A STRATEGY TOWARDS IMPLEMENTING STANDARDISED DATA STRUCTURES IN MUNICIPAL INFORMATION SYSTEMS

by

Silma Marguerite Koekemoer

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A STRATEGY TOWARDS IMPLEMENTING STANDARDISED DATA STRUCTURES IN MUNICIPAL INFORMATION SYSTEMS

Silma M Koekemoer

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Declaration

I, Silma Marguerite Koekemoer, hereby declare that

- this work is my own
- all sources used or referred to have been documented and recognised
- this thesis has not previously been submitted for a qualification at another university.

S M Koekemoer

Silma Marguerite Koekemoer

ABSTRACT

The regulation pertaining to a Standard Chart of Accounts (SCOA) for Municipalities was published in 2014 and is applicable to all 257 municipalities and municipal entities in South Africa. The regulation represents a data classification framework or structure and affects all financial management and internal control systems (FMICS) used by municipalities and municipal entities, and affects key business processes within these organisations.

Compliance with the SCOA regulation means that the full municipal accountability cycle should accommodate all seven of the SCOA segments, from the budget through transacting and reporting at the transaction level, with all seven of the segments being embedded in the master data table of the municipal FMICS. While the change to technology and systems may be self-evident, the related business change should not be underestimated. This information technology (IT) driven organisational change across the whole municipal environment represents the research topic and key objective of this research study, namely, a strategy towards implementing standard data structures in municipal IT systems.

The study followed a pragmatic philosophy using diagnostic reasoning based on an inductive approach, multiple action research methods and a descriptive case study to derive the proposed implementation strategy. The research subjects, which included 25 pilot municipalities, were studied for the duration of the pilot implementation of the strategy with the objective of identifying and utilising the lessons learnt from their experience to fast track the rollout of the strategy to non-pilot municipalities.

The study was limited to the local government environment and to South Africa as a geographic area and involved an accidental sample aligned to the implementation project

under investigation. The proposed implementation strategy was, however, of a generic nature and is therefore applicable to any other institution or environment engaged in a similar implementation project.

The main contribution of the study is an implementation strategy for standard data structures in municipal financial information systems and which consists of seven diagnostics, 17 guiding policies and 48 coherent actions. The strategy was developed and refined during six cycles of data collection, which were conducted at 25 municipalities actively involved in implementing of the standard data structures.

The secondary contributions of the research study include three conference papers and one submission to an academic journal.

Keywords: IT strategy development; IT system implementation; IT implementation strategy; IT governance; IT project management; financial management and internal control systems; standard data structures; audit findings; National Treasury; Auditor General

Dedication

I dedicate this thesis to my loving and supportive family:

Parents –

Annelene Bester and

Piet and Issie (late) Koekemoer

Husband –

Wouter Koekemoer and

our children

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AG	Auditor General of South Africa
ASB	Accounting Standards Board
CA	Coherent Action(s)
CEO	Chief Executive Officer
CIO	Chief Information Officer
Circ	Circular
COA	Chart of Accounts
CobIT	Control Objectives for Information and Related Technologies
COGTA	Department of Co-Operative Governance and Traditional Affairs
D	Diagnostic(s)
DoRA	Division of Revenue Act
ERP	Enterprise Resource Planning
FMICS	Financial Management and Internal Control Systems
GFS	Government Financial Statistics
GP	Guiding Policy
GRAP	Generally Recognised Accounting Practice

GUID	Global Unique Identifier
ICF	Integrated Communication Forum
ICT	Information and Communication Technology
IDP	Integrated Development Plan
IFMS	Integrated Financial Management System
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
ISACA	Information Systems Audit and Control Association
IS(s)	Information System(s)
ISO	International Standards Organisation
IT	Information Technology
ITIL	Information Technology Infrastructure Library
LGDRS	Local Government Database and Reporting System
MFMA	Municipal Finance Management Act
MGICTG	Municipal Guide for ICT Governance
MIOS	Minimum Interoperability Standard
MISS	Minimum Information Security Standard
MSC	Municipal Standard Classification

mSCOA	Municipal Standard Chart of Accounts
OAG	Office of the Accountant General
PESTEL	Political, Environmental, Social, Technology, Economic, Legal
PMBOK	Project Management Body of Knowledge
PSD	Project Summary Document
RACI	Responsible, Accountable, Consulted and Informed
SALGA	South African Local Government Association
SCOA	Standard Chart of Accounts
SITA	State Information Technology Agency
SLA	Service Level Agreement(s)
SMART	Specific, Measurable, Achievable, Relevant, Timely
SWOT	Strengths, Weaknesses, Opportunities, Threats

Chapter 1

INTRODUCTION

1.1 BACKGROUND

South Africa is governed by national, provincial and local spheres of government which are distinctive, interdependent and interrelated, and which were established in terms of the Constitution of South Africa (South Africa, 1996).

Local government comprises municipalities and municipal entities which are found throughout the Republic of South Africa and bordering each other. Their executive and legislative authority vests in the Municipal Council (South Africa, 1996). Municipalities are politically autonomous and are the closest level of government to the citizens of the country. The objectives of local government, as articulated in the Constitution, include the following:

- *To provide democratic and accountable government for local communities;*
- *To ensure the provision of services to communities in a sustainable manner;*
- *To promote social and economic development;*
- *To promote a safe and healthy environment; and*
- *To encourage the involvement of communities and community organisations in the matters of local government.*

Local government in South Africa consists of eight metropolitan municipalities, also referred to as category A municipalities; 44 district municipalities, referred to as category C municipalities; and 205 local or category B municipalities – 257 municipalities in total. The functions and responsibilities of municipalities are well-defined and clearly articulated in the constitution, legislation and relevant regulations.

On 14 July 2009, the late Minister for Cooperative Governance and Traditional Affairs, Honourable Sicelo Shiceka, launched “Operation Clean Audit 2014” which set the strategic vision as well as the objectives of the initiative, namely, for all municipalities to achieve clean audit reports on their financial statements by 2014. These audit reviews, which are conducted by the Auditor General (AG), include not only a review of the annual financial statements of the municipalities but also of their performance as assessed against pre-determined objectives as well as an information technology (IT) audit. To date, 58 municipalities only have been able to achieve a clean audit report although this is up from four in 2008/09. While numerous turn-around strategies have been attempted, these have generally focused on people and developing capacity within the municipal environment with limited attention being given to the disparate information systems (ISs) deployed within the municipalities.

National Treasury embarked on a comprehensive budget reform programme for both national and provincial departments with the objective of improving accountability and in order to modernise the accounts of government by aligning reporting with international leading practices. However, while the project was initiated to develop a new budget format, it soon became clear that the new reporting format would be effective only with an appropriately amended Chart of Accounts (COA). This was necessary because the budget formats outline the broad categories of planned expenditure while the COA is used to capture the detailed spending on items when the budget has been implemented. Thus, any change to the budget format must be supported by a corresponding change to the COA. The scope of the project was, therefore, expanded to include the development and implementation of a new Standard Chart of Accounts (SCOA).

Although local government is characterised by its own peculiarities the success achieved at the national and provincial levels from implementing the SCOA could be equally beneficial for local government in terms of improving data quality, achieving a greater

level of standardisation and uniform data sets. In addition, it is also critical for whole-of-government reporting. Accordingly, in 2010 and after initial research, the SCOA project was formally expanded to include local government. The newly regulated SCOA for local government, the Municipal Regulation on a Standard Chart of Accounts (mSCOA) (South Africa, 2014), was intended to impact on the financial management and internal control systems (FMICS) deployed across the municipal environment, therefore also representing an opportunity to standardise reporting, improve system compliance and align business processes and municipal structures.

Local government uses ISs to collect, analyse and present data as useful information that may be retrieved as the basis of expert knowledge at the point of service delivery and decision making (Tansey, 2010). These ISs usually involve the use of computers and include business computing, management information systems, informatics and computer-based products. A system, in this context, is regarded as an ordered collection of components that interact and behave as though the collection of the components is aimed at pursuing one or more agreed-upon objectives. Tansey (2010) adds that technology employs artefacts to support purposeful information processes in order to help to achieve stated objectives. Tansey (2010) illustrates an organisational information system (IS) as follows:

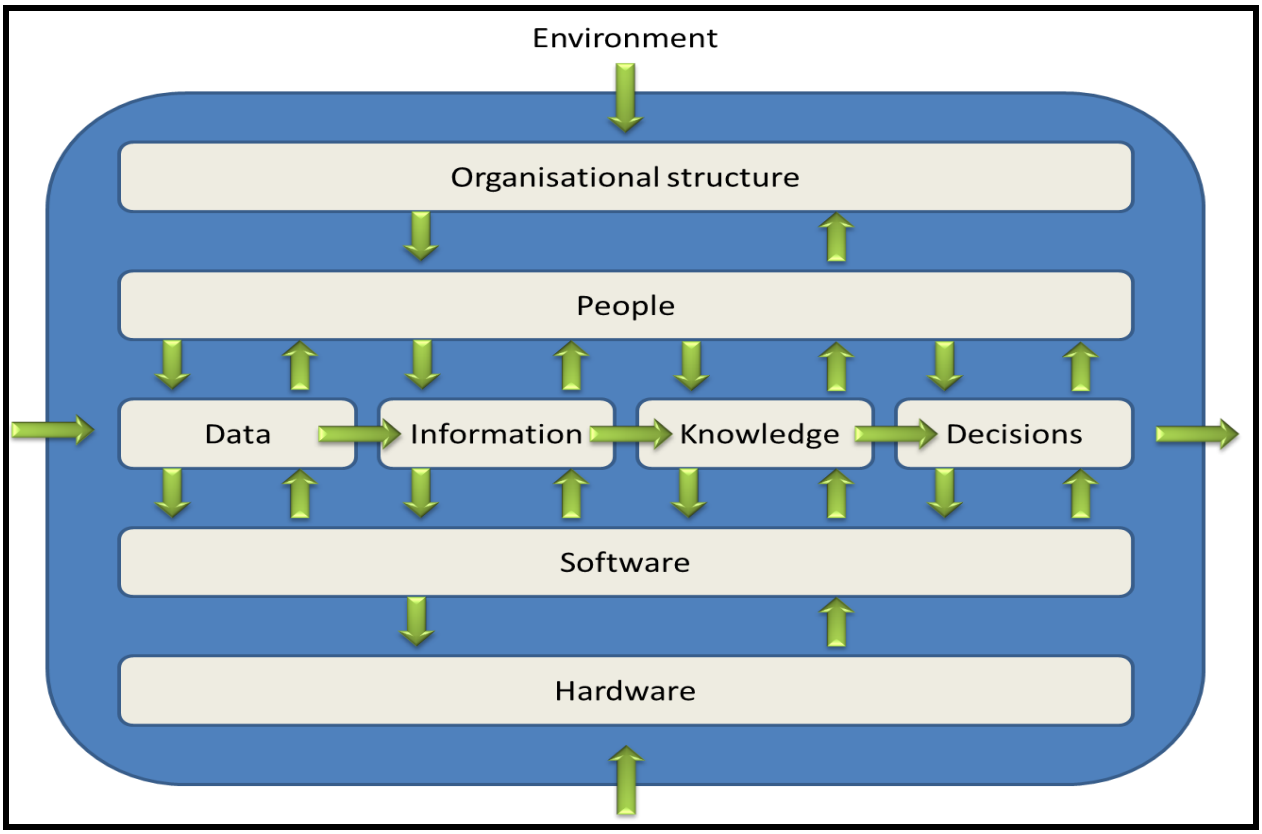


Figure 1.1 Organisational Information Systems (Tansey, 2010)

Local government employs FMICS both to enable services delivery to the community and to provide reporting to stakeholders, including National Treasury and provincial treasuries. Municipalities are politically autonomous in terms of running their own administration and, therefore, they employ disparate systems based on their particular needs, procurement processes and available resources. Municipal councillors, however, require knowledge – “an analysis and synthesis of information that is timely, relevant and responsive” – in order to address policy issues. It is this need that had given way to the situation which prevailed at the time of this study (Morgan & Peha, 2003).

An analysis of the local government ISs environment illustrates the disparate software in use by municipalities, before the demarcation in 2016 changed the borders and number of municipalities in the country from 278 to 257:

Table 1.1 Information systems in municipalities (Researcher)

Province	BIQ	BCX	Fujitsu	IN HOUSE	Microsoft	Munsoft	Rdata	Sage	SAMRAS	SAP	SEBATA	Vesta	Total
EASTERN CAPE		11	3	2		4	8	4	5		8		45
FREE STATE	1	10	1			2		2	2		6		24
GAUTENG	2	5				3				2			12
KWAZULU-NATAL		7	11	4	1	12		17	6		2	1	61
LIMPOPO		8	4	1		10		2	1	1	3		30
MPUMALANGA		5		1		9		1			5		21
NORTH WEST		10	1			1		7			2	2	23
NORTHERN CAPE	1	11	3	1		1	2		4		9		32
WESTERN CAPE		2	7				6		13	1	1		30
Total Per Vendor	4	69	30	9	1	42	16	33	31	4	36	3	278

Tansey (2010) contends that, in fact, in the government context, the development of technology itself and the pattern of its use have been fundamentally affected by government activity, including government spending and the decisions by policy makers. In addition, the ISs in government are also influenced by the training and availability of skilled personnel; control of broadcasting and telecommunications; and government regulations and interventions. However, this view is opposed by Rodemeyer, Sarewitz and Wilsdon (2005) who posit that government conducts business in ways that are still based on the conditions, priorities and approaches that existed decades ago and are, therefore, not well positioned to meet the demands of the public. They go on to say that technology change is accelerating and transforming every aspect of our lives and, thus, it should also inform government policy making and shape the consequences thereof.

The regulation of mSCOA in April 2014 has introduced legally enforceable minimum specifications for municipal IT and ISs, extending across the municipal accountability cycle and including key business processes which are listed in the regulation. It has also introduced municipal-wide change driven by ISs, representing the most significant reform of municipal administration and finance to date in South Africa and paving the way for policy making informed by technology.

1.2 PROBLEM DESCRIPTION AND STATEMENT

A COA, also termed *vote numbers* in municipalities, refers to a set of unique identifiers used in ISs to organise and classify financial data. In the case of municipalities, the prevailing vote numbers consist of two segments which represent the department and a line item. These are known as the municipal standard classification (MSC) and item segments of the COA. They are not prescribed in any way and, thus, every municipality uses a unique classification system, developed for their own needs and within the constraints set by their current FMICS.

The mSCOA regulation has extended the vote structure to include the following seven segments of which six are regulated:

- Project segment
- Function segment
- Item segment
- Fund segment
- Costing segment
- Regional indicator
- Municipal standard classification (non-regulated segment).

Municipalities and municipal entities have to comply with the mSCOA regulation. Such compliance means that the full municipal accountability cycle should accommodate all seven of the mSCOA segments, from the budget through transacting and reporting from the transaction level, with all seven of the segments being embedded in the master data table of the municipal FMICS. This regulation calls for either a re-configuration or implementation of all the FMICS of municipalities if they are to achieve an mSCOA compliant version of their FMICs and includes both minimum system specifications and the seamless integration of all sub-systems with the core financial system.

The problem statement thus becomes clear, namely: Municipalities must implement a standard data structure (mSCOA) in their core financial systems and sub-systems, irrespective of the software brand being used. This calls for a re-implementation of the affected systems across 257 municipalities and 60 municipal entities to ensure that they achieve compliance with the regulation.

However, the municipalities have limited resources and capacity to successfully implement a reform of this magnitude and, thus, they require guidance in the form of a high-level strategy for municipal ISs implementations (Siddle & Koelbe, 2012). An international study tour conducted by National Treasury, has revealed that excluding Russia, which provides a uniform e-budgeting system for government, the countries on the itinerary did not have an integrated financial system covering all the financial management dimensions across three spheres of government as is intended in South Africa. Such an integrated financial system for the entire government is attractive from a centralised control and reporting point of view. However, the political autonomy of local government, as well as significant differences in their business and administrative processes, prevents this from being possible. The study tour indicated that there appears not to be any guiding strategies or methodologies for the intended mSCOA implementation project (National Treasury, 2015).

1.3 RESEARCH OBJECTIVES

The primary objective of this research study was to develop a high-level strategy to guide the implementation of a standard data structure (mSCOA) in municipal FMICS. Posthumus and Von Solms (2010) confirm the need for implementation guidelines in their statement: “There is a need for clear guidance on IT governance and its implementation based on the current lack of broad level understanding of strategic IT-related issues”, a statement which is also true for strategic IT-related implementations in municipalities such as the mSCOA.

The primary objective is supported by the following secondary research objectives:

- an assessment of the strategies employed by the 25 municipalities which participated in the pilot phase of the mSCOA project implementation
- benchmarking these implementation strategies against leading IT system implementation practice, and
- developing a strategy to assist non-pilot municipalities with implementing standard data structures (mSCOA) across their FMICS.

The assessment of strategies employed by 25 pilot municipalities provided lessons learnt in terms of what works, and what does not. These strategies were then compared to leading practice, and informed the proposed strategy to improve on what is being done in municipalities.

Research based on case study and action research principles, together with a review of relevant literature, were used to develop a high-level implementation strategy for standard data structures (mSCOA) in municipal IT systems. Although the research was conducted in local government, the proposed implementation strategy is of a generic nature and, therefore, applicable to both government and non-government institutions.

1.4 SCOPE

The primary research was conducted across 25 pilot municipalities which represented all three categories of municipalities and all vendors of municipal financial software, and which were distributed across all the provinces in South Africa:

Table 1.2 Pilot municipalities (Researcher)

Municipality	**Town**	**Province**	**Category**	**Financial Software**
Municipality	Town	Province	Category	
Buffalo City	East London	Eastern Cape	A	Solar
Camdeboo LM	Graaff-Reinet	Eastern Cape	B	ProMun
Cape Town	Cape Town	Western Cape	A	SAP
City of Joburg	Johannesburg	Gauteng	A	SAP
City of Tshwane	Pretoria	Gauteng	A	SAP
Drakenstein LM	Paarl	Western Cape	B	Solar
Ekurhuleni Metro	Germiston	Gauteng	A	eVenus
Elias Motsoaledi LM	Groblersdal	Limpopo	B	Munsoft
eThekwini Metro	Durban	KwaZulu Natal	A	JD Edwards
Greater Giyani LM	Giyani	Limpopo	B	Sage Evol.
Hessequa LM	Riversdal	Western Cape	B	Venus
Knysna LM	Knysna	Western Cape	B	ProMun
Mangaung Metro	Bloemfontein	Free State	A	Solar
Nala LM	Bothaville	Free State	B	BIQ
Nelson Mandela Bay	Port Elizabeth	Eastern Cape	A	Sebata
Nkangala DM	Middelburg	Mpumalanga	C	Munsoft
Overstrand LM	Hermanus	Western Cape	B	Samras
Richmond LM	Richmond	KwaZulu Natal	B	Abacus
Senqu LM	Lady Grey	Eastern Cape	B	Sebata
Setsoto LM	Ficksburg	Free State	B	Munsoft
Sol Plaatje LM	Kimberley	Northern Cape	B	eVenus
Tlokwe LM	Potchefstroom	North West	B	Phoenix
uMgungundlovu DM	Pietermaritzburg	KwaZulu Natal	C	Sage Evol.
uMhlathuze LM	Richards Bay	KwaZulu Natal	B	ProMis
Victor Khanye LM	Delmas	Mpumalanga	B	Sebata

The selection of municipalities listed in the table above represents an accidental sample from the National Treasury project. The implementation strategies, activities and results of these municipalities had been documented and were readily available for inclusion in this research study. With the necessary permission from National Treasury, the owner of the information, the municipal project documentation was accessed from the project records while care was taken to maintain the anonymity of the research subjects as well as provide references to the source. It was possible to clarify, confirm and supplement the information through interviews and group discussions involving the National Treasury project team members and system vendors, in which case the appropriate ethical procedures were followed.

Secondary research, in the form of literature review, will cover the municipal context and systems environment; strategy development and leading system implementation methodology.

1.5 CONTRIBUTION

The implementation of the mSCOA is regarded as the biggest local government reform undertaken in the country to date, representing not only a financial classification framework but also having an impact on the technology and systems employed by municipalities, affecting key business processes, enforcing the municipal accountability cycle while standardising municipal data and culminating in improved service delivery. This project provided a unique opportunity to observe and study 25 research subjects (pilot municipalities) as the reform initiative was being implemented. The lessons learnt during these implementations were recorded and provided the basis for the development of an appropriate strategy.

The repeated testing and modification at 25 pilot sites followed an ongoing iterative strategy development process, as proposed by Rumelt (2011) and illustrated herewith in Figure 1.2:

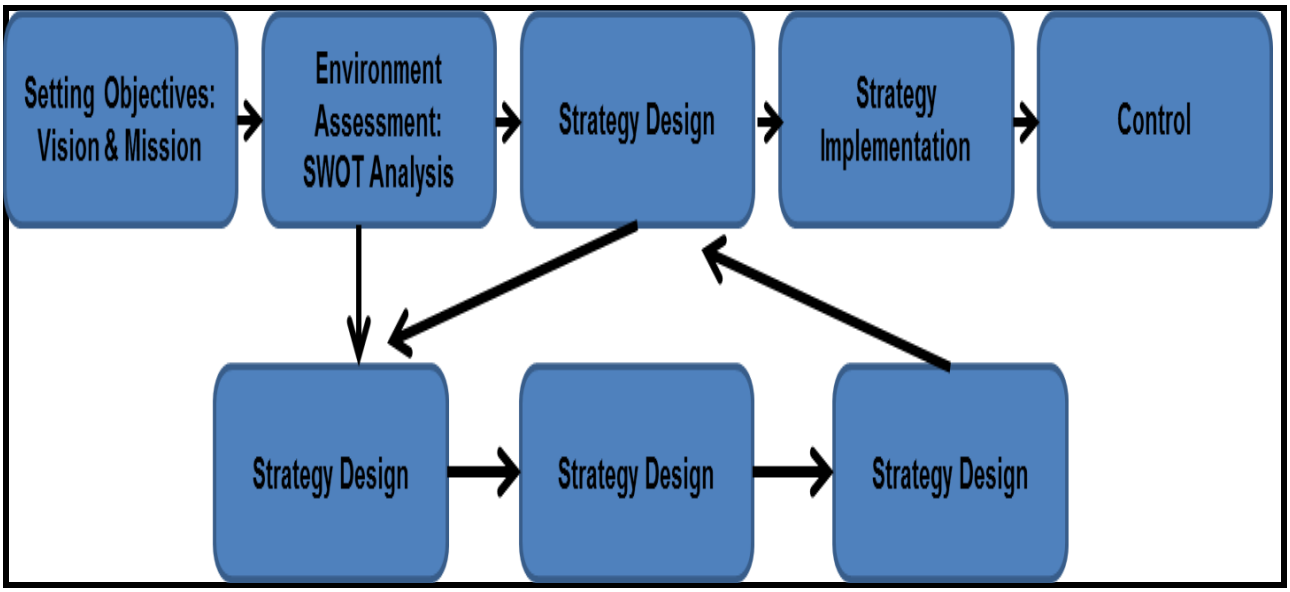


Figure 1.2 Strategy development process (Researcher, based on Rumelt (2011))

While the project activities at the time of the study were focused on individual municipalities (25 pilots) and their software vendors achieving minimum compliance and uniform financial reporting, it was anticipated that the implementation strategy to be developed would provide evidence, based on a deeper understanding of the daily challenges faced by officials, to inform prevailing practice in the local government environment. The strategy would be generic in nature and thus, although tested in the local government context, would also be applicable to system implementation in general.

The study did not focus on hardware and organisational structure as components within systems, instead focusing on software implementation, data management and the role of people in system implementation.

1.6 LITERATURE SURVEY

The literature review was presented in sections covering the municipal systems environment and the mSCOA regulation; strategy development methodology and practice; and system implementations.

1.6.1 The municipal systems environment

The municipal environment is best described by referring to applicable legislation and regulations to illustrate the functions, mandates and activities of municipalities. The role of ISs, the AG reports commenting on ISs in the municipal environment, and institute journals were also quoted in order to provide a clear picture of the context of the research.

The mSCOA project was initiated in 2010 and will continue until all municipalities comply with the regulation (South Africa, 2014). Pilot implementations were scheduled for the period from 2014 to 2016, the focus period of this research. During the pilot implementations, information was gathered using municipal self-assessments, mSCOA implementation team reviews, surveys and questionnaires as well as technical reviews and data extractions. These documents informed the design of the proposed system implementation strategy.

Organisations are recognising that their strategy and vision should include technology in order to prevent obsolescence, thereby illustrating why technology has become more than just a tool in terms of “how it can become a driving force and essential core of any business plan” (McDowell & Simon, 2001). Minnaar and Bekker (2005) maintain that generally, organisational, structural and management principles are applicable to both government and private sector organisations but that government is incapable of meeting public expectations, due mainly to its inability to adapt to the demands of the information age, burdened as it is by outdated governance, structures and management systems.

Case studies from private and public sector system implementations were presented, their methodologies were expanded upon and the lessons learnt highlighted for incorporation into the proposed mSCOA implementation strategy for municipalities.

1.6.2 Strategy development and implementation

Strategy may be explained as a plan with a specific purpose and includes the planning activity and execution of the plan, (Hornby, 2010). According to Bradford and Duncan (2013), strategy should be simple and flexible, adding that it is all about recognising options and making choices. Their proposed methodology may be summarised as embracing the top priority of management; analysing the prevailing situation (as-is); working out how things should be (to-be); designing the future; and creating ways to get things done.

Hellriegel, Jackson and Slocum (2002) present the following broad, five-step approach to strategy development, namely, diagnosing the environment; deciding on the vision and mission; formulating overall goals; creating and selecting general strategies; and allocating resources to achieve the goals. These steps lead to strategic action, ensuring that the efforts of the resources are aligned with the desired outcomes.

IT rarely has access to an unlimited supply of resources and, therefore, sustained business value should be demonstrated consistently over a period of time, (Ulrich & Newcomb, 2010). Ulrich and Newcomb (2010) suggest ten steps for the advancement of existing systems and caution that modernisation should be a common way of doing business. Vermeulen and Von Solms (2001) propose six phases for the implementation and ongoing management of information security, which could also be applied to systems implementation and which compare with the iterative process proposed by Rumelt (2011).

Obeidat and North (2014) reference Cats-Baril and Thompson (1995) and Rosacker and Rosacker (2010), who state that it is not possible to use the project management frameworks, guidelines and techniques which have been developed and used in private sector organisations in the public sector without both empirical study to identify similarities and differences between the two sectors and adaptation to purpose fit the environment. They highlight that aspects such as competition and the concomitant pressure thereof, accountability towards a broad stakeholder community, legislative frameworks, service delivery focus and criteria for performance evaluation as some of the key determinants for the difference in approach to system implementations between the two sectors.

Thus, the practical experience gained from the implementation of mSCOA in municipalities informed the proposed strategy in relation to implementing standard data structures in municipal ISs. In addition, the City of Charlotte, North Carolina, provided insight into its strategy for upgrading the technology infrastructure and lessons the city had learnt together with the concomitant benefits achieved in order to enrich the proposed strategy (McDowell & Simon, 2001).

1.7 RESEARCH DESIGN

The research design which is selected, emanates from the researcher's view of the world as well as the general subject area, the specific research field and the research questions to be addressed, while the research paradigm represents the pattern or shared way of thinking which guides the research.

The research design has important implications for the way in which the research is conducted as it forms the foundation that determines both the research process and the research method chosen to implement the research strategy (Saunders, Lewis & Thornhill, 2009). In this study the research 'onion' was used as analogy to guide the process involved in exploring and achieving the research objectives. The research 'onion'

may be viewed as a model, guiding the selection of the type of data to collect, techniques to use and the analysis of the data which has been collected.

The methodology represents the rationale and the philosophical assumptions relative to a particular field of study, as opposed to a mere collection of methods, while the research methods represent the vehicles and processes used to gather the requisite data. According to Salmon (1992), achieving a methodological approach which is consonant with the researcher's own values and concerns typically involves the longest struggle in research work.

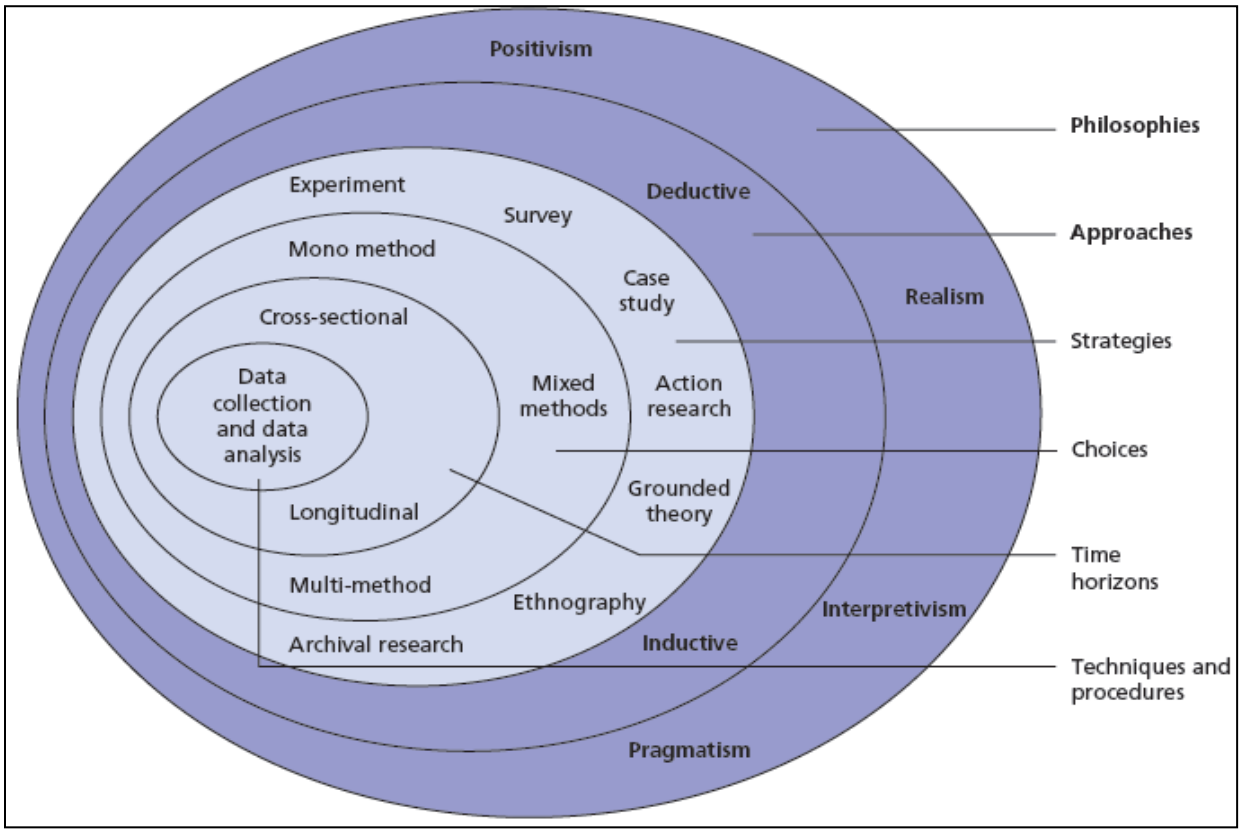


Figure 1.3 Research onion (Saunders, et al., 2009)

1.7.1 Philosophies

A pragmatic approach explores and explains how problems are solved in a practical and sensible way as opposed to having fixed ideas and theories. In the context of IT, pragmatism is concerned with the clear and practical value of solutions, testing ideas in practical settings and providing useable solutions.

This research, by the very nature of the phenomena being investigated and the solutions sought, dwelt in the pragmatist realm as it involved testing the mSCOA chart in 25 pilot municipalities before the data structure was rolled out to the remaining municipalities.

1.7.2 Approaches

Diagnostic reasoning based on an inductive approach utilises facts and examples to formulate general rules and principles. It provides an approach for investigating key questions, for example in the context of this study the measure of compliance with the mSCOA regulation and methods of implementation used. Inductive reasoning begins with specifics (compliance) and then moves to a broader generalisation using qualitative research to derive conclusions (Rovai, Baker, & Ponton, 2013). Strauss and Corbin (1990) explain inductive research as the study of the phenomenon, for example the mSCOA, as it is presented. The phenomenon in question may be discovered, developed and verified through data collection and analysis. Thus, the researcher does not embark on the research with an existing theory which is proven through the research but with an area of study (implementation of a standard data structure in 257 municipalities). What is relevant to this area of study is then allowed to emerge through the research, enriched with diagnostic reasoning, and culminating in artefacts (implementation strategy) for re-use in similar situations (roll-out to non-pilot municipalities and other organisations).

1.7.3 Strategies

Action research, as “a general term to refer to research methodologies and projects where the researcher tries to directly improve the participating organisations and, at the same time, to generate scientific knowledge” (Oates, 2011), emphasises worthwhile purpose, participation and improvement. Reason and Bradbury (2001) suggest that this research strategy should include relational practice, reflexive-practical outcomes, plurality of knowing, significant work and new and enduring consequences. Oates (2011) adds that, as this practice is not yet well established, it may be used to develop and refine the methods people use for developing (implementing) systems but that it should best be used in conjunction with other research strategies, such as the case study selected for this research.

Yin (2003) explains case study research as an empirical inquiry investigating a contemporary phenomenon in a real-life context, where the boundaries between the phenomenon being studied and the context of the phenomenon are not clearly delineated. Case study research focuses on actual complexities.

Characteristics of case study research include

- a focus on the depth, rather than the breadth of the research
- study of phenomena in a natural (real) setting
- a holistic review of the complex interconnected and inter-related factors, and
- multiple sources of information and data collection methods.

The descriptive case study used in this study included evaluation research methods to systematically determine, based on the requirements of the mSCOA, the outcome of the implementation efforts across the 25 pilot municipalities. The compliance criteria were fixed, and a comparison of the results achieved through project implementation and the

requirements of the regulation could yield one of two results only, namely, compliant or not compliant.

Surveys were utilised for the purposes of information gathering and for comparing the experiences of the pilot municipalities in their different contexts. The qualitative data collected was analysed empirically and used to examine causative variables. Surveys range from highly structured questionnaires to unstructured interviews and represent an excellent way of ascertaining people's opinions, desires and attitudes. The participants are presumed to possess sufficient knowledge and experience to be able to make a valuable contribution as well as a willingness to share the information, while representing the opinion of a larger group (Hofstee, 2013).

The selected vehicle for executing the practical research may include surveys, observations, interviews and system testing.

1.7.4 Choices

Bryman (2012) proposes that the choice of research method includes mono-, mixed and multi-methods. While mono-methods are self-explanatory, it is easy to confuse mixed and multi-methods. The key difference between the two is that a mixed method research utilises both quantitative and qualitative methodologies to arrive at a single set of research data while the multi-method includes several research segments, each resulting in a distinct data set which is then analysed using quantitative and qualitative methodologies.

Multiple research methods, carefully planned to arrive at an overall or negotiated account of the findings which brought together multiple components of the mSCOA pilot implementation, provided the source material for the proposed mSCOA implementation strategy and thus represented the preferred choice for the purposes of this study.

1.7.5 Time horizons

The mSCOA was initiated in 2010 with all municipalities and municipal entities being obliged to comply with it. This research study covered the period between 2014 and 2016 as it applied to the pilot implementations, with an ongoing data review, development and testing of artefacts. The longitudinal time horizon created the opportunity to repeatedly collect primary data from the 25 pilot municipalities and to evaluate the change and transition as the municipalities were implementing the requirements of the regulation (South Africa, 2014), the factors which determined the success of the implementation and compliance with the regulation.

1.7.6 Techniques and procedures

Primary data may be collected through participant observations and interviews, guided by questionnaires and may consist of recordings, field notes and written documents. In addition, secondary data may be found in documents, reports, correspondence, circulars and presentations, representing the work and opinions of others. This data is reduced to text before the data may be analysed.

Data which has been collected may be analysed using software tools or manually, utilising either quantitative or qualitative methods to discover relationships or themes. Oates (2011) explains that quantitative data analysis involves mathematical approaches while qualitative data analysis searches for themes and categories. He further contends that it is possible to apply a quantitative analysis to qualitative data by counting the number of times that phrases and/or themes occur.

This research included the collection of both primary and secondary data using a variety of data collection techniques. The data was then analysed utilising both quantitative and

qualitative techniques, thus producing results which were rich and rigorous (Wisker, 2008).

1.8 ETHICAL CONSIDERATIONS

Ethics are related to the beliefs and principles of what is right and/or wrong, and control or influence the behaviour of individuals. Rovai et al. (2013) point out that “at the most fundamental level, ethical research is characterised by informed consent, voluntary participation, avoidance of harm, confidentiality, and protection of vulnerable populations”. Wisker (2008) agrees that ethical research is concerned with ensuring that no harm is caused and the confidentiality of the participants is retained.

Mouton (2006) proposes that research ethics should be approached from four angles, namely, the practice of science, the relationship with society, the research subjects and the environment, while Oates (2011) considers the participants, research subjects, researcher, academic committee and users of the research from a “rights and responsibilities” perspective.

Action research involves multiple methods and is based on collaborating with the subjects while the research is taking place. The key benefits of action research include that few respondents refuse to participate, ownership of the findings and high construct validity. In addition, it is also incumbent on the researcher to guard against subjective involvement as well as the manipulation of the process by the participants.

The researcher obtained a letter of permission to conduct this research study from the National Treasury (Annexure A). In addition, the researcher took due care at all times not to identify or even imply the identity of a single municipality or vendor when documenting the findings. References were provided to all sources of information while, on completion of the research, all confidential material would be safely disposed of.

Reliability: Hornby (2010) explains reliability as the likelihood of the research findings being either correct or true, while Wisker (2008) cites how accurately research has been carried out, in other words, would another researcher obtain similar results if the research activities were duplicated? This research process was documented in detail to ensure that it could be duplicated while the findings were also supported by a literature review and findings from similar research.

Validity: Validity in research is considered to mean officially or academically accepted, (Hornby, 2010). This is achieved through peer review, the presentation of the research at academic conferences and/or publication in academic journals.

Trustworthiness: Rule and John (2011) propose that trustworthiness replace reliability and validity. They suggest scholarly rigour, ethics and transparency in order to achieve high quality research and support the concepts of transferability, credibility, dependability, confirmability and objectivity in academic research.

The ethical procedures and due care taken by the researcher were not negated by the formal approval from the ethics committee or the letter of permission from National Treasury with every care being taken to ensure that a professional and acceptable level of ethics was maintained during the research and continued after the research had been completed.

1.9 LIST OF CHAPTERS

The thesis consisted of eight chapters, with four appendices, laid out as follows:

Table 1.3 List of chapters (Researcher)

CHAPTER	OUTLINE
1. Introduction	The first chapter contains a copy of the approved research proposal. In addition, it presents an outline of the proposed research, amended for the purposes of inclusion in the final document.
2. Information technology governance	A literature review explored the constructs of IT governance as they apply to municipalities and municipal system implementations. It also discusses CobIT, ISO 38500, King reports on corporate governance and municipal practice.
3. The Municipal Standard Chart of Accounts	This chapter covers the municipal IT system environment and the mSCOA regulation. It includes an overview of the mSCOA project, mSCOA implementation activities and what constitutes compliance with the regulation. In addition, it creates the context for the research and links the mSCOA project with IT and strategy development in the interests of a standard data structure across disparate FMICS.
4. Research design and methodology	The research design and methodology are discussed in Chapter 4. Thus, the chapter explains how the research was executed and why the specific approach was followed. It outlines the actual research process which was followed, obstacles encountered and how these obstacles were addressed to arrive at the conclusion.
5. Strategy development and evaluation	Chapter 5 presents a review of existing literature on strategy development methodologies and culminates in the process followed in this research. The chapter also provides strategy evaluation check points which were derived from the literature and which were employed to ensure that sufficient breadth and depth were achieved in the final proposed implementation strategy.
6. Data collection and findings	The requisite data was collected from 25 pilot municipalities over a period of three years. The data collection was executed in six assessment cycles, during which each of the 25 municipalities was visited and assessed against specific guidance provided by National Treasury and external stakeholders, such as the AG.

CHAPTER	OUTLINE
	The municipal implementation teams were also observed during their implementation activities and advised on improvements and adjustments to their methodology and governance.
7. Strategy for the Implementation of a Standard Data Structure	The findings from Chapter 6 were analysed and arranged into the diagnostics (D) which informed the guiding policies (GP) and coherent actions (CA) in relation to an implementation strategy. This process and the proposed strategy were documented in this chapter.
8. Conclusion	The concluding chapter contains an evaluation of the study, the contribution and limitations of the study and recommendations for future research.

1.10 CONCLUSION

The context of the proposed research was a country-wide implementation of a standard data structure (mSCOA) for municipal IT systems. While, at face value, it appeared to be a financial reform affecting the financial systems of municipalities only, it was, in fact, an organisation-wide change, driven by changes to the financial management and internal control systems and which required a re-implementation of such financial management and internal control systems.

This project provided a unique opportunity both to access and research 25 pilot municipalities and to develop an implementation strategy for use by municipalities not included in the pilot group, as well as other organisations. It was anticipated that the proposed implementation strategy would provide generic guidelines which were not municipality or system specific and which could be applied broadly both within and outside of the government environment for system implementation or re-implementation.

The level of IT skills, project implementation experience and IT project management maturity (Koekemoer & Von Solms, 2017), or lack thereof in municipalities, has been

identified as one of the key inhibitors of the regulation and concomitant system implementation project roll-out. These findings have been confirmed year after year in the consolidated audit reports published by the AG. It was, therefore, clear that sound IT governance principles and a defined implementation strategy were required to guide the municipalities.

Chapter 2 presents a review of existing literature on IT governance within a municipal context, and the King Reports, ISO38500, CobIT, the AG and abroad.

Chapter 2

INFORMATION TECHNOLOGY GOVERNANCE

2.1 INTRODUCTION

Information technology (IT) is a key enabler of service delivery and plays an important role in all municipal administrations. While the contribution which IT could make towards service delivery has been recognised and several initiatives of this nature have been introduced in local government, the use of IT for this purpose is yet to materialise within the local government context (McDowell & Simon, 2001). Strategy and vision should include technology if municipalities are to remain relevant to the community and, therefore, it is imperative that they embrace technology as more than just a tool; instead it should be regarded as “a driving force and essential core” of business planning (McDowell & Simon, 2001). It is, however, broadly agreed that government is incapable of meeting public expectations, due mainly to its inability to adapt to the demands of the information age and the fact that it is burdened by outdated governance, structures and management systems (Minnaar & Bekker, 2005).

Atkinson (2002) argues that local government is required to serve as the agents of development within government through the achievement of the key objectives which are articulated in the constitution of the country. The Ministry for Provincial Affairs and Constitutional Development (1998) explains that developmental local government should be committed to working with both the citizens and stakeholder groups within the community to identify sustainable ways in which to address social, economic and material needs and improve the quality of the citizens’ lives. However, this is possible only with the effective use of technology.

According to Siddle and Koelbe (2012), it has become clear that municipalities have a key developmental role to play in local communities and environments, creating a firm basis for democratic, integrated and prosperous societies which are free from historic prejudices and which experience efficient service delivery. They add that transparency should be enhanced by enabling large numbers of people to monitor the way in which decisions and resource allocations are made. The World Bank (2003) further stresses that widespread participation is vital to achieve success at the municipal level, and that direct citizen decision-making is possible only if greater volumes of transparent and accurate information (processed and interpreted data) about the availability of resources are provided. Cloete (2002) maintains that the capacity of a municipal institution is about the ability of the municipality to perform appropriate tasks effectively, efficiently and sustainably, with support from relevant technology. This may typically be achieved through sound IT governance.

This chapter explores the constructs of IT governance as these relate to the municipal mandate and enable effective, efficient and sustainable technology supported service delivery.

2.2 IT GOVERNANCE

To achieve business success in the current competitive global digital economy, companies need to invest in information and communication technology (Van Grembergen & De Haes, 2018). This alone will not ensure their success. Companies also need organisational skills and capabilities, an enabling culture and e-leadership to achieve value from investments in technology. Rowlands, De Haes and Van Grembergen (2015) explain that IT governance is the process that links technology to the strategic and tactical objectives of the organisation, in the case of this research study, the Integrated Development Plan (IDP) of municipalities.

IT governance therefore, is an important element of the broader organisational governance. Organisational governance refers to a framework of rules and practices aimed at guiding executives in their role of ensuring accountability, fairness and transparency when dealing with diverse stakeholders (National Computing Center, 2005). The National Computing Center (2005) highlights that governance frameworks address implicit and explicit agreements between stakeholders regarding their responsibilities; rights and rewards; ways of reconciling conflicting interests within this relationship; and checks and balances to govern the relationship.

Stenzel (2007) maintains that "IT governance is the organisational capacity exercised by the board, executive management and IT management to control the formulation and implementation of IT strategy and in this way ensure the fusion of business and IT". Shark (2009) adds both a present and a future perspective to IT governance by stating that it addresses the way in which the current and future use of IT is managed and involves the evaluation and direction of "plans for the use of IT to support the organisation and monitoring the achievement of these plans". Shark (2009) further proposes drivers to improve IT governance and includes return on IT investment, the transformational nature of technology, alignment with the management strategy and objectives, and organisational considerations in this context.

A popular approach to integrating IT governance and management oversight, adapted from O'Brien (2004) and Shark (2009), is illustrated in Figure 2.1 below:

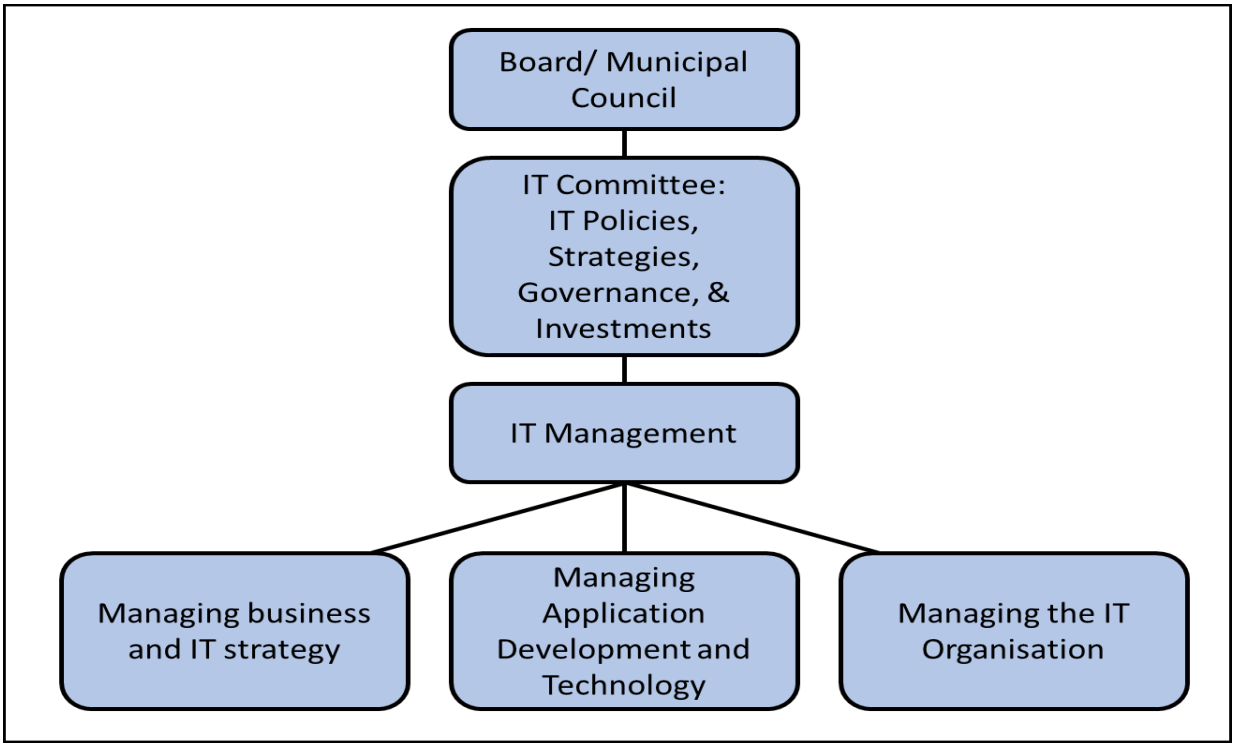


Figure 2.1 Information technology governance and management oversight (Adapted from O'Brien (2004) and Shark (2009))

O'Brien (2004) and Shark (2009) explain the IT management approach, as illustrated above, as: (i) jointly developing and implementing both business and IT strategies and objectives; (ii) researching, developing and implementing business – and IT applications, and new technologies; and (iii) managing the IT unit and its sub components. It is clear that the meaningful involvement of management and the end users in the development, implementation and governance of IT, results in improving the business value of IT for the organisation. Indeed, Shark (2009) posits that the chief information officer (CIO) is not a surrogate for effective IT governance, which is a sub-set of organisational governance and a product of executive involvement and drive. Shark (2009) concludes that technology change and advancement are likely to advance rapidly and remain a dominant

feature of organisations. “The ability of organisations, like cities and counties, to manage this change will be determined in part by their ability to manage their IT investments” (Shark, 2009), which in turn are dependent on their ability to integrate IT governance best practice into everyday business activities.

Thus, it has been established that IT is a strategic enabler of service delivery and also plays a key role in achieving predetermined objectives in municipalities. However, close cooperation from business is essential if IT is to realise its full potential and, as such, effective IT management and executive oversight are inseparable. IT governance is a subset of organisational governance and, considering the key role of IT in municipalities, it also makes a significant contribution towards the overall governance and risk portfolio of municipalities.

2.3 IT GOVERNANCE: THE MUNICIPAL CONTEXT

Municipalities spend the money from communities rendering basic services which should improve their lives. IT, on the other hand, is expensive and is expected to drive value creation in a time of budget constraints. Juiz, Guerrero and Lera (2014) point out that management relies on IT both to support decision making and to enable critical business processes while, at the same time, reducing the overall cost of doing business and, thus, IT governance should align the policies, culture, practices and services of the municipality in question. Effective IT governance, risk management and oversight create trust and confidence in the use of IT, the services it provides and the information it produces (Juiz et al., 2014).

The literature stresses the role of executives in the governance of IT and, in the case of municipalities, the councillors and top management. Weill (2004) posits that the executive role revolves around five key decisions, while Dahlberg and Kivijarvi (2006) expand the framework of Weill to six areas of responsibility namely, covering alignment of business

and IT; monitoring of IT resources, risks and management; monitoring of IT performance; evaluation of the business benefit of IT (cost benefit analysis); evaluation of business opportunities (opportunity risk analysis); and development of IT governance. Gancarz (2017) lists six indicators in respect of which technology has an impact on service delivery namely, financial, political, social, strategic, ideological, and stewardship. In practice, however, councillors and executives do not have the time to peruse comprehensive governance frameworks and reporting and/or to extract specifics from organisation-wide performance reviews and copious volumes of data. Accordingly, it has been found that this important aspect of their responsibility is neglected and often misunderstood. It is, therefore advisable that an accepted standard for governance be followed and key indicators produced in dashboard format for decision makers.

Hashim and Piatti (2016) are of the opinion that a well-functioning financial management and internal control system (FMICS) is the core component of a government's capacity to manage public finances. However, although significant resources have been invested in these across the world, the results have been largely disappointing. IT is no longer either a luxury or a grudge purchase in municipalities; instead, it has become a tool to address service delivery needs in cost-effective and sustainable ways. The increased cooperation and interaction between IT and business users, which results from executive involvement and good governance practice, should enable IT to focus on business enablement and results in the following (Shark, 2009):

- IT projects are aligned with the service delivery strategies and objectives of the municipality.
- The IT budget is a key component of the municipal budget and is destined to enable service delivery success.
- IT is integrated across the core business functions and processes of the municipalities.

- IT projects enjoy executive support and business involvement as there is a sense of ownership and teamwork.
- IT projects are delivered on time, within budget and to specification, and embraced by the end users.
- Common integrated IT applications are used across the municipality by all the functions and processes, thus eliminating duplication and optimising the cost.

Shark (2009) continues by explaining that there are six approaches to IT governance in municipalities, namely, business monarchy, IT monarchy, federal approach, IT duopoly, feudal system or anarchy. These may briefly be explained as follows:

- Business monarchy – key IT decisions are made by the business.
- IT monarchy – IT governance is driven by the IT professionals.
- Federal approach – decisions are made jointly by the executives, business unit management and IT management.
- IT duopoly – an approach to IT governance in terms of which key decisions are jointly made by management from the business units and IT.
- Feudal system – individual business units or process leaders make their own IT related decisions.
- Anarchy – there is no clear oversight or direction from either leadership or the IT department, thus resulting in individuals or small groups taking decisions in isolation.

A municipality could use a combination of one or more of these approaches, or even a different approach for different IT related decisions as may be applicable to the circumstances and the type of decision to be made. Key, though, is representation from executives, business and IT with all being committed to getting things done and in the right way (Shark, 2009).

The Control Objectives for Information and related Technologies (CobIT) was published by the Information Systems Audit and Control Association (ISACA) with the specific purpose of providing a generally accepted IT control framework for the day-to-day guidance of managers, executives and auditors, as is intended above. This framework, together with the International Standards Organisation (ISO) standards, the King Reports on governance and industry guidelines should, therefore, provide the guidance which municipalities require to align IT with their service delivery mandate.

2.4 IT GOVERNANCE FRAMEWORKS

IT governance in the municipal context may be explained as the structure of relationships and processes within a municipality which create value by balancing risk and return-on-investment within the context of the municipal strategies and objectives (ISACA, 2005). Internal controls give effect to governance and represent defined actions entrenched in the operations of the management processes, ensure reliable financial reporting as well as legal and regulatory compliance, and prevent reputational damage.

Koekemoer and Von Solms (2018) explain good governance by referring to the ways of managing business through formal institutions, regimes enforcing compliance and informal arrangements which have been agreed to or are perceived to be for the greater good. In this vein, municipalities tend to select from one of four governance frameworks, adopt hybrids of these or define their own. These governance frameworks include The King Reports, ISO 38500, CobIT and industry guidelines. Figure 2.2 below graphically displays the context of and relationship between these IT governance frameworks:

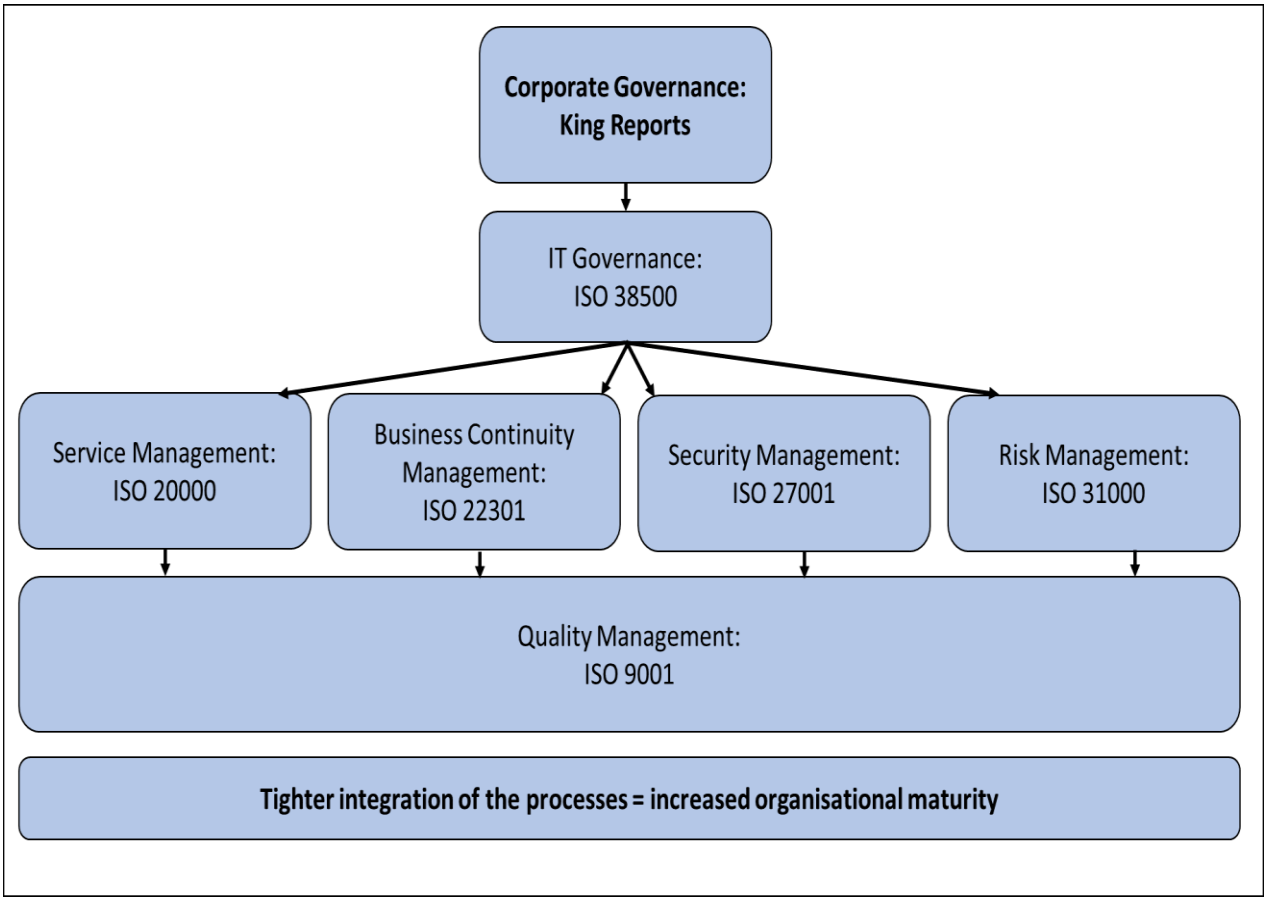


Figure 2.2 Governance frameworks (Fox ITSM, 2018)

The King Reports on corporate governance (Harduth & Sampson, 2016) address the information and technology environment of a municipality, placing numerous obligations on the executive regarding management and security, formal review to establish adequacy and effectiveness and compliance with disclosure requirements. They further explain that assurance calls for an adequate and effective control environment and the strengthening of the integrity of management reports to enable better decision making than may otherwise have been the case. In addition, assurance establishes a link between the governance framework and the oversight of risks and opportunities with

executives and the council formally approving a strategy defining the core purpose of the municipality, including its short-, medium- and long-term goals.

ISO 38500 assists board members (municipal councillors) and executives to understand and meet their legal, regulatory and ethical obligations in relation to the effective governance and use of IT. The standard is principle based and provides guidelines for the direction and control of prevailing and future IT, including strategies and policies for using IT to achieve the municipal service delivery strategies and objectives.

Fox ITSM (2018) explains that CobIT provides a leading-edge business optimisation and growth roadmap framework for the governance of IT, which capitalises on proven experience, global best practice and ground-breaking tools both to inspire IT innovation and to fuel business success. The basic premise of CobIT is to facilitate the achievement of objectives by creating a balance between risk and the cost of control for each system.

The South African Local Government Association (SALGA) has produced a guideline for municipalities to follow to ensure the effective governance of information and communication technology (ICT). This document defines the importance of governance within the public sector, it aligns with legislation and standards applicable to municipalities and it provides guidance on the governance of ICT (SALGA, 2012). Despite the fact that it is only a guideline, many municipalities have cited it as their standard for IT governance.

In short, in the municipal context IT governance refers to processes which add value to a municipality by supporting and enabling its business operations. IT governance assists municipalities to achieve their service delivery objectives by balancing risk and return on investments. The four approaches to IT governance, which have already been mentioned, are discussed below.

2.4.1 The King Reports

The King Reports provide principles and best practice to enable municipalities to achieve good governance through ethical behaviour.

These reports are founded on ethical and responsible leadership and include a section on technology governance and security which further addresses the critical nature of IT in business. However, it departs from the notion of IT as merely an enabler of services, towards the notion of IT as representing the source of opportunities and disruption, and placing IT on the agenda of council and key decision makers (PWC Southern Africa, 2016).

The key developments from King III to King IV may be summarised as follows (Myburgh & De Costa, 2017):

- Provides 17 principles for good governance
- Moves from apply OR explain to apply AND explain and from a checklist for good governance to practice
- Expands the classification of a non-executive director to that of an independent non-executive director
- Refines the notion of integrated reporting
- Explains the role of the social and ethics committee to cover oversight of both the ethics of the management committee, and the socially responsible nature of the remuneration policy
- Addition of sector supplements to extend the report to include public and private entities
- A focus on long-term investments and forward thinking
- The independence of auditors

- The executive obligation with regard to the management, protection and oversight of the IT portfolio
- The combined assurance regarding risk and opportunities, internal and external auditors, and governance bodies and committees
- Ownership of the group governance framework at the board level
- Oversight of the balance between risk and opportunities, and
- A formally approved strategy which defines the core purpose of the organisation, sets the direction to realise this purpose and oversees the planning and implementation thereof

The report includes 17 principles for good governance – three which address ethical culture; two which focus on performance and value creation; ten which guide adequate and effective control and two on trust, reputation and legitimacy. In addition, it provides extensive guidance on the implementation and execution of each of these principles and recommends best practice. The municipal supplement specifically advises municipalities on achieving their objectives, including the promotion of social and economic development, providing a safe and healthy environment, and basic service delivery in a sustainable manner, within the ambit of good corporate governance (Harduth & Sampson, 2016).

IT and the governance of IT receive specific attention as principle 12 of the report deals exclusively with this topic. It addresses information and technology separately and should also have included communication, as these three collectively represent the rapid advances in digitisation which are likened to the 4th industrial revolution.

