the existing policies was viewed to be a serious offence and responsible parties were held accountable through various ways, such as suspension or contracts of employment terminated. The measures were to enforce employees to comply with the defined rules and regulations.

The various rules and regulations were not often replaceable. Policies were not often replaced, this was due to the various reasons such as that management felt the policies in place were still applicable to the current situations and therefore there was no need to change. Others viewed the replacement of polices to be a costly process. An IT director opined as follows; "*Our policies don't not change very often. If the policies in place are still applicable, we just amend to add the new aspects*" (RS17, p. 86, 3054-3056).

Activity Theory: Community

Community refers to a group of interdepended individuals to which actors belong when carrying out activities. The various government Ministries made up the computing community. The government Ministries's computing environment community was made to serve the entire government.

Various communities existed within the government computing environment such as IT directors, systems analysts, systems administrators, analyst programmers. The communities were formed according to the organisational structures. Also the employees' skills and knowledge of the activities that were performed within the communities played a role in how the communities were formed. A Systems technician from one of the Ministries shared his views as follows: "*The chief systems administrators have higher qualifications and much more experience, so they know the most appropriate software and operating systems to use and which ones would be appropriate for the whole ministries*" (RS16, p. 80, 2778-2780).

The selection, development, implementation and management of the information systems and technologies were carried out within the various communities. Employees that performed the activities belonged to at least one of the communities. According to one of the Ministries' System Administrators; "*When users identify a problem, it is given to people under different specialisations. If it is a network problem it will go to the network specialist, if it is development it will go to the developers. If it is analysis it will go to Systems and business analysts"* (RS09, p. 37, 1272-1278). Due employees' specialisation in various areas, some of the employees belonged to more than one community at a time. For example, one of the IT Directors responsible for the Ministries' systems development belongs to the IT directors' community as well as to the programmers' community, as such he also did applications development.

Different types of tools existed within the various communities. The tools were used by the employees in the selection, development, implementation and maintenance of the information systems and technologies. Each community had policies and regulations that guided and governed the employees' actions. An IT director from the OPM stated; "*Various applications are governed by different legislations and this has influenced the way the information systems are implemented and integrated across the Ministries"* (RS04, p. 22, 771-772). Tools, policies, goals and objectives were shared among the communities as they interacted.

The various communities interacted differently. For example the directors' community did not interact very often as compared to the other communities. The directors' interaction was done at a strategic level. The strategic level informed operational levels where you have communities such as analyst programmers and systems analysts. These communities at operational level mostly had weekly meetings to discuss matters of significance with regards to the information systems and technologies in their Ministries. This promoted collaboration, unification and information sharing among the operational communities' members.

The communities were not independent of each other. Therefore the importance of each community was taken into consideration. An interviewee opined as follows; "*When we want a system, we consult all the units for their views, because different units handle things differently or they have different criteria and we need to incorporate all that in our development*" (RS09, p. 37, 1275-1278). One community has an impact on the rest of the communities during the selection, development and implementation as well as in the maintenance of information systems and technologies. Within the government Ministries' computing environment, many employees take for granted the influence and dependency between the different communities. According to a Systems Administrator; "*When it comes to upgrading and the replacement of technologies, it entirely depends on the networking people, not the users. It's the networking people that keep up to date with what is new in the market and what are the security issues in the market. The users only want systems that make work easier*" (RS07, p. 32, 1097-1101). As such, some communities were neglected and not involved in the selection, development and implementation of the information systems and technologies. This attributed to the complexities of disjoint and lack of business units and IT alignments.

The Communities also encountered challenges. Challenges influenced the way the hardware and software were selected, developed, implemented and maintained. One of the interviewees, an IT director shared his views as follows: "*When it comes to standards, our biggest challenge is finding knowledgeable people who understand how the standard works and who can evaluate the technologies to determine if they best fit the standards*" (RS04, p. 20, 702-709). Challenges such as shortage of programming skills among the programmers' community led to the government Ministries outsourcing some of their information systems development activities. Outsourcing was viewed to be a costly process. In most cases there

was a lack of skills transfer from the consultants to the various communities. Communities such as the programmers and systems administrators required skills transfer in order to be able to re-use and support the systems applications, servers and hardware. Due to the lack of skills transfer, government Ministries are dependent on the consultants throughout the information systems and technologies lifespan. One of the interviewees who felt the same stated*; "When we make use of consultants it's not guaranteed that we will be able to fully take over a certain system and be able to support and maintain it after the consultants are done. Hence we always rely on the consultants to be around to offer support because they know and understand how the system operates*" (RS17, p. 85, 2951-2954).

Activity Theory: Division of Labour

Division of labour is concerned with how the tasks are divided among the individuals or groups within the community. It represents task specialisation and the sharing of activities among the actors.

Within the government Ministries' computing environment, employees were allocated various tasks such as project management, systems analysis, systems administration and application development. Based on the task allocation, the employees assumed different roles in the selection, development, implematation and maintanance and usage of information systems and technologies.

Division of labour was viewed to be crucial in the government Ministries' computing environment. It allowed for the sharing of activities within the business units and for every employee to have responsibility when perfoming activities. A Chief Systems Administrator shared his views as follows: "*Our resposibility as IT people is to be part of the selection process and ensure that whatever is being selected conforms with the network standards and it is compatible and able to be integrated with other technologies*" (RS17, p. 85, 2931-2933). Task allocation was done according to the employees' competency in relation to what the activities entailed in the various projects. According to an IT director; "*The IT staff are skilled. When a new system is implemented, it is just a matter of sending them on training to ensure that they will be able to support the system*" (RS17, p. 85, 2921-2923). Employees were allocated tasks by their superiors (managers). Through the tasks allocated, empoloyees gained power and status as well. Information Systems and technologies depend on factors

such as effieciency and effectiveness to succeed. These factors are driven by the power and status that employees hold. One of the employees resposible for system maitanance stated; "*We are the ones implementing the software and doing systems troubleshooting, but the Chief systems administrators are the higher authority and they choose the most critical systems and do major decision making*" (RS16, p. 80, 2782-2784). To some extent, because of the power the empolyees posses, they take away some activities from certain individuals and groups within the Ministries.

5.4 Conclusion

The chapter presented an analysis of the data collected from the four Namibian government Ministries. The analysis was carried out through the socio-technical Activity Theory (AT). The application of AT components in the analysis enabled the researchers to identify technical and non-technical factors that influence the selection, development and implementation of information systems and technology. It could have been difficult or impossible to identify and understand such factors without the lens of the theory.

CHAPTER 6
FINDINGS AND INTERPRETATION

6.1 Introduction

This chapter focuses on the interpretation of the findings. The findings resulted from the data analysis presented in chapter five. The interpretation of the findings is carried out to further elaborate and gain a deeper understanding of the phenomena being studied. The interpretive approach was used for the interpretation to gain a better understanding of the information technology, process and people and how they influence each other in the Namibian government-wide Ministries' computing environment.

The chapter is structured into four sections. In the first section, findings from the data analysis are presented and discussed. The second section presents an interpretation of the findings. In the third section, the framework is presented and discussed. A conclusion of the chapter is finally drawn in the last section.

6.2 Findings from Data Analysis

Based on the analysis of the data as presented in chapter 5, some factors were found to be of significant influence in the development, implementation and management of EA within the context of the Namibian government-wide environment. The factors include business process, communication, lack of awareness, roles and responsibilities, actors' relationships, collaborative, technology selection processes and consultant dependency. Figure 6.1 illustrates the relationship, interconnectivity and dependence of the factors on each other. The factors are discussed below and they should be read with the figure to get a better understanding on how the factors influence EA.

