Sensemaking, Complexity and ERP Systems Adoption

– a conceptual study with reference to Programme Phakama

in the City of Johannesburg

by

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DECLARATION:

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OPSOMMING

Hierdie tesis interpreteer aspekte van die implementeringsproses van 'Enterprise Resource Planning Systems' (ERP) in die openbare sektor, en in die besonder op plaaslike regeringsvlak. Die interpetasie word gedoen met behulp van die sinmakingteorie van KE Weick en van kompleksiteitsteorie.

Hoofstuk 1 bied 'n oorsig oor die agtergrond en doelstelling van die tesis, sowel as die metodologiese aanpak.

In hoofstuk 2 word die teoretiese grondslae van die tesis bespreek. Die teorie word geïntegreer om 'n nuwe perspektief op die analise van ERP implementering te kan gee.

Hoofstuk 3 bied 'n gedetailleerde beskrywing van die geval wat hier ondersoek word, naamlik 'Programme Phakama' wat die implementering van 'n ERP in die stad van Johannesburg behels het.

Hoofstuk 4 span die net wyer om vergelykende gegewens van soortgelyke projekte elders te beskryf.

Hoofstuk 5 ontleed die problematiek en toon dat die gebruik van kompleksiteitsteorie en insig in sinmaking help om die verskynsel beter te begryp.

Hoofstuk 6 maak gevolgtrekkings vir die bestuur van sodanige projekte.

SUMMARY

This thesis provides an interpretation of what happens during Enterprise Resource Planning Systems (ERP) adoption in the Public Sector and in particular Local Government using Sensemaking and Complexity Theory.

Chapter 1 outlines the background and objective of the thesis including the methodologies used.

In Chapter 2 the theoretical foundations of the study are discussed. The theories are carefully meshed together to provide a new angle to interpret and analyse what takes place in ERP adoption.

Chapter 3 provides a detailed description of the case study, Programme Phakama. Programme Phakama implemented an Enterprise Resource Planning solution in the City of Johannesburg.

Chapter 4 contains an explanation of what happened in other projects with the same mandate within the public service elsewhere in the world. This in comparison to what happened in Project Phakama, to highlight the similarities or differences during the evolvement of the projects.

The last two chapters provide the interpretation and recommendations using the conclusion arrived at in Chapter 4 from a Complexity and Sensemaking perspective. There are no right or wrong answers in ERP projects, only good or bad decisions. The number of changes to be managed in ERP projects is overwhelming. Therefore many projects are challenged, regardless of success, failure or abandonment.

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BEE	Black Economic Empowerment
CIPRO	Companies and Intellectual Property Registration Office
CIVC	Customer Interface Value Chain
CoJ	City of Johannesburg
COR	Change Order Request
DHA	Department of Home Affairs
ERP	Enterprise Resource Planning
FTE	Full Time Employee
ID	Identity Document
IT	Information Technology
KM	Knowledge Management
LIS	Land Information System
MOE	Municipal Owned Entity
MPRA	Municipal Property Rates Act
NHS	National Health Service (UK)

NPfIT   National Programme for IT (UK)

OT   Organisational Transformation

RMVC   Revenue Management Value Chain

UAC   Utilities, Agencies and Corporatised Entities

UCCC   Unified Customer Contact Centre

Chapter 1

ERP Systems - Adoption and Complexity

1.1 Background to the Research

Organisations are adapting to the rapidly changing global trends in order to remain relevant and also to survive. This is one of the main characteristics of the Knowledge Economy (KE) with which every organisation is faced. Knowledge Economy is the environment in which productivity is derived from the interaction of knowledge upon knowledge rather than raw material[1]. The key value adding element in the KE is knowledge. Information Technology (IT) is one of the fast growing / changing sectors that is constantly improving. IT is often used by organisations to drive improvements of services and /or products. Among the most pervasive organisational changes and activities in the last decade or so has been the implementation of enterprise-wide information technologies such as Enterprise Resource Planning (ERP) systems[2]

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[1] Coke P, Schwartz D. 2008. Regional Knowledge Economies: An EU-UK and Israel Perspective. *Royal Dutch Geographical Society KPMG, 10*

[2] Morris M G, Venkatesh V. 2010. Job Characteristics and Job Satisfaction: Understanding the Role of Enterprise Resource Planning Systems Implementation. *MIS Quarterly 24 (1;) 143 - 161*

The public sector has not been excluded from implementing information technology solutions to improve service delivery, the sector cannot afford to ignore these global issues. Local government in particular, in the lowest sphere of government, has also joined others in using information systems for its own transformation and service improvements. These major technology improvements are implemented mainly though projects. Another major characteristic of the Knowledge Economy is the complexity that organisations must cope with. It is broadly accepted that good governance, specialisation and a good management approach are significant requirements of this era to manage complexity that often leads to chaos if unattended. Simple IT products no longer provide solutions to the problems posed by and experienced during the Knowledge Economy. In light of the context given above, the City of Johannesburg (CoJ) made a decision to provide a usable, sustainable, replicable and reliable Information Technology solution, an Enterprise Resource Planning (ERP) system to solve its problems of customer relations management and revenue collection and management. Thus in response to many of the inherent requirements of the Knowledge Economy and in order to survive, specialize (knowledge), invest in ICT and manage complexity, Programme Phakama, a project to implement the ERP solution, was designed.

1.2 What is an ERP System?

The definition of complexity on its own is a complex matter. According to www.dictionary.com, the word complex is defined as 'a whole made up of various interconnected or related parts and complexity as "a state or quality of being intricate or complex". Jackson defines a system as a complex whole, the functioning of which depends on its parts and the interaction between those parts[3]. The definition of complexity and that of a system demonstrate that they share similar features. The definition of a system implies that in any system complexity is inborn, which is brought about as a result of the relationship between the various parts. ERPs have become important applications for all industries. Becerra-Fernadez I, Gonzalez A, Sabherwal R defines an ERP system as a business

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[3] Jackson M C. 2003. *Systems Thinking: Creative Holism for Managers*, 3

management system that integrates all facets of the business including planning, manufacturing, sales and marketing into a single integrated application that is executed on a single database to support the entire enterprise[4]. The definition indicates that ERP is a system with various components or facets of business integrated together using a common set of data to achieve the organisation's goals and implied complexity. An ERP system also constitutes various parts that interact with one another to give meaning to the whole. All parts of an ERP system are interconnected. ERPs are regarded as an effective approach most organisations implement to enhance productivity and performance. It is a systematic approach used to organise resources for efficiency. ERPs automate business processes across various functional areas. Two main issues arise, the phrase system and implied complexity. Alhadeff-Jones states that *'complexity cannot be something which would be defined in a simple way, and would replace simplicity. Complexity is a word-problem and not a word-solution'*[5]. The definition of ERP elucidates its systemic features and its inherent complexity due to the relationship and interconnectedness of its parts.

Characteristics of an ERP system include the following:

1. It entails an *enterprise-wide* focus on resources

2. Entails a *business process* view and not a functional view

3. Consists of *applications (parts)* that provide an organisation with knowledge to manage their core business

4. *Integrates* a number of an organisation's business processes

5. *Processes* the majority of an organisation's transactions

6. Allows *access to real time data*

7. Integrates transaction *processing and planning activities*

Analysis of the above characteristics reveals that most, if not all, can also be said about a system and complexity, where there is integration of the parts which constitute the whole – hence the holistic view. The various facets or parts of an ERP are what eventually give

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[4] Becerra-Fernandez I, Gonzalez A, Sabherwal R. 2004. *Knowledge Management Challenges, Solutions and Technologies*, 359.

[5] Alhadeff-Jones M. 2008. Three Generations of Complexity Theories: Nuances and Ambiguities. *Education Philosophy and Theory, 40(1); 66 - 82*

meaning to the ERP system as a whole. ERPs have become a necessity for all organisations regardless of kind of industry because of the increased nature of the interconnectedness of problems, processes and environments. Ross and Vitale assert that ERPs are fundamental for organizations to thrive and survive[6]. The Knowledge Economy is complex naturally and the need and intensity of knowledge is very high both horizontally and vertically. The system assists organisations to embed knowledge both vertically and horizontally. ERPs also enable integration with external stakeholders, i.e. customers, suppliers, third parties, etc. which brings a different type of complexity throughout the life cycle of an ERP project. This also reflects that ERP systems embrace the external environment. Additionally they are a tool that organisations use to enable effective management of knowledge; therefore Knowledge Management (KM) is at the core of ERP systems. Knowledge Management lies at the centre of many interrelated problems ERPs are intended to resolve in organisations.
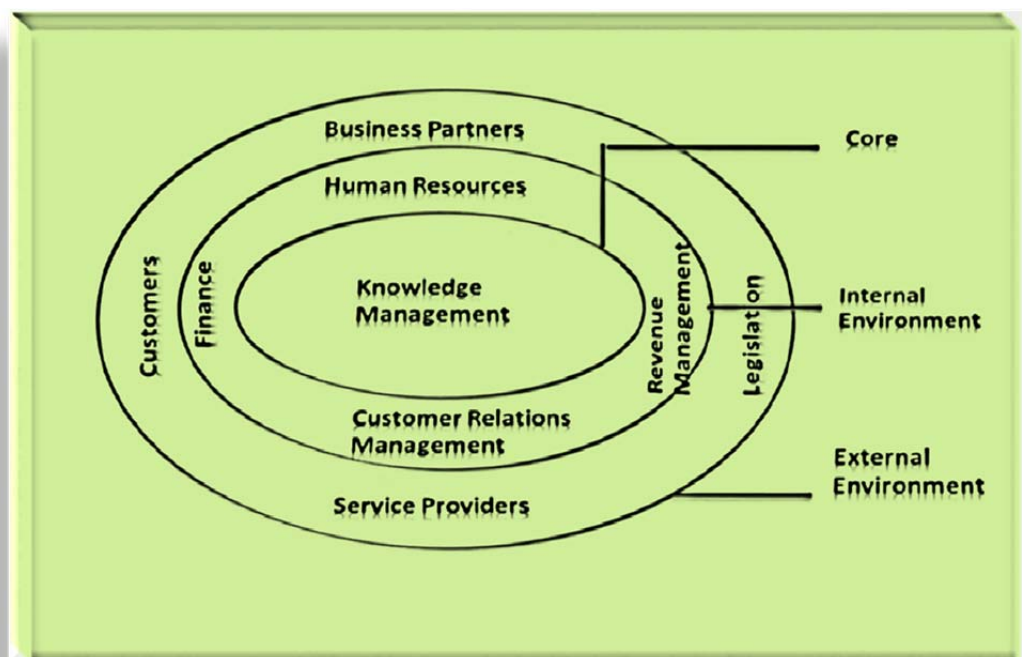
Figure 1: ERP and KM (Author's Formulation)

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[6] Ross J W, Vitale M R. 2000. The ERP Revolution: Surviving vs Thriving. *Information Systems Frontiers, 2 (2); 233 - 241*

Figure 1 above illustrates the relationship between Knowledge Management, the core processes in an organisation, and the external environment. The model shows the relationship between various parts of the ERP system and the external environment, with Knowledge Management at the heart of the relationship, all brought together which are brought together through using an ERP system ERP emerges from the interaction between the parts which affects each other through complex networks of complexity. KM is driven by the same elements that influence the organisation to make decisions on solutions such as ERPs. Amongst others, KM is driven by increasing domain complexity, the accelerating market volatility, an increasingly high pace of change, diminishing individual knowledge and intensified need for speed, responsiveness, sustenance of efficiency, continuous improvement, innovation, and more. As a result organisations have a great need to manage their organisational knowledge so that they can adequately respond to or address the elements that drive KM. ERPs provides a more sound starting point – all organisational knowledge is centralised, the relationships are managed and knowledge is embedded, which are the fundamentals of an effective knowledge management implementation in any organisation.

It suffices therefore to say that in this era the commodity at the centre of everything that an organisation does is knowledge, no matter how one looks at it. Knowledge is also the commodity that gives an organisation capability to deal with or handle complexity and its challenges. Therefore knowledge is a commodity by which organisations are able to do what is needed to survive and a commodity which organisations strive to retain it. ERP is not a Knowledge Management solution, however it is a solution that enables the management of knowledge by pooling all the knowledge together and the relationship thereof, which is required to manage an organisation successfully. It lays the foundation for KM implementation.

Figure 1 above illustrates the high level of complex relationships between various parts that the ERP system is enabling and managing. It is therefore suitable to say that problems in this era of the Knowledge Economy have become so complex and are interlinked that they require complex solutions. Solving the complex problems with a complex solution such as ERP will thus always be a compound and multifaceted exercise regardless of the good planning,

adequate resources, and other components. ERPs are complex and their implementation can be challenging, time consuming and an expensive undertaking for any company[7]. There is no guarantee of a successful outcome even with significant investment in time and resources. ERP systems, also referred to as Enterprise Systems (ES) are among the most important business information technologies that have emerged in the last decade[8]. The implementation of ERP systems causes greater change with broader impacts on employees than any other system.

1.3 The Research Question

Previous research focusing on IT projects implemented in the United States, Africa and South Africa have provided reasons for and statistics relating to the successes and failures of information technology projects.[9] Some of these have examined common causes of failure and success in large IT projects, producing a list of common causes of both failures and success in Public Sector projects in general.[10] The global failure rate is still high. The CoJ, just like many organisations in the world, holding the optimistic view that technology will improve matters, made a decision to implement SAP CRM (Customer Relations Management) and SAP ISU. It is a government initiative with a customer centric approach. However, the success rate of many e-government initiatives in the country is very lean as most ICT experts believe SA is not yet e-ready[11] E-government and ICT are seen as elements

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[7] Schoenherr T, Hilpert D, Soni A K, Venkataraman M A. Mabert V. 2010. Enterprise Systems Complexity and its Antecedents: A Grounded-Theory Approach. *International Journal of Operations and Production Management,* 30(6) 639 - 665

[8] Chung B, Skibniewski M J, Lucas H C, Kwak Y. 2008. Analyzing Enterprise Resource Planning System Implementation Success Factors in the Engineering-Construction industry. *Journal of Computing in Civil Engineering,* November / December; 373 - 382

[9] One such research report was conducted by Sonnekus R, Labuschagne L. 2003. *IT Project Management Maturity versus Project Success in South Africa.***See Also:** Nash K. 2000. Companies don't Learn from Precious IT Snafus. *ComputerWorld, October 30,* andUmble E J, Umble M M. 2002. Avoiding ERP Implementation Failure. *Industrial Management, 44 (1);25 - 33*

[10] The Royal Academy of Engineering, The British Computer Society. 2004. *The Challenges of Complex IT Projects: The Report of a Working Group from RoyalAcademy of Engineering & The British Computer Society.* 4

[11] eGovernment Conference. 2009. Available: www.itweb.co.za/events/egovernment/2009. During the conference proceedings, the e-readiness of South African government and its customers when it comes to ICT roll out for e-government was questioned.

of a larger government modernization program. As will be shown later, it is now clear that even when best practises were followed, adequate planning, good governance, and sound project management afforded to the ERP implementation project by the City of Johannesburg (CoJ), it however did not turn out as intended. It must be noted that the scale of the Phakama project is vast. It must further be noted that it being an e-government project, factors that are not usually present in private sector environments have to be factored in on top of the usual intricacies that are part and parcel of ERP systems implementations. At least two things stand out: governments cannot choose their customers, but have to service the entire community; and governments are primarily driven by political concerns which easily work at cross purposes with sound technical practice.

The underlying assumption of this thesis is that conventional approaches to analyse ERP systems implementation are not adequate to interpret the complexities of an e-government project of this size and nature. The starting point of the thesis is the assertion that insights form Complexity theory and Sensemaking theory is needed to achieve a more sophisticated understanding. The research question, therefore, is: *What is the interpretation of what happened in Programme Phakama and why did it happen that way, by looking at it from the perspective of complexity and sensemaking theory?* The research objective is not limited to understanding what happened in Programme Phakama only, but to arrive at a general answer by studying other ERP projects in South Africa and other countries. It is hoped that an answer to the above question will help organisations move to a more sophisticated understanding of the challenges facing management in conditions of high complexity in e-government applications.

1.4   Methodology

The thesis is the product of a primarily conceptual study anchored in Sensemaking and Complexity Theory and also System Development. This is a qualitative research study that employs an empirical approach to arrive to a conceptual outcome. The study is empirical because it investigates a contemporary phenomenon within a real life context and produce findings that are applicable beyond the immediate boundaries of the study. It takes the form

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of a case study on the ERP system implementation in the City of Johannesburg. The aim of the research is to develop a conceptual outcome that can be used in management practice beyond the City of Johannesburg. Written data sources for an empirical research can include published and unpublished documents, company reports, newspaper articles, letters, reports and so forth. The data used for the case study is not broadly published except in this study and was made available through the consent by the source, the City of Johannesburg specifically for this study. Accordingly, chapter 3 predominantly references the data and the graphs produced by the CoJ. The data used is not published material but produced by and for CoJ internal use during the implementation of the Programme Phakama. Empirical data is also collected that provided the base for the theories used and evaluation of other projects that are similar to Programme Phakama to arrive to a widely applicable solution or understanding. Sensemaking and Complexity theory are applied to develop an alternative management understanding that can be more effective.

The thesis is limited in two ways.

One, it does not focus primarily on economic, sociological, political or technological factors per se. These factors are indeed present and worth investigating in their own right. The thesis, however, is confined to investigating the evolution of Phakama at a holistic level through the application of the conceptual theories stated.

Two, although the implementation process of project Phakama is still on-going, the picture painted of the project in this thesis is restricted to the period 2006 (when it started) and 2009. This is a sufficient period to allow one to see the role of complexity and sensemaking in such a project.

1.5 Outline of Chapters

The chapters of the thesis are as follows;

1. The conceptual background of Complexity Theory, Sensemaking Theory and Systems Development are discussed in Chapter 2. The theories are carefully meshed together to provide a new angle to interpret and analyse what takes place in ERP adoption.
2. A description of the Programme Phakama ERP project is provided in Chapter 3

3. A review of ERP implementation projects similar to Programme Phakama are presented in Chapter 4 to demonstrate that it is not an isolated case.

4. Interpretation of what happens in ERP projects using the theory of complexity and Sensemaking is presented in Chapter 5.

5. The last chapter deals with the implications of this thesis for management.

Chapter 2

Systems, Complexity and Sensemaking

This chapter focuses on the three theories that are used in this study to provide a new perspective towards interpreting what really transpires in ERP project adoption that leads to delays, inflated costs, abandonment of the projects and increased project scope. The theories are System Development, Complexity Theory and Sensemaking. The theories provide a perspective from which the research question will be answered.

2.1   Background to System Development

Information Technology solutions / Information Systems have evolved in recent years to such an extent that most of them have become complex in character. The development and implementation of Information Systems also improved greatly to match the nature, character and the reasons for implementation of such systems in organisations. Systems development and implementation methodologies have increased and improved as organisations and IT experts could no longer afford to just randomly or in an unstructured manner implement large scale systems, especially ERPs without a methodology and technique.