The King IV Report requires the governance body, the council in the case of municipalities, to address the following with respect to the management and oversight of information and technology:

- Set the direction for the approach to IT
- Approve a policy which provides guidance in respect of such direction
- Delegate responsibility to manage IT
- Oversee the management of IT
- Conduct periodic independent assurance
- Disclosure regarding the governance and management of IT in the municipality

The King Reports have been a key source for the development of municipal guidelines on the governance of ICT by academics and national departments responsible for oversight of municipalities. These guidelines are discussed in Section 2.4.4 and have informed the data collection and analysis presented in Chapter 6, as well as the development of the implementation strategy documented in Chapter 7.

2.4.2 ISO 38500

Hamidovic (2014) argues that a lack of council oversight in relation to IT may place the entire municipality at risk as IT plays a critical role in generating business value and rendering services. Hamidovic (2014) provides a high-level overview of IT governance principles and key elements, based on the ISO 38500 standard. This overview provides executives and council with a framework of principles towards the good governance of IT, including evaluating the prevailing and future use of IT; directing the preparation and implementation of plans and policies; and monitoring conformance to policies and performance against plans for IT in the municipality.

The six principles on which ISO 38500 are premised include the following (Campbell, et al., 2011):

- *Responsibility for actions*. These actions cover the supply of and demand for IT, and the authority to take action in this regard.

- *Strategy*. Business strategy is informed by the current and future capabilities and needs in respect of IT.
- *Acquisitions*. This requires ongoing analysis, valid business cases and transparent decisions to balance benefits, opportunities, cost and risk.
- *Performance*. IT should be fit for purpose, i.e. support service delivery, service levels and quality.
- *Conformance*. Align with legislation, regulations, policies and practices.
- *Human behaviour*. IT takes into account human behaviour, addressing current and future needs in respect of service delivery.

In essence, ISO 38500 IT governance focuses on value creation and risk mitigation which are underpinned by business alignment and accountability. Both these premises are resource dependent and should be measured and monitored to ensure achievement. In this regard, Hamidovic (2014) maintains that "well designed, well understood and transparent governance mechanisms promote desirable IT behaviours".

While ISO 38500 focuses on the legal and regulatory requirements related to IT governance, CobIT links IT governance to complementary frameworks such as IT infrastructure library (ITIL) and project management body of knowledge (PMBOK). It provides a standard that sets minimum requirements for council and executives to ensure that appropriate procedures are in place and supported by corroborative evidence in order to evaluate, direct and monitor the IT delivery in municipalities.

2.4.3 CobIT

CobIT is a set of generally accepted IT control objectives for daily use by management and auditors which addresses both the management of current and the implementation of new IT. It should also be noted that this framework provides a benchmark for the annual audit review of municipalities (ISACA, n.d.).

The basic premise of CobIT is that control requirements, technical issues and business risk are managed within a regulatory framework and, thus, CobIT proposes four domains, namely, planning and organising; acquisition and implementation; delivery and support; and monitoring (ISACA, 2005). A maturity model based on these principles could contribute towards creating a balance between the importance, practicality and efficiency of IT objectives and processes as these relate to municipalities.

CobIT further provides the following enabling tools (ITIL Help, 2005):

- Management guidelines – critical success factors, goal indicators and performance indicators for control activities which support operational processes, information requirements and IT resources
- Frameworks – indicate how IT processes deliver information required to meet the business objectives
- Control objectives – these tools integrate 34 high-level control objectives with 318 detailed, yet specific, control objectives for the development of policies, good practice, procedures and defined responsibility
- Implementation tools – an implementation guide, management awareness information and diagnostic standards for IT control
- Audit guidelines – an outline and structure for audit control

The benefits of adopting CobIT as a standard for IT governance in municipalities include, among others, the systematic approach to and understanding of the challenges that have an impact on the strategic goals and service delivery objectives; enabling strategic decision making by the council and executives; supporting mechanisms to address the needs of the community and other stakeholders; realisation of the potential of technology enabled service delivery; and creating confidence to enable innovation and alternatives for service delivery through technology (Garsoux, n.d.).

It is, therefore, clear that, for IT to be successful in the municipal environment, it should deliver value against the set strategic objectives, support the operations and service delivery, and be cost effective to maintain. Accordingly, management should establish internal controls to govern IT. The orientation of CobIT, linking business and IT goals, providing metrics and measurements of the outcomes, and assigning responsibility to business and IT process owners, makes it well suited to the municipal environment.

2.4.4 Industry guidelines

The National Computing Center (2005) provides guidance for developing and implementing an IT governance strategy for municipalities, stating that the strategy should be consistent with the management style and risk appetite of the municipality, aligned with the regulatory environment, best practice and focused on deriving value from the IT.

The guidance which is provided covers the business case, performance measurements, an implementation roadmap, communication, capability assessments, risk management, supplier governance, the relationship between the IT function and internal audit, information security, the legal and regulatory environment, technology architecture and managing the investment in IT. It becomes clear from the guidance that IT governance should be viewed as a long-term project and not as a once off exercise and that its success is a product of executive and management involvement; that it requires culture change in order to entrench new processes; and that management expectations will only be met through continuous improvement.

The State Information Technology Agency (SITA) has developed a Minimum Information Security Standard (MISS) (SITA, 1996) and Minimum Interoperability Standard (MIOS) (SITA, 2017) for government. These documents were approved in 1996 and 2017 respectively and are generally quoted by government institutions in tender documentation as applicable to the required product or service. However, these documents do not cover

best practice as it relates to IT governance and are relevant only to national and provincial government.

Similarly, the Department of Public Service and Administration provide a framework for the governance of information and communication technology (2011), together with an outline for IT planning, implementation and operations (2014). The guidelines are based on the King Reports, ISO 38500 and CobIT and address IT strategy and risk, roles and responsibilities as these apply to IT governance within government, and assign accountability and responsibility for the management of IT to political and executive management. The documents are applicable to national and provincial government but may also be extended to local government.

SALGA prepared a guideline or roadmap for municipalities to ensure the successful governance of ICT (SALGA, 2012), namely, a Municipal Guide/Roadmap to Successful ICT Governance (MGICTG), which “suggests how to improve the status of ICT governance within municipalities and is to be used as a guideline to understand and get familiar with the concept of ICT governance”. This document is non-prescriptive and focuses on the relationship between corporate governance and IT governance. In addition, it addresses three layers of governance in relationship to the municipal structures and summarises IT governance principles, aligned to those of ISO 38500, as presented in Figure 2.3:

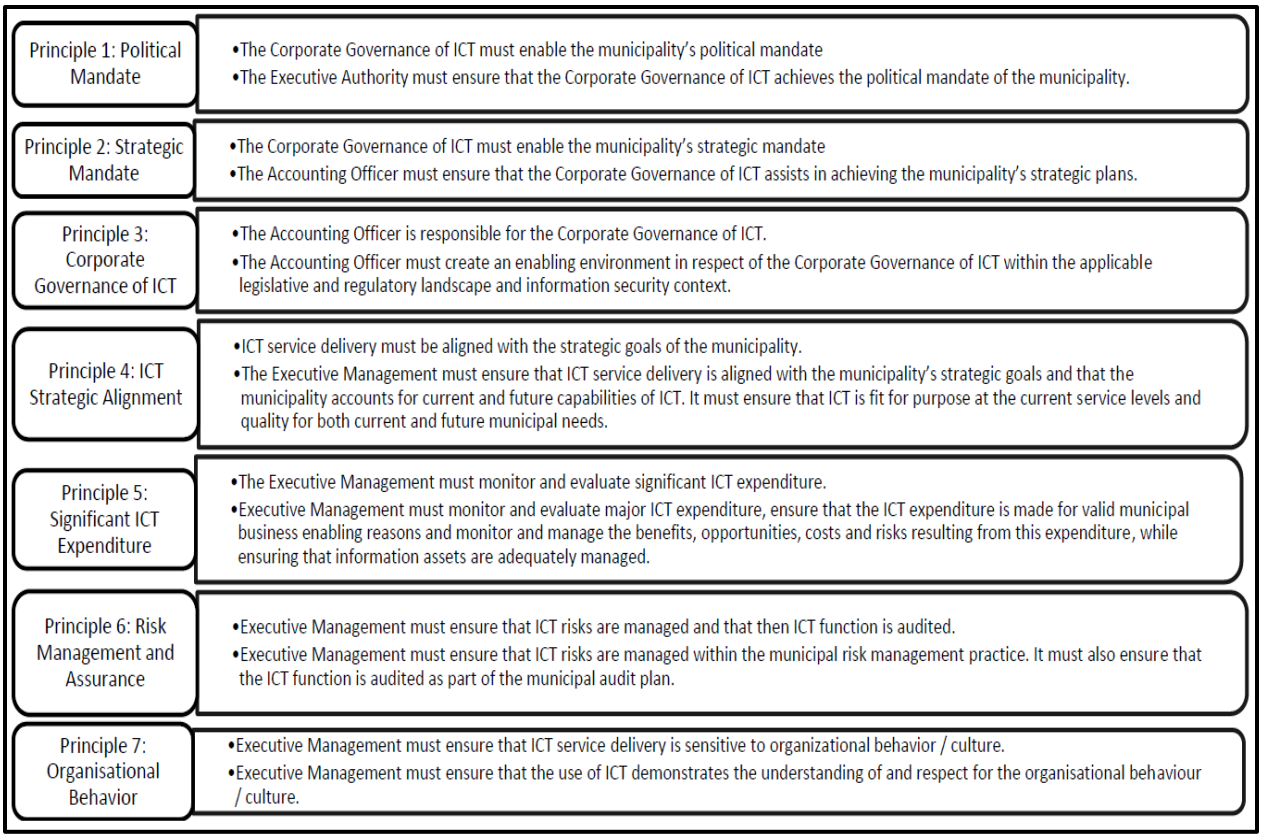


Figure 2.3 Corporate governance of ICT principles (SALGA, 2012)

The guidance encompasses a high-level roadmap for municipalities to implement IT governance. It takes into account the needs of the municipality, the proposed solution to address IT governance, a governance plan, the actual implementation and operationalisation of governance and includes a chart which identifies accountability, responsibility, support, consulted and informed stakeholders. The roadmap, summarised in Table 2.1, proposes short and medium-term approaches to IT implementation which closely resemble ITIL sub-processes (Fox ITSM, 2018):

Table 2.1 SALGA governance and ITIL processes (Researcher)

SALGA MGICTG	ITIL Processes	ITIL Sub Processes	ITIL associated functions
Security management	Service design	Security management	
ICT service continuity		Service continuity	
Program change management	Service transition	Change management	
Access management	Service operations	Access management	
Data centre management			Facilities management
Facilities and environment control			Facilities management
IT infrastructure			Technical management

SALGA further addresses the skills which are required to implement IT governance, and cites support available to municipalities, including national and provincial treasuries, Departments of Co-operative Governance and Traditional Affairs and Public Service and Administration, the Auditor General and the Local Government Sector Education and Training Authority. The document also mentions the support provided through the standardisation of the chart of accounts (mSCOA).

The guideline is concluded with a maturity self-assessment questionnaire. The questionnaire contains, among other, questions which are asked by the Auditor General

(AG) during the annual audit of municipalities and is completed by inserting a green, yellow or red indicator next to each question.

Governance supports the achievement of strategic objectives; ensures reliable financial reporting; legal and regulatory compliance; and prevents reputational damage. IT governance, on the other hand, represents an important subset of organisational governance and is, therefore, a core focus area of the AG. The guidelines presented above not only provide guidance to municipalities to achieve their service delivery imperatives, but also provide a framework for audit reviews and pave the way to successful audit outcomes.

2.5 REPORTS OF THE AUDITOR GENERAL

The AG performs an annual audit of municipalities. This comprises a confirmation of the financial statements, performance against pre-determined objectives and an IT review.

In his address on 14 July 2009, launching *Operation Clean Audit 2014*, the late Minister for Cooperative Governance and Traditional Affairs (COGTA), Honourable Sicelo Shiceka, set the strategic vision and the objectives of the initiative aimed at ensuring that all municipalities achieved clean audit reports on their financial statements by 2014 (Staff Reporter, 2009). In the period 2008 to 2017, as illustrated in Table 2.2 below, summarising the audit outcomes, the number of unqualified audits with no material findings increased from 4 to 33, and the number of unqualified audits with material findings, from 107 to 112.

Table 2.2 Municipal audit outcomes 2008/ 2009 to 2016/ 2017 (Researcher)

Audit outcomes	**Number of municipalities**								
	16/17	15/16	14/15	13/14	12/13	11/12	10/11	09/10	08/09
Financially unqualified with no findings	33	48	54	40	22	9	13	7	4
Financially unqualified with findings	112	108	109	110	138	106	114	122	107

The findings indicated above in Table 2.2 include findings related to performance against predetermined objectives, IT review, and compliance with laws and regulations. Koekemoer (2017) reports that the review of the AG includes, among other, assessing IT management roles and responsibilities, control and management weaknesses, as well as the root causes of any deficiencies. The article highlights that “significant IT weaknesses were identified in the areas of IT governance; security management; user account management; and IT service continuity” (Koekemoer, 2017).

The key findings and areas of concern in relation to IT management and governance were summarised as follows:

1. The status of information within local government:
    - Confidentiality
        - Deficient security management
        - Absence of IT governance
        - Inadequate user access control

- Integrity
    - Deficient security management
    - Inadequate user access control
- Availability
    - Deficient security management
    - IT Service continuity measures lacking

2. Key enabling controls were found lacking, insufficient, or not well managed:
    - Governance
    - Effective management controls
    - Secure architecture and infrastructure

The AG also warns that attention should be given to the threats and weaknesses that may have an impact on the confidentiality, integrity and availability of data, which recommendation is aligned to the Protection of Personal Information Act (South Africa, 2013). Attention is also required to ensure that staff across the municipality are aware of and understand the IT controls being implemented, as well as their roles and responsibilities in this regard. In addition, management should ensure that the IT controls that have been designed and implemented are functioning effectively at all times and should sustain these IT controls through disciplined and consistently performed daily, monthly and quarterly IT operational practices and reviews.

Koekemoer (2017) summarises the guidance provided by the AG to municipalities to address and resolve the audit findings as follows:

- A uniform IT governance framework should be developed and rolled out to all municipalities.
- An IT best practice manual or guideline should be drafted for municipalities.

- Policies and procedures should be centrally developed to address the control weaknesses.
- External stakeholders, such as COGTA, SALGA and district municipalities, should support and capacitate IT functions within municipalities.
- A working group should be established to assist the municipalities with addressing the root causes of the audit findings.
- IT governance forums should be established.
- Internal audit and audit committees should play a more effective role in tracking the progress made with the implementation of corrective measures to address IT audit findings.
- Management should institute consequence management.
- Management should reprioritise budget allocations to provide for the implementation of disaster recovery plans and backup procedures.
- Management should reallocate sufficient budget for the upskilling of IT staff.
- Consultants should be monitored and managed through service level agreements (SLAs).
- Staff should be upskilled by the consultants performing services.
- More standardisation should take place at the municipalities with regard to the IT systems used and the vendors supporting these systems.

IT controls ensure the confidentiality, integrity and availability of information, enable service delivery and promote security in local government. The strength of the financial management controls is dependent on IT controls and it is, thus, essential that good IT governance, effective IT management and a secure IT infrastructure are in place.

The AG reports clearly indicated that an intervention was required to address the prevailing situation in municipalities and also provided an indication of the prevailing

situation in South Africa. However, what is the situation in the rest of the world and, in particular, in other developing countries?

2.6 EXPERIENCE FROM ACROSS THE WORLD

Government as a whole and municipalities in particular represent a major proportion of the economic activities and employment in any country. Although the contribution of IT to service delivery is recognised it is, however, not always reflected in budget allocations or through executive involvement.

Governance in the public sector is complicated by the diverse stakeholders, including politicians, administration, business and households. In addition, it is also influenced by the legislative framework in place, complex accounting standards and demands for sustainable and cost-effective services. Sethibe, Cambell and McDonald (2007) state that the public sector, referring to the Australian Tax Office as an example, is confronted by "ongoing fundamental changes in how they function and relate to business and the wider community. These changes are in turn bringing about a re-evaluation of the appropriateness of governance structures, processes and relational mechanisms". Based on relevant literature, differentiation between IT management and governance, the role of the council, and alignment of business in terms of its contribution to IT governance, their paper compares IT governance in the public and private sectors. They also highlight a difference between IT management and governance based on the focus, i.e. internal on the existing operations vs. external towards meeting the present and future demands and goals of the municipality and its customers.

Sethibe et al. (2007) cite the following four key dimensions of IT governance:

- The role of the board, council and senior management, distinguishing between being accountable and being responsible. They mention the influence of the

corporate distance between the chief executive officer (CEO) and the CIO on the impact of IT governance, and that value should be derived from the IT assets of the municipality.

- The structure of IT management and the position of key decision makers determine the effectiveness of the IT governance. Despite limited funds, the benefits of sharing and reuse have not yet been exhausted by municipalities.
- IT processes, such as strategic decision making and monitoring, planning and budgeting in relation to business cases, governance maturity models and the use of IT scorecards as well as the impact of multiple layers of authority on key decisions and competing priorities.
- Relationships within municipalities, for example the relationship between business and IT, and the municipality and outsourced partners, as these relationships affect organisational learning, competitive positioning and the governance of contracts.

Australian research into IT governance in government (Marshall & McKay, 2004; Ali, 2006; Bowen, Cheung & Rohde, 2007) provides key dimensions to determine IT governance maturity levels and to guide municipal practitioners. These dimensions, as presented by the abovementioned researchers, are provided in Table 2.3 below:

Table 2.3 Dimensions of IT governance (Researcher)

Dimension	Marshall and McKay (2004)	Ali (2006)	Bowen et al. (2007)
IT strategy/steering committee		√	√
Executive and management involvement		√	
Culture of compliance and ethics in IT management		√	
IT supports municipal vision, strategy and objectives	√		
IT investment management	√		
IT governance improvement, monitor and oversee delivery of value	√		√
Shared understanding and decision making, integration of IT and business	√		√
Consideration of the business case, measurement of benefits realisation	√		
Performance assessment across the IT life-cycle	√	√	
Effective communication systems to share information relating to governance		√	√

Marshall and McKay (2004) caution that pressure to invest in IT extends beyond political and competitive reasons to include service delivery imperatives. They mention that the difficulty involved in calculating the return on investment is due to IT being an inextricable

component of municipal processes, structures and services. In addition, IT may also be viewed as a product of the municipality, based on the context and the purpose thereof. Ali (2006) argues that empirical findings without an in-depth analysis of the reason for the findings may be misleading. In such a case, layers of decision making may delay investments in IT or the absence of corporate performance measures may affect the evaluation of the value of these investments.

Bowen et al. (2007) stress the following six key points emanating from their research, namely, decision making structures as these relate to a shared understanding; active participation and balanced representation across the municipality; comprehensive and well communicated IT policies and strategies; defined value metrics which are used to select IT investments; interim evaluations of project progress involving all stakeholders; and formal post implementation reviews of IT projects.

In comparison to the findings from research conducted in Australia, research in developing countries indicates that the public sector is under pressure to deliver quality services at affordable prices which places reliance on IT to support service delivery, and also creates a challenge in terms of the adequate maintenance, operations and governance of IT (Nfuka & Rusu, 2011). Nfuka and Rusu (2011) found that, in Tanzania, the involvement of and support from senior management have a significant impact on IT governance, while the effect of the consolidation and standardisation of IT to reduce cost is minimal. In comparison, Adaba and Rusu (2014) comment on IT decision structures, processes, and relational mechanisms and practices in Ghana. They identified a centralised approach to IT governance. This approach is different to the findings in comparable literature and was characterised by inadequate board/council involvement, and an absence of IT steering and strategy committees.

Research in Brasilia reveals that a non-existent or underperforming IT portfolio management committee may result in nullifying the potential positive impact of both a strong IT steering committee and diligent IT solution management (Heindrickson & Dos Santos (Jnr), 2014). Heindrickson and Dos Santos Jnr (2014) also identified a knowledge gap and contended that informing key decision makers on how to plan and deploy IT in order to promote effective governance, would increase the joint effects of the IT portfolio management committee, the IT steering committee, and diligent IT solution management. Santos and Dos Santos Jnr (2017) created an understanding of the impact of non-operational IT governance on the IT goals which were defined in the strategy. They found that top management support does not contribute towards IT governance due to the structure of the public sector and that the role of strategic planning, due to political speech vs. delivery, is negligible. On the other hand, they did find that the performance of the IT investment portfolio committee does positively influence the performance of the IT steering committee and advance the governance of IT, as well as overall governance in the public sector. However, budget constraints have a significant impact on the formulation and implementation of IT governance policies across government.

South African research contributions to IT governance in the public sector include a summary of legislative requirements, best practice and AG findings by Kaselowski and Von Solms (2008) which delivers a strategic IT governance plan for municipalities from CobIT (What to do) and ISO 17799 (How to do). Woods (2010) discussed overspending on IT in government and argued that deficient governance is a key contributor. Other reasons include a lack of insight; delays in key decisions which result in increased cost and missed opportunities; heavily regulated procurement processes in government; IT and business not aligned in terms of needs; and IT which is too sophisticated and advanced for the purpose thereof.

Terblanche (2011) utilises six imperatives, namely, affordability, agility, ease of use, reliability, security and self-service, to propose a high-level framework for IT governance in the public sector. The framework draws on a top-down and bottom-up approach, which incorporates business processes and IT building blocks, as well as IT components, environment and improvements, but does not provide guidance on implementation. The framework is provided in response to finding that CobIT does not provide sufficient detail to be of use to municipalities that ITIL is process driven and not geared towards overall IT governance, and that best practice does not provide a solution, particularly for government. Terblanche (2011) concludes that IT governance in the municipal context should be based on the needs of the municipality and that the processes of implementation and continual improvement are key to success.

International experience, mainly from Australia, identified both legal and functional changes and the absence of strategy and policies as challenges. It further highlighted IT structures, roles and responsibilities, delayed decision making and a lack of performance measures as causes of weak IT governance. In comparison, experience from developing countries in Africa and South America reveal that communities in these countries expect high quality services at affordable prices, which in turn drive technology implementation. However, these factors may also result in limited budget allocations and spending on maintenance, operations and governance with inadequate executive involvement, an absence of steering committees and IT strategy, and a knowledge gap in these countries all compounding the deficiencies in terms of IT governance. South African municipalities similarly are pressured by legislative and regulatory compliance, with stakeholders demanding basic services but often without payment. Delayed decisions and business not being aligned with IT strategy often lead to the implementation of over-sophisticated solutions which are not fully utilised. This then results in overspending of budget allocations. Failed audit outcomes and negative audit findings have highlighted the need

for an external intervention as well as a return to the basics (governance) in order to address longstanding issues and shortcomings.

2.7 CONCLUSION

This chapter reviewed CobIT, ISO 38500, The King Reports and industry guidelines as best practices for IT governance in municipalities. It also focused on the reports and recommendations of the AG concerning the status and governance of IT in municipalities and summarised key proposals for improvements aimed at addressing these adverse audit findings. In addition, contributions from research across the world, developing countries and South Africa, in particular, were elaborated upon.

It has become clear that deficient IT governance in municipalities is a major source of the adverse audit findings with a lack of clear guidance, knowledge and understanding contributing to this state of affairs. Municipalities require both support and external interventions if the prevailing situation is to be addressed and clean audit outcomes achieved.

National Treasury, as part of its oversight role, has, therefore, embarked on a countrywide municipal reform in an attempt to address the situation (South Africa, 2014). mSCOA forms part of a broader initiative to standardise financial management in municipalities and improve oversight and governance in the public sector. The next chapter presents a high-level roadmap of the development and implementation of mSCOA and discusses the lessons learnt from the efforts of the pilot municipalities.

Chapter 3

THE MUNICIPAL STANDARD CHART OF ACCOUNTS

3.1 INTRODUCTION

The situation in municipalities at the time of the study i.e. the failed audit outcomes, lack of governance and internal control, and deficient service delivery, all call for reliable information, accurate measurement and effective control (Barnett, n.d.).

Chapter 2 explained the link between municipal governance, IT governance as a subset of municipal governance, IT management and IT operations. It highlighted principles from The King Reports, ISO 38500, CobIT and industry guidelines and compared these with reports from the Auditor General (AG) and international experience before coming to the conclusion that municipalities are overburdened by legislation and regulations. It is clear municipalities do not have at their disposal the skill, capacity and/or resources required for compliance and efficient service delivery, and technology is not providing the enabling support that it should.

With IT governance, as a subset of corporate governance, sorely lacking, it has become clear that this situation is contributing to the adverse audit findings. Municipalities require support, standardisation and external interventions to address the prevailing situation and achieve clean audit outcomes.

Chapter 3 introduces the Standard Chart of Accounts for Municipalities (mSCOA), a municipal-wide reform regulated by National Treasury in an effort to address the lack of IT governance through the standardisation of the data structure in their financial management and internal control systems (FMICS). The discussion touches on the need for reform, how the national project engaged and enabled the municipalities, thus gaining

an understanding of the requirements and what compliance with the mSCOA regulation (South Africa, 2014) entails.

3.2 THE NEED FOR STANDARDISATION

Pauw et al. (2011) explain that effectiveness in local government has consequences for financial management, namely, that budgets should clearly indicate the services and products to be supplied and that financial and performance reporting should support the measurement of the effectiveness of service delivery. They propose an IT architecture, see Figure 3.1 below, to support municipal finance management and ensure that budget preparation, execution, service delivery, performance measurement and reporting are all aligned.

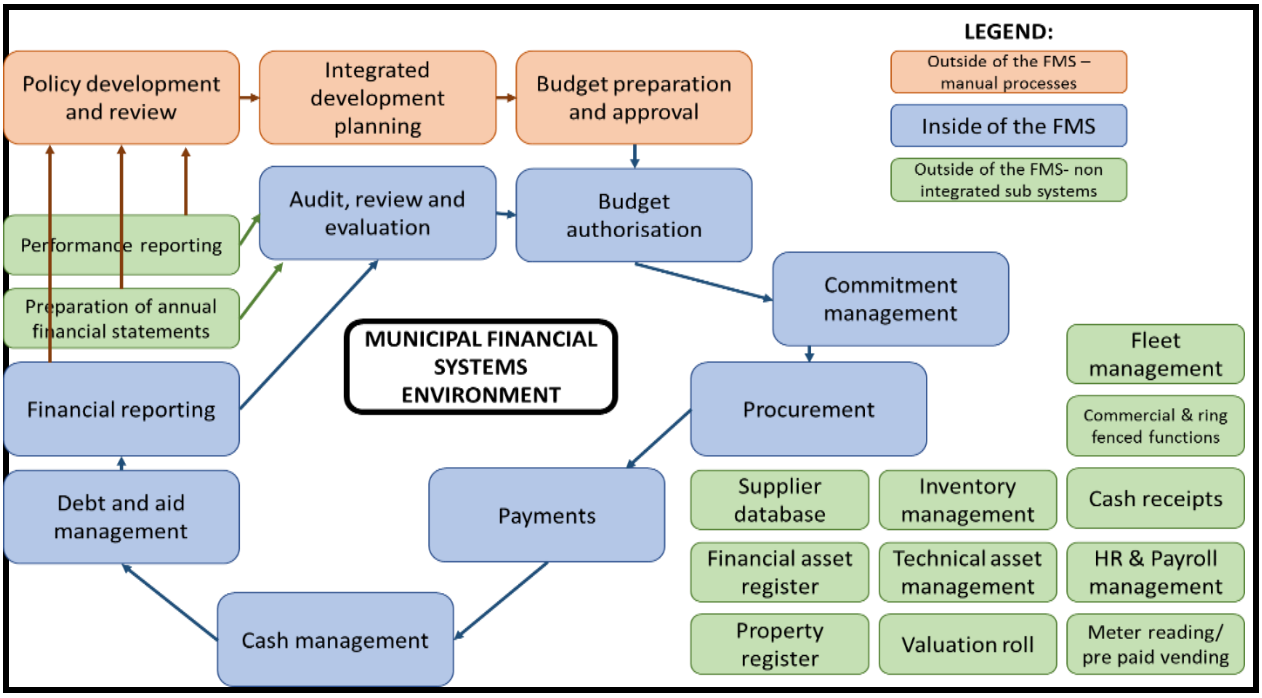


Figure 3.1 Municipal financial systems environment (Researcher, adapted from Pauw et al. (2011))

In Figure 3.1 the blue areas indicate functionality which Pauw et al. (2011) found to be generally included within the core financial systems of municipalities while the green areas refer to the external systems and sub-systems which are typically not integrated with the core financial systems. The pink areas refer to processes which are usually manually performed. Pauw et al. (2011) further found that there is no common denominator for costs, output or outcomes in local government, thus making the measuring and reporting of value an extremely complex task.

Section 2.3 discussed IT governance within the municipal context and highlighted that reliable and comparable data across municipalities is not available nor does IT support the measurement and reporting of service delivery. This was confirmed in section 2.5 where the findings of the AG concerning the status of information in municipalities were referenced. It is difficult to recognise the relationship between IT and its outcomes, as even the most effective municipalities' experience challenges in terms of quantifying the contribution of IT to service delivery and public value (Cole & Parston, 2006). Furthermore, measurement often focuses on the internal organisation and not on the value delivered to the community. Reliable and valid data, if available, is of use only if it relates to service delivery with the disparate systems and the time it takes to collect and consolidate information further compromising the usability of such data (Cole & Parston, 2006).

Cole and Parston (2006) concur with Pauw et al. (2011) that, in the public sector, one finds stand-alone IT systems that, at best, superficially interface with other systems, resulting in cumbersome data collection and analysis, often of irrelevant and redundant metrics, and not reflective of the contribution made by service delivery.

Indeed, as early as 1996, the government in South Africa realised the need for management control and uniformity in presenting data on financial management,

performance and service delivery. Accordingly, Section 216(1) of the Constitution (South Africa, 1996) stipulates that national legislation must establish a national treasury and prescribe measures to ensure both transparency and expenditure control in each sphere of government by introducing the following:

- Generally Recognised Accounting Practice (GRAP)
- Uniform expenditure classifications (SCOA)
- Uniform treasury norms and standards (MFMA, DoRA and Regulations).

Section 168(1) of the Municipal Finance Management Act (MFMA) (South Africa, 2003) provides that the Minister (of Finance), acting in agreement with the cabinet member responsible for local government, may publish regulations for any matter that may be prescribed or that may facilitate the enforcement and administration of the act.

Section 21(1) of the MFMA (South Africa, 2003) goes on to state that the municipalities must establish a process for preparing their annual budgets and for regularly reviewing their integrated development plans and related policies so as to ensure consistency and credibility across the budget, the integrated development plan and budget-related policies. This led to the publication of the mSCOA regulation (South Africa, 2014) which introduced a standard data structure, reporting formats and business processes across all municipalities in South Africa. The objectives of mSCOA include introducing a national standard for the recording, classification and reporting of municipal budget and financial information at a transaction level. The regulation further states the intention to regulate minimum IT system requirements, defined in the regulation as “those specifications for an integrated software solution, incorporating an enterprise resource management system” (South Africa, 2014).

Thus, all municipalities are compelled to implement the reform in order to align the data structures of their FMICS. This implies an upgrade, re-implementation or completely new implementation of their FMICS. This implementation project requires a well-managed and governed IT implementation project, business process review and organisation-wide reform. National Treasury provided support to the municipalities embarking on this journey by appointing a team of consultants, issuing circulars and conducting extensive training interventions. The next section provides a high-level summary of the national project as it unfolded over a period of almost ten years.

3.3 THE NATIONAL MSCOA PROJECT

A Chart of Accounts (COA) represents a set of unique identifiers used in FMICS to organise and classify financial data as such data relates to individual transactions. The COA defines a relational database consisting of data elements (financial transaction information) broken down into easy to use categories or accounts and utilises alphanumeric characters termed global unique identifiers (GUID) with which to organise these data elements.

It is incumbent on municipalities and municipal entities to comply with the regulation. This means that the full municipal accountability cycle should accommodate the regulated COA, from budget preparation through transacting and reporting, with all seven of the segments being embedded in the master data table of the municipal FMICS. This regulation called for a re-configuration or re-implementation of the FMICS in 257 municipalities and included minimum system specifications, standard operating procedures and the seamless integration of related subsystems with the core financial system.

The national mSCOA project started in 2010 with research and planning and was finally implemented in five phases. These five phases are graphically represented in Figure 3.2 herewith (Koekemoer, 2018):

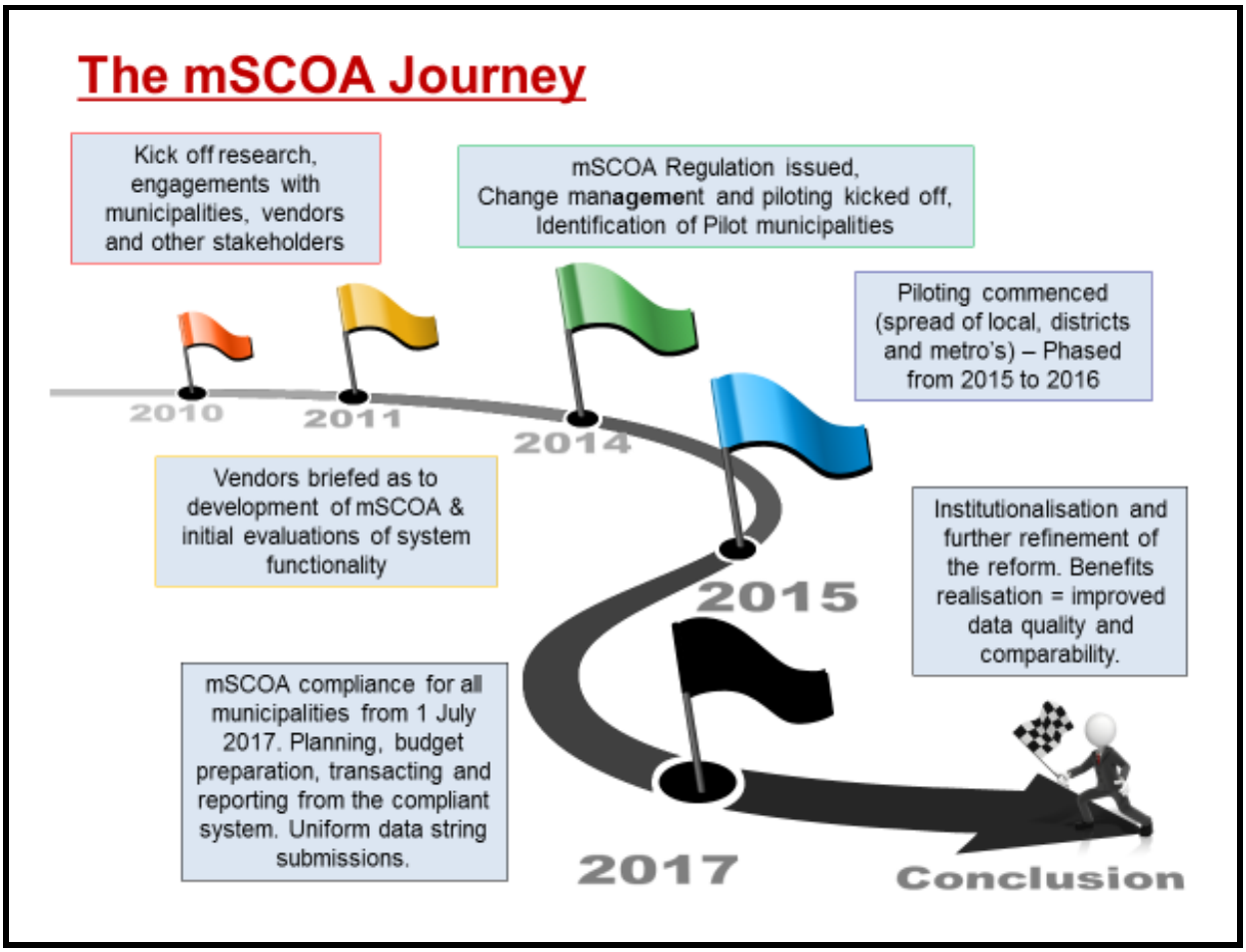


Figure 3.2 The mSCOA journey (Reproduced with permission from National Treasury)

Phases 1 to 3: Promulgation of mSCOA Regulation – 2010 to 22 April 2014

- National Treasury conducted research into financial management system reforms in local government and embarked on the initial concept development.

- An international study tour (National Treasury, 2015) revealed that no other country has embarked on a similar reform and that although certain municipal functions (eProcurement in Russia) are centrally managed, municipalities are generally responsible for their own IT.
- On 20 October 2011, National Treasury published MFMA Circular No. 57 to provide guidance on the requirements of municipal financial systems and processes, and to prevent municipalities from purchasing systems that do not meet the minimum requirements of the imminent mSCOA Regulation.

- National Treasury briefed existing system vendors and consultants on the intended development and implementation of mSCOA as well as the initial assessments of the systems deployed in municipalities.

- Extensive research and consultation with all relevant stakeholders resulted in the publication of mSCOA (Notice No. 37577) on 22 April 2014.

Phase 4: Change Management and Piloting – 23 April 2014 to 31 March 2017

- Phase 4 of the mSCOA project included change management and the development of the mSCOA data classification framework to be tested and refined during the piloting at 25 municipalities.

- Twenty-five municipalities using ten different IT systems piloted mSCOA with 20 going live early, from 1 July 2015. During the piloting process, which officially concluded in December 2016, a total of 32 municipalities (including voluntary early adopters) received continued support from the project team. This pilot project culminated in the release of mSCOA Version 6.1 on 7 December 2016.

- MFMA Circular 80, published on 8 March 2016 and replacing MFMA Circular 57, contained a detailed system specification for FMICS in municipalities to guide the municipalities towards achieving mSCOA compliance. In addition, National Treasury provided a transversal panel tender, RT25-2016, which municipalities could use to procure systems and services which had been technically evaluated and deemed suitable for this purpose.

- The Local Government Database and Reporting System (LGDRS) at National Treasury was upgraded and tested to accommodate the mSCOA reporting requirements. This involved the design of an additional database to accommodate the mSCOA classification framework as well as the collection mechanism to accept the datasets from municipalities. The monitoring and registration of these submissions, together with the validation of the formats and content, were prioritised in preparation for uniform municipal reporting.

- National Treasury provided change management support, training and technical guidance to ensure that the municipalities were able to implement the reform, i.e. an IT system upgrade and re-implementation of their FMICS to accommodate the changed data classification structure.

- An mSCOA Frequently Asked Questions Database was created to address queries, interact with municipalities and system vendors, and serve as a knowledge repository for the project.

Phase 5: Institutionalisation of mSCOA – June 2017 to March 2019

- The regulation requires all municipalities to comply from 1 July 2017 by planning, transacting and reporting in the mSCOA classification framework. Compliance is confirmed at National Treasury level through the submission of financial reports in the form of data string uploads to the LGDRS with these data strings then passing 17 validation rules during the upload process.

- The AG is mandated to audit the regulatory compliance of municipalities and would, therefore, include an mSCOA review on conclusion of the 2017/ 2018 financial year, which audit would also focus on the implementation projects and data migration strategies (Auditor General (3), 2017).

- The final phase of the national project has been designed to provide support to municipalities which have not been able to implement the mSCOA data classification framework by the regulated compliance date, 30 June 2017. The municipal classification framework and reporting processes will be further refined and aligned with national government processes. Integration of sub-systems, and use cases for applications of “big municipal data” also need to be addressed.

The support provided to municipalities over the course of the project may best be visualised across a timeline which is presented in Figure 3.3 below:

01/14	02/14	03/14	04/14	05/14	06/14	07/14	08/14	09/14	10/14	11/14	12/14
			Regulation published Version 5.4				ICF 1	ICF 2			ICF 3
01/15	02/15	03/15	04/15	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15
	ICF 4				ICF 5	mSCOA Circ. 1 published	mSCOA workshop	ICF 6 mSCOA Circ. 2 published		mSCOA Circ. 3 published	ICF 7
01/16	02/16	03/16	04/16	05/16	06/16	07/16	08/16	09/16	10/16	11/16	12/16
			mSCOA Circ. 4 published		Version 5.5	IMFO conf. / mSCOA Circ. 5 published	mSCOA Circ. 6 published AND Version 6.0	mSCOA workshop			Piloting complete Version 6.1

Figure 3.3 The mSCOA project timeline (Researcher)

The timeline indicates the publication of the regulation in April 2014, as well as the start of the piloting project, using version 5.4 of the COA. National Treasury hosted seven integrated communication forums (ICF), a conference and workshops to provide support and capacity building over and above the publication of six mSCOA circulars (Circ.) to provide guidance and project steps for the municipalities to follow. In addition, training material was prepared and rolled out across the country to assist the development of skills and build capacity within the municipalities, which are required to implement this reform.

In short, the mSCOA regulation prescribes an organisation-wide reform which affects the whole of local government and requires a complex IT project to implement uniform data structures at the transaction level, across the municipal accountability cycle. National Treasury has used a team of consultants to provide ongoing guidance and knowledge transfer to municipalities for this purpose. The next section briefly explains both mSCOA and the segmented chart which defines the data classification framework to be implemented.

3.4 UNDERSTANDING MSCOA

mSCOA refers to a multi-dimensional classification framework for municipal financial and non-financial data. The data originates from financial transactions in the general ledger of the municipality and non-financial data associated with the financial data, for example ageing of debtors account balances, achievement of project deliverables and condition assessment of infrastructure assets (National Treasury (1), 2015).

Financial data is described in terms of seven segments, six of which are regulated. The financial information (debits and credits) are contained in the Item segment, with six additional segments capturing attributes associated with the transactional data (National Treasury (1), 2015). This represented a departure from the existing two-segment flat file structure that municipalities were using, illustrated in Figure 3.4 below:

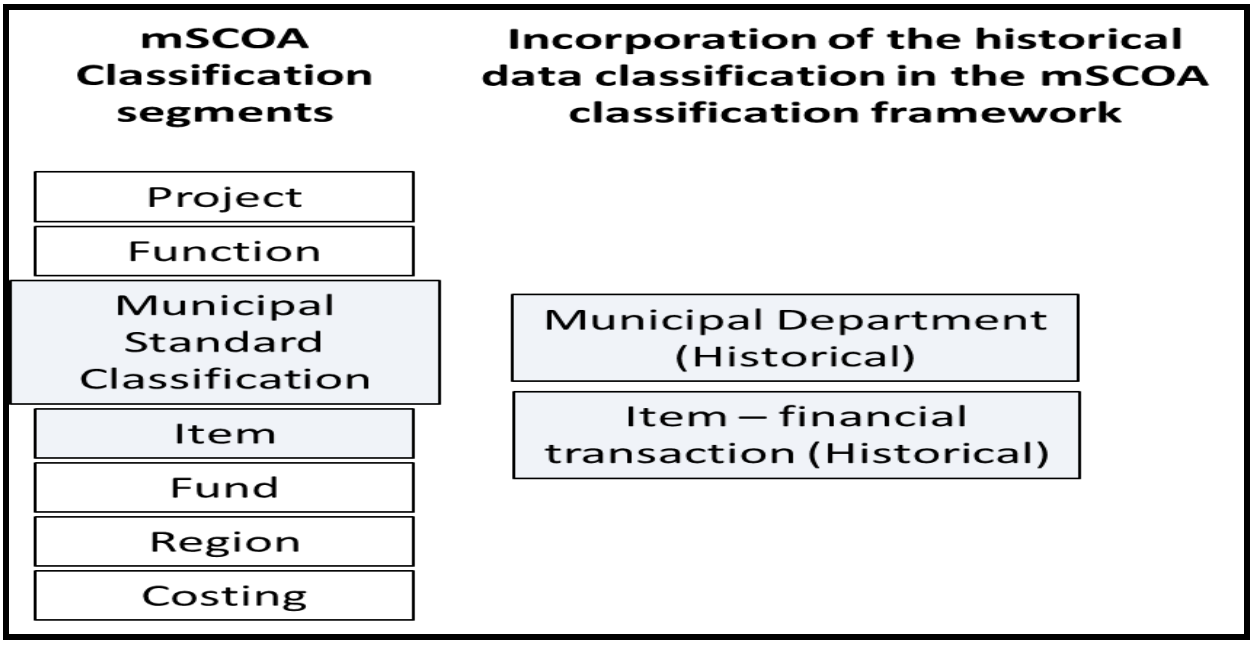


Figure 3.4 The newly regulated seven segment vote structure (Reproduced with permission from National Treasury)

Each of the seven segments is populated when a financial transaction is recorded, providing a complete data classification and reporting framework, as explained in Figure 3.5 below:

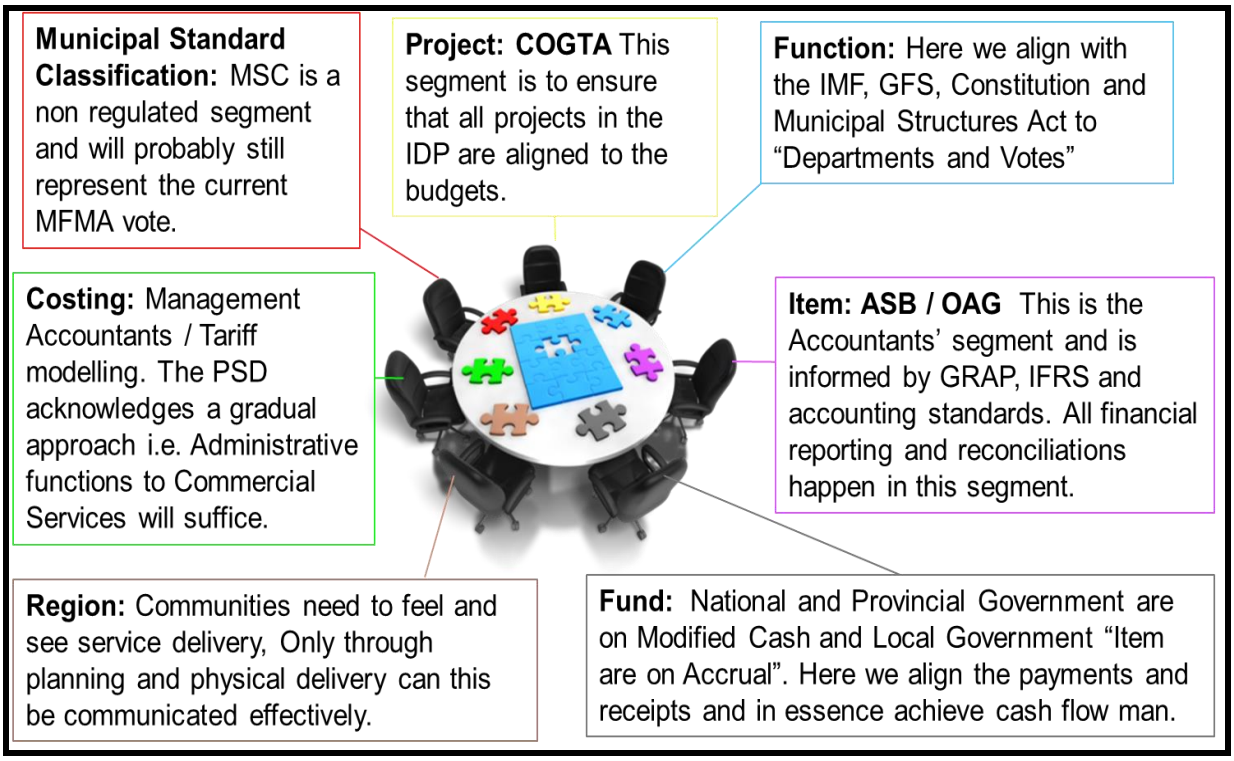


Figure 3.5 Explaining the seven segments (Reproduced with permission from National Treasury)

Section 5 of the mSCOA regulation (South Africa, 2014) indicates the following minimum implementation requirements, namely:

"5. (1) The standard chart of accounts of a municipality or municipal entity –

a) must contain the segments in the Schedule as required by regulation 4(1);

b) must accurately record all financial transactions and data in the applicable segment; and
c) may not contain data which is mapped or extrapolated, or which otherwise does not reflect transactions recorded or measured by the municipality or municipal entity.

(2) The financial and business applications or systems used by a municipality or municipal entity must –

a) provide for the hosting of the general ledger structured in accordance with the classification framework determined in terms of regulation 4(2);
b) be capable of accommodating and operating the standard chart of accounts; and
c) provide a portal allowing for free access, for information purposes, to the general ledger of the municipality or municipal entity, by any person authorised by the Director-General or the Accounting Officer of the municipality.

(3) Each municipality and municipal entity must have, or have access to, computer hardware with sufficient capacity to run the software which complies with the requirements in sub-regulation (2).”

It is clear from the above that all municipalities must

- review their current IT environment to ensure that the hardware, connectivity and FMICS are sufficient to accommodate the requirements of this regulation
- re-implement, upgrade or implement a new FMICS to ensure compliance with the regulation
- align their business processes and internal policies to support the regulation, and
- review and update their IT governance policy, structures and strategy in view of the pending mSCOA implementation.

The impact of the mSCOA regulation is far greater than merely changing a data structure. In fact, it is referred to as a total organisational reform – the biggest in local government to date. The impact of the reform is summarised in Figure 3.6 below:

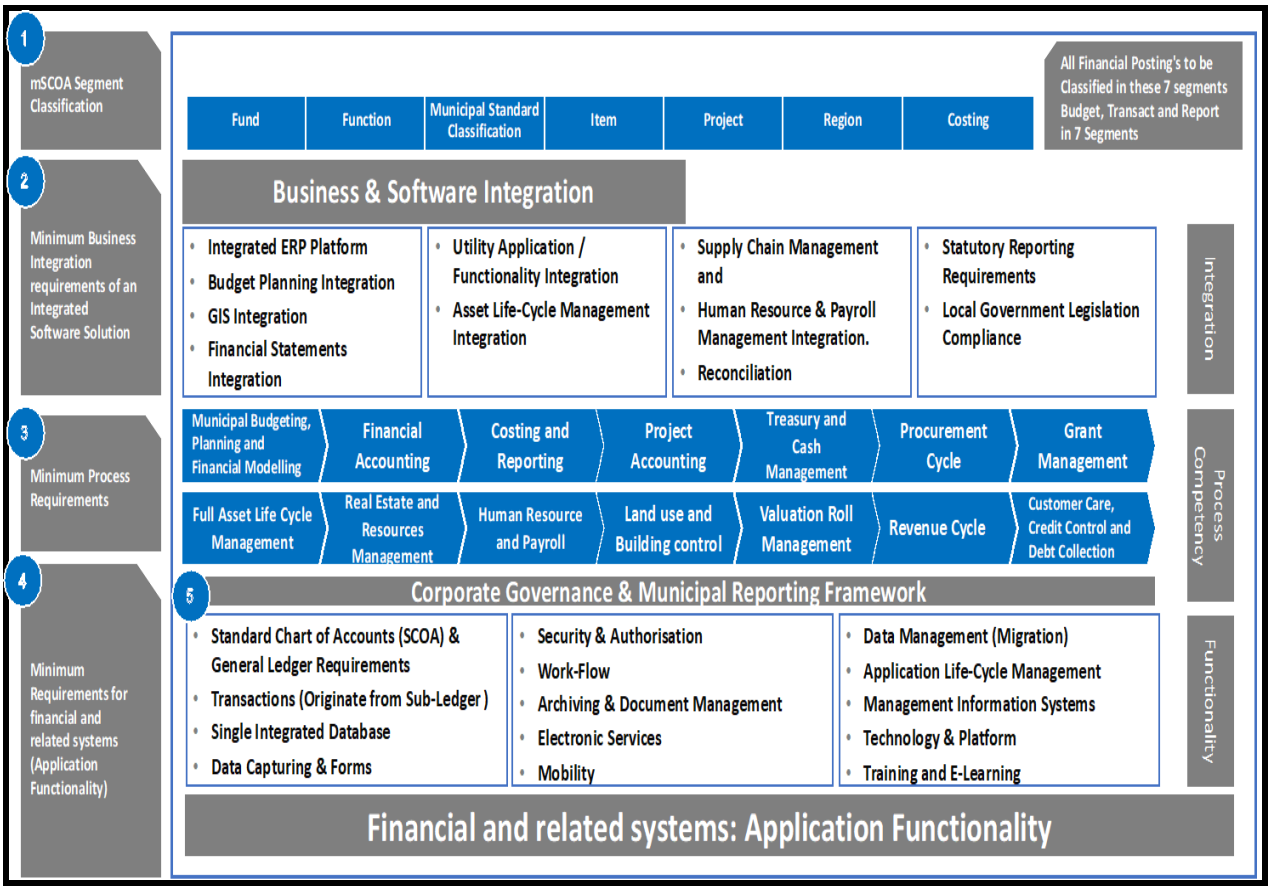


Figure 3.6 The impact of the mSCOA project (Reproduced with permission from National Treasury)

In Figure 3.6 above, section 1 refers to the standard data classification framework, consisting of seven segments, of which six are regulated. All financial information should be classified within this structure for budget, transacting and reporting purposes. Section 2 of the diagram highlights the business and software requirements. It should be noted

that these represent the minimum requirements but that, in most cases, municipalities require additional functionality to give full effect to the regulation. The assessment of the current business and IT environment were discussed above and in mSCOA Circular No. 2 (National Treasury (2), 2015). Sections 3 and 5 in Figure 3.6 above indicate the key municipal business processes, also listed in the regulation, and which are impacted upon by the regulation. Municipalities are required to review these processes and update them to ensure compliance with the regulation. Finally, section 4 unpacks the minimum requirements for the FMICS, highlighting key elements of the IT implementation projects.

Ducharme Consulting (2017) reports on the complexity of the data classification structure and mSCOA implementation as follows: “The multi-dimensional chart, together with all the affected business processes, result in the mSCOA project being complex, necessitating a comprehensive and well thought-out project plan, various key skills and a strong management team to ensure all the milestones are identified and coordinated”.

Koekemoer and Von Solms (2017) emphasise that the mSCOA project requires not only a high level of project management maturity but that it also changes municipalities from budget line item driven entities to project driven entities. They found that the project management maturity in municipalities is extremely low and, therefore, concur with the AG (2011) that municipalities would need guidance, support and, in most cases, an external intervention to implement this data classification framework.

Now that it has become clear what has to be done, the question then arises as to how municipalities would know if they were complying with the full extent of the mSCOA regulation? In the final instance, regulatory compliance is a mandate of the AG, while National Treasury, through the team of consultants, has the responsibility for monitoring the 257 IT implementation projects, and receiving and evaluating the output reports produced directly from the FMICS of the respective municipalities. Accordingly, Section

3.5 explains what regulatory compliance means to municipalities and how it may be evaluated.

3.5 COMPLIANCE WITH THE MSCOA REGULATION

Although regulatory compliance is a responsibility of the AG, it will be evaluated by the National Treasury mSCOA implementation team in the first instance, while stakeholders will receive in-year reports from the municipalities, for example the national and provincial departments, and the South African Revenue Services. However, the AG is mandated to perform municipal audit reviews and will engage with the municipalities on four levels in this respect, namely, normal IT audits, project implementation reviews, data migration assessments and regulatory compliance evaluations.

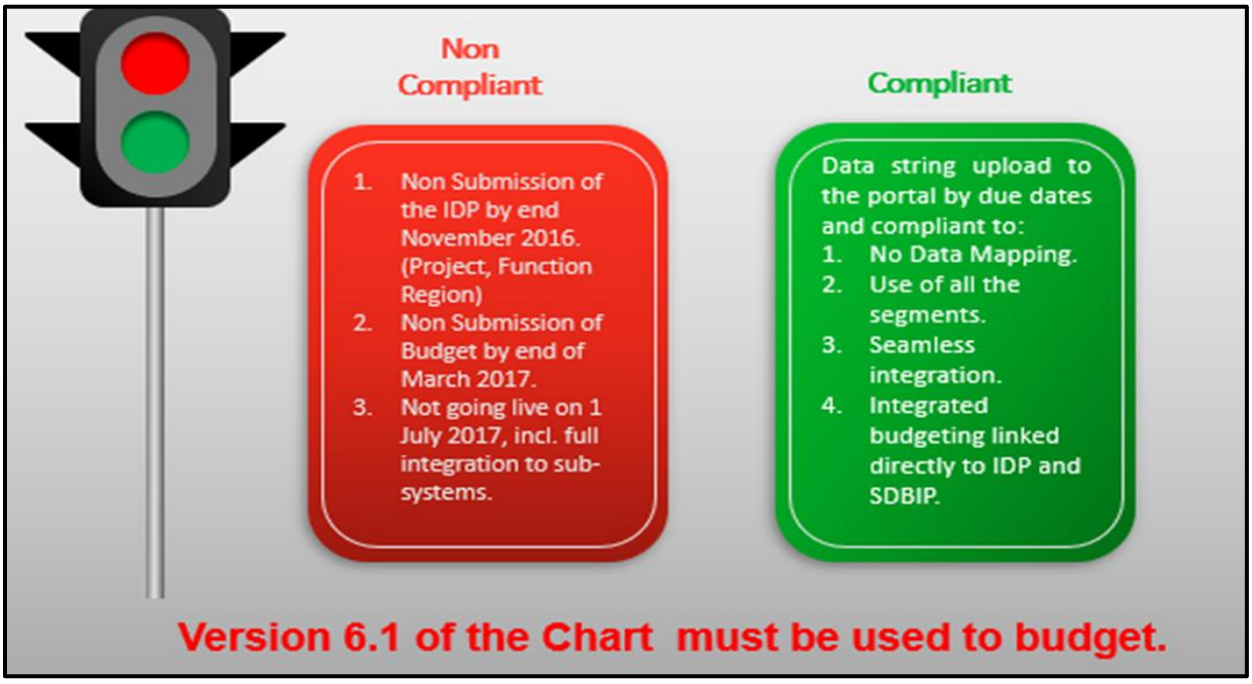


Figure 3.7 Compliance with the mSCOA regulation (Reproduced with permission from National Treasury)

Compliance with the regulation, at a very high level, is illustrated in Figure 3.7 above, and should be adhered to by all municipalities and their entities.

Municipalities are required to submit their Integrated Development Plan (IDP) in the form of data strings to National Treasury, utilising three of the segments, namely, the project, function and regional segments. These will provide information on their annual plan for service delivery in the coming year, the capital and operational projects which the municipality will deliver, the municipal function involved, for example electricity or water, and where in the municipality (ward) the project (service delivery) will happen. Thus, this plan provides insight into the activities of municipalities in the forthcoming year and paves the way for a project driven organisation, performance management based on the original plan, and identified projects within specified wards (South Africa, 2003).

The annual budget should be submitted to National Treasury, also in the form of data strings and including all the regulated segments. No mapping of data from the historical two segments to the seven segments is allowed. Every single budget item and financial transaction should include all the segments, from the source of the transaction to the final accounting treatment and reporting thereof. The data string submissions should be electronic, seamlessly submitted from the municipal IT system(s) to the LGDRS in a pipe delimited file with a strictly prescribed file format (National Treasury (9), 2017).