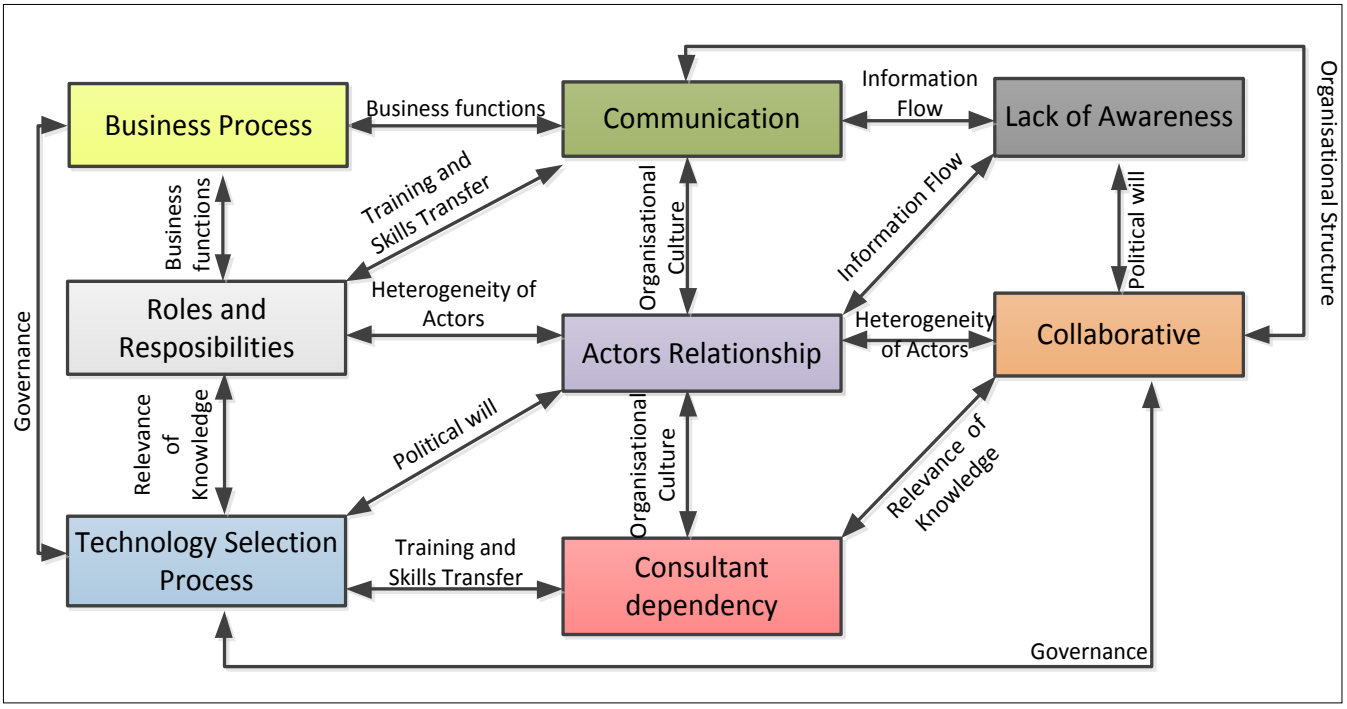

Figure 6.1: Factors influencing EA deployment in Namibian Government Ministries

i. Business process

Business processes define how the activities are executed and by who. They are used as guidelines by employees. Processes are of significance to the organisations' effective operations. How processes are communicated and interpreted by employees impacts the selection, development and implementation of technologies in the organisations. When not well defined, the business process leads to inconsistences and the duplication of efforts.

Processes are defined based on the various business functions. Business functions define the individual business's daily operations. These operations are the activities that uniquely differentiate the business unit within the organisation. Due to business functions' interdependency, processes are interconnected across the organisations. Interdependency calls for an understanding between the various business functions and processes. Not considering and a lack of understanding of business functions interdependence during the selection, development and implementation of information systems and technologies leads to process misalignments.

ii. Communication

Communication plays a vital role in the selection, development and implementation of information systems and technologies. How business process, needs and technology needs are communicated to the employees impacts their involvement in the organisational activities.

Communication is done according to the policies and standards defined. This ensures a governed interaction among the employees. The communication process is influenced by the organisational structure. Employees at the operational level communicate on a daily basis as they interact with each other when carrying out their tasks.

Communication can promote a positive environment where there is sharing of information and knowledge. This leads to employees' full participation in organisational activities and as a result, new and fresh ideas are brought on the table. On the other hand, a lack of communication among the employees can hinder organisations' development. When the organisation's processes and activities are not well communicated, employees are reluctant to participate. Reluctance leads to conflicts and demoralisation among the employees.

iii. Lack of awareness

To achieve the organisation's objectives and goals; business processes, principles and standards are communicated to the employees. The communication process is not always constructive. As such, in some cases it results in a lack of awareness among employees. Due to the lack of awareness, activities are not always carried out as per defined standards. Awareness is impacted by the information flow in the organisation.

Information flow is done from top-down, from management to operational employees as well as from bottom-up, from the operational employees to the management. Effective and efficient information flow enables rapid business decision making and information sharing. The design, development and implementation of information systems aims to establish the value and importance of using information effectively across the various units of the Ministries, as well as the need to attain collaboration with customers.

iv. Roles and responsibilities

Employees participate in projects according to their roles and responsibilities. Roles and responsibilities are defined to ensure that employees carry out the tasks allocated to them.

The roles and responsibilities are discussed between the employees and the management. The negotiations between the employees and management is to ensure that both parties are aware and understand what is expected of them and to resolve roles and responsibilities conflicts.

Roles and responsibilities are assigned to employees according to the relevance of knowledge. Some employees are knowledgeable in more than one business function. As a result, there is heterogeneity of actors within the organisations. Due to the heterogeneity of actors, an actor can partake in various projects relating to the development, implementation, maintenance and usage of systems and technologies. The involvement of the actors within a project leads to the creation of actors' network. In actor network theory, a network is an interconnection of both technical and non-technical actors. Actors can belong to more than one kind of network. The actors' performance in a network impacts their involvement in other networks. As such, due to the commitments in other networks, they might not fully participate in other networks.

v. Actor relationship

Technical and non-technical actors depend on each other through their interaction. This could hold to the symmetry argument by actor network theory, which says that human and non-human actors are equal, and should be treated as such. Even though ANT has been criticised for such philosophical assumptions, the argument seems to reflect from the empirical evidence. Technical actors are used as tools to enable and to support employees when carrying out their activities. This is to promote efficiency and effectiveness within the organisations. On the other hand, the technical actors were selected, developed and maintained by the non-technical actors through the means of other technical actors. Actors' relationship is of importance for the organisations' operations. Without their interactions, it would be impossible to achieve the organisational goals and objectives.

vi. Collaborative

Actors in relationships collaborate. Collaboration is done by means of information technology, such as the E-Government. The technology was viable and feasible from two different perspectives; to eradicate duplication and enact synchronisation, including support and the enabling of real-time data across the Ministries.

Collaboration is crucial as business units are dependent on each other when carrying out their activities. Through collaborations, employees share ideas and resolve disagreements. This is seen as an effective way to support employees within the organisations.

vii. Technology selection process

Technologies are selected according to the employees' relevance of knowledge about business functions and information systems and technologies. The selection process involves actors from business and IT settings. This promotes understanding and collaborations between business and IT units within the organisations. The lack of cooperation between the two teams leads to conflict within the various projects. Rivalry on many issues during the selection, development and implementation process results into misalignments among business and IT processes.

The selection process needs to be controlled and managed accordingly. This was done through governance. Governance helps to maintain the scope and boundaries within which employees carry out their activities. Through governance, the principles, policies and standards are developed. Principles are guiding statements that guide employees' actions on a daily basis. Employees' interactions are done according to the defined organisational principles. Good principles lead to good professional work ethics and a collaborative working environment.

The purpose of standards is to ensure uniformity and consistency across the organisation. Process uniformity and consistency leads to ease of interaction among the employees as they are able to relate to one another about the processes in place. This ensures that the developed and implemented information systems and technologies are fit for supporting business processes.

Additionally, the technology selection process is influenced by politics. Politics is a manifestation of actors' relationships. Because of their roles and responsibilities, employees use their power to influence the selection process. In most cases it is carried to satisfy individuals or groups' personal interests rather than the organisation's business interest.

viii. Consultancy dependency

Technologies selected are either developed in-house or are outsourced. The rationale for outsourcing is due to the lack of technical know-how within the organisations. Outsourcing enables the organisations to acquire technological artefacts from other organisations that have the necessary skills and competencies. This allows the employees to focus and concentrate on other projects they are capable of managing.

Outsourcing entails the process of skills transfer by the consultants to the organisations' employees. In an attempt to acquire such skills, during the development and implementation process, employees are often involved and trained on how to use and maintain the technologies.

Due to the specialised nature of information systems and technology, in most cases skills transfer does not always take place as expected. This can be due to the systems complexities, and as such there is limited time for the employees to learn, adopt and acquire the necessary skills about the technologies.

Also the consultants feel that they are the custodians of the application hence they should be the ones responsible for applications and systems maintenance. This has a serious influence on the collaboration among the organisational employees and the consultants. As such, some actors do not fully collaborate and this negatively impacts skills and knowledge transfers within the organisation. As a result, the organisations constantly depend on the consultants for support as they are more knowledgeable about the implemented technologies.

