

**MENTAL MODELS OF LEADERS IN THE SOUTH AFRICAN QUANTUM
ORGANISATION**

by

HENRIETTE MALHERBE

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PRETORIA

Promoter: PROF YVONNE DU PLESSIS

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DECLARATION

I, Henriette Malherbe, the undersigned, hereby confirm that the thesis titled *Mental models of leaders in the South African quantum organisation*, submitted by me in fulfilment of the degree PhD Organisational Behaviour to the University of Pretoria, is my independent work and has not been previously submitted by me for a degree at another faculty or university.

I, Henriette Malherbe, further declare that this thesis has been language edited by Tharina Hansmeyer (Post Graduate Diploma in Translation, Certificate in Advanced Editing Principles and Practice, University of Pretoria).

Henriette Malherbe

Date: 29 April 2011

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ABSTRACT

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by

Henriette Malherbe

PROMOTER : Prof Yvonne du Plessis
DEPARTMENT : Human Resource Management
FACULTY : Economic and Management Sciences
DEGREE : PhD in Organisational Behaviour

A preliminary literature review of mental models and the quantum organisation clearly indicated a gap, particularly in the South African context. The gap was evident on two levels: literature fails to agree on existing definitions and there is little guidance on research methodology in the context of complexity and leadership. The aim of this study was to explore and describe the form and function of leaders' mental models in a complex environment.

A postmodernist qualitative methodology as theoretical framework and constructivism as research paradigm were employed. It was important not to be restricted and limited by a specific method. Therefore a constructivist grounded theory was used to navigate in a pragmatic manner towards answers which could best describe and interpret findings in response to the initial set of research questions. Purposive sampling was used and the population consisted of individual South African leaders and academics that do research on and write extensively about the constructs investigated. Data were obtained through intensive semi-structured interviewing. Semi-structured interviewing implies that only a few research questions were selected to guide the interview, whereas the rest of the interview was a co-constructed conversation, which yielded narratives with rich data that were systematically analysed through computer-assisted coding.

An initial conceptual framework was thus created and used to substantiate the findings by means of a second literature review. It is concluded that the quantum organisation, being a leader in a complex environment, the dynamics of the mental models and the complex environment itself collectively represent a constellation of complex adaptive sub-systems, affecting one another in an interdependent manner and co-evolving accordingly. The conceptual framework describes the mindful sense-making process of a leader in a complex environment, consisting of a) an active acceptance of the current reality, b) catalytic questioning, c) letting go of, d) knowing that not knowing the solution, e) trusting what they do know, f) observing the actuality of unfolding patterns and g) realisation.

Criteria for rigour, authenticity, trustworthiness and credibility were applied and demonstrated. The findings provide insight into the form and function of a leader's mental models in the complex South African context. The practical contribution of this study specifically applies to the practice of leadership development and coaching. In addition, this study contributes methodologically to the field of mental model research by demonstrating the appropriateness of a constructivist paradigm for describing and interpreting the complexities of mental models of leaders in a complex context. Recommendations and opportunities for future research were also made.

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‘As scientists who are interested in studying people’s mental models, we must develop appropriate experimental methods and discard our hopes of finding neat, elegant mental models, but instead learn to understand the messy, sloppy, incomplete, and distinct structures that people actually have’ (Norman, 1983:14).

This was the first quote I came across during my initial literature review when drafting my research proposal. Unbeknownst to me at the time, this quote not only outlines the nature of mental models but also the nature of the journey on which I was about to embark – at times chaotic, complex and messy, yet fulfilling in every aspect of my being.

SECTION A: THE STUDY AND ITS METHODOLOGY

This section refers to Chapters 1, 2 and 3 in which I cover the following:

In Chapter 1 I introduce the study by contextualising the complex South African environment, explain my background as the personal context which led to this study and give a short literature review to highlight the research. I also identify the research questions and the scope of the study.

In Chapter 2 I provide a literature overview of my postmodernist research philosophy and constructivist research paradigm. Furthermore, I introduce discussions on rigour and my own research journey.

In Chapter 3 I provide a literature review of the constructivist grounded theory that informs the research design and methodology. I give a chronological account, from the researcher's perspective, of how I conducted the research and reasons for decisions taken during the research. I make specific reference to the data collection and analysis and the way in which I dealt with setbacks. I treat reflexivity in an integrated manner and delineate the impact of my own assumptions, expectations and role as researcher on the co-constructed findings. As in Chapter 2, I pay specific attention to research rigour and the integrity and legitimacy of the research.

CHAPTER 1: CONTEXTUALISING THE STUDY

1.1 INTRODUCTION

In this chapter I set out the multiple contexts of this study. These multiple contexts include the academic and environmental contexts and my personal context, from which a compelling research problem emerges. Finally, I indicate the evolutionary nature of the research questions and the scope of the study.

1.2 THE ENVIRONMENTAL CONTEXT: A SOUTH AFRICAN PERSPECTIVE

Real gross domestic product (GDP) at market prices increased by 2,6 per cent during the third quarter of 2010. The main contributors to the increase in economic activity for the third quarter of 2010 were the mining and quarrying industry (1,5 percentage points). The wholesale, retail, motor trade and accommodation industry and the agriculture, forestry and fishing industry each contributed 0,4 of a percentage point, and finance, real estate and business services and the transport, storage and communication industry each contributed 0,3 of a percentage point (Statistics South Africa, 2010:1). At first glance these financial indicators might paint a picture of growth and economic stability.

However, multiple variables are introduced on a daily basis which might reframe the picture of stability and growth to **complexity**, as the following excerpt from a credible local newspaper, the *Mail and Guardian*, shows (Smith, 2009):

‘In the past week, scenes reminiscent of the apartheid era¹ have returned to the townships – clouds of acrid black smoke rising from burning tyres, policing turning on residents with rubber bullets, sirens wailing and – most symbolic – official buildings and vehicles being set on fire’.

¹ The Apartheid Era is typically being viewed as the period between 1940 and 1993.

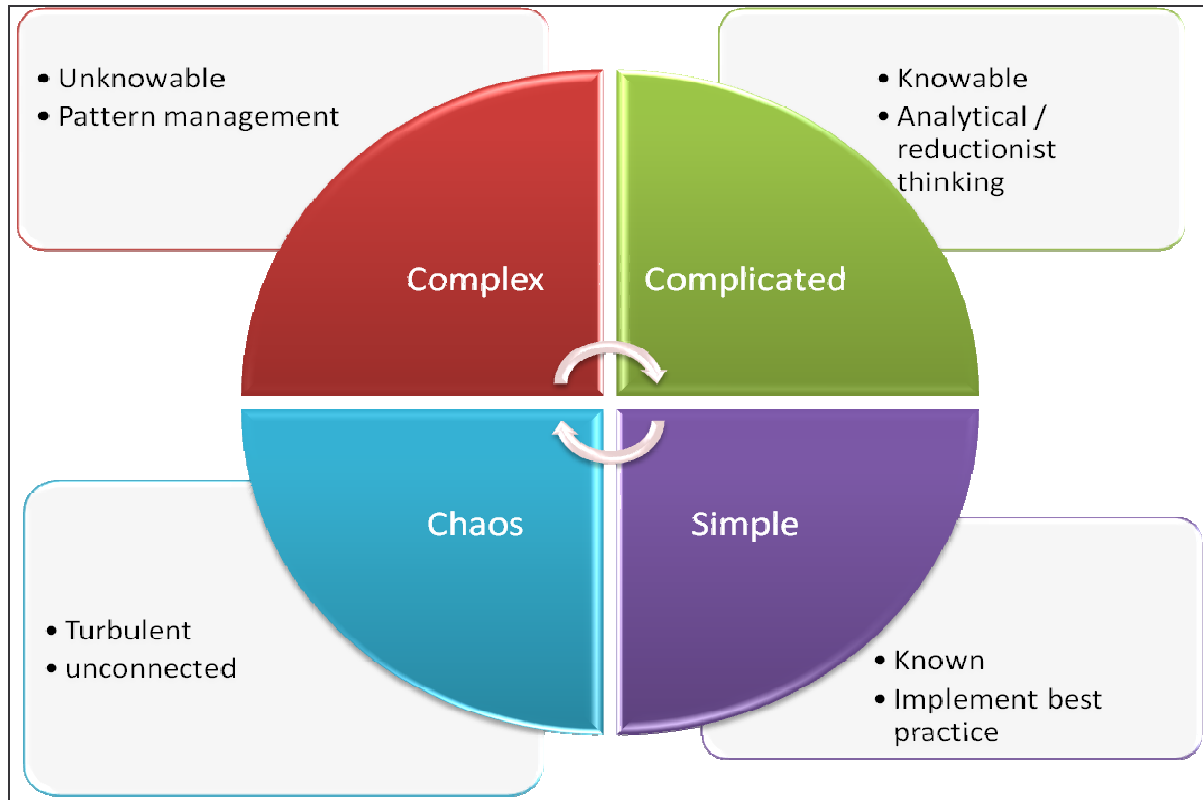
Since the African National Congress (ANC) has become the ruling party in 1994, people are less enthusiastic than before, partly because of an increase in crime over the last 15 years. Strikes in the very industries that contribute significantly to the annual GDP are prevalent. For example, strikes in the transport and chemical industries have affected gasoline supply, teachers actively participated in a nationwide strike and the construction industry has gone on strike for wage increases, while unions have the upper hand in power relations. In the midst of all this, other local variables, to name just a few, introduce even more complexity into the South African context:

- The official unemployment rate in 2010 was 23.5%.
- The total number of new HIV infections for 2010 was estimated at 410 000 out of a total population of 49,99 million. Among adults aged 15–49, an estimated 17% of the population is HIV positive, which will have a severe impact on the next generation workforce.
- Many children who have been orphaned due to HIV take on the role of caretakers for their siblings and cannot attend school. Only 67,8 per cent of matrics passed the exams in 2010 (Statistics South Africa, 2010:1).

In such changing times with diverse voices, change leadership effectiveness across all industries becomes the most pressing matter in the South African context. Literature agrees that effective change leadership is a critical part of leading an organisation successfully in a complex environment (Chaize, 2000:95; Conner, 1998:10; Deardorff & Williams, 2006:1; Denton & Vloeberghs, 2003:84; Guillory, 2007:91; Karp, 2006:3; Kilmann, 2001:76; Pellissier, 2001:34; Quigley, 2001:11; Shelton & Darling, 2001:264; Wheatley, 2006:36; Youngblood, 1997:8; Zohar, 1998:56).

Considering the complex context in which South African organisations are nested, further investigation into the relationship between contexts and change leadership is necessary. Snowden's model, 'The Four Ontologies' (Figure 1) provides a **typology of contexts** that guides which type of solution and change leadership approach will be best suited for which context.

Figure 1: The four ontologies

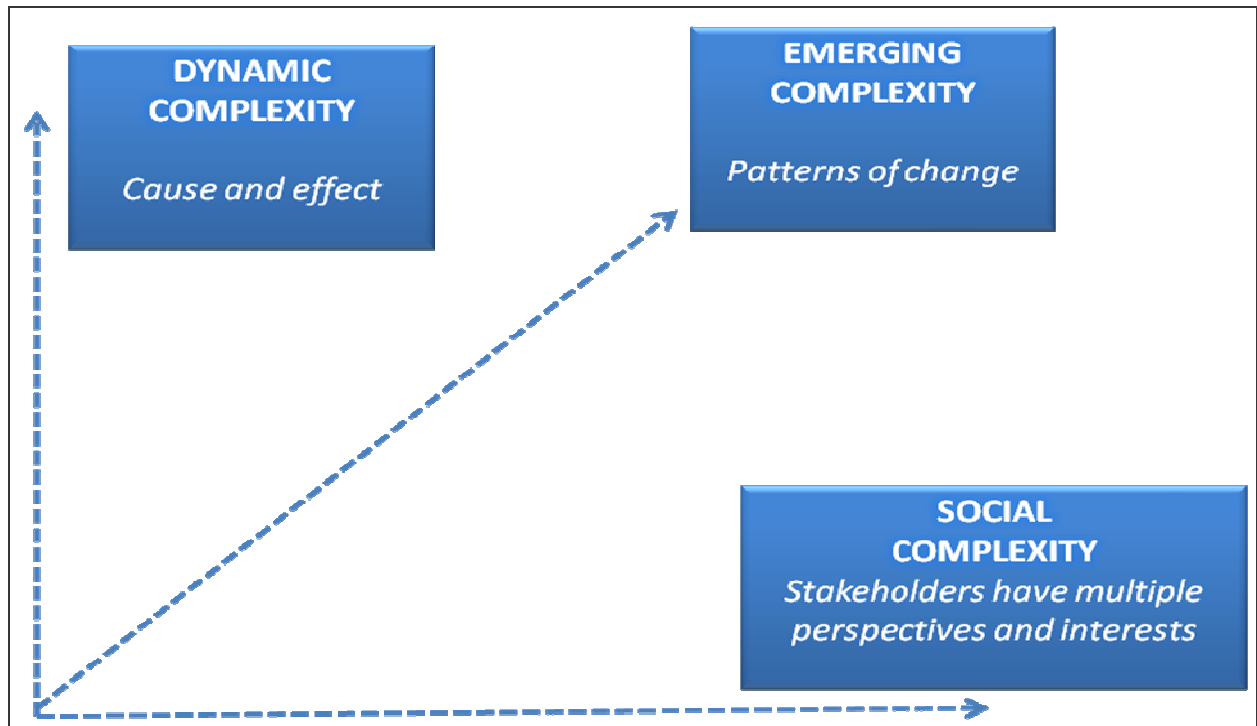


Source: Snowden & Boone, 2007:63

- In a **simple context** the relationship between cause and effect is clear and a best practice solution such as standard operating procedures would be appropriate.
- **In a complicated context** the relationship between cause and effect requires analysis and/or usage of expert 'knowing' to construct the solution.
- **In a chaotic context** there is no relationship between cause and effect at systems level due to randomness and thus the discovery of novel practices during random events would be appropriate.
- **In a complex context, the context which is applicable to this study**, the relationship between cause and effect can only be perceived in retrospect and therefore pattern recognition would be useful as part of the South African leaders' change leadership repertoire of skills.

Now that the South African environment has been established as a typical complex context according to Snowden’s four ontologies, it is worthwhile to explore what complexity constitutes of. The implications for the South African leader are immense since they are faced by three types of complexity simultaneously.

Figure 2: Three types of complexity



Source: (Scharmer, 2009:60)

Figure 2 shows three types of complexity faced by a leader. Dynamic complexity means that there is a systematic distance between cause and effect. For example, the uncontrolled HIV epidemic, poor education system and lack of skills (multiple causes) in the South African context lead towards an intense focus on talent attraction and retention.

Emerging complexity is characterised by change where the solution to the problem is unknown, or even where the problem statement itself keeps moving and unfolding. For example, mistrust between employees, unions and managers exist due to affirmative action, adverse labour relations and the wealth and poverty gap (Denton & Vloeberghs, 2003:84).

Social complexity, which refers to the product of the co-existence of multiple perspectives and interests of stakeholders, is perhaps most visible in South Africa. For example, aggressive union backing emerged due to the complex and inconsistent implementation of the new labour legislation.

This leaves South African leaders with a daunting question. **What** will determine change leadership effectiveness and **how** do they effectively lead transformation in a complex environment? There is only one certainty: due to the existence of multiple complexities, leaders can rarely rely on past experiences and solutions (Denton & Vloeberghs, 2003:88).

1.3 ACADEMIC CONTEXT: MENTAL MODELS AND LEADERSHIP IN A COMPLEX ENVIRONMENT

In this section, I first discuss the relevancy of mental models and change leadership in a complex environment to provide a backdrop for the focus of my study.

Why are some organisations successful whilst other organisations decay in the 21st century's turbulent and unpredictable environment? In an attempt to answer this dilemma, current literature no longer focus on the question 'why change?', but rather 'how to change' (Chaize, 2000:95; Conner, 1998:10; Deardorff & Williams, 2006:1; Denton & Vloeberghs, 2003:84; Guillory, 2007:91; Karp, 2006:3; Kilmann, 2001:76; Pellissier, 2001:34; Shelton & Darling, 2001:264; Wheatley, 2006:36; Zohar, 1998:56). Popular interventions towards transforming organisations have been restructuring, layering, downsizing, rightsizing, leadership development, team building, market positioning, industry analysis, total quality management and business process re-engineering (Pellissier, 2001:193). However, these interventions have been used as **change events within the existing paradigm** and not a **change of the organisational paradigm** itself (Kilmann, 2001:75). Kilmann (2001:78) argues that understanding and navigating a complex environment will be not only difficult but also foreign to leaders who have been contaminated with the traditional approaches to leadership.

Building upon this argument, a link has been established between successful organisational change and the self-transformational ability of a leader (Deardorff & Williams, 2006:1; Denton & Vloeberghs, 2003:84; Guillory, 2007:91; Karp, 2006:3; Serfontein, 2006:36; Shelton & Darling, 2001:264). Richie-Dunham and Puente (2008:509) assert that the process of sense-making and navigating through multiple variables in a complex context is influenced by a leader's mental model. Consequently, Chaize (2000:86), Kilmann (2001:70) and Scharmer (2009:6) convincingly argue that the **mental models of a leader are the source which will determine change leadership effectiveness** in a complex context.

Unfortunately, leadership practices, in general, are a reflection of a mindset that flourishes on predictability, reductionism and stability (Shelton & Darling, 2003:353). In addition, current South African leadership positions have been acquired through the successful mastery of traditional management techniques and approaches. These are inappropriate for a complex context and therefore never necessitate the leader to investigate the current content of their own mental model or, if awareness exists, leaders are not equipped to shift their mental model to be appropriate for a complex environment (Guillory, 2007:91; Shelton & Darling, 2001:265; Smith-Jentsch, Campbell, Milanovich & Reynolds, 2001:181; Snowden & Boone, 2007:60). Therefore, literature appeals to leaders to cultivate mental models that are aligned to a complex environment. Such cultivation will imply a continuous shift and reframing of the mental model content through a process of continuous learning (Guillory, 2007:91; Pascarella, 1998:56; Quigley, 2001:11, Youngblood, 1997:8).

A quantum organisation is co-created by leaders who demonstrate the capacity to continuously learn and adapt their mental models as new patterns emerge (Shelton, McKenna & Darling, 2002:378) and where rapid and continuous change happens (Druhl, Langstaff & Monson, 2001:379; Guillory, 2007:91; Shelton & Darling, 2003:353). The change in mental models will enable leaders to **see** the interconnectedness of the business environment, consciously **think** about their thinking and **behave** with the intention that facilitates constant organisational transformation (Kilmann, 2001:23).

1.4 PERSONAL CONTEXT: THE STORY OF THE WISE SIX-YEAR OLD

In this section I attempt to describe the aspects of my background that are relevant to the study and how my interest and passion in the topic emerged from a young age and was cultivated through career choices.

My story starts as a six-year old who lived in a world of possibilities, colours and music. However, a brutal and harsh 'truth' was enforced by my first-grade teacher when she insisted that $1+1=2$, whereas I thought that $1+1$ can be 2, 4 or 100. Surely, the sum of $1+1$ can take many forms, depending on what you believe to be possible? I had to unlearn my ideas about possibility and relearn that there is only 'one truth', which is $1+1=2$. My story continues as a classically trained pianist who searched for the ultimate perfection and mastery of the great classical works through rigorous training. I resonated in particular with the French Impressionistic works – paradoxical and complex compositions. I believed, as I was taught at school, that there is only 'one way' to master these works: technical mastery and a scientific understanding of music. Until one day, when my teacher stood up and started to dance on the music, discarding his conventional teaching methods on phrasing. This allowed me to experience the message and soul of the piece in the moment, as well as to listen to and observe myself whilst playing. Being in the moment allowed me to self-correct with grace as insights emerged. I had to unlearn my belief that there is only 'one way' to mastery and relearn that mastery comes with sensing, knowing, seeing, feeling and experiencing the complexity of music in the present moment.

Since 2000 I have worked in the field of leadership development as a registered psychologist with the Health Professions Council of South Africa (HPCSA). Part of my function is to conceptualise, design, write and facilitate leadership development programmes. During this period I became particularly interested in what makes some individuals more effective in change leadership than others. From my tacit knowledge at the time, the more effective individual connected to a purpose and often mindfully ask more questions than offer answers. I was also interested in the pockets of excellence and success stories of these individuals and engaged in true dialogue, not only conversation.

This gave me an opportunity not only to understand the context but also to participate actively in re-constructing meaning – hence the choice of a constructivist paradigm within the qualitative research methodology.

The complexity of the context in which we live and make meaning in a holistic manner requires a mindset of possibility and multiple truths. The wise six-year old was right: $1+1=\text{multiple truths}$ and this is the premise of my study....

1.5 THE RESEARCH PROBLEM

Now that the link between change leadership effectiveness in a complex environment and mental models has been established, the research problem starts to emerge.

Firstly, literature fails to agree on a common definition for mental models and the quantum organisation and definitions are varied and vague (Aronson, 1997:782; Guillory, 2007:91; Johnson, 1995:258; Rowe & Cooke, 1995:245; Shelton & Darling, 2001:265; Smith-Jentsch *et al.*, 2001:181; Theron & Roodt, 2000:15; Quigley, 2001:11). As existing definitions fail to reflect the richness and complexity of the mental model construct, literature suggests that future research must explore the form and function of mental models in the context of leadership (Shelton & Darling, 2003:359; Theron & Roodt, 2000:18).

Secondly, existing research mostly focus on understanding mental models within a computer-processed context from a positivist paradigm. This necessitates the study of mental models within the complex South African environment, as the context is significantly different.

Thirdly, conceptual frameworks on mental models only address **what** the process of shifting and learning in the mental model consists of, and not **how** the actual shift and learning-unlearning-relearning occur within the mental model (Pellissier, 2001:85; Deardorff & Williams, 2006:12).

1.6 RESEARCH QUESTIONS: AN EVOLUTIONARY PROCESS

The primary objective of this study is *the building of a conceptual framework on the form and function of mental models of leaders in the South African quantum organisation*. The following research questions were used as a framework, while other research questions emerged during the co-constructed conversations with research participants:

- What is a quantum organisation in the South African context?
- What is a leader regarded as in the quantum organisation?
- How are mental models influencing change leadership effectiveness in the quantum organisation?
- What is the form and function of a mental model?
- What does the learning process constitute of?

Due to the **iterative and reciprocal nature** of qualitative research, I have increasingly gained an understanding of and insight into the phenomena being studied. Consequently, my research questions became more specific and appropriate during the data collection phase. Schurink (2003:3) postulates that research questions are formulated not with the intention to operationalise variables but to investigate the variables in their context and complexity.

1.7 SCOPE OF THE STUDY

This research focus on the mental model of the individual leader in the South African quantum organisation (as illustrated in Figure 3) and falls within the field of organisational behaviour. Organisational Behaviour from a South African context can be defined as ‘a field of study that investigates the impact that individuals, groups, and structure have on behaviour within organisations for the purpose of applying such knowledge towards improving an organisation’s effectiveness’ (Robbins, Odendaal & Roodt, 2007:7).

The units of analysis in this study are mental models and not shared mental models, whereas the sampling units are leaders in a South African organisation. The **individual leaders** and **not the team** are the units of analysis. According to Conner (1998:14), someone who has the responsibility of managing a team and has transformational influence in an organisation can be regarded as a leader. This study does not test a hypothesis on the relationship between change effective leadership and mental models, as this relationship has already been established by literature (Chaize, 2000:95; Conner, 1998:10; Deardorff & Williams, 2006,1; Denton & Vloeberghs, 2003:84; Guillory, 2007:91; Karp, 2006:3; Kilmann, 2001:76; Pellissier, 2001:34; Quigley, 2001:11; Shelton & Darling, 2001:264; Wheatley, 2006:36; Youngblood, 1997:8; Zohar, 1998:56).

Figure 3: Scope of the research



The scoping of the study was an ongoing process as this is a topic that is part of a network of other related constructs, which proved to be perhaps one the biggest challenges and frustrations of this study. I had an unrealistic desire to see everything at the same time and to study all phenomena linked to complexity and leadership simultaneously. I fear that my brain is too small or not (yet) re-wired to process the phenomena in a gestalt-like manner and turn my insights into a language that communicates effectively. I fell into a trap like a fly would fall trap to a spider's web!

1.7.1 Assumptions

This research is based on the following assumptions:

- Although industry-specific knowledge will be different; the form and function of the individual leader's mental models as it relates to change and transformation in a complex context, will be similar regardless of the industry.
- A postmodernist philosophy and constructivist approach assume that truth is a particular belief system held in a particular context. Researching this constructed reality implies that knowledge and 'truths' are jointly created by participant and researcher, not discovered. Therefore, it would be appropriate to introduce the set of assumptions held by me. In Table 1, I explicated my set of assumptions and its impact on the research experience and results.

Table 1: Researcher assumptions

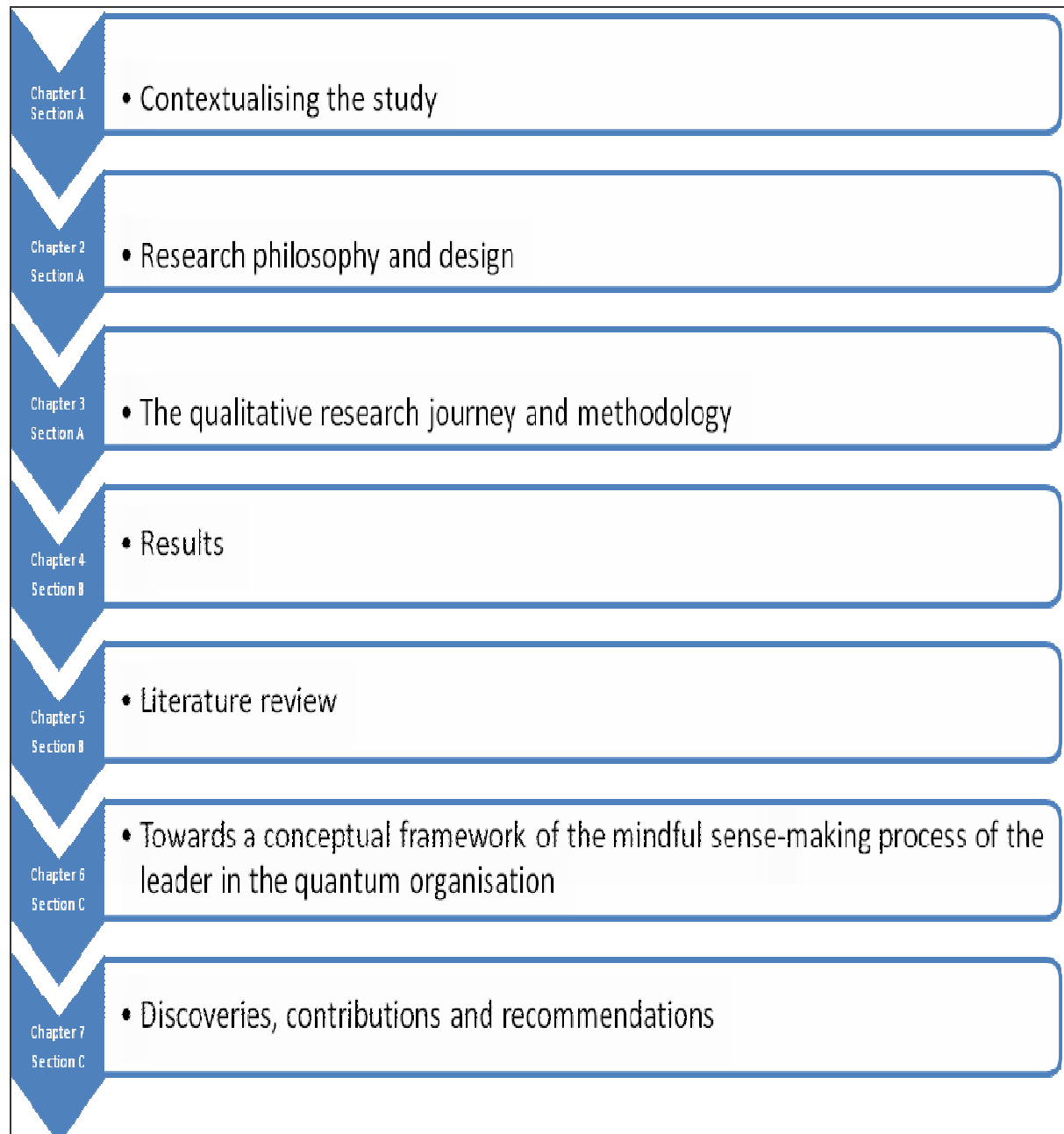
Themes to be explored during explication of assumptions	My assumptions	Perceived impact on the research
My philosophical/theoretical origins	Socially constructionist orientation	Positive impact on the chosen theoretical orientation of complexity theory, qualitative methodology and semi-structured interview approach
Nature of human beings	Individuals create their own reality and meaning and constantly engage in shifting that meaning	Impacted on the chosen research design, which allows for an iterative and circular approach
My explanation of what is a 'truth'	Individuals create their own reality and meaning and constantly engage in shifting that meaning. Multiple 'truths' can co-exist, often in discomfort.	Impacted on the chosen research design, which allows for an iterative and circular approach as multiple and contradicting 'truths' are unearthed.
During data collection and data analysis, whose voices are privileged?	Reality are co-constructed, therefore it is not a matter of a position of power or privilege, but a position of equality.	Used excerpts from interview transcripts of both researcher and participants to demonstrate equality in voice.
Where do social/political values enter into the study?	Values are an integral part of participants and their identities. No values are presumed to be superior to others.	Therefore, I am comfortable with contradicting value sets between participants and researcher – it is part of their reality and is neither right nor wrong.
Openly acknowledge and reflect on the influence of prior training and experience	Influence of prior training and experience can impact on how to conduct research	I am a registered psychologist within the fields of psychodynamics and cognitive emotive behavioural approaches (two opposing schools of thought!) and currently am practising (and learning) within the constructivist paradigm in leadership development and coaching.

Sources: Adapted from Fossey, Harvey, McDermott & Davidson (2002:719); McGhee, Marland & Atkinson (2007:335)

1.8 THE STORYLINE

In this section, I provide a brief outline of the study, as illustrated in Figure 4.

Figure 4: The dissertation structure



Section A deals with the study and its methodology and includes Chapters 1, 2 and 0. In Chapter 1, I have provided information on the environmental, academic and personal contexts, as well as the research problem, research questions and the scope of the study.

In Chapter 2, I provide a literature overview of my postmodernist research philosophy and constructivist research paradigm. I also introduce discussions on rigour and my own research journey.

In Chapter 3, I provide a literature study of the constructivist grounded theory which informs the research design and methodology. I provide a chronological account, from the researcher's perspective, of how I conducted the research and give reasons for decisions taken during the research. I make specific reference to the data collection and analysis, and the way in which I dealt with setbacks. I treat reflexivity in an integrated manner and delineate my own assumptions, expectations and role as researcher and the impact thereof on the co-constructed findings. As in Chapter 2, I pay specific attention to research rigour and the integrity and legitimacy of the research.

Section B consists of Chapters 4 and 5. In Chapter 4 I cite examples of responses gained from interviews *verbatim* to highlight the relationship between themes which emerged during the coding process. Chapter 5 deals specifically with the validation of the results through an extensive literature review.

Section C consists of Chapters 6 and 7. I present and discuss the conceptual framework of mental models of leaders in the South African quantum organisation (Chapter 7) and its key contributions, implications, limitations and recommendations for future research (Chapter 8).

CHAPTER 2: RESEARCH PHILOSOPHY AND DESIGN

2.1 INTRODUCTION

In this chapter I provide a literature overview of my postmodernist research philosophy and constructivist research paradigm. Furthermore, I introduce discussions on rigour and my own research journey, which led me to a conclusion that highlights the appropriateness of the qualitative research methodology in the studying of mental models of leaders in a complex environment.

2.2 POSTMODERNISM AND CONSTRUCTIVISM: MY READING GLASSES

A research philosophy can be defined as the worldview that guides the investigation, research methodology, assumptions, practical considerations and the relationship between knowledge and the process by which it is developed (Saunders, Lewis & Thornhill, 2007:100).