The AG (2017), speaking at a national mSCOA workshop in Cape Town, provided feedback on a pre-implementation review and highlighted the prevailing position of IT in municipalities and the general readiness to implement the reform. The report highlighted the fact that municipalities often do not have adequate controls, comprehensive implementation plans, sufficient competent staff and/or clearly documented business processes to enable a smooth mSCOA implementation. The mSCOA readiness assessment identified that only 41 out of a total of 257 municipalities were prepared for

the project and that at least 27 would require external support to achieve minimum compliance. Figures 3.8 and 3.9 below present the findings of the assessment by the AG:

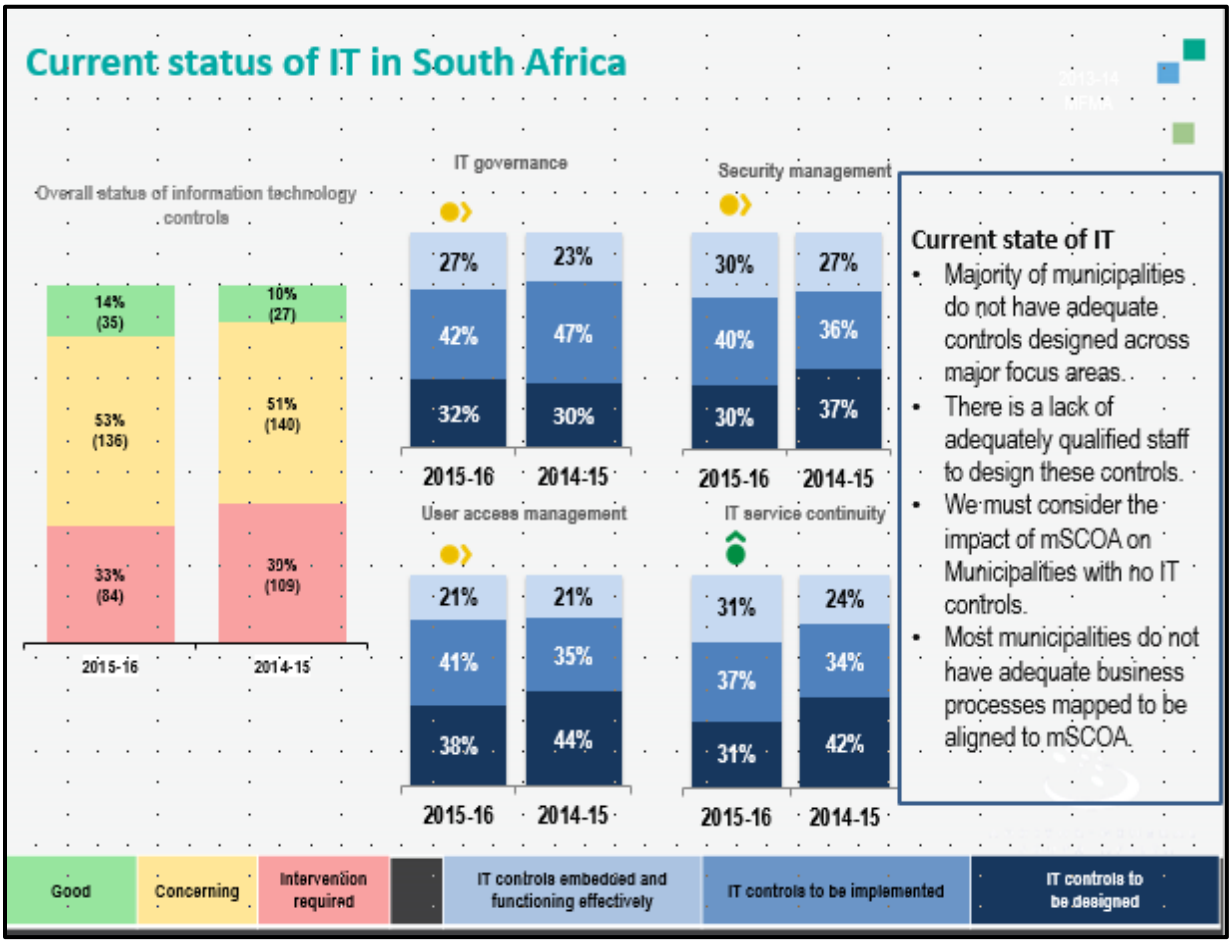


Figure 3.8 Pre-implementation status of municipal IT in South Africa (Reproduced with permission from National Treasury)

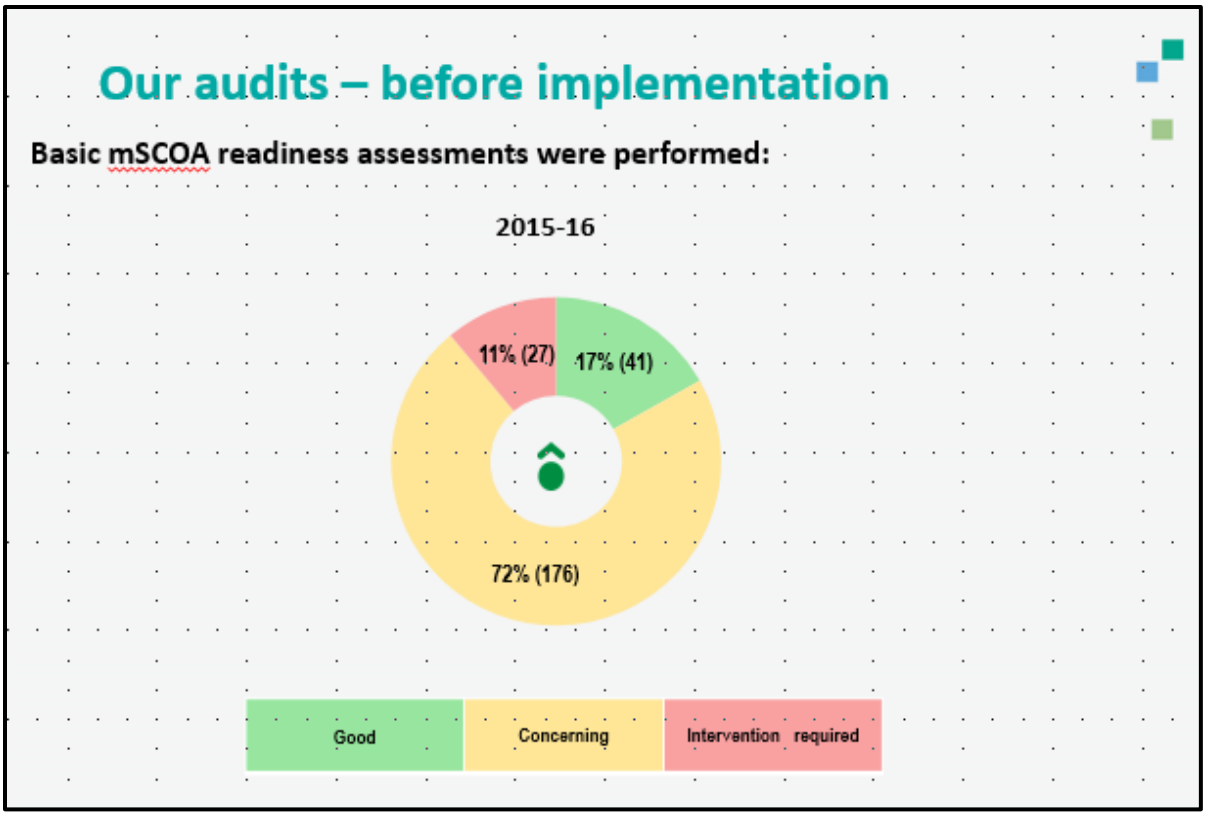


Figure 3.9 Pre-implementation mSCOA readiness assessment (Reproduced with permission from National Treasury)

Following on the assessment of the AG, presented in Figures 3.8 and 3.9 above, Koekemoer and Von Solms (2017) found that the IT project management maturity in municipalities was low, ranging from levels 0 to 2 out of 5, and recommended that external intervention and guidance are necessary to ensure that municipalities are able to comply with the regulation. These proposed interventions include capacity building and support of the municipal staff; addressing governance, policies and procedures; and standardisation across municipalities to enable the IT project delivery. A uniform implementation strategy would greatly assist municipalities in this respect.

National Treasury, in response to the above findings, has provided an IT system specification document, namely, MFMA Circular 80 Annexure B, to guide municipalities when assessing their current and potential new system software in view of compliance with the mSCOA regulations. National Treasury, in turn, has evaluated all the available systems being utilised by the 257 municipalities as compared to the published system specification document; and published a panel tender request, RT25-2016, in support of the municipal IT implementations. These interventions are in addition to providing guidance in mSCOA circulars, hosting change management workshops across the country, and training municipal staff on mSCOA, project management and related topics, (National Treasury (6), 2016).

Ducharme Consulting (2017) offer further advice on approaching the implementation project, namely, that the project plan should account for the size, complexity and risk involved, and include the existing reporting structures, project methodologies and capacity of the municipality in question. Van de Haar, Abrahams and Coertze (2016) state that, although the regulation does not specifically change technology, people or business processes, these are all affected by the design of the classification framework. They continue that “it will therefore be impossible for a municipality to successfully implement and remain compliant to mSCOA if it does not investigate the affected areas” and include such in the implementation plan. In addition, they recommend a pre-, during and post-assessment to discover and drive key focus areas. Recommended areas to assess and include in the mSCOA implementation plan include corporate governance; strategic planning and reporting; business processes; IT; data; capable municipal staff and change management.

The Department of Public Service and Administration (2014) published a framework which provides guidance for IT planning and implementation in government. The document indicates that the following items should be addressed in the plan but does not

provide a sample plan, explain how this should be done, or include a comprehensive strategy:

- A statement of the goals to be achieved
- The prioritised objectives to be included in the IT plan
- Target ISs architecture
- Implementation roadmap reflecting prioritised projects/activities and budget provision
- Enabling resource requirements such as funding, structure, capacity and capability.

Shark (2009) states that “there are well-defined methodologies, metrics, strategies and approaches for ERP projects” and also right and wrong ways of approaching IT implementations. The role of the CIO is presented as one of guiding the municipality to avoid common pitfalls in projects of this nature, some of which are listed as

- failure to dedicate sufficient and experienced resources
- a lack of executive commitment addressed through a project sponsor and steering committee
- predictable outside change, such as elections, demarcation changes, budget cycles, and financial year end
- not involving the users throughout the project
- underestimating the interdependencies of complex software environments
- significant organisational change, a shifting of roles and tremendous effort, and
- not thinking outside of the box, generating and capturing new ideas and approaches.

Municipalities are required to implement the regulated standard chart of accounts following a formal IT project implementation strategy and methodology. National Treasury has provided the following guidance in this respect, namely, to start with an assessment

of the prevailing IT environment and compare this with the minimum requirements of the regulation. The outcome of the assessment determines the nature of the project, namely, a system upgrade, re-implementation or a completely new implementation. However, research has highlighted that municipalities have limited capacity and project management maturity (Koekemoer & Von Solms, 2017), and, therefore, it is broadly agreed that municipalities would require assistance to implement a complex reform of this nature. An implementation strategy, uniform approach and effective governance of these projects would contribute to the success the project. The implementation strategy should be based on the lessons learnt during the pilot implementations.

3.6 CONCLUSION

The regulation of mSCOA, widely recognised as a ground-breaking, organisation-wide reform for municipalities in South Africa, calls for a re-implementation, upgrade or completely new implementation of IT systems to achieve a uniform data structure across 257 municipalities. National Treasury has provided guidance to municipalities in terms of what is expected of them, the initial assessment of their current IT environment as a point of departure and the minimum specifications for the final FMICS. National Treasury also employed a team of consultants to support pilot projects, developed guiding circulars and templates and hosted training workshops (ICF) in the interests of enabling municipalities.

Municipalities are required to assess their FMICS and compare such assessment with the minimum system specification which National Treasury published. The result should inform the way forward, namely, a formal IT project to address the gap identified. However, it is clear that municipalities do not have at their disposal the skills, capacity and/or project management maturity to manage the required delivery. Accordingly, municipalities need guidance in the form of a high-level implementation strategy and project approach which may guide the implementation of the standard data structure (mSCOA).

Chapter 4 discusses the science of design as it applies to IT and uses elements from the "research onion" (Saunders et al., 2009) to explain the methodology which was followed in this research study. The chapter addresses the research problem description and research objectives, and discusses the science of design and creation before unpacking the research design itself. Aspects of research design which are covered include design, philosophy, approach, strategy, choices, time horizons, techniques and sampling. The chapter is concluded with a summary of the ethical considerations which were adhered to during the execution of the study.

Chapter 4

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

The achievement of a methodological approach to research, aligned to the researcher's values and concerns, while also conforming to the rigorous demands of science within the field of study in question, often involves the longest struggle in academic research (Salmon, 1992).

Chapter 2 investigated the situation in municipalities regarding governance at the time of the study with a focus on IT governance as a subset of corporate governance. It became apparent that deficient IT governance in municipalities, which is a major source of adverse audit findings, impacts negatively on both financial management and service delivery. Municipalities require guidance and support through external interventions to address the existing situation, improve on their audit outcomes and deliver services to the community. A similar situation has been identified in developing countries where municipalities are under pressure to deliver services to the community at affordable prices. This expectation increases the reliance on IT to enable service delivery and creates a challenge in terms of adequate IT maintenance, operations, management and governance. Research has further revealed a knowledge gap, limited commitment from leadership and insufficient IT governance. However, these issues could be partially addressed with a uniform approach and guidance which is centrally developed and locally implemented. The need for guidance was confirmed by Posthumus and Von Solms (2010) who state that "there is a need for clear guidance on IT governance and its implementation based on the current lack of broad level understanding of strategic IT-related issues" in municipalities.

National Treasury, in response to the need for a standard approach, introduced a standard chart of accounts (SCOA) for the national, provincial and local spheres of government and uniform financial reporting. Chapter 3 discussed the support provided by National Treasury in the form of a team of consultants executing a project-based roll out of the reform at selected pilot municipalities. However, it has become clear that the municipalities do not have at their disposal the skills, capacity or project management maturity to manage the required delivery (Koekemoer & Von Solms, 2017). Thus, municipalities require further guidance in the form of a high-level implementation strategy and project approach which may guide the implementation of the standard chart of accounts for municipalities (mSCOA). Accordingly, the key objective of this research was to develop a guiding strategy for the implementation of the uniform data structure by way of a financial management and internal control systems (FMICS) upgrade and requiring a re-configuration or re-implementation of existing municipal IT systems.

This chapter discusses the science of design and creation, the research design and methodology used in the study, the process which was followed and concludes with a discussion of ethical considerations (Saunders et al., 2009). The creation of abstract artefacts by combining technical competence with academic rigour results in implementable solutions for real problems. Philosophically, this leads to arguments on the part of the pragmatists who point out that truth and utility "are two sides of the same coin and that scientific research should be evaluated in light of its practical implications" (Hevner, March, Park & Ram, 2004).

Chapter 4 also addresses the problem description and research objectives; the science of design and creation; the research design; research philosophy, approach, strategies and choices; time horizons, techniques; sampling; ethical considerations; and design science in IS research.

Although the study was conducted within local government, it was anticipated that the proposed implementation strategy would be of a generic nature and, thus, be applicable to both government and non-government institutions.

4.2 PROBLEM DESCRIPTION AND OBJECTIVES

The Regulation on a Standard Chart of Accounts for Municipalities was published on 22 April 2014 (South Africa, 2014) with all municipalities and municipal entities in South Africa being required to comply with from 1 July 2017. However, municipalities have limited capacity for project management (Koekemoer & Von Solms, 2017) and, according to the Auditor General (AG) (Auditor General (3), 2017), require an external intervention to support this implementation. The problem statement is, therefore, clear, namely, that municipalities must implement a standard data structure (mSCOA) in their core FMICS and related sub-systems, irrespective of the particular brand of software being used. In view of the fact that municipalities have limited resources and capacity to successfully implement a reform of this extent, they require guidance in the form of a strategy for the implementation of the uniform data structure (Siddle & Koelbe, 2012).

Thus, the primary objective of this research was to develop a strategy based on sound IT governance principles to guide municipalities through the implementation of a uniform data structure in their FMICS. The secondary objectives, which support the achievement of the primary objectives, may be summarised as follows:

- An iterative assessment of the strategies employed by the 25 municipalities which participated in the pilot phase of the mSCOA project implementation.
- Benchmarking these implementation strategies against leading IT system implementation practice and guidance provided by National Treasury and the AG.

- Documenting the findings and developing a strategy to assist the non-pilot municipalities with implementing standard data structures (mSCOA) across their FMICS.

The intended output of this research was a guiding IT implementation strategy following governance principles for municipalities and other organisations intending to implement a standard data structure within their FMICS. Creating new and innovative artefacts in response to real problems extends the boundaries of traditional research towards the design-science paradigm, which is briefly discussed below.

4.3 THE SCIENCE OF DESIGN AND CREATION

The science of design and creation focuses on developing new IT artefacts to address intricate problems and, typically, includes analysing practical challenges and designing and developing computer-based solutions for everyday problems and challenges (Oates, 2011). According to Simon (1996), design science is concerned with developing solutions to complex problems which would improve the current situation or solution and adding an incremental or iterative element. The inclusion of the improved current situation or solution in the definition also points towards a component of evaluation in terms of confirming the improvement which has resulted from the introduction of the artefact (Gregor & Hevner, 2013).

ISs are rooted in multiple disciplines, which include, among others, computer science, management, administration, system theory, sociology, finance, and economics (Offermann, Levina, Schonherr & Bub, 2009) and are intended to improve effectiveness and efficiency, in this case, in municipalities. This effectiveness and efficiency is influenced by the municipality itself, as well as processes, people, technology and methodologies. According to March and Smith (1995), improving the knowledge about IT and the contribution IT makes to effectiveness and efficiency involves both behavioural

science and design science. Hevner et al. (2004) contribute that the behavioural science paradigm involves the development and verification of theories that explain or predict human behaviour within the organisational context, while the design science paradigm intends to expand the “boundaries of human and organisational capabilities by creating new and innovative artefacts”. Knowledge and understanding of the municipal environment and the proposed solution to remedy the indicated problem are achieved through the development and implementation of the designed artefact, in this case, an implementation strategy based on IT governance principles for the implementation of a uniform data structure in municipal IT systems.

Simon (1988) defined design science as “a body of intellectually tough, analytic, partly formalisable, partly empirical, teachable doctrine about the design process”, combining synthesis with analysis to produce artefacts through science. Research in the domain of design science has two goals, namely, the development of artefacts and the production of knowledge. Baskerville, Kaul and Storey (2015) continue that the focus is on the creation of knowledge and that during the creation of knowledge, the investigator must work as both a researcher and designer to solve the problem and create new knowledge. The “knowledge production affects, and is affected by, the goals of design and the consequent artefact. It is enveloped in an iterative, constructive process that generates new knowledge that is sometimes quite specific to the design context but, at other times, highly abstract” (Baskerville et al., 2015).

According to March and Smith (1995), technology is an expression of intelligence as represented in tools, techniques, materials, and sources of power that human beings have developed in response to specific task requirements using practical reasoning and experiential knowledge. They postulate that design science attempts to create things, constructs, models, methods and implementations through research activities, which include building, evaluation, theorising and justification. The acceptance of design

science research as a legitimate approach to system improvement is increasing, yielding a “wide range of socio-technical artefacts such as decision support systems, modelling tools, governance strategies, methods for ISs evaluation, and ISs change interventions” (Gregor & Hevner, 2013).

Offermann et al. (2009) and Peffers, Tuunanen, Gengler, Rossi, Hui, Virtanen & Bragge (2006) present a summary of design science process elements to achieve a design science research process for ISs which, together with the methodology for strategy design proposed by Rumelt (n.d.), was employed to arrive at the artefact output for this study. The work of Hevner et al. (2004) contributed a research framework, research guidelines and evaluation methods which further added to this research while the work of Gregor and Hevner (2013) assisted with positioning and presenting the work for maximum impact.

A description of the research design serves to align the approach and methodology of IT research, as presented in the science of design and creation, with the natural laws governing the environment in which it is deployed and operates. Essentially, activities from the design science and natural science were required to ensure that this IT research produced relevant and effective solutions to an existing real-world problem (March & Smith, 1995).

Although the research project on hand was perfectly situated in the design sciences paradigm and culminated in the design of an implementation strategy for standard data structures in municipal information systems, the research design also represented a very classical research model, which is described in the next section.

4.4 RESEARCH DESIGN

IT is used throughout the industrialised world to collect, process and use information that addresses tasks or problems (March & Smith, 1995). IT further affects the actual work performed, the ways in which it is performed, the financial performance of the organisation and, therefore, it may be said IT shapes the financial landscape. The pervasiveness of IT in our modern, information-based society has attracted scientific interest and a rigorous and relevant implementation strategy would, undoubtedly, contribute to improved effectiveness, efficiency and financial results (March & Smith, 1995). The research design selected has important implications for the way in which the research is conducted as these assumptions form the foundation that determine the process to be followed and the methodology employed (Saunders et al., 2009). Elements from the research 'onion' were used to guide this research study towards exploring and realising the stated research objectives.

The research 'onion', depicted in Figure 4.1, provides a model to guide the researcher, layer by layer, through a thought process, i.e. unpacking research philosophies and approaches, supporting critical choices towards selecting the type of data to collect and techniques for the collection and analysis of such data. Figure 4.1 depicts these layers, which will be discussed individually:

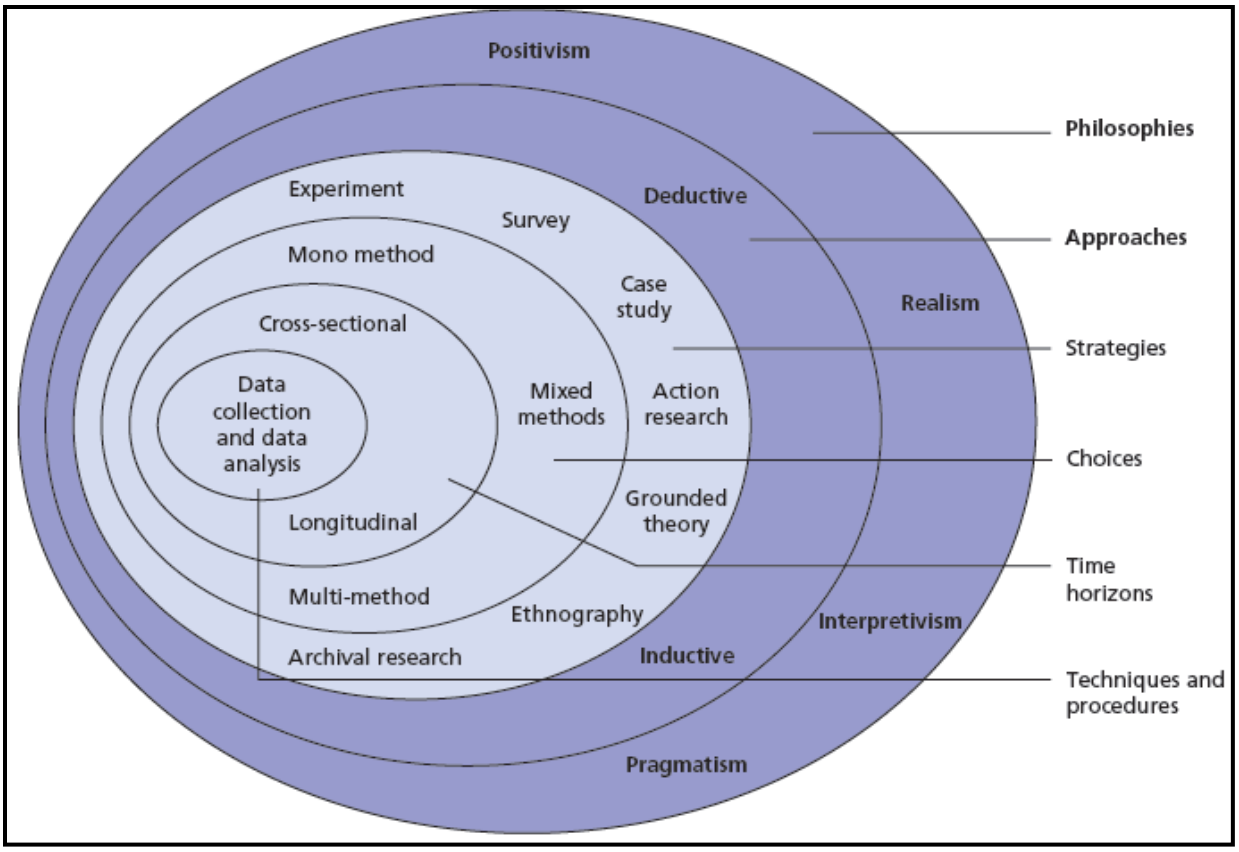


Figure 4.1 The research onion (Saunders et al., 2009)

4.5 RESEARCH PHILOSOPHY

The research paradigm provides an overall perspective to the research process and guides the methods and strategies employed. The paradigm is distinguished by the underlying philosophical assumptions.

Research philosophy refers to the development of knowledge and the nature of the knowledge to be created as related to a particular field of study in response to the research objective. The research philosophy is, in part, determined by practical considerations and the researcher's views; knowledge and the development of such

knowledge; facts as opposed to feelings and attitudes; and views on importance versus relevance. Oates (2011) suggests three research philosophies, namely, positivism, interpretivism and critical research while Saunders et al. (2009) cites four philosophies, namely, positivism, realism, interpretivism and pragmatism.

Views of research philosophies include epistemology, ontology and axiology. Epistemology is concerned mainly with what is considered to be acceptable knowledge in a particular field of study, and ontology with the way in which the world operates and commitment to particular views, the nature of reality or being. This, in contrast with axiology, which studies the judgements about the role of values and the process of social enquiry (Saunders et al., 2009). Table 4.1 presents a comparison of these views to enable the selection of the appropriate research philosophy:

Table 4.1 Comparison and selection of research philosophy (Adapted by the researcher from Oates (2011), Saunders et al. (2009) and Wisker (2008))

	Epistemology	**Ontology**	**Axiology**	**Characteristics and quality judgement**
Positivism	The philosophical stance of a natural scientist, with a preference for observable social reality and which focuses on law-like generalisations, causality and observable reality. Use existing theory to develop hypotheses.	Objectivism espouses the view that social entities are fixed in reality and outside of social the actors. Thus, the management of an organisation has views outside of the positions they hold.	The researcher is independent and objective towards the data and the research subject(s), providing a value statement to guide the research process in a value-free way.	Independence of humans Measurements and modelling Objectivity and reliability Hypothesis tests Quantitative approach Universal laws and Internal and external validity.

	Epistemology	Ontology	Axiology	Characteristics and quality judgement
Realism	Realism assumes a scientific position towards the development of knowledge based on what the senses perceive to be the truth and independent of the mind. However, insufficient data merely means that sensations are inaccurate and are open to misinterpretation.	Research is objective and independent of the researcher's thoughts, beliefs and knowledge. Nevertheless, it is interpreted through social conditioning and cannot be understood independently of the social actors.	Research is contaminated by values as the researcher is biased by his/her world view, culture and background, all of which impact on the research.	Integrate observations and context Subject matter determines the methods used Research is value laden, thus contaminated by the setting and actors Value statements to clarify interpretation Research ethics Objectivity and reliability and Internal and external validity.
Interpretivism	This perspective places the emphasis on the actors and their differences between them with research being conducted among people as opposed to objects. The social phenomena are viewed within a situation and meaning is sought for motivating actions.	Social construction studies the details of a particular situation as these relate to the reality or the reality working behind such details. It explores the subjective meanings motivating the actions under investigation.	Research is value bound and it is not possible to separate the researcher from the subject which is being researched.	Multiple subjective realities Socially constructed meaning Researcher reflexivity People in their natural setting Qualitative approach Multiple interpretations Trustworthy and dependable and Credible and transferable.

	Epistemology	Ontology	Axiology	Characteristics and quality judgement
Pragmatism	Either of, or both observable phenomena and subjective meanings may provide an acceptable level of knowledge to satisfy condition of acceptability within the field of study. The focus is on practically applied research and integrates different perspectives in order to support the interpretation of the data.	It is possible to work within the sphere of both the positivist and interpretivist philosophies as the most important determinant of the philosophy remains the research question.	Researchers adopt a dual point of view, objective and subjective, in the interpretation of research results, conclusions and recommendations.	Incorporation of both quantitative and qualitative methods, judging quality of study by intended purpose, available resources, procedures followed and results obtained.

A pragmatic approach explores and explains how problems are solved in a practical and sensible way instead of espousing fixed ideas and theories. In the context of an IT implementation strategy, pragmatism is concerned with the clear and practical value of solutions, testing ideas in practical settings and providing useable solutions. This philosophy is aligned with design science which aims to provide an artefact which is designed to address or solve a real problem. Gregor and Hevner (2013) support this notion by stating that design science aims to "create better solutions in the form of more efficient and effective products, processes, services, technologies, or ideas".

Tashakkori and Teddlie (1998) continue unpacking pragmatism, explaining that the researcher and the researched interact at some points in the research process but stand apart in other. The authors propose that one should "study what interests you, and is of value to you, study in the different ways in which you deem appropriate and use the results in ways that can bring about positive consequences within your value system" (Tashakkori & Teddlie, 1998).

This research study, by the very nature of the phenomena under investigation and the solutions sought may be said to be located in the pragmatist realm with the study observing and participating in the implementation of mSCOA in 25 pilot municipalities before the uniform data structure is rolled out to the remaining municipalities. Thus, the focus of the study was on practically applied research (active case study research over a period of time), integrating various perspectives (National Treasury, AG, multiple pilot municipalities and FMICS vendors) with the researcher in both a subjective (project manager) and an objective (academic scientific study) role. The research was evaluated through arguments which included descriptions, explanations and interpretations, all of which were plausible and supported by evidence; and this approach explained how the data was collected and the impact of the dual role of the researcher on the study results.

The output of this research, namely, a governance-based IT strategy for implementing a uniform data structure in municipal FMICS and other IT systems, aligned with the aims of both design and natural science research in IT, namely, to evaluate, address and improve the tasks facing practitioners (March & Smith, 1995).

4.6 RESEARCH APPROACH

De Vos, Strydom, Fouche and Delport (2009) discuss knowledge building in the context of deductive, inductive and diagnostic research approaches. They point out that deductive reasoning progresses from the general to the specific via a “pattern that might be logically or theoretically expected to observations that test whether the expected pattern actually occurs” (De Vos et al., 2009). Deductive conclusions are, therefore, drawn logically or are self-evident. Although deductive conclusions have a role in scientific and professional research this does not necessarily produce “new” knowledge of itself.

Babbie (2001) and Leedy and Ormrod (2001) highlight that the inductive approach moves from specific observations, instances or occurrences to the general discovery of patterns,

providing conclusions about entire classes of objects or the population. Induction supposes two premises, namely, the case of induction and the conclusion, which is not completely sure or certain, instead only a tentative possibility. An inductive approach, therefore, adds new thoughts to the existing scientific knowledge base.

Diagnostic reasoning, derived from the inductive approach, proposes that "the conclusion is not formally contained in the premises but, based on the premises as evidence, we reach beyond towards a designation of the class of objects to which the particular case may quite possibly belong, by testing the case against various known characteristics of that class of objects" (De Vos et al., 2009). Although the conclusion is only probable, similar to the inductive approach, it is strengthened by the testing of additional characteristics. The utilisation of diagnostic reasoning presupposes an underlying body of knowledge and experience pertaining to the research subject.

Diagnostic reasoning, based on an inductive approach was identified as the appropriate approach for this research study. Diagnostic reasoning, in the context of this study, emphasised (Saunders, et al., 2009):

- Gaining an understanding of the meanings which human beings attach to events, namely, in the context of this study, the multi-dimensional organisation-wide reform implied by the introduction and implementation of a uniform classification of financial data elements.
- A close understanding of the research context, placing this reform within both the local government environment and the greater financial reform agenda across the three spheres of government.
- The collection of qualitative data adhering to scientific and ethical principles, across 25 research subjects, namely, the pilot municipalities.

- A flexible approach which permits changes in the research emphasis as the research progresses, including observation of the operationalisation of concepts to ensure that clarity of definition is achieved.
- A realisation that the researcher is part of the research process and influences the unfolding of the implementation while also observing and documenting the same.
- The utilisation of pre-determined samples which do not necessarily allow for the generalisation of conclusions.

Diagnostic reasoning, based on an inductive approach, provided for investigating the problem at hand, namely, the implementation of the mSCOA regulation and methods of implementation of such regulation. The approach began with specifics (compliance and system specifications) and then moved on to a broader generalisation, using qualitative document-based research to derive conclusions (Rovai et al., 2013). Strauss and Corbin (1990) explain inductive research as the study of a phenomenon. In this research study, the phenomenon is mSCOA. It may be discovered, developed and verified through data collection and data analysis. This research did not begin with an existing theory which was proven through the study. Instead, the research began with an area of study (implementation of a standard data structure in 257 municipalities). What was relevant to this area of study was allowed to emerge through the research, culminating in artefacts (a well governed implementation strategy). The artefact was intended for reuse in similar situations, namely, the rollout of mSCOA in non-pilot municipalities, firstly, and then any other entity or organisation thereafter.

Design science research is fundamentally concerned with the utility of the artefact, i.e. the application of the intended strategy and the effective use of such strategy in multiple situations. Simon (1996) describes the design science approach as using available means as it exists to produce desired outcomes (artefacts) which may be implemented in a business environment (municipalities) while satisfying existing laws of the environment

(mSCOA). Thus, it is clear that there is an alignment between diagnostic reasoning which is based on an inductive approach to research, and the nature of the design science process.

4.7 RESEARCH STRATEGIES

The research strategy determines the general or overall plan a researcher intends to follow either to answer the research question or to address the research problem. According to Saunders et al. (2009), the choice of a research strategy is guided by the objectives of the study, the extent of the existing knowledge, the amount of time and resources which are available, and the philosophical underpinning of the research study. No research strategy is superior or inferior to another and often these are used in combination (Saunders et al., 2009).

Existing literature distinguishes between the various strategies which are available and which typically relate to a specific research question (see Table 4.2 below):

Table 4.2 Research strategies and related research questions (Adapted by the researcher from Oates (2011) and Saunders et al. (2009))

Strategy	Summary	Product	Research question
Experiment	Investigates cause and effect relationships, testing hypotheses, seeks to prove a causal link between two variables.	Establishes and determines causal relationships.	Exploratory and explanatory research answers how and why.

Strategy	Summary	Product	Research question
Survey	Analyses large volumes of data to establish patterns using statistics.	Possible reasons for relationships between variables and produces models of these relationships.	Survey questionnaires used to collect large volumes of standard sets of data.
Case study	Empirical investigation of a phenomenon in its context using multiple sources of evidence.	Detailed insight into challenging existing in the theory and producing new research questions.	Exploratory and explanatory research, answers how, what and why; triangulation of multiple data sets.
Action research	Reflects on a real situation in action rather than about action, following an iterative process.	Implications beyond the project as a theory or product is developed and skills and knowledge transferred.	Explicit focus on action, promoting change within an organisation and focusing on how.
Grounded theory	Developing theory through a combination of induction and deduction.	Developing and testing theories.	Explores business and management issues, predicts and explains behaviour.
Ethnography	Spend time in the field to understand the social world the research subjects inhabit.	An understanding of the phenomena within their natural setting.	Extended participant observation.
Archival research	Uses administrative records and documents	Documenting history and improving on	Questions which focus on the past and which

Strategy	Summary	Product	Research question
	as the principle source of data.	lessons learnt from past experience.	change over a period of time.
Design and creation	Focuses on the design and development of new IT products.	Artefacts.	An element or product of the development process.

Research for this study combined elements of action research with case study research, and design and creation research being used in a longitudinal study. The study further utilised elements of archival research and followed the principles of design and creation to deliver an IT artefact (implementation strategy) as the product.

Action research, “a general term to refer to research methodologies and projects where the researcher tries to directly improve the participating organisations (municipalities) and, at the same time, to generate scientific knowledge” (Oates, 2011) , emphasises worthwhile purpose, participation and improvement. Reason and Bradbury (2001) suggest that this research strategy should include relational practice, reflexive-practical outcome(s), and significant work and new and enduring consequences. Oates (2011) adds that, as this practice is not yet well established, it may be used to develop and refine the methods people use for developing (implementing) systems but that it should best be used in conjunction with other research strategies, such as the case study. The case study was included in this research for this purpose.

Action research is indicated by the following four common themes (Saunders et al., 2009):

- The research is focused on the resolution of organisational issues, for example the implementation of the uniform data structure within the FMICS and related IT systems.
- The researcher is part of the organisation within which the research and the change process are taking place with the researcher in this study being the national project manager for the rollout of the reform to the municipalities.
- The iterative nature of the process of diagnosing, planning, taking action and evaluating, which is also typical of strategy development methodology.
- Implications beyond the immediate project, for example applicability and utilisation in municipalities, municipal entities and other organisations.

This research strategy is similar to that of design science, which identifies organisational issues or environmental problems through analysis, for example involving the municipality, technology and people. An iterative IS research process is followed to deliver a practical solution which may be applied in multiple situations and which is founded on the IS knowledge base (Hevner et al., 2004).

Yin (2003) explains case study research as an empirical inquiry investigating a contemporary phenomenon in a real-life context, where the boundaries between the phenomenon being studied and the context are not clearly delineated. Case study research focuses on actual complexities.

The characteristics of a case study research include the following:

- A focus on depth, rather than breadth of research
- Study of phenomena in a natural (real) setting

- A holistic review of the complex interconnected and inter-related factors
- Multiple sources of information and collection methods

Case study research, by the very fact that it includes exploratory and explanatory research elements, extends to multiple data collection techniques and is associated with the triangulation or corroboration of data. Rovai et al. (2013) define triangulation as “the use of more than one measurement technique to measure a single construct in order to enhance the confidence in and reliability of research findings”. Newman and Benz (1998) add that scientific knowledge is based on verification, with qualitative and quantitative information each building on the results of the other approach, and producing richer and more insightful results as compared to the results from a single approach. The following triangulation methods are available to corroborate findings and enhance their validity (Oates, 2011):

- Method triangulation – the use of two or more data generation methods – multiple methods in the case of this research.
- Strategy triangulation – the use of two or more research strategies, for example action research in combination with case study research employing both the elements of archival research and the principles of design and creation.
- Time triangulation – the research takes place during two or more points in time;
- Space triangulation – the research takes place across two or more geographical areas.
- Investigator triangulation – the research is conducted by two or more researchers.
- Theoretical triangulation – the research draws on two or more theories.

The use of the administrative records and documents emanating from the mSCOA pilot project phase and an archival research strategy as a source of information for exploratory and explanatory research, focused on “how” action and change happened within the

organisation or municipality, was proposed to allow for the triangulation and verification of findings. This method is well suited to the design and development of strategy for new IT products or artefacts and, in the case of this study, the design and development of a strategy for the implementation of a standard data structure in municipal FMICS.

The selection of the case study method is supported by Benbasat, Goldstein and Mead (1987), who confirm that the selection of case study research for information systems is particularly appropriate, based on the pace of developments in IT as well as the fact that researchers often learn by studying innovations and pilot implementations. A certain measure of trial and error is necessary for the knowledge accumulation which enables researchers to test and formalise learning in preparation for the rollout to a broader audience, which is the aim of pilot implementations (Christenson, 1976). Simon (1996) highlights that design science, by its very nature, is iterative, searching for the best or optimal solution to produce feasible designs which can be implemented in multiple business environments.

Thus, a combination of action research, elements of case study research, and design and creation were used in this study. The study findings were supplemented and triangulated through archival research including elements of exploratory and explanatory research. This multi-strategy approach ensured that multiple perspectives of the pilot implementations were covered, and sufficient information collected to inform the design and creation of the proposed artefact – an implementation strategy for uniform data structures in FMICS.

4.8 RESEARCH CHOICES

Bryman (2012) points out that the choice of research method includes mono-, mixed or multi-methods. Whilst mono-methods are self-explanatory, mixed and multi-methods are often confused. The key difference between the two is that a mixed-method research

utilises both quantitative and qualitative methodologies in order to arrive at a single set of research data. The multi-method includes several research strategies, each resulting in a distinct data set which represents a different perspective of the same phenomenon. These data sets are then analysed using quantitative and qualitative methodologies.

It was decided that multiple research methods, carefully planned to arrive at an overall or negotiated account of the findings which would bring together (multiple) components of the mSCOA pilot implementation, would provide the source material for the proposed mSCOA implementation strategy and, thus, this was the preferred choice for this study. In addition, this method also facilitates the application of triangulation which, in turn, increases the validity of the research findings and improves the utility of the artefact which has been designed.

Saunders et al. (2009) confirm that multiple research methods are increasingly being applied in business and management research and that they may also be used for design science research where knowledge and understanding are achieved primarily through developing and implementing innovative artefacts in response to business problems (Hevner et al., 2004).

4.9 RESEARCH TIME HORIZONS AND TECHNIQUES

mSCOA was initiated in 2010 with all municipalities and municipal entities in South Africa being obliged to comply with the regulation. However, this research study covered only the period from 2014 to 2016 as it focused on the pilot implementations, with ongoing data review and development and testing of artefacts during this period. The longitudinal time horizon created the opportunity to repeatedly collect relevant data from the 25 pilot municipalities and evaluate the change and transition as it occurred in the organisational environment, including “lessons learnt”, factors determining the success of the implementation and, finally, compliance with the regulation.

The explanation of the research techniques includes a discussion of the sampling process, collection, analysis and credibility of the data and the research findings. This research study involved a review of relevant literature as well as a perusal of administrative records and documents, a secondary source of data found in the documents, reports, correspondence, circulars and presentations which represented the work of the national mSCOA implementation team and the pilot municipalities. The researcher also observed the pilot municipalities' implementation of the reform, and participated in the rollout thereof, using the accumulation of knowledge to influence and improve the delivery.

Data may be analysed using software tools or manually, utilising either quantitative or qualitative methods to discover relationships or themes which emerge from the data. Oates (2011) explains that quantitative data analysis uses mathematical approaches while qualitative data analysis searches for themes and categories. It is possible to apply quantitative analysis to qualitative data, counting the number of times that phrases or themes occur. These approaches were all applied to the data which was collected in this research study.

4.10 SAMPLING

"The objective of sample surveys is to make inferences about a population from information contained in a sample selected from that population" (Scheaffer, Mendenhall III & Lyman Ot, 2006). Scheaffer et al. (2006) provide six key definitions guiding sampling in academic research. These have been summarised for ease of reference in Table 4.3 below:

Table 4.3 Key definitions guiding sampling (Source: Adapted by the researcher from (Scheaffer et al., 2006))

Technical term	Definition	Application
Element	An object on which a measurement is taken.	A municipality or municipal entity.
Population	A collection of elements about which the researcher makes an inference.	The 257 municipalities and 60 municipal entities representing the local government environment.
Characteristic	A numerical measurement of interest for each member of the population.	Compliance with the mSCOA regulation by means of the implementation of the uniform data structure in the FMICS.
Sampling unit	Non-overlapping collections of elements from the population that cover the entire population.	A municipality. (Municipal entities are excluded as these are wholly owned by the municipalities and, in many cases, are included in the municipal implementation projects).
Frame	A list of sampling units.	The list of municipalities as determined by the Municipal Demarcation Board.
Sample	A collection of sampling units drawn from a frame or frames.	The 25 pilot municipalities which were used as the sample for this research.

The population for this study comprised all the municipalities in South Africa and their municipal entities, namely, 257 municipalities (278 before the municipal elections on 3

August 2016) and their 60 municipal entities. The municipalities are divided into categories, namely, eight metropolitan municipalities in category A; 205 local municipalities in category B; and 44 district municipalities in category C (South Africa, 1996).

The sample, consisting of 25 sampling units or 10% of the population, was drawn from all three categories of municipalities to represent a geographic distribution (at least one municipality in each of the nine provinces) and at least one pilot site per FMICS vendor represented across the municipalities. It should be noted that this sample was not determined or influenced by the researcher but was merely adopted from the national mSCOA implementation project for convenience and the availability of sufficient data. This method of sampling, where a researcher uses a readily available sample without influencing the selection thereof, is referred to as an accidental sample. The pilot municipalities are presented in Table 4.4 and were hereafter anonymised throughout the research for ethical reasons:

Table 4.4 Pilot municipalities (Researcher)

Municipality	**Town**	**Province**	**Category**	**Financial Software**
Buffalo City	East London	Eastern Cape	A	Solar
Camdeboo LM	Graaff-Reinet	Eastern Cape	B	ProMun
Cape Town	Cape Town	Western Cape	A	SAP
City of Johannesburg	Johannesburg	Gauteng	A	SAP
City of Tshwane	Pretoria	Gauteng	A	SAP
Drakenstein LM	Paarl	Western Cape	B	Solar
Ekurhuleni Metro	Germiston	Gauteng	A	eVenus
Elias Motsoaledi LM	Groblersdal	Limpopo	B	Munsoft
eThekwini Metro	Durban	KwaZulu-Natal	A	JD Edwards
Greater Giyani LM	Giyani	Limpopo	B	Sage Evolution
Hessequa LM	Riversdal	Western Cape	B	Venus
Knysna LM	Knysna	Western Cape	B	ProMun

Mangaung Metro	Bloemfontein	Free State	A	Solar
Nala LM	Bothaville	Free State	B	BIQ
Nelson Mandela Bay	Port Elizabeth	Eastern Cape	A	Sebata
Nkangala DM	Middelburg	Mpumalanga	C	Munsoft
Overstrand LM	Hermanus	Western Cape	B	Samras
Richmond LM	Richmond	KwaZulu-Natal	B	Abacus
Senqu LM	Lady Grey	Eastern Cape	B	Sebata
Setsoto LM	Ficksburg	Free State	B	Munsoft
Sol Plaatje LM	Kimberley	Northern Cape	B	eVenus
Tlokwe LM	Potchefstroom	North West	B	Phoenix
uMgungundlovu DM	Pietermaritzburg	KwaZulu-Natal	C	Sage Evolution
uMhlathuze LM	Richards Bay	KwaZulu-Natal	B	ProMis
Victor Khanye LM	Delmas	Mpumalanga	B	Sebata

4.11 ETHICAL CONSIDERATIONS

Ethics refer to the beliefs and principles of what is right and wrong, and which control or influence the behaviour of individuals. Rovai et al. (2013) point out that “at the most fundamental level, ethical research is characterised by informed consent, voluntary participation, avoidance of harm, confidentiality, and protection of vulnerable populations”. Wisker (2008) agrees that, in the research context, ethics are concerned with ensuring that no harm is caused, and the confidentiality of participants is retained.

Mouton (2006) proposes that research ethics should be approached from four angles, namely, the practice of science, the relationship with society, the research subjects and the environment, while Oates (2011) considers the participants, research subjects, researcher, academic committee and users of the research from a “rights and responsibilities” perspective.

Action research involves multiple methods and is based on changing the research in cooperation with the research subjects, in a collaborative fashion while the research is taking place. The key benefits hereof are low refusal rates, ownership of the findings and

high construct validity. However, at the same time, the researcher should guard against subjective involvement and manipulation of the process by the participants.

The researcher obtained a letter of permission to conduct the study from National Treasury (Annexure A) and took due care at all times not to identify or imply a single municipality or vendor when documenting the findings. References were provided to all sources of information and, on completion of the research, all confidential material will be safely disposed of.

Reliability: Hornby (2010) explains reliability as the likelihood of being correct or true, while Wisker (2008) refers to reliability in the sense of how well research has been carried out. In other words, would another researcher find similar results if the research activities were duplicated? Yin (2003) concurs that reliability addresses the consistency of the results over time. This research was documented in detail to ensure that it could be duplicated and supported by a literature study and findings from similar research. All the participants were aware that the information acquired would be used for research purposes, and that their anonymity would maintained.

Validity: Validity in research is considered to mean officially or academically accepted, or sound, appropriate and correct in terms of the research design (Hornby, 2010). De Vos et al. (2009) consider validity to refer to the extent to which research reflects what it was intended to measure, thus referring to the instrument(s) which was used and the concept which was measured. Validity is achieved through independent judgement, peer review and presentation of the research at academic conferences and/or publication in academic journals.

Trustworthiness: Rule and John (2011) propose trustworthiness to replace reliability and validity. They suggest scholarly rigour, ethics and transparency in order to achieve high

quality research and support the concepts of transferability, credibility, dependability, confirmability and objectivity in academic research.

Despite obtaining a letter of permission from National Treasury, the researcher had to ensure that ethical procedures and due care were employed in conducting the study. Hence, care was taken to ensure that a professional and acceptable level of ethics was maintained during the study and continued after the research has been completed.

4.12 DESIGN SCIENCE RESEARCH

Organisations use IT to achieve their business goals and objectives and, thus, it is important that IT research results in practical and useful artefacts to enable business strategy (Hevner et al., 2004). Indeed, Simon (1996) declares that it is the principles of design which distinguish the professions from the sciences. Van Aken and Romme (2012) continue the discourse by adding that research informed design and instrumental problem solving based on explicit knowledge, made rigorous by applying scientific theory and technique, as the basis for design science.

Hevner et al. (2004) provide seven guidelines for design science in IT. These are summarised and applied in Table 4.5 below for ease of reference:

Table 4.5 Guidelines for design science research (Adapted from (Hevner et al., 2004))

Guideline	Description	Application
Design as an artefact	Design science must produce a viable artefact in the form of a construct, model, method or instantiation	It was anticipated that this research would result in a guiding strategy based on IT governance principles for the

Guideline	Description	Application
		implementation of uniform data structures in IT systems
Problem relevance	The objective of design science is to produce technology-based solutions for real problems	This research addressed the requirements of the mSCOA regulation which is mandatory for all municipalities and municipal entities in South Africa
Design evaluation	The utility, quality and efficacy of the artefact should be demonstrated via well-executed evaluation methods	The evaluation followed an iterative approach, conducted by the 25 pilot municipal implementations
Research contribution	Effective design science research must provide clear and verifiable contributions	The strategy was suitable for municipalities and their entities, but also for a broader audience of public and private organisations, both nationally and abroad
Research rigor	Design science relies on rigorous methods of construction and evaluation of the artefact	The artefact was constructed and evaluated using accepted research methodologies and IT best practice principles
Design as a search process	The search for an effective artefact uses available means to reach the desired end while	The search process used academic and practical means, incorporating an iterative

Guideline	Description	Application
	satisfying laws from the problem environment	design, implementation and evaluation processes
Communication of research	Design science research should be well presented to technology and management orientated audiences	This research resulted in conference papers and published articles, as well as this thesis

Gregor (2002) and Ellis and Levy (2010) agree on the prominence of the resultant artefact in design science and emphasise the knowledge content and utility thereof. Gregor (2002) further highlights a wider range of socio-technical artefacts, such as decision support systems, modelling tools, governance strategies, methods of IS evaluation and change interventions, all taking into account the design logic, construction methods and tools, assumptions and context thereof.

Ellis and Levy (2010) add new theories explaining the underlying cause of problems; design and development models; new methods and processes for implementing existing models or using existing tools; and previously untested applications of tools, models or methods to new problems or contexts as acceptable artefacts.

The creation of these artefacts within the realm of design science results from a cyclical or iterative research approach which includes six distinct steps, also constructed in three cycles by certain researchers. These steps are broadly agreed (Hevner et al (2004); Gregor & Hevner (2013); March & Storey (2008); Ellis & Levy (2010)) as including

- identification and articulation of a clear and relevant organisational IT problem
- demonstration that there is no adequate solution for the problem in the extant IT knowledge base

- development and presentation of an IT artefact to address the problem
- rigorous evaluation and assessment of the utility of the IT artefact
- articulation of the contribution to the IT knowledge base and practice, and
- explanation of the implications for IT management and practice.

The effective development and transition of a strategy into a FMICS required design activity, the creation of an artefact and rigorous testing and evaluation of the contribution of the artefact. The above steps and the research design informed the way forward, following a creative and scientific approach, while remaining cognisant of the evolving nature of the design process and artefact as the research unfolded.

4.13 CONCLUSION

This chapter provided information on the science of design and creation in the context of creating IT products or artefacts, elements of research design and methodology based on the “research onion” and defined the problem statement and the research objectives. The key objective of this research was to develop a strategy based on sound governance principles and which could guide the implementation of a standard data structure in municipalities and other organisations.

A pragmatic research philosophy was adopted with diagnostic reasoning based on an inductive approach, action research, case study and the science of creation and design. The accidental sample included 25 pilot municipalities over a period of three years from 2014 to 2016. Multiple methods were used to collect the research data as the newly regulated data structure was implemented, tested and improved through cooperation with the pilot municipalities.

The ethical issues taken into account throughout the study included reliability, validity and trustworthiness, as well as the influence and role of the researcher, who was the national project manager involved in the implementation. Due care was taken to protect the

interests of individuals, municipalities, system vendors and National Treasury – stakeholders in the mSCOA project. All records and data collected as part of this research were safely disposed of on conclusion of the study.

The next chapter discusses the iterative process of strategy development within the realm of design science. The discussion covers diagnostics, guiding policies, coherent action steps, and multiple iterations over a period of time, application of the resultant artefact and the evaluation of this artefact.

Chapter 5

STRATEGY DEVELOPMENT AND EVALUATION

5.1 INTRODUCTION

The development of a strategy for the implementation of a standard data structure in IT systems, which uses a pragmatic research philosophy and diagnostic reasoning based on an inductive approach, involves elements of action research and case studies as well as the science of creation and design.

Chapter 4 expanded on the methodology which was employed while this chapter focuses on the essence of strategy development. Research by Chen, Mocker, Preston and Teubner (2010), Galliers and Sutherland (1991), Grant (1991), Levy, Powell and Galliers (1999), Mintzberg (1987), Salmela and Spil (2002), Gcaza and Von Solms (2017), Tsokota (2016), and Rumelt (2011) was consulted to gain an insight into the process of strategy design and evaluation. A composite approach was proposed for the development of such an artefact, namely, a guiding strategy for the implementation of a standard data structure in municipal IT systems, based on sound IT governance principles.

Thus, this chapter broadly covers the following sections: strategy defined; a discussion of approaches to IT strategy formulation; a proposed IT strategy development approach for this thesis and a strategy evaluation framework.

5.2 STRATEGY DEFINED

The concept of strategy evolved from a military concept, in particular, the conduct of campaigns, choice of operations and the occupation of favourable locations in respect of threats and enemies. Strategy in this context refers to winning wars, as opposed to tactics which are concerned primarily with the battle at hand (Tansey, 2010). Indeed, Hornby (2010) explains strategy as plans intended to achieve a particular purpose or long-term

aim. In other words, business strategies focus on the broad objectives of organisations and how these are to be achieved over a period of time. Strategic business considerations include new markets, products, resources and locations, among other.

Boar (2001) maintains that business is all about competition and advantage, thus, business strategy represents the eternal struggle of business to gain advantage – a valuable asset in any business. Grant (1991) agrees that strategy embodies the match an organisation makes between the internal resources and skills, and the opportunities and risk created by the external environment.

Taking the abovementioned into account, Glueck (1972) defines strategy as “a unified comprehensive and integrated plan relating the strategic advantages of the firm or enterprise to the challenges of the environment. It is designed to ensure that basic objectives are achieved”. Fred (2016) and Gartner (1997) refer back to the military, mentioning bridging gaps between policy and tactics, and ends and means.

Information is a strategic resource of any organisation and, therefore, the availability of information impacts on the development and formulation of the organisational strategy. Decision makers at every level of the organisation should define their requirement for information with this guiding a top-down and bottom-up approach to the information strategy (Tansey, 2010). IT strategy, on the other hand, is formulated from three different perspectives, namely; in support of the business strategy, as a master plan for the IT function, or based on the role of IT within the organisation (Chen et al., 2010). Chen et al. (2010) found that the term IT strategy is widely used but not well defined nor understood. Similarly, strategies for the implementation of IT and/or the components of such an implementation have not been documented in detail.

The discussion below explores different approaches to IT strategy formulation.

5.3 APPROACHES TO IT STRATEGY FORMULATION

Strategy formulation requires a clear understanding of the notion and aims of strategy, mastery of the tools and techniques of the discipline, a structured methodology, and diligent management in the execution thereof (Boar, 2001). Gcaza and Von Solms (2017) expand the discussion by identifying commonalities across strategy formulation approaches, namely; long-term objectives or intent, an environmental assessment, strategy formulation, implementation and control.

The approaches of Chen et al. (2010) (Conceptions and Typology), Galliers and Sutherland (1991) (Stages of Growth), Grant (1991) (Resource based), Levy et al. (1999) (Frameworks), Mintzberg (1987) (Intended vs. Emergent), Salmela and Spil (2002) (Four Cycles), and Rumelt (2011) (A Kernel of Plausible and Feasible Actions) are considered.

5.3.1 A conceptions and typology approach to IT strategy formulation

Chen et al. (2010) define IT strategy in terms of the organisational perspectives of investment, deployment, use and management of the IT portfolio. These perspectives address three conceptions, namely, the use of IT to support the organisation's strategy, the master plan for IT within the organisation, and a shared view of the role of IT in the organisation. Their definition of an IT strategy addresses technical components, human activities and managing the product life-cycle, and may be graphically represented as depicted in Figure 5.1 below.

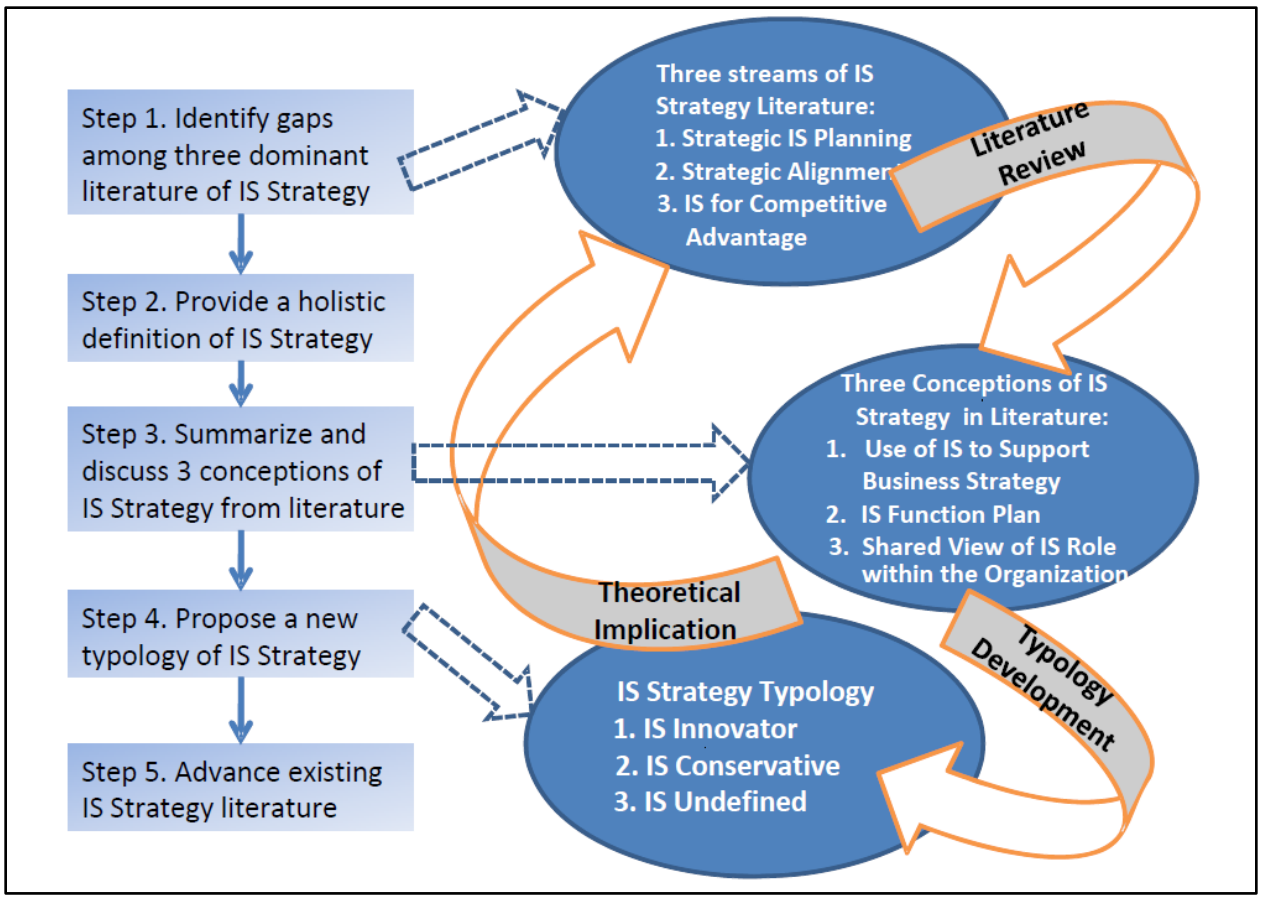


Figure 5.1 A conceptual IT strategy development framework (Chen et al., 2010)

Figure 5.1 indicates three conceptions that inform a new typology for strategy development. The typologies position the role of IT in the business as an innovator, which drives the organisational strategy from the bottom up, in turn driving the organisation to deliver innovative products and services. The second typology takes a conservative approach from top down, with the organisation strategy driving the IT strategy while the third typology is undefined, indicating no definite relationship between the organisational strategy and the IT strategy.

This conceptual framework clearly illustrates the common elements of objective or intent, assessment, and strategy formulation, as identified by Gcaza and Von Solms (2017), but without addressing the implementation or control of the resulting strategy.

5.3.2 A stages of growth approach to IT strategy formulation

Galliers and Sutherland (1991) revised their model for IT strategy formulation which is known as the Stages of Growth model. Their work identifies six stages of growth based on the focus an organisation places on IT. The first three stages prioritise technology, while the last three are concerned with the management of organisational data/information (Galliers & Sutherland, 1991):

- Adhocracy – acquisition of technology
- Laying the foundations – reactive approach; audit and user needs
- Centralised dictatorship – top-down driven IS planning
- Democracy – cooperation, integration, coordination and control
- Entrepreneurial opportunity – scanning the environment for opportunities
- Integrated relationships – maintain the comparative advantage through monitoring and planning

The stages of growth, together with the 7S management model of Pascale and Athos (1981), create a matrix for IT strategy formulation, providing guidance to organisations which will address their needs through the stages of growth in IT adoption. Galliers and Sutherland (1991) conclude with the following insights gained from the implementation of the model:

- Organisations do not display characteristics from only one growth stage at a time.
- The stages of growth represent organisational development, and the early stages should be completed for the later stages to be successful.

- Organisations do not necessarily need to progress through all the stages sequentially.
- The positive results of early stages should be maintained into the later stages.
- Maximum effectiveness is achieved by consolidating elements from earlier stages and identifying key elements to address going forward.
- There is no automatic progressing through the stages of the model, and organisations could even regress to earlier stages.

This model addresses objective or intent in a lesser degree but expands on assessment to determine the present stage of growth. Strategy formulation and implementation following this approach lead to insights or lessons learnt, as opposed to controls which were not mentioned at all in the model.

5.3.3 A resources-based approach to IT strategy formulation

A resources-based approach to strategy formulation considers the resources and skills available within an organisation, and matches these with the opportunities and risks emanating from the external environment (Grant, 1991). This approach stresses the capabilities of the organisation, places reliance on the individuals providing these capabilities and the value of the capabilities as being durable, non-transferable, irreplaceable and challenging to replicate.