6.3 Findings interpretation

Interpretation is primary carried out to gain a deeper meaning and understanding of the findings from the analysed data. The findings presented in chapter five were interpreted into factors, namely the Enterprise, Ministries, Information Systems and Technologies, and Society. The factors are depicted in figure 6.2 and are regarded to be crucial for the deployment of EA in the Namibia government-wide Ministries' environment. The factors are discussed below.

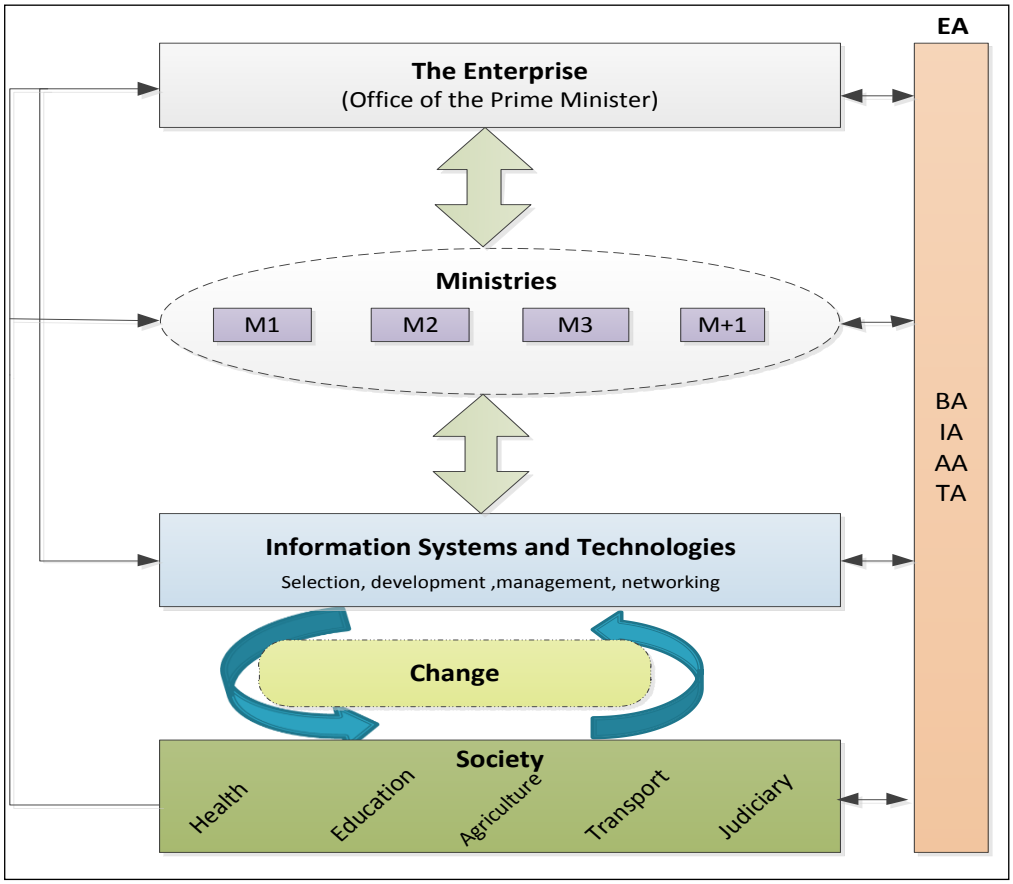

Figure 6.2: Information Systems, technologies and processes integration

i. The Enterprise

The enterprise represents the bigger organisation with all the connections to the external environment which includes business partners, suppliers, debtors, stakeholders and customers. In the Namibian government Ministries context, the enterprise is represented by the Office of the Prime Minister (OPM).

The OPM is mandated with the power to manage the selection, development and implementation of information systems and technologies across the entire government Ministries. Its responsibility is to ensure that the required IS/IT complies with the defined ICT policies and standards and to advise the concerned Ministries on the best practices and strategies to deploy and manage their supporting technologies.

As ICT needs arise within the individual Ministries, the Ministries communicate such needs to the OPM. The communication is carried out by the Ministry's IT deputy director.

However, not every employee was satisfied with the communication channels used to communicate the Ministries' ICT needs. Some employees felt that management discussed matters without involving them from the very beginning. This resulted in the deployed IS/IT not being fully supported by many employees in the organisation and as such some employees became resistant towards the organisation's projects.

Within the OPM, the selection, development and implementation of technologies involved actors from different backgrounds. Depending on the actors' roles and responsibilities, some used their political power to influence and manipulate decisions. As a result, some decisions were not made for the best interest of the whole organisation but rather to serve personal interests.

ii. Government Ministries

The Namibian government Ministries are defined according to the various sectors they are involved in. Some of the sectors include health, education, transport, agriculture and defence. Each Ministry has its own goals and objectives, hence their own resources in terms of process, technology and people. In an attempt to achieve their goals and objectives, the various Ministries have adopted information and communication technologies (ICT) to support and enable their organisational activities and processes. However, Ministries are often challenged with their ICT's operations. Some challenges include the development and implementation of the supporting technologies, compatibility and integrations issues. Such challenges prohibit the Ministries from obtaining maximum ICT's benefits.

Each IT division within the Ministry is headed by the IT deputy director. The director over sees the whole IT division and ensures that employees carry out their responsibilities accordingly. The different employees in the IT division perform different activities according to their knowledge and skills. In some instances, the employees specialised in more than one area. As a result, some employees belong to more than one network within the Ministries. Their participation in the organisation's projects was therefore influenced by their involvement in other networks.

In the Ministries, not all business units were aware what their IT division was doing. Some employees from the business settings indicated that IT is supposed to support their activities but they are not always aware of what they are doing. This was due to the lack of communication between the units (business and IT). Each unit felt that they were more superior to the others, so as a result there was often competition between the units rather than

working together. Through negotiations with various stakeholders, the Ministries aim to select and implement the best supporting technologies.

iii. Information systems and technologies

Ministries make use of ICT for various reasons such as to collaborate and share information from Ministry to Ministry, Ministries to citizens and Ministries to business partners. Such collaborations ensure that the Ministries have real time information required by employees and society at large to make informed decisions.

The selection, development and implementation of EA require knowledge and skills to succeed. As such, the employees interpret and understand the technologies based on their knowledge and skills. Skills in the organisation were acquired through formal schooling or through on-the-job training. However, knowledge and expertise was a major concern among the Ministries. In an attempt to resolve this challenge, the Ministries often outsourced activities and processes they were unable to deliver.

Also the deployment of IS/IT depends on both technical and non-technical factors for efficiency and effectiveness. However, in the Ministries, the technical factors were glorified more than the non-technical factors. Non-technical factors such as organisational culture and structure needed to be represented and understood across the organisation such as that employees' roles and responsibilities are formulated and communicated according to the structure influenced by the culture. Depending on the organisational culture, the activities and processes are legitimised.

The selection, development and implementation activities and processes are guided and informed by the business rules, policies and standards. The use of standards and policies must be well acknowledged among the IT and business units. Standards and policies enable uniformity and order necessary for achieving organisational objectives.

iv. Change

Organisational processes and activities are constantly changing. The changes are caused by the internal and external factors such globalisation, new markets and international laws. These changes impact the way society lives and conducts businesses. The impact can be both negative and positive. The organisation's survival and competitive advantage depends on how fast and effective it manages and responds to the changes.

Information systems and technologies operate according to their life span. Hardware such as servers, printers and computers function effectively for a period of three to four years. Due to the fast changing technologies, organisations often find it hard to keep up with the latest technologies. As a result, most organisations are operating with obsolete technologies. The application of obsolete technologies is often a challenge and as such, the technologies are not compatible and *integratable* with others.

As activities and processes within society change, they have an impact on IS/T. As such, IS/T need to be re-engineered and re-designed to support new processes and advancements in the society. Changes in the society are communicated to Ministries by different stakeholders. Based on the availability of resources (finance, business and technical skills), Ministries deploy the supporting technologies.

v. Society

Society is a collection of actors that share common interests. The society is comprised of actors with various needs such as health, transport and education. To offer better and improved services to society, the Ministries make use of information and communication technologies.

The application of ICT within society requires awareness. The awareness helps the society to understand the technological concepts and their applications. The communication channels used between the Ministries and society influences the ICT awareness.

vi. Enterprise Architecture (EA)

The development and implementation of information systems and information technologies is a challenging process. The process involves IT specialists, stakeholders and business staff with diverse and often conflicting goals. Enterprise architecture (EA) provides approaches and strategies to deal with such challenges. Through its various domains which include business, information, application and technical architecture, EA provides a holistic view of the Ministries' operations. In general terms, EA specifies how information systems and technologies are related to the overall business processes and organisational activities. The deployment of EA enables the Ministries to manage and govern their information systems and their supporting technologies to achieve and increase effectiveness, efficiency and minimise risks and inconsistencies via standards and governance of technologies. Due to environmental trends, businesses processes are constantly changing, causing changes such as obsolesce in IT. EA enforces change from current to the future at different levels and across

its architectural domains. These changes help to identify redundancies and obsolesce across the IS/IT infrastructures.