Finlay (1998:453) argues that when studying constructs characterised by ambivalence, unpredictability and contradictions, and meanings attached to definitions are socially constructed and interpreted in multiple ways, a postmodernist rather than a positive approach is required. Postmodernism is a worldview which postulates that individuals are immersed and flooded with multiple voices and meanings that create a cacophony or symphony of chaos. Thus, it is a study in multiple and often contradictory realities. It is argued that postmodernism offers a distinctly different approach to the study of leadership and representation of findings as it allows for context and complexity. This implies that my role as researcher was also to search for and capture the inconsistencies, contradictions and multiple representations of what constitutes a mental model in the quantum organisation (Kilduff & Mehra, 1997:453; Tierney, 1996:374). Postmodernism, therefore, appears to be an appropriate research philosophy for this study.

2.2.1 Epistemology and ontology

The research process is based on paradigms that involve distinct assumptions on the nature of reality (ontology) and how knowledge is acquired to know what the reality is (epistemology) (Shah & Corley, 2006:1822). Therefore, epistemology can be defined as the study of what knowledge is and is concerned with what is being regarded as acceptable knowledge (Saunders *et al.*, 2007:103).

Ontology, on the other hand, is concerned with the format and nature of reality and what can be known about that particular reality. The chosen ontological orientation was that there are multiple, constructed realities which are subjectively constructed and influenced by the context of the situation.

Within the postmodernist philosophy, I adopted a constructivist paradigm. Although Schurink (2003:3) draws a distinction between constructivism and interpretivism, Guba and Lincoln (1994:24) acknowledge that the two paradigms are similar and therefore the term 'constructivist-interpretive paradigm' is used. Table 2 reflects a continuum of epistemological and ontological orientation, which positions the constructivist paradigm (shaded column) in contrast with other paradigms that are not used in this study, such as the positivist paradigm.

Table 2: Epistemological and ontological continuum

Ontological assumptions	Reality as projection of human perception	Reality as social construction	Reality as realm of social discourse	Reality as contextual information	Reality as concrete process	Reality as a concrete structure
Epistemological orientation	Obtain phenomenological insight and understanding	Understand how reality is socially constructed	Understand patterns of symbolic discourse	To map contexts	To study systems, process and change	To construct a positivist science

Sources: Gioia & Pitre (1990:591); Johnson & Duberley (2003:1282); Klenke (2008:21); van der Mescht (2002:45)

A constructivist paradigm implies that reality cannot be understood by objectively interpreting the meanings, but rather by actively co-constructing meaning and reality through interaction between the researcher and participant. The very act of interpretation of the studied phenomena is in itself a construction where truth or reality becomes a socio-linguistic product and an independent reality does not exist.

Therefore, **the researcher is an instrument similar** to, for example, a scale that is used as an instrument in quantitative studies (Schurink, 2003:3). This research is not free from societal influences and values and I am incapable of neutralising subjectivity, since researcher and participants are both part of the phenomena under investigation. Contrary to a single authoritative monologue by an author, the postmodernist approach implies a number of voices which appear, disappear, resurface, agree, disagree and disrupt each other, reflecting the multiple meanings (Johnson & Duberley, 2003:1288). Therefore the relationship and interaction between researcher and participant are of critical importance. In a relationship of equality, the researcher and participant co-construct findings during dialogue (Ponterotto, 2005:129).

As stated in Chapter 1, scoping and explicating assumptions were an ongoing process (section 1.7.1). In addition, there is a primary set of assumptions about constructivism which was adopted throughout:

- 'Truth' is a matter of consensus among informed and sophisticated constructors and does not reflect the objective reality, as there is no such a phenomenon as an 'objective reality'.
- 'Facts' presented as findings in this dissertation have meaning within a value framework and therefore cannot be 'objective' assessments
- The phenomena of mental models and the quantum organisation can only be understood within the context in which they were studied (Klenke, 2008:21).

2.2.2 Ontological and epistemological rigour

Ontological and epistemological rigour refers to the choice of qualitative methodology that supports the ontological and epistemological underpinnings. It is assumed that reality is **socially constructed, contested, fluid and value-bound** (Van der Mescht, 2002: 46). 'Socially constructed' refers to how participants make their own reality in relationship with others and their environments. Reality is 'contested', because participants might have different understandings and meanings attached to the construct; 'fluid', because meanings might shift and be difficult to define as an essence (which is particularly relevant to multifaceted constructs such as the mental models in the quantum organisation); and 'value-bound' because both researcher and participant bring espoused values to the conversation and sense-making.

Lincoln and Guba (1985:39-40) elegantly put the following argument forward:

...it would virtually be impossible to devise a prior nonhuman instrument with sufficient adaptability to encompass and adjust to the variety of reality that will be encountered; because of the understanding that all instruments interact with respondents and objects but that only the human instrument is capable of grasping and evaluating the meaning of the differential interaction; because the intrusion of instruments intervenes in the mutual shaping of other elements and that shaping can be appreciated and evaluated only by a human; and because all instruments are value-based and interact with local values but only the human is in a position to identify and take into account (to some extent) those result biases.

This implies that the subjective engagement of the researcher is one of the greatest differentiators and strengths of qualitative research if the researcher wanted to stay true to the ontological and epistemological orientation of this study. Whereas some authors pose subjectivity as a 'methodological issue', as oppose to the postmodernist approach which implies that there is 'no way of neutralising subjectivity in qualitative research' (Conneeley, 2002:185).

2.2.3 Paradigm orientation and theory building

Organisational study, similar to other fields of inquiry, is paradigmatically anchored. A paradigm can be defined as a filter used to make meaning or a way of thinking that reflects deep-seated assumptions and beliefs (Gioia & Pitre, 1990:585). Because paradigms differ fundamentally, the approach towards developing a conceptual framework or theory will be significantly different, as demonstrated in Table 3. The constructivist paradigm (shaded column) is juxtaposed against other paradigms that are not used in this study, such as the radical structuralist and functionalist paradigms.

Table 3: Paradigm differences and theory building

Descriptors	Constructivist-interpretive Paradigm	Radical Humanist Paradigm	Radical Structuralist Paradigm	Functionalist Paradigm
Goals	To describe and explain in order to understand	To describe and critique in order to change	To identify sources of domination and persuade in order to guide	To search for regularities and test in order to predict and control
Theoretical concerns	Social construction of reality, reification process, interpretation	Social construction of reality, distortion interests served	Domination, alienation, macro-forces	Relationships, causation, generalisation
Theory-building approaches	Discovery through code-analysis	Disclosure through critical analysis	Liberation through structural analysis	Refinement through causal analysis

Source: (Lynham, 2002:226)

In this study, the goal of theory building in the constructivist-interpretive framework is to describe, interpret and co-construct meanings to make sense of, understand and interpret the form and function of mental models of a leader in a complex environment such as South Africa.

2.2.4 Postmodernism and rhetorical structure: my voice

The rhetorical structure refers to the language used to present the data collection and analysis procedures and findings (Ponterotto, 2005:132). It is stated that most authors of qualitative studies on leadership have employed one of two narrative stances: first or second person. The first narrative style highlights the author's involvement in the co-construction of meaning and text. The second and most pervasive narrative approach, passive voice, implies that data have an omniscient narrator who objectively presents the data (Tierney, 1996:377). The postmodernist orientation of this study implies that data are presented in the first person to weave my understanding into the narrative as a researcher-participant (Mills, Bonner & Francis, 2006:11).

2.2.5 Paradigms of enquiry

Organisational behaviour, as a field of study, requires researchers to choose a research philosophy that fits the nature and state of knowledge of the phenomenon studied, and also considers the implications on the quality of the research. Evered and Louis (1981:386) postulate that knowledge and understanding of an organisational setting can be obtained through two modes of enquiry (Table 4):

- Studying from the outside calls for detachment on the part of the researcher who conduct data analysis with pre-determined analytical categories.
- Becoming part of the organisation and studying the phenomenon from the inside and 'being-in-the-world' of the participant, which can only be understood and interpreted by another 'being-in-the-world', the researcher. Data analytical categories emerge and evolve during and after research (Evered & Louis, 1981: 385; Lowes & Prowse, 2001:474).

Table 4: Differences between the two different paradigms of enquiry

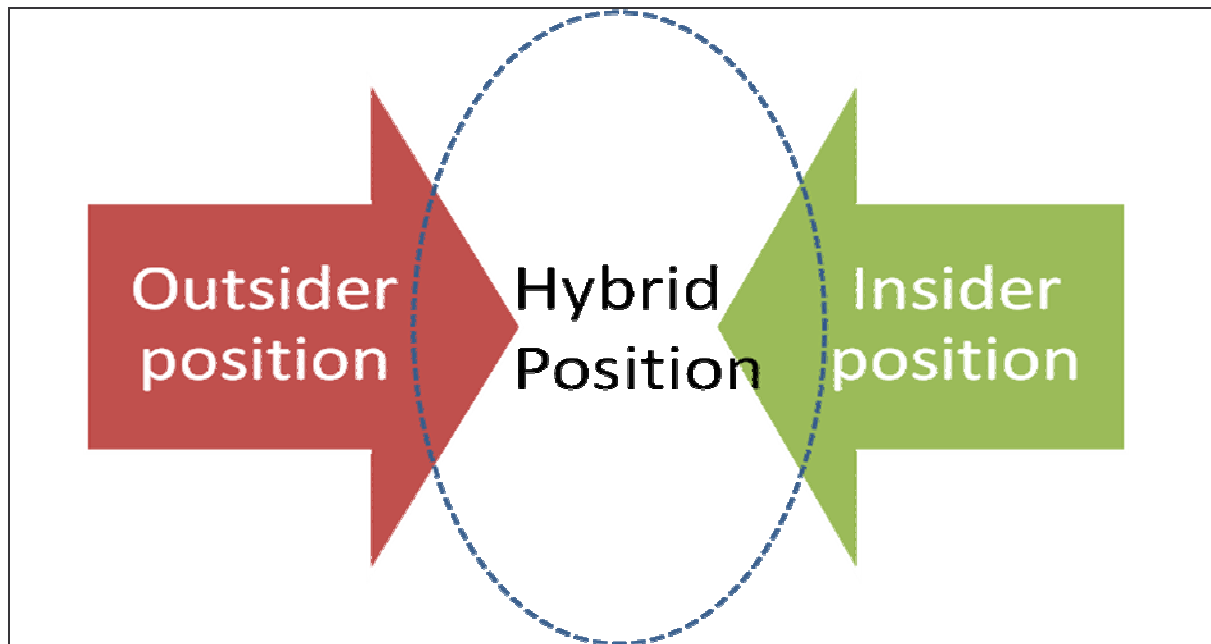
From the outside in	From the inside out
Detachment and neutrality Knower (researcher) and known (participant) are independent	Attached, involved and immersed Knower (researcher-participant and participant) are interactive and inseparable
Measurement and logic	Experiential
Onlooker (participant) and observer (researcher)	Participant interviewee and participant researcher
A priori	Interactively emergent
Universality and generalisability	Situational relevant
Factual and context free Reality is single, tangible and fragmentable	Interpreted, contextually embedded Realities are multiple, constructed and holistic
Inquiry is value-free	Inquiry is value-bound

Sources: Evered & Louis (1981:389); Giorgi (1992:121); Jootun, McGhee & Marland (2009:44); Lowes & Prowse (2001:474).

2.2.6 Researchscape: Location of researcher in paradigm of enquiry

Gummesson (2006:174) refers to the environment in which the researcher works as the researchscape – it includes the combined constellation and complexity of researcher lens, participant meaning and methodology in which meaning is co-constructed. From Figure 5 it can be deduced that inquiry from the outside has critical epistemological assumptions. These assumptions essentially are that the truth and reality consist of facts which can be observed in a structured and methodological manner. In contrast, inquiry from inside, carries the epistemological assumption that the researcher acquires knowledge about the reality by being part of the experience of the reality. As an alternative position on the researchscape, Jootun *et al.* (2009:42) postulate that the researcher must take a hybrid position, neither outside nor inside: a researcher who undertakes research in the practice area of other practitioners and is familiar with that research area.

Figure 5: The hybrid position



Source: Adapted from Jootun *et al.* (2009:44)

For this particular study my location as the **participant researcher** is inquiry from the inside out. This epistemological assumption implies that knowledge gained from interviews can only be co-constructed together with participants. Both researcher and participated experiences and voices are heard and reflected in the data and therefore I cannot marry myself with a 'hybrid' position.

Due to my vocation as leadership development researcher and practitioner, I have often taken on the role, consciously and unconsciously, of the 'insider'. This insider status had a significant impact. We (research participant and participant researcher) shared similar backgrounds and leadership jargon. For example, I could identify with the participants when they spoke of the 'double-bind' and paradoxical situations in which they found themselves, typical to leading in a complex environment. However, I had to guard against assuming that we shared the same meaning and saw the world similar in all instances.

An example stands out: I started with an assumption that as practitioners we need to understand and 'know' first before we can respond appropriately.

It came as a big surprise to me to find out that my participants' experience has been quite the opposite: not understanding and 'not knowing' is **the** source from which insight and appropriate response will emerge. Had I not reflected on and recorded my assumptions, I might have missed this insight. At times I found that I have unknowingly assumed the meaning of the participant and 'known' their experience. However, listening with curiosity and 'not knowing' the meaning of their experience allowed me as researcher to fully engage in a co-constructed conversation. My subsequent reflection and field notes helped me pick up the significance of 'not knowing' and guard against making assumptions from the 'insider' location on the researchscape. This has taught me to ask consciousness-raising questions to provoke thinking, not only about the location but also the power that may exist in the relationship (Mills, Bonner & Francis, 2006:10).

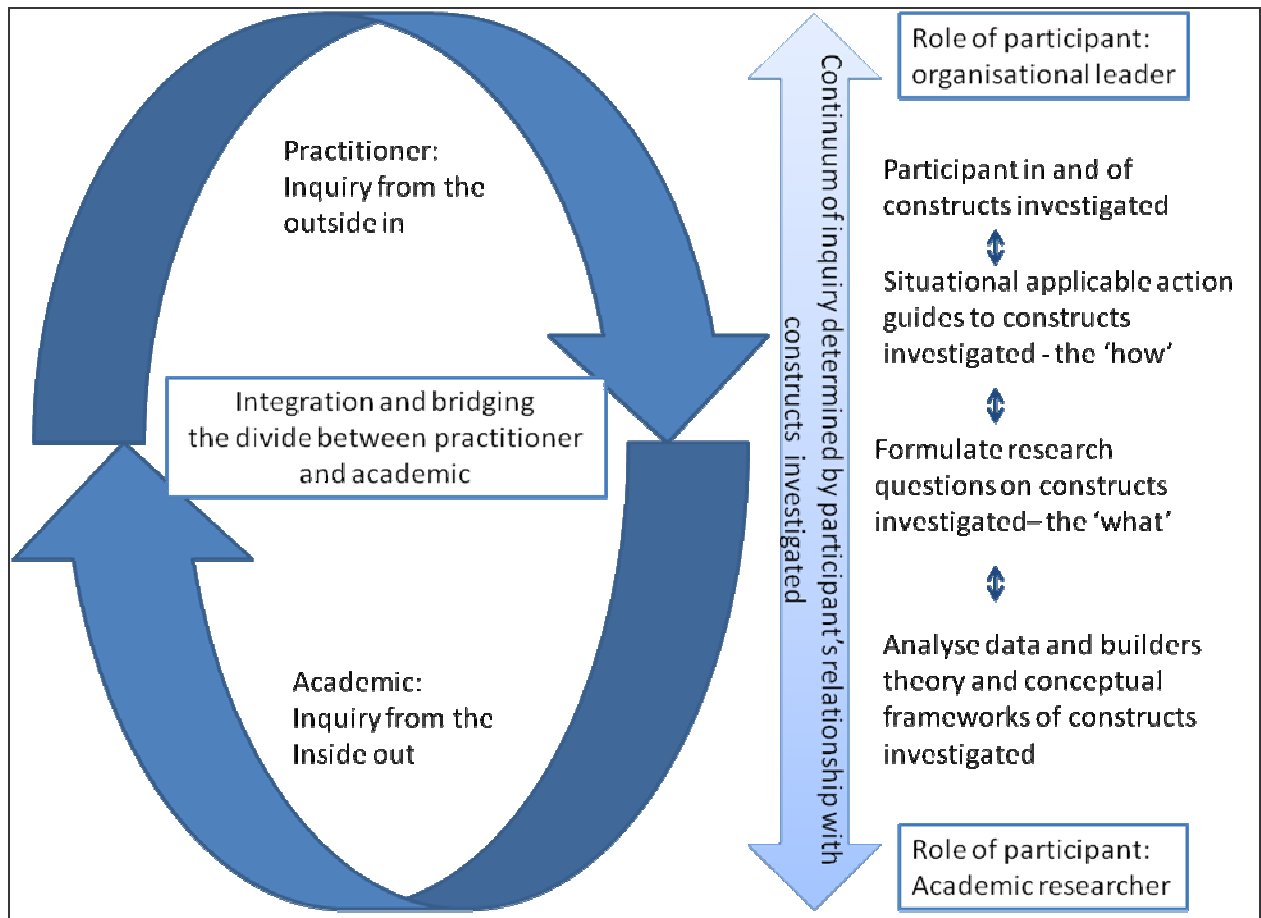
2.2.7 Researchscape: Location of participants in paradigm of enquiry

In this study I took the liberty to re-interpret 'inquiry from the inside and outside' so that it does not only offer the location of the researcher but also identify the position of the participants in relation to the constructs investigated.

As illustrated in Figure 6, 'enquiry from inside out' can be re-interpreted as participants who are dealing with the construct in a deductive manner. They develop a hypothesis or a framework and apply and test it on the 'outside' world. They are therefore more concerned with the formulation of research questions that will answer the 'what' of constructs, which I found to be prevalent amongst the academics.

In contrast, 'enquiry from outside in' can be interpreted as participants who experience the constructs intimately in practice, mostly in an inductive manner, which I found to be prevalent amongst practitioners/leaders. They see and experience the constructs, recognise patterns in practice and formulate hypotheses, and are therefore more concerned with the situational application of constructs. I acknowledge, however, that academics can experience enquiry from inside in their own leadership space, and vice versa.

Figure 6: A re-interpretation of paradigm of enquiry: location of participants



Source: Adapted from Evered & Louis (1981:385-395)

The diverse field of representation, also called the ‘politics of location’ (Koch & Harrington, 1998:888), acknowledges that the interpretation and creation of meaning of constructs investigated exist in a complex matrix or continuum of alternative meanings and representations. Politics of location can be demonstrated as follows: facts are treated as social constructions and the scenic method is used and shown rather than told, while multiple points are highlighted on the same construct.

Certain participants are academics whilst others stand exclusively in the practice. During data analysis it became apparent that practitioners’ mental models of the subject were viewed from the inside out, whilst academics’ mental models were viewed from the outside in.

2.3 QUALITATIVE RESEARCH

The research philosophy, as well as the epistemological and ontological orientation, has been established. The qualitative research method is discussed within the context of the postmodernist research philosophy.

There are a number of significant differences between qualitative and quantitative research methods as highlighted in Table 5. Schurink (2003:3) defines qualitative research as ‘grounded in a philosophical position which is broadly interpretivist in the sense that it is concerned with how the social world is interpreted, understood, experienced or produced.’

Table 5: Differences between quantitative and qualitative research

Quantitative	Qualitative
Based on meanings derived from numbers	Meanings of constructs expressed through the use of non-numerical data, such as words
Data collection leads to numerical data	Data collection results in non-standardised data, such as classification into categories
Data analysis through statistical analysis and diagrams, questionnaire surveys, experiments	Data analysis conducted through the use of conceptualisation of constructs, and information gathered through participant observation, interviewing, life history and grounded theory analysis

Sources: Parry (1998:88); Saunders *et al.* (2007:472)

A benefit of qualitative research is that it allows the discovery of new variables and the relationships between variables. Unfortunately, the impression has been created over time that qualitative research employs methods that are unsystematic and unscientific. To the contrary, literature on qualitative research argues that it does use formal and systematic methods for data collection and analysis (Leedy & Ormrod, 2005:133; Saunders *et al.*, 2007:470; Shah & Corley, 2006:1824).

2.3.1 Leadership and qualitative research: complex context and the individual

Qualitative research captures three dimensions of leadership phenomena – multiple levels, dynamism and social construction (Conger, 1998:111). Literature highlights that qualitative studies in the leadership arena, although growing, are underutilised as they have specific advantages over quantitative methods (Bryman, Stephens & à Campo, 1996:353; Bryman, 2004:729; Conger; 1998:109; Schurink, 2003:3; Waldman, Lituchy, Gopalakrishnan, Laframboise, Galperin & Kaltsounakis, 1998:178).

It is suggested that a qualitative approach:

- Allows for the exploration of complex and sometimes even contradictory information that exists (Parry, 1998:85). Gummesson (2006:170) argues that complex phenomena are not reduced but rather condensed to make each construct and conceptual framework progressively denser with knowledge – which is primarily the objective of qualitative research. The qualitative approach also implies that the researcher will not try to quantify observations, but to recognise rather that the constructs (mental models and quantum organisation) are multidimensional, complex and layered.
- Enables the researcher to investigate and represent mental models linguistically. Carley and Palmquist (1992:602) argue that mental models are internal representations and that therefore language is the key to understanding mental models. Their observations underscore the notion that mental models can be investigated and represented linguistically through co-constructed interviews.

Choosing a qualitative research design was therefore not a default choice but a deliberate and informed choice. Qualitative research is a different way of answering different type of research questions with a different set of assumptions and a different worldview of knowledge. As such, it proved to be best suited to answer the research questions of this study.

2.4 RESEARCH DESIGN: CONSTRUCTIVIST-GROUNDED THEORY

A research design is a general strategy, approach or framework for solving a research problem, which includes the structure for the procedures to be followed regarding data collection, analysis and interpretation (Mouton, 2001:55).

Glaser and Strauss in Pandit (1996:2) suggest a research design for grounded theory that consists of five analytic phases: research design, data collection, data ordering, as well as data analysis (open, axial and selective coding), and only thereafter a literature review. In response to this approach, Charmaz (2000:2) postulates that grounded theory methods should also include systematic, yet flexible guidelines to construct theories 'grounded' in the data themselves.

According to Glaser and Strauss (2009), defining components of grounded theory methods are

- simultaneous involvement in data collection and analysis
- the use of the constant comparison technique
- sampling that is aimed towards theory construction and not population representation
- the conducting of a literature review after an independent analysis
- the constructing of analytic codes, as opposed to preconceived logically deduced hypotheses.

Such an approach is **not compatible with the constructivist paradigm** and more suited to a modernist philosophy grounded in a post-positivist paradigm (Charmaz, 2000:67; Gioia & Pitre, 1990:584). For example, a *tabula rasa* approach is contentious, as grounded theory purists urge researchers to remove their 'intellectual baggage' and to 'wrestle with preconceptions' (Parry, 1998:93). Such an approach, as described by Glaser and Strauss, is in contradiction with the postmodernist philosophy and constructivist approach of this study where my 'intellectual baggage' is an integral part of the process of co-constructing meaning.

Another example is linked to the role of a literature review in grounded theory. An initial high-level literature review was conducted by me with the dual purpose of getting my research proposal approved and acquiring funding. It is suggested that knowledge of literature may make it difficult for a researcher to approach the study without preconceptions and be in a passionate participant role according to constructivist assumptions. Furthermore, knowledge of literature may distract perceptions to make accurate or value-free decisions, which creates the illusion of the existence of investigating an objective 'reality' (Lowes & Prowse, 2001:471).

However, it is acknowledged that many researchers have adopted and adapted grounded theory methodology to fit in with a variety of ontological and epistemological positions, such as postmodernism and constructivism. It is therefore my epistemological position which determines the form of the grounded theory. **A constructivist approach to grounded theory** reshapes the interactive relationship between researcher and participants and, in doing so, brings the centrality of the researcher as co-constructer of meaning to the forefront (Charmaz, 2000:66; Mills *et al.*, 2006:9).

Table 6 describes the research design, including the data collection and analysis phase. There is an **interactive and iterative interplay** between data collection and analysis and conceptualisation/theorising because of the constant comparative method of analysis (Parry 1998:89). For example, themes will be constantly developed in subsequent interviews as the themes emerge (Jootun *et al.*, 2009:43; McGhee, Marland & Atkinson, 2007:44).

Table 6: Research design

Research design phase	Activity	Rationale
Prepare to enter the field	Selecting a topic Initial literature review	Literature review to build rationale for study What are the gaps? What are the research questions?
Data collection	Identification of participants Enter the field	Purposive sampling
	Interview participants	Co-constructed conversations
Data analysis	Coding	Identify codes and categories Investigate, describe and interpret relationship between codes and between codes and a category
	Formulate draft conceptual framework	Identify relationships between categories Identify the emerging themes in relation to research questions
	Compare draft conceptual framework with a second in-depth literature review	Identify what was already known Compare with conflicting and similar frameworks in existing body of knowledge
Development of conceptual framework	Writing up a conceptual framework on the form and function of mental models of leaders in the South African quantum organisation	Show how it all fits together Describe constructs (quantum organisations, leader and mental model) in context of complex environment

Sources: Carroll & Swatman (2000:238); Eisenhardt (1989:533); Gioia & Pitre (1990:593)

The benefit of this interactive nature of data collection and analysis is that important relationships can be recognised already during data collection. This enables the researcher to reconceptualise and adjust future data collection.

2.5 REFLEXIVITY IN QUALITATIVE RESEARCH

An important element in the constructivist approach to grounded theory and an integral part of the research philosophy and design is the practice of reflexivity.

Reflexivity is defined as the ability to continuously notice and evaluate, to be consciously aware and to adopt a systematic analytical approach to the process. It specifically refers to ‘disciplined self-reflection’, also known as personal reflexivity, and method of research, also known as methodological reflexivity (Baxter & Eyles, 1997:505; Carley & Palmquist, 1992:602; Finlay, 1998:453; Johnson & Duberley, 2003:1280; Jootun *et al.*, 2009:42; Macbeth, 2001:35; McGhee *et al.*, 2007:43; Malterud, 2001:484; Tierney, 1996:380).

Reflexivity is a valuable tool to:

- Examine and describe the impact of perspective, implicit biases and preconceptions, which is part of the co-constructed experience
- Provide rich multilayered insight through the practice of introspection on personal response and personal dynamics of the research relationship
- Demonstrate rigour by consciously and deliberately linking the social process of engaging with participants with the technical processes of data collection, analysis and decision taking during this route (Macbeth, 2001:38).

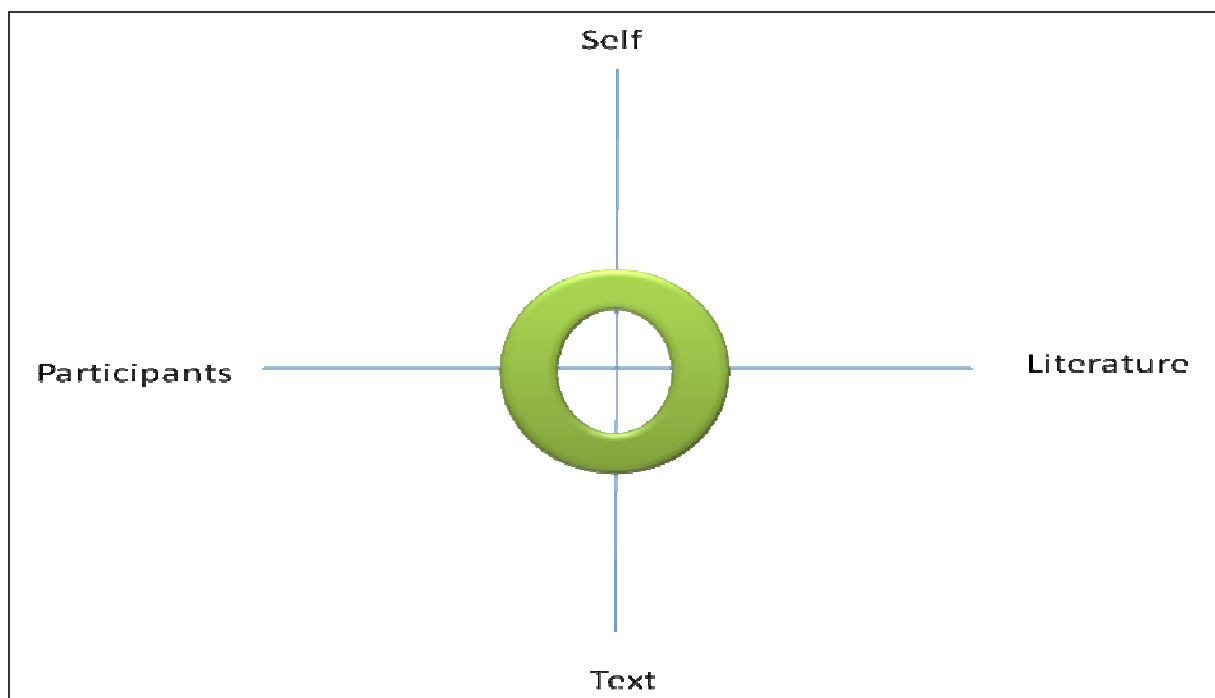
However, many scholars argue qualitative aspects from a positivist lens by advocating positivist notions of neutrality through practices such as bracketing and an authoritative paradigm of finding the truth or ‘the pursuit of objectivity’ (Jootun *et al.*, 2009:46; McGhee *et al.*, 2007:43; Waldman *et al.*, 1998:186). In addition, Koch and Harrington (1998:884) argue that a preoccupation with methodological rigour can be seen as a legacy of a positivist epistemology.

Reflexivity is therefore an opportunity rather than a problem of subjectivity (Johnson & Duberley, 2003:1295; Koch & Harrington, 1998:888). Similar to the constructs explored, the process of reflexivity is full of ambiguity and multiple trails. Qualitative research literature views the practice of reflexivity as a crucial component

of the research, interlinked with the epistemological and ontological orientation and commitments of the researcher (Johnson & Duberley, 2003:1281). The practice of reflexivity may increase the rigour of the research process as it enhances the quality of researchers' understanding of how their position and interest have affected the research process (Johnson & Duberley, 2003:1280; Jootun *et al.*, 2009:42; McGhee *et al.*, 2007:42).

The illustration in Figure 7 summarises reflexivity. Reflexivity is a deconstructive exercise for locating the intersections between the mental models of self (author), the mental models of participants, the text and the literature (Macbeth, 2001:35). **I include the reflections from my research diary throughout all chapters, because of the constructivist nature** of my epistemological and ontological commitments and orientation.

Figure 7: Reflexivity as a deconstructive exercise



Source: Macbeth (2001:35)

2.6 CONCLUSION

In this chapter I addressed the alignment between the postmodernist research philosophy, qualitative research and constructivist grounded theory as research design, as well as the appropriateness of the chosen route to research mental models of leaders in a complex context.

