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A strategy for improving the maturity levels of IT Service Management in Higher Education Institutions in South Africa

by

Thomas Hilmer

Treatise

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Supervisor: Professor Lynn Futcher

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Declaration of originality

I, Thomas Hilmer, (s181039020), hereby declare that the treatise for MPhil in IT Governance is my own work and that it has not previously been submitted for assessment or completion of any postgraduate qualification to another University or for another qualification.

SIGNATURE: _____

DATE: 03/12/2018

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"So much of what we call management consists in making it difficult for people to work."

—*Peter F. Drucker*

Abstract

IT Service Management (ITSM) refers to a set of activities that an organisation can perform to develop, supply, operate, manage and improve information technology related services in order to meet the needs of the business. The interest in ITSM is based on the expectation that applying best practice ITSM processes will result in lower expenses, fewer incidents and improved customer satisfaction. Various standards, frameworks, methodologies and processes have evolved to support this move to a value-driven, service-orientated approach to managing an organisation's information systems. Between 2007 and 2009, Higher Education Institutions (HEIs) in South Africa benefited from a national project to improve the quality of their IT services through training in ITIL, a best practice ITSM framework. An assessment at the time, however, found that the maturity levels of the ITIL processes implemented after the intervention remained low, and this observation is common in other industries as well. The implementation of industry best practice ITSM frameworks does not always proceed smoothly; they can be costly, have long implementation times, and can be seen as excessively complicated and suited mainly for large organisations. Therefore, it is often challenging for organisations such as HEIs to improve their ITSM process maturity levels.

The aim of this study is to develop a strategy that may assist South African HEIs in taking steps to improve their IT Service Management maturity levels. This primary research objective is addressed through a number of secondary research objectives, namely, to understand the challenges that HEIs often encounter when implementing ITSM; to determine the ITSM implementation status at a number of South African HEIs; to determine the various elements and components required to formulate the ITSM strategy; to determine whether alternatives to ITIL are feasible options for HEIs in South Africa; and to validate the proposed strategy by verifying its quality, utility and efficacy. A comprehensive literature review provides information on various ITSM standards, frameworks and methodologies. It also investigates ITSM adoption and implementation by organisations in general, and HEIs in particular, and how modern practices such as DevOps, Agile and Lean relate to ITSM. Thereafter, an online survey is used to determine the status of ITSM maturity levels at South African HEIs, and whether alternatives to ITIL are being used. Expert interviews are used to obtain additional information on what is required to formulate the proposed strategy. The findings from the literature review, survey and expert interviews are used to develop a four-step strategy, which was evaluated for its quality, utility and efficacy through an online

assessment by the same experts. This strategy can be considered a useful tool for Higher Education Institutions in South Africa if they wish to increase their levels of IT Service Management maturity. The findings of this study make a substantial contribution to the field of ITSM research at South African Higher Education Institutions.

Keywords: Strategy, IT Service Management, Maturity Levels, Higher Education Institutions

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List of Abbreviations and Acronyms

Abbreviation	Description
AWS	Amazon Web Services
ARIS	A data modelling software application
ASAUDIT	Association of South African Universities Directors of Information Technology
CAB	Change Advisory Board
CMMI	Capability Maturity Model Integration
CMMI-ACQ	CMMI for Acquisition
CMMI-DEV	CMMI for Development
CMMI-SVC	CMMI for Services
COBIT	A best practice[1] framework created by ISACA for IT management and governance
DHET	Department of Higher Education and Training
DITCHE	Developing Information Technology Capacity in Higher Education
FitSM	Standards for lightweight IT service management
HEIs	Higher Education Institutions
HEMIS	Higher Education Management Information System
ISACA	An independent, non-profit, global association engaged in the development, adoption and use of globally accepted, industry-leading knowledge and practices for information systems
ISO/IEC	International Organisation for Standardization / International Electrotechnical Commission

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[1] The term "best practice" is used throughout this treatise as this is what most publications in the literature review referred to. One only has to conduct a search on the internet on "best practice" versus "good practice" to see the vast amount of opposing opinions on whether a practice can be "best" or should be referred to as "good" instead.

IT	Information Technology
ITIL	A set of best practices for ITSM that focuses on aligning IT services with the needs of business
ITSCMM	Information Technology Services Capability Maturity Model
ITSM	Information Technology Service Management
MOF	Microsoft Operations Framework
NQF	National Qualifications Framework
PDCA	Plan-Do-Check-Act cycle (also known as the Deming or Shewhart cycle), a four-step management method for carrying out change and used for process control and continuous improvement.
RACI	A tool used for identifying roles and allocating who is **R**esponsible, who is **A**ccountable, who needs to be **C**onsulted, and who must be kept **I**nformed during all steps of a project
SLA	Service Level Agreement
SMMEs	Small, Medium and Micro-sized Enterprises
SMS	Service Management System
SWOT	Strengths, Weaknesses, Opportunities & Threats
TENET	Tertiary Education and Research Network of South Africa
USMBOK	Universal Service Management Body of Knowledge
YaSM	Yet another Service Management Model

CHAPTER 1: INTRODUCTION

1.1 Research Context

These days, organisations are virtually completely dependent on information technology (IT) to conduct their business. To ensure the effective and efficient use of IT to help an organisation achieve its goals, the leadership, organisational structures and processes of IT governance, as an integral part of enterprise governance, should be applied (ITGI, 2003).

Good IT governance ensures that IT responds to business needs and that the business remains competitive and customer loyalty is maintained (Taylor, 2012). One approach that assists in achieving this is a set of methods called IT Service Management (ITSM). Service Management is a set of specialised organisational capabilities that provide value to customers in the form of services (Botha, 2015). The interest of organisations in ITSM stems from the expectation that the application of best-practice ITSM processes results in reduced expenditure, reduction of incidents and improved customer satisfaction (Iden & Eikebrokk, 2013).

ITSM is about managing service quality, reliability and performance to ensure that IT services remain available. It also ensures that when unexpected events take place, there are processes in place to reduce their impact on the business (Taylor, 2012). The most widely used framework for ITSM is ITIL (Cater-Steel & Tan, 2005; Marrone, Gacenga, Cater-Steel, & Kolbe, 2014), a set of best practices originally developed by the UK government to standardise IT management practises. ITIL defines a service as "*a means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks*" (Iqbal & Nieves, 2007).

While ITIL is considered the industry standard, a number of other ITSM standards, methodologies and frameworks exist. Some of the more well-known ones include ISO/IEC 20000 Information Technology - Service Management, COBIT 5, Microsoft Operations Framework (MOF), Universal Service Management Body of Knowledge (USMBOK), Capability Maturity Model Integration (CMMI), and the Standard for Lightweight Service Management in Federated IT Infrastructures (FitSM). Although there are often many similarities between them, they have different approaches and focus areas in ITSM. They generally tend to have a process model to support the

management and delivery of services. ITIL, for instance, has 26 processes spread over five service lifecycle stages (AXELOS, 2013), which are discussed in more detail in Chapter 2. Maturity models are widely used to rate the capability and maturity of these processes and functions, and the aim is to understand current maturity levels (scores) to create a baseline for making improvements (CMMI, 2010).

ITIL can, at times, be seen to be overly complicated and suited mainly for large organisations (Küller, Grobowski, Sameš, & Vogt, 2010), with difficulties experienced by small to medium-sized enterprises (Lema, Calvo-Manzano, Colomo-Palacios, & Arcilla, 2015), such as expense, long implementation times and not knowing with which processes to start. To implement all 26 processes requires extensive resources, both financial and human, thus few organisations have done this (Ahmed & Assad, 2015).

What frequently happens in practice is that organisations wanting to implement ITIL follow the "low hanging fruit" approach by implementing the processes or functions that offer quick wins or value, but then for various reasons seldom go beyond these early implementation stages (Lucio-Nieto & Colomo-Palacios, 2012). In most cases, this involves processes related to IT service operations that are implemented, for example the service desk or incident management, while problem management and change management may also feature (Ahmed & Assad, 2015; Bovim, Johnston, Kabanda, Tanner, & Stander, 2014; Grewal, 2006; Lubambo, 2009). Often, further implementations of ITIL processes are slowed down, or halted completely, through restructuring of departments or loss of staff that were championing the implementation (Grewal, 2006).

1.2 Relevance of Research Problem
Although Higher Education Institutions (HEIs) in South Africa are often considered large in terms of number of students and staff, as well as size of operations, they operate under financial constraints. According to Africa Check (2018), private income accounts for less than 30% of the income of South African HEIs. In 2015, 39% of income was from government funds and 35% from student fees. In 2017 the government announced free higher education from 2018 onwards for students from poor and working-class families (The Presidency RSA, 2017). This has put enormous pressure on HEIs to find alternative revenue sources and has put a brake on

operational expansions. Under these circumstances, having decent ITSM processes in place would be beneficial by reducing costs and improving efficiencies, but achieving this may be challenging.

1.3 Research Rationale and Significance

Organisations such as Higher Education Institutions often introduce IT Service Management through the implementation of ITIL processes, but frequently fail to move beyond the adoption of only a few of these processes, thus not moving to higher ITSM maturity levels.

A suitable strategy may assist South African HEIs in taking steps to improve their IT Service Management maturity levels.

1.4 Research Aim and Objectives

The primary research objective is to develop a strategy that South African Higher Education Institutions can follow to improve their ITSM maturity levels.

Secondary research objectives (SRO) are:

1. To understand the challenges that HEIs often encounter when implementing ITSM (SRO1).
2. To determine the ITSM implementation status at various South African HEIs (SRO2).
3. To determine the various elements and components required to formulate the ITSM strategy (SRO3).
4. To determine whether alternatives to ITIL are feasible options for HEIs in South Africa (SRO4).

1.5 Scope and Delineation

The scope of this study will be restricted to South African HEIs, which are generally limited by resources, be it financial or human.

1.6 Ethical Considerations

A Self-Assessment Research Ethics Checklist was completed that identified that ethics approval was necessary. Furthermore, as part of the data collection, interviews would be held with staff members within the researcher's department. As this might impact on the voluntary aspect of the study due to possible power relationships in

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existence, formal ethics clearance was requested from the University Research Ethics Committee (Human), and approval was obtained (Appendix A). Approval for the research was also obtained from the Nelson Mandela University Deputy Vice-Chancellor (DVC): Research and Engagement (Appendix B).

1.7 Chapter Outline

The research project chapters are laid out as follows:

Chapter 1: Introduction

This chapter provides an overview of the research problem and its relevance. It details the research aims and objectives, and indicates the scope of the study.

Chapter 2: Literature Review

The literature review considers various ITSM standards, frameworks, methodologies and processes, as well as their adoption and implementation in industry and HEIs. ITSM is also discussed in the light of other techniques and work cultures.

Chapter 3: Research Design

This chapter explains the research paradigm and methodology followed to attain the research objectives, as well as the methods applied to formulate the strategy which South African HEIs can follow to improve their ITSM maturity levels.

Chapter 4: Results and Discussion

This chapter discusses the results obtained from the data collected.

Chapter 5: Developing the Strategy

This chapter demonstrates how the proposed strategy was developed.

Chapter 6: Strategy Evaluation

This chapter discusses how the proposed strategy was evaluated for its quality, utility and efficacy.

Chapter 7: Conclusion

The last chapter summarises the research, indicates how the research objectives were met and what research contributions were made. It also makes recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

IT Service Management (ITSM) evolved from a shift in reactive, technology-focused, user-centric management of IT to a proactive, preventative, process-focused and customer service approach (Galup, Quan, Dattero, & Conger, 2007; Nicho & Almourad, 2012). It is an approach by which IT systems are offered as a service to customers under an agreement and performance is managed. As mentioned in Chapter 1, ITIL defines a service as "*a means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks*" (Iqbal & Nieves, 2007). ITIL also describes the value of a service as consisting of two components: utility (fit for purpose) and warranty (fit for use), whereas utility is what the customer gets, warranty is how it is delivered (Iqbal & Nieves, 2007).

This move to a value-driven, service-orientated approach to managing an organisation's information systems resulted in the development of frameworks and methodologies to support it. In Section 2.2 this literature review considers various ITSM standards, frameworks, methodologies and processes, as well as the adoption and implementation of them in Section 2.3. Furthermore, ITSM in Higher Education Institutions is discussed in Section 2.4, while in Section 2.5 ITSM is discussed in the light of other techniques and work cultures.

2.2 ITSM Standards, Frameworks, Methodologies and Processes

This section addresses the broad tool sets that have evolved in the field of ITSM. As by their nature they have been developed by various types of organisations, both private and public, the information available is often from organisational websites in the form of white papers or other documents, rather than from published academic articles. Information from these websites is usually more up-to-date concerning current versions and trends than published academic articles.

In order to deal with the topic of ITSM, one has to understand the difference between standards, frameworks, methodologies and processes. The Oxford Dictionary (Oxford University Press, n.d.; Thompson, Fowler, & Fowler, 1995) defines these as follows:

- **Standard**: A required or agreed level of quality or attainment; a measure serving as a basis or example or principle to which others conform or should conform or by which the accuracy or quality of others is measured.

- **Framework**: A basic structure underlying a system, concept, or text.

- **Methodology**: A system of methods used in a particular area of study or activity. A method is a particular procedure for accomplishing or approaching something, especially a systematic or established one.

- **Process**: A series of actions or steps taken in order to achieve a particular end.

Standards can thus be seen as fairly rigid requirements agreed to within a specific industry that one has to adhere to if one wants to follow that standard. Standards controlling bodies, for example the National Institute of Standards and Technology (NIST) and the International Organisation for Standardization (ISO), also often allow external certification bodies to provide certification services which enable organisations to show that they conform to a particular standard (ISO, 2018a).

Frameworks, on the other hand, define a system that is far less rigid, allowing various practices and tools to be added, while providing the processes required for the system or concept. Examples of frameworks are COBIT (ISACA, 2012a) and Microsoft Operations Framework (Microsoft, 2016). Frameworks provide guidelines on a preferred way of doing something (Wood, 2013).

Methodologies provide details on how to do something in a defined and repeatable approach. DevOps (Erich, Amrit, & Daneva, 2014) and Agile (Beck et al., 2001) are two methodologies that can be employed in the ITSM environment. They are prescriptive in when and how to do something with tasks, tools and techniques (Wood, 2013).

In an organisation, processes are what help to run the business. For example, in an IT environment there are processes for creating a user account for a staff member, or for creating daily backups of data stored on servers. If the processes are well-defined, it becomes easier to find ways of automating them (Ellis, 2008).

By applying methodologies to processes in the context of a framework, and adhering to industry standards, organisations can become more efficient in providing the services they offer.

Chapter 2: Literature Review

During the search for literature for this review, various standards, frameworks and methodologies were found to be used in association with ITSM implementations in organisations, some more common than others. Eight of these will be discussed in more detail in the following sub-sections.

2.2.1 ISO/IEC 20000

The international standard for ITSM is ISO/IEC 20000 *Information Technology — Service Management*, published by the International Organisation for Standardization and the International Electrotechnical Commission. The standard consists of a number of parts (ISO, 2018b), namely:

- ISO/IEC 20000-1:2011 - Service management system requirements

- ISO/IEC 20000-2:2012 - Guidance on the application of service management systems

- ISO/IEC 20000-3:2012 - Guidance on scope definition and applicability of ISO/IEC 20000-1

- ISO/IEC TR 20000-5:2013 - Exemplar implementation plan for ISO/IEC 20000-1

- ISO/IEC 20000-6:2017 - Requirements for bodies providing audit and certification of service management systems

- ISO/IEC TR 20000-9:2015 - Guidance on the application of ISO/IEC 20000-1 to cloud services

- ISO/IEC TR 20000-10:2015 - Concepts and terminology

- ISO/IEC TR 20000-11:2015 - Guidance on the relationship between ISO/IEC 20000-1:2011 and service management frameworks: ITIL

- ISO/IEC TR 20000-12:2016 - Guidance on the relationship between ISO/IEC 20000-1:2011 and service management frameworks: CMMI-SVC

A "Part 13: Guidance on the relationship between ISO/IEC 20000-1:2011 and service management frameworks: COBIT" is expected to be published in 2019/2020 (Cooper, 2017).

Chapter 2: Literature Review

The first two parts are the most widely used, with the others providing supporting information.

ISO/IEC 20000-1:2011 provides all the formal specifications and requirements for a Service Management System (SMS): *"It specifies requirements for the service provider to plan, establish, implement, operate, monitor, review, maintain and improve an SMS. The requirements include the design, transition, delivery and improvement of services to fulfil service requirements"* (ISO, 2011). It requires the application of the "Plan–Do–Check–Act" (PDCA) cycle of continuous improvement to all parts of the SMS and the services. This is the only part that an organisation can be certified against.

ISO/IEC 20000-2:2014 can be considered the code of practice on how to apply and interpret Part 1. This is useful for companies that would like to be certified against ISO/IEC 20000-1.

ISO 20000 identifies the following processes that should be considered as a minimum when setting up an SMS, and thus these usually form the core set of processes that can be found in various ITSM frameworks:

- Audit
- Budgeting and accounting for IT services
- Business relationship management
- Capacity management
- Change management
- Configuration management
- Human resource management
- Improvement
- Incident management and request fulfilment
- Information item management
- Information security management
- Management review
- Measurement
- Organisational management
- Problem management
- Release and deployment management
- Risk management

- Service continuity and availability management
- Service design
- Service level management
- Service planning and monitoring
- Service reporting
- Service requirements
- Service transition
- SMS establishment and maintenance
- Supplier management

Through Parts 11 and 12, and the planned Part 13, ISO 20000 also recognises the importance of other frameworks that are in use, and of use, in supporting ITSM initiatives. These technical reports list the commonalities and correlations between the standard and the frameworks, and thus assist organisations with how the frameworks can be used in improving an SMS, or in conforming to the standard.

The ISO 20000 standard thus provides a good overview of what is required for ITSM. It does not, however, prescribe on how the concepts and parts of a Service Management System should be implemented in practice. Originally designed for IT services, the standard can also be applied to other types of services (Cots & Casadesús, 2015).

2.2.2 ITIL

ITIL is by far the most popular ITSM framework in use (Iden & Eikebrokk, 2013; Melendez, Dávila, & Pessoa, 2016). It was initially called the IT Infrastructure Library as it derived from a collection of best practices put together by a British body called the Central Computer and Telecommunications Agency in the 1980's to standardise IT management practices (Cater-steel & Toleman, 2007). It has evolved over time from focusing on service delivery and service support to a service lifecycle consisting of five stages (Figure 2.1) that depend on the others for input and feedback (Pollard, Gupta, & Satzinger, 2010). A joint venture between the UK Cabinet Office and Capita, AXELOS, now owns ITIL. Unlike some of the other frameworks, ITIL specifications and associated documentation and training is not freely available and can become costly for an organisation (Knahl, 2013).

The stages in the current version 3.0 (2011 edition) as depicted in Figure 2.1 are described below:
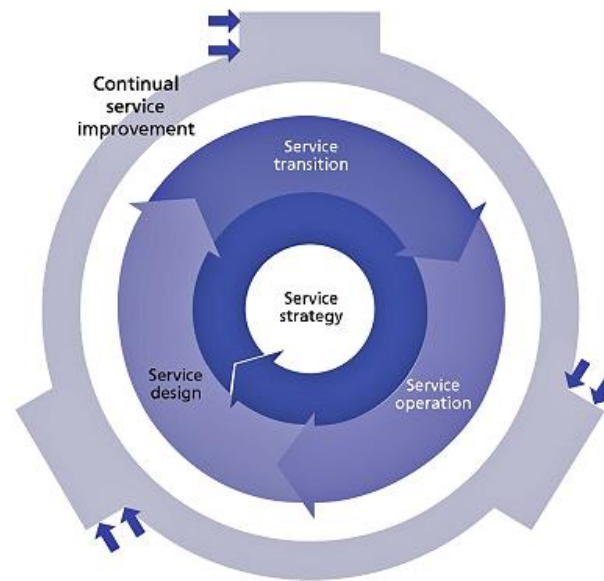
Figure 2.1. ITIL Service Lifecycle
(Iqbal & Nieves, 2007)

- **Service Strategy** is at the core and ensures that risks are addressed and that support is available for the improvements envisaged.

- **Service Design** focuses on a common and consistent architecture and translates the business requirements.

- **Service Transition** looks at bridging the gap between projects and operations, ensuring the quality of a new service brought into operation.

- **Service Operation** ensures that stable services are delivered, and the Service Desk is a key component here.

- **Continual Service Improvement** works with the other stages, aligning services with business needs and improving where necessary.

Twenty-six processes and four functions operate across the ITIL service lifecycle and are placed in the lifecycle stages as listed in Table 2.1 (AXELOS, 2013).

Chapter 2: Literature Review

Table 2.1. Processes and Functions across the ITIL Service Lifecycle

Service Strategy	Service Design	Service Transition	Service Operation	Continual Service Improvement
Strategy management for IT services	Design coordination	Transition planning and support	Event management	Seven-step improvement process
Service portfolio management	Service catalogue management	Change management	Incident management	
Financial management for IT services	Service level management	Service asset and configuration management	Request fulfilment	
Demand management	Availability management	Release and deployment management	Problem management	
Business relationship management	Capacity management	Service validation and testing	Access management	
	IT service continuity management	Change evaluation	Service desk function	
	Information security management	Knowledge management	Technical management function	
	Supplier management		IT operations management function	
			Application management function	

ITIL is a framework of "best practice" so it provides mainly *what* needs to be done rather than providing details on *how* to achieve the objectives. It offers solutions at the operational level only, while the causes of IT issues are often at the strategic planning and control levels (Botha, 2012). This is where COBIT fits in.

2.2.3 COBIT

COBIT is an IT governance and control framework aimed at ensuring good governance of all IT-related processes, including ITSM. It is used to relate business goals to IT goals via a goals cascade that translates stakeholder needs to enterprise goals, and then into IT-related goals (ISACA, 2012a). The actionable goals are then achieved through one or more COBIT enablers or processes.

The framework is intended to *"create optimal value from IT for an enterprise by maintaining a balance between realising benefits and optimising risk levels and resource use"* (ISACA, 2012a). To achieve this, COBIT 5 is based on five principles which are designed to be generic and useful for any enterprise. These include:

1. **Meeting stakeholder needs**

Businesses exist to create value for stakeholders, therefore decisions regarding IT management and governance need to consider benefits, as well as risks, for stakeholders.

2. **Covering the enterprise end-to-end**

COBIT 5 does not only focus on the IT function, but integrates governance of enterprise IT into enterprise governance by considering all functions and processes within the enterprise.

3. **Applying a single, integrated framework**

COBIT 5 can serve as an overarching framework because it aligns at a high level with other relevant standards and frameworks that may be in use within an organisation.

4. **Enabling a holistic approach**

COBIT 5 defines a set of enablers (anything that can help to achieve the objectives of the enterprise) for its implementation. The framework defines seven categories of enablers:

- **Principles, policies and frameworks** – the means to convert the desired behaviour into operational practice.

- **Processes** – a series of actions or practices to attain a particular end and produce outputs that support the achievement of the required IT-related goals.

- **Organisational structures** – entities for decision-making in an organisation.

- **Culture, ethics and behaviour** – of personnel and enterprise can determine the success of an organisation and their impact is often underestimated.

- **Information** – is both required and produced by the enterprise.

- **Services, infrastructure and applications** – provide the means for an enterprise to function and achieve its objectives.

- **People, skills and competencies** – required for the successful completion of activities, making the right decisions and taking remedial actions.

5.   Separating governance from management

The framework distinguishes between IT governance and management as these two domains serve different purposes, involve different kinds of activities, and require different organisational structures.

Governance involves evaluating stakeholder needs, ensuring objectives are met and monitoring the performance against those objectives. The COBIT activities for governance are Evaluate, Direct and Monitor (EDM) (ISACA, 2012a).

The management aspect is about ensuring that any activities undertaken are aligned with the governance directives, and are subsequently monitored. These COBIT activities are Plan, Build, Run, and Monitor (PBRM) (ISACA, 2012a). The governance and management areas are illustrated in Figure 2.2.
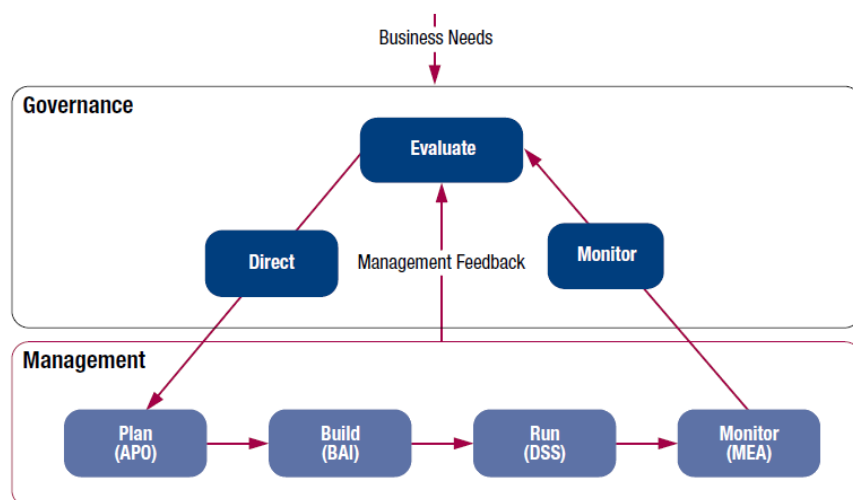
Figure 2.2. COBIT 5 Governance and Management Key Areas

Each area contains a number of processes which are combined into a process reference model (Figure 2.3). The governance area is one domain containing five governance

processes, while the management area has four domains with 32 processes (ISACA, 2012b).

Figure 2.3. COBIT 5 Process Reference Model

COBIT 5 also provides a Process Capability Model as a means to measure the performance of any of the governance (EDM-based) processes or management (PBRM-based) processes, and this allows areas for improvement to be identified (ISACA, 2012a).

A process can achieve six levels of capability:

- **0 Incomplete process** – the process is not implemented or fails to achieve its process purpose. At this level, there is little or no evidence of any systematic achievement of the process purpose.

- **1 Performed process** (one attribute) – The implemented process achieves its process purpose.

- **2 Managed process** (two attributes) – The previously described performed process is now implemented in a managed fashion (planned, monitored and adjusted) and its work products are appropriately established, controlled and maintained.