6.4 Enterprise Architecture Framework for Namibian Government-wide Ministries

Based on the analysis, findings and interpretations, a Framework was developed (figure 6.3). The Framework's aim is to guide Ministries and stakeholders in the selection, development and implementation of the EA.

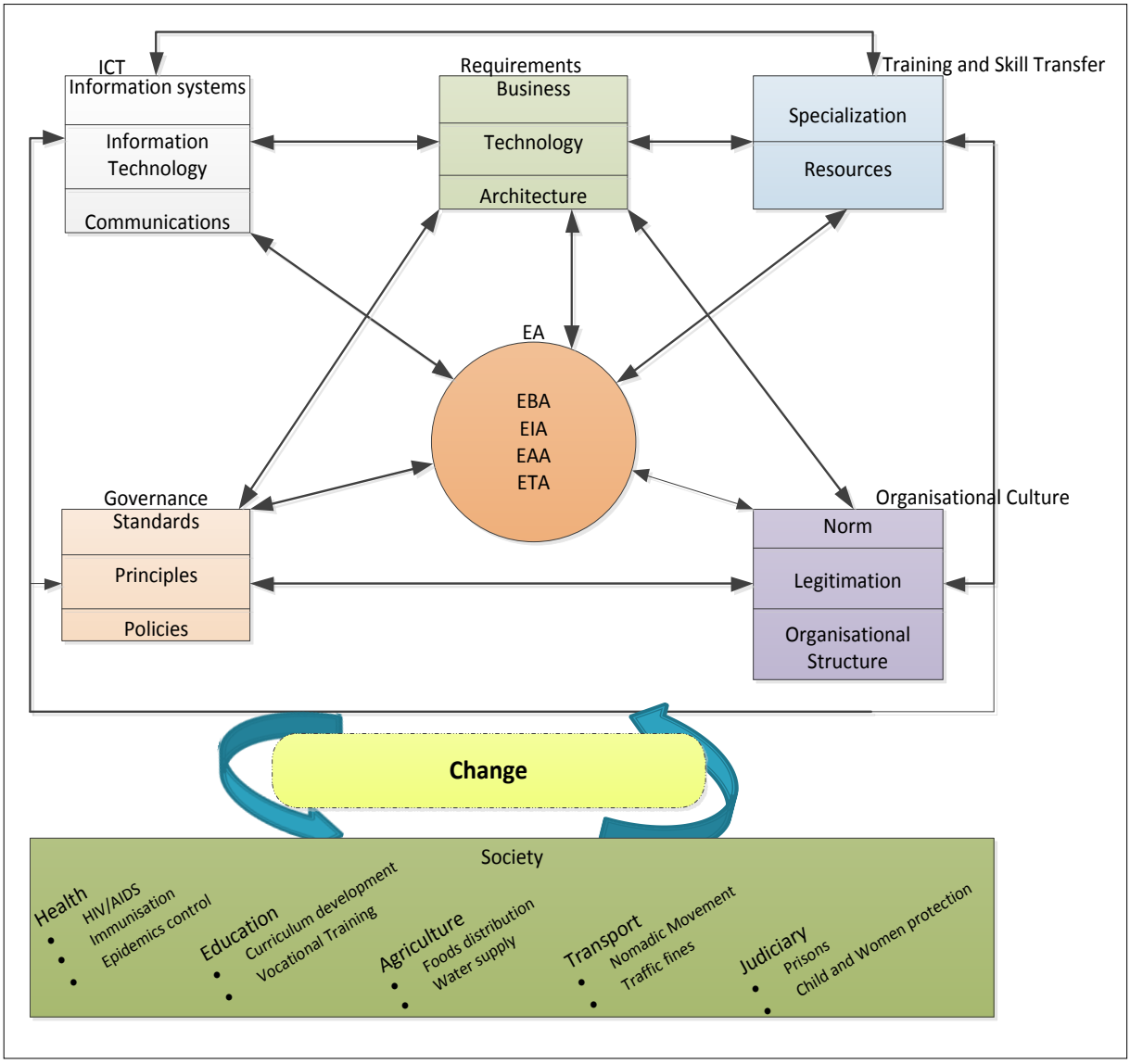

Figure 6.3 Factors that impact EA deployment

As illustrated in figure 6.3, above the most critical factors which impact and influence EA in organisations is clustered into information communication and technologies (ICT), requirements, training and skills transfer, governance and organisational culture. The factors are considered critical because of their impact and importance in the deployment of IS/IT as revealed from the analysis of the case studies. The factors are discussed as follows:

i. Information and Communication Technology (ICT)

The various Ministries have adopted and integrated information and communication technologies (ICT) into their business operations. Primarily this is because ICT supports and enables business process effectiveness and efficiency. It is argued that the use of ICT plays an essential role in solving problems and supporting decision making in various aspects of organisations (Khan & Zedan, 2010). This illustrates that organisations and individuals are partly or wholly dependent on technology for gaining a competitive advantage and to function efficiently. ICT embodies information systems (IS) and information technologies (IT).

a. Information systems (IS) and Information Technology (IT)

Information systems (IS) and Information Technology (IT) are socio-technical systems for managing information within an organization (Tiihonen, Luukkonen, & Mikko, 2010). It is further explained by the authors that IS and IT are purposeful systemic entities which consist of people, processes, information and technologies.

People in an organisation shape and guide IS/IT processes from selection, through development to implememtation. These are carried out according to the information communicated through the assigned roles and resposibilities. Silvius, de Waal and Smit (2009) reveal that the key success factor in the buisness' dynamic environment is IT supporting the business' strategies and processes.

However according to Jin, Peng and Kung (2010) business strategies and IT strategies are often disjointed. As a result, there is often misalignments between business process and IS/IT. Van Grembergren and De Haes (2009) define business/IT alignment as the fit and intergration among business strategy, IT strategy, business structures and IT structures. According to the authors, business/IT alignment is concerned with two questions: How is IT

aligned with the business? How is the business aligned with IT? Business and IS/IT alignment is important in order to obtain business value from IT artifacts. Enterprise architecture aligns business and information technology through its domains. Rouhani, Mahrin, Nikpay and Nikfard (2013) define enterprise architecture as a structure for business and IT within organisations. Consequently, Armour, Kaisler, and Huizinga (2012, p. 4229) uphold that "*EA focuses on a holistic and intergrated view of the why, where, and who uses IT systems and how and what they are used for within an organisation*". EA acts as a communication tool between aspects of businesses and IT infrastructures. Ross et al., (2006) assert that enterprise architecture involves ongoing negotiatians about an organisation's business strategy and how IT both shape and respond to that strategy. It aims to povide approriate IS/IT to support business strategies.

b. Communications

ICT plays a vital role in enhancing communications and work practices. With the advancements in ICTs, employees use ICT tools such as e-mail, chat room, bulletin boards and discussion group to communicate information, share knowledge and combine efforts across time and space barriers (Phang & Foong, 2010).

Communication plays a vital role in organisations. Through employees' interactions and collaborations, awareness about business process and policies is achieved. Indeed, Robbins and Judge (2013) explain that communication within organisations is a fundamental mechanism by which members show their satisfaction and frustrations.

ii. Requirements

Requirements represent the expectations, needs and desires of stakeholders about the information systems and their supporting technologies. These requirements are collected from various employees and business stakeholders. Giachetti (2010) argues that not getting the requirements right is a shortfall of projects that fail because if the project teams do not know what the stakeholders want, need and expect in the system, then they will not deliver.

a. Business

The business requirements are derived from the organisational processes, objectives and strategy (Iyamu, 2013). Organisational strategy defines how the organisation will be rendering services and products to customers to achieve the set objectives. Changes in business requirements bring new opportunities and challenges (Khan & Zedan, 2010).

b. Technology

Technical requirements provide guidance for the selection and deployment of the technical applications, software and hardware. Rapid changes of business processes and management processes make the IT life cycle significantly short (Wang, 2010).

c. Architecture

Iyamu (2013) reveals that the main requirement for the deployment of EA is to bridge the gap between the business and IT. Hence architectural requirements are collected from both IT and business. This is carried out by business and system analysts. Knowledge of the business processes is a pre-requisite for architectural work in any of the domains (Espinosa, Boh, & DeLone, 2011). This is because business process defined in the business domain provides directions required by other domains to work together inorder to deliver business efficiency. When enterprise architecture processes are well implemeted, they are a tremendous asset in finding effective ways to better use technology for the organisation's effectiveness.

iii. Training and skills transfer

Business and IT skills are crucial for enterprise architecture success. Many organisations are not able to develop and implement information systems and technologies primarily because they do not have skilled employees**.** Information systems can be built in-house if suitable expertise is available, or a consulting company can be hired to develop a system, explains Giachetti (2010). Iyamu (2011) points out that lack of skills results in poor performance and the inability to recognise and deliver the potential of the architectures. Ahlemann et al., (2012) believe that having the right people, with the right skills, in the right roles, doing the right things in a correctly empowered way is necessary for enterprise architecture benefits realisation.