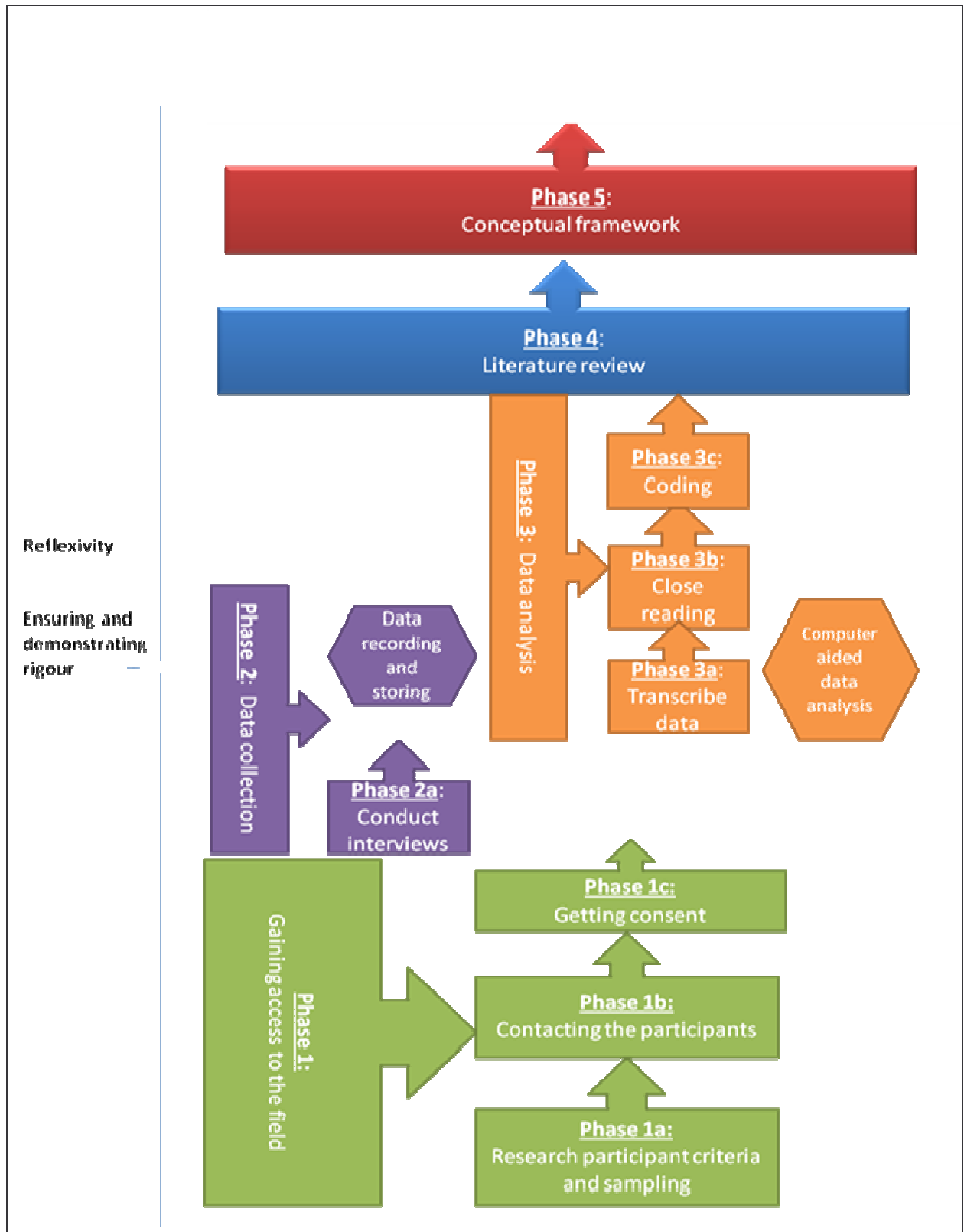
CHAPTER 3: THE QUALITATIVE RESEARCH JOURNEY AND METHODOLOGY

3.1 INTRODUCTION

In Chapter 2, I provided a theoretical account of my research philosophy and design and the role of reflexivity in qualitative research. In Chapter 3, I proceed with a theoretical account of my research methodology, but take a more integrated stance by incorporating my own personal account of the qualitative research journey. However, it must be realised that it is impossible to give a full account of every step and decision taken in this chapter. I offer a big picture by chronologically presenting key phases and methodological decisions taken with the intention to establish credibility and demonstrate rigour at the outset.

This research process is illustrated in Figure 8, which I use to structure the format and discussions in this chapter.

Figure 8: The research journey



3.2 PHASE 1: GAINING ACCESS TO THE FIELD

Phase 1 describes the preparation prior to entering the field, such as establishing and deciding on criteria for the best suitable research participants and the sampling approach. This phase also describes contacting the participants and getting their consent from an ethical perspective.

3.2.1 Phase 1a: Research participant criteria and sampling

After I have gained clarity on **what** to study (research topic, problem and questions), **how** to study it (research philosophy, paradigm and design), it was time to consider **who** will be studied (participants).

Plummer (2001:18) suggests that a good participant should be ‘thoroughly enculturized’, ‘currently involved’ and ‘non analytic’, which implies that they should be able to talk about their experiences in raw detail. In addition, my promoter and I have jointly agreed that the participants needed to be information-rich, fairly articulate and have a high level of self-awareness, courage and honesty. Senge (1992:31) also states that part of being a leader is becoming mature as a human being and gaining life experience. Therefore we decided that participants had to have a minimum of 15 years’ experience in any given industry in the capacity of a leader. Participants consisted of two groups: leaders who are in the organisational position of implementing and/or formulating strategy, and academics exposed to the constructs researched.

I **purposefully selected** seven research participants consisting of practitioners and academics who met these requirements.

3.2.2 Phase 1b: Contacting the participants

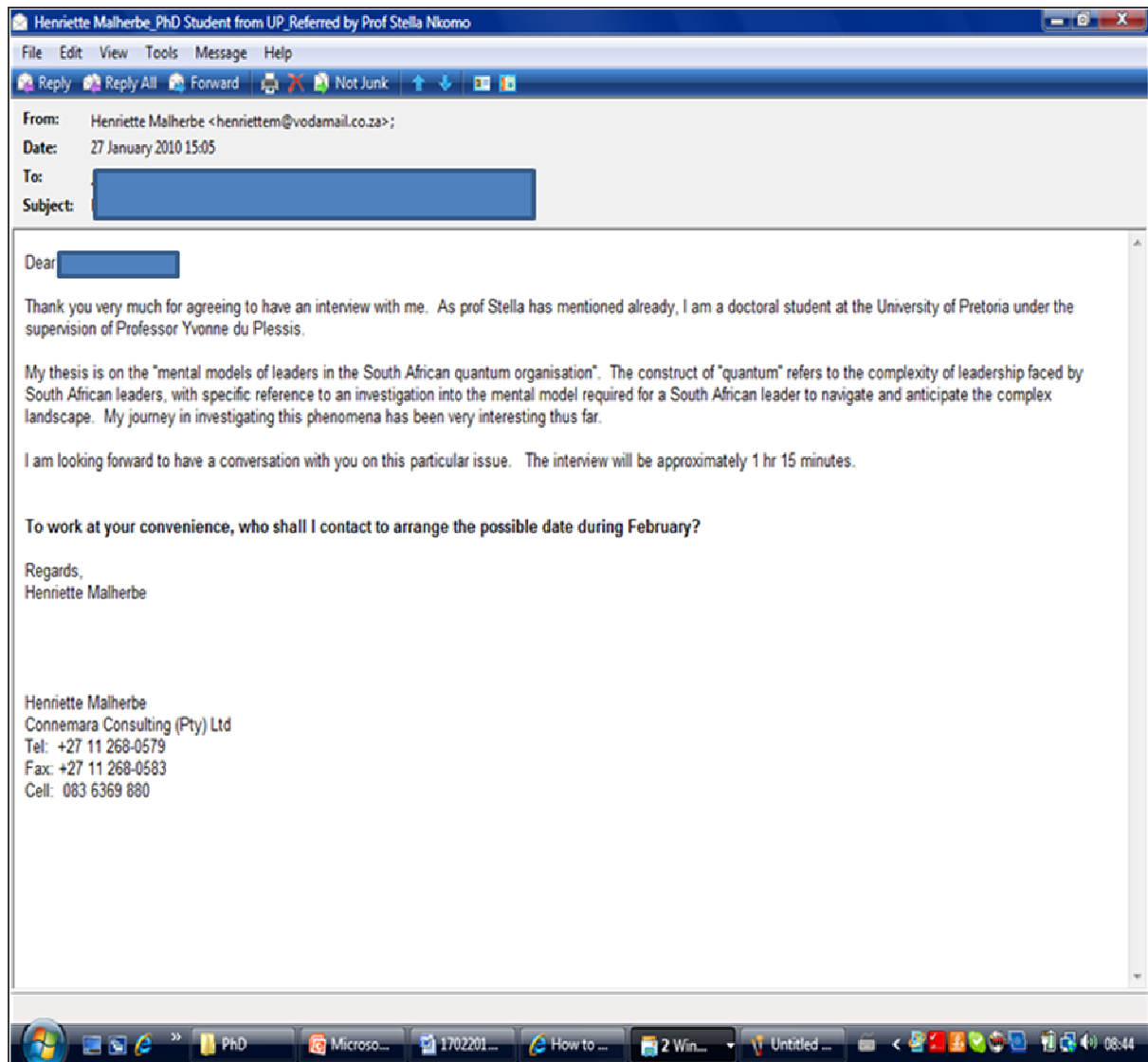
During my discussions with Professor Yvonne du Plessis² access to the research participants was considered, especially as the proposed research participants were executives in South African organisations and published academics. The nature of the research participants posed two potential problems:

- Gaining initial access to the individuals could be problematic, due to their positions and various gatekeepers. This proved to be a challenge initially only, as I got hold of their details to contact them directly or spoke directly to their personal executive assistants.
- Their diaries are typically full and to get a timeslot may be difficult. Once again, this challenge dissolved as I got an appointment with each of them within a two-week period through the help of one of our resident professors, Professor Stella Nkomo. This meant, however, that I had to meet them at their preferred place of meeting, which resulted in having to drive 456 kilometres to one participant!

Some participants also asked for an abstract or shortened version of my research proposal in order to prepare and be informed prior to the interview. Figure 9 shows an example of communication sent to a participant to gain preliminary approval (the participant's name has been hidden to protect the identity).

² I will hereafter refer to Professor Yvonne du Plessis as Prof Yvonne

Figure 9: Email contacting a participant



The seven research participants consisted of practitioners and academics. As indicated in Table 7, I reiterated their position in the researchscape and paradigm of enquiry, adopted mostly through the interview which of course indicated their preferred type of reasoning. I have made clear distinctions between practitioner and academic as I have explained in the location of participants in the researchscape (Section 2.2.7). Testing true to the nature of the quantum organisation, we represented a microcosm of a complex environment ourselves, which I view as a strength of this study as highlighted in Table 7. All participants had at least 20 years' experience, with the eldest participant being 73 years old.

Table 7: Participant information

Participant number	Participant background	Industry	Paradigm of enquiry in researchscape	Gender	Race ³
#1	CEO/Board member of top South African company	Practitioner in Retail industry	Enquiry inside out	Male	White
#2	Academic, author and consultant in organisational behaviour	Academic	Enquiry outside in	Male	White
#3	Academic, author in organisational behaviour	Academic	Enquiry outside in	Female	Black
#4	CEO of South African company	Practitioner in Education industry	Enquiry inside out	Male	Coloured
#5	Systems engineer and business consultant	Practitioner in Manufacturing and Mining, amongst other industries	Enquiry inside out	Male	White
#6	Academic, author in engineering, mathematics and quantum physics	Academic	Enquiry outside in	Female	White
#7	Rector of South African university	Practitioner in Education industry	Enquiry inside out	Male	Coloured

The next step in gaining access to the field was to gain the participants' consent.

3.2.3 Phase 1c: Getting consent

Ethics refers to the appropriateness of the researcher's behaviour in relation to the participants' rights, as well as a moral and responsible way of gaining access, collecting and analysing data and reporting findings, as indicated in Table 8.

³ According to South African demographics, there are four major racial groupings: Black, White, Indian and Coloured. The majority of South Africans prefer to be viewed as 'African' or 'South African' as opposed to be categorised according to racial groupings, especially in the post-apartheid era. However, for the purpose of this study, racial groupings are being made to demonstrate the diversity in the participant selection and in an attempt to demonstrate an equal representation of the South African population.

The University of Pretoria's Code of Ethics specifically states that no harm shall be done to a participant and I could enter the field only after the university's Committee for Research Ethics gave clearance based on my research proposal.

Table 8: Ethical issues

General ethical issues	Stage of research	Stage-specific ethical issues in this research
Privacy, voluntary nature, consent, deception, confidentiality, anonymity, embarrassment, stress, harm, discomfort, pain, objectivity, quality of research	Formulating and clarifying research topic	Participants' right to useful research Participants' right to quality research
	Designing research and gaining access to participants	Obtain written permission from participants to conduct the study Participants' right to be fully informed Participants' right to privacy
	Data collection through interviews (inductively)	Participants' right to informed consent Participants' right to withdraw Participants' right to anonymity and confidentiality
	Processing and storing of data	Participants' right as an individual to the processing and storing of their data
	Data analysis and reporting of findings	Rights of participants to confidentiality and anonymity

Sources: DiCicco-Bloom & Crabtree (2006:319); Saunders *et al.* (2007:180)

Informed consent can be defined as 'the voluntary and revocable agreement of a competent individual to participate in a research procedure, based on an adequate understanding of its nature, purpose and implications' (Leedy & Ormrod, 2005:101; Conneeley, 2002:186).

The participants agreed to sign a letter of consent detailing their participation and rights (Appendix A). One individual asked me not to take a picture as some of the information was sensitive in nature and might compromise confidential information, whereas the rest of the participants were quite comfortable with releasing their names and pictures. The right to privacy was of particular importance to this study and I made sure that the nature and quality of participants' identities were kept strictly confidential. Because of the close personal discussions, no pictures, names or credentials are offered to avoid any problems of confidentiality and anonymity. Each participant was coded with a number, for example Participant #1 and Participant #2.

3.3 PHASE 2: DATA COLLECTION

The next step was to start the qualitative research journey that would, although unbeknownst to me, bring many insights and a setback, namely the loss of data. The data were collected from 18 November 2009 until 9 February 2010. Although the data collection and analysis are discussed under separated headings, in reality these two phases were overlapping as the one activity is part of the other activity. During data collection, data analysis was already underway.

3.3.1 Phase 2: Conducting interviews

Data collection proceeded through interviews. The interviews were individual and semi-structured, guided by the initial set of research questions and newly evolving research questions that emerged during the interviews. Constructivists believe that it is 'impossible to separate the inquirer from the inquired into. It is precisely their interaction that creates the data that will emerge from the inquiry', as opposed to a 'smash-and-grab' approach (Mills *et al.*, 2006:9).

The venue for the interviews was chosen by the participants and most preferred their workspace. One of the participants even arranged for the interview to take place at one of his favourite spots in Cape Town, without the possibility of interruption from the public (Figure 10). This allowed for privacy. No interviews were conducted in coffee shops where external sounds could influence the tape-recording process. The field experience also enabled me to gain an understanding of the participants in relation to their environments, as they have chosen their workspaces as location for the interview.

Figure 10: Research location of an interview



Interviews were conducted in English, except for interview #6 which was conducted in Afrikaans. A translator was not used as both researcher and participant were fluent in English and Afrikaans. Table 9 is a summary of the interview schedule, indicating the duration and date of the interviews.

Table 9: A summary of the interview schedule

Interview #	Date of Interview	Duration of interview
Interview #1	18 November 2009	02:24:34
Interview #2	28 January 2010	01:39:11
Interview #3	21 January 2010	00:34:40
Interview #4	4 February 2010	01:08:04
Interview #5	5 February 2010	00:54:39
Interview #6	8 December 2009	00:49:55
Interview #7	9 February 2010	01:22:21

Each participant was only interviewed once, with no follow-up interviews, except for follow-up telephonic calls to clarify meaning or to gather more information on particular metaphors and stories used.

3.3.1.1 *Starting the conversation*

I introduced myself, gave my background and explained my interests in qualitative research and in researching mental models of leaders in the South African quantum organisation. I also explained to the participants why they had been chosen and invited them to share raw stories. I then explained the individual informed consent form that I had included in the initial contact email. I re-emphasised that:

- Their identities, names and names of respective organisations would be treated as confidential, nor would any responses be disclosed in the research report that might disclose their identity
- No confidential industry-related information that might emerge would be disclosed in the research report
- Interviews would be recorded.

They signed the individual informed consent forms before the interview commenced. We also did a thorough clarification of our respective roles: both participant and researcher would co-construct in the conversation, although I would have some initial questions to provide a framework to the conversation.

I had initial anxieties for doing it ‘the right way’, but was frustrated because I could not find a ‘right way’, except for embodying equality, demonstrating impeccable listening skills and conversing as a participant researcher. Ironically, the need for ‘getting it right’ was shared by notably one participant, who gave me all the politically correct answers, neatly packaged and not willing, or perhaps not able, to go to the uncomfortable places with me.

The following entry from my research diary speaks about this experience (dated 5 February 2010).

The need for ‘getting it right’ was certainly not mine alone, which explains the phenomena of counter transference⁴ during one interview. Perhaps this insight helped me gain empathy for the participants who were not willing or able because of the need to get it right - Perhaps it is because dipping into your own mental models is messy and an unpredictable journey. The irony? I had to deal not only with the messy reality of the thesis, but also with my own and participants’ internal complexity which emerged during the process.

I enjoyed the interviewing process and was left inspired by not only the collective body of knowledge which was revealed by the participants, but also the courage of the participants to disclose in a very authentic manner necessary information about their own mental models and leadership experience in a complex environment. They shared not only the good, but also the bad and the ugly and therefore I am forever humbled by my participants. Knowing that I might not get an opportunity to do follow-up interviews and that it might be my only chance to gather rich information created anxiety, though most of the participants thought spontaneously of offering me more time if needed.

3.3.1.2 The research questions: an evolutionary matter

The initial formulated research questions (Section 1.6) were used as a framework for the discussion, as opposed to getting through as many research questions as possible. The basic research questions served as the first interview questions to delve more deeply into different aspects of the research issue. As more information was gathered during the interviews, I was enabled as ‘co-participant’ to ask more specific questions.

⁴ Counter transference is a term used by therapists which implies the displacement or redirection of emotion onto the other party.

The iterative nature of preliminary data analysis coincided with data collection, which resulted in changing or adjusting the research questions for future interviews as the process unfolded. This enabled me to give account of my own and the participants' **lived** experience in this co-constructed conversation. I also trust that this allowed for rich data rather than data resulting from superficial opinion-seeking questions.

To demonstrate the evolving nature of research questions, I have selected research questions which organically emerged in a co-constructed manner during interviews.

Researcher asks during Interview #1:

My question however is: What enables someone to ask those questions? What enables people to make that shift towards asking the right questions?

Researcher asks during Interview #4

But how do I get to that place of asking questions and what other picture is there? How can we bring in a picture of possibility?

Researcher asks during Interview #5

While I am listening to you...uhm (3 seconds' silence)...a new question came up. Do the leaders in the quantum organisation think of themselves as leaders in the traditional and conventional sense of the word? Do they even think of themselves as leaders? If not, how do they think of themselves in a complex environment?

Interesting to note that most of the research questions were answered spontaneously as the conversation evolved. The central research question was: What does the learning and sense-making process constitute of?

3.3.1.3 Listening and reflective skills

The focus on the interviewer as an instrument and co-construct partner in interview makes strong demands on the interviewer's level of competency. It requires impeccable listening skills to content (what is being said) and process (how it is being said), empathy and reflective listening skills (Dicicco-Bloom & Crabtree, 2006:314).

I listened on two levels:

- Content – I listened to what the participant was saying (e.g. emerging themes, discrepancies, multiple meanings, ambiguities, for words that hold multiple meanings while I had participants to clarify). During the interview I would feedback and reflect or reiterate issues to ensure that I had understood correctly. Any misunderstanding or misinterpretation was then clarified by the participant. This contributed to the trustworthiness of the data.
- Process – silence, sudden movements, non-verbal cues, energy levels that change suddenly.

I include my own voice in the text to demonstrate equality in voice and bring alive the lived experience of co-construction and to demonstrate the application of listening and reflective skills as such (Charmaz, 2000:520).

Participant #3 responds after I (researcher) have reflected back to her what I have heard with an interpretive tone:

I haven't really thought about it that way. That is a good summary. I haven't thought about it that way (participant stares in front of her with 5 seconds' pause).

Researcher and Participant#2 co-constructed conversation:

Researcher: *You said something interesting whilst I listened to you. You didn't use the description of leader in a complex environment; you switched to the words 'quantum thinker'*

Participant #2: *I don't think it is insignificant that you have picked it up. I wasn't even aware of, or realised that I have made that distinction. But I think there is a lot of value in what you have just picked up.*

I spent a great deal of time paying attention to tone of voice, body language and other non-verbal behaviour during discussions as this is another means of collecting data. I also looked for 'off-the-cuff' and 'informal conversations' before and after the 'interview' and viewed these conversations as an integral part of the whole interview experience. These remarks were coded under themes. Sometimes interesting behaviour such as a sarcastic laugh, sudden pause and silence, sudden movement of the head and hands, and blushing emerged.

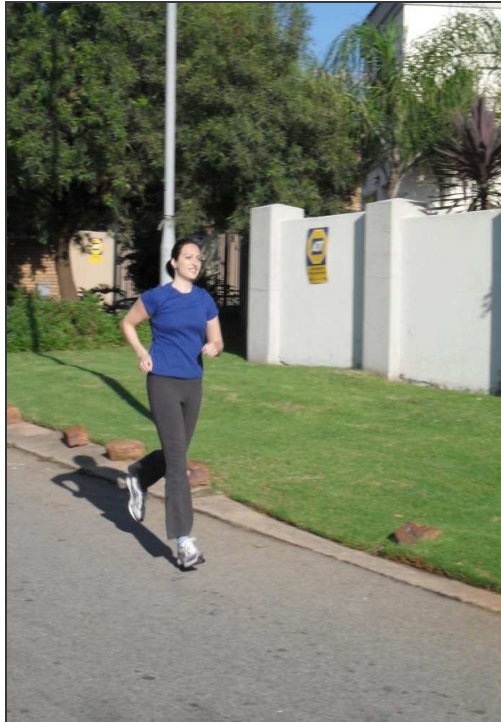
These behaviours were explored during the interview and the participant was then given the opportunity to discuss the meaning thereof. As participants described their understanding of the constructs, meaningful cues such as non-verbal expressions, quotations and sidetracks were also carefully documented in order to collect thick data.

3.3.1.4 Field notes

Strauss and Corbin (1990:184) advocate the use of a journal by the researcher to record thoughts and how they might influence his or her analysis of the data. I kept a journal not with the intention to keep researcher 'bias' at bay, but with the intention to keep an audit trail of my influence and experience during the co-constructed narrative (Mills *et al.*, 2006:10). My field notes were an invaluable element of data collection and analysis. I spent roughly 30 minutes to an hour per interview making both descriptive and reflective field notes. Descriptive notes were on emerging themes, discrepancies and ambiguities in participants' responses, whereas reflective notes were about my own reflections on the interview.

The saying that 'ideas don't keep office hours' tested true as an inner dialogue or 'conversation' continued whether I was driving, bathing, making a cup of tea or, especially, running. Running means different things to different people (Figure 11). For me it means an opportunity to empty my mind, let go and let new insights and ideas emerge. While I engaged in these activities, I became mindful and expectant of new insights. The field notes were also a way of keeping track of my own mental model of the study.

Figure 11: Running as part of the ‘inner conversation’



3.3.1.5 Data recording and storing

A high-quality digital recorder was used to download my interview recordings. Recorded data were carefully guarded and destroyed when transcription and analysis were completed. I had an incident where the recorder had insufficient space left for the particular recording. This alerted me to the importance of preparedness on the technical front: sufficient space, extra battery, and checking the recording immediately after the interview in the participant’s presence to ensure that the interview was recorded.

3.4 PHASE 3: DATA ANALYSIS

At this point, my qualitative research journey took a turn into the unknown: ‘how’ do I analyse the data and will I do it right? For the next 10 months I sifted through piles of data looking for patterns, trends, similarities and dissimilarities.

It is important to acknowledge that the text is a **sample** of what is known by an individual and hence **a sample of the content, form and function of the participant’s mental model**. Carley and Palmquist (1992:604) suggest specific guidelines regarding textual analysis on mental models:

- Identify ‘codes’, which is equivalent to open coding
- Define the types of relationship that exist between codes and create categories, which is equivalent to axial coding
- Use computer-assisted approach.

The underlying objective of qualitative data analysis is the categorisation of the data into meaningful parts or categories. The categorisation typically involves also recognising and identifying relationships between categories and developing a theory or conceptual framework to reach conclusions (Charmaz, 2000:509). This allowed the exploration of data in a systematic and rigorous manner:

- To comprehend and manage the information gathered in complex constructs;
- To integrate related data from different interviews;
- To develop a framework based on relationships, patterns and categories; and
- To draw and verify conclusions (Saunders *et al.*, 2007:479).

Data analysis occurred concurrently with data collection, which in turn influenced the formulation of research questions and coding. This iterative process is called the **constant comparative method** (Leedy & Ormrod, 2005:141). The process of analysis continues until no new themes emerge and a level of saturation is reached (Dicicco-Bloom & Crabtree, 2006:318).

3.4.1 Phase 3a: Transcribing

The first step in data analysis was the transcription of the interviews. I transcribed the interviews myself, which increased my awareness of and familiarity with the data exponentially. It also helped with the re-formulation and preparation of subsequent data for the next interview.

Transcribing the tape-recorded interviews was an intensive and time-consuming process. Therefore, I can confirm first-hand the following observation by Plummer (2001:149-501): '[A] first major task after interviewing for most researchers is transcription (and possibly editing too). This is a hugely time-consuming – and often boring – process. For every hour of tape, it can take up to ten hours to transcribe – especially if you are to engage in analysis at the same time.'

However, this 'painful' experience brought insight: I became aware of capturing the spoken word in text form through sentence structure, quotations and subtle nuances.

3.4.2 Phase 3b: A close reading of the raw data and voice

This step, before coding, involved a close reading of the transcript by me and was drawn from a practice advocated by Miles and Huberman (1984:59) in arguing for systematic procedures in data analysis. This close reading gave me an initial sense of some of the issues arising from the data. It afforded me the opportunity to read the transcript as a whole, to listen to the rhythm and beat of the script and the participants' voices as well as my own during the interviews without imposing a mind of coding on the script. It further alerted me to process commentary, which assisted me to read 'for regularly occurring phrases and with an eye to surprising or counterintuitive material' (Miles & Huberman, 1984:22). I read the transcripts *twice* before I began coding.

For example, what the interviewees regarded as a leader in the quantum organisation surprisingly elicited interesting responses.

Most participants suggested and made the assumption that a leader in a quantum organisation is someone who already maintains a position of power and holds a strategic position, such as an exclusive executive position. However, one participant clearly outlined that a leader in a complex environment is often not in an executive position, but from anywhere in the organisation from supervisory level. This account enabled me to draw more nuanced conclusions about the role and function of a leader in a complex environment, rather than focusing solely on who the leader is in a complex environment. A subtle yet significant reframing and refocus pointed me in the right direction and lead to confirmations during the literature review. This example illustrates the importance of reading transcripts closely and repeatedly and guarding against the mechanistic application of procedures and assumptions made by the researcher. It also demonstrates ‘investigator responsiveness’, which Morse, Barrett, Olsen & Spiers, (2002:11) explain as follows: ‘The investigator remains open, uses sensitivity, creativity and insight, and is willing to relinquish any ideas that are poorly supported regardless of the excitement and the potential that they first appear to provide’ as opposed to ‘responding reactively to the loudest bangs and brightest lights’ in the text.

The next step was to sanitise the interview transcripts (taking out all names and references) and prepare the format of the documents for input purposes into the Atlas.ti 6.0, according to guidelines supplied by Liz Archer from the Centre for Evaluation and Assessment at the University of Pretoria. Liz Archer is regarded as an expert in qualitative research and computer-assisted data analysis.

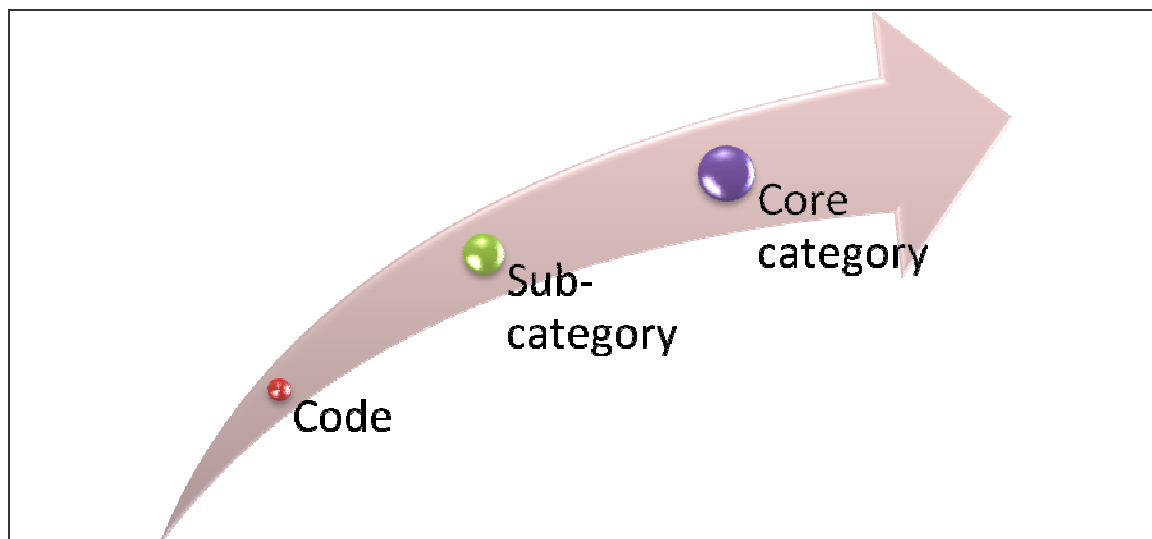
3.4.3 Step 3c: Coding

Coding means the naming of data segments with a label that simultaneously categorises, summarises and accounts for the piece of data (Charmaz, 2000:43). Graneheim and Lundman (2004:106) elaborate on the notion of a code and refer to a code as a constellation of words and/or statements that relate to the same central meaning, in other words ‘codes are tools’ to think with. This process entails data fragmentation and contributes to what Miles and Huberman (1984:11) refer to as ‘data reduction’.

The next level in data analysis is creating sub-categories of commonalities. They consist of multiple codes which are internally homogenous and externally heterogeneous and answer the question of ‘what?’ (Graneheim & Lundman (2004:107). Coding assisted me in managing information, and describing and interpreting segments of data. It also assisted with the building of a conceptual framework from the onset. However, coding, to my surprise, is not a simple, linear or mechanical task.

The next level of data analysis involves the concept of a core category which has multiple meanings, and creating themes is a way to link underlying meanings together in categories. Themes, therefore, operate as threads of meaning that recur and answer the question ‘how?’ (Charmaz, 2006:11; Graneheim & Lundman; 2004:106), as illustrated in Figure 10 below.

Figure 12: Data analysis process



Source: Charmaz (2006:11)

Each transcript was coded in its entirety before I moved onto the next transcript to prevent getting confused. However, I found that once I was finished with one script, new insights and connections emerged which was evident but not coded as such in the previous texts – an iterative process again.

I did however start to code during the interview process. This assisted me in recognising new possibilities or opportunities for questioning and deepening the interview process, and I then used that insight and learning in the next interview.

Under the next few headings, I discuss from a theoretical perspective, how I approached the data analysis and what the identification of codes and categories entailed. I also give an account of how I approached this, with my own personal reflections on the experience of coding.

3.4.4 Computer-aided data analysis

I met Liz Archer on 27 May 2010, before I bought an Atlas.ti student license on 12 July 2010. Atlas.ti was used in this study as it has its origin in grounded theory.

Using computer-aided data analysis has the following advantages:

- It allowed me to be in control during the actual coding and interpretive process, as the interview text on screen was linked to codes. The purpose of such software was not to provide me with a methodological or analytic framework, nor to think on my behalf.
- It allowed for a systematic and multilevel coding of data.
- The ‘source tags’ enabled me to go back and see where the original text has come from (original interview, who, when, contextual factors). For example, I used the functionalities offered by the software to search for codes *within a* document in order to verify whether all participants were reporting and saying the same things. For instance, most of the participants repeatedly mentioned that ‘knowing’ what to do in an uncharted area or situation, paradoxically came from acknowledging and being comfortable first by ‘not knowing’. Using the first-level code ‘not know’, a code that emerged from the data, I conducted an electronic search to see how many of the participants, across data sets, reported this particular thought pattern. From this, I compared and reflected and could weigh the significance of this particular finding in relation to the form and function of the mental model of a leader in a complex environment – by constantly checking and rechecking the data.

Strauss and Corbin (1990:212) stress the importance of memos to assist with the conceptualisation during data analysis. Memos can be viewed as electronic field notes (see Section 3.3.1.4 on field notes). There were also memo areas, which allowed the capturing of immediate insights and more questions on aspects that arose from the text. In the figure below, I questioned whether the quantum age originated from the quantum leaps in technology, or has it always been in existence, although our mental models did not allow us to label or interpret it as such? This question and insight came during a flight mid-air between Cape Town and Johannesburg, South Africa. The memo functionality of the Atlas.ti allowed me to capture emerging themes anytime and anywhere.