Grant (1991) illustrates the role of resources as the basis for organisational profitability as depicted in Figure 5.2 below:

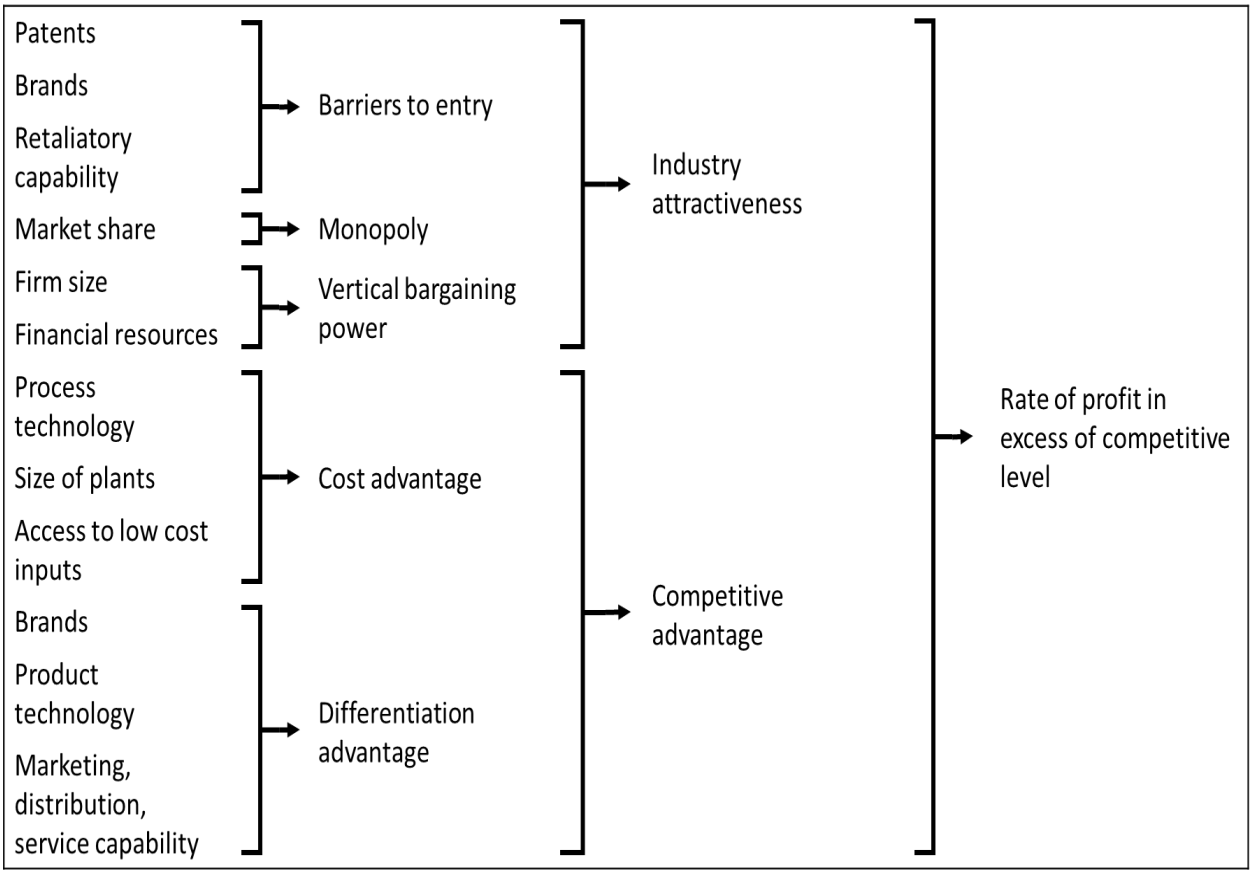


Figure 5.2 Organisational profitability in relation to resources (Grant, 1991)

Figure 5.2 illustrates the assessment of resources at the disposal of an organisation, and the capabilities of these resources, which are viewed as a sustainable source from which to generate profit. The resources inform the IT strategy formulation. Thus, compared to the principles proposed by Gcaza and Von Solms (2017), this approach comprehensively addresses organisational objective or intent, assesses the resources and their capabilities towards strategy formulation but does not touch on either the implementation of the strategy or controls.

5.3.4 A strategic IS frameworks approach to IT strategy formulation

Levy et al. (1999) contend that strategic information system (IS) planning is a source of increased efficiency, effectiveness and competitiveness in organisations. The reason for this approach is that the strategic planning and use of IT may potentially transform an organisation's ability to deliver superior products and services, achieve strategic objectives and provide a competitive advantage. It should, therefore, be an active concern and interest of top management.

This approach to strategy formulation provides three main frameworks, namely, awareness, opportunity and position, which are then further sub-divided (Levy et al., 1999):

Awareness frameworks:

- Refocusing frameworks – raise awareness or re-focus on the potential use of IT across the organisation.
- Impact frameworks – evaluate the contribution of IT towards the strategic position of the organisation.
- Scoping frameworks – consider the strategic scope of IT in different industries.

Opportunity frameworks:

- Opportunity frameworks – conduct a detailed assessment of the organisation and consider how IT may provide the necessary leverage to improve effectiveness, efficiency and competitiveness.
- System analysis frameworks – identify the creation and flow of information within the organisation.

- Application search frameworks – identify specific areas of the organisation which could benefit from the introduction and implementation of IT.
- Technology fitting frameworks – identify specific IT related to the needs of the organisation to ensure the realisation of business benefits.

Positioning frameworks:

- Position frameworks – review the current use and management of IT and the ability to respond to new IT.
- Scaling frameworks – determine the relative importance of IT for the various business activities.
- Spatial frameworks – separate users from management, and link IT planning to business planning across the organisation.
- Temporal frameworks – the development and growth of IT over a period of time.

Levy et al. (1999) conclude that the frameworks approach to IT strategy development is useful in organisations of any size. They found that all industries are in need of strategic IT and that these frameworks are useful to create an awareness of the potential of IT, particularly in relation to improving customer service and interaction, as well as management decision making. IT strategy formulation should take into account the stages of growth of the organisation, the capabilities and, in particular, the management of IT.

Compared with the principles proposed by Gcaza and Von Solms (2017), the frameworks approach includes objective or intent, assessment, and strategy formulation. However, there is no mention of either implementation or control.

5.3.5 An emergent and intended approach to IT strategy formulation

Mintzberg (1987) introduced the notion of emergent and intended strategy. Emergent strategy refers to patterns or streams of activity which are consistently followed and do not originate from specific design while intended strategy, on the other hand, is consciously made in advance, and has a purpose, directing actions in a certain way.

Mintzberg (1987) maintains that strategy defines how leaders establish direction within the organisation, it requires cognition to conceive, and it sets actions or patterns towards a position or goal. There is a distinction is made between plans, ploys, patterns, positions and perspectives:

- Plans – a consciously intended course of action developed in advance to achieve a purpose
- Ploys – a defensive manoeuvre to outwit opponents or competition
- Patterns – a consistent stream of actions driving behaviour
- Position – a niche or domain in the environment where resources are concentrated
- Perspective – an internal concept, paradigm or worldview which determines the way one acts or responds

While plans, ploys, patterns and positions are easy to change within a specific perspective, and often originate from perspective, they can be challenging. Perspective itself, on the other hand, is not easy to change and often results in emergent plans, ploys, patterns and positions.

Mintzberg's strategy concepts (1987) are based mainly on human designs and behaviour, and point towards intent and assessment as well as strategy formulation. However, limited attention is given to implementation and control of the strategy, as proposed by Gcaza and Von Solms (2017).

5.3.6 A four-cycle approach to IT strategy formulation

IT strategy development may be approached either comprehensively or incrementally, (Salmela & Spil, 2002). The purpose of this dual approach is to develop an IT portfolio, support the organisation in the execution of its business plans, and realise the business goals. Comprehensive IT plans are distinguished from incremental plans in that they cover detail, address integrated strategic decision making and are formally prepared across a long time horizon, with extensive analysis and broad stakeholder involvement. In comparison, the incremental approach involves a small team who focuses on a few themes or concepts at a time. These plans are based on informal contracts or agreements, rely on personal experience and experiments, and do not follow a step-by-step, prescribed methodology.

Salmela and Spil (2002) explain that strategic planning also includes IT implementation and employs principles from both the behaviour theories and business strategy development. Their definition of IT strategy illustrates how planning leads to improved management capabilities and becomes unique organisational capabilities, which result in a source of sustained competitive advantage. This approach is depicted in Figure 5.3:

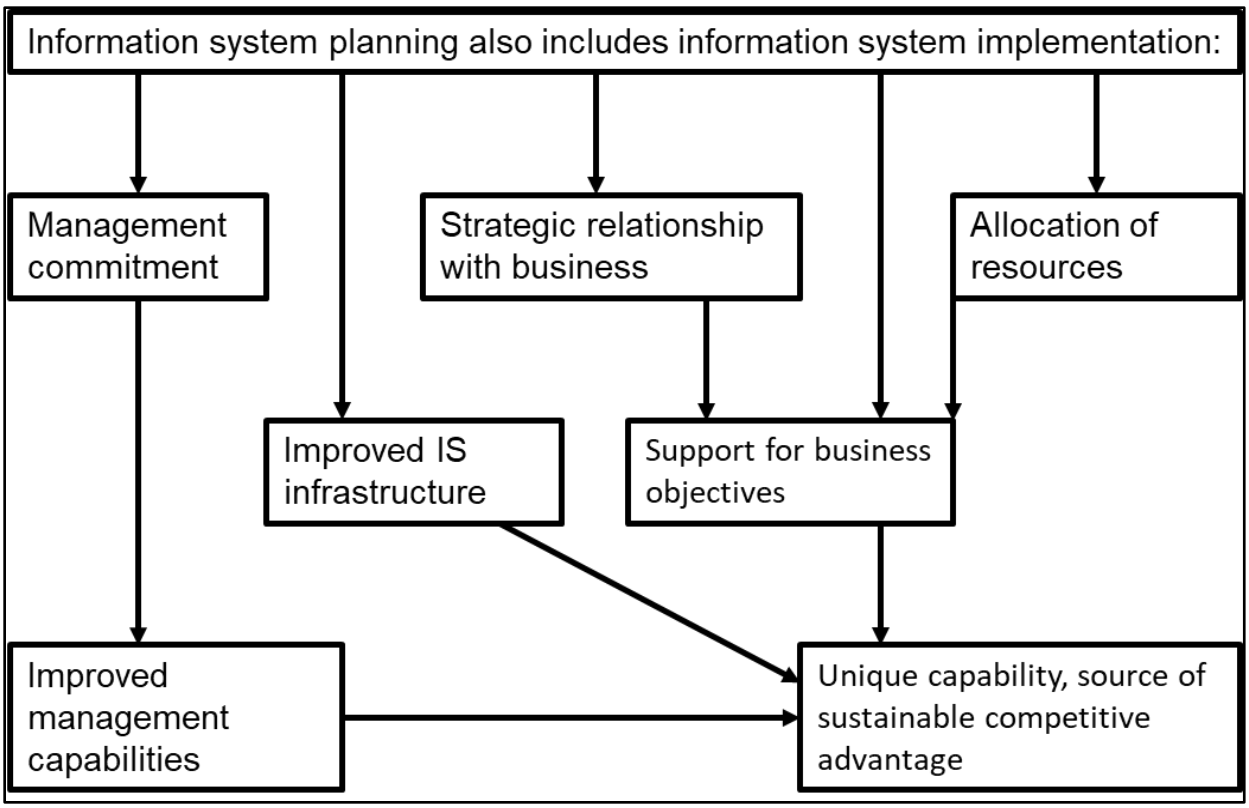


Figure 5.3 IS planning leads to sustainable competitive advantage (Salmela & Spil, 2002)

Salmela and Spil (2002) combined the learning from 18 case studies into four cycles. Key success factors from their research include the organisational learning and commitment in the comprehensive approach to strategy development, the requirement for sufficient resources and prompt implementation in the case of incremental planning. The four cycles represented in Figure 5.4, address the following: agreeing on planning objectives and stakeholders; aligning business objectives and information objectives; analysis of IT resources and infrastructure; and authorisation of actions.

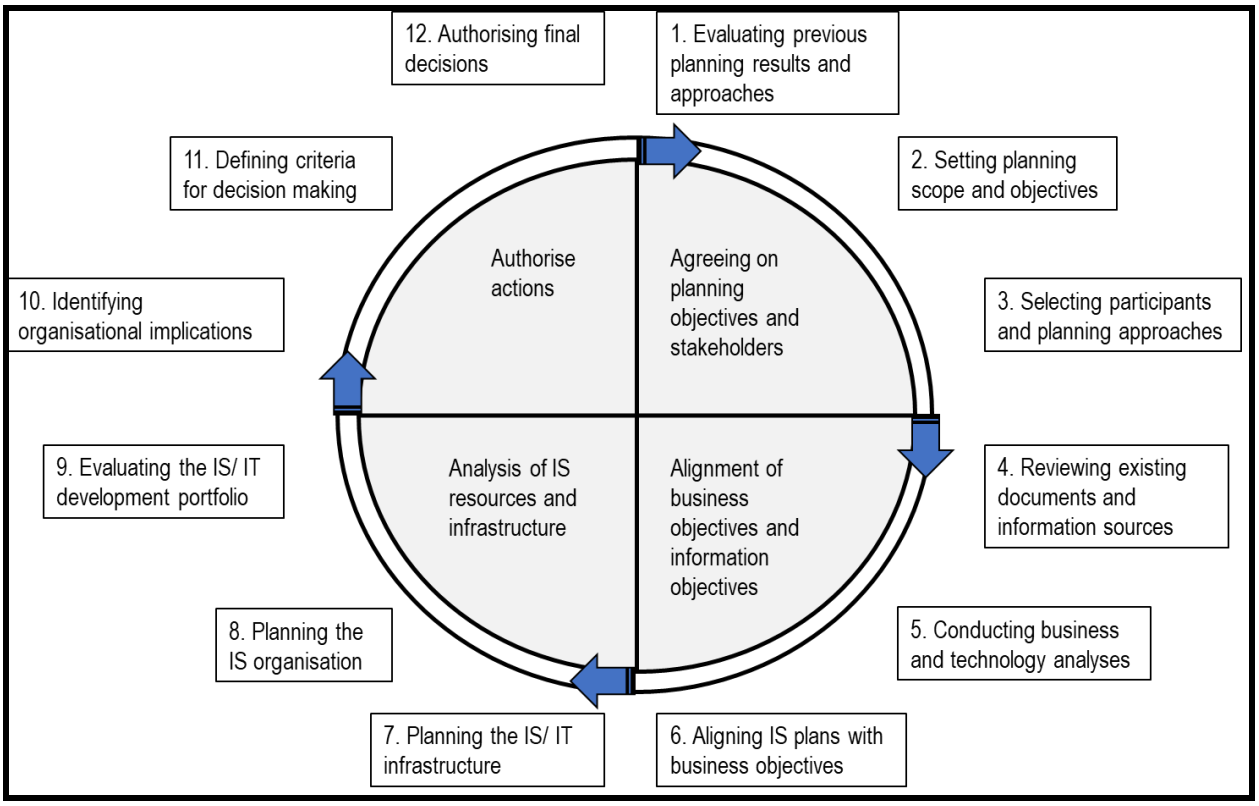


Figure 5.4 Four-cycle IS strategy development (Salmela & Spil, 2002)

Salmela and Spil (2002) emphasise that, although this approach to IS strategy development has not been tested in practice, it does emanate from case studies and valuable insight has been gained:

- Managers should be involved in order to monitor and implement plans, revise as may be needed, and evaluate whether the intended objectives were achieved.
- Feedback should be used to improve during the repeat of following cycles.
- Evaluation should happen against pre-determined objectives.
- Planning should address short and longer term opportunities and problems.
- The correct people should be involved throughout the process.

It is clear that this approach to IS strategy development embraces a continuous refresh and adaptation of plans, it includes implementation and the evaluation of the results, and it provides the flexibility to choose the best planning process to adopt. A comparison with the contribution of Gcaza and Von Solms (2017) indicates that this approach takes into account strategic intent and assessment and that it employs elements from both the behavioural sciences and strategy formulation theory. It stresses the role of implementation, evaluation and feedback, looping back to complete at least four cycles and, hence, the reference to a four-cycle method of strategy formulation.

5.3.7 A kernel approach to IT strategy formulation

Tsokota (2016), Gcaza and Von Solms (2017) and Tsokota,Von Soms and Van Greunen (2017) base their contribution on the work of Rumelt (2011), addressing a core or kernel component which consists of diagnosis, guiding policies and coherent actions. Tsokota (2016) explains that the purpose of the strategy is to move the organisation from its present position to a future destination and, in fact, Rumelt (2011) agrees that “a strategy that fails to define a variety of plausible and feasible immediate actions is missing a critical component”.

Strategy originates from a diagnosis, which consists of an assessment to identify the overall nature of the challenge which needs to be addressed, the goals to be met and the available resources. The guiding policy sets the overall approach and direction towards meeting the identified challenge while the coherent actions provide coordinated steps to execute the guiding policy. These steps represent the plausible and feasible immediate actions to be taken towards the final goal (Rumelt, 2011).

Figure 5.5 illustrates the kernel concept, and also adds the dimensions of strategic direction, environmental assessment or analysis, formulation, implementation and control.

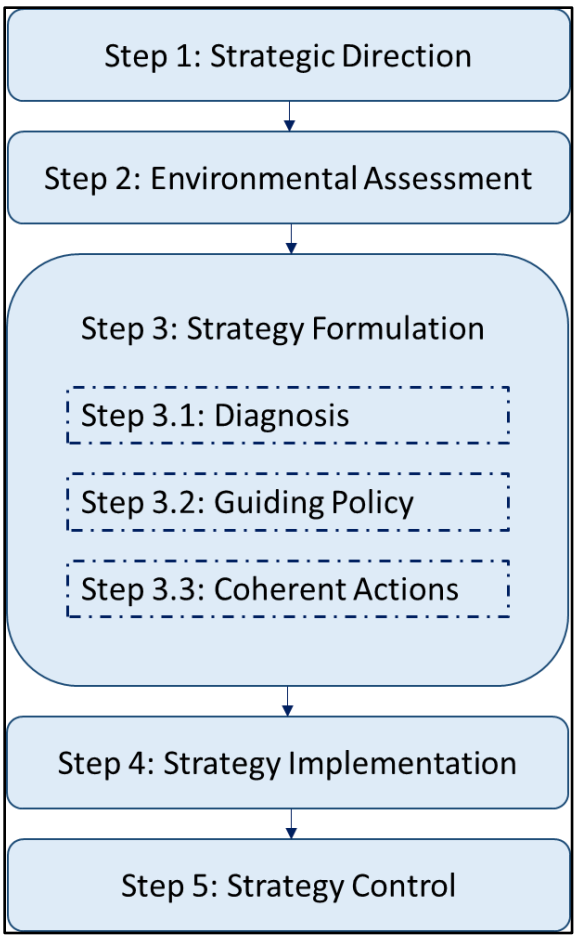


Figure 5.5 A kernel approach to IT strategy development (Gcaza & Von Solms, 2017)

The various elements in Figure 5.5 may be explained as follows:

- Strategic direction – this element summarises the medium and longer term direction of the organisation in terms of its mission, vision, values and objectives. It is often referred to as the strategic intent or objectives and leads the organisation along a pathway or roadmap towards an envisioned position.
- Environmental assessment – this assessment includes activities to gather information, fact finding and analysis. It uses traditional methodologies, SWOT

(strengths, weaknesses, opportunities and threats), PESTEL (political, environmental, social, technology, economic and legal), and personal and impersonal (documents, reports, news and academic articles) sources.

- Strategy formulation – strategy may come about through intent or emergence, as discussed in section 5.3.5 above. In this model it is a result of intent and emerges from diagnosis, guiding policies and coherent actions, diligently applied.
- Strategy implementation – this step addresses plausible and feasible activities which together constitute the strategy. The execution of programmes and plans (from guiding principles) and the allocation of budget and resources dictate the procedures to execute (coordinated actions) to achieve the objectives and move the organisation forward. The implementation involves who, doing what, how and when of the strategy.
- Strategy control – activities need to be controlled to ensure that the stated objectives are achieved. This may be done by developing metrics, i.e. measurements, standards of performance, comparing actual performance with the standards, and taking corrective action. Strategy control is clearly not a once-off activity but is applied throughout the strategy formulation and implementation on an ongoing basis. Strategic control ensures that the organisation stays on course and achieves the desired long-term outcomes while incorporating the principles of good governance.

The discussion of approaches to IT strategy formulation highlighted certain common elements and key success factors to consider. For the purposes of this thesis, the kernel approach was adapted to include elements of the other approaches which were discussed. The relevance of strategy evaluation, coherent actions and controlled implementation cannot be understated and, therefore, these elements were also incorporated.

5.4 IT STRATEGY DEVELOPMENT APPROACH

This section explains the approach which was adopted in this research study for the development of the strategy to implement a standard data structure in municipal IT systems. It clearly emerged from the approaches to IT strategy formulation which were presented that repetition and re-iteration play a major role in the strategic fit, acceptance and successful deployment of the final product.

The Municipal Standard Chart of Accounts (mSCOA) project was structured in multiple phases and repetitive cycles of guidance, assessment and course correction, over a period of time (Chapter 3, Figure 3.3). Accordingly, the data collection process in this study followed the same pattern, with cycles consisting of assessments, guiding policies and coherent action steps playing an influential role in selecting the most appropriate data collection and strategy development approaches.

A refined kernel model was selected as the most appropriate research approach. It not only matched the nature of the research problem and the sample consisting of 25 municipalities but was also supported by the theory and project which provided the opportunity to engage a broad sample of municipalities during the pilot implementation of the mSCOA regulation (South Africa, 2014). The approach is illustrated in Figure 5.6 below:

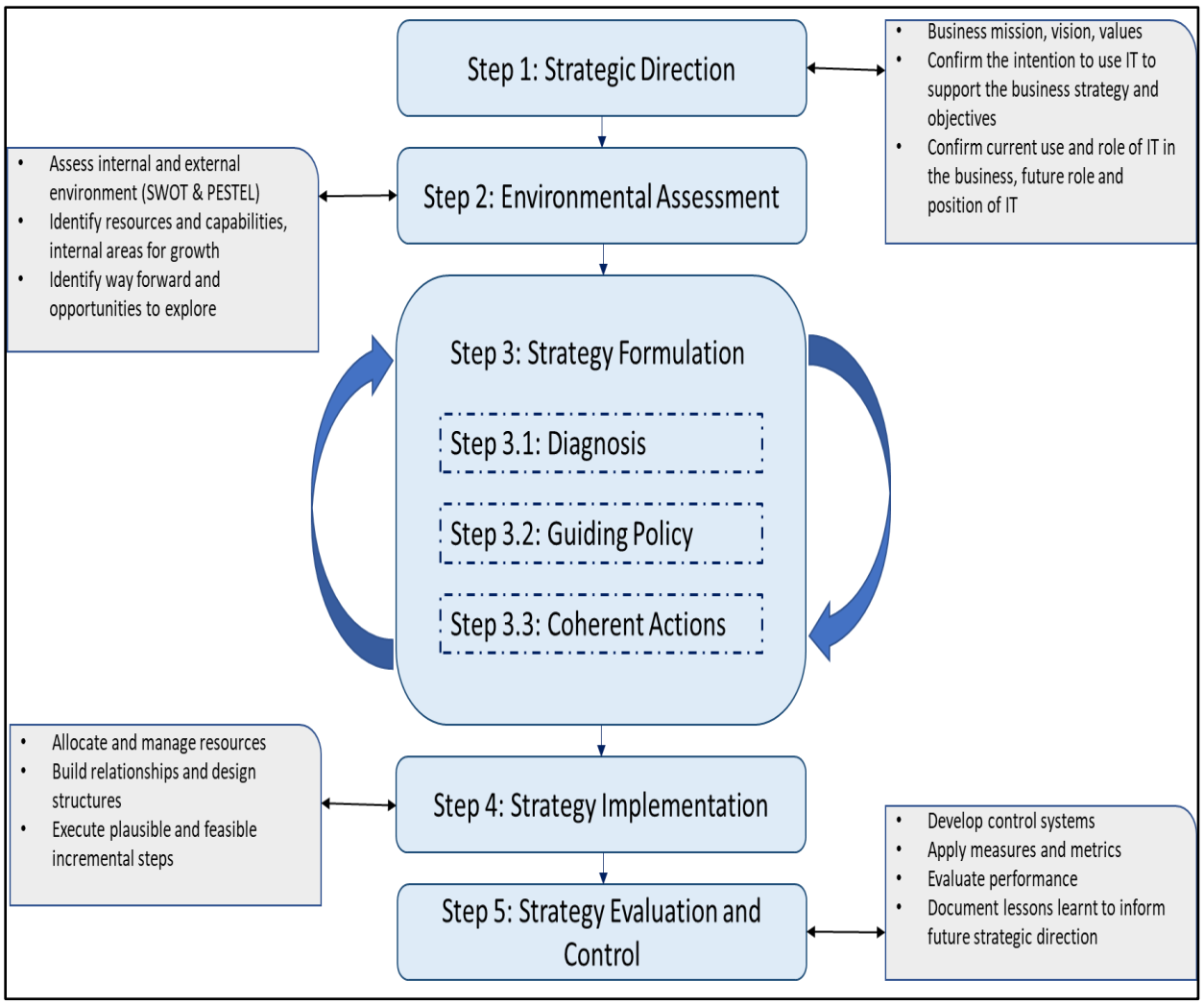


Figure 5.6 IT strategy development approach (Researcher)

The strategy development approach used for the purposes of this study and illustrated in Figure 5.6 above was based on the kernel concept coined by Rumelt (2011) and refined by Gcaza and Von Solms (2017). The researcher further developed and refined this approach for each of the main and sub steps as described below.

5.4.1 Strategic direction

The strategic objectives of the organisation, as well as for IT within the organisation, constitute the departure point for developing and formulating an IT strategy. The resultant IT implementation strategy should also be congruent with the principles of good IT governance which were presented in Chapter 2. Therefore, the activities within Step 1 include (Galliers & Sutherland, 1991):

- Confirm the organisational mission, vision and values as well as any strategic priorities and objectives.
- Confirm whether the organisation has a documented IT strategy or policy, and the strategic role of and approach to IT, i.e. the use of IT to support the business strategy, a functional approach to the use of IT, or a shared and supported view of IT across the organisation (Chen et al., 2010).
- Confirm the current use and role of IT in the business, including the future role and positioning, with reference to the stages of growth as presented in section 5.3.2 above.
- Consider the current growth phase of the organisation, the internal serviceable capabilities and, in particular, the approach to and management of IT.

5.4.2 Environmental assessment

Traditionally an internal and external assessment would utilise SWOT or PESTEL methodologies, cover key areas on which to focus and align with business imperatives.

For the purpose of this study, specific focus is placed on the availability and quality of resources, and the pattern of development of the current IT strategy, i.e. emergent or intended (Mintzberg, 1987). Multiple methods were combined to elicit data from the pilot

municipalities over an extended period of time, combining case studies and action research. The data collection and analysis included:

- Identify legal and regulatory requirements the organisation must comply with, including those related to the implementation and utilisation of IT.
- Identify service delivery opportunities which have emerged from technology advances, including the risks associated with these advances.
- Identify the resources and skills available to the organisation, taking into account the organisation size, financial position, key services and products together with enabling technologies, current and potential future brand reputation, and specific specialised service delivery capabilities.
- Consider the IT implementation and management plans, ploys, patterns and positions employed in the past, and lessons learnt from these.
- Evaluate the prevalent IT perspectives, resilience to change and strategic people networks across the organisation.

5.4.3 Strategy formulation – diagnosis

An inductive approach, following a process of diagnostic reasoning, is used, which is based on the four cycles proposed by Salmela and Spil (2002). This process comprises 12 steps which are composed of four cycles (Figure 5.4 above) and are supplemented by additions from the review of the approaches to the IT strategy formulation.

- Evaluate previous planning results and approaches, from recent iterations and more distant strategy formulation activities. Consider carefully whether the existing IT implementation strategy was adopted from external parties, emerged or was developed intentionally.

- Set the framework and boundaries for the current planning scope and objectives, the desired outcome and output of the initiative. This will be used as a yardstick during following iterations when evaluating previous planning cycles.
- Select participants, based on a top down and bottom up approach, including key end users as well as steering committee and operational committee members.
- Develop the approach to be followed as a team effort, paying marked attention to broad inclusion and participation, increasing acceptance and support going forward.
- Critically review existing documents and information sources, incorporating organisational learning, knowledge and experience. Capture lessons learnt and potential solutions to existing challenges to be considered for inclusion in future strategies.
- Conduct a business analysis covering legislation, regulations and policies. Consider management support, current governance practices, processes, operating procedures, delegations of authority and financial resources.
- Assess the technology covering hardware, networks, connectivity, licenses, applications and data availability and quality.
- Align IT planning with business strategies, objectives and future perspectives.
- Assess the available skills, experience and existing workload as these may be impacted upon by a reviewed and renewed IT implementation strategy. Define the required training and change management effort.
- Identify the potential impact on the organisation, clients and other stakeholders, together with risk mitigation measures and cost.
- Define the criteria for decision making and assign responsibility, including an oversight role and the good governance principles which must be adhere to.

5.4.4 Strategy formulation – guiding policy

Guiding policies determine the approach, direction and governance principles applicable to both the IT implementation strategy formulation process and the end product. The source of these policies may be either internal or external to the organisation, for example legislation and regulations, best practice and industry guidelines. The organisation should follow either approved internal policies and guidelines or collective approaches acceptable within the specific business environment or industry. These should be clearly highlighted at the beginning of the process to avoid rework and conflict. In addition, regulations and guidelines from National Treasury, the Auditor General (AG) and industry specific to municipalities should also be incorporated into the guiding policies.

5.4.5 Strategy formulation – coherent actions

Coherent actions result in the artefact or product and include coordinated steps. The steps should be plausible and feasible (Rumelt, 2011), a close match to the culture, intention and ability of the organisation, and designed in a way that will result in the desired end state. The coordinated steps should be developed according to SMART principles, i.e. specific, measurable, achievable, action-orientated, relevant, realistic and timely. Every action should be assigned to a responsible person, and the output and outcome thereof evaluated according to predetermined measurement criteria.

5.4.6 Strategy implementation

Rumelt (2011) contends that, as strategy represents a set of actions intended to create business advantage, it is based on position or perspective and derives value from being implemented and evaluated.

Implementation requires people, equipped to deliver the task, and a programme or plan to guide the execution. The plan is underpinned by agreed-upon methodologies and

procedures and enabled by the allocation of both sufficient budget and other resources as may be applicable. Once the plan has been actioned, it may be necessary to re-align the organisation to maintain the strategy.

5.4.7 Strategy evaluation and control

Strategy evaluation and control end the strategy formulation process and inform the beginning of the next cycle or re-iteration of strategy formulation. The key activities in this process step include developing control systems which define measurements and metrics, evaluating performance and documenting lessons learnt to inform future cycles and strategy formulation. This element of strategy development is of critical importance and is the one component which is severely neglected, and thus, it merits a whole discussion on its own.

5.5 STRATEGY EVALUATION

Having developed an artefact, namely, an IT implementation strategy, according to Oates (2011) it must then be evaluated. Oates (2011) proposed criteria such as functionality, completeness, consistency, accuracy, performance, reliability, usability, accessibility, aesthetics, entertainment and fit for purposes for consideration in this respect. The specific evaluation criteria should be related to the purpose of the artefact being evaluated and, in this study technical aspects alone would not be sufficient. An evaluation framework was, therefore, proposed as a departure point and is further developed in Chapter 6.

Baltzan (2014) points out that decisions of a strategic nature are generally unstructured and are directly related to the overall performance of the organisation. Critical success factors, such as the crucial steps the organisation performs in order to achieve its strategic

goals, should be linked to key performance indicators, which are quantifiable metrics used to link progress to critical success factors and, in so doing, to strategic objectives.

The departure point for the evaluation of the IT implementation strategy in this case was the strategic direction. The IT strategy follows and supports the organisational strategy and the IT implementation strategy should, therefore, be aligned with the IT strategy. Thus, without a clearly defined organisational strategy, the IT implementation strategy, however, well designed, would be at risk. Refer to Figure 5.7 below for an illustration of this point.

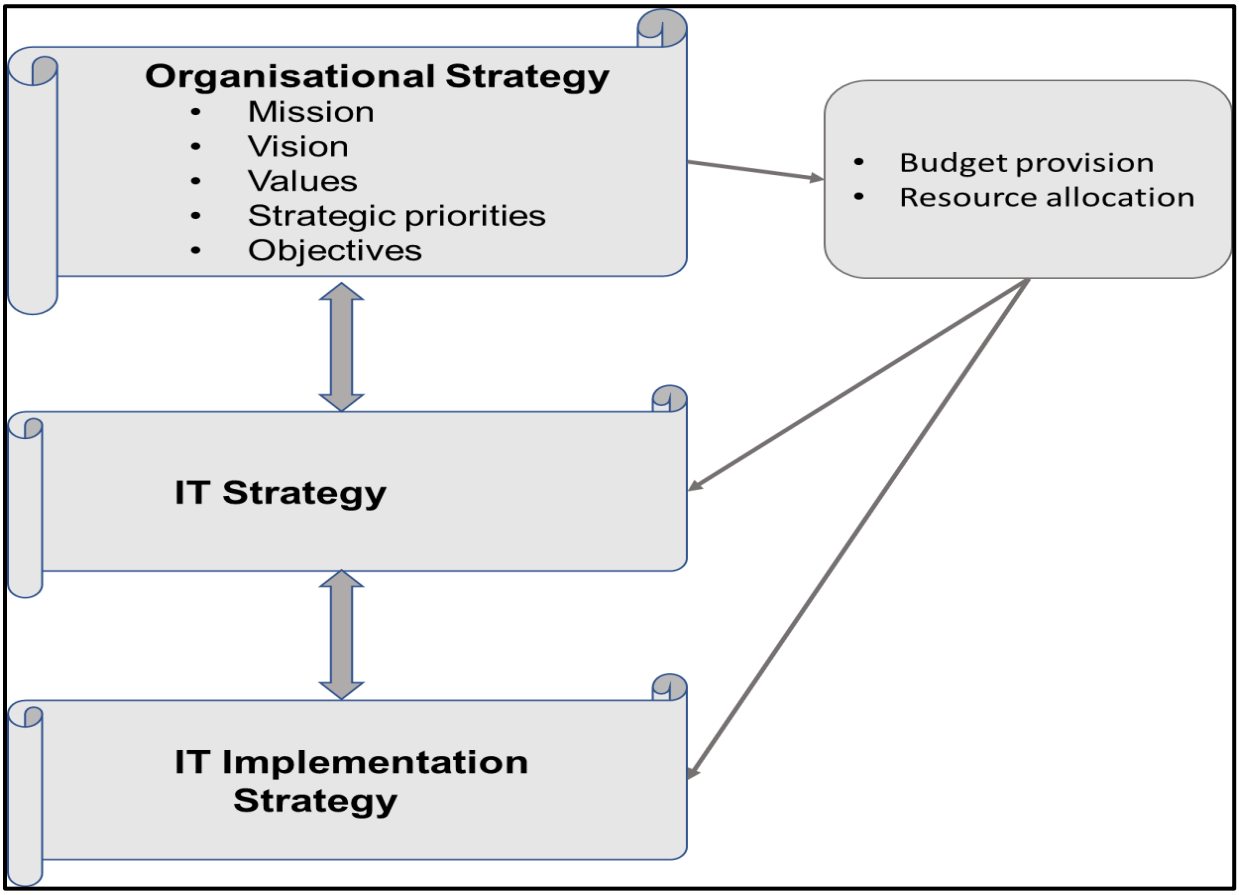


Figure 5.7 Organisational strategy and IT strategy hierarchical relationship (Researcher)

The IT strategy should give due consideration to the role of and approach to IT within the context of the organisation, the current and future use of IT in support of the strategic priorities and objectives, the present stage of growth and the internal serviceable capabilities. Refer to Table 5.1 (The IT implementation strategy evaluation rubric) in this regard.

Table 5.1 IT strategy evaluation rubric (Researcher)

IT strategy development step	**Strategy evaluation check point**
Step 1: Strategic direction	✓ Clearly defined organisational strategy: mission, vision, values, strategic priorities and objectives
	✓ Budget provision to deliver organisational strategies
	✓ Resource allocation to implement organisational strategies
	✓ Role of and approach to IT within the organisation context clearly articulated: Innovator, conservative or undefined
	✓ IT key focus: Technology, process enablement, data/information or opportunities/advantage creation

IT strategy development step	Strategy evaluation check point
Step 2: Environmental assessment	✓ Legal and regulatory requirements addressed
	✓ Guidance provided by industry bodies – NT, AG, SALGA
	✓ Approved policies and procedures accommodated
	✓ Governance and risk management adequately addressed
	✓ Processes and services currently enabled taken into account
	✓ Resource availability assessed: sufficient coverage, fit for purpose, appropriate skills and experience, time allocation/ availability
	✓ Existing and past strategies, plans and project outcomes, lessons learnt
	✓ Current IT perspectives, integration with business, readiness to participate and change

IT strategy development step	Strategy evaluation check point
	✓ Current IT environment: hardware, applications, licences and contracts, processes enabled/not enabled (manual), support and maintenance, pending projects, data quality and availability
	✓ Expectations and perceptions of internal clients and other stakeholders
Step 3.1 Strategy formulation: diagnosis	✓ Alignment of this project with organisational strategy, objectives, priorities and future perspectives
	✓ Governance and risk management for the project established
	✓ Clear boundaries, limitations and frameworks for the project stated
	✓ Decision making structures and process designed and agreed
	✓ RACI matrix developed and approved
	✓ Broad participation – top down, bottom up, business integration and support

IT strategy development step	Strategy evaluation check point
	✓ Knowledge management – existing sources consulted and incorporated, organisational learning assimilated, designed and agreed for new project
	✓ Incorporate output of the environmental assessment
	✓ Evaluate previous planning, approaches, sources and results to inform this strategy
	✓ Various implementation approaches considered, evaluated and the best approach agreed to and adopted
Step 3.2 Strategy formulation: guiding policies	✓ Legislation and regulations applicable to the industry
	✓ Principles of good IT governance
	✓ Best practice and collective approaches particular to the environment and industry
	✓ Internally approved and adopted policies and guidelines

IT strategy development step	Strategy evaluation check point
Step 3.3 Strategy formulation: coherent actions	✓ Clearly defined action steps to be taken in respect of strategy formulation
	✓ Evaluate according to SMART principles
	✓ Assign responsibility and due dates
	✓ Allocated the required resources
	✓ Take action
	✓ Measure the outcome and the output of the action against the SMART principles
Step 4: Strategy implementation	✓ Plans, ploys, patterns, positions and perspectives
	✓ Key performance indicators
	✓ Strategic objectives achieved
	✓ Changes in profitability, strategic advantage, unique capabilities and strategic resources

IT strategy development step	Strategy evaluation check point
	✓ Achievement of legislated and regulated compliance requirements
	✓ Conformance to the principles of good governance

The environmental assessment provides both an external and an internal focus, within the broader context of IT in this study. Although general assessments such as SWOT or PESTEL are useful, this assessment should produce clear IT related information which positions the IT implementation strategy in relation to the IT strategy as presented in Figure 5.7 above. The evaluation should, therefore, at the very least, focus on the legal and regulatory coverage, governance and risk management, process enablement, services delivered, resources, strategies and plans from previous projects, perspectives and technology addressed in the strategy. The evaluation is further addressed in the IT implementation strategy evaluation rubric in Table 5.1.

The diagnosis represents the first of the iterative steps to be followed in the development of the intended IT implementation strategy. In reality, diagnosis is an ongoing process, both in strategy formulation and in project implementation. The output of this step provides the foundation for the next two steps, namely, guiding policies and coherent actions and should, therefore, be able to inform the way forward. Broad participation is the key to success and, thus, a RACI matrix (responsible, accountable, consulted and informed) is introduced.

Aspects of the diagnosis which are evaluated in the resultant IT implementation strategy include alignment with organisational strategy and priorities, governance, risk management, boundaries and limitations, decision making structures, broad participation and support, knowledge management and, importantly, incorporation of the findings from the environmental assessment and previous projects of this nature. These are included for the purposes of review in the IT implementation strategy evaluation rubric, presented in Table 5.1.

Guiding policies emanate from the legislation and regulations, principles of good IT governance, best practice, collective approaches, industry guidelines, internally approved and adopted policies and guidelines which were identified and addressed during the environmental assessment step. These should also be used both to guide and to measure the coherent actions which were performed for the purpose of formulating the strategy. The outcome of the evaluation informs the following iteration which comprises diagnosis, guiding policies and coherent actions.

A strategy is useful when it has been implemented and it supports the organisation in the realisation of its strategic objectives. In this study, the strategy was intended and plans, ploys, patterns, positions and perspectives were utilised to move the organisation in a specific direction. These plans, ploys, patterns, positions and perspectives are evaluated in terms of the movement which has resulted from their implementation, i.e. the change in profitability, sustainable strategic advantage, unique capabilities and redefined quality of the internal and external resources (Grant, 1991).

It should be mentioned that strategy development and implementation are a dynamic process and, together with rapid advances in technology, result in the IT strategy formulation and implementation never being completed or finalised.

5.6 CONCLUSION

Chapter 5 focused on strategy development and evaluation methodologies as found in the existing literature. These were used to develop an iterative strategy development methodology which guided the collection of data from the pilot municipal implementations pertaining to a uniform data structure for financial management and internal control systems. The methodology was applied over a period of three years (2014 to 2016) and the results were assessed to inform further iterations towards the final proposed implementation strategy.

A high-level evaluation rubric was proposed. This was also refined and reworked during the pilot implementations and informed by the findings across the selected sample.

Chapter 6 presents the data collection and findings which emanated from the period of review, beginning with a pre-assessment, and concluding with the position of the respective pilot municipalities as of 1 July 2017, which was the due date for compliance with the mSCOA regulation.

Chapter 6

DATA COLLECTION AND FINDINGS

6.1 INTRODUCTION

Chapters 2 to 5 described both the background to and the foundation for the collection of data and the development of a strategy for the implementation of uniform data structures in municipal financial management and internal control systems (FMICS). Chapter 2 addressed IT governance, Chapter 3 discussed the Standard Chart of Accounts for Municipalities (mSCOA) implementation project, and Chapter 4 discussed research design and methodology, and strategy formulation. Chapter 5 proposed an iterative methodology for data collection and strategy development, based on a kernel concept devised by Rumelt (2011) and refined by Gcaza and Von Solms (2017), with further refinement for this specific application. The data collection was executed over a period of three years, from April 2014 to December 2016, and involved 25 pilot municipalities from a total of 257 municipalities. The data collection and strategy development methodology may be said to have been appropriate in view of the fact that they were based on the unfolding of the national mSCOA project, the timeline for the data collection and the number of municipalities involved. It was also aligned with the theory and documented literature.

Chapter 6 presents the research findings, following the timeline of the mSCOA project, which was presented in Chapter 3, Figure 3.3. Figure 5.6 presents the initial strategic direction and environmental assessment in line with the strategy development methodology proposed in Section 5.4. This methodology led to six cycles or iterations of data collection, guidance provided to the municipalities and activity steps performed before the next assessment and data collection.

This chapter is arranged according to the project timeline of the national project (see Figure 6.1 below). It is anticipated that this graphic representation will assist the reader to pinpoint and interpret the findings at the time of collection during the progress of the mSCOA implementation project. However, although the data collection process mirrors the national project, the focus was on the data collection in relation to the development of an implementation strategy, while the national project focussed on standardisation in the interests of financial reporting and regulatory compliance.

Thus, the various sections in this chapter address planning of the data collection, the strategic direction and the environmental assessment, arranged according to six data collection cycles or iterations, as conceptualised in Figure 5.6 in the previous chapter. This chapter concludes with a summary of the findings which informed the development of the intended artefact.

6.2 PLANNING THE DATA COLLECTION

The timelines, data collection cycles or iterations, supporting guidance and proposed activity steps were determined primarily by the national mSCOA project rollout and are presented in Figure 6.1. This figure illustrates key milestones throughout the three years of ongoing assessment and data collection, namely, 2014 to 2016; including the publication of the regulation (South Africa, 2014) and versions 5.4 to 6.1 of the chart; seven Integrated Communication Forum (ICF) meetings; six mSCOA guiding circulars (Circ.) (National Treasury (6), 2016); and a national conference and workshops.

01/14	02/14	03/14	04/14	05/14	06/14	07/14	08/14	09/14	10/14	11/14	12/14
System vendor and pilot municipality engagements; International study tour and local research; Pre-implementation readiness assessments by team and Auditor General.			Regulation published Version 5.4			**Data Set**	ICF 1	ICF 2			ICF 3
01/15	02/15	03/15	04/15	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15
	ICF 4				ICF 5	mSCOA Circ. 1 published **Data Set**	mSCOA workshop	ICF 6 mSCOA Circ. 2 published **Data Set**		mSCOA Circ. 3 published	ICF 7
01/16	02/16	03/16	04/16	05/16	06/16	07/16	08/16	09/16	10/16	11/16	12/16
			mSCOA Circ. 4 published	**Data Set**	Version 5.5	IMFO conf. / mSCOA Circ. 5 published **Data Set**	mSCOA Circ. 6 published Version 6.0	mSCOA workshop **Data Set**		**Data Set**	Piloting complete Version 6.1

Figure 6.1 Data collection plan (Researcher)

It is clear from Figure 6.1 that the data collection was arranged according to six cycles or iterations, as proposed in Figure 5.6 in the previous chapter. The initial pre-assessments conducted by the National Treasury project team and the Auditor General (AG) provided a baseline from which to launch the data collection activities, while the post compliance-date assessment that was completed after 1 July 2017 was also included in the data findings to provide both a reference point and support for the identified need for both guidance and a strategy to implement this and similar reforms.

It should be mentioned at this point that, in many of the pilot municipalities, the governance and formal project management aspects were neglected in favour of a hasty implementation of the minimum requirements which were often changed as the project unfolded. The data collection and findings are, therefore, presented according to the

timeline, as opposed to either carefully planned and measured individual cycles or iterations or defined and approved project plans.

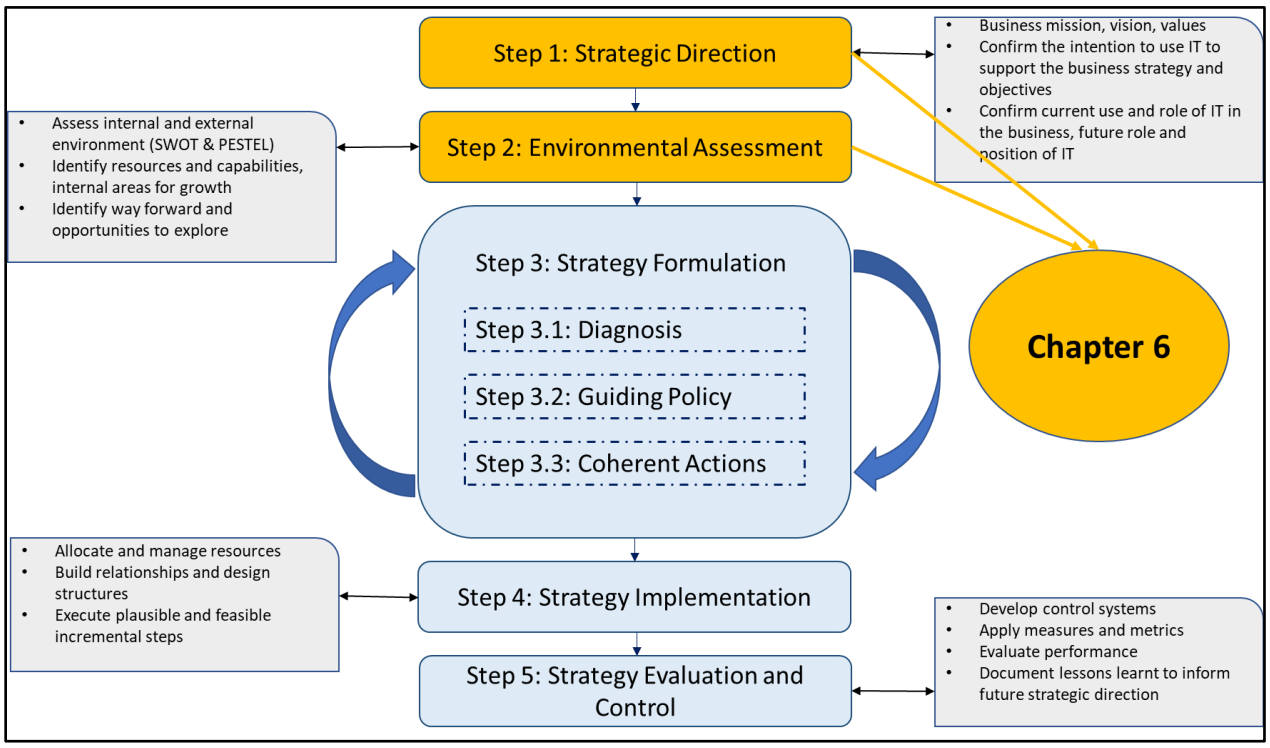


Figure 6.2 Data collection and findings within the strategy development methodology (Researcher)

6.3 STRATEGIC DIRECTION

The strategic direction, step 1 in Figure 6.2 above, was defined by the mSCOA regulation (South Africa, 2014) to create a uniform data structure (chart of accounts) for municipal FMICS which would enable the alignment of budget planning information with the actual information created and captured during the implementation of the budget, and the standardisation and compliance of the financial reporting. Additional key objectives of the

regulatory reform, articulated in the mSCOA regulation (South Africa, 2014), include the following:

- Improved municipal data quality and credibility
- The achievement of a greater level of standardisation across the municipalities
- The development of uniform data sets critical for 'whole-of-government' reporting
- The standardisation and alignment of the local government accountability cycle by the regulation of not only the budget and in-year reporting formats but also the annual report and annual financial statement formats
- The creation of an opportunity to standardise key business processes with the resultant introduction of further consistency in the management of municipal finances
- Improved transparency, accountability and governance through uniform recording of transactions at posting account level detail
- Enabling of deeper data analysis and sector comparisons to improve financial performance, and
- The standardisation of the account classification and municipal FMICS to facilitate mobility in financial skills within local government and between local government and other government spheres.

National Treasury appointed a team of independent consultants to assist the treasuries and municipalities with this project as it was clear that capacity constraints existed (Koekemoer & Von Solms, 2017) which would delay and may even have derailed the overall project. The team not only had to manage the national rollout but was also tasked with assisting with capacity building, change management and technical support, including developing a minimum system specification, standard municipal business

processes and establishing a transversal tender to support municipalities which were not able to follow their own procurement processes (Koekemoer, 2018).

The strategy development research approach was based on the fact that IT presents an opportunity to innovate, standardise and automate municipal processes towards improved service delivery, IT governance and financial management practices. This was opposed to the prevailing undefined IT focus of municipalities, which comprises mainly capturing financial transactions for reporting and regulatory compliance purposes (Chen et al., 2010). This approach also determined the level of change management which was required and challenged the data collection activities which were performed in parallel with the mSCOA project implementation.

6.4 ENVIRONMENTAL ASSESSMENT

The legal and regulatory environment within which municipalities operate is clearly established, and ranges from the constitution of the country (South Africa, 1996) to legislation prescribing the structures and systems employed by municipalities, their functions and reporting to oversight bodies (South Africa, 2003). Accordingly, the environmental assessment, step 2 in the strategy development process as depicted in Figure 6.2, was executed within this framework and mirrored the timelines of the mSCOA implementation project. The process assimilated data from the implementation project and simultaneously followed its own data collection cycles.

The National Treasury had embarked on extensive research and stakeholder engagement before developing and gazetting the mSCOA regulation in April 2014 (South Africa, 2014). This research provided input into the environmental assessment and included the following activities (summarised in Table 6.1):

Table 6.1 Environmental assessment (Researcher)

Engagement date	Stakeholder group	Issues and comments
25 September 2013	National Treasury and directorates	Welcomed the reform but concerned about affordability and capacity to implement
26 September 2013	Provincial treasuries, national departments and TCF working committees	Timeframes, technical complexity, skills and funding constraints
3 October 2013	Consultants, advisors and professional bodies	Capacity and skill constraints on the part of the municipalities
4 October 2013	System vendors	Technical complexity of the SCOA classification framework, inability of some of the current system vendors to accommodate the requirements
7 October 2013	Metropolitan municipalities	Timeframes for implementation and funding constraints
8 October to 11 November 2013	District and local municipalities	Timeframes for implementation and funding constraints

Engagement date	Stakeholder group	Issues and comments
6 to 13 November 2013	Potential pilot municipalities and their system vendors	Cost implications and impact on audit outcomes
Comment period up to March 2014		995 submissions received containing more than 2000 issues to be addressed

An international study tour provided information both on what other countries have done in respect of standardisation and the lessons learnt from similar and comparable implementations. The feedback report (National Treasury, 2015) details findings from the countries which were on the itinerary, namely, Austria, Russia, Denmark and The Netherlands. The study tour revealed that this reform was unique in the detail that covered and the extent of the implementation. However, the study group was not able to find guidance, lessons learnt or implementation strategies from these countries, and concluded that a pilot phase would assist in developing the final version of the chart. In addition, this would create an opportunity to develop guidance and methodologies which the non-pilot municipalities could adopt and use to fast track their respective implementations.

The team approached the provincial treasuries, system vendors already represented in the municipal market, and potential pilot municipalities to propose the concept of a standard data structure and financial reporting and gain valuable insight into the most suitable way in which to approach a project of this nature. The results of these engagements were reported to the National Technical Committee on Finance (TCF), a sub-committee of parliament and lead by the Minister of Finance.

The AG and South African Local Government Association (SALGA) were involved and consulted from the beginning of the project, although the AG remained objective and was guided in its approach to municipal audits by the accounting standards, performance against predetermined objectives and an IT audit. Major projects implemented by the respective municipalities, such as multimillion rand IT implementations, and compliance with legislation and regulations, are annually reviewed by the AG and, thus, a project of this nature would be of relevance to both these perspectives.

The Consolidated General Report on the Audit Outcomes for Local Government 2014-15 (Auditor General (2), 2015) reported on the readiness of the pilot municipalities for the mSCOA implementation. The pilot municipalities, listed in Table 4.4, which have been anonymised for purposes of this research, and identified as A, B, F, L, O, S and V, were found ill-prepared for the implementation and required additional support to continue with the project. Another two municipalities, not included with the pilot municipalities for research purposes, withdrew from the group even before any preparation for implementation had started. Across all 257 municipalities in South Africa, it was reported that the majority, namely, 88% of municipalities, were making slow progress with their preparations and that up to 10% would require an external intervention in this regard. Root causes for these findings were cited as capacity and skills constraints, insufficient financial resources, limited use of internal audits to ensure project assurance and waiting for the pilot municipalities to lead the way (Auditor General (2), 2015).

The Consolidated General Report on the Audit Outcomes for Local Government 2015-16 (Auditor General, 2016) continued by stating that 84% of all municipalities would require an intervention to meet their mSCOA project implementation and regulatory obligations (see Figure 6.3 below). This report also provided insight into the following key challenges:

- A lack of IT controls and skills
- Inadequately designed security policies and procedures
- Password and firewall parameters not effectively configured
- Outdated anti-virus software
- Patch management neither applied nor maintained
- Failure to manage segregation of duties
- Municipalities should design and implement disaster recovery plans
- Back-ups not being made or not tested
- Long delays in management approvals, impacting negatively on service delivery and project implementation

The report indicated that municipalities in the Free State, North West and Northern Cape would probably not be able to meet the due date of 1 July 2017. The report further explains that data cleansing, migration and mapping, in particular to different versions of the chart of accounts, are root causes for the regression in audit outcomes in indicated provinces. Figure 6.3 presents the provincial overview of municipal readiness for the mSCOA project implementation.

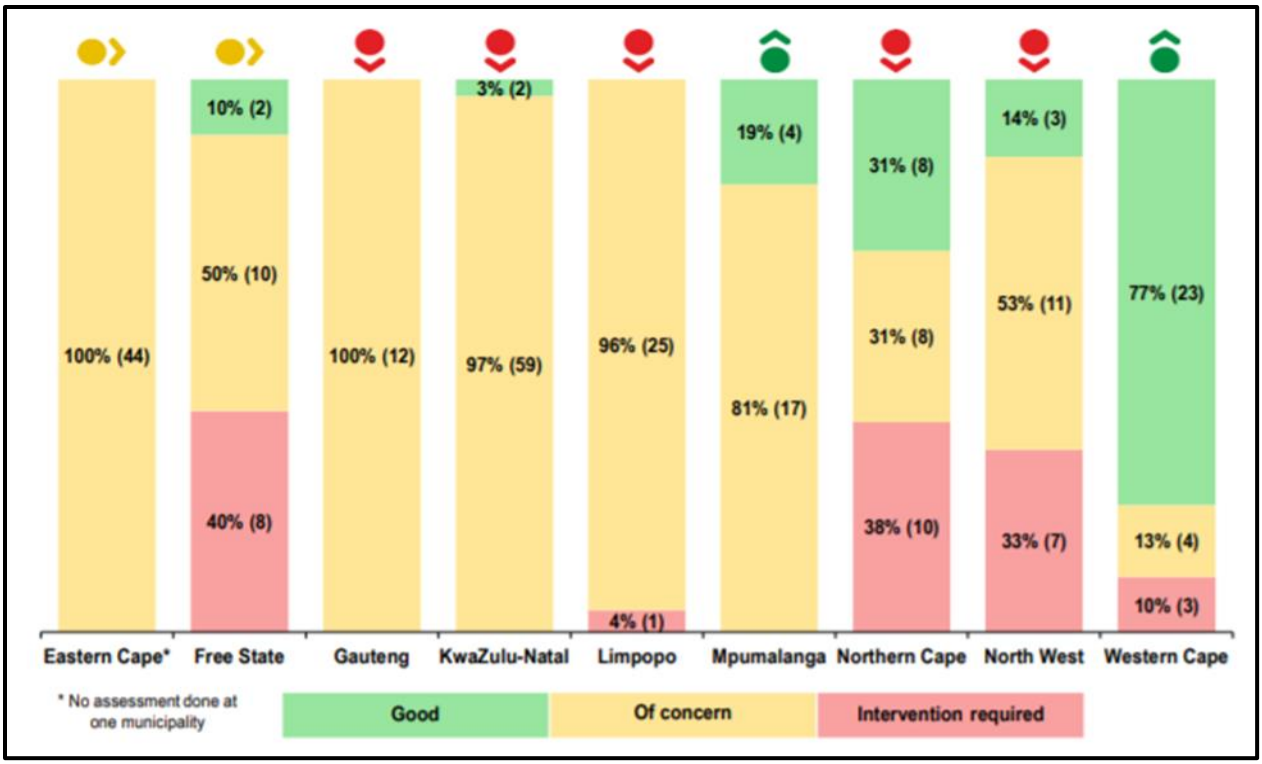


Figure 6.3 Provincial overview of municipal readiness for mSCOA implementation (Auditor General, 2016)

In 2016 to 17, shortly before the due date for regulatory compliance, the AG stated that "Municipalities were in various stages of readiness for the implementation of the mSCOA project … This is a significantly revised classification framework and required changes to the accounting process and IT systems. We identified various challenges with implementation which need to be addressed to ensure that these do not affect the ability of municipalities to produce reliable financial statements in 2017-18" (Auditor General (4), 2017). The AG also provided general guidelines for IT system implementation and, in particular, highlighted the role and impact of data migration. A copy of these guidelines has been included as Annexure D. However, this guidance may, in no way, be considered

a prescriptive or comprehensive strategy for the implementation of uniform data structures by the municipalities as this would compromise the objectivity of the AG.

The guidance of the AG was echoed by Ducharme Consulting in an mSCOA brochure (Ducharme Consulting, 2017) and an article by KPMG Technology Advisory (Van de Haar et al., 2016). According to Ducharme Consulting, the "implementation of mSCOA is not simply an information technology project, but a business transformation project that will fundamentally transform how the municipality carries out its operations" (Ducharme Consulting, 2017) before going on to explain the changes mSCOA would bring about and aligning the 15 core municipal business processes with the seven segments of the new chart of accounts. The complex project implementation required a well-constructed project plan, key skills and strong leadership. Ducharme Consulting (2017) proposed that the project should be broken down into smaller and more manageable chunks both to ensure success and to reduce the overall implementation risk. Van de Haar et al. (2016) concentrated on self-assessment and approached this self-assessment by segmenting the areas to be assessed, namely, corporate governance; strategic planning and reporting; business processes; technology; data and people and change management. They introduced a maturity model for the purposes of the assessment and evaluation statements for each of the identified areas. The diagnostic assessments of the municipalities by the respective treasuries revealed that municipalities in two of the provinces followed a similar approach to that presented in the article of Van de Haar et al. (2016), for their self-assessments.

It is clear from this discussion that municipalities were in need of guidance in terms of assessing their prevailing IT environments, developing strategy and implementation plans and executing the actual implementation of such plans. While this research study covered six cycles of data collection and culminated in a strategy for implementation (Figure 6.2

above), the project implementation plans were left to both the respective municipalities and the national team spearheading implementation across the country.

6.5 DATA COLLECTION AND FINDINGS

The data collection process, a key element of the environmental assessment, started as early as 2009 with a review and analysis of the functionality provided to municipalities by their financial system vendors as well as an international study tour to investigate what was being done in other countries (National Treasury, 2015). This initial research determined the strategic direction and confirmed the intention to create a uniform data structure in the FMICS of all municipalities. The objective of this budget and reporting reform was to enable and standardise financial reporting and improve the transparency, credibility and comparability of municipal data.

During the period preceding the first data collection cycle, the following municipalities were consulted on the objectives of the regulation, the initial version of the chart of accounts and the estimated effort to implement. These municipalities were randomly selected and were invited to form part of the pilot implementation group, an invitation which not all accepted at the time. The participating municipalities were: the City of Cape Town, the City of Johannesburg, Ekurhuleni Metro, EThekwini Metro, Knysna, Overberg, Overstrand, Polokwane, Saldanhabaai, Steve Tshwete and uMhlatuze municipalities.

A purposive selection of 25 pilot municipalities followed, including metro, district and local municipalities, representing all the system vendors represented in the market, and spread across the nine provinces. This same sample was adopted for the purposes of the study (accidental sampling), as was discussed in section 4.10. Table 6.2 lists the pilot municipalities, their geographic location and the financial software used before the mSCOA regulation and resulting IT implementation project.