- **3 Established process** (two attributes) – The previously described managed process is now implemented using a defined process that is capable of achieving its process outcomes.

- **4 Predictable process** (two attributes) – The previously described established process now operates within defined limits to achieve its process outcomes.

- **5 Optimising process** (two attributes) – The previously described predictable process is continuously improved to meet relevant current and projected business goals.

Each capability level can be attained only once the level below has been fully achieved.

COBIT and ITIL are often concurrently adopted by organisations, as they are complementary (Cater-Steel, Tan, & Toleman, 2006), but in most cases ITIL progress is further advanced than the COBIT implementation (Cater-Steel & Tan, 2005).

2.2.4 Microsoft Operations Framework (MOF)

Using ITIL as a basis, Microsoft developed the Microsoft Operations Framework (MOF), which is described as delivering practical guidance for everyday IT practices and activities (Microsoft, 2016). The framework covers more than just service management as it includes processes, governance, risk, and compliance activities, management reviews, and Microsoft Solutions Framework (MSF) best practices. MOF is composed of three phases—Plan, Deliver, and Operate—with an underlying Management Layer (Figure 2.4).

Figure 2.4. Components of the Microsoft Operations Framework

The activities and processes involved in managing an IT service are organised into Service Management Functions (SMFs). Each SMF is located within a lifecycle phase and contains a unique set of goals and outcomes supporting the objectives of that phase (Microsoft, 2008). Management Reviews are conducted to ensure an IT service's readiness to move from one phase to the next. This process aligns IT goals with business goals.

The MOF phase overviews and SMF guides describe the activities needed to achieve the ITSM goals, from conception of a service to the retirement of outdated services (Microsoft, 2008). The guides are written for different target audiences:

- Overview guides are aimed at the CIO who needs to see the big picture.
- Overview and workflow information in function-specific guides is directed at the IT manager who needs to understand the IT service strategies.
- Activities in function-specific guides are aimed at the IT professional who implements the framework within their work.

Microsoft Operations Framework also supports the integration of policies, tasks, and activities based on other frameworks, such as ITIL, COBIT, and ISO 20000. The way these can fit together in supporting each other is shown in Figure 2.5.
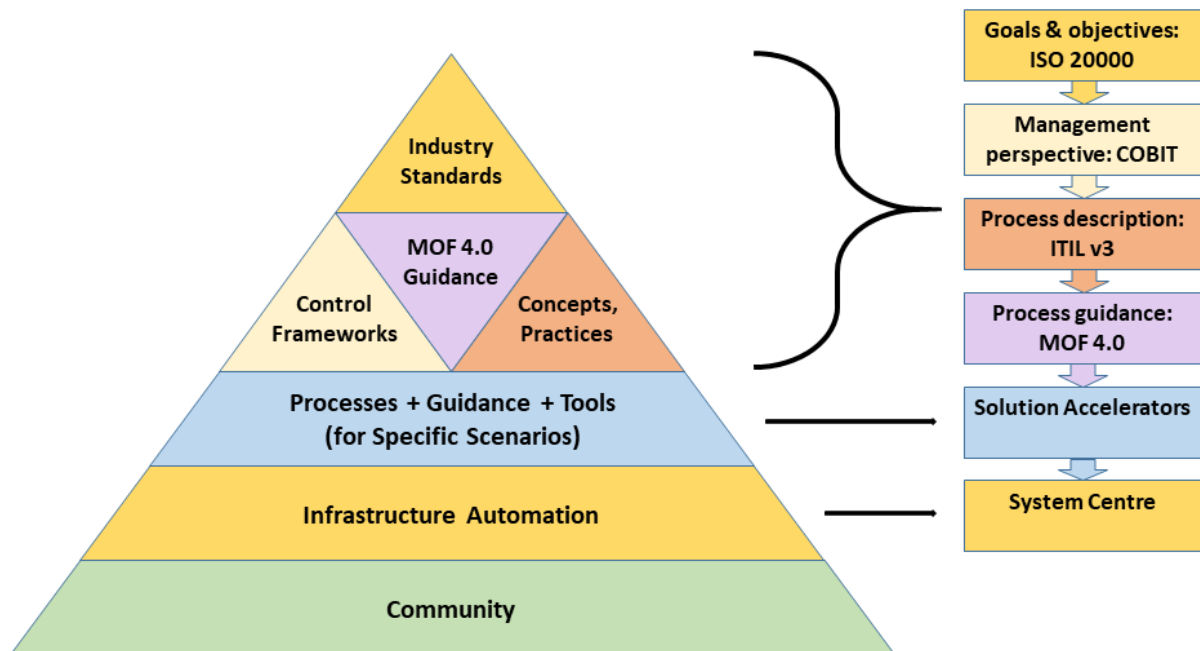
Figure 2.5. Pyramid of Strategic Management of IT Organisation (Microsoft, 2016)

As with ITIL, it is not necessary to implement the whole framework, but rather to adapt it to the requirements of the organisation. Unlike ITIL, the MOF provides more details on the *how* and not just the *what* of ITSM.

2.2.5 Universal Service Management Body of Knowledge (USMBOK)

As the name implies, the Universal Service Management Body of Knowledge (USMBOK) is a reference work, not a framework that can be implemented. At its heart is a guide book (Clayton, 2012a), and is supported by a series of books, online references and education programs. It "*presents a common lexicon of over 850 definitions of concepts and artefacts, and over 650 best practice statements representing common sense do's and don'ts*" (Grier, n.d.). As such, it is not restricted to ITSM and provides customer centric thinking based on an architecture of four key components (Clayton, 2012b), namely:

- Customer engagement strategy
- Service request management
- Service support program
- Continuous improvement program

The USMBOK service lifecycle is presented in a number of stages:

1) The Opportunity Stage

2) Require

3) Define

4) Plan

5) Concept

6) Approve

7) Design

8) Develop (Build)

9) Assure

10) Deploy

11) Commission

12) Operate and Support

13) Maintain

14) Revise

15) Retire

For each stage a number of features are described, including inputs, outputs, major influences from the customer's point of view, major influences from the service provider's perspective, and the main activities performed during the stage (Kempter, 2014d).

The USMBOK is very useful in supporting the implementation of other frameworks and understanding the terminology that goes with them.

2.2.6 Capability Maturity Model Integration for Services (CMMI-SVC)

A capability maturity model allows an organisation to assess its ability to accomplish defined tasks, against different maturity levels, along an evolutionary pathway (CMMI, 2010).

Capability Maturity Model Integration (CMMI) models originated from the aim to improve the usability of existing maturity models by integrating different models into one framework (CMMI, 2010). They are collections of best practices that help organisations to improve their processes and were developed by the Software Engineering Institute at Carnegie Mellon University, which formed a new organisation, the CMMI Institute, which was subsequently acquired by ISACA. CMMI is widely adopted by firms involved in software development (Cater-Steel et al., 2006). The four CMMI models are (CMMI Institute, 2018):

- CMMI for Development (CMMI-DEV) – provides best practices which improve business performance and organized by critical business capabilities, such as product development and engineering, quality, and managing business resilience.

- CMMI for Acquisition (CMMI-ACQ) – provides best practices which improve performance and capabilities for organisations that want to maximize supply chain efficiency.

- CMMI for Services (CMMI-SVC) – provides best practices which improve performance and capabilities for organisations that want to produce, deliver, and maintain a quality services management environment.

- People Capability Maturity Model (PCMM) – provides best practices for improving the capability of an organisation's workforce.

CMMI-SVC is therefore the model to use to improve processes for providing better services. It builds on the concepts and practices of CMMI and other service-oriented standards and models, including ISO/IEC 20000, ITIL, COBIT and ITSCMM (Information Technology Services Capability Maturity Model) (CMMI, 2010).

CMMI-SVC provides two approaches to improvement paths using levels: one allows organisations to progressively improve processes corresponding to one or more process areas; the other enables organisations to improve a set of associated

processes by progressively addressing successive sets of process domains (CMMI, 2010). The first is referred to as the continuous representation which enables one to achieve "capability levels" (of which there are four), and the second as the staged representation which enables one to achieve "maturity levels" (of which there are five). All goals of a process area, or set of process areas, must be satisfied in order to reach a particular level. The two types of levels are compared in Table 2.2.

Table 2.2. Comparison of Capability and Maturity Levels (CMMI, 2010)

Level	Continuous Representation Capability Levels	Staged Representation Maturity Levels
Level 0	Incomplete: A process that either is not performed or is partially performed.	
Level 1	Performed: A process that accomplishes the needed work to produce work products; the specific goals of the process area are satisfied.	Initial: Processes are usually ad hoc and chaotic. The organisation usually does not provide a stable environment to support processes. Success in these organisations depends on the competence and heroics of the people in the organisation and not on the use of proven processes
Level 2	Managed: A performed process that is planned and executed in accordance with policy; employs skilled people having adequate resources to produce controlled outputs; involves relevant stakeholders; is monitored, controlled, and reviewed; and is evaluated for adherence to its process description.	Managed: Work groups, work activities, processes, work products, and services are managed. The service provider ensures that processes are planned in accordance with policy. To execute the process, the service provider provides adequate resources, assigns responsibility for performing the process, trains people on the process, and ensures the designated work products of the process are under appropriate levels of configuration management.
Level 3	Defined: A managed process that is tailored from the organisation's set of standard processes according to the organisation's tailoring guidelines; has a maintained process description; and contributes process related assets to the organisational process assets	Defined: Service providers use defined processes for managing work. They embed tenets of project and work management and services best practices, such as service continuity and incident resolution and prevention, into the standard process set. The service provider verifies that selected work products meet their requirements and validates services to

		ensure they meet the needs of the customer and end user
Level 4		Quantitatively Managed: Service providers establish quantitative objectives for quality and process performance and use them as criteria in managing processes. Quantitative objectives are based on the needs of the customer, end users, organisation, and process implementers. Quality and process performance is understood in statistical terms and is managed throughout the life of processes
Level 5		Optimising: An organisation continually improves its processes based on a quantitative understanding of its business objectives and performance needs. The organisation uses a quantitative approach to understand the variation inherent in the process and the causes of process outcomes.

CMMI-SVC has 24 process areas organised into four categories for the *continuous representation*: Process Management, Project and Work Management, Service Establishment and Delivery, and Support. For the *staged representation*, process areas are grouped by maturity level, indicating which process areas to implement to achieve each maturity level (Table 2.3) (CMMI, 2010).

Table 2.3. CMMI-SVC Process Areas, Categories, and Maturity Levels (CMMI, 2010)

Process Area	Category	Maturity Level
Capacity and Availability Management (CAM)	Project and Work Management	3
Causal Analysis and Resolution (CAR)	Support	5
Configuration Management (CM)	Support	2
Decision Analysis and Resolution (DAR)	Support	3
Incident Resolution and Prevention (IRP)	Service Establishment and Delivery	3
Integrated Work Management (IWM)	Project and Work Management	3
Measurement and Analysis (MA)	Support	2

Organisational Process Definition (OPD)	Process Management	3
Organisational Process Focus (OPF)	Process Management	3
Organisational Performance Management (OPM)	Process Management	5
Organisational Process Performance (OPP)	Process Management	4
Organisational Training (OT)	Process Management	3
Process and Product Quality Assurance (PPQA)	Support	2
Quantitative Work Management (QWM)	Project and Work Management	4
Requirements Management (REQM)	Project and Work Management	2
Risk Management (RSKM)	Project and Work Management	3
Supplier Agreement Management (SAM)	Project and Work Management	2
Service Continuity (SCON)	Project and Work Management	3
Service Delivery (SD)	Service Establishment and Delivery	2
Service System Development (SSD)	Service Establishment and Delivery	3
Service System Transition (SST)	Service Establishment and Delivery	3
Strategic Service Management (STSM)	Service Establishment and Delivery	3
Work Monitoring and Control (WMC)	Project and Work Management	2
Work Planning (WP)	Project and Work Management	2

CMMI-SVC is also more about *what* needs to be done rather than *how* to implement ITSM, and it is often used to assess the state of ITSM in order to implement what is missing (Jurhs, 2009; Marrone & Kolbe, 2011; Melendez et al., 2016; Pereira & Mira Da Silva, 2011).

2.2.7 FitSM

FitSM was designed to be compatible with ISO/IEC 20000-1 and ITIL, but it is also suited for distributed services, especially federated environments (FitSM, 2014). FitSM describes itself as "a standard for lightweight IT service management". Introduced in

2014 (Söllner, n.d.), it originated from a project co-funded by the European Commission. Unlike some of the other frameworks, all parts of the standard and related material are free and licenced under a Creative Commons International License. Even though it has been only fairly recently introduced, it is starting to be recognised in the ITSM field (Appleton, Brenner, Schaaf, & Tortonesi, 2016; Bekkhus, 2016; Nylund, 2016).

FitSM considers 14 core processes in its process model (Table 2.4). For each process there are a number of implementation requirements (FitSM, 2016c), and further guidelines are provided on the activities needed to set up and implement ITSM using these processes (FitSM, 2016d).

Table 2.4. Core Processes of the FitSM Process Model (FitSM, 2016b)

Process	Objective
Service Portfolio Management (SPM)	To define and maintain a service portfolio
Service Level Management (SLM)	To maintain a service catalogue, and to define, agree and monitor service levels with customers by establishing meaningful service level agreements (SLAs) and supportive operational level agreements (OLAs) and underpinning agreements (UAs) with suppliers
Service Reporting Management (SRM)	To specify all service reports and ensure they are produced according to specifications in a timely manner to support decision-making
Service Availability and Continuity Management (SACM)	To ensure sufficient service availability to meet agreed requirements and adequate service continuity
Capacity Management (CAPM)	To ensure sufficient capacities are provided to meet agreed service capacity and performance requirements
Information Security Management (ISM)	To manage information security effectively through all activities performed to deliver and manage services, so that the confidentiality, integrity and accessibility of relevant information are preserved
Customer Relationship Management (CRM)	To establish and maintain a good relationship with customers receiving services

Supplier Relationship Management (SUPPM)	To establish and maintain a healthy relationship with suppliers supporting the service provider in delivering services to customers, and monitor their performance
Incident and Service Request Management (ISRM)	To restore normal / agreed service operation within the agreed time after the occurrence of an incident, and to respond to user service requests
Problem Management (PM)	To investigate the root causes of (recurring) incidents in order to avoid future recurrence of incidents by resolving the underlying cause, or to ensure workarounds / temporary fixes are available
Configuration Management (CONFM)	To provide and maintain a logical model of all configuration items (CIs) and their relationships and dependencies
Change Management (CHM)	To ensure changes to CIs are planned, approved, implemented and reviewed in a controlled manner to avoid adverse impact of changes to services or the customers receiving services
Release and Deployment Management (RDM)	To bundle changes of one or more CIs to releases, so that these changes can be tested and deployed to the live environment together
Continual Service Improvement Management (CSI)	To identify, prioritize, plan, implement and review improvements to services and service management

The processes can further be grouped into six main topic areas (Figure 2.6).

Figure 2.6. A Possible Grouping of the FitSM Processes (EGI, 2017)

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The FitSM standard describes the essential ITSM processes and roles and provides documentation and templates required (Figure 2.7). It also provides a capability/maturity assessment model for its processes (FitSM, 2016a).
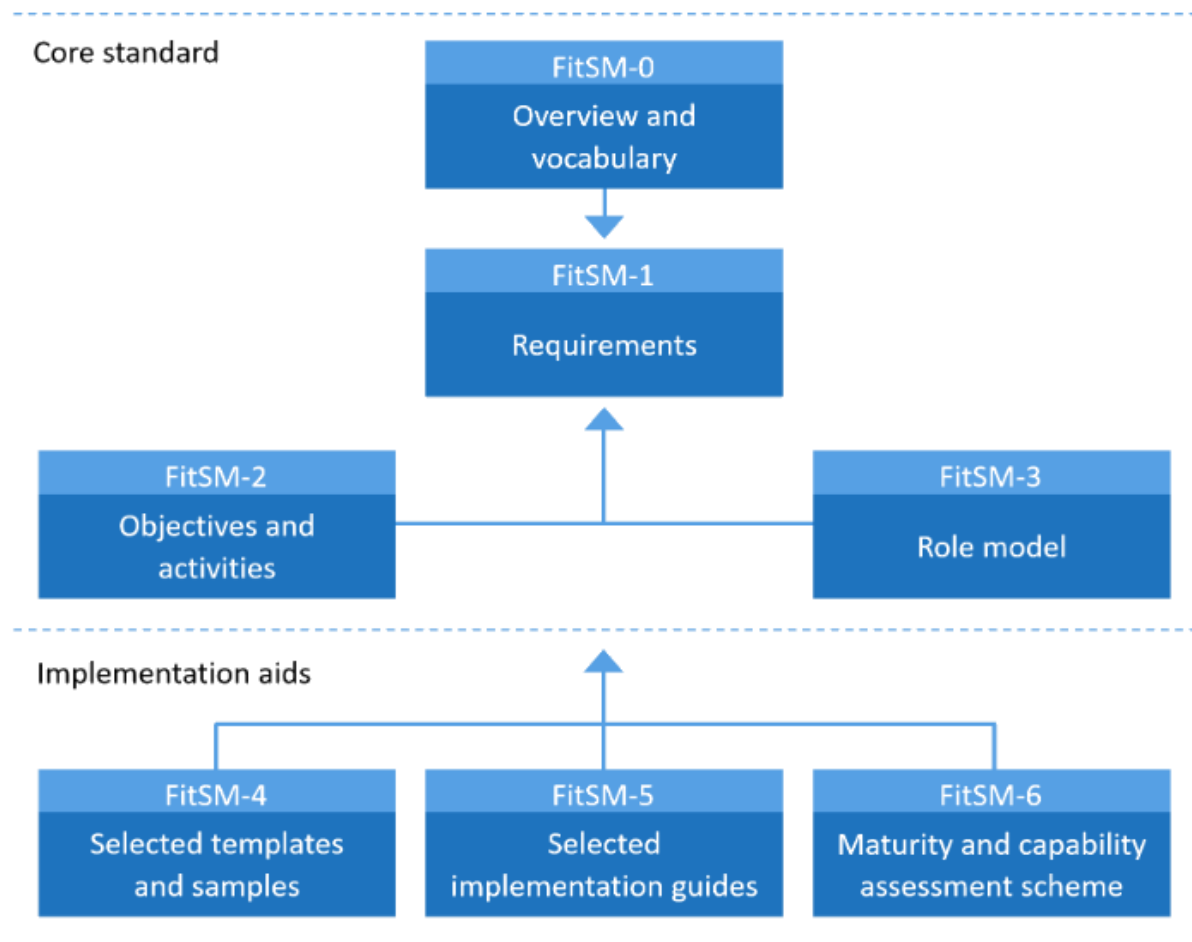
Figure 2.7. Structure of FitSM Parts (FitSM, 2016b)

Having its origin in Europe, most of its use is reported from there, for instance its use in efforts to improve operations in a consortium of the 5 largest Polish academic computer centres (Radecki, Szymocha, Szepieniec, & Różańska, 2014), as well as for better service management in the European Grid Infrastructure (EGI), a distributed computing infrastructure for research (Holsinger & Andreozzi, 2014).

Other FitSM implementations include the IFCA data center in Spain (Cotera Rodríguez, 2018), its use in lightweight security incident and event management in university environments (Ziegler, Kemmler, Brenner, & Schaaf, 2017), and service portfolio management (Prnjat, Liabotis, & Kanellopoulos, 2015).

FitSM appears to be developing into a useful ITSM framework with less complexity than ITIL and easier implementation guidelines.

2.2.8 YaSM

YaSM stands for "Yet another Service Management Model". It is mentioned here as one is bound to come across it in searches on the web. It was also introduced in 2014 and almost the only information about it can be found on its website, yasm.com. No mention of its use by organisations or case studies could be found online. According to the information provided, YaSM arose from the requests of customers for a simpler framework that is more readily understood: "*Smaller organisations, in particular, often regard frameworks like ITIL as 'too big and too complicated'*". YaSM grew out of an accredited process model for ITIL and was created from the ground up using time-tested key principles based on existing frameworks and standards such as ITIL and ISO 20000 (Kempter, 2014c). YaSM describes itself as a process model rather than another framework.

YaSM distinguishes between **service lifecycle processes** and **supporting service management processes** (Kempter, 2014a). The first are based on the PDCA cycle, and the second provide supporting functions, such as the management of configuration information, or ensuring security (Figure 2.8).
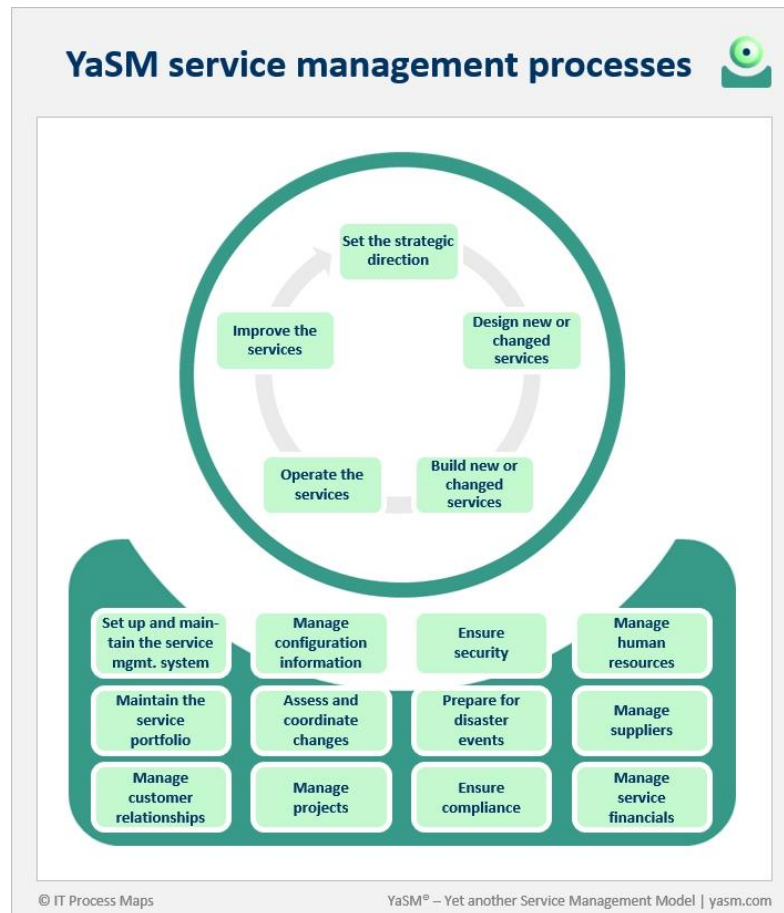
Figure 2.8. YaSM Service Management Processes (Kempter, 2014a)

Unlike ITIL, which, for instance, restricts configuration management to only the Service Transition stage of the cycle, YaSM's approach allows for the fact that configuration information is needed as an input for virtually every other process.

YaSM also defines Roles and via a responsibility assignment matrix (RACI) matrix assigns them to the various processes (Kempter, 2014e).

Although the model with most of the processes and other information is freely available, the heart of YaSM is the YaSM Process Map (Kempter, 2014b) which can be purchased. This is a set of process diagrams in three levels of detail provided in Microsoft Visio or ARIS format, and checklists and document templates in Microsoft Word format. YaSM presents everything very visually, rather than in wordy documents, which can be seen as an advantage.

The YaSM website also provides detailed information in how it compares or aligns with other standards and frameworks, such as ISO 20000, ITIL, COBIT, CMMI and USMBOK.

YaSM seems to be a well thought-out service management model in general, which is not just restricted to ITSM. It provides an interpretation of ITIL and other framework processes in a logical and concise way.

2.3 ITSM Adoption and Implementation

ITSM as a research area became popular after the turn of the century. Shahsavarani and Ji (2011) conducted a comprehensive review of publications on ITSM from 2000 to 2010 to look at the current state of ITSM research. Of 152 papers, 55.7% (67 conference proceedings and 17 journal papers) dealt with general ITSM topics such as ITIL, COBIT and ISO 20000 processes, and 34.2% (26 conference proceedings and 26 journal papers) with organisational topics such as implementation, adoption, alignment and outsourcing. The rest dealt with management concepts or disciplinary issues. Theoretical studies were few and popular topics included ITSM performance issues, justifications, and ITIL.

Research on the challenges, value and success factors of ITIL have been mainly conducted in Australia, New Zealand, the USA and Europe (Nicho & Almourad, 2012), although a number of interesting studies have also emerged from the Middle East, Asia and Africa (Ahmad & Shamsudin, 2013; Almourad & Johari, 2014; Alqahtani, 2017; Mehravani, Hajiheydari, & Haghighinasab, 2011; Seymour & Mukwasi, 2015).

A systematic literature review on ITSM, and ITIL implementation in particular, by Iden and Eikebrokk (2013) of 37 studies starting from 2005 found that the most frequently studied areas were critical success factors, implementation status, benefits and motives. Between 2005 and 2012, studies presented at conferences peaked in 2008, while journal publications peaked in 2011, with declines thereafter.

Similar trends have been observed by Mesquida, Mas, Amengual, and Calvo-Manzano (2012) and Melendez et al., (2016). A systematic review of ITSM process improvements for software process improvement (SPI) saw research peaking between 2008 and 2009 and then declining rapidly (Mesquida et al., 2012). When looking at ITSM models

applied to medium and small organisations, Melendez et al. (2016) in their systematic literature review found that research peaked in 2010 and then declined.

It thus seems that interest in academic ITSM research is waning.

During the search for publications for this literature review it was found that most research dealing with ITSM involved ITIL, which was to be expected with ITIL being the most widely used framework. Although being popular, many publications have reported problems and difficulties with implementing ITIL, as evidenced by the large number of studies on critical success factors for ITIL implementations (Mohammed, 2018). Problems often centred around understanding the ITIL framework, resistance to change and lack of resources resulting in slow progress of the implementations. ITIL success is difficult to measure and an ITIL implementation is a very challenging undertaking (Iden & Eikebrokk, 2013).