The information system development has in itself become complex[12],[13]. There are various methodologies, tools and techniques in place that are used in IT projects when developing and implementing an information technology system[14]. All over the world Information Technology systems development and implementation follows a methodology as either a legal requirement or as best practices. It is essential to note this and briefly discuss the history and the current trends in system development and implementation to build up to the next chapters that will focus on reviewing implementation of particular information systems – IT project/s. It is also worth noting that all Information Technology systems implementation in general follows a reputable and at times a prescribed methodology that suits not only the environment in which it is implemented but also the business purpose for deploying such a system. It is critical to also note at this stage that the organisational and environmental context within which systems are developed from conceptualisation, business requirements to system development changes over a period of time. Only too often valuable time is lost between the moment of identifying the need for a system and the moment this system may be deployed – during which time facts, processes, functions pertaining to the need, approach and methodology may undergo changes.

2.1.1 Systems Development Defined

Systems Development concerns itself with the way in which Information Systems are conceived, analysed, designed and implemented. An Information Systems Development Methodology is defined as a collection of procedures, techniques, tools and documentation aids which will help the system developers in their efforts to implement a new information system.[15] There are various system development methodologies and all of them to a great extent conform to the Systems Development Process. For this reason, a system development process is outlined which informs the design of many development methodologies.

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[12] Akkermans H., Van Helden K. 2002. "Vicious and virtuous cycles in ERP implementation: A case study of interrelations between critical success factors". *European Journal of Information Systems* 11 (1):35–46
[13] Xie W, Lee G. 2005. Complexity of Information Systems Development Projects: Conceptualization and Measure development. *Journal of Management Information Systems, 22 (1); 45 – 83*
[14] Botta-Genoulaz V., Millet RA, Grabot B. 2005. "A survey on the recent research literature on ERP systems". *Computers in Industry,* 56 (6): 510–522
[15] Avison D, Fitzgerald G. 2006. *Information System Development Methodologies, Techniques and Tools*, 24

2.1.2 Systems Development Process

The process of Information Systems development is predominantly associated with the methodologies applied in that process. The core activities found in a system development process are: system analysis, system design, programming, testing, conversion and production and maintenance.

2.1.2.1 Systems Analysis

It focuses on the analysis of the problem the Information Systems will resolve. This includes an analysis of the existing systems. The problems are defined, root causes are identified and solutions specified[16]. The business requirements the information system should meet are also defined here. This activity includes a feasibility study and identification of possible alternative solutions. The main purpose of this activity is to determine the achievability of the Information Systems financially, technically and from an organisation perspective.

2.1.2.2 Systems Design

System Design focuses on how the system will fulfil the objectives identified during System Analysis. It entails the in-depth understanding of the non-functional requirements. The design of the information system determines the overall plan or model of the solution. System specifications are detailed to deliver the required functionality – fulfilling the managerial, organisational and technical requirements of the system.

2.1.2.3 Programming

This activity entails the actual translation of the system specifications into software programme code. It can be done by an organisation, the software service provider or the developers of the system.

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[16] Bradley, J. 2008. "Management based critical success factors in the implementation of enterprise resource planning systems". *International Journal of Accounting Information Systems* 9 (3): 175–200

2.1.2.4   Testing

This is one of the time consuming exercises. Its aim is to ascertain that the system produces the desired results. Preparation and availability of test data is essential for the success of this activity. A system must undergo three types of testing, namely;

- Unit testing that tests each program separately to locate and address errors.
- System testing that tests the functionality of the system. This is done to ascertain whether the discreet modules functions together as planned.
- Acceptance testing which provides the final certification that the system is ready to be used in an operational environment by end users.

Testing of a system usually follows a test plan.

2.1.2.5   Conversion

This is the actual implementation/installation, where the change/transformation is made from the old system to the new one. System components are integrated in to the user environment. There are various strategies for system conversions. Organisation chooses the strategy that suits them best by mitigating identified conversion risks. These strategies include parallel strategy where both the old and new systems are run together for a while until the functionality of the new system is completely assured. Alternatively, the direct cut-over strategy is where the new system replaces the old one entirely at once – a full bang approach. The Pilot strategy and the phased approach strategy can also be used.

Once the system is installed and conversions are completed, the system is regarded as in production. At this stage the system is reviewed to determine how well it meets the original objectives/specifications. The exercise will also determine the need for revisions or system modifications.

2.1.3 System Development Methodologies

There are various system development methodologies available[17]. System development methods are chosen depending on the use and reason for implementing the technology. They do not merely reflect the step by step process, but encompasses the philosophy and approach as well. Different situations call for different approaches[18]. System Development methodologies had their origin in the mid-1960s when the need for formalisation and standardisation of development steps were identified. Changing user needs, evolving client priorities, focus on service provision, technological improvements and the need for flexibility in system development were all contributed to a need for system development methodologies, with each striking a different balance[19].

The development, use and operations of information systems occur within a particular environment which comprises components from the external and internal environments of an organisation. There are four main categories of System Development methodologies, code and fix, serial rigorous, intensive rigorous and Agile[20]. System Development Life cycle (SDLC) is the first methodology to be developed and applied in the 1970s and is regarded as the basis of many other methodologies[21]. Other existing methodologies includes, Agile (Data, Model Driven Development, Microsoft Solution Framework and Unified process), Dynamic System /Development Method, Enterprise Unified Process, Extreme Programming, ICONIX, object Oriented Software, Rational Unified process, ISO/IEC 12207, Scrum and Test Driven

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[17] Monk E, Wagner P. 2009. *Concepts in Enterprise Resource Planning*: Third Edition. Course Technology, Cengage Learning

[18] Finney S., Corbett M. 2007. "ERP implementation: A compilation and analysis of critical success factors". *Business Process Management Journal* 13(3): 329–347

[19] Dillard J F, Ruchala L, Yuthas K. 2005. "Enterprise resource planning systems: A physical manifestation of administrative evil". *International Journal of Accounting Information Systems,* 6 (2): 107–127

[20] Scott W A. 2009. Choose the right software for the job. Available www.agiledata.org/essays/differentStrategies.html

[21] Fitzgerald B. 2000. System Development Methodologies: the problem of tenses. *Information Technology and People.* 13(3): 174 - 185

Development amongst others. There are more than 25 distinct system development methodologies available[22].

2.2   Complexity Theory

Organisations are faced with many challenges to which there are many possible solutions, with each striking a different balance[23]. Organisations use Information Technology as one of the solutions to the challenges with which they are faced. De Wit and Meyer assert that, for every complex problem, there is a simple solution that is wrong[24]. The assertion implies that complex problems require equally complex solutions, with a solution that is designed in such a way that it can manage the relationship and the cause and effect of various parts of a system. Are ERP systems evidence of that, aimed at dealing with the complex problems brought about by the turbulent environment of the knowledge economy? It is generally accepted that ERP systems are complex systems. Systems complexity can be defined as perceived complexity associated with the analysis and design of systems. The interwoven nature of problems forces organisations to seek different approaches to resolving those problems. One of them is Complexity Theory which is one of the many systems approaches organisations have at their disposal to address problems with which they are faced. Organisations in pursuit of goal seeking and viability through the increased efficiency and efficacy of processes and structures, use systems thinking approach, and Complexity Theory. This is true to many organisations that focus on innovation, process improvement and competitive edge. Knowledge and the management thereof is the main enabler to achieve such organisational focus. Complexity Theory is orientated towards improving organisation performance in terms of how well the organisation manages its tasks and responds to changes in its environments. It is founded on the premise that there is hidden order in the behaviour of complex systems. Many organisations use it as a way to encourage innovative thinking and

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[22] Avison D, Fitzgerald G. 2006. *Information System Development Methodologies, Techniques and Tools*, 24

[23] Hall, R. 2002. "Enterprise resource planning systems and organizational change: Transforming work organization?" *Strategic Change,* 11 (5): 263–270

[24] De Wit B, Meyer R. 2001. *Strategy Synthesis: resolving strategy paradoxes to create competitive advantage*, 25

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real time response to change. The fundamental of Complexity Theory is holism and Michael Jackson defines it as "a holistic approach that asserts that parts of a system can only be understood in terms of their relationships with each other and with the whole"[25]. The way the parts interact is critical to how the whole system works.

A review of chapter 7 of Michael Jackson's book brings the following elements of Complexity Theory to light;

- It embraces a holistic approach
- A process view
- Focus attention on those aspects of organisation that bothers managers the most
- Relationship between the parts is inherently important
- Orientated towards improving an organisation's performance
- Constant exchange of information with its environments
- As an organisation evolves, it co-evolves with the environment
- Complexity Theory methodology allows an organisation to survive on the edge of chaos
- Order arises spontaneously out of chaos
- The system exhibits self-similarity
- Requires complete mind shift by managers to secure business success
- Understanding of patterns is important

It should be recognised that there are many authors in the field of Complexity Theory and each has a different perspective on the subject, emphasising different aspects and so generating rather different managerial priorities. Looking at each of the Complexity Theory elements above and comparing them to that of an ERP system there is no denying that ERP is a profound product of complex problems and Complexity Theory, therefore inherently complex in its character. The characteristics are so markedly similar that it is undeniable that ERPs were meant to solve complex problems using the same approach and essence of

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[25] Jackson M C. 2003. *Systems Thinking: Creative Holism for Managers,* 115.

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Complexity Theory. Similar to Complexity Theory advocacy, ERPs complexity only exist at the level of the system and not in the parts / modules. The complexity in ERPs too, results from the interaction between the various parts that comprise the system. The dynamics of each organisation or environment where ERPs are implemented also adds to the complexity of the system at any particular time. According to Jonathan Rosenhead "there is evidence of managerial take-up on complexity as a framework for informing organisational practice"[26] Management have accepted that embracing change and managing differently from the conventional methods is what will guarantee survival of their organisations. Organisations compete in highly dynamic markets and circumstances and needs to therefore be flexible. Smith asserts that Complexity Theory has fallen on fertile grounds, due to globalisation, technology, competition, change, speed, complexity and paradoxes[27]. It is the author's stance that organisations use Complexity Theory not as a result of a conscious decision but that they naturally utilise the theory and its methodology because of the complex nature of problems and solutions. Phenomena are seen as complex and as having parts that are non–linear in interactions. Managing that cause and effect is fundamental. The broader interest and implementation of ERPs in many organisation which in itself embraces the elements of Complexity Theory, could be a signal that use of Complexity Theory is gaining momentum.

2.2.1 Holistic Approach within Complexity Theory

Complexity Theory founded its existence on what Jackson refers to as the failure of reductionism. It therefore advocates a holistic view. Complexity Theory offers the benefit of describing how complex systems can generate simple outcomes while looking at the whole system and not the parts. An ERP solution touches an entire organisation and may affect nearly every employee in that organisation. It has been built on the same premise of Complexity Theory that views the reductionism approach to have failed. The author asserts that the consequences of the failure of reductionism are the current challenges that face many organisations, with regards to legacy systems that only addressed a particular functional area

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[26] Rosenhead J. 1998. *Complexity Theory and Management Practice.* A paper written by Jonathan Rosenhead. Available: http://www.human-nature.com/science-as-culture/rosenhead.html
[27] Smith ACT. 2005. Complexity Theory for Organizational Futures Studies. *Foresight, 7 (3): 22 - 30*

of an organisation's operation and in many instances have no relationship with other systems or the relationship is not stable for organisational efficiency. Therefore reductionism could be the reason behind the legacy systems, silo mentality and problems organisations are so desperately trying to correct in recent years using ERPs. Equal to Complexity Theory, ERPs are characterised by various parts that constitute the whole. ERPs' true ambition is enterprise-wide impact – the whole. It takes the needs of the entire organisations and provides a single integrated software solution that addresses the problems of an entire organisation. In most cases organisations that implement ERPs successfully, are viewed as successful.

2.2.2 A Process View

The pattern of relationships that determines the behaviour of a system is a crucial element of Complexity Theory. The Knowledge Economy brought about turbulence and uncertainty, therefore chaos is inherent. Complexity Theory attempts to bring order through a process view approach. Likewise, all ERPs are founded, based and configured around the understanding of processes in an organisation. Any ERP system pushes a company toward full process integration and solves the fragmentation of information[28]. Each ERP implementation project starts with the modelling of the organisation's processes to understand the pattern of relationships within that organisation. It is also an attempt to bring order to the chaos that together with self-organising processes, necessitated or pushed organisations to decide to implement ERPs. Michael Jackson states that "order is an emergent property of disorder and it comes about through self-organising processes operating from within the system itself.[29] Whenever an organisation experiences instability, it is forced to bring stability. The best and most popular way in recent years is a process approach that not only defines end-to-end processes but also entails a holistic approach.

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[28] Park K, Kusiak K. 2005. Enterprise Resource Planning (ERP) Operations Support Systems for
   Maintaining Process Integration. *International Journal of Production Research, 43 (19); 3959 - 3982*
[29] Jackson M C. 2003. *Systems Thinking: Creative Holism for Managers*, 115.

2.2.3 A Problem Focused Approach

Organisations focus mainly on those aspects with the highest impact, such as stakeholder relationship, customer relations, innovation, profit margins, sustainability and process optimisation, all rooted in knowledge, its access, retention and re-use. "Complexity Theory focuses attention on those aspects of organisational life that bothers most managers most of the time – disorder, irregularity and randomness".[30] Knowledge Economy is characterised by turbulence – instability, rapid change, unpredictability, interconnectedness, etc. Therefore, it suffices to say that what Michael Jackson refers to (quote above), is in essence the challenges brought about by the Knowledge Economy which puts knowledge or information and its value at the heart of what organisations do.

Complexity Theory requires managers to focus and address such challenges. These challenges are brought about by the KE, and no matter how broad and high level they seem, they affect each and every organisation immensely. Complexity Theory encourages managers to learn to live with turbulence by addressing and viewing the turbulences as good change. Management of Information and knowledge is one of the elements that allow organisations that manifest themselves in all aspects of turbulence to position themselves to address and survive in the KE. It has therefore in recent years, become a commodity that can determine the success and failure of an organisation depending on how well or poorly it is managed and used. As a result management of, as well as access to and security of data/ information/knowledge has become an important element in an organisation's strategies and ERPs can address these. Due to many organisations having disparate systems that are not integrated, getting to the single version of the truth becomes a daily challenge that, if not attended to, degrades organisational efficiency and business performance that are vital for survival in this era. Thus, many organisations use ERPs to address these day to day challenges because of their capability to span across functional areas, location and focus on

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[30] Jackson M C. 2003. *Systems Thinking: Creative Holism for Managers*. 113. **See Also;** Prigagine I. 1989. The Philosophy of Instability. *Futures, August 1989; 396 – 400,* **and** Stacey R D. 1992. *Managing the Unknowable: Strategic Boundaries Between Order and Chaos in Organizations*. Jossey-Bass, San Francisco. 43

executing business processes across an entire organisation. It can also be viewed as an attempt to bring stability to the inherent chaos. ERPs can collect data from various key business processes and store the data in a single central data repository, enabling an organisation to access and share information that was fragmented in different systems. ERPs also accelerate the communication of information in an organisation making it easier to coordinate daily operations.

2.2.4   The Inherent Importance of Independent Parts

The interconnected nature of phenomena and problems is apparent in the relationships that exist between their parts. The model of integrated problems and integrated solutions is evident beyond the Information Technology space. The parts and the interaction between the parts is the core to Complexity Theory. ERPs just like Complexity Theory states that the impact of the interactions of the parts on the whole can deliver significant results even though the interactions can be very minor. As such the relationships between the parts are non-linear. Scientifically, to explain something is to link the cause and the effects. ERPs are intended to manage the relationship between the various parts of a system in, and for, an organisation.

2.2.5   Performance Improvement Orientation

Technology related projects have become a common and recurring endeavour in many organisations in recent decades and ERP solutions in particular. ERPs are intended to help organisations become more flexible and productive by coordinating the business processes more closely and integrating groups of processes so they focus on effective management of resources and customer service. McAfee details the impact enterprise information technology adoption has on operational performance[31]. One of the main reasons that drive organisations' decisions on ERP or IT projects is to improve operating efficiency as part of the strategy to support future growth plans and sustainability. ERP's best hope – in design, branding and

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[31] McAfee A. 2002. The Impact of Enterprise Information Technology Adoption on Operational Performance: An Empirical Investigation. *Productios and Operations Management, 11 (1); 33 - 53*

marketing- is to demonstrate its value through improvement of organisation business process performance. Similarly, Michael Jackson asserts Complexity Theory to be one of those systems thinking approaches that are primarily orientated towards helping goal seeking and viability of organisations through increasing the efficiency and efficacy of organisational processes and structures[32]

2.2.6 Dynamic Information Exchange

Similar to Complexity Theory assertion, ERP systems have an intimate relationship with their environment and constantly exchange information, not to adapt to the information, but to respond effectively so that the relationships can be constantly aligned, are meaningful and therefore can co-evolve. The information exchanged is unique to each environment and that is what brings about dynamism. This is the reason why ERP systems in two organisations can never be implemented in the same way.

2.2.7 As an Organisation Evolves it Co-evolves with the Environment

Complex systems are characteristically open systems and it is therefore difficult to differentiate the system from its environment. There is a continuous flow of information from the environment through to the system which is stored for future use, and vice versa. Morel and Ramanujam assert that organisations are routinely viewed as dynamic systems of adaptation and evolution that contain multiple parts which interact with one another and with the environment[33]. Eventually both the system and its environment co-evolve. This is also evident with ERP systems. The ERP systems constantly exchange information with the environment and each effects change on the other. An organisation and an ERP system are able to adapt their structures where necessary, in response to the information from its environment – self organisation. The system and /or the organisation co-evolve with their environment. This brings about the element of flexibility in organisation and also in ERPs hence most are customised and not adopted nor implemented as plain vanilla systems. Plain

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[32] Jackson M C. 2003. *Systems Thinking: Creative Holism for Managers,* 2.
[33] Morel B, Ramanujam R. 1999. "Through the looking glass of complexity: The dynamics of organizations as adaptive and evolving systems". *Organization Science,* 10: 278–293.

vanilla is a term used to refer to the bare minimum of functions that are known to be available in an application or system. It is the standard functionality that an application is supplied with, which can be further enhanced by customization. In Knowledge Management perspective, this sets the basis for learning and innovation for both organisations and individuals. The uncertainty makes learning even more crucial, in particular double loop learning in order to respond to the changes in the environment and to the system. Organisations are viewed as complex evolving systems, and this also applies to ERP systems – all systems.

2.2.8 Adapt or Die

The Knowledge Economy is characterised by unprecedented change. The successful application of Complexity Theory methodology allows an organisation to cope better on the edge of chaos. Organisations welcome disorder as a partner and use instability positively. When this happens, underlying stability can be born. The key to organisational survival is to make decisions or create rules that are capable of keeping an organisation operating on the edge of chaos, according to Stacey[34] He believes in this way new possible futures for an organisation will emerge. In this era an organisation needs to position itself in a region of bounded instability to remain competitive. This releases creativity and mitigates the risk of a planned corporate death which arises when organisations seeks stability at all cost at all times. Stacey refers to this clear distinction as ordinary and extraordinary management[35] He says extraordinary management is required if an organisation is to be able to transform itself in situations of open ended change. The author's position is that the decision by many organisations to implement ERPs in the wave of rapid change is an attempt by organisations to operate as extraordinary managers as this will position and enable the organisation to cope with immanent change that exist in this turbulent world. Analysis is a key element of extraordinary management. ERPs provide fundamental data - and can also be a tool required

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[34] Burnes B. 2005. Complexity theories and organisational change. *International journal of management. review, 7(2):* 75

[35] Rosenhead J. 1998. Complexity Theory and Management Practice. 1998. A paper written by Jonathan Rosenhead. Available: http://www.human-nature.com/science-as-culture/rosenhead.html

for this analysis, which will help an organisation to respond effectively to each change for long term survival.