Table 6.2 Pilot municipalities (Researcher)

Municipality	Town	Province	Category	Financial software
Buffalo City	East London	Eastern Cape	A	Solar
Camdeboo LM	Graaff-Reinet	Eastern Cape	B	ProMun
Cape Town	Cape Town	Western Cape	A	SAP
City of Johannesburg	Johannesurg	Gauteng	A	SAP
City of Tshwane	Pretoria	Gauteng	A	SAP
Drakenstein LM	Paarl	Western Cape	B	Solar
Ekurhuleni Metro	Germiston	Gauteng	A	eVenus
Elias Motsoaledi LM	Groblersdal	Limpopo	B	Munsoft
eThekwini Metro	Durban	KwaZulu-Natal	A	JD Edwards
Greater Giyani LM	Giyani	Limpopo	B	Sage Evolution
Hessequa LM	Riversdal	Western Cape	B	Venus
Knysna LM	Knysna	Western Cape	B	ProMun
Mangaung Metro	Bloemfontein	Free State	A	Solar
Nala LM	Bothaville	Free State	B	BIQ
Nelson Mandela Bay	Port Elizabeth	Eastern Cape	A	Sebata
Nkangala DM	Middelburg	Mpumalanga	C	Munsoft
Overstrand LM	Hermanus	Western Cape	B	Samras
Richmond LM	Richmond	KwaZulu-Natal	B	Abacus
Senqu LM	Lady Grey	Eastern Cape	B	Sebata
Setsoto LM	Ficksburg	Free State	B	Munsoft
Sol Plaatje LM	Kimberley	Northern Cape	B	eVenus
Tlokwe LM	Potchefstroom	North West	B	Phoenix
uMgungundlovu DM	Pietermaritzburg	KwaZulu-Natal	C	Sage Evolution
uMhlathuze LM	Richards Bay	KwaZulu-Natal	B	ProMis
Victor Khanye LM	Delmas	Mpumalanga	B	Sebata

The data collection was organised according to six cycles. Each cycle include the elements of assessment, guidance to the individual municipality and action steps to

implement before the next cycle of data collection, according to the methodology discussed in Chapter 5 and presented in Figure 6.2.

The first cycle of data collection, covering the period July 2014 to June 2015 – a full municipal financial year after publication of the regulation – clearly highlighted the necessity for more frequent and regular assessments, guidance and support to the municipalities. It also became apparent that the municipalities were in need of a strategy for implementing both this and similar reforms.

6.5.1 Data collection cycle 1: July 2014 to June 2015

Data collection cycle 1 included an on-site assessment of each of the pilot municipalities and five integrated communication forum meetings, which were specifically convened to provide external support and implementation guidance to the participating pilot municipalities. System vendors, provincial treasuries and other stakeholders also participated in these forums.

Data collection

The AG (Auditor General (1), 2015) had provided both a perspective on the challenges associated with the mSCOA implementation and a general overview of the IT landscape across the municipalities at the inception of the pilot implementation (see Figure 6.4):

Lay of the land

Various factors affecting the roll out of MSCOA in South Africa:

- Different types of municipalities
- Various systems that currently exist
- Ability for vendors to support MSCOA
- Contractual obligations in terms of SLA's
- Financial resources available to municipalities
- Staff resources and adequate skills availability
- Challenges of location
- Infrastructure (External and Internal)
- Sustainability of the system
- Timelines that will be agreed to
- Roll out plans and the ability to streamline this

Figure 6.4 Lay out of the land-municipal readiness for mSCOA implementation (Auditor General (2), 2015)

The AG found that, leading up to the mSCOA project implementation, the majority of the municipalities did not have adequate controls either designed or implemented for a project of this nature, they lacked qualified staff and, in addition, their business processes had not reviewed and prepared in anticipation of the mSCOA requirements.

Three pilot municipalities were randomly selected and assessed to determine the level of support and intervention which would be required from the treasuries and vendors to successfully complete this project across the country. The findings, which are

summarised in Table 6.3 below, were collected by interviewing project managers and consultants involved with the respective municipal projects, and captured in project minutes and reports, as follows:

Table 6.3 Sample assessment of selected municipalities (Researcher)

Assessment criteria	**Municipality X**	**Municipality S**	**Municipality Q**
Detailed project plan with milestones, started early with planning	√	√	√
Phased approach to implementation	√		√
Organisational realignment to mirror the function segment		√	
Change management included	√	√	√
Enthusiastic and involved officials	√	√	√
Support from senior management and councillors	√	√	√
Internally implemented (not by service provider or other consultants)	√	√	√
Viewed as an opportunity to “clean house”	√	√	
Formal documentation of the process and progress to date			√
Dedicated testing time and full walk-through included			√
Parallel approach to implementation			√
All or nothing approach – replace full IT system functionality	√	√	
Extensive training to understand both mSCOA and the IT system	√	√	√
Continuous communication across the entire municipality included in project	√	√	√

Assessment criteria	Municipality X	Municipality S	Municipality Q
Excel based sub project to match the current chart of accounts to mSCOA	√	√	√
Latest (up to date) IT infrastructure available or ordered for this project		√	
Business processes reviewed and aligned with the project requirements	√	√	√

Following the initial assessment in July 2014 by the AG and the National Treasury team, it once again became clear that the pilot municipalities would not be able to implement the reform without external support. An ICF was therefore established. Five ICF meetings were convened from July 2014 to June 2015. Although the focus of these meetings was on the pilot municipalities, and regular site visits took place to each of these municipalities during this period, the next collective assessment report was only compiled during July 2015.

The ICF was formally established on 1 August 2014 at the first meeting. The terms of reference for the forum were agreed upon, together with the agenda items of the day, which included a discussion of version 5.4 of the mSCOA chart of accounts, addressing key questions from the Frequently Asked Questions database (FAQ) which had been created specifically for this project, presenting the national project plan and risk matrix, and confirming the roles and responsibilities going forward.

At the fifth ICF meeting, which took place from 22 to 23 June 2015, the results of a high-level progress assessment were presented (see Figure 6.5). This presentation referred to all the municipalities across the country and provided an overview of the adoption and implementation of the guidance which had been provided during the previous four ICF meetings, based on a 3-tiered scale, with red indicating less than 20% of municipalities

have attended to this aspect, green indicating more than 80% of municipalities have attended to this aspect, and yellow representing any scores between 20% and 80%.

CRITERIA	RATING
Project governance	Partially implemented or considered
Project team	Identified but not appointed
Project planning/ admin	Needs attention
ICF and other forums	Well attended
List/ liaison with stakeholders	Lists compiled but not engage as yet
Risk registers	Needs attention
FAQ database	To be communicated and monitored
Training participation	Well attended, asked for more
Change management	Only started

Figure 6.5 Municipal progress with mSCOA implementation by June 2015 (Reproduced with permission from National Treasury, 2015)

By July 2015 the national mSCOA team had found that municipalities had been actively piloting the reform since the publication of the regulation in April 2014. These pilot municipalities were utilising nine different FMICS and the evaluation found them to be at varying levels of progress.

6.5.2 Data collection cycle 2: July to August 2015

Based on a formal data collection which had been conducted at every one of the 25 pilot municipalities during the period March to May 2015, a report was produced and mSCOA

Circular 1 (National Treasury (1), 2015), which provided guidance and action steps, was published.

Data collection

The findings from the formal data collection during the period March to May 2015 are summarised in Table 6.4 below:

Table 6.4 Data collection from pilot municipalities (Researcher)

Municipality	Assessment	Diagnosis
A	Short codes – local, bespoke financial system	Vendor has embedded short codes in the master data tables, vendor not able to demonstrate functionality in a live environment, vendor would be under extreme pressure during the piloting phase and there was a high risk that extension of the implementation date may be necessary
B	Extensive re-development of a local, customised solution for municipalities	Vendor has undertaken significant steps in the modernisation of system and service offering. Vendor's methodologies and approach to the mSCOA classification framework incorporated the IDP/SDBIP and entire financial management accountability cycle.
C	Tier 1 ERP system	Implementation deferred to July 2016
D	Tier 1 ERP system	Implementation deferred to July 2016
E	Tier 1 ERP system	Implementation deferred to July 2016

Municipality	Assessment	Diagnosis
F	Short codes – local bespoke financial system	Vendor has embedded short codes in the master data tables, vendor not able to demonstrate functionality in a live environment, vendor would be under extreme pressure during the piloting phase and there was a high risk that extension of the implementation date may be necessary.
G	Short codes – local bespoke financial system	Vendor has embedded short codes in the master data tables, vendor could not demonstrate functionality in a live environment, vendor would be under extreme pressure during the piloting phase and there was a high risk that extension of the implementation date may be necessary
H	Extensive re-development of a local, customised solution for municipalities	Vendor has undertaken significant steps in the modernisation of the system and service offering. Vendor's methodologies and approach to the mSCOA classification framework incorporated the IDP/SDBIP and entire financial management accountability cycle.
I	Tier 1 ERP system	Implementation deferred to July 2016
J	Short codes – localisation of a tier 1 ERP system	Vendor has embedded short codes in the master data tables, vendor not able to demonstrate functionality in a live environment, vendor would be under extreme pressure during the piloting phase and there was a high risk that extension of the implementation date may be necessary
K	Short codes – local bespoke financial system	Vendor has embedded short codes in the master data tables, vendor not able to demonstrate functionality in a live environment, vendor would be

Municipality	Assessment	Diagnosis
		under extreme pressure during the piloting phase and there was a high risk that extension of the implementation date may be necessary.
L	Extensive re-development of a local customised solution for municipalities	Vendor has undertaken significant steps in the modernisation of the system and service offering. Vendor's methodologies and approach to the mSCOA classification framework incorporated the IDP/SDBIP and entire financial management accountability cycle.
M	Short codes – local bespoke financial system	Vendor has embedded short codes in the master data tables, vendor not able to demonstrate functionality in a live environment, vendor would be under extreme pressure during piloting. There was a high risk that extension of the implementation date may be necessary.
N	Hybrid approach to the requirements	The vendor has adopted a hybrid approach (project approach to municipal budget and mSCOA principles still to be embedded) which could result in varying levels of mSCOA compliance. Further refinement required for compliance.
O	Procured an enterprise management system	Implementation deferred to July 2016
P	Extensive re-development of a local customised solution for municipalities	Vendor has undertaken significant steps in the modernisation of system and service offering. Vendor's methodologies and approach to the mSCOA classification framework incorporated

Municipality	Assessment	Diagnosis
		the IDP/SDBIP and entire financial management accountability cycle.
Q	Hybrid approach to the requirements	The vendor has adopted a hybrid approach (project approach to municipal budget and mSCOA principles still to be embedded) which could result in varying levels of mSCOA compliance. Further refinements needed to be made to achieve compliance.
R	Hybrid approach to the requirements	The vendor has adopted a hybrid approach (project approach to municipal budget and mSCOA principles still to be embedded) which could result in varying levels of mSCOA compliance. Further refinements needed to be made to achieve compliance.
S	Extensive re-development of a local customised solution for municipalities	Vendor has undertaken significant steps in the modernisation of system and service offering. Vendor's methodologies and approach to the mSCOA classification framework incorporated the IDP/SDBIP and entire financial management accountability cycle.
T	Extensive re-development of a local, customised solution for municipalities	Vendor has undertaken significant steps in the modernisation of system and service offering. Vendor's methodologies and approach to the mSCOA classification framework incorporated the IDP/SDBIP and entire financial management accountability cycle.
U	Short codes – local bespoke financial system	Vendor has embedded short codes in the master data tables, vendor not able to demonstrate

Municipality	Assessment	Diagnosis
		functionality in a live environment, vendor would be under extreme pressure during the piloting phase and there was a high risk that extension of the implementation date may be necessary
V	Hybrid approach to the requirements	The vendor has adopted a hybrid approach (project approach to municipal budget and mSCOA principles still to be embedded) which could result in varying levels of mSCOA compliance. Further refinements needed to be made to achieve compliance.
W	Short codes – local bespoke financial system	Vendor has embedded short codes in the master data tables, vendor not able to demonstrate functionality in a live environment, vendor would be under extreme pressure during the piloting phase and there was a high risk that extension of the implementation date may be necessary.
X	Hybrid approach to the requirements	The vendor has adopted a hybrid approach (project approach to municipal budget and mSCOA principles still to be embedded) which could result in varying levels of mSCOA compliance. Further refinements needed to be made to achieve compliance.
Y	Extensive redevelopment of a local customised solution for municipalities	Vendor has undertaken significant steps in the modernisation of system and service offering. Vendor's methodologies and approach to the mSCOA classification framework incorporated the IDP/SDBIP and entire financial management accountability cycle.

The following became clear from the dataset:

- Municipalities that were not involved in the pilot implementation should urgently prioritise this reform to allow sufficient time for the extensive preparations and effort required to complete the project.
- Municipalities had changed financial systems without either prior due diligence investigations or a valid business case, resulting in significant cost without consideration of the value proposition of the acquisition.
- Specific challenges were identified in terms of IT procurement in municipalities, namely:
  - ✓ Significant municipal spending on IT incurred
  - ✓ excessive Use of Regulation 32 of the Municipal Supply Chain Management Regulations (South Africa, 2005), without implementation of the stipulated requirements therein
  - ✓ Disregard for section 33 of the MFMA (South Africa, 2003) with respect to contracts with a financial liability of longer than three years
  - ✓ Vendors were providing custom developed and highly customised IT solutions to municipalities with little oversight, confirmation of value for money or ensuring that municipalities had access to the latest technology

In addition, this assessment cycle highlighted the fact that implementing the requirements of the reform involved a huge volume of work, required municipal-wide change management, was technically challenging and, in many cases, would result in additional expenditure on the part of the municipalities.

National Treasury responded to these findings by releasing mSCOA Circular 1 to guide municipalities on the next steps to take. mSCOA Circular 1 (National Treasury (1), 2015) broadly addressed what mSCOA involved and why a project of this nature had become necessary. It also included information on who was responsible and accountable for the

project, guidance on how to approach the project, and how to access training on mSCOA (National Treasury (1), 2015). In particular, mSCOA Circular 1 listed the following action steps to be taken by municipalities, namely:

- Table the mSCOA regulation at the next council meeting for information purposes and for adoption for implementation by the municipal council.
- Attend the provincial forums and information sessions to gain a clear understanding of what is required.
- Attend the one-day information sessions and three-day training provided by National Treasury.
- Study the mSCOA regulation, project documents and answers provided on the FAQ website, which was created specifically for this purpose.
- Initiate an internal municipal implementation project by registering a formal project, identifying a project sponsor and establishing a project steering committee and formal governance structure for the project.
- Identify an internal project manager and multi-disciplinary implementation team to be tasked to draft a high-level delivery plan and risk register for the project.
- Study the list of activities provided on page 8 of the circular and include these in the project plan.
- Allocate an initial budget for this project.
- Submit copies of the draft plans to National Treasury for input and guidance.

Non-pilot municipalities were prompted to execute a due diligence review of their existing IT environment as procurement of a new financial IT system or additional functionality could only take place once a municipality had conducted a needs analysis and formulated a business case for the purchase. This practice represents good governance principles in action (Dahlberg & Kivijarvi, 2006) and formed part of the skills development and capacity building which was required for this project.

6.5.3 Data collection cycle 3: September 2015 to April 2016

During the period September 2015 to April 2016, the National Treasury project team focused on assessments as well as the support and engagement of individual municipalities, hosted a further two ICF meetings and published three mSCOA circulars, as well as MFMA Circular 80 to guide the participating municipalities. There was a sudden rush of “early adopting” municipalities which, although not piloting the implementation of the regulation, nevertheless decided to start the implementation project early due to the anticipated complexity and volume of work to be done. The progress of these municipalities is not discussed in this thesis.

Data collection

This third data collection cycle, which followed very soon after the previous cycle focused on the experience of the municipal implementation teams and the key challenges which were being identified by the pilot municipalities. The purpose of this approach was to understand the key challenges, lessons learnt thus far and to develop further guidance for the pilot and early adopting (non-pilot) municipalities to follow. The findings, which were collated by the researcher from the respective municipal feedback reports prepared by the team of consultants, are summarised in Table 6.5 below:

Table 6.5 Assessment of pilot municipalities (Researcher)

Municipality	Key challenges
A	This municipality has implemented two segments of the mSCOA chart only. The accountability cycle and business processes had not been addressed.
B	This municipality has added a project dimension to its existing two segments and were considering the procurement of an ERP system.
C	This municipality has embarked on extensive research and internal consultation in order to understand the impact of the regulation. However, the

Municipality	Key challenges
	municipality did report that it was struggling to articulate data extraction via derivation from objects and had deferred completion of the project to July 2016.
D	This municipality confirmed that it has a clear understanding of its existing IT landscape and the shortcomings but was awaiting "Proof of Concept" demonstrations from vendors before taking the next step. Implementation had been deferred to July 2016.
E	This municipality has yet to grasp the full impact of the institutional change which was required. Implementation had been deferred to July 2016.
F	This municipality has been forging ahead with implementing the reform. The municipality had initially experienced municipal service billing issues which were being addressed. However, the municipality was at risk of not completing the project in time.
G	This municipality has implemented two segments of the mSCOA chart only. The accountability cycle and business processes had not been addressed.
H	The municipality has had a delayed start but, since the municipal manager has taken responsibility for the project, it was moving forward.
I	This municipality was able to demonstrate a "Proof of Concept" for its IT system implementation although the sub-systems still had to be addressed and integrated. Implementation had been deferred to July 2016.
J	The municipality has started its project late due to institutional challenges.
K	This municipality has adopted a "short code" methodology and, as a result, was experiencing problems with the regulatory Section 71 submissions.
L	This municipality refrained from providing any comments.
M	This municipality has deferred the implementation project to July 2016.
N	This municipality did not provide any input and was not available for an assessment by the National Treasury team.

Municipality	Key challenges
O	This municipality has appointed a new IT system vendor and had deferred going live to July 2017, the final date for compliance.
P	This municipality did not provide any input and was visited by the National Treasury team shortly after for an assessment. The municipality has adopted a “short code” methodology which has resulted in significant additional work.
Q	This municipality has raised major issues with the approach of its IT system vendor and intended to procure an alternative FMICS.
R	After initial institutional and capacity constraints, this municipality has started with the implementation project and intended to catch up soon.
S	No comments were provided and the National Treasury team scheduled a visit to assess the implementation project.
T	No comments were provided and the National Treasury team scheduled a visit to assess the implementation project.
U	The municipality has adopted a “short code” methodology and has resolved initial challenges experienced with the regulatory Section 71 reporting.
V	This municipality has kicked off the implementation with a budget and planning module. It was anticipated that this would be ready for testing within a month after this assessment.
W	This municipality has made a slow start with the implementation project and would be capacitated with additional support.
X	This municipality has embarked on a project to upgrade its existing IT environment and has issued a tender to procure a new IT software system (FMICS) as well.
Y	This municipality has deferred the project to March 2016.

During this period several of the pilot municipalities deferred their implementation projects and withdrew from the piloting group. However, these municipalities were retained on the

list of municipalities for the purposes of this research study. They were continually followed up on and included in reports on progress made in implementing the regulation.

ICF 6 took place in Durban from 8 September to 9 September 2015 and was well attended by municipalities, provincial treasuries and stakeholder departments. The AG also attended and participated through an informative and guiding presentation. The pilot municipalities and provincial treasuries shared the lessons learnt and robust discussion further assisted municipalities with the challenging aspects of project implementation.

The final ICF 7, 1 December 2015, addressed the replacement of MFMA Circular 57 with MFMA Circular 80 and the supply chain management processes which should be followed to procure a new FMICS. However, the majority of the time was spent on the minimum requirements for FMICS to achieve compliance with the regulation, both in terms of business processes and system specifications. This information prepared the municipalities and system vendors for the next assessment which took place in May 2016.

National Treasury continued supporting the respective implementation projects and released mSCOA Circulars 2, 3 and 4, dated 21 September 2015, 2 November 2015 and 2 March 2016 respectively, in support of the reform. It should be noted that, as the AG reports often include statements relating to critical skills shortages and capacity constraints in municipalities (Auditor General (2), 2015), National Treasury used this opportunity to include training, skills development and capacity building initiatives in the roll out of the mSCOA project to all municipalities.

mSCOA Circular 2 (National Treasury (2), 2015) addressed the following key issues and provided guidance to municipalities on the structuring of an implementation project team:

- Reference to reading material related to the implementation of the regulation, available from the National Treasury website, including the mSCOA regulation

itself, a Project Summary Document (PSD), and all documentation and presentation slides for the respective ICFs

- Details regarding the mSCOA training/ skills development programme for municipal officials
- Guidance on how to structure a mSCOA project plan
- Feedback from the activities of the National Treasury mSCOA work streams

The circular cautioned municipalities that, during the piloting period, “the goal posts are moved as lessons are learnt, issues addressed and risks mitigated. However, this does not mean that healthy project governance should not exist” (National Treasury (2), 2015). It was found that, in most cases, the pilot municipalities had not considered good governance as it relates to IT project implementation and there was no clear strategy being followed for such implementation.

mSCOA Circular 3 addressed the following issues (National Treasury (3), 2015):

- The audit value chain and specific guidance from the AG (2017) relating to the audit of projects of this nature, and the potential impact which mSCOA implementation could have on the annual external auditing of municipalities
- Information regarding the use of disparate financial systems by municipalities and their municipal entities, as well as the integration of these systems for practical and reporting purposes
- Guidance regarding the implementation of the mSCOA reform at municipal entities
- A detailed discussion on project management, the role of project sponsors, different project charters for the project work streams, and governance structures for project implementation

The guidance provided by the AG, which was also incorporated into the assessments and data collection activities for the purposes of this research study, may be summarised as follows (National Treasury (3), 2015):

- The external audit approach before and after mSCOA implementation remained unchanged.
- Data conversion and migration, as well as access management and general controls, which represent major risks in all IT system implementations, would be a main focus area for audit review.
- No adverse impact on the results of the external audit were anticipated, unless the municipalities' system conversions and/or implementation projects eliminated the inherent audit trail.
- Municipalities were cautioned that incorrect input into any system would result in incorrect output and this in turn would influence the outcome of the audit review.
- Municipalities were encouraged to review and update their business processes to align with the mSCOA requirements, as incorrect, inappropriate and inadequate business processes, together with the actions of people, are the main causes of adverse audit findings.

The main purpose of mSCOA Circular 4 (National Treasury (4), 2016) was both to address queries and to provide additional project implementation support to municipalities and provincial treasuries. It was for this reason that example project templates were developed and attached for use by the municipalities. The circular discussed often repeated FAQs, the nature of ethics and governance within the context of the project and the use of self-assessment tools while also providing detailed project implementation support (National Treasury (4), 2016):

- A detailed discussion of change management together with examples to use at the various municipalities
- Project risk management and the use of project issue logs to capture key project decisions
- Data purification and migration from one system to another

MFMA Circular No. 80 was published on 8 March 2016, shortly after mSCOA Circular 4 (National Treasury (8), 2016). The purpose of this circular was to replace MFMA Circular 57, to update municipalities on the review and assessment of FMICS used by the municipalities and their entities, and to provide information related to municipal business processes, which processes were based on the piloting and ongoing assessment of the mSCOA classification framework. The circular also covered accountability for the mSCOA implementation and regulatory compliance and explained the meaning of minimum system compliance and what compliance with the regulation entailed. It covered a discussion of “off the shelf”, tier 1 enterprise requirements planning (ERP) systems as compared to locally developed, bespoke municipal FMICS. This comparison was extremely important for those municipalities which possessed neither the skills nor the capacity either to develop a technical specification or to evaluate tender responses in respect of IT procurement. The circular further included a discussion of the legislative framework for IT procurement at a municipal level as well as the use of a transversal tender, tender RT 25-2016, which had been established specifically for the mSCOA project (National Treasury (8), 2016). It should be noted that, while only a portion of the assessment which was used for the tender evaluation was replicated for this research, the full assessment and results of the tender evaluation and outcome are available from the National Treasury website.

MFMA Circular 80 (National Treasury (8), 2016) called on municipalities to take the following action steps, if not yet completed:

- Submit a letter to the relevant treasury prior to commencing with any procurement activities, with reasons and a motivation (business case) in support of the decision to procure.
- Await a letter in response from the relevant treasury.
- Follow an appropriate supply chain management process to procure the required system functionality, i.e. a completely new system or additional functionality only, in order to address the shortcomings identified in the existing system.
- Provide sufficient budget allocation for this project.
- Prepare the following project related documentation, to be signed off by the contracting parties and kept in the project audit file for later review:

    - ✓ Service level agreement
    - ✓ Project implementation plan(s)
    - ✓ Regular progress reports against the implementation plan(s)
    - ✓ Signed off deliverables and artefacts emanating from the project.

It should be noted that 26 municipalities only submitted procurement letters as noted in bullet 1 above. The implementation of the actions listed above was assessed and reported, together with the actions called for in mSCOA Circulars 2, 3 and 4, during May 2016. At this stage of the study it was clear that, even with specific action steps to follow, the majority of the municipalities were not progressing as anticipated and were also not following the guidance which was being provided. In most cases, municipalities had appointed IT vendors and consultants to implement the standard data structure within their FMICS on their behalf.

6.5.4 Data collection cycle 4: May to August 2016

mSCOA Circular 4 (National Treasury (4), 2016) concluded with a call to action, namely, that “The provincial treasury must review every municipality’s completed municipal

readiness assessment, together with the municipal mSCOA project plan and mSCOA project risk register. Once the municipality has updated the documents with the provincial treasury input, the municipality must submit its municipal readiness assessment, together with the municipal mSCOA project plan and risk register" to National Treasury. Accordingly, this instruction formed the basis for the next assessment and data collection cycle.

Data collection

The municipalities reported that the readiness assessment, preparations for the mSCOA implementation and preparation of a project plan were complex and had necessitated their calling on their respective IT system vendors to conduct the assessments, appointing consultants to help or soliciting the support of the provincial treasuries to complete these tasks. This clearly underlined the skills and capacity challenge in municipalities, as well as the importance of providing a strategy for implementing systems and uniform data structures in FMICS.

A summary of the provincial reports received by May 2016 is presented in Figure 6.6:

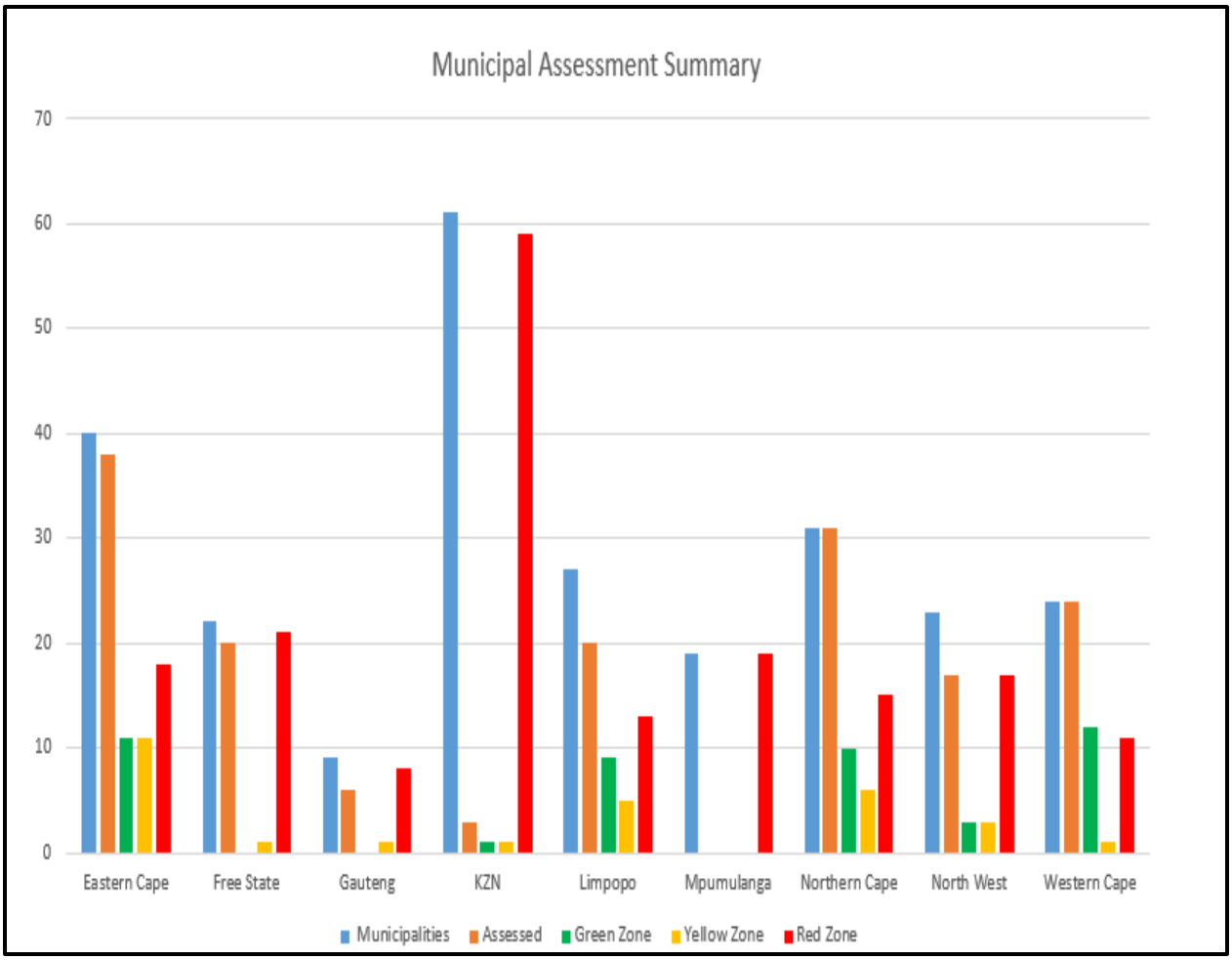


Figure 6.6 Municipal assessment summary per province (Reproduced with permission of National Treasury, 2016)

An assessment of the individual pilot municipalities, performed from March to April 2016 by the team of consultants, and reported to the TCF in May 2016, is presented in Table 6.6:

Table 6.6 Assessment of pilot municipalities' progress (Reproduced with permission from National Treasury, 2016)

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
A	√	√	0	x	NA	NA	70	Currently the municipality is transacting on function and item segments only, the other five segments are not used and capital projects only are recorded
B	√	√	58,33	√	NA	NA	70	With the exception of a full integration of the budget cycle the municipality is transacting in the mSCOA version of its system. The costing and regional segments are not being used and the funding segment is being only partially used.
C	x	√	41,67	√	?	NA	60	The municipality uses its own configured version of FMICS and is

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
								struggling to address the requirements across all segments.
D	x	x	0	x	x	√	50	Due to its internal structure the municipality is facing enormous challenges in respect of achieving full integration and compliance by 1 July 2017. Currently negotiating with its system vendor to assist with development of the requirements.
E	x	x	0	x	?	√	50	The municipality is planning to go live and should then be able to transact on three segments. The remainder will be incorporated via a reporting solution.
F	√	√	58,33	√	NA	NA	70	The municipality has partially embraced the transactional environment after an initial slow start. The data submission revealed elementary

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
								use of the project, region and costing segments.
G	√	√	0	x	NA	NA	70	The municipality has partially achieved the transactional environment with data submission revealing an elementary embrace of three segments only.
H	√	√	66,67	√	NA	NA	70	The municipality has implemented the accounting cycle perspective and is transacting and budgeting from a projects perspective. Currently struggle with the costing and regional segments.

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
I	x	x	0	x	?	√	70	Significant progress made towards going live on the core financial system from 1 July 2016. Extensive integration of subsystems has been made but full testing will commence only in the next financial year.
J	√	√	0	x	NA	NA	80	The municipality is transacting on the current mSCOA version of its system and was extensively supported by its service provider. The data submission indicates elementary use of the segments.
K	√	x	0	x	NA	NA	70	The municipality successfully implemented the transactional environment after an initial slow start. No data submissions have been received yet.

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
L	√	√	0	x	NA	NA	70	With the exception of a full integration of the budget cycle, the municipality is transacting in the current mSCOA version of its system. However, the costing and regional segments are not being used at all while funding is only partially being used.
M	x	x	0	√	?	√	60	The municipality initially postponed going live on mSCOA and is still apprehensive about going live in July 2016. The municipality has indicated a desire to change financial systems.
N	x	x	0	x	x	x	0	Municipality was not available for an assessment.

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
O	x	x	0	x	x	√	60	The municipality reported challenges (including functionality) with the newly acquired ERP solution that could result in delays in implementation, thus exposing it to a high level of risk.
P	√	√	0	x	√	√	70	The municipality has not embraced the accounting cycle perspective and is transacting from a short code functionality although budgeting from a project perspective. Also struggling with the costing and regional segments. Reported a high incidence of misallocation of transactions.
Q	√	√	66,67	√	NA	NA	80	The municipality is transacting on the mSCOA version of its software and has utilised five segments as far as practically

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
								achievable. The region and costing segments were not used at all.
R	x	x	0	x	x	?	NA	The municipality failed to start and indicated it will be using the transversal tender to procure a new system.
S	√	√	83,33	√	NA	NA	80	The data extraction is almost complete with only region and costing still not being used as intended. It should be noted that the entire system is running in parallel and, thus, a working environment has not yet been achieved at this municipality.
T	√	√	66,67	√	NA	NA	70	The municipality has implemented the accounting cycle perspective and is transacting and budgeting from a project perspective. Struggling with the

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
								costing and regional segments.
U	√	√	91,67	√	NA	NA	80	The municipality has been transacting on the mSCOA version of its software and is using five segments, excluding the costing and regional segment. The budget was compiled in Excel and could expose several misallocations once it has been interrogated during an audit. However, an analysis of the data submission shows a level of segmentation has been achieved.
V	√	√	83,33	√	NA	NA	80	The municipality has managed to incorporate the mSCOA version of its chart at a high level and has utilised the newly developed

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
								budget module across sub systems during this budget cycle.
W	√	√	0	x	NA	NA	80	The municipality is transacting on the mSCOA version of its system and has been extensively supported by its service provider.
X	√	√	66,67	√	NA	NA	70	After an initial slow start by the municipality, it has been reported that it is now fully functional on the mSCOA version of its system. The data submission reveals an elementary embrace of the project (capital and repair and maintenance only), region and costing segments.

Municipality	Live 1 from July 2015	Data String Submitted	Segments (%) Used	IT Submission done	Probability to "go live" 1 July 2016	Probability to "go live" 1 July 2017	Accountability Cycle implemented	Comments
Y	x	x	0	x	?	√	NA	The municipality's project was driven by the CFO and its go live date was postponed to March 2016. However, the CFO was suspended and only recently reinstated. This has had an impact on the project progress.

It was clear from the assessment that this was definitely not a finance or IT project alone, but involved the whole municipality, and that the success of the project was dependent on a senior project sponsor and project manager driving the implementation. In addition, the complexity of the implementation was revealed in the fact that the majority of municipalities were struggling with the region and costing segments.

Guidance and support were provided to the municipalities during the site visit(s) and the identification of municipal and vendor specific challenges prioritised for intervention.

During the national conference of the Institute for Municipal Finance Officers (IMFO), municipalities which were not involved in the pilot implementation were engaged and specific guidance provided on what to do, how to do it and the way forward. Multiple workshops were hosted on topics including performance management and reporting;

budgeting for projects; local government database submissions; mSCOA reporting; and municipal tariff setting. In addition, feedback was provided the stage which the project had reached and the way forward, as well as guidance on the use of panel tenders for procurement. The discussions and questions from these sessions were used as input in the compilation and publication of mSCOA Circulars 5 and 6.

The fifth mSCOA circular, published by National Treasury on 15 July 2016 (National Treasury (5), 2016), was aimed at equipping non-piloting municipalities, in particular, to take the next step in initiating the implementation project. It also provided detailed information regarding the use of the regional segment in the new data structure, including a summary of all the related queries logged on the FAQ database.

The circular continued with a discussion of and examples from the budget and planning business process, namely, linking the Integrated Development Plan (IDP) to capital and operational projects and allocating budget for these projects.

It is important to note that the circular addressed data purification and actions which the municipalities should prioritise in anticipation of the implementation project. It reminded the municipalities of the IT assessment which should have been completed and submitted to the treasuries for review and included a template for municipalities, which were not able to perform this assessment independently, to complete. The proposed activities from this circular and assessment may be summarised as follows:

- Training of municipal employees using the information and slides attached to the circular
- Data purification activities as directed in the circular
- Completion of an IT due diligence review, using the template which was provided
- Planning the way forward, based on the IT review, and requesting of indicative pricing to address the shortcomings identified

- Preparation of a submission to the IT steering committee and municipal council, including the IT due diligence, gaps identified and indicative pricing, together with a proposed way forward
- Submission of the municipal council report to National Treasury for review and comments before embarking on any procurement activities

mSCOA Circular 6, the last to be issued before the due date for compliance by all municipalities, was published on 2 August 2016. This circular explained both the use of the chart for budget preparation purposes and the version control applicable to the due date for compliance, namely, 1 July 2017. It also addressed procurement procedures for municipalities using transversal tender RT25-2016, which had been specifically established for this purpose and training and capacity building initiatives, and provided a list of activities to be performed during August and September 2016, namely:

- Download chart version 6.0, review and prepare for implementation.
- Review mSCOA Circulars 5 and 6 and complete all the activities listed in these circulars.
- Schedule and attend training as provided by National Treasury.
- Unpack capital and repairs and maintenance projects into their components to upload into the new mSCOA compliant FMICS.
- Submit all outstanding documentation to the respective treasuries.
- Complete the IT due diligence reviews and municipal reports, including procurement decisions and processes relevant to the implementation project.
- Work through the FAQ database of questions and answers for training purposes, as well as the guidance relating to the implementation of the reform.

These final two mSCOA Circulars guided municipalities in their preparation for the assessment which was executed during September 2016.

6.5.5 Data collection cycle 5: September to October 2016

During September 2016, site visits and assessments of the pilot municipalities were conducted in consideration of the fact that the pilot phase of the national project was coming to a close in December 2016. These assessments would highlight which of the pilot municipalities still required an urgent intervention in order to conclude their respective projects.

Assessment

A summary of the findings and future perspective of the individual pilot municipalities' progress are presented in Table 6.7:

Table 6.7 Findings and future perspective of pilot municipalities' progress (Researcher)

Municipality	Transacting in mSCOA	Chart comparison completed	mSCOA budget created	Comments	Comply by 1 July 2017?
A	√	Vendor assisted	Created and being tested	Transacting since 1 July 2015. Data strings were rejected but adopted version 5.4 of the chart and GUID instead of long codes. This has reduced the error count to minimal.	NA
B	√	√	√	Although the municipality is transacting in mSCOA, certain shortcomings with allocation were identified. Municipality is committed to addressing these. The municipality has achieved one successful data upload.	NA
C	√	√	Currently being reviewed	Transacting on the mSCOA chart but recent data load testing failed due to technical issues. Issues with the opening balance/prior period corrections due to	NA

Municipality	Transacting in mSCOA	Chart comparison completed	mSCOA budget created	Comments	Comply by 1 July 2017?
				classification differences. The municipality has uploaded two partly correct files to the portal.	
D	x	x	Manually prepared	Project deferred beyond the compliance date.	x
E	x	Partially	Manually prepared	Aborted go live due to data migration issues	x
F	√	√	√	The municipality embraced the transactional mSCOA after an initial slow start. The data revealed an elementary embrace of the project, region and costing segments only.	NA
G	√	√	√	Municipality is transacting live on mSCOA and will upgrade its current system to the latest version. Has embraced the regulation and is demonstrating good project governance. Successfully uploaded data strings.	NA
H	√	√	Vendor assisted	Transacting on all the segments although experiencing challenges with the costing segment. The municipality started to upload the data strings to the portal with very limited success.	NA
I	x	Vendor assisted	External system used	Municipality has adopted the general ledger and budgeting portions of the chart. Currently busy with a consolidation process and finalising the integration of 3rd party systems.	√
J	√	√	√	Municipality is transacting on the mSCOA version of	NA

Municipality	Transacting in mSCOA	Chart comparison completed	mSCOA budget created	Comments	Comply by 1 July 2017?
				its system after extensive support from its service provider. The data indicates a high level of use of the segments. Costing is not used and user access challenge still to be addressed.	
K	√	√	√	After initial slow start, municipality using mSCOA comprehensively. Challenges with existing system and will have to upgrade system soon. Not submitted any data strings.	NA
L	√	√	Outside of financial system	Transacting in the mSCOA version except for budget preparation. The costing and regional segments have not been used and funding segment is only partially being used. A new steering committee appointed to set a new path and procure another system.	NA
M	x	Vendor assisted	No data available	The municipality deferred going live due to possible system change. Elementary use of project, region, funding and costing segments only.	√
N	x	Will ask vendor to assist	x	CFO has extremely negative attitude toward mSCOA and the existing service provider. Significant amount of work to do before go live and budget preparation. Probably not make the due date.	x
O	x	Vendor assisted	Testing before upload	Internal politics and vendor relationship impacting on the implementation project.	Not clear

Municipality	Transacting in mSCOA	Chart comparison completed	mSCOA budget created	Comments	Comply by 1 July 2017?
P	√	√	√	Budget from a project perspective but using short codes for transacting. Also struggling with the costing and regional segments.	NA
Q	√	Vendor support	Vendor support	The municipality is transacting on the mSCOA version of its software and has embraced the segments as far as is practically achievable. The region and costing segments were not used. The municipality has uploaded only one successful data string.	NA
R	x	Started but reverted back to old system	x	The municipality failed to start and indicated it will be using the transversal tender to procure a new system.	Not clear
S	√	√	√	Closely managed project. It should be noted that the entire system is still run in parallel and, thus, a working environment has not yet been achieved at this municipality.	NA
T	√	√	√	The municipality has fully embraced the accounting cycle perspective and is transacting and budgeting from a project base.	NA
U	√	√	Compiled in excel	Transacting on the mSCOA version of its software and extensive use of the segments. Well managed and governed project.	NA
V	√	√	Vendor assisted	The municipality has incorporated the mSCOA version of its chart and has utilised the newly	NA

Municipality	Transacting in mSCOA	Chart comparison completed	mSCOA budget created	Comments	Comply by 1 July 2017?
				developed budget module for budget preparation.	
W	√	√	√	Municipality is transacting on the mSCOA version of its system. The data indicates a high level of use of the segments and it is anticipated that the next budget cycle will further increase the use of the segments.	NA
X	√	√	√	Functioning with mSCOA version of system. Has procured a new system – to start with implementation.	NA
Y	x	√	Manually prepared	Deferred go live due to suspension of CFO.	x

The pilot municipalities had been supported by their respective system vendors to implement the mSCOA requirements. However, it appeared that, in several cases, the costing, regional and funding segments seemed to be particularly challenging. Although most of the municipalities had been able to generate a budget in the new format, the misallocation of transactions had occurred and this could have a regressive impact on the outcome of the annual audit reviews.

The assessments conducted at the pilot municipalities resulted in National Treasury hosting another workshop to assist municipalities in addressing the issues which had been identified. The workshops, conducted over two days, allowed for interaction and lively participation, consisted of ten sessions and addressed the following challenges:

- Existing status of municipal implementation projects and understanding compliance with the mSCOA regulation

- VAT transactions using the mSCOA classification
- A system vendor session to discuss the various approaches to implementation, status of the municipal clients' projects and the way forward
- A discussion of the FAQ, position papers emanating from the pilot implementations and lessons learnt
- A "rules register" to guide the municipalities in the use of the mSCOA chart
- Costing training on costing methodologies and the use of the costing segment
- How municipalities should account for water volumes in storage facilities (pipes and reservoirs) at the end of the financial year, the new formats of the budget schedules and financial reporting using the mSCOA chart
- Business processes aligned to the mSCOA reform
- Accounting for the cost of free basic services to the community
- Change management and additional training being provided

Municipalities were urged to study the presentations and associated documentation and incorporate all of the information into their respective implementation projects. They were also invited to attend the training sessions and courses which were being offered.

6.5.6 Data collection cycle 6: November to December 2016

The National Treasury team paid a final visit to the pilot municipalities and voluntary early adopters during October/November 2016 and performed a detailed diagnostic analysis of the municipalities' progress and compliance with the requirements on conclusion of the piloting phase of the mSCOA national project. A summary report was compiled of the findings for submission to the TCF.

Assessment

The position of the pilot municipalities on the conclusion of the pilot phase was summarised as follows in Table 6.8:

Table 6.8 Final position of pilot municipalities in November 2016 (Researcher)

Municipality	Live by 1 July 2015	Live by 1 July 2016	Planning to go live 1 July 2017	Comments
A	√	N/A	N/A	Using three segments only, one of which only partially. Region, costing and fund segments have not been used at all.
B	√	N/A	N/A	Four segments used, one incorrectly and costing segment not at all.
C	√	N/A	N/A	Own configuration of ERP system, with the challenges requiring a re-implementation in future.
D	x	x	x	Currently negotiating with the vendor for a solution but long-term implementation plan will miss the compliance date.
E	x	x	Partial	Working around solution and not hosting the full chart as required; will not make the due date for compliance.
F	√	N/A	N/A	Full use of three segments but only partial use of project, region and costing segments.
G	√	N/A	N/A	Applying a phased approach to the adoption of the reform. Using some elements of four segments only.
H	√	N/A	N/A	Planning and transacting from a project perspective. Rudimentary use of costing and region only.
I	x	x	Probably	Integration of third-party systems a challenge. Will probably be able to go live by 1 July 2017 with most of the segments.
J	√	N/A	N/A	Major support from the system vendor; costing segment not used and not all users have access to the system yet.
K	√	N/A	N/A	No submissions received; battling with reporting and audit review. Upgrade and additional support planned.
L	√	N/A	N/A	Replacing the steering committee and finalising tender. Using three segments only at present.

Municipality	Live by 1 July 2015	Live by 1 July 2016	Planning to go live 1 July 2017	Comments
M	x	x	Probably	Considering a new system and vendor. Will only be able to use three segments from 1 July 2017.
N	x	x	Will not be ready by the due date.	Political instability and conflict with the system vendor and provincial treasury has had a negative impact on the implementation of the project.
O	x	x	x	Challenges involved in implementing a newly acquired ERP system may cause delays in going live.
P	√	N/A	N/A	Struggling with the costing and region segments, reported a high incidence of incorrect transaction allocations.
Q	√	N/A	N/A	Using four segments across all transactions; costing and region segments defaulted.
R	x	x	Not likely	The municipality did not start in time and indicated that it would like to procure a new system.
S	√	N/A	N/A	Project very well executed and governed, new system and old system running in parallel. Region and costing segments partially used.
T	√	N/A	N/A	Good relationship established with the system vendor. Only partially using region and costing segments.
U	√	N/A	N/A	Well-run project using five segments; region segment not being used at all. Some misallocations of transactions to correct.
V	√	N/A	N/A	Partially using the chart, with several misallocations to correct.
W	√	N/A	N/A	Extensive support provided by the system vendor. All segments used but a few misallocations to be corrected.
X	√	N/A	N/A	After a slow start the municipality procured a new system – still to be implemented. The old system has been upgraded to provide compliance in the meantime. Good use of segments.
Y	x	x	√	Political instability has had an adverse impact on the project. A new system has been procured and will most likely be live by 1 July 2017, even if only partially.

In addition to the assessment of the pilot municipalities reflected above, the National Treasury team collected three sets of data from all the municipalities, the provincial treasuries and the FMICS vendors. These three datasets were then compared to assess the existing status and determine future interventions. The results of these assessments were summarised as follows in Figures 6.7 to 6.9:

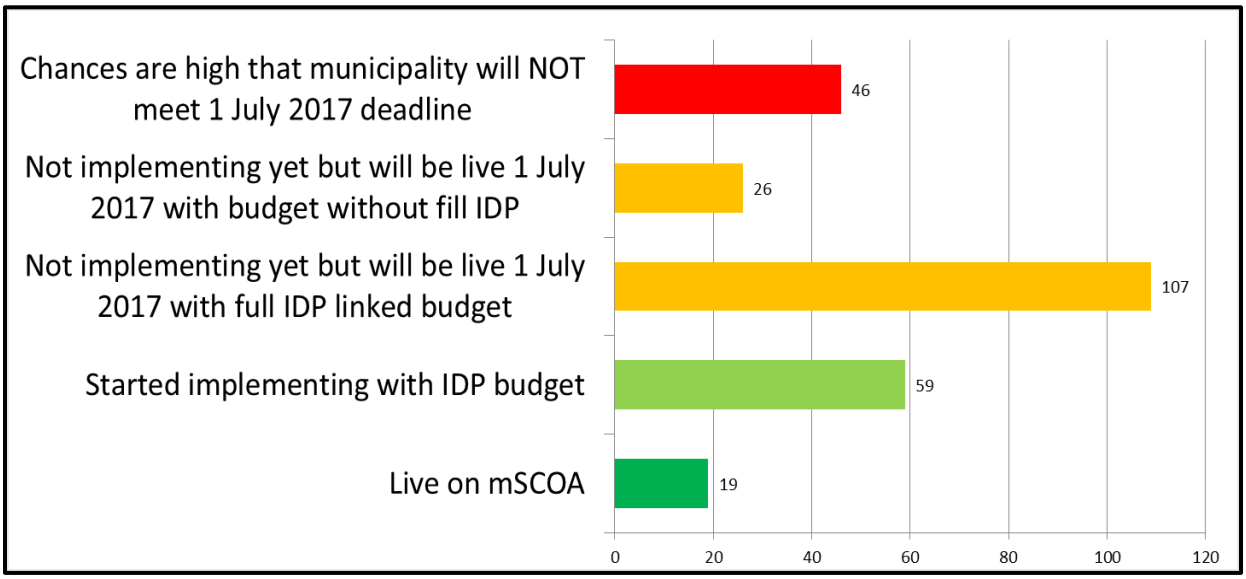


Figure 6.7 Municipal assessment of the status at November 2016 (Reproduced with permission of National Treasury, 2016)

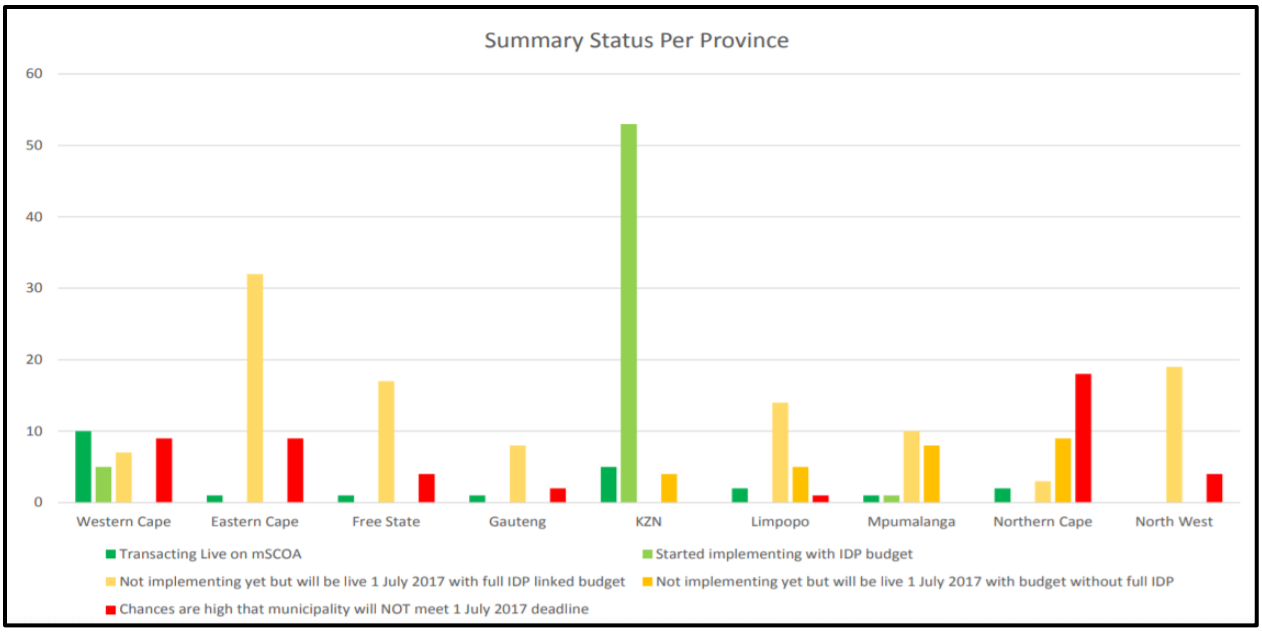


Figure 6.8 Municipal assessment per province as at November 2016 (Reproduced with permission of National Treasury, 2016)

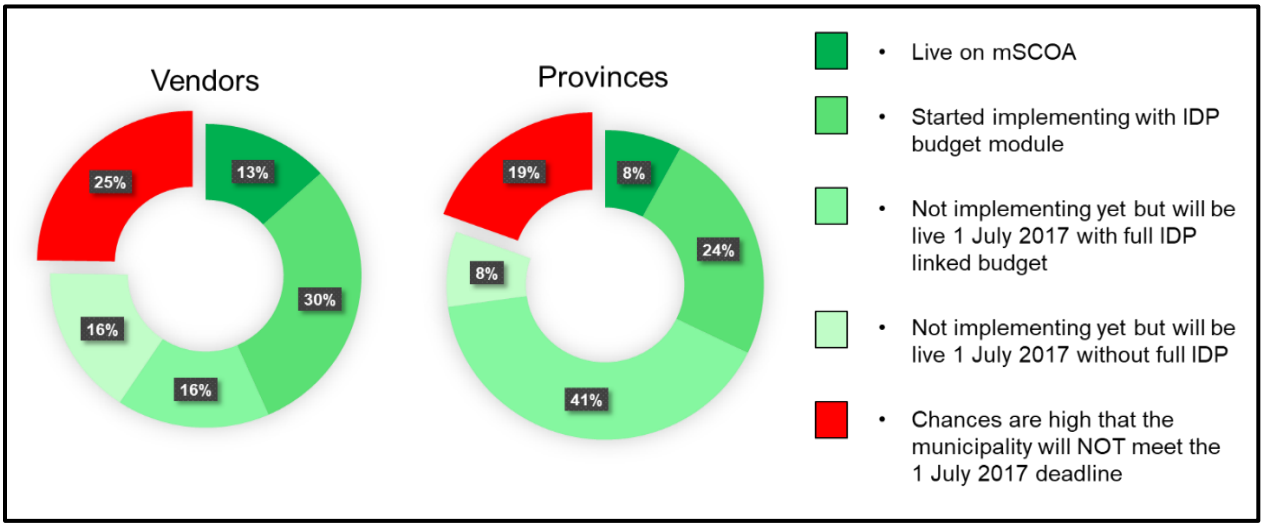


Figure 6.9 Municipal assessment by FMICS vendors as at November 2016 (Reproduced with permission of National Treasury, 2016)

The assessments of the three parties did not correlate although there was agreement that a significant proportion of the municipalities had not completed their mSCOA project implementations and that others had not even started. The assessment is summarised in Table 6.9 below and clearly indicates that a further external intervention was required to support the municipalities.

Table 6.9 Estimated municipal position by 1 July 2017 (Researcher)

Position	**Municipal assessment**	**Provincial assessment**	**Vendor assessment**
Not achieve target date 1 July 2017	46	49	64
Not started but will achieve target date	133	126	82
Total in danger	179	175	146

The municipalities indicated that, despite the training, guidance and templates which were provided by the National Treasury team, they did not have either the skill or capacity to implement the mSCOA project at their disposal. Limited resources were further preventing them from appointing consultants to implement the project on their behalf. It was, thus, clear from the assessments that the municipalities required not only a guiding strategy for implementing uniform data structures in their FMICS but that they also required information of the action steps to take, hand holding and day-to-day operational support.

The piloting phase of the mSCOA national implementation project concluded in December 2016 with the publication of version 6.1 of the chart. All the municipalities were

then expected to implement the regulation from budget preparation stage for compliance by 1 July 2017.

6.6 POST COMPLIANCE DATE ASSESSMENT AUGUST 2017

In a report, tabled at the TCF during August 2017, it was mentioned that "whilst significant progress has been made with reporting in terms of the Municipal Finance Management Act, 2003 (Act No. 56 of 2003) (MFMA) and its Regulations, there are still several challenges with the quality, reliability and overall credibility of municipal information" (National Treasury (10), 2017). This report also provided an update of the status of the respective municipalities' compliance with the requirements of the mSCOA regulation (South Africa, 2014) in terms of preparing a budget in the new format. Table 6.10 below, indicates a marked improvement on the estimation dated November 2016:

Table 6.10 Municipal budget as of 1 July 2017 (Reproduced with permission of National Treasury, 2017)

Province	**Total number of municipalities**	**Number of municipalities assessed**	**Number of municipalities with budget in old format**
Eastern Cape	39	39	10
Free State	23	23	9
Gauteng	11	11	2
KwaZulu-Natal	54	54	1
Limpopo	27	27	8
Mpumalanga	20	20	1
North West	22	22	10
Northern Cape	31	31	7
Western Cape	30	30	6
Total	**257**	**257**	**54**

The report continued with an assessment of the various financial functions which should have been updated to comply with the mSCOA regulation (see Table 6.11 below).

Table 6.11 Municipal financial processes functional as of 1 July 2017 (Reproduced with permission of National Treasury, 2017)

	SCM	Payments	Debtors	Receipts	Payroll	Budgets	Inventory	Assets	Reporting
Fully functional	63	132	36	52	30	67	39	15	21
Non functional	72	92	100	97	189	56	166	144	104
Partially functional	122	33	118	108	38	134	52	98	132
Total	257	257	257	257	257	257	257	257	257

The findings from the six assessment cycles and the post compliance date review were collated and analysed to generate input for the development of an implementation strategy for uniform data structures in municipal FMICS.

6.7 DATA ANALYSIS

An analysis of the findings from the six assessment cycles, as well as the final post compliance evaluation, clearly indicated the necessity for a guiding strategy to implement reforms of this nature at municipal level, critical skills shortages across all the municipalities, limited budget availability and continued non-compliance with legislative and regulatory requirements. At this point it should be emphasised that an overarching IT strategy for the municipalities should be distinguished from what had been documented and analysed, namely, an implementation strategy for a uniform data structure within the FMICS of multiple municipalities. It was anticipated that the resultant artefact would assist municipalities to prepare, plan and oversee the implementation for the structure for

compliance with the mSCOA regulation or a similar reform and also that it would be applicable to any other organisation intending to implement FMICS.

A thematic analysis of the findings from the data collection cycles was performed by the researcher, identifying and counting specific recurring themes, as these were documented in every data collection cycle. The key findings are summarised as presented in Table 6.12 below:

Table 6.12 Summary of the data analysis and findings (Researcher)

Key findings	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
Pre-implementation research and assessments						
Extensive preparations and effort required to complete the project		√	√	√		√
Municipalities did not perform either a due diligence assessment or a review of their own IT environment	√	√	√	√	√	√
Municipalities did not calculate the existing total cost of ownership, cost of implementation and future cost of ownership beforehand	√	√	√	√	√	√
Assessed the impact of the existing contractual obligations of municipalities	√					
Few municipalities had studied the regulation, the impact thereof, project documentation and guiding circulars	√	√	√	√	√	√
Limited project planning before implementation	√	√	√	√		√
Limited understanding of own systems		√	√			

Key findings	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
Municipalities do not complete a due diligence assessment or prepare a business case before major procurement activities		√	√	√	√	√
Project approach and methodology impacting on the volume of work and outcome – insufficient due diligence and overdependence on system vendors			√	√	√	√
Governance and project oversight						
Insufficient project governance	√			√		
Appointment of project oversight and implementation teams (internal)	√	√	√	√	√	√
Risk registers and issue/key decision logs	√		√			
Formal documenting of project and implementation progress	√		√	√		
Complex organisational structures as well as political and management instability impacting on project implementation		√	√	√	√	√
SCM issues and irregularities		√	√	√	√	√
Access management, system control and security			√		√	√
Technology environment						
Internal and external infrastructure and technology inadequate	√	√		√	√	√
Ageing technology, limited maintenance		√	√	√	√	
Multiple, non-integrated systems, duplication and silo approach impacting on project success			√	√	√	√

Key findings	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
Data purification, conversion and migration			√	√	√	
Access management, system control and security			√		√	√
Limited understanding of own systems – require system vendor to demonstrate functionality and system changes		√	√			
Overdependence on external consultants, suppliers and vendors						
Diverse FMICS and limited ability of system vendors to support multiple municipalities, diverse approaches to implementation of the requirements	√	√	√	√	√	√
Dependence on external support/system vendors for implementation		√	√	√	√	√
Limited understanding of own systems – require system vendors to demonstrate functionality and system changes		√	√			
Project approach and methodology impacting on the volume of work and outcome – insufficient due diligence and overdependence on system vendors			√	√	√	√
Municipal environment						
Geographic distribution of municipalities – travel time, availability of service providers, connectivity issues	√					

Key findings	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
Alignment of legislation, regulations, requirements, policies, business processes and enabling systems	√		√		√	
Complex organisational structures as well as political and management instability impacting on project implementation		√	√	√	√	√
People related challenges						
Staff skills and capacity	√		√	√	√	√
Insufficient stakeholder engagement and broad communication	√					
Municipal staff not reading training material and guidelines provided		√	√	√	√	
No clear understanding of what needs to be done or how to do it		√	√	√	√	
Insufficient change management	√		√		√	
Project planning, appointment of implementation teams and project management issues	√	√	√	√		√
Executive and management involvement, willingness of staff to take responsibility		√	√	√		
Other project implementation issues						
Availability of sufficient financial resources	√	√	√			√
Project planning and implementation management	√	√	√	√		√
Roll out plans and the ability to streamline these	√			√		√
Timelines for implementation	√	√	√	√		√

Key findings	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
Parallel approach to implementation	√			√		√
Dedicated testing time and full walk through before going live	√			√		

The AG (2015) specifically mentioned the sustainability of the reform as a consideration, given the limited internal capacity for implementation, the capacity of the system vendors to support multiple municipalities, the small national team and the tenure of the team members' contracts. In addition, the timelines were raised as an issue as the pilot municipalities had achieved mixed success over a period of two years, 2014 to 2016, leaving non-pilot municipalities with six months only, January to June 2017, for their respective implementations.

The implementation of a standard data structure in multiple, disparate FMICS across 257 municipalities is a complex project as was evidenced by the fact that the payroll systems of 189 municipalities were not compliant by 1 July 2017 (see Table 6.11 above). In addition, 166 inventory management systems, 144 asset management systems, 104 financial reporting systems, and 100 debtor management systems were found to be deficient (see Table 6.11 above). A further 54 municipalities were not able to produce their annual budget in the required format (see Table 6.10 in respect of this finding).