Not all organisations that adopt ITIL experience positive outcomes (Pollard & Cater-Steel, 2009). Cater-Steel and Tan (2005), for instance, noted in a survey that only 56% of the respondents were of the view that ITIL had met or exceeded their expectations. Some of these problems (for example increased workload while switching to new processes, gaining support of technical staff, changing work culture, not being able to determine return on investment) may be due to attempts to implement all or most ITIL processes (Irfandhi et al., 2016) when this may not be necessary (Botha, 2012). ITIL should not be regarded as a strict set of directives to comply with. Almourad and Johari (2014) also highlight the importance of recognising and not underestimating challenges that come before implementation, such as the uncertainty about which process to implement first, lack of top management support, process managers not identified, staff resistance to change, traditional mind-set of IT staff (technology-focused rather than customer-centric), lack of ITIL knowledge by IT staff, lack of resources dedicated to implementing ITIL, and fear of the perceived complexity of ITIL.

In practice, ITIL is often not only considered difficult to implement (Bovim et al., 2014; Lema et al., 2015), but the implementations are often long, expensive and risky (Gobel, Cronholm, & Seigerroth, 2012; Pereira & Mira Da Silva, 2010). In addition, it is not always clear in what order the processes should be implemented, and some processes are also dependent on the maturity level of others (Nicewicz-Modrzewska & Stolarski, 2008). For instance, Problem Management requires Incident Management to be at a

certain maturity level, which in turn requires the Service Desk function to be in place to gather data about incidents.

Although Service Strategy is the core of the ITIL service lifecycle, this is usually not where organisations start. While there is no set procedure for a correct ITIL process implementation sequence, many have adopted a strategy that looks for quick wins (Pollard & Cater-Steel, 2009). This usually involves the processes of Service Operation which pivot around the Service Desk, Incident and Problem Management because these improve the customer experience (Calvo-Manzano, Lema-Moreta, Arcilla-Cobián, & Rubio-Sánchez, 2015; Lema et al., 2015). Pollard et al. (2010) noted this as well, i.e. that most efforts concentrate on the final stages of the service lifecycle to better manage IT services already in operation, such as the three processes mentioned above. In a similar vein, Marrone et al.(2014) found that organisations adopting ITIL implemented more operational level processes than tactical/strategic level processes.

There is evidence to indicate that as the maturity levels of ITIL increase, there is a concomitant increase in benefits. Potgieter, Botha, and Lew (2005) found that both customer satisfaction and operational performance improved with increased use of ITIL, while Marrone and Kolbe (2011) found greater operational and strategic benefits to the organisation as the adoption of ITIL increased, as well as the levels of maturity of the Business-IT alignment.

Much of the work on ITIL has focused on determining Critical Success Factors (CSFs) to ensure the successful implementation of ITIL and early work advocated possible steps to follow. For example, Lubambo (2009) suggested a generalised 10 step approach starting off with having a clear vision and getting top management support, while Wang & Sereshki (2010) proposed a more hands-on 14 steps starting with ITIL project preparation and definition of the IT service structure.

Mohammed (2018) considers the implementation of ITIL as a paradoxical intervention as "*on the one hand, it is deemed essential for integrating IT and business processes for cost and performance efficiency, yet the radical change and paradigm shift it brings pose serious challenges to both IT and business managers*". From his own case studies and CSFs identified in previous studies, Mohammed (2018) identified 41 CSFs that have been recorded (grouping according to treatise author):

Leadership

- Top Management Support /Commitment/Ownership & Leadership
- Project Change Champions
- Use of Steering Committee
- Senior Management Knowledge of Process Orientation
- Strategic Alignment and Customer Focused
- A Contingency Based Approach
- Planned and Risk Driven Approach
- High Quality ITIL Implementation
- Learning and Knowledge Management
- ITIL Project Feasibility
- Use of Legitimate Power
- Combine ITIL with Additional Quality Standards
- Project Team Competence

Management

- Clear Goals and Objectives
- Project Management
- Management of Expectations
- Vendor Support
- Careful ITSM Software Package Selection
- Data Analysis and Conversion
- Dedicated Resources
- Business Process Reengineering
- Minimal Customization
- Architecture Choices
- Change Management
- Process Priority
- Start with Quick Wins
- Continuous Improvement
- Incremental Implementation Process

Cultural

- Interdepartmental Cooperation
- Open Interdepartmental Communication
- User Training on Software and Personal Development
- Education on New Business Processes
- Partnership with Vendor
- Use of Vendors' Tools
- Use of Consultants
- Incentives
- Organisational Readiness
- Conflict Resolution Mechanism
- ITIL Friendly Culture
- Customer-Focused Metrics and Measurements.
- Empower Employees

This highlights the complex nature of ITIL implementations that organisations face. What is noteworthy is that these CSFs are not purely technical, but involve leadership, management and cultural dimensions. This has been supported by Ahmad and Shamsudin (2013) and Alqahtani (2017) who also noted in their studies that a large number of the CSFs are not technology-based (are not vendor- or application-dependent), but rather relate to user acceptance of the framework, and that strong leadership, management and good communication are required.

This aspect was investigated in more detail by Mehravani et al. (2011) who identified seven important CSFs and used the Technology Acceptance Model (TAM) of Davis (1989) to develop a model for ITIL adoption to make sure that all factors that affect IT staff acceptance are considered. This proposed model is shown in Figure 2.9. Perceived Usefulness (PU) is "*the degree to which a person believes that using a particular system would enhance his or her job performance*", and Perceived Ease of Use (PEU) is "*the degree to which a person believes that using a particular system would be free of effort*". The different CSFs contribute to either PU or PEU and that influences the Attitude towards Use, which determines the Intention to Use ITIL. Thus, if the CSFs are carefully considered and communicated, then there is a far greater chance of user acceptance of the ITIL implementation.
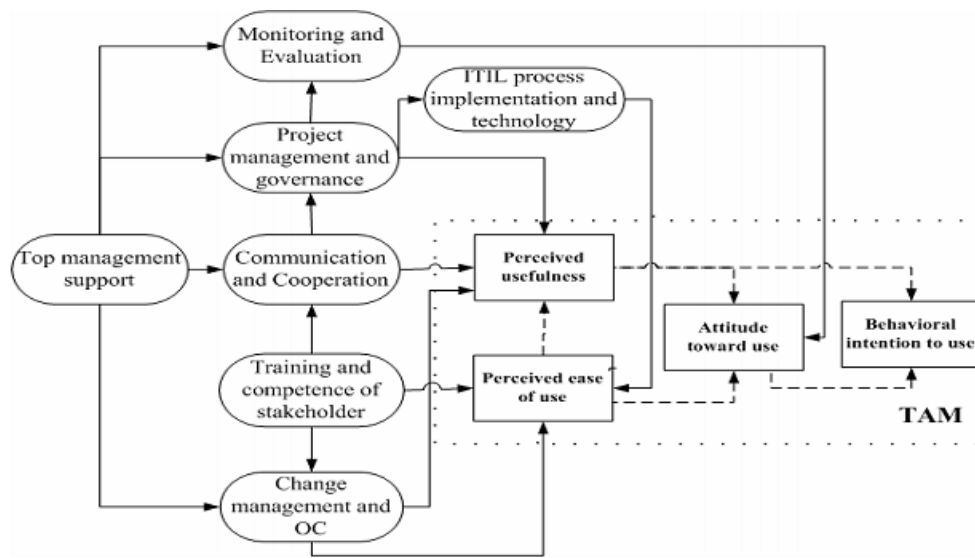
Figure 2.9. Proposed ITIL Adoption Model (Mehravani et al., 2011)

Cultural issues have also been highlighted by Seymour and Mukwasi (2015) as possibly influencing the successful implementation of ITIL, in that staff may feel intimidated by the framework as they view it as a monitoring tool. An organisational culture that does not support collaborative team work may experience difficulties as well. This cultural resistance to change is also apparent in Higher Education Institutions (HEIs) as will be discussed in the next section.

2.4 ITSM in Higher Education Institutions

Higher Education Institutions are complex organisations, requiring an IT infrastructure to support teaching and learning, research and administrative processes. Often this consists of a mix of different platforms, applications, academic and e-learning systems utilising both legacy and modern cloud technology, and COBIT and ITIL are seen as the most implemented practices for improving IT governance (Bianchi & Sousa, 2016).

In a study of seven Australian universities, Grewal (2006) found that the following were key issues in the implementation of ITIL: pre-implementation processes, which processes were implemented, the order of implementation, the hiring of external expertise, correct tool selection, staff training, ongoing assessments, managing cultural change, managing learning curve and resource strain. Bick, Börgmann and

Onuchowska (2009), looking at five European universities, found that ITIL projects conducted there were long-term projects hindered mainly by human factors such as reluctance of staff to change. Also, ITIL adoption was more likely at large universities with better skills and resources.

Problem management is not usually considered a first-choice process to implement, but Jurhs (2009) suggests it may provide a great opportunity for return on investment without costly outlays on systems and tools needed to support ITSM. Using data from 25 North American HEIs on Incident and Problem Management processes, and the utilisation of a Configuration Management Database, Jurhs (2009) reported that maturity levels were generally low and factors such as size of institution, support structure (e.g. centralised, de-centralised) and institution type (public, private) played no role in the maturity levels attained. One important result shown was that ITIL processes are often interdependent, and implementing one without the other reduces the effectiveness of a service.

The Tertiary Education and Research Network of South Africa (TENET) provides internet and information technology services to South African universities and associated research and support institutions. Between 2007 and 2009, TENET provided funding through its Developing Information Technology Capacity in Higher Education (DITCHE) project for universities to undertake ITIL (v2) training for their IT staff, in order to offer improved quality of services to customers (Crowster, 2009; Mukwasi & Seymour, 2016). In 2008, TENET, in collaboration with the Association of South African Universities Directors of Information Technology (ASAUDIT), undertook a survey to determine the status of the ITIL intervention, and some of the outcomes were referred to by Lubambo (2009) and Botha (2012) (the original information on the DITCHE project and survey no longer exist on the new TENET website, and could not be obtained elsewhere).

The results of the survey indicated that the training was undertaken enthusiastically by the 15 universities that responded. The training covered ITIL Foundation, ITIL Practitioner and ITIL Managers levels. However, only ten universities reported staff passing the Foundation level, five had qualified ITIL Practitioners, and three had qualified ITIL Managers (Botha, 2012).

In addition to referring to the above 2008 survey, Lubambo (2009) also conducted an own survey on the implementation of ITIL processes and received responses from six universities. Both surveys indicated that process maturity levels were low, and the Service Desk, Incident Management and Change Management were the main and initial processes implemented.

Both Lubambo (2009) and Botha (2012) noted that the low maturity levels obtained so far were a cause for concern going forward.

Work done by Johl, Von Solms, and Flowerday (2013) on IT governance process maturity in HEIs in South Africa, using the COBIT (4.1) framework as a measure, indicated that the average maturity levels were low: 1.8 ('repeatable but intuitive') out of a maximum of 5 ('optimised'). In the 'Delivery and Support' domain, which covers many of the typical ITSM processes, 'Manage Service Desk and Incidents' showed the average highest level of maturity reported (2.2), closely followed by 'Ensure systems security', while other ITSM processes fell below 2. They came to the conclusion that IT governance process maturity (which includes ITSM as a means to improve those maturity levels) *'do not relate to the critical nature that IT serves in the HE sector in South Africa'*.

Similar trends were observed in the 2014 Gartner Hype Cycle for Education report (Lowendahl, 2014), where ITIL had reached the 'Trough of Disillusionment'. It was noted that most educational institutions still treated ITIL as a bottom-up process engineering exercise without reframing it from a more strategic perspective. Although widely adopted, maturity levels of ITIL processes were still low and progress was slower than in other sectors. In addition, a full implementation of ITIL processes in an institution was seen as rare. This is in the face of expectations for ITSM in education becoming a proper service-based entity. Lowendahl (2014) also expected the lack in ITSM maturity to be a stumbling block as the education sector increasingly moves towards a shared-services approach. However, it was also noted that it is important to recognise that HEIs do not have, or need to have, the cultural preconditions for obtaining the highest ITSM maturity levels. The Gartner report moreover suggests that in order to keep up with changing operational needs, one looks at additional methods, such as DevOps, Agile and Lean, to support ITSM initiatives. Mukwasi and Seymour (2016), for instance, have reported on using Customer Relationship Management (CRM) to maintain contact with customers, thus strengthening the Service Level Management process.

As far as COBIT was concerned, the 2014 Gartner Hype Cycle for Education report (Lowendahl, 2014) rated its impact in the education sector as limited, with a decline in interest. It was expected that it would reach the 'Plateau of Productivity' on the Hype Cycle only in the next 10 years.

In the 2016 Gartner Hype Cycle for Education report (Lowendahl, 2016), both ITIL and COBIT had been retired from the Hype Cycle, due to the low interest shown by the education sector.

Although there is a definite waning of interest in ITIL in the education sector world-wide, this does not remove the need for ITSM in whatever form to improve the competitive business edge of HEIs. The findings for ITSM in HEIs regarding mainly ITIL (and some COBIT) implementations mirror much of what has been found in other sectors, for instance the same few processes that are implemented and the struggle to take it further.

2.5 ITSM and DevOps, Lean and Agile

It is clear that ITSM and ITIL are often regarded as synonymous, simply because of the overwhelming use of ITIL compared to other frameworks like COBIT, MOF or FitSM. For that reason, it is not surprising that any discussions around ITSM, DevOps, Lean and Agile methodologies will centre mainly on ITIL.

The current version of ITIL dates to 2011 and its best practices were not designed to deliver IT services quickly. Software development practices in the first three ITIL versions were based on the waterfall methodology and software projects delivered with this model typically take many months or years to become available to users (Barry, Mukhopadhyay, & Slaughter, 2002). Traditional ITSM methods cannot handle the recent scale and frequency of changes required in the operating environment. The traditional paradigm of ITSM believed that shorter delivery times and more regular releases led to decreased stability and quality (Forsgren & Humble, 2016).

Historically, application development generally took place in distinct silos: developers built applications and dealt with fixes, and then handed everything over to the operations team who dealt with the release, maintenance and support of the applications (Thoms, 2018). In this siloed approach, the two sections often failed to communicate, collaborate and get results, with one blaming the other for failures. To overcome this, DevOps (a

portmanteau of the words Development and Operations) evolved, which is more of a culture and approach than a framework or methodology. It has also taken on a more holistic view of ITSM and is no longer just restricted to the application development lifecycle (Majewski, 2016).

Gartner (n.d.) describes DevOps as follows: "*DevOps represents a change in IT culture, focusing on rapid IT service delivery through the adoption of agile, lean practices in the context of a system-oriented approach. DevOps emphasises people (and culture), and seeks to improve collaboration between operations and development teams. DevOps implementations utilise technology — especially automation tools that can leverage an increasingly programmable and dynamic infrastructure from a life cycle perspective.*"

Amazon Web Services (AWS, n.d.), which makes use of DevOps in its operations, provides the following definition: "*DevOps is the combination of cultural philosophies, practices, and tools that increases an organisation's ability to deliver applications and services at high velocity: evolving and improving products at a faster pace than organisations using traditional software development and infrastructure management processes. This speed enables organisations to better serve their customers and compete more effectively in the market.*"

Agile, lean and speed all feature in these descriptions. (Gartner, n.d.-b) defines Lean as "*A customer-value focused approach to the provision of effective solutions involving the consumption of a minimum of resources*". Lean methodology derives from the manufacturing industry and aims at the elimination of waste; bottlenecks in the process must be eliminated and wasteful activities identified and avoided (Pillai, Pundir, & Ganapathy, 2014).

Agile has its roots in Lean and is "*The ability to create and respond to change in order to succeed in an uncertain and turbulent environment*" (Agile Alliance, 2001). The agile software methodology emphasises close collaboration between the development team and business stakeholders, and short iterations of developing, testing and releasing functional components in sprints, rather than one long sequential development cycle (the traditional waterfall methodology).

The question now arises, do the lean and agile methods of DevOps replace ITIL? The simple answer is No; they complement each other. Although ITIL is often seen as a monolithic, rigid, process-driven framework that fails if not everything is implemented,

this is not the case. ITIL is useful for standardisation, both within and between organisations, but the DevOps approach manages to leverage human capital, drive innovation, and deliver releases to customers quicker than ITIL can do alone (Klassen, 2018).

ITIL has nine guiding principles (AXELOS, n.d.), which need to be considered when painting ITIL as an inflexible behemoth:

1. **Focus on value**: Everything the service provider does needs to map, directly or indirectly, to value for the customer and/or the organisation.

2. **Design for experience**: It is critical to retain the focus not only on business / customer value, but also on the experience that both customers and users have when they interact with the service or service provider.

3. **Start where you are**: Resist the temptation to start from scratch and build something new without considering what is already available to be leveraged.

4. **Work holistically**: No service or component stands alone.

5. **Progress iteratively**: Resist the temptation to do everything at once.

6. **Observe directly**: To know what is really going on, measure and/or observe it directly.

7. **Be transparent**: The more that people are aware of what is happening and why it is happening, then the more those people will help and fewer people will obstruct.

8. **Collaborate**: When the right people are involved in the right ways, improvements benefit from better buy-in, better relevance and better likelihood of long-term success.

9. **Keep it simple**: If a process, service, action or metric provides no value or produces no useful outcome, then eliminate it.

In other words, ITIL provides for incremental implementation and does not expect every process to be put in place. There have also been attempts to provide a 'lite' version of ITIL. Lightweight versions of ITIL are usually about picking key ITIL components and filtering out processes and unwanted components (Fry, 2010).

The requirement for ITIL and complementary practices, such as DevOps, Agile, and Lean to be used successfully together is being taken into consideration by AXELOS, and ITIL 4, scheduled for release in 2019, will promote and support dynamic collaboration between them (AXELOS, 2017).

2.6 Conclusion

ITIL is the most widely adopted framework for ITSM and is often used together with other frameworks, standards and methodologies to provide a comprehensive operational and governance environment. The size and complexity of processes and functions needed to support an IT environment has meant that many organisations have experienced problems in the way they have implemented ITIL. Much of the academic research has concentrated on critical success factors for ITIL projects, both in industry and Higher Education Institutions (HEIs). The literature indicates that maturity levels of ITSM in South African HEIs appear to be low, even after a national intervention by the Tertiary Education and Research Network in 2007. Useable alternatives to ITIL exist in the form of the Microsoft Operations Framework (MOF) and FitSM.

Chapter 3 provides an overview of the research paradigm and methodology followed to attain the research objectives.

CHAPTER 3: RESEARCH DESIGN

3.1 Introduction

The literature review in Chapter 2 reflected on ITSM standards, frameworks, methodologies and processes, as well as their adoption and application in industry and Higher Education Institutions.

The purpose of this chapter is to describe the research approach followed in solving the real-world problem identified, namely that Higher Education Institutions often fail to improve their ITSM maturity levels after the initial implementation. A particular research paradigm is proposed in Section 3.2 to produce an artefact that is considered to be a viable research contribution. A suitable research methodology is suggested in Section 3.3 and the related research methods are discussed in Section 3.4.

3.2 Research Paradigm

From the literature review in the Chapter 2, it is clear that ITSM has been widely adopted by organisations over the last 20 years. Many of them have experienced difficulties, both financially and in human resource requirements, in realising the full range of IT service management offerings. Large organisations are obviously more capable of achieving higher levels of ITSM maturity and capability. HEIs can be seen as large organisations considering the number of students and staff associated with them, but one may argue that in South Africa very few have the resources of comparable institutions elsewhere. Therefore, their IT environment is more similar to that of small, medium and micro-sized enterprises (SMMEs), where a small number of specialised IT staff have multiple roles and responsibilities across the ITSM spectrum.

In order to improve and expand the ITSM maturity and capability in such an environment, it may be of benefit to develop a strategy that allows HEIs (and SMMEs) with limited resources to achieve this by avoiding the problems often experienced by others in the past. *"The purpose of good strategy is to offer a potentially achievable way of surmounting a key challenge"* (Rumelt, 2012).

The research paradigm that was followed is that of design science research. Unlike natural science, which deals with "real, independently prevailing natural phenomena", design science is about "materially objectified man-made things" or "humanly designed, socially objectified vehicles of functional meaning" (Beckman, 2001), in other words "the

science of the artificial and production of artefacts". Design science research therefore aims at creating knowledge by designing artefacts.

Van Aken (2004) lists the following as characteristics of design science research:

a) Research questions are driven by field problems.

b) There is an emphasis on solution-oriented knowledge, linking interventions or systems to outcomes, as the key to solving field problems.

c) The justification of research products is largely based on pragmatic validity.

The research question relates to the real problem of successfully implementing ITSM processes, and improving ITSM maturity levels, at HEIs, with a strategy proposed as the outcome or solution. The solution can be adjusted relative to the context in which it is applied, in other words it may not be applied in the same way in different HEIs (pragmatic validity).

Hevner, March, Park and Ram (2004) suggest seven guidelines required for good design science research:

1. Artefacts are produced.

2. They must be relevant to a given environment.

3. The artefact must yield utility and then must be evaluated.

4. Design research must provide a novel contribution.

5. Design research must balance rigor and relevance.

6. Design science is inherently iterative and enables a research process whereby a problem space is constructed and a mechanism enacted to find an effective solution.

7. Design research results must be communicated to both technical and management audiences.

The overall research process designed for this study is presented in Figure 3.1 and the individual elements will be described and discussed in the following sections. It addresses the seven guidelines of Hevner et al. (2004) as follows:

Chapter 3: Research Design
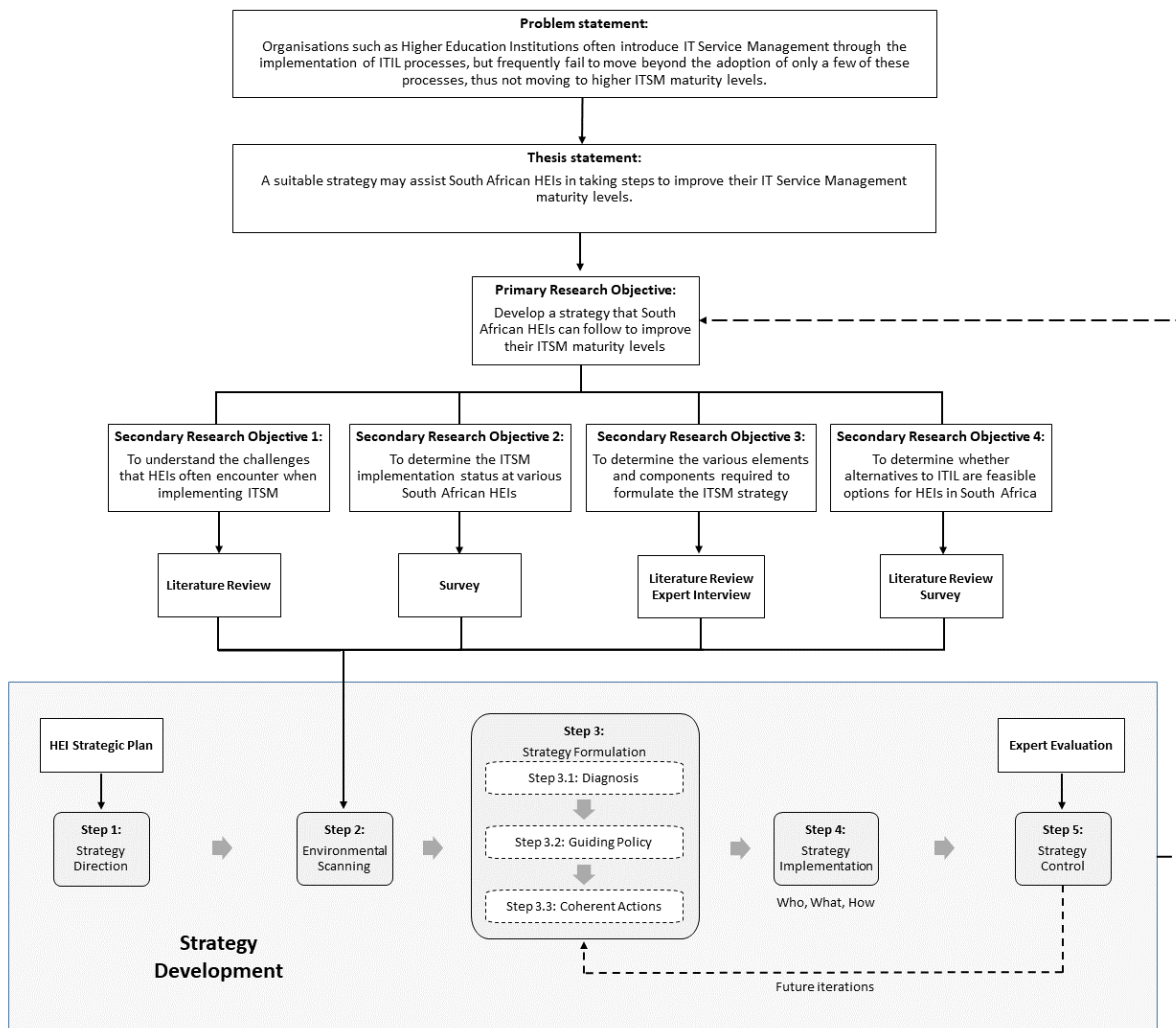
Figure 3.1: Research Process

A novel and useful artefact (the strategy) relevant to the HEI environment is produced and evaluated in a particular problem space. Rigor is provided by employing accepted research methodologies, and the strategy development model provides an iterative cycle of improvement over time. Research results will be communicated to both technical and management audiences during implementation and in publications. Venable (2010) cautions against using the guidelines of Hevner et al. (2004) as a mandatory checklist for evaluating Design Science Research projects. Rigour of evaluation should be appropriate to the stage and scope of the research, and higher levels may not be required for early stages of research.

3.3 Research Methodology

The artefact that was produced by this study is a strategy. According to Henry Mintzberg's "5 Ps for Strategy" (Mintzberg, 1987), a strategy can be:

a) A plan: an intended course of action or guidelines to deal with a situation; of moving from a current state to an envisioned future state (Iqbal & Nieves, 2007).

b) A ploy: to outwit an opponent or evoke a reaction; tactics to counter a situation (Porter, 1986).

c) A pattern: consistency in behaviour, decisions and actions over time (Iqbal & Nieves, 2007)

d) A perspective: an ingrained way of how an organisation does things, e.g. the manner in which services are provided (Iqbal & Nieves, 2007).

e) A position: as a means of locating an organisation in an "environment"; adopting a well-defined standpoint (Iqbal & Nieves, 2007).

In other words, a strategy involves a consistent and ingrained course of action to gain advantage in a situation and stake one's claim in an environment. The strategy that was developed in this study can best be described by the definition of Tsokota, Von Solms and Van Greunen (2017): "*A strategy is an all-encompassing plan, which involves the allocation of resources – in an endeavour to realise the objectives*".