2.2.9 Orderly Disorder

Order arises spontaneously out of chaos. With every chaos a hidden order may be concealed. In the midst of disorderliness there is an underlying pattern that needs to be understood. *"From a complexity perspective, chaos describes a complex, unpredictable, and orderly disorder in which pattern of behaviour unfolds in regular but similar forms"[36]*. Complex systems such as ERPs have large numbers of independent and yet interacting parts and actors. There are two fundamentals evident with ERPs, that at any given time the interactions put an organisation on the edge of chaos and that with each ERP implementation there is a stage where chaos is inevitable and that is usually followed by system stability which results with the system being successfully implemented. In many implementations of complex systems like ERP, there is much uncertainty as to what could have or has caused the instability or chaos. There will be at any given time a number of reasons that are thought to be the cause though without certainty. That edge of chaos during or just after ERP implementation is usually spontaneous in many instances followed by stability or order. The continuous interactions between the parts and the actors put the organisation and the system continuously on the edge of chaos. The benefit is that, this is the general belief that creativity, growth and useful self-organisation are at their optimum when complex systems operate on the edge of chaos. This could be the cause of the spontaneous order. There are patterns of self-organisation that occur from the turbulences of systemic interactions.

2.2.10 System Self-Similarity

Within a complex system the properties of the various parts are similar in shape to the whole. Self-similarity is also an important aspect of the design of many computer systems. As such ERP also is characterised by self-similarity. The parts that make up the whole are intrinsically

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[36] Burnes B. 2005. Complexity theories and organisational change. *International journal of management. Review, 7(2):* 79

similar and this could be the reason why underneath every chaos there is an underlying stability.

2.2.11 Metanoia Secures Success

Complexity Theory requires complete mind shift by managers to secure business success. The word metanoia means fundamental change in character or to change one's mind or purpose. Conventional methods in many ways do not suffice any more in today's world which is characterised by rapid change, intense knowledge requirements and advancement of technology. In order to remain competitive, viable and sustainable, managers in organisations are forced to approach management differently. A complete mind shift is required. Stacey refers to this as a strategic choice organisations have to, and do, make – a transformational process where organisations adapt to environmental changes by restructuring themselves in an intentional and rational manner[37]. The complexity of many things around, the interconnectedness of phenomena and parts requires a different thinking to the traditional method, a thinking that embraces and responds to change. There are various concepts and fields of study that justify this, i.e. creativity, innovation, change management, customer relations management, stakeholder management and business process management. Embracing and accepting these concepts may prove that a manager is on the path towards benefiting from using Complexity Theory to tackle organisational problems. In essence there is a greater diversity of problems managers are faced with and that need to be adequately tackled for organisations to survive. As a result, managers have sought assistance from advisers and consultants to help manage their organisations or to steer them to success.

Complexity Theory also requires managers not only to embrace change but to understand that the future of the organisations they manage is largely uncertain. Hence a need to be flexible when new information from the environment appears that needs a change in direction. The

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[37] Stacey R. 1995. "The science of complexity: An alternative perspective for strategic change processes". *Strategic Management Journal*, 16 (6): 477-495.

problems and practices of ordinary management have been repeatedly addressed in management texts. What is innovatory is the concept of extraordinary management. Extraordinary management requires the activation of the tacit knowledge and creativity available within the organisation. This necessitates the encouragement of informal structures – for example, workshops on particular issues or processes, with membership drawn from different business units, functions, and levels. Formation of these groups should be essentially spontaneous, provoked by paradoxes, anomalies and conflicts thrown up in the process of normal management. They need to be self-organising, capable of redefining or extending their remit rather than being bound by fixed terms of reference.

2.2.12 Understanding Patterns

A system is recurrent and displays a pattern. ERPs also demonstrate a pattern and are therefore fundamentally stable. System Thinking generally argues that one must see beyond the clutter on the surface to see the underlying regularities. In the midst of the apparent complexity and chaos, there is an underlying pattern of stability that if understood makes managing the changes possible – this applies equally to ERP systems. This is the only way managers are able to determine what the future may hold for the organisations. Given that the key finding claimed for Complexity Theory is the effective uncertainty of the future, the common assumption among managers that part of their job is to decide where the organisation is going, and to take decisions designed to get it there is, seen as a dangerous delusion. Management, afflicted by increasing complexity and information overload, can react by becoming quite intolerant towards ambiguity. Factors, targets, organisational structures all need to be clearly identified. The management task is seen to be the enunciation of mission, the determination of strategy, and the elimination of deviation in the midst of uncertainty. As a result, the complexity in the KE era and the interrelatedness of phenomena has elevated the importance of history. Understanding history is now critical in the complex system and it is one of the elements that bestow the capacity to act.

 One of the best and common ways to predict and cope with the complex environment is to understand the pattern which is historical. ERPs are the foundation to effective information management, business intelligence, data management, etc. The knowledge technologies such

as artificial intelligence are tools that organisations use to derive patterns out of the historical data. The tools operate on the sense of complexity. Knowledge embedded in ERPs is therefore used. The best and common way to predict and cope in the complex environment is to understand the pattern. The concept of using data to improve business performance and decision making evolved. Information Technology projects are naturally characterised by uncertainty, and so are many things in today's life. The main question to ask is, are organisations aware that they use complexity theory to address their problem or is it simply implicitly used because of the complexity in the environment and problems? Pascal Van Eck and Maria Laura Ponisio[38] assert that IT projects are complex systems that consists of different kinds of components and also that project outcome is governed by the dynamics of a complex system which IT project management aims to control. Complexity exists everywhere. Complexity is present in all the aspects that directly and indirectly impact on an IT project itself, the solution it aims to implement, the problems that the solution and the project aims to address, the management of and the outcome of such project. The dynamics of any complex system arises from the interactions of the components of that system. Complexity Theory is often an unconscious or an obvious choice for many organisations because it embraces complexity and encourages organisations to accept diversity as a good change and challenge.

2.3 Sensemaking

IT projects in general are infested with challenges that originate from the changes that happen around them and the complexities and dynamism that result from the interaction of various complex systems that form part of the IT project and its environment. So many questions arise when thinking about complexities that exist in the IT solution project management environment, the internal and external organisational environment in relation to what constitute an IT project success. Some of these questions are: how do organisations make

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[38] Van Eck P, Ponisio M L. 2008. *IT Project Management from a Systems Thinking Perspective*. A Position Paper. eProceedings of the 3rd International Research Workshop on Information Technology Project Management. Paris, France, 12th – 13th December 2008.

sense in the age of rapid change that lasts beyond momentary? Is it possible to make sense where there is complexity? Because when one is making sense of an occurrence, other changes and turbulences take place and render the sense being made irrelevant in the wake of newer changes that too require sensemaking. When and how do organisations make sense of the IT solution itself and how it should function? How do organisations make sense of what they are doing before they see the outcome? Do organisations make decisions with huge implications without making sense of the reality - actual solution/decision? Sensemaking plays a crucial role in complexity and is one of the backbones or cores of understanding the meaning brought about by the complexity organisations are trying to address. In order to address the changes, sense (Sensemaking) must be made of those changes to have the right or appropriate response. The study focuses on the Sensemaking process, where, when and how it takes place in an organisation in relation to ERP projects, from decision making to implementation. This is an attempt to answer some of the questions raised above. The Knowledge Economy and the challenges brought about by it contributes largely to the need and demand for organisations to have IT - ERP systems implemented. It is discussed in the previous sections that ERPs are in themselves complex systems, that information is one of the main drivers in today's economy, and managing it successfully is crucial for organisations to survive. As a result organisations are using IT to manage information and information to manage and implement IT.

The evaluation of IT projects also needs to be equally complex in order to address all the factors organisations are faced with internally and externally when implementing such solutions. Besides the fact that in most cases, there is considerable uncertainty about what to evaluate in information systems projects[39], it is also becoming clear that the decision on how ERP systems should work when implemented, becomes apparent only during and after implementation, when continuous Sensemaking takes place, necessitated by the changes and the interaction between components that constitutes a system in an ERP project and the environmental factors. The position of the author is that Sensemaking processes take place

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[39]Alderman N, Ivory C, McLoughlin I, Vaughan R. 2005. "Sense-making as a process within complex service-led projects". *International Journal of Project Managent,* 23(5):380–5

continuously, from decision making until the completion of the project. It therefore suffices to say that Sensemaking is an essential process that advances Complexity Theory by making sense of the changes and environmental influences. The continuous Sensemaking is necessitated by the various changes, new information and interactions at various stages in the project life cycle that continuously emerge so that the organisation can align and be relevant to its environment at all times. It can also be assumed that an organisation whose ERP projects failed to the stage of abandonment either failed to continuously make sense as and when the changes occurred, or responded incorrectly to the changes, or choose the wrong options from the many that are presented by new information as the changes occur, that eventually it could not keep up with not only what it is doing but also what the environments requires it to do. From a Systems Thinking perspective, the feedback loop mechanism did not function efficiently or not at all.

2.3.1 What is Sensemaking?

There are many definitions of Sensemaking in the literature[40],[41],[42]. Weick defines Sensemaking as follows: 'Sensemaking involves placing stimuli into some kind of framework'. When a stimulus is put into framework, it enables people to comprehend, understand, explain, attribute, extrapolate and predict. He also provides a definition of Sensemaking as a thinking process that uses retrospective accounts to explain surprises[43]. Both definitions will be used in this study as the author's view is that they complement and do not contradict each other. The latter definition focuses on what is done in Sensemaking whereas the former focuses on how Sensemaking takes place. Using both definitions, Sensemaking is using retrospective accounts to explain what is not understood by putting stimuli (information, sense, deduction or interpretation of the retrospective account) in to a framework that shapes what is thought to be, needs to be, or should be. The definition implies

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[40] Edited by Hernes T, Maitilis S. *Process, Sensemaking, and Organisaing*. Oxford: Oxford University Press. 2010.

[41] Harris S. G. 1994. "Organizational Culture and Individual Sensemaking: A Schema-Based Perspective". *Organization Science,* 5(3):309-321.

[42] Klein G, Moon B, Hoffman R R. 2006. "Making Sense of Sensemaking 2: A Macrocognitive Model". IEEE *Intelligent Systems*, 21(5): 88-92

[43] Weick K. E. 1995. *Sensemaking in Organisations,* 4.

that at the time of decision making, planning and actioning, the circumstances, information and the frameworks are different, the people engaged at this levels are also not the same and that result in different outcomes both conceptually and practically for the same matter. A framework or a frame of reference and cues are pre-requisite for sensemaking. A frame is a generalised point of view that directs interpretation. Cues are familiar structures which are seeds from which people develop a larger sense of what may be going on. Even though Sensemaking originates at an individual level, the focus in this study is on how Sensemaking takes place in an organisation and relates it to complexity and IT projects. It involves the on-going retrospective development of plausible images that rationalise what people are doing. It is therefore a critical organisational activity.

2.3.2 Characteristics of Sensemaking

Weick provides seven main characteristics of Sensemaking[44]. They are Identity construction, Retrospective, Enactive of sensible environments, Social, Ongoing, Focus on and by extracted cues and Plausibility rather than accuracy. These properties are used whenever Sensemaking takes place. As indicated earlier Sensemaking takes place at all the stages in the ERP implementation project by various people using all the properties of Sensemaking. These people operate at various levels and use different cues to arrive at a meaning. Sensemaking as a process unfolds as a sequence in which people concerned with identity in the social context of other actors engage on-going circumstances from which they extract cues and make plausible sense retrospectively[45]. The statement sums up most of the elements that are characters of Sensemaking. Each property will be described in relation to at least one element/area where it is applied in an ERP implementation project life circle.

2.3.2.1 Identity Construction

Sensemaking is grounded in identity construction. When an organisation makes sense and choices it is doing so to construct and maintain a particular identity about itself. When doing

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[44] Weick K E. 1995. *Sensemaking in Organisations,* 17
[45] Weick K E, Sutcliffe K M, Obstfeld D. 2005. Organizing and the Process of Sensemaking. *Organizing Science, 16 (4): 409 - 421*

so, cues that support the preferred identity are used to arrive at a meaning. Organisations continuously interact with the environment and what organisations are (identity), and what the environment is, is the result of the interactions and the choices made. Consequently the decisions that organisations make are also driven by a sense of self identity and self-efficacy as an organisation's response to its environment. Choices and decisions are made not only because they are right but also because they fit the frame and are supported by cues. Sensemaking is central because it is the primary site where meanings materialize that informs and constrain identity and action. When a particular ERP solution has constantly been unsuccessfully implemented by various organisations, it produces a cue of poor identity. Therefore, organisations will not opt for that solution, while there may be nothing wrong with the product itself but rather with the implementation thereof. Organisations build their own brand informed by the phenomenon they perceive and the cues they derive from the environment to support their decisions and/or branding. What is worth noting is that identity in an organisation is not the same throughout all the organisational levels. The cues that inform the identity for executives, planners and operations staff are not the same and cannot be the same. Therefore there is already an incongruity of identity for the same elements in the same organisation for various groups.

2.3.2.2 Retrospective Construction

From a Sensemaking perspective, retrospective construction of meaning refers to using previous experiences to explain current changes or surprises. To perceive an outcome organisations have to look backwards and find cues to explain the current and predict the future or determine what needs to be done. Since there are many people involved in Sensemaking in an IT project, it means that there are many cues that are used to explain the same phenomena with different frames. The current context of a phenomenon affects how organisations and individuals look back and determine the meaning. History is important and it is used to explain things in this world of uncertainty where continuous prediction is required. Beside the point that history provides previous facts, the same way it does for complexity, for Sensemaking it provides cues that can be used to not only understand what is happening now but also what may happen in the future, thereby bringing an element of

expectations which reduces complexity or surprises. Complexity Theory also supports history as that brings pattern and a sense of stability, ERPs are implemented in order to have historical data and be able to use it for projections and predictions bringing stability and capacity to act – all these are similar to the aims of Knowledge Management. History is also used to justify the choices organisations make in decision making, highlighting positives of the choices and negatives of available options not chosen. A decision why a particular ERP solution was opted for over another will be justified using history and retrospective experiences available that are fitted in to the current framework, i.e. an organisation needs an ERP that will address the challenges identified and which was successfully implemented somewhere else.

2.3.2.3 Environmental Interactions

Organisations are not separate from their environment, their actions are reflected in the environment. In the same way that organisations and IT projects get complexities, turbulence and information load from the environment, they also contribute these in turn to the environment. The actions made in relation to a complex IT project contribute back to the environment. The crux of this is that in any organisation where the employees are constituted at various levels and groups what is sensed and used from the environment is different for the same phenomenon. The outcome of all implemented projects, failed or successful, contributes to what constitutes and is contained in the environment. With reference to Figure 1 (Page 4), which shows that KM is at the heart of the interactions between an organisation and its environment, it therefore suffices to say that what an organisation does regarding ERP projects, underlying reasons for implementing those and Sensemaking regarding that, directly or indirectly impact the KM realities of that organisation. Even though organisations may not think about it, the inherent relations that exist between the environment and the organisation, the challenges posed by the KE, all centres around KM and managing the challenges brought about by the KE, knowingly and unknowingly. An organisation when deciding on an ERP solution and by choosing a specific ERP product, it is defining andchoosing to confront and to compete in the ERP/ IT project environment. The outcome of each project or ERP implementation contributes to that environment and other organisations will use that outcome

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as cues to justify their decisions or choices in the future. It also equally becomes part of history.

2.3.2.4 Social Context

Social context cannot be separated from organisations because they are constituted by individuals. People are not required to have the same meaning in organisations but rather alignment to a meaning. Sensemaking in an organisation is crucial for getting a collective action, implementation of ERP system, in order to succeed or move forward. There are various groups within an organisation, executive management, operations management, functional grouping and specialists who can easily align to meaning but not so easily across the groups because their social context is inherently different.

2.3.2.5 On-going

Sensemaking is on-going in character. It involves the on-going retrospective developments of plausible images. This means that since complexity exists throughout the life of an ERP project, continuous Sensemaking is required to get meaning, and to respond accordingly, from the beginning of the project until completion. Therefore there are various meanings attached to the same phenomenon at various levels and points in the ERP project life. The challenge is that, the various and fragmented meanings derived from a change needs to be aligned from an organisational context in order to enable pursuit of a common goal. Therefore holding one meaning for various levels and groups in an organisation can only last for a short period of time, when change or disruptions occurs at any level, the shared meaning is lost. Even with its on-going nature, Sensemaking is subtle, swift, social and takes place without conscious intention.

2.3.2.6 Focused on and by Enacted Cues

The enacted cues for various levels in the organisations are different, i.e. the cues that management uses and that are used by operational personnel are different for the same phenomenon. What is often considered positive by management may be regarded negatively by those not in the same level. This is also supported by Weick who argues that commitment,

capacity and expectations affect sensemaking during crisis and severity of the crisis itself[46]. This distorts the shared meaning and alignment at various stages in the ERP project life because the cues and the ratification of those cues are different for various levels and stages in a particular project and in an organisation.

2.3.2.7 Plausibility versus Accuracy

ERP projects are driven by plausibility rather than accuracy. In this world of fast paced change, multiple meaning, diversity and information overload, it is difficult to be accurate at all times. Sensemaking is characterised by acceptance of 'good enough'. It also advocates the fact that it is not possible to maintain a consistent level of perfection but acceptance of whatever satisfies the need in order to move forward. ERP projects are equally like that especially at the implementation stage when various possibilities present themselves and the planned activity proves to be inadequate or incorrect. At this point whatever satisfies the need of the organisation will be acceptable. When Sensemaking takes place it means something new, something unknown happens and it intrigues or stimulate one to seek meaning. When implementing an ERP and in the course of stability something unexpected usually happens, i.e. the modules or parts may not be talking to each other as planned and expected, Sensemaking, is triggered as the unexpected has disrupted the stability. Sensemaking is the human cognitive process that takes the unknown and structures it to make it known.

2.3.2 Sensemaking in Organisations and ERP Adoption

There exist in the world today a fast pace or weave of change and as these changes affects organisations, they need to effectively respond to them. Sensemaking therefore becomes an indispensable on-going exercise that seeks to find meaning to the changes/surprises. Mattlis states 'the basic idea of Sensemaking is that, reality is an on-going accomplishment that

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[46] Weick K E. 1988. Enacted Sensemaking in Crisis Situations. *Journal of Management Studies, 25 (4); 305 – 317.* **See Also;** Smircich L, Stubbart C. 1985. Strategic Management in an Enacted World. *Academy of Management Review, 110; 724 - 736*

emerges from efforts to create order and make retrospective sense of what occurs'[47]. Sensemaking is a process that seeks to structure the unknown. Firstly, there are three main elements that environmentally determine when Sensemaking should take place: information overload, complexity and turbulence. All three are the drivers of Knowledge Management in organisations and are also the same elements that affect the direction of ERP projects before and during implementation. Turbulence, complexity and information overload bring about uncertainty and ambiguity in organisations the same way that they affect ERP projects. According to Weick[48], when and where there is information overload, the quantity of diverse information that people need to process is high and that result in ambiguity. Where and when there is complexity, there is increased perceived uncertainty because of the diverse elements that interact in many ways, and lastly where and when there is turbulence there is instability due to the frequency and the randomness of change. Therefore, the author's view is that Sensemaking is also an attempt by organisations to understand and deal with uncertainty, instability and ambiguity, the same reasons that see ERPs implemented in organisations to increase an organisation's capability to deal with that.

