A DIVESTMENT FRAMEWORK FOR IT GOVERANCE:
Case Studies in a South African mining industry

by

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THESIS SUMMARY

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ABSTRACT

Business divestment tends to be the result of a change in the business strategy or due to changing economic circumstances that force a company to either close or demerge business units that are no longer profitable or do not fit the company's profile. Business divestment strategy forms part of a company's long-term business goals to ensure long-term viability, maximise return on investment and to maintain the company's competitive advantage. Business divestment strategies are often a result of a company that needs to reposition itself with regard to its competitive position in the market. Divestments and closures are often described as strategy's missing link.

The South African coal mining industry is a mature industry spanning a number of decades; as a result, a large number of collieries have closed down and numerous others are approaching end of life and will cease production in the near future. Mine closure or divestment is an instrument of strategy to free up capital and resources and to assist the business to refocus on core activities and to reverse over-diversification. The business success of a

divestiture is usually evaluated by the measure of success in achieving the underlying strategic goal that was set when the divestment strategy was adopted. Strategy decisions need to embody a sound governance foundation. Al internal departments and operations need to be aligned with the company's goals and strategy and should persevere in focusing its actions on obtaining these goals.

The goal of this study is to identify what the essence, content and characteristics of a divestment framework for IT governance should be. In order to achieve this goal, the research focused on the following objectives as reflected in the research question, sub-research questions and chapter divisions:

- To create an understanding of the South African mining environment, but more specifically the coal mining industry by depicting and describing the impact of the macro and market environment in strategy formulation to align with a mine closure or divestment decision.
- To establish the impact of a divestment strategy on the IT governance model and IT-business alignment and determine the steps that IT and business should take to ensure alignment in order to support a divestment strategy.
- To determine if any of the existing IT governance frameworks and standards could be implemented or adopted to serve as a divestment framework for IT governance.
- To establish what the content and logical steps for a divestment framework for IT governance should include and how it should be deployed.
- To test the proposed divestment framework for IT governance for validity and soundness at the hand of three case studies.

As a result of the literature review and study conducted for this thesis, the author determined the following specific dimensions pertaining to the fundamental building blocks of a divestment framework for IT governance to support company divestment, more specifically mine closure:

- The IT department needs to understand the role it needs to fulfil in the company to support the achievement of the company's business strategy. Information systems and infrastructure are deployed to influence unparalleled business proficiencies, merge and divest companies and business units, restructure industries, and expedite global competition. The company's IT strategy needs to align itself with the business strategy in order to support the company when a divestment strategy is implemented. Because of the complexity and inter-relatedness of Information Technology systems and infrastructure with the rest of the business units business processes, a divestment initiative should include the steps that need to be taken to *de-integrate* or disentangle the IT infrastructure and IT portfolio from the rest of the company.

- Poor or misalignment of business and IT embodies itself in various ways, such as expensive IT investments generating low returns, the establishment of highly plausible applications that are neglected, the existence of avoidable inefficiencies, delays and redundancy. The augmentation of IT to company achievement is a sphere where the idea of fit of IT and business strategy is particularly relevant. No solitary activity will empower a company to attain and preserve alignment. There are no silver bullets. The technology and business biospheres are too progressive. Actualising alignment is metamorphic and necessitates concentrating on maximising the promotors and minimising the obstacles that ameliorate the integration of business and IT. It demands strong accords and leadership, compelling communication and pertinent prioritisation.
- IT governance resides in the ambience of the company's umbrella regulatory environment. Governance guarantees the evaluation of available options, that implementation is suitably supervised, and attainment is monitored, and these similar principles relate to IT governance. The alignment of company objectives and IT is primarily about governance and only occasionally related to technology. IT governance consists of defining the rules and constructing the proficiency to run IT to create value for stakeholders. The progression of IT governance occurs at the junction of and in reaction to corporate proceedings and an inconstant environment. The mixture of corporate practices that have evolved over time and the contemporary encumbrances spawned from a dynamic environment cater for the evolvement of IT governance. The evolvement of IT governance, in turn, envelopes the evolution of IT governance for a specific company and circumstances that impact IT governance.
- A number of IT governance frameworks are available and postulate an IT governance model that consists of numerous definitions and foundations. These frameworks have a diverse variety of strengths and weaknesses. Companies might consider the deployment of particular components from a number of frameworks and standards to form the company's unified and comprehensive IT governance framework. Despite the existence of a variety of protocols, such as IT control frameworks, models and standards, the persisting nature is theoretical. Control frameworks tend to be viewed in isolation from one another and implemented in an ad hoc approach that boils down to an inefficient IT governance system, focusing on either strategic or operational areas, but never on both simultaneously. All currently available IT governance frameworks are management frameworks, and most of them generally conform to the management processes for the provisioning and deployment of new IT infrastructure or governance mechanisms. These frameworks do not address the concerned areas in the IT environment when moving from the limited focus of the supply, maintenance and support of IT to consider the broader

question of how companies actually use, and ultimately dispose of IT when a divestment strategy is implemented.

- Although some studies exist on the topic of IT integration and integration processes, and on decision making models during mergers and acquisitions, no studies could be found that provide guidelines on how to de-integrate IT software systems, infrastructure and architecture during a business unit divestment or mine closure process. A need exists for a decision support model or governance framework that is based on the characteristics of a business unit divestment or mine closure process. This model should outline and represent the variables that influence the untangling decisions and the relationship between them. The IT governance framework created to fit the operational model of the company exactly provides a number of benefits, such as identifying business opportunities, risks, benefits and impacts, establishing IT standards, policies and guidelines and guaranteeing uneventful transformation with regard to policy, employee productivity, transaction changes, efficient support and technology infrastructure. Therefore, the company's strategic intent should form the foundation for the implementation of solid IT governance conventions, assuming that the fundamental tactical and operational objectives already exist.
- In the application of the final version of the divestment framework for IT governance, which is influenced by best practices, suitable governance processes prescribe a holistic approach and direction to perform efficiently and effectively as the instrument to ensure business-IT alignment and the management of the IT component when a divestment strategy is implemented. The divestment framework is fundamentally a decision support model or governance framework based on the characteristics of a mine closure or business unit divestment process. The divestment framework for IT governance outlines and represents the variables that influence the untangling decisions and the relationships between them.

PUBLICATIONS

1. Wolmarans, A., Kruger, C.J. & Croft, N. 2016. “Company Divestment: Applicability of Existing IT Governance Frameworks,” *IJCANDI,* (1:2), pp. 30 - 35.
2. Wolmarans, A., Kruger, C.J. & Croft, N. 2016. “IT Governance and Business Alignment in Support of a Divestment Strategy,” *Global Journal of Management and Business Research: G Interdisciplinary,* (16:2), pp. 28 - 35.

CONFERENCE PAPER

1. Wolmarans, A., Kruger, C.J. & Croft, N. 2016. “Alignment of the IT Strategy and Governance Model with a Company’s Divestment Strategy,” *International Journal of e-Education, e-Business, e-Management and e-Learning,* (6:2), pp. 103 - 110.

UNDER REVIEW

1. Wolmarans, A. “Mine Closure: The Role of Business-IT Alignment,” *Journal for Sustainable Mining*.
2. Wolmarans, A., Kruger, C.J. & Croft, N. “IT Governance and Managerial Divestment Framework,” *MIS Quarterly.*

OVERVIEW: MAP OF THESIS CHAPTERS

To bolster the deliberation and flow of discussions in this thesis, each chapter commences with a chapter map that is a vivid representation of the core components in the chapter. To comprehend the linkage to the particularised graphical representation, the subsequent characterisation renders a synopsis of how the chapter maps are associated. The chapter maps are presented as a catalogue of the core structure, structural focus and theoretical debate of this thesis. The maps render an overview of where all the chapters fit into the thesis, what the main theme of each chapter is and the line of argument is presented. The chapter maps are not catalogued as diagrams or figures in the thesis, as the maps do not contribute to its discourse. The maps serve as a *location* guide to facilitate following the line of thought of the research.

As may be seen in Chapter Map 1, the thesis is based on a systematic evaluation and consideration of two of the main dimensions of a divestment framework for IT governance. The first dimension of the core structure covers the theoretical viewpoint underpinning a divestment framework for IT governance and the second dimension considers the essence, content and characteristics of such a framework in practice at the hand of a case study and testing it for soundness and effectiveness. The thesis ends by adding an integration dimension in which the theoretical perspective and practical implementation of the divestment framework for IT governance is refined by applying it to two other similar case studies; this assisted in developing the final version of the divestment framework for IT governance in a South African coal mining context.

Within the scope and context of the theoretical viewpoint of a divestment framework for IT governance, the structural focus highlights the core concepts covered in literature; these relate to the role of the political, economic, social, technological, ecological and legal (PESTEL) framework in a mine closure or divestment strategy and competitive forces to shape company strategy, the alignment of business and IT strategy and IT governance and the problems and concerns leveraged against the identified concepts. It reviews and presents a consideration of the dimensions of strategy, business-IT alignment and IT governance definitions and how these concepts have been described over time when approached from a theoretical perspective. When referring to the divestment framework for IT governance, the thesis focuses on the structure of and support for a divestment framework for IT governance and ultimately on the execution steps in the IT divestment process.

Chapter 2 serves as an introductory chapter that aims to create an understanding of the South African mining environment, more specifically the coal mining industry by depicting and describing the impact of the macro and market environment in strategy formulation aligned with a mine closure or divestment decision and setting the scene for the rest of the thesis. Knowledge of the essential causes of competitive encumbrance provides the underpinning for a strategic agenda for engagement. These causes highlight the crucial strengths and weaknesses of the company, exalt the company's positioning in the industry, and define the areas where strategic innovation will yield the best results. They underline the notion that strategy decisions need to embody a sound governance foundation and that internal departments need to be aligned with the company's goals and strategy and constantly persevere in focusing its actions on obtaining these goals.

Chapter 3 sets out to establish the impact of a divestment strategy on the IT governance model and IT-business alignment and determines the steps that IT and business should take to ensure alignment to support such a strategy. The chapter focuses on the role of IT governance in strategic alignment of business IT, IT-business alignment levels, alignment approaches and the impact of a divestment strategy on the IT governance model and strategic alignment.

The purpose of Chapter 4 is to investigate existing relevant IT governance frameworks and standards to determine if any single one or a combination of frameworks and standards could potentially serve as a divestment framework for IT governance. The chapter scrutinises frameworks and standards such as Control Objectives for Information and Related Technologies (CobiT®), Information Technology Infrastructure Library (ITIL), The Open Group Architecture Framework (TOGAF), International Organization for Standardization (ISO) and King III*. Conceptual argumentation has established the role of IT governance theory as a basis for business-IT alignment and the IT Governance aspects and elements such as strategic alignment, risk management, performance management, accountability, business value delivery and capability management.

Chapter 5 sets out to establish what the content and logical steps for a divestment framework for IT governance should include and how it should be deployed. It discusses the structure, support and pre-divestment procedures and then continues to set out the execution steps in the IT divestment process. This chapter defines and describes the theoretical underpinnings of the first version of the divestment framework for IT governance.

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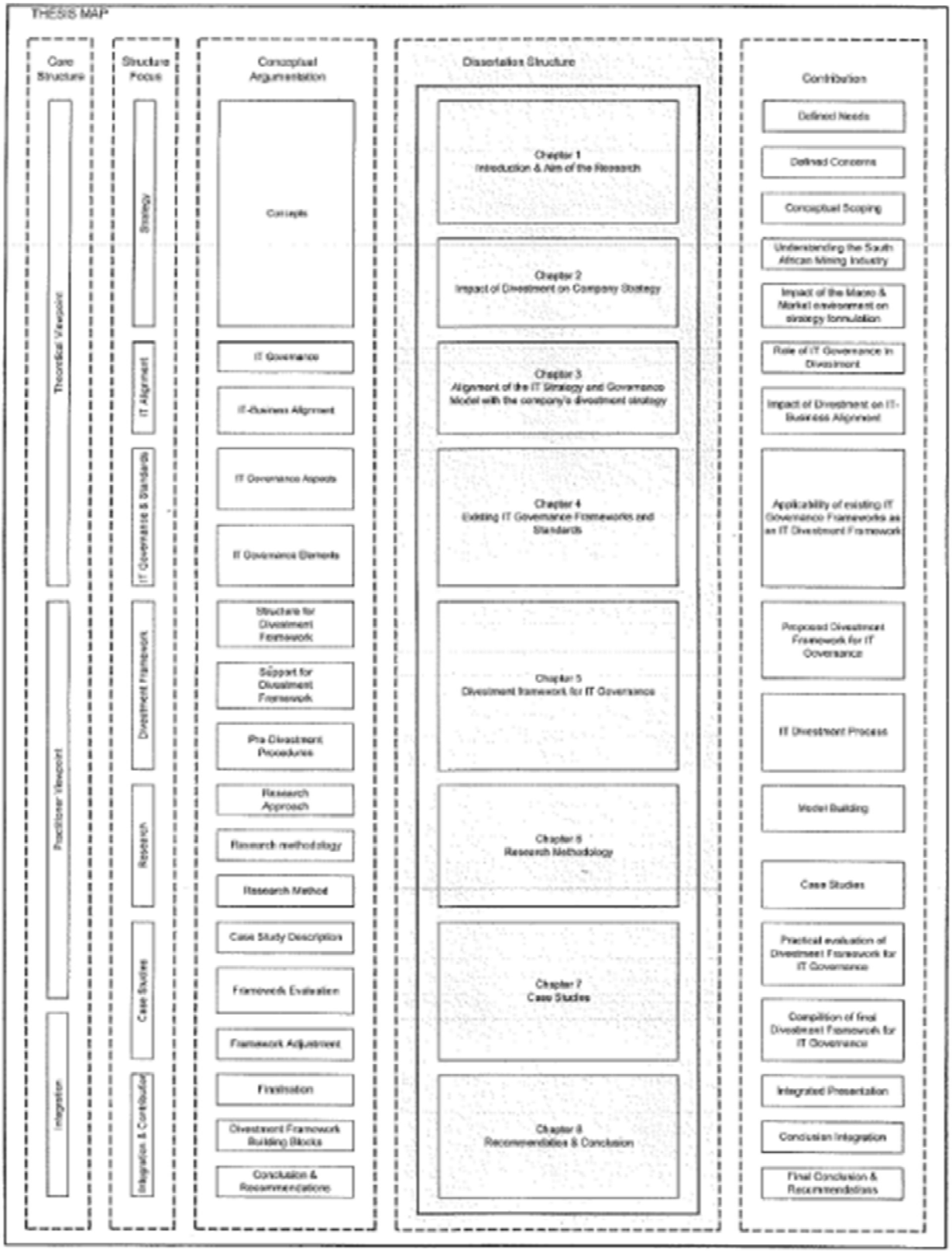
* King III represents the King Report on Corporate Governance and is ground-breaking guidelines for the governance structures and operations of companies in South Africa.

Chapter 6 describes the alternative philosophical approaches that were considered for their relevance to studying behavioural information systems and the social processes involved in the use of Information Technology. It defines and describes the methodological approach of this research study by describing the research design, research guidelines and the research output. The proposed research instruments, data analysis methods and the use of three case studies are introduced and the ethical considerations pertaining to research are explained.

Chapter 7 is based on the conceptual argumentation of the description of the three case studies, the framework evaluation and the framework adjustment. The outcome and contribution of Chapter 7 is the final version of the divestment framework for IT governance. It is influenced by best practices, suitable governance processes and prescribes a holistic approach and direction to perform efficiently and effectively as the instrument to ensure business-IT alignment and the management of the IT component when a divestment strategy is implemented. The framework is fundamentally a decision support model or governance framework based on the characteristics of a business unit divestment or mine closure process. The framework outlines and represents the variables that influence the untangling decisions and the relationship among them.

Chapter 8 concludes the study by integrating and finalising the core relationships between the theoretical underpinnings and the practical implementation and testing for soundness and effectiveness. The theoretical underpinning of a divestment framework for IT governance includes the role of PESTEL in a mine closure or divestment strategy, the role of competitive forces to shape company strategy, business-IT alignment during company divestment or mine closure and the evaluation of the existing IT governance frameworks and standards for their applicability to serve as a divestment framework for IT governance. The practical implementation describes the structure and support for a divestment framework for IT governance as well as the execution steps of the framework during a divestment or mine closure process.



Chapter Map 01: Overall Thesis Map

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GLOSSARY OF TERMS

Alignment

Hosseinbeig, Karimzadgan-Moghadam, Vahdat and Moghadam (2011:1) describe alignment as *"use of IT in a proper and time-effective manner in balance with strategies, goals, and business needs of the organization".*Alignment refers to the linking of company goals with the departmental goals and requires common understanding of purposes and goals of the company, and consistency between every objective and plan.

Ambidexterity

"The ability to simultaneously pursue both incremental and discontinuous innovation … from hosting multiple contradictory structures, processes and cultures within the same firm" (Tushman & O'Reilly, 1996:24).

Communication

"A process by which participants create and share information with one another in order to reach a mutual understanding" (Steinberg, 1997:12).

- **Technical definition:** *"Sending and receiving messages – transmission of messages from one person to another"* (Steinberg, 1997:13).
- **Process definition:** *"Dynamic process of exchanging meaningful messages"* (Steinberg, 1997:13).
- **Transactional definition:** *"Exchanging messages and negotiating meaning to establish and maintain relationships"* (Steinberg, 1997:13).

Company or Mine Closure

Decker and Mellewigt (2007:43) define company closure as *"the shut-down of entire businesses"*. Mine closure can be described as the extent of time during which the ore-extracting endeavour of a mine has been terminated and the mine embarks on the final phase of deactivation and decommissioning of assets and rehabilitation actions. Mine closure as defined by the International Council on Mining and Metals (ICMM, 2008), is *"a process that must be managed throughout the entire lifecycle of a mining activity. It should not oppose mining operations and should aim to integrate all stages of the enterprise"* (Diniz, Saliba, Carvalho & Santos, 2014:2).

Dynamic Capabilities

Dynamic capabilities are defined as *"the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments"* (Teece, Pisano & Shuen, 1997:516). Dynamic capability is the capability of an organisation to adapt an organisation's resource base purposefully.

Divestment

Divestment, also known as divestiture, is the opposite of an investment, and it is the process of selling an asset for either financial, social or political goals. Assets that can be divested include a subsidiary, business department, real estate, equipment and other property. Divestment can be part of following either a corporate optimisation strategy or political agenda, when investments are reduced and companies withdraw from a particular geographic region or industry due to political or social pressure.

Framework

Shah and Mahmood (2006:541) describe a framework as *"a generic problem space and a common vocabulary within which individuals can operate to solve specific problems".* Frameworks are not inevitably exhaustive, but can be influenced into the provisioning of no less than an initial array of the problems and responsibilities to be addressed.

Information Technology

"A term that encompasses all forms of technology used to create, exchange, and use information in its various forms" (Bernhardt, 2007:19). Information technology (IT) is the use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data.

IT Architecture

Information Technology architecture can be defined as *"the design of a system with the linkage of different applications, software, and subsystems"* (Kruchten, Oblink, & Stafford, 2006:22) or as *"a developed outline that organisations implement to synchronize IT resources with other resources in order to reach organizations' missions"* (DoC, 2015).

IT Artefact

Orlikowski and Iacono (2001:121) conceptualise IT artefact as *"[b]y and large, IT artefacts (those bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software) continue to be under-theorized".* Benbasat and Zmud's (2003:186) definition has a different angle when they conceptualise an IT artefact as *"… the application of IT to enable or support some task(s) embedded within a structure(s) that itself is embedded within a context(s)".*

IT Carve Out

Böhm, Hansbauer, Müller, Leimaster and Kremar (2011:4) describe an IT carve out as *"the actions required to de-integrate the IT systems"* when a business unit is demerged or closed down during a period of implementing a divestment strategy. The IT assets of the business unit that are closed down or sold, need to be separated from the IT assets of the rest of business.

IT Component

An IT component consists of software or tightly limited software systems running separately on a dedicated hardware device. IT components do not directly support a business process. Instead they are part of an IT system or a platform (Matthes, Schneider & Schul, 2012:43).

IT Governance

Maizlish and Handler (2005:65) define IT governance as *"the system by which an organization's IT portfolio is directed and controlled."* It provides a set of rules and parameters to align IT activities with the business objectives and goals. Wessels and Van Loggerenberg (2006:3) define IT governance as *"a framework of IT-related processes, disciplined to deliver maximum IT value, in order to complement business strategy, while balancing risks".* One of the main reasons for implementing IT governance is to ensure that companies realise the full range of benefits from their IT investment through the effective alignment of the business and IT strategy. The King III Code of Governance defines IT governance as *"the effective and efficient management of IT resources to facilitate the achievement of corporate objectives"* (Liell-Cock, Graham & Hill, 2009:2).

The IT Governance Institute (ITGI) defines IT governance as *"an integral part of enterprise governance"* (ITGI, 2003:10); Weill (2004:3) states that *"IT governance represents the framework for decision rights and accountability to encourage desirable behaviour in the use of IT."* Additionally, Van Grembergen (2002:1) defines IT governance as *"the organizational*

capacity exercised by the board, executive management and IT management to control the formulation and implementation of IT strategy and in this way ensure the fusion of business and IT".

IT Infrastructure

Research has shown that there are many definitions to explain IT infrastructure. Two definitions that are relevant to the content of this research are Duncan's (1995:39) who states that *"IT infrastructure generally describe a group of shared, tangible IT resources that provide a foundation to enable present and future business applications"* and the definition provided by Byrd and Turner (2000:172) that appears to be more descriptive and complete, stating *"the shared IT resources consisting of a technical physical base of hardware, software, communications technologies, data, and core applications and a human component of skills, expertise, competencies, commitments, values, norms, and knowledge that combine to create IT services that are typically unique to an organization".*

IT Service

An IT service is rendered by a service provider to one or more customers. The service is based on IT and supports the customer business processes. An IT service consists of a combination of people, processes, and technologies, and should be described by means of an IT service contract or agreement also containing information about the service quality (Matthes *et al.,* 2012:43).

IT System

"An IT system is a well-defined collection of business functions, which enables effective and efficient implementation of business processes. It consists of IT components and own program logic and addresses different business use cases" (Matthes *et al*., 2012:44).

Management

Liell-Cock *et al.* (2009:32) describe management as *"the system of controls and processes required to achieve strategic objectives set by the organization's governing body. Management is subject to the policy guidance and monitoring set through corporate governance".*

Measure of Prudence

Measure of prudence is an investigation or audit to confirm all facts, such as reviewing all financial records, assess risks plus anything else deemed material. Due diligence refers to the care a reasonable person should take before undertaking a new business venture.

Ontology

According to Scotland (2012:9) *"researchers need to take a position regarding their perceptions of how things really are and how things really work".* In other words, ontology constitutes the beliefs and assumptions of the researcher that form his or her initial standpoint or opinion.

Strategic Alignment

IT alignment is defined by Luftman, Lewis & Oldach (1993:204) as *"the extent to which the IS strategy supports, and is supported by, the business strategy"*; Reich and Benbasat (1998:4) add more detail with their definition that states that IT alignment is *"the degree to which the information technology mission, objectives and plans support and are supported by the business mission, objectives and plans".* However, Maes *et al.* (2000:19) redefine IT alignment in compiling their unified framework as *"the continuous process, involving management and design sub-processes, of consciously and coherently interrelating all components of the business – IT relationship in order to contribute to the organisation's performance over time".*

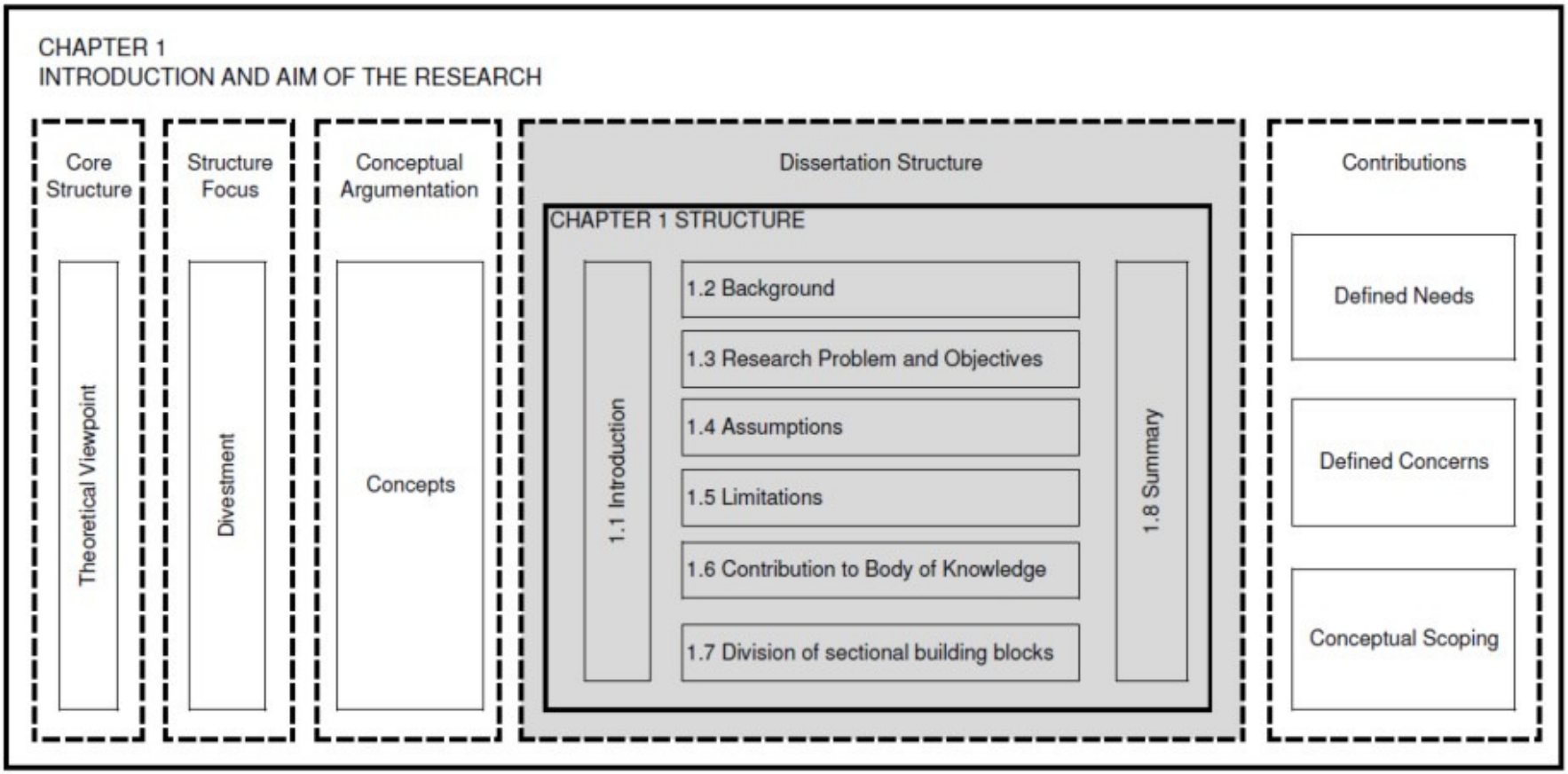
Alignment has been construed by different academics as *"the degree to which the mission, objectives, and plans contained in the business strategy are shared and supported by the IT strategy"* (Chan, Sabherwal & Thatcher, 2006:27), and by Henderson and Venkatraman (1993:474) as the extent of fit and synthesis between business strategy, IT strategy, business infrastructure, and IT infrastructure.

Strategy

Oliver (2001:7) defines strategy as *"understanding an industry structure and dynamics, determining the organization's relative position in that industry's structure or the organization's position to improve organizational results".* Porter, Argyres & McGahan (2002:47) describe strategy as *"a set of relationships to profitability"* and Baker and Jones (2008:6) construe strategy as *"the creation of long-term goals, the selection of courses of action that would enable the achievement of the goals, and the subsequent allocation and deployment of resources to achieve the goals".*

Work System

"The work system is a system in which human participants and/or machines perform work using information technology, and other resources to produce and/or services for internal or external customers" (Alter, 2003a:368). The work system concept is a common denominator for many of the types of system that operate within or across companies.



Chapter Map 02: Introduction and aim of the research

CHAPTER 1 – INTRODUCTION AND AIM OF THE RESEARCH

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1.1 INTRODUCTION

Mining companies in South Africa play a significant role in the economic wellbeing of the country by contributing to the country's budget through direct and indirect tax contributions. According to a report released by the Chamber of Mines in November 2012, the mining sector is responsible for 17,2 % or R25,8 billion direct corporate taxes received by the government. In addition, mining companies contribute to the government's budget by paying R5,5 billion royalties for the extraction of minerals, R1,3 billion on special levies for electricity and R900 billion as a national skills development levy (Facts about South African Mining, 2012:3).

The South African mining industry currently earns most of South Africa's foreign exchange and this contribution has allowed South Africa to become the most industrialised country in Africa. The industry imports a small amount of products and services and thus makes a huge contribution to the overall positive foreign exchange balance.

The mining sector plays a major role in fuelling the economy of provinces by the substantial contribution to the budgets of South African provinces. It is estimated that 89 % of the expenditure of the mining sector benefits the internal South African economy and people. For every job created directly in the mining industry, two jobs are created in other sectors that provide services to the mining sector (Facts about South African Mining, 2012:4).

However, the global economic situation has a major impact on the South African mining industry that faces significant challenges for mitigation through the pressure of a global recession. The recession has caused a decline or stagnation in the demand and prices of commodities and thus has limited or reduced the income potential of mining companies. The mining sector is further under the pressure of a worldwide trend to nationalise mineral resources in an attempt to increase the government's share of the mining profit (Lane, Guzek & Van Antwerpen, 2013:5). As a result of the downward spiral of the global economy, mining companies have to optimise their operations and consider divestment and closure of business units as a strategy to ensure that the company maintains its competitive advantage, improve profitability and be able to strengthen its shareholder value. According to Limpitlaw (2004:1) the number of functional South African coal mines has decreased from 112 in 1986 to 53 in at the end of 2000. Pooe and Mathu (2011:318) discuss the diminishing South African coal reserve and the effect it will ultimately have on South Africa's ability to generate power and export coal. Hartnady (2010:4) and Prévost (2003:100) concur that the South African coal reserve has diminished from -48 Gt in 2010 to -30 Gt in 2013 and to -15 Gt in 2016.

According to Hayes, Thompson & Wright (2000:3) company re-convergence through discretional divestment has become a popular strategy to counter external environmental changes and to embellish focus on operations. Chen and Guo (2005:400) point out the positive affiliation between better returns on investment and the upsurge in operational focuses. Following the product life-cycle concept, divestment is described as one or the strategic alternatives to counter a slumping industry, high volatility and unpredictable prospects on returns. Financial performance and a focus on corporate liquidity requirements could also influence a decision to embark on a divestment strategy (Benito, 2003:7)

Business unit divestment or mine closure results in the disposal of company assets with the intention of shrinking and condensing company perimeters (Decker & Mellewigt, 2007:1). Divestment assists a company to unbundle for a diverse number of considerations in search of obtaining particular goals. These goals include refocusing the company by eliminating operations and activities that do not form part of the company's core operations, and repositioning the company by revising the strategic intent and goals of the company. There

are several modes or approaches to divestment. These include sell-offs, spin-offs, spin-outs carve-outs and split-ups (Moschieri & Mair, 2005:3 & 5). Benito (2005:14) as well as Mata and Portugal (2000:1) points out that divestment could also take on the form of business or mine closure. When looking at the reasons for a business unit divestment or mine closure there are a number of reasons not common to the closure of business in general. These reasons include a reserve that is depleted, a decrease in the grade of the ore body, mechanical or equipment failure, government policy changes or community pressure (Laurence, 2006:286).

Business unit divestment or mine closure has far-reaching impacts on local and national stakeholders. These risks and impacts are usually complicated and need to be managed though a rigorous and systematic process to ensure the best possible outcome for all the affected stakeholders. On a local level, the direct impacts of a business unit divestment or mine closure are usually job losses of local people, a major decline in economic activity, especially when the business unit or mine is situated in a rural area with the accompanying discontinuation or downscaling of community services, such as health services and schools (Weber-Fahr, Strongman, Kunanayagam, McMahon & Sheldon, 2001:6)

A mining company that has adopted the business unit divestment or mine closure strategy needs to plan and execute a divestment or mine closure project plan to ensure all the relevant business areas are addressed in the downscaling and final closure process. This closure plan should typically address areas such as post-closure rehabilitation, the socio-economic impact on the local community and economy, mitigation of risks, and issues regarding adherence to South African laws and regulations. The closure plan should further cater for downscaling, discontinuation and relocation of employees, infrastructure and services (Mine Closure 2013, Conference Report, 2013:4).

The business processes when a mining operation approximates the end of its life differ from the business processes when the mine is a fully operational entity. In the pre-closure phase when approaching closure there needs to be a clear transformation from an operational phase to the closure and deactivation and, ultimately, the post-closure phase. The pre-closure or decommissioning phase business process entails the decommissioning and disassembling of infrastructure, processes relating to the relocation or auctioning of assets, disarmament of the labour force and the abdication and cancellation of agreements. It also includes appropriate perseverance in the monitoring and reporting on the post-decommissioning status, rehabilitation and community aspects. Other mine closure-related processes and actions that will commence during the pre-closure phase of a mine closure include addressing legal

obligations and commitments, collecting the relevant data for analysis, consulting with all the relevant internal and external stakeholders and identifying and managing any closure-related issues that might emerge (Planning for Integrated Mince Closure: Toolkit, 2008:43).

Information Technology (IT) has an important role to fulfil in accomplishing a business unit divestment or mine closure. The comprehensive adjustment and alignment of the IT panorama is an essential concern for the business. A pre-closure assessment will facilitate a better understanding of possible limitations or data-related issues that might impact or jeopardise a successful mine closure (Diniz *et al.*, 2014:1). All the business processes and functional departments need to be involved to ensure smooth cooperation with the IT department and assist with the disentanglement of the affected mine. The IT department needs to have processes and procedures in place to ensure information life cycle management and a well-defined archiving solution. Policies and procedures should address retention rules, data, system and IT infrastructure decommissioning, and system retirement (Kumar & Lal, 2011:3).

1.2 BACKGROUND

The macro environment represents the circumstances that are present in the economy as a whole, rather than in a singular region. The company has no control over these forces that influence the company's decision making and impinge on its performance and strategies. It incorporates trends and movement in gross domestic product (GDP), inflation, employment, spending, and monetary and fiscal policy. The amplitude to which the company is influenced by the macro environment is established by the degree to which the company is reliant on the soundness of the economy and its resources. The fluctuation in the macro environment leads to uncertainty, imposes confinement, or might provide opportunities and assist in the avoidance of potential threats. Continuous vigilance is required to curb change in the environment and implement the necessary corrective measures to retain and extend the company's market share (Pallapothu & Krause, 2013:28; Gimeno & Woo, 1996; Porter, 1986). Strategy needs to be designed to either endorse the norms of industry or to transform the industry framework through the implementation of a fundamentally new strategy (Pallapothu & Krause, 2013:28; Hill & Jones, 2006).

The macroeconomic environment of a company consists of a number of forces that impact on a company's operating and competitive strategy and a continuous awareness of the impact of these forces is necessary to ensure rigorous adaptability to maintain the company's competitive advantage (Jones & George, 2011:196; Ehlers & Lazenby, 2006:88; Smit & Cronje, 1997:74). Kotler (1998) believes that PEST (or PESTEL) analysis represents a

convenient strategic accessory to assist with analysing the impact and interrelatedness of each force. It will also contribute to the comprehension of market growth or downturn, business scene, capabilities and objectives for company operations. PESTEL represents the political, economic, socio-economic, technological, ecological and legal environments or forces and presents a framework for reviewing the company's strategic objectives and marketing offer or proposition. PESTEL will help guarantee that company effectiveness and performance are firmly coordinated with the compelling forces of change that directly impact the business environment (Abdullah & Shamsher, 2011:1447).

Business divestment tends to be the result of a change in the business strategy or due to changing economic circumstances that force a company to either close or demerge with business units that are no longer profitable or do not fit the company's business profile. Business divestment strategy forms part of the company's long-term business goals to ensure long-term viability, maximise return on investment and to maintain the company's competitive advantage. Business divestment strategies are often a result of a company that needs to reposition itself with regard to its competitive position in the market (PwC, 2012:3; Moschieri & Mair, 2005:13; KPMG, 2002:1).

The company's IT strategy needs to align itself with the business strategy in order to support the company when a divestment strategy is implemented. According to Maizlish and Handler (2005:1) "*information technology can be either a strategic enabler that adds value, drives growth and transforms business or a source of distracting noise".* According to Fähling, Leimeister, Yetton & Krcmar, (2013:106) business unit divestment is a *"standard instrument of strategic management"* but it usually only *"refers to the operational activities needed to divest and separate*" a business unit or a mine. They continue to state that *"IT typically receives limited attention relative to its complexity and financial implications".*

Because of the complexity and inter-relatedness of Information Technology systems and infrastructure with the rest of a business units business processes, a divestment initiative should include the steps that need to be taken to *de-integrate* or disentangle the IT infrastructure and IT portfolio from the rest of the company (Matthes *et al*., 2012:4; Kumar & Lal, 2011:1). According to Böhm *et al.* (2011:2) *"solutions to IT challenges are critical for realizing the potential value of the transaction".* IT alignment and portfolio management should identify the interdependencies and relationships that might exist between the business processes and IT processes and have a formal plan to follow in order to disentangle the IT systems and infrastructure from the rest of the business processes when a divestment strategy is implemented by a company.

The role of IT alignment management is to focus on the alignment of the business strategy and the IT strategy and for IT professionals to understand what the business is really about (Maes *et al.*, 2000:7) and become even more relevant when a divestment strategy is implemented to ensure the reorientation and adaption of the IT portfolio to maintain business alignment at all cost. IT alignment management should furthermore understand the most important aspects of the IT strategy and IT governance framework to be able to adapt the IT strategy and governance framework to support business strategy decisions in a business environment that is subject to continuous change and adaption.

A number of IT governance frameworks and standards exist to guide and assist companies in implementing, managing and governing their IT assets. ITIL and CobiT® are widely recognised as generic IT governance frameworks. Because IT is an integral component of every business, a business needs to manage the IT environment through regulatory compliance, controlling the cost of IT and efficiently managing the availability and risks associated with IT to ensure that stakeholder value is realised and maximised. Both frameworks provide business with a structured approach and best practices models to guide the implementation and management of all these components in the information technology environment. The ISO 38500 provides business with a standard that includes a list of principles for the effective corporate governance of IT (ITGI & OGC, 2005:8).

TOGAF®, The Open Group Architecture Framework, is one of the leading architecture frameworks used by companies all over the world to manage and optimise their enterprise architecture (Van Sante & Ermers, 2009:7). One of TOGAF®'s main objectives is to enable boundaryless information flow and to assist business to reduce the complexity and increase the usability of their IT infrastructure landscape.

King III is a governance model that is not only applicable to IT governance but on a higher level addresses corporate governance. Corporate governance is the system by which organisations are supervised and regulated and involves the institution of organisational structures, processes and administration procedures and methods. The core dissimilarity between corporate governance and IT governance is the resources being influenced in order to accomplish organisational objectives (Posthumus, Von Solms, & King, 2010:24; Liell-Cock *et al.*, 2009:3).

It is currently unclear whether any of these standards or frameworks could individually or in combination form the basis of a divestment framework for IT governance; these will need to

be investigated thoroughly to establish how useful they could be in contributing to, or forming the basis of the proposed divestment framework. A formal framework to map and plan for the downscaling or discontinuation of IT systems and infrastructure should be developed and implemented. The purpose of this divestment framework for IT governance is to ensure that the IT strategy is aligned with and supports the business's divestment and closure strategy. The IT divestment framework's role should be to minimise the impact of a divestment or closure strategy on the company's IT governance model. Both Matthes *et al.* (2012:4) and Böhm *et al.* (2011:2) concur that literature providing factual guidance for the management of processes relating to business carve-out or closure is limited and not readily available in the existing body of knowledge.

1.2.1 Aim

The aim of this study is to develop a divestment framework for IT governance as a guideline to enable and support mining companies to address the IT component of a mine closure project effectively. In order to achieve this aim, the main concern of this study is to answer the following question:

What are the ***essence***, ***content*** and ***characteristics*** of a ***divestment framework for IT governance***?

1.2.2 Scope

For the researcher to achieve this objective, the essential theoretical foundation of a mine closure process and existing IT theories needed to be investigated. The study achieved this through the understanding of the fundamental ontological constructs of a mine closure process and by identifying the crucial properties, criteria and guidelines contained in existing IT frameworks. The question is what the indispensable fundamental *elements* that should form part of a divestment framework for IT governance to address and support both the business process and the IT processes and procedures during a mine closure process are. This was answered through a literature review process of the following:

- The impact of a divestment or closure strategy on the macro and micro economy and the role competitive forces play in shaping company strategy.
- The impact of a divestment or closure strategy on the IT governance model and the process that should be followed to align the IT strategy and governance model with the company's divestment strategy.

- Investigation of existing IT frameworks and standards to determine whether these frameworks could be implemented adequately or adapted to serve as a divestment framework for IT governance.

1.3 RESEARCH APPROACH

This research study follows a design science research approach as design science research is positioned to provide an alternative approach that has the ability to endorse positivist and interpretive prospects of Information System (IS) research. It differentiates between natural science and the science of the unreal or artificial, and focuses on the creation of designed artefacts. Designed artefacts could be represented by, among other things, frameworks, methods, models and operational principles (Kuechler & Vaishnavie, 2008:11). The proposed artefact of this research study is a divestment framework for IT governance.

IT artefacts are contemporary whenever relating to the subject of IT or IS. Orlikowski and Iacono (2001:123) conceptualise them as *"piece(s) of equipment"* that function independently from the social or business process composition within which they are applied. This *equipment* view or approach conceptualises the IT artefact as technology to substitute labour, serves as an information processing tool and assists with enhancing productivity and social relations. However, Alter (2003:366) believes that the traditional IT artefact should be replaced with the concept of an IT-reliant work system because of the interrelatedness of the IT/IS field with the business processes within which they are applied.

A *work system* represents a specific business process in a real-world situation in the company. According to Alter (2003:368) the conception of work system is *"the focal point for understanding, analysing, and improving systems in organizations, whether or not IT is involved".* The work system method encapsulates a dual approach of a static view and a dynamic view. The dynamic view represents the life cycle model to demonstrate the evolvement of the work system through iteration; the static view forms the foundation of the work system framework that classifies and describes the fundamental elements for comprehending and evaluating a work system.

The research encompassed two primary steps. The first step ascertained the theoretical elemental concepts and their link and applicability to a divestment framework for IT governance. This was done through an extensive literature review of all the existing primary IT management and governance frameworks and models.

Webster and Watson (2002:13) define an effective literature review as a review that *"creates a firm foundation for advancing knowledge. It facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed".* The purpose of a literature review is to perform as an instrument that enables the researcher to acquire a solid theoretical foundation for the proposed study through methodological scrutiny and integration of literature. An effective literature review should furthermore yield a valid justification for the selection of the research methodology (Levy & Ellis, 2006:182).

Levy and Ellis (2006:182) list the following four steps of an effective literature review:

1. Methodologically analyse and synthesise quality literature.
2. Provide a firm foundation to the research topic.
3. Provide a firm foundation for the selection of research methodology.
4. Demonstrate that the proposed research contributes something new to the overall body of knowledge or advances the research field's knowledge base.

Building upon the characteristics of an effective literature review, Levy and Ellis (2006:182) describe the literature review as logical analytical steps following an *"input-processing-output"* approach. They define the literature review process as *"sequential steps to collect, know, comprehend, apply, analyse, synthesize, and evaluate quality literature in order to provide a firm foundation to a topic and research method".*

The literature review for this research study systematically evaluated conceptual interrelationships and dependencies among published research literatures. A rigorous approach to theory building supported the construction and comprehension regarding the *de facto* formulation of the appropriate research field and assisted in identifying logical clusters of research to serve as endorsement and establish the knowledge gaps in existing literature.

The second step comprised the compilation and development of an artefact in the form of a proposed divestment framework for IT governance. The artefact was evaluated through comparison with existing IT management and governance frameworks and by applying the proposed divestment framework to the case study of one company closing four different business units to illustrate its applicability.

1.4 ASSUMPTIONS

The researcher postulates and is supported by both Matthes *et al.* (2012:4) and Böhm *et al.* (2011:2) that there is currently no divestment framework for IT governance that specifically

and in detail focuses on mine closure, or more specifically discusses or addresses the steps that need to be taken by IT management to align the IT strategy and governance model with mining companies when closing or divesting mines ensuring smooth transition while scaling down and discontinuing IT infrastructure and services during the divestment or closure process.

1.5 LIMITATIONS

The study focuses only on the divestment and closure strategies implemented by mining companies in a South African context. It investigates the history of divestment and mine closures in South Africa to determine the macro and market economic impacts caused by the implementation of mine closure and divestment strategies.

The study further focuses on the downscaling and discontinuation of IT infrastructure and services during the process of divestment or mine closure, and not on the mine closure process in general.

1.6 CONTRIBUTION TO THE BODY OF KNOWLEDGE

The main contribution of the research is in establishing what the essence, content and characteristics of a divestment framework for IT governance should entail by:

- describing the process that should be followed in formulating the IT strategy and governance model for the company's divestment strategy;
- determining the impact of a divestment strategy on the IT governance model, and
- investigating if any of the existing IT governance frameworks and standards could serve or be adapted to serve, as a divestment framework for IT governance.

1.7 DIVISION OF SECTIONAL BUILDING BLOCKS

The following is a synopsis of the work that was involved to complete this study. It encapsulates the core abstractions that have been explored in this thesis.

Chapter 1: Introduction

Chapter 1 contains the background information and the problem statement of the study, explains the purpose of the study, assumptions that were made and the limitations of the study. The chapter identifies and clarifies the research questions addressed and gives a brief overview of all the chapters.