How does one develop a strategy? Table 3.1 shows a comparison of steps that are considered fundamental to developing a strategy and nomenclature used by different authors (Christiansen, Yildiz, & Yildiz, 2014; Enz, 2009; Goldman & Nieuwenhuizen, 2006; Tesone, 2010).

Basically, it involves five steps as shown in Table 3.1:

- **Strategy Direction**: can be derived from the long-term objectives of an organisation and a clear understanding of the business (Enz, 2009).

- **Environmental Scanning**: this is the gathering of information (Wheelen & Hunger, 2012) often done in the form of a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) to determine factors that could potentially impact the success of the strategy.

- **Strategy Formulation**: the information obtained from the environmental assessment informs the most appropriate courses of action to take to achieve the goals.

- **Strategy Implementation**: is execution of the activities that make up the strategy (Goldman & Nieuwenhuizen, 2006).

- **Strategy Control**: involves the measuring, monitoring and corrective action to ensure that the objectives of the strategy are achieved (Wheelen & Hunger, 2012).

Table 3.1. Fundamental Steps of a Strategy Development Process

Step	Goldman & Nieuwenhuizen (2006)	Enz (2009)	Tesone (2010)	Christiansen, Yildiz & Yildiz (2014)
1	Strategy direction	Direction setting	Strategy intent	Strategy intent
2	Environmental assessment	**SWOT analysis**	**SWOT analysis**	Environmental scanning
		Internal analysis (Strengths & Weaknesses)	Internal analysis (Strengths & Weaknesses)	
		External analysis (Opportunities & Threats)	External analysis (Opportunities & Threats)	
3	Formulation	Selecting strategies	Strategy formulation	Strategy formulation
4	Implementation	Resource allocation & management	Strategy implementation	Strategy implementation
5	Control	Evaluation	Strategy control and evaluation	Strategy control and evaluation

Rumelt (2012) goes further and states that a good strategy requires a core concept that ensures actions are taken and not just formulated. This "kernel of strategy" consists of three elements, namely:

- A diagnosis that outlines the nature of the challenge

- A guiding policy to address the challenge by channelling action in a certain direction, without necessarily specifying exactly what needs to done.

- A set of coherent actions that change the guiding policy into deeds. These are the actionable steps that coordinate and build upon each other.

Tsokota et al. (2017) have taken all of the above and combined them into a strategic formulation model as follows (Figure 3.2):
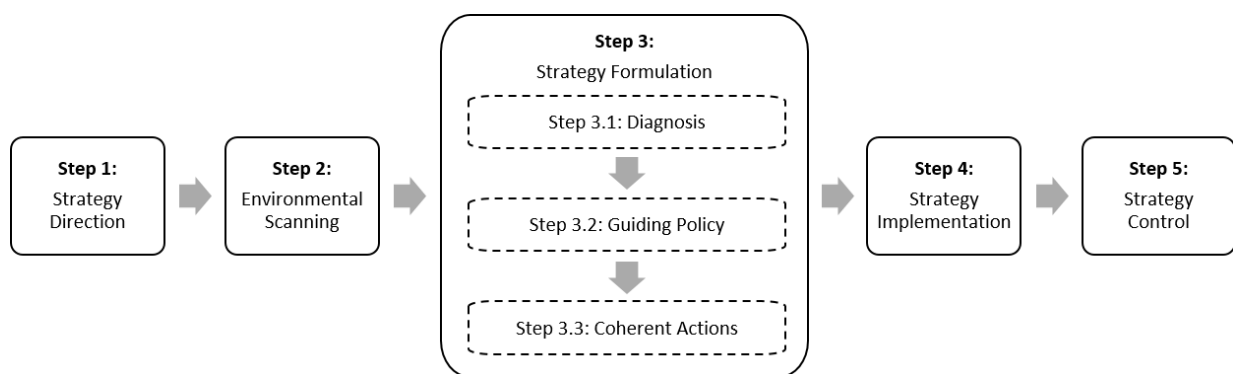
Figure 3.2. Strategic Formulation Model (adapted from Tsokota et al., 2017)

This is the approach that was followed in this study as indicated in Figure 3.1 and the research methods used for each step will be discussed in Section 3.4.

3.4 Research Methods

3.4.1 Strategy Direction

According to Enz (2009) a strategy begins with a clear understanding of the business. This includes the long-term goals, vision, mission, values and principles. These documents and statements must therefore be used to outline the strategy direction when the strategy is being developed.

3.4.2 Environmental Scanning

Zhang, Majid and Foo (2010) indicate how the initial definition of environmental scanning by Aguilar (1967), as acquiring information about events and relationships in an organisation's external environment to assist with plotting its future course, has over

time grown into an integrated information management system of obtaining, analysing and using information for decision making.

Aguilar (1967) identified four types of environmental scanning:

- **Undirected viewing** - reading for no specific purpose other than to be informed;
- **Conditioned viewing** – reading with the purpose of determining the relevance of the information to the organisation;
- **Informal searching** – searching for information in an unstructured way;
- **Formal searching** – searching in a planned way to obtain information for a specific purpose.

Morrison, Renfro, & Boucher (1984) simplified Aguilar's four types of scanning to either being passive or active. In passive scanning, the information is not used for strategic planning. Active scanning is more focused, and resources recognised for their expected wealth in the desired information are especially selected. This study makes use of active scanning.

3.4.2.1 Review of Literature

A literature review was conducted to understand the environment and help define the objectives for a solution. This assisted with the primary research objective, as well as secondary research objectives SRO1 (to understand the challenges that HEIs often encounter when implementing ITSM), SRO3 (to determine the various elements and components required to formulate the ITSM strategy) and SRO4 (to determine whether alternatives to ITIL are feasible options for HEIs in South Africa).

3.4.2.2 Survey (Questionnaire)

Survey research is a method using standardized questionnaires to collect data in a systematic manner and can be used for descriptive, exploratory, or explanatory research (Bhattacherjee, 2012). To address SRO2 (to determine the ITSM implementation status at various South African HEIs) and SRO4 (to determine whether alternatives to ITIL are feasible options for HEIs in South Africa), a survey was carried out on the maturity level of ITSM in IT departments at South African universities. This recorded their experiences in implementing ITSM (Appendix C: ITSM Maturity Survey).

The survey was structured in the following way: the purpose of the survey was explained and a section gathered general institutional information. This was followed by questions about the ITSM Framework used at the institution and their experience in implementing

the framework. Further questions gathered information on the maturity levels of processes and functions, and their implementation order. A section dealt specifically with the ITIL Configuration Management Database and the survey finished off with some general questions about the ITSM environment.

Once the strategy was developed, the three experts described in Section 3.4.2.3 were subsequently asked to evaluate it through a second, separate online assessment survey to determine its quality, utility and efficacy (Appendix F: Strategy Evaluation Survey).

3.4.2.3 Expert Interviews

Opinions from a sample of experts are considered more credible and Bhattacherjee (2012) describes expert sampling as a technique where respondents are chosen in a non-random manner based on their expertise in the field under study. To address SRO3 (to determine the various elements and components required to formulate the ITSM strategy), expert interviews were conducted with three IT department management staff involved with the historical ITSM implementation at the Nelson Mandela University. This was done to leverage their experience of the implementation process and determine how the implementation fared in order to inform the development of the strategy. One of the experts was involved from a strategic managerial aspect in effecting the overall ITSM project, the second expert dealt with putting into practice a specific subset of ITIL processes from a managerial perspective, and the third was a specialist who experienced the project from a technical implementation point of view and later took over the management of certain processes.

Thematic analysis was used to examine the results. When analysing expert interviews, attention is given to thematic units or excerpts with similar topics spread across interviews (Bogner, Littig, & Menz, 2009; DeSantis & Ugarriza, 2000). According to Braun and Clarke (2006), the purpose of thematic analysis is to identify, evaluate and report on patterns found in data. An inductive approach was used to identify themes, which means that they are closely related to the data themselves rather than imposed by the researcher, and there may be little relationship between specific questions asked of the interviewees and the themes identified (Braun & Clarke, 2006; Nowell, Norris, White, & Moules, 2017).

3.4.2.4 Data Collection and Analysis

The main sources of literature for the review were online databases such as Emerald, Sage, ScienceDirect, Scopus, SpringerLink and Taylor & Francis; Google Scholar searches; and white papers by the ITSM industry.

The online survey tool, QuestionPro (www.questionpro.com), was used to design and manage the survey on the ITSM maturity status (Appendix C). The sampling method was purposive and the source of the population was the directors of IT departments at South African universities. Purposive sampling is a non-probability sampling technique that is most effective when one needs to study a specialised domain containing well-informed experts (Tongco, 2007). For quantitative survey data, such as categorical data (Lickert Scales, Yes/No questions) descriptive statistics, such as frequency distribution, were used.

Incomplete and illogical survey data was removed from the data set and the built-in data analytics tools of QuestionPro were used to obtain summary and frequency distribution tables of the data. The tables were exported to Excel in order to round frequency distribution percentages to zero decimal places.

The survey was distributed through ASAUDIT (The Association of South African University Directors of Information Technology) and the general manager of ASAUDIT acted as the gatekeeper (see Appendix D).

Sampling for the expert interviews was also purposive with the selection being restricted to a very small pool of specialists within the IT department at the Nelson Mandela University who had taken part in the initial implementation of ITIL during 2007 and 2008.

All interviews were recorded electronically and then transcribed using the Temi online speech-to-text transcription service (www.temi.com).

The same survey tool (QuestionPro) was used to design the questionnaire for the assessment of the strategy by the three experts (Appendix F).

3.4.3 Strategy Formulation

Based on the literature review, survey and expert interviews, the strategy was formulated using the "kernel of strategy" as described in Section 3.3 above. Following the *diagnosis*, suggested *guiding policies* and *coherent actions* were developed.

3.4.4 Strategy Implementation

Once it was formulated, recommendations for the implementation of the strategy were presented. According to Wheelen and Hunger (2012), strategy implementation involves programs (activities needed to accomplish a plan), budgets (cost of the programs) and procedures (sequence of steps needed to do the job). In the suggested strategy, the *guiding policies* can be equated to programs, and the *coherent actions* to the procedures. In addition, the following three questions should be answered (Wheelen & Hunger, 2012):

1) Who will carry out the strategic plan?
2) What needs to change in the organisation?
3) How is everyone going to work together to do what is needed?

3.4.5 Strategy Control

In order to find out if the original goals of the strategy are being achieved, Wheelen and Hunger (2012) suggest a five-step process:

1. **Determine what to measure**: Measure the most significant elements in a consistent and objective way.

2. **Establish standards of performance**: These are measures of satisfactory performance results within a range of acceptable deviations.

3. **Measure actual performance.**

4. **Compare actual performance with the standard**: If it falls within the acceptable range, the measurement procedure ends.

5. **Take corrective action**: If the results fall outside the acceptable range, action must be taken to correct the deviance, and also to find out whether it is due to chance, incorrect processes being followed or whether the processes are suitable in the first place. The person responsible to take the remedial action also needs to be determined.

The proposed strategy was presented to the three experts for review and they were asked to validate and verify its quality, utility and efficacy through an online assessment survey. Validation assures that the strategy meets the needs of the user, while verification checks that the conditions of the strategy formulation are met (Thacker et al., 2004).

3.5 Conclusion

This chapter presented the research approach that was taken to develop the proposed strategy. It described the research paradigm and research methods employed to develop the strategy.

Chapter 4 presents the results obtained from the environmental scanning and discusses the findings.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

Chapter 3 dealt with identifying the research methodologies to be used for this research study. The chapter identified and described the research paradigm, research philosophy and how the strategy will be developed.

The primary research objective, to develop a strategy that South African Higher Education Institutions can follow to improve their ITSM maturity levels, is focused on in Chapter 4 by first addressing the secondary research objectives. Secondary research objectives SRO1 (to understand the challenges that HEIs often encounter when implementing ITSM) was addressed by the literature review.

This chapter addresses secondary research objectives SRO2 (to determine the ITSM implementation status at various South African HEIs) and SRO4 (to determine whether alternatives to ITIL are feasible options for HEIs in South Africa). This is achieved by evaluating the results that were obtained from the survey that was circulated to the South African University IT directors through ASAUDIT.

The chapter also addresses SRO3 (to determine the various elements and components required to formulate the ITSM strategy) by evaluating the expert interviews that were conducted with three IT department management staff involved with the historical ITSM implementation at the Nelson Mandela University. The interviews were conducted to establish the reasons for the ITIL processes chosen to be implemented and how the implementation fared.

After the strategy was developed, it was evaluated by the experts, who were asked to validate the quality, utility and efficacy of the proposed strategy. This is discussed in Chapter 6.

4.2 Survey on South African University ITSM Implementation Status

The survey was circulated to all 26 South African public university IT department directors via ASAUDIT. A number of reminders were sent out periodically to encourage completion of the survey. The survey required that only one response per university was necessary for reporting on its IT department's ITSM status.

Chapter 4: Results and Discussion

The survey was viewed 29 times, and in the resulting data set entries that were obviously just attempts to look at the survey without completing it, were removed (for example, only one or two of the initial demographic questions were answered, or nonsense values were entered). There were two cases where two respondents from the same IT department had answered questions. In both cases, only one had completed the full survey, and therefore the other entry was removed. Also, in both cases, the position of the respondent in the IT department who had completed the survey was higher than the one who did not.

Table 4.1 shows the final respondent statistics. Eleven respondents started the survey (a response rate of 42%) and seven completed it (a completion rate of 27%).

Table 4.1. Final Respondent Statistics

Respondent status	Count	Percentage
Population	26	
Started	11	
Response rate		42%
Completed	7	
Completion Rate		27%
Drop Outs (after starting)	4	

Four respondents dropped out from the survey, two after completing Question 9, one after completing Question 22 and one after completing Question 25 (Table 4.2). Their data is included up to the final question they completed.

Table 4.2. Drop-Out Analysis

Last Completed Question	Count
[Q9] Which ITSM standards / frameworks / methodologies do your IT department use?	2
[Q22] Maturity Levels: Continual Service Improvement	1
[Q25] Do you maintain a complete CMDB (all IT components, including their versions, constituent components and relationships)?	1

Chapter 4: Results and Discussion

4.2.1 Demographic Profile of Survey Respondents

The 11 universities that responded to the survey are listed in Table 4.3. Seven were traditional universities (offering theoretically-oriented university degrees), two were universities of technology (offering mainly vocational or career-focused undergraduate diplomas, and limited postgraduate programmes), and two were comprehensive universities (offering programmes typically of both of the other two types).

To get an idea of the sizes of the universities, the official student and staff head counts were obtained from the Higher Education Management Information System (HEMIS) reports made available by IDSC (IDSC, n.d.), and utilising data annually provided by the Department of Higher Education and Training (DHET). The latest data available was from 2016. The student to staff ratio provides a rough indication of how well a university might support its students: the lower, the better.

Table 4.3. Respondent University Type, Student and Staff Head Counts

Name	Type of University	Student Head Count (2016)*	Staff Head Count (2016)*	Student / Staff Ratio
Nelson Mandela University	Comprehensive	27780	2154	12.90
North West University	Traditional	63395	3886	16.31
Rhodes University	Traditional	8136	1322	6.15
Sol Plaatje University	Technology	703	133	5.29
Stellenbosch University	Traditional	30161	3541	8.52
University of Cape Town	Traditional	29232	4909	5.95
University of Fort Hare	Traditional	13831	968	14.29
University of the Free State	Traditional	36269	2429	14.93
University of the Witwatersrand	Traditional	37448	3231	11.59
Vaal University of Technology	Technology	19241	1146	16.79
Walter Sisulu University	Comprehensive	28581	1395	20.49

*Obtained online from PowerHEDA HEMIS reports (IDSC, n.d.)

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In the survey, the respondents were asked to provide an estimate of the number of staff and students at their university, and to provide the number of ICT staff in their department. The results are shown in Table 4.4.

Table 4.4. Respondent University Student, Staff and IT Staff Numbers

Name	Student Estimate (2018)	Staff Estimate (2018)	ICT Staff	Student / Staff Ratio	Student / IT Staff Ratio1**	Student / IT Staff Ratio2***	Staff / IT Staff Ratio3***
Nelson Mandela University	28000	3000	90	9.33	311.1	308.7	23.9
North West University	100	100	180	1.00	0.6	352.2	21.6
Rhodes University	8500	1200	48	7.08	177.1	169.5	27.5
Sol Plaatje University	1700	350	12	4.86	141.7	58.6	11.1
Stellenbosch University	31765	5242	135	6.06	235.3	223.4	26.2
University of Cape Town	30000	5000	150	6.00	200.0	194.9	32.7
University of Fort Hare	17067	934	32	18.27	533.3	432.2	30.3
University of the Free State	30000	2000	150	15.00	200.0	241.8	16.2
University of the Witwatersrand	34000	6000	100	5.67	340.0	374.5	32.3
Vaal University of Technology	20000	2500	30	8.00	666.7	641.4	38.2
Walter Sisulu University	26000	2000	27	13.00	963.0	1058.6	51.7

** Estimated Student to ICT Staff Numbers Ratio, ***2016 HEMIS Student Head Count to ICT Staff Ratio

In general, the estimates for student and staff numbers provided were fairly accurate when compared to the HEMIS data (apart for North West University, which were obviously entered incorrectly). Some of the numbers entered are also not estimates, but

seem to be accurate current figures (i.e. Stellenbosch University and University of Fort Hare). The numbers are slightly higher than the 2016 HEMIS data, which one could expect two years later.

Two Student to ICT Staff ratios are presented, the one based on the estimated 2018 student numbers, and the other on the 2016 HEMIS data. The two ratios are quite similar, except for Sol Plaatjie University which has seen more than a doubling in student numbers during this time. The 2016 Staff to ICT Staff ratio is also presented. High Student to ICT Staff, and Staff to ICT Staff, ratios may provide insight into how an IT department should leverage, or has leveraged, ITSM to provide good service to their community.

The functional level in the IT department of the respondents is shown in Table 4.5. One respondent worked on the operational level while the rest were in management and senior management positions.

Table 4.5. Functional Level of Respondents in the IT Department

Functional level	Count	Percentage
Operational	1	9%
Management	4	36%
Senior management	6	55%
Total	11	100%

The position or job title of the respondents is shown in Table 4.6 and their highest qualification in Table 4.7. All were in senior positions and their qualifications ranged from Bachelor's degree to Doctorate.

Table 4.6. Position or Job Title of Respondents in the IT Department

Position or Job Title	Count	Percentage
CIO	2	19%
Director	5	45%
Senior Manager	4	36%
Total	11	100%

Table 4.7. Highest Qualification of Respondents

Highest Qualification	Count	Percentage
NQF 4: National Certificate (Matric)	0	0%
NQF 5: Higher Certificate	0	0%
NQF 6: Diploma & Advanced Certificate	0	0%
NQF 7: Bachelor's Degree & Advanced Diploma	2	18%
NQF 8: Honours Degree & Postgraduate Diploma	2	18%
NQF 9: Master's Degree	6	55%
NQF 10: Doctoral Degree	1	9%
Total	11	100%

The length of time the respondents have been working in their IT department, and the length of time the department has been practising ITSM, is shown in Table 4.8. Only one respondent has been in their department for less than 10 years. Two-thirds of the departments have been practising ITSM for more than five years, and two have only recently started.

Table 4.8. Length of Time a) Working in IT Department b) Department Practising ITSM

	a) Working in IT		b) ITSM Practised by Department	
Years	Count	Percent	Count	Percent
1-2	0	0%	2	18%
3-5	1	9%	2	18%
6-10	0	0%	4	37%
10+	10	91%	3	27%
Total	11	100%	11	100%

The demographics indicate that the respondents should have a good grasp of the ITSM environment in their department, and that in most departments ITSM is not a new concept.

4.2.2 ITSM Frameworks Used

Table 4.9 lists the ITSM standards, frameworks or methodologies used by the respondent universities. All 11 used ITIL, five used COBIT, two used ISO/IEC 20000 and one used CMMI. One respondent mentioned that they had looked at CMMI but did not use it. Another respondent listed Service Desk Institute (SDI SDC) as an additional option they use that was not in the original survey list. As far as versions go, four respondents indicated they were using ITIL 3 and another four that they were using COBIT 5. No other versions were provided.

Table 4.9. ITSM Standards / Frameworks / Methodologies Used in IT Department

Standard / Framework / Methodology	Count	Percentage used
ITIL (version 3 specified by four respondents)	11	100%
COBIT (version 5 specified by four respondents)	5	45%
ISO/IEC 20000 Information technology — Service Management	2	18%
Capability Maturity Model Integration (CMMI)	1	9%
Service Desk Institute (SDI SDC)****	1	9%
FitSM (Standard for lightweight IT service management)	0	0%
Microsoft Operations Framework	0	0%
Universal Service Management Body of Knowledge (USMBOK)	0	0%
YaSM (Yet another Service Management Model)	0	0%
None	0	0%

****provided as a reply under 'Other'

Chapter 4: Results and Discussion

The combination of frameworks used is shown in Table 4.10. Five IT departments only used ITIL; one used ITIL in combination with CMMI; three used ITIL with COBIT; one used ITIL, COBIT and ISO\IEC 20000; and one used four frameworks, namely ITIL, COBIT, ISO\IEC 20000 and SDI. The fact that more than half of the respondents use more than one framework indicates that a single framework is usually not sufficient to meet their ITSM needs.

Table 4.10. Use of Multiple Frameworks by IT Departments

Framework combinations	Count	Percentage
Only ITIL	5	45%
ITIL and CMMI	1	9%
ITIL and COBIT	3	28%
ITIL, COBIT and ISO\IEC 20000	1	9%
ITIL, COBIT, ISO\IEC 20000 and SDI	1	9%
Total	11	100%

From this point onwards, the survey results are based on a total number of nine respondents due to two dropping out of the survey.

All nine respondents considered *"It is regarded as best practice by the industry"* as a reason for choosing their main framework (Table 4.11). Four considered the provision of formal certification as important and four made detailed comparisons before selecting their framework. Only one considered freely available documentation as important. None of the respondents selected "*No costly training was required to implement it*", implying that costly training was generally required for the frameworks selected. Two chose the framework because it was easy to implement, and two respondents noted that they were not aware of some of the other frameworks at the time of choosing their frameworks.

Table 4.11. Reasons for Choosing the Particular ITSM Framework(s)

Standard / Framework / Methodology	Count	Percentage
It is regarded as best practice by the industry	9	100%
It provides for formal certification	4	44%
After detailed comparisons, it suited our environment best	4	44%
The various processes were easy to implement	2	22%
We were not aware of some of the other frameworks listed in the previous question	2	22%
The documentation was freely available	1	11%
No costly training was required to implement it	0	0%
Other	0	0%

4.2.3 Implementation and Usage Experience

This section of the survey dealt with how the respondents experienced the implementation of ITSM in their departments. Six different factors were considered, namely planning, human, financial, capability, time and efficacy. These were coded as PFx, HFx, FFx, CFx, TFx and EFx respectively, where x are numbered statements relating to each factor. The percentages in the following frequency distributions do not always add up to 100% due to rounding.

4.2.3.1 Planning Factor

The four statements relating to the planning factor are shown in Table 4.12. Six respondents disagreed with the statement that "*Not enough planning was done before the implementation*", while two agreed and one was undecided. Eight of the respondents agreed with the statement "*We carefully selected a few processes and did not intend to implement any further as they were not needed*" and only one disagreed. Two respondent agreed with the statement "*We tried to implement as many processes as possible*", while two were undecided and five disagreed. When it came to the statement "*We never got around to implementing the other processes we had planned*" it was an even spread, four disagreed, two were undecided and three agreed.

These results indicate that during the ITSM implementation enough planning was generally done, there was a procedure of carefully selecting processes to implement although the number of processes to put in place was not always clear, and in some cases not all the processes that were planned to be put in place, were implemented.

Table 4.12. Frequency Distribution - Implementation and Usage: Planning Factor

Code	Statement	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total
PF1	Not enough planning was done before implementation	0 (0%)	6 (67%)	1 (11%)	1 (11%)	1 (11%)	9 (100%)
PF2	We carefully selected a few processes and did not intend to implement any further as they were not needed	0 (0%)	1 (11%)	0 (0%)	8 (89%)	0 (0%)	9 (100%)
PF3	We tried to implement as many processes as possible	1 (11%)	4 (44%)	2 (22%)	2 (22%)	0 (0%)	9 (100%)
PF4	We never got around to implementing the other processes we had planned	1 (11%)	3 (33%)	2 (22%)	2 (22%)	1 (11%)	9 (100%)

4.2.3.2 Human Factor

The four statements relating to the human factor are shown in Table 4.13. There was unanimous agreement with the statement "*Due to limited resources, IT staff needed to take on multiple roles and responsibilities to manage all the service processes*". The statement "*Each service process requires dedicated resources in order to do ITSM properly*" drew a mixed response, with four respondents agreeing, two being undecided, and three disagreeing. Four respondents agreed with the statement "*We did not receive enough support from management during implementation*", one was undecided and four disagreed. The response to the statement "*Interest in implementing more ITSM processes waned after a few processes were implemented*" was fairly evenly split, with four disagreeing and five agreeing.

The results for the human factor indicate that, as can be expected, resources are always an issue, and an ITSM implementation will put extra workload on existing staff. This does not mean, however that dedicated resources are always needed for each process

implemented. Ideally, management should be involved in an ITSM implementation from the start and provide full support to make it a success. Keeping the interest and momentum going in a long project, so that further ITSM processes can be put in place, is not easy, as more than half of the respondents indicated.

Table 4.13. Frequency Distribution - Implementation and Usage: Human Factor

Code	Statement	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total
HF1	Due to limited resources, IT staff needed to take on multiple roles and responsibilities to manage all the service processes	0 (0%)	0 (0%)	0 (0%)	4 (44%)	5 (56%)	9 (100%)
HF2	Each service process requires dedicated resources in order to do ITSM properly	0 (0%)	3 (33%)	2 (22%)	2 (22%)	2 (22%)	9 (100%)
HF3	We did not receive enough support from management during implementation	0 (0%)	4 (44%)	1 (11%)	3 (33%)	1 (11%)	9 (100%)
HF4	Interest in implementing more ITSM processes waned after a few processes were implemented	0 (0%)	4 (44%)	0 (0%)	3 (33%)	2 (22%)	9 (100%)

4.2.3.3 Financial Factor

The three statements relating to the financial factor are shown in Table 4.14. There was a mixed response to the statement "*The implementation turned out to be more costly than expected*". Four respondents disagreed, two were undecided and three agreed. Six respondents agreed with the statement "*We could not implement all the processes we wanted to because of limited funds*", and three disagreed. Five respondents were undecided about the statement "*We achieved cost savings by implementing the framework*", two disagreed and two agreed.