As already stated, ERPs or IT projects are inherently complex and are implemented in organisations that are faced with challenges brought about by the Knowledge Economy, therefore it suffices to say, the same challenges manifest themselves in every aspect of an organisation's life that each action and decision an organisation makes from IT to general management and operational activities is aimed at addressing the same challenges. Organisations are in constant pursuit of stability while the environment brings about changes that disrupt a pattern. It can be argued therefore that in the KE era, Sensemaking becomes significant to also seek and provide meaning to the phenomena so organisations are able to understand, interpret and decide on what needs to be done. The definitions of Sensemaking discussed earlier on imply that, when disruptions happen, Sensemaking takes place and also that real sense is made after an action. Sensemaking takes place when people in an

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[47] Mattlis S. 2005. The Social Process of Organizational Sensemaking. *Academy of Management Journal, 48 (1): 21 - 49*
[48] Weick K E. 1995. *Sensemaking in Organisations,* 87

organisation confront surprising changes. In essence organisations are constantly and continuously challenged. This makes Sensemaking an on-going and continuous process in organisations. The words continuous and on-going are used simultaneously to echo that it is on-going so that changes or disruptions can be addressed and also continuous because a disruption or change can continuously be addressed at various levels of an organisation. A phenomenon can receive Sensemaking attention at various levels of an organisation resulting in different meaning to the same phenomenon by different people and at different times which adds to the complexity with which an organisation is constantly faced with. The author's stance is that this could be the reason why organisations are facing challenges with implementation of ERPs or complex IT solutions in general. Different people assign different stimuli to different frameworks within the same organisation on the same change or disruption that inherently results in even more chaos than that brought about by the change itself. The 7 properties of Sensemaking are applied at all three levels in an organisation in relation to ERP adoption; the strategic level, planning stage and implementation or execution stage. The above is also supported by Snowden with his concept of multi-ontological nature of Sensemaking[49]. In light of the above, a closer look at the Sensemaking property, retrospect, as an example, implies that at every level those involved only make sense of their actions after the act. Action is a precondition for Sensemaking. Throughout the organisation regardless of level, people are not sure of what they are doing until they have done it because the element of certainty is never there until after the act. It follows therefore that, Sensemaking precedes decision making and also follows it.

During and before action, real Sensemaking occurs with different cues, frames and context. If this is the case, why do organisations review project success based on the original plan – scope, budget and timelines? The cues, frames and the context used to determine the costs, timelines and the scope are different from those in use during planning and implementation. Why do we want to measure IT project success based on what we knew and required then, which is different from what is known after implementation and arguably what is now

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[49] Snowden D J. 2005. Multi-Ontology Sensemaking: A New Simplicity in Decision Making. *Informatics in Primary Care, 13 (1); 45 - 53*

ascertained to be the requirements? Furthermore Sensemaking of the same phenomenon at various stages yields totally different results. Shouldn't project success therefore be determined for each stage and groups of stakeholders, since it will hold different meaning for each group? Also the environmental factors that affect each level are different resulting in different cues and frames for each level, therefore the enactive of sensible environments in the stages will be different. Strategists are able to pull out the cues and put them in to frames quicker than at any other level because the required information and frames load are less therefore manageable and understanding of complexity at a higher or different level, whilst this is not the case with other levels. At the planning stage information, frames load and requirements increases compared to the strategic stage. The pool of people involved at this stage increases too. The implementation stage has a bigger pool of people involved, whilst the complexity is vastly different to the other stages, the information load and requirement is higher with the corresponding amount of frames and cues to match. Even though there is more information available at this stage, however the need is for specific information in this pool. Thus the information requirements shift from low (at strategy level) to higher at the implementation level. The need for specific information in the large pool of information at the implementation level is predominant whilst at strategic level, general information is sufficient. Another critical character of the implementation level is that those involved are driven and need satisfaction more than "good enough' as it is the case with the strategic level. The confusion or chaos is greater at the implementation stage because of the search for specific meaning in the weave of multiple meaning and ambiguity. It is at this stage that the likelihood for organisations being on the edge of chaos is greater because at implementation stage there is a greater need for specific information and the need to accurately respond to the environmental changes that exist. Lack of alignment across the three main levels can also be attributed to be due to the communication gap across them.

There are different complex systems at play in each level, i.e. at the strategic level, the political and financial systems influences the frame and the information/facts and eventually the decision made. The intensity of knowledge of those involved at these levels is also different. The implementation stage requires intense and specific knowledge whereas at the strategic level the knowledge required is high level and generic or broad in nature.

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Complexity is intense at the implementation level and if not properly managed and change efficiently resounded, has the potential to render the project to fail, thereby contributing to an organisation being on the edge of chaos from a Complexity Theory perspective. Other constituents of an organisation that have an impact on Sensemaking are the people – actual users of the system, culture of the organisation, stakeholders and the importance of change management should not be underestimated.

2.4   Conclusion

Implementation of ERP systems follows system development methodologies that standardise and quality assure the implementation. Complexity Theory and ERPs are established on similar foundations – to address complexity. In order to address the complexity adequately and correctly, sense needs to be made of the changes. Sensemaking plays a crucial role in understanding, managing and coping with complexity.

Chapter 3

The Case of Programme Phakama

This chapter focuses on and details the conceptualisation, planning, developments and activities of Programme Phakama. It is a City of Johannesburg project that implemented the ERP solution. Programme Phakama is used as a case study for this research to enable a close-up view of an ERP implementation project in a local government context and to apply sensemaking, complexity and system development theories.

3.1 The City of Johannesburg

The City of Johannesburg is one of the six Metropolitan Municipalities in South Africa. It is located in Gauteng province, serving the economic hub of South Africa. It is mandated to provide basic services to its customers and residents. Historically the City of Johannesburg was founded in the 1800s as a mining camp after gold was discovered. The City evolved through the years to become the dynamic and progressive city it is today. Due to its economic, political and social history, it comes across as a unique institution. This City faces different problems in comparison to comparable cities countrywide due to its history, location, its clients and other inherent characteristics of its environment, serving a number of corporate clients that impact on local and national economy. It is therefore forced to be at the top of its game at all times. It faces all the realities brought about by the Knowledge Economy albeit being the last domain of the public service. The CoJ as a result developed

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into a vibrant, result driven, dynamic and successful organisation that has crafted innovative solutions ahead of other cities at all times. It has over the years developed a vision to make Johannesburg a World Class African City. In order to achieve this, it has embarked on a mission for sustainable economic growth which will ensure better life for all. The CoJ has in the past embarked on various transformation processes with its strategy in full sight. Therefore Programme Phakama came about as a continuation of the transformation journey by the City which began as a key objective of the iGoli 2002 strategy[50]

3.2 Conceptualisation of Programme Phakama

The iGoli 2002 strategy brought about the most fundamental change to the City's business model, in particular the establishment of UACs (Utilities, Agencies and Corporatised Entities), which were seen as key drivers for restoring and sustaining financial stability to the City. However, since the implementation of iGoli 2002, there have been several changes impacting on the City's business model, such as the promulgation of the Municipal Systems Act and the Municipal Finance Management Act. The Municipal Systems Act requires significant changes in the relationship between citizens and municipalities. It is required that service delivery be orientated towards the needs of the community and the Municipalities to be citizen focused. The Act also requires the Municipalities (City of Johannesburg) to "…*organize its administration in a manner that would enable the municipality to be responsive to the needs of the community"*.[51] The CoJ is a very large, complex, and diversified organisation with over three (3) million customers and a diverse residence type. In order to maintain its leadership status, the City has established a vision of a governance that is innovative and proactive, embracing information technology and dynamic structures to leapfrog to higher levels of efficiency in service delivery.

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[50] City of Johannesburg. 2002. *iGoli 2002 Plan*. iGoli 2002 is a three years transformation project by the City of Johannesburg. Its main aim was to restore the financial health of the City and structural transformation. It sought to reduce fragmentation, eliminate duplication, improve accountability and ensure a cost effective service delivery. 18

[51] South Africa. 2000. *Local Government Municipal Systems Act, 2000*, Chapter 7, Section 51, (a)

This vision demands support systems that provide information expediently to managers for improved decision-making, accountability, and control. Programme Phakama was therefore born based on recognition of the above and the need to bring about a solution to the challenges. The need to improve service delivery through improved customer relationship management and to develop a sustainable revenue base through improved billing and revenue management with an integrated approach to service delivery emerged and could not be overlooked by the City. This brought about the conceptualisation of Programme Phakama in 2006. The primary mandate of the project is to re-design business processes and implement an integrated IT solution for the entire customer relations and revenue management functions/ value chains across the City.[52] The integrated IT solution is the Enterprise Resource Planning system for the customer service and revenue management main streams of the City. The Programme Phakama Blueprint was then developed, which contains models guiding how the system should be implemented for and support the customer relations management and revenue management in the City and its entities.

The City reviewed the whole issue of accessibility to service, as part of its broader service delivery improvement thrust. In the past, points of access have been complex, fragmented and confusing. Currently, the City is falling short of providing integrated access to its citizens in line with the Batho Pele principles and the notion of integrated government. In particular, the creation of a mixed service delivery model has also made it difficult for citizens to view and experience the City in an integrated manner[53]. The Municipal Finance Management Act holds the Accounting Officer of a municipality responsible for the management of the revenue of the municipality. Under the current model accountability for revenue management is fragmented across the CoJ Revenue Management Unit and the Utilities. It is clear that the City has to deal with the considerable fragmentation in respect of procedures and information systems for revenue and customer interface. It is also clear that this leads to the opportunity for business units and departments of the CoJ to escape single point accountability. The need for change was inevitable in order to improve the situation with regards to accountability.

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[52] City of Johannesburg. 2005. *Programmed Phakama Blueprint Executive Summary,* 4
[53] City of Johannesburg. 2005. *Programmed Phakama Blueprint Executive Summary*, 6

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This need was also highlighted by the increasing public concern around the management of customer service, the delivery of services, and billing and revenue collection processes. The fundamental change and recommendation of this blueprint is that the Revenue and Customer Interface Value Chain (CIVC) should be seen as a core function of the CoJ and be developed into a broader service utility; essential to the sound financial status of the City allowing it to provide its customers with a first class service. In May 2005 the Mayoral Committee approved the establishment of a single Revenue Management Value Chain and single Customer Interface Value Chain supported by an integrated IT system which Programme Phakama is to implement[54] The problems identified above and the project described below exhibits all the characteristics of complexity in that, the link between the parts are not linear and simple solutions cannot solve the problem. In what follows, the author extensively makes use of and quotes the following Project sources of the CoJ;

- Revenue Management Value Chain Operating Model document
- Customer Interface Value Chain Operating Model
- Value chains Operating Model
- Mayoral Committee Meeting Resolutions
- Presentation of programme Phakama to the Mayoral Committee
- Programme Phakama Blueprint
- Programme Phakama Implementation Approach
- Jo-serve Business Model Principles

3.3 The Scope and Deliverables of Programme Phakama

The scope of the Programme as indicated in the Blueprint report includes the following[55];

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[54] City of Johannesburg. 2005. *Mayoral Committee meeting resolutions, May 2005*
[55] City of Johannesburg. 2005. *Programme Phakama Value Chains Operating Models,* 14

3.3.1 Revenue Management Value Chain

The approach the CoJ has taken in scoping the revenue management value chain indicated an understanding and acknowledgement of the significance of this value chain from a customer perspective. It is a value chain that has the inherent potential, if it fails, to cripple the City financially, which has happened in the earlier years when the City experienced billing and revenue collection problems and was under financial strain. This was in essence a risk mitigating action by the City to prevent the re-occurrence of the aforementioned. The original scope of the Revenue Management Value Chain (RMVC) is focused and limited to the design and implementation of an end-to-end CoJ Revenue Management Value Chain across the proposed CoJ's organisational boundaries of UACs, JoServe and CoJ.

The scope of the value chain is defined on two levels, viz.:

Organisational:

- City Power;
- Johannesburg Water; and
- PIKITUP
- CoJ Revenue Department;
- Rates & Taxes;
- Related CoJ functions / directorates;
    i.   GIS
    ii. Property valuations
    iii. Town Planning

Functional:

- All core revenue and related revenue processes within the above-mentioned utilities/ department/ functions are responsible for the following sources of revenue:
    i.   Consumption based utility services: electricity, water, refuse, sewerage
    ii. Availability charges: electricity, water, refuse
    iii. Property rates and taxes
    iv. Sundry billing items that are stand related

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Revenue sources such as libraries, traffic fines and others that are not generated in the CoJ Revenue Department, City Power, Johannesburg Water, Pikitup and the Rates and Taxes unit were not to form part of the scope of the revenue management value chain. [56]

3.3.1.1   Revenue Management Value Chain Deliverables

The main focus of this value chain is to ensure that the right customer is correctly billed, the bill delivered and the billed amount collected from the customer. By definition, the main purpose of the Revenue Management Value Chain (RMVC) is to ensure that all monthly billable services rendered are expanded in use, billed and the relevant income recovered. This also includes upstream and downstream dependencies to ensure efficient and complete service delivery. This specifically excludes the supply of technical services and the associated financial aspects thereof. It is clear from this description that many dependencies exist between the RMVC, the CIVC and the other CoJ and UAC competencies. These dependencies are even more significant when considering that JoServe will perform most of the RMVC activities and as such effective service arrangements between JoServe, UACs and CoJ will be critical to ensure the success of JoServe. The impact of JoServe on Rates & Taxes is significant as the entire billing and collections activities, including administering of customer accounts will now be performed by JoServe and will to a great degree also be automated through SAP. However, the core focus for the Rates & Taxes department will be on Revenue Planning and as such, the current organisational structure of Rates & Taxes reporting to the Executive Director: Finance and Economic Development will remain. In the case of the UACs, JoServe will now perform the entire billing and collection activities except Meter Reading. This business model will give enough control to the Power and Water utilities on their revenue without compromising the Phakama main objective of an integrated Revenue Value Chain for the city of Johannesburg. The UACs will be accountable for the water and power components of the bill, whilst JoServe will be accountable for the other components. As the RMVC activities performed by JoServe are mostly back office in nature,

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[56] City of Johannesburg. 2005. *The Programme Phakama Revenue Management Value Chain Blueprint*, 14

there are also several touch points between the RMVC and CIVC. These are mainly revenue related customer queries that cannot be resolved by the front office CIVC staff, cash collections and credit management in the form of clearances.[57]

3.3.2 Customer Interface Value Chain

The City's approach to this value chain reflected the understanding that this value chain is the face of the City. The undisputed dilemma of a value chain of this nature is that it is at the end of the stick and is as such just a reflection of either the good or bad work done by supporting value chains, e.g. main revenue management value chain. This value chain can never independently achieve its mandate, as its success relies on what others have contributed. The scope of work for this entire value chain is to design and implement a CoJ Customer Interface Value Chain solution. 'The Customer Interface Value Chain's organisational scope is limited to the CoJ entities currently utilising a system called the Pega (An in house system designed to be used for customer relations management in the City) or a similar IT system for customer/citizen contact processing. Hence, this includes Joburg Connect (The CoJ call centre), People Centres, Revenue, and the UACs, namely Johannesburg Water, City Power, Pikitup, Johannesburg Roads Agency, City Parks and MetroBus. Within this scope, it is important to note that this Blueprint Report does not include Emergency Management Services (EMS). This is primarily driven by the need to manage risks better, thus ensuring the programme gets things right with limited services (medium risk) and organisational scope and then replicates excellence to include all other services (high risk). With regard to the Customer Interface, Programme Phakama is focused on the following,

"That a Customer Interface Management Value Chain be implemented consistently across all City services providing one-stop citizen access. This will be achieved by implementing a

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[57] City of Johannesburg. 2005. *Programme Phakama Blueprint Executive Summary*, 6

single and common customer database and customer interface IT system throughout the City services, along with common customer service practices".[58]

It is not part of the scope of Programme Phakama: for CIVC to deliver a CRM strategy document for the City, rather to design and implement the functional capability thereof.'

3.3.2.1 Customer Interface Value Chain Deliverables

The deliverables of the Customer Interface Value Chain embraces residents, customer's rights to be served and the accessibility to its premises. 'Customer satisfaction is dependent on the successful interaction with the local government institution. Good local governance is dependent on strong regional governance and civil society institutions. For example, to ensure customer satisfaction, issues of water cannot be dealt with in isolation from issues of electricity. Successful service delivery cannot occur by focusing on one element of the value chain solely, the entire chain that relates to customer interaction needs to be addressed. The challenge in meeting the service needs is really one of building good customer service – integrating the different elements of the value chain into a mutually supportive whole. Focusing on implementing a Customer Interface value chain needs to be understood in the context of the City's principle of 'One City, One Vision and One Strategy'.[59] This will be achieved through centralisation of a single and common customer database, customer interface IT system and common customer service practices. JoServe will be a service utility that will be established as a core function of the City to optimally deliver customer services in collaboration with the UACs and other CoJ departments. The goal is to consistently ensure high value experiences across the customer continuum. These dependencies and service arrangements between different service centres of the CoJ are depicted in a Conceptual Model, at a competency/component level across the relevant organisational structures, depicted by performance measures.

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[58] City of Johannesburg. 2005. *Programme Phakama Customer Interface Value Chain Blueprint.* 7
[59] City of Johannesburg. 2005. *Programme Phakama Blueprint Executive Summary*, 5

3.3.3 Data Management

One of the critical areas in the rollout and implementation of the SAP solution as part of the Programme Phakama was data purification from the legacy systems to make it SAP compatible and also resolve any existing data quality issues that will compromise the billing on the new system. Without the data being "cleaned" adequately it will not be possible to load the data on SAP and hence enable the newly designed and implemented business processes – more important is the ability to generate a correct bill. The main objective of Data Management is to purify and create a meta-data for the two value chains in the City.

3.3.3.1 Data Purification and Management Deliverables

The core deliverable for this stream is to cleanse data from the various legacy systems that exist throughout the City. The legacy systems that were used by the MOEs that are covered by the project and the billing system used by the City at that time all had varying information about one customer. This problem had to be rectified before the new system could be utilised. The final outcome was clean, quality and reliable data of the City's customers that will allow a single view of the customer that will be migrated into the new SAP application. The planning and the high level of details are undoubtedly of world class quality. With such thorough foundation work, many projects should succeed. The next chapter will detail the achievements of the project against the blueprint. Planning is only one element of management and it requires other management functions to achieve success.

3.3.4 The New Service Organisation Business Model

The Revenue Management and Customer Interface sections of the Blueprint report decompose the value chains into competencies and business components, which form the building blocks for the proposed service utility (currently referred to as "JoServe"). JoServe should be established and running by the end of the Project.