To interact with technology, people have to make sense of it; and in this sense-making process, they develop particular assumptions, expectations, and knowledge of the technology, which then serves to shape subsequent actions towards it (Iyamu & Adelakun, 2008, p. 4).

The increasing demand for an understanding of business process and architecture has implications for the expertise of IT professionals (Lu & Lin, 2012). The interpretation of technology is different among employees and this is due to their level of understanding and skills.

Skills in organisations are acquired and transferred among employees through various strategies such as on-the-job trainings and certifications. Hendrickx and Daley (2011) assert that certification establishes a recognizable standard of knowledge and competency.

a. Specialization

Because of the uniqueness and specialised nature of enterprise architecture, there is a need for skills specialisation. The selection, implementation and deployment of technological artefacts involve many employees from different units of the organisation. These employees have a variety of specialised skills based on the business units' functionalities.

Employees' specialisation is defined by their roles and responsibilities. In organisations, employees specialise in more fields such as network administration, system administration, desktop support, analyst programming and business analysis. According to Gøtze (2013), enterprise architecture is practiced in different ways, and there are different types of enterprise architects with quite different roles. Based on their speciliasations, an enterprise architect is either viewed as a business architect, information architect, and application or techenical architect. It is adduced that due to the generic high-level nature of EA approaches, their tailoring and adaptation to specific domains, it is difficult and requires skilled and qualified resources (Antunes et al., 2011). Enterprise architects develop the strategy and enable the decisions for designing, developing and deploying IT systems to support the business as well as to assess, select and intergrate the technology into the organisation's infrastructure (Armour, Kaisler, & Huizinga, 2012).

b. Resources

Resources in organisations include employees, skills, time, finances, technologies, rules and policies. Chuang and van Loggerenberg (2010) noted that the allocation of resources indicates the deployment of internal resources such as the financial, human, technological, and physical infrastructure of an organization. The selection, development, implementation as well as the usage and maintenance of information systems and technologies is influenced by the availability of resources within the organisations. As such, resources can constrain or

enable business efficiency and effectiveness. According to Espinosa, Boh and DeLone (2011) in organisations, projects with little funding to implement will yield less benefits than a project fully supported financially. The allocation of resources is influenced by the power employees hold within organisations. Based on the power the management has, they can opt not to support or fully support projects. Most often IT projects in organisations come to a standstill due to a lack of resources.

iv. Organisational culture

Enterprise architecture operates in an organizational context and this context is shaped by organisational culture (Chuang & van Loggerenberg, 2010). Organisational culture shapes the organisation's management, attitudes and behaviours. Acknowledging this, Pishdad, Haider and Koronios (2012) assert that organisations are shaped by the interactions of the environment that they operate in, rules and norms imposed on them, behaviours of their internal systems, and cognitive patterns of their stockholders. Schwalbe (2014), highlights that organisational culture is a set of shared assumptions, values and behaviours that characterise the functioning of an organisation. Shared values help employees in an organisation to understand which actions are considered acceptable and which are unacceptable (Griffin & Moorhead, 2012). Influenced by the organisational culture, employees partially or fully participate in projects. Organisational culture is reflected through the norms and legitimised activities.

a. Norms

According to Robbins and Judge (2013), norms are acceptable standards of behaviour shared by the organisations members, which express what they ought and ought not to do under certain circumstances. Furthermore, it is argued by Sharma and Biswas (2012) that norms govern how employees behave, think, make judgments and perceive the world. Norms can be viewed to be good or bad depending on how they impact IS and IT success.

b. Legitimation

Activities and processes are performed within the organisations' environments because they are legitimised. Legitimations do not necessarily apply to good things, but due to the acceptance of certain forms conduct by the organisation, the employees apply such conduct when performing business activities. Management in organisations define and approve process and activities legitimacy. This is because of the power they hold as a result of their

positions in the organisational structure. Legitimised activities and processes become norms and form the organisational culture.

c. Organisational structure

Organisational structure refers to the hierarchy by which resources are arranged, shared and used within the organisations. In the view of Ahlemann et al., (2012), the right organisational structure is the key to effective EA execution. Employees participate in projects according to the organisational structure, hence the need to understand the organisation's structure.

v. Governance

Governance refers to the way flows of information, resources and goods are controlled by the relevant parties, the legal form of organization and the incentives to the participants (Casadesus-Masanell & Enric Ricart, 2010). Governance enforces organisations' boundaries required to ensure individuals and groups' full participation in organisational activities. The right governance will ensure that good decisions are made at the right time and in the right way, ensuring that enterprise architecture is delivered and sustained overtime (Ahlemann et al., 2012). IS and IT processes and activities are governed according to the established standards, principles and policies.

a. Standards

Standards enforce uniformity and consistencies in the selection, design and implementation of information systems and technological processes and activities. Applying standards ensures that actions performed by the various employees yield similar results.

The standards influence the selection, design and implementation of information systems and technologies. According to Ahlemann et al., (2012) standards are normally enforced, thus providing control. As such, software and hardware that do not comply with the defined standards are considered not suitable for the business environment and therefore are not selected. This ensures the acquisition of technology artefacts that will be able to support organisational activities.

b. Principles

Principles are formulated based on the business needs and technology practices. Iyamu (2009) defines principles as guiding statements of positions, which communicate the fundamental elements, truths, rules or qualities that must be exhibited by the organisations. The primary aim is to control processes and activities within the various business units.

c. Policies

Policies refer to the rules and regulations guiding organisations' operations. They intend to maintain order across the organisation. The policies are formulated and enforced through the organisational structure. In the absence of policies, it would be impossible to develop and implement information systems and technologies.

vi. Enterprise Architecture (EA)

Enterprise architecture (EA) provides a holistic view and classification of organisational activities and processes. Accordingly, EA is a tool that enhances the organisation in terms of the objectives pursued at the time (Iyamu, Mphahlele, & Hamunyela, 2014). This is done through its non-technical and technical domains. The domains which include business, information, application and technical architecture are depicted in Figure 6.4. The domains are discussed below:

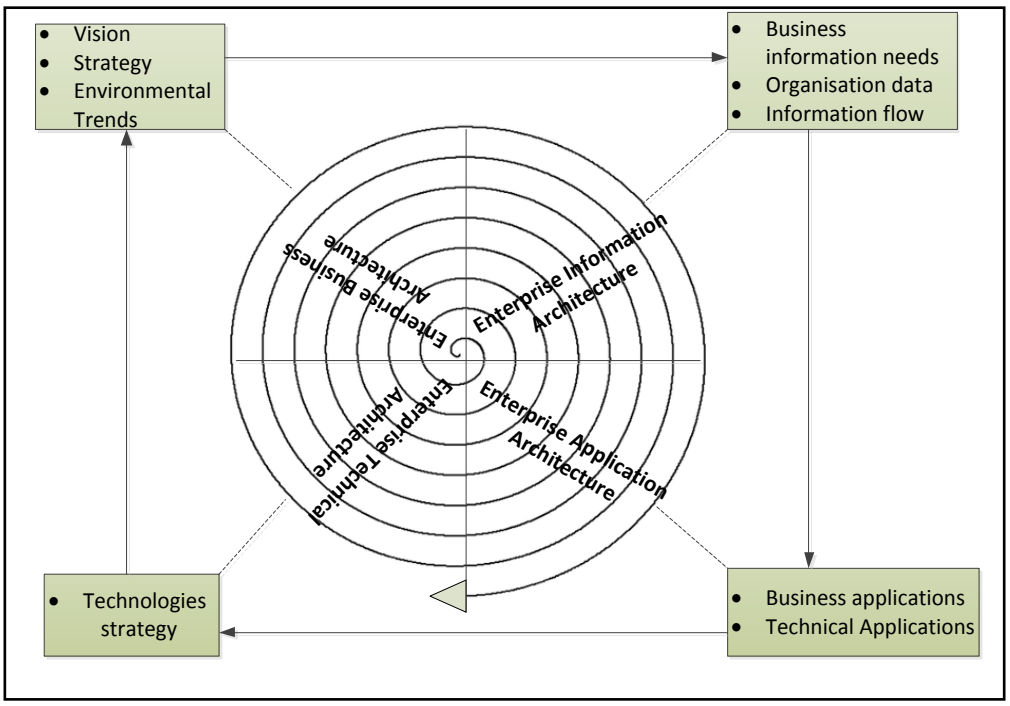

Figure 6.4: The role of EA in government Ministries

Enterprise business architecture defines the business needs and vision through the input of business strategy (Jin, Peng, & Kung, 2010). Business strategy defines what services and products the organisation will be offering to its customers and how it will generate income from such services. In the view of Hendrickx and Daley (2011), business architecture is used to define an enterprise from a business perspective and then leverages its formalized