Figure 13: Atlas.ti memo during data analysis

```
MEMO: ME - 24/02/10 [1] (0 Quotations) (Super, 24/02/10 20:33:20)
No codes
No memos
Type: Memo
```

```
Is it the Quantum age or has it always been there just mental mode did
not acknowledge it? See if old cultures live, however current technological
facilitated and acted as a catalyst to see existence of 'Quantumness' (sic)
of our environment.
```

3.4.4.1 Methods of reasoning

Inductive, deductive and abstraction as methods of reasoning are used in this study. The use of both the inductive and deductive perspectives has enabled me to consider the multiple realities of the mental model in the quantum organisation (Saunders *et al.*, 2007:116).

There are three approaches in generating new knowledge:

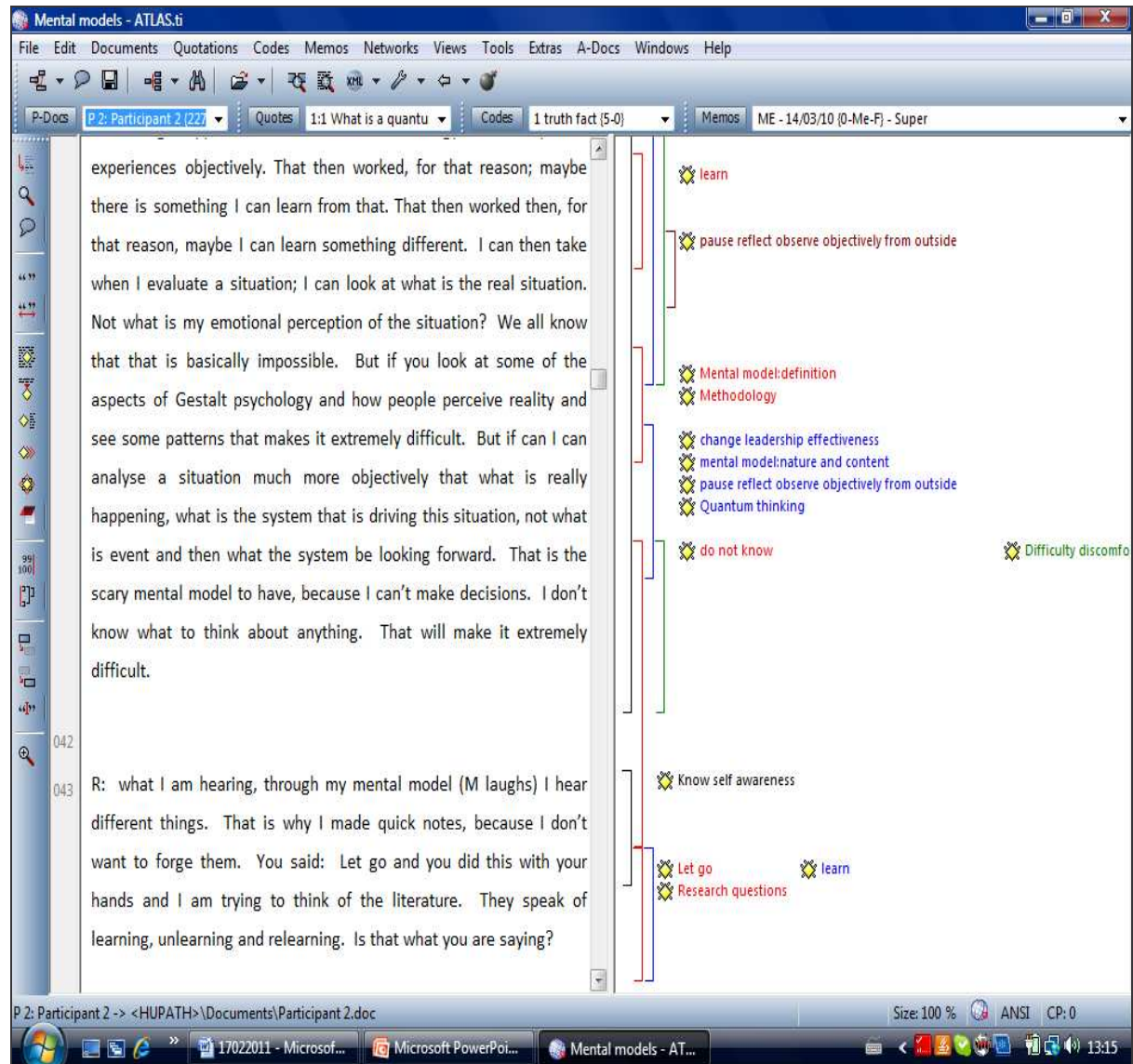
- Deductive reasoning begins with a theory, hypothesis or research question and then attempts to operationalise and test the assumptions of the theory, hypothesis or research question in practice.
- Inductive reasoning begins with the observation of phenomena in order to reach wider and general statements based on the phenomena witnessed.
- Grounded theory typically requires the fracturing of data through coding and then puts the data back together through abstraction, which is another mode of reasoning.

3.4.4.2 Open Coding

Miles and Huberman (1984:69) refer to the naming, labelling and classifying of text in a working set of codes as ‘first-level coding’, while Charmaz (1995:30) uses the term ‘initial coding’. It is suggested that first-level coding is mostly descriptive. Coding entails the assigning of unique labels to text passages that contain references to particular categories of information, as well as the disaggregation of data into units, and does not apply pre-existing categories to the data (Miles & Huberman, 1984:56).

The initial coding in this study included broad and fine codes, as introduced by Wengraf (2001:227). For example, a broad code was ‘mental models’ and fine codes would be ‘mental models: cognitive’, ‘mental models: metaphysical’ and ‘mental models: emotional’. These finer codes are nestled in the broad code ‘mental models’, but are not categories because they do not focus on patterns and relationships in the data; they are merely a description on a detailed level of a construct (Charmaz, 2006:50). I did line-by-line or rather, word-by-word coding through the computer-assisted programme called Atlas.ti. Figure 14 is a screenshot to illustrate the Atlas.ti-assisted coding process.

Figure 14: Coding procedure used in Atlas.ti



This approach has elicited critique from a constructivist that the voice and individuality of participants might get lost in the coding and conceptualisation. Cognisant of this, I have attempted to seek meaning in the data that goes beyond the surface, searching for tacit meanings and beliefs and assumptions. In capturing these during coding, I have made use of what Charmaz (2006:550) refers to as 'in vivo' coding. In vivo codes are used to capture participants' special terms and assist to preserve their meanings or their view in the coding itself. These codes kept the coding closer to the participants' experiences (Mills *et al.*, 2006:12). I looked for their implicit meanings and in doing so, was able to link them to a category.

I was often unsure of whether I was doing it 'right' and felt overwhelmed by the number of codes. On 12 August 2010, I met Prof Yvonne at her office to give feedback on progress and discuss fears and anxiety regarding coding.

Figure 15: Top: Prof Yvonne and myself discussing codes and categories.
Bottom: I am giving feedback on progress and discuss insights gained.



Unfortunately, ‘sleeping over it’ and taking a procrastination stance towards coding did not cure this anxiety, and I decided to deep dive back into the literature and phone a PhD graduate. The indication from Strauss and Corbin (1990:58) that open coding is indeed a very careful and minute interpretation of data, as well as words of encouragement from my colleague, created a normalising experience - anxiety is normal.

It sparked a flame of confidence in my own ability to continue confidently with the coding process, as reflected in the following entry in my research diary (dated 14 August 2010):

I was often tempted to simply take away the ‘difficult’ data and settle for the ‘easy’ ones. However, sitting through the difficulties showed me complexity theory in action – essential patterns and meaning initially emerged. Complexity theory is not just a theory after all. I am experiencing it first-hand!

I ended up with 144 codes. Certain codes, such as ‘letting go’, ‘seeing’ and ‘understanding the context’, were central to the nature of the mental model. Other codes suggested the context of complexity and the quantum organisation functioning within a complex context.

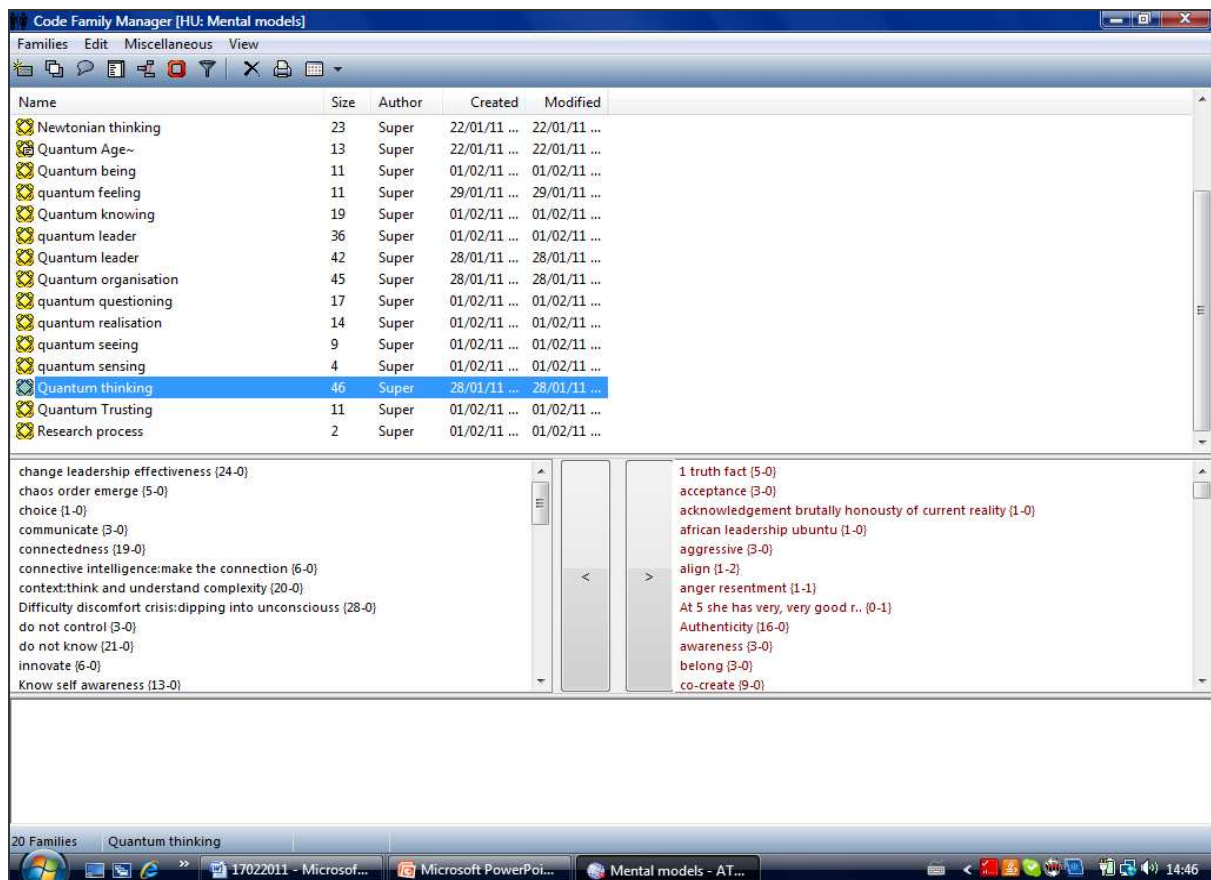
3.4.4.3 Axial coding

The second level coding involved two steps: firstly, identifying clusters and hierarchies of information and, secondly, a deeper level of analysis identifying patterns and relationships between codes. The categorisation of codes is also known as axial coding. Strauss and Corbin (1990) define axial coding as a ‘set of procedures whereby data are put back together in new ways after open coding, by making connections between categories’, which implies identifying and recognising **relationships between categories** of data. This process is also referred to as ‘focused coding’ in which the most significant and/or frequent earlier codes are used to sift through larger amounts of data and synthesise larger segments of data

(Charmaz, 2006:60). By arranging a number of sub-categories, I began interpreting the relationship between codes and between sub-categories. For example, ‘pause stop and thinking from the outside’ would be a sub-category as it introduces an interpretive element of the quantum thinking process. This second step helped me to begin producing the findings.

Atlas.ti refers to ‘families’ when codes are meaningfully coded together. A family must be created manually and are not generated automatically. Two panes appear in the middle of the window – the one on the left for codes which have been grouped in the family and the one on the right (in red) for non-members. Codes I wished to group together in the family were then transferred manually to the left pane. The numbers in the upper column after the code family name indicate how many codes have been allocated to this specific code family (Figure 16).

Figure 16: Creating families in Atlas.ti



I also experienced, as suggested by Miles and Huberman (1984:57), that this part of the coding process was both descriptive and interpretive, as codes are partly analytical and they link segments of text to a particular construct.

Atlas.ti enabled me to generate electronic reports on the codes attached to a category. These summaries included evidence in the form of quotations from the data and a weighting of evidence based on how many times the single code came across and was mentioned by participants. Patterns of repetition of occurrences when talking, unusual disclosures and consistent silences were part of the findings (Miles & Huberman, 1984:51-54). The result was 20 sub-categories, with quantum thinking (consisting of 46 codes), quantum leader (consisting of 42 codes) and quantum organisation (consisting of 45 codes) as the themes with the most codes attached to them. For an illustration of the axial coding, refer to Section 4.2.

3.4.4.4 *Selective coding*

Strauss and Corbin (1990:92) point out that selective coding is a process where the researcher selects a core or central category and then systematically relates it to the sub-categories to validate those relationships in the process. The result is core categories.

I selected the sub-categories and grouped (clustered) sub-categories with underlying similarities into core categories and defined these new core categories in terms of the conceptual framework from which they emerged. For an illustration of the selective coding, refer to Section 4.3.

3.4.4.5 *Data loss*

The content of this heading is ironic, seeing that it flows from a previous discussion on data recording and storing (see Section 3.3.1.5). In September 2010, I lost data on my hard drive and external hard drive due to unforeseen events. Luckily, I kept a hard copy of every article and coded interview, since a PhD graduate who also experienced data loss shared this misfortune with me early on in my study.

This meant that I had to type up and code all interviews again, but it gave me a second opportunity to conduct open coding and re-assess my categories. New insights and confirmations of my previous coding emerged through this painful, yet valuable experience. It did, however, slow me down significantly.

3.5 PHASE 4: LINKING THE DATA WITH THE LITERATURE

The place of a literature review in grounded theory has been debated in order to reach clarity about when and why to conduct the literature review. Some researchers (McGhee *et al.*, 2007:334) are of the opinion that an initial high-level literature overview enables researchers to justify before starting to develop the theory. Furthermore, an initial high-level literature overview facilitates theoretical sensitivity and awareness of the complexity and depth of constructs to be researched, provides a secondary source of data for triangulation purposes (McGhee *et al.*, 2007:336). After data had been collected inductively, a second and more in-depth review of the literature was conducted with the aim to link existing research and theory with concepts (derived deductively), constructs and properties of the new theory that emerged inductively. Up to this point I have avoided a more thorough literature review to ensure that the themes would emerge from the data itself.

The literature review that followed was structured around significant sub-categories and core categories that had emerged. Literature on the categories was then synthesised with the aim of an integrated theoretical understanding that would

- articulate attributes and the complexities of leaders' mental models in the quantum organisation;
- discover the scope of existing knowledge on mental models of leaders in the quantum organisation, after which findings could be validated and a theory could be developed; and
- increase awareness and pro-actively avoid conceptual and methodological pitfalls (McGhee *et al.*, 2007:336).

Linking the categories with existing literature was very time-consuming, chaotic, messy, like falling into a labyrinth of information, but very rewarding. This process occupied me from September 2010 until January 2011.

3.6 PHASE 5: CONCEPTUAL FRAMEWORK

A theory can be defined as ‘a set of interrelated concepts, definitions and propositions that represent a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting phenomena’ (Kerlinger & Lee, 2000:11). The primary goal of a theory is therefore to answer the questions *how*, *when* and *why*. Miles and Huberman (in Veal, 2006:54) describe a conceptual framework as follows: ‘A conceptual framework explains, either graphically or in narrative form, the main things to be studied – the key factors, constructs or variables and the presumed relationships among them.’ This description suggests that a conceptual framework is simply a graphic or written description of a set of relationships which still needs to be tested empirically.

Building the conceptual framework based on my data analysis enabled me to consolidate core categories. However, the challenge proved to be how to visually convey my conceptual framework to demonstrate to the reader the complexity of the nature and structure of the mental model of a leader. I had numerous meetings with Prof Yvonne where we brainstormed on the most effective format to visually display the conceptual framework.

3.7 RESEARCH RIGOUR

Rigour is defined and demonstrated when the epistemological and ontological philosophy of a research study is displayed congruently with the methodology of data collection, analysis and interpretation. Historically, Lincoln & Guba (1985:300) and Strauss and Corbin (1990:222) put forward a strong argument that, because interpretive research is based on a different set of ontological and epistemological assumptions, it cannot be measured against the traditional criteria of validity and reliability (Morse *et al.*, 2002:2). Strauss and Corbin (1990:250) advocate a redefinition in order to align to the qualitative research orientation.

Baxter and Eyles (1997:505) suggest a set of evaluation questions derived from a review of qualitative work to demonstrate rigour, as suggested by Lincoln and Guba. The criteria are credibility, dependability, confirmability and transferability as juxtaposed against traditional quantitative criteria in Table 10.

Table 10: Conventional and alternative criteria for qualitative research

Traditional criteria to assess rigour	Criteria to assess trustworthiness
Internal validity	Credibility
External validity	Transferability
Reliability	Dependability
Objectivity	Confirmability

Sources: Conneeley (2002:186); De Wet & Erasmus (2005:28); Lincoln & Guba (1985:300)

It is interesting to note that authors distinguish between conventional and alternative criteria, whereas the 'alternative' is not really an alternative; it is **the** criteria.

Doyle and Ford (1998:27) postulate that accurate, unbiased measures of mental models can only be done through rigorous experimental research. Nine rules are suggested in order to ensure rigour and quality in researching mental models. However, having a closer look at the epistemological orientation, it appears that there is a strong positivist and quantitative orientation present by using the traditional set of criteria to assess rigour, which is not aligned to the epistemological and ontological orientation of this study (De Wet & Erasmus, 2005:27; Lowes & Prowse, 2001:472).

3.7.1 Credibility

Table 11 outlines a demonstration of evidence for meeting trustworthiness criteria with specific reference to credibility.

Table 11: Credibility criteria

Methods for meeting credibility criteria	Reference to sections for evidence
Adoption of appropriate, well-recognised research method	Chapter 0
Purposeful sampling	Section 3.2.1
Prolonged engagement with some of the participants and familiarity of participants' culture	Section 2.2.6
Interview tactics to ensure honesty and rapport	Sections 3.3.1.1 and 3.3.1.2
Iterative questioning in data collection dialogues	Section 3.3.1.2
Use of reflective commentary	Section 3.3.1.3
Thick description of phenomena	Chapter 4

Sources: Baxter & Eyles (1997:512); Lincoln & Guba (1985:289-331); Shah & Corley, (2006:1830); Shenton (2004:73)

3.7.2 Dependability

Table 12 outlines a demonstration of evidence for meeting trustworthiness criteria with specific reference to dependability.

Table 12: Dependability criteria

Methods for meeting dependability criteria	Reference to sections for evidence
Recorded data	Section 3.3.1.5
Purposive and theoretical sampling	Section 3.2.1
Participants' confidentiality protected	Section 3.2.3

Sources: Baxter & Eyles (1997:512); Lincoln & Guba (1985:289-331); Shah & Corley, (2006:1830); Shenton (2004:73)

However, the usual qualitative reliability measures, such as member checking or peer checking (asking panel of experts to re-analyse the data), are questioned from an epistemological approach. Rolfe (2006:305) postulates that if reality is assumed to be co-constructed and consisting of multiple truths, then repeatability is not essential and one should not expect fellow researchers to arrive at the same themes and categories. Therefore, any attempt to increase reliability through checking is coined as ‘artificial consensuses at the expense of the validity of the data. Consequently, I did not include reliability measures such as member checking.

3.7.3 Confirmability

The table below outlines a demonstration of evidence for meeting trustworthiness criteria with specific reference to confirmability.

Table 13: Confirmability criteria

Methods for meeting confirmability criteria	Reference to sections for evidence
Triangulation to reduce effect of researcher bias	Not applicable. Already put forward the argument of the non-existence of researcher ‘biases due to constructivism approach.
Explication of researcher’s beliefs and assumptions	Section 1.7.1
Recognition of shortcoming in methodology	Section 7.6
Audit trail products Thick description of audit trial	Chapters 0 and 0
Meticulous data management and recording Verbatim transcription of interviews (careful notes of observations, clear notes on theoretical and methodological decisions, accurate records of contacts and interviews)	Chapter 0

Sources: Baxter & Eyles (1997:512); Lincoln & Guba (1985:289-331); Shah & Corley, (2006:1830); Shenton (2004:73)

Triangulation is mentioned as a method to meet confirmability criteria in order to 'reduce bias', whereas triangulation was applied in this study for different purposes. The combination of different sources of data, the methodology, methods of reasoning, and theory offers the following triangulation options for this study (Baxter & Eyles, 1997:514; Conger, 1998: 111):

- Data triangulation, which is the use of various sources in the study such as a combination between leaders in practice and academics
- Theory triangulation, which is the use of multiple perspectives and theories (cognitive sciences, complexity sciences, quantum physics)
- Triangulation in methods of reasoning such as induction, deduction and abduction.

Furthermore, triangulation

- May lead to thicker, richer data
- Leads to integration or synthesis of theories
- May uncover contradiction
- Confirms and corroborates findings in order to provide richer data and mitigate paradoxes in data
- Provides a fuller picture and deeper understanding and enhances description, understanding and definition of constructs, which leads to an integrated approach.

Conger (1998:111) warns against over-reliance on interviewing as principal methodology and suggests method triangulation in gathering data. Conger (1998:11) asserts that qualitative researchers will fall in the same trap as quantitative researchers who use surveying as their principal method. It is therefore imperative to use other qualitative strategies in addition to the interviews to ensure:

- Method triangulation – I used the principles of grounded theory and qualitative and pragmatist approaches.
- Multiple perspectives on phenomena being studied – I employed multiple theories on conducted interviews with several participants to gather multiple perspectives on constructs investigated.

3.7.4 Transferability

Table 14 outlines a demonstration of evidence for meeting trustworthiness criteria with specific reference to transferability.

Table 14: Transferability criteria

Methods for meeting transferability criteria	Reference to sections for evidence
Purposeful sampling	Section 3.2.1
Detailed and thick description of concepts, categories documented and analysed after interviews, and literature review	Chapters 2, 3 and 4

Sources: Baxter & Eyles (1997:512); Lincoln & Guba (1985:289-331); Shah & Corley, (2006:1830); Shenton (2004:73)

3.8 CONCLUSION

It is suggested that a researcher should construct a decision trail explaining the choices on research methodology and decisions taken during the journey (Bowen, 2008:7-8; Jootun *et al.*, 2009:45; McGhee *et al.*, 2007:44). In this chapter I have attempted to construct a decision trail in a systematic manner by referring to appropriate research methodology literature and personal insights, as well as describing the process since entering the field up to the submission of the thesis.

According to my epistemological orientation I do not ask if my **biases** were relevant, but rather **how they were relevant**. As a researcher I have found that my emotions and values were always prevalent; however non-judgemental I tried to be. It is also clear that my behaviour as a researcher affected participants' responses and thus influenced the direction of the findings.

Another researcher with a different repertoire of knowledge and experience, a different set of assumptions, would probably have unfolded a different story. This first-hand experience is echoed by Hammersley and Atkinson as cited in Finlay (1998:455): 'We must work with what knowledge we have, whilst recognising that it may be erroneous and subjecting it to systematic inquiry, instead of treating reflexivity merely as a source of bias, we can exploit it'.

SECTION B: OUR STORY

I call this section 'our story' because the data derived represent the construction of how we (participant researcher and participant interviewees) moved towards a co-constructed narrative. This section refers to **Chapters 4 and 5** and cover the following:

In **Chapter 4** I present the sub-categories and core categories which emerged during axial coding, citing direct examples of responses from interviews.

In **Chapter 5** I conduct a literature review.

CHAPTER 4: RESULTS – AXIAL CODES

4.1 INTRODUCTION

To contribute towards a rich description of the results, it is important to include verbatim quotations to reveal how meanings are expressed in respondents' own words rather than the words of the researcher (Baxter & Eyles, 1997:510).

Firstly, in this chapter, I discuss what Charmaz (2006:57) refers to as 'focused coding', which implies the use of axial and selective coding. First, I report on my axial coding and the axial codes derived from open codes, and thereafter I report on the selective codes. The selective codes were used as a basis for the conceptual framework.

Secondly, this chapter contains the results from the interviews, with actual excerpts. I discuss the axial codes and relationship between axial codes, instead of the individual open codes⁵. While I was writing this chapter, it spontaneously emerged that I was describing and also interpreting results. Due to the nature of the topic, there will perhaps never be an end to a discussion such as this. Therefore I do not attempt to show all excerpts, but only a few to demonstrate the results and the relationships between axial codes.

⁵ As there are a total of 144 codes, I deemed it to be more effective to discuss sub-categories and relationships between sub-categories, as opposed to individual codes.

4.2 AXIAL CODING

Axial coding was already discussed in terms of its function and also how it was applied in Section 3.4.4.3. Axial coding implies the reassembling of data that were fractured during open or ‘initial’ coding (Strauss & Corbin, 1990:124). Table 15 displays axial codes in the form of sub-categories as it was related to the open codes, as well as a description of the category

Table 15: Axial codes

Sub-category	Open codes ⁶	Description of sub-category
Understand context	Connective intelligence	Understanding a complex context crucial to change leadership effectiveness
	Complexity	
	Connectedness	
	Make the connection	
	Understand patterns to understand complexity	
The challenge	Do not know	The challenge posed to leaders in a complex environment: they will not always know ‘the answer’ and cannot rely on past solutions
	Learn	
	Navigate	
	Paradox	
	Quantum realisation	
Sense of belonging and meaning	Authenticity	Specific aspects that create a sense of belonging and give meaning, which is a characteristic of the quantum organisation
	Values	
	We: relationships	
	Belong	
	Purpose	
Interdependence	Acceptance	Specific aspects that create an enabling environment for interdependence, which is a characteristic of the quantum organisation
	Co-create	
	Co-exist	
	Communicate	
	No ego	
	Let go	
	Stakeholders	
Networked	Network	Description of the quantum organisation as a network environment.
	Complexity	
	Connectedness	
Learning and thinking	Energy	Describing the importance of learning, which is a characteristic of the quantum organisation
	Going against convention	
	Learning organisation	
	Nimble, quick, responsive resilience	
Map to navigate	Map	A description of the function of a mental model of a leader in a
	Template	

⁶ An open code may appear in more than one sub-category

	Guide	quantum organisation
	Navigate	
Conscious/Unconscious	Unconscious	Unconscious element of the mental model
	Do not know that do not know	
	Awareness	
	Unawareness	
Culture	Success	Describing a mental model as similar to the phenomena of culture, but on a smaller scale
	Learn	
	Risk	
	Acceptable	
There is only one truth	One truth	Linear thinking that there is only one truth
	Fact	
	Aggressive	
	Conditioning	
	Decisions on own autonomy	
It is a predictable world	Rule book	Linear thinking that external world phenomena, including behaviour, are predictable
	Mechanistic	
	Predict future	
	Past patterns	
We are separate and disconnected from one another	Decisions on own autonomy	Linear thinking that external world phenomena and behavioural patterns are isolated happenings and events
	Discrimination and bias	
	Illusion	
	Disconnected	
	Separate	
Survival of the fittest	Aggressive	Linear thinking that there will be only a winner and a loser
	Conditioning	
	Left brain	
	Superiority and inferiority	
	Tangible value	
	Survive	
It is a connected world	Complexity	Quantum thinking that all external phenomena, including behaviour, are connected and interrelated
	Connectedness	
	Context	
	Do not know	
	Navigate	
	Interdependent	
We are all equal thinkers	Interdependent	Quantum thinking characterised by equality.
	Co-create	
	Problem solving	
	Equal	
	Diversity	
Co-existence of multiple truths	Co-exist	Quantum thinking in that multiple stakeholders hold multiple perspectives and therefore multiple 'truths'
	Interdependent	
	Stakeholders	
	Multiple perspectives	
	Multiple truths	
	Multiple solutions	
Making sense of emerging	Complexity	Function of quantum thinking,

patterns	Connectedness	i.e. making sense of emerging patterns in a complex environment
	Connective intelligence	
	Make the connection	
	Understand pattern	
	Do not know	
	Navigate	
	Paradox	
Learning	Learn	Describing the process of learning of leaders in a complex environment
	Letting go	
	Resilience	
	Do not know	
	Navigate	
Meta-cognition	Thinking	Describing the process of thinking about and enquiring into one's own thinking process and assumptions
	Learning	
	Letting go	
	Do not know	
Awareness of present moment	Do not know	Shifting attention and awareness to the present on two levels, a) attention to present as future is unfolding in the now, and b) attention to present of self and of thinking in now
	Letting go	
	Mindfulness	
	Presence	
Acceptance of current reality	Accept	Acceptance of current reality with honesty and courage towards understanding current reality and influencing emerging future
	Acknowledgement, brutal honesty, current reality	
	Understand	
Questioning	Acceptance	Asking the right questions about current, external and internal (mental model) patterns
	Do not control	
	Let go	
	Meta-cognition	
	Pause, reflect	
	Possibility	
	Being	
	Values	
Challenge status quo	Accept	Challenging status quo and going against convention
	Courage	
	Move against convention	
	Influence	
Letting go	Change leadership effectiveness	Letting go of deep-seated assumptions
	Difficulty	
	Discomfort	
	Dipping into unconscious	
	Ego	
	Risk	
Awareness of not knowing	Complexity	Awareness by the individual leader that he/she does not know 'the answer'
	Do not know	

	Trust	
	Ego	
	Let go	
	Presence	
Talking about not knowing	Interdependence	Talking and testing 'not knowing' with others who do not necessarily know the answer, but know how to deal with 'not knowing'
	Trust	
	Test	
Trusting the knowing	Chaos, order	Trust what they do know. This includes certainties, e.g. it is a connected world, the existence of multiple truths
	Comfortable with unknown	
	Do not know	
	Let go	
	Pause, reflect, observe	
Observing	Let go	Observing the moment and in the present
	Pause, reflect, observe from outside	
	Paradox	
	Presence	
Sensing	Cognitive	Use intuition to make sense of emerging patterns
	Emotional	
	Intuitive	
Seeing	Making the connection	Seeing and recognising new patterns
	Context	
	Learn	
	Let go	
Identity	Self-awareness	Leader's sense of self
	Holistic	
	Purpose	
	Spirituality	
Behaviours	Listen and suspend judgement	Behavioural elements of a leader in a quantum organisation
	Serve	
	Facilitate	
	Trust	
	Navigate	

4.3 SELECTIVE CODING

Selective coding was discussed in Section 3.4.4.4. Selective coding is the final phase in data analysis as a whole and refers to the integration and refining of core categories, as set out in axial coding. Selective codes are shown in Table 16.

Table 16: Selective codes

Axial codes	Core category	Description of core category
Understand context	Complex context	Describing the importance and challenge of leading in a complex context
The challenge		
Sense of belonging and meaning	Quantum organisation	Properties of the quantum organisation
Interdependence		
Networked		
Learning and thinking		
Map to navigate	Mental model	The form and function of a mental model
Conscious/unconscious		
Culture		
There is only one truth	Linear thinking	Elements describing linear thinking
It is a predictable world		
We are separate and disconnected from one another		
Survival of the fittest		
It is a connected world	Quantum thinking	Elements describing quantum thinking
We are all equal thinkers		
The co-existence of multiple truths		
Making sense of emerging patterns		
Co-creation		
Meta-cognition		
Learning	Making sense of	What the sense-making process constitute of
Awareness of present moment		
Acceptance of current reality		
Questioning		
Challenge status quo		
Letting go		
Awareness of not knowing		
Talking about not knowing		
Trusting the knowing		
Observing		
Sensing		
Seeing		
Realising		
Identity	Leader	Leader in the quantum organisation in a complex
Attitudinal orientation		

4.4 THE CONTEXT: A COMPLEX ENVIRONMENT

The participants refer to the properties and dynamics of the context, a complex environment, as the 'quantum age'. They highlighted that the complex environment is a networked environment consisting of intangible properties such as relationships.