The results for the financial factor were a mixed bag, there was uncertainty whether the ITSM implementation achieved cost savings, most IT departments felt a lack funds limited their ability to introduce more processes and in two cases things turned out more expensive than expected.

Table 4.14. Frequency Distribution - Implementation and Usage: Financial Factor

Code	Statement	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total
FF1	The implementation turned out to be more costly than expected	0 (0%)	4 (44%)	2 (22%)	3 (33%)	0 (0%)	9 (100%)
FF2	We could not implement all the processes we wanted to because of limited funds	0 (0%)	3 (33%)	0 (0%)	3 (33%)	3 (33%)	9 (100%)
FF3	We achieved cost savings by implementing the framework	1 (11%)	1 (11%)	5 (56%)	2 (22%)	0 (0%)	9 (100%)

4.2.3.4 Capability Factor

The two statements relating to the capability factor are shown in Table 4.15. More than half of the respondents agreed with the statement "*Our IT staff had no problems in adapting to the requirements of the framework*". Two respondents were undecided and two disagreed. Also close to half of the respondents disagreed with the statement "*The framework turned out to be overly complicated*", with four being undecided and only one agreeing.

These results show that the IT staff were generally capable of dealing with the changes introduced by the ITSM implementation, and well within their technical expectations.

Table 4.15. Frequency Distribution - Implementation and Usage: Capability Factor

Code	Statement	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total
CF1	Our IT staff had no problems in adapting to the requirements of the framework	0 (0%)	2 (22%)	2 (22%)	5 (56%)	0 (0%)	9 (100%)
CF2	The framework turned out to be overly complicated	0 (0%)	4 (44%)	4 (44%)	1 (11%)	0 (0%)	9 (100%)

4.2.3.5 Time Factor

The two statements relating to the time factor are shown in Table 4.16. Seven respondents agreed with the statement "*It was very time-consuming to implement the framework*". One was undecided and one disagreed. The statement "*We achieved time savings by implementing the framework*" was supported by six respondents, two were undecided and one disagreed.

The results for the time factor indicate that although in most cases ITSM implementations are time-consuming, one of the benefits afterwards is that time savings in other areas can be achieved.

Table 4.16. Frequency Distribution - Implementation and Usage: Time Factor

Code	Statement	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total
TF1	It was very time-consuming to implement the framework	0 (0%)	1 (11%)	1 (11%)	7 (78%)	0 (0%)	9 (100%)
TF2	We achieved time savings by implementing the framework	0 (0%)	1 (11%)	2 (22%)	6 (67%)	0 (0%)	9 (100%)

4.2.3.6 Efficacy Factor

The three statements relating to the efficacy factor are shown in Table 4.17. Most respondents agree with the statement "*The framework serves us well*", with only two undecided and one disagreeing. Five agreed with the statement "*Our end-users have noted a great improvement in service*", three were undecided and one disagreed. None disagreed with the statement "*We would recommend the framework and our approach to others*", with six agreeing and three being undecided.

The results for the efficacy factor indicate that in general, the IT departments were positive about their ITSM implementation, feeling that they made the right choices and that the end users noticed the benefits.

Table 4.17. Frequency Distribution - Implementation and Usage: Efficacy Factor

Code	Statement	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total
EF1	The framework serves us well	0 (0%)	1 (11%)	2 (22%)	5 (56%)	1 (11%)	9 (100%)
EF2	Our end-users have noted a great improvement in service	0 (0%)	1 (11%)	3 (33%)	4 (44%)	1 (11%)	9 (100%)
EF3	We would recommend the framework and our approach to others	0 (0%)	0 (0%)	3 (33%)	5 (56%)	1 (11%)	9 (100%)

Comments that were made about the implementation and use of the ITSM framework included:

"Implementation requires deliberate resourcing and actioning. Executive buy-in is pertinent."

"We took the aspects of each framework that was best compatible with our environment. We also benchmark with the help of Gartner and HDI (Helpdesk Institute)."

"Please note that we are currently in the middle of an ITSM implementation and therefore could not provide valuable input to the survey in some areas."

"Structural changes in the organisation affected the implementation - Leadership vacuum led to gaps..."

"Had we had the support, time and dedication of people to implement ITIL it would have been very successful. We saw some of the advantages in the early stages of implementation but it did wane, particularly as the IT Director left and the new Director wasn't interested - so I have had to answer that the framework hasn't served us well because we got half way into implementing but then stopped - but what we did implement and those staff that received the ITIL training still see and use the benefits of the framework."

4.2.4 Maturity Levels of the Surveyed IT Departments

The processes covered by different ITSM frameworks tend to be similar, with some combining a few that others keep separate. For the sake of simplicity, the list of 30 ITIL (v3, 2011) processes and functions was used in the survey to determine maturity levels as it was expected that most of the respondents would be familiar with this framework. This was confirmed by the survey conducted (Table 4.9).

The five ITIL maturity levels are defined as follows (AXELOS, 2013):

Initial: *Processes or functions are ad hoc, disorganized or chaotic. There is evidence that the organisation has recognized that the issues exist and need to be addressed. There are, however, no standardised procedures or process/function management activity, and the process/function is regarded as of minor importance, with few resources allocated to it within the organisation. There are instead ad hoc approaches that tend to be applied on an individual or case-by-case basis. The overall approach to management is disorganised.*

Repeatable: "*Processes or functions follow a regular pattern. They have developed to the stage where similar procedures are followed by different people undertaking the same task. Training is informal, there is no communication of standard procedures, and responsibility is left to the individual. There is a high degree of reliance on the knowledge of individuals and therefore errors are likely. In general, activities related to the process or function are uncoordinated, irregular and directed towards process or function efficiency.*"

Defined: "*The process or function has been recognized and procedures have been standardized, documented and communicated through training. The procedures themselves are not sophisticated but are the formalisation of existing practices. It is, however, left to the individual to follow these procedures and deviations may occur. The process has a process owner, formal objectives and targets with allocated resources, and is focused on both efficiency and effectiveness. Activities are becoming more proactive and less reactive.*"

Managed: "*The process or function has now been fully recognized and accepted throughout IT. It is service-focused and has objectives and targets that are aligned with business objectives and goals. It is fully defined, managed and is becoming pre-emptive, with documented and established interfaces and dependencies with other IT*

processes. Processes and functions are monitored and measured. Procedures are monitored and measured for compliance and action taken where processes or functions appear not to be working effectively. Processes or functions are under constant improvement and demonstrate good practice. Automation and tools are increasingly used to deliver efficient operations."

Optimised: "*Leading practices are followed and automated. A self-contained continuous process of improvement is established, which has now resulted in a pre-emptive approach. IT is used in an integrated way to automate the workflow, providing tools to improve quality and effectiveness, making the organisation quick to adapt. The process or function has strategic objectives and goals aligned with overall strategic business and IT goals. These have now become 'institutionalized' as part of the everyday activity for everyone involved with the process or function."*

For each of the ITIL processes and functions (referred to as "process" or "processes" from here on), the respondents had to indicate the maturity level, or "not implemented" if it was not being used. In the case of the latter, they were also given the opportunity to indicate if the process would be implemented in the next two years. This seems to have been misinterpreted by most respondents as the majority marked every process as "Will implement in the next two years", even if they had indicated that it was already implemented. This data was therefore ignored in the analysis.

A heat map of the maturity levels is presented in Table 4.18. A heat map is a representation of data where the information is represented as colours, or shades of a colour. The ITIL processes were arranged in their lifecycle stages, and the nine institutions were arranged according to the number of processes implemented and their maturity levels.

From the results, three distinct groups of institutions could be identified:

- Institutions with entry-level ITSM environments (few ITIL processes in place, mainly at an Initial maturity level, and some at a Repeatable maturity level).
- Institutions with mid-level ITSM environments (most ITIL processes in place, many at a Repeatable maturity level).
- Institutions with mature ITSM environments (all ITIL processes in place, many at the Defined and Managed maturity level, with some even at the Optimised level).

Table 4.18. Maturity Level Heat Map of ITIL Processes and Functions

Process or Function	Institution								
	Entry-level		Mid-level			Mature			
	1	2	3	4	5	6	7	8	9
Service Strategy									
Business relationship management	N	N	I	N	R	R	R	R	R
Demand management	N	N	I	I	I	R	R	M	M
Financial management for IT services	N	N	I	I	I	D	R	M	D
Service portfolio management	N	N	I	R	I	D	M	M	D
Strategy management for IT services	N	I	I	R	I	D	R	M	R
Service Design									
Availability management	N	N	I	N	R	R	M	M	R
Capacity management	N	N	I	N	R	R	R	D	R
Design coordination	N	N	I	I	R	R	R	D	R
Information security management	N	N	I	I	R	D	M	R	D
IT service continuity management	N	N	I	I	R	D	D	M	D
Service catalogue management	N	R	I	I	R	D	M	R	D
Service level management	N	N	I	N	R	D	M	R	M
Supplier management	N	N	I	N	R	D	R	R	I
Service Transition									
Change evaluation	N	N	I	I	R	D	R	R	D
Change management	N	I	I	R	R	R	R	R	R
Knowledge management	N	N	I	I	R	R	I	R	M
Release and deployment management	N	N	I	I	R	R	R	R	R
Service asset and configuration management	N	N	I	I	R	R	R	R	I
Service validation and testing	N	N	I	I	R	R	I	R	R
Transition planning and support	N	N	I	I	R	R	I	R	R
Service Operation									
Access management	N	N	I	R	I	R	M	M	O
Application management function	N	N	I	R	I	D	R	M	R
Event management	N	N	I	I	I	D	R	M	R
Incident management	N	R	I	R	R	D	D	M	O
IT operations management function	N	I	I	I	R	D	R	M	M
Problem management	N	I	R	R	R	D	R	R	M
Request fulfilment	N	I	R	R	R	R	R	R	O
Service desk function	N	D	R	R	R	D	M	M	O
Technical management function	N	N	R	R	R	D	R	M	D
Continual Service Improvement									
Multi-step improvement process	N	N	N	I	R	D	R	R	D

(N) = Not Implemented, (I) = Initial, (R) = Repeatable, (D) = Defined, (M) = Managed, (O) = Optimised

4.2.4.1 Institutions with Entry-Level ITSM Environments

Two institutions had low numbers of processes in place and at low maturity levels. One of them was obviously the new institution that had indicated that it was in the middle of an ITSM implementation, and therefore nothing much was in place yet. The second one had only eight processes in place, concentrating on the Service Desk (at the Defined level) and immediate end-user support services such as Service Catalogue Management, Incident Management, Change Management, Problem Management and Request Fulfilment at a lower levels of maturity.

4.2.4.2 Institutions with Mid-Level ITSM Environments

This group included three institutions that had implemented most of the ITIL processes, which were mainly at the Initial or Repeatable maturity level. None were at the Defined level or above.

The heat map indicates that all three institutions concentrated on the Service Operations lifecycle stage, namely Incident Management, Problem Management, Request Fulfilment, Service Desk Function and the Technical Management Function, with 14 out of the 15 occurrences being at the Repeatable level. One of the institutions also put effort into the Service Design and Service Transition lifecycle stages, with all those services being at the Repeatable level.

4.2.4.3 Institutions with Mature ITSM Environments

Four institutions had implemented all ITIL processes, with only four occurrences being at the Initial level. All other were at least at the Repeatable level, with many also being at the Defined and Managed level, and one institution even had four processes at the Optimised level.

Most effort was put into the Service Operation lifecycle stage, but the Service Design and Service Strategy stages also received a lot of attention.

Overall, the Service Transition lifecycle stage was the least mature, indicating that these processes are generally neglected by most institutions, and the last ones to be considered when wanting to improve ITSM maturity levels. Processes such as Change Evaluation, Knowledge Management, Service Validation and Testing, and Transition Planning and Support probably seem onerous and not as easily implemented or maintained as the rest. Service Asset and Configuration Management involves the Configuration Management Database (CMDB), which is known to be difficult to keep

up-to-date (see Section 4.2.6). Processes such as Change Management, and Release and Deployment Management are often associated with the software development lifecycle, and the degree to which software development takes place within the institutions is not known, although one institution later indicated that they do not do any software development at all (see Section 4.2.7).

To conclude, it is good to note that ITSM maturity levels at South African HEIs have improved since the TENET-sponsored ITIL training initiative nearly ten years ago. The situation is not as dire as was expected from the findings of the literature review, and some institutions have obviously made an effort to improve the maturity of their ITIL process levels.

4.2.5 Process Implementation Order

From this point onwards, the survey results are based on a total number of eight respondents (see Section 4.2 for explanation).

The respondents of the survey were asked to arrange the ITIL processes and functions in the order they were implemented in their department, from earliest to latest. Only those that were actually used needed to be included in this ranking exercise.

From the results, four different approaches to the implementation of ITIL processes and functions could be determined.

4.2.5.1 No Obvious Approach

Two institutions arranged less than three processes (Table 4.19). One of these institutions was established fairly recently, and was starting off on an ITSM implementation. The respondent indicated that they were currently looking at Service Portfolio Management. The other institution indicated that they started off with their Service Catalogue, and Asset and Configuration Management, but no further processes were listed, although in the previous section they had shown that many other processes were in place.

Table 4.19. Process Implementation Order with no Obvious Theme

Institution			
1		2	
Order	Process	Order	Process
1	Service Portfolio Management (M)	1	Service Catalogue Management (R)
		2	Service Asset and Configuration Management (R)

(N) = Not Implemented, (I) = Initial, (R) = Repeatable, (D) = Defined, (M) = Managed, (O) = Optimised

4.2.5.2 Approach Focused on Quick Wins

Two other institutions concentrated on the Service Operation lifecycle stage (Table 4.20). Both started off with the Service Desk Function and Incident Management, while Problem Management and Request Fulfilment also featured for both.

These two institutions could be considered typical of institutions that took the 'low hanging fruit' approach of addressing immediate needs. Looking at the maturity levels of each, one is still at low to middle levels, while the other concentrated on perfecting the existing processes over time.

Table 4.20. Process Implementation Order Focused on Quick Wins

Institution			
3		4	
Order	Process / Function	Order	Process / Function
1	Service Desk Function (D)	1	Service Desk Function (O)
2	Incident Management (R)	2	Incident Management (O)
3	Request Fulfilment (I)	3	Knowledge Management (M)
4	Service Catalogue Management (R)	4	Problem Management (M)
5	Problem Management (I)	5	Change Management (R)
		6	Demand Management (M)
		7	Request Fulfilment (O)
		8	Multi-Step Improvement Process (D)

(N) = Not Implemented, (I) = Initial, (R) = Repeatable, (D) = Defined, (M) = Managed, (O) = Optimised

4.2.5.3 Approach Focused on Service Design and Service Operation Lifecycles

The following two institutions also concentrated on the service desk and services that support the end-user, but mixed with some processes mainly from the Service Design lifecycle stage (Table 4.21). Both have mid to low levels of maturity in these processes, and between 10 and 14 processes were listed in this exercise.

Table 4.21. Process Implementation Order Focused on Design and Operations

Institution			
5		6	
Order	Process / Function	Order	Process / Function
1	Request Fulfilment (R)	1	Incident Management (I)
2	Capacity Management (I)	2	IT Service Continuity Management (I)
3	Availability Management (I)	3	Request Fulfilment (R)
4	Service Portfolio Management (R)	4	Service Desk Function (R)
5	Service Desk Function (R)	5	Service Level Management (I)
6	Incident Management (R)	6	Service Catalogue Management (I)
7	Change Management (R)	7	Knowledge Management (I)
8	Service Catalogue Management (I)	8	Service Portfolio Management (I)
9	Service Level Management (I)	9	Event Management (I)
10	IT Service Continuity Management (I)	10	Change Management (I)
		11	Change Evaluation (I)
		12	Capacity Management (I)
		13	IT Operations Management Function (I)
		14	Financial Management for IT Services (I)

(N) = Not Implemented, (I) = Initial, (R) = Repeatable, (D) = Defined, (M) = Managed, (O) = Optimised

4.2.5.4 Approach Focused on Strategic Implementation of Processes

The last two institutions took a different approach to the others (Table 4.22). One had 14 processes and functions in place, the other 18. Both started off with processes in the Service Strategy lifecycle stage, the first one being Strategy Management for IT Services. One then carried on with Financial Management for IT Services, and the other with Business Relationship Management. Other processes then followed from the

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Service Design and Service Strategy stages. The Service Desk Function was only put in place after many other processes had been put in place already (in the one case seven and in the other nine). Information Security Management was also specifically listed. Although none of the processes or functions were rated at the Optimised level, many were at the Managed and Defined level, and the rest were at the Repeatable level. Only one process was rated at the Initial level (Service Validation and Testing).

Table 4.22. Process Implementation Order Focused on Strategic Implementation

Institution			
7		8	
Order	Process / Function	Order	Process / Function
1	Strategy Management for IT Services (R)	1	Strategy Management for IT Services (M)
2	Financial Management for IT Services (R)	2	Business Relationship Management (R)
3	Availability Management (M)	3	Service Level Management (R)
4	Access Management (M)	4	Financial Management for IT Services (M)
5	Change Management (R)	5	IT Operations Management Function (M)
6	Information Security Management (M)	6	Request Fulfilment (R)
7	IT Operations Management Function (R)	7	Service Desk Function (M)
8	Problem Management (R)	8	Service Portfolio Management (M)
9	Service Desk Function (M)	9	Service Catalogue Management (R)
10	Service Level Management (M)	10	Service Asset and Configuration Management (R)
11	Service Catalogue Management (M)	11	Technical Management Function (M)
12	Service Validation and Testing (I)	12	Access Management (M)
13	IT Service Continuity Management (M)	13	Information Security Management (R)
14	Service Portfolio Management (M)	14	IT Service Continuity Management (M)
		15	Incident Management (M)
		16	Change Management (R)
		17	Capacity Management (D)
		18	Availability Management (M)

(N) = Not Implemented, (I) = Initial, (R) = Repeatable, (D) = Defined, (M) = Managed, (O) = Optimised

The ITIL process implementation order results show that there was no common approach adopted by the institutions, although some loose patterns could be observed. Each obviously did what made sense to them at the time, while some had a definite focus.

4.2.6 Configuration Management Database

Configuration management involves identifying, tracking, and controlling the numerous components in an IT environment. These configuration items (CI) are usually stored in a database called the Configuration Management Database (CMDB), which is a core part of the Service Asset and Configuration Management process (Botha, 2015). CMDBs are notoriously difficult to build and maintain because of the sheer number of CIs that usually stored in them, the varied sources of information for the CIs and the effort required to constantly update them to remain accurate (Brenner & Gillmeister, 2014; England, 2009).

The respondents were asked whether they maintain a complete CMDB or a scaled-down version. If the answer to any of the two questions was Yes, then three further questions were asked. The results are shown in Table 4.23. As a result of one respondent dropping out after completing Question 22 and another after completing Question 25, the respondent totals in the table are 8 and 7, respectively.

Table 4.23. Use of a Configuration Management Database (CMDB)

Question	Yes	No	Total
Do you maintain a complete CMDB?	1 (12%)	7 (88%)	8 (100%)
Do you maintain a scaled-down CMDB?	2 (29%)	5 (71%)	7 (100%)
If the answer to one of the above two questions is Yes, then:			
Is it difficult to maintain all the configuration items (CIs)?	3 (100%)	0 (0%)	3 (100%)
Do you make extensive use of the information stored in the CMDB?	0 (0%)	3 (100%)	3 (100%)
Would you agree with the statement that the value of the CMDB seldom exceeds the cost of doing it?	2 (67%)	1 (33%)	3 (100%)

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Only one institution indicated that it maintained a complete CMDB, and two indicated that they maintained a scaled-down version of a CMDB. All three agreed that it was difficult to maintain the configuration items and that they did not make extensive use of the information stored in the CMDB. Two respondents agreed with the statement that the value of the CMDB seldom exceeds the cost of doing it, while one disagreed.

Only one respondent provided information on how many configuration items they stored in their CMDB (Table 4.24), which confirmed the huge numbers of items that need to be kept up-to-date.

Table 4.24. Size of the Configuration Management Database (CMDB)

Question	Number of items	Count
If you have a CMDB, approximately how many objects does it contain?	100,000 - 999,999	1

The respondents were furthermore asked whether they maintain a service catalogue. The IT Service Catalogue is a list of technology services that is made available to users, thus helping to manage their expectations. The results are shown in Table 4.25 and indicate that six of the seven institutions provide a service catalogue for their user to view.

Table 4.25. Use of a Service Catalogue

Question	Yes	No	Total
Do you maintain a service catalogue that your end-users can browse? (6 respondents, see Section 4.2 for explanation)	6 (86%)	1 (14%)	7 (100%)

The survey finished off with three open-ended questions/requests to elicit responses on the topics of DevOps, any particular software used for ITSM, and final comments on the respondents' ITSM environment.

4.2.7 DevOps

The question 'How do you see the relationship between ITSM and DevOps?' elicited replies from all seven respondents:

"There are close linkages between the two as both aim to introduce service agility and delivery."

"It fits the CSI model well." (CSI = Continual Service Improvement)

"Not relevant to us yet"

"None"

"Critical"

"We are still at early stage of DevOps implementation"

"We have implemented ITIL and COBIT but do not do any software development, we rely on standard products"

4.2.8 Software

The request 'If you make use of open source or commercial enterprise software to support your ITSM endeavours, please elaborate' had two responses:

"We have done POCs with open source and commercial packages and settled on a commercial package"

"Open Source. Easy to implement and experiment"

4.2.9 Final Comments

The request for 'Final comments on your ITSM environment' elicited two responses:

"Working well. It need resources."

"ITSM has been implemented over the past 11 years. It is not and will probably never get to the state of "optimal" but the ITSM and COBIT (governance) systems are used to continuously improve the ICT environment."

4.2.10 Conclusions Based on the Survey

The survey provided useful information on the current state of ITSM at South African HEIs. Although only a third of the HEIs responded to the survey, it could be reasonably argued that the rest will fall more or less into one of the three maturity categories identified: either entry-level, mid-level or mature. Mature does not necessarily mean that every single process has been put in place and is operating at the highest level, it means that for a particular HEI all the **relevant** ITSM processes for it to conduct its IT business successfully, are in place and are generally managed at a high level.

Due to the uneven spread of respondents from the traditional, technology and comprehensive universities, data linking the maturity levels to the type of institution, student-to-staff ratios and size of institution are not shown so as not to individually identify them. However, it can be stated that there was no obvious link between ITSM maturity level and these three metrics. The length of time an institution had practised

ITSM also bore no relation to the maturity levels. Low student to IT staff ratios and extended length of time practicing ITSM did not guarantee that ITIL maturity levels would be higher.

All nine respondents indicated that they use ITIL, but more than half of them indicated that they used other frameworks as well (Table 4.10). The secondary research objective 4 (SRO4) aims to determine whether alternatives to ITIL are feasible options for HEIs in South Africa. The results from the survey do not seem to support this as none of the institutions indicated that they used some other framework in place of ITIL. Frameworks such as COBIT and ISO 20000 are usually seen as complementary to ITIL. Some reasons that ITIL predominates in the institutions could be:

i) Other frameworks or models did not exist at the time the ITSM implementation was initiated.

ii) Institutions were unaware of the frameworks that could achieve the same result.

iii) Other frameworks that could achieve the same result do not yet have the same acceptance as ITIL. In other words, organisations have a tendency to prefer to be associated with the term "best practice".

4.3 Thematic Analysis of Expert Interviews

4.3.1 Introduction

Expert Interviews were conducted with three IT department management staff involved with the historical ITSM implementation at the Nelson Mandela University in order to obtain data that would inform the development of the strategy. Thirteen guiding questions were provided to the experts before the interview (Appendix E). Not all questions were specifically asked during the interview as the topic may have been touched upon or covered during the discussion of a previous topic.

The six step method described by Braun and Clarke (2006) was used to analyse the results:

1. Become familiar with the data
2. Generate initial codes
3. Search for themes
4. Review themes
5. Define themes
6. Write-up

4.3.2 Coding of Transcripts

The transcriptions were read a number of times and initial codes were developed and colour-coded on the printouts. The codes were then refined and combined where it made sense, and five themes were identified as shown in Table 4.26.

Table 4.26. Final Themes Identified

Theme	Codes
1: Planning and preparation	Underestimating complexity of putting processes in place
	Better planning in initial stages would have helped
	Need dedicated people to perform tasks
	Holistic approach to ITIL implementation would be better
	Look outside your box
	Get buy-in at the highest level
	Develop a service culture
	Training of IT staff beforehand is important
2: How to get management buy-in	Prepare concept documents, regular reports
	Have regular meetings
	Gather statistics to show value
	Show customer feedback
3: You have to deal with silos	Silos are a problem
	Get staff to talk to each other
	Understand how things are interrelated
	Ways to overcome silos
4: Frameworks, processes and software	Consider what is in place already
	Consider open source products
	Quick win processes
	Pros and cons of a CMDB
	Pros and cons of a Change Advisory Board
5: Dealing with the end-user	Create and explain service level agreements
	Establish the value of service management
	Need right skills and motivation from the start
	Develop policies and guidelines
	Create awareness of changes to services

4.3.3 Description of Themes

Theme 1: "Planning and preparation"

This theme describes what worked and what did not for the participants. All felt that even though planning did take place, it was not comprehensive enough. The focus was on the operational side of things to attend to issues and problems, to assist the IT department internally to improve, rather than being customer focused. They were looking at quick wins, and instead of looking only at the internal systems, it would have been better to 'look outside the box' and get the customer's view point as well. Some felt rushed into the roll-out and therefore the complexity of putting some of the processes in place was underestimated, which resulted in frustrations when things slowed down once unexpected difficulties were encountered. Also the lack of staff that could be dedicated to perform tasks was seen as a handicap. Staff had to carry on with their normal daily duties in addition to rolling out the project.