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3.3.4.1 New Service Organisation – JoServe Deliverables

The CoJ has in terms of its iGoli 2002 institutional framework adopted a service utility business model in which the UACs (Utilities, Agencies and Corporatised Entities) were established to manage service delivery on behalf of the CoJ. The iGoli 2002 institutional framework was based on the need to resolve a financial crisis in the City, consolidate a fragmented organization and to fundamentally improve service delivery to the citizens of the City. This was achieved through the establishment of service utilities to focus on improved management of service delivery. However, the establishment of the UACs has resulted in the fragmentation and loss of single point accountability for revenue management and customer interface services across the CoJ and the UACs. The CoJ identified a need to consolidate its fragmented revenue management and customer interface value chains into a single accountable customer facing organization. The establishment of a service utility is consistent with and complementary to the current working CoJ institutional framework and represents a reinforcement of that framework. Furthermore, the creation of a service utility outside of the CoJ core administration will allow management the opportunity to focus exclusively on improving the core revenue management and customer interface function of the service utility which will in turn directly benefit the citizens of the City.[60]

3.4 Management Style of Phakama

3.4.1 Governance of the Programme

3.4.1.1 Governance Structure

Similar to other CoJ departments there are two levels of management on the governance structure for Programme Phakama, the political / strategic level and the administrative level.

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[60] City of Johannesburg. 2005. *Programme Phakama Blueprint Executive Summary*, 7

Political / strategic structure[61] below illustrates a balanced approach to governance for the project.
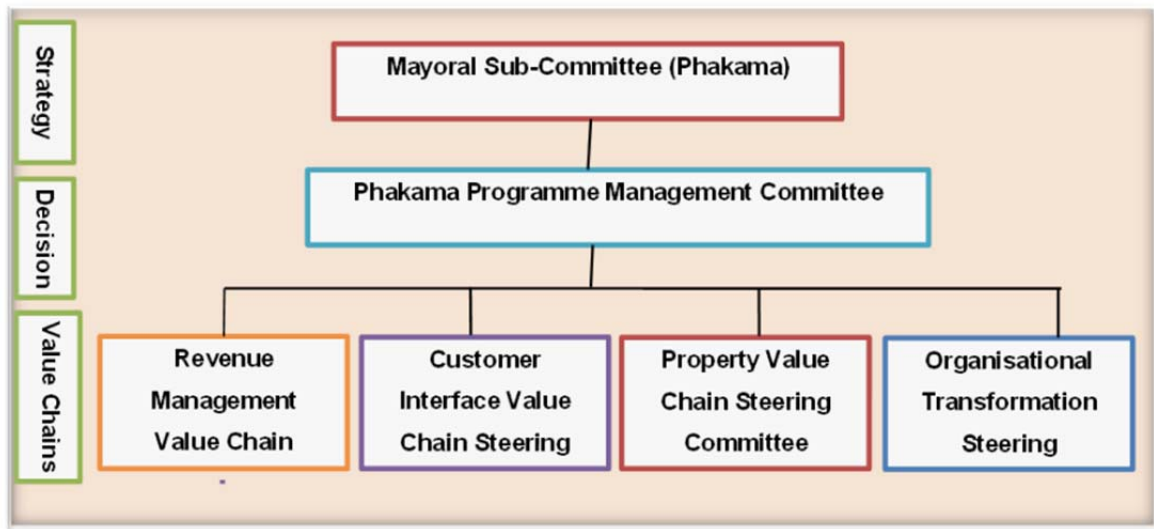
Figure 2: Programme Phakama Governance Structure

3.4.1.1.1 The Mayoral Sub-committee

The role of the Mayoral Sub-committee which is operating at the strategic level is to:

- Inform Mayoral Committee of progress against strategy
- Oversee and direct implementation of Programme Phakama strategy
- Advise Mayoral Committee on strategic risks, issues and needs
- Monitor alignment of Programme Phakama with CoJ strategy

The oversight committee consists of members of the mayoral committee, the Chairpersons of the boards of the UACs and the City Manager.

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[61] City of Johannesburg. 2006. *Programme Phakama Induction Presentation,* 9

3.4.1.1.2 Programme Phakama Management Committee

The role of the Programme Phakama Management Committee that operates at the decision making level is to:

- Ensure Programme is completed on time and within the budget
- Ensure strategies are aligned with CoJ strategic destination
- Monitor the execution of all projects under Programme Phakama
- Approve policies in relation to Programme Phakama interventions
- Approve the blueprint designs for all projects under Programme Phakama

This committee consists of the City Manager, Executive director of Finance and Economic Development, Chief Information officer, Chief Operations Officer, UACs Managing Directors and Revenue Management Chief Executive officer. It should be noted that this layer of the governance structure changed after the restructuring process in the City that took place later in 2006. As a result some of the designations no longer exist in the new structure which includes; 'JoServe was replaced by the Revenue and Customer Relations Department (R&CRM), the Chief Operating Officer designation was discontinued and the departments of finance and economic development were split.

3.4.1.1.3   The Value-Chain Steering Committee

The Value Chains Steering Committee focus on the operations of the value chains. Its role is to:

- Recommend policies to Programme Management Committee regarding the Value Chains management
- Ensure optimal utilisation of resources allocated to the Value Chains
- Recommend any major changes in relation to the scope of the project
- Assist with timely resolution of key decisions
- Arbitrate differences between UACs & Programme Phakama

The Committee consists of Programme Managers (from the Project), Executive directors of affected departments in the City, The UACs Managers and the Chief Operations Officer.

3.4.2 The Administrative level

Programme Phakama management structure consist of five streams, each with sub-streams. Each of the streams has a Stream Manager that reports to the Programme Manager who in turn reports to the Programme Director. The Programme Director is the link between operations, decision making and the strategic levels. The streams are: CIVC, RMVC, Organisational Transformation (OT), Data Management and Information Technology stream.

3.4.3 Resource Allocation

To ensure that the project delivers solutions of high quality that responds adequately to the identified business challenges, a decision has been made that Programme Phakama acquires the services of consultants who will work closely with identified Subject Matter Experts (SME) from the City in designing solutions. In total the project consists of 280 CoJ resources and 163 consultants supplied by the service provider.

3.4.4 Programme timelines and delivery approach

The initial proposed timeline were based on the Deployment Strategy to be a Pilot followed by three separate releases based on the constraints of converting customer data and managing the risks of impacting customers and the overall effectiveness of the City.[62] Figure 3 below illuminates the high level delivery plan and time lines of the project. In order to minimise the risk to the CoJ customers and the City yet maximise the speed at which the City's burning issues will be addressed, the team recommended that the Phased approach be adopted, resulting in the overall timeline illustrated below:

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[62] City of Johannesburg. 2005. *Programme Phakama Implementation Approach*, 7
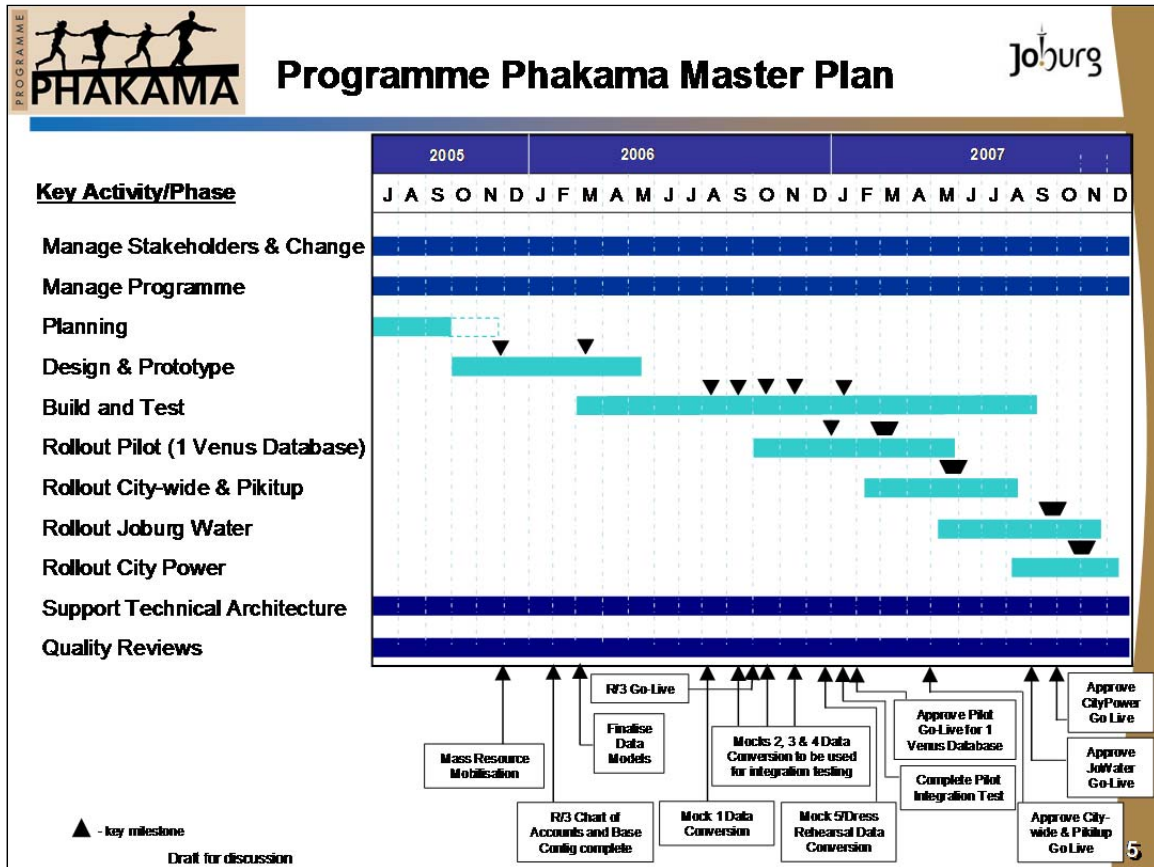
Figure 3: Overall Programme Phakama Master Plan

The approved plan and major stages of work are described in more detail below:

1. The Design stage during which the team (Consultants and CoJ SMEs) had to work towards designing the new solution, establish the tools, plans and templates to be used for the duration of the programme and confirm the effort estimates. The design of the new solution incorporate the following:

   a. business processes and Key Performance Indicators (KPIs),

   b. user roles,

   c. basic configuration and prototyped scenarios,

   d. functional designs of all custom components and data conversion programs,

   e. a transfer policy for transferring staff to JoServe,

   f. ring-fenced employees that will be affected, and

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g. human performance capabilities.

All the solution's components needed to be accepted and signed off by the business.

2. The Build and Test stage should result in a fully tested and quality assured solution that will be used for Pilot Dress Rehearsal. During the first two months of this stage, a software factory will be established and work will commence with the coding of interfaces, data conversion programs, enhancements and reports. A new organisation structure, job descriptions and a performance management framework will be developed for JoServe. Staff will be matched to jobs/positions. The human performance support components will be developed, integrated testing of all system components will be performed, data purification and conversion procedures will be developed and tested, and implementation preparation will take place. JoServe will be established as a legal entity. The establishment of the JoServe site and facilities will be completed and the required corporate support services will be put in place. This stage will include several iterations of integration testing, and user acceptance testing to approve the system, process and human performance solutions for all of CoJ's customer segments. Once the Pilot Dress Rehearsal commences, a subset of the integration testing team will remain to continue testing the solution with the subsets of customer that are due to be converted in the later releases.

3. A Pilot implementation stage during which the approved solution had to be deployed for an agreed upon representative subset of users and customers of the City. The overriding objective of the pilot is to minimise the risk, uncertainty and pain to the City and the customers while verifying the entire solution in live mode (real-time). This will gain the confidence and trust of the City and its customers in the new solution. The pilot will identify the unforeseen key CoJ-specific challenges for the rollout processes in order to minimise the risk to further rollouts. The Pilot subset should be chosen to enable the highest number of business scenarios to be verifiable. To further minimise the risk to the City, no Platinum customers will be included in the pilot. A core group of JoServe

employees will be appointed, receive induction and professional skills training and will be transferred to the JoServe site.

4. A Deployment stage for the users and customers of all remaining CoJ Venus and Pega databases and PIKITUP. This stage only commenced after the Pilot was declared successful and stable. During the first two months, users were trained, technology components installed (i.e. user workstations), a Dress Rehearsal of the deployment conducted and Go-Live data converted. No Platinum customers were converted during this stage according to the plan. Additional trained staff was transferred to JoServe. User support members were deployed on site to verify site readiness and assisted the users with pre-conversion activities. This was to be provided by Programme Phakama team members for three months after Go-live to enable the City to have a smooth transition from the old system to the new one.

5. A final Deployment stage, during which the solution had to be rolled out to Joburg Water and City Power was planned to take place one month apart. This stage was planned to overlap with the previous deployment stage stabilisation activities by three months. During the first two months, remaining technology infrastructure had to be implemented, users trained, dress rehearsals conducted and data converted. User support was planned to be provided for three months after Go-live for Joburg Water and two months after Go-Live for City Power. City Power should require less support due to all their users already being familiar with SAP functionality.

6. The pilot release's main purpose was to minimise uncertainty and unforeseen business issues on a large scale by proving that the solution conforms to business requirements in operation for a small subset of customers before general release to the business. This is based on a proven and prudent release strategy that was adopted in numerous previous Revenue Management and Customer Interface Value Chain and supporting systems implementations. Platinum customers were excluded from the first rollouts to minimise the financial risk and potential media backlash risk during stabilisation.

7. As seen on similar large programmes, the importance of the user community to gain confidence in the new business solution by witnessing the successful delivery of the first rollout regardless of the size was greatly acknowledged. Past performance, audit reviews and representation were used to select the most appropriate legacy database for the pilot rollout. The data for the pilot was prepared so that it can be purified in time. It was, however, imperative to ensure that the customer base and transaction types were a representative sample to ensure that as many as possible scenarios are covered during the pilot to identify as many challenges as possible.

8. Participation and communication was planned in the delivery stages to assist in ensuring that all affected staff understand the JoServe structure, the future operating model between CoJ, JoServe , the UACs and the Staff Transfer Policy and all other relevant information that could potentially hinder successful implementation of the project. This would later undoubtedly and greatly assist in minimising fears and in promoting acceptance of the change.

9. Only one customer database was to be used for the pilot rollout, to ensure more attention is focused on knowledge transfer, training and support of the associated users. It was also proposed that as many users as possible from the remaining databases participate during the pilot in order to gain experience and exposure in preparation for the deployment of the solution to their respective areas.

10. The data in the legacy system/was mostly stored logically per region, which facilitated the conversion of data by region and consequently would affect a defined subset of users. By converting all Customer data per database concurrently, the affected users would only be required to work off the new system for customer processing which would assist in avoiding unnecessary impact to the users.

11. The UAC customers are maintained in separate databases which are different from the CoJ customer database. For this reason, converting one of the UACs will not constitute a representative basis for a pilot. The UAC customer base also includes Platinum customers which will increase the financial risk should they be included in a pilot.

3.2.1 Detailed Approach
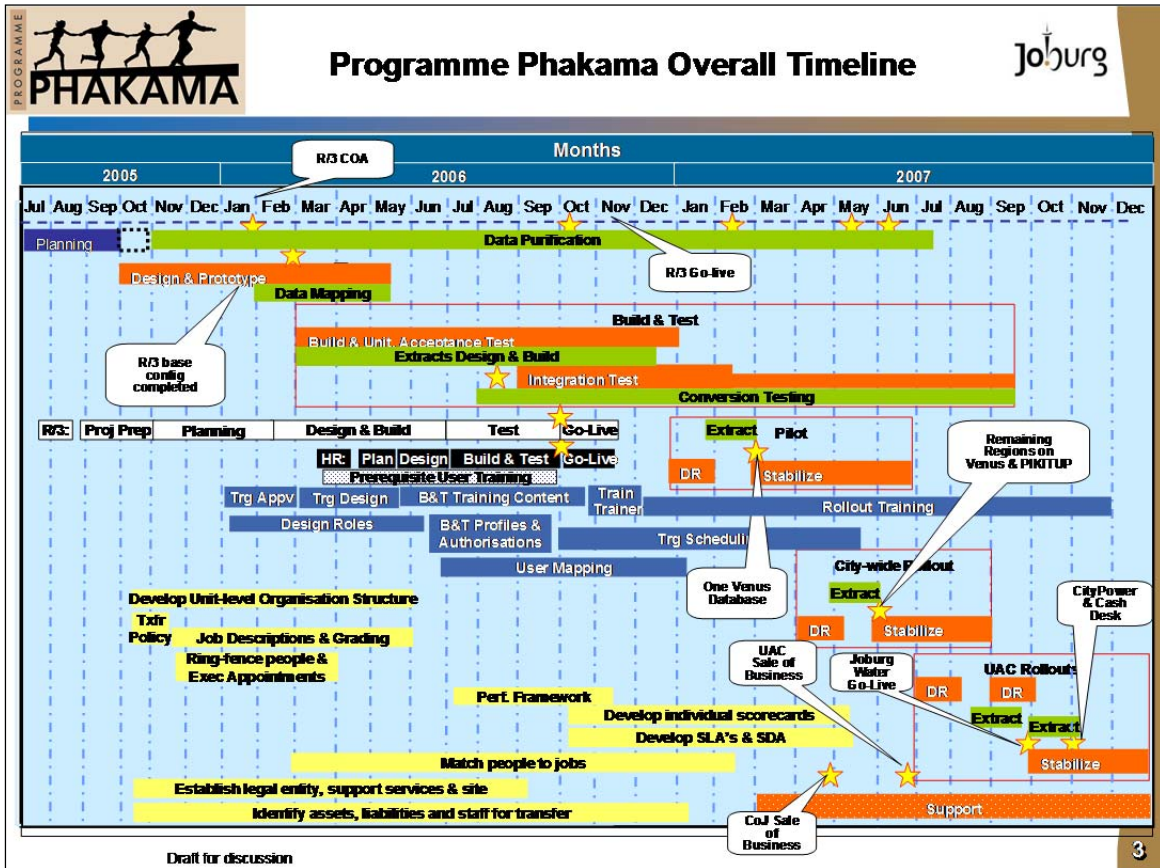
Figure 4: High-Level Programme Critical Path Timeline

The above figure provides a conceptual view of the overall timelines and critical path dependencies of Programme Phakama[63]. The major timeline dependencies agreed with major external systems i.e. Finance and HR, are also depicted. The evaluation of this project will be based on this originally approved timelines.

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[63] City of Johannesburg. 2005. *Programmed Phakama Implementation Approach*, 7

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3.5 The Evolvement of ERP Adoption in Programme Phakama

This section focuses on the progress and the shape the project took during implementation. It comprehensively details how the plans turned out, what changes were made to the plan, approach, scope and costs and the reasons. According to the original plan in the Programme Phakama Blueprint, the project was to be delivered in a period of 30 months. (July 2005 – Dec 2007), with the main approach concurrent as phased approach go-live to minimise and manage the risk. The above, considering the entire original scope of the project was estimated to cost the CoJ a total of R279 000 000.00 (Two hundred and seventy nine million Rands). According to the Phakama Master Plan, figure 3 (Page 50), the planning phase that also included the mobilisation of human resources was to take place between July and December 2005. The design phase of the project was to begin in October 2005 according to the plan. It is worth mentioning that the period July 2005 – Jan 2006 was utilised for preparatory / planning work that included but was not limited to development and approval of the Blueprint, approval of the budget and securing of the required resources (human, project office space, etc.) as opposed to the plan. The actual work on the project began four months later, in February 2006. This study focuses on that period onwards. The focal point is analysis of project progress and changes in the following four main areas of the original plan to understand the cause of the changes, increases and delays:

- Scope
- System implementation approach,
- Project timelines
- Project costs.