6.8 CONCLUSION

This chapter documented the data collection process, assessment and findings which represented the first two steps in the strategy development process, namely, strategic direction and environmental assessment (see Figure 6.2 above). The data collection was

arranged into six cycles or iterations, with pre- and post-implementation reviews by the AG provided in order to enrich the findings.

The findings informed the development of a diagnostic, formulation of guiding policies and coherent actions in relation to the implementation strategy. Rumelt (2011) explains that strategy in the business context culminates in actions or activity which create business advantage and which is evaluated and controlled so as to inform further action.

Thus, the resultant artefact was derived from actual implementations witnessed during a three-year case study and action research. The pragmatic philosophy and diagnostic reasoning based on an inductive approach which were followed, together with action research and case study strategies, supported the science of creation and design to arrive at an artefact which would address the real-world problem as identified during the assessments.

Chapter 7 focuses on the development and presentation of the proposed strategy for the implementation of standard data structures in municipal FMICS. This strategy represents the key deliverable of this research. The chapter includes diagnoses which are formulated from the research findings, guiding policies and coherent actions, culminating in the strategy for the implementation of standard data structures in municipal FMICS.

Chapter 7

STRATEGY FOR THE IMPLEMENTATION OF A STANDARD DATA STRUCTURE

7.1 INTRODUCTION

Strategy in the organisational context refers to plans an organisation formulates in order to achieve a particular purpose over a period of time (Hornby, 2010). Chen et al. (2010) add that, for the purposes of IT, various perspectives inform such a strategy, namely, in support of the business strategy, as a master plan for the IT function, or based on the role of IT within the organisation. However, the purpose of the strategy which was the focus of this study was the implementation of a uniform data structure in relation to disparate financial management and internal control systems (FMICS) across 257 municipalities in South Africa.

Chapter 5 discussed an iterative strategy formulation methodology, which was created from a methodology developed by Rumelt (2011), and adapted by Gcaza and Von Solms (2017) (see Figure 5.6). Chapter 6 presented the data collection, findings and an analysis of these findings as a basis for the development of the implementation strategy. The data was collected from 25 pilot municipalities which were implementing the uniform data structure, as well as input from the Auditor General (AG) and other stakeholders.

As explained in Chapter 4, Simon (1996) highlights that design science involves developing solutions to complex problems – in the context of this study a strategy for the implementation of a uniform data structure across 257 municipalities. It was anticipated that such a strategy would improve the existing situation, i.e. unreliable and incomplete financial reporting by municipalities. Such an improvement or solution to the problem as defined points towards an evaluation component, aimed at confirming the improvement

which results from the introduction of the artefact, in this case, the strategy which has been developed (Gregor & Hevner, 2013).

Accordingly, this chapter discusses the strategy formulation, comprising diagnosis (D), guiding policy (GP) and coherent actions (CA) which then culminate in an artefact or implementation strategy for uniform data structures in FMICS. The specific activities involved in the strategy formulation, step 3 in Figure 7.1 below, are as follows:

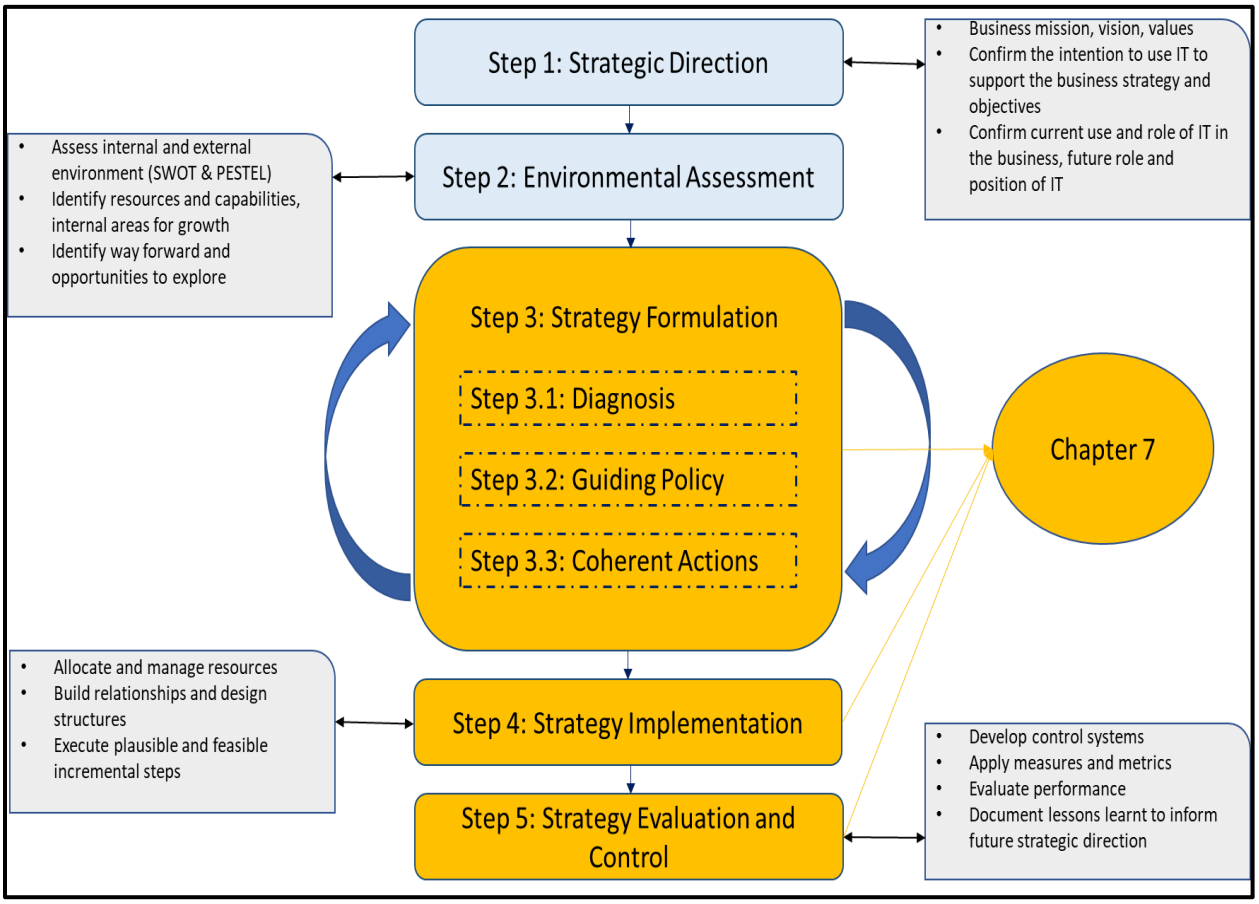


Figure 7.1 Strategy formulation in terms of the strategy development methodology (Researcher)

This chapter presents the diagnosis emanating from the data captured (Chapter 6). The diagnosis is then used to formulate the guiding policies as illustrated in Figure 7.1. Coherent actions which the municipalities should implement to implement the diagnostics are then suggested.

7.2 DIAGNOSIS

Municipalities are required to enhance, upgrade or re-implement their FMICS in order to comply with the Municipal Regulation on a Standard Chart of Accounts (mSCOA) (South Africa, 2014). While there are system implementation strategies, plans and methodologies documented and available for use, it was found during an international study tour (National Treasury, 2015) that a reform of this nature and scale is unique and would require a considered effort to implement, far surpassing a mere system implementation.

Stair, Reynolds and Chesney (2008) summarise the traditional approach to system development and implementation into the following five steps, namely, an investigation to understand the problem; system analysis to identify what must be done to address the problem; system design; system implementation during which the system is either built or bought; and system maintenance and review. The system implementation steps are further expanded to include hardware sourcing; software acquisition; user preparation; site preparation; data preparation; the actual installation; testing; and go-live. These steps are then followed by user acceptance of the new system. While these steps do feature in the proposed implementation strategy, the data collection, data analysis and findings clearly indicated that the steps only represent a portion of what is required, and do not accurately either represent or address the specific challenges which were identified during the data collection.

Table 6.12 in the previous chapter presented a thematic analysis of the findings across the six cycles of data gathering and incorporated assessments by the AG and other key stakeholders. Similar findings were grouped together to arrive at a diagnosis (see Table 7.1 below). The diagnosis represents step 3.1 of the strategy development process which is depicted in Figure 7.1 above.

Table 7.1 Findings and diagnosis (Researcher)

Findings	Diagnosis
Pre-implementation research and assessment – Municipalities did not prepare sufficiently for the required implementation, including not reading the regulation and not assessing their existing IT environment to identify the gap and/or develop the business case. Municipalities did not prepare project plans and were overtaken by the extent of the implementation.	Diagnostic 1 (D1) – Insufficient research, planning and preparation before project implementation.
Governance and project oversight – The absence of governance, oversight and consequence management, in general, is raised in the annual consolidated audit reports and clearly featured as an issue in terms of both IT management and project management in this research. In many cases project oversight and management involvement (steering and implementation committees) delayed decision making and progress.	Diagnostic 2 (D2) – Inadequate governance, project oversight and project management.

Findings	Diagnosis
Technology environment – Municipalities have a limited understanding of their technology environment. Ageing infrastructure and software, together with duplication and non-integrated, unlicensed software and data which is not maintained, impacted negatively on this and similar IT projects.	Diagnostic 3 (D3) – Hardware, software, site establishment and data related deficiencies.
Overdependence on external consultants, suppliers and vendors – This finding is prevalent across the public sector and is linked to the limited skills and capacity of employees, the disparate systems deployed in municipalities and the existing work environment/climate.	Diagnostic 4 (D4) – Dependence on external resources to deliver key projects and services.
Municipal environment – Municipalities are geographically distributed and vary in size, with complex organisational structures and unstable political and administrative leadership. The regulatory environment is rigid and complex, with business processes not aligned or clearly defined.	Diagnostic 5 (D5) – Complex municipal environment with undefined/ non-aligned business processes.
People related challenges – Municipal employees are not motivated, lack critical skills and capacity to deliver, and are overburdened due to the prevalence of critical vacancies. Management does not drive the delivery of critical projects and, thus, employees are unwilling to take responsibility.	Diagnostic 6 (D6) – People related issues including a lack of critical skills, non-participation and insufficient change management.

Findings	Diagnosis
Change management was found to be inadequate in most municipalities.	
Other project implementation issues – These issues include a general lack of resources (funds), too little time to implement and test the solution, and deficient project management skills and experience.	Diagnostic 7 (D7) – Other issues emanating from limited resources including funds and time; and deficient project management skills and experience.

The diagnostics provide an input into the strategy formulation and are linked to guiding policies, step 3.2, and coherent actions, step 3.3 (see Figure 7.1 above).

7.3 GUIDING POLICIES

In the IT context guiding policies provide direction and incorporate governance principles into the delivery of IT projects. Rumelt (2011) maintains that the guiding policy determines the overall approach to addressing the broad challenges which were identified through diagnosis, while the coherent actions result in coordinated steps towards delivering the solution and addressing the initial problem statement.

Gcaza and Von Solms (2017) equate a guiding policy to a programme which may include multiple activities and which is geared towards addressing the diagnostics or problem which has been identified. The programme is not limited by the strategy which has been defined but may also include activities in preparation for the project implementation as well as those which ensure the long-term success of the project, for example training and establishment of post-implementation support.

The next section identifies the guiding policies as a remedy for each of the seven diagnostics, step 3.2, in Figure 7.1 above.

7.3.1 D1 – Insufficient research, planning and preparation before project implementation

The research, visits to the participating pilot municipalities and the data collected clearly indicated the complexity of the implementation while highlighting the fact that the municipalities were ill prepared, and in particular, the lack of research and assessment on their part before the project had been was initiated. This as compared to the five years of research and planning preceding the publication of the regulation (Koekemoer, 2018). The guiding policies, as a solution to D1, are presented in Figure 7.2.

GP1.1 Research: This first guiding policy is similar to the investigation suggested by Stair et al. (2008). Municipalities must research what is required in terms of the mSCOA regulation (South Africa, 2014) and in terms of what is offered by the existing FMICS. National Treasury provided guidance to municipalities in relation to this investigation as well as research in the mSCOA circulars (National Treasury (2), 2015). Thus, GP1.1 Research, as a remedy for D1, indicates the research that investigates what is required and what needs to be done prior to proposing an implementation project for the municipality in question.

GP1.2 Planning: This guiding policy includes identifying the gaps between what is required and what the existing system offers – also termed a gap analysis as indicated in the research in GP1.1. A high-level system design (Stair et al., 2008) would indicate what needs to be implemented while the project plan would address how to close the gaps between the existing FMICS and the minimum system specification (National Treasury (8), 2016). The plan should be both practical and feasible. Accordingly, GP1.2 Planning includes the gaps identified and plans which are developed to close the gaps between the regulated system requirements (National Treasury (8), 2016) and the existing FMICS as a solution in respect of D1.

GP1.3 Preparation: Thorough preparations increases the possibility of a successful implementation (Shark, 2009). Accordingly, GP1.3 is dedicated to the preparations which are required before the implementation. These preparations include, among others, deciding on the appropriate delivery mechanism, i.e. upgrading the existing system or procuring a new system as well as the appropriate procurement method to follow. Sufficient budget allocation for the project should be set aside (Koekemoer, 2017) and the timelines for delivery approved. A capable implementation team should be identified and allocated to deliver the project, and governance and oversight structures established (National Computing Center, 2005). Thus, Preparations, as per GP1.3, include all the preparations before a project is initiated, including procurement, budget, time and resource allocation, and governance structures to oversee the project.

In short, D1, namely, insufficient research, planning and preparation, is addressed by means of GP1.1, 1.2 and 1.3 – graphically represented in Figure 7.2 below:

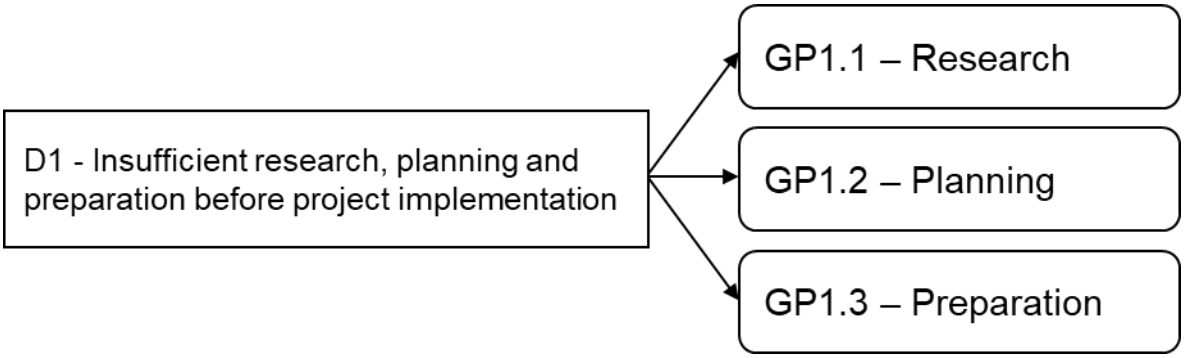


Figure 7.2 Diagnostic 1 and guiding policies 1.1, 1.2 and 1.3 (Researcher)

7.3.2 D2 – Inadequate governance, project oversight and project management

Koekemoer and Von Solms (2017) report ongoing audit findings related to weaknesses in IT governance and low levels of IT project management maturity in municipalities. The

reports of the AG for the period 2010 to 2018 respectively (Auditor General (6), 2018) were discussed in Chapter 2 and further highlighted that significant IT weaknesses existed in respect of IT governance, security management, user account management and IT service continuity – all requiring urgent attention and external support if they were to be addressed.

Thus, the guiding policies in response to D2 focus on governance, project oversight and project management as related to IT and illustrated in Figure 7.3.

GP2.1 Governance and oversight: IT governance, a management responsibility, encompasses IT controls functioning effectively as designed, and ongoing IT practices being reviewed and regularly reported on. This notion is supported by Juiz et al. (2014), who state that effective IT governance, risk management and oversight create trust and confidence in the use of IT. GP2.1, therefore, incorporates the principles of good governance as discussed in Chapter 2, and proposes to address D2 by establishing a governance structure and oversight roles for the project. Therefore, GP2.1 Governance and oversight refers to the inclusion of principles of good governance such as executive oversight, management involvement, and alignment with the organisation strategies, IT procurement based on a business case, and independent review and assurance as remedies for D2.

GP2.2 Project management: IT project management maturity levels have been found to be low across municipalities (Koekemoer & Von Solms, 2017) with this clearly having a negative impact on the broader implementation project (Ducharme Consulting, 2017). Municipalities should, therefore, use a formal project management methodology and skilled resources who manage the delivery of agreed products and services within a specific timeline, budget, quality and scope in order to ensure the successful implementation of the project. Thus, GP2.2 Project management proposes remedies for D2 by addressing the inadequate project oversight and low levels of project management

maturity with this remedy also contributing to improving the annual audit outcomes (Staff Reporter, 2009).

Thus, D2 is addressed by GP2.1 and GP2.2 with the guiding policies addressing the inadequate IT governance, project oversight and project management in municipalities.

Figure 7.3 presents GP2.1 and GP2.2 as proposed remedies for D2:

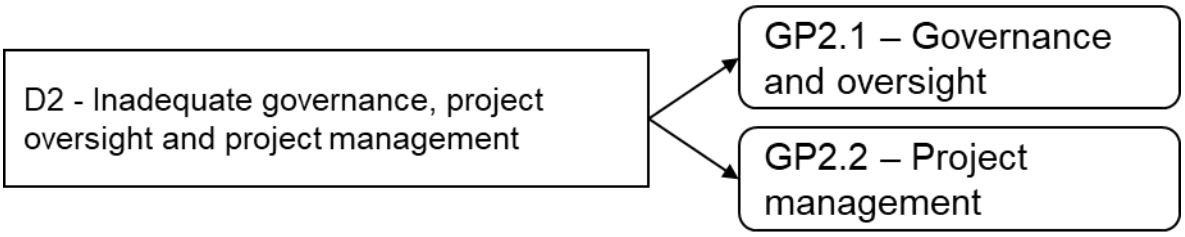


Figure 7.3 Diagnostic 2 and guiding policies 2.1 and 2.2 (Researcher)

7.3.3 D3 – Hardware, software, site establishment and data related deficiencies

IT consists of technology, processes and people. The technology typically includes hardware, software and data as well as the site where the technology is installed. In this vein the mSCOA Regulation (South Africa, 2014) and the Municipal Finance Management Act (MFMA) Circular 80 (National Treasury (8), 2016) both refer to municipalities having access to sufficient and appropriate hardware and software to enable the reform in question. The minimum software requirements are addressed in detail in Annexure B of MFMA Circular 80 (National Treasury (8), 2016) and further discussed in the mSCOA circulars. Data management and migration, a continued source of audit findings, are addressed in the consolidated audit report of the AG (2016) and again in the guidance and approach to the auditing of mSCOA implementation projects at the municipal level (Auditor General (3), 2017).

GP3.1 Hardware: “Municipalities must have, or have access to, computer hardware with sufficient capacity to run the software”, as directed by the mSCOA regulation (South Africa, 2014), and required for this implementation project. Stair et al. (2008) also address hardware in their implementation strategy while National Treasury expanded on this topic in the mSCOA circulars. GP3.1 should, therefore, as a minimum, address the availability, maintenance, licensing, security and protection, redundancy and disaster recovery in relation to this hardware. Thus, GP3.1 Hardware remedies D3 by addressing the limitation created by ageing, unlicensed and inadequate hardware.

GP3.2 Software: Software and data are intangible assets of municipalities and need to be managed and maintained (Auditor General (6), 2018). A life-cycle management plan for the software ensures that the latest version is always available and that it enables the minimum requirements in terms of legislation and regulations (South Africa, 2014). It was clear during the assessment of the respective municipalities that software, as an asset of the municipalities, was not well managed and, therefore, a guiding policy was required to assist municipalities and address this aspect of D3. Thus, GP3.2 Software is intended to remedy D3 by introducing software life-cycle management into the IT management at municipalities.

GP3.3 Site: Servers hosting municipal software and data should be located within the borders of the country, well established, well managed and secured (SITA, 1996). The municipalities contend that, to ensure that servers are located within the borders of the country, they prefer to own and manage their own servers. Similar to the previous guiding policy, deficient asset management has a negative impact on IT provisioning in the municipalities and was also found to have an adverse impact on the implementation of the uniform data structure (mSCOA). Therefore, GP3.3 is included as a solution for D3 and addresses the hosting site for the software which is to be implemented.

GP3.4 Data: Data should be encrypted, stored only for the duration and purpose for which it is required, and safely destroyed after use (South Africa, 2013). The poor management and protection of data in municipalities leads to ongoing adverse audit findings and, therefore, the AG provided guidance regarding the management and migration of data for implementation projects (Auditor General (3), 2017). In addition, the study found poor management and protection of data. These findings emphasise the need for a guiding policy to remedy D3, relating to data management and, thus, GP3.4 Data was proposed with GP3.4 providing guidance in terms of the use, management, storage and disposal of data in response to D3.

GP3.1 to GP3.4, which address hardware, software, the hosting site, and data management respectively, as a remedy for D3, are summarised in Figure 7.4 below:

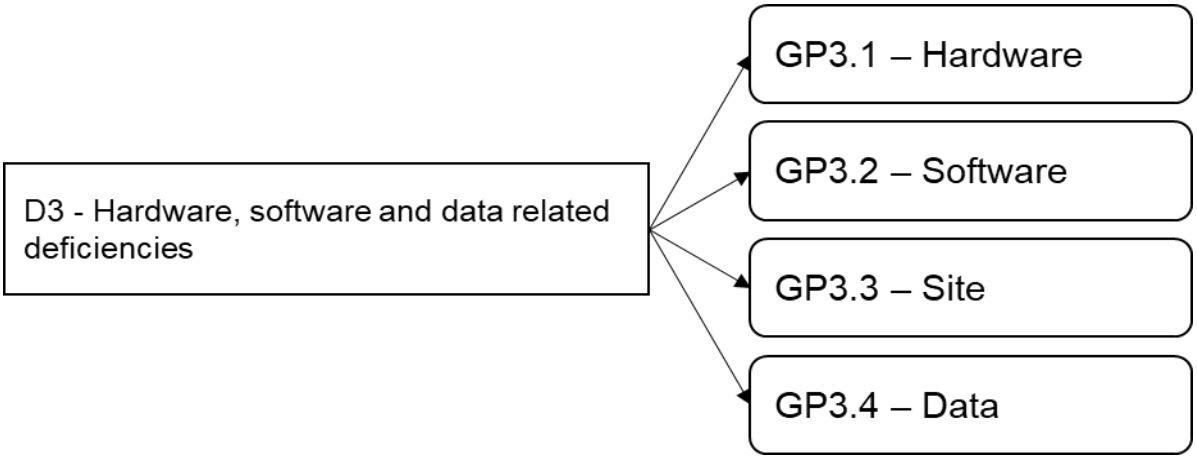


Figure 7.4 Diagnostic 3 and guiding policies 3.1 to 3.4 (Researcher)

7.3.4 D4 – Dependence on external resources to deliver key projects and services

National Treasury has highlighted the dependence on external resources to deliver key projects and services and is targeting this area of expenditure for cost containment across

the public sector (National Treasury (7), 2016). The finding was also relevant to this research project and was reported by the AG (2018). However, in pilot municipality C it was found that employees nearing retirement were being retrained to support the IT environment. In so doing the municipality was achieving a measure of knowledge management as well as reducing its dependence on external consultants.

GP4.1 External resources: GP4.1 External resources is intended to address D4 by reducing the ongoing dependence on external resources. This may be done by addressing the skills of existing employees, and simultaneously improving the management of external resources. Service level agreements should be concluded and actively managed, with skills transfer a clear requirement of all external resources.

GP4.1, as a remedy for D4, is presented in Figure 7.5 below:

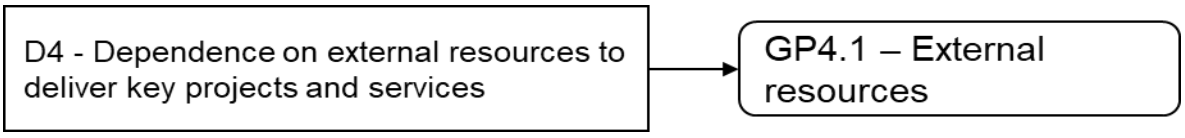


Figure 7.5 Diagnostic 4 and guiding policy 4.1 (Researcher)

7.3.5 D5 – Complex municipal environment with undefined/non-aligned business processes

The complexities of the municipal environment include geographic distribution which limits IT and telephone network coverage and operational cooperation with municipalities varying in size from metropolitan municipalities with more than 20 000 employees to small rural municipalities with less than 1000 employees. This situation is then exacerbated by unstable political and administrative structures, which change every five years after the municipal elections; and a rigid regulatory framework (Van de Haar et al., 2016). It was concluded from the data collection and assessments conducted that a lack of clearly

defined business processes (Ducharme Consulting, 2017) further impeded the working environment of municipalities.

GP5.1 Business processes: GP5.1 Business processes addresses an aspect of this complex environment which may be remedied, namely, the definition of business processes and design of the FMICS to enable and support these processes as a solution for D5.

GP5.1 is presented in Figure 7.6 as a solution for D5:

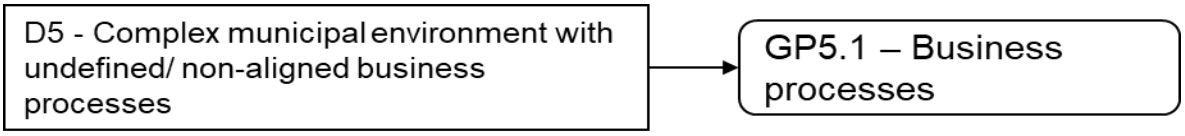


Figure 7.6 Diagnostic 5 and guiding policy 5.1 (Researcher)

7.3.6 D6 – People related issues including a lack of critical skills, non-participation and insufficient change management

Shark (2009) explains that, while there are existing methods to implement IT projects, common pitfalls in respect of the people aspect include a failure to dedicate experienced and well trained staff to the project, a lack of executive involvement, and not involving the end users throughout the project. Stair et al. (2008) agree with this assertion and, therefore, they provide for user preparation and user acceptance in their proposed implementation strategy. It was deduced from the data collected in this study that the experience and skills required to deliver a project of this nature were limited and did not reside in the municipalities (Koekemoer & Von Solms, 2017). Employees were found to be overburdened due to the continued vacancies (Auditor General (6), 2018) while executives and management were not involved with the project implementation. In addition, change management initiatives were inadequate and training was provided to a few individuals only. Accordingly, GP6.1 to GP6.4 were proposed to address D6.

GP6.1 Leadership: GP6.1 Leadership specifically addresses the involvement of leadership, directing the implementation project and overseeing the delivery of solutions which will meet the legislative and regulatory requirements. This guiding policy provides a remedy for the key findings resulting in D6 and is also closely linked to D2.

GP6.2 Change management: GP6.2 speaks to change management across the municipality to inform the employees of what is to come, involve them in the project and to prepare for the anticipated training and new ways of working. Thus, GP6.2 Change management proposes addresses D6 and also has an impact on D4 and D5.

GP6.3 Training: GP6.3 covers the issue of training which should be available to all the employees who affected by the implementation and will be end users of the new FMICS. Although National Treasury had provided training interventions in each of the 44 municipal districts and the eight metros, this research study found that the training had not been sufficient to address the need. Thus, GP6.3 as a solution for D6, requires extensive training to develop the skills of the municipal employees.

GP6.4 Secondment: The secondment of an employee means that a person is temporarily relieved of certain responsibilities in order to be able to fulfil other responsibilities – a practice which is common in municipalities. The research findings indicated that the municipal employees were stretched to capacity due to continued critical vacancies and were, therefore, not able to actively participate in the implementation project. This finding was confirmed by the AG (2018). Accordingly, GP6.4 Secondment, as a solution for D6, calls for the secondment of key employees to the implementation project for a period of time to enable them both to focus their effort on the delivery of the project and to gain maximum exposure to the implementing consultants, thus building internal capacity within the municipalities.

GP6.1 to GP6.4 are proposed to remedy D6 (see Figure 7.7 below).

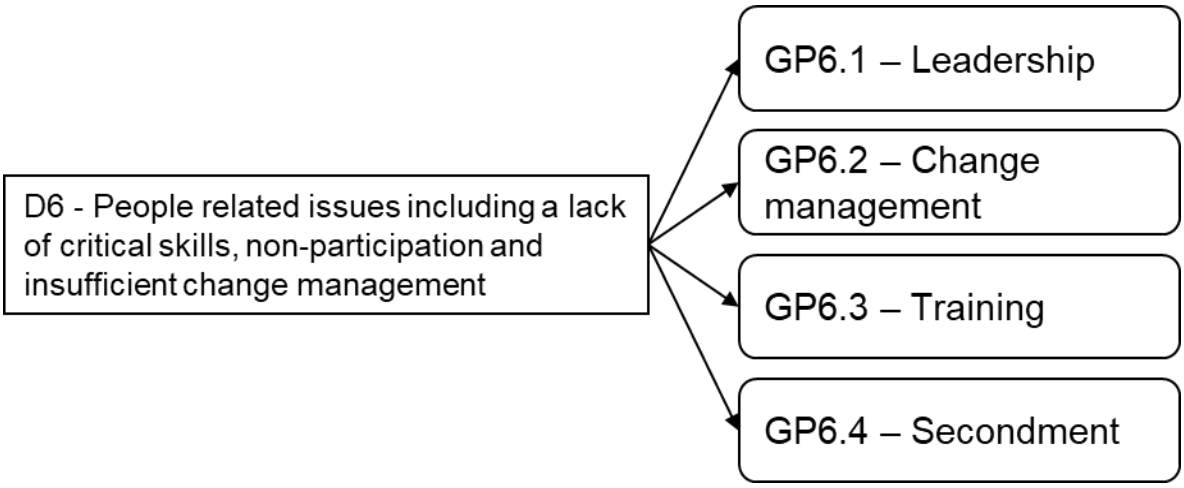


Figure 7.7 Diagnostic 6 and guiding policies 6.1 to 6.4 (Researcher)

7.3.7 D7 – Other issues emanating from limited resources including funds and time; and deficient project management skills

At the time of the study municipalities across the country were experiencing financial pressure and, hence, the cost containment measures implemented by National Treasury (2016). However, over and above the financial constraints, several municipalities indicated that the time remaining for the implementation after the completion of the pilot projects was too short. This issue, together with low project management maturity levels (Koekemoer & Von Solms, 2017), could be addressed with an implementation strategy. D7 is, therefore, addressed with guiding policies GP2.2, discussed above, and GP7.1 and GP7.2.

GP7.1 Funding: National Treasury (South Africa, 2014) has clearly indicated that municipalities are responsible for ensuring that they have access to sufficient budget allocations to fund the implementation of the mSCOA requirements and address the hardware, software and implementation costs. This should be accommodated by either

re-prioritising municipal expenditure or applying for external funding in the form of grants or loans. Accordingly, GP7.1 Funding offers a solution for D7 by addressing the financial resources required to fund the implementation project.

GP7.2 Time: The mSCOA Regulation was published in 2014, three years before the final compliance date (South Africa, 2014). During the three-year period, National Treasury engaged every municipality and provided extensive guidance and support in respect of the municipal implementation projects. However, during the data collection and visits to individual municipalities, several mentioned insufficient time in which to comply as a constraint. Thus, GP7.2 Time stresses timely planning, immediate action, the use of an implementation strategy and formal project management methodology to address D7.

GP7.1 and 7.2, solutions for D7, are summarised in Figure 7.8.

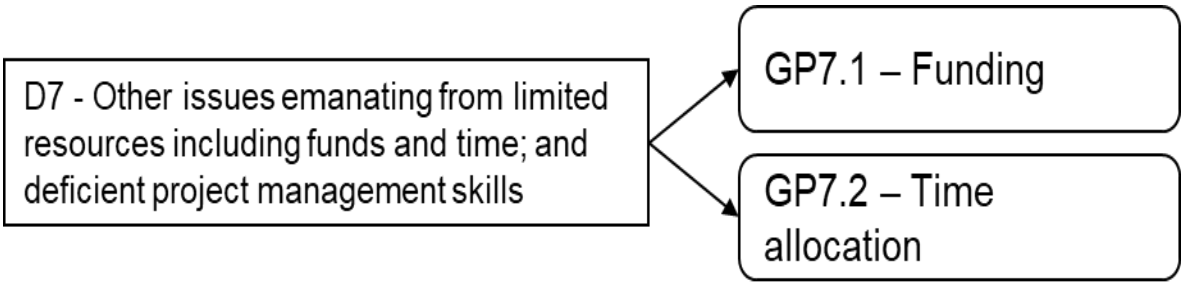


Figure 7.8 Diagnostic 7 and guiding policies 7.1 and 7.2 (Researcher)

The seven diagnostics, which were derived from the data collection, data analysis and findings, as presented in Chapter 6, resulted in the formulation of 17 guiding policies. Coherent actions flowing from the guiding policies conclude the strategy formulation as per step 3 of the methodology, presented in Figure 7.1. Accordingly, Section 7.4 discusses the proposed coherent actions emanating from the above guiding policies.

7.4 COHERENT ACTIONS

The coherent actions embody the governance principles which were explained in Chapter 2 and the strategy development theory and process discussed Chapter 5, and incorporate the lessons learnt from the pilot implementations, data collection, data analysis and study findings.

Rumelt (2011) and Tsokota (2016) are in agreement that a strategy without action steps, which are plausible and achievable, is worth nothing and has no practical value. This notion is supported by Boar (2001) who maintains that execution is the most difficult step of the entire strategy. Boar (2001) goes on to state that "strategy execution is won or lost based on the depth, insight, and foresight of the strategy plan" or coherent actions. Thus, the coherent actions, step 3.3 in Figure 7.1, are presented and discussed below.

7.4.1 D1 – Insufficient research, planning and preparation before project implementation

D1 highlighted insufficient research, planning and preparation before the project implementation kicked off as root causes of the limited success which was reported. Figure 3.2 (Chapter 3) depicted the mSCOA journey, clearly indicating that National Treasury had embarked on research and engagements with municipalities, system vendors and other related stakeholders from 2010, four years before the publication of the reform. Accordingly, the first coherent action (CA1.1.1), which emanated from D1 and GP1.1, was in-depth research into the environment, the proposed change and the impact of the change on the implementing municipalities. National Treasury also provided guidance for conducting research and developed templates for the municipalities to use. The templates direct municipalities to conduct research, which should also include the hardware, software, hosting site, data requirements, business processes affected and people readiness, as a minimum (CA1.1.2). Once the research has been concluded, the

municipality should be in a position to plan the project, addressing all the areas identified in the research and which will be impacted upon by the implementation project.

CA1.2.1 and CA1.2.2 action the planning from GP1.2 and follow directly upon CA1.1.1 and CA1.1.2. CA1.2.1 calls for a plan to address both the gaps between the existing system and environment and the minimum requirements of the new FMICS. It is essential that the plan covers all the aspects of the implementation and also be practical and affordable within the context of the specific municipality. CA1.2.2 points to the system design which should meet all the requirements of the mSCOA regulation (South Africa, 2014).

GP1.3 is addressed by CA1.3.1 to CA1.3.4, which describe the preparations for the implementation project. CA1.3.1 requires key decisions from the executives in relation to an appropriate delivery mechanism and procurement method for the project. The municipality could resolve either to upgrade its existing system or procure a new system, and should appoint a system vendor to deliver the project.

CA1.3.2 flows from GP1.3 and GP7.1, namely, the allocation of sufficient budget/funding to deliver the project while CA1.3.3 relates to GP1.3 and GP7.2 as it refers to the time allocation for the project. Sufficient time should be allowed not only for the implementation itself, but also to test the system, prepare the users, and provide support for the first few weeks after going live.

CA1.3.4 is important for continuity, to minimise cost and to reduce the dependence on external service providers (National Treasury (7), 2016), namely, through the use of internal resources to deliver the project. The secondment of employees to participate in the implementation project will serve to address GP1.3, GP4.1 and GP6.4.

The efficient execution of all of the above coherent actions will result in thorough preparations for the project implementation, the allocation of sufficient resources and the

selection of the best implementation methodology to follow. It is clear that, had D1 – Insufficient research, planning and preparation before project implementation – been adequately addressed, several of the following diagnostics would not have materialised.

The coherent actions from D1 and GP1.1 to GP1.3 are presented in Figure 7.9.

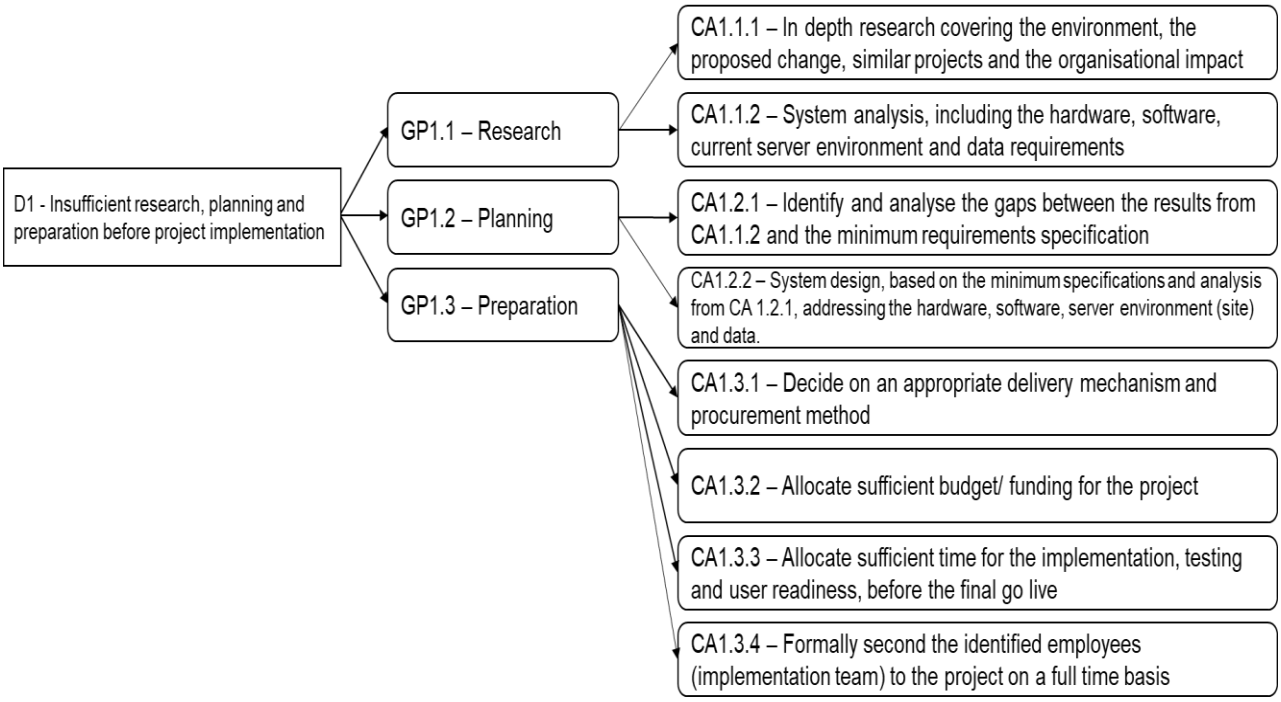


Figure 7.9 Coherent actions emanating from D1 and GP 1.1 to GP1.3 (Researcher)

Close inspection of the coherent actions above reveals that the first three steps in the strategy proposed by Stair et al. (2008) have not only been adequately covered but also in more detail than their proposal.

7.4.2 D2 – Inadequate governance, project oversight and project management

Effective project governance and oversight, together with efficient project management, ensure that projects are delivered smoothly within the allocated time and budget. The data collection indicated an absence of governance, oversight and effective project management in general, which finding was confirmed in the 2018 annual consolidated audit report (Auditor General (6), 2018).

GP2.1 is actioned through CA2.1.1 to CA2.1.4, each of which address an aspect of governance and oversight. CA2.1.1 – IT projects should support the strategic objectives of the municipalities and contribute towards the service delivery which represents the purpose and goals of municipalities (Myburgh & De Costa, 2017). Legislative and regulatory compliance are key objectives of any municipality and, therefore, this implementation project is also a priority. CA2.1.2 – Governance and oversight emanate from the formal structures which are aimed at executive support and oversight, as well as broad involvement from business. According to PWC Southern Africa (2016), these structures and their activities are directed by approved policies and contribute to project success.

CA2.1.3 – IT procurement should be based on a business case in order to achieve cost benefits and follow the approved procurement policies of the municipality in question. This is ensured by effective governance and executive oversight and is, thus, a natural coherent activity within the ambit of GP2.1. CA2.1.4 – Independent assurance review and audit reports provides executives with an independent confirmation that governance is adhered to and supports their oversight role (PWC Southern Africa, 2016). This coherent action is, therefore, extremely important as it supports policies and practices relating to governance and oversight. These coherent actions, flowing from GP2.1, are aligned with

recommendations of the AG in order to address the growing irregular and fruitless expenditure across municipalities (Auditor General (4), 2017).

CA2.2.1 to CA2.2.4 flow from GP2.2 and address insufficient project management in municipalities. CA2.2.1, Koekemoer and Von Solms (2017) as well as the AG have confirmed the low levels of project management maturity in municipalities. This finding is partially addressed by CA2.2.1 as following a formal methodology would assist municipalities with managing the implementation project as well as improving the governance of such project. CA2.2.2 – The AG (2015) has consistently reported the insufficient resources of municipalities as one of the main reasons for service delivery challenges and failed project implementations, including this project. The findings also confirm this ongoing problem, particularly, in respect of vacancies in critical positions. Well-resourced projects would address both GP2.1 and GP2.2 as well as promoting adequate governance, project oversight and effective project management.

CA2.2.3 – The assessment cycles and visits to the municipalities enforced regular reporting and influenced the roll out of the respective implementation projects. This impact was not tracked or considered for the purposes of this research although Salmela and Spil (2002) confirm that regular reporting improves project delivery. CA2.2.4 – This coherent action is linked to CA2.2.3 in that, in the main, municipalities do not formally close off projects, capitalise the assets, review projects and capture the lessons learnt. An inspection of the annual financial statements of municipalities would confirm this fact and, therefore, CA2.2.4 has been included both to ensure that these implementation projects are handed over to maintenance teams for support and to address the governance and project management deficiencies which were identified during the assessments.

Coherent actions CA2.1.1 to CA2.1.4 and CA2.2.1 to CA2.2.4, which provide a solution to D2 by addressing GP2.1 and GP2.2, provide adequate coverage for the guidance provided by the National Computing Centre (2005) and may be represented as follows in Figure 7.10 below:

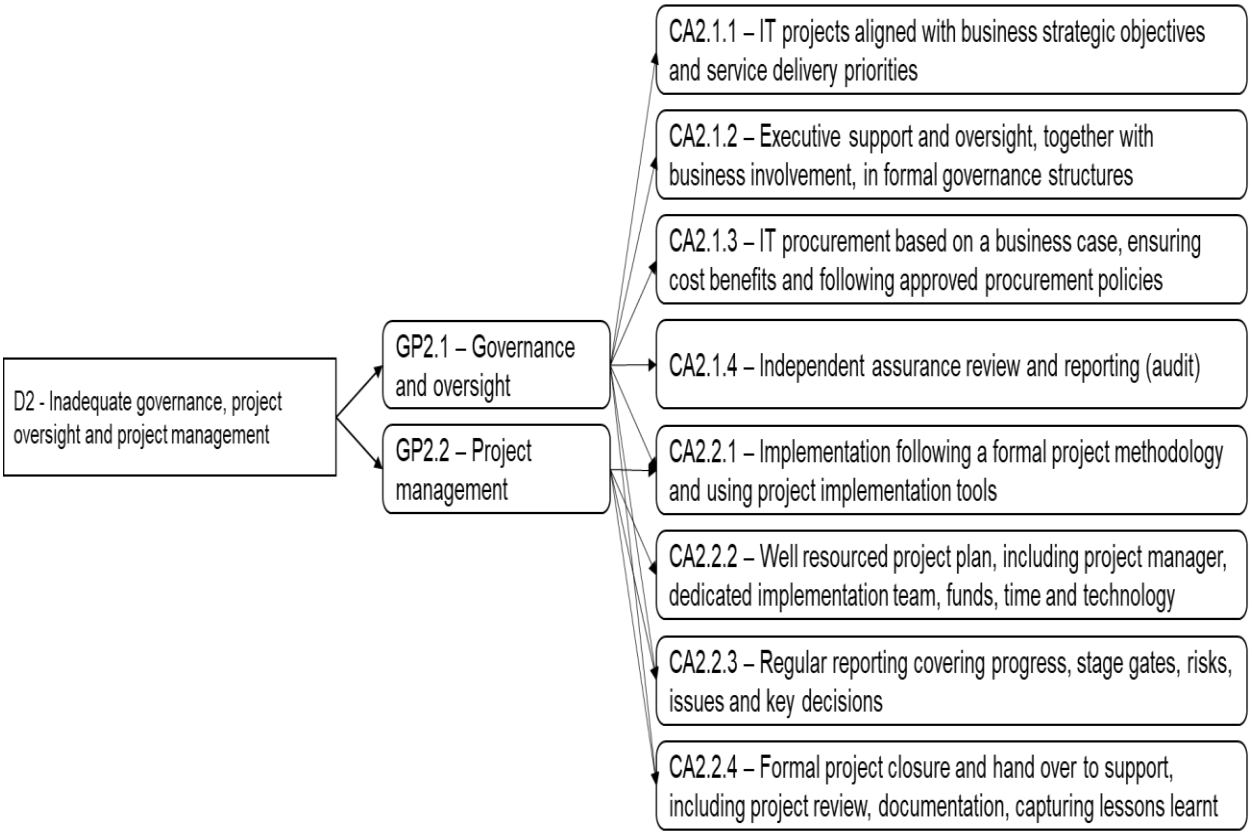


Figure 7.10 Coherent actions emanating from D2 and pointing to GP2.1 and GP2.2 (Researcher)

7.4.3 D3 – Hardware, software, site establishment and data related deficiencies

Stair et al. (2008) provide guidance regarding the components which are required for an IT implementation, namely, the hardware, software, preparation of the hosting site and data provisioning. The municipalities were guided by the publication of the mSCOA circulars, ICF meetings and workshops (Figure 6.1 in Chapter 6) as well as guidance from the AG (2017) in this respect. Thus, the coherent actions following D3 and GP3.1 to GP3.4 addresses the guiding policies, relevant literature and guidance provided to municipalities.

CA3.1.1 and CA3.1.2 relate to GP3.1, namely, the site where the hardware will be established and the software and data hosted. The State Information Technology Agency (SITA) (1996) published minimum security standards applicable to municipalities, which should be adhered to. The majority of municipalities opt to procure their own hardware, which need to be installed on a site that provides a conducive environment and meets the required standards. The waiting time for the delivery, installation and commissioning of such hardware requires of municipalities to attend to this aspect of the project as soon as possible in preparation for the implementation and, therefore, a separate guiding policy and coherent actions were included.

GP3.1 focuses on the implementation site and GP3.2 on the hardware, which should meet the requirements of the software provider, the capacity requirements of the municipality as well as guidelines provided by National Treasury (2016). CA3.2.1 and CA3.2.2 were specifically included to ensure that municipalities address the hardware requirements and that the available equipment will support the business functions and service delivery (see GP3.2 which deals with hardware).

National Treasury (South Africa, 2014) expects of municipalities to have access to the latest version of the software they have selected and to ensure that all the regulatory and legislative requirements are enabled. It is incumbent on the municipalities to maintain the software licences and implement patches and upgrades as these become available. Accordingly, GP3.3, together with CA3.3.1 and CA3.3.2, address this aspect of D3, which stems from the finding that municipalities often do not pay their software licences and are often not up to date with the loading of patches and upgrading of software. This deficiency also unduly increased the cost and complexity of implementing the uniform data structures.

It was found that data management is not a priority in municipalities and, therefore, GP3.4 attempted to address this finding. Notwithstanding the legislative requirements (South Africa, 2013) and guidance provided by the AG (2017), it remains necessary for municipalities to develop a policy (GP3.4) in this respect and to take specific actions (CA3.4.1 to CA3.4.3) to assess the data requirements, purify and enrich the data in preparation for the implementation project, and migrate the data to the new FMICS.

Figure 7.11 depicts the high-level project implementation activities CA3.1.1 to CA3.4.3, which address GP3.1 to 3.4 in response to D3:

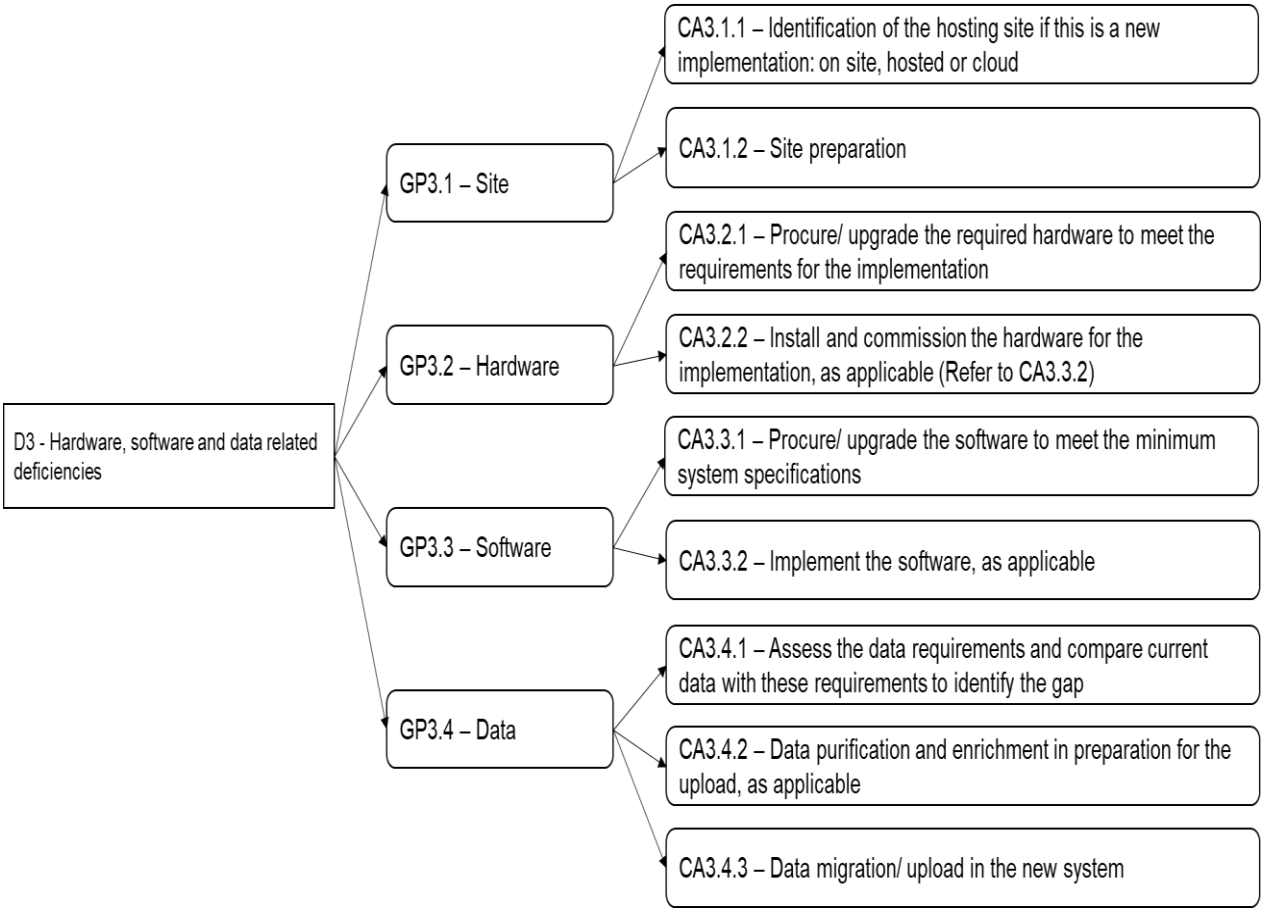


Figure 7.11 Coherent actions emanating from D3 and GP3.1 to GP3.4 (Researcher)

7.4.4 D4 – Dependence on external resources to deliver key projects and services

Although National Treasury and the AG have been highlighting the dependence on external resources across the public sector they have, nevertheless, not provided specific guidance on how to reduce this dependence. Accordingly, CA4.1.1 to CA4.1.3 specifically assist in this respect, actioning GP4.1. CA4.1.1 – External resources should be closely managed to ensure that they deliver on time and within budget as well as actively transfer skills to the internal resources. During the research it was found that, in many cases,

external resources performed the work that is expected of municipal employees, without showing them what to do or how to do it, and only providing limited documentation, if any (Table 7.1). CA4.1.2 – Municipalities should ensure that formal skills are transferred to internal resources. Such training should be documented and retained for future re-use. CA4.1.3 – Municipalities should implement succession planning and retention strategies to equip the internal resources with the new skills and to reduce the dependence on external resources over a period of time.

D4, GP4.1 and CA4.1.1 to CA4.1.3 are depicted in Figure 7.12 below:

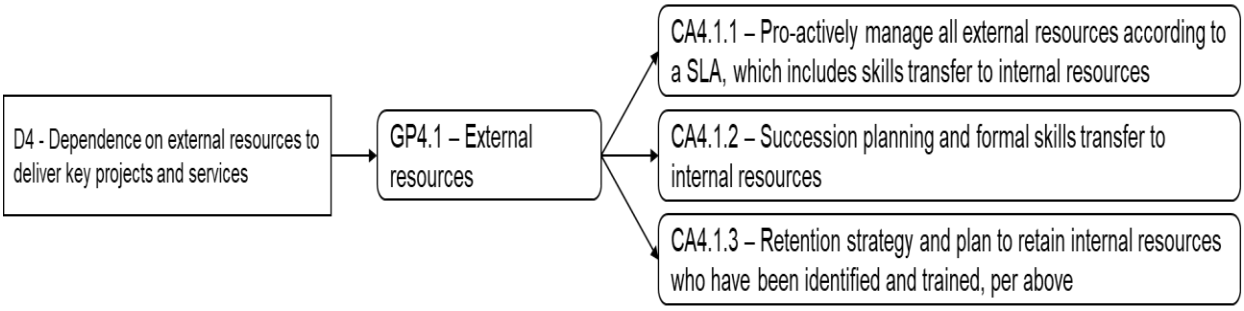


Figure 7.12 Coherent actions emanating from D4 and GP4.1 (Researcher)

7.4.5 D5 – Complex municipal environment with undefined/non-aligned business processes

Complexities in the municipal environment include those which are within the control of the municipality and those which are beyond their control and which may be either geographical or political in nature (see Table 7.1 above). The internal complexity which may be managed is, therefore, addressed in the proposed policy emanating from the study and, indeed, also in the mSCOA regulation (South Africa, 2014). The regulation identifies 15 key business processes which municipalities need to review and update with guidance in this regard being provided in the mSCOA circulars, (National Treasury (2),

2015). These coherent actions, therefore, deal only at a high level with either the amendment of existing business processes or the creation of new business processes, as may be applicable to individual municipalities. Thus, CA5.1.1 to CA5.1.4 provide action items for GP5.1 and offers a solution to D5 by identifying both the business processes which are affected by the project and the new ones which are required (CA5.1.1). CA5.1.2 – This action entails a review of each of the key business processes to identify how to approach the amendment. CA5.1.3 – Documenting of the new business processes is the next activity which addresses GP5.1. The final action, CA5.1.4, requires formal approval by the municipal council and training for all the affected stakeholders and, thereafter, a roll out of the new business processes.

This is an extremely high-level and simplistic approach to either changing or implementing business processes, which is a science on its own, and is summarised in Figure 7.13:

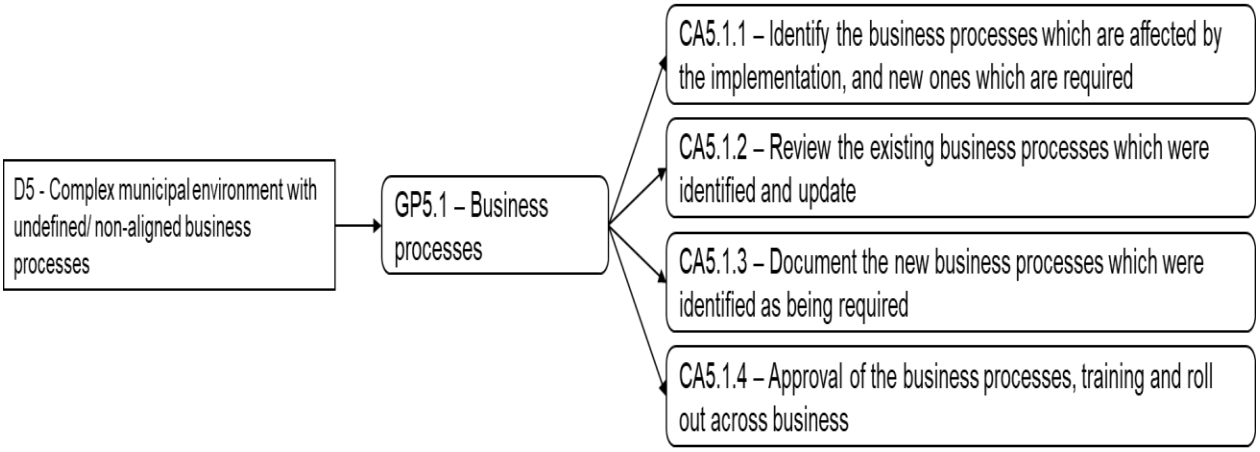


Figure 7.13 Coherent actions emanating from D5 and GP5.1 (Researcher)

7.4.6 D6 – People related issues including a lack of critical skills, non-participation and insufficient change management

People related findings included a lack of leadership, motivation, skills and capacity to deliver as required (Table 7.1 above). All of these, as well as continued critical vacancies, overburdened employees, poor management and inadequate change management, have been highlighted by the AG (2017) on numerous occasions as impacting negatively on both the project implementation as well as service delivery.

Coherent actions to address D6 and action GP6.1 involve political and administrative leaders executing their mandate (CA6.1.1) and are also linked to GP2.1. Leaders should provide clear direction, develop performance management criteria and formulate feasible plans to achieve the municipal strategy and objectives through the implementation of projects (CA6.1.2). In addition, leaders should also implement consequences in cases where objectives and performance criteria are not achieved (CA6.1.3).

This implementation is far more than an IT project as it also impacts on critical business processes and involves the entire municipality (South Africa, 2014). Accordingly, coherent actions addressing GP6.2 deliver on change management, an important aspect of the implementation project and one which was found to be completely disregarded by most municipalities (see Table 7.1). Municipalities should involve employees to entrench the mSCOA reform and to reduce their dependence on external consultants. CA6.2.1 – A change champion should be appointed, ideally, a senior person who is well respected and able to influence both the internal and the external stakeholders. CA6.2.2 – Change management and communication plans should be developed and approved by the oversight committee. These plans should be executed by the change and communication network (CA6.2.3) for the duration of the implementation project.

GP6.3 addresses the issue of training, over and above the training which was provided by National Treasury. CA6.3.1 focuses on training material, which may either be developed or sourced from National Treasury. CA6.3.2 indicates that trainers should be sourced, internally or externally, and trained to facilitate the training interventions at the municipality (CA6.3.3).

Secondment (GP6.4) involves a policy to address the internal skills and capacity shortages as per D6. CA6.4.1 refers to applying for resources from national and provincial support programmes in order to fill the gaps, CA6.4.2 focuses on developing internal capacity for this purpose while CA6.4.3 deals with actions to address D6 through a retention strategy to retain internal skilled resources.

The coherent actions which municipalities should implement to address D6 and action GP6.1 to GP6.4 are depicted in Figure 7.14 below:

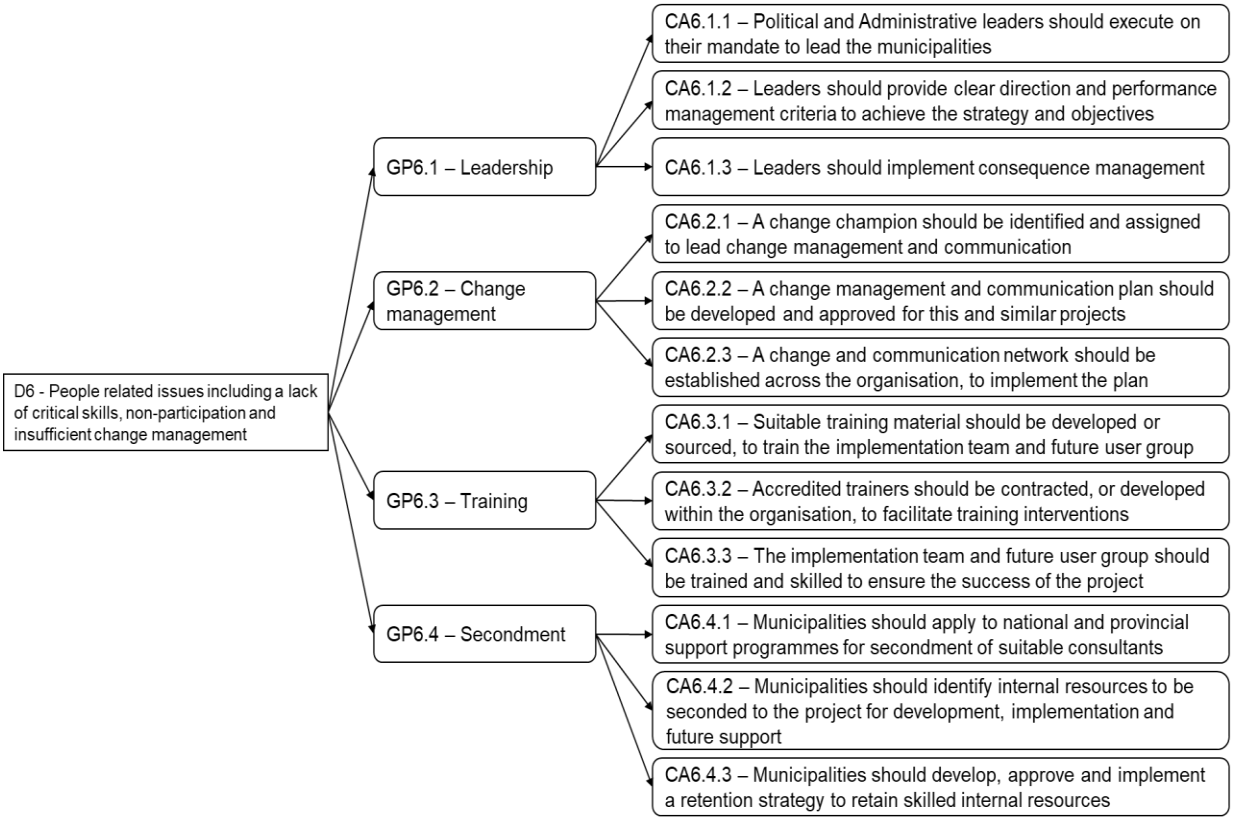


Figure 7.14 Coherent actions emanating from D6 and GP6.1 to GP6.4 (Researcher)

7.4.7 D7 – Other issues emanating from limited resources including funds and time, and deficient project management skills

At the time of the study municipalities across the country were experiencing continued financial pressure (Auditor General (6), 2018) and, thus, a reform of this nature poses a challenge in terms of already stretched resources. D7 highlights limited resources in relation to funding, time constraints and deficient project management skills (see Table 7.1). The guiding policies aimed at addressing D7 include both funding (GP7.1) and time allocation (GP7.2), GP2.2 (Project management) addressed the lack of project

management skills in the municipalities, and GP6.3, training of the municipal employees. GP6.4 called for the secondment of skilled resources to this implementation project.