What did help a lot was that staff both on the operational and management level had attended the ITIL training freely provided via TENET, which meant that the implementation teams knew what it was all about, and the knowledge level of service management was lifted because of the awareness created. Workshops and discussions were held to try and ensure that seamless integration of the new processes took place and to consider the impact on other divisions in the IT department. These included workshops with external suppliers that provided assistance and shared knowledge of other companies implementing ITIL.

There was agreement that a holistic planning approach to an ITSM implementation would be better:

- Realise that you are delivering a service to students and staff
- Get buy-in at the highest level
- Include other departments in the planning of services
- Try to create a culture of service throughout the university
- Consider long-term effects such as loss of staff, loss of interest, loss of skills and knowledge.
- Do not look at the processes in isolation

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Theme 2: "How to get management buy-in"

This theme describes what was done to acquire Strategic Management support for the ITIL project. Support from the IT department management was no issue, but at the time the relationship between the IT department and the organisation's Strategic Management was disjoint as they did not have a Chief Information Officer or other representation at the highest level. It took a while for Strategic Management to understand and provide buy-in to the project.

Concept documents on ITSM, ITIL, risk and audit requirements were researched and prepared beforehand and provided to management to create awareness. After some of the initial processes were put in place (e.g. Service Desk), reports on metrics such as numbers of tickets opened and closed, first-call resolution, rating of service provided and customer feedback comments were submitted in regular reports to management committees so that they could see the benefits. Further awareness was created through meetings with other departments, such as Finance, who then also started talking about the IT department's initiative in higher circles.

This served the purpose of making Strategic Management aware of the fact that IT was aligning with Business, which made the project easier to understand, and therefore to support, by Strategic Management.

Theme 3: "You have to deal with silos"

This theme deals with the problem of silos within the IT department that was raised by all three experts. This made it difficult to get the ITIL processes to function as smoothly as they should. For instance, the Service Desk Function, Incident Management and Problem Management require end-user support staff, technicians and engineers to work together to provide a good service. This did not often happen at the beginning. It was important to get the different groups to talk to each other and understand the responsibilities of each and how they are dependent on each other. Instead of blaming each other for work not done, it was important for them to understand that they were working towards the same goal, namely to provide a service so that the end-user has an excellent experience.

Regular combined meetings of the teams, or a committee of representatives of the groups, were two ways to overcome these barriers.

Theme 4: "Frameworks, processes and software"

This theme focuses on the approach used to decide on which frameworks, processes and software to use. It was mentioned that various aspects of service management as defined in ITIL, COBIT and ISO 20000 were already being used, although in a way unrelated to the frameworks. Thus practices like access management, problem management, a help desk, financial management, disaster recovery, security and change management were already being performed, often using scripts and mainly open source software in a supporting function.

Although COBIT was considered the ideal way to go, there were no formal certification opportunities readily available at the time, and when TENET provided funding for certification in ITIL, it was the obvious way to go. As far as ITIL process choice was concerned, it was decided, with input from ITIL consultants, to adopt a phased and quick win approach based on existing processes. Therefore the Service Desk Function, Incident, Problem and Change Management were chosen as the initial processes to concentrate on. The project of aligning the ad-hoc processes to the ITIL framework was considered successful, keeping in mind what was mentioned in Theme 1.

One expert stated that, as part of Change Management, at a later stage a formal Change Advisory Board (CAB) was established to deal mainly with development around the ERP system. The CAB is a group of people who are tasked with evaluating changes to the IT environment. This was later abandoned as being too cumbersome, it did not work, and it became a barrier rather than an effective way of making decisions.

All three experts brought up the subject of a Configuration Management Database (CMDB). A number of attempts were made to keep one going, but the spread of information in so many different systems made it difficult to maintain and keep up-to-date. So it never delivered on its promise.

Theme 5: "Dealing with the end-user"

This theme deals with the end-user, the reason why service management is put in place in the first place. The end-user, or customer, has certain expectations from a service provided by the IT department. In order to manage expectations, a service level agreement (SLA) should be put in place for every service provided. This spells out the minimum service that the end-user can expect; for example, the service will be available

between 8:00am and 4:30pm. The SLA is not only for the benefit of the end-user, but also for the IT staff, who are made aware of what their responsibilities are with respect to the service. If service levels are adhered by the IT department, there are reputational benefits.

It is important to establish the value of service management. One needs the right skills and motivation from IT staff from the start so that the end-user does not have a bad experience. The end-user doesn't know or care about ITIL, only that a call is logged for his or her problem and how long it takes to fix it. However, it is important for the end-user to be aware and educated of the service management efforts of the IT department. This has a beneficial effect on the end-user as they now understand what is involved and what they can expect. Through policies and guidelines, limits and rules are established. Any new services being introduced, changes made to existing services, or the withdrawal of services, should be accompanied by an awareness campaign that includes email, posters, web portals, workshops and even training where required.

4.3.4 Conclusions Based on the Expert Interviews

The expert interviews have produced useful information that provided suitable input for the formulation of the strategy, and have thus contributed successfully to the secondary research objective (SRO3), which is to establish what is needed to develop such a strategy. The important points raised were:

- Consider the consumer of your service in your planning, not just yourself
- The need for dedicated staff resources to carry out the work
- The advantage of staff training before the implementation
- Ensure management buy-in and advertise successes
- Break down barriers between service groups in your department
- Look at what you have got already and start there
- Manage end-user expectations with SLAs and have awareness campaigns

Much of what was said matches up with the nine guiding principles of ITIL (AXELOS, n.d.). This endorses the idea that organisations often have similar experiences when dealing with an ITSM implementation, and that is what ITIL is: a set of best practices based on the experience of many.

4.4 Conclusion

This chapter presented and discussed the findings of the survey and the expert interviews. In Chapter 5 these findings, together with information from the literature review, are used to develop the proposed strategy.

CHAPTER 5: DEVELOPING THE STRATEGY

5.1 Introduction

The aim of the proposed strategy is to assist South African HEIs with improving their ITSM maturity levels. It is not to implement ITSM from the beginning, thus the focus is slightly different to what one could derive from the studies of critical success factors for ITIL implementations. Maturity levels can be improved in two ways, either by improving the way a particular process or function is managed, documented, measured and monitored; or by introducing one or more processes or functions not previously used.

As discussed in Section 3.3 of Chapter 3, the first of the five steps in developing a strategy according to the strategic formulation model of Tsokota et al. (2017) involves setting the strategy direction.

5.2 Strategy Direction

Each South African public higher education institution must produce (and update) a strategic plan at least every five years, and also submit an annual performance plan to the Department of Higher Education and Training (Higher Education Act, 1997, sec. 41). These documents should serve as the basis for any ITSM strategy planning and provide input for the strategy direction. They are specific to each institution and will ensure that there is alignment between the IT services chosen for improvement and the overall business goals of the institution.

The second step in the strategic formulation model comprises environmental scanning.

5.3 Environmental Scanning

The purpose of environmental scanning was to determine the state of the environment in which the strategy will operate; in other words, any weaknesses, gaps and challenges that the strategy should address in order to ensure a successful outcome. These are collectively referred to as diagnostics and are the first element of the "kernel of strategy" (Rumelt, 2012). The literature review, survey and expert interviews all served as sources of information for determining the diagnostics that shaped this strategy.

The results of the survey and the expert interviews indicated that not every institution canvassed had a problem-free implementation of their ITSM processes. Those who reported high levels of maturity are obviously not the target of the strategy that is being

proposed. Rather it is those institutions that are still at low maturity levels, some even after many years of practising ITSM, which could benefit from the strategy. With this in mind, the following were issues, to varying degrees, for some of the institutions: not enough planning was done, not finding enough time to put all planned processes in place, staff having to take on extra work, not being able to dedicate staff to manage the new processes, trying to implement too many processes at once, underestimating the cost of the implementation, available funds limiting the amount of work that could be done, the lack of management support, and some uncertainty as to whether the end-result was worth the effort from the end-user point of view.

The third step in the strategic formulation model consists of formulating the strategy by determining the diagnostics and addressing each through guiding policies and coherent actions.

5.4 Strategy Formulation

From the environmental scanning, the following diagnostics were identified:

5.4.1 Diagnosis 1 (D1): Insufficient Planning

Thorough planning ensures that what needs to be achieved is done so in an efficient and effective manner. It is important to look at the project holistically and not focus just on one aspect. To assist with proper planning, the following guiding policies (GP) and coherent actions (CA) are proposed:

a) GP1.1: Alignment

Ensure that any planned action serves the purpose of helping the business achieve its aims. Implement ITSM processes that align with the current strategic directions of the HEI. For example, if there is a move to a shared services model within the HEI, the priority may be Capacity Management, rather than other processes.

i. CA1.1.1: Determine how the intended service will benefit the business and the end-user.

View the intended service, or improvement to the service, from the end-user perspective to make sure their needs are addressed properly.

ii. CA1.1.2: Determine how the IT department will benefit internally.

In addition to benefiting the end-user, the IT department should also gain, for instance, by now automating tasks that were previously done manually.

b) GP1.2: Understand and manage the goal

Make sure there is a clear understanding about what is being proposed: is a new service or process being put in place, or is an existing one being improved?

    i. CA1.2.1: Create a proposal that outlines in detail what will be put in place and what will change.

    ii. CA1.2.2: Follow an accepted project management methodology to manage the project.

    iii. CA1.2.3: Plan in small, incremental steps

c) GP1.3: Build knowledge

Ensure that everyone involved in the project, from managers downwards, has sufficient knowledge of the subject matter to be able to make informed decisions.

    i. CA1.3.1: Establish a training schedule for the IT staff.

    ii. CA1.3.2: Promote understanding of the frameworks and methodologies being used.

5.4.2 Diagnosis 2 (D2): Complexity and Cost of Framework

The particular ITSM framework being used by the HEI may require costly payments for manuals, books and training in order to get access to information about the framework. The material may also be unnecessarily voluminous and complex to justify the cost.

a) GP2.1: Be open-minded

Make use of reference material from other frameworks that make their guidelines, documents, worksheets and spreadsheets freely available on the internet. Frameworks these days tend to align with one another, and smaller, less complicated ones may be sufficient for the needs of the HEI.

    i. CA2.1.1: Investigate the suitability of material from frameworks that provide it free of charge.

b) GP2.2: Do not start from scratch

Make use of what is already in place.

    ii. CA2.2.1: Establish if any software, scripts, policies and procedures already exist that support any elements of the proposed service or process improvement.

    iii. CA2.2.2: Establish if any IT staff already have knowledge about the service or process that could assist with its implementation or improvement

5.4.3 Diagnosis 3 (D3): Lack of Management Support

Lack of management support is usually the result of a lack of information available to them to make informed decisions.

a) GP3.1: Inform stakeholders

    The more information strategic management has available, the more likely it will be that they will support the project.

    i. CA3.1.1: Create and distribute concept documents and case studies on the subject material.

    ii. CA3.1.2: Provide a risk analysis of the proposed interventions, indicating any possible disadvantages of not putting the processes in place (or of not improving their maturity).

b) GP3.2: Manage time

    Take care of the time expectations of management by providing sufficient information on the project. This will ensure that staff have enough time to complete the project successfully.

    i. CA3.2.1: Develop a detailed project plan.

    ii. CA3.2.2: Publish progress reports.

5.4.4 Diagnosis 4 (D4): Loss of Momentum

Loss of momentum can result in interest in ITSM waning, both within the IT department and with the end-user community. Staff changes can also influence future priorities.

a) GP4.1: Awareness

    Awareness of services offered, the benefits they provide and regular feedback can ensure that interest is maintained.

    i. CA4.1.1: Create and maintain a service catalogue that end-users can access.

    ii. CA4.1.2: Obtain feedback on services from end-users via user satisfaction polls.

    iii. CA4.1.3: Establish mechanisms whereby IT staff in different sections are kept informed about all aspects of the service environment.

b) GP4.2: Assign ownership

    If no one is in charge of a service, no one will take responsibility for it.

    i. CA4.2.1: Assign service or process managers.

5.4.5 Diagnosis 5 (D5): Lack of a Service Culture

Lack of a service culture, both within the IT department and the HEI, will make it more difficult to introduce a new service process, or improve an existing one.

a) GP5.1: Break down silos

 If staff in the various sections of an IT department realise that they are working together towards a common goal, everyone benefits.

   i. CA5.1.1: Introduce practices such as DevOps and Agile.

   ii. CA5.1.2: Establish regular combined team meetings to discuss services.

   iii. CA5.1.3: Advertise and celebrate milestones and successes as a unit.

b) GP5.2: Involve the end-user

 Managing end-user expectations through awareness and education, by establishing the value and scope of the services offered will be beneficial to the service environment.

   i. CA5.2.1: Develop a general service management policy.

   ii. CA5.2.2: Establish service level agreements for each service provided.

   iii. CA5.2.3: Establish a mechanism to regularly update the end-user on the status and value of services offered.

A summary of the strategy formulation is shown in Table 5.1.

The fourth step in the strategic formulation model comprises the implementation of the strategy.

5.5 Strategy Implementation

Strategy implementation is the execution of the activities that make up the strategy (Goldman & Nieuwenhuizen, 2006). It also involves answering the three questions posed by Wheelen and Hunger (2012): Who will carry out the strategic plan? What needs to change in the organisation? How is everyone going to work together to do what is needed?

It is up the IT department of the HEI to ensure that the activities of the strategy are carried out. A person within the department with sufficient seniority and experience to carry out the strategy successfully would be the most logical person to assign the responsibility to. The IT department would have to determine what changes, if any, need to take place in the HEI, as well as how everyone will work together to achieve a

Table 5.1. Proposed Strategy Formulation for Improving ITSM Maturity Levels at HEIs

Diagnosis	Guiding Principle	Corrective Action
Diagnosis 1 (D1): Insufficient Planning	GP1.1: Alignment	CA1.1.1: Determine how the intended service will benefit the business and the end-user
		CA1.1.2: Determine how the IT department will benefit internally
	GP1.2: Understand and manage the goal	CA1.2.1: Create a proposal that outlines in detail what will be put in place and what will change
		CA1.2.2: Follow accepted project management methodology to manage the project
		CA1.2.3: Plan in small, incremental steps
	GP1.3: Build knowledge	CA1.3.1: Establish a training schedule for the IT staff
		CA1.3.2: Promote understanding of the frameworks and methodologies being used
Diagnosis 2 (D2): Complexity and Cost of Framework	GP2.1: Be open-minded	CA2.1.1: Investigate the suitability of material from frameworks that provide it free of charge
	GP2.2: Do not start from scratch	CA2.2.1: Establish if any software, scripts, policies and procedures already exist that support any elements of the proposed service or process improvement
		CA2.2.2: Establish if any IT staff already have knowledge about the service or process that could assist with its implementation or improvement
Diagnosis 3 (D3): Lack of Management Support	GP3.1: Inform stakeholders	CA3.1.1: Create and distribute concept documents and case studies on the subject material
		CA3.1.2: Provide a risk analysis of the proposed interventions, indicating any possible disadvantages of not putting the processes in place (or of not improving their maturity)
	GP3.2: Manage time	CA3.2.1: Develop a detailed project plan
		CA3.2.2: Publish progress reports
Diagnosis 4 (D4): Loss of Momentum	GP4.1: Awareness	CA4.1.1: Create and maintain a service catalogue that end-users can access
		CA4.1.2: Obtain feedback on services from end-users via user satisfaction polls
		CA4.1.3: Establish mechanisms whereby IT staff in different sections are kept informed about all aspects of the service environment
	GP4.2: Assign ownership	CA4.2.1: Assign service or process managers
Diagnosis 5 (D5): Lack of a Service Culture	GP5.1: Break down silos	CA5.1.1: Introduce practices such as DevOps and Agile
		CA5.1.2: Establish regular combined team meetings to discuss services
		CA5.1.3: Advertise and celebrate milestones and successes as a unit
	GP5.2: Involve the end-user	CA5.2.1: Develop a general service management policy
		CA5.2.2: Establish service level agreements for each service provided
		CA5.2.3: Establish a mechanism to regularly update the end-user on the status and value of services offered

successful outcome. The latter two would most likely already have been identified while considering the coherent actions for the various guiding policies, such as GP1.3: Build knowledge, GP4.2: Assign ownership, GP5.1: Break down silos, and GP5.2: Involve the end-user.

The last step in the strategic formulation model consists of the strategy control:

5.6 Strategy Control

At a HEI, the steps of strategy control should be executed through the management committee that oversees IT strategy as part of the normal governance structures in place, as required by the Higher Education Act, 1997 (Act 101 of 1997).

For the purpose of this study, strategy control is seen as the process of validation (does the strategy meet the needs of the user?) and verification (have the conditions of the strategy formulation been met?) of the strategy that was developed. The three experts who were previously interviewed, were presented with the proposed strategy and supporting documentation, and asked to assess it through an online questionnaire (Appendix F). The outcome of the survey is summarised in Section 6.2.6.

5.7 Conclusion

The steps taken to create the proposed strategy were detailed in this chapter. The strategy direction needs to be obtained from the strategic plan each South African HEI has to prepare for the Department of Higher Education and Training. Information obtained from the literature review, the survey on the status of ITSM maturity at South African HEIs, and the expert interviews, was used determine five diagnostics. From these diagnostics, 11 guiding policies and 24 coherent actions were developed to address the issues highlighted. The implementation of the proposed strategy was considered a function of the IT department of the HEI, and to be actioned through a suitably qualified person. Strategy control was deemed to be the responsibility of the IT governing committee of the HEI.

The evaluation of the proposed strategy is presented in Chapter 6.

CHAPTER 6: STRATEGY EVALUATION

6.1 Introduction

This chapter evaluates the proposed ITSM strategy that was outlined in Chapter 5. As described in Section 3.4.2.3, this was done by the three experts through an online assessment questionnaire (Appendix F). Supporting documentation about strategy development found in Section 3.3, was provided as background information before the questionnaire was completed. This allowed the experts to familiarise themselves with the subject matter.

Evaluation of an artefact, such as the proposed strategy, serves the purpose of determining how well it supports the solution to a problem (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2008). The three experts were considered suitable candidates for evaluating the quality, utility and efficacy of the proposed strategy due to their close involvement and experience with implementing ITSM processes at the Nelson Mandela University.

6.2 Analysis of Feedback from Experts

The experts were asked a number of questions relating to the quality, utility and efficacy of the proposed strategy and to indicate their response as either *'low', 'medium', 'high'* or *'very high'*. Space was provided to add comments and suggestions after each section. The results are presented by stating the question first, followed by the experts' answers and then the actions taken by the researcher in response to the feedback.

6.2.1 Confidence Levels after Studying the Proposed ITSM Strategy

This section describes how confident the experts were in understanding and potentially carrying out the strategy after studying the material provided.

Question 1: *"After studying the strategy and accompanying documentation, what is your confidence level of your understanding of the proposed strategy?"*

> **Expert 1**: *"High"*
> **Expert 2**: *"High"*
> **Expert 3**: *"High"*
>
> **Actions**: No actions were taken as all three experts expressed high levels of confidence in understanding the proposed strategy.

Question 2: *"What is your confidence level of being able to carry out the instructions of the strategy if required?"*

> **Expert 1**: *"High. The strategy is broken down into meaningful pieces of work with action items per suggested guiding policy."*
> **Expert 2**: *"High"*
> **Expert 3**: *"High"*

> **Actions**: No actions were taken as all three experts expressed high levels of confidence in being able to carry out the instructions of the proposed strategy. One expert provided a reason for rating it *"High"*.

6.2.2 Quality of the Proposed ITSM Strategy

Quality in this case refers to the degree of excellence shown by the proposed strategy.

Question 1: *"To what extent were the elements that were identified and described relevant to the strategy?"*

The answers to this question are shown in Table 6.1.

Table 6.1. Rating of the Elements of the Proposed Strategy

Element	Expert 1	Expert 2	Expert 3
Strategy Direction	High	High	Very high
Environmental Scanning	High	Very high	Very high
Strategy Formulation: Diagnosis	High	High	High
Strategy Formulation: Guiding Policies	High	Very high	High
Strategy Formulation: Coherent Actions	High	High	Very high
Strategy Implementation	High	Very high	Very high
Strategy Control	Very high	High	Very high

Actions: No actions were taken as the relevance of the elements were all rated as either "High" or "Very high".

Question 2: *"Did the strategy fulfil all the theoretical requirements as outlined in the supporting documentation?"*

> **Expert 1**: *"Yes."*
>
> **Expert 2**: *"All addressed. Detailed guidance can be found in frameworks such as ITIL."*
>
> **Expert 3**: *"Seems to cover all the requirements."*
>
> **Actions**: Based on the feedback, no actions were required.

Question 3: *"Have any guiding policies or coherent actions been left out?"*

> **Expert 1**: *"Effective Project Planning is vital and should be emphasized and used at the early stages and throughout the process."*
>
> **Expert 2**: *"Nothing obvious left out."*
>
> **Expert 3**: *"Not that I am aware of."*
>
> **Actions**: Project planning is already emphasised in Coherent Action 1.2.2. Based on the feedback from Expert 1, CA1.2.2 was amended to read:
>
> *"Follow **and promote** accepted project management methodology to manage the project."*

Question 4: *"Can any of the guiding policies or coherent actions be improved?"*

> **Expert 1:** No comment provided.
>
> **Expert 2**: *"It suffices as good guidance to start with, and individual institutions can strive to adapt and continuously improve as they go through step-wise implementation."*
>
> **Expert 3**: *"CA5.2.2 - Would suggest that this SLA be reviewed on an annual basis. Perhaps change to: Establish and review SLA for each service provided."*
>
> **Actions**: Based on the feedback from Expert 3, CA5.2.2 was amended to read:
>
> *"Establish service level agreements for each service provided **and review annually**."*

6.2.3 Utility of the Proposed ITSM Strategy

Utility refers to being useful, profitable, or beneficial.

Question 1: *"To what extent does the documentation provide sufficient information for understanding of the strategy?"*

> **Expert 1**: *"Very high"*
> **Expert 2**: *"High"*
> **Expert 3**: *"High."*

> **Actions**: Based on the feedback, no actions were required.

Question 2: *"To what extent can the strategy be easily understood and put into action?"*

> **Expert 1**: *"High"*
> **Expert 2**: *"Very high"*
> **Expert 3**: *"Very high"*

> **Actions**: Based on the feedback, no actions were required.

Question 3: *"To what extent can the strategy be used to improve ITSM maturity levels in HEIs in South Africa?"*

> **Expert 1**: *"High"*
> **Expert 2**: *"Very high"*
> **Expert 3**: *"High"*

> **Actions**: Based on the feedback, no actions were required.

Comments or Suggestions on the Utility of the Proposed Strategy:

> **Expert 1**: No comment provided.

> **Expert 2**: *"Possibly too much emphasis on diagnosis. Key success factors that may have been critical for success may have been overlooked. Even in poor implementations, some things went right because key principles were implemented."*
> **Expert 3**: *"An easily implementable strategy with work breakdown structures."*

Actions: In Section 5.1 it is mentioned that the focus of the proposed strategy is slightly different to what one could derive from the studies of critical success factors for implementations of ITIL. Therefore the emphasis is more on diagnosis than on critical success factors. Thus no actions were required.

6.2.4 Efficacy of the Proposed ITSM Strategy

Efficacy is the ability to produce a desired or intended result.

Question 1: *"How easily can a satisfactory ITSM maturity level improvement be derived from the strategy?"*

Expert 1: *"High"*

Expert 2: *"High"*

Expert 3: *"High"*

Actions: Based on the feedback, no actions were required.

Question 2: *"How effective do you consider the strategy?"*

Expert 1: *"High"*

Expert 2: *"Very high"*

Expert 3: *"High"*

Actions: Based on the feedback, no actions were required.

Question 3: *"To what extent would the strategy appeal to HEIs?"*

Expert 1: *"High"*

Expert 2: *"Very high"*

Expert 3: *"Very high"*

Actions: Based on the feedback, no actions were required.

Comments or Suggestions on the Efficacy of the Proposed Strategy:

Expert 1: No comment provided.

Expert 2: *"May appeal especially to ICT departments. Other organisational units may be less enthusiastic. The fact that the strategy framework is simple, based on principle and includes actions and controls is very appealing."*

Expert 3: No comment provided.

Actions: The proposed strategy is aimed at use by IT departments as it deals with IT Service Management. Thus no actions were required.

6.2.5 Overall Impression of the Proposed ITSM Strategy

Question 1: *"What is your overall impression of the strategy?"*

Expert 1: *"It is overarching and balanced to cover the implementation as a whole."*

Expert 2: *"Very appealing. If linked to project plans for duration of the planning cycle, and updated annually, can be very good for maintaining visibility and focus."*

Expert 3: *"What I like is that it doesn't try and mirror other service strategies like ITIL. This is a fresh perspective based on the environmental scanning and focusses on issues and solutions in the service management space of HEI."*

Actions: Based on the feedback, no actions were required.

Question 2: *"Please provide any suggested improvements to the proposed strategy."*

Expert 1: no comment provided

Expert 2: *"Link explicitly to best practice framework(s) and best practice guidelines. But that is another study in itself."*

Expert 3: No comment provided.

Actions: As the expert noted, the extent of the excellent suggestion is beyond the scope of this treatise. Therefore, no actions were required.

6.2.6 Summary of the Feedback from the Experts

All experts expressed high levels of confidence in understanding the proposed strategy from the material provided, and being able to carry out its instructions if required. All the elements used to develop the strategy were found to be relevant and fulfil the theoretical requirements as described in Section 3.3. The guiding policies and coherent actions defined in response to the five diagnostics were found to be very acceptable with only two minor alterations suggested. All felt that the strategy could be used to improve ITSM maturity levels and it was seen as easily implementable, effective and appealing to HEIs.

The proposed strategy was amended and improved by adding the suggestions made by the experts for:

Diagnosis 1 (D1): Insufficient Planning

    Guiding Policy GP1.2: Understand and manage the goal

        Coherent Action CA1.2.2: Follow **and promote** accepted project management methodology to manage the project

and

Diagnosis 5 (D5): Lack of a Service Culture

    Guiding Policy GP5.2: Involve the end-user

        Coherent Action CA5.2.2: Establish service level agreements for each service provided **and review annually**

6.2.7 Final Strategy

The final strategy for improving ITSM maturity levels at South African Higher Education Institutions can thus be summarised in four steps as follows:

Step 1: Strategy Direction

Use the strategic plan of the HEI, as required every five years by the Department of Higher Education and Training, to align the existing and planned IT services with the business goals of the HEI.