Chapter 2: Impact of divestment on company strategy

This is the first literature review chapter to provide the theory for the scope of this research study. It depicts and describes the impact of a divestment strategy on the macro and market economy of a company and discusses the role of PESTEL and how Porter's (2008:88) competitive forces shape company strategy.

Chapter 3: Alignment of the IT strategy and governance model with the company's divestment strategy

This the second literature review chapter. The impact that a divestment or closure strategy has on the IT governance model is analysed and the process that should be followed to align the IT strategy and governance model to support the company's divestment or closure strategy is described.

Chapter 4: Existing IT frameworks and standards

This is the third literature review chapter. It reviews existing IT frameworks and standards, such as CobiT®, ITIL, ISO and King III to determine whether these frameworks could adequately be implemented or adapted to serve as a divestment framework for IT governance.

Chapter 5: A divestment framework for IT Governance

This chapter outlines the compilation and development of an artefact in the form of a proposed a divestment framework for IT governance describing the steps that need to be followed to address divestment-related IT issues and problems. It researches and discusses the essence, content and characteristics of a divestment framework for IT governance.

Chapter 6: Research methodology

This chapter explains the methods, methodology and theoretical underpinning that the researcher considered while executing the proposed research project. The data collection and analysis approach as well as research ethics is defined and described.

Chapter 7: Case studies

The practical application of the proposed divestment framework for IT governance in three different case studies of three coal mine closures tested the hypothesis discussed in Chapter 5; this adapted the proposed divestment framework for IT governance best suited to supporting the IT component of company divestment or mine closure.

Chapter 8: Recommendations and conclusion

This chapter contains the summary, findings, deductions, recommendations and conclusion of this thesis. It provides proof whether results ratify or veto the anticipated. Particular prominence is placed on accentuating areas of ambivalence and on highlighting disparities that may require further study. Chapter 7 concludes with an explication of the main findings, and suggests a number of topics for further research.

1.8 SUMMARY

This chapter provides an overview of the bilateral dependency of the global and local economy and mining companies in South Africa for economic growth and well-being and how this impacts on a company's strategy. Mining companies contribute substantially to the overall economic prosperity of South Africa through the generation of foreign exchange, job creation and social upliftment.

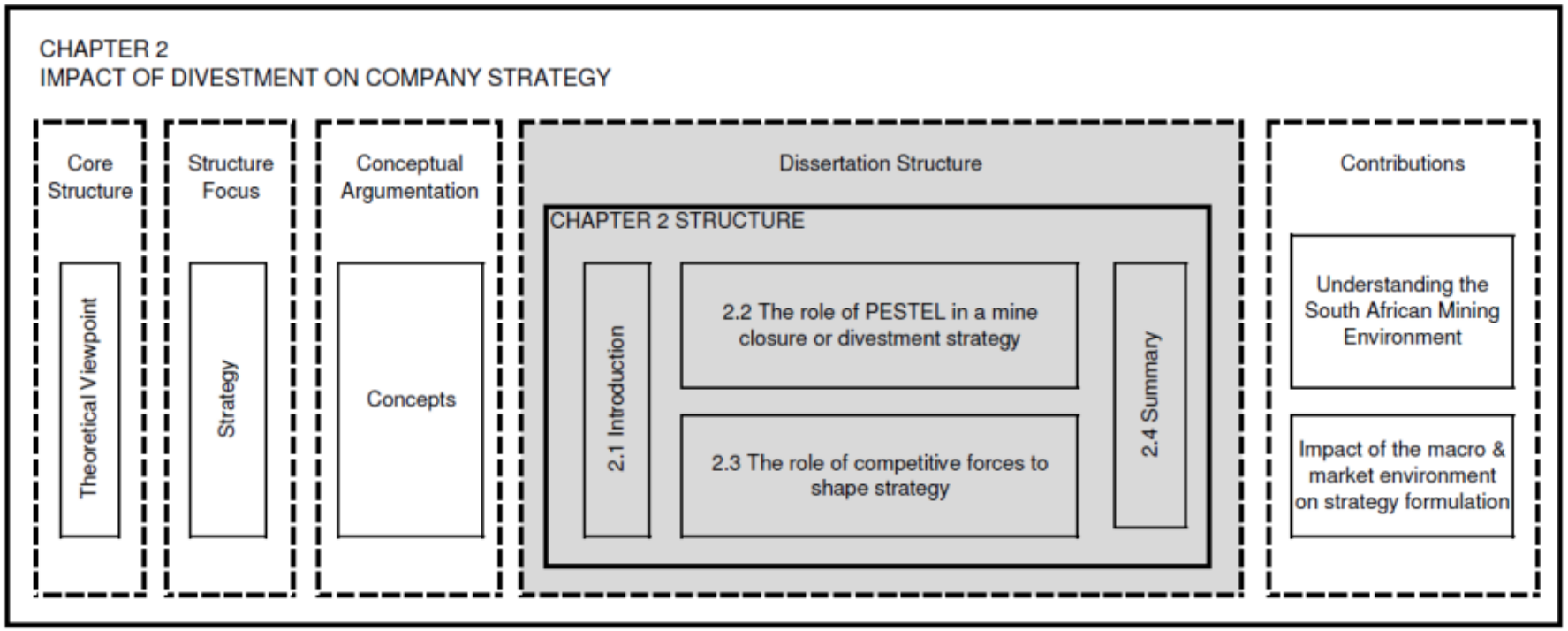
As a result of a global recession the mining industry is experiencing a downward spiral in the macro-economic environment; this has resulted in a decline and stagnation in the demand for mining products and prices of commodities. Companies have no control over economic development in the macro environment but need to be vigilant and flexible in adopting their strategy according to fluctuations, such as a recession in the environment.

The macro environment consists of a number of forces, namely political, economic, socio-economic, technical, ecological and legal. Analysing and monitoring these forces provides a convenient strategic accessory to ensure coordination and protect effectiveness and performance. The descending trend in the economy has forced mining companies to adopt their strategies accordingly, which has culminated in divestment and mine closures in order to maintain competitive advantage and market share and preserve profitability.

Divestments and mine closures in turn have had a devastating impact on local and national stakeholders. Mining companies that adopt divestment strategies need to align the business processes for the business unit or mine closing down accordingly to cater for downscaling and deactivation of operations and plan for post-closure activities, such as rehabilitation and relocation of assets and employees. All the functional departments need to be involved in the process, but more importantly be aligned with the company's divestment strategy. The IT department has a major role to play in the disentanglement of systems and IT infrastructure. To achieve this goal it is imperative to have the necessary well defined IT processes and procedures to ensure the smooth execution of the IT divestment process.

This chapter provides an overview of the research approach that was followed. It produced a synopsis of design science research, the development of an IT artefact and work system theory. The role of a literature review in theory building and in serving as the foundation to explore and uncover conceptual affiliations and dependencies amidst promulgated research literatures is demonstrated. Assumptions, limitations and the contribution to the body of knowledge are narrated and explicated; the breakdown of the content of each divisional building block that forms part of the thesis is provided.

The next chapter outlines a literature review on the influence of divestment on company strategy. The role of PESTEL and the influence of a competitive force on strategy is deliberated.



Chapter Map 03: Impact of divestment on company strategy

CHAPTER 2 – IMPACT OF DIVESTMENT ON COMPANY STRATEGY

Table of Contents: Chapter 2

2.1 INTRODUCTION

International mining companies play an important role in the South African economy through its creation of favourable circumstances for employment and the gross economic product and export revenue. South Africa's mineral resources includes gold, platinum, coal and a variety of base metals. The mining industry plays a vital role in a developing country such as South Africa to render these mineral resources as financial and human capital (McCourt, 1999:744).

South Africa is a major player in global coal markets and the industry is conspicuous because it is a pertinent low cost producer, has the world's largest coal export terminal and because of

its favourable position between the Atlantic and Pacific coal markets. Owing to South Africa's significant coal reserve capacity is available to expand coal exports to engender much anticipated export earnings and reduce its negative trade balance and current deficit. Crucial barriers and constraints to increased coal exports do, however, exist and include problems such as meagre rail capacity to the export coal terminal, absence of a unified coal development policy, water shortages, inadequate infrastructure and coal resources that are difficult to mine (Eberhard, 2011:1).

Domestically South Africa is a major consumer of coal, primarily for the production of electricity and for the Sasol coal-to-liquid plant. Although the country could be described as a developing economy that needs to generate employment opportunities and conquer poverty, it is among the twenty extreme carbon-intensive economies in the world. Transpiring events in the coal sector have been impacted by eminent legislative interventions that include a coordinated exertion to increase black economic empowerment, an indispensable reconstruction of the licensing governance for prospecting and mining, and thirdly a new royalty payment governance (Overview of the South African Coal Value Chain, 2011:IV).

The coal industry in South Africa offers both trails and favourable circumstances. Primarily two coal mining methods are applied, namely surface mining and underground mining. The utilisation of each method hinges on geological factors, but mainly on how deep the coal seam resides and the ratio of overburden waste material to the seam width. Economical uncostly mining practices are endorsed by virtue of coal seams being relatively thick and close to the surface. Roughly half of the country's coal production stems from opencast mines and the other half from underground mines. Unfortunately the use and production of coal transpire in serious environmental impacts such as acid mine drainage, destruction of biodiversity and soil erosion, to name but a few (Eberhard, 2011:4).

Coal mining is a highly culminated industry in South Africa and a large number of collieries in some of the prominent coal fields have closed. According to Limpitlaw (2005:1) *"The challenges faced in closing coal mines should not be underestimated. The reactive nature of coal and its associated strata and the high level of surface disturbance result in potentially significant pollution problems which may persist for many years after mining has ceased".* Mine closure is a reality faced by more South African mines than ever before in the history of the country. It has the potential to create value for shareholders, improve the company's operating performance, ameliorate corporate governance and expansion of strategic resilience. The term *mine closure* describes an expansive process relating to the activities emerging from the discontinuation of mining operations (Munnick, 2010:7). Logan, Murphy &

Beale, (2007:2) take this description a step further by defining an effective mine closure as *"the criteria of sustainable outcomes through the minimisation of environmental, social and economic impacts on host communities and the maximisation of positive legacies that contribute positively to future generations".*

Insight into the coherence of the company, its competitive environment and its aim to endure and prosper are key elements in the establishment of insight to empower management to take the necessary action. The outcome of such action is the company's strategy. The goal of strategy is to construe the company's long-term plan of action to maintain and increase the extent of its competitive advantage in the market and macro environment. The market environment represents the environment that directly surrounds the company and contains the volatile elements that revolve around competition, opportunities and threats. It has a direct impact on the future of the company. The macro environment represents the elements over which the company does not have control or influence; it could impact the company and its market environment, either directly or indirectly (Smit & Cronje, 1997:74). The significant forces of the market and the macro-economic environment have created an influential and unmanageable competitive context. The intricate nature of these environments necessitates elevated strategic adaptability, speed and novelty to manage environmental disruption and erratic changes for the formulation or perpetuation of a competitive advantage. Staying conversant about developments in the external environment is imperative to assist the strategic decision making process for company endurance and growth in the chaotic mining industry (Brummer, Badenhorst & Neuland, 2006:19).

Divestments and closures are described as strategy's missing link (Dranikoff, Koller & Schneider (2002:75). Many companies oppose this strategic option because it is cursed with the disgrace of failure and poor corporate management. However, according to Dranikoff *et al.* (2002:83) divestment *"is not an end in itself. Rather, it is a means to a larger end".* The economic downturn has elevated the burden on companies to frequent their strategies to conclude whether a divestment strategy is a feasible response to compelling business issues. Divestment is a primary instrument that companies can apply to consolidate and refocus their business. It is seen as an essential factor of the co-development of company effectiveness and product market capacity (Kaul: 2012:2). Both the market and macro-economic environment impact and influence the direction of strategy to ensure the long-term viability and return on investment for the company. Proactive or corrective reasons are the most dominant reasons for companies to divest. Corrective reasons include rectifying previous strategic aberrations, reduction of over-diversification, refocusing core business, and reorganising company strategy where the company identifies and disposes of negative

synergies. The proactive reasons are identified as improving performance and profitability, obtaining new cash flows, reducing high debt levels, and restructuring the asset portfolio (Moschieri & Mair, 2005:5).

According to Håkansson and Snehota (2006:271), no company exists or operates as an enclosed, self-encompassed entity. Business relationships provide significance and operate as a meaningful component of connection in the economic landscape. An integral part of business strategy is concerned with the comprehension of what effectiveness in the company's market environment entails. The company needs to match and adapt its competencies and potential to the attributes, such as customers and competitors of its environment. However, due to the constant change in environmental conditions it is imperative for the company to be resilient and adaptable to change (Håkansson & Snehota, 2006:259).

2.1.1 Aim

In this chapter as an introductory chapter, the aim is to create an understanding of the South African mining environment, but more specifically the coal mining industry by depicting and describing the impact of the macro and market environment in strategy formulation aligned with a divestment or mine closure decision.

2.1.2 Scope

In order to obtain the above mentioned aim, the following topics are discussed:

- The role of PESTEL in a divestment or mine closure strategy to identify and describe the relevant forces that impact the macro economy of the coal mining industry with specific reference to the influence of the six major types of impact of PESTEL:
    - Political
    - Economic
    - Socio-economic
    - Technological
    - Environmental
    - Legislative

- The role of competitive forces to shape company strategy through the discussion of the five competitive forces identified by Porter and by referencing the coal mining industry:
    - Rivalry among existing competitors
    - Threat of new entrants
    - The bargaining power of buyers
    - The bargaining power of suppliers

- The threat of substitute products or services

In concluding the chapter, all the facts, arguments and findings admissible in the role of a divestment strategy on the macro and market environment are concisely summarised.

2.2 THE ROLE OF PESTEL IN A MINE CLOSURE OR DIVESTMENT STRATEGY

Why do mining companies divest and close down mines and business units? According to literature there seemingly exist a number or reasons, such as the acceleration of political, economic and legislative climate changes that could potentially impinge on the continuance of operations. The primary force is presumably economic, particularly a persistent downturn in global commodity prices. However, the reason could be geological, due to an untimely and unexpected decline in the grade or the ore body. In addition it could be technical, as a result of unfavourable geotechnical conditions, regulatory due to safety or environmental contraventions or even as a result of policy changes (Laurence, 2006:286).

2.2.1 Political impact

This force represents the bi-directional influence of government on organisations and of organisations on government. The political environment includes the framework in which organisations and pressure groups strive for economic transformation, effective enforcement of law and order and direction and stability of political factors. Local, provincial and national laws and regulations influence the formulation and pursuit of ambitious strategies (Ehlers & Lazenby, 2006:90; Smit & Cronje, 1997:82; Jones & George, 2011:199).

Political systems and structure are the primary considerations that motivate and propel government policies. Political factors may result in political pressure and thus play a role in the stability of an industry's environment and impact on the operating cost of the company. Such factors could furthermore impose additional costs, such as taxes, and implement import restrictions and tariffs (Tan *et al*., 2012:2).

South African mining companies face regulatory unpredictability due to the government's prevalence for poor governance, questionable legislative frameworks, delicate security of term and ambiguous royalty and tax incumbency. Furthermore, a global trend of resource nationalism and community activism is evident (Lane *et al*. 2013:4).

With regard to mine closure, the South African government has adopted a much stricter approach toward mining companies since 1994. This implies the introduction of a legislative

framework to force all mining companies to take responsibility for their activities from the cradle to the grave and make financial provision throughout the life of the mine for remediation of environmental damage, waste management and sustainable social and economic development of the neighbouring communities (Swart, 2003:492).

This legislation has had an enormous economic impact on mining companies as it implies the creation of a dedicated closure fund in which a percentage of the mine's yearly income has to be deposited. This closure fund then serves as financial assurance to eradicate or limit detrimental environmental or social impacts once the mine reaches the end of its life and closes down. It also entails the upgrading of environmental, waste and pollution management systems to comply with the standards set by legislation, and spending funds on the sustainable development of communities (Peck & Sinding, 2009:227).

2.2.2 Economic impact

This environment is influenced by the political, technological, ecological and social environments. These cross-influences create continuous fluctuation in the economic growth rate, levels of employment, consumer income, rate of inflation, exchange rate and the general character of the economy. These economic forces could eventually be the cause of organisational growth and prosperity or calamity (Smit & Cronje, 1997:76; Ehlers & Lazenby, 2006:90 - 91; Jones & George, 2011:197).

These impacts relate to economic growth, interest and exchange rates. They have a direct influence on the way in which companies do business and execute operations. The interest rate determines the cost of capital, which in turn has a direct impact on the extent of a company's growth or decline. A fluctuating exchange rate could result in an increase in import cost or a decline in the income generated from exports. The country's economic growth rate determines the unemployment rate and spending power of consumers and the availability of scarce resources for key inputs, such as skilled labour and sufficient energy in the form of power and fuel (Babatunde & Adebisi, 2012:27).

South African mining companies' surpluses are under pressure. This is due to a mixture and combination of causes, such as a decline in global commodity prices, a decline in demand and growing input cost such as a surging labour and energy costs, which currently surpass inflation (Lane *et al.* 2013:5).

An unsuspected drop in commodity prices due to unstable international and local markets is a well-known reason for mine closures. Larger mining companies have the ability to survive

but smaller mining companies cannot absorb the major losses, which then results in mine closure.

2.2.3 Socio-economic impact

Over and above soaring demands from workers, government's demands with regard to the role mining companies should fulfil in society also continuously escalate. Although expectations are usually not indistinctly outlined, it is expected of mining companies to assist with the supply of basic services, education and healthcare in the communities surrounding the mine (Lane *et al.* 2013:5).

In many cases a synergetic affiliation between a mining company and surrounding communities exists that benefits both parties. Communities prosper as a result of economic and social enhancements in the form of better health services, public schools, transport, infrastructure and growth opportunities for local businesses. Mine closure thus virtually always has an instantaneous and detrimental socio-economic impact on the community. The adverse impact comprises the reversal of all the beneficial improvements that were implemented during the life of the mine. This economic downturn gives rise to a number of social problems such as unemployment, collapsing infrastructure, declining social services and an upwards spiral of crime (Andrews-Speed, Ma, Shao & Liao, 2005:40).

Socio-economic factors impact mine employees and their families directly, as well as local businesses that have trade agreements with the mine. However, indirect socio-economic factors impact other industries, such as the local taxi industry, the informal sector such as domestic workers, and property value in the area.

2.2.4 Technological impact

The technological environment comprises the creation and establishment of new knowledge that could be converted into new products and processes. Technological evolution spawns opportunities and uncertainty but could have erratic consequences. The exceptional attribute of technological innovation is that it invariably enhances the rate of change (Smit & Cronje, 1997:74; Ehlers & Lazenby, 2006:92; Jones & George, 2011:197).

Technical issues that have an impact on the mining environment are characterised by disparate commodities, processing or beneficiation approaches, mining practices, waste features and unique geographies.

In the mining environment geotechnical issues could result in mine closures. Mining activities take place in a non-analogous rock mass and differ from one mine to another. Ore body fallibilities such as joints, cleats, planar instability and cleavages combined with hydrological problems, faults and shear zones have the potential to cause the collapse of side walls and slope failures if not detected early enough.

Mechanical and equipment failure, or the use of inadequate, out-dated equipment and technology could also play a vital role as this has the definite potential to cause the loss of life and eminently result in mine closure if it is determined that the mining company was negligent (Laurence, 2006:287).

2.2.5 Environmental impact

"The final stages of mining exploitation plans typically involve the closure of the mine, implementation of reclamation and environmental requirements associated with the cessation of mining operations, and the liability associated with mine waste that extends beyond the life of a given project" (Cidu, Biagine, Fanfani, La Ruffa & Marras, 2001:489). Mine and mineral fabricating refuse have the likelihood to generate an environmental, social and economic inheritance for many millenniums.

The primary aim of rehabilitation is to implement a process to rehabilitate and restore the surface area surrounding a mining operation to a state, in which respect it is self-sustaining and can again be used productively. South African legislation requires mining companies to have an Environmental Management Plan (EMP) that contains the steps that will be taken throughout the life of a the mine to ensure that a rehabilitation end state is defined after final closure of the mine (Fourie & Brent, 2006:1085).

Great uncertainty exists in the South African mining industry on how to handle mine closure-related impacts to ensure the accomplishment of auspiciously rehabilitated sites after mine closure. Mining companies continue to be accountable and responsible for all impacts that prevail after closure. They are also responsible for the enormous financial obligation affiliated with these impacts (Fourie & Brent, 2006:1087).

Mining processing waste embodies an expansive collection of issues regarding steps on how to handle waste, such as *reduce, reuse, recycle, treat* or *dispose*; by implementing these steps a company could greatly enhance the sustainability of the industry at large and reduce the rehabilitation burden after the closure of the mine (Franks, Roger Côte & Mulligan, 2011:115).

By implementing an EMP while still operational, mining companies also reduce the post closure rehabilitation burden and ensure regulatory compliance and satisfied communities. The EMP should address the following rehabilitation issues (Fourie & Brent, 2006:1087):

- Physical and chemical stability of mine waste dumps and open pits
- Maintenance of water quality
- Safe disposal of infrastructure
- Development of sustainable ecosystems
- Meeting community expectations

2.2.6 Legislative impact

Legislative impacts include factors such as how local, national and global legislation impacts the company's processes and products. Mining in South Africa has been going on for more than a century. In the early days legislation focused mainly on the rehabilitation of the surface area impacted by the mining operations, such as mine dumps. To a large extent mining was one of the industries that helped to alleviate poverty and to create jobs and their focus was thus primarily on economic gains. There was little or no legislation on environmental management and as a result it was neglected. Mining is a significant force and burden on the environment and has sadly left the country with an immense economic, social and environmental inheritance. The result of this negative inheritance is a continuing impact on the prosperity of communities in close proximity to these mining areas that have not been restored and renovated. Because the role of government is to be the regulator of the mining industry, and to be the final scion when a negative legacy is left behind by mining companies, a mine closure legislative framework was introduced. The framework includes the roles and responsibilities of all the relevant role players and provides the necessary guidelines and requirements to ensure that mining companies execute operational and closure endeavours with the necessary perseverance and respect for the rights of others (Swart, 2003:489).

The content of the current legislative framework for mine closure includes requirements in terms of minerals and mining legislation and a number of relevant acts. The framework clarifies the roles and responsibilities of government and all other stakeholders and outlines a number of mine closure scenarios.

Constitution of South Africa, 1996 and common law

The constitution of South Africa supersedes all other legislation. Section 24 states the following:

"Everyone has the right:

a) *to an environment that is not harmful to their health or well-being; and*
b) *to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that*
    i) *prevent pollution and ecological degradation;*
    ii) *promote conservation; and*
    iii) *secure ecologically sustainable development and use of natural resources while promoting economic and social development of people."*

Emulating the escalation in environmental awareness mining companies need to direct their effort to focus on historical environmental damage, consummate the constitutional right to an environment that is conserved, adverse to people's health and committed to the tenable growth of the country (Munnick, 2010:9).

National Environmental Management Act, 107 of 1998

In terms of Section 24(b) of the Constitution, it is the responsibility of the government to impose the environmental rights as specified in Section 24(a). The National Environmental Management Act (NEMA) was produced as a result of the stipulations of Section 24(b) to serve as the "reasonable legislative measures" implemented by the government. The purpose of NEMA is to serve as the institutional structure and provide the legal mechanism to espouse the environmental objective. NEMA is considered the linchpin of South Africa's environmental legislation and the environmental rights vested in the Constitution have been alluded to verbatim in the prologue of NEMA, which renders it constitutional certitude (Glazewski, 2005:135).

Minerals Act, 50 of 1991

The Minerals Act provides a statutory blueprint equipped to regulate and ensure accountable mining activities and it explicitly acknowledges the need for restoration to take place after the discontinuation of mining activities. Section 4.1c of the act obligates the aversion or effective mitigation of water, soil and atmospheric pollution. Of more significance to mine closure is Section 4.4 (viii) that instructs "cradle-to-grave" management of environmental impacts during the life of a mine. This entails compelling review and auditing procedures, financial assurances to cover rehabilitation responsibilities, regulated decommissioning and closure proceedings,

and steps to identify and manage possible dormant environmental risks after final closure (McCourt, 1999:744).

Mine Health and Safety Act, 1996

The purpose of the Mine Health and Safety Act is to provide protection to employees working in a mining environment and to encourage a habit of living and enforcing health and safety practices. The Act relates to mine closure in Sections 2 and 5 where reference is made to the maintenance of "a safe and healthy environment", even when commencing with decommissioning and closure activities (Swart, 2003:491).

National Water Act, 36 of 1998

The National Water Act essentially addresses water pollution impediment and primarily focuses on pollution that might occur as a consequence of enterprises undertaken on land. The Act states that the entity that either owns, controls, uses or occupies land is ultimately accountable for implementing actions to prevent the pollution of the above or underground water resources. It provides guidelines on the inauguration, use and maintenance of waste treatment plants and the minimisation of pollution of water resources (McCourt, 1999:746).

Minerals and Petroleum Resource Development Act, 28 of 2002

The Minerals and Petroleum Resources Development Act requires meticulous management and alleviation of environmental and socio-economic repercussions as a result of mining activities. This Act provides a comprehensive integrated "cradle-to-grave" approach and contemplates all the relevant impacts of mining activities, including decommissioning and closure. The Act addresses principles for sustainable development, integrated environmental management, financial provisioning for closure, rehabilitation and ultimately for the issuing of a final closure certificate (Limpitlaw 2005:2).

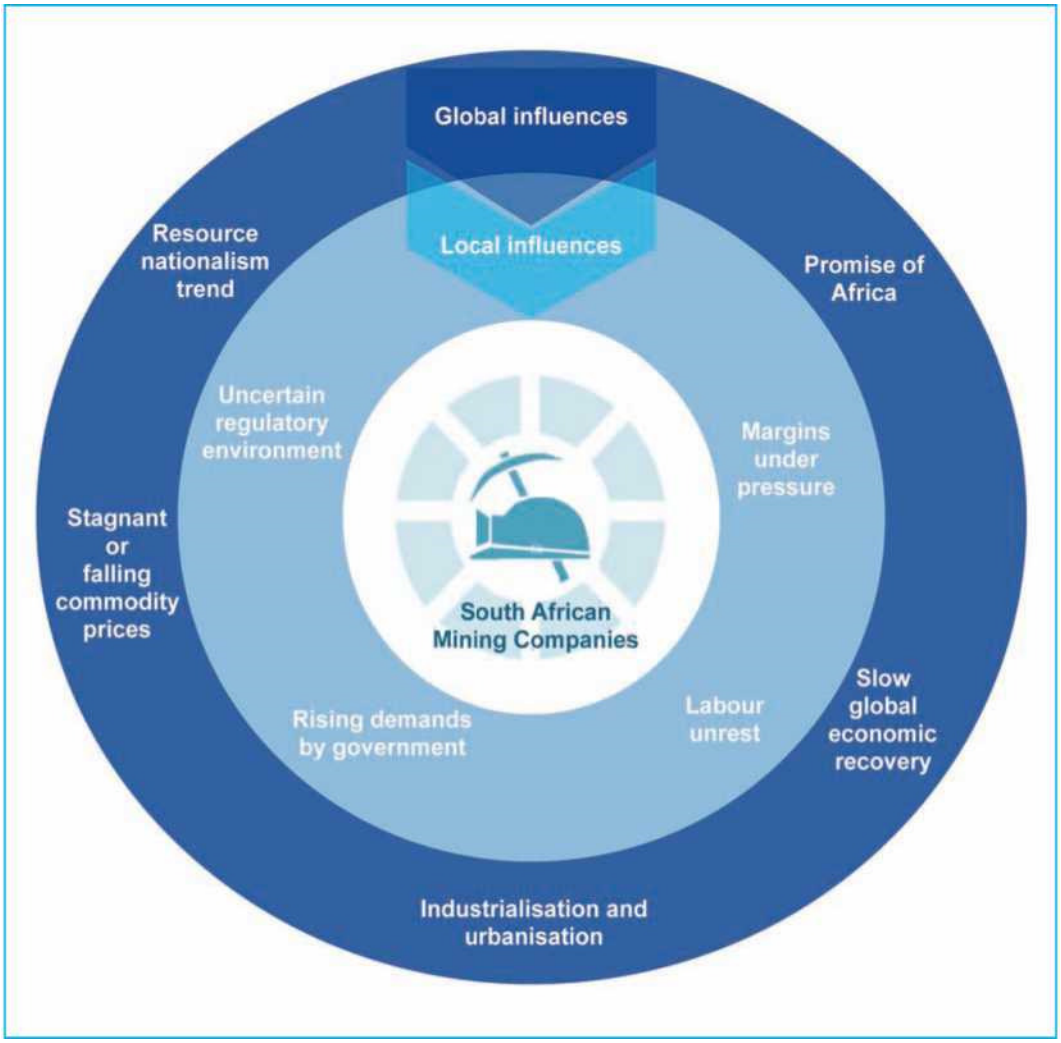


Figure 2.1: Global and local influences on mining companies with South African Operations

(Lane *et al.* 2013:2)

2.3 THE ROLE OF COMPETITIVE FORCES TO SHAPE STRATEGY

2.3.1 How do competitive forces shape company strategy?

Mining companies operate in intricate circumstances and the culminating effect is that they need to make difficult choices. Making choices necessitates a thorough understanding of the elements that impact the mine's profitability, its reputation and its affiliation with stakeholders. Strategy relates to choices; it encompasses a unified array of choices that incorporates both strategic location choices and strategic provocation choices. Choice decisions enable mining companies to focus on primary aspects of their high-profile and operational strategies that jointly form the foundation for indelible strategic planning and short-term antecedence (Lane *et al.*, 2013:6).

In difficult economic circumstances mining companies need to decide whether they will follow a *leadership strategy* or a *survival strategy*. A leadership strategy assists the mining company in advancing and improving as a result of identifying new opportunities. Adopting a survival strategy focuses on cost cutting and risk elimination in order to protect and preserve core business. One of the cost cutting choices is the closure of unprofitable mines to free up capital and resources, and to eliminate profit losses (Lane *et al*., 2013:11).

Porter (2008:88) describes the five competitive forces in the market environment of a company that influence and shape the company's strategy. Comprehension of these forces forms the basis of strategy development and enables the company to integrate industry circumstances into strategy. Porter's competitive forces stipulate a guideline for determining the company's strengths and vulnerabilities with regard to rivals, substitute products, new entrants, buyers and suppliers. An additional advantage of the five forces is that they play an important role in determining and characterising the industry in which the company competes.

2.3.1.1 Rivalry among existing competitors

One of the aspects of strategy definition is to endure with competition. Competitor analysis enables the company to identify competitor vulnerabilities that could be capitalised on, or strengths to avert. It will further assist the company in predicting how competitors will respond to their proposed strategies. Proactive awareness regarding competitor's strategic intentions will ensure strategic deftness and developments in the macro-economic environment (Brummer *et al*., 2006:32).

Rivalry among companies fluctuates significantly. It is affected by the number of opponents, market growth, fixed costs, converting cost, exit barricades and assortment of rivals. The greater the extent of rivalry in any given industry, the lower the median return on investment (Niederhut-Bollmann & Theuvsen 2008:64).

Up to 2009 China was a net coal exporter, but since 2009 China, after strategic re-alignment, became the world's top coal importer. All the major global coal companies are competing to obtain contracts and become trade partners with China in order to export their coal to a still growing Chinese coal market. In 2010 Canadian and USA companies were the principal providers of coal to China, but South African and Columbian companies have since taken up an equal slice of the available Chinese market as a result of a number of factors that are beneficial to China (Jainjun Tu & Johnson-Reiser, 2012:3 - 4).

2.3.1.2 Threat of new entrants

According to Porter (2008:80) *"[n]ew entrants to an industry bring new capacity and a desire to gain market share that puts pressure on prices, costs, and the rate of investment necessary to compete".* The impendence of new entrants imposes a limit on the profit ability of an industry and their aim is to divide the current market share even further, resulting in lower returns and reducing sales volumes and revenue.

The threat of new entrants relies upon entry barriers. Entry barriers are the favoured position that incumbents have relative to new potential competitors. Porter (2008:81) lists seven major entry barriers:

a. Economics of scale
b. Product differentiation
c. Capital requirements
d. Cost disadvantages independent of size
e. Access to distribution channels
f. Government policy

When entry barriers in a specific industry are not difficult to overcome the industry will soon appeal to new competitors to enter the industry.

The threat of new entrants plays a major role in the closure of coal mines as the coal produced by India and Australian coal mines is of a similar quality as the South African product. The Indian coal producers had very few entry barriers to overcome, as the mines have access to very cheap labour and mining operations are not governed by stringent mining legislation. Because India is recognised as one of the developing BRICS countries, obtaining foreign capital to fund their mines is not a problem. As a result of all these factors, they are able to produce coal much more cheaply than South African coal mines, and in some instances are even closer to European and other Asian markets than South Africa. As a result of a major decline in international coal prices, it is even cheaper for local steel producers to import metallurgical coking coal from Indonesia, than to buy it from local producers (Medium-term Coal Market Report 2013).

2.3.1.3 Bargaining power of buyers

Customers are forceful if they possess bargaining leverage parallel to other industry participants. This leverage could assist them in demanding lower prices, insisting on higher quality or better service, and circumvent industry participants against one another. Bargaining leverage within a customer group exists if the following conditions exist (Porter, 2008:82):

- There are a limited number of customers, or each customer procures large volumes relative to the volume of a single merchant.
- Products are patterned or undifferentiated.
- The switching cost to an alternative product is low.
- Customers are able to produce the product themselves.

Eskom is the primary domestic customer of thermal coal in South Africa and burns approximately 70 % of domestically produced product to generate electricity. As a result Eskom uses its bargaining power to negotiate long-term fixed price coal contracts where coal is supplied at a pre-arranged price and prices are increased by means of a pre-set formula (Eberhard, 2011:16).

2.3.1.4 Bargaining power of suppliers

Powerful suppliers have the ability to provide natural resources at high prices in order to apprehend a percentage of their customer's profits. Suppliers are powerful in the following scenarios (Porter, 2008:82):

- They are more collective than their customers.
- They do not exclusively depend on the industry for revenue.
- Customers encounter high switching cost when switching to alternatives.
- Products are differentiated.
- No substitutes exist.

South African coal mines are currently the only suppliers of low grade power station coal to Eskom's coal-fired power stations, which comprise approximately 93 % of all South African power stations. Through the implementation of advanced beneficiation methods, coal producers are now able to export low grade coal to international markets and obtain much better prices for their products. This situation has led to rising coal prices. Eskom in turn is unable to import low grade coal at a lower price than they can purchase low grade coal in South Africa.

As a result of global economic circumstances, smaller South African coal producers have merged with large coal producers and a number of coal mines had to close down. This has resulted in five companies being responsible for 80% of all coal production within South Africa, and the average coal price increasing substantially because of a lack of adequate competition in the coal market (Eberhard, 2011:3 & 16).

2.3.1.5 Threat of substitute products or services

A substitute product accomplishes a similar purpose as an industry's product by a dissimilar means. When the impendence of a substitute product is likely, profit potential will deteriorate and it will limit price increases. The threat of substitute products tends to be more probable when the alternative provides an appealing price accomplishment and the switching cost of the alternative is low (Porter, 2008:85).

With an ever-growing awareness and fight against greenhouse gases, which results in global warming, the announcement of *envirocoal* by the Indonesian coal industry poses a legitimate threat to the South African coal export industry. Although South African coal provides similar energy content as envirocoal, the ash and sulphur content of envirocoal is lower. It is thus perceived as a cleaner alternative by the European market with their strong viewpoint regarding global climate change. Envirocoal might not be a cheaper alternative, but it provides the benefit of being an environmentally friendly alternative with lower methane emissions, which is a significant factor for the United Nations Framework Convention on Climate Change Annex 1 countries (De Wit & Le Roux, 2004:9).

2.4 SUMMARY

This chapter serves as an introduction to the South African mining environment, and more specifically the coal mining industry. It provides an overview of the global and domestic coal environments and the challenges faced by the coal mining industry in these environments. It investigates the influence of the macro-economic environment and the six impacts of PESTEL on a mine closure strategy; it indicates how the competitive forces of the market environment shape company strategy by referencing the coal mining industry.

On the local market front mining companies are exposed to factors such as labour unrest, rising demands by government, an uncertain regulatory environment with the implementation of new laws and regulations to regulate and prescribe to the mining industry, and profit margins that are under pressure as a result of all the afore-mentioned factors. Company strategy in the market environment directly relates to a consolidated collection of choices that relate to the company's position and justification. These choices are ultimately shaped by rivalry among existing competitors, the threat of new entrants, bargaining power of buyers and suppliers and the threat of substitute products or services. It is imperative for a company to understand and assess these competitive forces and their impact on the company and to shape company strategy to operate effectively within its environment.

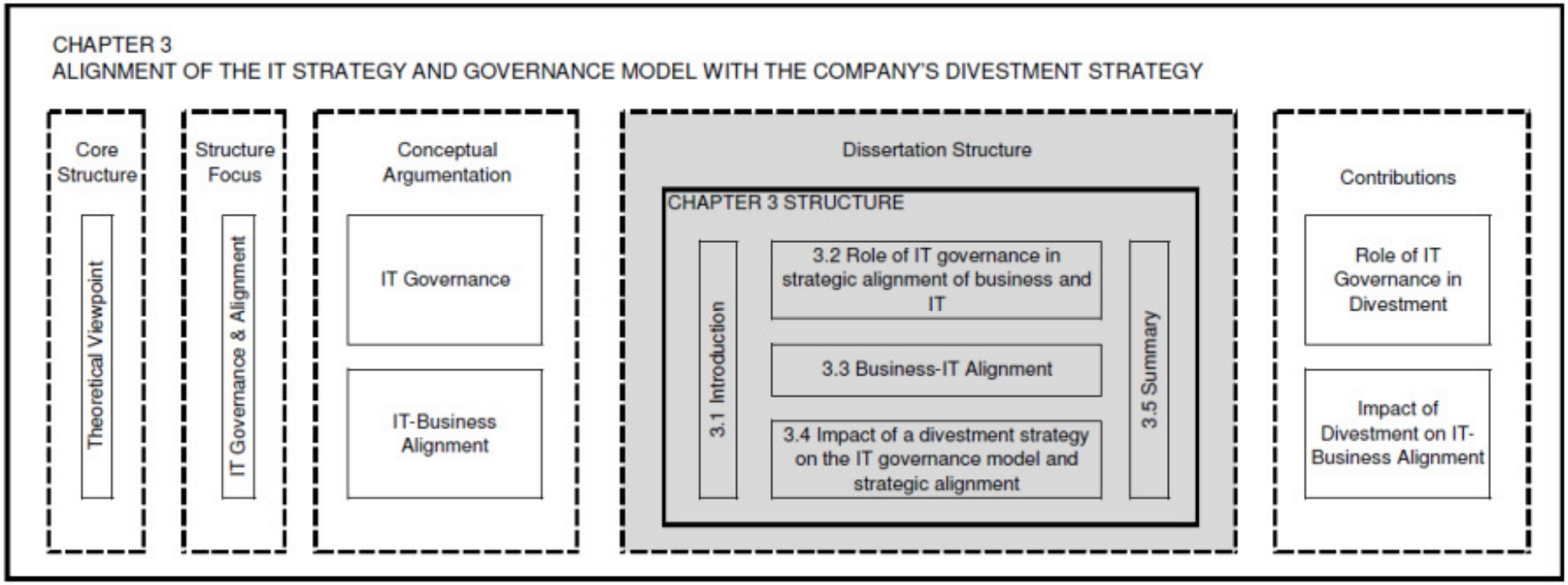
The external environment and its role and impact on a mining company's strategy formulation have been investigated. South Africa faces numerous challenges and opportunities such as a lack of rail infrastructure, new governance introduced and the fact that South Africa is currently globally one of the most carbon-intensive economies. South Africa is, however, in the position to be one of the cheapest producers of coal and the largest export coal terminal resides in South Africa, giving the country access to global coal markets. Mining companies need to be agile and adaptable as both the market and macro environments in which they operate and exist are dynamic and changes occur continuously. Changes in the global macro environment are impacted and influenced by the dynamics of the political, economic, environmental, socio-economic and legislative arenas.

Divestment or mine closure is an instrument of strategy to free up capital and resources and to assist the business to refocus on core activities and reverse over-diversification. Divestment is typically an acknowledgement of dynamic unstable internal or external company prospects and the objective is always to strengthen and reinforce the company's efficacy and performance. Divestiture will necessitate adoption of the company strategy and thus consists of a strategic dimension. Divestment can thus be an appropriate and profitable strategy. A divestment strategy is relevant to a product life cycle approach as it could serve as an option for a deteriorating industry and a convenient approach in *end game* scenarios symbolised by a high level of excitability and unpredictability concerning future returns. The business success of a divestiture is usually evaluated by the measure of success in achieving the underlying strategic goal that was set when the divestment strategy was adopted.

The probable reason for divestment is low profits or unequivocal losses as a result of high cost, perpetual decreases in demand, or entry by more efficient new competitors.
Divestment can be related to a decline in demand, changes in customer behaviour, product failure or inaccurate product design because of the poor performance of a product. The consequences of divestment are far-reaching and affect customers, suppliers and distributors negatively. Only competitors prosper as a result of company closure or divestment as the opportunity then arises to strengthen their market share and favourable circumstances develop for market entry of new competitors.

It is of great importance for the company to determine its position within the industry it operates in to establish the situation to best oppose the forces or leverage them to its advantage. Knowledge of these essential causes of competitive encumbrance provides the underpinning for a strategic agenda for engagement. These causes highlight the crucial strengths and vulnerabilities of the company, exalt the company's positioning within its industry, and define

the areas where strategic innovation will yield the best results; they highlight the domain where industry is inclined to produce the best position to identify opportunities or threats. However, the strategy formulation originates from a company's internal or micro environment with variables such as vision, mission, goals and objectives. Strategy decisions need to embody a sound governance foundation. Al internal departments and operations, and specifically the IT department need to be aligned with the company's goals and strategy and constantly persevere in focusing its actions at obtaining these goals, even if the company adopts a divestment or mine closure strategy.



Chapter Map 04: Alignment of the IT strategy and governance model with the company's divestment strategy

CHAPTER 3 – ALIGNMENT OF THE IT STRATEGY AND GOVERNANCE MODEL WITH THE COMPANY'S DIVESTMENT STRATEGY

Table of Contents: Chapter 3

3.1 INTRODUCTION

In the previous chapter the role and impact of divestment on company strategy are discussed. It was established that divestment is one of the instruments of strategy and that company strategy needs to be flexible to adapt to external macro and market economic conditions. Strategy is a consolidating concept that connects the utilitarian areas of a company and correlates its activities with its external environment. This chapter discusses the importance of the alignment of internal departments or the micro environment, but more specifically the IT department, with the company's business strategy, even if it is a divestment strategy, to support and ensure the achievement of the company's goals and objectives. The creation of a company strategy commences with top management's vision for the company, which is then developed into a business strategy and actively governed through a formal process and policies. Included in this vision is management's perspective on the role that IT needs to fulfil in the company to support the achievement of the business strategy. Information systems and technology are deployed to influence unparalleled business proficiencies, merge and divest companies and business units, restructure industries, and expedite global competition.

Hosseinbeig *et al.*, 2011:1) describe alignment as *"use of IT in a proper and time-effective manner in balance with strategies, goals, and business needs of the organization"*. Luftman (2000: 2) describes strategic IT alignment as *"the activities that management performs to achieve cohesive goals across the IT and other functional organizations"* and therefore alignment encompasses the harmonious co-existence of business and IT. Information technology has become a fundamental business activity for every organisation. Without exception, every organisation has strong belief in its IT investment for its potential long-term advantages for the business. And yet, in most organisations, IT is not intrinsically entangled or synchronised to shape strategy proactively. The major predicament is that most IT strategies tend to be technology-centric rather than being business-aligned IT strategies. This strategic disparity is not only extremely hindering but also greatly damaging. It results in an inheritance of unduly complex IT infrastructure that battles to maintain and preserve the business operations because the IT strategy is hitched onto the business as an afterthought (Beveridge, 2003:3).

Poor or misalignment of business and IT embodies itself in various ways, such as expensive IT investments generating low returns, the establishment of highly plausible applications that are neglected, existence of avoidable inefficiencies, delays and redundancy (Chan, 2002:98). The augmentation of IT to company achievement is a sphere where the idea of fit between IT

and business strategy is particularly relevant (Bergeron, Raymond & Rivard, 2001:128). No solitary activity can empower or facilitate a company to attain and preserve alignment. There are no silver bullets. Technology and business biospheres are too progressive. Actualising alignment is metamorphic and necessitates concentrating on maximising the promotors and minimising the obstacles that ameliorate the integration of business and IT. It demands strong accords and leadership, compelling communication and pertinent prioritisation (Chege, 2014:205).

The extensive application of technology has spawned a pivotal dependence on IT, which has necessitated an urgency to focus on IT governance. IT governance is composed of leadership, company structures and business processes that guarantee that IT preserves and amplifies the company's strategies and objectives. According to De Haes and Van Grembergen (2005:1) the *"ultimate goal of IT governance is achieving strategic alignment between the business and IT to make sure that money spent in IT is delivering value for the business".* Ridley, Young and Carroll (2004:1) further concur by stating *"The appropriate alignment between use of IT and the business goals of an organization is fundamental to efficient and effective IT governance".* The consolidation of strategic alignment and IT governance may be an adequate strategic initiative obliging companies to exploit IT effectively and obtain a competitive advantage.

3.1.1 Aim

The aim of this chapter is to establish the impact of a divestment strategy on the IT governance model and IT-business alignment and to determine the steps that IT and business should take to ensure alignment in order to support a divestment strategy.