Participant 1:

The quantum world, unlike the linear world, does not yield to power.

Participant 5:

And guess what? The quantum age is all about relationships

Participants 1 and 2, in particular, alluded to the notion that the quantum world has always been there. However, a shift in awareness and consciousness has made leaders aware of the context, creating a false impression that the quantum age is a 'new' context, whereas the newness comes from the shift in awareness of the individual and not necessarily the context. In addition, they highlighted that the world is both quantum and linear, which implies embracing pluralism and complexity as opposed to binary thinking.

Participant 1:

And the world has always been linear and quantum, it has always been there. We are not conscious and aware of this, and we don't even know that we are living in it, because the quantum world has always been there.

Participant 2:

It is everywhere around us. It has always been there. Just look at the principles and laws of nature, for example.

4.4.1 Understand context

Within the context of the quantum age, all participants were in agreement that it presents complexity. They understand 'complexity' as unpredictable and consisting of multiple variables, as well multiple perspectives held by multiple stakeholders. It appears that understanding or 'making sense of' is equivalent to having the real upper hand and power in the complex environment. To understand complex patterns has also been introduced by participants as the ability to navigate. Power in the complex environment, according to participants, is based on understanding, making sense of patterns and navigating accordingly.

Participant 3:

I constantly remind myself that I need to be reflective and thinking deeply about making a decision, even understanding the complexity of itself, yourself and what it might mean, because there is no way that you can anticipate the repercussions. You know, because in the quantum world, you know that A doesn't go to B. So if you make this decision, you don't know where it is going to ripple through the system....

Participant 2:

We look at leadership - then we look at a very, very complex picture. Complexity in the sense of the multiple variables involved.

Participant 3:

Leaders need to think about and understand the context in which they operate.

Participant 6:

What is very, very important is 'to understand'. For me to understand why Black and White students are so angry, resentful about Apartheid, whilst they were born yesterday and they did not experience it first-hand. This calls for understanding at a deeper level. Because, if I can't understand, I can't influence. It is important to understand it, however unacceptable the behaviour, but to understand. I can understand their thought patterns, I can anticipate and influence. I can't lead on the surface; I must lead deeply.

4.4.2 The challenge in a complex environment

Participant #2 was convinced that his previous mental model, which enabled him to navigate through complexity, might not be sufficient for future challenges, as the variables and situation have changed and cannot be addressed by the existing understanding, insight and interventions.

Participant 2:

One thing that I believe very deeply (and that is a basic assumption that I have) is that the difficulty of mental models of most people and most leaders included, is that their mental models are developed from the past and it is used to look into the future. But the past is not the same as the future. Somebody once said: It is like driving somewhere looking in the rear-view mirror. And that is the difficulty with applying mental models.

Participant 4:

We are extrapolating the past experiences and conditions onto what happen in the future. We are trying to solve future problems of an emerging future with past solutions within a predictable framework.

4.5 QUANTUM ORGANISATION

Participants described the key properties of and dynamics within a quantum organisation as illustrated in Figure 17.

4.5.1 Sense of belonging and meaning

The first theme that emerged as an element of the quantum organisation is a sense of belonging and meaning.

Participant 1:

So the task of an organisation is to create a sense of belonging, is to say you belong.

Participant 5:

What is the thing that ties it all together? It is the central tenet of meaning. The central tenet of meaning is the values in the organisation.

Participant 6:

'I am my position' is part of giving meaning to not only what I need to do in my small part, but also how do I fit in the bigger group and the strategy.

4.5.2 Interdependence

The second theme that emerged as an element is interdependence and co-creation. Interdependence and co-creation refer to how outputs are generated. This, in turn, affects the decision-making practices which do not sit with one central individual. Decisions are taken and solutions are crafted in a distributed manner and responsibilities are shared. This, in turn, fosters a climate of trust.

Participant 1:

That leadership in the quantum organisation is defined of how can I get the right people and how can I access that space of co-creating. Would that be part of leadership effectiveness?

Participant 2:

The mental models of the learning organisation are: I can't exist without you.

Participant 5:

Because here is the point; organisations that are quantum have to rely on individuals to make decisions on their own. Which means that those individuals need to be empowered to make those decisions and the only way that you are going to empower them is if you are going to trust them.

4.5.3 Networked

The structure of the quantum organisation refers to a networked environment which creates a set of boundaries that still allows for creativity and innovation.

Participant 2:

A network is one of the key qualifiers of a quantum organisation.

Participant 5:

In fact, the constraints were not constraints as we see in organisations today. The constraints were taken to a quantum perspective. Which is called chaordic, but what you have is bounded instability. What we need to do is to look at the concept of the pattern in which they operate and give a set of boundaries within - it is called bounded instability. Within these bounds do what you want. You can work from 3 pm until 3 am - I don't care as long as the output is there.

Participant 6:

It is a networked organisation and not a traditional, hierarchical organisation. It is networked because it sits within a networked environment, which is quantum and connected itself.

4.5.4 Learning and thinking

The competitive advantage of the quantum organisation is the orientation towards learning and thinking, which lends itself to innovation.

Participant 4:

Part of a successful organisation is its orientation towards learning.

Participant 6:

Learning is definitely part of the quantum organisation.

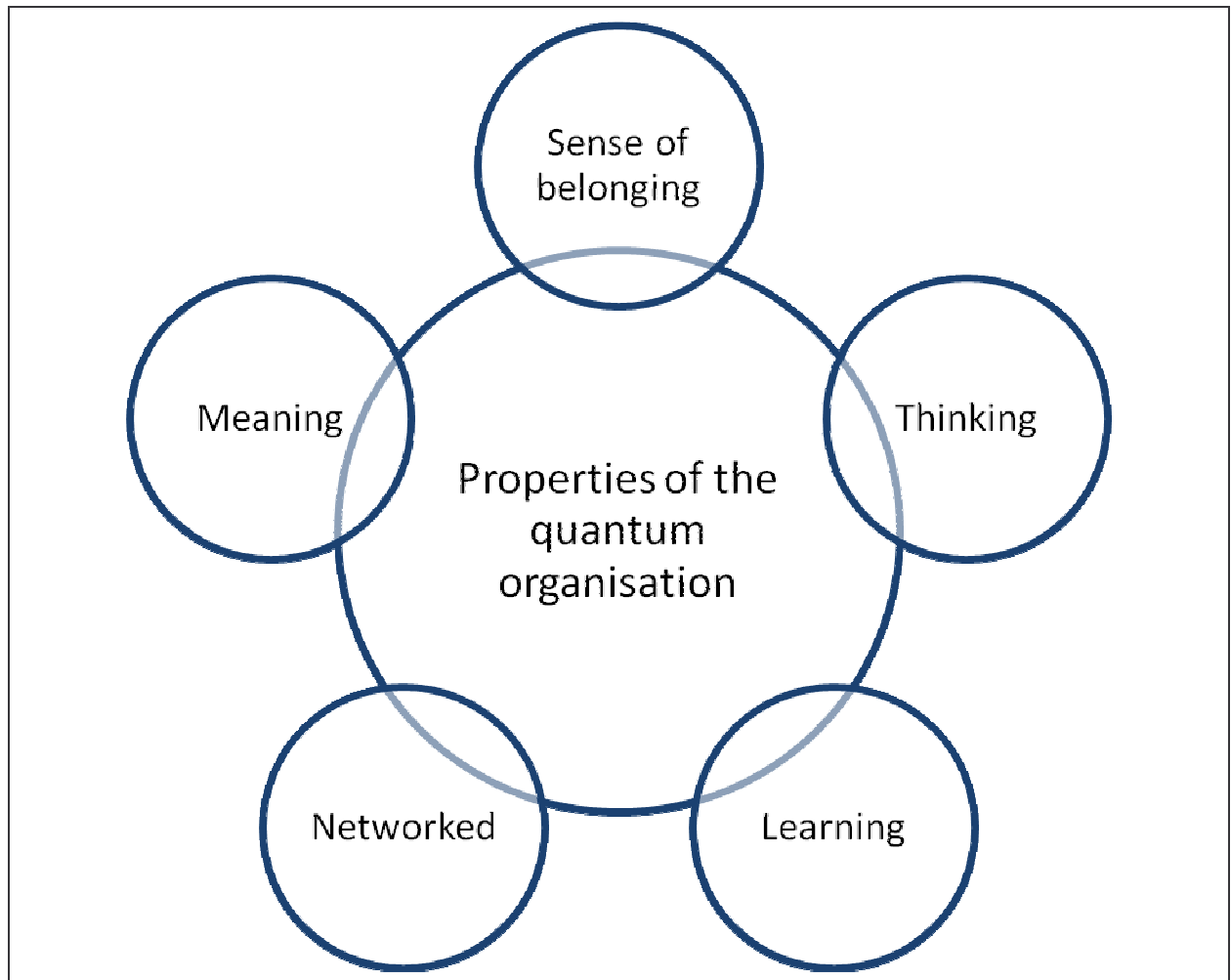
Participant 5

Now, quantum organisations innovate and grow faster than other organisations. Uh, the problem with that is that organisations then suddenly stop to innovate. It is because they stop thinking. And we give you a complex environment that is continually shifting. That allows, for now, the organisation to continually make decisions at the coal face and be able to move ahead of their competitors who might not be thinking the same way.

Participant 1:

So, a quantum organisation would be an organisation in which the right-brain capacity of the people in that organisation is high. A linear organisation would be one where that is low.

Figure 17: Properties of the quantum organisation



4.6 MENTAL MODEL

4.6.1 Map to navigate

Participants gave a broad description of their understanding of what a mental model is, using words such as 'map' and 'template' interchangeably. Also noteworthy is the sense that a mental model acts as a map to navigate in a complex environment and is made up of assumptions. However, the nature of a mental model is mostly unconscious and contains elements of which I am mostly unaware.

This refers to an unawareness of external elements (e.g. patterns and multiple variables and perspectives of stakeholders), as well as internal elements (e.g. limiting assumptions).

Participant 3:

So, I think your mental model serves as a map, finding the path that you are going to take to be effective in a quantum world where you are not in charge a 100%.

Participant 2:

Well, it is my basic assumptions about life, about the organisation. If I say organisation: What makes an organisation work? What makes an organisation successful? My mental model includes basic assumptions about the industry we are in, about people, about me.

4.6.2 Unconscious

One participant specifically emphasised the unconscious element of mental models, which is part of the problem - the assumptions are so deep-seated that leaders are not aware of the effect that they have on their change leadership effectiveness (external environment). All delegates agreed that mental models are deep-seated assumptions; but they differed in terms of the degree to which the mental model has an unconscious element.

Participant 2:

For me the mental model is the unconscious view of the world and the organisation that a person has that has been developed from many actions and many interventions and interactions. But I mean the main thing is that it is unconscious. The leader does not even know that he has a mental model or she has that mental model about the world, about the organisation, about the future, the present, etc.

Participant 2:

It is my basic assumptions about the world, about me, about life, which are tainted by political correctness, what I am expected to say, my espoused values, my espoused views of the world... I didn't even know I have those. So the first time you ask me about that and I tell you about it. I tell you what I think I should tell you. What I have heard from somewhere else, but that's not really what is inside, my own thinking. I am just too unconscious about it.

Participant 6:

A big part of the real mental model is not nice, not cute, and not beautiful. It is damn uncomfortable and unattractive. Who would want to face their unconscious?

It was acknowledged that once one becomes aware of what one was previously unaware of or unconscious about, the emerging contents is not attractive. This creates feelings of anxiety and can potentially be a disturbing experience.

Participant 7:

*The more I thought about it, the more I came to the realisation and it was a disturbing reality. Now I stand in front of the ugliness of my own arrogance, ignorance and other s**t. It is difficult.*

A mental model can change and shift as one becomes aware and makes conscious certain content.

Participant 7:

I think it is important to acknowledge that my mental model has changed over time.

4.6.3 Culture

Participants also drew comparisons and highlighted the similarity between the phenomena of culture and a mental model.

Participant 2:

But they will first repeat what they have heard from others and what they think is their thinking, because mental models are culture on an individual scale.

Participant 2:

Similar to culture, mental models are based on what made me successful.

Participant 6:

The mental models of leaders are not only their mental models; it becomes the mental models of the organisation. And it becomes institutionalised in the organisation, in work processes and thinking in organisations, systems, and it becomes the culture.

4.7 LINEAR THINKING

Continuing with the theme that deep-seated assumptions are an integral part of a mental model, I highlighted the assumptions embedded within linear thinking per sub-category. The central theme of power emerged throughout these assumptions; therefore I did not create a separate heading for 'power'. Power specifically refers to the individual leader experiencing loss of personal power and exerting power in an abusive fashion in an attempt to regain control in a complex environment.

4.7.1 Assumption #1: There is only one truth

Linear thinking is typically being characterised by the assumption that there is only one truth which is applicable to all stakeholder groups and all situations in the organisation, denying diversity and multiple perspectives. This often leads to feelings of frustration, anger and even aggression towards others, coercing others to comply with the 'one truth'. This reductionist thinking often creates even more complexity.

Participant 1:

The picture - there is only one picture of the truth. Then you become aggressive, malevolent and attacking that version of the truth, you can't help it.

Participant 2:

But if you go with that mental model into the conversation, you can't have a dialogue. You don't really listen; you don't accept the other person's view as an equal. And therefore, couldn't really tap into the resource that you have. I can't stand the fact that you have a different mental model.

This also has repercussions for the problem-solving capacity of linear thinking. It implies that there is only one solution because there is only one truth in the first place, denying possibility and diversity in thinking.

4.7.2 Assumption #2: It is a predictable world

A mental model aligned to linear thinking would have the assumption that it is a predictable and not a complex world. Such a predictable context can be controlled only by the linear application of policies and procedures.

Participant 3:

Newtonian zone, you see. Where people are searching for rules, they are searching for policies, they are searching for formulas.

Participant 5:

Because if you measure the thinking process they go through, they go: I need to analyse! So I am looking in my rear-view mirror and what has happened before - so that forecast the future. But forget about it, because the environment is what the future was, but I still forecast the future from that, because that is what I have been taught to do. Then I am going to put my plan and execute it. Simple!

4.7.3 Assumption #3: We are separate and disconnected from one another

A mental models embedded within linear thinking would have the assumption that all stakeholders, teams and individuals are separate and disconnected from one another and do not operate in a networked manner.

Participant 1:

I daren't connect, because if I connect I take on the responsibility and therefore I work from power.

Participant 1:

We are separate and disconnected from one another. So if we are separate and disconnected from one another then what happens to you doesn't bother me. We are detached from the realities of others. What happens to the oil doesn't matter to me as long as I have got enough for myself. What happens to the world doesn't matter as long as I am OK. Because I am not affected you see? If I change that picture to say that we are infinitely connected in such a way that the flapping of a butterfly's wings affects the weather patterns over Detroit, then I have got to stop and I need to ask: What am I doing when I flap my wings? Who am I hurting? Power gets things done. That is the ultimate. It is about punishment and reward.

Participant 5:

When I say that: one of your biggest problems in organisations is the fact that we have reduced organisations into parts in a supply chain. All separate in the chain and all with their own strategies; all with their own objectives in terms of how to achieve this big thing and none of them work together.

4.7.4 Assumption #4: Survival of the fittest

A mental model aligned to linear thinking would have the assumption that there is always a winner and a loser and only the fittest will survive, cultivating a false sense of superiority and inferiority.

Participant 1:

Darwin stated that this is a world of superiority and inferiority. If that is true and it is the survival of the fittest and I will in some other way slant this conversation to make an idiot of you. Because I must win and I will use gender and if you were Black, I will use colour and I will use any bloody tool I can to destroy your self-confidence and your ability. I could have written your PhD better than you could have written it. Now, that is so deeply ingrained in human behaviour because the picture is particularly re-enforced by the South African apartheid regime.

Participant 1:

For example, survival of the fittest is a linear strategy. There is only one of us that is going to survive and it is not going to be you, so it is going to be me.

Participant 1:

I dare not take chances in an unfriendly world. I live in fear and I daren't come second, because second is coming last.

4.8 QUANTUM THINKING

Continuing with this theme that deep-seated assumptions are an integral part of a mental model, I highlighted the assumptions embedded within quantum thinking that is appropriate for leading change effectively in a complex environment.

4.8.1 **Assumption #1: It is a connected world**

A mental model aligned to quantum thinking would have the assumption that all stakeholder groups, teams and individuals operate in a networked environment and are therefore connected, which reiterates the sub-category of interdependence and co-creation.

Participant 1:

That is, everything is connected to everything else and even in our own tradition of ubuntu there is a fundamental understanding that nothing can be seen in isolation of other things.

Participant 3:

That you say that leaders need to think about the context in which they operate, but they have also acknowledged the interconnectedness, as well as the interdependency; interconnected/interdependent.

Participant 6:

I dare not behave from a vacuum.

4.8.2 **Assumption #2: We are all equal thinkers**

A mental model aligned to quantum thinking would have the assumption that all stakeholder groups, teams and individuals are **equal as partners in a co-created thinking** process.

Participant 2:

I don't have to do it consciously, because I see every other person not as a thing, but as an equal and together we can do more. I am therefore not afraid to involve another person or I am not afraid to throw away my pre-conceived ideas and accept somebody else's which stands in the way of co-creation. If I get stuck on my ideas, that is not co-creation. It is just building a little more on what I have. I think in terms of quantum thinking, co-creation lives in that mental model.

Participant 2:

Uhm...I think in terms of your question the ability to tap unconditionally into other people's thinking and to regard them as equal sources and resources are fundamental to what you call a leader in a complex environment of quantum thinking in leadership.

This introduced an interesting paradox in itself. Equality does not reduce diversity but harness diversity in background, ethnicity and thinking, because of the very diverse nature of the networked environment.

Participant 6:

I work with people. They are not Black people or White people. They are all people.

4.8.3 Assumption #3: The co-existence of multiple truths

A mental model embedded within quantum thinking would have the assumption that all stakeholder groups, teams and individuals have multiple perspectives and therefore multiple truths.

It was also highlighted that multiple possibilities can co-exist. This significantly and fundamentally impacts on problem solving as there are multiple truths and multiple solutions in the system. This is a major shift in the distribution of power from one leader with all the information as the 'knower' of the 'one truth' towards a sense maker of multiple truths and facilitator of problem solving amongst stakeholders.

Participant 2:

Well, many pictures and many different truths can co-exist because it is a quantum world!

Participant 3:

And have the right mental model that they can, uhm.... (silence for 5 seconds)that they can construct for themselves out of the multiple dimensions around them - what is it that is going on - out of that for a balanced view and the right decision.

Participant 4:

The truths for you are not necessarily the truths for me.

Participant 5:

When it comes to making a personal decision they have to see both sides of possibility, not just one possibility of one truth.

4.8.4 Making sense of emerging patterns

Within the context of the quantum age, all participants were in agreement that the mandate of the 21st-century leader in a complex environment is the ability to make sense of emerging patterns as part of quantum thinking.

Participant 2:

So you are never going to get it, understand it totally. But the most important thing: do not understand elements, but rather the patterns between them. Understand the patterns that those elements create. And once you understand patterns, you can understand complexity and then you can manage the problem.

Participant 3:

So, when somebody has an understanding of the environment around them and has the right mental model that they can, uhm..... (Silence).....that they can construct for themselves out of the multiple dimensions around them - what is it that is going on - out of that for a balanced view and the right decision.

Participant 3:

Reflecting about and thinking deeply about making that decision, even understanding the complexity of itself yourself and what it might mean and there is no way that you can anticipate the repercussions, you know, because in the quantum world, you know that A doesn't go to B. So if you make this decision, you don't know where it is going to ripple through the system.

Participant 4:

We actually saw the processes and macro-patterns that occur between things.

Participant 6:

Strip the self from subjectiveness in the situation and tape into experiences objectively; however not possible. In order to understand the situation objectively - what is really happening, what is driving the system - and not the event.

Participant 7:

But if I can analyse a situation much more objectively - what is really happening, what is the system that is driving this situation.

4.8.5 Co-creation

Within the context of the quantum age, all participants were in agreement that co-creation during problem solving and viewing all stakeholders as interdependent and equal partners are fundamental to quantum thinking and a central theme of the mental model of a leader in a complex environment.

Participant 1:

Because one person doesn't have the answer, but all of us together do. Between us.

Participant 2:

I think the quantum thinker has a mental model of co-creation - therefore co-creation happens spontaneously. I don't have to do it consciously, because I see every other person not as a thing, but as an equal and together we can do more. I am therefore not afraid to involve another person or I am not afraid to throw away my pre-conceived ideas and accept somebody else's - which stands in the way of co-creation. If I get stuck on my ideas, that is not co-creation. It is just building a little more on what I have. I think in terms of quantum thinking, co-creation lives in that mental model.

Participant 3:

If I am interdependent on you to create a solution together for this complex situation, in other words, we co-create.

Participant 5:

Because here is the point; organisations that are quantum have to rely on individuals to make decisions on their own.

Participant 5:

In the quantum world, it is interdependence and therefore you make sure that you don't let them down and they won't let you down.

4.8.6 Meta-cognition

Meta-cognition describes the process of thinking about and enquiring into one's own thinking processes and assumptions. Participants referred to the ability to think about their own thinking as part of the ability to test assumptions. When enquired about what enables a leader to become aware and shift deep-seated assumptions in order to optimally engage in quantum thinking, consensus was reached that meta-cognition and a continuous process of learning ensure a shift in mental model and, as a consequence, a shift in reality.

Participant 2:

OK. Very few leaders, very few people think about their thinking and leaders are in a very practical world, because they very seldom think about their thinking. They think about doing. But they don't think about their thinking. They accept truths and they accept what it is doing, but they don't think about the thinking that they have created.

Participant 4:

Sometimes I argue with myself and I try to play the devil's advocate game and very often the game is like a chess game, because I keep on saying: the moves you make now, is going to determine the end game.

4.8.7 Learning

The complex process of learning-unlearning-relearning is not a state to be achieved, but a trait of a leader in a complex environment.

Participant 2:

Now, to first unlearn, I first need to know what I have learnt, and the difficulty with a mental model, because it is unconscious, is that I don't know that I have to unlearn it; I don't know what to unlearn.

Participant 4:

Learning itself is a complex endeavour.

Participant 5:

You said there is no certainty on where we are going and we need to learn about this.

4.9 SENSE MAKING PROCESS

Participants agreed on the following elements which forms part of the sense making process. Within the sense making process a change in the content of their mental model naturally occurs due to new emerging insights. The following sub-categories describe the change process of the mental model.

4.9.1 Awareness of present moment

Shifting attention to the present moment occurs on two levels, a) awareness of present as the future is unfolding in the now, and b) awareness of present self and thinking of thinking in the now. This awareness includes, but is not limited to, a general awareness of strengths and liabilities.

Participant 2:

They must already know to a certain extent what they do know and they don't know. So there must be at least a level of knowing of and awareness of their unconscious.

Participant 4

Life is constantly a set of circumstances like - you read a book, you talk to somebody, you go to a lecture, something happens, you read something and you make the connection. You just need to be awake.

Participant 4

You yourself are being responsible to be aware of the moment, because life will give you pieces of information which you will need afterwards to connect - you need to be aware.

Participant 6:

This newly found awareness is not just 'unpacking' and 'processing' of insights. It includes a shift in attention to new things and, as a result, a different way of being.

Such awareness introduced another paradox, as the very act of thinking about your thinking and nature of your mental model requires the leader to step out of the cognitive space and integrate feelings and intuition.

4.9.2 Acceptance of current reality

Consensus was reached that accepting the current reality is important, but does not mean a passive acceptance of the status quo. This acceptance is an active movement towards facing and understanding the current reality, as it has already been established that understanding is the very first part of the change leadership process under another sub-category.

Participant 4:

And it is in the tackling of this....the other model is to embrace the problem, don't run away from the problem - so when you embrace the problem you have got to be with it.

Participant 4:

Then you embrace it. Because for me, that is the start of it. Because if you want to start running away from the problem, then you already have lost the battle.

Participant 6:

Your assumption will not go away. Regardless of what you do, it will not go away. The only way is to face it.

4.9.3 Questioning

All participants and the researcher agreed and experienced that one needs to ask the right questions regarding external phenomena, but also to question one's own thinking and assumptions. This links back to the sub-category of meta-cognition – thinking and questioning your own thinking (Section 4.8.6).

Participant 2:

I am questioning what I already know and what I do not know - quantum thinking - questioning the current paradigm. That would be the first level of awareness. I have to question this paradigm which I operate with.

Participant 4:

The quantum thinker would start with a lot of questions and your focus would be much more around questions - that would be the first thing.

Participant 6:

If you say questioning, uhm.....I want to bring in then the construct of meta-cognition, in other words, I am questioning what I am thinking.

4.9.4 Challenge status quo

The very courageous act of challenging the status quo highlighted also the notion of risk in a complex environment.

Participant 2:

That is an immense maturity and a willingness to go against the conventional. The individual will have to move away from the norm to be successful.

Participant 3:

He went against the wishes of the xx⁷, of his employing government, to do certain stuff, knowing very well it is going to come back and haunt him. But he has been doing that for many years. Even when he was with xx, he was not being politically correct in people's eyes. Because he had the guts - that is what made him successful.

Participant 4:

The individual will have to move away from the norm; that to be successful I have to be a 5 merit; but to have enough maturity and self-esteem to say: This is what I believe; this is what I am going to do. This is going to hurt me financially, it is going to hurt my status, it is going to hurt my job level, but I am not going to do that. Or it might hurt him; it is not necessarily going to hurt him.

Participant 6:

It is my responsibility to go against the stream. I have to...I have to...(5 seconds' silence whilst looking down).

4.9.5 Letting go

It is important to understand 'letting go' in a broader and holistic context than just to let go of previous assumptions. The conscious act of letting go implies also letting go of identity in that context, which requires a lack of ego.

Participant 2:

It means to strip myself from my subjectiveness in a situation.

Participant 2:

Because I build my mental model on success and if I let it go, I am letting go of my success, of my sense of self, of my identity.

Participant 3:

Someone said: What is the difference between quantum thinking and then just sitting back and letting go. So, I haven't thought about it as trust, but I think that quantum thinking is not so much worrying about, trying about getting order.

⁷ Xx are inserted to protect crucial information which might reveal the identity of the participant

Participant 6:

People ask me: 'Aren't you angry?' I just reply that I am not angry, because in the greater scheme of things this incident does not matter. I have already let go of this.

Participant 5:

They chuck the rule book out of the window. They said: This is how we have done it before - we are not interested in that anymore.

4.9.6 Knowing that not knowing

Participants also specifically referred to the difficulty of letting go and knowing that they do not know, with specific reference to uncomfortable feelings such as anger, shock, being scared, despair, and feeling insecure because of 'not knowing'.

Participant 2:

My mental model is that those are the things that will make me successful going into the future. Now you are asking me to unlearn the stuff that made me successful. You are crazy!!! Similar to culture. Because mental models are based on what made me successful, and now you are asking me to unlearn the very phenomena that made me successful.

Participant 5:

It is very scary, because this is all I know, this is all I know.

Participant 2:

I am scared, because everything was so cut-and-dry and some things were right and some things were wrong, but going through this process I have realised that things are not that simple. What now? I feel insecure about all this. I feel I have failed. The truth of the matter is that they didn't understand and referred me away. I feel insecure about all of this. I feel I have failed. Uhm... (Sigh). And then I sit with the question....That is uncomfortable.

Participant 6:

I feel frustrated. Not because I don't know, but because I don't know how to behave, because suddenly my reality has changed.

The sudden awareness and knowing that they do not know even brought on questioning and thoughts fuelled by doubt.

Participant 2:

For someone to say: I don't know. They must already know to a certain extent what they do know and they don't know. So there must be at least a level of knowing of and awareness of their unconscious.

Participant 5:

So you are never going to get it, understand it totally. It is very scary, because this is all I know, this is all I know.

4.9.7 Talking about not knowing

Participants shared that they prefer to talk about the fact that they do not know, and use others as a sounding board, accepting guidance from others who have shared a similar experience. This also included talking with others who did not necessarily know the answer, but who knew how to deal with 'not knowing'. This in itself is an answer!

Participant 4:

I go to those who have walked this path before and just talk.

Participant 6:

I talk to people who know and think deeply with me.

4.9.8 Trusting the knowing

Delegates reported that, although they do not know 'the answer', there is a set of certainties which they trust and know to be true in a complex context (e.g. it is a networked environment; a solution does exist; there are multiple truths and therefore multiple solutions from stakeholders; they are dealing with an emerging future; not knowing is part of leading in a complex context).

Participant 1:

So, if you as an organisation operating in a quantum, or even as an individual - then I am really not seeking equilibrium. I am not seeking equilibrium. The chaos and the turmoil don't bother me, because I know somehow it will come together.

Participant 2:

The way that quantum comes in there for me... You know what? It is a connected world. If I make decisions that resonate with my basic values, in the end, it will be OK. It will be OK.

Participant 3:

I know I am going to be OK. And that for me translates into trust. Whether it is trust in the system, in the universe, trust in self or trust in my values, maybe trust in the quantum world...knowing that we are interconnected and that I, rather my behaviour right now, will have an impact later because we are interconnected and I will be OK.

Participant 5:

In this chaos and knowing that it will go to order and go back to chaos. You know...there has to be chaos for something new to come, a new form to come. There has to be chaos.

Participant 6:

It is knowing what you know; it is at a different level of knowing. It is a wisdom, wise way of being, and it comes frommmmm.....you know what it is? Knowing what to do in a situation when you don't know.

Participant 7:

I have learnt to trust my gut feeling about listening to others and letting them think with me.

4.9.9 Observing

Participants shared instances where they actively observe the present, expecting solutions to emerge. This includes pausing and observing patterns.

Participant 4:

Well, you know, a lot of breakthroughs come through observing life and from being aware.

Participant 3:

I think we all have to step outside in a metaphysical way and look back into the bigger question.

Participant 2:

You have to reflect, you have to watch yourself doing it, as you are doing it.

Participant 4:

*They don't stop and think about what is happening **now**?*

Participant 5:

It is gone - they stop, pause and be in the moment, where they start to make the connections and realise, ah...

Participant 6:

I think I can learn to deal with that - I am talking about that presence and sit with that.

Participant 7:

You will realise if you pause and sit down and think.

4.9.10 Sensing

Sensing includes using not only cognitive functions in quantum thinking, but also deep-seated sensory emotions and intuition.

Participant 3:

You have to come out of the head, you know...it is not only the cognitive, but it is also getting in touch with the intuitive part of yourself and feelings.

Participant 6:

Feelings and I think something else, kind of, some of the sensory things, those deep-seated sensory emotions, and I don't want to use the cliché, emotional intelligence.

4.9.11 Realising

During conversations, realisation was referred to as 'enlightenment' or an 'a-ha moment', but it was a definite moment in time which brought clarity and focus that emerged from the 'not knowing'. Two participants also spoke about the suddenness and instantaneous moment of clarity when a realisation emerged.

Participant 1:

There is an awareness that comes from it. Awareness comes from enlightenment.

Participant 5:

*That realisation **suddenly** made him very small, in a very big way.*

Participant 5:

***Suddenly** you realise that this isn't what life is about and it is really those people around you and the team, and so it flows and so the circle widens....*

Participant 6:

Something happens dramatically and suddenly when you gain a new perspective about the context and the people involved. I was completely disorientated. I cried....I realised with how much hate, disappointment and pain I sat due to my own set of assumptions about Apartheid. Suddenly, I could make sense of all the happenings around me. It just suddenly all made sense.

Participants all spoke about the lightness and freedom that came with realisation, escaping from their own imprisonment of assumptions and actually seeing the patterns, instead of seeing what they believed.

Participant 7:

I was free. Just for a short while after 50 years of mental imprisonment. It was an unbelievable experience. The lightness of just being in the moment!