Step 2. Strategy Formulation

Use the guiding policies and coherent actions in Table 6.2 to ensure the successful rollout or improvement of new or existing ITSM processes or functions.

Table 6.2. Diagnostics, Guiding Policies and Coherent Actions

Diagnosis 1 (D1): Insufficient Planning	GP1.1: Alignment	CA1.1.1: Determine how the intended service will benefit the business and the end-user
		CA1.1.2: Determine how the IT department will benefit internally
	GP1.2: Understand and manage the goal	CA1.2.1: Create a proposal that outlines in detail what will be put in place and what will change
		CA1.2.2: Follow and promote accepted project management methodology to manage the project
		CA1.2.3: Plan in small, incremental steps
	GP1.3: Build knowledge	CA1.3.1: Establish a training schedule for the IT staff
		CA1.3.2: Promote understanding of the frameworks and methodologies being used
Diagnosis 2 (D2): Complexity and Cost of Framework	GP2.1: Be open-minded	CA2.1.1: Investigate the suitability of material from frameworks that provide it free of charge
	GP2.2: Do not start from scratch	CA2.2.1: Establish if any software, scripts, policies and procedures already exist that support any elements of the proposed service or process improvement
		CA2.2.2: Establish if any IT staff already have knowledge about the service or process that could assist with its implementation or improvement
Diagnosis 3 (D3): Lack of Management Support	GP3.1: Inform stakeholders	CA3.1.1: Create and distribute concept documents and case studies on the subject material
		CA3.1.2: Provide a risk analysis of the proposed interventions, indicating any possible disadvantages of not putting the processes in place (or of not improving their maturity)
	GP3.2: Manage time	CA3.2.1: Develop a detailed project plan
		CA3.2.2: Publish progress reports
Diagnosis 4 (D4): Loss of Momentum	GP4.1: Awareness	CA4.1.1: Create and maintain a service catalogue that end-users can access
		CA4.1.2: Obtain feedback on services from end-users via user satisfaction polls
		CA4.1.3: Establish mechanisms whereby IT staff in different sections are kept informed about all aspects of the service environment
	GP4.2: Assign ownership	CA4.2.1: Assign service or process managers
Diagnosis 5 (D5): Lack of a Service Culture	GP5.1: Break down silos	CA5.1.1: Introduce practices such as DevOps and Agile
		CA5.1.2: Establish regular combined team meetings to discuss services
		CA5.1.3: Advertise and celebrate milestones and successes as a unit
	GP5.2: Involve the end-user	CA5.2.1: Develop a general service management policy
		CA5.2.2: Establish service level agreements for each service provided and review annually
		CA5.2.3: Establish a mechanism to regularly update the end-user on the status and value of services offered

Step 3: Strategy Implementation

Assign the responsibility to carry out the strategy successfully to a person within the IT department with sufficient seniority and experience.

Answer the following questions (adapted from Wheelen & Hunger (2012)):

- Who needs to be included to carry out the strategy?
- What needs to change in the organisation?
- How is everyone going to work together to do what is needed?

Step 4: Strategy Control

The management committee that oversees IT strategy as part of the normal governance structures of the HEI must ensure that the following is carried out (adapted from Wheelen & Hunger (2012)):

1. **Determine what to measure**: What aspects of the service or function need to be measured to gauge its success? Measure the most significant elements in a consistent and objective way.

2. **Establish standards of performance**: These are measures of satisfactory performance results within a range of acceptable deviations.

3. **Measure and compare actual performance with the standard**: This can be done through regular reporting. If it falls outside the acceptable range, corrective action must be taken.

4. **Take corrective action**: Correct the deviance, and find out whether it is due to chance, incorrect processes being followed or whether the processes are suitable in the first place. The person responsible to take the remedial action also needs to be determined.

6.3 Conclusion

The assessment of the strategy showed that the impression of quality, utility and efficacy was of the highest order, with none of the experts selecting a rating of less than "High" for any of the elements that were evaluated in the survey. The strategy can therefore be considered a useful tool for Higher Education Institutions in South Africa to use when wanting to elevate their levels of IT service management maturity.

Chapter 6: Strategy Evaluation

The following chapter concludes the research by summarising the findings, describing how the research objectives were met and what research contribution has been made. It also considers limitations of the study and future research.

CHAPTER 7: CONCLUSION

7.1 Introduction

This chapter concludes the study by providing a summary of the findings. It describes how the research objectives outlined in Chapter 1 were met, what contributions were made and suggests for possible future research.

7.2 Research Summary

Chapter 1 places the research into context by describing how information technology (IT) is core to any business these days. In order to assist an organisation to achieve its goals, good IT governance can contribute by ensuring that IT processes are managed effectively and efficiently. IT Service Management (ITSM) is one approach that can assist in this respect by offering specialised organisational capabilities that provide value to customers in the form of services. Various frameworks and methodologies exist to implement ITSM, of which the most widely used is ITIL. ITIL implementations can at times be difficult for various reasons and indications were that organisations like Higher Educations Institutions (HEIs) in South Africa in particular, may find it challenging to improve their ITSM maturity levels over time. Maturity levels indicate how advanced the running and management of processes and functions have become. It is noted that a suitable strategy may be useful in assisting South African HEIs in taking steps to improve their IT Service Management maturity levels. This chapter outlines the main research objective for this study, which is to develop such a strategy. This primary research objective is addressed through a number of secondary research objectives, namely, to understand the challenges that HEIs often encounter when implementing ITSM (SRO1); to determine the ITSM implementation status at various South African HEIs (SRO2); to determine the various elements and components required to formulate the ITSM strategy (SRO3); to determine whether alternatives to ITIL are feasible options for HEIs in South Africa (SRO4); and to validate the proposed strategy by verifying its quality, utility and efficacy.

Chapter 2 presents a wide-ranging literature review on ITSM standards, frameworks and methodologies. The review also explores ITSM adoption and implementation by

organisations in general, and HEIs in particular, and how modern practices such as DevOps, Agile and Lean relate to ITSM.

Chapter 3 describes the research process followed to address the primary research objective. It begins by presenting the research paradigm of design science research that was followed, which requires an artefact to be produced, such as the strategy that is developed in this study. The chapter then presents a strategic formulation model that was used to develop the strategy and the data collection methods applied to achieve this.

Chapter 4 presents and discusses the results that were obtained from the survey of the ITSM status at South African HEIs, as well as the thematic analysis of the interviews that were held with the experts. The maturity levels of the ITIL processes at the various respondent universities show that there is a fairly large spread, covering everything from Not Implemented to Optimised. It also indicates that there has been some real progress in some institutions with regards to ITSM maturity. The themes derived from the expert interviews provide valuable information for the development of the strategy.

Chapter 5 describes the steps used to develop the strategy, based on the information obtained from the literature review, the survey and expert interviews. Five diagnostics are determined, and 11 guiding policies with 24 coherent actions are developed to address the issues highlighted.

Chapter 6 presents the results of the assessment carried out by the experts of the proposed strategy. It includes the suggestions made by the experts for the improvement of the strategy. The strategy was found by the experts to be of a high quality, useable, beneficial and able to produce the desired result.

Chapter 7 concludes the study by providing a summary of the findings in each chapter. It also describes how the research objectives were met, the research contributions that were made, and discusses possible future research.

7.3 Meeting the Research Objectives

This section describes how the research objectives were met.

7.3.1 Accomplishment of the Primary Research Objective

The primary research objective of this study was to develop a strategy that South African Higher Education Institutions can follow to improve their ITSM maturity levels. This objective was met through the accomplishment of secondary research objectives. The researcher needed to understand the challenges that HEIs often encounter when implementing ITSM; to determine the ITSM implementation status at various South African HEIs; to determine the various elements and components required to formulate the ITSM strategy; and to determine whether alternatives to ITIL are feasible options for HEIs in South Africa. From this, the strategy was developed in Chapter 5 and evaluated in Chapter 6.

7.3.2 Accomplishment of the Secondary Research Objectives

1. To understand the challenges that HEIs often encounter when implementing ITSM (SRO1) — This objective was accomplished by means of the literature review in Chapter 2, particularly Sections 2.3 and 2.4 which discussed the adoption and implementation of ITSM in organisations, and in particular HEIs. This showed that HEIs experience similar problems to other organisations.

2. To determine the ITSM implementation status at various South African HEIs (SRO2) — This objective was accomplished through the online survey submitted via ASAUDIT to the IT directors at South African HEIs, and discussed in Section 4.2 of Chapter 4. The results showed that a range of ITSM maturity levels existed at the HEIs that responded to the survey.

3. To determine the various elements and components required to formulate the ITSM strategy (SRO3) — This objective was accomplished firstly, through the literature review in general (Chapter 2), and secondly, through the expert interviews discussed in Section 4.3 of Chapter 4. The elements and components found were used to assist in the formulation of the strategy.

4. To determine whether alternatives to ITIL are feasible options for HEIs in South Africa (SRO4) — This objective was accomplished firstly, through the literature review (Section 2.2 in Chapter 2), and secondly, through the online survey discussed in Section 4.2.10 of Chapter 4. This established that practical

alternatives to ITIL exist in the form of the Microsoft Operations Framework (MOF) and FitSM, although the HEIs surveyed have not made use of them.

Together, the four secondary research objectives contribute to addressing the primary research objective of developing a strategy for improving the maturity levels of IT Service Management in Higher Education Institutions in South Africa.

7.4 Research Contributions

This study provides the following contributions:

1. A design science artefact in the form of a strategy. This strategy can be followed by Higher Education Institutions in South Africa should they wish to improve the maturity levels of their IT service management processes or functions.

2. Research findings that can result in at least two publications or conference contributions, one based on the development of the strategy including the guiding policies and coherent actions, the other discussing the status of ITSM maturity levels at South African HEIs.

3. The discovery that academic interest in ITSM has declined rapidly in the last five years and that there is a move towards agile and lean approaches to ITSM, including simplified frameworks.

7.5 Limitations and Future Research

Only a third of the HEIs of South Africa responded to the survey, with the majority being the so-called traditional universities. The reasons why the universities of technology and comprehensive universities were underrepresented is not known. Inclusion of their data could have an influence on the spread of universities listed as entry-level, mid-level or mature as far as their ITSM maturity levels are concerned.

Future research could look at convincing them to participate in a similar survey and determine if there are significant differences between university types and ITSM implementations. It would also be beneficial to conduct case studies where the strategy developed in this study is carried out in practice to determine how effective it is.

While this strategy is aimed particularly at HEIs in South Africa, there is no reason why it could not also be applied, perhaps with minor changes, to SMME's which often labour under similar constraints and challenges (Cater-Steel et al., 2006; Gobel et al., 2012;

Marrone et al., 2014). For example, the IT department may be much smaller and therefore coherent action *"CA4.1.3: Establish mechanisms whereby IT staff in different sections are kept informed about all aspects of the service environment"* may not be necessary. The strategy direction and strategy control steps would also need to be aligned with the practices of the SMME.

7.6 Epilogue

Although the review of the literature gave rise to the impression that ITSM maturity levels at South African HEIs are uniformly low, this study has shown that this is not the case, which is a very positive sign. This research project has created a useful strategy that Higher Education Institutions wanting to improve their ITSM maturity levels can easily follow.

REFERENCE LIST

Africa Check. (2018). FACTSHEET: Funding & the changing face of SA's public universities. Retrieved May 20, 2018, from https://africacheck.org/factsheets/factsheet-funding-changing-face-sas-public-universities/

Agile Alliance. (2001). What is Agile. Retrieved November 12, 2018, from https://www.agilealliance.org/agile101/

Aguilar, F. J. (1967). *Scanning the Business Environment*. New York: Macmillan.

Ahmad, N., & Shamsudin, Z. M. (2013). Systematic approach to successful implementation of ITIL. In *Procedia Computer Science* (Vol. 17, pp. 237–244).

Ahmed, M. A., & Assad, M. I. (2015). *Guidelines for ITIL Implementation: A Framework for IT Service Management, Master's thesis*. Jönköping University.

Almourad, M. B., & Johari, R. (2014). Resolution of Challenges That Are Facing Organizations before ITIL Implementation. *International Journal of Future Computer and Communication*, *3*(3), 210–215.

Alqahtani, A. S. (2017). Critical Success Factors In Implementing ITIL. *International Journal of Advanced Computer Science and Applications*, *8*(4), 230–240.

Appleton, O., Brenner, M., Schaaf, T., & Tortonesi, M. (2016). Proceedings of the 10th IEEE/IFIP International Workshop on Business-driven IT Management (BDIM 2015). USA.

AWS. (n.d.). DevOps. Retrieved November 12, 2018, from https://aws.amazon.com/devops/

AXELOS. (n.d.). ITIL® Practitioner 9 Guiding Principles. Retrieved November 13, 2018, from https://www.axelos.com/9-guiding-principles

AXELOS. (2013). ITIL Maturity Model [White paper]. Retrieved from https://www.axelos.com/getmedia/37940a44-addb-4c16-9e11-08d7773b07de/ITIL-Maturity-Model.aspx

AXELOS. (2017). AXELOS announces the planned update of ITIL® at itSMF USA Fusion 2017 conference. Retrieved November 13, 2018, from https://www.axelos.com/news/axelos-announces-update-itil-itsmf-us-fusion

Reference List

Barry, E. J., Mukhopadhyay, T., & Slaughter, S. A. (2002). Software Project Duration and Effort: An Empirical Study. *Information Technology and Management*, *3*, 113–136.

Beck, K., Beedle, M., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., Martin, R.C., Mellor, S., Schwaber, K., Sutherland, J., Thomas, D., van Bennekum, A. (2001). Manifesto for Agile Software Development. Retrieved November 4, 2018, from http://agilemanifesto.org/

Beckman, S. (2001). The nature of artifacts. In B. Dahlbom, S. Beckman, & G. B. Nilsson (Eds.), *Artifacts and Artificial Science* (pp. 45–92). Stockholm: Almqvist & Wiksell International.

Bekkhus, R. (2016). Do KPIs used by CIOs Decelerate Digital Business Transformation? The Case of ITIL. *DIGIT 2016 Proceedings*, *16*.

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices* (3rd ed.). Textbooks Collection. Retrieved June 13, 2018, from http://scholarcommons.usf.edu/oa_textbooks/3.

Bianchi, I. S., & Sousa, R. D. (2016). IT Governance Mechanisms in Higher Education. In *Procedia Computer Science* (Vol. 100, pp. 941–946). https://doi.org/10.1016/j.procs.2016.09.253

Bick, M., Börgmann, K., & Onuchowska, A. (2009). Information Technology Infrastructure Library Introduction in the Higher Education Sector - Exploration of the Use of ITIL at European Universities. In *European University of Information Systems Conference (EUNIS 2009)*. Santiago de Compostela, Spain.

Bogner, A., Littig, B., & Menz, W. (2009). *Interviewing Experts*. New York: Palgrave Macmillan.

Botha, E. (2012). *Information Technology Governance Frameworks in higher education in South Africa : A paradigm shift*. North-West University, South Africa.

Botha, J. (2015). *ITIL Foundation* (2nd ed.). getITright. VitalBook file.

Bovim, A., Johnston, K., Kabanda, S., Tanner, M., & Stander, A. (2014). ITIL adoption in South African: A Capability Maturity view. *Proceedings of the E-Skills for Knowledge Production and Innovation Conference 2014, Cape Town, South*

Africa, 49–60.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Brenner, M., & Gillmeister, M. (2014). Designing CMDB data models with good utility and limited complexity. In *2014 IEEE Network Operations and Management Symposium (NOMS)* (pp. 1–15). Krakow, Poland: IEEE.

Calvo-Manzano, J. A., Lema-Moreta, L., Arcilla-Cobián, M., & Rubio-Sánchez, J. L. (2015). How small and medium enterprises can begin their implementation of ITIL? *Revista Facultad de Ingenieria, Universidad de Antioquia*, *77*, 127–136.

Cater-Steel, A., Tan, W.-G., & Toleman, M. (2006). Challenge of adopting multiple process improvement frameworks. In *ECIS 2006 Proceedings. Paper 177*. Göteborg, Sweden.

Cater-Steel, A., & Tan, W. G. (2005). Implementation of IT infrastructure library (ITIL) in Australia: progress and success factors. In *IT Governance International Conference*. Auckland, New Zealand: Auckland University of Technology.

Cater-steel, A., & Toleman, M. (2007). The Role of Universities in IT Service Management Education. In F. Tan, J. Thong, & L. Janczewski (Eds.), *PACIS 2007: Managing Diversity in Digital Enterprises* (pp. 369–382). Auckland, NZ.

Christiansen, B., Yildiz, S., & Yildiz, E. (2014). *Handbook of Research on Effective Marketing in Contemporary Globalism*. IGI Global.

Clayton, I. M. (2012a). *The Guide to the Universal Service Management Body of Knowledge*. Service Management 101.

Clayton, I. M. (2012b). USMBOK: ITIL for the Rest of the Business? - (I Clayton in response to M Dortch). Retrieved May 5, 2018, from https://community.servicenow.com/community?id=community_blog&sys_id=fc2e2 66ddbd0dbc01dcaf3231f96196e

CMMI. (2010). CMMI for Services, Version 1.3 Improving processes for providing better services. Pittsburgh, PA: Software Engineering Institute, Carnegie Mellon University.

CMMI Institute. (2018). CMMI Institute - Capability Maturity Model Integration.

Retrieved May 6, 2018, from https://cmmiinstitute.com/cmmi

Cooper, L. (2017). ISO/IEC 20000 - Update Following International Standards
Meeting. Retrieved April 30, 2018, from https://apmg-
international.com/article/isoiec-20000-update-following-international-standards-
meeting

Cotera Rodríguez, R. (2018). Implementación de los estándares para la gestión ligera
de servicios de tecnologías de la información FitSM en el entorno del IFCA.
Retrieved May 5, 2018, from
https://repositorio.unican.es/xmlui/handle/10902/13377

Cots, S., & Casadesús, M. (2015). Exploring the service management standard ISO
20000. *Total Quality Management & Business Excellence*, *26*(5–6), 515–533.

Crowster, N. A. (2009). *Establishing a community of practice in the information
technology departments of South African higher education institutions:
Developing Information Technology Capacity in Higher Education's ITIL
programme 2007-2009, Master's dissertation*. University of the Western Cape,
South Africa.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user
acceptance of information technologies. *MIS Quarterly*, *13*(3), 319–340.

DeSantis, L., & Ugarriza, D. N. (2000). The Concept of Theme as Used in Qualitative
Nursing Research. *Western Journal of Nursing Research*, *22*(3), 351–372.

EGI. (2017). FitSM Foundation Training. Retrieved May 25, 2018, from
http://slideplayer.com/slide/12509966/

Ellis, V. (2008). Frameworks, Methodologies and Processes. Retrieved April 30, 2018,
from http://vsellis.com/frameworks-methodologies-and-processes/

England, R. (2009). *The IT Skeptic looks at CMDB*. Two Hills.

Enz, C. A. (2009). *Hospitality strategic management: Concepts and cases*. John Wiley
& Sons.

Erich, F., Amrit, C., & Daneva, M. (2014). Cooperation Between Software
Development and Operations: A Literature Review. In *Proceedings of the 8th
ACM/IEEE International Symposium on Empirical Software Engineering and*

Measurement. Torino, Italy.

FitSM. (2014). Standards for lightweight IT service management. Retrieved May 3, 2018, from https://fitsm.itemo.org/

FitSM. (2016a). FitSM-6: Assessment. Retrieved May 5, 2018, from https://fitsm.itemo.org/fitsm/6

FitSM. (2016b). Part 0: Overview and vocabulary. Retrieved May 3, 2018, from https://fitsm.itemo.org/sites/default/files/FitSM-0_Overview_and_vocabulary.pdf

FitSM. (2016c). Part 1: Requirements. Retrieved May 3, 2018, from https://fitsm.itemo.org/sites/default/files/FitSM-1_Requirements.pdf

FitSM. (2016d). Part 2: Objectives and activities. Retrieved May 3, 2018, from https://fitsm.itemo.org/sites/default/files/FitSM-2_Objectives_and_activities_v2.2.pdf

Forsgren, N., & Humble, J. (2016). DevOps: Profiles in ITSM Performance and Contributing Factors. In *Proceedings of the Western Decision Sciences Institute (WDSI).* Las Vegas, NV.

Fry, M. (2010). *ITIL lite : a road map to full or partial ITIL implementation*. TSO.

Galup, S., Quan, J., Dattero, R., & Conger, S. (2007). Information technology service management: An emerging area for academic research and pedagogical development. In *Proceedings of the 2007 ACM SIGMIS CPR Conference on Computer Personnel Research.* St. Louis, Missouri.

Gartner. (n.d.-a). DevOps - IT Glossary. Retrieved November 12, 2018, from https://www.gartner.com/it-glossary/devops/

Gartner. (n.d.-b). Lean - IT Glossary. Retrieved November 12, 2018, from https://www.gartner.com/it-glossary/lean

Gobel, H, Cronholm, S., & Seigerroth, U. (2012). Towards an Agile Method for ITSM Self-Assessment: A Design Science Research Approach. In *Proceedings of the International Conference on Management, Leadership and Governance* (pp. 135–142).

Goldman, G., & Nieuwenhuizen, C. (2006). *Strategy: Sustaining competitive advantage in a globalised context.* Juta and Company Ltd.

Reference List

Grewal, S. K. (2006). *Issues in IT Governance & IT Service Management - A Study of their adoption in Australian Universities, Master's thesis*. University of Canberra-ACT.

Grier, S. (n.d.). Universal Service Management Body of Knowledge. Retrieved May 5, 2018, from http://itmanagersinbox.com/831/universal-service-management-body-of-knowledge/

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design Science in Information System Research. *MIS Quarterly*, *28*(1), 75–105.

Higher Education Act (1997). (ACT NO. 101 OF 1997), South Africa.

Holsinger, S., & Andreozzi, S. (2014). EGI: Implementing service management in a largescale e-Infrastructure. In *2014 IEEE Network Operations and Management Symposium (NOMS)* (pp. 1–5). Krakow: IEEE.

Iden, J., & Eikebrokk, T. R. (2013). Implementing IT Service Management: A systematic literature review. *International Journal of Information Management*, *33*(3), 512– 523.

IDSC. (n.d.). PowerHEDA dashboard. Retrieved November 15, 2018, from http://www.heda.co.za/PowerHEDA/dashboard.aspx

Iqbal, M., & Nieves, M. (2007). *ITIL Version 3 Service Strategy*. Office of Government Commerce (OGC).

Irfandhi, K., Indrawati, A., Alexandra, D., Wanandi, K., Harisky, Y., & Liawatimena, S. (2016). Implementation of information technology service management at data and information system center of xyz university. *ComTech*, *7*(1), 41–52.

ISACA. (2012a). COBIT 5: A Business Framework for the Governance and Management of Enterprise IT. Rolling Meadows, IL: ISACA.

ISACA. (2012b). COBIT 5: Enabling Processes. Rolling Meadows, IL: ISACA.

ISO. (2011). *Information technology — Service management Part 1: Service management system requirements*. (ISO/IEC 20000-1:2011).

ISO. (2018a). Certification & conformity. Retrieved April 30, 2018, from https://www.iso.org/certification.html

ISO. (2018b). Standards catalogue. Retrieved April 30, 2018, from

https://www.iso.org/ics/35.020/x/

ITGI. (2003). *Board Briefing on IT Governance - 2nd Edition. IT Governance Institute*.

Johl, C., Von Solms, R., & Flowerday, S. (2013). Information technology governance process maturity in Higher Education Institutions in South Africa. *South African Journal of Higher Education*, *27*(3), 627–644.

Jurhs, P. A. (2009). *Information Technology Infrastructure Library Problem Management Practices in Higher Education: A Maturity Model Approach, Master's thesis*. Boise State University.

Kempter, S. (2014a). Service Management Processes. Retrieved May 2, 2018, from https://yasm.com/wiki/en/index.php/YaSM_Processes

Kempter, S. (2014b). The YaSM Process Map. Retrieved May 2, 2018, from https://yasm.com/en/products/yasm-process-map

Kempter, S. (2014c). Why "Yet another Service Management Model"? Retrieved May 2, 2018, from https://yasm.com/en/blog/why-yasm

Kempter, S. (2014d). YaSM and USMBOK. Retrieved May 5, 2018, from https://yasm.com/wiki/en/index.php/YaSM_and_USMBOK

Kempter, S. (2014e). YaSM RACI Matrix. Retrieved May 2, 2018, from https://yasm.com/wiki/en/index.php/YaSM_RACI_Matrix

Klassen, M. (2018). ITIL vs DevOps. Retrieved November 13, 2018, from https://www.cherwell.com/library/blog/itil-vs-devops/

Knahl, M. H. (2013). Application of IT Management Frameworks in Higher Education Institutions. In X. Franch & P. Soffer (Eds.), *Advanced Information Systems Engineering Workshops: CAiSE 2013 International Workshops* (pp. 124–133). Valencia, Spain: Springer.

Küller, P., Grobowski, M., Sameš, P., & Vogt, M. (2010). IT Service Management Methods and Frameworks Systematization. InnoTrain IT.

Lema, L., Calvo-Manzano, J. A., Colomo-Palacios, R., & Arcilla, M. (2015). ITIL in small to medium-sized enterprises software companies: Towards an implementation sequence. *Journal of Software: Evolution and Process*, *27*(8), 528–538.

Reference List

Lowendahl, J.-M. (2014). Hype Cycle for Education, 2014. Retrieved November 10, 2018, from
https://cdn2.hubspot.net/hubfs/2656713/PDF/hype_cycle_for_education.pdf

Lowendahl, J.-M. (2016). Hype Cycle for Education, 2016. Retrieved November 11, 2018, from https://www.cfisd-technologyservices.net/uploads/5/1/5/7/51575175/l_v_gartner_-_2016_06_-_hype_cycle_for_education_2016.pdf

Lubambo, N. (2009). *Investigating the use of the ITIL Framework towards IT service delivery at the NMMU, Master's dissertation*. Nelson Mandela Metropolitan University.

Lucio-Nieto, T., & Colomo-Palacios, R. (2012). ITIL and the creation of a Service Management Office (SMO): A new challenge for IT professionals: An exploratory study of Latin American companies. In *7th Iberian Conference on Information Systems and Technologies (CISTI)*. Madrid, Spain.