3.1.2 Scope

In order to obtain the above mentioned aim, the following topics are discussed:

- The role of IT governance in strategic alignment of business and IT
- IT-Business alignment levels
- Alignment approaches
- Impact of a divestment strategy on the IT governance model and strategic alignment

3.2 ROLE OF IT GOVERNANCE IN STRATEGIC ALIGNMENT OF BUSINESS AND IT

IT governance is formed as a subset of regulations for Corporate Governance but forms part of the all-embracing Corporate Governance of a company. This approach to IT governance is, in comparison to other approaches, relatively new and emanated just over a decade ago. The role of Corporate Governance is to police and uphold management's accountability in general, prevent fraudulent activities, and provide stakeholders and shareholders with an economic and strategic efficiency view. While the primary focus of IT management is internally on departmental level on the day-to-day operations, IT governance has a broader focus on a corporate level to ensure that the company's IT infrastructure will meet the present and future strategic goals and needs of both the company and its external stakeholders (Sethibe, Campbell & McDonald, 2007:835).

IT governance is supplementary to Corporate Governance and its core function is to ensure that IT investments generate business value, and to alleviate the risks related to IT (Brisebois, Boyd & Shadid, 2007:31). IT governance should not be implemented in isolation but needs to form part of corporate governance. IT governance is a set of behaviours, structures and processes that provide direction, support, resources and oversight for IT in a company. In other words, the role of IT governance is to ensure IT expenditure and uses are coordinated with business strategy and in conformity with prescriptions and procedures. IT governance represents the architectures, operational and comparative mechanisms that facilitate business and IT alignment (Silvius, De Waal & Smit, 2009:8). The IT Governance Institute (2003) states that *"IT governance is the responsibility of the board of directors and executive management. It is an integral part of enterprise governance and consists of the leadership and organisational structures and processes that ensure that the organisation's IT sustains and extends the organisation's strategies and objectives".*

Establishing company objectives for IT is described as best practice for IT governance. IT has emerged as a primary enabler for virtually all business metamorphosis and the application of IT directly influences the achievement of the company's vision, mission and strategic goals. Over time, an optimised and refined IT governance structure will help ensure that the company concentrates on the strategic value of IT to enable the establishment of the necessary oversight for the company to reap the ultimate advantage from its IT investment. IT governance encourages important resolutions along the IT life cycle. IT governance thus advocates essential components of IT planning. Adequate governance will administer pivotal steerage to both the planning process and its products. Governance may compose strategic

ideas for deliberation as potential initiatives and provides preconditions regarding strategy alignment, IS/IT portfolio suitability and internal business process priorities (Hickman & Smltz, 2008:7).

The major impediments to IT governance is the lack of senior management involvement in the formulation of IT governance, inadequate IT project ownership, mediocre IT risk management, ineffective IT resource management and above all, feeble strategic alignment. Silvius *et al.* (2009:8) describe IT governance as *"one of the building blocks of alignment and alignment is one of the goals of IT governance".* According to Hosseinbeig *et al.* (2014:67) "*the combination of strategic alignment and IT governance may be an effective strategic initiative allowing organizations to effectively utilize IT and achieve competitive advantage".* Kearney (2008:2) postulates that *"the most successful companies are those that have matured beyond simply linking IT strategy and the business, and instead have established a fully integrated operating environment".* It is presupposed that business needs a new analogy where IT governance is a key element of a holistic comprehensive corporate strategy. Kearney (2008:2) proposes *"The 7 Habits of highly effective IT governance"* that includes the following:

3.2.1 IT is viewed as a strategic business asset and managed as a portfolio

Because IT cost could absorb a large portion – up to four per cent – of a company's revenue and operating expenses it is imperative to treat and manage the company's IT assets as a portfolio to gain an improved appreciation of how appropriate strategies could be employed by defining the benefits that could be realised. The portfolio procedure enables management to converge on how IT augments to overall business success by providing a better understanding of how resource intensive each technology is with regard to labour and monetary resources. The portfolio approach assists the IT department to communicate the significance and value add of IT in common business language (Kearney, 2008:2-3).

The IT portfolio should target business areas where it can beget a compelling brunt on shareholder value and the company bottom line. In essence the business areas on which the portfolio should converge are operations, business enablement and innovation. In the operations business environment the IT portfolio's aim should be the enhancement of existing information systems and support services, and the formulation of a higher standard of effectiveness and cost efficiency. Business enablement depicts the IT tools that have the capability to revolutionise core business processes and enhance business operations to the level of being market leaders in the industry. Innovation represents the technology that could

facilitate the discovery of breakthrough novelties to support competitive strategies and reconstruct market influences and ambulation (Hagen, 2010:2)

3.2.2 Technology ignorance is not accepted

Posthumus *et al.* (2010:23) quote Nolan and McFarlan (2005:1) in saying that *"most boards have not yet achieved adequate control over IT and are quite ignorant when it comes to IT spending and strategy".* According to them very few boards appreciate the amplitude to which companies are operationally susceptible to IT systems or how their IT systems play a crucial role in the development of the company's business strategies. Furthermore, most boards do not have the fundamental vital IT knowledge or literacy to comprehend the extent of IT risks and expenditure. These boards mainly rely on an assortment of implied rules.

Technology literacy is construed as more than only the aptitude to use a computer. It suggests a high level understanding of the complete integrated technological process and its duties and functions in the company. It furthermore entails comprehension of the interrelatedness of antecedents such as risk, privacy, cost effectiveness, governance and sustainability and customer relations. The repercussion of technology illiteracy ranges from a quixotic anticipation regarding technology to the ineptitude to engage actively and intelligently in deliberations and decisions on suitable processes and procedures to resolve issues in which technology fulfils a determining role. It results in the board of directors understanding that the implementation of new technology will obligate organisational change, equipping managers on all levels to operate in the new model and training for employees (Bugliarello, 2000:83 - 86).

3.2.3 IT has board of director-level oversight and clear executive leadership

Because IT can be described as the heart or centre of business operations, IT governance should be an imperative crucial component of the board's corporate governance obligation. However, Huff *et al.* (2004:2) note that *"most boards seem to be passive receivers of information about IT as opposed to aggressive, proactive questioners. We saw little board-level concern about the company's return on its IT investment, for example, or the appropriate level of IT expenditures".* They add that *"The risks and opportunities IT presents may require a level of technical insight that is often absent from the boardroom. The net effect is that many boards are reluctant to deal with IT governance issues".* The IT Governance Institute's (ITGI 2003) board briefing on IT governance was established upon the CobiT® framework and the

main purpose is to act as guideline for boards and senior management in the practices and procedures of IT governance (Musson & Jordan, 2004:3).

The role of the board in general is to act as overseer of business compliance, and institute strategic goals and policies. However, the fundamental obligation of the board is to ensure that optimal value is derived from all assets and therefore alignment is of pivotal significance in IT governance. IT governance can be redistributed by using a combination of structures, processes and rational mechanisms (Sethibe *et al.*, 2007:838). Structures empower and enable parallel liaison opportunities between business and IT management for decision making. Processes indicate the interpretation and institutionalisation of strategic IT resolution reaching or IT supervising procedures. The rational mechanisms represent the diligent participation of, and cooperative connection between corporate board executives, business management and IT management. They are critically important in the IT governance framework and predominant for achieving and preserving business/IT alignment (De Haes & Van Grembergen, 2009:124).

3.2.4 There is no one-size-fits-all *IT governance model*

Rau (2004:35) suggests each company needs to implement its own version of IT governance best practice, based on the company's own organisational roles and relationship structures needed for the effective governance of its IT investment with regard to policy setting, control, and monitoring as in reality there is *no one-size-fits-all* way to govern IT. IT governance is located at various tiers in the company, such as the strategic level, management level and operational level and can be implemented by applying a combination of different structures, processes and related mechanisms. Each of these components in the IT governance framework serves specific or numerous objectives in the intricate alignment challenge. *"There is no 'one-size-fits-all' way to implement IT governance models within a company, but rather a range of approaches that have relative merits depending upon the circumstances. In various contexts; one or more of these approaches may be the best suited to accomplish the goal of an IT governance model"* (IT Governance Institute, 2009:12).

Arcot and Bruno's (2006:25) study provides support for the assumption that in corporate governance, but more specifically in IT governance regulation *one-size-does-not-fit-all.* They have found that companies that selected to diverge from best practices because best practices did not fit or support the company's strategy, in most cases outplayed their competition. Paradoxical to popular belief, the devotion and obedience to principles of good IT governance do not guarantee exceptional company performance. The most pertinent approach to

governance needs to be guided by strategic considerations and impacted by the company's relative topography in the corporate lifecycle. A variety of governance practices are affiliated with company performance and as such companies need to contemplate their strategic preferences before endorsing governance (Todd, 2006:1).

3.2.5 IT is an essential part of corporate planning and strategy

IT governance contains components such as management direction, organisational design and processes establishing an IT organisation that will preserve and expand the organisation's strategies and goals. The first step is the selection of an appropriate IT governance framework and implementing the framework as a solution. In-depth knowledge of business and IT processes and collaboration is required to ensure that the framework that is chosen is adequate and efficient (Hosseinbeig *et al.,* 2014:68; Luftman, 2000:17).

Bernhardt (2007:4) points out that company investment in IT *"requires consistent firm strategies, effective internal and external communication and a careful assessment of risk".* She warns that the selection of good IT governance is becoming incrementally more complex because IT has such a direct and instantaneous effect on matters such as legal compliance, strategic risk and return on investment. The consequence of IT's interrelatedness is that IT governance can no longer be conceived in isolation from the other essential assets of the company. Broadbent (2004:2) describes IT assets as *"just one asset class among others that companies deal with … But increasingly, if not managed appropriately and well integrated into the business they leave organizations exposed to huge risk and competitive disadvantage".*

3.2.6 IT plays an active leadership role in transformation and innovation

According to Fagerber and Verspagen (2002:1294), *"Technology is a key factor shaping economic growth, and the changes in growth rates".* It is postulated that the IT investment made by a company is intimately associated with correlative innovation that enables and supports business process re-engineering, which in turn is a key distinctive characteristic of economic growth. IT is fundamental as it systematises, informs and conceives the heartbeat of a company: business-critical data. IT is instrumental in the destruction of hurdles and obstacles while facilitating innovation. Companies implement IT systems and architecture with the ultimate objective of enabling the exploitation of opportunities and maximisation of related benefits. The result is increased automation for more effective operations, more efficient business processes and abatement of costs (Abu-Musa, 2007:83). The goal of IT governance is focusing on operating and revolutionising IT in order to address current and imminent

forthcoming needs and requirements of the business and its customers, to reduce complexity and raise standards. It is essential that IT governance plays an active role in building the company's IT capabilities in general and supports the achievement of IT process maturity in particular (De Haes & Van Grembergen, 2009:124 - 125).

3.2.7 IT's impact on the business is measured and monitored

It is a well-known fact that significant and severe IT failures have the ability to create chaos on internal and external levels of the company and could potentially lead to the destruction of customer trust and brand loyalty, and ultimately threaten the company's existence. It is thus essential for companies to introduce the necessary procedures to assess and regulate the quality and cost effectiveness of the IT capability. Tracking and monitoring will enable companies to quantify the IT systems that support profitability and identify systems that are not functioning optimally and need to be optimised or replaced. Haghjoo (2012:3) describes some of the benefits of effective IT governance as the ability to protect shareholder value, better focus on IT spending, higher ROA from IT, improved ROI, performance improvement and enablement of external compliance, to mention only a few.

Hagen (2010:5) describes effective IT governance as *a long journey* and claims that companies that set out to understand the path can envisage and effectuate success by applying these seven habits to ensure they stay on course. IT governance frameworks, such as CobiT® and ITIL, endorse benefits such as efficiency, decreased cost, increased regulation of IT infrastructures, product and maintenance excellence in clarification of IT governance and improvement of organisational liability, culminating in return on investment (Wessels & Van Loggerenberg, 2006:1). These frameworks are discussed in more detail in Chapter 4.

IT governance can be described as a building block of strategic alignment. Debreceny (2013:130) affirms that *"a core dimension of ITG is strategic alignment between the information technology function and other functions in the organization".* Inadequate execution of an IT governance framework will derail strategic IT alignment. The role of IT governance is to safeguard the achievement of strategic alignment, but more importantly, to evaluate and measure alignment continuously to ensure sustained strategic alignment (Hosseinbeig *et al.*, 2011:3; Silvius, 2009:5; Chan & Reich, 2007:299).

3.3 BUSINESS-IT ALIGNMENT

Strategic unification recognises the obligation for strategy to devote effort to both external and internal environments. This accentuates the requirement to make selections that will position

the company in the external market environment and establish how internal factors should be arranged to accomplish a market-position strategy. These decisions and selections are the business strategy, and the company infrastructure and business processes. Performance of the company is characterised by the measure and intensity to which the internal and external strategies are compatible and dependable. Strategic advantage is obtained through the application of IT to embellish these decisions and selections (Burn & Szeto, 2000:198).

Defining the strategic value of a commodity or a convention is challenging. Why is strategic value deemed more precious than operational value? How does a business differentiate between IS-based competitive advantage and IS strategic value? De Vaujany (2008:2) describes strategic value as *"the portion of the legitimate price a given stakeholder can correlate to IS artefacts or IS activities as implemented by a firm".* According to Barley and Hesterly (2006:12), a strategic value can be interpreted as an economic value. In the end competitive advantage results in the company beings able to create better economic value than its rivals. Strategic value and *competitive advantage* is often equivalent and postulated to emanate from *strategic alignment* or is an implied part of characterisation and fiddling in the company.

According to Hiekkanen, Helenius, Korhonen & Patricio (2013:81) the concept of alignment has its origin and lineage in the *design school* of strategy, where the fundamental constituents are the measures of conformance amid a company's inherit structure and its extrinsic situation. Alignment is valuable not exclusively in the development of strategies but also in their execution. Execution is promoted by aligning and adapting indispensable systems, processes, and verdicts within the company, consisting of accolade systems, information systems, resource distribution, corporate culture, and company aspirations and antecedence (Joshi *et al.*, 2003:354). Peppard and Breu (2003:745) describe business-IT alignment as *"a process of bricolage, improvisation and tinkering"* and construe that although *"alignment thinking is theoretically and conceptually consistent"* most companies underestimate the difficulties they will encounter when trying to sustain business-IT alignment for a longer period of time.

Business-IT alignment faces numerous challenges that relate to the lack of knowledge, where, on the one hand, business executives lack IT knowledge and IT executives do not have knowledge or access to the corporate strategy, and IT managers do not understand the key business and industry drivers. Furthermore, business managers do not have adequate knowledge relating to their own industry, and thus cannot employ IT solutions to solve business problems. Business managers are uninformed and unconversant regarding the

significance of IT alignment and in general do not have the expectation that IT will be the solution to crucial and eminent business problems. This concern is consequence of the view that strategy should be focused only on the external environment of the company and that IT is considered as an internal reaction or contribution to business strategy contrarily to an entity that influences business strategy. If not managed carefully, alignment has the potential to give rise to unwholesome situations, such as the misalignment as a result of inconsistent business strategies, IT deceleration and the challenges presented by cultural differences as well as the impact of the extent of globalisation on IT (Chan & Reich, 2007:298 - 299).

Two mind-sets on Business-IT alignment prevail in existing literature. The first inclination describes alignment as an *end state* where component models evolve to facilitate the antecedents and the consequences of alignment. The second inclination describes alignment as an ever chancing *process* where the goal of alignment is rarely accomplished as a result of the dynamic environment in which the company operates. Baker and Jones (2008:3) conclude that fusion between these two alignment sentiments is needed to better understand alignment. According to them an *end state* of alignment prevails and advancement of the end state can be measured and evaluated. However, alignment is also a process to support business in a compelling progressive business environment.

3.3.1 Business-IT alignment levels

Business strategy relates to which favourable circumstances, market segments, products and services the company will target and how these will attain superiority over competitors in addressing customer needs. Before the company can execute its business strategy it needs to determine the most appropriate company structure, and business processes and services to support the strategy. Effectuating calibration of the needs of non-IT departments within the company and service rendition by IT is a major constituent of IT governance. The purpose of the alignment of IT governance and strategic business-IT alignment is to endorse the accomplishment of business goals on a strategic, structural, tactical and operational level and to ensure complete synthesis and integration between business and IT (Hosseinbeig *et al.*, 2014:68; Masa'deh, Hunaiti & Yaseen, 2008:180).

Reich and Benbasat (2000:82) describe two dimensions of alignment, namely the intellectual and structural dimensions. Firstly, the intellectual dimension is defined as *"the state in which a high quality set of interrelated IT and business plans exist".* Secondly, the structural dimension is *"the state in which business and IT executives within an organisational unit understand and are committed to the business and IT mission, objectives and plans".*

Hiekkanen *et al.* (2013:83) construe the structural alignment dimension as the *"fit between business and IT decision-making structures and organizations".*

3.3.1.1 Intellectual alignment

Intellectual alignment entails the existence of business and IT plans that are aligned. A strategic plan is an instrument that gives direction to complete an assignment as effectively and with the most significance possible. If it is to be compelling and practical, it should enunciate definitive goals and illustrate the process that needs to be followed as well as the resources needed to achieve them. A business plan is customarily fixated on the activities and investments to produce income from a particular program or service. A business plan comprises information regarding a company's products, competitive environment and revenue expectations (Mittenthal, 2000:2). King and Teo (2000:667) describe strategic planning for information systems and technology as *"the process of identifying a portfolio of computer-based applications that will assist an organization in executing its business plans and consequently achieving its business goals".* Business planning and information systems planning integration are the alignment of IS/IT strategies with business strategies that can be influenced by harmonising business planning and IS/IT planning processes. As IS/IT planning has become universally accepted, it is obvious that information and technology strategies need to be conceptualised in alignment with the business strategy, if the ultimate goal is to secure competitive advantage from IS/IT (Goldsmith, 1991:67).

IT needs to understand the business objectives, business problems and how the business operates. The enhancement of business and IS/IT planning integration ensures that IS/IT endorses the company goals and activities on all the business process levels through the allocation of the necessary resources to implement and support the needed information systems and technology to ensure the smooth running of critical processes. It further facilitates establishing the IT department as an indispensable business partner in the company through the facilitation of information sharing and intrinsic commentary between top management and IT management in the process of strategy formulation and implementation (Teo & King, 1996:310). Optimal planning processes drive companies to success and to staying in the forefront in a highly competitive environment.

The aim of strategic information systems and technology planning is wide and involves all prospects and angles necessary to make the running of a company effortless. These objectives include aligning IS/IT with business, gaining competitive advantage, establishing new and better return on investment systems and infrastructure, escalating top management

obligation, better communication with end users, predicting IS/IT resource needs, apportioning IS/IT resources, developing IS/IT infrastructure and escalating the visibility of IT. The significance and prominence of strategic information systems and technology planning has grown because companies pursue the highest benefit form resources and limit risks if possible. The emphasis of strategic systems and technology planning emerge to generate a strategic plan devoted to the imminent need for IT and IS resources in line with the business objectives (Al-Aboud, 2011:180).

3.3.1.2 Structural alignment

According to Peppard and Breu (2003:744) structural alignment *"stresses the importance of structural fit between IS and the business, specifically in the areas of IS decision-making rights, reporting relationships, provision of IS services and infrastructure, and the deployment of IS personnel".* Chan (2002:100) describes structural fit or alignment as an indication of how the IT organisational structure correlates with the business organisational structure and addresses issues such as the lodgement of IT decision making privileges, reporting relationships, consolidation of IT services and infrastructure and the positioning and placement of IT personnel. The objective of structural fit is to ensure that both the business and IT organisational structures endorse organisational goals and objectives.

Literature highlights a number of essential prerequisites of structural alignment. These include the following:

- Business managers need IT knowledge and IT personnel needs business knowledge.
- Consolidated or deconsolidated reporting structures and committees.
- Spontaneous casual networks and structures.
- Interconnected career paths and utilitarian.
- Inducements and accolades.
- Performance assessment and appraisal.

In addition to intellectual and structural alignment, Tarafdar and Qrunfleh (2009:339) construe two alignment levels, namely a strategic level and a tactical level. The strategic level signifies an affiliation between business strategy and the comprehensive IT portfolio. The correlating processes involve planning and electing IT software and infrastructure pertinent to the company's strategic goals and objectives. Tactical alignment is attained through the implementation of the elected IT software and infrastructure that results in realising the company benefits forecast.

3.3.1.3 Strategic alignment

Joshi, Kathuria & Porth, (2003:353) describe strategic alignment as *"the level of agreement within an organization regarding the relative importance of cost, quality, delivery and flexibility to the organization's operational goals"* that is obtained when the attentiveness and agility of all employees are concentrated on the company's goals and objectives. Baker and Jones (2008:26) explain strategic alignment as *"an enduring organizational capability that enables the organization to respond to the dynamic competitive environment and sustain strategic alignment over time".* Henderson and Venkatram (1999:474) support their theory of strategic alignment with two building blocks, namely functional integration and strategic fit.

Functional integration

Functional integration concedes the necessity for any strategy to pontificate both external and internal business domains and thus has a relevant interface with Porter's (2008:88) competitive forces that shape company strategy. The external domain described by Henderson and Venkatram (1999:474) represents the realm in which businesses rival and are implicated with decisions regarding product-market offering and the extraordinary strategy characteristics that extricate the organisation from its rivals. It also includes the dimensions of *make-versus-buy* decisions that comprise partnerships and coalitions. Henderson and Venkatram recommend the following choices to help position the organisation in the IT marketplace or external domain:

- Information technology scope – specific IT, such as WAN, expert systems or robotics, to champion current business strategy or configure new business strategy enterprises (Silvius *et al*., 2009:10).
- Systematic competencies – attributes of IT strategy, such as flexibility and systems reliability, emphatically advancing the creation of new business strategies, or enhancement of existing business strategies (Luftman, 2000:15).
- IT governance – selection and use of instruments, such as joint ventures and strategic alliances, to secure the necessary critical IT competencies (Silvius *et al*., 2009:8; Luftman, 2000:17).

The internal domain represents choices regarding the rationale for the organisational structure and the logic for the construct of crucial business processes, such as product development, customer service total quality, etc. and lastly for attaining the appropriate skills and competencies. Henderson and Venkatram (1999:475) propose the following components to address the internal IS domain:

- IS architecture – definition of the application portfolio, configuration of hardware, software and communication to define the technical architecture collectively (Silvius *et al*., 2009:6; Luftman, 2000:14).
- IS processes – defining work processes central to the operations of IS infrastructure (Luftman, 2000:19).
- IS skills – management, training and development of critical skills to manage and operate the IS infrastructure (Silvius *et al*., 2009:10; Luftman, 2000:19).

Strategic Fit

According to Porter (1996:10) strategic fit drives both competitive advantage and sustainability through activities that are integrated and aggregate one another to forge real economic value. *"Fit locks out imitators by creating a chain that is as strong as its strongest link."* Fit is further described as a pivotal element of competitive advantage, which is characterised by core competencies, critical resources and key success factors across all the functions and activities working together to reduce cost or increase differentiation. The augmentation of IT to company performance is a realm where the concept of fit is specifically applicable and relevant.

Chorn (1991:20) defines the principle of strategic fit as *"the degree of alignment that exists between competitive situation, strategy, organisation culture and leadership style".* Alignment thus represents the suitability of the individual elements. Strategic fit is an optimal mode of being, which should be the continuous goal of the company. Fit is, however, an evolving objective that is somewhat ambiguous and rarely achieved. Management should not approach the competitive situation and the company as disconnected, collective entities, but rather realise that they are distinct forces in a compatible global environment.

The fit between company activities and functions is essential as they have the potential to influence one another by reducing cost or increasing differentiation. Porter (1996:11) describes three types of strategic fit but emphasises that the most treasured fit is strategy explicit as it embellishes a position's singularity and intensifies trade-offs. First order fit is uncluttered consistency between each function and the overall strategy; second order fit materialises when activities are augmenting, and third order fit entails optimisation of effort.

3.3.1.4 Tactical alignment

The absence of tactical alignment contributes to disparity between IT that is planned and contemplated and IT that ultimately realises; considering the crucial role of IT in facilitating business in a number of aspects it will severely impact strategic business-IT alignment, which

in turn will hamper the execution of the business strategy. The tactical level of alignment elucidates goals and requisites of the strategic environment into actual achievable objectives, obligations, endorsements, frameworks and direction for the operational domain. It has become obvious that business managers and the IT department need to collaborate to enable the development of a collective system of understanding and a consolidated domain knowledge, which should be applied while colluding to resolve generic universal problems and issues. Tactical IT-business alignment is essential for ensuring the timely delivery of IT projects and producing the desired business benefits with IT projects. Alignment at the operational or tactical level is imperative to ensure that proposed applications are successfully realised, supported and used and that software systems extraneous to the strategic business plan are not executed (Tarafdar & Qrunfleh, 2009). Gutierrez, Orozco, & Serrano (2008) validate the necessity to bolster inquest to the tactical and operational level. Derived from a literature review findings they state the following:

- Business-IS alignment and evaluation resolutions are essentially fixated on the strategic level.
- The correlation between IT projects implementation and strategies is inadequate.

Tarafdar and Qrunfleh (2010:110) identified six aspects of tactical IT business alignment. These aspects are related to communication, governance, skills, sourcing, project execution and the role of IT professionals. They further describe the four outcomes of tactical IT-business alignment and how they are supported by the aspects mentioned.

Outcomes of Tactical IT-business alignment	**Alignment aspects facilitating each outcome**
Implementation of planned applications	• Communication-related • Governance-related • Skill-related • Sourcing-related • Project-related
Enabling Execution of IT	• Communication-related • Governance-related • IT professionals' role-related • Project-related
Increased credibility of the IT function	• Communication-related • Governance-related • IT professionals' role-related • Skill-related

Increased business value from IT projects	• Communication-related • Project-related

Table 3.1: Outcomes of Tactical IT-Business Alignment and Corresponding Facilitating Aspects

(Tarafdar & Qrunfleh 2010:114)

3.3.1.5 Operational alignment

Economic buoyance has put companies under growing adversity to align strategy and operations. Volatile market environments that have an impact on strategy and operational enactment are one of the most critical barriers faced by companies in their pursuit to align strategy and operations. Alignment gaps may emanate as a result of imparity in strategic and operational goals. Strategic functions gravitate towards focusing on competitive discernment, while operations experience continuous encumbrance to enhance efficiency and manage cost. Only with escalated perceptibility can a business pinpoint the barriers to alignment and address the gaps that are prohibiting it from competing more effectively. Strategies are futile unless they are embraced at the tactical and operational level. The tactical level needs to determine which projects are necessary to support strategy execution. On an operational level projects need to be executed and form part of the daily operations of the business. At an operational level the IS/IT manager gravitates towards promoting the actions of business associates, rather than the strategies incorporated in the business plan as they tend to be too complex to be comprehended and executed at an operational level. Guldentops in Van Grembergen, De Haes, & Guldentops (2004) address the significance of business-IT alignment on an operational level. He differentiates between vertical and horizontal alignment. Vertical alignment in essence is driven by recapitulating an all-embracing business and IT strategy and deciphering the strategy at each business layer into a common comprehendible language, responsibilities, opportunities and threats relevant to each layer. Horizontal alignment is fundamentally driven by collaboration between business and IT on consolidating the strategy, on cultivating and conforming on performance measures and on apportioning accountability.

According to Santa, Vemuri, Ferrer, Bretherton, & Hyland (2010:902) their research established that *"it is not possible to achieve maximum returns through technological innovations as dimensions of operational effectiveness need to be aligned with technological innovations to improve their operational performance".* Technological innovation implementation on its own is unable to relinquish an ongoing competitive advantage. The advantage is acquired through the ability of the business to capitalise continuously on the functionality of technological innovation.

3.3.2 Alignment approaches

Strategic management is typified by a disjuncture between the strategy content and strategy process research approach. Content-based research explores disclosure of *What* the constructs of competitive advantage is. It seeks comprehension of the linkage amidst strategy and achievement, applying an architectural avenue to production and competitive capability. Process-based research explores how strategies emanate over time and describes how they are actualised and executed.

3.3.2.1 Content-Based stream

The content-based stream of business-IT alignment is the typical formative approach where an extrinsic strategy is surmised. A continues connection to business strategy where an "IT pursue business" ethos is followed. Approaches such as market-based, industry structure and internal structure are all applied as elements of analysis (Henderson & Venkatraman, 1993:472).

The market-based view

In a commercial business-related framework that has become intrinsically all-encompassing and virtualised, companies need to influence IT in order to convert themselves into astute and flexible departments, continuously conforming and adjusting the formation of strategic alignment of fit. When strategic adaption is the axe to grind, management needs to ensure that the establishment of a new or embellished business strategy is imitated in the conception of a fresh or augmented IT strategy. Companies whose business and IT strategies are aligned should be less exposed to external variation and internal disorganisation and should thus be empowered to perform better. Companies should convert their IT investments into escalated business performance in terms of productivity, better market share, profitability or alternative barometers of company validity. When IT strategy is the sanctioning cogency, management should establish how emanating IT capabilities can be applied to intensify the company's strategic direction. The two principal dimensions of IT strategy are IT environmental scanning, which determine the extent of the company's capabilities to detect and react to technological changes in relation to competitors, and secondly the extent to which the strategic use of IT increases product quality, competitiveness, and performance (Bergeron, Raymond & Rivard., 2004:1008).

Resource-based view

The resource-based view (RBV) postulates that the business's internal resources are the fundamental prognosticator of exceptional financial performance. The aim and focus of the RBV is to scrutinise IT resource performance inconsistencies, provide abutment for the strategic-grid framework, associate IT's potential competency and business effectiveness and achievement and to analyse the significance of senior management and infrastructures in IT adaptability. RBV underlines the notion that companies should focus on the development of their internal assets and processes. Companies should cultivate mechanisms that are incomparable and involve esteemed core assets. In this new information intensive age all companies are reliant on the availability of relevant information. It is thus the companies with the most advanced processes to adapt and exploit information that will acquire and sustain a competitive advantage. Strategic IT alignment is such a process. It is unparalleled in the business and integrates business and IT discernment to enable endorsement of the business objectives. Alignment also incorporates those results that are the outcomes of the alignment process – thus the strategies that are accommodated in both the business and IT plans (Kearns & Lederer, 2003:3).

How do companies endure when confronted with change? The intrinsic question is whether companies acclimate and innovate, and if they do, how is this innovation implemented? Being sizable and prosperous provides no assurance of persistent survival. According to O'Reilly and Tushman (2007:9) the aptitude to engage concurrently in developing sophisticated strategies is a fundamental component of being prosperous in the long-term. In essence it relates to the company's ability to capitalise on or exploit existing commodities in a prosperous way and synchronously explore emerging technology and markets; furthermore, to be able to construct and reconstruct the company's resources to acquisition emerging and established opportunities. This ability is the essence of a company's dynamic capabilities and ambidexterity. In essence dynamic capabilities are the company's ability to reconstruct its internal and external wherewithal to focus on a vigorously changing environment (Teece *et al.*, 1997:515).

Ambidexterity demands a systematic alignment of proficiencies, structures, practices and perceptions to enlist in exploration, a diverging harmonious alignment fixated on exploitation and leadership with the intellectual and detectable resilience to institute and cherish both. Future attainment and prosperity necessitate leaders to reapportion company resources beyond declining business units benefitting from transpiring growth opportunities. Business will accommodate a portfolio of resources to ensure the existence of the necessary capabilities to be able to respond to rival forces that promote a subsistence level correlative advantage.

Because resources are interchangeable and unexclusive to an entity, competencies are entity explicit and devised to achieve the company's strategic goals and objectives. Conversely, in the IT context, resource capabilities are a *distinctive set* of artistries, adjustments, attitudes, catalysts, and behaviours that commit to achieving specific endeavours and contribute to the company's overall performance (Teece, 2006:38). The process of alignment is an aptitude on its own and should be differentiated with the supporting technology that, because it is equally available to all companies, cannot lead to a sustainable competitive advantage. Only when company resources and technology are leverage in an unparalleled unique way will it result in an advantage (Clemons & Row, 1991:275).

3.3.2.2 Process-based stream

According to Debreceny (2013:132) *"an important ingredient of IT governance is the level of process maturity. The ability of organizations to leverage information technology for value generation and management of risks depends in large measure on the maturity and reliability of a myriad of business processes, organizational structures, and relational mechanisms".* The alignment models coinciding with the process-based stream focus on the vigour of business-IT alignment, co-metamorphic evolution of both business strategy and IT strategy as well as on the social aspect of alignment. These models accentuate the significance of the internal process to cultivate and sustain alignment. The pivotal argument is that alignment is mainly discerned as a continuous progressive mechanism and never as a static end state. The degree of business/IT alignment is the most compelling vaticinator of the degree of process maturity in a company. Processes provide the necessary architecture to benefit enhancing activities and business/IT alignment depicts the criticality of IT process correlation and path reliance. IT process adaptability and strategic alignment are reliant on and entrenched in processes as well as impalpable resources such as managerial IT knowledge, rather than on the availability of discernible resources (Debreceny & Gray, 2013:183).

Strategy-as-practice

The strategy-as-practice concept of strategic management portrays strategy as an action initiated by people, and not an explicit orderly characteristic of organisation. Strategy-in-practice in turn focuses on strategy as an intricate work system that is formed and reformed by the internal and external environment of the organisation (Hiekkanen *et al*., 2013:86). A strategy-as-practice approach has been endorsed as an informative view for the analysis of strategic technology management. Three components of a philosophy of practice are recommended, namely praxis, practice and practitioners. Whittington (2006:619) defines practice as *"the shared routines of behaviour including traditions, norms and procedures for*

thinking, acting, enduring things"; Kerr, Farrukh, Phaal & Probert (2013:1050) describe the practice mind-set as the *"managerial activity, i.e. how managers do strategy".* Practice concerns the tools and models for sanctioning action coupled with their correlated company definitive ingrained routines. Whittington defines praxis as *"the intra-organisational work required for making strategy and getting it executed".* Praxis refers to the established and socially proficient flow of enterprises that are strategically *"consequential for the direction and survival of the group, organization or industry"* (Kerr *et al.*, 2013:1050). When related to IT, praxis is the routinely day-to-day flow that is required to maintain, adopt and produce the needed IT infrastructure to support the company's practices and processes. IT praxis involves the recreation and conversion of overarching practices, which include elements of regulation, control and assurance and depend upon both internal and external company elements (De Vaujany, 2008:7).

Strategy as process

Notwithstanding the acknowledgment that strategic IT alignment is a process and not a result, its origin is still unduly regulated and little intuitiveness is available for the preservation of a flexible and ongoing process of modification and change among business-IT strategies. Because of strategic IT alignment's enslavement by mechanistic processes of architectural and strategic alignment, it fails to acknowledge the critical role played by human instrumentality – both historically and present-day, externally and internally – within this process. The requirements, limitations and results of the business-IT strategy process are not only an objective of architectural and strategic alignment but also unmistakably hinge on whether the company is following an exploration and/or an exploitation strategy for value creation, whether the company is functioning in an extremely equitable and sensitive environment, and whether technology is surfacing or disturbing (Peppard & Breu, 2003:747).

Co-evolutionary theory as described by Peppard and Breu (2003:745) is viewed as one of the approaches that could help to shed some light on strategy as process as it applauds the inter-relatedness of companies in an intricate socio-cultural and classical framework, where the capability to embrace change and cooperation converges and echoes. Furthermore, it supports an influential opinion of the processes and actions impacting the company and its environment. Lewin and Volbera (1999:526) define coevolution as *"the joint outcome of managerial intentionality, environment, and institutional effects".* A co-evolutionary approach permits the formulation of a process of bilateral reshaping between business-IS strategies, not only as an element of alignment but as a progressive exchange of co-emerging interactions, interdependence and ramifications that are influenced by a perplexing combination of constantly changing forces.

Although it is mainly the benefits of the strategic alignment between business and IT that are researched and focused on, strategic alignment could potentially pose a number of challenges to the sustainment of strategic alignment. According to Sabegh and Matlagh (2012:16) these challenges entail an unstable business environment and continuous changes to the company's strategies to counter the influence of price wars, the launch of new products, decrease in demand and depletion of the company's natural resources. In the light of these challenges the strategic alignment between business and IT has become an essential component; successful alignment will enable the company to change the fundamental nature of industries through the improvement of core business processes and mining opportunities furnished by the renovation of business procedures.

Smits, Fairchild, Ribbers, Milis & Van Geel (2009:427) discuss reasons for why strategic alignment is such an ambiguous concept. According to them business usually focuses on how IT is aligned with its strategy but very seldom on how it is aligned with the IT strategy; secondly, alignment is considered to be a *single issue item* rather than the product of numerous diversified issues, such as capable processes or transformation of enterprises and data. Lastly, the lack of acceptable suitable models or frameworks contributes to alignment abdication. Luftman and Kempaiah (2007), Silvius *et al.* (2009:5) and Luftman (2000:14 - 20) propose the valuation of strategic alignment by assessing the extent of alignment maturity with the Business and IT Alignment Maturity Model.

3.3.3 Business-IT alignment maturity

Companies constantly and endlessly seek strategic alignment. Alignment grows from a primary ad-hoc process to a well-established convergent process if maintained and preserved over an extended time period. Business-IT alignment maturity is described by Baker and Jones (2008:11) as *"the 'depth' or 'degree' of strategic alignment rather than the length of time alignment has been sought or observed".* Mature alignment emerges into an affiliation in which IT and other business departments conform and shape their strategies in collaboration. No matter whether alignment is considered from a business-driven perspective (IT-enabled) or from an IT-driven perspective, the main goal is to warrant that the company strategies transform conjointly (Chege, 2014:203). Business-IT alignment maturity is classified on three levels where the alignment with business goals and strategies represents the first level. On the second level of alignment IT capabilities are aligned with the external environment of the business and on the third level of alignment the focus moves to beyond current business needs to consider technology trends and the competitive landscape to ensure a proactive

approach when determining the business strategy by applying IT (Zeinolabedin, Khademi, & Rahbar, 2013:14).

Chan *et al.* (2007:303 - 304) describe a number of influential alignment and alignment maturity models. The purpose of these models in general is to encourage the exploitation of the strategic power of IT investment to contribute meaningful benefits in supporting the business strategy. Maturity models characterise the transformation of the alliance of business and IT over an extended period of time. The outcome of these maturity assessments indicates the predictability and refinement of business-IT alignment, and the potential to achieve the outcomes desired by both business and IT. Maturity models employ a life-cycle resolution to ensure that business-IT alignment reaches its full potential and highest maturity level. It furthermore aims to assist with the establishment of goals to support process enhancement and focuses on opportunities for expansion and optimisation as fundamental virtues expected to represent business-IT alignment maturity levels (Tapia *et al.*, 2008:71). According to Smaczny (2001:797) most of these models have a few similar underlying assumptions, the first of which is that leading edge companies are built on a mechanistic bedrock, and secondly that modern day management applies a methodical approach to achieve business objectives.

3.4 Impact of a divestment strategy on the IT governance model and strategic alignment

A business decision to modify the company strategy can be taken at any point during a financial or calendar year. Such decisions are usually taken because of major developments in the company's macro or market environment and could entail any number of events, such as a merger, an acquisition, a divestment of business units or the closure of a business unit. The IT strategy needs to be agile and flexible in order to adapt in synthesis with the company's dynamic operating and market environment. The IT department cannot afford to struggle with convocation of IT resources, IT governance model and IT projects to support the realisation of the new IT strategy as this will result in misalignment between the business and IT. Business executives are frequently uninformed of the impact associated with IT cost and resources that arise as a result of business decisions. Furthermore, the altering or adoption of the business strategy and plans tend not to be aware of or acknowledge the brunt on pertaining operational level IT processes and resources that will contribute to execution disparities (Tarafdar & Qrunfleh, 2009:338).

The importance of IT management's presence in the company's business unit divestment efforts needs to be understood and accepted in the context of the benefits that could be

leveraged through IT de-integration. Early participation in and cooperation between business and IT will broaden communication, highlight potential areas of opportunity, operational threats and financial liability and risks. Implementing a divestment strategy necessitates the establishment of an IT governance model to support divestment and define the roles and responsibilities necessary to manage the IT de-integration efforts. According to Weill and Woodham (2002:3) *"designing an effective IT governance structure requires understanding the competing forces in a large organization and creating harmony among business objectives, governance archetype and business performance goals".* Effective IT governance implements mechanisms that will embolden an attitude coherent with the company's mission, strategy, values and culture. Adopting the IT governance model will ensure alignment of business and IT with regard to understanding the company's strategic objective or intent with the divestment strategy and business understanding the effort and expenses required from an IT perspective to de-integrate the IT component of the business unit. IT governance is described as the *"vehicle to implement strategic change"* (2002:9). When a company understands the strategic value of IT when implementing a divestment strategy, its strategic approach should be one ensuring an IT architecture and platform that is well suited to divestment, and in following this approach can ensure a smooth transition to support the IT carve-out process during a divestment strategy. As a definite link between IT strategy and business strategy alignment in divestments has been established, it can be argued that the level of alignment maturity is a key contributor to the outcome of divestment efforts. The lack of alignment between IT and business strategy can also be an inhibitor in realising the full envisioned benefit of the divestment effort.

3.4.1 Factors affecting alignment when implementing a divestment strategy

3.4.1.1 Environmental uncertainty

Factors outside the company's jurisdiction, such as environmental uncertainty also affect alignment. Environmental uncertainty represents the intensity of change and volatility in the company's external environment, and the value and applicability of available information on the prevailing context of the environment, probable significance of the situation, and the strategic choices available. IT has the capability to empower the company during uncertain periods and provide extended flexibility and adaptability. Companies operating in unstable environments are presumed to enlarge their investment in IT and to place greater trust in IT. Managers in these companies are expected to increase their focus on business and IT strategies and the alignment of strategies (Chan *et al.*, 2006:30).

IT has the capability to empower a company in uncertain environments through IT application to enhance information conversion and transformation capabilities (Chan *et al.*, 2006:30). The company's change agenda sketches the disposition of the needed modifications to business processes and the IT landscape. A roadmap catalogues and portrays the step by step process to execute infrastructure and system changes with particular detail regarding each individual technology, depicting priorities and time lines. Understanding the significance of items on the business portfolio and how they impact technology will enable IT to align a portfolio roadmap accordingly to ensure reaping benefits through a combined implementation program between business and IT. After establishing the technology roadmap to support and align with the business portfolio the next step is to convert and transcribe the technology roadmap into execution plans by defining and implementing the delivery framework. The final step in the process is to measure whether business has reaped the intended IT benefits and ensuring proper alignment of business strategy and the IT function (Beveridge, 2003:10)

3.4.1.2 Connection between business and IT planning

Planning can be described as regimen and foresight to anticipate obstacles and opportunities within an unmanageable and complex environment and has been classified as one of the most eminent and influential IT management issues. The goal of business and IT planning processes is to prompt continuous and ongoing interaction between business and IT executives to optimise the management of technology associated strengths and weaknesses. This evolving and continuous communication provides the foundation for business-IT alignment (Chan *et al.*, 2006:29). As IT planning has become more prevalent, it is apparent that IT strategies need to be forged simultaneously and in alignment with the business strategies if a competitive advantage is to be secured from IT investments or divestment. For IT planning to add value, it needs to understand the business objectives, business obstacles and how business operates (Goldsmith, 1991:67).

3.4.1.3 IT's understanding of business

The conventional function reserved for IT is secondary to business planning and is seen simply as a deployment tool and not essential in the construction of strategy. When embarking on a divestment strategy it is imperative to ensure optimal synchronised Business-IT alignment and for the IT department to realise that real opportunity exists to make a difference. Although the IT contribution is now less likely to provide competitive advantage, it is probable that the best advantage will be obtained from the implementation and use of robust but agile technology, thus supporting a flexible and adaptable business strategy. IT needs a straightforward and

authentic alignment plan to support business in realising its divestment strategy (Beveridge, 2003:4).

The IT department will need an unambiguous understanding of the company itself. This understanding includes aspects of mapping the business processes as well as the information flow that supports the company through the various software systems and IT infrastructure. It further entails a detailed understanding of roles and responsibilities to match the nature of the company's systems with the nature of its business, and focus on what exactly makes the business functional. Over and above understanding the business, the IT department needs to be knowledgeable regarding its own resources and value chains and inter-dependencies between the components and services. It is fundamental that the IT department has a clear comprehension of what the true driving force of their IT function is as well as what the disposition of their scaling factors entails (Silvius *et al.*, 2009:10).

3.4.1.4 Organisational transformation

Companies embark on organisational transformation when a divestment strategy leads to the unbundling or carve-out of business units and assets. Lee and Ivan (2006:31) describe business transformation as *"a key executive management initiative that attempts to align the technology initiatives of a company with its business strategy and vision".* Business transformation is also described as fluctuating processes that include the company's functions and demeanour through the application of compelling strategies to counter vital changes in the business environment in order to attain the company's strategic, tactical and operational alignment of business with IT. The aim of business transformation is embarking on a divestment strategy to improve the company's profitability and reduce cost, but on the other hand it assists the company in dealing with and re-aligning tacit values and beliefs, and to build a new portfolio of skills and products after the divestment of a business unit. Divestment forces the company to investigate new markets, deploy new approaches and optimise business processes through simplification, standardisation and consolidation (Al-Hasem & Yaseen, 3).

3.4.1.5 IT management sophistication

According to Gregory (1995:351) technology management *"addresses the effective identification, selection, acquisition, development, exploitation and protection of technologies needed to maintain a stream of products and services to the market".* Phaal *et al.* (2004:5) affirm that technology management is related to *"establishing and maintaining the linkages between technological resources and company objectives".* Technology management can

thus be described as a *"multifunctional and multidisciplinary field"* as it addresses all the conditions of integrating technological concerns into business decision-making and is applicable to core business processes, inclusive of strategy, modernisation and new product development and operations management.

3.5 SUMMARY

This chapter reviewed the role of IT governance in the strategic alignment of business and IT. It explained that IT governance is a deduction of, and supplementary to Corporate Governance. The purpose of IT governance is to provide direction and oversight for IT within a company and is described as an important building block in business-IT alignment. It is proposed that for IT governance to be eminently dynamic, board of director oversight is necessary. Furthermore, technology ignorance by the board of directors can no longer be acceptable as it is imperative that the board is able to make informed IT decisions and view IT as a strategic business asset that has the potential to revolutionise core business processes and propels the company into a position of market leadership in an industry.