3.5.1 Management of Change

The overall conceptualisation and planning of the project has been afforded acceptable wisdom. The inherent complexity of the project and the proposed technology solutions were never undermined. The dynamic nature of the CoJ was also carefully considered. This is evident with the controls that have been put in place to ensure that the project is well managed. Nonetheless, unforeseen issues were inevitable and continued to disengage the

original plan, mainly the scope, approach, costs and original timelines of the project. During the project planning, most possible causes of project failure were mitigated, i.e. lack of subject matter experts, a clear and detailed statement of works (Contract) with the project's principal contractor, proper leadership, clarity of vision, stakeholder management, etc. The project has however proven to be complex even with all the above in place. One of the controls adopted was the use of a Change Order Request (COR), to raise and manage any change in the project plan and scope. This means change was always anticipated and did not come as a surprise, but the actual rate of change was not and perhaps could not be anticipated. Depending on the nature and impact of the change the COR may be approved by either the Political Management or the Administrative Management of the Project or CoJ as detailed above. For the purpose of this study only approved COR will be reviewed for both the in-scoping and approach changes that affected both the timelines and costs, for the duration of the project until June 2009. There have been no changes that pertains to de-scoping of certain deliverables from the project plan, therefore all the changes effected, increased both the original costs and amplified the project scope thus resulting in delayed delivery timelines for the entire project. A review of the approved CORs presented a picture as detailed below. It points out that the rate of change for a project as complex as this one to be quite high. The first approved COR was raised just six months into the project – 4th July 2006

3.5.1.1   Scope Creep

The scope creep is viewed by the author as common in many projects and it is also generally accelerated by the Knowledge Economy. Generally in all projects, the intent is to evade scope creep, since it has an immediate negative impact on a project with regards to time, effort, resources and budget. However, at most times scope creep eventually brings long term benefit with regards to the overall project and the organisation itself. This project also experienced those unavoidable project scope changes. Usually, not all activities run as smooth as planned without any creeping weave that changes the original plan and at times the overall objectives. Adapting and adjusting as the project progresses is common, important and a manageable exercise. It is the magnitude of this change in many projects that

distinguishes such projects and makes it necessary to understand the high level of variance when plans and budgets are prepared so they can be adhered to. Following that, evaluation of projects mainly relies on the original plan and budget and this further creates the discord. The question is, is it still necessary to plan for projects that are complex even when it is expected that the variance between the plan and the deliverable will be higher? Certainly, most agree that a plan is necessary as it provides a road map of what needs to be done and how, most importantly, it provides a starting point. It generally never happens that with any huge plan, things always goes according to the plan, but a plan is nonetheless required to give shape and a complete picture to what needs to be achieved. Project planning is vital for many reasons. Even though change is probable in any project, a plan provides a structure of what needs to be achieved by when, detailing the costs associated with that. A project plan will clarify the approach to be taken, the scope, the duration of the project, deliverables of the project and resources required. Without the above it is not possible to make a business case for the project to be awarded, as a result planning is important. Little or no changes at all with regards to any project scope, is always better and makes the overall management of the project relatively easy. During the period under study (Feb 2006 to June 2009) the Programme Phakama approved a total of 45 changes that pertains to the scope of the project. The changes varied in nature from those with small impact, others with medium and to those with high or critical impact. This categorisation of the change was very important for decision making as well, since it makes it apparent what kind of impact the change has on the project and CoJ business at large and the potential of each to derail the project. Each COR was thoroughly investigated to also include the cost each will carry. Of the 45 CORs, 35 were of small impact and most with no cost attached to them; seven of the CORs were of medium impact to the progress of the project and on COJ business at large with varying costs.

The remaining three were changes of critical or high impact in nature which largely cost huge amounts of money. In total these 45 Programme Phakama scope related CORs added an overall sum of R18 585 448, 72 to the original project budget. This amounts to a 7% increase to the originally estimated project costs. It is clear that in the beginning the changes were frequent and dropped in numbers as the project gained momentum and shape. The changes as indicated above required an additional 1 936 (one thousand, nine hundred and thirty six)

manpower hours of full time employees (FTE) for the project, which resulted in 242 days in total that could possibly be shared by more than one resource (FTE) in accordance with the expertise required for each COR. It cannot be denied that an increase in scope 45 times is too high. The nature of the problem, the location of the problem, the nature of the solution to the problem and the current local and global environment all contributed to the changes which if ignored could have led to the failure of the project. Even though the blueprint was as detailed as any project plan could be in relation to all aspects of the project, i.e. scope, approach, budget, etc. change was inevitable.

3.5.1.2   Implementation Approach

It cannot be over emphasised how important it is in any mission to have a clearly defined approach. The project under study was also afforded that. However in the period between February 2006 to June 2009 a total of 21 (Twenty one) COR relating to project approach were approved. Of the twenty one only one was of critical or high impact to the project and CoJ business, whilst two were of medium impact and 18 were of small impact. Immediately it is noticeable that the changes in relation to approach were not as many compared to the scope creep. This can be attributed to good planning. A high number of changes here would have resulted in the project taking a completely different picture to what it was originally planned to be. The other noticeable factor here is that most of the changes made were not critical in nature indicating that the situation was reasonable manageable. Only one COR was almost obligatory to endorse to make the project a success and beneficial to the City. Even though the changes were not many they however had cost implications in both time and monetary value. Approach related changes are difficult to manage, unlike scope creep where more work is simply added, approach changes affect the technique or the strategy of how to achieve the results. Approach changes usually have a more rippling effect than scope changes. The 21 project approach changes resulted in an additional cost of R134 614 650, 60 to the original budget. This is about 50% more than the original estimated cost / budget for the project. The changes experienced included matters such as:

- Changes in go-live approach from phased approach to full bang[64]
- Using external (Step in) resources and not CoJ resources due to lack of required expertise
- Investigation and decision around the use of win client or web client version of the solution which turned out to be different from the original plan

3.5.1.3   Scheduling

With a project as huge as Programme Phakama and a solution as complex as SAP it is almost inevitable not to have delays in the project. Added to this, the economic downturn experienced by the global world, and not only South Africa, undoubtedly had its impact. During the period of economic meltdown, even municipalities felt the brunt. Most of them had difficulty with revenue collection, which is the main source of revenue for local government. . Despite its pre-eminence among cities country-wide, the City of Johannesburg did not escape and also felt the impact of loss of earnings. The intrinsic complex nature of this project and the external environment played a major role in causing time delays to this project. Looking at the number of change order requests for scope and approach, time delays were unavoidable to ensure that the project achieved its objectives successfully. Project timeline issues were raised very early in the project. The first happened just four months into the project in July 2006 with an overall project time line extension of 3 months, resulting in an overall time line variance of 7% only. The time line as per the original plain in the blueprint was that the project will be fully delivered by December 2007. Re-planning exercises dominated most parts of the project. Each approved change order request that had a high impact was generally followed by a re-planning exercise to adjust where necessary. This was a management mechanism to address project alignment issues brought about by the changes. Dependencies also played a significant role on time delays as there were various deliverables that were entirely dependent on completion of others or at other times, on the decision making process. The project progress report of June 2009 indicates that the project

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[64] This may have changed back to the original phased approach implementation late in 2009 of which the period is not covered by this research

had only achieved 50% of the scope including the new changes in comparison to the original plan. By June 2009 the project timelines were extended to June 2010. This already is an increase of 120% from the original project time line of December 2007 for project go-live. Overall the project timelines were increased by two and a half years from December 2007 to June 2010.

3.5.1.4   Costs

Wherever there is change in plan, scope and approach, it is inevitable that there will be a financial impact. Programme Phakama also experienced cost variations. The cost variations were not only incremental, there were also various instances where there were savings due to change of approach. The original estimated cost of the project (Two hundred and seventy nine million Rands) inevitably never remained static. With every change of scope, approach, re-planning and time delays the project costs were mainly increased with few instances where change meant savings. With a project of this magnitude this was bound to happen. The project ensured that change was properly managed to maintain harmonisation throughout the project deliverables, time, resources and plan. Using the data / information available, it can be approximated that the original costs had increased by an estimated 54 % by June 2009.

3.5.2 Challenges

To further demonstrate the complexity of the project and the huge management demand to realise its objectives, it is worth mentioning other changes that were significant and had imperative impact on the overall project, and mainly the approach. Most of these changes emanated from the external environment of the project and mainly CoJ internal environment. Their impact cannot be ignored.

3.5.2.1   Leadership Changes

South Africa went through local government elections in April 2007. This always brings about change in any local government. Political leadership of the City also changed and this resulted in internal restructuring post the elections. With the change in political leadership came the new Administrative head (City Manager) for the Municipality. The internal

restructuring resulted in new political portfolios and departments, merging and splitting of some portfolios and departments and also new zoning of the City's regions. The Project Management Directorate of the City was established to manage all projects that cut across the City. This meant that the Project now had a project executive who is not part of the functional project team. Amidst these changes the City afforded the project a priority status and offered its support to ensure its success and completion. The creation of a project management role within the office of the Municipal Manager gave the project a boost and a platform at the highest administrative management level of the City.

3.5.2.2 Organisational Changes

According to the Blueprint of Programme Phakama, the realisation of the project includes the establishment of a MOE, provisionally named Joserve. The entity shall be responsible for the centralised revenue management and customer relation function in the City. As the project progressed, it was realised that the challenges around the establishment of an entity from a legal perspective were not in the best interest of the City. As a result a new home for the project deliverables had to be found. The restructuring that took place after the election gave the City an opportunity to do that. A new department called Revenue and Customer Relations Management (R&CRM) was established that became the business owner of the project deliverables. The billing department was done away with, resulting with the immediate establishment of the R&CRM department. All staff from the Billing department were migrated to the new department. The Organisational Transformation Value Chain of the project faced an increased work load to ensure that all relevant and identified staff were moved from the MOEs to the department and that they were adequately and fairly placed in their new positions through a job matching exercise.

3.5.2.3 Merging of Value Chains

The establishment of the R&CRM department in 2007, its inherent relationship to the project deliverables and the advanced progress status of the project determined a need to merge the project's value chains, since they encouraged silos which at this stage of the project was detrimental to project alignment and stakeholder management. It was becoming increasingly

difficult for the project to engage with one voice with the R&CRM department. What each value chain was doing needed to be communicated amongst the value chains and business. The earlier than planned establishment of this department was beneficial to the project and to the City because business had a voice and their needs and requirements could be identified and addressed during the project sooner rather than later. The Customer Relation Management Value Chain and the Revenue Management Value Chain merged and were called Solution Stream Value Chain. This was done to harmonise and synchronise all the deliverables whilst the project was at the system testing phase. Deliverables such as user acceptance testing produces better results when the approach covers the end to end processes. The quality of data also influences the success or failure of the revenue function / billing and equally so the quality work done by revenue function has a direct impact on the quality of customer relation function. The merging of the two value chains afforded synchronisation of cause and effect.

3.5.2.4   Contract Management

By the end of 2008 the City ended the contract with the original service provider / contractor due to non-delivery. Various reasons internally and externally were presented as causes to this unforeseen change. It became inevitable to find a new service provider on board which further increased the delay in the project progress. The handover process was not an easy exercise due to the complex nature of the project and the related planning and administrative process that went with it. In any project a change of service provider never presents immediate benefits. It was a difficult time for the City. This kind of change brings with it new costs that further increases the already stretched budget.

3.5.3 Overall Project Progress

It was originally planned to complete the project within two and a half years. The evidence has indicated that the project plan was in the end extended by a further two and a half years. The completion date of the project was extended from end 2007 to June 2010. In total it took five years to complete a project originally planned for half the time with double the costs, effort and scope. The envisaged dependencies and approach were severely affected and

increased in volume by the unforeseen dependencies, new legislation, hidden costs, unforeseen circumstances, politically related changes, external environment, miscalculations of efforts and the economic crisis. These included but were not limited to the new Municipal Property Rates Act, system integration dependencies and concerns raised regarding the legacy systems and interfaces to third party systems. All these put together resulted in the scope and approach of the project changing many times to ensure that the required results were met ultimately. It became apparent that the project management team had to adapt and adjust or risk dismal failure of the project. It was also apparent that adopting a different plan is not always a matter of choice with projects such as these but often a matter of accepting unforeseen circumstances in an effort to achieve the desired goal. Evidence also shows that the risks and dependencies to the project did not necessarily decrease as the project progressed

The risks and issues consistently stayed at levels of above 70% and the seriousness of the risk increased instead, i.e. migration of staff in relation to labour issues and legislation from the MOEs to the R&CRM department, the technology risk posed by the Unified Customer Contact Centre (UCCC) not ready for integration testing, the new Municipal Property Rates Act (MPRA) and testing of the Land Information System (LIS). Project timelines had to be moved three times. Figure 5and 6 below indicates the project progress status by March 2009 and the project timelines by June 2009 which were not changed until the completion of the project. It is clear from the two illustrations below that even though the project has progressed satisfactorily considering the slippages, scope creep, financial strain and changed timelines, however there are still areas that posed considerable risks to the overall progress and threaten the successful completion of the project.

Project 7 Keys to Success	Solution	Testing	Data	Cut-Over	Change Mgt	Transition	Training	Software fact	Authorisation	Infrastructure	BASIS	XI	Overall
Stakeholders	A	A	A	R	A	A	A	R	R	A	A	A	R
Business Benefits	A	A	A	A	A	A	A	R	A	A	A	A	R
Work & Schedule	A	R	A	A	A	A	R	R	A	A	A	R	R
Team	R	R	A	R	R	G	A	A	A	A	A	G	R
Scope	A	A	A	A	A	A	A	G	A	A	A	G	A
Risks	R	A	A	A	A	A	A	A	A	A	R	R	A
Delivery Org. Benefits	A	A	A	A	A	A	A	A	A	A	A	A	A
Overall	A	R	A	A	A	A	A	R	A	A	A	A	R

R – Significant Issues (Urgent Attention) | A – Potential Issues (Regular Review) | G – No Concerns (Monitor)

Figure 5: Overall Project Progress Summary

Figure 5 above is an analysis of the project status at the time the new service provider took over. A closer look at it reveals that the project is highly threatened from a risk perspective. The figure provides a holistic view of the project progress in relation to organisational aspects and identified dependencies. The aspects that pose immediate risk and need urgent attention constitute 21.5%, whilst potential risks that need constant monitoring amount to 75% and only 3.5% aspects of the project that has no risk. Figure 6 below is a clip of the new and final timelines of the project, confirming the envisaged completion date of June 2010.

3.6 Conclusion

An analysis of the project reveals an overwhelming change brought about mainly by the environment and interaction between various parts of the project and organisation. Almost all

aspects of this project experienced some form of change. The project scope changed 45 times resulting in 7% overall budget increase. The project approach changed 21 times causing the budget to increase by 50%. The project timeline increased by 120% which was inevitable because of the scope and approach changes. The overall budget of the project increased by 54% from R279 000 000 to R432 199 999.32. In a positive light the organisation identified and acknowledged that the changes needed to be addressed. Another issue noticeable in the analysis is the fact that a change in one part of the project or organisation called for a response in most if not all other parts of the project, i.e. a change in leadership leads to a change in strategy, a change in strategy leads to a change in project scope and approach which required the entire project to be reviewed in terms of timelines, costs and efforts.

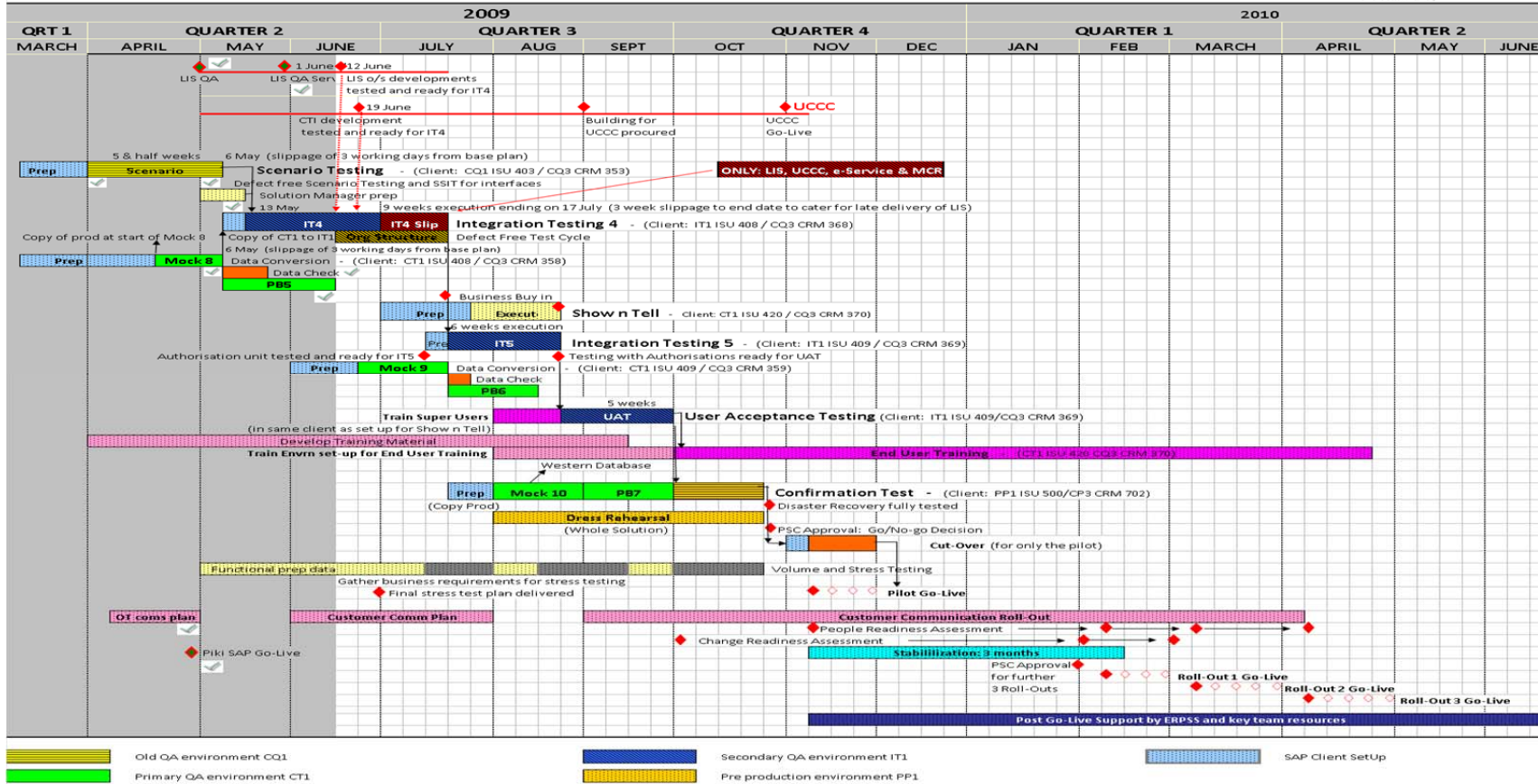CITY OF JOHANNESBURG PROGRAMME PHAKAMA FLIGHT PLAN - 22 JUNE 2009

Figure 6: Final Project Delivery Timelines

Chapter 4

What happened in the Public Sector elsewhere in the World?