Majewski, M. (2016). Understanding the Relationship Between Lean, Agile, and DevOps. Retrieved November 12, 2018, from https://leankit.com/blog/2016/09/lean-agile-devops/

Marrone, M., Gacenga, F., Cater-Steel, A., & Kolbe, L. (2014). IT Service Management: A Cross-national Study of ITIL Adoption. *Communications of the Association for Information Systems*, *34*(49), 865–892.

Marrone, M., & Kolbe, L. M. (2011). Impact of IT Service Management Frameworks on the IT Organization. An Empirical Study on Benefits, Challenges, and Processes. *Business & Information Systems Engineering*, *3*(1), 5–18.

Mehravani, S., Hajiheydari, N., & Haghighinasab, M. (2011). ITIL Adoption Model based on TAM. *International Conference on Social Science and Humanity IPEDR Vol. 5 (2011) ACSIT PRESS*, *5*, 33–37.

Melendez, K., Dávila, A., & Pessoa, M. (2016). Information technology service management models applied to medium and small organizations: A systematic literature review. *Computer Standards and Interfaces*, *47*, 120–127.

Mesquida, A. L., Mas, A., Amengual, E., & Calvo-Manzano, J. A. (2012). IT Service Management Process Improvement based on ISO/IEC 15504: A systematic

review. *Information and Software Technology*, *54*(3), 239–247.

Microsoft. (2008). MOF Overview. Retrieved May 6, 2018, from
https://technet.microsoft.com/en-us/library/cc543224.aspx

Microsoft. (2016). Microsoft Operations Framework 4.0. Retrieved May 6, 2018, from
https://technet.microsoft.com/en-us/library/cc506049.aspx

Mintzberg, H. (1987). The Strategy Concept I: Five Ps for Strategy. *California Management Review*, *30*(1), 11–24.

Mohammed, T. A. (2018). Critical Success Factors for Information Technology Infrastructure Library Implementation in Public Service Organizations: An Exploratory Study. *International Journal of Advanced Information Technology*, *8*(1/2). https://doi.org/10.5121/ijait.2018.8201

Morrison, J. L., Renfro, W. L., & Boucher, W. I. (1984). *Futures Research and Strategic Planning Process: Implications for Higher Education*. ASHERIC Higher Education, Report No. 9, Washington D.C.: Association for the Study of Higher Education. ED 259 692.

Mukwasi, C. M., & Seymour, L. F. (2016). Customer Relationship Management in IT Service Delivery. In *Proceedings of the Annual Conference of the South African Institute of Computer Scientists and Information Technologists - SAICSIT '16* (pp. 1–7). Johannesburg, South Africa. https://doi.org/10.1145/2987491.2987497

Nicewicz-Modrzewska, D., & Stolarski, P. (2008). ITIL implementation roadmap based on process governance. In *European University of Information Systems Conference (EUNIS 2008)*. Aarhus, Denmark.

Nicho, M., & Almourad, B. (2012). Success Factors for Integrated ITIL Deployment: An IT Governance Classification. *Journal of Information Technology Case and Application Research*, *14*(1), 25–54.

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, *16*, 1–13. https://doi.org/10.1177/1609406917733847

Nylund, A. (2016). *Improving Service Design & Service Transition Phases of Service Management System, Master's thesis*. Helsinki Metropolia University of Applied Sciences.

Reference List

Oxford University Press. (n.d.). Oxford Dictionaries. Retrieved April 30, 2018, from https://en.oxforddictionaries.com/

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2008). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, *24*(3), 45–77.

Pereira, R., & Mira Da Silva, M. (2010). A Maturity Model for Implementing ITIL v3. In *2010 6th World Congress on Services* (pp. 399–406). Miami, FL.

Pereira, R., & Mira Da Silva, M. (2011). A maturity model for implementing ITIL V3 in practice. In *Proceedings - IEEE International Enterprise Distributed Object Computing Workshop, EDOC* (pp. 259–268).

Pillai, A. K. R., Pundir, A. K., & Ganapathy, L. (2014). Improving Information Technology Infrastructure Library Service Delivery Using an Integrated Lean Six Sigma Framework: A Case Study in a Software Application Support Scenario. *Journal of Software Engineering and Applications*, *7*, 483–497. https://doi.org/10.4236/jsea.2014.76045

Pollard, C., & Cater-Steel, A. (2009). Justifications, Strategies and Critical Success Factors in Successful ITIL Implementations in U.S. and Australian Companies: An Exploratory Study. *Information Systems Management*, *26*(2), 164–175.

Pollard, C. E., Gupta, D., & Satzinger, J. W. (2010). Teaching Systems Development: A Compelling Case for Integrating the SDLC with the ITSM Lifecycle. *Information Systems Management*, *27*(2), 113–122.

Porter, M. E. (1986). The Strategic Role of International Marketing. *Journal of Consumer Marketing*, *3*(2), 17–21.

Potgieter, B. C., Botha, J. H., & Lew, C. (2005). Evidence that Use of the ITIL Framework is Effective. In *Proceeding of the 18th Annual Conference of the National Advisory Committee on Computing Qualifications*. Tauranga, NZ.

Prnjat, O., Liabotis, I., & Kanellopoulos, C. (2015). Virtual Research Environment for value-added services in national and regional NRENs: case studies. In *Proceedings and report of the 8th UbuntuNet Alliance annual conference* (pp. 210–218). Maputo, Mozambique.

Radecki, M., Szymocha, T., Szepieniec, T., & Różańska, R. (2014). Improving PL-Grid

Reference List

Operations Based on FitSM Standard. In M. Bubak, J. Kitowski, & K. Wiatr (Eds.), *eScience on Distributed Computing Infrastructure. Lecture Notes in Computer Science, vol 8500* (pp. 94–105). Springer, Cham.

Rumelt, R. P. (2012). *Good strategy, bad strategy: The difference and why it matters*. New York: Crown Business.

Seymour, L. F., & Mukwasi, C. (2015). Towards understanding organisational culture contradictions between organisations and the Information Technology Infrastructure Library (ITIL) framework: A review of the literature. In *African Conference on Information Systems & Technology (ACIST) 2015*. GIMPA, Ghana.

Shahsavarani, N., & Ji, S. (2011). Research in Information Technology Service Management (ITSM): Theoretical Foundation and Research Topic Perspectives. In *CONF-IRM 2011 proceedings. 30*.

Söllner, D. (n.d.). FitSM - Konkurrenz oder Ergänzung zu ITIL? Retrieved May 3, 2018, from https://www.dsoellner.de/blog/35-fitsm-konkurrenz-oder-ergaenzung-zu-itil

Taylor, S. (2012). *Service Intelligence: Improving Your Bottom Line with the Power of IT Service Management*. New York: Prentice Hall.

Tesone, D. V. (2010). *Principles of management for the hospitality industry*. Routledge.

Thacker, B. H., Doebling, S. W., Hemez, F. M., Anderson, M. C., Pepin, J. E., & Rodriguez, E. A. (2004). *Concepts of Model Verification and Validation*. Springfield, VA.

The Presidency RSA. (2017). The President's response to the Heher Commission of Inquiry into Higher Education and Training. Retrieved May 20, 2018, from http://www.presidency.gov.za/press-statements/president's-response-heher-commission-inquiry-higher-education-and-training

Thompson, D., Fowler, H., & Fowler, F. (1995). *The Concise Oxford Dictionary of Current English* (9th ed.). Oxford Oxfordshire: Clarendon Press.

Thoms, N. (2018). A Definition of DevOps for the Masses. Retrieved November 12, 2018, from https://devops.com/definition-devops-masses/

Tongco, D. (2007). Purposive Sampling as a Tool for Informant Selection. *Ethnobotany Research & Applications*, *5*, 147–158.

Tsokota, T., von Solms, R., & van Greunen, D. (2017). An ICT Strategy for the Sustainable Development of the Tourism Sector in a Developing Country: A Case Study of Zimbabwe. *Electronic Journal of Information Systems in Developing Countries*, *78*(5), 1–20.

van Aken, J. E. (2004). Management Research Based on the Paradigm of the Design Sciences: The Quest for Field-Tested and Grounded Technological Rules. *Journal of Management Studies*, *41*(2), 219–246.

Venable, J. R. (2010). Design Science Research Post Hevner et al: Criteria, Standards, Guidelines, and Expectations. In R. Winter, J. L. Zhao, & S. Aier (Eds.), *Global Perspectives on Design Science Research. DESRIST 2010. Lecture Notes in Computer Science, vol 6105*. Berlin, Heidelberg: Springer.

Wang, J., & Sereshki, H. K. (2010). *How to implement ITIL successfully, Master's thesis*. Jönköping University.

Wheelen, T. L., & Hunger, J. D. (2012). *Strategic Management and Business Policy: Toward Global Sustainability* (13th ed.). Prentice Hall.

Wood, M. (2013). Why You're Confusing Frameworks with Methodologies. Retrieved April 30, 2018, from https://www.projectmanagement.com/articles/278600/Why-Youre-Confusing-Frameworks-with-Methodologies

Zhang, X., Majid, S., & Foo, S. (2010). Environmental scanning: An application of information literacy skills at the workplace. *Journal of Information Science*, *36*(6), 719–732.

Ziegler, J. A., Kemmler, B., Brenner, M., & Schaaf, T. (2017). Leichtgewichtiges Security Incident und Event Management im Hochschulumfeld. In P. Müller, B. Neumair, H. Raiser, & G. Dreo Rodosek (Eds.), *10. DFN-Forum Kommunikationstechnologien* (pp. 103–112). Bonn: Gesellschaft für Informatik e.V.

Appendices

APPENDIX A: ETHICAL CLEARANCE FORM

NELSON MANDELA

UNIVERSITY

PO Box 77000, Nelson Mandela University, Port Elizabeth, 6031, South Africa   mandela.ac.za

Chairperson: Research Ethics Committee (Human)
Tel: +27 (0)41 504 2235
charmain.cilliers@mandela.ac.za

Ref: [H18-ENG-ITE-003 / Approval]

24 August 2018

Dear Prof Futcher

A STRATEGY FOR IMPROVING THE MATURITY LEVEL OF IT SERVICE MANAGEMENT IN HIGHER EDUCATION INSTITUTIONS IN SOUTH AFRICA

PRP: Prof L Futcher
PI: Dr T Hilmer

Your above-entitled application served at the Research Ethics Committee (Human) for approval.

The ethics clearance reference number is **H18-ENG-ITE-003** and is valid for three years. Please inform the REC-H, via your faculty representative, if any changes (particularly in the methodology) occur during this time.

An annual affirmation to the effect that the protocols in use are still those for which approval was granted, will be required from you.

We wish you well with the project.

Yours sincerely

Prof C Cilliers
Chairperson: Research Ethics Committee (Human)

Cc: Department of Research Capacity Development
       Faculty Officer: EBEIT

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APPENDIX B: APPROVAL LETTER FROM DVC: RESEARCH AND ENGAGEMENT

NELSON MANDELA
UNIVERSITY

Office of DVC Research & Engagement
Room 1706, Main Building
NMMU South Campus
Tel. +27 (0)41 504 2016/7 Fax. +27 (0)41 504 9591
Andrew.leitch@mandela.ac.za
09 September 2018

(Institutional permission for conducting research)
H18-ENG-ITE-003

Dear Dr T Hilmer

TITLE: A STRATEGY FOR IMPROVING THE MATURITY LEVEL OF IT SERVICE MANAGEMENT IN HIGHER EDUCATION INSTITUTION IN SOUTH AFRICA.

I **Professor Andrew Leitch, DVC: Research and Engagement** grant permission for the above mentioned study and will act in the capacity as gatekeeper for this institutional study.

SIGNATURE:

DATE: 09 September 2018

APPENDIX C: ITSM MATURITY SURVEY

Survey: ITSM 2018

The Status of IT Service Management at South African Universities 2018

Hello:
Thank you for participating in this research study, which forms part of an MPhil in IT Governance degree at the Nelson Mandela University.

The person completing this survey should have a good understanding of the **IT Service Management** (ITSM) environment in their IT department.

The aim of this survey is to obtain information on the current state of ITSM at South African universities. The survey is distributed through, and with the permission of, the Association of South African University Directors of Information Technology (ASAUDIT). It should take between 15 and 20 minutes to complete.

IT Service Management (ITSM) is a set of specialised organisational capabilities that provide value to customers in the form of services. The interest of organisations in ITSM stems from the expectation that the application of best-practice ITSM processes results in reduced expenditure, reduction of incidents and improved customer satisfaction.

DISCLAIMER: Your participation in this survey is voluntary and your individual responses will remain anonymous. We will neither divulge such information to any outside party, nor identify it without your written permission. As such, no individual will be identifiable in any written or published research reports. By completing this survey, you consent to participate in this research study. Furthermore, participants may withdraw from the research study at any time without penalty. By submitting this survey, you consent to your participation in this research project.

Thank you very much for your time and support. Please start with the survey now by clicking on the Next button below.

(Nelson Mandela University ethics clearance reference number: H18-ENG-ITE-003)

Institutional information

* 1. Please select your university (this information will only be used to indicate which universities took part in the survey, no answers will be linked to your institution)

-- Select --

2. Approximately how many staff and students are in your institution?

	Number
* Staff	
* Students	

3. How large is your IT staff complement?

	Number
* IT Staff	

The following information will NOT be linked to your university

* 4. What is your functional level in the IT department?

O Operational

O Management

○ Senior management

---

* **5. What is your position or job title in the IT department?**

[   ]

---

* **6. What is your highest qualification?**

○ NQF 4: National Certificate (Matric)

○ NQF 5: Higher Certificate

○ NQF 6: Diploma & Advanced Certificate

○ NQF 7: Bachelor's Degree & Advanced Diploma

○ NQF 8: Honours Degree & Postgraduate Diploma

○ NQF 9: Master's Degree

○ NQF 10: Doctoral Degree

7. How long have you worked in the university IT department?

	1-2	3-5	6-10	10+
* Years				

8. How many years has your IT department practiced ITSM?

	1-2	3-5	6-10	10+
* Years				

ITSM Framework

9. Which ITSM standards / frameworks / methodologies do your IT department use?

	Select all you use	Version (if known)
None	☐	
ISO/IEC 20000 Information technology — Service management	☐	
ITIL	☐	
COBIT	☐	
Microsoft Operations Framework	☐	
Universal Service Management Body of Knowledge (USMBOK)	☐	
Capability Maturity Model Integration (CMMI)	☐	
FitSM (standard for lightweight IT service management)	☐	
YaSM (Yet another Service Management Model)	☐	

P QuestionPro

Other, please specify in the Version text box	☐	

10. Please indicate the reasons why your university chose the particular ITSM framework(s)

	Select the reasons that apply	Comments
It is regarded as best practice by the industry	☐	
The various processes were easy to implement	☐	
No costly training was required to implement it	☐	
The documentation was freely available	☐	
It provides for formal certification	☐	
After detailed comparisons, it suited our environment best	☐	
We were not aware of some of the other frameworks listed in the previous question	☐	
Other, please specify	☐	

This section deals with your experience in implementing and using your framework by looking at different factors.

11. Implementation & use: Planning factor

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
* Not enough planning was done before implementation	○	○	○	○	○
* We carefully selected a few processes and did not intend to implement any further as they were not needed	○	○	○	○	○
* We tried to implement as many processes as possible	○	○	○	○	○
* We never got around to implementing the other processes we had planned	○	○	○	○	○

12. Implementation & use: Human factor

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
* Due to limited resources, IT staff needed to take on multiple roles and responsibilities to manage all the service processes	○	○	○	○	○
* Each service process requires dedicated resources in order to do ITSM properly	○	○	○	○	○
* We did not receive enough support from management during implementation	○	○	○	○	○
* Interest in implementing more ITSM processes waned after a few processes were implemented	○	○	○	○	○

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13. Implementation & use: Financial factor

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
* The implementation turned out to be more costly than expected	O	O	O	O	O
* We could not implement all the processes we wanted to because of limited funds	O	O	O	O	O
* We achieved cost savings by implementing the framework	O	O	O	O	O

14. Implementation & use: Capability factor

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
* Our IT staff had no problems in adapting to the requirements of the framework	O	O	O	O	O
* The framework turned out to be overly complicated	O	O	O	O	O

15. Implementation & use: Time factor

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
* It was very time-consuming to implement the framework	O	O	O	O	O
* We achieved time savings by implementing the framework	O	O	O	O	O

16. Implementation & use: Efficacy factor

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
* The framework serves us well	O	O	O	O	O
* Our end-users have noted a great improvement in service	O	O	O	O	O
* We would recommend the framework and our approach to others	O	O	O	O	O

17. Any comments or suggestions you would like to add about your implementation and use of your ITSM framework?

Maturity levels of processes

The processes covered by different ITSM frameworks tend to be similar, with some combining a few that others keep separate. For the sake of simplicity, the list of ITIL (v3, 2011) processes and functions will be used in the following question. Please indicate the maturity levels of processes and functions that you have implemented. Also indicate any processes you intend to implement in the next 2 years. Maturity levels are defined as follows:

- **Initial:** No governance over the processes or functions, some records of activity exist depending on skills of the current participant, and no automation is in place.
- **Repeatable:** Some degree of management commitment, participant's roles are recognized but not clearly defined or documented, and operations are still on ad-hoc basis.
- **Defined:** Visible management commitment, services and process roles are assigned to knowledgeable and trained participants, and there is some level of automation within the organization.
- **Managed:** Processes or functions are stable and rarely fail, documentation is complete and covers all aspects of the organization, and great deal of pre-emptive measures and continual improvement plans are in place.

P QuestionPro

- **Optimised:** Effective control, governance and focus visible throughout all levels of the IT organization.

* 18. Maturity Levels: Service Strategy

	Maturity Level	Will implement in next 2 years	
		No	Yes
* Business relationship management	-- Select --	O	O
* Demand management	-- Select --	O	O
* Financial management for IT services	-- Select --	O	O
* Service portfolio management	-- Select --	O	O
* Strategy management for IT services	-- Select --	O	O

* 19. Maturity Levels: Service Design

	Maturity Level	Will implement in next 2 years	
		No	Yes
* Availability management	-- Select --	O	O
* Capacity management	-- Select --	O	O
* Design coordination	-- Select --	O	O
* Information security management	-- Select --	O	O
* IT service continuity management	-- Select --	O	O
* Service catalogue management	-- Select --	O	O
* Service level management	-- Select --	O	O
* Supplier management	-- Select --	O	O

* 20. Maturity Levels: Service Transition

	Maturity Level	Will implement in next 2 years	
		No	Yes
* Change evaluation	-- Select --	O	O
* Change management	-- Select --	O	O
* Knowledge management	-- Select --	O	O
* Release and deployment management	-- Select --	O	O
* Service asset and configuration management	-- Select --	O	O
* Service validation and testing	-- Select --	O	O
* Transition planning and support	-- Select --	O	O

* 21. Maturity Levels: Service Operation

	Maturity Level	Will implement in next 2 years	
		No	Yes
* Access management	-- Select --	O	O
* Application management function	-- Select --	O	O
* Event management	-- Select --	O	O
* Incident management	-- Select --	O	O
* IT operations management function	-- Select --	O	O
* Problem management	-- Select --	O	O

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* Request fulfilment	-- Select --	O	O
* Service desk function	-- Select --	O	O
* Technical management function	-- Select --	O	O

* **22. Maturity Levels: Continual Service Improvement**

	Maturity Level	Will implement in next 2 years	
		No	Yes
* Multi-step improvement process	-- Select --	O	O

23. Any comments on Maturity Levels?

Implementation order of processes and functions

* **24. Please arrange the processes/functions in the order that you implemented them (from oldest to latest). You only need to drag & drop the ones that you used, you do not have to add all.**

Drag your choices here to rank them

Access management
Application management function
Availability management
Business relationship management
Capacity management
Change evaluation
Change management
Demand management
Design coordination
Event management
Financial management for IT services
IT operations management function
IT service continuity management
Incident management

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Information security management
Knowledge management
Multi-step improvement process
Problem management
Release and deployment management
Request fulfilment
Service asset and configuration management
Service catalogue management
Service desk function
Service level management
Service portfolio management
Service validation and testing
Strategy management for IT services
Supplier management
Technical management function
Transition planning and support

Choose at least 1 choice to rank them

The following section deals with the Configuration Management Database (CMDB). A CMDB holds data relating to a collection of IT assets.

* 25. Do you maintain a complete CMDB (all IT components, including their versions, constituent components and relationships)?

○ Yes

○ No

* 26. Do you maintain a scaled-down CMDB with only certain core configuration items (CIs)?

○ Yes

○ No

* 27. Is it difficult to maintain all the configuration items (CIs)?

○ Yes

○ No

* 28. Do you make extensive use of the information stored in the CMDB?

○ Yes

○ No

* 29. Would you agree with the statement that the value of the CMDB seldom exceeds the cost of doing it?

○ Yes

○ No

30. If you have a CMDB, approximately how many objects (configuration items + attributes), does it contain?

	< 1000	1000-9999	10,000-99,999	100,000-999,999	> 1,000,000
Objects (CIs + attributes)	-				

General

* 31. Do you maintain a service catalogue that your end-users can browse?

○ Yes

○ No

* 32. How do you see the relationship between ITSM and DevOps?

33. If you make use of open source or commercial enterprise software to support your ITSM endeavours, please elaborate:

34. Please enter any final comments on your ITSM environment:

Appendices

APPENDIX D: ITSM MATURITY SURVEY DISTRIBUTION EMAIL

School of ICT
Nelson Mandela University
Principal Investigator: Thomas Hilmer 041 504 2746
Primary Responsible Person: Prof Lynn Futcher 041 504 9128

Date: 27 August 2018

Contact person: Thomas Hilmer

General Manager ASAUDIT

Dear Val Theron

As per our verbal discussion at the ASAUDIT National Technology Event held in June at the Nelson Mandela University, this is a formal request to obtain permission to distribute a survey to ASAUDIT members.

I am an MPhil in IT Governance student at the Nelson Mandela University busy with my treatise entitled: "A strategy for improving the maturity level of IT Service Management in Higher Education Institution in South Africa".

In 2017 the government announced free higher education for students from poor and working-class families. This has put enormous pressure on Higher Education Institutions (HEIs) to find alternative revenue sources and has put a brake on operational expansions. Under these circumstances, having decent IT Service Management (ITSM) processes in place would be beneficial by reducing costs and improving efficiencies, but getting there may prove challenging.

Organisations such as HEIs often introduce ITSM through the implementation of ITIL processes, but frequently fail to move beyond the adoption of only a few of these processes, thus not moving to higher maturity levels of ITSM. The aim of this study is to develop a suitable strategy that may assist South African HEIs in taking further steps to improve their ITSM maturity levels.

I would like to request your permission for having the attached survey questions distributed via an online survey by ASAUDIT to its member universities. The results will assist with obtaining information on the current state of ITSM at South African universities, as well as highlighting possible problems encountered during the implementation thereof.

Please find attached the survey questions, as well as a proposed "Request for Participation' to accompany the survey.

Yours sincerely

Dr Thomas Hilmer
Deputy Director: Web Systems and Development
ICT Services, North Campus
Nelson Mandela University
Port Elizabeth
6031, SOUTH AFRICA
Tel: +27 (0)41 504 2746
www.mandela.ac.za

Nelson Mandela University ethics clearance reference number: H18-ENG-ITE-003

APPENDIX E: EXPERT INTERVIEW QUESTIONS

The following guiding questions were provided to the experts before the interview:

1. What was your involvement in the initial implementation of ITSM processes?
2. What were the drivers behind the implementation?
3. What planning was done?
4. Was there management buy-in?
5. What framework or methodology was chosen and for what reasons?
6. Were other frameworks considered?
7. Which processes were implemented and what determined their choice?
8. Which processes where planned for future phases?
9. Were end-users aware of these processes being implemented and what was their reaction?
10. How long did it take before the initial processes selected where actually being used operationally?
11. How successful do you consider the implementation?
12. What problems did you encounter?
13. What would you have done differently?

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APPENDIX F: STRATEGY EVALUATION SURVEY

ITSM Strategy Evaluation

The primary research objective was to develop a strategy that South African Higher Education Institutions can follow to improve their ITSM maturity levels. You are asked to validate and verify its quality, utility and efficacy through this online assessment questionnaire. Validation assures that the strategy meets the needs of the user, while verification checks that the conditions of the strategy formulation are met. This survey is anonymous, thus you will not be identified in the discussion of the results of this assessment.

* After studying the strategy and accompanying documentation, what is your confidence level of your understanding of the proposed strategy?

○ Low

○ Medium

○ High

○ Very High

* What is your confidence level of being able to carry out the instructions of the strategy if required?

○ Low

○ Medium

○ High

○ Very High

Comments:

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Quality of the strategy (degree of excellence)
To what extent were the elements that were identified and described relevant to the strategy?

	Low	Medium	High	Very High
Strategy direction	○	○	○	○
Environmental scanning	○	○	○	○
Strategy formulation: Diagnosis	○	○	○	○
Strategy formulation: Guiding policies	○	○	○	○
Strategy formulation: Coherent actions	○	○	○	○
Strategy implementation	○	○	○	○
Strategy control	○	○	○	○

Did the strategy fulfill all the theoretical requirements as outlined in the supporting documentation?

Have any guiding policies or coherent actions been left out?

Can any of the guiding policies or coherent actions be improved?

Strategy Assessment

P QuestionPro

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* Utility of the strategy (being useful, profitable, or beneficial)

	Low	Medium	High	Very High
To what extent does the documentation provide sufficient information for understanding of the strategy?	◯	◯	◯	◯
To what extent can the strategy be easily understood and put into action?	◯	◯	◯	◯
To what extent can the strategy be used to improve ITSM maturity levels in HEIs in South Africa?	◯	◯	◯	◯

Comments/Suggestions:

* Efficacy of the strategy (the ability to produce a desired or intended result)

	Low	Medium	High	Very High
How easily can a satisfactory ITSM maturity level improvement be derived from the strategy?	◯	◯	◯	◯
How effective do you consider the strategy?	◯	◯	◯	◯
To what extent would the strategy appeal to HEIs?	◯	◯	◯	◯

Comments/Suggestions:

* What is your overall impression of the strategy?

Please provide any suggested improvements to the proposed strategy:

Strategy Assessment