IT has become a fundamental component of corporate planning and strategy and can have an abrupt impact on issues such as legal compliance, strategic risk and return on investment. When deciding on and implementing an IT governance model, it is imperative for the board and executive leadership to realise that no *one-size-fits-all* IT governance model will maximise their business-IT alignment efforts and that IT should form an integral part of corporate planning and business strategy. It is thus essential that the impact of IT on the business be quantified and observed.

Business-IT alignment originates from the school of business strategy where the degree of alignment between internal departments and the external environment is an important indication of the value the company harvests from the execution of its strategy. A number of business-IT alignment dimensions or levels are described in the literature. These include intellectual alignment, which in essence is the existence of business-IT plans, and structural alignment where the organisational structure of business correlates with the organisational structure of the IT department. Strategic alignment encompasses the relationship between the business strategy and the IT portfolio, and consists of two building blocks, namely strategic fit and functional integration. Tactical alignment determines which IT projects need to be executed to support the execution of company strategy, while operational alignment addresses the execution of IT projects to support superior business process automation of the

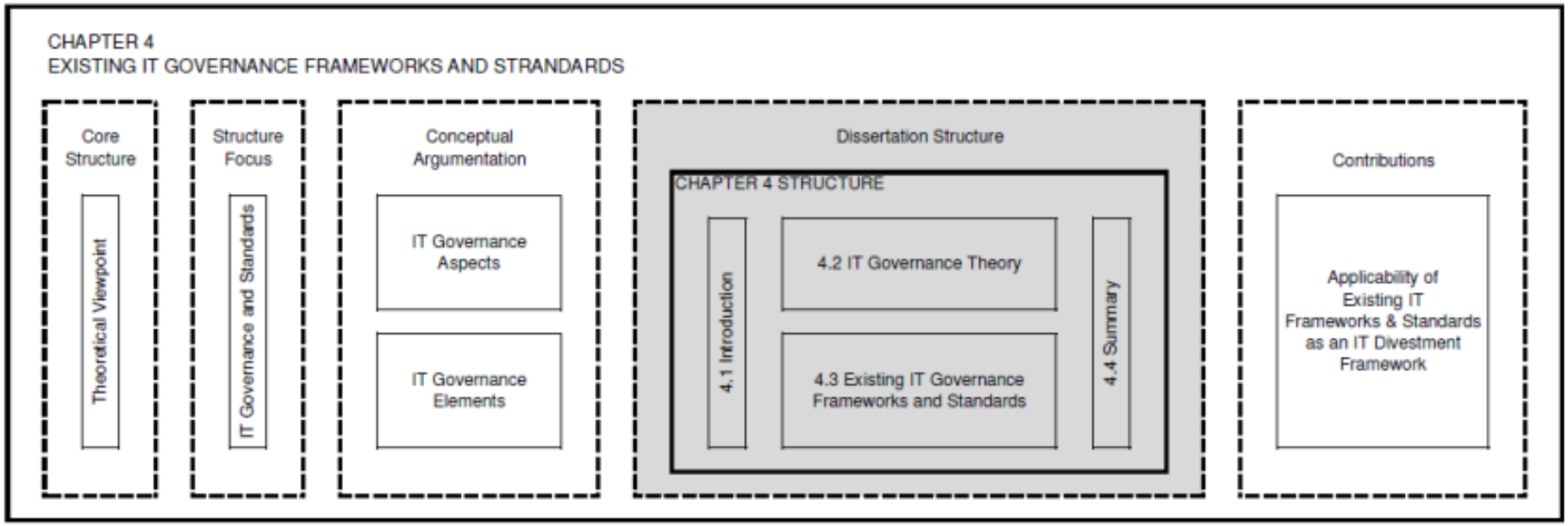
company's daily operations. Operational alignment extricates between vertical and horizontal alignment.

The two most prominent alignment approaches are the content-based stream and the process-based stream. The content-based stream focuses on what competitive advantage consists of, and includes the market-based and resource-based views, while the process-based stream explores *How* strategies that describe the strategy-as-practice and strategy-as-process concepts.

Despite all the alignment levels and alignment approaches advocated in literature, strategic alignment is still a concept that is hard to achieve in most companies. Business-IT alignment maturity assesses and measures the degree of strategic alignment and consists of three maturity levels. The alignment of business and IT goals represents the first level; the second level measures the alignment of IT capabilities with the external environment, while the third level considers technology trends and focuses on a pro-active approach. The intention of alignment maturity models is to stimulate and embolden the strategic capabilities of the company's IT investment to promote the business strategy. Maturity models portray the metamorphosis of the partnership between business and IT over a prolonged time period.

A definite link exists between IT strategy and business strategy alignment when a divestment strategy is implemented. When the company acknowledges the strategic value of its IT investment the implementation of a divestment strategy will lead to the adoption of an IT governance model that will support divestment and assist in defining the roles and responsibilities for the successful de-integration of IT systems and infrastructure. A number of factors will impact business-IT alignment when a divestment strategy is implemented. These factors include environmental uncertainty, alignment of business and IT planning, IT's understanding of business, organisational transformation and IT management sophistication.

Erratic diversity is an inevitable component of operating in the current emerging economy. There is limited allowance for error and an abundance of opportunities to reap rewards from aberrations of competitors. If internal processes are not aligned and animosity is at the order of the day, the probability of the company being agile enough to exploit and reap benefit from favourable circumstances is limited. Business and IT ought to be compelled to function and strategise in unity or be abated and crippled by their dissidence. IT governance is crucial to ensure the alignment of business and IT, taking into account that the IT governance framework employed is a fit for purpose one, especially when a divestment or mine closure company strategy is implemented.



Chapter Map 05: Existing IT governance frameworks and standards

CHAPTER 4 – EXISTING IT GOVERNANCE FRAMEWORKS AND STANDARDS

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4.1 INTRODUCTION

IT governance abides in the ambience of the company's umbrella regulatory environment. Governance guarantees the evaluation of available options, implementation is suitably supervised, and attainment is monitored, and these similar principles relate to IT governance. The previous chapter explained that IT governance is a derivation of and ancillary to Corporate Governance. Chapter 3 established the direct link between IT governance and strategic business-IT alignment and described IT governance as an important building block in business-IT alignment. Alignment of company objectives and IT is mostly about governance and only occasionally related to technology. IT governance is trivial because managers of

companies ratify standards and IT governance frameworks to govern and uphold their company's business goals. Ratifying a governance structure does not imply that the company has efficiently and adequately actualised a governance structure aligned with IT, which will support and improve the business. IT governance schedules define the resolutions, the intent of different collaborators, and the structures, processes, maturity and other methods needed to come to conclusions. These comprise the construction of the correct ability and competency to support the making of decisions to aid the achievement of alignment, management of risks and enablement of change to dispense and dispatch excellent IT services and control service cost. IT governance consists of defining the rules and constructing the proficiency to run IT to create value for stakeholders.

The diligent application of information technology has become a conventional company obligation across all industries. The underlying catalyst is convalescent colloquy and commercial virtue. The abrupt velocity of adaption in these technologies has relegated a number of best practice advents to antiquity. Contemporary IT policy makers and business managers countenance unpredictability typified by the absence of pertinent, workable admonishment and standards to govern the company through this unfamiliar business upheaval. Companies could implore governance in a makeshift manner and develop their own foundation, or they could embrace existing governance, which has already matured through the integrated sophistication of global companies and knowledgeable people to be impeccable. Companies will reap a number of benefits when emulating a canonical IT governance framework. An array of canonical IT governance frameworks and divergent evaluation mechanisms for the evaluation of IT's significance and attainment have emerged. A number of intermediaries have evolved into protocols, others into mechanisms or best practices (Spafford, 2003:1).

4.1.1 Aim

The aim of this chapter is to determine if any one of the existing IT governance frameworks and standards could be implemented or adopted to serve as a divestment framework for IT governance.

4.1.2 Scope

In order to obtain the abovementioned aim, the following topics are discussed:

- IT governance in theory
- Existing IT frameworks and standards
    - ITIL

- CobiT®
- TOGAF
- ISO
- King III

4.2 IT GOVERNANCE IN THEORY

According to Wilson and Pollard (2009:103) the progression of IT governance occurs at the junction of, and in reaction to corporate proceedings and an inconstant environment. Corporate practice symbolises the adoption of practice that materialises as a result of participants learning to function within IT governance to accomplish their petitioned aspirations, which might be in conflict with the company's aspirations. The *changing environment'* invokes the continuously shifting company environment within which IT governance is established, the dynamic skills set mandatory within IT and the encumbrance that the volatile environment spawns for employees. The mixture of corporate practices that have evolved over time and the contemporary encumbrances spawned from a dynamic environment cater for the evolvement of IT governance. The evolvement of IT governance in turn envelopes the evolution of IT governance for a specific company and circumstances that have impacted IT governance to mature.

A number of factors have been identified as having the potential to impact the implementation and maintenance of IT governance within a specific company. The success of IT governance is dependent on the mental analysis of, and apt with, company and social circumstances and the validity of the structures, processes and instruments of IT governance. Unified elements such as the intricacy of communications among groups of managers and associates can effect outcomes. It is vital for companies to realise that IT should rather be governed through superintendence and joint effort rather than by the deception of controls (McGinnis *et al.,* 2004:7). IT governance is made up of six aspects and a number of elements that are deployed in companies to bolster IT governance.

4.2.1 IT governance aspects

4.2.1.1 Strategic alignment

Strategic alignment of business and IT is generally affirmed and a pivotal accomplishment for modern companies and the pressing issues for IT executives. Appropriate alignment of business and IT implies that the company's management comprehends the possibilities and restraints, the IT function comprehends the goals and equivalent needs of the company and this comprehension is practised and observed throughout the company, using a suitable

governance structure and accountability. Comprehending the financial worth and cost of IT is valuable for company management and IT management. Fruitful alignment of the company and IT materialises when the goals and objectives of the company are aligned with the requirements of the company, and IT is capable of addressing those requirements in partnership with company management (Gellings, 2007:2).

4.2.1.2 Risk management

Risk management has a widespread appositeness considering financial, operational and fundamental risk, and relates to technological concerns. The management of risk is a vital element of IT governance, and safeguards the strategic objectives of the business from the results of IT failures. IT-associated risks are to a greater extent a board level problem as the brunt of an IT deficiency in the business, be it an operational disaster, security violation or an unsuccessful project, can have calamitous results. Managers are particularly worried about operational and fundamental risks, within which technology risk and information security violations are notable. To facilitate effective IT governance, IT risks should consistently be articulated in the business framework rather than in the technical context and endorsed by IT risk specialists. An established procedure should ensure that risks introduced from IT are uniformly identified, evaluated proportionately to pre-established metrics, and subsequently treated. The risk liability should be in accordance with the risk inclination of the company. Moreover, the risk decision making authority should be properly defined (Bradley & Pratt, 2011:3).

4.2.1.3 Performance management

Performance management is not a one-dimensional approach and can be elucidated in a number of methods that incorporate performance management of the company in association with IT decisions. In this framework it could be protracted to incorporate the calculation of benefits contributed as a result of ICT investment. It contributes confidence that IT service results correspond to the required accomplishment and quality levels. Compelling governance should be available that will avert the misguidance of IT investments (Raghupathi, 2007:96). Performance management is eminent because it validates the accomplishment of strategic IT objectives and affords for the scrutinising of IT performance and the contribution of IT to business. It is also imperative in contributing a translucent evaluation of IT's capability and an anticipative warning system for risks and hazards that might be missed. Performance assessment contributes transparency of IT-related expenditure, which increasingly accounts for a meaningful dimension of most company's operating expenses.

4.2.1.4 Accountability

Adequate IT governance occurs when senior management enacts an indispensable role throughout the IT investment lifecycle, and accountability for outcomes is sanctioned. Senior management sanctions this accountability by being vigorously engaged in applicable resolutions, metrics, and exertion of such. Three categories of governance prevail, namely at the organisational level, employee value level, and the consequence and behaviour control level. The organisational equivalent is the level at which IT governance would be anticipated to function. The formulation of a responsibility framework establishing who is accountable for assuring that the IT investment earns business value is a goal of IT governance. Accountability is, however, an agent for annoyance for managers and regularly generates distraction within business.

4.2.1.5 Business value delivery

Delivery of business value through IT is a persistent theme in research. The significance should be enhanced in three areas: time, cost and quality. By forging significance, the anticipation of the business will be realised through a universal language between IT and business. Business value rendition attempts to appraise and optimise advantages and costs as well as contingency and risks of IT to establish ultimate value creation. To guarantee that the overall process is effective and will be incorporated in the overall business culture, it is fundamental to implement suitable tracking mechanisms to establish the true value created, and to facilitate accountability. Given the unpredictability of a portfolio of IT-associated business projects, it is pertinent to ingrain active portfolio management into the business to expand value formulation and downplay the risk of value carnation (Olyaee, 2009:55).

4.2.1.6 Capability management

A decisive consideration for successful IT is the capability of a business to create and manage IT capabilities adequately. Amit and Schoemaker (1993:35) define capabilities as *"a firm's capacity to deploy resources, usually in combination, using organisational processes, to effect a desired end"*. Capability management is the agility of managers within the business to expand the ICT capability of the business. It endeavours to designate resources to critical IT infrastructure services in a responsible and valid way. The majority of businesses have an obscure view of their IT capability, and find it too complex to comprehend the technical and business IT domain on which they progressively depend. Frequently inabilities only reveal themselves when projects are unsuccessful, costs increase, operational systems fail, or service providers defalcate to dispense the committed value. In general IT capabilities are not synchronised with escalating IT complexities and the increasing requirement for reliable,

protected and agile services. Cost control and minimising incompetence are crucial considerations for analysing technical and organisational capability (Makadok, 2001:388).

4.2.2 IT governance elements

4.2.2.1 Structures

IT governance can be redistributed by applying a combination of a number of structures, processes and comparative techniques. When composing IT governance for a company, it is imperative to understand that it is dependent on a number of contradictory internal and external circumstances. Structures comprise the presence of liable functions, such as IT executives and an assortment of IT committees. Processes deduce to making strategic decisions and monitoring activities. The relational procedures encompass business-IT cooperation, strategic discourse, proportional learning and good communication. A collection of nonpareil practice IT control frameworks, models and standards that can be applied to create and implement an adequate IT governance system is feasible.

Organisational structure is pivotal in promoting strategy (Boar, 2001:125). Essentially Boar also agrees that, while design is indispensable to facilitating strategy, structure is not strategy. Equally IT governance is not structure; it is and can be expedited by pertinent structure. Distinct operational structure, the operational character of its constituents, how these interact with one another, and the accountability covenants are essential for the IT function to produce the necessary categories and degree of service for the company to realise its ambitions. Existing business and governance frameworks are a reliable manifestation of whether IT contributes and enables the business to achieve its strategic objectives. Structures such as steering committees implicate the existence of liable frameworks for exercising IT decisions. Steering committees should consist of both business and IT executives. The IT steering committee should be a fundamental guiding body for continuous IT operations and enterprises of the business, incorporating IT investment projects. Lucrative IT governance obligates compelling communication between all stakeholders, based on productive relationships, a universal language, and a distributed commitment to IT policies and procedures (Bowen, Cheung, & Rohde, 2007:194).

4.2.2.2 Processes

As with the alignment of IT strategy and business strategy, it is imperative that a business construct its IT governance processes to be scrupulously aligned with those of its corporate governance. Accountability within the processes is imperative. Policies and procedures are designed mechanisms to facilitate and support the operation of IT governance, but do not

define it. The substantive practice of IT governance in a company can only be confirmed with inevitability through exploration of IT governance in action (Weill, 2004). Process provides the foundation for the interpretation of a management system; process explanations are applied to acquisition and catalogue information regarding proprietorship, extent, responsibilities, valuation, systematic working practices and interfaces; processes explain the life-cycle of enterprises, with rebuttal convolutions, and capacitates the creation and implementation of a lean, tenable potential to reach the desired goals.

4.2.2.3 Control frameworks

Control frameworks are construed as *"any set of processes, procedures and policies that enable an organisation to measure, monitor, and evaluate their situation in relation to predefined factors, criteria or benchmarks"* (Webb, Pollard & Ridley, 2006:4). The Institute of Internal Auditors Research Foundation defines a control framework as *"a recognised system of control categories that covers all internal controls expected in an organisation".* The impetus for actualising an IT control framework can result from a number of focuses:

- Jurisdictional or financial control
- Control of decision-making regarding IT investment
- Maintaining strategic alignment
- Security

Current IT control frameworks fluctuate, hinging on the focus. The objective might be to have oversight over financial matters, procurement, acquisition or deployment, or even have oversight over alignment of IT with the business strategy. There are three categories of control framework (Nicho, 2008:52):

- Business oriented controls:
    - COSO (Committee of Sponsoring Organisations)
    - SAS (Statement of Auditing Standards)
- IT focused controls:
    - ITIL
    - ISO/IEC 17799:2000
    - ISO/IEC 27000 family
- Business-IT alignment focused controls:
    - CobiT®

A portion of the obligation for sustaining distinct internal controls is about limiting or alleviating risk. Information systems and technology progression have subjected businesses to a new

assortment of danger and risk, specifically in the dominion of fraud vulnerability. Over and above financial vulnerability related to fraud as a consequence of inadequately planned or managed IT formulations, there are vulnerabilities implicit in the IT planning process. In persistent circumstances demanding that managers do more with less, productive and methodical IT planning processes are crucial (Segars & Grover, 1996). Control frameworks, when adopted, facilitate the measuring and monitoring of IT execution achievement and conformance. IT control frameworks can coincide with IT governance frameworks and can be a valuable instrument for management; however, equivalent to IT governance frameworks, their actuality is not proportionate to IT governance.

4.3 EXISTING IT GOVERNANCE FRAMEWORKS AND STANDARDS

Routinely a framework is a genuine or abstract structure designed to suffice as an aid or catalogue for the construction of something that broadens the structure into something useful. A framework is commonly more inclusive than a protocol and more authoritarian than a structure; it is an expansive overview or summary of intertwined items that backs up a specific resolution to a particular objective, and suffices as a guide that can be adapted by adding or deleting items.

Standards are customarily or universally acknowledged, concurred, or established mechanisms of establishing what something should be. Principal allotments of this term include a concept, benchmark or convention developed by concurrence, authority or habitual action, and applied as a precedent or model to equate or measure the characteristics or efficiency of a practice or procedure, and a drafted explanation, confine or principle approved and monitored for conformity by an authentic dependable agency (or professionally recognised body) as a merest tolerable benchmark.

An IT governance framework objective is to incorporate the accord of experts into a standardised best-practices document. The framework can then be utilised as a well-defined step-by-step concept to create and implement IT governance, or aspects thereof, in a specific company. The benediction of applying an IT governance framework includes the following (Steenkamp, 2010/11:53):

- Briefer implementation period
- Decreased costs
- A configured evolution process
- Better quality end products

Notwithstanding, an imbalance notorious as the IT gap has been conceived emanated from the difference in understanding between business and IT management and culminated in a misalignment between IT foundations to a company's business prospects and a disorganised IT governance system (Goosen & Rudman, 2013:92).

4.3.1 ITIL

According to Perazzo and Willis (2008:5) IT Infrastructure Library (ITIL) is described as *"a set of best practices to manage existing services in the most effective and efficient manner"* and as a *"process-based approach to IT activity"* (Kim, 2003:13). ITIL is essentially an instrument applied by business to enhance current IT services to ensure alignment with the business strategy; it guarantees IT serves as a facilitator of modernisation to support the business in its endeavour to become a market pacesetter and maintains the company's competitive advantage. According to Zeinolabedin *et al.* (2013:17) *"ITIL has the ability to impact business strategy and support it, but not shape it".* It has the ability to embellish strategy and in addition ITIL can influence organisational infrastructure considerably. To a smaller measure it also has an influence on business processes. ITIL thus possesses the ability to promote alignment. Universally IT services act in a supportive role for business to ensure the accomplishment of the business strategies and goals and support business maturity. ITIL applies IT as a promotor and driver for business to identify and acknowledge new inventiveness and initiatives.

ITIL guarantees the alignment of IT and business strategies. It inspires the IT department to obtain a better comprehension of business requirements and to provide IT infrastructure, systems and services that are collectively synchronous with the business strategy. ITIL provides IT service management with a foundation that will facilitate better fraternisation among business actors and IT departments by way of alliances and cooperation (Perazzo & Wills, 2008:7 - 8, Wessels & Van Loggerenberg, 2006:4).

The ITIL framework concentrates on five classifications (Goosen & Rudman, 2013:841):

- Service strategy – administers instruction on the process of cultivating and implementing service management conventions and service blueprints.
- Service design – concentrates on composing effective IT services, inclusive of architecture, policies, procedures and credentials for design constituents.
- Service transition – concentrates on creating and reconstructing changeover capabilities culminating in services becoming functional more rapidly.

- Service operation – furnishes the specific aspects of directing the infrastructure, applications, and the technology prospects to guarantee the distribution of services at the conceded standard.
- Continual service improvement – directs continuous improvement of the calibre of services through the improvement of the configuration, initiation, and application of services.

The ITIL foundation is an array of best practices that are in line with the ISO/IEC 2000 standard for IT Service Management. ITIL furnishes the business with direction and advice on optimally structuring IT services to aid in bolstering business processes, but does not furnish a mechanism to calculate or judge conformity to the ITIL service delivery foundation.

4.3.2 CobiT®

CobiT®, Control Objectives for Information & related Technology, is described by Butler (2001:1) as *"a tool set which helps business managers to understand and manage the risks associated with implementing new technologies"* and it is based on international best practices in IT management and control. CobiT® describe governance as follows: *"Governance ensures that stakeholder needs, conditions and options are evaluated to determine balanced, agreed-on enterprise objectives to be achieved; setting direction through prioritisation and decision making; and monitoring performance and compliance against agree-on direction and objectives"* (ISACA, 2012). This description appreciates numerous stakeholders of the business's IT and the equilibrium of resource allocation while cultivating comprehensive business goals. It furnishes the business with a distinct all-including foundation for all the IT processes that delineate high level control objectives and incorporate management instructions to derive maximum value from IT. The function of CobiT® is to act as a unified comprehensive governance model for managing the company's Information Technology (Khanyile & Abdullah, 3). Furthermore, CobiT® undertake to explain and simplify the boundaries between governance and management and form a concept of IT governance as "evaluate, direct and monitor (EMD)" processes, which demonstrates a significant intensity of internal reliance (Khanyile & Abdullah, 3).

The CobiT® framework embodies the thorough life cycle of IT investment, from the routine strategic planning to the prosaic operations of the IT function. CobiT®'s *Management Guidelines* include the maturity models for each of the 34 IT processes. CobiT® influence process maturity theories as a foundation for IT governance implementation. Maturity modelling enables the company to identify the shortcomings in its capabilities and action plans

to be formulated to address these capability gaps. The primary intent of CobiT® involves the evolution of straightforward policies and exceptional practices for security and control in IT to ensure global ratification by all companies and organisations. The objective of CobiT® is to explore, create, make available and bolster dependable information technology control objectives for everyday application by both company managers and auditors (Wessels & Van Loggerenberg, 2006:5; Steenkamp, 2011:4).

From a CobiT® perception corporate governance and IT governance are closely connected. Corporate governance is incomplete without IT governance and vice versa. IT has the ability to boost and manipulate the accomplishment of the company if it is enthralled by sufficient governance. In contrast, business processes also need intelligence from the IT processes and this integration and cooperation need to be governed. Keeping these inter-dependencies in mind, it becomes palpable that IT processes are not an intention in themselves but an instrument to obtain the intention, which is well entangled with the management and business processes (Sheikhpour & Modiri, 2012:14).

The CobiT® Framework expounds the way IT mechanisms relinquish the information needed by the company to accomplish its goals and intentions. The framework determines which of the seven information yardsticks, namely effectiveness, efficiency, confidentiality, integrity, availability, compliance and reliability, and which of the IT capabilities are the most crucial for IT to firstly support, but also to help sustain the company's objectives. CobiT® proposes five conventions influencing the governance of IT:

Convention 1: Accommodating stakeholder requirements – accentuate goal cascading and value generation between all stakeholders.

Convention 2: Covering the business end-to-end – demonstrate the all-inclusiveness of CobiT® which is not limited to IT only.

Convention 3: Employing a distinct unified framework – signifies CobiT®'s objective to be the overall protective framework and caters for a unification protocol to be used in coalition with other frameworks.

Convention 4: Facilitating an integrated method – demonstrate the manner in which IT governance constituents correlate and contribute an assortment of crucial success considerations that are referred to as *promotors*.

Convention 5: Segregating governance from management – distinctly illustrate that CobiT® isolate governance and management from each other (Preittigun, Chantatub, & Vatanasakdakul, 2012:582).

As portrait in figure 4.1, management procedures are classified by IT life cycle and provide four realms as the foundation of the CobiT® framework:

1. Align, plan and organise – encapsulating planning and directing IT to correspond with business strategy – business-IT alignment – and incorporating IT risk assessment and management.
2. Build, acquire and implement – directing the implementation of new IT systems and alterations to existing systems.
3. Deliver, service and support – providing guidance on how the everyday management of IT systems should be addressed.
4. Monitor, evaluate and assess – describing how IT performance should be surveyed and audited.

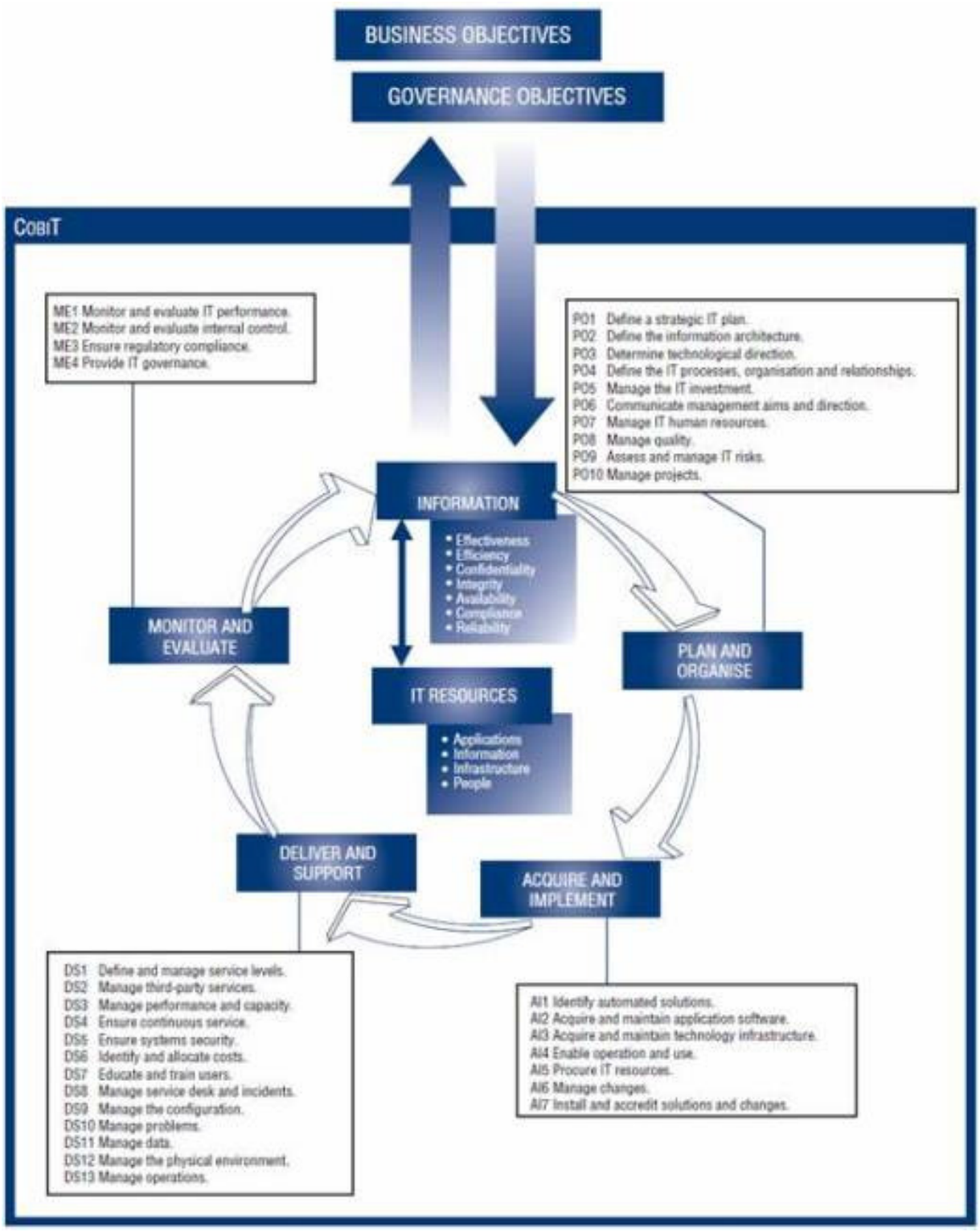


Figure 4.1: COBIT IT Processes Defined within the Four Domains (Sheikhpour & Modiri, 2012:17)

According to Debreceny and Gray (2013:184) one of the limitations of the CobiT® Framework is that the IT processes in the framework *"are generic and as a result may not directly correlate to the capabilities of any particular organization".* The disadvantage of using CobiT® for information security governance is that it does not provide for a detailed description in terms

of procedure – the *ow* – to do things. The Detailed Control Objectives (DCOs) describe *what* needs to be done. In the majority of instances a more detailed protocol for stipulating precisely *how* to do things is required.

4.3.3 TOGAF

TOGAF – The Open Group Architecture Framework – aspires to integrate business or enterprise and IT-architecture, eventually to promote the adeptness of IT and improve cost effectiveness. Schekkerman (2004a;13) defines enterprise architecture as *"a complete expression of the enterprise; a master plan which acts as collaboration force between aspects of business planning such as goals, vision, strategies and governance principles; aspects of business operations such as business terms, organisation structures, processes and data; aspects of automation such as information systems and databases; and the enabling technological infrastructure of the business such as computers, operating systems and networks".* The Open Group describes TOGAF as *"a comprehensive architecture framework and methodology which enables the design, evaluation and implementation of the right architecture for an enterprise".* The Open Group is a service provider that is a technology-impartial conglomerate that focuses on a disparate assortment of open standards and partner authentication programmes for the improvement of the enterprise architecture role.

TOGAF is a gradual approach for the development of an enterprise architecture, through the application of a set of arbitrary methods. It is available at no cost on the Open Group website; the first version was established in 1995 by the US Department of Defence. TOGAF attempts to be a path to accelerated architecture evolution and compelling governance. It does not stipulate which standards and designs should be applied for architecture illustration; it directs the mechanism when architecture is constructed and it endorses and promotes all levels of architecture. The purpose of TOGAF is to facilitate with Enterprise Architecture Management (EAM) and as a framework its role is to assist with the documentation, planning and analysing of existing Enterprise Architectures, and to provide guidelines when building new Enterprise Architecture. The framework furthermore expedites measures to expose and limit verbosity, escalate uniformity and influence possibility to rehash infrastructure. It affords techniques and advocates resources to promote business efficiency by developing appropriate Enterprise Architectures and is the most distinguished and dependable enterprise architecture standard. TOGAF is one of the most expansive and comprehensive frameworks for Enterprise Architecture Management; it is readily attainable and sufficiently documented (Meuller, Schuldt, Sewald, Morisse & Petrikina, 2013:2 - 3).

The fundamental consideration for the development of enterprise architecture is to aid the business through the provision of essential technology and process framework for an IT strategy. It is thus a susceptible advantage for a rewarding business strategy. One factor worth noticing is the possibility for enterprise architecture to become an instrument for metamorphic transition and ratification. Enterprise architecture conforms into an indispensable business feature that progresses to accommodate changing requirements. The solution to business success and competitive advantage is productive oversight and profiteering through IT. Enterprise architecture attends to this requirement through the provision of a calculated ambience for the progression of the IT systems in reaction to the continually changing requirements of the business environment. Untainted enterprise architecture facilitates the business to accomplish optimal balance between IT effectiveness and business novelty. It enables business units to evolve safely in their quest for competitive advantage. It also confirms the business requirement for a consolidated IT strategy, allowing for intimate symbiosis across the whole business (Winter & Fischer, 2007:1).

TOGAF designates an array of 21 enterprise architecture principles (EAP) classified in correspondence with four realms, namely business, data, application and technology, and defines EAP as *"general rules and guidelines, intended to be enduring and seldom amended, that inform and support the way in which an organization sets about fulfilling its mission"* (TOGAF, 2009). TOGAF indicates the institution of conventions on three levels, namely enterprise conventions, IT conventions and architecture conventions. These arrays of conventions structure a ranking, in which IT conventions will be apprised and extended. The conventions at the enterprise level and architecture conventions will similarly be apprised by the conventions at the two higher levels. The alignment of business aspirations and IT proficiency is a crucial key in delineating conventions. TOGAF points out that conventions should be scanty, prospect-oriented, and sanctioned and supported by senior management. The optimal array consists of conventions that are coherent, robust, exhaustive, dependable and durable (EsmaeilZadeh, Millar & Lewis, 2012:4271).

TOGAF consists of four main parts:

- An architecture development method (ADM)
- A theoretical base (The enterprise continuum)
- A technical reference model (TRM)
- Standards information base (SIB)

4.3.3.1 Architectural development method

The architectural development method is a detailed, step-by-step method on how to build, maintain and implement enterprise architecture. It accommodates a dependable, established method of creating the architecture, correlation with constructive case studies and guidance on mechanisms for architecture development. ADM also contributes architecture perspectives that empower the architect to assure that an intricate array of needs are appropriately directed.

An addition to TOGAF is the inception of a "Content Metamodel"; *"The core metamodel provides a minimum set of architectural content to support traceability across artifacts. Additional metamodel concepts to support more specific or more in-depth modelling are contained within a group of extensions that logically cluster extension catalogues, matrices, and diagrams, allowing focus in areas of specific interest and focus"* (TOGAF, 2009). The fundamental metamodel objects are grounded upon the vocabulary applied to define the TOGAF Architecture Development Method (ADM). The amplification conventions appended to the metamodel are arbitrary and as such should be picked concurrently with the initial phase of architectural evolution to address the business requirements.

It contains 8 different steps in the design cycle as per Figure 4.2.

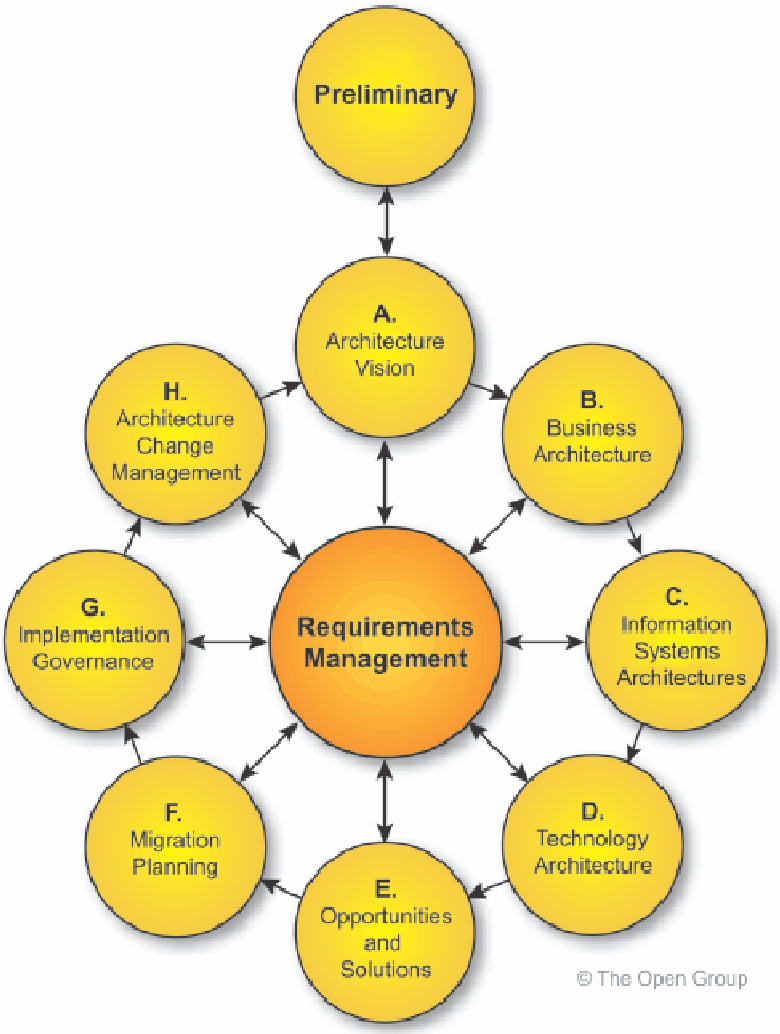


Figure 4.2: ADM Cycle (The Open Group: http://pubs.opengroup.org/architecture/togaf9-doc/arch/chap05.html)

4.3.3.2 The Enterprise Continuum

The Enterprise Continuum is a subsidy to communication and comprehension of the company's architecture, through the contribution of invariable language. In addition to supporting communication, the Enterprise Continuum facilitates the re-use of architectural components and resources. It is the assemblage of the Architecture and Solution Continua. The Enterprise continuum is a virtual repository with re-useable building blocks, such as models, patterns, architecture descriptions, etc. that prevail independently inside both the enterprise and IT industry.

Two reference models are contributed by TOGAF for contemplation and potential incorporation into a business's exclusive Enterprise Continuum:

- The TOGAF Foundation Architecture is an architecture consisting of universal services and activities that allocate a base for the construction of particular architectures and architectural constituents.
- The Integrated Information Infrastructure Reference Model, is established upon the TOGAF Foundation Architecture and is explicitly proposed for the design of architecture that facilitates and bolsters the conception of *Boundaryless Information Flow*.

The Enterprise Continuum is divided into three particular sequences:

- The Enterprise Continuum is the most outlying sequence and segregates resources relevant to the circumstances of the complete enterprise architecture. Its categories of resources might impact architectures, although it will not be applied during ADM architecture construction. It segregates contextual resources applied to construct architectures, like procedures, principles, strategic actions, business structures and enterprise level aptitudes. The Enterprise Continuum is in a position to segregate resolutions rather than to describe or specify them. Lastly, the Enterprise Continuum consists of two types of adeptness, namely the Architecture and Solutions Continua.
- The Architecture Continuum provides an unchanging method to explain and comprehend the universal principles, embodiments and connections in an architecture, incorporating tractability and inception affiliations. It symbolises a composition of Architecture Building Blocks (ABBs) that are subservient architecture resources. ABBs progress uninterruptedly through their evolution cycle from conceptual and universal organism to explicit business specific architecture resources. The Architecture Continuum resources are utilised for guidance and selection of constituents in the Solution Continuum. The Architecture Continuum represents the links between elementary frameworks, universal system architectures, business architectures and enterprise architectures. It is a valuable instrument for uncovering mutuality and eradicating needless verbosity.
- The Solutions Continuum explains which entities are applicable and feasible in the business domain as re-deployable Solution Building Blocks (SBBs). The solutions emanate from concurrences among stakeholders and business partners, resulting in the implementation of principles and affiliations as described in the architecture environment.

4.3.3.3 Technical Reference Model (TRM)

The TOGAF Architecture, illustrated within the Architecture Continuum, is an architecture of universal services and objectives that affords a bedrock on which detailed architectures and architectural elements can be composed. The Foundation Architecture abides by two portions, the Technical Reference Model (TRM) and the Standards Information Base. The Technical Reference Model is made up of a classification of architecture and is a vivid portrayal of this classification as shown in figure 4.3.

The TRM suffices to summarise the technology principles that mutually encourage the endorsement and enactment of peripheral-based architectures. The model contributes the building blocks to accelerate the re-application of technology and peripheral assistance through uniformity. Coordinating agency capital contributions to the TRM influence an ordinary, institutionalised terminology, obliging inter-Agency and intra-Agency revelation, association and participation. Cultivating peripherals founded upon a requirement facilitates enterprise applications through the foundation of basic common transposable peripherals, and by furnishing a comprehensive array of services to the selected peripherals.

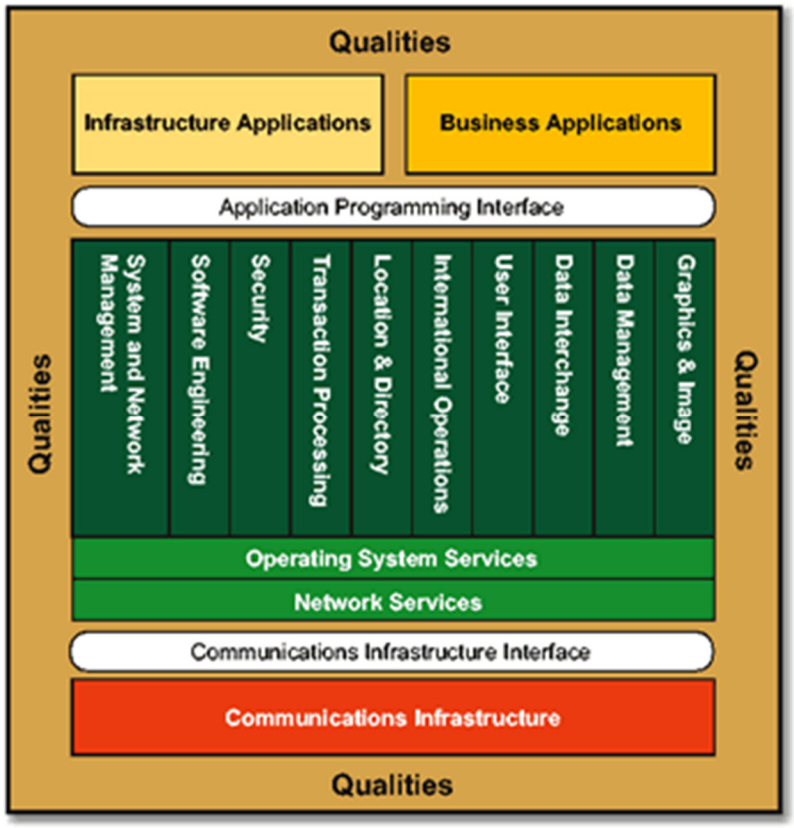


Figure 4.3: Technical Reference Model (The Open Group: http://pubs.opengroup.org/architecture/togaf8-doc/arch/chap19.html

The Standards Information Base is a catalogue of standards regarding information systems, created by the Open Group and is thus not essentially part of TOGAF, but should be beneficial when creating architectures. It consists of a table of standards, created by a number of organisations. The principle benefit when using these standards is that they represent established technology and are underwritten by nearly all of the industry, averting dealer lock-in.

4.3.4 ISO

4.3.4.1 ISO/IEC 20000 IT Service Management

In accordance with Cots and Casadesús (2016:515) the expanding prominence of IT services in contemporary civilisation has directed the necessity for excellence in the formulation of services. Customers and consumers of IT service companies are progressively pressing for more preserved, efficiently optimised services. This client difficulty and the sophistication of technology necessitate a deviation in focus from technology-focused operations to a transparent service antecedent. In a directive to address this business requirement, the curriculum familiar as *Information Technology Service Management* (ITSM) has been refined and bolstered. An array of management standards have been encapsulated in this foundation, whether they be explicit or existing. ISO 20000 is the IT Service Management standard that provides business with a set of IT service delivery requirements that need to be accomplished in order to obtain ISO 20000 certification. According to ISO/IEC 20000 (2005:3) the main objective of this standard is *"to provide a management system, including policies and a framework to enable the effective management and implementation of all IT services".*

The standard is systematised in two documents, ISO 20000-1 and ISO 20000-2. The first document accommodates the precise academic qualification of the standard and illustrates the requisites needed to acquiesce and is cited as *mandatory criteria* or *"minimum requirements.* The next document enriches and simplifies the requirements and specifies propositions for exertion. Some companies struggle to be successful without superior capacity IT services to propagate business processes. As a result of the increase in market emulators and cost tension the rivalry between the goals "IT quality" and "IT costs" inevitably yields more consideration and focus. As demonstrated in figure 4.4, five process areas stipulate numerous superior management processes for service management. In particular, these superior management processes should establish strategic alignment of IT services, reinforcing alignment with business, economic and quality goals (Buchsein, Victor, Gùnther & Machmeier, 2007:52).

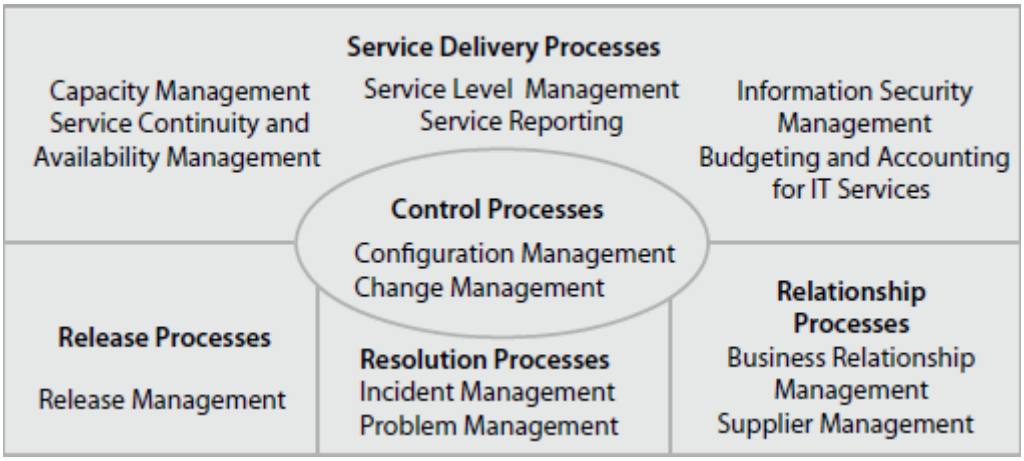


Figure 4.4: ISO 20000 Service Management Processes (Disterer, 2009:465)

Customer expectations, needs and requirements regarding the capacity and cost of IT services could be addressed through the systematic and focused application of a number of mechanisms. The primary mechanisms (Disterer, 2009:463) are the following:

- Uniformity: The consolidation of proceedings guarantees IT service delivery is provided autonomously of individuals, time and location. This ensures strong support for the planning, governance and oversight of IT services. It supports methodical handling for the potential high frequency of technical changes. Uniformed approaches are unambiguous, clear and can be communicated effortlessly.
- Customer focus: Focusing on customer needs is more important than technical conditions in an IT services environment.
- Process adaption: When embarking on changing the IT processes, it is customary to follow the established model of process orientation to ensure uninterrupted processes notwithstanding vertical distribution of employees, which is founded in the business structure. A process-oriented adaption of IT services will evade confusion and weaken agitation.
- Continuous improvement: When pursuing the standards of quality management in the bolstering of IT services it is amenable to ongoing substantiation and evaluation to evade confusion and weaken agitation and reduce the number of resources if possible.
- Alignment with reputable advents: Uniformity of processes is bolstered through referencing current frameworks and mechanisms. Notwithstanding the need for major modifications to accommodate the business specifics, implementing current frameworks also bolsters cost aspirations as it prevents the re-invention of the wheel.