Participant 3:

I always start with myself. What were the people trying to tell me that I didn't hear? Is there anything that I can do? What is happening here? In those moments, the clarity comes and this is what I need to do different and I need to re-open this issue and don't understand this issue well enough and I am connected to someone who had a similar problem because I am sure they can help to solve it or as a sounding board.

4.10 LEADER IN A COMPLEX ENVIRONMENT

An interesting conversation emerged when I asked: 'Who is a leader in the quantum organisation?' Delegates were in agreement that **leaders are recognised by their thinking and not positions**, which implies that a leader can be anyone in the networked organisation and not necessarily an individual in a formal leadership position.

Participant 2:

You see, in the real quantum environment your leader in a complex environment will not be the hierarchical leader. The hierarchical leader will be the more charismatic person, the more traditional kind of person who will be successful because of the leaders in a complex environment are underneath him or her. Who does the thinking, networking, the real cutting up of issues in an objective way to get to new, novel answers?

Participant 3:

Leadership can truly come from anywhere in the organisation because you have every single person leading and growing the organisation.

Participant 4:

I think if we get down to the real stuff, it will not be romantic.

Participant 6:

This leader will not always be the 'good guy'. Whether you like them or not, the fact of the matter is that they make a quantum difference. They embody change in a radical manner.

Participant 7:

You have every single person leading and growing the organisation.

4.10.1 Identity

We started to speak about identity spontaneously and it emerged that a leader embodies multiple identities simultaneously, e.g. coach, mentor, motivator, facilitator and sense maker. However, the construct of identity of a leader in a complex environment could not be defined nor objectified as singular, but rather be represented in a holistic manner.

Participant 6:

I walk around asking myself: Who am I without an office, business card, email address or even a job title? I ask myself who I am regardless of a CV and I find comfort in saying: I am the mom of X⁸, X and X.

Participant 3:

So, in essence, what we are talking about right now is that leaders play multiple roles. Before this very simple Newtonian approach of who is the leader, is the hierarchical person in charge. And that is the major identity issues that function in an organisation. Now, Warren Bennis talks about a leader being a coach, facilitator, father, and mother. You are playing many, many roles and the thing that you would realise from a quantum point of view is that those identities are complex, they interrelate and they are fluid. They change.

Participant 3:

I am a leader in my organisation, I am a leader at home, and I am a leader in my community; so once again...leadership comes in various guises.

⁸ Names of children have been omitted to protect identity of participant and adhere to confidentiality agreements.

Participant 6:

I was always a leader as I think everyone is a leader. You are a leader if you are a mom or dad. You are a leader at school, church, as captain of the soccer team.

Participant 3:

I think, from a quantum point of view, that one would think about the complexity of my identity - I occupy many identities at the same time.

4.10.2 Attitudinal orientation

This category describes the attitudinal orientation of a leader in a complex environment.

3.3.1.6 4.10.2.1 *Sense of responsibility*

Participants shared a deep sense of responsibility, not only towards the cause for transformation but also towards others such as team members, stakeholders and employees. This sense of responsibility is characterised by compassion and caring for others.

Participant 2:

I am the leader; I need to take responsibility here.

Participant 5:

I had a relationship with every single employee to the point of feeling responsible for them, and had an incredible sense of duty.

3.3.1.7 4.10.2.2 *Spirituality and purpose*

Delegates shared personal experiences characterised by a deep sense of purpose in life, not only towards their organisation and people.

Participant 3:

For me the depth in my value system is a spiritual card, and that speaks strictly of who I am.

Participant 4:

I think, in conclusion, the things all test true to what you are telling. You have to have a meta-physical dimension where great leaders live a very strong purpose-driven life.

Participant 6:

I think we all have to step outside in a metaphysical way and look back into the bigger question. This is spiritual in the sense of what drives me.

Participant 7:

What is the thing that ties it all together? It is the central tenet of meaning. The central tenet of meaning is the values in the organisation.

3.3.1.8 4.10.2.3 Authenticity

Authenticity had a specific meaning shared by participants. In this context, authenticity meant to be able to go into their mental model and to understand what their mental model is, and to work with it even if it is not perfect. It is an unconditional acceptance of who they are - warts and all - and not living under false pretences and living up to expectations of what a leader is supposed to be. Authenticity in this context implied having the courage to face and be with a **real sense of self**.

Participant 2:

The difficulty when you talk to leaders and you want to use that, is they will give you a situation where they feel comfortable and that fit the kind of mental model that we expect from them.

Participant 2:

Seeing and staying true to my real mental model.

Participant 3:

All I can say is that it means that I came to - and it is terrible. TO THY OWN SELF BE TRUE. To thy own self be true.

3.3.1.9 4.10.2.4 Optimism

Participants reported on having an optimistic outlook on themselves and others.

Participant 4:

There is a kind of sense that you can draw strength from the fact that you face problems. People have always problems and you can overcome these challenges, and so it is... maybe there is a certain kind of optimism.

Participant 5:

...and I have been accused of being too optimistic and ...so I said: That's fine because I prefer to be an optimist rather than to be pessimistic.

3.3.1.10 4.10.2.5 Resilience

Resilience carried a very specific meaning during conversations in the context of a complex environment. Resilience was referred to as the ability to let go and then again influence, at critical moments. Resilience was also discussed in terms of, a) the function and, b) the form. This also shows a strong relationship with the sub-category of letting go (Section 4.9.5).

Participant 6:

I was never overcome by fear, because my belief in the cause was more powerful and it was not about what needed to happen. Regardless, I knew I was going to achieve this. What was perceived to be difficult is no longer difficult. I let go of my fears and my belief was stronger.

Participant 2:

You will have to be very strong, very resilient. You are going to introduce another reality which might be uncomfortable for others. You will have to first be comfortable and resilient yourself. Leading is being, not doing.

4.10.3 Behavioural orientation

This category describes typical behaviours of a leader in a complex environment.

3.3.1.11 4.10.3.1 Listen and suspend judgement

The power of listening and the suspension of judgement with the intention to understand were highlighted.

Participant 1:

When we put those two together, if we have the capacity to listen, we have an unbelievable potential!

Participant 2:

And then the mental models of people came out. The one guy: It is wrong! Yatta....yatta....yatta..... and after a while they started to open up, to listen, to suspend their judgements.

Participant 6:

"I lost my grip once I heard the heart of the people."

3.3.1.12 4.10.3.2 Facilitate

It was also highlighted that a leader facilitates problem solving and conversations amongst stakeholder groups in order to facilitate co-creation. This shows a strong relationship with the identity of being a facilitator of multiple stakeholders and perspectives (Section 4.10.1).

Participant 2:

They will bring the things together behind the screens.

Participant 5:

The leader is the one who takes the place of the least and is being elevated by the others to the most. It is the guy steering from the back and keeping everybody aligned.

3.3.1.13 4.10.3.3 Serve

Participants felt that a leader also serves, driven by a sense of purpose.

Participant 5:

But how come that makes a difference? That makes a difference because they start to think about it and move from being egotistical to serving others.

Participant 5:

How can I support you in this? How can I keep you moving? It is not the charismatic leader! Those are not the ones that build enduring companies, leave a legacy or make a difference in this world. In fact, they are typically the ones that break companies and destroy them because it is all about themselves - all about ego. Quantum leaders are about others.

3.3.1.14 4.10.3.4 Trust

Conversations highlighted that effective leaders trust themselves and others.

Participant 5:

He empowered them because he trusted their judgment and he allowed them to make decisions. They never had that before.

Participant 5:

Which means that those individuals need to be empowered to make those decisions and the only way that you are going to empower them is if you are going to trust them.

3.3.1.15 4.10.3.5 Navigate

Change leadership effectiveness in a complex context was described as ‘navigating’ due to not always knowing what to do.

Participant 1:

Latest thinking is that people spend too much time in strategic planning and they actually have to spend more time in strategic navigation.

Participant 3:

‘We make the road by walking’.

Participant 4:

But you know, sometimes it is very difficult, and muddling through is also a strategy. ‘Muddling through’ is as much part of leadership and co-creation.

Participant 6:

Finding a path that you are going to take to be effective in a quantum world where you are not in charge a 100%.

4.11 CONCLUSION

In this chapter I used excerpts and quoted the words of the leaders themselves, which enabled me to present their first-hand experiences and perspectives. The categories I presented in this chapter inform the literature review and the foundation of the conceptual framework.

CHAPTER 5: LITERATURE REVIEW

5.1 INTRODUCTION

Foxcroft and Roodt (2001:176) define a systematic literature review as ‘a review of the evidence on clearly formulated questions that use systematic and explicit methods to identify, select and critically appraise relevant primary research, and to extract and analyse data from the studies that are included in the review.’ This literature overview is structured in such a fashion that it reflects the research questions of the study, as well as investigates the results of axial codes.

First, complexity theory informed the understanding of the complex South African context or the ‘quantum age’ as it is referred to by participants. Thereafter, the form and function of mental models were investigated and I concluded with an investigation into the existing body of knowledge to inform the process describing the shift and change in the content of the mental model.

The conclusions based on results and the literature is discussed in Chapter 6.

5.2 COMPLEXITY THEORY

Whereas it has been established that reality contains any amount of variables, traditional theories in management, leadership and personality do not reflect complexity and multiple truths (Gummesson, 2006:169). Complexity theory, on the other hand, offers unique perspectives of organisational behaviour and the generation of dynamic adaptability in the context of the quantum age. Such a perspective challenges the Newtonian reductionist approach, systems theory and other related notions of predictability, planning and coordination (Marion & Uhl-Bien, 2001:389).

The key message of the theory of complexity is that our world is the result of our interactions with one another and the environment, and is not only subjective. Therefore, there is also an alignment between complexity theory and my postmodernist philosophical orientation and constructivist paradigm.

Dent (1999:5) offers a definition that ‘complexity science is an approach to research, and a perspective that makes the philosophical assumptions of the emerging worldview’. Complexity theory is the study of dynamic behaviours that interact in an interdependent fashion and act as adaptive agents under conditions of internal and external pressure. It is useful to summarise the three dominant characteristics of complex systems: they involve interacting units, they are dynamic and they are adaptive, as explained in Table 17.

Table 17: Characteristics of a complex system

Characteristic of a complex system	Explanation
Interactive	Complexity theory examines the patterns of the dynamic mechanism that emerge from the adaptive interaction of many agents (multiple stakeholders)
Dynamic	Things change and emerge over time
Adaptive	Ability to adapt on individual and macro-level

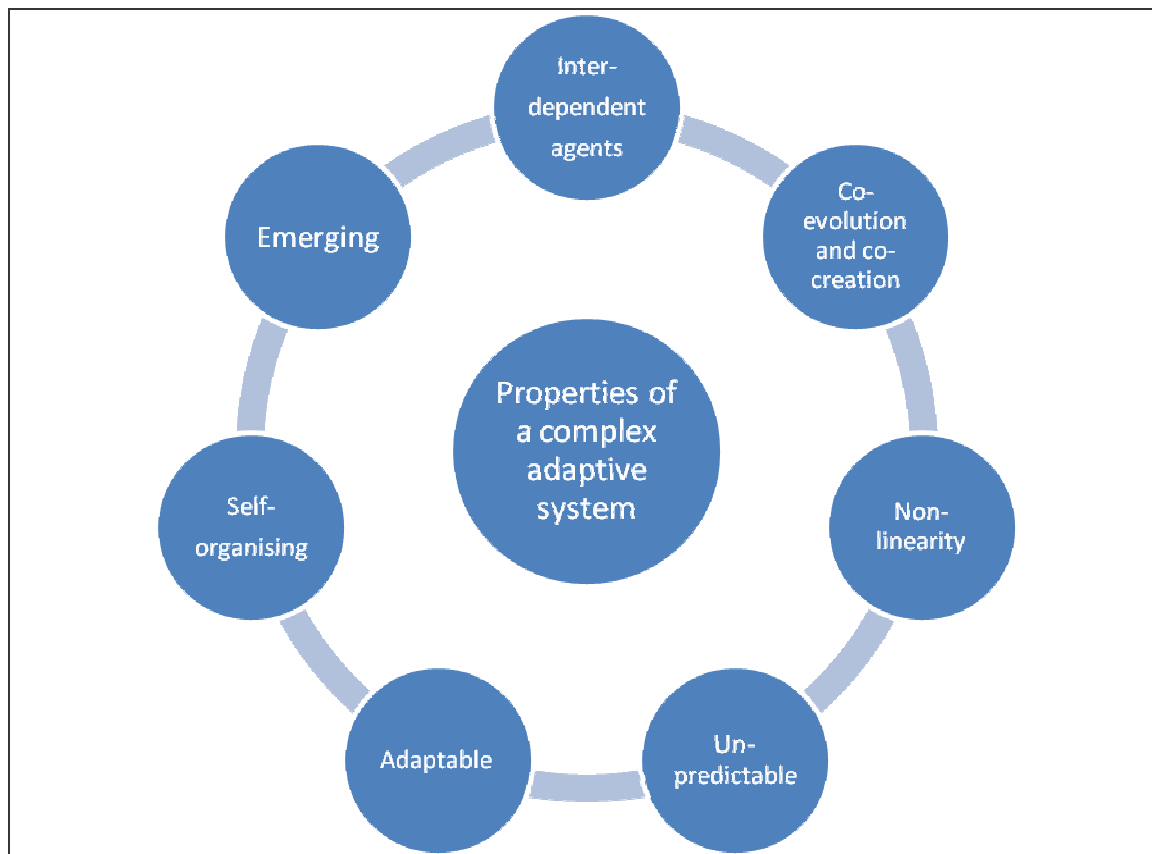
Source: Palmberg, 2009:485

5.2.1 Assumptions of complexity theory

Complexity theory is based on a set of assumptions as illustrated in Figure 18.

- Complexity theory does not require coordination or input from outside sources (i.e. traditional top-down leader) that creates order in behaviour and structure.
- Order can be created by getting rid of energy, which is called dissipating. When a system becomes overly tense or destabilised, a sudden release of energy will occur and new order will emerge from this dissipative process – almost a mini big bang event! Complexity theory describes this as emergent, non-linear change.
- Complexity theory argues that the future is totally unknowable (link to ‘do not know’) due to the nature of dynamic interactions, interdependencies and relationships (i.e. relationships among stakeholders, workers and leaders) which are influenced, in turn, by random properties. This combination can have a tremendously unpredictable effect on the future of the systems because they are driven by random dynamics and complex interactions in the network.
- Complex systems are based on chaos and self-organised order. In other words, the systems are continuously changing and yet preserve some degree of structure at all times. Because the system is continuously changing, the outcomes are path dependent and may be layered with multiple values or ‘multiple truths’ from stakeholders.

Figure 18: Properties of the quantum organisation



Source: Palmberg, 2009:485

Complexity science provides a starting point for discussing both the environment and nature of the quantum age, as well as the complexity of the internal structure of the leader's mental model. Chaos theory was not used in this particular study because it is in its essence still deterministic in nature (Gummesson, 2006:170).

The transferring of natural science theories and concepts to social sciences is often being regarded as 'unscientific' or lacking rigour, and labelled as guru-like evangelism. In some cases this may be true, but in this study, I am not attempting to master my understanding of the complexity theory. My search led me to complexity sciences to prove that not only metaphorical but also genuine commonalities exist between the physical realm and social phenomena of leaders. As it turned out, complexity theory was particularly helpful in describing and explaining the behaviour of organisations as complex adaptive systems, while they affect and are being affected by their environment (Houchin & MacLean, 2005:152; Murray, 1998:275).

5.3 THE QUANTUM ORGANISATION

A literature review of the nature, form and function of the quantum organisation is presented. A simplistic definition of an organisation is a group of humans working together towards reaching a common goal (Conner, 1998:13). The word ‘quantum’ literally means ‘a quantity of something’. The ‘something’ does not, however, refer to material things, but rather to energy with potentiality and possibility (Shelton & Darling, 2001:264). As can be deduced from Table 18, the existing literature on the quantum organisation is mostly descriptive (Chaize, 2000:95; Conner, 1998:10; Denton & Vloeberghs, 2003:84; Guillory, 2007:91; Karp, 2006:3; Kilmann, 2001:76; Quigley, 2001:11; Shelton & Darling, 2001:264; Wheatley, 2006:36; Youngblood, 1997:8; Zohar, 1998:56). For example, Deardorff and Williams (2006:14) refers to a quantum organisation as a certain type of capacity.

Table 18: Definitions of the quantum organisation

Source	Description of the quantum organisation
Pellissier (2001:56)	The quantum organisation is ‘an organic web made up of a dynamic and evolving network of relationships, the primary tenets of which are wholeness, balance, and connectivity, co-operation, creativity and open possibilities’.
Deardorff & Williams (2006:14)	The quantum organisation has ‘an organisational capacity to create an empowering atmosphere of trust, safety, and a sense of belonging enabling continuous introspective and organisational learning and the aligning of personal values to behaviour’.
Youngblood (1997:9)	‘Quantum organisations operate on an organic model that closely mirrors the functional or natural systems.’

Furthermore, it seems that meanings attached to terminologies are varied and used interchangeably in an inconsistent manner. For example, Zohar (1998:56), Overman (1996:87), Youngblood (1997:9) and Gilliland (2004:64) refer to the 'quantum organisation', whereas Guillory (2007:91) refers to the Future Perfect organisation, and Putnik and van Eijnatten (2004:418) refer to the 'chaordic enterprise' as a goal state towards which the learning organisation might evolve. Druhl *et al.*, (2001:382) shed some light by discerning between the learning organisation and the quantum organisation. It is postulated that the learning organisation is a 'forerunner' of the quantum organisation. Learning and systems principles are the central themes of the learning organisation, whereas the themes of emerging and changing structures are central to the quantum organisation, although there are overlaps.

In contrast, Shelton and Darling (2003:358) say that quantum organisations are 'learning organizations – places where continuous improvement and constant learning are cultural norms'. This necessitated an extensive literature review of quantum organisations and led to a synthesis of common themes describing the quantum organisation, as illustrated in Table 19.

In the midst of the conversation around quantum organisations, Houchin and MacLean (2005:162) refreshingly step away from labelling and just ask whether organisations are naturally complex adaptive systems, whatever they are being named. As shown in Table 19, themes emerged from synthesis such as common purpose, shared responsibility, learning, interdependence, networked, self-organising, potentiality and energy, and unpredictability. When comparing the themes with properties of a complex system, as illustrated in Figure 18, it appears that the quantum organisation indeed inhabits the dynamics and properties of a complex adaptive system, hence the success of the quantum organisation in a complex environment.

Table 19: A synthesis of the literature on properties of the quantum organisation

Clusters of themes	Overman (1996) – Quantum organisation	Youngblood (1997) – Quantum organisation	Conner (1998)	Zohar (1998) – 8 features of the Quantum organisation	Kilmann (2001)	Pellissier (2001)	Deardorff & Williams (2006) – Quantum organisation	Guillory (2007) – Future Perfect organisation
Common purpose is shared and owned by everyone	Common purpose	Promoting ownership	Deep sense of shared purpose	Participative in nature	Everyone is involved in the design of structure and strategy.	It is creative and collaborative	Owned by identifying with values.	x
Learning	X	Learning as key competence and catalyst for innovation	Learn from experiences	Continual self-transformation of the leader takes place through learning.	Continual improvement and self-reflection; focus on learning	Organisational learning and renewal necessary for survival	Learning is important and continuous	Learning is key
Organisational structure	X	Web-like organisational structure	Line operation and flexible interpretation of existing roles; assume new job responsibilities on periodic basis	Networked	Cross-boundary processes as opposed to silo thinking and operations	It is decentralised	x	x
Self-organising characteristic	X	X	The role of self-organisation in the organisation's future.	Self-managing infrastructure; bottom-up flow of ideas; nurture creativity; spaces with no boundaries (self-organising	Management of self, teams, systems and processes	It is self-managed and leadership based on real trust	Relies on self-emergence of unique solutions, ideas and insights through the self	Self-directed performance and creative adaptation in process; constant evolving

Role of Self				and emergent)				
	X	Awareness of self and mental model	X	X	Deep internal commitment to self-discovery	Self-transformation as the key ingredient for effective leadership	Journey inwards to self as key requirement at individual level of leader to create synergy	X
Power and control	X	x	X	Replace control with trust	Empowered relations among active participants	X	x	X
Diversity	X	Ensure the rich flow of information and diversity in opinion	Diversity of ideas	Inclusive and not exclusive (e.g. us vs them)	Eternal self-transformation of flexibly designed organisations	x	x	Diversity in people is valued and comprehensively integrated
Information	Reliance on non-tangibles such as information	x	X	X	X	It is information based	x	Information sharing
Management of paradoxical nature due to ambiguity	X	Ability to hold and manage anxiety that comes with paradox	Leader's and organisational ability to manage chaos and the unexpected as an asset	Flexible and responsive due to ambiguous and complex environmental phenomena	X	It is rapidly adaptable and extremely agile	x	X
The role of the leader	X	Leadership is not a position, but a process and	The shift from an event to a process mentality	X	X	X	Create synergy through self-sharing with	X

		distributed phenomenon.					others	
Vision and drivers	X	Creating compelling goals and vision	It is vision driven.	Vision centred and value driven.	X	X		The vision is customer integrated and driven.
Potentiality and energy	X	x	x	Realise value of taking risks and encourage play and rewards creativity	x	x	x	x
Participatory universe	X	x	x	Concerned with symbiosis of human and non-human dimensions	x	x	x	X

Sources: Conner (1998); Deardorff & Williams (2006:1); Guillory (2007); Kilmann (2001); Overman (1996:87); Pellissier (2001); Zohar (1998)

5.4 THE LEADER IN A COMPLEX ENVIRONMENT

Literature is in agreement that the concept of transformational leadership is inadequate (Denton & Vloeberghs, 2003:84; Conner, 1998:10; Kilmann, 2001:76; Pellissier, 2001:16; Wheatley, 2006:36). In this, several authors have attempted to reframe and label a new type of leadership appropriate for the complex environment. Deardorff and Williams (2006:1) label the leader in a complex environment as the 'synergy leader', Plowman, Solansky, Beck, Baker, Kulkami & Travis (2007:341) refer to 'emergent leadership' and Zohar (1998:146) refers to the 'servant leader'. However, one commonality is that they all focus on the behaviour and thinking that determines a leader, rather than the role assigned through positional power.

Complexity theory raises provocative questions about the conventional approach of the leader and follower. Building an argument upon the assumptions of complexity theory and the properties of the quantum organisation, one should ask who is a leader and what does it mean to be a leader in the quantum organisation? If self-organisation is an inherent characteristic of the quantum organisation, then what is the role of the leader? Table 20 compares principles of complexity theory, relates it to enabling behaviours required from a leader and juxtaposes it against certain mythical assumptions about a leader.

Table 20: The role of the leader in a complex environment

Complexity theory principles	Myths	Enabling behaviours of leader in a quantum organisation in context of a complex environment
Emergent self-organisation – system level order emerges as agents interact; information gets exchanged	Leaders specify desired futures as they know the future and their role is that of a future crafter	Leader provides linkages to emergent structures; enhances a connection amongst members of system (stakeholders)
Sensitivity to initial conditions such as small fractal changes can have huge, unpredictable consequences	Leaders drive change because they know the one truth and reality	Leader makes sense of patterns in small changes
Far-from-equilibrium is where change occurs, because system will dissipate energy and information, which will create disorder and lead to new order	Leaders have power that comes with role and position. Must eliminate disorder and gap between current reality and future vision	Leaders encourage disequilibrium
Non-linear interactions occur, because diverse and multiple stakeholders are interconnected	Leaders influence, manage and control others because they are all knowing	Leaders encourage processes that enable emergent order between multiple stakeholders with multiple perspectives. Distributed phenomena; results are achieved by creating environment of quality thinking, co-creativity and learning a leadership competency

Sources; Plowman *et al.* (2007:349); Youngblood (2000:6)

Literature on the quantum organisation often describes the behaviour of individuals operating within the quantum organisation (Chaize, 2000:95; Conner, 1998:10; Denton & Vloeberghs, 2003:84; Gilliland, 2004: 64; Guillory, 2007:91; Karp, 2006:3; Kilmann, 2001:76; Quigley, 2001:11; Shelton & Darling, 2001:264; Wheatley, 2006:36; Youngblood, 1997:8; Zohar, 1998:56).

When conducting a comparative analysis, it appears that leaders in a complex environment do not fit in the framework sketched by the transformational, transactional, charismatic, serving, authentic theories. They do, however, embody certain elements and demonstrate certain contact points with the theories. For example, a leader in a complex environment has an orientation towards serving others and being authentic, although he/she does not comply with the 'criteria' of the theories. An interesting alignment appears between African leadership and leading in a complex environment. For example, leading in a complex environment requires co-creation of new meaning between stakeholders, which is also implied by the African leadership of 'ubuntu'. The phenomenon of 'ubuntu' underpins a philosophy of interconnectedness and power in the networked community of being and thinking.

In the quantum organisation, the system's ability to self-organise needs to be optimised and therefore the leader needs to shift his/her behaviour and thinking to promote and cultivate the richest possible environment for this self-organisation to occur, instead of attempting to block and/or control it. The result is the phenomenon of synergy (Deardorff & Williams, 2006:1; Mason, 2007:10; Youngblood, 1997:10).

This can be done by:

- Developing alignment and promoting understanding of events in the context of the organisation's shared vision. As people can be inundated with data that are often ambiguous and contradictory, the role of the leader is to interpret, make sense of and translate the 'noise' in a meaningful way (Gilliland, 2004:374).
- Cultivating and positioning learning at the heart of the organisation (Karp 2006:16).
- Being an 'internal networker' as someone who inhabits many roles and is mobile within the informal operating networks. The leader fulfils the function of connecting, because it has been found that internal networking infuses change (Senge, 2006:51).
- Focusing on the emergence of relationships (Karp and Helgø, 2008:30).

- identifying and directing attention to patterns of behaviour and thinking (Palmberg, 2009:485).

In conclusion, leaders in the quantum organisation are distinguished by their quantum thinking as opposed to only their position.

5.4.1 **African leadership: An alternative paradigm**

The African management philosophy offers an alternative route to the existing body of literature on complexity theory relating to leadership which is worth investigating.

African leadership is seen as a catalyst for social transformation, but only when deeply rooted in African concepts of identity and community. It is therefore a group phenomenon where a leader is a servant to the clan, tribe, community or group and co-creates with the village towards the desired objective. Power and decision making becomes a phenomenon to be shared by all villagers or community members, rather than be invested in one person (Mbigi, 2000; Prinsloo, 2000:280; Reddy, 2004:4).

African leadership can be defined in terms of various perspectives and variables.

- **Attribution:** African leadership is located in personal behaviours, competencies and characteristics such as empathy, understanding, participation, sharing, reciprocating, hospitality, loyalty, sociality, health, sympathy (Prinsloo, 2000:276).⁹
- **Relational:** Khoza (2007:25) postulates that 'African leadership influences others to allow others to lead themselves'. African leadership is therefore located in the relationship between the leader and the follower.
- **Gender dimensions of African leadership:** Despite the dominance of men in political power structures, the societies have been centred on women - the principle of matriarchy. Research cannot afford to neglect an understanding of the status and experiences of African women in African organisations. Gender relations is of critical importance in the African Renaissance, as gender is

⁹ Correlation with axial code 'behavioural orientation'

socially constructed from historical and cultural perspectives (Mboup, 2008:106; Nkomo & Ngambi, 2009:50; Phendla, 2004:161).

This is by no means an extensive list of all the variables that come into play during the African leadership discussion. The Generational theory may also have an impact on the perceptions and experiences of Generation Y or African leadership.

5.4.2 Ubuntu

A body of knowledge has emerged in response to the Western approach and global considerations of leadership, as well as practice. This field of study is known as African management philosophy and defined as ‘the practical way of thinking about how to effectively run organisations – be they in the public or private sectors – on the basis of African ideas and in terms of how social and economic life is actually experienced in the region. Such thinking must be necessarily interwoven with the daily existence and experience in Africa and its contextual reality’ (Prinsloo, 2000).

Does ubuntu provide Africans with a distinctive social value that can be called ‘African leadership’? To answer this, the ontology of ubuntu must be critically investigated to determine whether it is implied as a romanticised notion or truly a social practice across the African continent. How then is this communitarian value system conceived and what are the implications for leadership in such a value system? (Bolden & Kirk, 2005:13) Central to Afrocentric management is the concept of ubuntu – the community concept of management. Ubuntu is not a management style or business technique, but an epistemological and humanistic philosophy that focuses on people and provides some guidelines for leadership styles and management practices. Ubuntu, literally translated, means ‘I am because we are.’ The social value of ubuntu is that the human being finds identity and ways of being in a community without losing personal identity or being swallowed up by the community (Booyesen, 2001:30).

Khoza (2007:24) argues that the following constellation of values characterises the ubuntu African leadership paradigm:

- Valuing humanity - *Umuntu ngumuntu ngabantu* – a human being finds genuine human expression in human relationships with other humans – ‘I am because you are, you are because we are.’
- Consultation as a value orientation
- Interdependence as a superior value to independence¹⁰ - *Rintiho rin we a ri nusi hove Xitsonga* (one finger cannot pick up a grain – you can achieve more through co-operation)

It also begs the question whether a quantum organisation can be without a leader or can a leader be without a quantum organisation? In a South African study on quantum leadership, Hall (2008:5) found that the leader is first necessary to cultivate an enabling environment. Thereafter, the quantum organisation will self-organise as such and instil leadership behaviour at all levels.

The next section of the literature review addresses the type of mental model of such a leader.

5.5 MENTAL MODELS

First, the form and thereafter the function of a mental model are discussed. Definitions of mental models from an organisational behaviour perspective are cited in Table 21.

¹⁰ Correlation with axial codes ‘it is a connected world’, ‘we are equal thinkers’ and ‘co-creation’

Table 21: Definitions of mental models

Source	Definition of mental models
Marquard (1996:45)	A mental model is 'our image or perspective of an event, situation, activity or concept. It is a deeply ingrained assumption that influences how we understand the world and how we take action.'
Rowe & Cooke (1995:243)	Mental models are 'internal representations of a system that is formed by one's knowledge of a system'.
Theron & Roodt (2000:15)	Mental models are defined as 'unitary, spatial models where distance has functional consequence, and which are used to give meaning and understanding to complex systems or phenomena'.
Gilliland (2004:374)	A definition of mental models 'is assumptions leaders hold'.
Karp (2006:5)	A mental model is 'an internal scorecard that helps to structure thinking and behaviour in situations'.
Senge (2006:164)	The mental model is 'deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action.'
Morecroft (1994:7)	'It is useful to think of mental models as a dynamic pattern of connections comprising of a core network of "familiar" facts and concepts, and a vast matrix of potential connections that are stimulated by thinking and by the flow of conversation.'
Deardorff & Williams (2006:5)	'The mental model reflects the interconnected characteristics of the leader, team members and organisation within which collective thinking is of value.'

Literature does not agree on the form and function of a mental model. For example, are mental models deeply ingrained and relatively stable or unstable? Are they 'extremely simple' (Meadows, Behrens, Meadows, Nail & Zahn, 1974:128) or ranging to complex and sophisticated? (Senge, 1992:5)

Are they images, facts, beliefs or assumptions, paradigms, cognitive maps or recipes? Should a single belief be considered as a mental model or should the term 'mental model' refer to a 'set of interacting beliefs or network?' (Doyle & Ford, 1998:20). Does an individual have a mental model referring to one particular type of cognitive structure? Are they images or mirrors or are they declarative knowledge or intuitive knowledge? Are they unstable and ever-changing in the sense that they are being discarded as needed to solve problems?

Constructs such as archetype, gestalt, worldview, template, schema, mind-set, conceptual framework, paradigm and **mental model** are used interchangeably, which causes confusion about the exact nature of a mental model (Kilman, 2001:13; Marquard, 1996:45; Rowe & Cooke, 1995:243, Senge, 2006:164; Shelton & Darling, 2003:353). Definitions of the mental model are therefore ambiguous, multidimensional and contingent. Partly because of the inconsistency, the concept of mental models is being used by researchers in different contexts for different purposes. For example, Johnson-Laird (1980:100) applied the concept in the context of reasoning, whilst other studies used it in the context of human computer interaction. Different meanings could therefore be attached because of different contexts.