CA7.1.1 and CA7.1.2 were developed to address D7 and pointed to GP7.1, funding. CA7.1.1 called upon municipalities to apply for funding for the project through support programmes while CA7.1.2 proposed the funding of the implementation project through own resources and budget allocations.

GP7.2, on the other hand, focused on time allocated to the project, from the planning phase CA7.2.1. It was recommended that municipalities should not wait, but should start with the mSCOA project immediately, as well as any other projects which they intended to implement (CA7.2.2).

Coherent actions following from D7, GP7.1 and GP7.2 are illustrated in Figure 7.15 below.

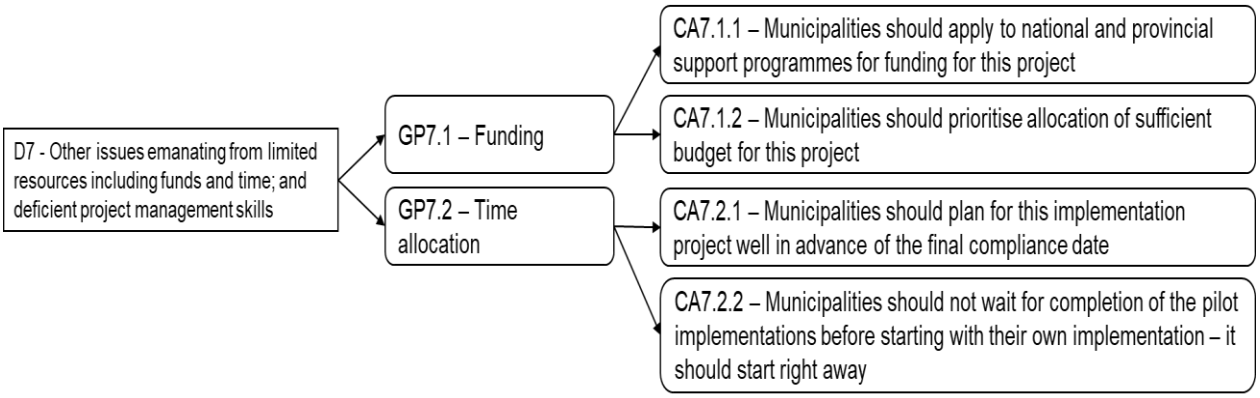
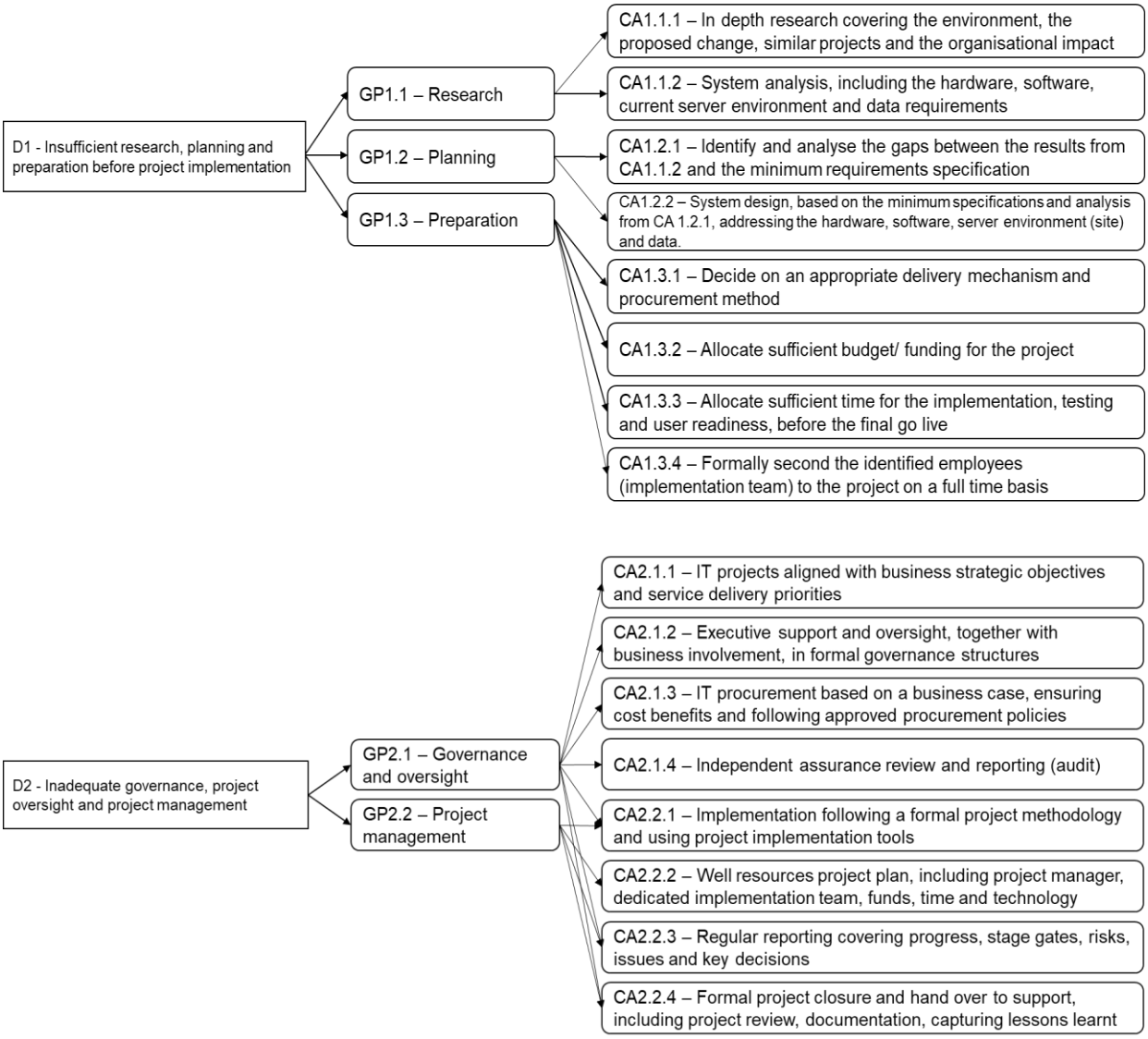


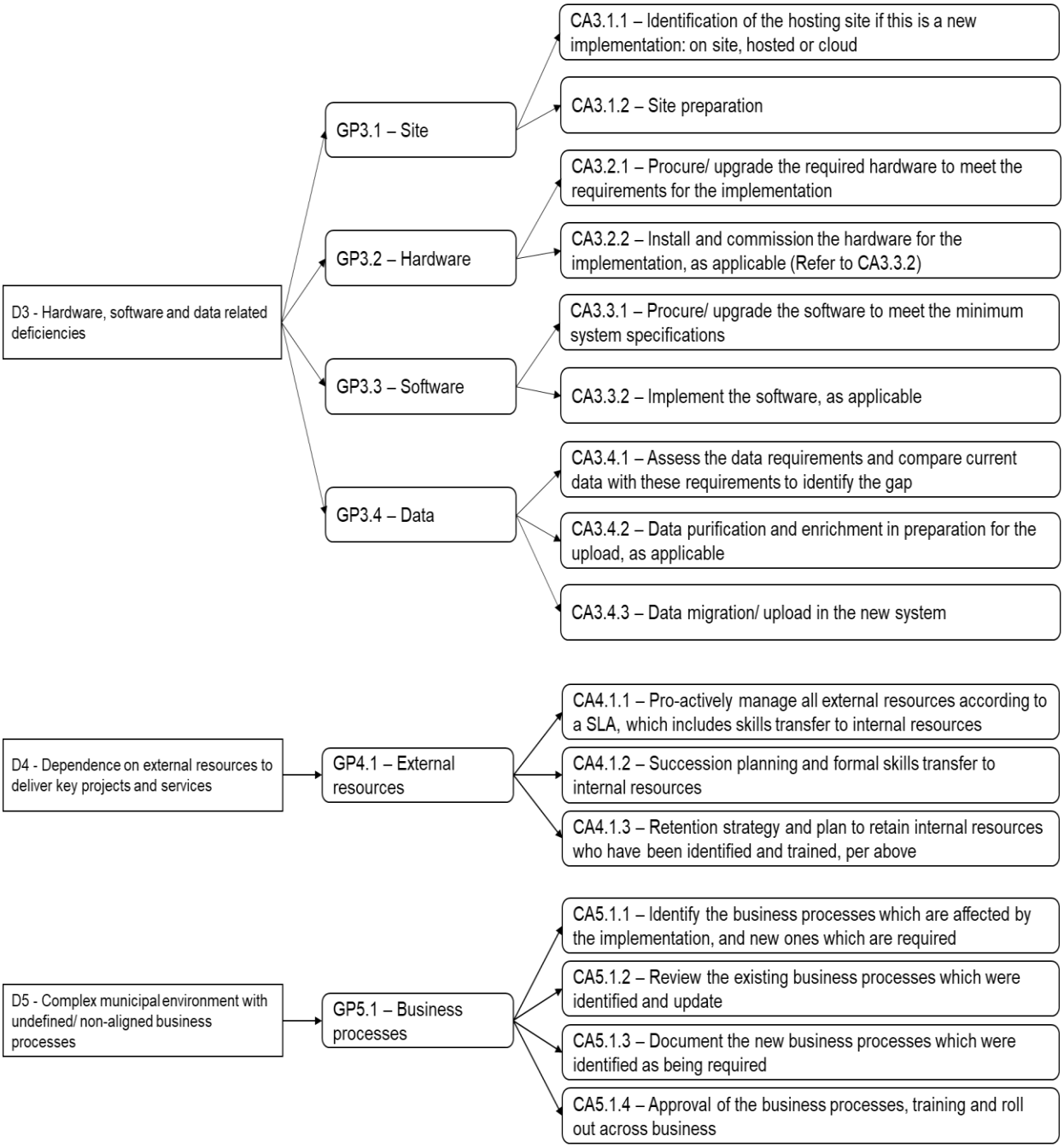
Figure 7.15 Coherent actions emanating from D7 and GP7.1 and GP7.2 (Researcher)

7.5 IMPLEMENTATION STRATEGY

Section 7.2 discussed the diagnosis emanating from the findings, which were summarised in Table 7.1, Section 7.3 presented guiding policies that resulted from the

diagnoses and Section 7.4 focused on coherent actions emanating from the guiding policies. Thus, steps 3.1 to 3.3 (Figure 7.1 above) resulted in a strategy for the implementation of standard data structures, which is presented in Figure 7.16 below:




D3 - Hardware, software and data related deficiencies
GP3.1 – Site
GP3.2 – Hardware
GP3.3 – Software
GP3.4 – Data
CA3.1.1 – Identification of the hosting site if this is a new implementation: on site, hosted or cloud
CA3.1.2 – Site preparation
CA3.2.1 – Procure/ upgrade the required hardware to meet the requirements for the implementation
CA3.2.2 – Install and commission the hardware for the implementation, as applicable (Refer to CA3.3.2)
CA3.3.1 – Procure/ upgrade the software to meet the minimum system specifications
CA3.3.2 – Implement the software, as applicable
CA3.4.1 – Assess the data requirements and compare current data with these requirements to identify the gap
CA3.4.2 – Data purification and enrichment in preparation for the upload, as applicable
CA3.4.3 – Data migration/ upload in the new system
D4 - Dependence on external resources to deliver key projects and services
GP4.1 – External resources
CA4.1.1 – Pro-actively manage all external resources according to a SLA, which includes skills transfer to internal resources
CA4.1.2 – Succession planning and formal skills transfer to internal resources
CA4.1.3 – Retention strategy and plan to retain internal resources who have been identified and trained, per above
D5 - Complex municipal environment with undefined/ non-aligned business processes
GP5.1 – Business processes
CA5.1.1 – Identify the business processes which are affected by the implementation, and new ones which are required
CA5.1.2 – Review the existing business processes which were identified and update
CA5.1.3 – Document the new business processes which were identified as being required
CA5.1.4 – Approval of the business processes, training and roll out across business

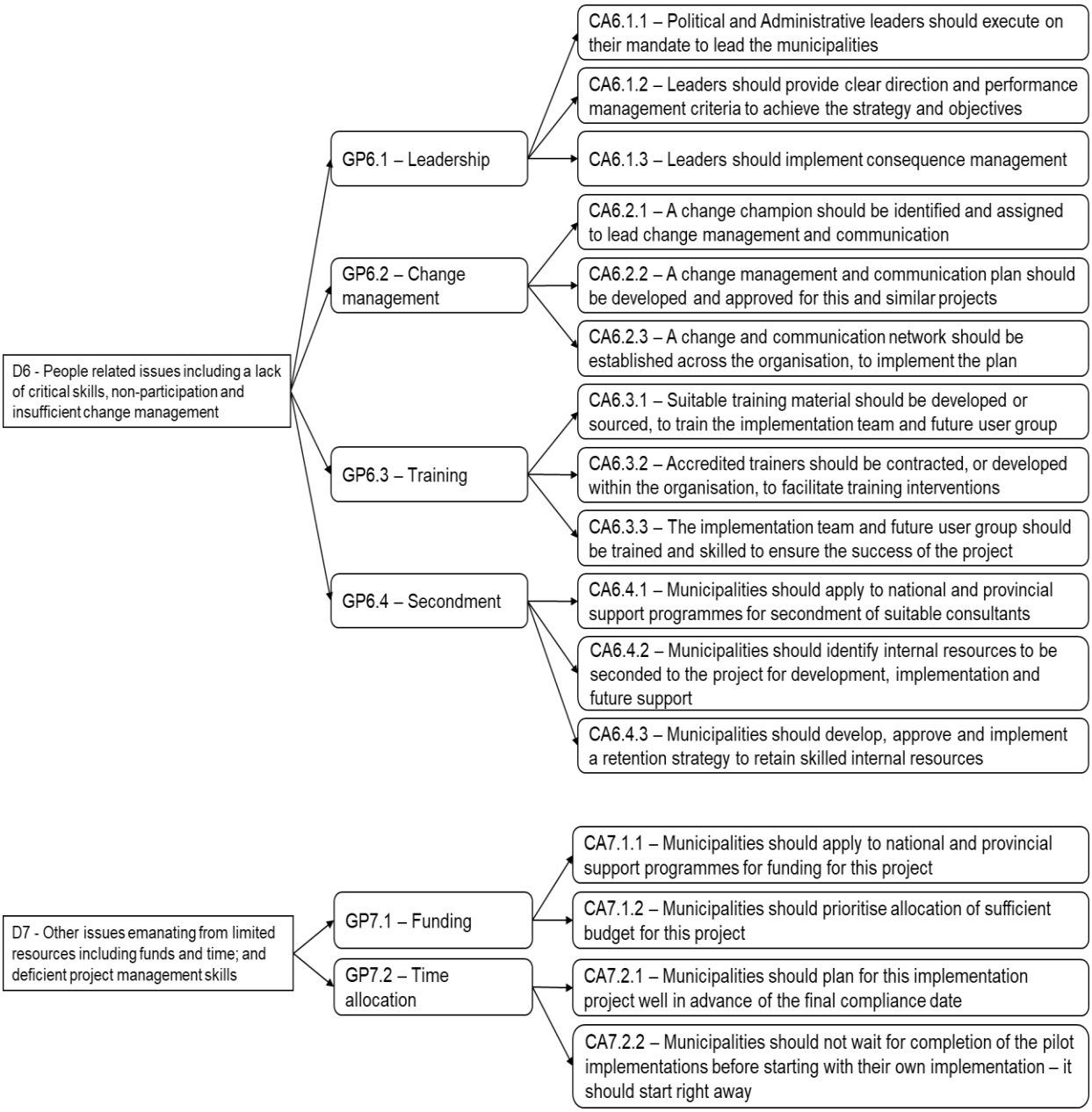


Figure 7.16 A strategy for implementing the standard data structures (Researcher)

The strategy for implementing the standard data structures in municipal FMICS, presented in Figure 7.16, is based on the data which was collected from 25 pilot municipalities over a period of three years. The findings which emerged from the data analysis informed seven diagnostics. These diagnostics were then addressed through guiding policies and the coherent actions proposed in the strategy. Despite the fact that the strategy was developed from municipal data, it is, nevertheless, sufficiently generic to be applicable in any environment for the implementation of standard data structures, financial IT systems, or any similar reform.

Broader application of the strategy should include state owned entities, which in South Africa, are required to report to the responsible cabinet minister. Uniform data structures and reporting formats will improve comparability and oversight, as well as introduce a measure of IT governance, as was discussed in this research thesis. The strategy could also be used by the ICT sector, for IT implementation projects in private sector clients, to reduce the implementation time and cost, and improve the participation and adoption of the IT products and solutions by the business representatives.

7.6 STRATEGY IMPLEMENTATION, EVALUATION AND CONTROL

The strategy development methodology which was adopted for the purposes of this research and illustrated in Figure 5.5 includes five steps. Steps 4 and 5 denote strategy implementation and strategy evaluation and control respectively. These last two steps, highlighted in Figure 7.1 above, clearly indicate that their absence would result in an incomplete product.

For the purposes of this research, implementation of the strategy took place during the research and the strategy development was based on the findings from 25 pilot implementations. Thus, no implementation per se has been documented separately.

Table 5.1 in Chapter 5, which presented a summary of the literature review provided in Chapters 2 and 5 and linked to the steps in the strategy development model, provided a high-level rubric to assess the comprehensiveness of the proposed implementation strategy. Table 7.2 below is used to illustrate how the coherent actions (CA) from Chapter 7 align with the strategy evaluation check points which were listed in Table 5.1:

Table 7.2 High-level strategy comprehensiveness assessment (Researcher)

IT strategy development step	**Strategy evaluation check point**	**Coherent actions addressing the strategy evaluation check points**
Step 1: Strategic direction	✓ Clearly defined organisational strategy: mission, vision, values, strategic priorities and objectives	✓ CA1.1.1; CA2.2.1; CA6.1.1 to CA6.1.3
	✓ Budget provision for delivering organisational strategies	✓ CA1.3.2; CA2.1.3; CA2.2.2; CA7.1.1 and CA7.1.2
	✓ Resource allocation to implement organisational strategies	✓ CA1.3.2, CA1.3.3 and CA1.3.4; CA2.2.2; CA4.1.1 to CA4.1.3; CA6.2.1 to CA6.2.3; CA6.4.1 to CA6.4.3

IT strategy development step	Strategy evaluation check point	Coherent actions addressing the strategy evaluation check points
	✓ Role of and approach to IT within the organisation context clearly articulated: innovator, conservative or undefined	✓ CA1.1.1 and CA1.1.2; CA2.1.1; CA6.1.1 to CA6.1.3
	✓ IT key focus: technology, process enablement, data/information or opportunities/ advantage creation	✓ CA1.1.1 and CA1.1.2
Step 2: Environmental assessment	✓ Legal and regulatory requirements addressed	✓ CA1.1.1 and CA1.1.2; CA1.2.1; CA2.1.4
	✓ Guidance provided by industry bodies, NT, AG, SALGA	✓ CA1.1.1 and CA1.1.2; CA1.2.1; CA1.3.1; CA6.1.1 to CA6.1.3
	✓ Approved policies and procedures accommodated	✓ CA1.1.1 and CA1.1.2; CA1.2.1 and CA1.2.2; CA1.3.1; CA2.1.4

IT strategy development step	Strategy evaluation check point	Coherent actions addressing the strategy evaluation check points
	✓ Governance and risk management adequately addressed	✓ CA1.1.1 and CA1.1.2; CA1.2.1 and CA1.2.2; CA1.3.1; CA2.1.1 to CA2.1.4; CA2.2.1; CA2.2.3 and CA2.2.4; CA6.1.1 to CA6.1.3
	✓ Considered processes and services currently enabled	✓ CA1.1.1 and CA1.1.2; CA1.2.1 and CA1.2.2; CA5.1.1 to CA5.1.4; CA6.2.1 to CA6.2.3
	✓ Resource availability assessed: sufficient coverage, fit for purpose, correct skills and experience, time allocation/availability	✓ CA1.3.2, CA1.3.3 and CA1.3.4; CA2.2.2; CA4.1.1 to CA4.1.3; CA6.4.1 to CA6.4.3
	✓ Existing and past strategies, plans and project outcomes, lessons learnt	✓ CA1.1.1; CA2.1.4; CA6.2.1 to CA6.2.3; CA6.3.1 to CA6.3.3

IT strategy development step	Strategy evaluation check point	Coherent actions addressing the strategy evaluation check points
	✓ Existing IT perspectives, integration with business, readiness to participate and change	✓ CA1.1.1 and CA1.1.2; CA6.2.1 to CA6.2.3; CA6.3.1 to CA6.3.3
	✓ Existing IT environment: hardware, applications, licences and contracts, processes enabled/not enabled (manual), support and maintenance, pending projects, data quality and availability	✓ CA1.1.1 and CA1.1.2; CA 1.2.1 and CA1.2.2; CA3.4.1; CA5.1.1 to CA5.1.4
	✓ Internal clients' and other stakeholders' expectations and perceptions	✓ CA1.1.1; CA2.1.2 and CA2.1.4; CA6.2.1 to CA6.2.3
Step 3.1 Strategy formulation: diagnosis	✓ Alignment of this project with organisational strategy, objectives, priorities and future perspectives	✓ CA1.1.1; CA2.1.2 and CA2.1.4; CA6.1.1 and CA6.1.2

IT strategy development step	Strategy evaluation check point	Coherent actions addressing the strategy evaluation check points
	✓ Governance and risk management for the project established	✓ CA1.1.1 and CA1.1.2; CA1.2.1 and CA 1.2.2; CA1.3.1; CA2.1.1 to CA2.1.4; CA2.2.1; CA2.2.3 and CA2.2.4; CA6.1.1 to CA6.1.3
	✓ Clear boundaries, limitations and frameworks for this project stated	✓ CA1.2.2; CA1.3.1; CA2.2.1 to CA2.2.4; CA6.1.1 to CA6.1.3; CA7.2.1 and CA7.2.2
	✓ Decision making structures and process designed and agreed upon	✓ CA1.3.1 and CA1.3.4; CA2.1.2; CA2.2.1 to CA2.2.4; CA6.1.1 to CA6.1.3
	✓ RACI matrix developed and approved	✓ CA1.3.4; CA2.2.2; CA4.1.1 to CA4.1.3; CA6.4.1 and CA6.4.2
	✓ Broad participation – top down, bottom up, business integration and support	✓ CA1.3.4; CA2.2.2; CA6.1.1 and CA6.1.2; CA6.4.1 and CA6.4.2

IT strategy development step	Strategy evaluation check point	Coherent actions addressing the strategy evaluation check points
	✓ Knowledge management – existing sources consulted and incorporated, organisational learning assimilated, designed and agreed upon for new project	✓ CA1.1.1 and CA1.1.2; CA1.3.1; CA2.2.3 and CA2.2.4; CA6.3.1 to CA6.3.3
	✓ Incorporate output from the environmental assessment	✓ CA1.1.1 and CA1.1.2; CA1.2.1 and CA1.2.2; CA1.3.1; CA2.1.3; CA7.2.1
	✓ Evaluate previous planning, approaches, sources and results to inform this strategy	✓ CA1.1.1 and CA1.1.2; CA1.2.1 and CA1.2.2; CA1.3.1;
	✓ Various implementation approaches considered, evaluated, and the best agreed upon and adopted	✓ CA1.1.1; CA1.3.1; CA2.2.1; CA6.1.2; CA7.2.1

IT strategy development step	Strategy evaluation check point	Coherent actions addressing the strategy evaluation check points
Step 3.2 Strategy formulation: guiding policies	✓ Legislation and regulations applicable to the industry	✓ CA1.1.1 and CA1.1.2; CA1.2.1; CA2.1.4; CA6.1.1 to CA6.1.3
	✓ Principles of good IT governance	✓ CA1.1.1 and CA1.1.2; CA1.2.1 and CA1.2.2; CA1.3.1; CA2.1.1 to CA2.1.4; CA2.2.1; CA2.2.3 and CA2.2.4; CA6.1.1 to CA6.1.3; CA7.2.1
	✓ Best practice and collective approaches, particular to the environment and industry	✓ CA1.1.1, CA1.3.1; CA2.2.1; CA6.1.1 to CA6.1.3; CA7.2.1
	✓ Internally approved and adopted policies and guidelines	✓ CA1.1.1, CA1.3.1; CA2.2.1 and CA2.2.4; CA6.1.1 to CA6.1.3
Step 3.3 Strategy formulation: coherent actions	✓ Clearly defined action steps to be taken in relation to strategy formulation	✓ CA1.3.1;

IT strategy development step	Strategy evaluation check point	Coherent actions addressing the strategy evaluation check points
	✓ Evaluate according to SMART principles	✓ CA1.1.1 and CA1.1.2; CA2.1.4; CA3.4.1;
	✓ Assign responsibility and due dates	✓ CA1.3.1, CA1.3.3 and CA1.3.4; CA2.2.1 and CA2.2.2; CA6.1.1 to CA6.1.3; CA6.4.1 and CA6.4.2; CA7.2.1
	✓ Allocated the required resources	✓ CA1.3.1 to CA1.3.4; CA2.2.2; CA4.1.1 to CA4.1.3; CA6.4.1 and CA6.4.2; CA7.1.2; CA7.2.1
	✓ Take action	✓ CA7.2.2
	✓ Measure the outcome and the output of the action against the SMART principles	✓ CA1.1.1 and CA 1.1.2; CA2.1.4; CA6.1.2 and CA6.1.3
Step 4: Strategy implementation	✓ Plans, ploys, patterns, positions and perspectives	✓ CA1.3.1; CA6.1.2, CA7.2.1

IT strategy development step	Strategy evaluation check point	Coherent actions addressing the strategy evaluation check points
	✓ Key performance indicators	✓ CA1.3.1; CA2.1.3; CA6.1.3; CA6.4.3; CA7.2.1
	✓ Strategic objectives achieved	✓ CA1.1.1; CA2.1.1 to CA2.1.4; CA6.1.3; CA6.4.3
	✓ Changes in profitability, strategic advantage, unique capabilities and strategic resources	✓ CA2.1.2 and CA2.1.4; CA6.1.1 and CA6.1.2; CA7.1.2;
	✓ Achievement of legislated and regulated compliance requirements	✓ CA1.1.1 and CA1.1.2; CA1.2.1; CA2.1.4; CA6.1.1 to CA6.1.3
	✓ Conformance to the principles of good governance	✓ CA1.1.1 and CA1.1.2; CA1.2.1 and CA1.2.2; CA1.3.1; CA2.1.1 to CA2.1.4; CA2.2.1; CA2.2.3 and CA2.2.4; CA6.1.1 to CA6.1.3; CA7.2.1

Table 7.2 above clearly illustrates that the coherent actions in the proposed implementation strategy in Figure 7.16 address all the strategy assessment check points which emerged from the literature review presented in Chapters 2 and 5. However, in depth strategy evaluation and control require an actual implementation of the strategy, with metrics for measuring each of the guiding policies and coherent actions, and success indicators to evaluate the result of the implementation.

National and provincial treasuries controlled the pilot implementations through the team members who were visiting individual municipalities and conducting assessments of the progress made (see Chapter 6). This evaluation and control have continued and have been expanded to include all municipalities. In addition, all municipalities are required to submit regular data string submissions from the municipal financial management and internal control systems (FMICS) to the Local Government Database and Reporting System (LGDRS), which is hosted by National Treasury. These data submissions are scrutinised to ensure that all municipalities are complying with the Municipal Regulation on a Standard Chart of Accounts (mSCOA) (South Africa, 2014), and that the data classification structure is being adhered to.

7.7 CONCLUSION

Chapter 7 detailed the development of the strategy for implementing standard data structures utilising the strategy development methodology discussed in Chapter 5. It is based on the data analysis and findings documented in Chapter 6. Figure 7.1 highlighted three key steps in the strategy development process, namely; diagnosis, guiding policies and coherent actions, together with the strategy implementation, evaluation and control. All of these steps were discussed in this chapter and resulted in seven diagnoses, 17 guiding policies and 48 coherent actions which together constituted the strategy. Figure 7.16 depicted the strategy which is the final product or artefact resulting from this research.

Section 7.6 deals with the implementation and evaluation of the strategy, and how it formed a part of this research study.

Chapter 8, the final chapter, presents an overview the strategy and expands on the realisation of the primary and secondary research objectives. Finally, it evaluates the study, the contribution of the study and its limitations. The chapter concludes with suggestions for future research.

Chapter 8

CONCLUSION

8.1 INTRODUCTION

This final chapter intends to conclude this research project, summarise the main findings and discuss the contribution of the study in a way that will assist the readers to understand the importance of the study. In addition, the chapter presents an assessment of the study and suggests further research to expand upon the body of knowledge which has been generated. Wisker (2008) explains that all of these discussion points include conclusions which round off the arguments, even if still incomplete, and establish the importance of the study's contribution. This opinion is supported by Labaree (2009), who states that "in order to be able to discuss how your research fits back into your field of study (and possibly the world at large), you need to summarise briefly and succinctly how it contributes to new knowledge or a new understanding about the research problem".

Thus, this final chapter briefly summarises of the study findings, discusses the study's contribution and the realisation of the research objectives, assesses the research, outlines the limitations of the study and proposes areas for future research.

8.2 SUMMARY OF THE SALIENT POINTS

This research thesis was structured as presented in Table 1.3 in Chapter 1 and consisted of eight chapters. Refer to Table 8.1 herewith, in which the key elements and salient points from each chapter are summarised:

Table 8.1 Summary of the salient points per chapter (Researcher)

CHAPTER	SALIENT POINTS
1. Introduction	The first chapter contains a preview of the intended research, covering the background to the study, problem description, literature survey, research design and ethical considerations. This first chapter highlights the problem statement and the objectives which the thesis addressed: Problem statement: Municipalities must implement a standard data structure (mSCOA) in their core financial and sub-systems, irrespective of the software brand which is being used. This calls for a re-implementation of the affected systems across 257 municipalities and 60 municipal entities in order to achieve compliance with the regulation. Research objective: To develop a high-level strategy which may guide the implementation of a standard data structure (mSCOA) in municipal FMICS. Secondary objectives: • An assessment of strategies employed by 25 municipalities during the pilot phase of the mSCOA project implementation; • Benchmarking these implementation strategies against leading IT system implementation practices; and • The development of a strategy to assist non-pilot municipalities with implementing standard data structures across their FMICS.
2. Information Technology Governance	The second chapter contains a review of existing literature on IT governance as it applies to municipalities and municipal system implementations. It also discusses IT governance in the municipal context, The King reports, ISO 38500, COBiT, industry guidelines, reports of the Auditor General (AG) and experience from abroad. The chapter concludes that: • Deficient IT governance is a major source of adverse audit findings; • There is a need for clear guidance, knowledge and understanding of what is required; and • Municipalities require support and external interventions to address the existing situation and improve their audit outcomes.
3. The Municipal Standard Chart of Accounts	This chapter presents an overview of the municipal IT system environment and the mSCOA regulation. It explains the mSCOA project and implementation activities, and what constitutes compliance with the regulation. It further establishes a link between the mSCOA project, IT governance and the development of an implementation strategy. Figure 3.2 provides a graphic depiction of the mSCOA

CHAPTER	SALIENT POINTS
	journey while Figure 3.3 presents the project timelines, which also informed the data collection activities. Key findings included: • Municipalities do not have the skills, capacity or project management maturity to manage the project independently; and • Municipalities require guidance in the form of a high-level implementation strategy and approach if their respective implementations are to be successful.
4. Research Design and Methodology	Chapter 4 uses the "research onion" and principles of design science to explain how the research was executed in its attempt to find a practical solution for a real problem. The data was collected in six cycles over a period of three years and involved 25 pilot municipalities. Multiple methods were employed with case study and action research strategies being used. Diagnostic reasoning based on an inductive approach was employed, allowing the pilot implementations to be assessed using a flexible approach and focusing on the utility of the final artefact. A pragmatic philosophy was selected to solve a real-world problem and there was ongoing interaction between the researcher and the research subjects. The abovementioned choices were well matched with the goals of design science with the study aiming to improve the existing situation at municipalities while also creating scientific knowledge from the research.
5. Strategy Development and Evaluation	Strategy development methodologies were researched and key points incorporated into a methodology which was fit for the purposes of this research. The proposed strategy development methodology, which was adapted from Rumelt (2011) and Gcaza and Von Solms (2017), is presented in Figure 5.6. The chapter also provides strategy evaluation check points which were derived from the literature with these being used to ensure that sufficient breadth and depth were achieved in the final proposed implementation strategy (see Table 8.1 above).
6. Data Collection and Findings	Data was collected from 25 pilot municipalities over a period of three years. The data collection was executed in six assessment cycles, during which each municipality was visited and assessed against specific guidance provided by National Treasury and external stakeholders. The municipal teams were observed during their implementation activities and advised on improvements and adjustments to their methodology and governance.

CHAPTER	SALIENT POINTS
	Table 6.1 summarises the main findings of the data collection process and these were used to develop diagnostics, which informed the next two steps in the strategy development.
7. Strategy for the Implementation of a Standard Data Structure	Chapter 7 focuses on the development of the implementation strategy, the culminating artefact and the scientific contribution of the research. The diagnostics informed guiding policies which in turn translated to coherent actions to be implemented by the municipalities. Together the diagnostics, guiding policies and coherent actions represent the strategy for implementing a standard data structure. This artefact is presented in Figure 7.16.
8. Conclusion	The final chapter concludes the research thesis by presenting an evaluation of the study, discussing the limitations of the study and providing recommendations for future research.

8.3 ATTAINMENT OF THE OBJECTIVES

The research was initiated by a problem statement, namely, that municipalities must implement a standard data structure in their core financial and sub-systems, irrespective of the software brand being used. This called for a re-implementation of the affected IT systems across 257 municipalities in order to achieve compliance with the applicable regulation (South Africa, 2014). Thus, the primary objective of this research was as follows:

To develop a high-level strategy which may guide the implementation of a standard data structure (mSCOA) in municipal financial management and internal control systems.

The primary objective was underpinned by the following secondary research objectives, namely:

- An assessment of the strategies employed by the 25 municipalities which participated in the pilot phase of the mSCOA project implementation

- Benchmarking these implementation strategies against leading IT system implementation practice
- The development of a strategy to assist non-pilot municipalities with implementing the standard data structures (mSCOA) across their FMICS

The implementation projects, methodologies and strategies of the 25 pilot municipalities were assessed repeatedly during a period of three years. The findings from these assessments were compare with IT governance frameworks from Section 2.4 Chapter 2, and reports of the AG which were discussed in Section 2.5. These informed the diagnosis which in turn formed the basis of the development of the proposed implementation strategy. Thus, the first secondary research objective was achieved and contributed towards the achievement of the primary objective.

In Chapter 2 the municipal implementation strategies were compared to governance principles while Chapter 5 focused on IT strategies and approaches. National Treasury (2017) and the Auditor General (2017) provided guidance on the approach municipalities should take to the implementations in question. The assessments documented in Chapter 6 used these guidelines as a benchmark and municipal teams were advised throughout the research project on the best route to take to adhere to these guidelines. The outcome of the assessments and benchmarks was used to produce circulars, informing the non-pilot municipalities on the best way forward and guiding the subsequent assessments of pilot municipalities' progress. In addition, the benchmarks, guidance provided and findings from the respective assessments contributed to the agenda items for the Integrated Communication Forum (ICF) meeting. It is, therefore, clear that the second secondary research objective was achieved and contributed significantly to the data collection which was performed as well as the guiding policies and coherent actions which followed.

Chapter 7 focused on the development of an implementation strategy for a standard data structure. The strategy includes diagnostics, guiding policies and coherent actions which not only municipalities, but any organisation wishing to implement standard data structures in their FMICS, may use. The guiding policies provide solution in relation to the diagnostics while the coherent actions provide steps for implementing the guiding policy. This approach is advocated by Rumelt (n.d.), who maintains that strategies acquire their value through their implementation (Rumelt, n.d.). Chapter 7 addressed the third secondary research objective. In doing so, it may be confirmed that the primary research objective, namely, to develop a strategy for the implementation of a standard data structure (mSCOA) in municipal FMICS was realised.

This assertion is further confirmed by the validation of the study, presented in Section 8.4.

8.4 VALIDATION OF THE STUDY

According to Von Solms and Van Niekerk (2011), research should be evaluated in order to confirm its validity, credibility and rigour. They state that validity depends on a rigorous methodology and clear argumentation by the researcher. Oates (2011) agrees with this assertion and adds that the research approach should ensure accurate and meaningful results. Bryman (2012) also maintains that research should be evaluated to guarantee that rigour, credibility and integrity are achieved.

It is, therefore, clear that the elements of validity, reliability, and consistency, together with an assessment of the foundational elements, utilisation and consequences of the research, are required.

8.4.1 Validity

Oates (2011) provides three criteria for the validity of research, namely, that the findings emanate from the research, that an appropriate process was followed, and that the findings do, indeed, provide an answer the research question. In this study, where the

researcher analysed documents and observed the municipal implementation projects, selective recall and perceptions, as well as accentuated perception, may have impacted on the validity of the study. However, these issues were addressed through using a specific script for every cycle of assessment which was based directly on the research purpose, multiple cycles of assessment, comparison with assessments performed by team members, and triangulation with National Treasury reports and the findings of the AG. It may, therefore, be assumed that the findings met the criteria of validity for purposes of this research.

8.4.2 Reliability

Reliability is concerned with the repeatability of research and similar results being yielded when the research is repeated (Oates, 2011). This may not have been possible in this study due to the fact that the change being measured was already affecting the whole population, i.e. all 257 municipalities. Nevertheless, the sample consisted of 25 pilot municipalities and repeated assessment of their progress yielded similar results, which may be considered to indicate the reliability of the research findings. These findings were also similar to those of National Treasury, the AG and other external stakeholders (see Chapter 6).

The reliability of documents and other sources used for the purposes of this research was assured as these documents and other sources comprised public and confidential National Treasury and AG reports, as well as those of industry bodies such as the South African Local Government Association (SALGA) and the Chartered Institute of Government Financial Audit and Risk Officers (CIGFARO), all of which were agreement in respect of the existing situation in the municipalities and the research findings.

8.4.3 Consistency

Hofstee (2013) stresses the importance of consistency in academic research, which is expanded upon by Dellinger and Leech (2007) to "whether the methodology used in the study under review was adequate to maximise the amount of information available to answer the selected question and/or purpose as opposed to an alternative methodology".

In this study the research methodology was discussed in Chapter 4 and the strategy development methodology in Chapter 5 with the latter including a literature review as well as a graphic summary of the process followed (Figure 5.5). The strategy development methodology was based on the work by Rumelt (2011), Tsokota (2016), and Gcaza and Von Solms (2017), which was also used by Tsokota (2016) and Gcaza (2017) for the development of national strategies. Thus, similarly applied, this strategy development methodology may be considered to meet the evaluation criteria of consistency.

8.4.4 Foundational elements

The foundational elements of academic research refer to the literature which is consulted and incorporated into a thesis. Wisker (2008) explains this element of research as engaging in dialogue with other researchers in the field and defining the conceptual level of the research. In this study relevant literature was consulted to establish context, identify themes and debates and frame the contribution of this body of work.

The literature review conducted in the study focused on the governance of IT in Chapter 2, thus laying a strong foundation for the development of an IT strategy. Chapter 3 created context for the reader (Koekemoer, 2018) to highlight the importance of understanding the need for a uniform data structure across municipalities and the practical implications of the mSCOA regulation (South Africa, 2014). Chapter 5 discussed strategy development principles and methodologies, culminating in the methodology which was used to develop the artefact which is the main contribution of the research thesis.

It may, therefore, be concluded that the literature review which was conducted was appropriate and relevant for the purpose, comprehensive in its coverage of what was available, and directly informed the contribution of the study.

8.4.5 Utilisation

Utilisation, as a criterion for evaluation, refers to the appropriateness of the methodology selected. In the first instance, the research methodology was explained in Chapter 4 and the application of the research methodology chosen within the science of design and creation context illustrated in Table 4.5.

Chapter 5 focused on the methodology which was selected for the development of the implementation strategy. This methodology was deemed the most appropriate as two other national IT implementation strategies had been developed using a similar methodology, namely by Tsokota (2016) and Gcaza (Gcaza & Von Solms, 2017).

8.4.6 Consequences

The practical consequences of this research study include the use of the findings, social and political acceptance of changes, changes within the participants, and addressing a real-world problem. In the case of the findings, these were used to change the course of the national project and informed the development of guiding circulars and agenda items for ICF meetings. Individual municipalities received guidance and support as were appropriate for their individual circumstances, and training courses were developed to benefit all the municipalities.

Although the state of municipal finance and administration at the time of the study was widely known and acknowledged, limited change has, nevertheless, come about other than uniform financial reporting to National Treasury on a monthly basis.

Several individuals from participating municipalities have since, sadly, moved on and become consultants themselves. This, undoubtedly, further exacerbates the lack of skills and capacity within municipalities, which has been reported (Koekemoer & Von Solms, 2017).

The problem of the lack of uniform financial reporting has been addressed. However, whether the quality, comparability and reliability of the data from municipalities have been addressed, should be the focus of further research before being confirmed.

8.5 LIMITATIONS

Limitations in the research context include any factors which may have influenced the research process, or the outcome thereof. The key limitations include the research environment, the researcher, the research methodology and the research sample, to name a few.

The research was conducted within the local government environment and involved 25 municipalities which were implementing a National Treasury directed project. The objective of this project was to enable uniform financial reporting through regulating the data structures in municipal FMICS. In comparison, this research focused on the implementation project itself, collecting data within a fixed timeframe and utilising an accidental sample. The environment was daunting, for example logistic and regulatory issues, financial constraints, limited availability of key participants with many competing priorities, the financial problems of municipalities, and a general municipal election in 2016.

Although the regulation was published as early as April 2014, data collection really only commenced in mid-2015 when it became apparent that the municipalities were not making progress and, in many cases, would require an external intervention if they were to achieve compliance. Accordingly, limited data was available from 2014, mainly

secondary data from records and reports, which was then evaluated for relevance and impact before being included in this study. Reports from the AG which were available in the public domain were used throughout to supplement and support the findings. National Treasury did give written permission for this research to be conducted and for certain information to be reproduced although confidential documents and reports also further enhanced both the findings and the final implementation strategy.

The study used an accidental sample, namely, the municipalities which were selected by National Treasury to be part of the pilot group. The selection included municipalities from three categories, namely, metropolitan, district and local municipalities, which were spread across the country. Every province and every FMICS vendor were represented in the sample. However, the sample did not take into the varied administrative capacities of the municipalities. The municipalities included in the pilot group were generally top performing and more affluent as compared to the bigger population of all municipalities. The vendors were also allowed to propose pilot municipalities and did not suggest their most challenging clients. It may, therefore, be said that the sample did not accurately reflect the depth and breadth of the challenges the municipalities were experiencing at the time of the study.

The research methodology included elements of case study and action research over a period of three years, with the researcher actively participating in the project as well as observing the implementation and influencing the direction which the individual and collective group of municipalities took. The personal involvement of the researcher may have resulted in bias in relation to the views and conclusions documented and also influenced the project teams to change their behaviour due to their being observed. However, the researcher was a member of a larger team of consultants and, therefore, the personal influence and impact were minimal. This possible limitation was not specifically considered or recorded but should nevertheless be noted.

Although this research was conducted at the local government level due to the convenience of the implementation project and the available sample, the end product should not be limited to this environment. The implementation strategy is suitably generic to be applicable to any implementation of this nature and, thus, recommendations for future research include testing and validating the artefact for other environments.

8.6 FUTURE RESEARCH

The proposed strategy was not implemented after the research and design process but during the process, as explained in Section 7.6. While guidance was provided to the benefit of all 257 municipalities, only the 25 pilot municipalities were monitored and reported upon. Thus, the first recommendation for future research is to assess the non-pilot municipalities to determine the status of their respective implementation projects, the approach they followed and the results which were achieved. These results could then be used to further refine and improve the artefact.

The broader implementation project included a panel tender from which municipalities could procure services and software to address the gaps they had identified during the assessment of their IT environment. A detailed analysis of and research into the total cost of IT in local government, including the various components thereof and the implementation and commissioning, would assist the three spheres of government when allocating resources. A benchmark of this nature could also assist municipalities and other organisations when negotiating similar contracts.

The third recommendation for future research proposes a wider environment to validate the applicability of the strategy outside of government. The research should be repeated in another industry to prove that the strategy may be transported to any organisation and yield the same positive results.

8.7 SUMMARY OF THE CONTRIBUTION

The primary contribution of this research study was the strategy for the implementation of uniform data structures (see Figure 7.16 above). The thesis also contributed the refined, five-step, strategy development methodology which is presented in Figure 5.5.

Conference papers stemming from this research, which have been included in Annexure B, include:

1. Koekemoer, S.M. and Von Solms, R. (2017) *IT Project Management Maturity in South African Municipalities*; in IST-Africa 2017 Conference Proceedings; www.IST-Africa.0rg/Confernce2017;
2. Koekemoer, S.M. and Von Solms, R. (2018) *Document Management Systems – Legislative Compliance, Good Governance and Municipal Practice*; in IST-Africa 2018 Conference Proceedings; www.IST-Africa.org/Conference2018; and
3. Koekemoer, S.M and Von Solms, R. (2019) *Deficient Governance Practices, Adverse Audit Findings, Financial Vulnerable Municipalities and Service Delivery Protests – Does the 4th Industrial Revolution hold the Solution to Sustainable Basic Service Delivery in South Africa?*; in South African Association of Public Administration and Management 2019 Conference Program.

An article submitted for publication in the Journal of Public Administration and awaiting notification of selection outcome, Annexure C, namely:

Koekemoer, S.M. and Von Solms, R. (2019) *Deficient Governance Practices, Adverse Audit Findings, Financial Vulnerable Municipalities and Service Delivery Protests – Does the 4th Industrial Revolution hold the Solution to Sustainable Basic Service Delivery in South Africa?*

8.8 EPILOGUE

This research was initiated to address the problem statement that municipalities and their entities should implement a standard data structure (mSCOA) in their core financial and sub-systems, irrespective of the software brand being used. It was confirmed that the municipalities lacked the skills and capacity required to implement the ensuing reform independent of an external intervention and would, therefore, need a guiding strategy, among others, if they were to succeed with this project.

The study has contributed a strategy development methodology which was developed for this purpose. The research followed an iterative data collection methodology, including elements of case study and action learning, over a period of three years, and included a sample of 25 participating pilot municipalities. The science of creation and design was employed to develop a strategy for the implementation of uniform data structures which addressed the problem statement, is broadly applicable within the public sector and may be useful in other industries as well.

This final chapter focused on the implementation, evaluation and control of the proposed strategy. It provided a summary of the salient points of the research, arguments for realisation of the research objectives and an evaluation of the study. The chapter also highlighted the imitations of the study and proposed areas for future research. The chapter concluded with a list of the contributions emanating from this research. It may, therefore, be asserted that this research has achieved its objectives.

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ANNEXURES

A: Letter of permission

Letter of permission from National Treasury

B: Conference proceedings

1. Koekemoer, S.M. and Von Solms, R. (2017) *IT Project Management Maturity in South African Municipalities*; in IST-Africa 2017 Conference Proceedings; www.IST-Africa.0rg/Conference2017;
2. Koekemoer, S.M. and Von Solms, R. (2018) *Document Management Systems – Legislative Compliance, Good Governance and Municipal Practice*; in IST-Africa 2018 Conference Proceedings; www.IST-Africa.org/Conference2018; and
3. Koekemoer, S.M. and Von Solms, R. (2019) *Deficient Governance Practices, Adverse Audit Findings, Financial Vulnerable Municipalities and Service Delivery Protests – Does the 4th Industrial Revolution hold the Solution to Sustainable Basic Service Delivery in South Africa?* in South African Association of Public Administration and Management 2019 Conference Program.

C: Article submitted for publication to Journal of Public Administration (JOPA)

Koekemoer, S.M. and Von Solms, R. (2019) *Deficient Governance Practices, Adverse Audit Findings, Financial Vulnerable Municipalities and Service Delivery Protests – Does the 4th Industrial Revolution hold the Solution to Sustainable Basic Service Delivery in South Africa?*

ANNEXURE A: Letter of Permission from National Treasury

national treasury
Department:
National Treasury
REPUBLIC OF SOUTH AFRICA

Private Bag X115, Pretoria, 0001 Tel: +27 12 315 5009, Fax: +27 12 395 6553

Ref No: EC/29

The Head of Department:
Faculty of Engineering, the Built Environment and Information Technology
Nelson Mandela Metropolitan University
PO Box 77000
PORT ELIZABETH
6031

Dear Professor Rossouw Von Solms

CONFIRMATION OF PERMISSION FOR PHD STUDIES: S M KOEKEMOER

The National Treasury hereby confirms that Silma Koekemoer has been a part of the *m*SCOA team, firstly in the capacity of change team lead and since February 2016 as the project manager. These positions have provided her with access to information in the public domain, as well as confidential information relating to the *m*SCOA project and municipalities across the country.

Silma is granted permission to use this information for purposes of her PhD (ICT) studies, with the clear understanding that she may not use confidential information in any way that individual persons, municipalities or other stakeholders are identifiable, or in any way reflects negatively on the National Treasury. Additionally, she should adhere to the conditions agreed to in terms of the Non-Disclosure Agreement, Code of Ethics, and Solemn Declaration which she signed, copies attached herewith for your perusal and record purposes.

I would like to use this opportunity to wish her the best with her studies and look forward to viewing the final product.

Yours faithfully

JAN HATTINGH
CHIEF DIRECTOR: LOCAL GOVERNMENT BUDGET ANALYSIS
DATE: 08/12/2016

ANNEXURE B: Conference Proceedings

1. IT Project Management Maturity in South African Municipalities; IST Africa 2017 Conference Proceedings

2. Document Management Systems – Legislative Compliance, Good Governance and Municipal Practice; IST Africa 2018 Conference Proceedings

3. Deficient Governance Practices, Adverse Audit Findings, Financial Vulnerable Municipalities and Service Delivery Protests – Does the 4th Industrial Revolution hold the Solution to Sustainable Basic Service Delivery in South Africa? SAAPAM 2019 Conference

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IIMC International Information Management Corporation, 2017
ISBN: 978-1-905824-57-1

IT Project Management Maturity in South African Municipalities

Silma KOEKEMOER, Rossouw VON SOLMS
Nelson Mandela Metropolitan University, School of ICT, P.O. Box 77000 NMMU, Port Elizabeth 6031, South Africa
Tel: +27 41 504 3604, Email: silma.m.koekemoer@gmail.com, rossouw@nmu.ac.za

Abstract: Information Technology (IT) is a key enabler of service delivery to citizens and business, and therefore the low success rate of IT projects negatively impacts on service delivery. This paper evaluates the current IT project management maturity levels of South African municipalities which was observed during the implementation of an IT project, and compared to leading project management maturity models. The IT project management maturity was found to be low across the sample municipalities, ranging from levels 0 to 2, and therefore interventions were recommended to support people, improve processes, and provide tools to address the identified shortcomings.

Keywords: Information Technology, Project Management, Project Management Maturity, Maturity Models.

1. Introduction

Information Technology (IT) enables innovation and improved service delivery in private and public sectors, and supports development. The Horizon 2020 website [1] states that "ICT also invades and transforms bit by bit all aspects of our societies and economies and changes the way people live and behave". However, research by the Standish Group [2], indicates that IT projects are late up to 72% of the time, whilst only 35% of these are considered successful and a further 46% are challenged in terms of budget and functionality delivered. They continue by pointing out that over time, organisations and government have been burdened by an ever-growing installed base of software which control virtually all their processes; and that "these systems have grown into black-box behemoths of business logic and data representations that continue to stifle organisational agility", service delivery and cost effectiveness. Shark [3] contributes that "the skills and success factors in project delivery are always based on the right people, with the right processes, utilising the right tools".

"Local and regional governments have an imperative duty to their communities because they are directly responsible and accountable for service delivery", Sibindana [4]. As budgets get tighter and the economy declines, community pressure on government to deliver more and better services increase. This drives managers to do more with less, realising the need for a fresh approach to service delivery and smarter use of enabling technology.

Ramabulana [5] found that for municipalities to operate optimally and provide services to the community, existing deficiencies in Information Technology (IT), particularly their inability to link strategy to community needs and service delivery priorities, should be addressed. "Municipalities and municipal entities need IT systems that support all types of activities at different levels in the system. Designing an efficient IT system that works well for all employees has become a paramount need." He concludes that global standard practice in public sector is geared towards strategic and performance management systems

that link community needs with service delivery, and help to clear audit findings. Above all, these systems should incorporate models for evaluating performance maturity levels, including maturity in project delivery.

Thus, the question arises, how will service delivery and existing deficiencies in IT be addressed without the right people, processes and tools? Furthermore, the limited success with IT implementation projects leads to the key question namely, what is the current IT project management maturity level at municipalities and how can the level be enhanced to support the required service delivery standards?

This paper addresses the research objectives; an overview of the methodology which was employed; a short literature review covering key Project Management Maturity Models; the actual research findings from a sample of 17 South African municipalities; and conclusions and summary recommendations, including opportunities for research cooperation between Europe and Africa.

2. Research Objectives

Project management provides a framework for structuring organisations, by focusing on strategy, service delivery, effort and use of scarce resources, Minnaar & Bekker [6]. IT project management enables municipalities to acquire and successfully implement technology in support of service delivery and therefore the key objective of this paper is to evaluate the current IT project management maturity of municipalities. This key objective is supported with the following sub objectives, namely to:

1. Compare existing maturity models and propose an IT project management maturity model for purposes of this paper;
2. Apply the proposed model to evaluate the current IT project management maturity of sample municipalities; and
3. Recommend activities to improve IT project management maturity levels in municipalities.

The anticipated business benefits from this research paper are practical and implementable recommendations to improve the IT project management maturity in municipalities which Nesensohn et al [7] contend, should lead to an evolution of people, technology, processes and products over a period, keeping projects on track, having clearly defined ways of doing things with defined roles and responsibilities, and constantly achieving planned goals and strategic objectives. It is posited that improved IT project management maturity will permeate the municipality and ultimately lead to improved service delivery for citizens and business.

3. Methodology

A literature review provided an overview of the evolution of project management maturity models, the domains and attributes which are considered when evaluating the maturity of an entity, as well as the maturity level definitions, assessment descriptions, and appraisal and scoring methods. This was adapted for use in appraising the current IT project management maturity of municipalities.

There are 257 municipalities in South Africa, consisting of 8 metropolitan municipalities, 44 districts and 205 locals. A purposive sampling method was used, utilising the pilot municipalities and early adopters of the recently regulated standard chart of accounts [8]. This organisational reform includes an IT project which involves all the municipalities in the country, re-implementing their current Financial Management and Internal Control Systems (FMICS), or implementing a completely new FMICS. The sample for this research paper therefore was:

Table 2 – Research Sample

Municipal Category	Total number	Sample size	Percentage of category
Metropolitan	8	2	25%
District	44	5	11%
Local	205	10	5%
Total	257	17	

The municipalities' project implementation teams were observed during execution of the IT project from February 2015 to November 2016, which is a similar project for all the municipalities in the country with clear guidance provided by National Treasury regarding the governance of the project, project implementation teams, minimum system specifications and change management.

Observation included evaluation of the project implementation as it unfolded at the selected municipalities, regular site visits and advice to the municipalities, change management and training interventions, municipal self-assessments and questionnaires, and project team meetings to discuss progress.

4. Project Management Maturity Models

Obeidat and North [9] state that a literature review has revealed that the use of IT in project management is gaining prominence, with up to 63% of the articles they reviewed relating to IT projects itself and not merely the use of IT tools. The authors continue that, most IT projects in both public and private sectors are mismanaged and inefficient at achieving the goals and objectives of the project. The article also points out differences between these sectors which could influence the delivery of IT projects, namely: IT managers' approach to interdependence across organisational boundaries; evaluation criteria for hardware and software; the key concerns and planning focus; and IT managers in public sector are placed at a lower organisational level than in private sector. They propose that research into the area of IT project management remains insufficient and warrants further investigation.

Maturity models originate from the total quality management discipline and drive continuous improvement linked to strategy. Maturity models can be explained as a set of attributes or characteristics which indicate development, progress and achievement in a specific field or discipline. Caralli et al [10] pose that maturity models allow for "practices, processes and methods to be evaluated against a clear set of artefacts that establish a benchmark", and which typically represent best practice. Proposals for improvement should be based on an understanding of the organisation's current and future positions and assume that performance improves commensurate with higher levels of maturity, Brookes and Clark [11]. Maturity in project management therefore suggests improved project performance through formalisation of processes, increased knowledge and experience, and organisational maturity, Moraes and Laurindo [12]. Sidenko [13] investigated the relationship between project management maturity and project success, confirming that project efficiency and organisational success were most relevant in contributing towards organisational project management maturity.

Soares and Meira [14] posit that to increase the success rate of IT project implementations, an effective maturity model, which forms a part of the organisation strategy, is key. They provide an overview of the development of project maturity models, which was adapted by the researcher and represented in Figure 1 herewith. (Refer to Appendix A for a list of acronyms).

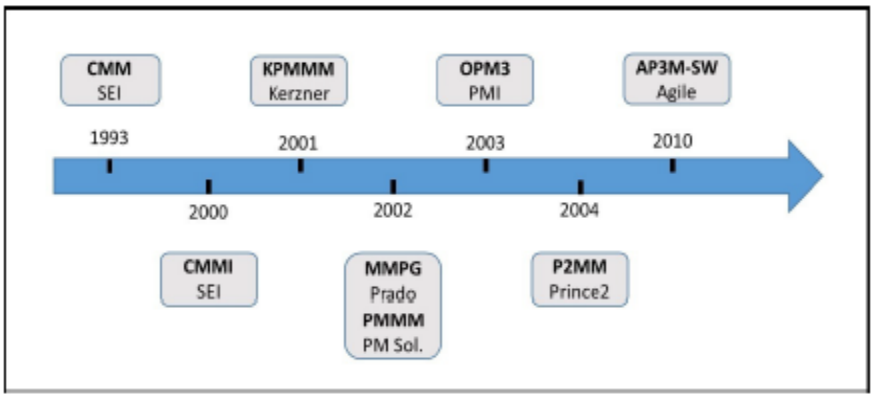

Figure 1 - An overview of the development of Project Management Maturity Models

Hans and Rwelamila [15] on the other hand, maintain that the challenge is based in the skills and attributes of the individual project manager, the assigned importance of the role of project managers, and skewed training programmes offered within the country. These findings are aligned to the findings of the Auditor General of South Africa (AGSA), namely "key positions vacant or key officials lacking appropriate competencies", [16].

Caralli et al [10] list the essential components of maturity models, namely maturity levels; model domains; attributes; appraisal and scoring methods; and the improvement roadmaps. Table 2 presents the maturity levels and assessment descriptions which have been used in this instance:

Table 2 – Maturity Levels

Level	Stage of Maturity	Assessment Description (adapted for this research paper)
5	Sustained/ Optimising process	A clear process improvement and optimisation focus throughout the municipality
4	Integrated/ Quantitatively managed	Processes are quantitatively measured and well controlled, integrated into the business processes
3	Managed/ Defined process	Clearly characterised and defined processes, which are executed proactively throughout the municipality
2	Basic definition of repeatable processes	Processes have been characterised and initially defined as repeatable, with execution mostly reactive
1	Awareness of process/ Ad hoc or initial execution	Awareness of processes which are poorly controlled and mostly reactive in approach or execution
0	Non-existent	No evidence observed of the defined behaviour

Model domains group attributes per subject matter or intent of the model. These are often referred to as processes and can either be used to focus on a single area for improvement or describe a pathway for progressive improvement. Maturity models measure attributes, competencies, dimensions or knowledge areas. Table 3 presents a summary of the key project management maturity models and provides the foundation for the maturity model used in this research, which is included in the last column.