4.3.4.2 ISO/IEC 27001 Information Security Controls & ISO/IEC 27002 Code of Practice

ISO/IEC 27001 and ISO/IEC 27002 (formerly known as ISO 17799) are internationally recognised Information Security Management Standards. ISO/IEC 27001 emanated from a code of good practice circulated by the UK department of Trade and Industry in 1989. It unhurriedly advanced into BS7799. ISO/IEC 27001 cited the specifications for instituting and overseeing a documented Information Security System (ISMS) within the framework of the company's comprehensive business risks.

According to Carlson (2001:4) ISO/IEC 27001 defines information as *"an asset that may exist in many forms and has value to an organization"*. The purpose of the standard is the safeguarding of information to ensure business continuity and decrease business disturbance by way of the conservation of reticence, confidentiality, probity and availability of business information. A fundamental facet of IT governance is the conservation of business information, which resulted in the emergence of this standard to form the cornerstone of an effective governance foundation (Goosen & Rudman, 2013:96). A standard that bolsters the enforcement of ISO/IEC 27001 is the code of practice ISO/IEC 27002. This code of practice provides direction for the information security regulations outlined in ISO/IEC 27001.

The standard institutes a recurrent model known as the "Plan-do-Check-Act" (PDCA) model, the objective of which is to create, introduce, control and enhance the capability of a company's ISMS. The PDCA cycle has four phases as shown in figure 4.5:

Phase 1: Plan – inaugurate ISMS policy, purpose, processes and procedures appropriate to managing risks and enhancing information security to relinquish outcomes in line with a company's comprehensive policies and objectives.
Phase 2: Do – inaugurate and contrive the ISMS policy, controls, processes and procedures.
Phase 3: Check – evaluate and, where relevant, calculate process effectiveness against ISMS policy, objectives and practical knowledge and know-how and report the outcomes to management for oversight.
Phase 4: Act – Take punitive and precautionary steps, seated on the outcomes of the internal ISMS audit and review in order to accomplish ongoing improvement of the ISMS.

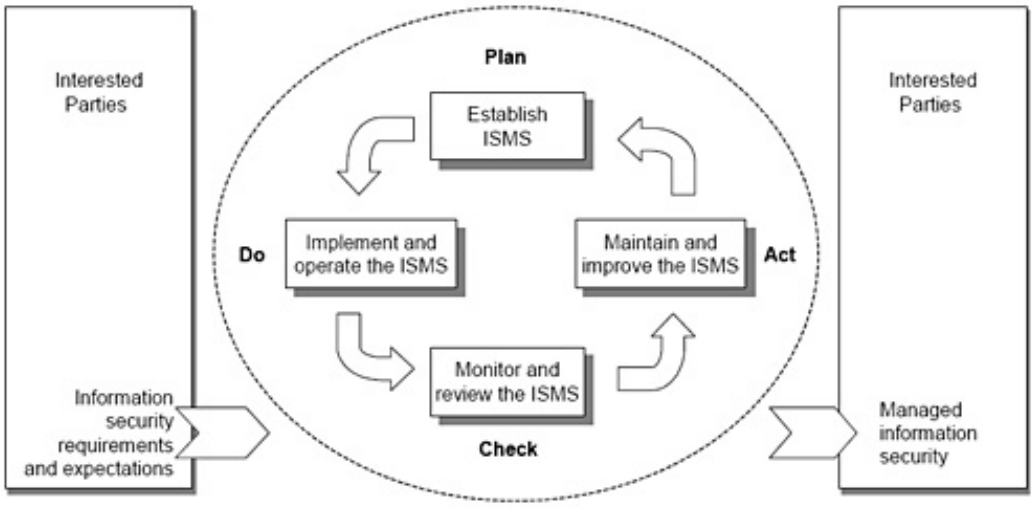


Figure 4.5: PDCA Model Applied to ISMS Processes (Sheikhpour & Modiri, 2012:19)

The fundamental difference between CobiT® and ISO/IEC 27001 is that ISO/IEC 27001 focuses on information preservation and security only, whereas CobiT® focuses on more commonly accepted information technology controls. CobiT® deploys a broader scope of commonly accepted information technology subject matters, but does not contain as many particularised information security obligations as ISO/IEC 27001. CobiT® includes a greater set of concerns pertaining to information technology governance, and is more commonly applied as part of a comprehensive corporate governance framework (Sheikpour & Modiri, 2012:21).

4.3.4.3 ISO/IEC 38500 Corporate Governance of Information Technology

According to ISO, the International Organization for Standardization, international standard ISO/IEC 38500 for Corporate Governance of Information Technology, is a *"high level, principles based advisory standard"* (ISO/IEC 38500, 2008:iv). The standard *"provide(s) a framework for effective governance of IT"* and its purpose is to *"promote effective, efficient, and acceptable use of IT in all organizations"* (ISO/IEC 38500, 2008:1).

Figure 4.6: Model for Corporate Governance of IT ISO/IEC 38500 (Juiz et al., 2014:15)

The standard consists of a framework for good corporate governance of IT and prescribes six principles (see figure 4.6) to guide IT governance sanctioned behaviour to support decision making. The principles include guidelines for conspicuous comprehension of IT responsibilities; alignment of business and IT strategy is the recipe for how IT can optimally support the business and ensure that IT is fit for the business purpose it is intended for; how to validly acquire IT; IT performance monitoring; compliance to ensure IT compliance with established rules and with all mandatory legislation and the mitigation of IT risks, and human conduct to ensure IT considers human aspects (ISO/IEC 38500, 2008:6).

The three primary activities of ISO/IEC 35800 are “direct, evaluate and monitor”, and need to be accomplished through the application of the six standards. These standards explain the behavioural side of IT governance (Juiz, Guerrero & Lera, 2014:16):

- Stakeholder representative duty and preservation of the governance association, and in return, the governance association will take on responsibility for meeting stakeholder expectations.
- The governance association provides guidance and accountability for the general business performance and consumes a preservation role towards the business.

The eminent dissimilarity between ICO/IEC 38500 and CobiT® is that ISO/IEC 38500 has a preservation aspect and CobiT® has a process aspect, offering guidance about process. Sylvester (2011:1) uses the analogy of a house for describing the difference between ISO/IEC 38500, CobiT® and ITIL. He compares ISO/IEC 38500 with the roof on a house, which looks down from the top, while ITIL is described as the foundation of the house and CobiT® is described as the walls of the house. It thus implies that one cannot implement the roof of the house if the walls and foundation are absent, as the roof would collapse. If the roof of the house is absent, the company *living* in the house, would be exposed to the elements. ISO/IEC 38500 is not a one-size-fits-all standard and it does not replace ITIL or CobiT®, but rather endorses them by contributing a demand-side-of-IT-use angle.

4.3.5 KING III

The governance of IT was announced in the Third King Report on Governance for South Africa (King III), published by the Institute of Directors in South Africa (IODSA) on 1 September 2009. In contrast to King I and King II, King III is appropriate to all companies, heedless of their size or whether the company is listed or not. The *apply and explain* foundation of the King III report obliges every company to exercise the King III framework to fit the company objectives optimally. The report is the cornerstone for implementing a corporate governance framework regarding IT that is suitable for a specific company, and regards prospects such as the size of the company, the role of IT within the company and all constitutional obligations (IODSA, 2009). There are a number of aspects that need to be considered when a suitable IT governance framework is designed for a company, such as the specific industry's morality, the company's culture, mission, vision and strategy.

The role of King III is not to provide a particular set of guidelines for every company; it is rather a *principle-based document*. King III asserts that it is the role of a director to make sure that caution and vigilant actions have been taken with regard to IT governance. However, boards are in the habit of not paying sufficient attention to IT as they conventionally concentrate on business-related matters, such as strategy, risks, ROI and accounting issues. It is rather common for IT to be regarded as an element disjointed and explicit from the business, which is not managed as part of an integrated business. The justification for the inclusion of IT into the King report is the rapidly changing IT landscape and the direct impact on the business environment (Butler & Butler, 2009:34).

According to King III, IT management should deploy a robust process to recognise and exploit favourable circumstances to ameliorate the performance and sustainability of the company in

accordance with the triple bottom line objectives. Process orientation, which includes a component of introspection, contributes to continuous improvement, frequently described as the *Deming cycle* of *Plan-Do-Check-Act*. This is conducive to a repetitive characteristic needed to sustain and extend process performance and sustainability (Liell-Cock *et al.* 2009:18). IT governance further contributes a framework (Table 4.1) that is the obligation of the board and should ensure the integration of IT into the business strategy in a value adding and risk mitigating way. IT governance is included in Chapter 5 of the King III report and in essence contains seven IT governance principles:

Principle	Description
Principle 5.1	The board should be responsible for information technology governance
Principle 5.2	IT should be aligned with the performance and sustainability objectives of the entity
Principle 5.3	The board should delegate the responsibility for the implementation of an IT Governance framework to management
Principle 5.4	The board should monitor and evaluate significant IT investments and expenditure
Principle 5.5	IT should form an integral part of the entity's risk management process
Principle 5.6	The board should ensure that information assets are managed effectively
Principle 5.7	A risk committee and audit committee should assist the board in carrying out its IT responsibilities

Table 4.1: Seven IT Governance Principles of King III (Butler & Butler, 2010:35)

As a result of the increased awareness of IT governance "top management issues for the oversight of IT have moved from technology to management-related areas" (Pultorak & Kerrigan, 2005:18). King III assigns roles and responsibilities to the different role players in the IT organisational structure in order to ensure that sufficient effort is devoted to the extensive nature of information technology. When a company aims to comply with the stipulations of the King III report, it could be useful and beneficial to investigate the use and deployment of one of the existing IT governance frameworks. According to Steenkamp (2011:3) the benefits are:

- Lower cost expenditure as a structured approach will shorten the development period.

- The end product will be more effective as frameworks are best practices that are created through the input and cooperation of many participants, affirming the coverage of all areas.
- It is prone to uncomplicated evaluation to confirm conformity with external regulations.

4.4 SUMMARY

When looking at IT governance in theory, a number of aspects are identified, which in essence could influence the deployment and maintenance of IT governance and it is essential that companies should realise that IT needs to be governed through guardianship and combined efforts rather than by deceiving controls. IT governance consists of six aspects and three elements; each of these aspects and elements supports particular or several goals in the intrinsic IT governance question.

A number of IT governance frameworks are available and postulate an IT governance model that consists of numerous definitions and foundations. These frameworks have a diverse variety of strengths and weaknesses and include imbricates. Companies might consider the deployment of particular components from a number of frameworks and standards to form the company's unified and comprehensive IT governance framework. Despite the existence of a variety of protocols, such as IT control frameworks, models and standards, the persisting nature is theoretical. Control frameworks tend to be viewed in isolation from one another and implemented in an ad hoc approach, which results in an inefficient IT governance system focusing on either strategic or operational areas, but never on both simultaneously.

The ITIL framework on its own will not suffice as a divestment or mine closure framework as the main focus is on IT service delivery and management. IT infrastructure support and maintenance activities are scaled down to the bare minimum and IT support services for both infrastructure and software systems will be mostly on an ad-hoc basis in order to minimise IT-related costs. ITIL will thus be an over kill and too expensive to be considered to form part of a divestment framework for IT governance.

CobiT® are described as the mechanism to support business managers in their decision making and to better understand the risks when new IT infrastructure and software systems are planned and implemented. It is also described as the core of IT governance implementation that embodies the total life cycle of all IT assets. The CobiT® framework as such is unfit to serve as a divestment and mine closure framework as its main focus is on the

planning and deployment of new technologies and infrastructure in contrast with divestment or mine closure downscaling and removal of IT infrastructure and software systems.

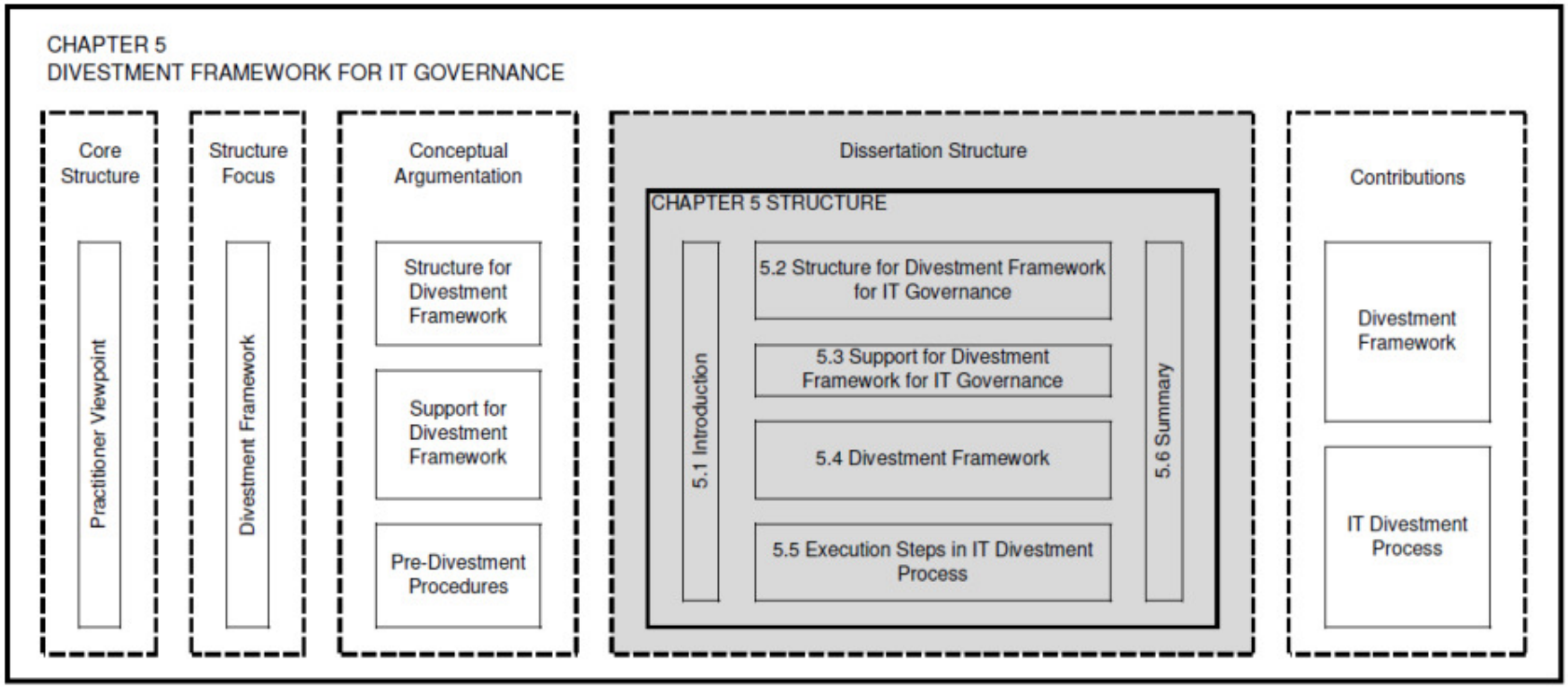
Although TOGAF is available free of charge from the TOGAF website it has been found that the purpose of TOGAF is to serve as an all-inclusive architecture framework; the main purpose is to provide a guideline to enable rapid architecture evolvement through the provisioning of a framework to assist with the design, evaluation and implementation of appropriate architecture. TOGAF is furthermore one of the most wide-ranging, complete and well documented frameworks for Enterprise Architecture Management. As with CobiT® the primary focus of TOGAF is on the deployment and management of new enterprise architecture; the decommissioning of enterprise architecture is not addressed within this framework, which makes the framework ill-equipped to be used during divestment or mine closure.

ISO/IEC 20000, ISO/IEC 27001 and ISO/IEC 38500 are the standards investigated to form part of a divestment or mine closure framework. ISO/IEC 20000 is a standard that supports ITIL and provides the means to measure service management. The goal of ISO/IEC 27001, Information Security Management standard is the safeguarding of company information against external and internal threats in order to business continuity. It strives to limit damage to the business through the maintenance of confidentiality, probity and availability of business information. The objective of ISO/IEC 38500 is the promotion and guidance for the agreeable and satisfactory use of IT within the company and is governed by the three main activities of this standard, namely regulation, assessment and control. Not one of these three standards is in essence purposed to support divestment or mine closure activities.

The King III report is not an IT governance framework or standard as such, but rather an array of principles or a *principle-based* document. The crux of the King III report is to ensure that the company's IT is aligned with and supports the company's business processes and the triple bottom line objectives, and that information assets are managed effectively. It prescribes the implementation of an existing IT governance framework, which is best suited to the company's purpose and needs. The King III report reference framework is the current business operations and processes and the IT systems and infrastructure that support these, with no accommodation for company divestment or mine closure activities.

After investigating the most relevant and well known IT governance frameworks and standards, it has become clear that not one of the existing frameworks or standards investigated meets the requirements of a divestment framework for IT governance for

divestment or mine closure. All the currently available frameworks in the IT environment are management frameworks, and most of them generally conform to the management processes for the provisioning and deployment of new IT infrastructure or governance mechanisms. These frameworks do not address all the concerned areas in the IT environment when moving from the limited focus on the supply, maintenance and support of IT to consider the broader question of how companies actually use, and ultimately dispose of IT when a divestment strategy is implemented and a company or business unit is closed down or carved out. The need for a framework to provide guidance on dealing with the disposal aspect of IT clearly exists.



Chapter Map 06: Divestment framework for IT governance

CHAPTER 5 – DIVESTMENT FRAMEWORK FOR IT GOVERNANCE

Table of Contents: Chapter 5

5.1 INTRODUCTION

The King III report instructs company directors to take the lead in being prudent by taking reasonable measures to deploy an IT governance framework that will uphold the effective and efficient management of IT resources, enveloping the deployment of a trustworthy risk management system and internal controls (Section 4.3.5[1]). The IT governance framework needs to address company specific requirements to support the achievement of strategic objectives, even if the objectives include divestment or mine closure. Due to the absence or inadequate counselling to management that relates to the deployment of IT governance principles, the creation of an all-inclusive framework to guide the constructive implementation of fundamental conventions at a strategic level, bringing calibration with the control objectives of a number of IT control frameworks, models and standards and ensuring alignment with the proposed IT governance principles. A proficient unified framework will assist management in focusing on and addressing primary IT risks, inclusive of the strategic areas concurrently (Goosen & Rudman, 2013:92).

While management defines a strategic direction, IT, in collaboration with business management, crafts an array of IT-enabled solutions that will aid the enterprise. This will guide and support the IT department to deliver the necessary applications, data and technology infrastructure to implement the solutions (See Section 3.2.5). This process will reoccur at every instance when management defines a new strategic enterprise. The company will thus construct IT solutions rather than IT capabilities and each new strategic enterprise derives in an autonomous IT solution, each based on a unique technology. As a result of IT always responding to the most recent strategic enterprise, IT is consistently a bottleneck and not developing as an asset embodying prospective strategic opportunities, such as business unit divestment or mine closure. IT is an essential component in the foundation for companies. The strategic logic for the belief backing every divestment or mine closure is uncommon, but everything will imminently be dependent on and supported by IT.

As previously discussed, IT has played an important role in the realisation of divestitures and mine closures. While planning a business unit divestment program, the overall affirmation and alignment of the IT environment is a fundamental priority for business operations. In the event of business unit divestment or mine closure, when untangling the company's tangible capability, the untangling procedure also influences IT resources. To aid risk mitigation and lower overall business unit divestment or mine closure project cost, it is of great benefit to

[1]**NOTE:** All sections referenced in brackets (in this instance Section 4.3.5) refer to arguments proposed in sections in the preceding literature study.

determine as soon as possible the exact timeframe in which each IT element needs to be de-integrated. To ensure that the company is in a position to select the best resolution in untangling IT, a comprehensive understanding of all applicable IT options and elucidations is necessary.

A pre-closure evaluation will facilitate a better understanding of possible limitations or data-related issues that might impact or jeopardise a successful business unit divestment or mine closure (Diniz *et al.*, 2014:1). The evaluation approximates cost, prudently delineates planned objectives, distinctly designates resources, and outlines a plan of action regarding the IT divestment-related activities. This preliminary planning facilitates the selection of an appropriate IT strategy to approach the mine closure.

5.1.1 Aim

The aim of this chapter is to determine what the contents and logical steps of a divestment framework for IT Governance should include and how it should be deployed.

5.1.2 Scope

In order to obtain the abovementioned aim, the following topics are discussed:

- Structure of an IT governance and management framework for business unit divestment or mine closure.
- Support for an IT unit divestment or mine closure framework.
- Divestment framework.
- Execution steps in the IT process.

5.2 Structure of a Divestment Framework for IT Governance

Frameworks commonly apportion comparable aspirations but differ in locus and resolution. Each business sector follows different business processes and has unique goals and objectives. There is unequivocal differentiation between a framework that prescribes a holistic approach and the direction and guidelines provided by particular standards, and best methods and conventions that could be applied when crafting unique policies, processes and procedures. By applying a framework influenced by best practices, suitable governance processes could be derived and augmented for IT governance to perform efficiently and adequately as a component of day-to-day business processes (See Section 4.2.2.3).

Although some studies on the topic of IT integration and integration processes and decision making models during mergers and acquisitions are available, no studies could be found to provide guidelines on how to de-integrate IT software systems, infrastructure and architecture during a business unit divestment or mine closure process. A need exists for a decision support model or governance framework that is based on the characteristics of a business unit divestment or mine closure process. Such a model needs to outline and represent the variables that influence the untangling decisions and the relationships between them. The elements of such a governance framework should include the following components:

- Governance principles – the foundation for governing IT initiatives. They should be aligned with the business unit's strategic goals and serve as the foundation for long-term IT strategies while supporting contemporary IT policies, standards and guidelines (Section 4.2.1).
- Governance structure – relies on organisational elements to oversee IT matters, such as the completion of the IT strategic operational plan and addressing risks associated with the plan (See Section 4.2.2.1).
- Governance process – the mandatory distinctive actions for reviewing, evaluating and approving new IT initiatives (See Section 4.2.2.2).

An IT governance framework created to fit the operational model of the company exactly provides a number of benefits, such as the facilitation to identify business opportunities, risks, benefits and impacts, establishes IT standards, policies and guidelines and guarantees uneventful transformation with regard to policy, employee productivity, transaction changes, efficient support and technology infrastructure (See Section 3.4). The strategic intent of companies is compelled by business accountabilities and commitments, which in this instance is business unit divestment or mine closure. Therefore, the company's strategic intent should form the foundation for the implementation of solid IT governance conventions, assuming that the fundamental tactical and operational objectives already exist (Goosen & Rudman, 2013:97 - 100).

5.2.1 IT governance

Every company's path to IT governance might vary and revolves around its business needs for and dependence on IT to be both the driving force and support structure of the company's main objectives. For IT governance to be compelling, two of its adulatory aspects need deliberation. The first is the articulation of a categorisation framework that will embolden and bolster responsibility through the assignment of decision power and liability to relevant individuals (See Section 3.2.3). The second aspect is the implementation of a schema to

provide the principles of behaviour and discipline. The pinnacle of this schema is IT principles that enclose the essentiality of the company's prospective future intent and how IT should be deployed. Underwriting these principles are control instruments consisting of the company's governing structures, such as policies and procedures. Companies should decide what their strategic position is regarding IT governance to assist with the comprehension of the degree of detail it coerces (See Section 3.2.5).

A number of aspects could signify a demand for new or improved IT governance proceedings. As discussed in Section 2.3.1, circumstances in the company's environment, both internally and externally, could spark increased focus on IT governance and move it to the top of the company's agenda. A number of everyday difficulties experienced by the company could revolve around issues of IT governance, such as business unit divestment or mine closure. The IT department might be confronted with vivid and dramatic changes following a divestiture or mine closure. It will be necessary to gain a comprehensive understanding of IT governance issues during the measure of prudence phase of the planned divestment or mine closure. In addition to the rest of the amalgamation and reconstruction needs, there will also be a requirement to devise the most desirable IT governance processes and procedures to fit in the business environment. A slumping economy or financial crunch could result in an unfamiliar fluctuation of principles and procedures that the company needs to adhere to (See Section 2.2.2). These administrative and amenability demands could present an alternative manifesto to induce change in IT governance. Implementing new company strategy will ultimately impact on IT governance.

A number of concepts to empower change have been established during the past years and these contribute treasured guidance that is exploited and applied in conjunction with the IT governance life cycle exercise. The following steps are the most commonly sanctioned method for change enablement of an IT governance implementation (ISACA, 2009:30):

- Formulate the appetite for change.
- Assemble a competent attainment group.
- Effective vision communication.
- Legitimise interested and affected parties.
- Identify low hanging fruits.
- Capacitate agency and purpose.
- Implant contemporary concepts.
- Maintain and preserve.

As described in Section 3.2.6, IT governance is construed as an instrument to assist the company to navigate through the nebula of technological intricacies and adverse business challenges. It bolsters expedient demeanour patterns and administers the control agency to aid acceptable use of IT, operational virtue and regulatory conformity. Effective IT governance will result in IT becoming a treasured asset, indivisible to the business and valued as an investment, not an expenditure. IT governance contributes the vital principle for the adequate acquisition of, or untangling from technology.

5.3 SUPPORT FOR A DIVESTMENT FRAMEWORK FOR IT GOVERNANCE

5.3.1 IT value

IT operations could potentially be among the most complicated functions to appraise as business unit divestment or mine closure transactions are being put together. They could furthermore be among the most difficult to manage efficiently and adequately during the crucial transformation period. In approximately all occurrences IT operations manifest the main company's unparalleled array of business processes and operating data, and generally apply a *one-off* composition of technologies that is bespoke explicitly for the company. As a company is scaled down, its IT will have to adopt and scale down in unison with the requirements of the company (See Section 4.2.1.5).

The divestment and closure framework will be influenced by the variables of the IT untangling decision and supported by the divestment objectives and situational variables as the key factors that shape the IT untangling strategy as well as the information technology requirements of the desired future mode of operations. The divestment or closure objectives relate to the business strategy implemented and the type of business that will transpire from the divestment or closure transaction. It is important to take into consideration that the information technology requirement variables defined will have a pertinent significance on the configuration of the IT architecture (Kumar & Lal, 2011:3).

5.3.2 Risk management

In order to endure and flourish in the current highly aggressive business environment, companies will require more flexible and buoyant IT solutions, which imminently transcribe into greater levels of technology and operational exposure (See Section 3.4.1.1). An IT governance agenda delineates the IT structure, procedures and audit framework required to determine and manage risk adequately. It is the executive committee's function to determine a risk inclination or fortitude level for the company amidst business unit divestment or mine closure, which is established in conformity with the company's divestment strategy objectives.

A comprehensive resolution of risk identification is needed. Attention and awareness should be paid to notoriety risk and IT juridical risks. IT management should compose the mechanisms of risk management established upon the executive committee's propensity for risk, the company's established risk ideology and the company's interim and indelible strategies. Vulnerability of IT solutions persists and is abused by an increasing number of delinquents. Lacking efficient information security, companies might be vulnerable to confidential business divestment or mine closure information leaking out to markets and competitors, exposing the company to unwanted law suits from environmental policing groups and trade unions seeking to exploit the company's vulnerability during these trying times (Section 4.2.1.2).

5.3.3 Compliance requirements

With the growing tally of regulators, principles, acts and statutory accountabilities, management will need to acquire a feasible way to address conformity. The best way to accomplish conformity with independent regulators and internal preconditions is to take on a process-driven resolution, offsetting with only one commonly accepted measure of regulation to which supplementary regulatory and sanctioned measures are added. Environmentally friendly IT processes and procedures should be established as a derivative of the company's environmental policy, which in turn will be a derivative of the government's environmental laws applicable in general, but more specifically, to business unit divestment or mine closure (See Section 4.3.4.3).

Aligning IT enterprises with environmental tenability intentions requires of management to take the environmental aspects and relevant repercussions of IT and IT ventures during business unit divestment or mine closure into account when compiling environmental policies and procedures specifically addressing IT matters, such as the following (Liell-Cock *et al.,* 2009:18):

Energy Saving

A great deal of money has been spent on providing stable data sources for data centre power. Data centre servers, air conditioning and networking equipment are the main consumers of energy and companies are thus investigating more affordable sources and consumers of data centre power. There are a number of ways of optimising and saving energy through better use and application of IT software and infrastructure (See Section 4.3.3). Some of the measures that could be implemented, are to avoid printing documents, turning off computer monitors when not using them, turning off computer equipment and

printers over weekends and ensuring that power management features on equipment are activated (Nandakumar & Dhenakaran, 2013:5).

Other measures to take into consideration to assist with energy efficiency and energy saving are the following:

- Data-hub amenity design
- Data-hub heat reprocessing and recovering
- State-of-the-art cooling technologies
- Processor composition and server effectiveness
- Energy optimisation
- Unified energy management for the system's domain
- Application of modelling and monitoring software

Avoidance of wasteful expenditure

- Re-use infrastructure (See Section 4.3.3)
    - The first convention is to limit dilapidation at the origin, after which the subsequent conventions are considered:
        - Re-use tangibles that can be revitalised through an industrial process.
        - Rehabilitate apparatus or tangibles that have the potential to be repaired to either its initial state or re-applied as described above.
- Recycle code and services
    - Recycle tangibles and apparatus that have benefits and suitability for alternative settings:
- Paperless reporting
- Ameliorated software system
- Unduly convoluted and deeply entangled solutions
- Redundant and irrelevant data depository
- Superfluous security and disaster restoration planning

E-waste recycling

Morselli, Passarini & Vassura, (2006) define E-waste as *"any device that for functional reasons is dependent on electric currents or electro-magnetic fields in order to work properly. It becomes e-waste when the holder discards, intends or requires to discard".* E-waste is made up from inestimable and rare metals, such as gold, palladium and platinum but could also contain conceivably harmful elements like beryllium, cadmium and mercury (Namias, 2013:1). As discussed in Section 4.3.3, TOGAF is instrumental in exposing and limiting verbosity,

escalating uniformity and influencing the possibility to re-use infrastructure. Accountable annihilation management of e-waste is indispensable to ensure the recovery of treasured constituents and correctly managing precarious and lethal constituents. Annihilation management of e-waste encompasses rehash of working electronics, restoration and revitalisation of electronics, reconstruction of electronic constituents, reclaiming e-waste, and destruction. Rehash, restoration or renovation of electronics is most advantageous as these alternatives expand the life expectancy of electronic commodities and provide better resource adeptness.

Reuse of electronics limits the environmental impact of producing commodities from natural resources, limits expenditure and decay, and lessens the necessity to import new electronic components. It is, however, not easy to reuse electronic rubbish as there are a number of hurdles to overcome, which include scepticism regarding the management of end-of-life electronic equipment, inadequacy of recycling framework, inadequacy of supervisory frameworks, etc. The propulsive authorities backing the reuse of e-waste are economic, environmental, public health and data security.

5.3.4 Sustainability

Sustainability is *"a process that helps create a vibrant economy and a high quality of life, while respecting the need to sustain natural resources and protect the environment. It expresses the principle that future generations should live in a world that the present generation has enjoyed but not diminished"* (Clough, Chameau & Carmichael,, 2006:32). In first world countries, information systems and IT infrastructure have transpired to be an essential vital part of their world. However, the evolution of the worldwide communication network, and the apparatus allocated to it, are becoming extravagantly pricey. These benefits come with a price and are not free, as over and above the financial cost, the development, implementation and application of these systems impact the worldwide ecosystem and affect global sustainability. The scope and extent of these consequences, or how they could be limited or managed, is construed by the alternative selection we make when buying, using or predisposing of these infrastructures (See Section 3.2.7).

The business canvas for IT tenability incorporates changeful IT practices to conserve resources, enhance operational achievement, and cultivate and advocate methods by which IT could assist the limitation of the environmental footmark. Real advantage and concrete prosperity will be accomplished exclusively when tenability is entrenched as the bottom line of the values and strategy of the company, incorporating methodical connections to

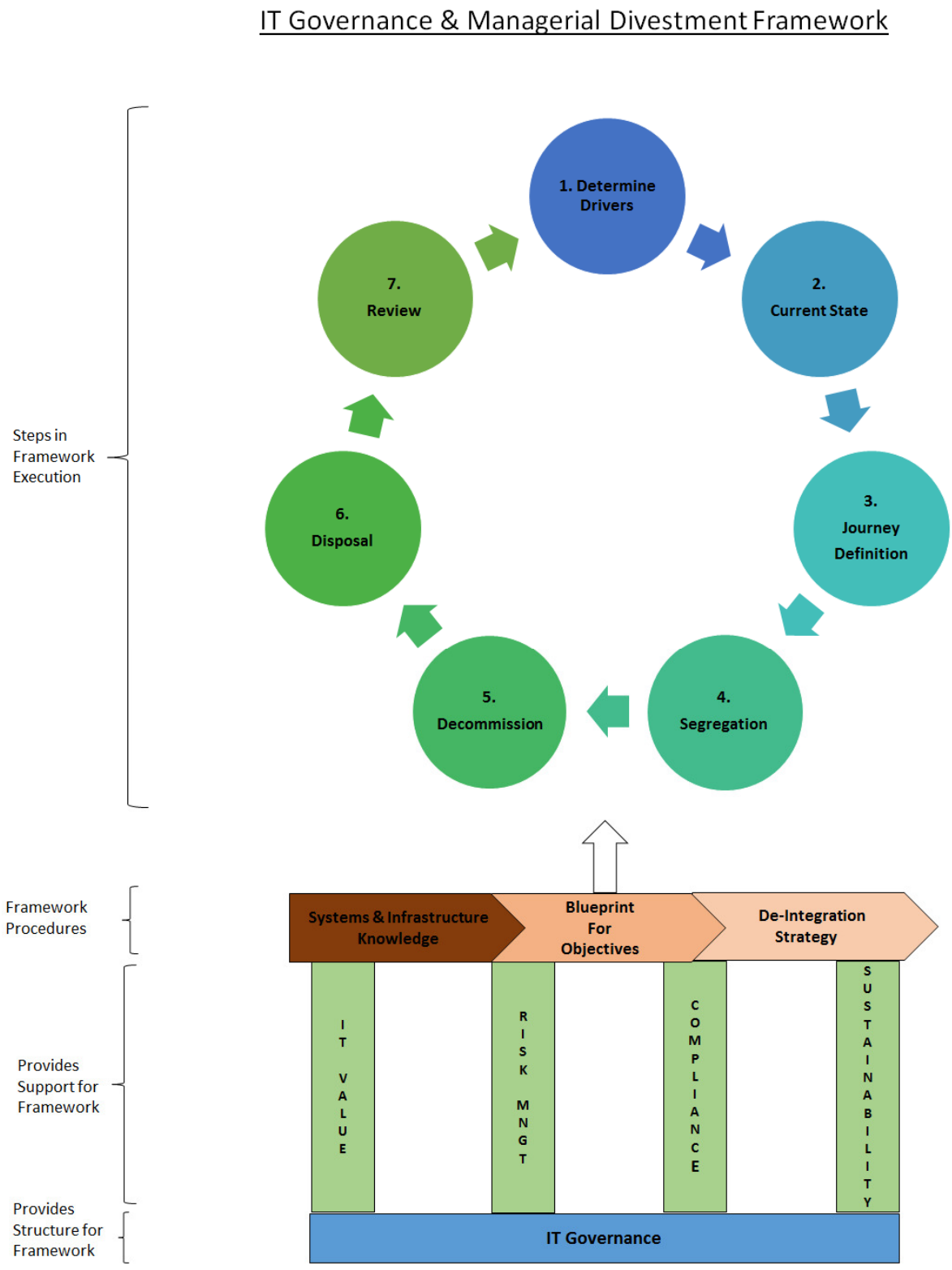
modernisation and artistry. As discussed in Section 4.3.3.2, the Solutions Continuum is a valuable instrument for uncovering mutuality and eradicating needless verbosity. When corporate sustainability becomes the topic of the day, the IT department is ordinarily not at the top of the list of sources consulted for leadership, although the IT department has a crucial strategic role to fulfil. The IT department can support corporate sustainability initiatives during a business unit divestment or mine closure process through the implementation of the following (Logan *et al.,* 2007:3):

- Evolution of closure indexes – Taking the physical and non-physical features of a divestment or closure into consideration, indexes are established to align with the core elements of deactivation and closure management.
- Assimilation of divestment or closure compositions – Different divestment or closure compositions are described for every composition within the closure indexes. Taking the divestment or closure context into consideration, a composition is a possible structure or design of each index to ensure the accomplishment of the coveted conception and aspiration.
- Evolution of assessment norms – Compile and implement an evaluation framework.
- Assessment of compositions – Assessment of every alternate composition is necessary to develop an extent of divestment or closure to ensure construct and budget computations will be concluded.
- Establish endorsed extent of divestment or closure – Credible indexes are chosen based on both their conformity and business-related results. In order to inflate the effectiveness of this chosen option and the contingency presented, risk management strategies need to be identified.

5.4 DIVESTMENT FRAMEWORK

A fit-for-purpose IT governance foundation contributes the elements for gauging the capability and potency of the current foundations and governance instruments to accomplish its function in a specific situation. A foundation simply describes elements and common links that are obligated to be contemplated for institutional scrutiny. It does not afford particular mechanisms for context mapping or the establishment of adequate IT governance strategies. Rijke, Brown, Zevenbergen, Ashley, Farrelly, Morison & Van Herk (2012:76) define fit-for-purpose governance as *"a measure of the adequacy of the functional purposes that governance structures and processes have to fulfil at a certain point in time".* Fit-for-purpose IT governance specifically considers the functions that different components of a particular system need to fulfil (See Section 3.2.4).

The divestment framework for IT governance as illustrated in figure 5.1, provides the foundational building blocks and structure to support a company's divestment strategy through the adoption and formalisation of IT governance in support of a divestment strategy. The advancement of IT governance materialises at the confluence of, and in response to company operations and a volatile situation (Wilson & Pollard, 2009:103). Thus a divestment framework for IT governance was created explicitly to assist and guide the IT departments and business unit managers with untangling the IT infrastructure and resources during the divestment or mine closure process. As discussed in Section 4.2.2.1 IT governance provides the structure of the divestment framework on which the support pillars of the framework in the form of drivers, such as IT value, risk management, compliance and sustainability rest. The divestment framework for IT governance provides the foundational building blocks and structure to support a company's divestment strategy through the adoption and formalisation of IT governance in support of a divestment strategy.



. Figure 5.1: First Version: Divestment Framework for IT Governance

5.4.1 Pivotal pre-divestment procedures

5.4.1.1 SYSTEMS KNOWLEDGE

Timely current information on all IT assets and initiatives is essential to anticipate. Contemporary software systems, including numerous interdependencies among software applications that are unified at a platform level and not interconnected through the application of software level unification schemes are convoluted conglomerates. Usually a solid interconnectedness exists between the different system platforms and IT infrastructure. As such, comprehensive knowledge regarding the overall system and infrastructure ecosystem is indispensable to ensure optimised pre-divestment IT procedures that are not managed as non-aligned silos. The intricacy of the ecosystem suggests that IT management teams require specific functional multidisciplinary skills and techniques apart from the convention to manage particular components of the ecosystem (See Section 3.2.2).

5.4.1.2 BLUEPRINT FOR UNTANGLING OBJECTIVES

When divestment is considered as a component of a premeditated business strategy, it is planned well in advance of the physical divestiture. The period of time needed for architectural resolutions, migration endeavours and planning can be limited or totally eradicated. Management and IT are obligated to develop a framework for the best suited software and infrastructure composition for the post-divestment or post-mine closure business requirements, and by designing for it, it will concentrate on probable savings without impacting the final outcome of the divestment plans (See Section 3.2.5).

5.4.1.3 CREATE AN UNTANGLING STRATEGY

As explained in Section 3.3.2.1, strategy as process in strategic alignment plays an essential role in IT strategy development and hinges on the particular growth or divestment strategy the company is following. Election of a favoured or acceptable untangling strategy is optimally accomplished by evaluating the determining considerations and taking into account their characteristics for a particular business unit or mine. A number of circumstances need effort to be devoted to them, the matter at hand being to accomplish the best suited resolution in a probable, methodical and legitimised manner. On account of their being beyond the bounds of possibility to dislodge every software system and infrastructure at the same time, companies need to deploy a strategy to assist in the decision making process to determine the timing of de-integrating which components and data when during the divestment or mine closure process. The selection method of an untangling strategy commonly kicks off by compiling and evaluating applicable data, through the consideration of conceivable guiding determinants such as pertinent legislation and correlating best process indicators. An array of feasible

untangling alternatives is then compiled with an initial untangling plan for the implementation of each alternative. It is crucial that the IT software and infrastructure untangling approach is well formulated to align with the method of divestiture followed by the business (See Section 3.3.1.3). This permits divestiture to be typecast as a *business as usual activity* and not a hamper the accessible and applicable resources; it needs competent, knowledgeable IT management and technical experts with comprehensive knowledge of different types of divestiture; it needs an integrated method and commitment in all stages and aspects of the divestiture process for management to concentrate on better strategic business results.

Preference-based software retirement

Commencing with the software systems that will propagate the most significant cost savings improves the financial worth of the software system retirement drive through the emancipation of financial and human resources. Confining the fund savings to hardware that is supported through maintenance contracts close to expiring is the best avenue as a large segment of the fund savings could potentially be achieved right away. A major hurdle during software systems retirement is the inadequacy of functional specifications and reporting regarding the software systems being retired. But commencing the retirement process with the legacy systems where the functional specifications and reporting foundation are available will help ensure successful execution. This approach will also assist with compiling the case for change for retiring the rest of the software applications.

Unconditional software retirement or particular data detainment

Software system retirement modality recommends the once-off archiving of all the data while preserving continuous online connectivity to access the archived data. This approach is uncomplicated and rapidly deployable, which will assist the business to evade prolonged investigations and data scrutiny when starting with the archiving process. When business shows an explicit comprehension of the software system data framework, and data retention needs discerning data, detainment could be executed early on in the retirement process or after complete retirement of software systems. In both instances the application of modality software systems retirement solutions provides companies with a variety to choose from for their retirement and retention strategy.

Retirement of software of ambiguous or minimal significance

In a synopsis where the software system has limited or no functional or financial worth, software system retirement is the best possible strategy. A company can save on expenditure when it takes the final decision to discontinue old legacy applications, while keeping the data

from these systems for future reference and use. The company will need to be able to adjoin the relation amid the different software systems data, even after discontinuation, as it will safeguard the company from potential legal action when the data needs to be retrieved again later.

5.5 EXECUTION STEPS IN THE IT DIVESTMENT PROCESS

5.5.1 Determine the drivers

Determine the prevailing change agents. Risks as described in Section 4.3.4.3 correlate with the execution of the new IT governance index needs to be outlined in the business case and managed during the whole implementation lifetime. A change agent could be an intramural or extrinsic occurrence, circumstances or fundamental problem that acts as a catalyst for change. Circumstances, developments, tendencies, efficiency deficits, market and company goal adjustments could function as change agents. The main company should set out to provide guidance for divestment or mine closure and embrace governance while the future state-divested business unit needs to focus on performing the divestiture and conforming to the established protocols and keeping the fundamental business configuration in mind.

5.5.2 Establishment of current state

During business unit divestment or mine closure, the company structures and the fundamental comprehensive business configuration in its own nature might be inconclusive at best. The aim is accuracy and transparency as the particulars of the business unit divestment or mine closure materialise. Align IT objectives with business strategies and risks, and formulate the fundamental IT goals and processes. Taking into account the described IT goals, crucial processes are construed, managed and regulated to guarantee positive outcomes. Management needs to be informed about its prevailing proficiencies and where weaknesses and inadequacies might exist (See Section 3.3.1).

MEASURE OF PRUDENCE

The method of establishing the measure of prudence starts when the resolution to divest has been taken. A measure of prudence needs to be undertaken to reveal the recorded and unrecorded facets of reliance of all IT resources. A catastrophic oversight occurs when business management decides to involve only the IT department very late in the divestment life cycle (Kumar & Lal, 2011:6). It is fundamentally important to ensure close alignment of the business structure, the IT operating model, the divestment index and the implementation strategy (See Section 3.3). Despite undertaking a comprehensive financial measure of

prudence, it might not take all the IT unknowns that might emerge during a divestment or closure transaction into consideration. Intricacy and complicatedness start to materialise when the divestment team starts to deal with IT issues. The advantage of influencing IT untangling measure of prudence endeavours prematurely will present divestment or closure stakeholders with the following:

- Understandable resolutions/strategic ambitions – The business advantage to be obtained from the divestment or closure is clearly enunciated in perceptible conditions and is transparent to all the parties involved.
- Better comprehension of the exertion and budget needed – The effort needed to de-integrate a business unit from a timeline and budget viewpoint.
- The formulation of a governance index – Distinctive specifics regarding the duty and functions needed to manage IT untangling exertions.