This necessitated me to conduct a further investigation into the existing descriptions of the form and functions of mental models in a complex context (Table 22), with specific reference to the work of Karl Weick (1995:15). Form implies the contents and structure of the mental model, whereas function refers to the role it plays.

Table 22: A synthesis of descriptions of the form and function of mental models

	Description of mental model	Sources
Form (structure, elements it consists of)	A mental model includes biases, deeply-seated and ingrained assumptions, beliefs, experiences, values, and generalisations, and is therefore a representation of how one sees reality ¹¹	Day & Nedungadi, 1994:31; Meadows <i>et al.</i> , 1974:4-5; Senge, 2006:164
	Contains both declarative and procedural knowledge	Barker, van Schaik & Hudson, 1998:312
	Mental models are multifaceted and made up of distinguishable sub-models	Richardson, Anderson, Maxwell & Stewart, 1994:3
	May evolve and change over time, leading to a different way of understanding, acting and being in the world. Develop through context of social and cultural practices and through discursive interaction. The 'richness' in evolution is usually linked to growing maturity, exposure to new experiences	Barker <i>et al.</i> , 1998:310; Jacobs & Heracleous, 2005:340
	Not consciously aware of contents of mental model ¹²	Senge, 2006:170; Karp, 2005:89
Function (role)	Constant interacting with patterns of perception through thinking and action	Senge, 2006:164
	Mental models are the 'driving force' for understanding, sense-making, reasoning and prediction, problem solving activities, decision making, selecting and organising newly acquired knowledge	Adamides, Stamboulis & Kanellopoulos, 2003:72; Barker <i>et al.</i> , 1998:310; Doyle and Ford, 1998:3; Michael, 2004:228; Senge, 2006:164; Johnson, 1995:258

¹¹ Correlation with axial code 'map to navigate'

¹² Correlation with axial code 'unconscious'

The declarative knowledge of the mental model, as explained by Bucciarelli (2007:67), refers to what people believe themselves to know about any given entity in the world and its principles in a conscious manner, and which they are able to express verbally and reflect upon. Procedural knowledge, on the other hand, refers to knowledge about how to act even when such information is not represented in an explicit fashion. In practice, a clear-cut distinction between the two definitions is difficult. However, it appears that procedural knowledge, knowing how to, has far more currency in the change arena than declarative knowledge, which seems to confirm that mental models are made up of deeply-ingrained assumptions. Leaders are often not consciously aware of what is known as procedural knowledge,¹³ as found during the axial coding and interviews.

5.5.1 Mental models and change leadership in a complex environment

It has been established that mental models and change leadership effectiveness are interdependent (Bovey & Hede, 2001:372; Harrison & Boyle, 2006:31, Karp, 2005:89; Osborne, Stubbart & Ramaprasad, 2001:435). The direct relationship between the leader's mental models and successful organisational change has also been established (Strange & Mumford, 2002:343; Osborne *et al.*, 2001:435). Barr, Stimpert and Huff (1992:16), amongst others, state that the crucial component of leadership behaviour in an ever-changing environment is undeniably the cognitive process of noticing, absorbing and making meaning of environmental change (Karp, 2006:3; Lyons, Adjali, Collings & Jensen, 2003:11).

Karp (2006:4) highlights the dynamic relationship between mental models and change effectiveness and performance when he says: 'Each person has an internal mental model of his/her world; a dynamic model that guides his/her thinking and behaviour and that changes as a result of the consequences of that person's actions and of the information exchanges.'

¹³ Correlation with axial code 'unconscious' element of mental model

5.5.2 The challenge

Leaders often fail to consider alternative models in reasoning and thereby perpetuate the same deductive inferences about a complex situation, because mental models are held in a limited-capacity working memory. Therefore, a leader will reduce the cognitive load in an attempt to deal with complexity by integrating new information into already constructed and simplified mental models.

The challenge is the following:

- The sense-making functionality of a mental model necessitates that it ‘manages’ complexity by reducing it into chunks, which is no longer sufficient to make sense of and navigate in a complex environment
- The leader’s perception of reality is simply a function of the categorisation and interpretation processes and, as a consequence, he/she focuses on things which have already happened in the past and enacts the environment. What is seen, therefore, is the construction of the environment, not the environment itself, as informed by the theory of sense-making by Weick in 1995.
- The leader holds an incorrect mental model and draws incorrect conclusions, as informed by the work of Johnson-Laird in 1983.
- The mental model of the leader determines what information will be received and attended to, whilst other potentially important fractal and strange attractors may not be recognised.
- Current data may be interpreted in relation to the individual’s current mental models rather than be seen as a signal for needed change (Barr *et al.*, 1992:17; Day & Nedungadi, 1994:31; Grosset & Barrouillet, 2003:289-290; Doyle and Ford, 1998:10).

Studies show that organisational decline is a result of significant changes in the environment that either go unnoticed, or are improperly interpreted by the leader’s mental model and, as a consequence, are addressed through inappropriate actions (Barr *et al.*, 1992:17).

5.6 LINEAR AND QUANTUM THINKING

Now that the form and function of mental models have been investigated, it is important to investigate two types of thinking that can drive mental models: linear thinking or quantum thinking. Table 23 illustrates a comparative analysis between linear and quantum thinking.

Table 23: A comparative analysis between linear and quantum thinking

Linear thinking	Quantum thinking
Continue to apply previously established criteria for success	Develop new criteria for success and realise that this is a continuous process of revising, reformulating and updating success criteria
Continue to pay attention to issues and ask questions that were relevant in previous circumstances	Learn what to pay attention to and what type of questions to ask in the complex environment
Apply previously established priorities, policies and practices and/or sequencing of interventions to new circumstances	Identify new priorities and/or new sequencing of activities to match emerging demands in complex environment
Continue to apply outdated approaches to solving problems	Identify new ways to solve problems and/or take advantage of opportunities posed by environment
Feel resentful that previously successful behaviours are no longer relevant or rewarded in new circumstances	Feel accountable to develop and learn new behaviour that will address new circumstances
Thinking in either/or paradigms and 'categories' (us/them) through the use of deductive logic and adversarial confrontation	Cooperative dialogue in order to explore and understand together. Talk and listen in order to change mind model and as a consequence, thinking. Build a deeper understanding of investigated phenomena through collective or parallel thinking

Sources: Adapted from Conner (1998:321); Deardorff & Williams (2006:12)

5.7 THE CHANGE WITHIN

Chaize (2000:86) and Kilmann (2001:70) provide clarity and conclude that continual change and reformulation of the leader's own mental model is a pre-requisite for leading organisational change successfully. Barr *et al.* (1992:17) and Adamides *et al.* (2003:73) agree that organisational renewal and agility require of the leaders to constantly change their mental models in response to the complex environment first. If they do not, they respond to change from an outdated mental model and contribute to deteriorating performance.

Conner (1998:vi) poses a leadership challenge for the complex environment: 'How do we get ready for the changes we can't even see yet.' Organisational success in the complex environment will be achieved by 'those who realise where changes are heading and are therefore able to use changes to their own advantage' (Pellissier, 2001:67). According to Scharmer (2009), to lead is to continuously shift focus and structure of attention within the mental model. This implies deepening the process of becoming aware and increasing the number of options for responding to a given situation. The Mental Model Theory (MMT) refers to the 'un-focussing' of the mental model, which is the process of automatic inferencing and making alternatives explicit and aware. Holland in Lyons *et al.* (2003: 12) distinguishes between a 'tacit internal model', which describes current action under the current assumptions of the future state, and an 'overt internal model', which provides a basis for the internal processes of exploring alternatives. He advocates the successful approach which involves taking tacit internal models (held by the leader) and turning them into overt internal models.

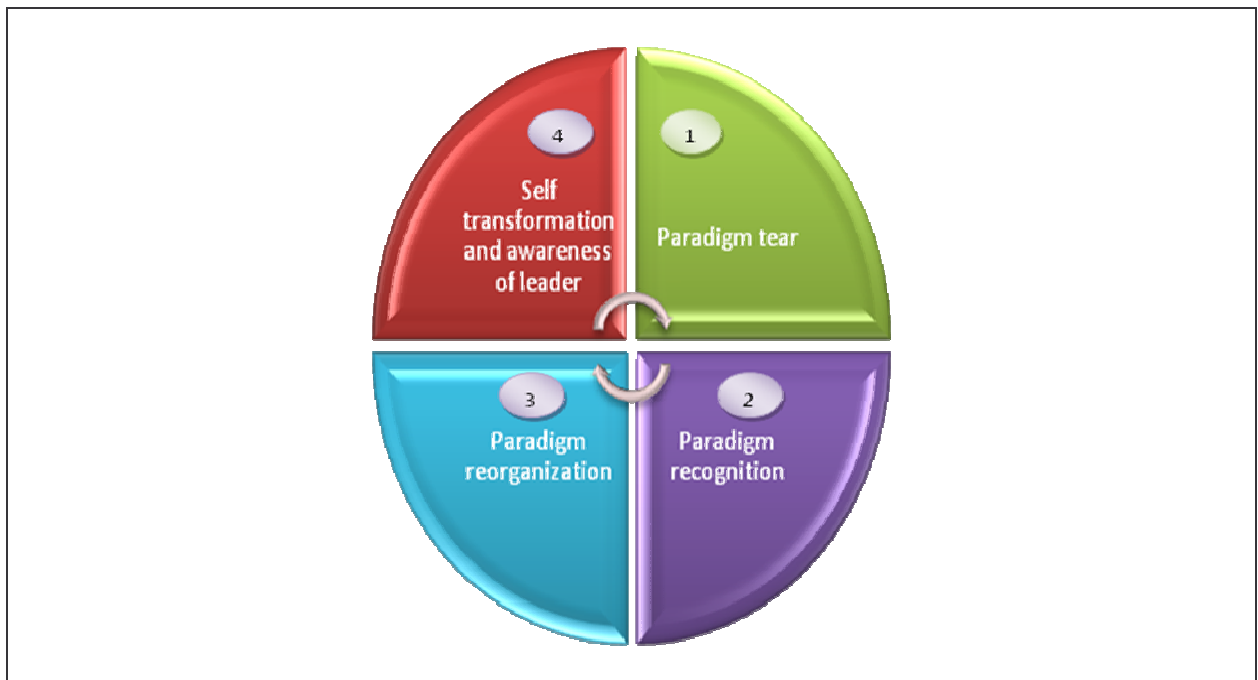
Next I discuss three models and one theory which describe the process of shift within the mental model in the context of complexity. I use principles of quantum physics, called the quantum thinking mental model and the quantum skills model, Scharmer's generative dialogue model and the essence of the U-theory. I also pay a brief visit to the field of Mindfulness to inform the change process in a mental model.

5.7.1 Quantum thinking mental model

Deardorff and Williams (2006:12) describe a shift in the leader's mental model in the quantum organisational context, called the **quantum thinking mental model** (Figure 20), which involves 4 steps:

- Step 1: Paradigm tear - when the existing mental model is exposed to new environmental challenges and the existing understanding of the complex environmental phenomena **causes discomfort and chaos**.
- Step 2: Paradigm recognition - when the existing mental model and new mental model are juxtaposed, intuitively creating the need to establish the new mental model or readjust the existing mental model.
- Step 3: Paradigm reorganization - the mental process of re-thinking and accepting the newly reframed mental model.
- Step 4: Self-transformation - a radical change in the mental model of the leader that leads to self-transformation. The change reflects the change capability and adaptability of the leader, which in turn reflects successful change leadership in the complex environment.

Figure 19: The quantum thinking mental model

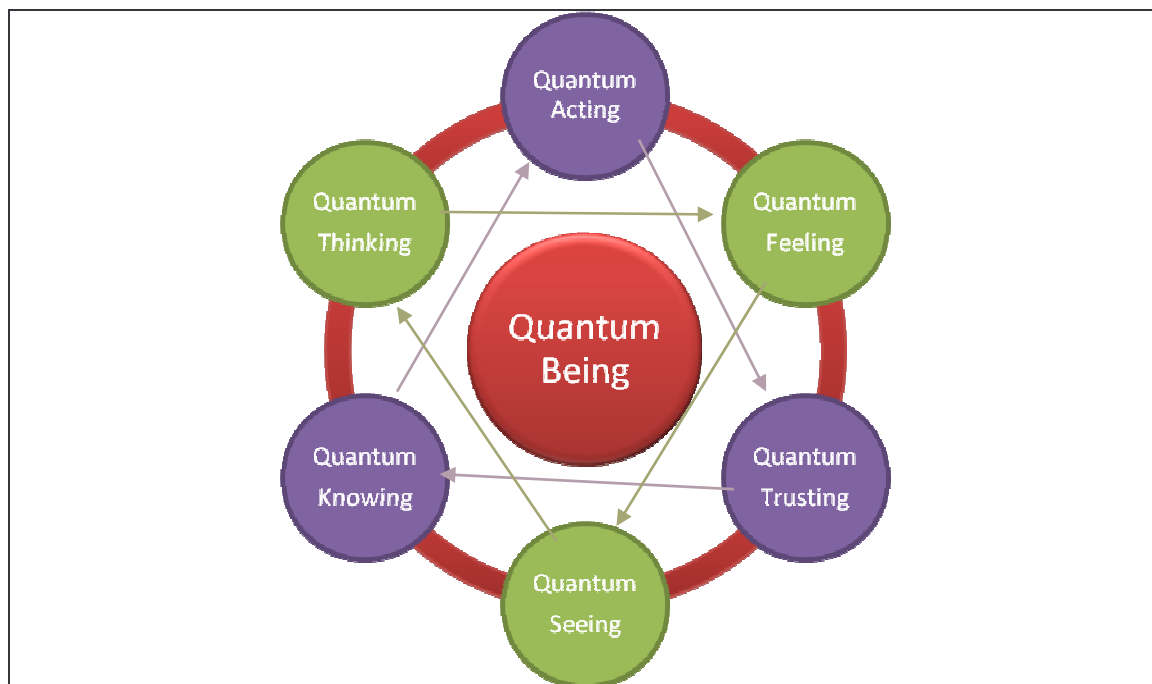


Source: Deardorff & Williams (2006:12)

5.7.2 Quantum skills model

The purpose of the quantum skills model is to demonstrate the interaction between skills and thinking, premised on the assumption that quantum reality of energy is the essence. The first three skills are clustered as primarily psychological in nature, whereas the other three are spiritual in nature (Figure 20). Notice the correlation between axial coding results and the quantum skills model.

Figure 20: The quantum skills model



Source: Shelton & Darling, 2001:265

- ‘Quantum seeing’ refers to the ability to see intentionally, as human perception is highly subjective. It is based on the premise that reality is inherently subjective and manifests according to the assumptions and beliefs of the observer.
- ‘Quantum thinking’ refers to the ability to think paradoxically. Creative thinking requires the development of the right hemisphere of the brain. Quantum thinking is based on the premise that the universe often functions in an illogical and paradoxical manner.¹⁴

¹⁴ Correlation with axial code ‘quantum thinking’

- ‘Quantum feelings’ refers to the ability to feel vitally alive. Human feelings are not the result of external events, but of internal assumptions and inferences driven by mental models.
- ‘Quantum knowing’ refers to the ability to know intuitively because we live in an intelligence universe. It is not meant to bypass the diligence process, but to reduce the frequency with which an organisation needs to deploy it.¹⁵
- ‘Quantum acting’ refers to the ability to act responsibly because everything in the universe is interrelated. It is based on the concept of interconnectivity and its by-product, non-local causation.
- ‘Quantum trusting’ refers to the ability to trust life’s processes and that the principles as applicable to chaos and the emerging nature of complexity can be trusted.¹⁶
- ‘Quantum being’ is inextricably linked to other quantum skills and reflects on the role of connectivity. The ability to be in a relationship that recognises the relational nature of the complex context.

5.7.3 Scharmer’s U-theory

The U-theory postulates that awareness will emerge from three different movements (indicated by circular movements in Figure 21) by:

- Co-sensing¹⁷: opening up to the world outside and seeing that you as the observer are not a separate entity from the external world, but that all is connected and part of a complex adaptive system
- Co-presencing¹⁸: opening up to that which wants to emerge and being still. However, a pre-requisite is to first ‘let go’
- Co-creating¹⁹: bring the new emerging realities into reality and activate a capacity by ‘being’ the new reality

¹⁵ Correlation with axial code ‘trust the knowing’

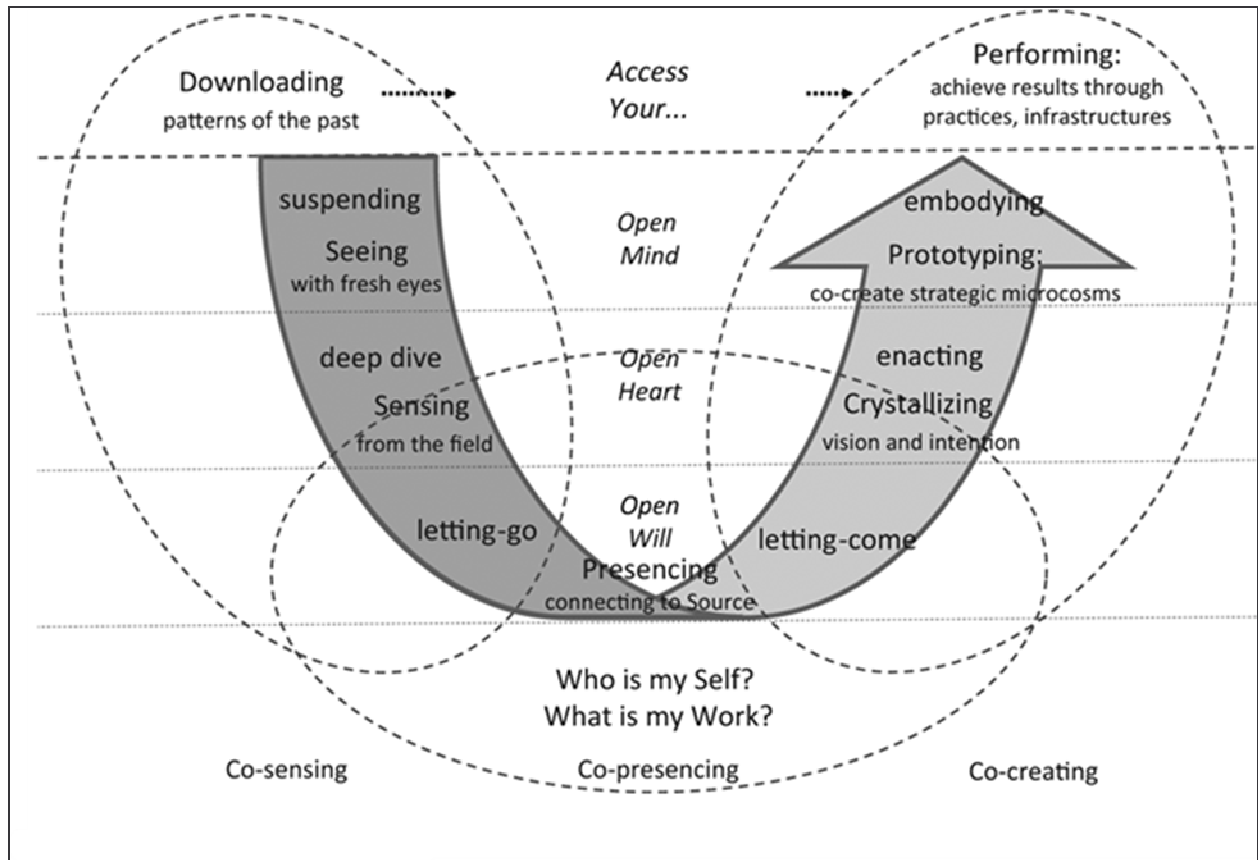
¹⁶ Correlation with axial code ‘trust the knowing’

¹⁷ Correlation with axial code ‘it is a connected world’

¹⁸ Correlation with axial code ‘letting go’

¹⁹ Correlation with axial code ‘co-creation’

Figure 21: The U-process of presencing: Seven field structures of attention



Source: Scharmer (2009:246)

Within these three movements, there are seven different actions, which are:

- Paying attention: beginning to open up and letting to
- Seeing the view from outside
- Sensing the view from within
- Presencing the view from a surrounding presence
- Crystallising vision and intent
- Prototyping living microcosms
- Performing, embodying and ‘being’ the new reality

5.7.4 Generative dialogue

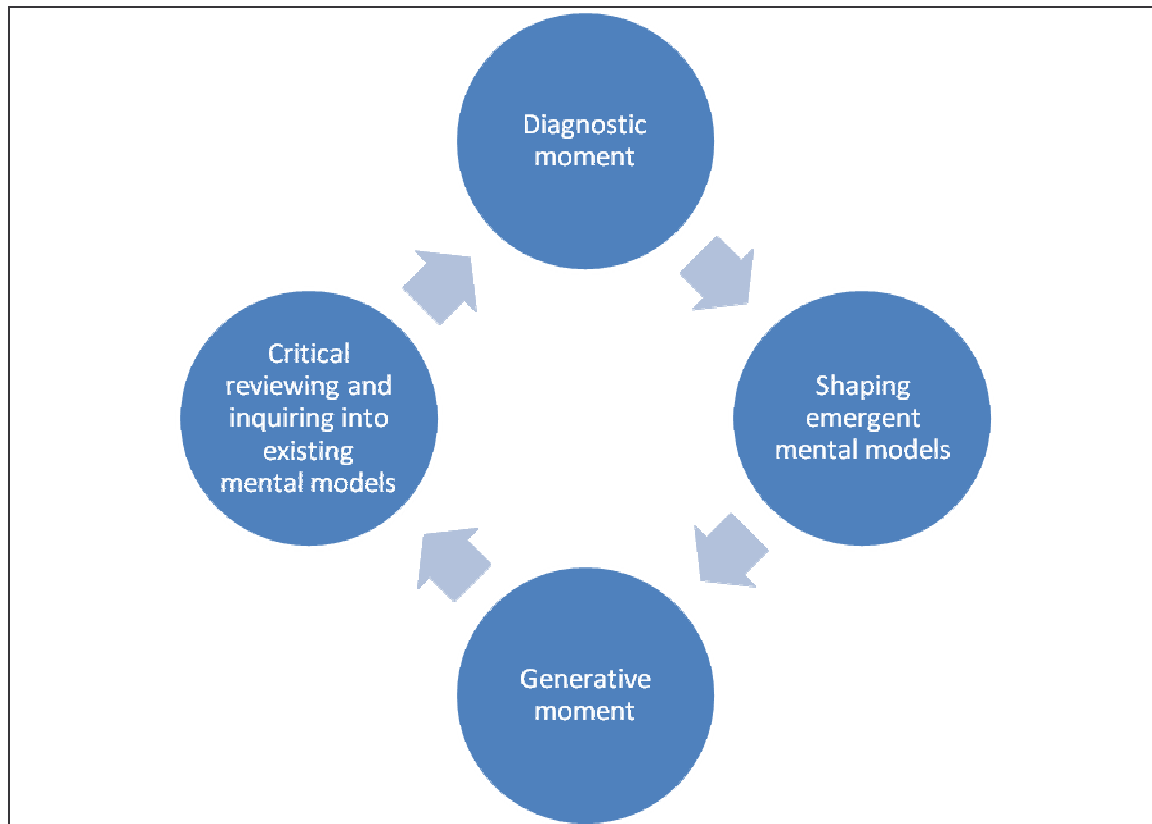
‘The mental model is fuzzy. It is incomplete. It is imprecisely stated. Furthermore, within one individual, a mental model changes with time and even during the flow of a single conversation.’ (Forrester, 1971 in Doyle & Ford, 1998:6).

This quote led me down the avenue of the body of knowledge in dialogic sense-making. Dialogue is being defined as a sustained collective inquiry into the processes, assumptions and certainties that compose every day experiences. Knowledge is created through a continuous dialogue between tacit (elements of mental model and deep beliefs which are difficult to communicate) and explicit (can be formally communicated) knowledge.

In addition, constructivist perspectives have shown that verbal communication is not simply about the transfer of information; it is integral to the construction and reconstruction of meaning. A significant body of literature suggests that dialogue as a reflective conversation mode can enable sense-making and, as a consequence, alter deep-seated assumptions within the mental models and transform, in turn, social interactions and new ‘realities’ due to its generative potential (Jacobs & Herecleous, 2005:338).

The opportunity for a leader to see things differently, as well as think differently, will be afforded through this practice of inquiry into privately held assumptions, mostly unconscious, and a recursive process of inquiring into existing mental models (the diagnostic moment) and thereby allow for emergent mental models to take shape, which will lead to the generative moment (Figure 22).

Figure 22: Reflective dialogue as an enabler for sense-making



Source: Jacobs & Herecleous, 2005:344

The essence of the generative moment is when time slows down, self-imposed boundaries collapse and limiting assumptions dissolve. This, however, requires being acutely aware and being in the present (notice correlation with axial code ‘awareness of present moment’ in Section 4.9.1).

5.7.5 Mindfulness

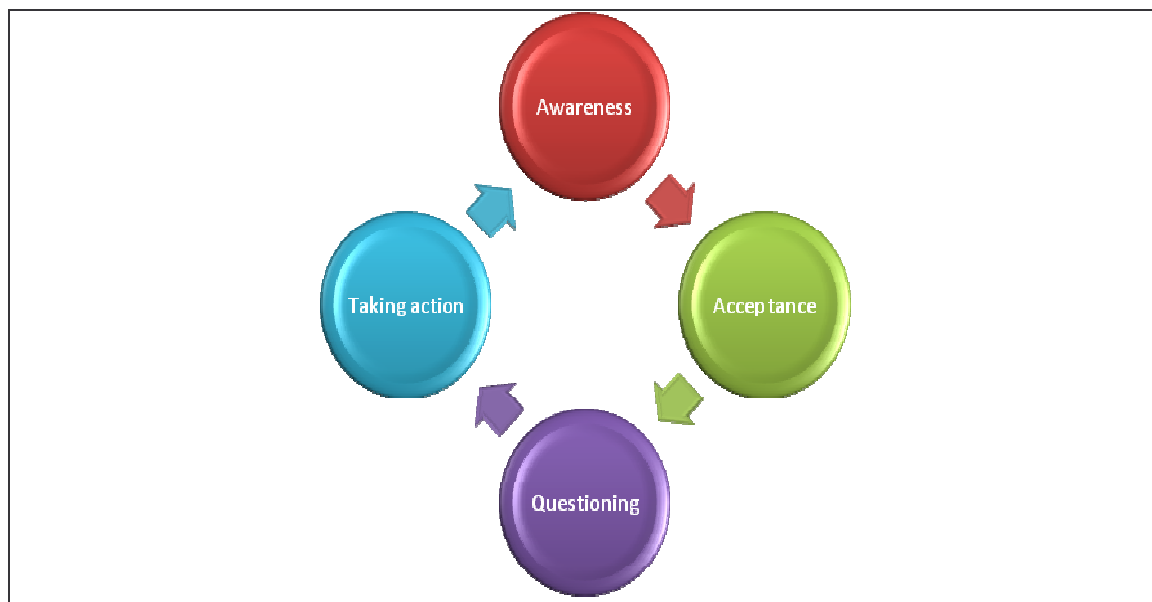
This was perhaps the most surprising part of my journey of searching to understand the internal change process, which led me to the body of work on Mindfulness. Mindfulness can be defined as a state of being, based on deep awareness of the present moment and what is going on within and around one, and is characterised by openness, curiosity and acceptance (Nhat Hanh, 1976 in Hawkins, 2010:2; Hopper, 2010:15). It is also important to note that in all Asian languages, the word for ‘mind’ and ‘heard’ is the same.

Jagannathan and Rodhain (2009:4) further elaborate that a mindful leader is characterised by surrendering the need to know and control,²⁰ by empathy²¹ and compassion, tolerance, tranquillity, joy, happiness and purpose. Furthermore, mindfulness is not only a cognitive way of being, but it also flows towards the attitudinal dimensions of compassion. Which drives the message: It is not only about doing but also about being, as the doing will flow from the sense of being. Hawkins (2010:2) proposes a four-phase description, through dialogic sense-making, for the mindful leadership of change in a complex environment (Figure 23):

- An awareness of early signals in the external environment²²
- Acceptance of the current reality²³
- Questioning²⁴
- Taking action

Although this model describes the process for mindful engagement with others during change, it can also be applied as the mindful internal change of the mental model during change leadership.

Figure 23: Mindful leadership of change



Source: Hawkins, 2010:69

²⁰ Correlation with axial code 'awareness of not knowing'

²¹ Correlation with axial code 'attitudinal orientation'

²² Correlation with axial code 'awareness of present moment'

²³ Correlation with axial code 'acceptance of current reality'

²⁴ Correlation with axial code 'questioning'

5.8 CONCLUSION

The quicker leaders learn and mindfully reconstruct their mental model, the more armed they are to lead in the complex environment. Zohar (1998:25) eloquently summarises the key message: 'If we want to transform the structure and leadership of our organisations, we have to address change at the fundamental paradigmatic level. We have to change the thinking behind our thinking. Leaders who want to initiate real change processes must become aware that they have been acting out of a paradigm. They must see the origin and nature of this existing paradigm and the effect on their management. And they must get to a point where they can feel the reality of an alternative paradigm - or the creative excitement of standing at the edge between paradigms.'

SECTION C: THE CONCEPTUAL FRAMEWORK

This section refers to Chapters 6 and 7 in which I cover the following:

In **Chapter 6** I discuss and draw conclusions on mental models of leaders in the South African quantum organisation. The conceptual framework describes the dynamic change leaders undergo in their mental models. **Chapter 7** addresses the contributions of the study, its limitations and recommendations for future research.

CHAPTER 6: TOWARDS A CONCEPTUAL FRAMEWORK OF THE MINDFUL SENSE- MAKING PROCESS OF THE LEADER IN THE QUANTUM ORGANISATION

6.1 INTRODUCTION

In this chapter I discuss and draw conclusions on mental models of leaders in the South African quantum organisation. The conceptual framework describes the dynamic change leaders undergo in their mental models. The purpose of this chapter is twofold: first, to discuss the findings and secondly, to demonstrate rigorous practice by showing the important relationship between the central research questions and axial codes as analytical tools, as well as to answer the central research questions.

6.2 THE MULTIDIMENSIONAL CONSTRUCTS

Multidimensional constructs are widely used to represent multiples of distinct dimensions as a single theoretical concept. The use of multidimensional constructs has initially created a dilemma for me as I wanted breadth and comprehensives, but also precision and clarity from ambiguous dimensions. The constructs of 'quantum organisation' and 'mental model' are typical multidimensional constructs (Edwards, 2001:144).

Based on the epistemological and ontological orientation of the study, the findings showed that there are multiple meanings in the minds of the participants, multiple realities in their multiple universes, as well as multiple interpretations of the multiple realities. In my discussion I have not attempted to unearth a single 'truth' from the realities of the participants and myself, nor have I tried to achieve outside verification of my data analysis. The conceptual framework, therefore, does not attempt to establish a single truth from the participants' experiences.

Thus, it is irrelevant whether another researcher would arrive at different codes and ultimate themes when looking at the transcripts, because both may be correct.

Due to the complexity of the multidimensional constructs, I have attempted to unbundle the constructs by offering a description and an integrated interpretation of the results and literature, instead of trying to define the constructs of a quantum organisation and mental model. Ironically, the very act of trying to condense such a broad and deep construct into one single definition would be trying to cope with complexity in a reductionist manner, reflecting linear thinking on my part.

6.2.1 The quantum organisation

The South African quantum organisation can be described as follows (illustrated in Figure 24):

- Learning is at the heart of the organisation and as such cultivates a culture of innovation and creativity. Learning takes place both on the individual level, where it starts, and the organisational level. Therefore, the quantum organisation is open to new ideas coming from any level in the organisation, which implies that the quantum organisation is always moving in terms of flow of information and energy to make sense of information.
- It is a networked structure. Although the quantum organisation has little organisational structure, it has structure when needed because of its self-organising and networked nature. The quantum organisation is a conscious participant in the self-designing process.
- The quantum organisation is resilient (the ability to let go and be stable at points that matter at fractal movement) and therefore adaptable, always moving in anticipation of an emerging and non-linear future.
- Co-created solutions (acknowledgement that solutions and leadership exist at all levels) implies that the quantum organisation generates complex solutions by interdependent, multiple stakeholders with multiple truths and solutions.