Table 3 – Maturity Attributes, Competencies, Dimensions and Knowledge Areas

	CMMI	Berkeley (PM)²	OPM3	PMI	P3M3	AP3M	Municipal PMMM
Formal Project Management Methodology							*
Pre-implementation Business Case							*
Planning	*						*
Monitoring & Control	*				*		*
Requirement (Scope) Management	*	*		*			*
Audit & Risk	*	*	*	*	*		*
Integrated PM	*						
Integration		*	*	*			
Time		*	*	*			
Cost/ Financial Management		*	*	*	*		
Quality		*	*	*			*
HR/ Resources		*	*	*	*		*
Communication		*	*	*			*
Procurement		*		*			*
Contract Management			*				*
Change			*				*
Software			*				
Environment (Culture, Politics, Economic, Stakeholders)			*		*		*
Organisational Governance					*		*
Benefits Management					*		*
Envisioning						*	
Speculate						*	
Explore						*	
Adapt						*	
Close						*	*

Maturity models also include scoring and appraisal methods, which are designed to ensure consistency of application and standardised measurement. Caralli et al [10] note that many of the above models have prescribed methods for identifying the scope for improvement and diagnosing the current state. The identified attributes from Table 3 were observed during implementation or upgrade of a FMICS in the sample municipalities, and appraised per the maturity levels identified in Table 2. A general roadmap of activities to address the project management maturity levels at municipalities was developed as a recommendation of this paper.

5. Research Findings

Observation of the project management teams at 17 sample municipalities can be summarised as follows:

Table 3 – Research Findings

Municipal PMMM	Metropolitan Municipalities	District Municipalities	Local Municipalities
Formal Project Management Methodology	Level 1	Level 1	Level 1
Pre-implementation Business Case	Level 2	Level 2	Level 2
Benefits Management	Although all the municipalities indicated that a Business Case was prepared before project initiation, there was no observation or evidence of management of the business case or expected benefits of the project during project implementation		
Requirement (Scope) Management	Defining and agreeing on the scope was challenging and in most of the municipalities significant scope creep and contract extensions and additions were observed		
Planning	Level 2	Level 2	Level 2
Monitoring & Control (Management)	All the municipalities indicated an existing or established oversight structure but not all were able to produce steering committee meeting agendas or minutes The municipalities have functioning audit and risk structures but minimal involvement in the IT project was observed as the audit and risk teams did not want to "compromise their objectivity"		
Organisational Governance	Level 2	Level 2	Level 2
Audit & Risk Management	Level 3	Level 3	Level 3
Quality Management	It was observed that there is an over-reliance on consultants and system vendors which compromises the municipalities' ability to manage the quality of project delivery		
Project Team	Municipalities do identify internal implementation teams, but could not confirm project related training or experience of individuals, and did not provide written appointments or extensions to performance agreements In several of the municipalities the project manager and - sponsor were identified as the same person or role confusion arose during execution of the project		
HR/ Resources Management	Level 1	Level 0	Level 0
Communication Management	Level 2	Level 1	Level 1
Procurement Management	Municipal procurement is strictly governed by legislation, yet IT procurement seems not to always follow these processes; and in several municipalities, it can be described as ad hoc, driven by individuals and requiring further research		
Contract Management	Level 1	Level 0	Level 0
Change Management	Level 2	Level 2	Level 2
Environment (Culture, Politics, Economic, Stakeholders)	Level 2	Level 1	Level 1
Formal Closure	Level 0	Level 0	Level 0

Table 3 indicates an IT Project Management Maturity Level ranging from Level 0 to Level 2 (excluding Audit and Risk Management) across the sample municipalities. This evaluation is supplemented by comments from the project teams, such as:

- "Alignment between IT and business is always a challenge at our municipality";
- "It is imperative that procurement of IT be centralised to ensure standardisation";
- "An IT committee should be formed to ensure adequate governance";
- "Customised project management frameworks and methodologies are the best for municipalities to ensure practicality and value for money"; and

- "Lack of leadership and 'silo mentality' negatively impacts on project outcomes".

Above evaluation and comments are supported by the AGSA, who for the period 2013-14 highlights five general areas that require external intervention, IT management and controls being one. The AGSA cautions that attention should be given to, amongst other, the qualifications and experience of CIOs and IT managers, in addition to addressing the audit findings from previous years and paying attention to emerging IT risks. The AGSA also provides guidance to municipalities to address the audit findings, amongst other that:

- An IT governance framework should be developed for all municipalities;
- An IT best practice manual or guideline should be drafted for municipalities;
- Policies and procedures should be standardised to address the control weaknesses;
- A working group should be established to assist the municipalities in addressing the root causes of audit findings;
- IT governance forums should be established;
- Internal audit and audit committees should play a more effective role in tracking the implementation of corrective measures to address IT audit findings;
- Management should reallocate sufficient budget for the upskilling of IT staff;
- Consultants should be monitored through service level agreements;
- Staff should be trained by the consultants performing services; and
- Standardisation of municipal IT systems and supporting vendors.

Molatlhwa [17] continues this discourse in support of the AGS's finding of over-reliance on consultants, stating that whilst "municipalities spent more than R3.3-billion of taxpayers' money on consultants, … it was the AG's office that had to correct their material mistakes". The author found that "R615-million was spent on consultants for Information Technology (IT) services, R43-million for preparation of performance information and R1.822-billion for other services".

6. Conclusions and Summary Recommendations

IT is an enabler of efficient service delivery to citizens and business. The potential contribution of higher IT project management maturity levels towards improved municipal service delivery should not be underestimated.

The ultimate objective of implementing a Standard Chart of Accounts for municipalities in South Africa, is not merely achieving a uniform data set, but also introducing an organisation wide reform which changes the way in which municipalities operate, from a budget line item driven organisation to a project driven organisation. In this way, service delivery can be directly related to strategy and financial performance. For this reason, the team will continue to work closely with all municipalities, towards improving project management maturity in general, and including supply chain management and contact management into the broader project scope.

This paper discussed project management maturity models and adapted leading models for appraisal of the current IT project management maturity in municipalities. The research findings were then compared and confirmed with the findings of the AGSA, namely that the current IT project management maturity in all categories of municipalities is very low, ranging from levels 0 to 2 across the research sample. As the sample is representative of all categories of municipalities, and correlates with the report of the AGSA, the findings can be applied to all municipalities in South Africa.

The AGSA proposes areas for improvement which, together with the findings of this research paper can be recommended as an IT project management maturity improvement plan or roadmap. Although this list is not exhaustive and does not address all the attributes of the project management maturity models in detail, it does address the main findings and

provides guidelines to municipalities along the evolutionary path to improve on their current IT project management maturity, and ultimately on service delivery:

Table 4 – IT Project Management Maturity Improvement Roadmap

Enablers	Intervention	Activities
People	Capacity building and support	Development of guidelines and manuals
		Training and skills transfer
		Establish working groups to support officials
		Involve internal stakeholders: HR, Communication, Procurement, Change and Contract Management
		Address performance agreements
Processes	Governance	Formal appointment of steering committee and project implementation teams
		Strengthening the oversight role, internal and external audit and risk management, and regular project review
		Quality reviews and management
		Management of internal and external stakeholders
	Policies and procedures	Adoption of a formal project management methodology for IT projects
		Pre-implementation business case development, benefits management and realisation, and value for money audits
		Requirements and scope management
		Formal close out procedures and report
Tools	Standardisation across municipalities	Legislation, regulations and practise notes
	Enable IT project delivery	Formal project management methodology
		Contracts, SLAs and MOUs which comply with the prescribed minimum standards, to manage service providers and contractors
		Examples and templates of project delivery artefacts

Further study is recommended to link IT project management maturity levels to service delivery and audit outcomes, as well as a formal appraisal of the IT project management maturity at the sample municipalities to gauge improvement in maturity levels after implementation of the proposed activities.

Opportunities exist to research the IT project management maturity levels of municipalities in Europe, in comparison to the findings in South Africa municipalities, and particularly how this impacts on service delivery. Lessons learnt from European municipalities can then be transferred to South African municipalities to increase the level of IT project management maturity; to improve service delivery; to link service delivery to strategy; and to enable effective performance management.

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Appendix A

APM	Agile Project Management
AP3M-SW	Agile Project Management Maturity Model
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integration
KPMMM	(Kerzner) Project Management Maturity Model
MMPG	Maturity Model for Project Governance
OPM3	Organisational Project Management Maturity Model
PMI	Project Management Institute
PMMM	Project Management Maturity Model
$(PM)^2$	Project Management Process Maturity
P2MM	Prince2 Maturity Model
P3M3	Portfolio Programme and Project Management Maturity Model

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Document Management Systems – Legislative Compliance, Good Governance and Municipal Practice

Silma KOEKEMOER, Rossouw VON SOLMS
Nelson Mandela University, School of ICT,
P.O. Box 77000 NMU, Port Elizabeth 6031, South Africa
Tel: +27 41 504 3604, Email: rossouw@nmu.ac.za

Abstract: Document management refers to a system used for creating, managing and storing documents within an organisation. Municipalities require a system of this nature to remedy adverse audit findings due to unsubstantiated financial transactions and contract awards. This paper investigates the legislative requirements for such a document management system, good governance principles related to management of documents, and current practice in municipalities. It was found that municipalities do not make adequate use of document management systems and that implementing such would assist to address the audit findings. This paper concludes that an external intervention is required to set municipalities on a path towards effective documents management and provides guidance for the implementation of document management systems, including addressing organisation needs, an implementation strategy, involving the management and employees, and ensuring a seamless user experience to maximise use of the system and achievement of the business case.

Keywords: Document management systems, information management, legislative compliance, good governance, audit findings, municipal practice, and project implementation.

1. Introduction

A document management system can best be described as a system, manual or electronic, which is used to generate, track, manage and store documents, including tracking various document versions created and modified by different users. It provides an audit trail, overlaps with content management systems, and is related to digital asset management, document imaging, workflow and records management systems (Frost, 2017). The terms document management, knowledge management and information management are often used interchangeably. This paper is based on the literature sources which have been quoted.

Minnaar (2010) explains that government organisations operating in the information age need to satisfy the demands of a sophisticated and informed public, and therefore need to adapt the municipal management and planning methodologies to individualise citizen choice, deal with instantaneous communication spread, and the demise of time and geographic birders, using information. He also reminds that municipalities do not strive to optimise profit, but rather sustainable development, following government policies which determine their mandate.

The Auditor General of South Africa (AGSA) reported in 2013/2014 (Auditor General of South Africa, 2014) that "the basic controls in municipalities are weak" and assessed the status of controls as requiring intervention. Proper record keeping, and information management was indicated as the key source of the finding that 100% of the municipalities in the Free State, Mpumalanga, North West and Northern Cape require an external intervention to address the situation. The 2014/2015 consolidated audit report for local

government (Auditor General of South Africa, 2015) once again reiterated the importance of proper and timely record keeping as the source of complete, relevant and accurate information which is easily accessible and available to support financial and performance reporting. The report continues by stating that a lack of effective document management practices affects all areas of business and impedes accountability and service delivery.

During the 2015/2016 review of municipal performance, (Auditor General of South Africa, 2016), it was found that contract awards to the value of R2 765 million at 52 municipalities could not be confirmed, because the municipalities did not maintain sufficient evidence to substantiate that these awards had been made in accordance with the requirements of supply chain management regulations. The relevant documentation did not exist, or could not be retrieved, due to poor document management systems and practices.

Cox (2000) states that: "The importance of records, and the daily, unfolding challenges to the management of these records, merits new thinking and new approaches mixed with those that have stood the test of time and proven themselves".

Therefore, it becomes clear that document management systems in municipalities not only fulfill an important administrative - and legislative role, but also impact on the annual audit findings, and require an external intervention to set municipalities on the right path.

2. Research Objectives

Management of information, which includes document management, is not primarily about technology, it is about organisations, their culture and people, strategy, processes and the technology they use. Robertson (2005) contends that "Information management is an umbrella term that encompasses all the systems and processes within an organisation for the creation and use of corporate information". Casadesus de Mingo and Cerrillo-i-Martines (2017), stated that transparency in public administration has proved to be a powerful weapon against corruption. Additionally, Centobelli et al. (2017) confirm that there is a positive correlation between effective content management and organisation performance and therefore it is the research objectives, reported in this paper, to investigate the use of document management systems in local government within the context of the adverse audit findings and to propose key principles for document management systems to address these.

The key contribution of this paper is not restricted to municipalities alone, as sound document management practices not only improve efficiency and effectiveness of performance, but also promotes transparency and prevents corruption in general.

3. Methodology

A literature review provided insight into legislative requirements for document management and related principles of good governance. This was used as a framework for an assessment of the use of document management systems in municipalities.

There are 10 main Information Technology (IT) vendors serving municipalities, and not all of them provide document management systems to their municipal clients. Assessments of these systems identified eight possible uses of a document management system in a municipality. These uses informed the data collection which was performed.

Data was collected from 40 of the 257 municipalities (8 metros, 44 districts and 205 locals) in South Africa, and represents the municipalities which have access to document management systems. This constitutes 15% of the municipal population.

Questions relating to the use of document management systems addressed managing documents, Integrated Development Planning (IDP), budget preparation, financial transacting, reporting, asset management, governance, and customer interaction. The results were then compared with the findings of the audit reports and the literature review, and some key principles are proposed to address the shortcomings. Corporate strategy, the role

of people and the quality of the content, were not included in the review, as the focus is on the availability of IT and the actual use thereof.

4. Document Management – Legal Compliance

The South African Institute for Chartered Accountants (SAICA) provides guidance on the legislative framework, stating that where multiple acts are applicable, the most stringent should be applied, (South African Institute for Chartered Accountants, 2013). In the case of municipalities, the Municipal Finance Management Act (MFMA) (South Africa, 2003) is not very explicit and therefore, the guidance in the Public Finance Management Act (PFMA) (South Africa, 1999) should be followed. It dictates that information should be retained for at least one year after the last year of applicability or auditing thereof. Further, if the retention period has expired, the information may be stored in an alternative form, which should still ensure the integrity, reliability and accessibility of the information, i.e. a document management system.

The National Archives of South Africa Act, (NASA) (South Africa, 1996), ensures that government records are properly cared for, preserved and managed. The Act calls for: "(i) Efficient and reliable management of information; (ii) Well managed records to support sound decision making; (iii) That records should meet legal, evidential and accountability requirements; and (iv) Documenting and recording events and history".

The regulatory framework also includes the Promotion of Access to Information Act (Act No. 2 of 2000), Promotion of Administrative Justice Act (Act No. 3 of 2000), and Electronic Communications and Transactions Act (Act No. 25 of 2002), read together with the Electronic Communications Policy, Electronic Document Management Policy, and Information Security Policy.

Section 14 of the Protection of Personal Information Act (South Africa, 2013) states that personal information must not be retained for any longer than is necessary to achieve the purpose for which it was collected. It should also be safely destroyed if there is no legal requirement to keep the information. This therefore places an obligation on the municipality collecting the data, to destroy or remove it at an appropriate time.

The Treasury Regulations to the PFMA, Regulation 17(2) determines the following minimum document retention periods, applicable to this paper:

Table 1: Document Retention Periods

Reference	Document type	Retention period
12.1	General ledger and cash books or similar records	15 years
12.2	Internal audit reports	10 years
12.3	Main transaction summary records, including journals and transaction summaries	10 years
12.4	Primary evidentiary records, including copies of forms issued for value, vouchers to support payments made, pay sheets, returned warrant vouchers or cheques, invoices and similar records associated with receipt or payment of money	5 years
12.5	Source documents: General and incidental source documents not included above, including stock issue and receivable notes, copies of official orders (other than copies substantiating payments or for unperformed contracts), bank deposit books and post registers	5 years
12.6	Subsidiary ledgers, including inventory cards and records relating to assets no longer held or liabilities have been discharged	5 years

Thus, it has become clear from the legislative framework, and the findings of the AGSA, that these findings could be addressed and remedied by a functional document management system, supported by relevant IT.

5. Document Management – Good Governance

Good governance is a continuing process, the sum of the many ways of managing common affairs, including "formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest", (Commission on Global Governance, 1995).

Already in 2007, the Department of Provincial and Local Government (DPLG) identified the need to actively capture and manage knowledge, including documents, to develop local government, (Gaffoor & Cloete, 2010) and improve governance. Not only does this improve service delivery, it also supports risk identification (Ngoepe, 2014) and prevents corruption (Casadesus de Mingo & Cerrillo-i-Martinez, 2017). The eight major characteristics of good governance are generally held to be accountability, consensus oriented, effectiveness and efficiency, equity and inclusiveness, participation, responsiveness, transparency, and following the rule of law. It is considerate of the current and future needs of the organisation (municipality) and community, whilst supporting the process of decision making and – implementing, (Governance Pro).

Therefore, a document management system by design, should contribute towards effectiveness, efficiency, accountability and transparency, reduce unnecessary administration and support improved service delivery, which objectives are aligned with the characteristics of good governance, Casadesus de Mingo and Cerrillo-i-Martinez (2017). Transparency and accountability should also be incorporated into records' lifecycle management to manage risk and reduce corruption. The authors continue that transparency in public administration can be improved by document management systems which facilitate access, dissemination and reuse of information. These systems should form the very basis for transparency in administration throughout the entire lifecycle of records.

ISO 15489-1:2016 (ISO Standard, 2016), declares a document management system to be a source of information on business activities and addresses:

- records, metadata for records and records systems;
- policies, assigned responsibilities, monitoring and training supporting the effective management of records;
- recurrent analysis of business context and the identification of records requirements;
- records controls; and
- processes for creating, capturing and managing records.

The standard applies to the creation, capture and management of records regardless of structure or form, in all types of business and technological environments, over a period.

Ngoepe (2014) found that notwithstanding the reciprocal relationship between records - and risk management, government generally lacks records management, risk mitigating frameworks and strategy. Risk committees do not include records managers and that "risks associated with records are often dealt with on an ad hoc basis via internal audits, legal processes, and information technology and in few instances, records management". The author explores the use of records to identify risks, records as the cause of risk, risks associated with the archival function, and records management associated with the risk management process. Ngoepe (2014) continues that records are necessary to substantiate organisational conduct and that the strength and effectiveness of record-keeping and risk management are inter-dependent and ensure authenticity and integrity of electronic records.

Records and documents management, clearly provides a basis for transparency in municipal administration, and enables the creation of quality documents (authentic, reliable and credible), provides a foundation for planning of budgets and activities, tracking of decisions (resolutions), standardisation of processing, and the fulfilment of the right to access of information (access, reliability and preservation), (Casadesus de Mingo & Cerrillo-i-Martinez, 2017). Rodreck (2017) identified a direct relationship between

inadequate records management and adverse audit findings related to governance of financial activities in government entities and therefore it becomes clear that municipalities could address governance related audit findings through effective document management.

6. Document Management – Municipal Practice

The rapid advancement of technology and systems provides speedy access to greater volumes of information. This can overwhelm employees and inhibit their use and the value thereof, according to Averweg (2012), negatively impacting on service delivery.

Service delivery in the information age requires a rapid flow of communication, effective processing of information (including documents), an integration of work activities and processes including flexible interaction with the management, and generation of organisational knowledge which would support meaningful execution of the municipal mandate. Minnaar (2010) supports this point of view and relates the creation of the IDP to management of the "ultimate core resource", the applied information which the municipality captures (documents) and uses to direct service delivery.

Averweg (2012) investigated the role of IT within eThekwini Metro in managing and sharing of knowledge, as it relates to service delivery. This implies the existence of an efficient document management system, as reference is made to "alerting" employees of the availability of material/ documents, including blocking of (electronic) functionality until all relevant information has been retrieved, and "retrieving" of discretionary information from the intranet. The author contributes that IT is a key enabler of knowledge management. The purpose thereof should be to store, organise and disseminate knowledge (documents) and support externalising and socialising knowledge. He continues to argue that knowledge management offers local government organisations the benefit of planning, decision making and efficiency in service delivery. The author concludes that systems should be developed to improve access to information, policies should be aligned, the organisational culture should support information sharing, and creation and sharing of information should be encouraged as being good practice.

Information enables municipalities to improve service delivery, transparency and accountability (Gaffoor & Cloete, 2010). This information is systematically created, maintained and accessed, and improves employees understanding of the internal processes and functioning. However, knowledge management is restricted if it is not supported by adequate systems and a supportive organisational culture. The required IT is described as facilitating quick searching, access and retrieval of information, should integrate with the current municipal systems, and provide "value" to the users.

An analysis of the IT environment at Stellenbosch Municipality (Gaffoor & Cloete, 2010), indicated the municipality "utilises various systems in various departments. There is no system spanning over the entire municipality", and these systems are not integrated. The survey identified co-existing but not integrated information, content and document management systems. This hampers planning, decision making and service delivery.

Henderson and Venkatraman (1993) researched the strategic alignment between organisations and their IT, concluding that internal and external alignment are required. Internal alignment refers to the alignment of organisational - and IT processes, whilst external alignment refers to the business itself, its strategic objectives and its IT strategy. Centobelli et al. (2017) propose a process to align knowledge, knowledge management systems and decision support, which would also address management of documents. Accordingly, the municipality should assess the nature of the knowledge (information and documents) and its alignment to the systems (tools and practices). The purpose is to reduce the misalignment and improve the operational performance in terms of efficiency, effectiveness and management decision support. Decision support systems are defined as data-driven, model-driven, document-driven, communication-driven, or knowledge-driven.

The assessment of legal compliance, good governance and municipal practice as these relate to document management clearly indicated that municipalities are legally compelled to manage documents within a prescribed framework and require a system and processes to do satisfy AGSA. Additionally, there is a direct relationship between the principles of good governance and achieving clean audit outcomes, which calls for municipal processes, including document management, to be designed and implemented in a way that results in the achievement thereof and are supported by appropriate IT. Data was collected to determine if this is the case in South African municipalities.

7. Gathering of Data

The document management systems and practices of 40 municipalities were investigated through a simple questionnaire, to determine if they have a policy and system, the role and importance thereof in the municipality, and its use. The responses were not further interrogated to confirm the effectiveness of the systems where these were found to be present, but several of the system vendors, when they were questioned, indicated that they are maintaining and running the document management systems for the municipalities. It was also found that the individual municipalities and even departments within these municipalities, use disparate systems. The respective system vendors provided additional insight into the IT products and the levels of integration between the document management system and the core (financial) systems of municipalities.

The municipalities all responded that they have access to document management systems, but these were mainly used for imaging, storage, management, tracking and control of documents (paper-based source), and archiving of documents in support of financial transactions. Half of the municipalities indicated that the document management system also supports asset management in terms of archiving of paper based documents, plans and photographs, but no reporting or support of strategic and management decisions is informed by the document management systems.

The findings from this research correspond with the findings of the AGSA.

8. Research Findings

Document management systems and practices of 40 municipalities were investigated and can be reported in Table 2.

Whilst all the municipalities confirmed that they do have access to document management systems, the use thereof is mainly distributed between managing documentation relating to transacting (financial source documents) and asset management (condition assessments and revaluations). Only one municipality indicated that the system is used for customer interaction related to service delivery, which is a key objective of municipalities. Five municipalities have policies governing the management of documents and two experience tangible and visible benefits from their document management systems.

Municipalities have confirmed that the document management system is primarily used to manage financial source documents, yet the AGSA, in 2015/ 2016 found that contract awards to the value of R2 765 million at 52 municipalities could not be confirmed, because the municipalities did not maintain sufficient evidence to substantiate that these awards had been made in accordance with the requirements of supply chain management regulations.

Table 2: Research Findings

DESCRIPTION	NUMBER	PERCENTAGE
Sample size	40	100
Municipalities using a document management system	40	100
Provided by a sub system vendor	28	70
Functionality included in the core municipal system/ package of systems	12	30
What is the document management system used for?		
Documents, i.e. imaging, storage, management, tracking and control of documents	40	100
IDP, i.e. record of community requests, prioritisation, record of public engagement(s), version control, strategic planning	0	0
Budget, i.e. record of documentation generated in the budget preparation process, agendas and meeting minutes, guiding circulars to departments	0	0
Transacting, i.e. debtor's information and correspondence, SCM documentation including quotes and specifications, creditors information and correspondence, delivery notes, HR and payroll related information, employee related correspondence and copies of qualifications, leave requests NOTE: This response could relate to all, or only some of the uses listed. It is directly related to the findings of the AGSA.	40	100
Reporting, i.e. notes to the AFS, performance management documentation, recording of non-financial information, annual report and budget speech NOTE: One of the respondents indicated that they do have a separate performance management system, not related to their document management system and not integrated with any of their other systems.	0	0
Asset management, i.e. storing of photographs and documents, barcoding and tracking, workflow related to operating and maintaining assets, asset registers NOTE: This functionality is incorporated into the core asset management system used by some municipalities, but mostly managed and maintained by the system vendor on behalf of the client municipalities	22	55
Governance, i.e. petitions, resolution tracking, audit reports and findings management	6	15
Customer interaction, i.e. recording of calls, documents supporting calls, correspondence, notifications	1	2.5
	YES	**NO/ NOT SURE**
Does the municipality have a policy regarding the retention and disposal of documents?	5	35
Does your document management system deliver tangible and visible benefits to the municipality or the community?	2	38
EXAMPLES: Keep a record of interaction with citizens (letters); keep a record of council resolutions; electronic copies of invoices processed; photos of infrastructure assets; documents relating to construction assets; record of retention payments due to contractors		
Is your document management system a priority IT system of the municipality/ IT department/ municipal administration?	0	40
Is your document management system a key feature of the risk management process in your municipality?	0	40

The graphic presentation of the findings in comparison with the sample total of 40 municipalities, clearly indicates that there is no use of the system for planning purposes and reporting, with minimal visible benefits to the municipality or the community. Only 5 municipalities indicated that they have a document management policy and 6 responded that it is used for governance purposes. Document management systems are considered effective if they increase transparency and accountability, support risk management and reduce corruption, which is not the case from these findings.

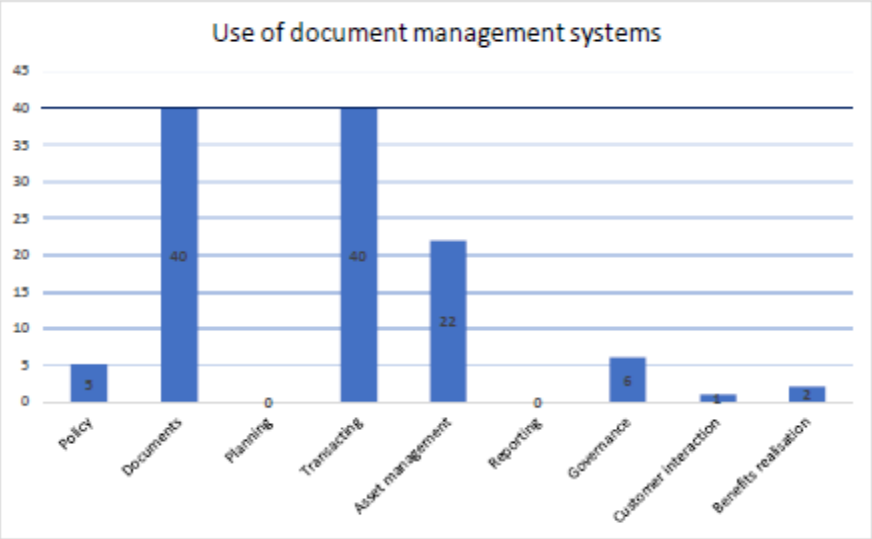

Figure 1: Research Findings

Only 30% of the municipal respondents utilise document management systems which form part of their core systems, requiring of the other 70% to ensure integration across different and disparate systems. Gaffoor and Cloete (2010) confirmed that at Stellenbosch Municipality, systems are not integrated, resulting in information sharing being hampered and only providing limited access to sources, identifying a priority need at the municipality to implement an organisation wide document management system.

These findings are aligned with the findings from the literature, as well as the quoted reports of the AGSA, and confirm that there is a pressing need for effective document management systems within municipalities. Municipalities do not have document management embedded in the business processes or daily practice, and do not effectively use document management systems to support planning and reporting, or to interact with the community. The systems do not comply with the ISO standard and have not been prioritised in either the IT master plans or risk management processes. Therefore, the call from the audit reports for an external intervention to address the matter, is supported.

9. Recommendations and Conclusion

It can be concluded from the research that document management systems should be embraced by employees to be effective, and therefore they should be designed around the needs of the users in a series of small steps, as opposed to a large-scale organisation wide burden which is designed merely to address compliance. These efforts should be prioritised by management and supported with external interventions.

Key recommendations emanating from this research are:

- The departure point for a document management system should be to identify key corporate information, information shared within the municipality and information communicated externally. Management of key information will have a greater effect than doing nothing at all, or trying to do everything and failing at the attempt;
- Successful implementation of IT tools (document management systems) requires an understanding of the business and management activities of the municipality, as well as the legal and regulatory reasons for the implementation;

- The municipality also needs an implementation strategy and plan; methods for incorporating document management requirements into the design of business applications, work processes and management functions; and evaluation techniques for measuring the effectiveness of the document management infrastructure of the organisation;
- The municipality should identify the key project risks up front and plan to mitigate these throughout the implementation, assigning a risk owner and tracking these risks in project progress meetings; and
- Considering the current state of document management systems in municipalities, as presented in this research and confirmed by the audit reports, it becomes clear that an external intervention is necessary.

This research paper, supported by the findings of the AGSA and applicable legislation, has indicated a need for document management systems in municipalities and deduced some key recommendations during implementation. However, the municipal environment continues to evolve, is subject to political change and technology advances. Implementing IT systems is complex and requires thorough planning, supported by a clear strategy and business case, strong leadership and a committed team. It is therefore, recommended that municipalities should consider an external intervention, to achieve the objectives and business benefits intended from a document management system implementation.

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Appendix A - Acronyms

AFS	Annual Financial Statements
AGSA	Auditor General of South Africa
DPLG	Department of Provincial and Local Government
HR	Human Resources
IDP	Integrated Development Plan
ISO	International Standards Organisation
IT	Information Technology
MFMA	Municipal Finance Management Act
NASA	National Archives of South Africa Act
PFMA	Public Finance Management Act
SAICA	South African Institute of Chartered Accountants
SCM	Supply Chain Management

Title of submission: **Deficient Governance Practices, Adverse Audit Findings, Financial Vulnerable Municipalities and Service Delivery Protests – Does the 4th Industrial Revolution hold the Solution to Sustainable Basic Service Delivery in South Africa?**

Conference sub-theme: **Election promises and the use of public institutions and resources**

Name of author: **Silma Koekemoer and Rossouw Von Solma**

Institutional affiliation of author: **PhD student at Nelson Mandela University, Port Elizabeth**

E-mail address of author: **silma.m.koekemoer@gmail.com** **and** **Rossouw.VonSolma@mandela.ac.za**

Deficient Governance Practices, Adverse Audit Findings, Financial Vulnerable Municipalities and Service Delivery Protests – Does the 4th Industrial Revolution hold the Solution to Sustainable Basic Service Delivery in South Africa?

Smart municipalities refer to urban areas using technology to collect data which is transformed into information, and which in turn directs the efficient use of assets to provide sustainable services to the community (African News Agency, 2018). These services, defined in the constitution, include amongst other the four major trading services, namely electricity, water, waste water treatment and solid waste removal; and additionally, services such as safety and security, housing, healthcare, transport, and economic development (South Africa, 1996).

In contrast to these expectations, municipalities across the country are subject to ongoing service delivery protests (National Treasury, 2018), adverse audit findings, and deficient governance practices, resulting in financial vulnerability and leading to service delivery collapse (Auditor General (5), 2018). Desperate communities have no alternative, but to resort to "self-service" as a means to address their most pressing needs (Hosken, 2018). This paper firstly presents research into the current state of affairs at municipalities, expectations of the community and why to date, interventions have not made a significant difference.

As early as the 18th century, human invention and technology advances improved lives and addressed societal challenges. This paper therefore further investigates how harnessing public resources, introducing automation, the use of technology and new products offered by the 4th Industrial Revolution, can sustainably address the current service delivery challenges. Proposals seek to address the energy and water crises in the country, skills shortages and inefficiencies across government, and achieving sustainable solutions of an acceptable quality (Staff Reporter, 2015).

Finally, the impact of the 4th Industrial Revolution and the implementation of these proposed solutions on the government's mandate to bridge inequality, relieve unemployment and in particular the growing youth unemployment, is considered, before a conclusion is drawn and recommendations for further study are formulated.

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Annexure C: Article submitted for journal publication – Journal of public Admnistration (JOPA)

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Name of authors: **Silma Koekemoer & Prof. R Von Solms**

Institutional affiliation of author: **PhD student at Nelson Mandela University, Port Elizabeth**

E-mail addresses of authors: **silma.m.koekemoer@gmail.com** **and** Rossouw.VonSolms@mandela.ac.za

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In contrast to these expectations, municipalities across the country are subject to ongoing service delivery protests (National Treasury, 2018), adverse audit findings, and deficient governance practices, resulting in financial vulnerability and leading to service delivery collapse (Auditor General (5), 2018). Desperate communities have no alternative, but to resort to "self-service" as a means to address their most pressing needs (Hosken, 2018). Examples of these are the community cleaning the streets and waterways, fixing of potholes, drilling of boreholes and installation of water tanks, and purchasing generators or installing solar panels. Thus, this paper presents research into the current state of affairs at municipalities, expectations and perceptions of the community, to articulate the problem which needs to be resolved.

As early as the 18th century, human invention and technology advances improved lives and addressed societal challenges. This paper therefore further investigates how harnessing innovation, introducing automation, the use of technology and new products offered by the 4th Industrial Revolution, can address the current municipal service delivery challenges. Proposals seek to

address the energy and water crises in the country, skills shortages and inefficiencies across government, and to achieve sustainable solutions of an acceptable quality (Staff Reporter, 2015).

Finally, the impact of the 4th Industrial Revolution and the implementation of these proposed solutions on the government's mandate to bridge inequality and unemployment, are considered, before a conclusion is drawn and recommendations for further study are proposed.

Key words: Municipal service delivery, 4th Industrial Revolution, Technology, Innovation, Strategy, Governance

1. Introduction and background

Since the earliest ages, human invention and technology advances have improved lives and addressed societal challenges. Stone and iron implements, the wheel, steam engines, electricity, production line manufacturing and the advent of the computer, have hailed wave after wave of industrial, economic and personal advancement, permeating every aspect of life.

Despite a near miraculous transition of local government in South Africa since 1994, the second decade of democracy has been fraught with increased and violent protest action. In most of the cases the protest action relates to inadequate service delivery (Nleya, 2011). Sibindana (2015) reports that municipalities have a duty towards their respective communities and are directly responsible and accountable for service delivery in their municipal area. Buhlungu et al (2007) ascribe the failure of service delivery to municipal inefficiencies, poor municipal response to public grievances, and the prevalent culture of self-enrichment amongst officials and councillors. They add that often, municipalities face the consequences of inept policies and programmes at national, provincial and district level. Whilst there has been a rapid roll out of infrastructure and government grants, more effective and sustained support is required from sectoral departments to

address the issues. Ramabulana (2015) adds to the discussion that for municipalities to operate optimally and provide quality services to their communities, existing deficiencies in Information Technology (IT), and particularly municipalities' inability to link strategy and objectives to community needs and service delivery priorities, should be addressed.

The 4th Industrial Revolution, largely based on improvements and further development of technologies from the 3rd Industrial Revolution, is driven by smart objects, intelligent sensor networks, the internet of things, cyber physical systems of which the elements record information and communicate independently, and flexible mass production based on individualised customer demand (Dombrowski & Wagner, 2014), which could potentially hold the key to unlock the current service delivery challenges in South Africa.

Therefore, this paper employs a literature review methodology to investigate solutions and products from the 4th Industrial Revolution in response to service delivery challenges and their appropriateness for South African municipalities. It touches on the current service delivery challenges in municipalities, the 4th Industrial Revolution, the energy and water crises in the country, skills shortages and inefficiencies across government. The potential impact of the 4th Industrial Revolution and the implementation of these solutions and products on the government's mandate to bridge inequality, relieve unemployment and stimulate the economy is considered, before a conclusion is drawn and recommendations for further study are formulated.

2. Research objectives

Municipalities, the third sphere of government in South Africa, operate closest to the citizens and provide basic services across communities. Spatial segregation inherited from the apartheid-era requires large financial contributions from the government to address inequalities from the past and to render basic services to poor households, and as the pace of urban population growth is faster than economic growth, this position will prevail for the foreseeable future.

However, Dombrowski and Wagner (2014) explain that the 4th Industrial Revolution is poised to change social and economic structures, work circumstances and human-technology interaction, simultaneously creating opportunities to address historic inequalities and exclusion. The 4th Industrial Revolution reduces barriers and creates new opportunities for regional co-operation and governance, service delivery mechanisms and interaction with the community and stakeholder groups (World Economic Forum and Asian Development Bank, 2017).

Thus, this paper intends to investigate the opportunities offered by the 4th Industrial Revolution to provide innovative solutions for basic service delivery challenges in South Africa. Therefore, the secondary objectives of the research paper are:

i) To investigate the current state of basic service delivery at municipalities in relation to the expectations of the community;
ii) To understand how the introduction of automation, the use of technology and the offering of new products through the advent of the 4th Industrial Revolution, can address the current service delivery challenges;
iii) To consider the impact of the 4th Industrial Revolution and the implementation of these proposed solutions on the government's mandate to bridge inequality, address the prevalence of unemployment and in particular the growing youth unemployment; and
iv) To propose areas for further study.

3. Research methodology

This paper employed a qualitative research methodology, using document analysis as primary source of information. Oates (2011) distinguishes between researcher generated and found documents, in that found documents existed before the research commenced and were not specifically developed for the research. For the purpose of this paper, found documents were used to identify service delivery challenges in South African municipalities, and also to identify opportunities and challenges offered by the 4th Industrial Revolution to address these issues, their impact on inequality and unemployment.

4. Deficient governance practices, adverse audit findings, financial vulnerability and service delivery protests in South African municipalities

Municipalities across South Africa, consisting of 8 metropolitan, 44 district and 205 local municipalities, are subject to ongoing service delivery protests (National Treasury, 2018).

The Auditor General (2018) reports that municipalities do not take responsibility, nor assign accountability for service delivery and do not enforce consequence management. This results in municipalities receiving adverse audit findings. Municipalities were also found to employ deficient governance practices, resulting in financial vulnerability and leading to service delivery collapse. The audit report (Auditor General (5), 2018) further points out material non-compliance with legislation, administrative instability due to the number of vacancies and a shortage of critical skills, lack of oversight, political in-fighting and a disregard for controls, creating a hostile audit environment and inhibiting the ability of the municipality to collect revenue and pay creditors.

Bonga (2007) notes that although access to basic services has improved since the establishment of democracy, i.e. 50% access to water, 80% access to electricity, 70% access to sanitation and 80% refuse removal at least once a week, there remain historic imbalances to be addressed. Informal settlements still experience extreme poverty due to high unemployment levels, together with high crime rates, illiteracy, and the prevalence of HIV/ Aids. Many are dependent on subsistence farming for survival. The key reasons for the state of affairs is cited as being a lack of institutional capacity, capacity constraints across government including a lack of project management skills (Koekemoer & Von Solms, 2017), inadequate funding available to municipalities, the prevalence of sector departments not providing support to municipalities, and municipal officials not being held accountable (Bonga, 2007).

The ensuing 7 years did not bring about meaningful change, as was reported by Managa (2012) and Meyer (2014). Managa contributes to the discussion that informal settlements on the periphery of metropolitan municipalities are more likely to resort to protest action and do not make a

distinction between the spheres of government and their legislated mandates. These communities, whilst being exposed to the affluent and well-served citizens in metropolitan suburbs, are generally subject to unemployment, poverty and a lack of services. They are dependent on grants to access basic services and they drain the limited resources of the municipalities (Managa, 2012). Meyer (2014) adds that providing housing and basic services could have a positive impact on poverty alleviation, as it grants access to assets and opportunities for wealth creation. The indirect benefits include jobs in construction and maintenance, skills development, decent shelter and dignity of the beneficiaries. However, both these authors are in agreement that a paradigm shift is required, as structural and spatial design barriers to inclusion perpetuate inequality. Interventions should be tailored for individual municipalities and include capacity building, stronger oversight addressing nepotism and corruption, and a focus on broader cooperation and public-private partnerships to address key issues.

Nkomo (2017) highlights the role of municipal councillors in service delivery and refers to the outcome of the 2016 municipal elections, where a change in the majority party at three metro municipalities indicates changing sentiment of the voters at ground level. Service delivery statistics, i.e. 88% access to water, 84% access to electricity, 81% access to sanitation and 65% refuse removal at least once a week, indicate an improvement on the report by Managa (2012), and draws attention to the quality as well as hitherto disregarded issues namely, roads, market places, land use, health standards and environmental management. Nleya (2011) points out that democracy is instrumental to access services and that perceptions influence civil protest action. This research links the conditions of roads to perceived levels of councillor corruption, and contends that land use management is linked to a positive assessment of councillor performance. It was also found that educated and employed suburban residents were less likely to resort to protest action and that regular and meaningful interaction with councillors, significantly reduces the number of protest actions.

Smart municipalities use technology to collect data which is transformed into strategic information, and which in turn directs the efficient use of assets to provide sustainable services to the community (African News Agency, 2018). The question therefore arises, if it is at all feasible or even possible for basic municipal services to be improved and provided, at a quantity and quality that would appease the community, meet regulatory compliance and improve efficiencies, using innovative technology and products of the 4th Industrial Revolution?

5. The 4th Industrial Revolution

A revolution can be explained as an abrupt or radical change which significantly impacts society. An industrial revolution, buoyed by technology improvements and advancement, impacts economic systems through changed production methodologies which, whilst increasing economic production capacity, often are associated with changed labour, skills and educational requirements, resulting in large scale job losses (Liao, et al., 2018).

The 4th Industrial Revolution builds on technology from the 3rd Industrial Revolution in the digital, physical and biological realm. Examples of these technologies include artificial intelligence; automation and robotics; smart devices, sensors, connectivity and independent in-system communication; block chain and distributed ledgers; 3D printing; autonomous vehicles; new energy generating and storage technology; and quantum computing, to name but a few (World Economic Forum and Asian Development Bank, 2017). The report further explains that not only the technologies themselves, but also the inter-action between components, will offer new ways to create and consume services, transforming public sector, and accelerating the pace of change.

Liao et al (2018) provide insight into the impact of the 4th Industrial Revolution across countries and regions. Their study reviews public policies and plans to deal with the impact of the revolution. It was found that only 8 countries have developed a public policy, 1 region and 3 industrial agencies, all with a focus on manufacturing and production. The plans cover an average period of 8 years and focus on economic impact, competitiveness and sustainability. This concurs with

findings of the World Economic Forum (2017) in terms of the impact on humans, production and infrastructure, and with the findings and proposals of Falkenthal et al (2016) regarding cloud technology leveraging the 4th Industrial Revolution.

Falkenthal et al (2016) explain that smart services are enabled by augmenting machinery and equipment to become components of smart cyber-physical systems. These components are able to predict future device states based on data analytics, and automatically react to changing environmental circumstances. Smart cyber physical systems benefit from internet of things technology, embedded devices, and internet connectivity. Being fundamentally pre-emptive, their analysis of production steps and environmental changes are based on hard field intelligence which is analysed close to source and influence production flow by adapting machine configurations. It becomes clear that there are multiple opportunities arising from the 4th Industrial Revolution which should be considered for municipal service delivery improvements.

6. Opportunities arising from the 4th Industrial Revolution

Manufacturing, as was the case in the previous 3 industrial revolutions, is an obvious beneficiary of the 4th Industrial Revolution and hence the bulk of literature focuses on this aspect (Liao, et al., 2018). Economic development; improved community services; water and electricity supply; and access to employees, the community and other stakeholders, are aligned with the strategic objectives of local government and therefore are highlighted for purposes of this paper (National Treasury, 2018).

6.1 Economic development

Local economic development is a function of municipalities and opportunities to increase wealth, empower small and micro enterprises (SMEs), broaden economic inclusion and improve agricultural efficiencies, abound (World Economic Forum and Asian Development Bank, 2017). The 4th Industrial Revolution, through improved connectivity, brings markets within reach of SMEs and hitherto subsistence farmers, and new products

within reach of potential consumers. Improved access stimulates competition, improves product quality and increases production volumes to match the demand. Business services, strategic information, and financing become accessible to all. Sharing of equipment, pooling of skills and leapfrogging technology, together with greater access to information and drone delivery, have the potential to change commerce as we know it today (World Economic Forum and Asian Development Bank, 2017), and address issues of economic inclusion.

6.2 Community services

Municipal community services include libraries, recreational facilities, environmental management, disaster management, and healthcare, amongst other (South Africa, 1996). Disaster management and healthcare are used to illustrate the opportunities for service delivery improvement.

Data collection, analysis, early detection and warning of eminent disasters could improve prevention, preparedness and emergency response. The tracking and early warning of fires in informal settlements across South Africa in particular, has attracted attention due to the use of flammable construction materials, limited access for emergency vehicles, delayed reporting and slow reaction to these incidents (Gibson, et al., 2018). Similarly and following the devastation caused by the tsunami in 2004, technology has been used to develop early warning systems which have been deployed across vulnerable areas, safeguarding residents and tourists (Wachter, et al., 2012). Similar systems could also be used to collect data and track changing weather patterns, warn communities of potential natural disasters and inform agricultural applications to limit the risk of financial losses due to crop failures.

Healthcare is benefitting from opportunities which exist in the area of data collection and patient record management, precision medicine or individually tailored treatments, telemedicine, remote diagnosis and treatment, and drone delivery of chronic medication.

Wamala and Augustine (2013) found that 33 of the 48 poorest countries globally, are in Sub-Saharan Africa. Their desperate financial position directly impacts on the roll out of IT, basic services and healthcare. Research has identified opportunities to address a lack of basic healthcare services through technology, should adequate legal and professional policies be implemented to address cross border issues. Mars (2013) concurs that telemedicine holds great benefits for Africa, and whilst the need is great, legal and ethical issues relating to cross border telemedicine have yet to be resolved. Telemedicine, a development of the 4th Industrial Revolution, "can provide access to scarce specialist care, improve the quality of care in rural areas and reduce the need for rural patients to travel long distances to seek medical attention" (Mars, 2013).

In South Africa, the digital divide between rural and urban areas persists, negatively impacting on basic healthcare, access to specialist treatment and distribution of medication. Chetty (2005) developed a prototype system for remote health consultation, which was tested in the Eastern Cape, a predominantly rural province. This pilot study supports the findings of Mars (2013) and points to the use of technology to improve health care services.

6.3 Water and electricity supply

Water and electricity are core trading services of municipalities and represent a significant portion of their regular revenue (National Treasury, 2018). Drought conditions have limited the consumption of water across the country and negatively impacted on this source of municipal revenue. Mukheibir (2008) presents a development framework to address water resources management in South Africa, aligned to the developmental goals of municipalities, and given the intermittent drought conditions. Supply and demand side strategies are presented, with the key barriers to implementation identified as human capacity and financial resources at municipal level.

Currently, water management is approached from an engineering perspective, as opposed to an economic model, due to the political reluctance to use pricing as a management tool (Olmstead & Stavins, 2007). This paper investigated the pricing and non-pricing tools

available to manage water consumption and found that whilst non-pricing mechanisms are more costly, they yield better results; and using pricing to reduce water consumption is cost effective and presents additional benefits in terms of monitoring and enforcement. A key observation is that these approaches are enabled by human capacity, which the Auditor General (2018) reports to be a prevalent weakness.

Efficient processes, sufficient data and the availability of technology to analyse and manage the data, are also required, but not necessarily readily available at all municipalities for this purpose.

Historically more than 90% of South Africa's energy supply was generated from coal (Malzbender, 2005) with the mining industry, the backbone of the economy, being the greatest consumer (Grover & Pretorius, 2007). The country has been experiencing electricity deficits, routine load shedding and power outages since 2007. This, in part, is due to power generation capacity constraints, inadequate electrical power delivery systems, insufficient infrastructure maintenance and demand growth in areas which were not adequately planned for (Mwale & Davidson, n.d.). This has prompted inclusion of renewable energy sources in future planning, including wind power, concentrated solar power (CSP), solar photo-voltaic (PV), landfill, and mini/micro hydro.

The 4th Industrial Revolution changes the trends in energy production from high to lower carbon types with a shift from fossil sources to renewables. The production methods and utilisation patterns are also affected, for example from steam and combustion engines to electromagnetic induction using smart networks for distribution.

Cyber physical networks (Dombrowski & Wagner, 2014) consist of smart devices which collect and analyse data, are able to communicate with other devices in the network, self-correct and even pre-empt changes in the environment and adapt to these. Smart networks should not be confused with the installation of pre-paid or smart meters, which initiatives have largely failed due to the prevalent culture of non-payment for services and self-enrichment (Buhlungu, et al., 2007). Cyber physical networks together with robotics and

remote management, could address critical skills shortages by automating certain tasks. Automation could also improve the reliability and quality of water and electricity supply, whilst reducing the operational expenses associated with these basic municipal services (Karabegovic & Husak, 2018).

6.4 Access to employees, the community and other stakeholders

National Treasury (2018) reports for the period 2015/ 2016 that an average of 4.6 ward committee meetings per ward took place across the country, and 2 135 service delivery protests were reported in the same period. Key to understanding protest action, is the perception that complaints are not attended to and a lack of communication between the municipalities and their stakeholders, the community they serve. Nkomo (2017) proposes that regular communication with the community and multiple channels to voice expectations and complaints, could reduce the number and nature of protest action.

Schwab (2016) identified that the greatest opportunities and challenges emanating from the 4th Industrial Revolution are found in how government relates to citizens and business relate to their stakeholders. Wilson et al (2017) add that virtual collaboration, an extension of the current connectedness associated with the emergence of social media, creates a new channel for human-human and human-technology interaction, and opportunities for municipalities to engage the community in a constructive way.

Capacity to embrace the opportunities and technologies presented by the 4th Industrial Revolution, requires renewed creativity, novel and adaptive thinking, emotional intelligence and technical competence. Municipalities have been crippled by vacancies in critical positions and a shortage of critical skills (Auditor General (5), 2018). Are these the only challenges associated with the 4th Industrial Revolution?

7. Challenges associated with the 4th Industrial Revolution

Industrial revolutions are identified by new technology which turns around manufacturing and production, and therefore has a profound impact on all aspects of life, not least the way we work

and what we do every day. Wilson et al (2017) actually reckon that this might be the first technology driven revolution to end in a net loss of opportunities for human effort and application, and Schwab (2016), with a more optimistic view of the future, believes that the "significance of connectivity" and the "potential for continuous regeneration of natural environments", together with improved efficiencies and collaboration, holds more opportunities than challenges. The 4th Industrial Revolution is no different to previous industrial revolutions, except perhaps for the pace of change, and some challenges which have already been alluded to in the above discussion. A good understanding of these challenges results from research:

7.1 Technology and tools

As early as 2011, National Treasury reported that "Information from the Consolidated General Report on Local Government Audit Outcomes for 2009/10 points to various weaknesses in the financial management and IT systems of municipalities and municipal entities that require urgent attention" (National Treasury, 2011). This did not change much in five years, as National Treasury (2016) found that "varying levels of deficiency in the functionality of systems of financial management and internal control" still exist. It is clear that municipalities do not have access to the latest hardware devices and together with limited network capacity, this prohibits efficient service delivery, recording of financial transactions, maintenance of consumer records, and the transfer and processing of large volumes of data. Data processing, an important driver of the 4th Industrial Revolution, should ideally happen close to source and requires self-documenting file formats which merge multiple data sources, analyse changing environmental conditions and prompt reaction (Falkenthal, et al., 2016). The emergence of pre-emptive functionality which automatically reacts to changes in the physical environment will therefore not be possible at municipal level, challenging the intended use of smart cyber physical systems to improve water and electricity supply.

7.2 Connectivity

Dynamic smart service provisioning is dependent on a reliable power supply, sufficient bandwidth and internet connectivity. The topography and distance to remote municipalities remains an obstacle to overcome, and with unreliable power supply from Eskom (Mwale & Davidson, n.d.), alternative energy sources are paramount to embrace service delivery benefits from the 4th Industrial Revolution. Mcleod (2017) reports that rural provinces are lagging in access to internet, and that income disparity and limited education exacerbate the divide. The report continues that it is critical for the roll out of infrastructure to underserved areas to be prioritised, as this deficiency inhibits access to services and opportunities for social and economic advancement. Karabegovic (2018), Liao et al (2018) and Falkenthal et al (2016) all stress the importance of connectivity and the role of internet access to benefit from the 4th Industrial Revolution. Thus, this poses a serious challenge to be addressed across the country, to enable service delivery improvement and improve interaction with municipal stakeholders, create opportunities for employment and address broad economic development.

7.3 Data management

The biggest impact of the 4th Industrial Revolution from a municipal perspective, could be the way in which municipalities relate to their employees, the community and other stakeholders (Schwab, 2016). The World Economic Forum (2017) adds that data sharing across borders and regions has not been adequately addressed by an appropriate legislative framework and regulatory policies. Sharing and protection of personal information, ownership of data and use of intellectual property, as well as issues relating to open access, need to be considered.

Municipalities operate in a data intensive environment, elevating data governance to the level of a strategic risk. Whilst legislation such as the Protection of Personal Information Act, the National Credit Act, and the Consumer Protection Act impose strict regulatory frameworks for data management, mismanagement can have catastrophic consequences

(Allerman, 2016). Conscientious information management practices can also be beneficial, namely in reducing operational expenses, identifying new business opportunities, improving service delivery and individualised customer engagement (Petkovic, 2017). The author contributed that data represents the "raw material of the 21st century" and certainly, it is also fast becoming the raw material of the 4th Industrial Revolution. Considering the volume and nature of data managed by municipalities, it should be viewed as a major opportunity for service delivery improvement. The advancements in artificial intelligence and machine learning, buoyed by the 4th Industrial Revolution, are creating opportunities for municipalities to automate service delivery, improve stakeholder interaction and extract new value streams from the data they control. However, the Auditor General (2018) continues to report weak governance practices at municipalities and this extends beyond mere financial controls to also include data management practices.

7.4 Municipalities, strategy and governance

Liao et al (2018) researched the existence of country and region specific policies to deal with the 4th Industrial Revolution. The authors found that only 8 national public policies and 1 regional policy exist, together with 3 policies from industrial agencies. The core focus of these was manufacturing, and governance received limited attention.

Municipal strategic planning, or creating the Integrated Development Plan (IDP), is a well-entrenched process in municipalities. Adonis and Van Der Walt (2017) provide a legal framework for strategic planning, citing the Constitution and the Municipal Systems Act. They explain the collaborative intent, involvement of communities and other stakeholders, and address the immediate community needs which include social and economic growth, in their approach. However, municipalities continue to battle with service delivery and citizen engagement, despite several external support interventions and improvement programs. Adonis and Van Der Walt (2017) therefore conclude with a balanced scorecard and improvement project approach to address failing service delivery.

Moyo (2016) refers to reports of the Auditor General and Department of Cooperative

Governance and Traditional Affairs, emphasising continued deficient service delivery and citizen interaction across municipalities, in particular 6 municipalities in North West Province. The author continues, in support of the findings of Buhlungu et al (2007), by adding the role of politics within administration and a lack of governance and consequence management, to the discussion.

Strategic alignment refers to the correlation between strategy, the priorities of an organisation, and its environment. A close match between strategy, priorities and the environment, is a precursor to organisational performance (Adonis & Van Der Walt, 2017). Thus, strategy implementation also includes activities such as creating a strategy-supportive culture, approving an effective organisation structure, aligning marketing efforts with the strategy, providing budget allocations to implement the strategy, and developing and maintaining IT systems to enable the strategy.

IT governance forms an important part of the broader municipal governance, which refers to a framework of rules and practices to guide executives in their role of ensuring accountability, fairness and transparency when dealing with diverse stakeholders (National Computing Center, 2005). Koekemoer (2017) confirms the findings of the Auditor General that "significant IT weaknesses were identified in the areas of IT governance; Security Management; User account management; and IT service continuity" across all municipalities. Municipalities should develop strategies and policies towards benefitting from the 4th Industrial Revolution, as well as implementing governance frameworks to deal with the ensuing opportunities and challenges. These strategies and plans should cater for all levels of service delivery including social and economic development, community engagement and collaboration.

7.5 People

Industrial revolutions, whilst improving production and manufacturing through the application of technology, are also widely known for job losses, and negative changes to the socio-economy circumstances of labour in general. It is projected that artificial

intelligence will outperform 50% of human capability in 45 years, and all current human jobs within 120 years (Wilson, et al., 2017). Shanahan (2015) reckons that "the ability to innovate, to generate novel behaviour, to invent new things or devise new ways to use old things" is already a well-established machine behaviour. This in comparison with ongoing reports of municipal vacancies, critical skills shortages and capacity constraints (Auditor General (5), 2018). Wilson et al (2017) stress that specific skills, knowledge and capabilities are required to navigate an unpredictable future dominated by creative thinking and technology applications. The authors recommend new media literacy, complex problem solving, computational and critical thinking, cross-cultural adaptability, emotional intelligence and high levels of resilience together with a service orientation. A shift from employment to employability, and from employed to cloud based pools of human capital is envisaged.

Other than the automation of low skilled and repetitive type jobs, reshoring of production and increasingly knowledge-based economic activities, inequality and political instability are set to escalate (World Economic Forum and Asian Development Bank, 2017).

Wilson et al (2017) provide guidance on developing capacity for the 4th Industrial Revolution, from higher education to increasing the employability of individuals. The authors indicate a service orientation, people management and cross-cultural competence, creatively applying novel and adaptive thinking, cognitive flexibility, using sound judgement for decision making, and virtual collaboration, as examples of 4th Industrial Revolution competencies. In a municipal context, it points towards systemic changes to accommodate creativity, soft skills and critical thinking; a departure from the current culture of self-enrichment to principled service-orientation; and embracing an unpredictable future which is driven by technology.

Key challenges exist in terms of the availability of technology and tools to benefit from the 4th Industrial Revolution, as well as the electricity and connectivity to utilise these, should they be

available. Whilst the technology itself might be able to address this challenge through machine learning and cyber physical systems, the role and impact the 4th Industrial Revolution will have on people, could be far greater than is currently envisaged.

8. Does the 4th Industrial Revolution hold the Solution to Sustainable Basic Service Delivery in South Africa?

It is clear that the 4th Industrial Revolution is upon us, will have far reaching implications and should be embraced for the opportunities it offers. Municipalities and the community which they serve, could benefit from the technology and products of the 4th Industrial Revolution through improved service delivery, interaction with the municipality and access to opportunities. These opportunities include new products and services hitherto only featured in science fiction movies, access to markets and strategic business information, increasing opportunities for economic activity and inclusion.

Whilst the Auditor General (2018) reports that there is a continued deterioration in the financial position of municipalities, maintenance of infrastructure is inadequate and a skills shortage persists, new ways of energy production and water management could address basic service delivery issues. Together with these, improved emergency services, disaster management and health care will improve quality of life and life expectancy, prolonging the period of economic activity for individuals. Furthermore, greater levels of connectivity could blur international and regional borders, improve communication and stimulate collaboration.

However, municipalities do not have access to the required technology to sustain their current services. Budget allocations remain insufficient for purpose and infrastructure maintenance is neglected. Additionally, municipalities have capacity constraints due to inadequately skilled labour. This leaves municipalities dependent on consultants and external service providers to ensure that basic service delivery continues.

The 4th Industrial Revolution promises technology advancements and solutions to address basic service delivery dilemmas, offers new products and services to advance human development and socio economic circumstances, and obliterate historic barriers and challenges. However, there are many challenges to be addressed towards benefitting from the 4th Industrial Revolution.

9. Conclusion

This paper is based on a qualitative review of found documents addressing service delivery challenges in South African municipalities, and the products and services of the 4th Industrial Revolution. The paper considers the current state of service delivery in municipalities and considers the question whether municipal service delivery could benefit from implementing these products and services.

It is clear that municipal service delivery in South Africa is inadequate, failing the citizens greatest in need thereof and steadily deteriorating. Municipalities are not well managed and financially vulnerable. Whilst municipalities are not able to deliver the services which citizens expect, they are also not adequately communicating or managing their expectations.

Technology advances from the 4th Industrial Revolution are more than suited to deliver municipal services, in fact, replace most, if not all of the human activities at local government level. This is possible through the introduction of cyber physical systems of which the components collect and analyse large volumes of data from the operating environment, communicate with other components within the system, and self-correct or adjust to the projected future state of the operating environment. Artificial intelligence and machine learning will soon be able to regenerate environments and replace human endeavour, improving on municipal service delivery and the outcomes thereof.

The government has committed to improve the health, education, welfare and particularly the employment status, of the citizens of the country. Without a strategic intervention in education, skilling the youth and unemployed to embrace technology, the opportunities which technology

brings, and preparation for the new human-technology interaction, South Africa will not be able to stem the growing rate of unemployment and economic exclusion. This inability of government to deliver on their promises, will result in escalating incidents of protest and create political instability.

The World Economic Forum, in cooperation with the Asian Development Bank (2017) embarked on research into strategy and plans to deal with the 4th Industrial Revolution. Every region should follow suit and in the absence of suitable strategic planning, prompt countries to apply their mind and fund research to ensure that they are well prepared and positioned to deal with the revolution as it unfolds. Similarly, municipalities should review their IDPs, and more specifically their IT strategy, which should play a leading role in determining the future of service delivery in the country.

Koyle (2014) noted that "problems are created when there is a discrepancy between what we have and what we need". Clearly there is a problem with municipal service delivery in South Africa. Einstein (2015) contributed that "we cannot solve our problems with the same thinking we used when we created them". The 4th Industrial Revolutions brings about a new way of thinking to solve problems created by "our old way" of thinking. The first step towards change is therefore revolutionising our thinking, to be able to benefit from the opportunities and address the challenges brought about by the 4th Industrial Revolution.

In light of the findings of this paper, it is recommended that further study should examine the planning and strategies developed by municipalities and development agencies across the country in preparation for the 4th Industrial Revolution, the impact it will have on municipal service delivery as we know it today, and in particular on the people of our country, our social and economic circumstances, and high unemployment levels.

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