The records, information in visible form and statistics conceived during the measure of prudence process constitute the singular most critical array of information that a company owns. The administration of transcripts and information assets is mostly not acknowledged as an indispensable component of best company management practices. This deficiency to engage appropriately in planning for the administration of information resources could lead to major financial disasters and wasted intellectual capital (See Section 3.3.1.2). Business unit divestment or mine closure that does not relinquish anticipated financial prosperity to business owners or stakeholders is commonplace. In a number of instances, higher quality measures of prudence mechanisms with improved documentation and better intelligence attainment and retention might culminate in optimised business decisions.

5.5.3 Journey definition

The degree of transition and the amount of work associated with an IT untangling could easily inundate the business resources. To progress quickly from planning to execution, a well-defined work breakdown structure is fundamental. Responsibilities need to be outlined clearly at the commencement of any divestment. The evolution of a business unit divestment apt IT landscape calls for a deliberate systematic method to IT software and architecture management foregoing business unit divestment, containing IT and business management examination and review to determine when common off-the-shelf software is appropriate and when imperative alterations will be needed (See Section 2.2.4). Producing the most favourable stability assists in ensuring low operational IT expenditure and facilitates future business unit divestment. Divestiture-ready companies perpetuate adequate blue prints of their IT landscape to contribute to their all-inclusive IT software and infrastructure management

strategies. Information from IT software and architecture management could be an important antecedent for acting prudently in evaluating all associated risks to the negotiations of the contract and the following business unit divestment project. Enterprise software and architecture management furnish and support an analysis of the IT environment and the interdependencies among other IT components.

In reality different work streams need to be established for infrastructure untangling, software untangling and agreements, including negotiations regarding software licenses and changeover documents of concurrence. An independent work stream to deal with data and document archives could also prove to be advantageous. This will make provision for the realisation of the prospective resolution into everyday practices and the institutionalisation of standards and rules to assure the achievement of business alignment and measurement of performance. A favourable outcome requires commitment, alertness, engagement and understanding from management, and partnership and control from the concerned business and IT mechanism proprietor (See Section 3.2.6).

5.5.4 Segregation

The IT processes for business unit divestment or mine closure, for instance the segregation of infrastructure and applications, can be postponed until after final business unit divestment or mine closure and executed progressively. These processes (Matthes *et al.,* 2012:15) include the following

- Probable application segregation – Material and juridical pertinent applications are rationally segregated through the installation of a copy of the software on equivalent hardware. Irrelevant data is then removed. Segregation of master data is a pivotal step in the process. The effort and cost to execute these steps is frequently underestimated. Rational segregation will accommodate the legal preconditions and needs to be endorsed by an auditor.

- Rational infrastructure segregation – Through firewall and VPN tunnels, network connections are segregated rationally to ensure shielded access to the segregated applications. In this instance the mother company needs safety and protection. A rational segregation assists in complying with juridical and administrative obligations.

- Physical segregation – Subsequent to rational segregation, the IT infrastructure will be physically segregated. Applications will now run on disconnected independent physical machines and in physically independent networks. Physical segregation is commonly

introduced in the final phase when the extenuated software architecture and data strategy have been pegged.

- Step-by-step segregation – This method frequently needs to be implemented as a result of ambitious timetables for the closing and short itinerary between the statement disclosure and the closing milestone. In this case the rational segregation will be implemented as a provisional solution for the furnishing of hardware.

The preeminent differentiation between rational and physical segregation is that physical segregation relates to a chiselled separation on a hardware level, indicating that the information systems needed by the business unit divestment or mine in closure operate on physically segregated machines. This is inclusive of both applications and data. The network linking the machines will in addition be physically segregated from the network of the main company. In comparison, rational separation basically exclusively encases data, applications or infrastructure. Physically it prevails on identical hardware. Rational segregation could be accomplished through the creation of independent exemplifications of an application, virtual machines or firewalls segregating networks.

5.5.5 Decommissioning

Decommissioning portrays the administrative and technical approach towards the retirement and elimination of the governing controls from application and infrastructure resources. Applying the phrase *decommissioning* signifies that resources will no longer be utilised for their current purposes. Intrinsic to a strategic avenue to untangling it is pivotal to be well informed regarding the contemporary and probable subsequent requirements of the divested business unit or closed mine. A thoroughly contrived decommissioning procedure will, over and above interim effectiveness, ensure a better strategic approach to the reduction of cost and optimisation in the long term (See Section 3.4). The decommissioning proceedings are the concluding action in the IT framework for business unit divestment or mine closure. This action ensures the dispositioning of all pertinent software systems and infrastructure. Improperly planned and executed decommissioning will contribute to inefficient value creation and lost opportunities. Infrastructure withdrawal from active service is the discontinuation of the infrastructure enterprises. Software system detachment best practices imply that all data should be archived as long as online access is maintained by way of an endorsed reporting interface (See Section 4.3.4.2). Lengthy analysis at the beginning can be avoided if the archived data stays available via an online reporting interface. This process is uncomplicated and rapidly deployable, which will ensure that the savings benefit is accelerated. For companies that have an explicit comprehension of the software data model and detainment

needs, discerning data detainment can be realised in advance or adapted after complete software separation. In both instances, applying a recommended best practice software separation solution provides a company the luxury of choice of outright or selective separation.

It must be guarantee that resigned information is safeguarded and maintained for duration particularised by the applicable regulations. Detainment policies should be designated to retired information, from the top level of software applications to the rugged level of data combinations. Data is then expunged when the detainment extent of time concludes to prevent retention outside the limits of time that would present a statutory risk (See Section 4.3.4.2). In addition, statutory holding facilities should be ready for use to guarantee the availability of admissible data to a statutory dispute even beyond the expiry of the initial retention period. A range of capabilities should be feasible to make sure that sequestered information stays attainable in the event of a review or legal case.

The first step in a decommissioning framework is the compilation of a decommissioning plan. Every software system, infrastructure peripheral or element that will be relocated to a production inactive condition should be supported by the development of a detailed decommissioning plan. Every decommissioning plan, accompanied by a decommissioning certificate, should be preserved for future reference. The plan should be well configured and contain headings such as change management and stakeholder management, to name but a few (See Section 3.3.1.4). Decommissioning is in essence a change process that depends upon an array of capabilities and expertise related to directing the usually profoundly intricate, engaging and metamorphic change processes. Decommissioning depends on subtlety regarding the repercussions on the selection of services companies and end-users and the management of the confusion, mistrust and ambivalence that could emerge during the decommissioning kick-off process.

5.5.5.1 STEPS IN THE DECOMMISSIONING PROCESS

As with all change, software and infrastructure decommissioning will not be embraced. It includes following an array of audacious, and sometimes disturbing and upsetting actions. It is not practically doable to start from scratch. It is essential for IT teams to identify the software and infrastructure that have the highest impact and draft a step-by-step approach plan (see figure 5.2) for decommissioning (See Section 3.3.1.4). Software and infrastructure decommissioning is usually not a once-off operation during the business unit divestment or mine closure process, but preferably a continuous process compelling companies to reconsider their method of software and infrastructure life cycle management to include

seclusion and data depository into their business processes. IT can decommission software and infrastructure successfully exclusively with a deliberate, logical, systematic constituent approach.

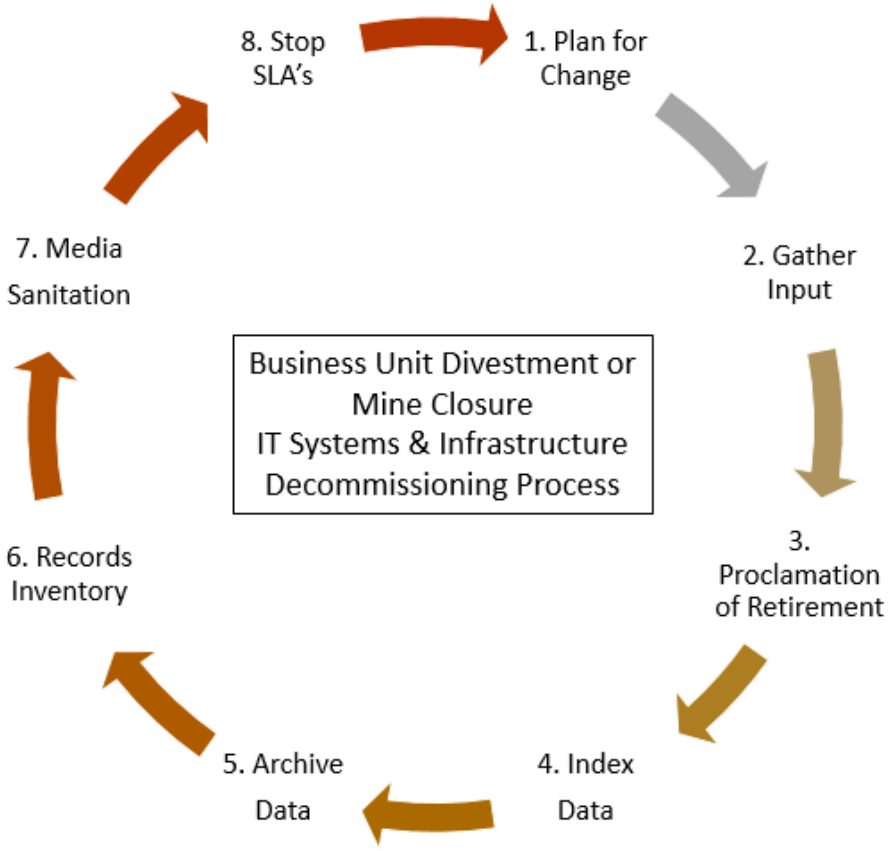


Figure 5.2: Business Unit Divestment or Mine Closure IT Systems and Infrastructure Decommissioning Process

Plan for change

What is the starting point for the pilgrimage to alter the approach to the retirement and decommissioning of software and infrastructure radically? Which innovative standards will the company need to integrate in their software and infrastructure life cycle management to guarantee more effective agility when relinquishing and decommissioning software and infrastructure? How does the company design and build its software and infrastructure for change? How does the company secure backing from its interested and affected parties to execute disturbing changes? The attainability and application of appropriate technology are essential components of decommissioning planning and could guide the choosing of a strategy (See Section 3.4.1.3). Business unit unique characteristics might necessitate

technology augmentation and ratification. However, sophisticated technology might already be commercially available.

Perhaps the first crucial step should be to examine, evaluate and anticipate the company's actual software and infrastructure environment, comprehend and appreciate how it presently aligns with the business requirements and decide how to align it with the business unit divestment or mine closure strategy (See Section 4.3.3). The preparation phase is for delineating the extent of the company's decommissioning and retirement program, determining appropriate resources and alliances and establishing cross-functional support for the diverse IT untangling initiative. It signifies that the IT scope of divestment or mine closure primarily evolves into a more direct approach that in general is quicker to execute. This relinquishes unequivocal, quantitative results while contributing better adaptability for prospective divestments or mine closure.

The decommissioning program will prescribe how the individual elements of the integrated IT resolution will be deployed at the conclusion of mining operations, and includes components such as applications, infrastructure, communication and lastly, transcripts and records. The program will include an outline of particular arrangements for subsequent access to any specific individual element, such as records and transcripts. Great care should be taken to ensure that all software systems and infrastructure components are included in the decommissioning program and that any connections and affiliations to other decommissioned components are diverted or also decommissioned if no substitute capability is available.

Consultation with interested and affected parties

To be knowledgeable regarding the existing number of production systems in the company's software systems portfolio is simply not adequate. The IT department will need to deploy an investigation and metrics to better comprehend the interconnection and interdependencies among the different software applications. Clearly explained, it is beside the point to determine the exact number of users for each software application. There is greater significance in comprehending the business criticality regarding individual systems and to what measure each individual system impacts the business process. The input from a variety of interested and affected parties is necessary to ensure that an authentic software system inventory list is compiled.

In Section 4.3.2, convention 1 of the Cobit® framework explicitly states that stakeholder requirements need to be accommodated. It is important to consider the apprehensions, concerns and sentiments of all the interested and affected parties during the decommissioning

stage of a business unit divestment or mine closure. A decommissioning program will be challenged to be executed successfully if it is not approached with an attitude of openness and transparency. Continuous communication with the most afflicted interested and affected parties is crucial throughout the process as they are key in identifying the present utility of data, capabilities and use of solutions, as well as the disposition of usage with regard to criticality and usefulness. All intelligence that has been collected in the assessment phase will assist in shaping the physical foundation for the software systems design and portfolio paradigm. Sequentially this could serve as admonition for the divestment and mine closure framework and for designing the decommissioning and retirement blueprint.

Proclamation of retirement from active duty

Software system retirement is conceivably the most uncomplicated resolution. Nevertheless, companies, in general, lack formal unambiguous policies and procedures to guide the decommissioning or withdrawal of production systems. Software system lifecycle management is defined as a three tier approach: plan, build and run. Unfortunately most companies do not make provision for the fourth essential tier in this process, which is decommissioning or withdrawal of software systems. The fourth tier will depend on its own unique constituents and meticulous evaluation.

It is essential to notify all the interested and affected parties regarding the resolution to discontinue operational availability of software systems and infrastructure. Communication should be adapted to address the diverse priorities and individual sensitivities of all interested and affected parties (See Section 4.3.2). When configuring the communication the following content should be included:

- The justification and motivation for discontinuing the software application.
- The transition plan for retaining data and functionality.
- The prospective timeframe for discontinuation and decommissioning.
- Down time that might occur during software system and infrastructure decommissioning

Indexed data

Section 4.3.4.2 discusses information security and controls and the role of ISO/IEC 27001 in the safeguarding of information to ensure business continuity; Section 4.3.4.3 outlines the compliance with established rules and with mandatory legislation, including the Mine Health and Safety Act with regard to the safeguarding of documents and data after mine closure. Concurrently with divestment or mine closure, property might be disposed of, and employees lessened in force or reassigned. Document and register detainment might stay the same, as

the overarching company may maintain documentation and recounting accountabilities for the initial operations for the near future. Records of IT resources that formed part of the company's tax returns will presumably need to be reserved for prospective tax audits. Regulatory departments such as the Department of Labour and the Department of Mineral Resources might require that certain records be retained and be accessible for a long period of time although all operations have ceased at divested business unit or mine in closure.

Archiving data

No matter the process, technique or means applied for archiving data, it is crucial to make sure that archived records and data are kept in a functional scheme focusing on an enduring, technology independent recovery method to access the records and data in future. Furthermore, it needs to be confirmed that delicate and confidential records and data that have become obsolete are obliterated securely. The preferred archiving solution will determine the storage medium. Existing company policies and procedures, in accordance with the guidance from the legal department, will provide the necessary guidelines with regard to the records and data retention requirements. To perpetuate the virtue of all historical records and data, affirmation needs to be given that archival enterprises will:

- perpetuate the business framework of retained records and data;
- cater for facilities to ensure rapid and uncomplicated records and data retrieval for the purpose of studies, reporting and reviews;
- actualise suitable depository strategies to support maximisation of business value and enable access needs for optimising and minimising the potential expenses during the detainment period.

Archiving the data and decommissioning applications will also lead to the discontinuation of software system support and could emanate in meaningful savings as a result of reduced energy expenses and the decreased software systems footprint (See Section 4.3.4.2).

Inventory of records

Thorough record management is based on a record inventory, and is commonly the initiation step in implementing a record management program. Regardless of the company's approach to organising its records, a records inventory will furnish a synopsis that forms the foundation for future record management. When undertaking a record inventory the company will uncover, pinpoint, and outline all available record series, regardless whether the records are in electronic or hard copy format. After completion of a record inventory the company will be well informed regarding the nature and number of records spawned and maintained. The

company will now also have a better understanding of the approach they need to implement efficient and effective record management. Records correlating with decommissioned software systems should be archived based on the record disposition schedules (Etherington & Przybyla, 2003:1) (See Section 4.3.4.2).

Sanitise media

The National Institute of Standards and Technology published NIST 800-88 Revision 1, Guidelines for Media Sanitation, in December 2014. These guidelines supply the formerly omitted authoritative and all-inclusive recommendations and provide the foundation for an impartial approach towards safeguarding and eradicating the storage of delicate and confidential data on obsolete IT assets and media. The NIST guidelines describe four approaches to media sanitation to utilise with each individual data protection classification on differing types of storage media and devices. The following are the different sanitation types (Kissel, Regenscheid, Scholl, & Stine, 2014:8):

- **Disposal** is associated with relinquishing the media.
- **Clearing** is associated with rendering the data on the media indecipherable by method of overwriting.
- **Purging** deletes data completely and safeguards deleted data from professional hacker attacks.
- **Destroying** renders media permanently worthless.

In order to employ the NIST protocols in an effective way, the company should compile and implement a data categorisation guideline and procedure to assist with evaluating and categorising data delicacy. The process for governing the sanitisation of devices and media contains the following steps:

- Determining the delicacy and preservation classification for all retained data.
- Deciding on the suitable media sanitisation procedure for each category and media.
- Sanitising the media.
- Validation of the sanitisation process outcome.

Determining the delicacy and potential exposure should incorporate contemplation on matters such as software license violations and patent or copyright unveilment, including business process interruption or humiliation and ruining of employee privacy and theft of identity (See Section 4.3.4.3).

Discontinuation of all business unit specific IT service level components (SLAs)

The first step is to identify and document all the SLAs that are impacted by the divestment or mine closure. Compile a resolution framework that clearly illustrates which IT services will form part of the support portfolio during the scaling down period of the divestment or mine closure. A divestment or mine closure SLA decision communication should be composed to inform end-users regarding the available support portfolio service, including the term, scope and cost of each service. IT services, specifically, need this degree of exactness to manage end-user expectations.

IT Service Level agreements in general are considered secondary agreements since they do not form part of the contracts supporting the core business of the company or mine. Subsequently these agreements are not taken into account until the eleventh-hour in the divestment or mine closure process by employees who are inexperienced in dealing with IT contracts in general. Based on the specific IT SLA, it could be an intricate and belligerent covenant. The IT department ultimately comprehends the extent of the IT assets and software systems of the divested business unit or mine. The IT department should thus compile a gradual segregation program, tabulating cumulative milestones and target dates and will assist with the prevention and minimisation of deferments and the management of correlated risks during the process of SLA discontinuation (See Section 4.3.1).

5.5.6 Disposal of absolute infrastructure

When the coveted final stage is determined, every component and business process ought to have a predetermined discontinuation defined. All the respective untangling programs should have a specific discontinuation plan contingent on a number of circumstances. Business-IT alignment should be based on prospects for the business process right from the start and revised with routine intermissions (See Section 3.3.3). IT infrastructure sometimes comprises components that are hard to dispose of. Appropriate disposal of IT infrastructure is seen as environmentally accountable and usually prescribed by law. To ensure the protection of the company's data, all repository components should be sanitised correctly ahead of being disposed of (See Section 4.3.4.3). Suitable guidelines should be composed and enforced for the disposal of IT infrastructure during a business unit divestment or mine closure. IT Infrastructure components should be categorised as follows:

- Equipment that has reached the end of its useful life.
- Equipment that can be redeployed at other business units or mines.
- Equipment that can be donated to schools or the community as part of the community upliftment projects.

The guidelines should address the handling of IT equipment according to each of the above categories. The guidelines should be incorporated into an ICT disposal policy or procedure that addresses matters, such as who will be responsible for the management of the disposal decisions, which end-of-life solutions will be implemented, who will track and document the process (See Section 4.3.5: King III, principle 5.6).

5.5.7 Review

Section 4.3.5 discusses the necessity of *introspection* through the execution of *Plan-do-Check-Act* cycles to ensure continuous improvement in processes and to sustain and extend process performance. Compiling the post-decommission report is essential for the documentation of the exercise to discontinue and remove software systems and infrastructure. The report catalogues the lessons learned during the decommissioning exercise and outlines the locality of all records, data and software peripherals that were archived. The move or archival of individual records or data needs to be defined. The definition needs to include the description of the medium, composition, locality and access method to retrieve the information. Supplementary to compiling the lessons learned, the post-untangling report revision is supposed to identify the locality of all the records and information that have been archived. Every individual IT infrastructure component that has been de-integrated should have a post-untangling review report. Concentrating on the tenable transformation of the usual procedures into common company processes, and auditing the accomplishment of the enhancement through the measurement of the performance prosody for the anticipated advantages.

5.6 SUMMARY

Despite the fact that a number of studies on the subject matter of IT integration and integration processes and decision support standards during mergers and acquisitions are at hand, no supporting literature could be obtained to give direction on the untangling of IT software systems and infrastructure during a business unit divestment or mine closure process. A pertinent necessity prevails for a decision support standard or governance framework that is established upon the essence of a business unit divestment or mine closure process. An IT governance framework that is designed specifically to fit the operational model of the company contributes a number of advantages. The aim of this chapter is to determine what the content and logical steps of a divestment framework for IT governance should include and how it should be deployed. When the business strategy is formulated, IT and business need enhanced aptitude and awareness to recognise the challenge of managing the continuously changing IT environment. IT needs to be logical and systematic, but relevant when contemplating which strategic projects to execute. The interpretation of an IT strategy is

essential for defining the concept, context and the method of accomplishing IT goals. The impact of business unit divestment or mine closure on the alignment of IT and the affected business unit or mine is unknown.

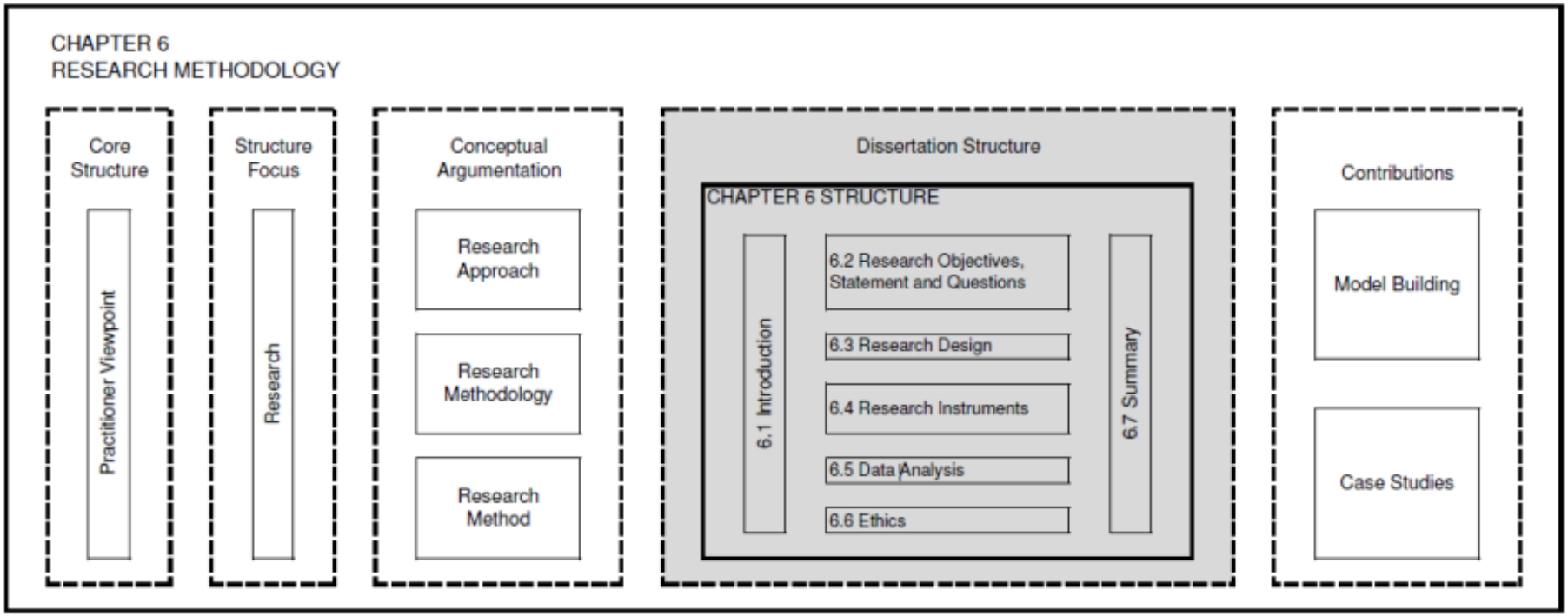
IT operations could be classified as among the most complicated business processes to evaluate during a business unit divestment or mine closure transaction. When the company strategy is scaling down its operations, IT will need to adopt and scale down collectively with business requirements. The divestment and closure framework will be determined by the volatility of the IT untangling decision and bolstered by the company's divestment objectives and circumstantial variables. An IT governance program will facilitate outlining the IT structure, procedures and analysis framework needed to establish and manage risk appropriately. Environmentally friendly and sustainable IT processes and procedures need to be constituted as a derivative of existing environmental policies, which, in proper sequence, will be derived from governmental laws specifically applicable to business unit divestment or mine closure. IT environmental policies and procedures should include matters such as energy saving, avoidance of wasteful expenditure and e-waste recycling. The business portrait for IT sustainability includes flexible IT practices for the conservation of capabilities, embellishing operational accomplishments and bolstering methods in which IT could support the minimisation of the company's environmental footprint. The IT department supports the corporate sustainability initiatives during a business unit divestment or mine closure process through the implementation of closure indexes, assimilation of divestment or closure compositions and the compilation of assessment criteria.

A custom-developed IT governance framework provides the essential features for measuring the capability and efficacy of the contemporary bedrock and governance instruments to manage its objectives in a particular situation. In essence a framework outlines the components and universal links that are needed for institutional reviews. The framework will address a number of IT decisions and actions that will need to be taken into consideration or addressed during the business unit divestment or mine closure. The pivotal pre-divestment or mine closure IT procedures are the first step in the framework and define components that need to be taken into consideration, such as the level of IT systems knowledge. Adequate knowledge regarding all the IT software systems and infrastructure portfolios and interdependencies is essential. The blueprint for termination objectives and the untangling strategy will assist with decisions such as the approach to software systems retirement.

The next step will be to determine the drivers and change agents for the business unit divestment or mine closure. Following this step, is determining the current state by means of

conducting a measure of prudence investigation to reveal the recorded and unrecorded facets of reliance of all IT software systems and infrastructure. The transcripts and information gathered during the measure of prudence process will form a unique and important cluster of information that the company owns. After the current state has been defined, it will be appropriate to define the approach or journey that IT will follow to de-integrate all the IT software systems and infrastructure components. Segregation, steps in the decommissioning process and the disposal of obsolete infrastructure will be mapped and defined to best support the final outcome desired by the company for business unit divestment or mine closure. The very last step in the divestment framework for IT governance will be to review the outcome after implementing the framework to determine whether the business unit divestment or mine closure IT goals and objectives have been successfully reached.

Chapter 5 defined and described the theoretical underpinnings of the first version of the divestment framework for IT governance. Chapter 6 continues with a description of alternative philosophical approaches that were considered for their relevance to studying behavioural information systems and the social processes involved in the use in Information Technology. It will define and describe the methodological approach of this research study by describing the research design, research guidelines and the research output.



Chapter Map 07: Research methodology and approach

CHAPTER 6– RESEARCH METHODOLOGY AND APPROACH

Contents: Chapter 6

6.1 INTRODUCTION

Chapter 5 investigated and described the theoretical underpinnings for the development of a divestment framework for IT governance. Methodology can be described as *"the strategy or plan of action"* (Scotland, 2012:9 applied during a study to uncover the knowledge that the researcher

believes can be known. Specific techniques and procedures are used to form the basis of the research framework. Hesse-Biber & Leavy (2011:6) describe methodology as *"the bridge that brings our philosophical standpoint (on ontology and epistemology) and method (perspective and tool) together".* Methodology or theoretical perspective is the explanation of social reality or some integral part of it. The research framework is defined through the use of research questions that assist in defining the problem to be investigated. Research framework conceptualisation is done in terms of two sets of assumptions, namely ontology and epistemology.

Ontology can be described as what can be known and how. According to Scotland (2012:9) *"researchers need to take a position regarding their perceptions of how things really are and how things really work".* In other words, it constitutes the beliefs and assumptions of the researcher that form the initial standpoint or opinion of the researcher.

Epistemology and ontology are closely related as epistemology is *"the philosophy of knowledge"* and addresses the relationship between the knower and the known while ontology represents the *"philosophy of reality"* or the nature of social reality (Krauss, 2005:758 - 759). Orlikowski and Baroudi (1990: 9) define epistemology as the *"assumptions [that] concern the criteria by which valid knowledge about phenomenon may be constructed and evaluated".*

Qualitative research methods were chosen to assist in the creation of meaning, thus understanding the *how* and *what* posed in the research questions of the dissertation. According to Bowen (2005:209) the most important strength of qualitative research is *"that it yields data that provide depth and detail to create understanding of phenomena and lived experiences".*
A design science research approximation was applied as an artefact in the form of a closure framework developed in order to solve a problem situation, and the usefulness of the artefact to solve the problem that was initially identified, was assessed. The primary goal of design science research is to provide utility in contrast with behavioural science research where the primary goal is to uncover truth. Hevner, March Park & Ram (2004:98) state that *"while it can be argued that utility relies on truth, the discovery of truth may lag the application of its utility".*

A naturalistic paradigm was followed as a real world situation as in business unit divestment or mine closure is studied as it unfolds naturally, without controlling or manipulating the situation. Data collections methods applied were sensitive to context and led to a detailed description of the study outcome (Tuli, 2010:100).

6.1.1 Aim

The aim of this section is to review the methodological concerns in conducting research related to the identified research question.

6.1.2 Scope

In order to achieve this aim, concepts related to the research question and the research approach followed were covered in the following topics on concern:

- Research objectives, statement and questions
- Research design
- Research instruments
- Data analysis
- Ethics

6.2 RESEARCH OBJECTIVES, STATEMENT AND QUESTIONS

The objective of this study is to determine the essence, content and characteristics of a divestment framework for IT governance, and secondly to develop a divestment framework for IT governance support mining companies to address the IT component of a business unit divestment or mine closure project effectively.

For the researcher to achieve this objective, the essential theoretical foundation of a business unit divestment or mine closure process and existing IT theories were investigated. The study achieved this through the understanding of the fundamental ontological constructs of a business unit divestment or mine closure process and by identifying the *what*, such as the crucial properties, criteria and guidelines contained in existing IT frameworks. In other words, it determined the indispensable fundamental *elements* that should form part of a divestment framework for IT governance. This was done through a literature review process.

Secondly, the resultant framework constructs were applied to create a new framework to address the IT governance and managerial component of a business unit divestment or mine closure process and formed the *artefact* that was the outcome of a design science research study.

6.3 RESEARCH DESIGN

6.3.1 Research philosophy

A great number of behavioural information systems research projects focus on the continuous relationship that is present in information technology, individuals and companies. These research projects usually share a common theme, describing the social processes involved in the development, implementation and use of information technology. When choosing a philosophical approach, it is important to consider as many alternatives perspectives as possible to ensure the one most suitable for studying the phenomenon of the proposed research project is selected to support and articulate the researcher's beliefs (Orlikowski & Barloudi, 1991:7).

Positivist research is based on the status quo and is concerned with the testability of theories that are inclined to disregard historical context in research but do search for universal laws and principles to support the predicting patterns of human behaviour across different situations. A positivist paradigm works in a deductive manner to identify one-sided informal relationships in order to develop a basis of general knowledge. Positivist researchers apply either descriptive, exploratory or explanatory methods or one of their primary objectives in IS research is hypothesis testing. Positivist researchers tend to disregard the validity of other philosophical approaches and thus also disregard other varieties and forms of knowledge (Orlikowski & Baroudi, 1991:10 - 14).

Researchers applying a critical paradigm believe in the existence of a world that has causal relationships and effectiveness but it does not exist as part of their knowledge. This world exists totally independently of knowledge. Critical researchers accept that their view of the world through perceptual and theoretical lenses is always based on their own individual historical and current knowledge, but they do not believe that all viewpoints are equally valid. Lastly critical researchers acknowledge that different types of knowledge exist, namely physical, social and conceptual, and that these need to be researched through different methods as each consists of different types of object. The critical research paradigm moves from descriptions of events or regularities to the reasons why these events are caused and what is causing them. The explanations could be non-physical and non-observable and it is accepted that knowledge could always be deficient and unreliable (Orlikowski & Baroudi, 1991:21 - 24).

The post-modernist researcher's view is that the role of knowledge of IS research is to substitute facts with a representing image. In Orlikowski and Baroudi's view it is naïve and incorrect to

attempt the discovery of the real order of things. It will prove problematic when trying to determine the factual relationships through experimental methods as it is believed that the experimental process will be redefined. The post-modernist researcher questions and challenges the modernist's need for reason and harmony with high level explanations of developments to cater for standardised corporate IS with fixed business rules and conformity for the use of data. It rather encourages information systems that cater for individual needs and is developed through participative design. Users are encouraged to have their own information environments that will address their individual needs and suit their work and task environment (Hassard, 1994:303 - 324).

The interpretivist paradigm claims that the real world and what we know about it is a product of society established by social actors assigning meaning to it. In essence the world is perceived as a continuously developing social process that is a fabrication of human consciousness and intuitive biased experience. Interpretivists prefer phenomenology as an approach to use for the study of IS as it recognises the lived experiences of the actors, the symbolic nature of their language and common analytical problem (Orlikowski & Baroudi, 1991:14 - 20).

The pragmatic researcher explains the nature of knowledge in terms of its functional application and successes rather than in terms of its depictive accuracy. Such a researcher would challenge the prominence of knowledge by providing an *ecological account of knowledge*. It is believed that knowledge is a product of human interest in specific topics. The pragmatist view is that the ultimate goal of IS research is to commit to the enhancement of IS practices in general. Pragmatists approach IS research on the basis that they gain knowledge with the end goal to act on the knowledge in order to improve and make a difference through IS research. They focus on action, which means they describe and characterise the actions of humans and how they interact with IT systems (Cameron, 2011:96 - 108).

A functional pragmatism approach was applied in this study. In pragmatism knowledge is utilised to improve and change the world through action. Knowledge created though functional pragmatism has a prescriptive character and produces prescriptive knowledge products such as framework and methods. The purpose of functional knowledge is to provide practical guidelines for specific action (Goldkuhl, 2008:2).

6.3.2 Design Science Research

6.3.2.1 BACKGROUND

Winter (2008:470) describes the intent of information systems design research as *"the construction and evaluation of generic means-ended relations"* or in other words, a *"utility"* that provides the research community with the direction needed through the specification of its rigour. The role of design science research in information systems can be characterised as informative regarding the synergy between humans, technology and business to obtain the goal of information systems to improve the performance and efficiency of organisations. In essence design science research is a problem solving paradigm. It seeks to implement and manage information systems to provide innovative problem solving solutions through intellectual and computational tools or artefacts (Hevner *et al., 2004:76).*

"The most visible output of the design research tradition is the artefacts" (Parao, 2002:5) who describes his thesis about design science research as *"research in this paradigm dares to invent virtual artefacts that intervene to support and improve real phenomena"* (2002:1) and declares that IT artefacts are not *"natural, neutral, universal or given"* (2002:4) Hevner *et al.* (2004:77) define IT artefacts as *"constructs (vocabulary and symbols), models (abstractions and representations), and instantiations (implemented and prototype systems)"* and their purpose is to help solve organisational needs and problems and to evaluate the feasibility of proposed solutions.

Design science research does not only imitate and collaborate with a stagnant and unchanging universe. When intervening in the virtual world, design science research plays a major role in influencing and altering reality over time. The intervention usually occurs in the form of an artefact *"coming into being"* where the inner and outer environments meet. This meeting point between technology (inner environment) and humans (outer environment) recognises the establishment and existence of an artefact (intervention) (Parao, 2002:11).

According to Keuchler and Vaishnavi (2008:11) design science research in information systems are synonymous with producing artefacts by using a constructivist method. This is, however, not an accurate representation of what research outputs could be when following a design science research methodology in information systems. Other possible outputs are principles, frameworks and taxonomies, research results and case studies. The outputs identified are a form of knowledge that is not represented or does not form part of an artefact.

A disadvantage of design science research is the belief that artefacts could be the only research output of this methodology and that it has the potential to limit the research scope by preventing the researcher from investigating research topics that could benefit information systems design practice (Keuchler & Vaishnavi, 2008:12). Winter (2008:471) relates a further disadvantage of design science research to the fact that it lacks generally accepted distinguishing guidelines for the different types of artefact.

According to Kuechler and Vaishnavi (2008:8) design science research in information systems lacks *"a common understanding of the definition and scope"* and Winter (2008:470) adds to this statement by indicating *"a lack of a commonly accepted reference process model"*. Parao (2002:15) is of the opinion that the design science research approach of *"knowing through making the epistemology of design research unstable, making prescriptive accounts problematic".*

6.3.2.2 ONTOLOGY

Ontology can be described as what can be known and how it can be known. According to Scotland (2012:9) *"researchers need to take a position regarding their perceptions of how things really are and how things really work".* It constitutes the beliefs and assumptions of the researcher that form the initial standpoint or opinion of the researcher.

Parao (2002:12) describes the ontology of design science research as *evolutionary* because it epitomises the continuously changing ontological hypothesis, and as *complementary* because it takes both the phenomenon and the artefact into consideration. The researcher has a moderate realist approximation of the phenomenon and his focus is to better understand it in order to simplify it. However, his approximation towards the artefact that still needs to "come into being" is emergent and his approach to the research will be determined by his values and goals.

Constructivist research describes the role of the researcher in examining reality. It *"recognize(s) that human actors enact their physical and social reality and that they come to share a set of meanings around this reality"* (Orlikowski & Baroudi, 1991:16). In this view the researcher does not only depict and describe reality from the actor's viewpoint, but he is part of the social reality under study and partially establishes the social reality through the designs or *constructs* applied to view the world. The result of this approach is that the researcher's theories and values are intensely implicated in the research.

6.3.2.3 EPISTEMOLOGY

Mlitwa and Van Belle (2010:2) describe technology as a *social construct* where it is assumed that an information system is a *socio-technical* system and depicts technology in its social settings, embodying its technical form and the means of application. The epistemological approximation of the research in design science research is characterised as *reflective* and *hermeneutic* and is typified by the approach of *knowing through making.* In contrast with other research modes where the goal of research is to seek the truth through exploration and understanding, the goal of design science research is courageous enough to envisage prospective solutions ahead of their time (Parao, 2002:14).

Design science research is characterised as reflective as it applies a selective analytical approach while accomplishing the simultaneous generation of data and theory in order to master knowledge. It applies analytical cycles to reduce the number of possible solutions step-by-step, addressing the need through the development of artefacts. The analytical cycles followed ensure that the researcher will eventually understand the phenomenon well enough to create the best artefacts as a solution to the need (Parao, 2002:15).

Iivari (2007:46) epistemologically theorises a three level structure of the types of knowledge that are produced by design science in information systems research:

- *Conceptual knowledge* contains no truth value and gives meaning to concepts, constructs, classifications, taxonomies, typologies and conceptual frameworks.
- *Descriptive knowledge* contains truth value and describes observational facts, empirical regularities, theories and hypotheses.
- *Prescriptive knowledge* contains no truth value and gives meaning to the design product and design process knowledge, such as technological rules and technical norms.

Hevner (2007:87 - 88) describes design science as three cycles of activity. The three cycles as illustrated in figure 6.3, interact with the three areas in design science research that are the environment or application domain to provide context to the research, the design science research itself, and lastly the existing knowledge base to inform the research.

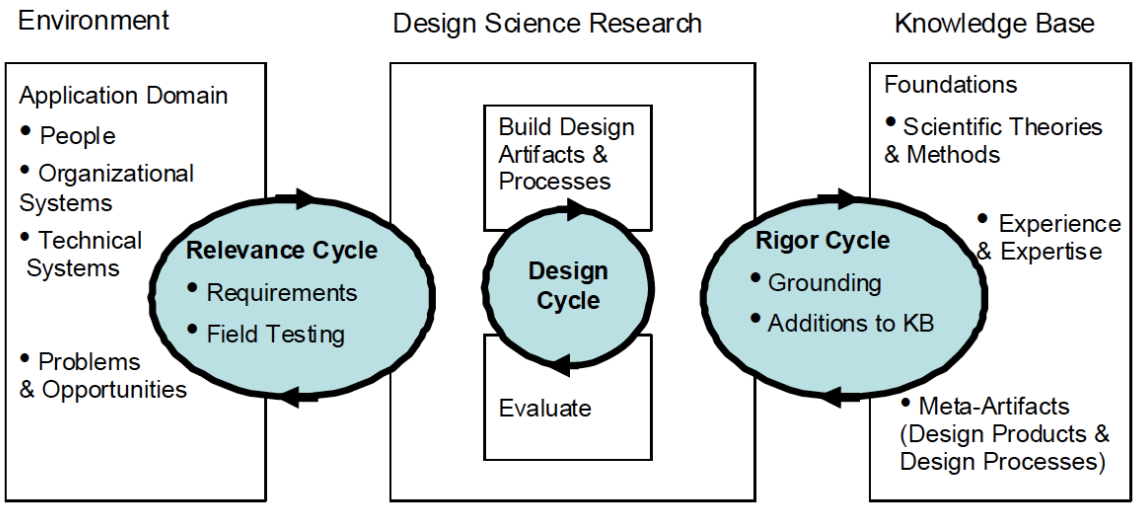


Figure 6.3: Design Science Research Cycles (Hevner, 2007:88)

6.3.2.4 METHODOLOGY

According to Bowen (2005:209) the *"main strength of qualitative research is that it yields data that provide depth and detail to create understanding of phenomena and lived experiences".* Qualitative approaches usually apply qualitative inductive methods that result in the aggregation and analysis of specific data, which in turn will direct the researcher to a broader, generic understanding of the research topic (Hesse-Biber & Leavy, 2011:9). Qualitative research seeks meaning and focuses on extricating meaning from the data accumulated. Questions are usually open-ended and begin with words like *Why*, *How* and *What*.

Hesse-Biber and Leavy (2011:4) describes qualitative research can be described as *an intellectual, creative, and rigorous craft.* They further describe qualitative research as a *holistic approach* that applies a *process-oriented approach to knowledge-building.* Qualitative research contains three primary research purposes (Hesse-Biber & Leavy, 2011:10):

- . Exploratory which seeks to investigate an under-researched aspect of social life.
- Descriptive, which seeks to describe an aspect of social life.
- Explanatory, which seeks to explain an aspect of social life.

Goldkuhl (2004:18) describes a pragmatic approach to research as one of action. According to Goldkuhl (2012:139) *"actions are thus pivotal in pragmatism"* and *"the essence of a pragmatist ontology is actions and change"*. Pragmatists believe that concepts and ideas are meaningless unless we act upon them and that reality is defined by human experiences and their actions upon these experiences.

For the pragmatist researcher research is not only about the meaning of a concept, but also about what practical implications could be derived from the concept. Pragmatists view knowledge as *"a mirror of reality"* and have a strong belief that one cannot only observe events and information and then assign it to generalised knowledge that is attributed to *"summaries of past experiences"*.

It is important to pragmatists to understand if the knowledge they gain through research will be able to bring about a practical positive change in practice. The aim of a pragmatist is to convert the knowledge he gains into action that will translate into meaningful improvement (Goldkuhl, 2004:20). The pragmatic position in research is thus twofold, namely that *"reality exists as an actable and affordable world"* and furthermore that it is *"an accountable and socially meaningful world".* The role of the pragmatist researcher is to be actively involved in the creation of data and theories by participating and exploring the outcomes of applying a number of tactics. Action research and design science research are thus some of the theories applied by pragmatist researchers (Goldkuhl, 2012:141).

Keuchler and Vaishnavi (2008:8) describe design science research methodology as constructivist with *"prescriptive design theories"* because the research mainly encompasses the creation and evaluation of artefacts. However, according to Parao (2002:17) the approximation of design research is portrayed by a visionary approach that will generate new ideas. The methodology of design research is furthermore described as a process that takes the inner and outer environments of an artefact into consideration while the knowledge of the structure of underlying subjective science, organisational behaviour and management practices forms the foundation of the research process (Parao, 2002:17).

The progression of the design will result in the merging of goals, restraints and the possible impact that the artefacts may have on the phenomenon. The design researcher needs to be aware that there might be better solutions to the problem or need he is addressing and thus the satisfaction that the best known solution will be implemented and will influence the researcher process of selection (Parao, 2002:18).

According to Vaishnavi and Kuechler (2004) *"knowledge contribution needs to be a key focus of design science research".* They created a design science process model to explain visually the design science research process steps, the knowledge flow and the outputs that are generated

during the process. As reflected in this process model (see figure 6.4) design science research comprises the following phases or steps: an *awareness of a problem* that is outlined in a research proposition, a *suggestion* in the form of a tentative design, *development* of an artefact with the focus on the design and not the construction of the artefact, *evaluation* of the artefact according to pre-determined performance criteria that will be described in the research proposition and finally a *conclusion* that contains the results of the design effort.

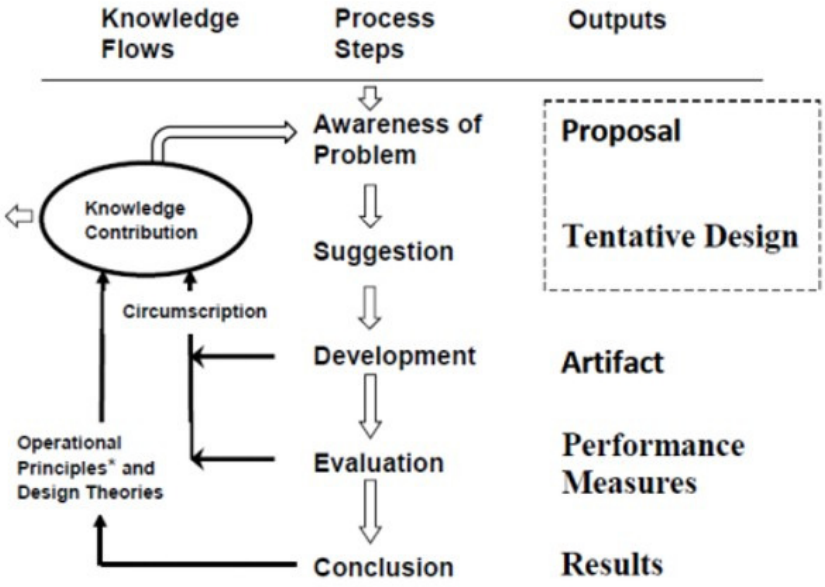


*Figure 6.4: Design Science Research Process Model (*Vaishnavi & Kuechler, 2004*)*

In this study the design science research process was approached as follows:

Step 1: Awareness of problem: The problem or gap in knowledge was identified. The knowledge base of this step was to understand the problem's applicability, if current solutions existed, what deficiencies there were. After a thorough literature research to find information and guidelines on how to address the IT governance and managerial divestment or mine closure process a non-trivial lack of literature on this topic was identified.