Now that the project of the CoJ has been presented, it is fitting that in this chapter the focus shifts to how projects similar to Programme Phakama have performed. The aim in this chapter is to establish whether what happened in Programme Phakama is an isolated pattern of events or if similar trends are common in other local and international projects. Projects reviewed in this chapter are limited to those implementing ERP systems in the public sector.

4.1   Global ERP Adoption

Making a decision on how and when to implement an ERP is a challenge that does not have a wrong or right answer but constitutes a good or bad choice. Organisations mainly implement ERP systems first and it only becomes clearer after or during implementation if the choices made were indeed good or bad. At this point there are only two things that can be done when implementation does not go as planned, amend the plan and continue or disband the project. The CoJ is not the only organisation to have implemented an ERP solution of this nature, which is naturally a complex system. The magnitude of Programme Phakama is however wider than usual. An assessment of what happened in other organisations and/or countries that implemented an ERP, to determine elements of similarity, differences and the influence

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by and on knowledge management is important. Organisational knowledge and knowledge on ERP system greatly influences the outcome of ERP implementation, in many situations this knowledge is possessed by two different entities and usually fails to fuse together for better results. Similarly knowledge embedded in ERP greatly influences the success and focus of Knowledge Management in an organisation. Many organisations all over the world have in the recent years jumped on the band wagon to improve their processes through the use of technology solutions for various reasons such as, agility, reliable data, standardization of processes, competitiveness, information as an asset, etc. According to recent studies conducted, there is still a high rate of Information Technology projects that are not succeeding and that are challenged[65]. A study in 2006 by the Standish group illustrates that 50% of projects done by governments failed or were abandoned whereas 52% were above budget and behind schedule. The study found an average cost overrun of 45%, time overrun of 63% and functionality delivered at an average of 67%. The diagram below demonstrates the success and failure rate of Information Technology projects from the Standish Group 2009 study.

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[65] Wan K S C, Ma L C K, Banejee P. 2009. The Importance of Manager's soft competence on IT project success:
An exploratory study in the banking context. *Association of Information Systems.*117. A study was conducted by
the Standish Group (2009) which shows that around one third of the IT projects were classified as successful in its
studies in 2004, 2006 and 2009 and that IT project failure rate has since increased from 2004.. IT Project Success
Rate (Standish Group, www. Standishgroup.com/press/article)

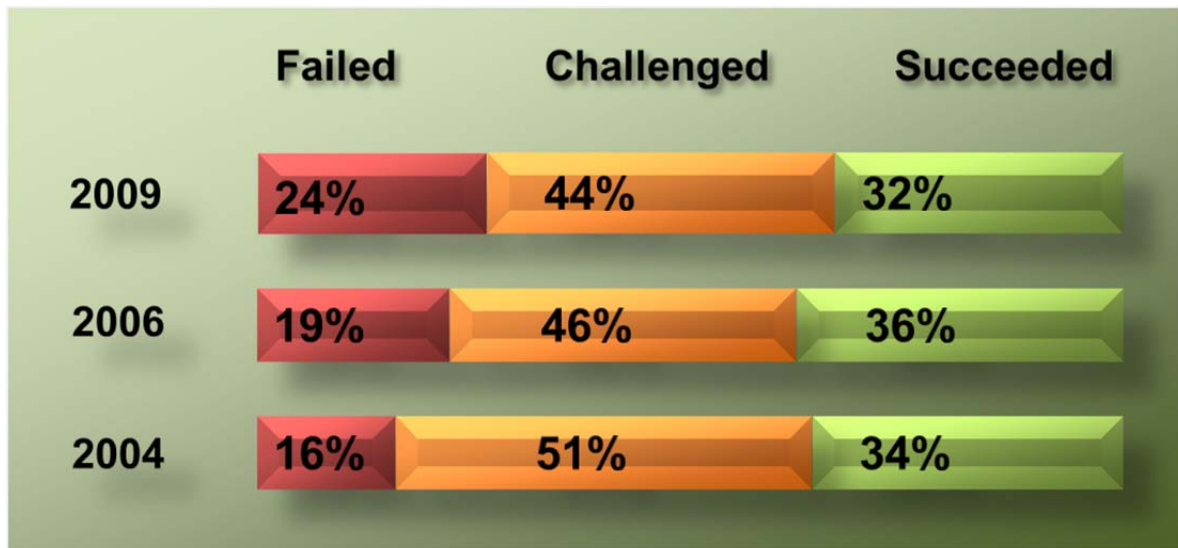|	Failed	Challenged	Succeeded
2009	24%	44%	32%
2006	19%	46%	36%
2004	16%	51%	34%

Figure 7: IT Project Success Rate By The Standish Group 2009

According to the Standish Group, Gartner conducted a study in 2007 on IT spending as a percentage of revenue by industry[66]. The Government sector is the third largest spender preceded by the banking and financial sector and the media industry sector. If 50% of the IT projects by government fail or are abandoned, considering that the government is the third largest spender on IT, it means about 50% of the money spent on IT in the government sector is futile. Figure 7 above indicate that the situation around successful implementation of IT projects is not getting better. Instead there is a noticeable lack of improvement with the 2009 statistics confirming an increase in failed projects and a decrease in successful projects. This is a picture that is not impressive compared to the spending and the development trends in the IT sphere. Does it mean that the world lacks required knowledge to implement successful projects of this nature? Let us review what really happened on some IT ERP projects in the United States, United Kingdom, Canada and South Africa.

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[66] Wan K S C, Ma L C K, Banejee P. 2009. The Importance of Manager's soft competence on IT project success:
An exploratory study in the banking context. *Association of Information Systems*. 118

4.2   South Africa

South Africa is one of the countries that have in the past decades increasingly used and implemented technology solutions to improve efficiency in organisations. Such organisations have benefited in terms of preparing themselves for implementation of Knowledge Management. Various public sector institutions have to date implemented huge and complex ERP solutions. These institutions include City of Cape Town Municipality, City of Tshwane Municipality, Eskom, Regional Electricity Distributor and City Power amongst others. South Africa, in both public and private sectors, has acknowledged the benefits of KM and has put tremendous efforts in improving its understanding of Knowledge Management and implemented technologies such as ERPs to create an opportune environment for its implementation and success.

4.2.1   Cape Town Municipality

The City of Cape Town, one of the largest municipalities in South Africa, launched Project Ukuntinga in 2001 to implement a SAP ERP solution that integrates the billing systems of its seven constituent councils. The City is home to 75% of the population of the Western Cape Province. Ukuntinga is an isiXhosa word meaning 'to soar and rise above'. The project is regarded as the second largest SAP project in the country[67]. One of the unique requirements South Africa has on awarding tenders regardless of size, complexity and costs is that a company must be Black Economic Empowerment (BEE) compliant. The City of Cape Town project was awarded to a newly established company regarded as inexperienced at the time, Cornerstone, an enterprise solutions integration company. BEE is defined by the South African Department of Trade and Industry as an integrated and coherent socio-economic process that directly contributes to the economic transformation of South Africa and brings about significant increases in the number of black people that manage, own and control the

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[67] SAP South Africa. ERP for the City of Cape Town: SAP modernization for the benefit of the citizens.
     Available: http://www.sap.com/southafrica/about/company/ps/press/1.epx.

country's economy as well as significant decreases in income inequalities[68]. This is a good tool to address the historic inequalities. The main problem that has the potential to derail the good intent of the BEE laws is the fact that BEE has not been given a time limit. The intent to bring balance can eventually result with the same inequalities, but with different population groups.

4.2.1.1 Scope

In 2000 seven previously autonomous municipalities in greater Cape Town were merged into a single metropolitan unicity called the City of Cape Town. One of its main objectives at the time was to integrate and streamline the delivery of equitable city services and reduce costs. The scope of Project Ukuntinga extended across all City departments, which began with the modelling of the business processes for the chosen SAP solution to ensure integration across various processes and departments[69]. The scope also included the integration of the City's billing systems so as to improve the revenue collection of the City.

4.2.1.2 Timelines

The project was launched in the second semester of 2001 when the modelling of the processes began. In December 2002 the 1st release of the SAP R/3 was achieved. This saw the pilot for the 2nd release in March 2003. In June 2003 the Rates and Billing solution was implemented and the final deployment of the 2nd release was realised in September 2003[70]. Even though data on the original (planned) timelines could not be accessed, the actual delivery dates are impressive. The City of Cape Town implemented this project in a period of just about three years.

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[68] South Africa. Department of Trade and Industry. 2004. *South Africa's Economic Transformation: A strategy of the BBBEE*, 12.

[69] Other project experience. Available: http://www.hetuconsulting.com/cms/index.php?option=com_content&view=article&id=40:eoh-hetu-staff-other-project-experience&catid=36:our-experience&Itemid=21

[70] City of Cape Town Systems Implementation. Available: www.accenture.com/accenture/registration/PtintThis.aspx?GUID=(FE11E9F1-8.

4.2.1.3 Costs

Project Ukuntinga has cost the City of Cape Town a total of R355 million in the three years. The total project cost was fully recovered in the 2009 financial year due to financial value add the system has brought. [71]

4.2.1.4 Benefits and Identified Challenges

Project Ukuntinga has been hailed as one of the first successful ERP implementation projects in local government. It has seen the City of Tshwane and the City of Johannesburg municipalities following in its footsteps in implementing SAP. Even though the scope differs slightly, both the City of Tshwane and Johannesburg used the Cape Town project as a benchmark and drew a lot of lessons from it. The project Ukuntinga has seen various benefits that includes a centralised IT system which led to the delivery of standardised services, citizen focused government with 24/7 access, streamlined revenue collection, improved employee productivity, duplication minimised and reduced operating costs[72]. More than 300 processes were modelled and implemented whilst more than 113 legacy systems and 70 interfaces were replaced

4.2.2 Department of Home Affairs

The South African National Department of Home Affairs (DHA) is facing two major IT projects that are bungled due to various reasons, the Who Am I Online (WAIO) and the Smart Card ID (Identity Document) projects. The tender for the WAIO was awarded to a big player in the ICT industry in South Africa, Gijima Ast, at a cost of R4 billion. WAIO is an integrated IT system intended to enable the DHA to process transactions for issuing identity documents, birth, death and marriage certificates, passports, visa permits, section 22 asylum permits, refugee identity documents, citizenship certificates and permanent and temporary residents permits electronically. This system allows transactional processing and

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[71] Cape Town's Smart City Strategy in South Africa. 24 – 25. Available: www.idrc.ca/en/ev-115669-201-1-DO
[72] Other project experience.
Available:http://www.hetuconsulting.com/cms/index.php?option=com_content&view=article&id=40:eoh-hetu-staff-other-project-experience&catid=36:our-experience&Itemid=21

simultaneously supports information about photographs, fingerprints, signatures, voice recordings, demographic information and supporting documents[73]. The system was to link with the automated fingerprint identification system. The system was also to be linked with those in the Immigration Office, the police, health department and the revenue services. The project was supposed to pave a way for the smart chip technology such as electronic passports and smart ID cards[74].

The system implementation is a prerequisite for the Smart ID card. The WAIO project was so plagued by delays and non-delivery that the DHA cancelled the tender citing non-delivery in 2008[75]. On the other hand the Smart ID Cards project did not enjoy any success either. The Department of Home Affairs introduced the Smart ID Card project which was aimed at replacing the current green ID book which is manually produced and posed major challenges due to interventions in the processing of applications for IDs. The Cabinet approved the Smart ID Card (SIDC) project in July 2001. It was only in March 2005 that the DHA received approval by Cabinet to start with the procurement process of the SIDC solution and service provider. The DHA communicated to Cabinet that the SIDC pilot project will be rolled out in April 2008. The State Information Technology Agency (SITA) was requested to assist with the procurement process as it is mandatory to do so for all government departments. In the above process the state organs involved were the department, National Treasury and SITA, by the end of 2009 the Procurement process was deemed irregular and had not progressed as the process was halted.

4.2.2.1 Scope

The scopes of both the projects were to integrate business systems and replace all manual processes with on-line and real time transactions.

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[73] Engelbrecht L. 2010. Smart ID cards next year? Or the next? Available:
www.deenceweb.co.za/index.php?option=com_content&view=article&id=7015p2
[74] Gijima AST disputes R4 bn contract cancellation in South Africa. Available:
http://www.balancingact-africa.com/news/en/issue-no-509/money/gijima-ast-disputes/en
[75] Gijima AST disputes R4 bn contract cancellation in South Africa. Available:
http://www.balancingact-africa.com/news/en/issue-no-509/money/gijima-ast-disputes/en

4.2.2.2   Costs and Timelines

The budget originally requested for the SIDC system was R1.4 billion whereas the WAIO costs were originally estimated at R4 billion. Both the projects were intended to be delivered in time for the FIFA 2010 world cup and this was not achieved.

4.2.2.3   Benefits and Identified Challenges

The two projects were clearly held up by various inefficiencies that led to non-delivery of either. There is clear evidence of poor planning and coordination[76]. This resulted in SITA abandoning/halting the SIDC project due to problems with the initial tendering process. The fact that it took too long to take decisions and too long for the project to take off resulted in the project not materialising at all after it had been on the radar screens of the DHA and involved stakeholders for nearly nine years. The integrity of procurement process is also questionable, although there are clear guidelines on processes, procedures and protocols to be followed. Does this mean that it takes a decade to plan to fail? The WAIO tender was awarded successfully and work resumed, however that did not continue for long before the contract was cancelled by the DHA citing non-delivery? Could BEE have had an influence on this? What led to Gijima's non-delivery? Does it mean the South African public sector will never realise the real benefits of Knowledge Management and reap the benefit of the money spent – on failed projects? It is systems such as these that enable successful implementation of Knowledge Management. ERP systems also present a natural platform for aggregating knowledge across different parts of an organisation[77]. Gijima Ast is contesting the DHA's decision and the matter was not finalised by the time of penning this study.

4.2.3 Centre for Intellectual Property and Registration (CIPRO)

The South African Companies and Intellectual Property Registration Office (CIPRO) is one of the latest victims of a failed procurement of ERP system and implementation. CIPRO

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[76] Parliamentary Monitoring Group. 2010. Briefing by the Department of Home Affairs on their strategic plan and budget for 2010/11. Available: www.pmg.org.za/report/20100310-department-home-affairs.

[77] Becerra-Fernandez I, Gonzalez A, Sabherwal R. 2004. *Knowledge Management: Challenges, Solutions and Technologies:*44.

awarded a tender and launched a project to implement a content management system. It is common knowledge that a Content Management system is an ERP system that is fundamental to the successful implementation of Knowledge Management in any organisation. Its successful implementation is the foundation on which Knowledge Management is built upon. CIPRO awarded the tender in 2009 to a 'new kid on the block' Valor IT which was three months prior at the time, to implement a content management system and subsequently, the company was paid millions of Rands in advance[78].

4.2.3.1   Scope

The scope of the project was limited to implementation of a content management solution for the entire CIPRO offices, which covers functionalities such as document management, records management, workflow, access management, audit trail, etc.

4.2.3.2   Cost and Timelines

The tender was awarded for a remarkable sum of R352 million. R56 million of the total amount was paid to the service provider as advance payment before any work could resume.

4.2.3.3   Benefits and Identified Challenges

The tender was subsequently cancelled and an investigation launched in to the procurement process followed when awarding this tender. As a result no work was performed by the service provider amidst receiving an advance payment of R56 million. Could this be BEE taken too far? Or just another project that went horribly wrong?

4.3   United States

The United States of America (US) did not escape the wrath of IT project failure in its public sector. Just like many other countries this happened, happens often and happen because of certain reasons that if learned from, recurrence can be averted in future projects. Technology

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[78] Parliamentary Monitoring Group. 2010. Briefing by the Department of Home Affairs on their strategic plan and budget for 2010/11. Available: www.pmg.org.za/report/20100310-department-home-affairs

projects have moved beyond evaluation based on, on time and on budget, and should strive to strike a win-win situation between the client and the service provider.

4.3.1 The FBI Virtual Case Files Project

The Federal Bureau of Investigations (FBI) kicked off the Virtual Case file project in 2001 aimed at implementing an automated online mechanism for handling all the typical paper based forms in use for routine case reports. The system will allow for sharing and cross referencing of virtually all the information gathered daily. Problems became apparent when the system was tested. The FBI reported that the system was not operating as required and a flood of change requests began. The change requests inadvertently affected the interfaces and the alignment thereof. The situation resulted in complexities that could not be, and were not, adequately addressed at the time. The system testing also identified that the features that were not required were implemented where as those that were required were not implemented resulting in 400 system level deficiencies. After four years (in 2005) the system was abandoned after $170 million had been spent.

4.3.1.1   Scope

The Virtual Case File project was the third and largest part of the FBI project called the Trilogy project. The first two parts focused on upgrading of the software and hardware for the FBI and that of the FBI's communication network. The scope of the Virtual Case File project was limited to the upgrading of the case management system to allow easier access and sharing of case related information throughout the FBI. At the same time the 2001 September 11 attack on the United States brought even more pressure on the project to deliver faster, the scope creep of the three parts projects grew by 80%[79].

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[79] Eggen D, Witte G. 2006. The FBI upgrade that wasn't: $170 million brought an unusable computer system. *Washington Post*. Available:http://www.highbeam.com/doc/1P2-1364715.html

4.3.1.2   Costs and Timelines

The FBI's Virtual Case Files project was planned to take three years, but it ended up taking four years with requirements still not met. The project cost overran by 89%.

4.3.1.3   Benefits and Identified Challenges

The first two parts of the Trilogy project delivered amidst huge challenges. The Virtual Case File was clouded by poor planning and made a number of mistakes/choices, ingredients of a failed project that led to the project being eventually abandoned. The following points were noted and reported[80]:

- A choice to build a new system and not modify commercially existing software.
- The project was planned to be launched all at once with minimal testing beforehand.
- Lack of knowledgeable people and expertise internally to develop the kind of sophisticated information technology system that it needed.
- Badly designed business requirements which resulted with an 80% scope creep
- Unrealistic timelines
- Poorly managed contract

4.4   Canada

Many cities around the world have in recent years implemented ERP solutions to streamline their processes. City of Ottawa and City of Winnipeg in Canada implemented a successful ERP solution in the early 2000s. Both projects delivered on time and at cost. This proves that it is possible to achieve a high success rate on ERP implementations in local government.

4.4.1 City of Winnipeg ERP

The City of Winnipeg developed a larger vision of streamlining and integrating more than 100 of its diverse systems scattered across the City's various departments with remarkable

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[80] Eggen G, Witte G. 2006. The FBI upgrade that wasn't: $170 million brought an unusable computer system. *Washington Post*. Available: http://www.highbeam.com/doc/1P2-1364715.html

results. The City of Winnipeg used ERP implementation to address the many operational inefficiencies brought about by the incompatible and disconnected legacy applications[81].