Figure 24: Properties of the South African quantum organisation



This led me to a comparative analysis of the complex adaptive system and the South African quantum organisation, as demonstrated in Table 24. I concluded that the quantum organisation is indeed a complex adaptive system as it displays similar properties. I indicated the correlation by using similar colours, for example co-creation from the quantum organisation correlates with co-creation and interdependent agents from the complex adaptive system. The quantum organisation is resilient, which implies letting go in preparation, and adaptable to an emerging and non-linear future (complex adaptive system). A networked organisational structure (quantum organisation) allows for self-organisation to take place (complex adaptive system).

Table 24: A comparative analysis between the properties of a complex adaptive system and the South African quantum organisation

Properties of a complex adaptive system	Properties of the South African quantum organisation
Learning	Learning at the heart of the organisation, which cultivates a culture of innovation and creativity
Self-organising	Networked structure. However, the quantum organisation has little organisational structure but is structured when needed, because of self-organising and networked nature. The quantum organisation is a conscious participant in the self-designing process.
Adaptable Emerging Non-linear	Resilient (the ability to let go and be stable at points that matter at fractal movement) and therefore adaptable, always moving and growing, in state of emerging, towards a new reality
Co-evolution and co-creation Not predictable Interdependent agents	Co-created solutions (acknowledgement that solutions and leadership exist at all levels). Co-created solutions implies the generation of complex solutions by interdependent, multiple stakeholders with multiple truths and solutions. Such complex variables are not predictable.

I also concluded that, although learning is an essential element of the quantum organisation with the view to be adaptable and demonstrate resilience, an organisation can be a learning organisation without being a quantum organisation.

The patterns of behaviour in the South African organisation are not constant because the external complex environment constantly changes and emerges, and therefore also the behaviour of its agents. This behaviour of systems as a whole can change. Complexity theory focuses on relationships between the individual and teams or between organisations in the organisation. The South African quantum organisation is a complex system.

6.2.2 Leader in a complex environment

Because of the context in which a leader in a complex environment is discussed, it emerged that the traditional and conventional meaning of the word we attach to 'leader' needs to be reframed or, at the very least, re-examined. Just the very fact that we use the word 'leader' implies that there is a follower, but following to where, what and how? Is the usage of the word 'leader' still applicable in the complex context? Should we use the old labels in a new context?

It can be concluded that the leader in a complex environment cannot get tainted by using the old recipe, or be limited by a theory of transformational, charismatic, transactional, serving or even African leadership, although there are certain contact points. To call such a leader a 'quantum leader' would also imply a boundary. It would be best keeping it open and descriptive by referring to such a leader as the leader in a complex environment, or describing the process of complexity leadership.

The function of the leader in a complex environment is thinking related, with specific reference to embodying the roles of:

- **Mindful** sense maker of emerging patterns
- Facilitator of sense-making in the networked environment (quantum organisation) between stakeholders. This implies a distributed leadership approach and the confirmation that all involved are regarded as equal thinkers towards co-constructing a complex solution.

Being a leader in the complex environment is **defined by quantum thinking** and therefore can come from anywhere in the organisation, and not necessarily your typical hierarchical leader. However, this does not imply that elements of a leader in a complex environment cannot be found in hierarchical leaders as well. Being a leader in a complex environment cannot be captured in a definition and certainly not objectified as a singular. Being such a leader can rather be captured in a description consisting of intersectionalities and multitudes of roles: motivator, sense maker, facilitator of sense-making, enquirer, co-creator and thinker.

The leader in a complex environment embodies properties of a complex adaptive system. For example, the leader is an interdependent agent, co-creating with others in the sense-making process of non-predictability and non-linearity. Therefore the very essence of the identity of such a leader can be summarised in the following saying, capturing an element of ubuntu:

I am because we are.

‘In the end our purpose is social and communal harmony and wellbeing. Ubuntu does not say “I think therefore I am”. It says rather “I am human because I belong. I participate. I share”’. Archbishop Desmond Tutu

6.2.3 Mental models

Based on the results and an extensive literature review, I conclude with the following conceptualisation on mental models.

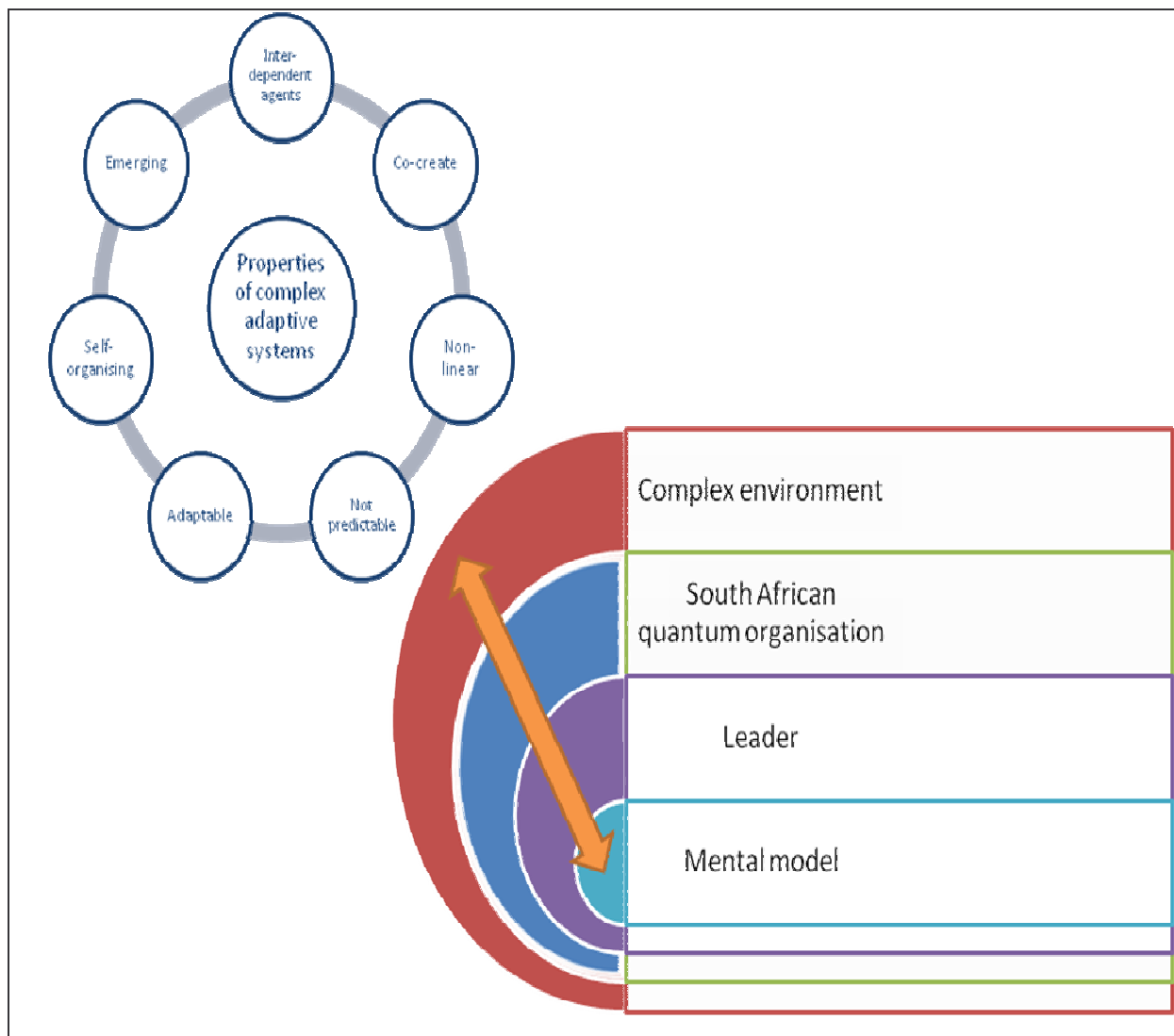
- Mental models are internal representations of a socially constructed ‘reality’.
- The mental model serves as an **enabling interpretive structure of sense-making** (function), which consists of (form) an unconscious element or tacit knowledge and a conscious element or explicit knowledge.
- This knowledge is deeply ingrained and relatively stable, but can change. And in this case, mental model refers to a set of interacting assumptions or network of assumptions.
- Although the mental model in itself is a cognitive function, the sense-making process and shift in assumptions within the mental model itself include also emotional and metaphysical components.

Mental models have a dual and paradoxical function. On the one hand, they assist in reducing complexity and thereby enable leaders to make sense of phenomena and navigate accordingly. On the other hand, the effectiveness of the reduction of complexity creates an illusion and allows leaders to recognise and identify data in search for appropriate data. The existing mental model only allows the leader to rely on data to confirm rather than to challenge the existing mental models. The role of the leader is to make explicit their tacit knowledge within the mental model.

Part of becoming aware of the tacit knowledge is thinking about thinking and being, as well as thinking about the thinking patterns co-created by the leader. Once again, the mental model of the leader in a complex environment shares similarities with the properties of a complex adaptive system. For example, it is adaptable and emerges with new realities through the process of sense-making.

I came to the conclusion that the quantum organisation, being a leader in a complex environment, the dynamics of the mental model and the complex environment itself collectively represent a constellation of complex adaptive sub-systems, affecting one another in an interdependent manner and co-evolving accordingly (Figure 25).

Figure 25: A system of complex adaptive sub-systems



6.3 THE CONCEPTUAL FRAMEWORK: MINDFUL SENSE-MAKING PROCESS OF THE LEADER IN A COMPLEX ENVIRONMENT

‘Be awake’ – Buddha

The rationale for the choice of design of the conceptual framework is an eight lying on its side, which symbolises the notion of *infinity*. Infinity is significant and appropriate in that the sense-making process has no beginning and no end, as it is a continuous and constantly emerging process. The sense-making process consists of a series of moments as illustrated in Figure 25.

This sense-making process is done in a mindful manner, which refers to paying attention, on purpose, to the present moment. Mindfulness is a state of mind that comes out of paying attention to, on purpose, the present moment and nothing else but this deep awareness. It is a capacity shared by all, but the cultivation thereof is often lacking and most individuals are fairly out of touch with this capacity. An affectionate quality of mindfulness is compassion and empathy, which is a manifestation of the attitudinal orientation of the leader – a sense of being.

This calls for an awareness of the external as well as the internal landscape of the leader. Such awareness can be reframed as *awareness-ing*. Although it is not an acknowledged word in English, it gives tonal and textural feeling to the concept. The act of *awareness-ing* is not an idea, nor a philosophy or a technique, but actually a way of living and being. The key message of the mindful sense-making process, *awareness-ing*, in a complex environment is not only the ability to know but rather the ability to question and being comfortable with not knowing, and paying attention to the actuality of emerging patterns.

The process can be described as follows:

The acceptance of current reality should not be misunderstood as a passive acceptance of or resignation to the current state of affairs.

Knowing and *awareness-ing* of the current state of affairs provides a sense of orientation which enables the leader to act accordingly. However, not accepting and knowing will not allow the leader to actually know how things are, which disempowers the leader in seizing the actuality of the current ‘reality’.

Catalytic **questioning** is the second level of *awareness-ing*. This implies questioning the mental model with its associated deep-seated assumptions, as well as asking catalytic questions which makes tacit knowledge explicit. Such questioning implies challenging the status quo of the external and internal landscape of the leader.

Letting go is a critical point in the mindful sense-making process of the leader. Letting go can be compared to the meaning of the mathematical saddle point. A saddle point is the point intersection between two dimensions where one dimension curves up in one direction and the other curves down in a different direction, as illustrated in Figure 25. Quantum physics refers to event horizon as the crossing over from one galaxy to another and as the point of no return. From an energy perspective the saddle point represents the optimal point of resilience by absorbing and releasing energy, or in this case, letting go. It also represents the crossing over from one reality to another, where new meaning and, as a consequence, a new reality will emerge. The *awareness-ing* in letting go means to actively and consciously let go of previously held assumptions that were deemed ‘truths’ or ‘facts’ about the external and internal landscape of the leader.

Following the mindful act of letting go, is *awareness-ing* of **knowing that not knowing** is crucial, because knowing that you do not know will not allow for something to emerge. Often clinging to what is known prevents new insights to emerge and the sense-making process as a whole. ‘Knowing that not knowing’ is underpinned by the attitudinal orientation of a beginner’s mind, which refers to the philosophy that there are an infinite number of possibilities. One should therefore not get stuck in expertise and knowing, as clinging to the security of knowing often gets in the way of knowing what is not knowing.

Although there are multiple variables that are not known, there are certain variables that can be trusted as known for sure.

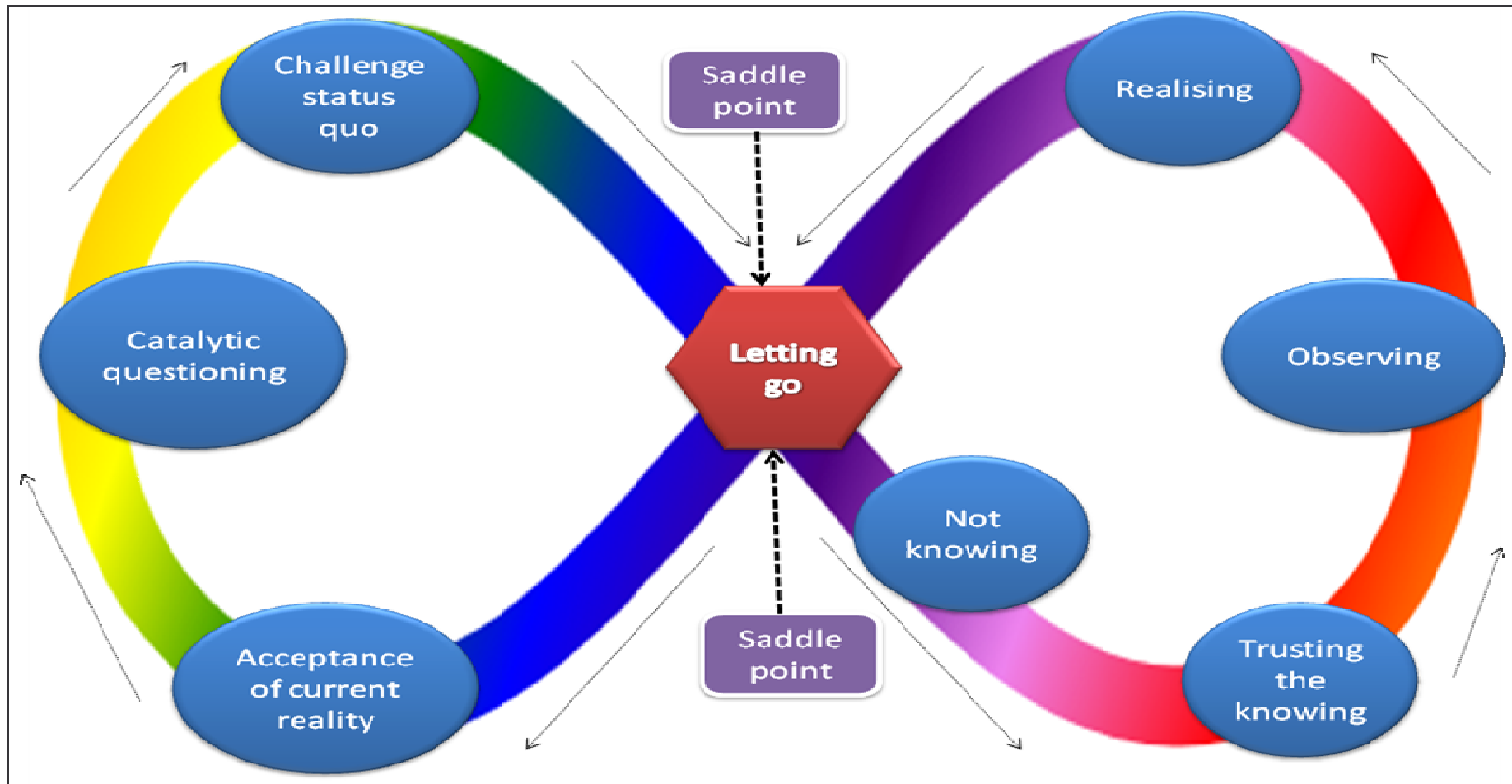
Trusting the knowing refers to the act of trusting that all will be okay, that it is a complex adaptive system and emerging patterns will appear, that multiple truths are part of the experience and a complex environment. Therefore, one should trust one's own experience and mental model until it is proven to be untrue. Trusting the knowing is part of wisdom. I interpret wisdom in the complex environment as knowing the actuality of things without being caught or misperceived in one's own mental model.

Part of the mindful sense-making process, called *awareness-ing*, is **observing** and noticing the ebb and flow of the emerging patterns, without getting hijacked into the illusion created by the mental model, and observing the actuality of unfolding patterns.

An *awareness-ing* of sudden **realisation** follows observing. Realisation can be compared to a principle in complexity theory called dissipating. When a system becomes overly tense or destabilised, a sudden release of energy will occur and new order will emerge from this dissipative process – almost a mini big bang event! Complexity theory describes this as emergent, non-linear change. Realisation is a dissipative event in itself, due to pressure building up from the movement caused by letting go and knowing that do not know.

The value of a conceptual framework is that it does not aim to predict outcomes in the complex system, but rather offers understanding of how to navigate in the complex environment through the mindful sense-making process. It can also be argued that no single model can offer a result because of the number of different dynamic processes within the organisation. Rather than predicting and forecasting one singular outcome and crafting a predetermined future, such a conceptual framework allows leaders to broaden their viewpoint beyond their fixed notions, based on current perceptions, to what can possibly transpire. Thus, the type of knowledge emerging from the conceptual framework will be in itself 'complex' (not complicated) with no single-value answers but rather a statement of options which will limit the extent to which control can be exercised by the leaders themselves. The very mindful sense-making of complexity in a complex environment serves as an enabler for effective change leadership.

Figure 26: The conceptual framework of mindful sense-making in a complex environment



6.4 APPLICATION

Can this be attained by an individual? The key in the quantum age is interdependency, that is the individual does not achieve on his/her own but engages in the act of co-creation to create together with other individuals. The realisation that mindful sense-making is not a luxury to be dispensed at critical times, but the source of navigation in a complex environment, should be the burning platform to embark to continue on the *awareness-ing* journey.

6.5 CONCLUSION

In this chapter I attempted to illustrate how, through axial and selective coding, I arrived at a conceptual framework of mindful sense-making in a complex environment and the role that the mental model of a leader plays. In addition, I described my conceptual framework, which was linked to an extensive literature review in Chapter 5.

CHAPTER 7: DISCOVERIES, CONTRIBUTIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

In this chapter I first highlight the most prominent insights and elucidate the study's most significant contributions. Secondly, I point out the shortcomings of this study and thirdly, I make some recommendations and suggestions for future research.

7.2 DISCOVERIES

In view of the lack of literature on the form and function of mental models in the context of complex environments within the quantum age, I am convinced that the participants' stories break new ground with the discoveries described in this study, specifically in the South African context. The existing body of knowledge on mental models and quantum organisations is expanded due to the findings of this research. The findings make a valuable contribution to the theory and research base of the interdisciplinary fields of leadership, psychology, the cognitive sciences and organisational behaviour. This was done by investigating the mental models of leaders in the South African quantum organisation using the constructivist grounded theory approach.

I made the following discoveries during the course of the study on mental models of leaders:

- The complexity theory is an appropriate option for explaining the nature of the complex context in which the South African leader needs to exercise change leadership effectiveness. Upon investigation, it is concluded that the quantum organisation, the leader and the mental model of the leader possess properties that resemble those of an adaptive complex system and therefore can be perceived as multiple complex adaptive sub-systems which affect one another interdependently.

- It is concluded that the quantum organisation has learning as a central theme.
- Leaders in a complex environment are being characterised by the quality of their quantum thinking and their roles, although multiple, are dominantly that of a sense maker and facilitator of sense makers co-creating solutions in a complex environment.
- The mental model is an interpretive structure which enables sense-making of complexity. However, not to fall trap to the reductionist approach in sense-making which leads to incorrect conclusions, a mindful approach is required. This mindful approach is being referred to as *awareness-ing*, implying being in the present and acutely aware of the present moment as it emerges.
- The conceptual framework, therefore, is linked to the function of the mental model and called the mindful sense-making process of the leader in a complex environment. This process can be described as accepting the current reality, challenging the status quo, letting go, knowing that ‘don’t know’, knowing and trusting ‘what do know’, observing emerging patterns and realising insights.

7.3 CONTRIBUTIONS

The main objective of this study was to develop an understanding of the nature of mental models of the leader in the South African quantum organisation. This led to the conclusion that the mental model as an interpretive structure of sense-making can be employed during navigating complexity. In addition, although the initial scoping of the research focus on the leader, the actual sense-making framework refers to leadership as a process and organisational behaviour phenomena.

In addition, I have attempted to answer the following research questions:

- What is a quantum organisation in the South African context?
- What is a leader regarded as in the quantum organisation?
- How are mental models influencing change leadership effectiveness in the quantum organisation?
- What constitutes the sense-making process?

A conceptual framework was developed to describe the sense-making function and process of the mental model. The **practical contribution** of such a framework would also initiate dialogue through which the leadership and research community might achieve a shared understanding of mental models. This conceptual framework describes the form and function of mental models of leaders in the South African quantum organisation. It can also be used as a reflective and diagnostic tool to introduce leadership development and coach conversations on a practical level.

Organisational behaviour is a 'field of study that investigates the impact that individuals, groups, and structure have on behaviour within organisations for the purpose of applying such knowledge towards improving an organisation's effectiveness (Robbins *et al.*, 2007:1). The contribution of this study to organisational behaviour as a field of study, is the construction of a conceptual framework which describes and interprets the mindful sense making process of a complex environment. The purpose of applying the conceptual framework is towards improving a leader's and as a consequence, organisational effectiveness in the South African environment.

I believe that this study contributed **methodologically** to the field of sense-making by demonstrating and confirming the alignment between qualitative research and constructivist grounded theory to uncover the contextual setting (complex context and quantum organisation) and integrate the individual (individual leader and mental model).

This methodology has allowed for complex and multidimensional constructs and investigation on multiple levels (quantum organisation and individual leader). This study adopts the epistemological belief that there is not necessarily a single, constant truth to be discovered. In this case, there is not a single, definite definition of the constructs of quantum organisations and mental models, but the multiple experiences and 'truths' of different individuals have been investigated, conceptualised and described. I verified and validated findings **within context**.

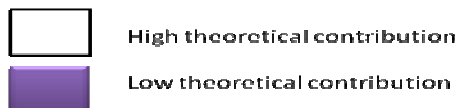
The qualitative approach specifically addresses the contextual nature in which mental models operates: the quantum organisation in a complex context (Johnson, 1995:257; Rowe & Cooke, 1995:243).

I believe that the conceptual framework has also contributed to the existing **theoretical** body of knowledge. When examining the meaning of making a theoretical contribution, it is established that the contribution can be assessed along two dimensions: theory building and theory testing (Colquitt & Zapata-Phelan, 2007:1281). Theory is described as ‘a coherent description, explanation and representation of observed or experienced phenomena’ and this is done ‘within a set of boundary assumptions’ (Bacharach, 1989:496; Gioia & Pitre, 1990:587; Colquitt & Zapata-Phelan, 2007:1282), whereas theory building is the ongoing process of producing, confirming, applying and adapting theory (Lynham, 2002:221). This implies that constructs and variables are an integral part of a theory that answers the questions of how, when and why rather than describing the what.

This study contributes towards knowledge in offering an understanding and explaining the nature and function of mental models as the interpretive sense-making structures of the leader in the South African context. The research is aligned with the requirements of theory building and expander (Figure 27), according to Colquitt and Zapata-Phelan (2007:1283), in the following manner:

- Constructs are significantly re-conceptualised because of the discrepancies in definitions and concepts of these constructs in the context of the quantum organisation in a complex environment (theory builder). A conceptual framework of the mindful sense-making process of the leader in a complex environment is offered, although not a substantive theory.
- This study examined the previously unexplored process of constructivist grounded theory as methodology (theory expander) and used an existing theory, namely the complexity theory, to inform investigated constructs.

Figure 27: Criteria for theoretical contribution



Source: Colquitt & Zapata-Phelan, 2007:1283

Given the multiparadigm perspective, it is believed that theory building or expansion is not so much a search for the truth, but more a search for comprehensiveness stemming from different worldviews. The aim of this study was to generate descriptions and explanations of findings so that meaning would be revealed as co-constructed by participants and myself.

Lastly, this study aimed to assist with the integration of research and practice. I have experienced frustration when reading through popular management literature on mental models, learning and especially the use of quantum physics as metaphor in the leadership arena, positioning it as an 'evangelical-next-best-thing' approach.

Hopefully this study will contribute and advocate the responsible use of statements and assumptions without curbing enthusiasm and creativity in both research and practice.

7.4 RECOMMENDATIONS

This study's contributions and discoveries can be translated into recommendations for leaders.

The following recommendations are made:

- Over-reliance on popular literature, as well as traditional theoretical approaches, which reframes the leader as the 'corporate hero' and 'knower' should be avoided; also an over-reliance on doing and getting tainted into a recipe.
- The practice of mindfulness as a leadership competence should be encouraged.
- Sense-making should not be seen as only a cognitive function, but as an integration of intuition and trust into the mindful sense-making process.
- The mindful sense-making process should not be viewed as a technique or model that can be added to a repertoire of skills, but should be embraced as a way of living and being.

7.5 EVALUATION OF THE RESEARCH

Below is a table containing the essence of evaluative criteria for qualitative studies, as proposed by Baxter and Eyles (1997:518) and Fossey *et al.* (2002:730).

Table 25: Evaluative criteria

Evaluative question	Application and explanation in this study
What is the natural history of the researcher?	Storytelling and foreword of researcher in beginning of thesis Explicating assumptions of researcher
How were data collected and by what methods?	Semi-structured interviews Purposive sampling Recorded interviews
How was the sampling done?	Explicit delineation of sample frame Purposeful sampling Rationale for type of sampling
How was the data analysis done?	Use of computer-assisted programme, Atlas.ti Audit trail
What results are presented?	Description of researcher's objectives for results presentation Differentiation of participant concepts as opposed to theoretical constructs Presentation of conceptual framework on mental models of leaders in the South African quantum organisation
How credible and dependable are the data-construct links?	Details of relationship(s) between data and constructs offered Rigour discussion in thesis
How credible is the theory or conceptual framework?	Details of relationship between constructs and theory/conceptual framework provided
How transferable are the findings?	Recognition of limits imposed by sampling strategy
What was the aim of the study?	Research questions are relevant issues Aim focused and stated clearly Title of study give clear account of aim
How was reflexivity dealt with?	Researcher's motives, background, perspectives are sufficiently dealt with
What method and design were used?	Qualitative research method justified as suitable for research questions
How were data collection and sampling done?	Data collection strategy and choice clearly stated Best approach been taken in view of research questions Consequences of chosen qualitative strategy discussed and compared with other options
What was the theoretical framework?	Perspectives and conceptual frameworks used for data interpretation are presented

	<p>Adequacy of complexity theory framework in view of aim of study</p> <p>Account given of role of theoretical framework during data analysis</p>
How was the data analysis done?	<p>Principles and procedures for data organisation and analysis fully described from raw material to results and interpretations</p> <p>Various themes identified and developed from data described</p> <p>Principles followed to organise presentation of findings are explicit</p> <p>Strategies used to validate results presented, such as member checks and triangulation</p>
What were the findings?	<p>Findings are relevant with respect to the aim of the study</p> <p>Findings provide new insight into constructs investigated</p> <p>Presentation of findings well organised to demonstrate that findings are drawn during systematic analysis of data rather than preconceptions of researcher</p> <p>Quotes are adequately used to support and enrich researcher's synopsis of themes identified during systematic analysis</p>
What were discussed?	<p>Questions about trustworthiness and reflexivity are addressed</p> <p>The design has been scrutinised</p> <p>Shortcomings are accounted for and discussed without denying the responsibility of choice taken</p> <p>Findings have been compared with appropriate theoretical and literature references</p> <p>Consequences of study are proposed</p>
How was the report presented?	<p>Report easy to understand and contextualised</p> <p>Possible to distinguish between voices of participants and researcher</p>
What about references?	<p>Important sources have been used and applied in text</p>

Source: Malterud, 2001:485

7.6 NOTICEABLE SHORTCOMINGS AND LIMITATIONS

This study, similar to all studies, has limitations which should be acknowledged accordingly.

- Parry (1998:96) criticises the use of interviewing as the single source of data collection in the investigation of mental models. It is postulated that the behavioural manifestation of mental models of leaders should be observed, especially in a crisis situation. It is proposed that perhaps a longitudinal approach should have been taken, but it was not possible due to time and funding constraints.
- Another limitation of this study is particularly related to the applicability of results and methods to other contexts and countries, although this study was done in South Africa (Mouton, 2001: 175).
- Outliers in data were not sufficiently explained in the sense-making framework as themes were consolidated. Outliers could have been tested against a bigger population to see whether it might be an emerging theme as well.

7.7 OPPORTUNITIES FOR FUTURE RESEARCH

This study identified the need for further studies pertaining to leadership in a complex environment. Possible focus areas for further studies are as follows:

- It has been ascertained that the Newtonian and New-sciences approaches should not be viewed as polar opposites, but should rather be integrated. Further research is required on when a complex as opposed to linear solution is appropriate, as well as how to discern between the two options.
- Application of this conceptual framework in the shared mental model space.
- Exploration into the physical brain activity (neuro-science) when learning takes place.
- Exploration of the relationship between mental models and future pattern-based strategies.

- Exploration of the relationship between mindfulness and change leadership effectiveness.
- A psychodynamic perspective on mental models in the quantum setting.
- Exploration into the culture of a quantum organisation.
- Development of an assessment tool for quantum thinking.
- Mental models from a diversity perspective in a cross-linguistic and cross-cultural Southern Africa context of African leadership and 'ubuntu'.
- A comparative study in developing countries such as the East and South-America.

7.8 ANTI-CONCLUSION

The thesis started with the title 'Mental models of leaders in the South African quantum organisation'. After multiple avenues had been explored, this title could have been reframed as 'the mindful sense-making process of leaders in a complex South African context'. I am sure that if I continued with the investigation, the study could have been re-titled again. I realised that this study embodied the properties of a complex adaptive system, because the topic and depth of constructs just kept moving as new insights were emerging constantly. Therefore, I deem the heading of this section as anti-conclusion appropriate. There will never be an end to the journey of sense-making and learning in this field of study, and never a conclusion.

'The illiterate of the 21st century will not be those who cannot read or write, but those who cannot learn, unlearn and relearn.' Alvin Toffler

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APPENDIX



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Economic and Management Sciences
Department of Human Resource Management
Tel 012 420 3074

**Participation in an academic research study:
'Mental models of leaders in the South African quantum organisation'**

Research conducted by:

Ms. H. Malherbe (student nr.28338741)
Cell: 083 6369 880

Dear Participant

You are invited to participate in an academic research study conducted by Henriette Malherbe, a Doctoral student, busy with a PhD in Organisational Behaviour from the Department Human Resource Management, at the University of Pretoria under the supervision of Prof Yvonne du Plessis. *The purpose of the study* is to develop a theoretical construct on mental models of leaders in the South African quantum organisation. Senge (2006:8) defines the mental model as "deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action." It is also concluded in the literature that mental models will therefore determine your change leadership effectiveness as leader.

Please note the following:

- You are invited to participate in an semi-structured interview of approximately 2 hours. The interview will be recorded and the researcher will also make field notes.
- If you choose to participate, your name will be acknowledged (optional) and the response you give will be made known. The benefits of participating in the study will also be discussed with you before the interview.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- The nature of the interview will be semi-structured and should please be viewed as a conversation between yourself and the researcher on mental models of leaders in the South African quantum organisation.
- The results of the study will be used for academic purposes only and may be published in an academic journal or presented at a conference. We will provide you with a summary of our findings on request.
- Please contact my promoter, Prof Yvonne du Plessis (email: Yvonne.duplessis@up.ac.za) or myself (email:henriettem@vodamail.co.za) if you have any questions or comments regarding the study.

Please sign the form to indicate that:

- You have read and understand the information provided above.
- You give your consent to participate in the study on a voluntary basis.

Participant's signature

Date