Step 2: Suggestion: The question that should be answered in this phase is how the problem, or knowledge gap should be solved by determining and describing the objectives of a solution. The researcher needs knowledge of possible and feasible solutions and also of approaches, philosophies and technologies to assist in defining an objective. The solution was to develop a divestment framework for IT governance that would provide managerial and governance

guidelines on how to approach and execute the IT business unit divestment or mine closure process.

Step 3: Development: An artefact in the form of a divestment framework for IT governance was created to address the gap in knowledge on this topic by qualitatively analysing existing IT frameworks and governance models.

Step 4: Evaluation: In this step the researcher measured the artefact to prove whether it could effectively address the problem through comparison of the objectives determined for the solution. A single case study of one mining company closing several business units was used to illustrate the utilisation of the proposed divestment framework for IT governance.

Step 5: Conclusion: The results of the research process, outcome and knowledge contribution was documented and communicated.

This study applied design science research to evaluate and clarify the content of the proposed divestment framework for IT governance. To assess the artefact it was correlated with and measured against some of the most prominent and widely used existing IT frameworks and governance models, such as TOGAF and ITIL. Measurement of functionality and applicability was based on pre-determined design criteria. A single case study approach was adopted to illustrate the utilisation and relevance of the proposed framework.

6.3.2.5 RESEARCH OUTPUT

Vaishnavi and Kuechler (2004) propose a classification of design science research outputs as per Table 6.1:

	Output	Description
1.	Constructs	The conceptual vocabulary of a domain.
2.	Models	A set of propositions or statements expressing relationships between constructs.
3.	Methods	A set of steps used to perform a task – *how to* knowledge.
4.	Instantiations	The operationalisation of constructs, models and methods.
5.	Better theories	Artefact construction as analogous to experimental natural science.

Table 6-1: The Outputs of Design Science Research (Vaishnavi & Kuechler, 2004)

Parao (2002:19) describes two more potential outputs from design science research, namely *"operational principles (reproducible knowledge) that the artefact illustrates"* and *"a metaphoric understanding of how the artefact supports or controls the phenomenon of interest (emergent theory)".* After the surveillance of a number of academic journals and other design initiatives Kuechler and Vaishnavie (2008:11) came to the conclusion that the output of design science research is not limited to the five artefact-related outputs mentioned in Table 6-1. They identified the following non-artefact research outputs that constitute a construct of knowledge or information not encapsulated in an artefactual form but existing detached:

1. Principles
2. Study and research results
3. Case studies
4. Frameworks and taxonomies

The definition of Peffers, Tuunanen, Rothenberger, & Chatterjee (2007:6) of an artefact is relevant. This definition describes an artefact as *"any designed object with an embedded solution to an understood research problem".* The artefact of this research study is an IT mine closure framework that provides managerial guidelines and governance. If evaluated according to the outputs defined in Table 6-1, the proposed framework embodies the first three outputs: constructs, to some extent a model, and a prescriptive guiding method. The framework then needs to be evaluated to determine if it is functional and executable in a business unit divestment or mine closure process. The evaluation needs to be executed in line with the pre-determined criteria as discussed in step 4 of the design science process model in the previous section.

6.3.2.6 RESEARCH GUIDELINES

Hevner *et al.* (2004:83) provide seven protocols or ground rules for design science research:

1. The research must result in the creation of a tenacious design artefact that is effectively characterised to enable implementation and use.
2. The aim of design science research is the development of a technology-based pertinently significant solution to business problems.
3. The establishment of evaluation criteria to ensure quality, utility and effectiveness of the design artefact.
4. Design science research needs to contribute authentic, clear and demonstrable knowledge relevant to the design artefact, design foundations and methodologies.

5. Research must display rigour in both the development and evaluation of the design artefact.
6. Design constitutes a search process for an appropriate artefact while evaluating alternative processes.
7. The research results need to be communicated adequately to both technology-oriented (IT community and academics) and management-oriented (business unit divestment or mine closure management committees) audiences.

6.3.2.7 THEORETICAL UNDERPINNING

Walls, Widmeyer & Sawy (1992:36) provide a highly recognised and adequate definition of design theory: *"A design theory is a prescriptive theory based on theoretical underpinnings which says how a design process can be carried out in a way which is both effective and feasible".* De Moor (2005:1) describes design theory as a prescriptive theory grounded upon theoretical underpinnings that direct the design process to be compelling and attainable. The benefit of such a design theory is the provision of a toolset that will enhance description and analysis and better design approaches.

According to Friedman (2003:508) *"the foundation of design theory rests on the fact that design is by nature an interdisciplinary, integrative discipline".* Design theory is described to be dominantly prescriptive in nature and characterised by design principles that provide extensive guidelines on how the design should be approached. The expansion of these principles then results in the design rules that will define in detailed terms how system features should be selected and designed in order to accomplish the aspired system goals (Hanseth & Lyytinen, 2010:5).

A design theory lives in a hypothetical world made up of synthetic objects, which include hypothetical objectives such as algorithms and figures. *"A design theory instantiated would have a physical existence in the real world"* (Gregor & Jones, 2007:320). The primary aim of design theory and philosophy is to form the cornerstone of support for IS professionals to ensure the resolution of functional problems for the desired outcome. Business needs are the source of the functional problems and are the driving force behind the satisfactory resolution of problems (Carlson *et al.*, 2011:114).

IS design theory describes *"the principles inherent in the design of an IS artefact that accomplished some end, based in knowledge of both IT and human behaviour"* (Gregor & Jones, 2007:322). De Moor (2005:2) discusses the obligation of design to satisfy the expectation to be

both a process and a product. *"From a product perspective, a design theory consists of several components"* and from a process-perspective the constituents are a *"design method describing procedures for artefact construction; kernel theories governing the design process; and testable design process hypotheses, to check whether or not the design method results in an artefact consistent with the meta-design".*

"Theorising and theory building occur before, during, throughout, and at the end and as a result of Design Science Research" (Venable, 2010:15). Design science research is based on both existing theory and business needs and could result from the following:

- Recombining ideas and conceptualisations of problem areas.
- Realising new possibilities for solutions.
- Recombining existing solutions/technologies.
- Imagining new technologies.
- Realising new applications for existing technologies.

6.3.3 Literature review

A methodological analysis of previous literature is an important undertaking for all pedantic research (Webster & Watson, 2002:48-49). It is necessary to reveal what has previously been unveiled in the body of knowledge before the initiation of any research study. The literature examination frames the current research study by means of positioning it opposite to previous research. A great number of research questions are inspired through *real-world* problems and a potential void in the research literature, and a literature study should accentuate this. This, however, implies that even though plenty of the earlier research one has explored might furnish one's comprehension of a specific subject; merely an exclusive portion of it is inclined to be incorporated in the author's literature review (Reuber, 2010:106). Levy and Ellis (2006:182) state that an effective literature review:

- scientifically evaluates and incorporates distinct literature;
- specifies a consistent bedrock to a research question;
- specifies a solid underpinning to the choice of research methodology;
- illustrates that the prospective research provides a new entity towards the comprehensive body of knowledge or enriches the study area's expert base.

The advantages of propositioning a premature literature review is that it could contribute a convincing justification for a study, enveloping the rationale for a distinct research approach. It assists in contextualising the study, familiarising the researcher and discloses how the paradox had previously been studied. Additionally, it aids the researcher to cultivate stimulating theories, acquire hypothetical awareness, avert risks and literally evolves into an awareness of instead of indifference to potentially purposeless predispositions. An early literature review promotes lucidity in contemplative theory evolution. Lastly, not being up to date regarding pertinent literature prematurely could result in the researcher being criticised (Dunne, 2011:116).

Chapters 2, 3 and 4 provide an overview of current research and enables an understanding of the extent of specific subject matter that was relevant in the establishment and vindication of the research question and empowered the researcher to recognise an area of focus that formerly had not been covered. This analysis was compelling to such an extent that it underscored an important gap, namely the unavailability of a framework or a standard to guide management during a business unit divestment or mine closure process. As the data gathering and examination advanced, and concepts and provisional theories began to materialise, the researcher began to hypothesise regarding the formulation of a divestment framework for IT governance. It was the researcher's inclination to assist in explaining or repudiating the numerous and diversified theories unfolding from the data analysis, to assist with the improvement of the condition, accuracy and solidity of the analysis. Before commencement of the study the researcher was already knowledgeable regarding the hypothetical compositions such as the *business-IT alignment*, *IT governance*, *the coal mining industry*, *business unit divestment* and *mine closure*, each of which the researcher used to her advantage when evaluating the data.

6.3.4 Model building

Constructing a hypothesis, in general, adds to more than an accomplishment in hypothetical contemplations, but instead provides an enterprise essential to the durability of companies, associations and individuals. A hypothesis is understood as a methodical, descriptive, theoretical and meaningful array of co-dependent explanations for a phenomenon. These explanations are made up of connected compositions associated through verifiable hypothesis that have an understandable philosophy and linked premises (Davis, Eisenhardt, & Bingham, 2007:481). Hypothesising is to discover real world actions, to contemplate or explore them and to come to methodical convictions, which have feasible outcomes. Building a hypothesis, as understood in this instance, is made up of compiling and formalising a theory in order to assign action. In

general, models are mostly hypotheses or part thereof. Hypotheses could consist of collective and well defined models as their essential elements (Schwaninger & Groesser, 2008:2).

Model evolution is regarded as a compelling research method. It facilitates researchers and experts in correlating meticulously to reality. It assists in describing, forecasting, testing or comprehending intricate systems or circumstances. Models frequently contribute a framework for conducting research. A model is a contemplation, an intellectual framework for analysing a system. It comprises abstract portrayal of real-world experiences (Powell & Connaway, 2004:60). Models play a crucial role in research and could be tested in conditions of hypothetical formulations, experimenting and comprehending versatile systems, and composing links among research and humanity. Models contribute advice and direction for the culmination of tasks or the formulation of systems and are a portrayal of a real world situation.

A model is a portrayal or contemplation of a real phenomenon or circumstance. It depicts the interrelatedness, directly or indirectly of an activity and response in conditions of cause and effect. Because models are a contemplation of reality, they could be considered less convoluted than reality itself. A model needs to be characteristic of the indicated elements of reality being studied. It is important to be alert and cautions to avert from overgeneralisations of models. Shafique and Mahmood (2010:4) describe the following attributes of models:

- Materiality, for diverse and contrasting models and methods.
- Pellucidity, in relation to facilitation of understanding.
- Durability, or responsiveness to suppositions made.
- Productiveness, or abundance in rationale and scientific feasibility.
- Facilitation of enhancement or aptitude to adapt and augment.

The character of a model recommended in a research project frequently hinges on the sophistication of the research question. Researchers frequently grasp that a research opportunity has evolved though the exact disposition of the opportunity is frequently not distinctly comprehended at this premature point. Models are frequently projected as a preeminent impetus of a project. A model might be applied to direct an analysis, to direct the compilation of theories and questions for an inquiry, to arrange findings from case studies, and so on (Olivier, 2004:49). The characteristics of the model will to some extent be driven by its predetermined utilisation.

6.3.5 Appropriateness of using a case study

Yin (2003:13) describes a case study as *"an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident".* Leedy and Ormrod (2005:108) define a case study as *"A type of quantitative research in which in-depth data are gathered relative to a single individual, program, or event, for the purpose of learning more about an unknown or poorly understood situation".* According to Olivier (2004:10), *"Case studies are particularly useful for studying some phenomenon in the situation where it occurs".* Case study research not only allows for research on a single subject or company, but also has the potential to identify and handle complex situations within the single entity. It assists and empowers the researcher to answer *How* and *Why* questions while taking into account how aspects are shaped by the context in which they occur (Baxter & Jack, 2008:556).

A case study is ideally suited to provide an interpretive apprehension of the synergetic relationship between humans and technology in its natural social environment. The design and evaluation of a case study research project needs an encyclopaedic literature scrutiny to be initiated to comprehend the extant body of research literature enveloped in the research area and to plot the research questions within the lexicon of that literature (Darke, Shanks & Broadbent, 1998:280), as was done in Chapters 2, 3 and 4. In qualitative descriptive case studies the approach of the researcher is to be actively committed to the process of data collection and evaluation that will contribute to an in-depth understanding of the research topic. A further advantage of a descriptive case study approach is that it enables the researcher to compose his own version and interpretation of the topic (Andrade, 2009:45). According to Andrade (2009:46) the main contribution of case study design is its suitability to guide the researcher in defining the research boundaries. Researchers with the intent to develop a philosophy may, however, discover that case study protocols are insufficient because of inadequate procedures to support the theory building process.

A single descriptive case study approach will provide an in-depth description of the problem domain, scrutinising the domain for areas where current subject knowledge is insufficient and to test theory. A case study research approach is viewed as the method that is applied most widely for qualitative research in information systems. It is an appropriate method to assist with the interpretation of the synergetic relationship between information technology innovations against an organisational background (Darke *et al.*, 1998:274 - 275). The composition and capacity of a

case study research project needs an extensive investigation into existing literature to enable comprehension of the current body of literature knowledge available to ensure positioning of research questions in relation to that literature (Darke *et al.*, 1998:280).

According to Merriam (1998:33) a case study is a principally suited design for the interpretation of process. Process as the focal point of case study research could imply monitoring and results in the description of the context, or causal explanation that results in revelation and confirmation of the process. To evaluate the IT framework for business unit divestment or mine closure a single case study was used to embody the relevance of the proposed framework. A case study encapsulates the IT aspects and the business processes of a potential business unit divestment or mine closure process.

6.4 RESEARCH INSTRUMENTS

6.4.1 Documentation

Documentation that was used during the study can be categorised into two distinct categories, accredited journal articles, and publications and documents related to the business process followed during a business unit divestment or mine closure. The business-related documents include minutes of meetings held by the business unit divestment or mine closure committees, business unit divestment or mine closure guidelines provided by the department of minerals and resources (DMR), and company specific Standard Practice Instructions (SPI's) related to the control of records and business unit divestment or mine closure in general.

6.4.2 Personal experience

The researcher is an employee in the Information Management department at the company that is in the process of applying a divestment strategy by closing down business units. One of the primary responsibilities of the researcher is to manage the IT downscaling and discontinuation process and ensure alignment of the company's divestment strategy and IT strategy as well as alignment of the downscaling of business process with the departure of employees of the business unit closing down and the IT processes.

When the researcher became responsible for the management and alignment of IT during the business unit divestment or mine closure process, it was discovered that not only did the company

lack the existence of specific guidelines and procedures for IT management and alignment during business unit closure, but that very little academic literature existed that was applicable to these phenomena. This led to the decision to embark on a research journey on the topic and to provide a generic framework that could assist other IT practitioners and management teams of business units and companies implementing a divestment strategy. The researcher obtained, and is still in the process of obtaining, valuable experience that will be applied to guide the development of a divestment framework for IT governance.

6.5 Data Analysis

"Case study analysis is, by nature, argumentative, so it is critical that the researcher be fair in laying out the arguments and consider competing hypotheses and evidence that would disconfirm what is being sought" (Kohn 1997:6). According to Miles and Huberman (1984:21 - 23) data analysis includes three coinciding activities: *Data reduction* relates to the selecting, clarifying, outlining and converting raw case data; *data display* relates to the coordinated accumulation of information to make a deduction*; data displays* refer to graphical and narrative outputs, such as graphs and tables. The analysis process results in a substantiated conclusion from which context can be assigned to data to assist in building a legitimate deposition.

Yin (2014:130) describes four data analysis strategies to assist in simplifying case study data analysis. *Relying on theoretical propositions* implies the adoption of *theoretical propositions* that prompted the case study research. The initial intention and design of the case study was most likely based on propositions that contributed to a number of research questions, gave direction to the literature review and might have resulted in new propositions. The proposition is *"a theoretical orientation guiding the case study analysis"* and directs attention to particular data while ignoring other data.

Developing a case description refers to the establishment of a descriptive framework for constructing the case study. The formulation of the framework's structure will be mirrored in the chapters. The descriptive framework represented by the chapters will formulate the case study analysis and assist in the establishment of innovative links to be analysed (Yin, 2014:131). *Using both quantitative and qualitative data* refers to the combination of statistical data in the form of graphs or tables to illustrate quantitative data and descriptive or interpretive data and results in an evaluative case study (Yin, 2014:132). *Examining rival explanations* introduces an analytical

strategy that attempts to define and assess rival explanations and operates in combination with the previously mentioned analytical strategies to obtain its objectives (Yin, 2014:133).

6.6 ETHICS

Davison (2002:1) defines ethics as *"the systematic application of moral rules, standards, or principles to concrete problems"* and in a general sense refers to an ethical predicament that could arise when arrangement or process has the ability to impact either positively or negatively on the well-being of an individual person or a group of people. Research ethics refers to the focus on acceptable research practices to do good and avoiding damage. Virtuous issues are applicable to any kind of research because research has the tendency to create constitution between the aspirations of research to make abstractions in order to benefit all and participants' right to privacy (Orb *et al.,* 2000:93).

The main ethical theories used in IS research as described by Stahl (2008:3) are the utilitarianism and the deontology approach. The primary purpose of utilitarian ethics is to correlate the accumulated applicability of each resolution. The most appropriate ethical resolution would be the one that has the ability to augment overall applicability. The aim of this approach is to focus on the results or ramifications of each decision only and it is thus also called the *consequentialist* approach to ethics. Stahl (2008:3) describes deontology as an essentially different approach that measures the ethical character of decisions and focuses on the constrained intentions of the researcher without concern for possible ramifications. Iivari (2007:54) describes ethics of design science research as *"an ethical change from describing and explaining of the existing world to shaping it".* Information systems as an adapted discipline could potentially portray three roles:

- Means end-oriented
- Interpretive
- Critical

Design science research tends to favour the means-end orientation where the focus is on the development of artefacts. The researcher aspired to contribute knowledge to obtain goals without examining the validity of the goals. Case study research suggests research conditions where the researcher is an uninvolved observer. However, in this research project, the researcher was zealously entangled in dealing with the problem on a continual basis. This situation might indicate the necessity to combine theory and practice. It is, however, believed that by linking theory and action by introducing repetitive periodic change it was feasible to reinforce the theory by witnessing the impact of purposeful indirect changes.

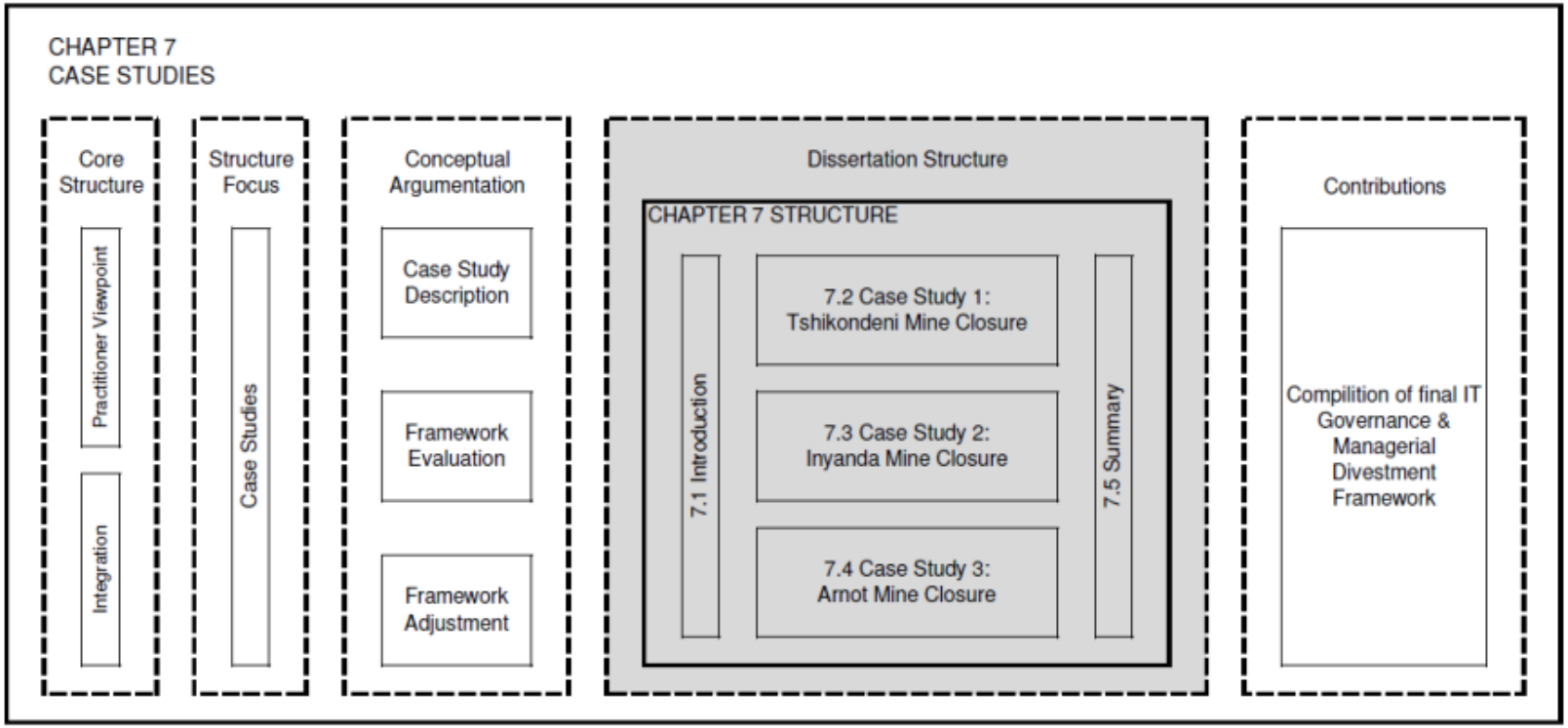
6.7 CONCLUSION

The research approach that the researcher intended to utilise for this study was discussed in this chapter. This chapter gave a description of alternative philosophical approaches that were considered for their relevance to studying behavioural information systems and the social processes involved in the use of information technology. The proposed research instruments, data analysis methods and the use of three case studies were introduced and the ethical considerations pertaining to research were explained. The impact of a divestment strategy on the macroeconomic environment was scrutinised to gain a better understanding of this domain and its applicability to business unit divestment or mine closure.

Design science research was selected for this research project after exploring and reflecting on the ontology, epistemology and methodology and reviewing design theory as the underpinning theory. Design science focuses on the creation of artefacts and enquiring about what the outcome should be to ensure the attainment of objectives. The intention of design science research is to alter actual circumstances into elected and endorsed circumstances and artefacts are depicted by pertinence and uniqueness. This implies that an artefact can resolve a prominent problem in an uncommon way. From a process viewpoint the elements are a design approach, in this research represented by modelling, which portrays an agenda for artefact development. Distillate hypotheses guiding the design process, and verifiable design process theories, to confirm if the design approach concludes in an artefact compatible with the meta-design, and in this study represented by the three different case studies that were described.

Exploratory case studies were selected because no methodology was necessary. The researcher merely contemplated the cases to observe what could be discovered from them. Hypotheses to be substantiated through consequent research can then be founded on the learning outcomes. The case study covenant describes exactly what needs to be contemplated in the three cases and the method to be used in contemplating these elements. The covenant describes the elements of each case that was studied. Because multiple case studies were done, the first case study served as a pilot case study. A pilot study analyses a case in less detail than the remaining cases, but surely with greater adaptability and allows for modification to the protocol if gaps or problems are identified.

The outcome of the case studies that were done, presented an artefact in the form of a divestment framework for IT governance. It was decided to use modelling to present the artefact that emerged during this study as the final outcome, based on a number of factors that were considered. These factors included candour, which makes it attainable to comprehend the significance of the modelled theory, adequateness, as models frequently methodically focus on every element of a problem; also abstraction, for the greater the number of alternatives addressed by the mode, the better the accuracy and clarity. Chapter 7 describes and analyses the three case studies that were conducted as well as the final divestment framework for IT governance that resulted from this research study.



Chapter Map 08: Case studies

CHAPTER 7 – CASE STUDIES

CONTENTS: CHAPTER 7

7.1 INTRODUCTION

As a result of the economic downturn the mining industry has experienced a downward spiral in the macro-economic environment that resulted in a decline of and stagnation in the demand for mining products and commodities. The downward trend in the economy has forced mining companies to adopt their strategies accordingly, which culminated in mine closures and divestments in order to maintain competitive advantage and market share, and preserve profitability. Mining companies in South Africa are furthermore exposed to factors such as labour unrest, rising demands by government, an uncertain regulatory environment with the implementation of new laws and regulations to regulate and prescribe to the mining industry, and profit margins that are under pressure as a result of all the aforementioned factors. Company strategy directly relates to a consolidated collection of choices that relates to the company's position and justification.

The South African coal mining industry is a mature industry spanning a number of decades and as a result, a large number of collieries have already closed down and numerous others are approaching end of life and will cease production in the near future. A mine closure or divestment strategy is relevant to a product life cycle approach as it could serve as an option for a deteriorating industry and a convenient approach in *end game* scenarios symbolised by a high level of excitability and unpredictability concerning future returns. Business unit divestment or mine closure results in the disposal of company assets with the intention of shrinking and condensing the company perimeters (Decker & Mellewright, 2007:1).

As discussed in detail in Section 5.3.5, in a case study a specific singleton, agenda, or incident is studied comprehensively for a pre-determined time period. Rowley (2002:16) affirms that case study as a research strategy frequently materialises as a clear alternative for researchers who are pursuing an ordinary humble scope research project grounded on their working environment or the analogy of a defined number of companies. Constructing the case theory entailed that the researcher recognised that the *case* does not only present a *case* per se, but needs to be formulated as a case for study. The researcher is required to gestate what the *bounded system* of the case represents, what the case is comprised of, what exactly is contained and omitted, and what it is a case of (Creswell, 2003:133). In this research study, the research was based on a real-life situation at the researcher's workplace, where the *case* was the company implementing a divestment strategy that led to a decision to close mines and divest from business units. The divestment strategy led to real-life questions, which informed the *bounded system* of the case and

constituted the research of what the essence, content and characteristics of a divestment framework for IT governance should be. When the current research study commenced, the researcher was involved in the IT component of one single coal mine closure within the specific coal mining company. However, as time progressed, the mining company adjusted its strategy to close all the coal mines or business units that were no longer profitable for one reason or another. Up to this point in time the researcher had already been involved in and studied the closure of three different coal mines or business units in the process of planning the closure of a fourth coal mine or business unit within the next 18 months.

A case study may be specifically appropriate for obtaining additional knowledge regarding an unfamiliar or inadequately comprehended situation. Exploratory case studies do not specifically try to examine or employ extant hypotheses but instead spawn a hypothesis from the bottom up, instead of dictating a hypothesis on the case from the top down, where the focal point of attraction is the comprehension of the case itself instead of utilising the case in theory testing (Rule & John, 2015:6). In this instance the researcher discovered that there was a very limited body of knowledge regarding the IT component of a mine closure or business unit divestment and no supporting information available on IT governance and business-IT alignment when a company adopts a divestment strategy. The three case studies thus assisted the researcher to better understand and build a theory on the impact of a mine closure or business unit divestment on IT governance and business-IT alignment and to capture the processes and steps that need to be implemented and followed.

A fundamental investigative procedure applied in the scrutiny of numerous case studies is replication. The essential target of the examination is to determine the overall arrangement of outcomes and the range to which the detected arrangement of volatility matches an anticipated one. The primary focus of the analysis is on the overall pattern of results and the extent to which the observed pattern of variables matches a predicted one (Kohn, 1997:6). The researcher analysed a singular case to determine a comprehensive arrangement of outcomes, which in this instance was represented by the Tshikondeni mine closure. If a pattern was found, it would be investigated in subsequent cases, represented by the Inyanda and Arnot mine closures. Case study examination is generally belligerent, and thus it is crucial that the researcher be impartial in forming arguments and claims. Extrinsic legitimacy indicates the capability to derive outcomes for a universal hypothesis. Extrinsic legitimacy in case study examination is obtained through the replication in multiple cases, as proven in this research study. Multiple case studies cater for

hybrid case examination and contrasting, and the analysis of a specific paradox in diverse settings. The artefact, which resulted from this research, is in the form of a divestment framework for IT governance, an example of an explicit hypothesis representing a common and supposedly ordinary kind of hypothesis. It contains reflections and theories cultivated through the study and can be utilised in other similar mine closures and business unit divestments.

The three case studies discussed in this chapter had a number of similarities and differences. Firstly, all three mines that faced closure were coal mines; two mines were underground mines and one an open cast mine. Tshikondeni mine had an incline underground shaft, whereas Arnot mine had a shaft access underground mine. All three business units were smaller business units in the company portfolio. Both Tshikondeni mine and Inyanda mine faced closure as a result of the depletion of their reserves. Tshikondeni mine was a captive mine whose only client was Mital Steel, whereas Inyanda mine produced high quality export coal. Arnot mine, on the other hand, was also a captive mine producing its coal specifically for Eskom's Arnot power station, which is situated right next to the mine. Arnot faced closure because of its inability to produce coal at a competitive price as after 20 years of mining, the coal reserves were situated at a very deep level of which made it costly to excavate. All the mines employed IT infrastructure, data and software systems according to the prescription of the company's IT standards. Tshikonendi mine was situated very far from its client and coal had to be transported by road. Inyanda mine's coal was transported by rail to the Richards Bay coal terminal for export purposes, and Arnot coal mine's coal was transported via a conveyor belt to Arnot power station.

7.1.1 Aim

The aim of this chapter is to test the proposed divestment framework for IT governance for validity and soundness.

7.1.2 Scope

In order to consider the proposed approach objectively the following case studies are discussed:

- Introduction to the case studies
- Case study 1: Tshikondeni coal mine closure
- Case study 2: Inyanda coal mine closure
- Case study 3: Arnot coal mine closure

7.2 CASE STUDY 1: TSHIKONDENI COAL MINE CLOSURE

7.2.1 Background

Tshikondeni coal mine was an operating business unit of one of the largest Black Economic Empowered mining companies in South Africa. A board decision was taken to close down the mine because of its diminishing coal reserves and growing financial burden. To add to the business unit's predicament, it was situated a great distance from its market and the increasing transport cost of coal attributed to its economic downturn. The business unit management had to embark on the mine closure journey in collaboration with environmental specialists, rehabilitation specialists, mining and minerals act specialists, and IT specialists to adopt the mine closure strategy and to align all the business processes for mine closure accordingly to cater for downscaling and deactivation of operations and plan for post closure activities, such as rehabilitation and relocation of assets and employees.

The business processes when a mining operation approaches the end of its life differ from the business processes when the mine is a fully operational entity. In the pre-closure phase when approaching closure there needs to be a clear transformation from an operational phase to the closure and deactivation and ultimately, the post-closure phase. The pre-closure or decommissioning phase business process entails the decommissioning and disassembling of infrastructure, processes relating to the relocation or auctioning of assets, disarmament of the labour force and the abdication and cancellation of agreements. It also includes appropriate perseverance in the monitoring and reporting on the post-decommissioning status, rehabilitation and community aspects. Other mine closure-related processes and actions that commence during the pre-closure phase of a mine closure include addressing the legal obligations and commitments, collecting the relevant data for analysis, consulting with all the relevant internal and external stakeholders and identifying and managing any closure-related issues that might emerge (Chapter 1)).

As explained in Chapter 1, Information Technology (IT) fulfils an important function in achieving company divestment. The extensive adoption and alignment of the IT environment is a critical consideration for the company. A pre-closure evaluation will support comprehension of inevitable limitations or data-related problems that could influence or imperil a successful divestment. The core business and support services departments all need to cooperate with the IT department

and take part in the disentanglement of the business unit. The IT department must ensure that processes, policies and procedures are implemented to enforce information life cycle management and to support an unambiguous archiving solution. Retention rules, software systems and IT infrastructure decommissioning and retirement should be addressed in the relevant policies and procedures.

As discussed in Chapter 4, there are five major focus areas that make up IT governance. These focus areas include strategic alignment, value delivery, resource management, risk management and performance measures. A need, however, exists to specify and identify factors that impact each IT governance rollout and that is not included in any existing framework other than the supply of a collection of guidelines without any indication of how to apply these guidelines in a company-specific context. Compared to a game of rugby or soccer, IT governance represents the rules of the game, IT strategy represents the specific playing field or the lines between which the game takes place, and IT management represents the game itself that needs to be played by following the rules relevant to the game within the outlines of the playing field.

Additionally, a number of eminently influential frameworks available have been identified in written matter as having inadequate hypothetical authority from a scientific perspective *(*See Chapter 4*).* While recognising that the governance scheme and structure incorporates the management system, and comprehending that both governance and management schemas embroil people, process, structure and technology, it should be understandable that entrenched frameworks need to be in a position to support and guide the formulation of reciprocal systems. A great number of companies have mistaken governance for the management and agency of IT. The rationale behind this misconception was the partially diluted frontiers between these two.

As discussed in Chapter 4, the existing IT governance frameworks were investigated for their potential to serve as or to be adopted to serve as a divestment or mine closure framework. The author of this thesis came to the conclusion that not one of the most relevant and well known IT governance frameworks and standards meets the requirements of a divestment framework for IT governance for mine closure and that no academic literature pertaining to the IT component of mine closure specific, or IT divestment in general, exists. A decision was taken to develop a divestment framework for IT governance to map and plan for the downscaling or discontinuation of IT software systems, data and infrastructure to assist with and guide the discontinuation and downscaling of the IT component during the Tshikondeni mine closure.

The divestment framework for IT governance (See Figure 5.1) that evolved and is described in Chapter 5, was developed with the Tshikondeni mine closure in mind. The first step in the process was to determine the structure that was needed to form the foundation of the framework.

7.2.2 Findings

The planning for the Tshikondeni mine closure started about three years before the actual closure commenced. The IT department was never invited to be involved in the planning process and could thus not declare that the closure project plan included the IT components or that the IT strategy could be aligned with the business strategy that changed to a divestment strategy. IT was not viewed as a strategic business asset; neither was it managed as part of the company portfolio (See Section 3.2.5). Business did not recognise that IT should be an essential part of the corporate planning and strategy and could play an active role in the transformation and innovation of the business, even when a divestment or mine closure strategy was implemented. All the factors that would affect alignment when the company implemented a divestment strategy, as described in Chapter 3, came into play. Management failed to understand the importance of IT management's presence and collaboration in both the planning and execution of the company's business unit divestment and mine closure efforts.

In this mine closure the IT department was invited to be involved only when execution of the mine closure commenced. This led to a very low level of business-IT alignment and unsatisfactory communication between business and IT. The IT department was struggling to catch up with mine closure processes. The IT governance model was adopted to support a divestment or mine closure strategy while the mine closure process was already in progress. The IT department struggled to keep up and did not have sufficient time for proper planning or to define the roles and responsibilities necessary to manage the IT de-integration efforts effectively. Because sufficient time was not spent on planning the IT mine closure strategy and process, the post-divestment state was not properly defined or documented. As a result of the end state not being properly defined, no provisioning was made for interim service arrangements for the care and maintenance and rehabilitation phases. The result was that plans and support for the end state had to be optimised and revised when the mine closure had been completed and the mine had already started with the care and maintenance and rehabilitation process.

The divestment framework for IT governance that was developed to guide and support the mine closure process had to be revisited and revised to include business-IT alignment as a critically important component of the structure that supported a successful and effective divestment framework. Furthermore, the early involvement of the IT department and plans for interim service arrangements were omitted from the framework procedures and early definition of the post-divestment or mine closure state needed to be included in the steps of the framework execution. It became apparent that the Inyanda mine closure was imminent even before the final closure of Tshikondeni mine and the IT department could now insist to be become part of the closure planning process; it had the opportunity to ensure much better collaboration and business-IT alignment from the very beginning. The IT department furthermore had the opportunity to implement and test the workability and applicability of the first version of the divestment framework for IT governance and identify some areas that were omitted or needed for the optimisation of the divestment framework for guidance during the Inyanda mine closure process.

7.3 CASE STUDY 2: INYANDA COAL MINE CLOSURE

7.3.1 Background

The Inyanda mine closure was announced before the final completion of the Tshikondeni coal mine closure, and was to some extent a surprise for the coal mining community. The original divestment strategy adopted indicated the closure of Tshikondeni mine only because of the depletion of its coal reserve and the fact that it would have been too expensive to move the coal mining operation to an alternative coal reserve that was in relative close proximity. Although the original Inyanda mine coal reserve was also nearing depletion, another rich coal reserve was available close by. Unfortunately negotiations with the community to obtain mining rights failed and the decision was taken to extend the divestment strategy to include Inyanda coal mine. The IT department and business learned many lessons relating to how business and IT should align, how important it was to involve the IT department from the onset of the closure planning phase and to utilise the relevant IT resources from the very beginning. These lessons that were learnt during the Tshikondeni mine closure resulted in the original divestment framework for IT governance on which the Tshkondeni mine closure was based being revisited and updated to present a more complete divestment and mine closure framework to guide the IT component of the Inyanda mine closure.

The experience and forced collaboration between business and IT departments during the Tshikondeni closure led to a much better understanding and appreciation of the scope and extent of a mine closure or business unit divestment process by both business and IT. Business came to realise that although they had previously in essence focused on the environmental processes, people and asset relocation and mine rehabilitation only, that IT should be viewed as an important strategic business asset and although the company was in a process to implement a divestment strategy, IT continuously needed to be managed as a portfolio (See Section 3.2.1). Changes that were made to the original divestment and mine closure framework to optimise it for providing support and guidance during the Inyanda mine closure added the business-IT alignment building block to the structure for the framework, incorporating early IT involvement and interim service arrangements and early definition of the post-divestment state to the framework implementation steps.

7.3.2 Business-IT alignment

As described in Section 3.3, business alignment is in essence surmised on proactivity. An absence of lucidity regarding licensing rules has the potential to inhibit progress and could lead to reactive behaviour. The IT strategy needs to remain resilient in spite of the existence of a number of disruptive forces, which is introduced by agile business preferences and policy (Koop, 2014:7). Continuously changing business structures varying from business unit divestitures to mine closures suffices to convolute software license and IT infrastructure asset management and are in many instances instituted without the involvement of IT. When conceiving business strategy, IT and business need augmented intuitiveness and awareness to acknowledge the challenge of directing an ever-changing IT ambience. Technology lacks perpetually in an agile business environment. The interdependent nature of business and technology necessitates a more ardent approach towards governing IT software and infrastructure assets available.

Alignment entails the conversions of IT strategy in governance approaches, software and infrastructure in the frame of reference of groundwork, origination and operations. IT strategy quantifies the reference of groundwork and the conversion of strategic IT goals into IT governance constitution and IT approaches by adapting them to the business. IT must be plausible and methodical, but be pertinent when deliberating its strategic prospects. In this frame of reference IT strategy can be interpreted as the action plan to achieve goals. Business strategy will be incorporated within the IT strategy as demand. The interrelatedness of business and IT is formed

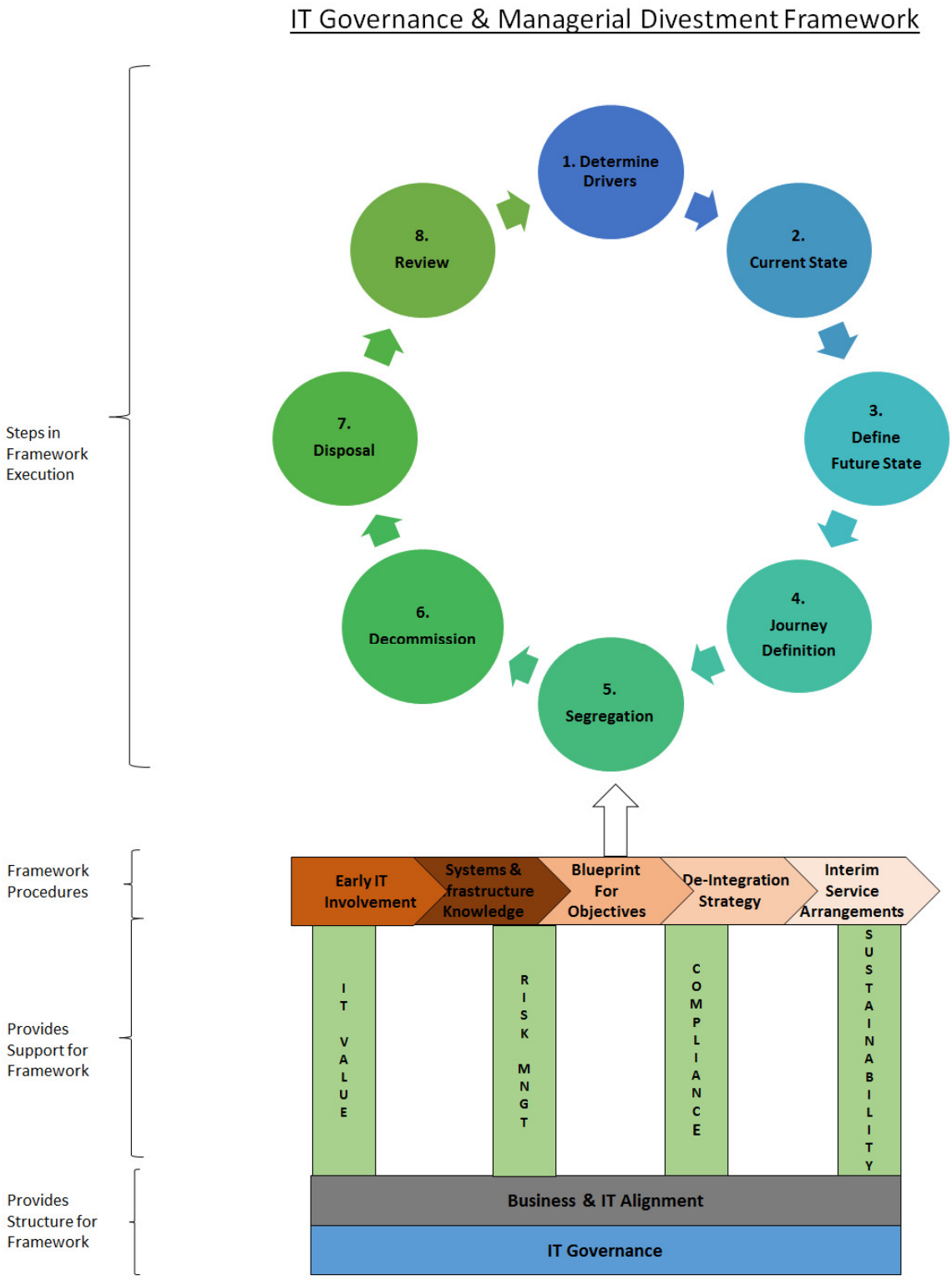
through the formulation and implementation of IT strategy in a way that guides and structures the achievements of IT management to focus categorically on the company success. The conception of an IT strategy is instrumental for the definition of the abstraction, context and the approach to how strategic IT goals are transmitted and accomplished in strategic enterprises. Priceless deliberations for contriving IT strategy within current value chains, treasured operator standards or business process strategies. IT strategy can be defined as the link between crucial IT goals and crucial IT enterprises. IT strategy formulates and shapes IT enterprises and through this, also considers their implementation.

Business unit divestment belongs to the most disturbing and troublesome situations companies – and specifically IT departments – could encounter. Ultimately the brunt of these situations on the IT alignment of the affected business units is predominantly uncharted. IT-related countenance is challenging to establish because of the interconnected information systems, an absence of IT governance, dynamic strategic spheres and the failure to perpetuate competencies. Within a divestment project, the IT component – referred to as *IT divestment* – is usually challenging, which leads to either the business unit divestment or mine closure object and the main company being exposed to great uncertainty and a stressful situation. Segregation of the IT environment is the major technical concern with crucial ramifications for business unit divestment or mine closure expenditure and a favourable outcome.

Divestment or closure convergence raises a number of concerns, such as transferring systems and data, adjudicating contracts with vendors and assuring the intellectual equity of the concerned individuals. The reasons for administering a divestment or closure are commonly grouped into three areas: strategic focus, poor financial results, and shortage of capital. The aspirations and intentions of IT divestment projects consist of agility, expenditure, risk belittlement and bolstering the competitive superiority conditional to the IT landscape. According to Bòhm *et al.* (2010:3) the topmost success elements for IT divestment or mine closure are adequate and frequent communication and the early involvement of IT, starting already with the measure of prudence and continuing with contract negotiations and divestment planning. One of the prevailing aberrations detected in a business unit divestment or mine closure transaction is the omission of the IT department. Even worse is not involving the IT department at the commencement of the planning phase of the divestment process or not augmenting IT to the appropriate level within the company.

7.3.3 Divestment framework

With specific focus on business unit divestment or mine closure, it is speculated that a schema can be copied from previous failings and favourable outcomes, which can be developed as a managerial and governance framework in terms of supporting the IT component related to business unit divestment or mine closure. In an attempt to administer benefit to the business, an IT governance foundation needs to have appropriate organisational frameworks, IT processes and evaluations. The frameworks need to be relevant to business unit divestment or mine closure. There is no point in striving to accomplish more than what is precisely needed to accomplish the company's business unit divestment or mine closure objectives. IT governance represents the architectures, and the operational and comparative mechanisms that facilitate business and IT alignment. Figure 7.1 illustrates the final proposed version of the divestment framework for IT governance.