description to govern and manage change and transformation. Any organisation is affected by the environmental trends in its business operations. Environmental trends refers to the factors such as labour law, market dynamics, customers and regulations that result from internal and external environments in which the business operates from. Wang (2010) points out that the function of business architecture is including the recognition and awareness to the environmental trends and changes, analysing and forecasting the market trends.

Enterprise Information Architecture (EIA) is concerned with the organisational data and the flow of information needed by employees to execute processes and activities. According to Jin, Peng and Kung (2010), EIA defines the organisation's strategic, tactical and operational information needs according to the business strategy. Information is of importance and as such, it enables the organisation's competitive advantage. Therefore information architecture intends to address information policies and governance necessary for information sharing and management across the organisation and its customers.

EIA provides the requirements needed to develop and implement Enterprise Application Architecture (EAA). Phang and Foong (2010) point out that the application architecture provides a blue print for the deployment of applications, describing specifically the relationship among applications and business processes. Applications are categorised into either business applications or technical applications. Business requirements guide the development and implementation of business applications, while the development and implementation of technical applications is according to the technical requirements. Both applications are the focus of the application architecture and as such, they complement each other for business efficiency and effectiveness.

Technical architecture defines the organisation's IT strategy. Iyamu and Adelakun (2008) define IT strategy as the technical design which serves as the road map over a period of time for the implementation of information technology and information systems by people using a formal process. In light of the above, enterprise technical Architecture (ETA) describes the standards and structure of the technology infrastructure, which are the hardware, software, networking and communication platforms, which are necessary to support the applications and data management needs (Espinosa, Boh, & DeLone, 2011). The architecture provides the technology foundation to support other architectures and enables the organisation to plan for hardware and software technologies.

The domains are interconnected and implemented sequentially, from business to technical architecture as depicted in figure 6.4 above. Song and Song (2010) define EA as an iterative, incremental and continuous process. Organisations are continuously challenged by changing environmental trends. To maintain competitive advantages, organisations need to constantly improve and re-engineer business processes and supporting technologies. The arrows indicate the sequence of the domains development and implementations. Iyamu (2013, p. 7) observes that the sequential order is primarily to architect and manage the flow of processes, activities and events in the organisation. As a result, the completion of one domain initiates the development of another domain.

6.5 Conclusion

The findings presented were of significance because of their influence and impact in the development and implementation of IS/IT across the Ministries. The interpretation enabled a deeper understanding of the findings. The understanding is of primary importance as it helps the researcher to answer the "why" and "how" questions that are needed to achieve the study objectives. Therefore based on the analysis, findings and interpretations, a framework was developed. Both technical and non-technical factors were considered in framework development.

CHAPTER 7
CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This chapter presents the study conclusion and recommendations. Both the conclusion and recommendations are influenced by the findings from analysis and the researcher's subjective interpretations of the findings. Semi-structured interviews and documents were used as data collection techniques to collect data from the case studies. The study applied activity theory as a lens during data analysis. The theory enabled the researcher to view beyond the normal settings, hence the findings of technical and non-technical factors that could impact the deployment of EA in the Ministries.

The remainder of this chapter is organised as follows: In the first section, the chapters presented in the study are summarised. The second section outlines the evaluation of the study. Theoretical and practical contributions of the research are presented in section three. In section four recommendations are presented according to the findings and interpretation of the data analysis. Benefits on the study are outlined in section five. The benefits are twofold: contribution to existing body of knowledge and also to the further research and investigation in this field of work. Lastly, section six concludes the study. The conclusion provides the summary of the entire study. In this section all the aspects of the study are concluded in order to realise the study objectives.

7.2 Summary of the study

In an attempt to attain the defined study objectives, the study was structured into seven chapters. All chapters were of significance to the study. The significance of each chapter is summarised as follows**:**

Chapter 1

This chapter gives readers a summarised view of what the study entails. Outlined in the chapter are problem statement, research objectives and research questions as well as research methodology.

Chapter 2

This chapter presents the literature review based on the study keywords namely: Information and Communication Technologies (ICT), Enterprise Architecture (EA), Government-wide. The study consulted various published works for an understanding of the technical factors and non-technical factors that impact and influence the deployment of EA in organisations. Included in the chapter also is the literature review of Activity Theory (AT) which was used to underpin the study. The theory's six components were examined further to justify the theory's suitability to analyse the collected data.

Chapter 3

The chapter describes the research methodology undertaken to accomplish the research objectives. The research methodology encompasses research strategy, design, data collection and analysis. Selections of the method and data collection techniques used were influenced by the study objectives and research questions. To ensure data collection effectiveness, data collection questions were formulated from the main research questions.

Chapter 4

The main focus of the chapter is the background information on the four Ministries used as case studies. The Ministries granted the researcher permission to carry out the study and provided a suitable computing environment to examine and understand the selection, development, implementation, maintenance and usage of ICT. The areas covered in the chapter included the individual Ministries' objectives and services, IT departmental structure and employees' roles and responsibilities.

Chapter 5

In this chapter the collected data is analysed. Activity theory (AT) was used as the analysis technique. The theory's six components (tools, object, subject, community, division of labour and rules) were used as lenses to analyse and identify what technical and non-technical factors could impact the deployment of EA within the Namibian government-wide Ministries. The factors are illustrated in figure 6.1, on page 91.

Chapter 6

The findings and interpretation is presented and discussed in the chapter. An interpretive technique was used to make sense of the findings in order to understand how the factors could impact EA success. To attain this, the researcher used her skills as a social being to try and understand meanings attached to the actors' behaviours. Based on the findings from data analysis and their interpretation, a framework was developed and discussed as well in this chapter.

Chapter 7

This chapter provides the study's recommendations and conclusion. The chapter combines the content of all the chapters. It provides a summary of the entire study and presents the benefits to the body of knowledge and for further research, as well as the contribution of the research, which refers to both the theoretical and practical contribution.

7.3 Evaluation of the study

The study aimed to identify factors that could impact the deployment (development and implementation) of EA in the Namibian government Ministries context and based on such findings develop a framework that can be applied by the Ministries as organisations to plan, develop and implement information systems and IT needed to support their business operations.

To achieve the above mentioned aim, three objectives were formulated. As presented in Chapter 1, the objectives of the study are as follows:

1. To identify and examine the factors that can impact the development and implementation of Enterprise Architecture in the Namibian government Ministries environment.
2. To examine how EA can be used to integrate systems and technologies within the government Ministries in Namibia.
3. To assess and understand the role of Enterprise Architecture in the government Ministries.

In order for the above outlined objectives to be accomplished, research questions were articulated. Similar to the research objectives, the research questions were also presented in chapter 1 and 3. The questions are as follows:

1. What are the factors that can impact the development and implementation of enterprise architecture in the Namibian government Ministries environment?
2. How can EA be used as tool for the integration of information systems and technologies within the government Ministries in Namibia?
3. What is the role of Enterprise Architecture in the government Ministries?

To gather data pertaining to the development and implementation of ICT across the Namibian government Ministries, semi-structured interviews and documents analysis techniques were used as data collection methods. The semi-structured technique allowed for respondents and researchers to seek for clarity and further probing on aspects discussed during the interview process. Data collection questions applied during the interview process were formulated according to the three main research questions. This was primarily to maintain uniformity and consistencies among the interviewees. During the interview process, the researcher also used follow up questions. The follow-up questions enabled the researcher to do further probing on the aspects that were of significance to the study. Due to the limited time to cover and provide detailed data about all aspects during the interview process, documents were also used as a data collection method. Documents acquired provided supporting evidence about the technical and non-technical factors that were part of the Ministries' computing environment and influenced the environment under study.