. Figure 7.1: Final Version: Divestment Framework for IT Governance

7.3.4 Pivotal pre-divestment IT procedures

7.3.4.1 EARLY IT INVOLVEMENT

IT is usually included at a late stage in the process to determine risks, but with little comprehension of the synergy case or what cost preservation the transaction should liberate. IT, jointly with all the other work streams, needs comprehension of the divestment justification, the covet collaborations and synergies and the major challenges. Engaging IT managers from the outset is one of the best ways to guarantee that duration and expense projections are prudent. Adequate allotment should be given to the IT team to ensure their comprehension of the end-to-end process and to determine probable hurdles. Engaging IT managers during the initial phases will provide for more conclusive goals and could further contribute to speeding up the process and avert value destruction from the beginning (See Section 3.4).

7.3.4.2 INTERIM SERVICE ARRANGEMENTS

The stability and durability of business is crucial and therefore identifying the necessary IT services and levels of support desired post-divestment or post-mine closure is indispensable for the preparation and arbitration of service level agreements with service providers. A divestiture or mine closure necessitates chiselling out or de-integrating the complete technology portfolio – applications, data, infrastructure, and mechanisms for the divested business unit. Every approach to divestiture or mine closure has a relevance to the method to be endorsed for chiselling out the IT infrastructure environment. It is crucial to comprehend the fundamental architectural components that are obligated to be taken into account for an IT untangling index. The index should allow for all the fundamental components of IT infrastructure as described by each particular company. Every fundamental IT infrastructure component needs to be considered during each stage of the divestiture or mine closure process. Comprehending and evaluating the present set of inventory of every infrastructure aspect will be necessary in the measure of the prudence phase to predict the size and dissemination of the IT infrastructure environment. This will ensure the comprehension of the current level of infrastructure assimilation amidst the divesting body and the body to be divested or closed (See Section 4.3.1).

7.3.5 Execution steps in the IT Divestment process

7.3.5.1 DEFINE THE POST-DIVESTMENT STATE

Efficient IT and business cooperation is essential amidst a business unit divestment or mine closure (See Section 3.3). Just as the impending business model motivates the IT configuration post-divestment or mine closure (See Section 3.3.1.2), the IT untangling approach and momentum will support business survival and effectiveness during the divestment or mine closure phase and further – therefore business should be participating in crucial IT decisions (See Section 3.4). It encompasses managing the calculation and determination of software and data to be de-integrated, and establishes IT constraints and their impact on functional areas. Irrespective of the final business model, IT untangling needs to be comprehensible and transparent. Explicit goals and objectives need to be established at the commencement of the divestment or mine closure. These goals and objectives may be altered or modified; however, it is essential to operate on transparent and collectively agreed expectations continuously (See Section 3.3.1.4). Being contingent on the level of amalgamation and the all-inclusive dis-entanglement objectives, IT untangling configuration might fluctuate from a small change to establishing an ameliorated stand-alone IT configuration for the proposed divested business unit or mine.

IT untangling projects are continuously subjected to consultation and arbitration. A covenant in which unforeseen expenditure and profit advantages are shared could enhance cooperation and partnership. Nevertheless, with transparent communication and intimate cooperation juridical proneness could be uncovered and deferred and service delivery contracts could be adapted when additional information becomes apparent regarding system reliance and sensible achievement dates.

Properly devised intermediate service level contracts could be an efficient instrument for managing the post-closure stage of a divestiture or mine closure when software and information need to be accessible to the divestment or closure object, without it being palpably de-integrated from the main company's IT environment (See Section 4.3.1). Nevertheless, unsatisfactorily conceived transitional service level contracts could introduce expenses and security risks. The abetment of recognition and understanding of business dependencies on IT by the board is crucial for the advantageous outcome of a divestment or closure strategy. It is indispensable for IT management frequently to take part in strategic decision-making to reduce the risk of being omitted.

The company CIO, who is usually a member of the team tasked to make the strategic company decisions is less at risk of not being included when divestiture decisions are made. IT management needs to be included in divestment or closure teams to guarantee that IT-related information forms part of the measure of prudence and following arbitration. As a result, the tangible and intangible expenditure could become considerable and diminish the advantages of the divestment or closure.

7.3.6 Findings

As a direct result of the early involvement of the IT department and exceptional business-IT alignment, the de-integration of Inyanda mine's IT component during the divestment and mine closure process was executed with very few problems. The early definition of the post-divestment state ensured that interim service arrangements for the IT support of the mine during care and maintenance and rehabilitation could be negotiated and implemented before the final closure of the mine. The importance of structural business-IT alignment and functional integration (see section 3.3.1) was clearly established during the Inyanda mine closure process. Functional integration plays an intricate role during the alignment of the external and internal business domains and deciding on the information technology scope, IT architecture and IT processes when implementing a divestment framework for IT governance. It was also clearly established that although the divestment framework for IT governance was an excellent tool and guideline to assist the IT department during the mine closure or business unit divestment strategy implementation, that there was no *one-size-fits-all* IT governance model. Although there are 90 % similarities in the IT component of mine closure or business unit divestment, there will always be the 10 % mine or business unit specific component that the IT department will need to make provision and cater for during the demerging and dis-entanglement process when a mine closes or a business unit is divested.

Environmental uncertainty (See Section 3.4.1.1) specifically played a preeminent role during the Inyanda mine closure. The external factor that impacted most was the unwillingness of the community to collaborate with company management to negotiate the most beneficial divestment deal to support the community in the long-term. The company received an offer to purchase this mine because of its strategically situated railway siding approximately one year after the mine was finally closed. As such the care and maintenance and rehabilitation of this mine is no longer the responsibility of the company.

7.4 CASE STUDY 3: ARNOT COAL MINE CLOSURE

7.4.1 Background

In 2015 Eskom announced that they would not be interested in renewing the contract with Arnot coal mine to provide power station coal to their Arnot power station. This mine was a captive mine, which meant that their sole purpose of existence was to provide power station coal to the Arnot power station. The political impact (See Section 2.4.1) played a significant role in Eskom's decision not to obtain the coal for the Arnot power station from the Arnot mine. The justification provided by Eskom was that the coal provided to the power station was too expensive. Eskom was of the opinion that they could procure the coal needed for their Arnot power station from other coal mines situated close to the Arnot power station. The threat of substitute products (See Section 2.3.1.5), in this instance coal from a neighbouring, government-owned coal mine, sealed the faith of Arnot coal mine. The final decision to divest and close this mine was taken at the end of 2015. The IT department was now already involved in two previous mine closures and the optimised and adopted divestment framework for IT governance proved to be the key to the successful execution of the IT component of the Arnot mine closure.

7.4.2 Mine closure execution

As a result of the IT departments' involvement in the execution of the IT component of the previous two mine closures, and the development and refinement of the divestment framework for IT governance that was the resultant artefact of this research study (See Section 7.3.3), the process of demerging and disentanglement of the IT component during a mine closure or business unit divestment process became less arduous. By this time t IT department had come to comprehend the specific business processes to be followed when a coal mine is closed or a business unit is divested.

The first step was to determine the drivers and change agents for this specific mine closure (See Section 2.2). Following this step, the future state was defined as the obvious next step in the process as the imminent business model stimulated the IT configuration post-divestment or mine closure and the IT untangling method and impetus would bolster the continuation and effectiveness of the business during the divestment or mine closure phase. The next step of the disentanglement of the IT component during the Arnot mine closure was for the IT department to

establish that the IT governance structure (See Section 5.2.1) that evolved to support mine closures and business unit divestments was still applicable and to confirm the presence of acceptable business-IT alignment practices (See Section 7.3.2) to ensure that the foundation needed to commence with the disentanglement of the IT component existed and was present.

The IT department now commenced with verification that the support structure for the mine closure existed. The support structure included the determination of the present and future IT value (See Section 5.3.1), the implementation of a risk management strategy (See Section 5.3.2) specific to the Arnot mine closure and confirmed the availability and conformity to compliance requirements (See Section 5.3.3). Lastly IT sustainability (See Section 5.3.4) was taken into consideration with specific focus on the evolution of closure indexes, assimilation of this specific closure composition, evolution of assessment norms, the assessment of every alternate composition and the endorsement of the chosen composition.

The consequent expedient was the confirmation of the framework procedures (See Section 5.4.1) for the support of the actual mine closure execution steps. The IT department ensured their comprehension of the Arnot mine specific systems and infrastructure, that the blueprint for IT objectives existed and that the de-integration strategy had been signed off by business, and that interim service arrangements had been planned and implemented. The IT department was now ready to commence with the actual execution of the IT divestment process.

The execution of the divestment process started off with the determination of the prevailing change agents and outlining the risks associated with the execution steps (See Section 5.5.1). It is essential that the IT department identify every prevailing risk and understand how each risk could potentially impact the IT divestment component of the closure, but also what the potential impact on the business could be (See Section 5.5.2). Following the risk identification process, the IT department did an audit to determine and document the current state of the Arnot mine IT systems, IT infrastructure and all data relevant to the closure process. It was only after the completion of both the risk assessment and the due-diligence audit that planning for the future state could commence.

The journey to the disentanglement of the IT component specific to the Arnot mine was carefully mapped, taking all the crucial factors such as sustainability, compliance, tangible and intangible risks and the desired future state into consideration (See Section 5.5.3). This step was pivotal for

the determination of contemporary and probable subsequent requirements for the mine post-closure and before the actual decommissioning process could commence. The IT department compiled a well-defined work breakdown structure, outlining roles and responsibilities and circumscribing a deliberate systematic method for the disentanglement process. The subsequent phase of the divestment framework for IT governance consummation was the enforcement of segregation and differentiating between logical and physical segregation and establishing the optimal approach to follow (See Section 5.5.4). The decommissioning process started in parallel with the physical segregation of the IT infrastructure. Decommissioning is the concluding action in the divestment framework for IT governance. It ensures the decommissioning of all relevant software systems and infrastructure and is in essence a change process that depends on an array of capabilities and expertise related to the intricacy of the change process (See Section 5.5.5).

The very first step in the execution of the decommissioning process is the compilation of a comprehensive decommissioning plan to determine and describe all the variables and the interconnectedness of the different variables regarding the configuration of the existing IT landscape (See Section 5.5.5.1). The IT department then started consulting with all the relevant interested and affected parties to investigate and compile a matrix, to enhance their comprehension of the interconnections and interdependencies of the different components of the IT landscape. The IT department also set out to understand the concerns and sentiments of all the interested and affected parties. All the intelligence that was gathered during the intelligence phase was applied to shape the foundation of the new proposed post-divestment IT landscape. The next crucial step in the decommissioning process was the compilation of communication regarding the actual retirement of software and infrastructure from active duty. The communication included the justification and motivation for discontinuation, the transition plan, the proposed time frame in which the decommissioning would be implemented as well as systems and infrastructure downtime that might occur as a result of the retirement process. Data was indexed and archived and an inventory of all the archived records was compiled for later reference purposes.

The IT department then determined the media sanitation process that was applicable to the IT environment of Arnot mine. Delicacy and preservation classification of all retained data was undertaken, suitable sanitation procedures for each category and media were executed and a validation of the outcome of the sanitation process was done. The very last step in the decommissioning process was auditing and identifying all the service level agreements that were

impacted by the mine closure process and then compiling a resolution framework to indicate which IT services would need to form part of the support portfolio during the scaling down period and which would form part of the post-mine closure support portfolio. Suitable guidelines for the disposal of absolute infrastructure were compiled and included in the ICT disposal procedure. The guidelines were categorised to include equipment that had reached the end of their useful life, equipment that could potentially be redeployed, and equipment that could be donated to schools or the community (See Section 5.5.6). The very last step in the divestment framework for IT governance for business unit divestment or mine closure was to review the outcome after implementing the framework to determine if the business unit divestment or mine closure IT goals and objectives had been successfully reached (See Section 5.5.7).

7.4.3 Findings

The Arnot mine closure was the third mine closure in which the author of this thesis was involved. Although the mine closure was similar to the Tshikondeni and Inyanda mine closures, it still presented the 10 % mine closure specific challenges that were not encountered during the Tshikondeni and Inyanda closures. This again emphasised the significance of business-IT alignment maturity and highlighted the journey that the business and IT department travelled to evolve the business-IT alignment level of maturity from an ad-hoc process during the Tshikondeni mine closure to a well-established coinciding process where the alignment emerged in a partnership in which IT and other business departments had attuned and formed their strategies in collusion.

As with all proposed changes, software and infrastructure decommissioning was not embraced by the business. After the IT department had come to the realisation that they needed a deliberate, logical, systematic constituent approach they were in a position to identify the software and infrastructure that had the highest impact on business processes and defined a step-by-step decommissioning approach to minimise the impact on the business during the IT divestment process (See Section 5.5.5.1). The IT department came to understand that their proposed decommissioning plan would be challenged to the extreme if all the stakeholders did not experience the IT department's approach as open and transparent.

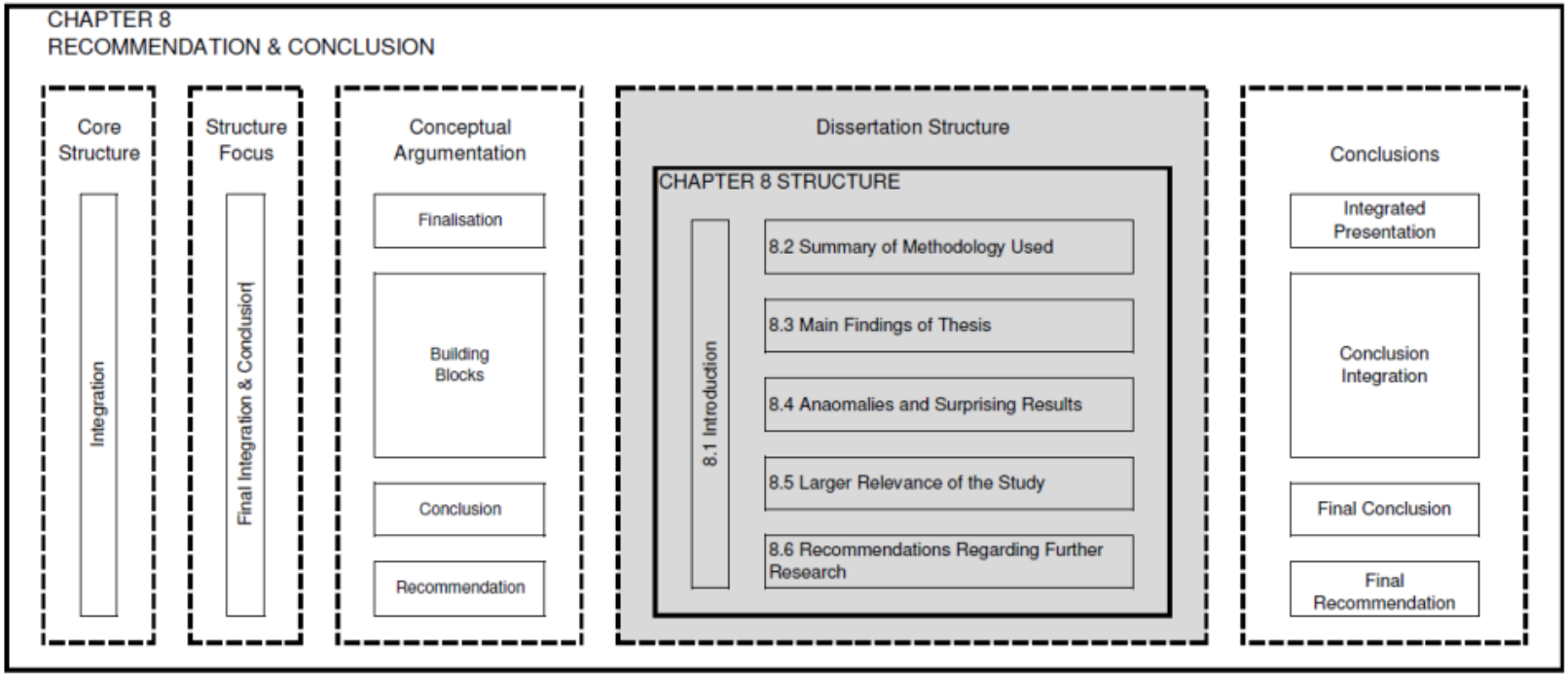
7.5 SUMMARY

By applying the final version of the divestment framework for IT governance, which was influenced by best practices, suitable governance processes and prescribed a holistic approach and direction

to perform efficiently and effectively as the instrument to ensure business-IT alignment and the management of the IT component when a divestment strategy is implemented. A divestment framework is fundamentally a decision support model or governance framework based on the characteristics of a mine closure or business unit divestment process. A divestment framework for IT governance outlines and represents the variables that influence the untangling decisions and the relationships between them.

The final version of the divestment framework for IT governance evolved to become an exact fit for this specific mining company's operational model and provided the IT department with advantages, such as the facilitation of the identification of business opportunities, risks, benefits and impacts. It guided the IT department in the establishment of new and the adoption of old standards, policies and procedures for mine closure and business unit divestment and affirmed monotonous metamorphosis with regard to all the aspects covered during a mine closure or business unit divestment.

In order to reach the objective of this chapter, the three case studies pertaining to this thesis were discussed in detail to explain the process that was followed, firstly to create and implement a divestment framework for IT governance during the closure of Tshikondeni coal mine, and secondly to refine the divestment framework at the hand of the lessons that were learnt during the Tshikondeni coal mine closure to improve and optimise the divestment framework. The new optimised framework was then deployed as the guideline for the Inyanda coal mine closure and again deployed and executed during the Arnot coal mine closure. Both the Inyanda and Arnot mine closures IT component divestments were successfully executed and all the necessary support structures put in place to support the mine while in care and maintenance and during the rehabilitation process.



Chapter Map 09: Conclusion and recommendations

CHAPTER 8 – RECOMMENDATION AND CONCLUSION

Contents

8.1 INTRODUCTION

Information technology has a crucial role to play in carrying out business unit divestment or mine closure. The overall alteration and alignment of the IT landscape is a fundamental consideration of the business. As a result of the analogous and convolutedness of IT systems and infrastructure

with the overarching business processes of the business unit, a divestment enterprise should incorporate the framework to disentangle the IT infrastructure and IT portfolio from the remainder of the company. IT management needs to be in a position to establish the intricacies and affiliations between business and IT processes and has an explicit agenda for the disentanglement of the IT systems and infrastructure when a divestment strategy is implemented.

To enable the effective implementation of a divestment framework within a company in general, or more specifically with a mining company, an appropriate and utilitarian set of rules and guidelines (ontology or taxonomy) is necessary to assist in the implementation of a divestment framework for divestment framework for IT governance. One needs to identify and define fundamental divestment framework building blocks that can be applied within companies to assist in the implementation and application of a divestment framework. These building blocks would assist in sharing similar codification schemes and constructs representing a divestment framework for IT governance and its content. It has been suggested that ontologies or taxonomies can be applied in the development of a scheme for implementing a divestment framework for IT governance. However, this will need a high level of specialised knowledge and skills, focusing on technology, tools, utilities or mechanisms assigned to a divestment framework for IT governance.

The aim of this study is to develop a divestment framework for IT governance to serve as a guideline to enable and support companies in general, but more specifically mining companies, to address the IT component of business unit divestment or mine closure effectively and efficiently. In order to address this aim, the essence, content and characteristics of a divestment framework for IT governance may be defined within the scope and context, referencing and describing the components of a divestment framework. By combining the theoretical expectations of a divestment framework (the academic perspective) with the practical application that satisfies the components of a divestment framework in practice (practitioners' perspective), this thesis focuses on identifying generic high-level building blocks relating directly to a divestment framework for IT governance as applied in practice by companies and mining houses with a divestment strategy.

The findings of the research are presented in this concluding chapter. Unequivocal affiliations and final conclusions are presented (Chapter Map 8: Recommendations and Conclusions).

8.1.1 Aim

The aim of this chapter is to conclude the study, summarise final results and present recommendations for future research.

8.1.2 Scope

In order to achieve this am, results had to be reviewed based on the following core concepts:

- Summary of methodology used
- Main findings of thesis
- Anomalies and surprising results
- Relevance of the study

8.2 SUMMARY OF METHODOLOGY USED

Methodological contemplation relates to the measure the research approach affected the outcomes of this thesis. The thesis pursued a systematic design. The research design implemented a design science research strategy. Each constituent of the thesis is in alignment with each other, guaranteeing the deliverables and results of the research substantiate the initial research objectives and research questions. The design of the divestment framework for IT governance adopted the fundamental cycle of problem consciousness and impetus, conjectural design proposal, design artefact evolution, design artefact manifestation (See Chapter 5) and assessment (See Chapter 7), and finally the communication and conclusion. The artefact evolvement pursued two internal evolvement cycles, where the first cycle enveloped the original development of the artefact (See Case study 1), and the second cycle the refinement of the artefact (See Case study 2) as well as pursuing a specific and appropriate research technique.

In chapter 1, 2, 3 and 4 the author reviewed and analysed literature in order to comprehend and explicate theory relevant to the background on the South African mining industry, company strategy, business-IT alignment and IT governance and standards. Literature through contention and discussion, provided insight into the abovementioned topics and the role they could play during business unit divestment and mine closure. Thus, the literature assisted in highlighting the following:

- Mining companies in South Africa offer a substantial contribution to the overall economic prosperity of the country through the generation of foreign exchange, job creation and social upliftment. The descending trend in the economy forced mining companies to adapt their strategies accordingly, which culminated in mine closures and divestments in order

to maintain their competitive advantage and market share and preserve profitability (See Section 1.8).

- Business unit divestment or mine closure is an instrument of strategy and will necessitate the adoption of the company strategy. The business success of a divestiture or mine closure is usually evaluated by the measure of success in achieving the underlying strategic goal that was set when the divestment strategy was adopted. Strategy decisions need to embody a sound governance foundation (See Section 2.4).
- IT governance is a deduction of, and supplementary to Corporate Governance; the purpose of IT governance is to provide direction and oversight for IT within a company and is described as an important building block in business-IT alignment. When deciding on and implementing an IT governance model, it is imperative to realise that no *one-size-fits-all* IT governance model will maximise business-IT alignment efforts (See Section 3.5).
- Business-IT alignment originates from the school of business strategy where the degree of alignment of internal and external departments and the external environment is an important indication of the value the company harvests from the execution of its strategy. Strategic alignment of business and IT encompasses a relationship between the business strategy and the IT portfolio and consists of two building blocks, namely strategic fit and functional integration. Despite all the alignment levels and alignment approaches advocated in literature, strategic alignment is still a hard-to-achieve concept in most companies (See Section 3.3).
- When looking at IT governance in theory, a number of aspects are identified that in essence could influence the deployment and maintenance of IT governance; it is essential that companies should realise that IT needs to be governed through guardianship and combined efforts rather than by deceiving controls. A number of IT governance frameworks are available and postulate an IT governance model that consists of numerous definitions and foundations. These frameworks have a diverse variety of strengths and weaknesses and include imbricates (See Section 4.4).

In chapter 6 the author states a case for and indicates an approach for the modelling of an artefact (See Section 6.3.4) in the form of a divestment framework for IT governance through the application of design science research. Design science research (See Section 6.3.2) was selected for this research project after examining and contemplating the ontology, epistemology and methodology and reviewing design theory as theoretical underpinning. Design science focuses on the creation of artefacts (See Section 6.3.2.5) and investigates what the results should be to

guarantee the accomplishment of the original objectives. The purpose of design science research is to modify real situations into desired and sanctioned situations; artefacts are characterised by consistency and uniqueness. This signifies that an artefact will resolve a conspicuous complication in an exceptional way.

Exploratory case studies (See Section 6.3.5) were selected as no methodical methodology was needed. The author simply considered the cases to detect what could be disclosed by them. The case studies described precisely what needed to be considered in the three case studies and which method was to be used in considering these factors. As a result of the fact that multiple case studies were done, the initial case study served as a pilot case study. The results of these case studies provided an artefact in the form of a divestment framework for IT governance. It was decided to use modelling to present the artefact that emerged during this study as the final outcome of this.

This segment solicits to manifest that this research accomplished, at least to some degree, proficient research that contrived some augmentation (theoretical, methodological and practical) to the field of Informatics. The subsequent prospectus and conclusions are made with an association to the larger pertinence of the study presented in this thesis.

8.3 MAIN FINDINGS OF THESIS

Chapter 1 contains the background information and the problem statement of this thesis, explains the purpose of the study, assumptions that were made and the limitations of the study. The chapter identifies and clarifies the research questions addressed and gives a brief overview of all the chapters. It provides the reader with an overview of the mining industry in South Africa and describes the impact of mine closure on the South African economy. Chapter 1 focuses on the following objective:

Objective 1: The essence, content and characteristics of a divestment framework for IT governance

The objective highlights the essential theoretical foundation of a divestment or mine closure process and investigates existing IT theories. It provides an understanding of the fundamental ontological constructs of a divestment or mine closure process and identifies crucial properties, criteria and guidelines contained in existing frameworks.

Chapter 2 is the first literature review chapter to provide theory for the scope of this research. It creates an understanding of the South African mining environment, more specifically the coal mining industry. Section 2.2 discusses the role of PESTEL in a divestment or mine closure strategy and describes the relevant forces that impact the macro economy of the coal mining industry. Section 2.3 investigates the role of competitive forces in shaping company strategy through the five competitive forces identified by Porter. Chapter 2 concludes that is of great importance for a company to determine its position in the industry it operates in. Knowledge of the essential forces of competitive advantage provides the environment for a strategic agenda for engagement. Strategy formulation, however, originates from the company's internal environment with variables such as the vision, mission, goals and objectives and all internal departments need to be aligned with the company's strategy and goals and constantly focus their actions on obtaining the company goals. Chapter 2 focuses on the following objective:

Objective 2: Create an understanding of the South African mining environment

The objective depicts and describes the impact of the macro and market environment in strategy formulation to be aligned with a divestment or mine closure decision.

The aim of Chapter 3 is to provide insight into the role of IT governance in strategic alignment of business and IT and the importance of the alignment of internal departments, but more specifically the IT department, with the company's business strategy, even if it is a divestment strategy, to support and ensure the achievement of the company's goals and objectives. Section 3.2 describes the role of IT governance in strategic alignment of business and IT with specific reference to Kearney's (2008:2) *"7 habits of highly effective IT governance".* Business-IT

alignment is discussed in Section 3.3 with specific reference to the business-IT alignment levels describing intellectual, strategic, structural, tactical and operational alignment. This section discusses different alignment approaches, such as the content-based stream consisting of the market-based and resource based view. It furthermore discusses the process-based stream that focuses on strategy-as-practice and strategy-as-process. Lastly this section investigates business-IT alignment maturity.

Business-IT alignment maturity is classified on three levels where alignment with business goals represents the first level, IT capabilities alignment with the external environment of the business represents the second level and the third level represents a proactive approach towards new technology trends and the competitive landscape. Section 3.4 investigates the impact of a divestment or mine closure strategy on the IT governance model and strategic alignment and discusses the factors affecting alignment when implementing a divestment strategy. These factors include environmental uncertainty, connection between business and IT planning, IT's understanding of business, organisational transformation and IT management sophistication. Chapter 3 concludes that a definite link exists between the IT strategy and business strategy alignment when a divestment strategy is implemented and that business and IT ought to be compelled to function and strategise in unity or be abate and crippled by their dissidence. Chapter 4 focuses on the following objective:

Objective 3: Establish the impact of a divestment strategy on the IT governance model and IT-business alignment

The objective determines the process that IT and business should follow to ensure alignment in order to support a divestment strategy.

Chapter 4 Investigates and discusses existing IT governance frameworks and standards to try and establish if any of the existing available frameworks or standards could be adopted or implemented to serve as a divestment framework. Companies will reap the benefit when emulating a canonical IT governance framework. An array of canonical IT governance frameworks

and divergent evaluation mechanisms for the evaluation of IT's significance and attainment has emerged. A number of intermediaries evolved into protocols, others into mechanisms or best practices (Spafford, 2003:1). The theory of IT governance is discussed in Section 4.2. A number of factors have been identified as having the potential to impact the implementation and maintenance of IT governance within a specific company. It is vital for companies to realise that IT governance should be governed though superintendence and joint effort rather than by the deception of controls (McGinnis *et al.*, 2004:7). IT governance is made up of six aspects and a number of elements that are deployed to bolster it and that are discussed as part of Section 4.2. Existing IT governance frameworks and standards such as ITIL, CoBIT, TOGAF, a number of ISOs and King III contents and applicability are investigated and discussed in Section 4.3. After investigating the most relevant and well known IT governance frameworks and standards, it became clear that not one of the existing frameworks or standards investigated meets the requirements of a divestment framework for IT governance. To achieve the aforementioned objective, Chapter 4 focuses on the following:

Objective 4: Delineate existing IT governance frameworks and standards
Determine if any existing IT frameworks could be implemented or adopted to serve as a divestment framework for IT governance.

Chapter 5 focuses on determining the contents and logical steps that need to be followed to define and create a divestment framework for IT governance by following the methodology of creating an artefact as described in Chapter 6. Parao (2002:19) describes two more potential outputs from design research, namely *"operational principles (reproducing knowledge) that the artefact illustrates"* and *"a metaphoric understanding of how the artefact supports or controls the phenomena of interest (emerging theory)".* Keuchler and Vaishnavie (2008:11) identified a number of non-artefact research outputs that constitute a construct of knowledge or information not encapsulated in an artefactual form but existing detached, namely principles, study and research results, case studies and frameworks and taxonomies.

Objective 5: Determine the content for a divestment framework for IT Governance

Describe the structure and support, as well as the steps to be followed in the deployment process of an IT divestment process.

Chapter 7 gives an introduction to case studies in general and the background to the three case studies used in this study. Section 7.2 describes the Tshikondeni mine closure as the first case study on which the first version of the divestment framework for IT governance was tested and identifies a number of shortcomings in the framework. These shortcomings are described in Section 7.3, the Inyanda mine closure where they are included in the final version of the divestment framework for IT governance, and included the following: late inclusion of the IT department during in the mine closure process (Section 7.3.4.1), omitting to recognise the crucial role of IT-business alignment as a component of the foundation of the divestment framework (See Section 7.3.2), the implementation of interim service arrangements to support the business unit during downscaling and in the post-closure phase (See Section 7.3.4.2) and lastly, early definition of the post-divestment state (See Section 7.3.5.1). Section 7.4 describes the successful implementation of the final version of the IT governance and divestment framework during the Arnot mine closure. To achieve the aforementioned objective, Chapter 7 focuses on the following:

Objective 6: Testing the theory at the hand of case studies
Testing the theoretical underpinnings of a divestment framework for IT governance at the hand of three coal mine closure case studies to determine the practical workability of the divestment framework.

In compliance with objective 5 and the research question, the author identified the following core concepts that need to be understood, implemented, facilitated and applied within a company when a divestment or mine closure strategy is implemented.

Consider the following:

- Information Technology has an important role to fulfil in accomplishing a business unit divestment or mine closure (Chapter 1).
- Although the macroeconomic environment (PESTEL) and competitive forces play an important role to shape a company's strategy, a company's strategy formulation originates

from the internal or micro environment with variables such as the vision, mission, goals and objectives and strategy decisions embodied in a sound governance foundation (Chapter 2).

- IT governance provides direction and oversight for IT within a company and is described as an important building block for business-IT alignment where a definite link exists between the IT strategy and the business strategy alignment when a divestment or mine closure strategy is implemented. Alignment of company objectives and IT is about governance and only occasionally related to technology (Chapter 3).
- All the currently available IT governance frameworks and standards are management frameworks, and most of them generally conform to the management processes for the provisioning and deployment of new IT infrastructure or governance mechanisms (Chapter 4).
- A pertinent necessity prevails for a decision support standard or governance framework that is established upon the essence of a business unit divestment or mine closure process (Chapter 5).
- Testing the theory of a decision support divestment framework for IT governance during the execution of three mine closures (Chapter 7).

One can now state the following:

The identified essence, content and characteristics of a divestment framework for IT governance are:

- **Structure for a divestment framework** consisting of IT governance and business-IT alignment.
- **Support for a divestment framework** provided through IT value, risk management, compliance and sustainability.
- **Framework procedures** to support framework execution.
- **Framework execution steps** to implement the IT component of a divestment or mine closure framework.

8.4 RELEVANCE AND CONTRIBUTION OF THIS STUDY

This study is relevant and significant to the South African coal mining industry but could also relate to other industry settings. The inclusion of structuration in the theory permits for the framework to

find reverberation in other settings and industries. The fundamental applicability of this study is that it identifies the components and building blocks for a divestment framework for IT governance that could be implemented in the context of a company or mining house. Clearly it cannot be assumed that all companies are the same. The aim of a related starting point may however demonstrate just that – a starting point. As presented in this thesis, there are disparate views on company divestment, the role of business-IT alignment and IT governance and as such it is arduous to commence with the implementation of a divestment framework for IT governance or to accommodate dissimilar views of the approach to business unit divestment or mine closure. Having a starting point might be advantageous and might benefit in the long term. This needs to be proved in future studies but it is not included in the scope of this thesis as this thesis concentrated on points of view in academia and practice. If all companies start from the same point of view when implementing a divestment or mine closure strategy, it may simplify the process of implementing a divestment framework for IT governance across different companies and different industries globally.

In the following section the contributions, linked to the larger relevance of this study, have already been listed and reviewed in each chapter and is information already presented.

8.4.1 Chapter 1: Introduction and aim of the research

It may be observed in Chapter Map 1 to Chapter Map 9 that the accomplishment of this chapter induced the achievement of the following contributions linked to the greater significance of this study. The contributions have already been mentioned and discussed in the summary/conclusions of each chapter:

1. **Defined Need –** Stipulating that there is a definite need for a divestment framework for IT governance. A formal framework to map and plan for the downscaling or discontinuation of the IT systems and infrastructure should be developed and implemented. The purpose of such a divestment framework for IT governance is to ensure that the IT strategy is aligned with and supports the business unit divestment or mine closure strategy. The role of such a framework should be to minimise the impact of a divestment or mine closure strategy on the company's IT governance model. Both Matthes *et al.* (2012:4) and Böhm *et al.* (2010) concur that literature providing factual guidance for the management of processes relating to business unit divestment or mine closure is limited and not readily available in the existing body of knowledge. As part of an ontological construction, one

would be required to have a core and fundamental understanding of the concepts or components of ontology. Constructing such an ontology could be problematic due to the unavailability of literature discussing the IT component of a business unit divestment or mine closure.

2. **Defined Concerns –** IT has an important role to fulfil in accomplishing a business unit divestment or mine closure. The comprehensive adjustment and alignment of the IT panorama is an essential concern for the business. The IT department needs to have processes and procedures in place to address retention rules, data, system and IT infrastructure decommissioning and system retirement. IT could either be a strategic facilitator that contributes purpose and benefit, supports and enhances growth and revolutionises business or the origin of disturbing noise. Because of the complexity and interrelatedness of IT systems and infrastructure with the rest of a business unit's processes, a divestment initiative should include the steps that need to be taken to de-integrate or disentangle the IT portfolio from the rest of the company. It is unclear whether any of the existing frameworks or standards could individually or in combination form the basis of a divestment framework for IT governance.

3. **Conceptual Scoping –** Scoping the concepts applied to investigate and define what the essence, content and characteristics of a divestment framework for IT governance should be. To achieve this goal of understanding the essence, content and characteristics of a divestment framework for IT governance, the chapter provides a conceptual scoping indicating the need for a sequential and systematic approach in conducting such an ontology. The initial step would be the identification of constituents associated with a taxonomy for the rules and connections to be determined. The taxonomy could then be enforced to assemble and test such an ontology. What this chapter attains is to illustrate an accumulative resolution that may be implemented in the assembly of an ontology, and then methodically illustrate the process than can (and has been) implemented in this thesis. It was consequently contemplated that to construct an ontology, the first step would be the identification of the constituents needed to develop a taxonomy and ultimately an ontology. The main objective of this thesis is characterised as an approach to identify and describe the essence, content and characteristics of a divestment framework for IT governance within the purview and context of a divestment scenario so that one may

ultimately employ these in an analogous manner as to appease the establishment of an IT divestment framework.

8.4.2 Chapter 2: Impact of divestment on company strategy

On conclusion of this chapter, the subsequent was accomplished as contributions with an association to the larger significance of this study. The contributions previously noted and discussed within the summary/conclusion of each chapter are as follows:

1. **Understanding the South African mining environment –** The chapter gave an overview and served as an introduction to the South African mining environment, and more specifically the coal mining industry. It gave an overview of the global and domestic coal environments and the challenges faced by the coal mining industry in these environments. The South African coal mining industry is a mature industry spanning a number of decades and as a result a large number of collieries have already closed down and numerous others are approaching end of life and will cease production in the near future.

2. **The impact of the macro and market environment in strategy formulation –** The influence of the macro-economic environment and the six impacts of PESTEL on a mine closure strategy were investigated to determine how the competitive forces of the market environment shape company strategy by referencing the coal mining industry. Company strategy in the market environment directly relates to a consolidated collection of choices that relate to the company's position justification. Divestment is typically an acknowledgement of dynamic unstable internal or external company prospects and the objective is always to strengthen and reinforce the company's efficiency and performance. Divestiture will necessitate adoption of the company strategy and thus consists of a strategic dimension. Divestment can thus be an appropriate and profitable strategy.

8.4.3 Chapter 3: Alignment of the IT strategy and governance model with the company's divestment strategy

On conclusion of this chapter, the subsequent was accomplished as contribution with an association with the significance of this study. The contributions previously noted and discussed in the summary/conclusion of each chapter are as follows:

1. **Role of IT governance in divestment –** When the company acknowledges the strategic value of its IT investment, the implementation of a divestment strategy will lead to the adoption of an IT governance model that will support divestment and assist in defining the roles and responsibilities for the successful de-integration of IT systems and infrastructure. Adopting the IT governance model will ensure alignment of business and IT with regard to understanding the company's strategic objective or intent with the divestment strategy and business, understanding the effort and expenses required from an IT perspective to de-integrate the IT component of a business unit. When the company comprehends the strategic value of IT when implementing a divestment strategy, its strategic approach should be one where it ensures an IT architecture and platform that is well suited to divestment or mine closure and in following this approach can ensure a smooth transition to support the IT de-integration during a divestment strategy.

2. **Impact of Divestment on IT-Business alignment –** A definite link exists between IT strategy and business strategy alignment when a divestment strategy is implemented. A number of factors impact business-IT alignment during such a process. These factors include environmental uncertainty, alignment of business and IT planning, IT's understanding of business, organisational transformation and IT management sophistication. Erratic diversity is an inevitable component of operating in the current emerging economy. There is limited allowance for error and an abundance of opportunities to reap rewards from the aberrations of competitors. If internal processes are not aligned and animosity is at the order of the day, the probability of the company being agile enough to exploit and reap benefit from favourable circumstances is limited. Business and IT ought to be compelled to function and strategise in unity or be abate and crippled by dissidence.

8.4.4 Chapter 4: Existing IT Governance Frameworks and Standards

On conclusion of this chapter, the subsequent was accomplished as contributions with an association with the significance of this study. The contributions previously noted and discussed in the summary/conclusion of each chapter are as follows:

Applicability of existing IT frameworks and standards as an IT divestment framework – A number of IT governance frameworks are available and postulate an IT governance model that consists of numerous definitions and foundations. These frameworks have a diverse variety of

strengths and weaknesses and include imbricates. Despite the existence of a variety of protocols such as IT control frameworks, models and standards, the persisting nature is theoretical. Control frameworks tend to be viewed in isolation from one another and are implemented in an ad hoc approach that results in an inefficient IT governance system, which focuses on either strategic or operational areas, but never on both simultaneously. After investigating the most relevant and well known IT governance frameworks and standards, it became clear that not one of the existing frameworks or standards investigated meets the requirements of an IT governance framework for mine closure or divestment. All the currently available frameworks in the IT environment are management frameworks, and most of them generally conform to the management processes for the provisioning and deployment of new IT infrastructure or governance mechanisms. These frameworks do not address all the concerned areas within the IT environment when moving from the limited focus on the supply, maintenance and support of IT to consider the broader question of how companies actually use, and ultimately dispose of IT when a divestment strategy is implemented and a company or business unit is closed down or carved out. The requirement for a framework to provide guidance on dealing with the disposal aspect of IT clearly exists.

8.4.5 Chapter 5: Divestment Framework for IT governance

On conclusion of this chapter, the subsequent was accomplished as contributions with an association with the significance of this study. The contributions previously noted and discussed in the summary/conclusion of each chapter are as follows:

1. **Divestment Framework -** Despite the fact that a number of studies are at hand on the subject of IT integration and integration processes and decision support standards during mergers and acquisitions, no supporting literature could be obtained to give direction to the untangling of IT software systems and infrastructure during a business unit divestment or mine closure process. A pertinent necessity prevails for a decision support standard or governance framework that is established upon the essence of a business unit divestment or mine closure process. An IT governance framework that is specifically designed to fit the operational model of the company contributes a number of advantages. An IT governance program will facilitate outlining the IT structure, procedures, and analysis framework needed to establish and manage risk appropriately. A custom developed IT governance framework provides the essential features for measuring the capability and efficacy of the contemporary bedrock and

governance instruments to manage its objectives in a particular situation. In essence a framework outlines the components and universal links that are needed for institutional reviews. The framework will address a number of IT decisions and actions that will need to be taken into consideration or addressed during the business unit divestment or mine closure.

2. **IT Divestment Process -** IT operations could be classified as among the most complicated business processes to evaluate during a business unit divestment or mine closure transaction. When the company is scaling down its operations, IT will need to adopt and scale down collectively with business requirements. The divestment and closure framework will be determined by the volatility of the IT untangling decision and bolstered by the company's divestment objectives and circumstantial variables. Environmentally friendly and sustainable IT processes and procedures need to be constituted as a derivative of existing environmental policies, which, in proper sequence, will be derived from governmental laws specifically applicable to business unit divestment or mine closure. IT environmental policies and procedures should include matters such as energy saving, avoidance of wasteful expenditure and e-waste recycling. The business portrait for IT sustainability includes flexible IT practices for the conservation of capabilities, embellishing operational accomplishments and bolstering methods in which IT could support the minimisation of the company's environmental footprint. The IT department will support the corporate sustainability initiatives during a business unit divestment or mine closure process through the implementation of closure indexes, assimilation of divestment or closure compositions and the compilation of assessment criteria.

8.4.6 Chapter 6: Research methodology and approach

On conclusion of this chapter, the subsequent was accomplished as contributions with an association with the significance of this study. The contributions previously noted and discussed in the summary/conclusion of each chapter are as follows:

1. **Model Building -** A model is a portrayal or contemplation of a real phenomenon or circumstance. It depicts the interrelatedness, directly or indirectly of an activity and response in conditions of cause and effect. Because models are a contemplation of reality,

they could be considered less convoluted than reality itself. The character of a model recommended amidst a research project frequently hinges on the sophistication of the research question. Researchers frequently grasp that a research opportunity has evolved though the exact disposition of the opportunity is frequently not distinctly comprehended at this premature point. Models are frequently projected as a preeminent impetus of a project. A model might be applied to direct an analysis, to direct the compilation of theories and questions for an inquiry, to arrange findings from case studies, and so on (Olivier, 2004:49). The characteristics of the model will to some extent be driven by its predetermined utilisation. The outcome of the case studies that were done presented an artefact in the form of a divestment framework for IT governance. It was decided to use modelling to present the artefact that emerged during this study as the final outcome of this research based on a number of factors that were considered. These factors included candour, which makes it attainable to comprehend the significance of the modelled theory, adequateness, as models frequently focus on every element of a problem. Also abstraction, for the greater number of alternatives addressed by the model, the better the accuracy and clarity.

2. **Case studies -** Relying on theoretical propositions implies the adoption of theoretical propositions that prompted the case study research. The initial intention and design of the case study was based on propositions that contributed to a number of research questions, gave direction to the literature review and resulted in new propositions. Developing the case description refers to the establishment of a descriptive framework for constructing the case study. The formulation of the framework's structure is mirrored by the chapters. The descriptive framework represented by the chapters formulated the case study analysis and assisted in the establishment of innovative links to be analysed. Case study research not only allows for research on a single subject or company, but also has the potential to identify and handle complex situations within the single entity. It assists and empowers the researcher to answer *How* and *Why* questions while taking into account how aspects are shaped by the context in which they occur. Exploratory case studies were selected because no methodical methodology is necessary. The outcome of the case studies that were done, presented an artefact in the form of a divestment framework for IT governance.

8.4.7 Chapter 7: Case studies

On conclusion of this chapter, the subsequent was accomplished as contributions with an association with the significance of this study. The contributions previously noted and discussed in the summary/conclusion of each chapter are as follows:

1. **Compilation of final divestment framework for IT governance -** The three case studies pertaining to this thesis were discussed in detail to explain the process that was followed: firstly, creating and implement a divestment framework for IT governance during the closure of Tshikondeni coal mine, and secondly refining the divestment framework at the hand of the lessons that were learnt during the Tshikondeni coal mine closure to improve and optimise the divestment framework. The new optimised framework was then deployed as the guideline for the Inyanda coal mine closure and again deployed and executed during the Arnot coal mine closure. The final version of the divestment framework for IT governance evolved to become an exact fit for this specific mining company's operational model and provide the IT department with advantages, such as the facilitation of the identification of business opportunities, risks, benefits and impacts. It guided the IT department in the establishment of new, and the adoption of old standards, policies and procedures for mine closure and business unit divestment and affirmed monotonous metamorphosis with regard to all the aspects covered during a mine closure or business unit divestment.

8.5 RECOMMENDATION REGARDING FURTHER RESEARCH

This research has focused only on the closure and divestment strategies implemented by mining companies in the South African context and the downscaling and discontinuation of IT infrastructure and services during the process of mine closure or divestment. It has underscored topics for further research. The substantive theory presented in this study was obtained through the application of a literature survey and three empirical case studies. Further evolution of the theory would necessitate expansion of the research to include a number of industry sectors to establish how these sectors might implement a divestment framework for IT governance.

8.6 CONCLUDING SUMMARY

This chapter provides a contemplation of the research journey by frequenting the main research question. The main research question required several chapters to explain and answer it. The nature of the research required its positioning within an academic framework. The study does not

merely focus on the contemporary subject of business unit divestment or mine closure but relates to the expansive topic of IT governance and business-IT alignment.

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