The interview conversations were recorded using a voice recorder and they were later transcribed. The collected data was then analysed using Activity Theory (AT). From the analysis, findings were identified and subjectively interpreted. The analysis and findings interpretation enabled the study to gather evidence required for the objectives fulfilment and to draw the study conclusion. Below, the interviewees' opinions and views are summarised according to the research objectives and questions:

Research objective one: To identify and examine the factors that could impact the development and implementation of Enterprise Architecture in the Namibian government Ministries environment.

Research question: What are the factors that can impact the development and implementation of enterprise architecture in the Namibian government Ministries environment?

From the four Ministries that were used as case studies, the factors that can impact the deployment of EA were analysed and interpreted together.

Before interpretation, data was analysed through the lens of Activity Theory (AT). Findings from the analysed data were subjectively interpreted and the researcher applied her own understanding to make sense of what and how factors impacted information and communication technologies in Namibian government Ministries.

Interviewees shared different views and perspectives with the researcher during the study, which formed parts of the data analysis. Some of the views and perspectives are further summarised as follows:

Across the Ministries, various factors were identified that impacted the development and implementation of information and communication technologies. Figure 6.1 in chapter six illustrates the findings. The impact was either positive or negative. The significance of each factor was dependent on the individual interpretation, which was informed by the level of skills and knowledge.

Communication and collaboration within the Ministries was viewed to be a critical aspect for ICT success. Communication was carried out according to the organisational structure. Some interviewees revealed that top management discussed issues that were of importance and influenced their performance, but they were not part of such collaborations. As a result, these created a lack of awareness among the employees.

Business functionalities influenced the selection of technologies. Business units within the Ministries performed different activities, so as a result there were different forms of technologies to support the units' uniqueness. Most often because of the various stakeholders involved in the selection, development and implementation, it was hard to reach agreement. This could be attributed to stakeholders' different understanding of the benefits of

information systems and technologies and as such, some felt technologies will only be benefiting some business units and not the entire organisation.

Roles and responsibilities were allocated according to the employees' relevance of knowledge in business and technologies areas. Some employees were specialists in more than one area. As a result, they often belonged to more than one group of employees. According to actor network theory, when actors belong to more than one network of actors, it is referred to as the heterogeneity of actors. Due to the heterogeneity of actors, not all employees participated in the deployment of technologies. In some cases this negatively impacted the employees' relationships within the organisation. The relationship between the business and IT units was seen as a critical factor, particularly in the areas of roles, responsibilities and ownership related to information systems implementation.

According to their roles and responsibilities, employees gained power and authority. Employees used their power to constrain or enable activities in their organisation. The deployment of technologies was also political and as such, some employees selected technologies to serve their political interests rather than for organisational efficiency.

Due to a lack of technical support within the Ministries, most of the development projects were outsourced. Skills transfer among the different employees was a challenge, so as a result the organisations were dependent on consultants for systems maintenances.

Organisational working culture was perceived to be flexible. Because technology was constantly changing, not all employees were able to keep up with the latest technologies. In such cases, it was considered legitimate to move employees to areas they are competent in. Although the environment was perceived to be flexible, the employees' actions were constrained by the organisational rules and regulations. Governance was intended to guide and maintain order in the organisations. This promoted ethical and professional conduct within the computing environments. To successfully implement and maintain information systems and technologies, standards and policies were defined. However, because of the employees' power, not all complied with the defined policies. Some policies were viewed to be unnecessary and causing employees' performance delay.

Research objective two: To examine how EA can be used to integrate systems and technologies within the government Ministries in Namibia.

Research question: How can EA be used as tool for the integration of information systems and technologies within the government Ministries in Namibia?

To deliver effective and efficient services to their customers and business partners, the government Ministries have offices country wide. The integration of systems and technologies are ideal in order to promote collaboration and communication among the Ministries and their clients. The respondents provided information concerning the integration of systems and technologies. The responses are summarised below:

The Ministries' computing environment constituted of various types of information systems and technologies. The technologies were of importance as they enabled the organisations' goals achievements. According to majority of the employees, information systems and technologies were not integrated. This was due to various reasons such as:

- Legislations governing systems: Due to different legislations governing systems, it was challenging to integrate systems. The legislations were a result of individual business units' functionalities.
- User privacies: It was revealed that some users feared that integrating systems would violate their users and departmental privacies. There were also differences of ownerships once systems are to be integrated.
- Lack of systems documentations: It was a challenge to integrate existing technologies with new technologies acquired in the organisation because systems and technologies developed by consultancies were not appropriately documented.

However, employees revealed positive attitudes towards systems integrations. It was revealed that not integrating systems was costly because it caused operational delays as information was not shared on time. The interviewees opined that information technologies integration is crucial because it eases communication and speeds up processes.

Research objective three: To assess and understand the role of Enterprise Architecture in the government Ministries.

Researches question: What is the role of Enterprise Architecture in the government Ministries?

It was evident that EA was not fully implemented within the Ministries. This was due to lack of knowledge and education about EA in organisations. Among the interviewees there were no roles such as information architects, business architects or chief architects, rather roles and responsibilities such as systems analyst, analyst programmers and systems administrators were common within the computing environments. The majority was puzzled by what the study meant by enterprise architecture.

EA is intend to reduce the cost of deployment, maintenances and management of technology and processes in the enablement of Ministries' goals and objectives. It does this through the elimination of non-value adding and redundant activities.

Some employees, especially from the business settings revealed that the IT specialist made decisions without informing them, and as a result they were not aware of how IT is supporting them. The deployment of enterprise architecture will bridge the gap between business and IT units. EA brings union between organisational components through its technical and non-technical domains.

The primary aim of the IT division is to enable and support the business units via applications, information systems, internet and networks. How this aim was articulated and communicated was important. It was evident that there was a lack of awareness among employees as a result of inappropriate communication channels used to communicate processes and policies. The types of communication channels used impeded information flow across business units. The intention of EA through its information domain intends to improve on information accessibility and manageability. Information shared across the organisation was regarded as strategic information.

In the view of IT specialists, information systems and technologies are always changing and involving. As a result, it was revealed to be challenging to keep up with the technologies

involving pace. EA acts as a change management tool. Through gap analysis, the Ministries are able to assess the current state of the information technologies against the desired state as reflected by the business requirements.

IT artefacts were perceived to be costly. Due to the cost factor, out-dated technologies were still applicable. Unfortunately, old technologies were considered not user friendly and causing frustrations among employees. With EA in place, it enables Ministries to outline the life cycle and appropriate use of all hardware and software products in the organisation. It models the technology environment, including infrastructure configuration and management. The models provide views of the recommended technologies and a basis for assessing the impact of new or replacement technologies within the context of the technologies being considered.

The empirical data confirmed the importance and criticality of standards. According to the interviewees, standards promoted consistencies and uniformity in their environments. If it was not for governance, employees will not be committed to the organisation's projects but rather to their personal goals as declared by one of the directors. EA provides a standard selection, development and implementation methodologies of hardware and software that will assist Ministries to respond to the rapid changes of business processes. This will promote acquisitions of technologies that are compatible and integratable.

Through the holistic view, business process, activities and supporting technologies, EA is able to communicate principles, standards and policies to stakeholders, and facilitate understanding. EA architects are specialists who are able to communicate such needs due to their high level of understanding of business and IT strategy.

The development and implementation of information systems and technologies require an in-depth understanding of technical needs and business requirements. In most cases employees were sent for training to acquire the necessary skills but due to the specialised nature of systems and technologies being developed and implemented, skills transfer does not always occur as intended by management. EA as an iterative process ensures planning and training of employees that align with changes of business processes and IT infrastructure.

Research Aim: To develop a Namibian government-wide framework that can be applied by the Ministries to plan, develop and implement information systems and IT needed to support their business operations.

To achieve the study aim, the study employed semi-structured interviews as a data collection technique. Data collection questions used were guided by and formulated according to the above-mentioned research questions. Data collected was analysed by means of Activity Theory (AT) as illustrated in chapter five. Findings from analysis were then interpreted to enable an understanding of the findings.

From the findings' interpretations, it came to light that the Ministries encountered challenges with the selection, development and implementation of information systems and technologies. The challenges were a manifestation of both technical and non-technical factors.

Technical factors included

- Information systems
- Information technologies (hardware and software)

Non-technical factors included

- Organisational structure
- Organisational culture
- People and processes
- Policies and standards
- Political power

The framework development took into consideration both factors, primarily because in both case studies both factors impeded the deployment of technologies within the Ministries' computing environments. Information systems and technologies on their own were considered effortless; as a result process, employees' skills and knowledge and how the organisational structure and culture were utilised influenced and impacted technologies and business effectiveness and efficiency. Figure 6.3 on page 100, represents the framework. Within this framework, technical as well as non-technical factors represented.

7.4 Contribution of the research

The contribution discusses the study inputs to society. The study used four government Ministries as case studies. Both cases were Namibian government Ministries. The Ministries welcomed the study and provided the researcher the opportunity and support to conduct the research within their computing environments.

The contributions of the study are in two fold. They are theoretical and practical. This section outlines both theoretical and practical contributions as follows.

7.6.1 Theoretical contributions

The application of Activity theory (AT) as a lens for data analysis enabled the study to highlight non-technical factors that impact the deployment of technologies. The factors included processes, skills and knowledge, policies and people. Interviewees from all Ministries shared their concerns about these factors. The significance of non-technical factors was according to individuals' relevance of knowledge in the area of specialisation. In some cases these factors were underestimated or rather ignored. The study contributes to the understanding of the social relationship between technology, people and process. The study elaborated about the significance of these factors.

7.6.2 Practical contributions

Similar to the theoretical contributions, the theory lens helped to unpack how both technical and non-technical factors interacted and were applied in the organisations. From IT specialists, it was evident that technologies changed constantly. As a result, there was a lack of alignment between the employees' skills and knowledge and the latest technologies on the market. For employees to be competent in their roles and responsibilities, organisations invested in employees' training and seminars. Information systems and technologies effectiveness and efficiency calls for communication and understanding between IT and business units. The study identified that the business units' participation was not considered significant.

The study also provides a practical guide which can help researchers and management in their attempt to employ Activity Theory as a lens in information systems.

7.5 Recommendations

The recommendations offered are derived from the data analysis and interpretations. The findings outlined the influence and impact of the technical and non-technical factors on the selection, development and implementation, maintenance and usage of information systems and technologies.

It was revealed from the Ministries that the deployment of technologies was dependent on the availability of technical know-how and support. Due to a lack of local support, some technologies were not opted for. Employees were recruited on the basis of their qualifications

and skills in the areas of information technologies. But due to a shortage of skills in some areas, the organisations were often dependent on outsourcing from enterprises outside the country. Challenges such as inappropriate skills transfer, lack of systems and process documentations and costly investments were some of the challenges that the Ministries encountered. Skills and knowledge are essential for technologies deployment and application as technologies understanding is influenced by individual knowledge. Without relevant skills and competencies organisations will encounter many challenges that will prohibit them from realising information systems and technologies benefits. As a result, the Ministries need to invest and develop training initiatives. The training initiatives should be aligned with technologies supporting their business environments. This is to ensure that the employees' skills are up to standard with the evolving technologies.

Data collected indicated that the majority of employees have an understanding of what is the role of standards and policies in their working environment. As much as there was a strong emphasis on the importance of policies and standards, employees felt that some of the policies are unnecessary and out-dated. It is recommended that new policies should be renewed and redeveloped for them to be applicable to the constantly changing Ministries' business environments. Most of the policies were developed and implemented immediately after the colonial regime however they are still being applied.

Communication was one of the non-technical issues discussed by all the organisations. Among the interviewees, the junior employees were more dissatisfied with the ways of communication and collaborations within the Ministries. Information systems and technologies' success depends on how they were communicated and interpreted to various shareholders. A majority of the employees at the lower level of the organisational structure felt that top management discussed matters of concern without involving them. As a result they were often just instructed to carry out procedures they were not aware of. The employees also felt that communicating issues to top management was not satisfactory as it often took long before feedback was communicated back to them. This created tension and led to demotivation among employees. The organisations should therefore clearly define communication approaches and channels as communication is essential for awareness creation and it promotes information sharing and knowledge creation.

The selection, development and implementation of technologies were also politically driven. As such, some employees used the power they held because of their roles and responsibilities

within the organisational structure to serve their personal political interests and not organisational needs. Politics emerged as a challenge in the deployment (development and implementation) of technologies. Employees used power as a tool to enable or constrain organisational activities and processes. This resulted in some projects being allocated more resources than others. In addition, this influenced the relationship between IT and business units. The relationship between business and IT is of importance and needs to be understood for information systems and technologies success. This calls for business units and IT units politics to be considered and governed.

7.6 Benefits of the study

The study recognises benefits of the study towards the existing body of knowledge and to further research. Both benefits are discussed as follows:

7.6.1 Body of knowledge

A body of knowledge represents the existing literature within the field of research. The study presented evidence to build upon qualitative research, IS/IT and EA. It was evident from the data collected that there was a lack of EA awareness and development and implementation in the Namibian government Ministries. The study provided empirical evidence of the factors that could impact the deployment of EA in the Ministries. Non-technical and technical factors impacted information systems and technologies success.

The study contributes to the understanding of the criticality of relationships between people, technology and process in the implementation of EA in the organisations. IT highlights the importance of the non-technical factors in the implementations of technologies and EA. This helps stakeholders, business managers and IT managers in terms of decision making during the deployment of EA. The study also contributes to the academic domains as it emphasises on the importance of skills and training in both business and IT fields. Study findings can lead to addressing the skills gap.

Another contribution of the study is to IS research and the application of the social theory, namely Activity Theory (AT). The theory provided a lens to study IS/IT as socio-technical activities that are developed by people as they interact with other subjects in their environments. The results of the study emphasise on the need to recognise and understand the relationship between technical and non-technical factors, how they influence and impact each other in the achievement of defined goals and objectives.

7.6.2 Further research

The study findings indicate that IS/IT does not only depend on technical factors to succeed. There was also a need to study and understand non-technical factors. In most organisations these factors are often under-represented. It is urged that future studies should focus more on the non-technical factors and their impact on technologies deployment. This is primarily because challenges encountered by organisations with their technological artefacts were manifestations of non-technical factors such as communication, organisational structure and skills and knowledge transfer.

Activity Theory (AT) components (tools, subject, object, community, division of labour rules) were applied to gain a good understanding of technical components and roles and responsibilities and processes which were used to guide the development of the organisation's activities within the computing environments. The rationale for using the theory is because these factors (technical and non-technical factors) were not easy to interpret, hence the use of a lens to underpin factors in the perspectives of what, why and how things occur in the way they do.

It is recommended that further studies make use of other socio-technical theories to fill the gaps that Activity theory could not examine. Such a theory was not suitable for studying how technological innovations were communicated, adopted and diffused within the organisations. The application of Diffusion of Innovation Theory (DoI) can help bring more light into such areas. There is also a need to apply Actor Network Theory (ANT) in order to understand better the impact of the heterogeneity of actors as it was revealed that due to some employees belonging to more than one group of employees, it contributed to a lack of commitment to organisational projects. There is a need to focus on the actors' networks and relationships as they impact communication and collaboration among employees. It was evident that the selection, development and implementation of IS/IT was political as employees used their political power to dominate computing activities. It is therefore recommend that future researches apply the theory of structuration (ST) to make sense of how power is associated with the exploitation of rules and resources in organisations.

7.7 Conclusion

This chapter is an overall synthesis of the thesis chapters. The study investigated the factors that could impact the deployment of EA in the Namibian government Ministries environments. According to the empirical data gathered, technical and non-technical factors were a challenge.

The study collected data from four cases and data was subjectively analysed. The data analysis as illustrated in chapter five was carried out through the lens of Activity Theory. It was evident that the deployment of information systems and technologies was intended to increase organisations' efficiency and effectiveness and competitive advantages. However, the development and implementation of information systems and technologies was not easy as the organisations are meant to believe.

There were communication issues among the various communities within the computing environments. Most of the issues were a result of organisational structure. As one moves below the organisational structure, there was a lack of information flow. This created tensions and confusions among the employees, leading to reluctances to participate in projects. The result is a non-collaborative environment which impacted information and knowledge sharing.

Skills and training were viewed as critical in the organisations. IS/IT were selected based on the employees' relevant knowledge. It was evident that there was a lack of a skilled labour force. As a result, the organisations outsourced most of their development projects. Resources allocation was influenced by the political will. Employees used their political power to serve their personal interests rather than the overall organisation's benefit. This calls for an urgent need for the governance of computing activities and processes.

The application of Activity Theory in information systems helps to identify and understand the roles of technologies, and the connection between technical and non-technical factors. Both factors significantly impact the deployment of IS/IT and should not be undermined. There is a need for management support and IS research collaborations. Through this a better understanding of the factors is gained.

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