4.4.1.1   Scope

A service provider was sourced to assist the City of Winnipeg to implement an ERP solution that integrated systems across its 14 departments. The main goal of the project was to streamline business processes, improve decision making, reduce costs, improve customer service and provide a single and consistent view of data across the organisation. The scope of the ERP had two main components, the Human Resources component consisting of four modules (payroll, benefits, time and labour) and the Finance component consisting of five modules (general ledger, accounts payable, purchasing, project accounts and inventory control).

4.4.1.2   Timelines

The project was able to implement all financial modules along with the first phase of Human Resources components in only 10 months.

4.4.1.3   Benefits and Identified Challenges

This project is a typical example of ERP project success in the local government. Successful implementation saw the City of Winnipeg positioning itself well for future growth. The new system aligned Human Resources, Finance and the IT across all 14 departments, along with real time information management and employee self-service.

4.5   United Kingdom

As early as 2003 Nick Huber[82] raised complexity as one of the factors that increased the likelihood of failure or success of IT projects. Even though IT projects have become a

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[81] City of Winnipeg: Taking the lead. Available:http://www.deloitte.com/view/en_CA/ca/services/consulting/7cfa01f0ed5fb110VgnVCM100000ba42f00aRCRD.htm
[82] Huber N. 2003. Hitting targets? The state of UK IT project management. *Computer Weekly;* 11/4/2003,

common and recurring undertaking in many organisations today, their costs are huge but their success is very scarce.

The UK has reported a failure rate of 7 in every 10 government IT projects[83]. The UK spends about £14 billion per year with only a success rate of 30%. One of these 70% failed projects that received enormous criticism in the UK is the National Health Services (NHS) National Programme for IT (NPfIT) which terribly overrun deadlines and had hugely inflated costs.

4.5.1 The NHI's National Programme for IT

The National Programme for IT was an initiative of the Department of Health in England in 2003 to move the NHS towards a single, centrally-maintained electronic records for patients and to connect 30 000 general practitioners to 300 hospitals, providing secure and audited access to these records. The cost of the programme together with its on-going management problems has placed it at the centre of on-going debate.

4.5.1.1   Scope

The main objective of NPfIT was to provide better, faster and safer patient care in England. The programme was initiated as a ten year programme that was divided into a number of deliverables. These include integrated care records service, electronic prescribing, electronic appointment booking, medical imaging software, underpinning IT infrastructure, performance management of primary care and central email and directory services. The scale of the *programme was huge* and undoubtedly riddled with challenges and complex issues that had to be dealt with.

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[83] Espiner G. 2007. Seven in 10 UK government IT projects fail. ZDnet UK. Available: http://www.zdnetasia.com/seven-in-10-u-k-government-it-projects-fail-62014045.htm. Joe Harley, the CIO of the UK Department of Works and Pensions called for projects to be completed at a lower cost for the tax payers.

4.5.1.2   Timelines and Costs

The initial plan of the project was for a period of ten years at a cost of £6.2bn.to cover procurement, development and delivery of NPfIT core systems. However actual cost as at mid-2010 when the programme was finally scrapped, was reported as £11.4bn of the forecasted £12.7bn. At this point many of the deliverables were in place and integrated.[84]As at January 2009 the programme was reported to be four years behind schedule[85].

4.5.1.3   Benefits and Identified Challenges

The Programme received a lot of criticism in the media and many challenges faced by the Programme were identified. These challenges included:

- Poor relations between the suppliers and clinicians
- Poor management caused a number of service providers to pull out of the programme voluntarily and otherwise, i.e. Accenture, Fujitsu services, etc., resulting in financial loss for the remaining service providers.
- The project cost doubled
- The programme was scrapped before the 10 year timeline was reached.

4.6   The Common Factors

The rapid changes of IT are faster than any huge project can deliver and equally so the nature and interconnectedness of problems the IT is meant to address. Challenges are therefore inherent which usually lead to delays, change of plan, approach, scope, abandonment of projects and inflated costs amongst others. There are similarities in the nature of challenges faced by projects all over the world. A closer look at those reviewed in this chapter reveals the following:

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[84] Grant I. 2010. Government scraps £1.7bn NHS National Programme for IT. Available: http://www.computerweekly.com/Articles/2010/09/09/242670/Government-scraps-16312.7bn-NHS-National-Programme-for.htm

[85] NHS connecting for health. Available: http://en.wikipedia.org/wiki/NHS_Connecting_for_Health

4.6.1 The Delivered Product and Specifications Not the Same

The system specifications are meant to specify what the system should do. In many IT projects if not all, the end product always differs from the specification. There are many reasons that can cause that, such as poor crafting of the specifications, lack of understanding and knowledge by organisations of what the solution should really do, etc. These are all organisational internal matters, although there could also be issues that originate externally affecting the organisation, that may in turn influence the organisation's positive achievements. Therefore, the most striking reason that has not yet been explored could be that the rapid change within and outside the organisation and the changes in the relationship of the various ERP modules that occurred from the specification development to the actual system implementation, which are usually many, renders the developed specifications faulty. The City of Johannesburg's Programme Phakama had what was believed to be the best specifications having used the City's experts and industry experts to develop them. Needless to say, during the period under review the project saw a total of 21 change order requests relating to planning and approach being approved and a change in scope done 45 times. The rate of change is undeniably high. The NPfIT in the UK is one of the projects riddled by internal and external issues that eventually led to the abandonment of the project after 10 years of managing the changes with regards to both the needs of the organisation and the IT offering at any given time. The original business requirements were changed several times over the 10 year period so that they could be relevant to the current needs of the organisation. Still, this resulted in so much confusion and complexity that the project had to be abandoned. Even if the project had continued, the delivered product would be far different from the original specifications. As organisational needs changes, so does the specification hence change requests. This result with the final specification as informed by organisational needs to differ enormously from the original specifications, rendering the delivered product to be vastly different from the original expectations.

4.6.2 Timelines Always Missed

Problems are interrelated and so are changes, solutions, etc. With any change delays in time can never be avoided. The CoJ project also experienced this. Of crucial importance to all

projects is that, amidst delays and inflated costs the project should strive to achieve its objectives, when that does not happen it presents an unacceptable state of affairs. Most of the projects reviewed in this study experienced time delays due to changes made to some aspects of the projects.

4.6.3 Changes Increases Costs

With the interconnectedness in complexity, missed time lines, changes in scope etc., cost will undeniably escalate. This is a common factor to most of the projects reviewed.

4.6.4 Huge Dependency on Consultants

In general, organisations make use of consultants to develop their specifications because of their lack of knowledge and skills to document the specifications. This leads to organisations not fully understanding and unable to comprehend the specifications. Organisations also depend on consultants to give direction during the project life span. It is usually during the testing phase or at go-live that most realise that what was given is not what the organisation had in mind. The clarity of what is in the specifications versus what is actually needed develop only later in the project life rather than at project conceptualisation and initiation. The dependency on consultants from initiation could also be the reason some of the specifications are badly or incorrectly written.

4.6.5 High Rate of Replacing Consultants and Service Providers

This is a puzzling situation that is common throughout the world. Organisations bring consultants on board to develop the solution specifications for them and to help them implement the solutions. At a later stage in implementation when the direction the project is taking becomes clearer, organisations start to realise that things are not going as expected and subsequently consultants are always blamed and replaced. As a result there is no joint ownership to the problems and the evolving solution on most of the projects. There is also a tendency of replacing consultants every time the project experiences a chaotic stage, therefore using as many as possible consultants for one project. The underlying complexity

could be that organisations fail to fully understand and are not able to conceptualise what their needs are.

4.6.6 Unrealistic Timelines

Most of IT projects runs late and misses the deadline amidst careful and intense planning. The author's view is that while this is caused by some projects simply underestimating the efforts required to achieve the project objectives, the fundamental reason is the failure to comprehend the complexity that is inherent in a project and its environment that when responding to the changes inflate cost, change in scope, delay timelines, require more resources, effort, etc. are bound to happen. This is also adversely caused by the fact that organisations fail to comprehend their specifications and therefore set unrealistic timeline.

4.6.7 Inconsistent and Unreliable Procurement Processes

This is not only unique to SA. Procurement process is usually hasty and ignores critical elements that can determine the failure or success of a project.

4.7 The Unique SA Situation

South Africa is a developing country with many laws in place to undo the effects of the apartheid era. Broad Based Black Economic Empowerment is one of them. We have seen the CIPRO and the Department of Home Affairs projects not realising implementation phase despite costs being incurred. It is the author's observation that there could be a relation between projects that failed to be implemented and BBBEE laws or compliance to these. It could be that the BBBEE mission is regarded as fundamental and is achieved at the cost of organisations' interest. The awarding of the CIPRO tender was halted as a result of problems created under the auspice of following BBEEE rules. The need to pay the service provider before delivery of services reflects financial instability. The same could be argued for the poor delivery that riddled the Department of Home Affairs project as lack of knowledge resulting from compliance to BBEEE rules.

4.8   Conclusion

All the common factors identified above are symptoms of underlying complexity in the environment and also in the solution being implemented. What does all this mean? Where do all the projects get it wrong? How to get it right? The facts reveal that IT projects in general in the world are challenged in terms of delivery, scope, timelines and cost. What is inherently similar in all of them is the fact that they are always working against a fast passed change in the IT domain – forces from the external environment, manifesting themselves in the organisations therefore riddled as a result by complexity. Also that often what is believed to be what is needed is eventually not exactly the same for both the service providers and the contracting organisations. Another underlying factor that is worth researching is what leads to the discord between what organisations think they need and what service providers believe organisations needs which is predominant in the IT space? You order a chair or a table or even a car with the specifications and you always almost get it right – but this is usually not the case with Information Technology solutions. The reason could be that the knowledge organisations have about their needs and situation is not aligned to what the technology can provide as a solution or the knowledge of the IT companies of problems separate from the solution itself. It could also be that the knowledge of the service providers is only on their solution and is therefore limited and the two knowledge domains fails to meet each other most of the times because of the rapid changes in the knowledge economy. What about the complexity of the real problems organisations are facing which they try to resolve with technology solution chosen? ERP adoption projects are generally challenged in terms of successful implementation in most parts of the world. There is no identified or simple formula to get the implementation right. The variance between the delivered products and the specifications are many.

The scope creep is also a common factor in many projects of this type, with the FBI project a distinctive example, which similarly to the CoJ, experienced huge scope creep. The scope creep was too high, at 80%, it eventually led to the abandoned of the project. Abandonment of a project is a concerning matter not only in South Africa., money is spent for an unworthy cause. What is interestingly noticeable is that complex ERP projects can equally succeed, the

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Cape Town and the Winnipeg municipalities are classic examples. Reliance on consultants is also a point to be noted. What transpired in the CoJ project is not an isolated case but a similar pattern in most projects. Where there is complexity, there can never be a simple answer, a formula, the same answer for what is viewed to be similar problems. The dynamics in each environment makes every situation unique despite common problems and pursuit of common solutions. Even with the most organised organisations i.e FBI and CoJ there is an element of surprise. Where environmental changes are not appropriately responded to or unprecedented, i.e. FBI case files and the NHI abandonment of the mission is unavoidable at most times.

Chapter 5

ERP Adoption from the Perspective of Sensemaking and Complexity

This chapter provides an analysis and fuses the erudition of the previous chapters in relation to the sense behind the complexity and provides findings and recommendations. The focus is specifically on the analysis of the underlying forces behind what can be seen during ERP implementation; what really happened at Programme Phakama and provides recommendations. ERPs are recognised as the most imperative information technology infrastructure of modern companies[86].

5.1 Inescapable Challenges

The Programme Phakama by the City of Johannesburg was founded and built on a solid foundation. The plans, the implementation methodologies and approaches were well designed and based on sound system development and project management methodologies. The

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[86] Park K, Kusiak K. 2005. Enterprise Resource Planning (ERP) Operations Support Systems for Maintaining Process Integration. *International Journal of Production Research, 43 (19); 3959 – 3982.* ***See Also,*** Allen L E. 2008. "Where good ERP implementations go bad: A case for continuity". *Business Process Management Journal,* 14(3): 327–337.

problem the City needed to address with the technology solution was also well defined and a clear vision of improved services once the system is implemented was greatly anticipated. The plan was comprehensive and included business issues such as Stakeholder Management, Change Management and governance and management structures and processes. In essence best practices were followed. Despite all of the above, the project was overwhelmed with more changes than ever anticipated. The changes impacted the scope, costs and timelines and the combined average increase reached around 50%. It is therefore evident enough that the element of surprise in projects such as this is inevitable. There are various factors, that even though they seem to emanate separately, they are intrinsically linked and together contributed to what happened during the roll out of Programme Phakama. They are:

5.1.1   Use of Best Practices

Best practices have advantages when followed, however they also can have limitations in that they may limit the thinking, flexibility and creativity of those applying them. The shortcoming therefore, is the ignorance to other issues equally important that can have a crippling effect on the project preventing it from achieving its objectives. So using best practices is never a guarantee for success. The CoJ Programme Phakama used the City of Cape Town project Ukuntinga, amongst others, as a benchmark. The City of Cape Town managed to deliver the solution in a short period of time and the assumption made by the City of Johannesburg was that if the same principles and methodologies were used by the Programme Phakama, the same results will be achieved. This proved to be wrong. The CoJ failed to deliver the solution in the planned time, budget and scope because of its unique environment. The use of best practices brings with itself the confidence that the plan is attainable, resulting in rigid plans.

5.1.2   Rigid Plans

Even good plans are rendered useless if they are not flexible. The general problem with project plans is that they are made to be rigid and not flexible enough to be regarded as guidelines for the ERP implementation. A slight shift from the plan is viewed in a negative light. If the complexity of projects that implement ERP solution were not underestimated and miscalculated, project plans, scope, budgets and timelines would be regarded as the starting

point that provide guidelines towards achieving the goal. When change is anticipated, an understanding that plans are merely a guideline will be developed. If this was the case, determination of project success or failure would not regard increased scope, budget and timelines in a negative light. If the complexity was anticipated and changes expected then the change in scope, costs and timelines would be regarded as an embracement of and response to the changes and actually the complexity in pursuit of a delivery of a usable solution.

5.1.3   Under-estimated Complexity

There are two factors, the element of under-estimation and the fact that ERP implementation is riddled with insurmountable complexity. The complexity of ERP solution implementation is underestimated whilst project plans are deemed to be the final plan and therefore an object to measure project success or failure against. Even where change is anticipated, it far exceeds the expectation. It therefore suffices to say, if the complexity is adequately estimated and the correct rate of changes anticipated, the element of surprise will be reduced to manageable levels. However, in many instances, it is not possible to estimate such vast changes to impact a single project. The element of surprise is also brought about by the lack of anticipation or underestimation of the changes which are bound in the environment in which the project naturally interacts and engages with. This further proves that, the pace of change in both information technology and in the environment of projects of large magnitude is very high. The changes in the projects are mainly due to the responses to those changes posed by the environment. Programme Phakama experienced a lot of these changes that originated from both internal and external environments of the organization and the project. External environmental changes include the new legislation introduced during project roll out, i.e. the Property Rates Act. The overwhelming number of dependencies that emanated from the promulgation of the Act could not have been imagined during planning. Internal environmental changes include unavailability of resources (personnel) at some stage, the change in City of Johannesburg leadership, the restructuring of the organisation and the change in service provider (contractor). All these changes impacted the project and required necessary action to be taken which resulted in the change made to the original plans. If Complexity Theory was consciously used in organisations, changes would be embraced and viewed in a positive light and therefore measurement of project success or failure would

focus on how well a project or an organization responded to those anticipated changes that were meant to sharpen and shape the project realization and to respond to the real problems on completion. Hence what is usually delivered in a project is different from what is in the plans, and this should be viewed as a good thing

5.1.4 Timing

A large number of the ERP adoption variances in many projects have a lot to do with when the ERP was implemented as much as it has to do with why, which solution and where. The ERP project by the City of Cape Town, City of Johannesburg and also that of a Winnipeg in Canada are similar, implemented in organisations that have the same mandate, but the uniqueness and dynamism in each as well as the time the projects were implemented greatly impacted the outcome of each project, resulting in the difference. i.e. there were legislative changes at the time of the CoJ project that directly impacted on the billing process. The promulgation of and therefore the requirement to comply with the Property Rates Act necessitated certain action from the project. This meant the project scope and plan were impacted, and inherently costs and timelines, although this impact was not a negative one. Incorporation of the Property Rates Act requirements in to the project's scope was a positive move. Finalising the project first and then only addressing the Property Rate Act requirements later, would have created more problems, impacted costs negatively and rendered the implemented system inadequate and non-compliant. This was not the case during the implementation at the City of Cape Town. Therefore it suffices to say that the differences in the complexities in similar projects also relate to the time the projects are implemented and where they are being implemented.

5.2 The Changing Nature of Business Requirements

One aspect that emerge from this study is that the business requirements of IT solutions such as ERP are not stagnant and organisations have not yet realized that. This is also the case with the project of the City of Johannesburg. It is however a common problem to most projects reviewed in this study. In general the time between the initiation of ERP projects to the time implementation begins, takes an average of 18 months in the public sector. During this period

the approved business requirements that informed the plan, budget, scope and timelines changes. Business requirements cannot remain unchanged due to the interaction of various parts of the system called organisation and the complexity that emanates from the interaction within the system and with the system and its environment. Anderson states that organisations consist of processes and these processes are also affected by broader fields or environmental factors[87]. Therefore as the organisations evolve, so does the environment[88]. Stagnation of business requirements becomes an unrealistic expectation. The problem remains the same but the best way to resolve or address the problem changes as the interaction continues beyond the development and approval of business requirements. By the time a project resumes, the business requirements have changed so much that the project plans have to change. This is also due to the fact that the implementation stage in any project is closer to the interactions, the complexities and the realities of the situation than at initiation/ strategic level and planning stage. The first wave of changes in IT projects implementing ERP is mainly due to misalignment of the business requirements. Usually they are obsolete when implementation begins, resulting in a solution that responds to old requirements. There is a need to review business requirements to ensure that the solution implemented addresses current and real situations, after which other environmental changes may follow. Business requirements should be regarded as a guideline to begin a project and changes to align the prevailing business requirements and the current ones must be anticipated by organisations. This will also address the issue that evaluation of projects concerns itself only with the time, cost and scope the product was delivered in, which is not aligned to the actual and current business requirements. Organisations and Project Managers need to understand that the plans, budgets, scope, timelines, implementation approaches are all evolving documents that needs to change as the situation changes. If this is not the case, organisations and Project Managers force projects to address current problems using

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[87] Anderson P. 1999. "Complexity theory and organization science". *Organisation Science,* 10(3): 216–232.
[88] Boisot M, Child J. 1999. "Organizations as adaptive systems in complex environments: The case of China" *Organisation Science,* 10(3):237–252.

yesterday's solutions by standing by the original plan, budget, approach, scope and timelines. All these need to evolve as the changes in the environment are responded to. Unfortunately most projects fail to do this and results in failed projects that insisted on using the obsolete business requirements. It suffices to say, the evaluation of project success or failure is far more than just being on time, in budget and within timelines, because if changes are addressed and adequately responded to, it should be expected that budget, scope and timelines will change and therefore change should be viewed as good. The project by the City of Johannesburg, the FBI and the NPfIT are classic examples.

The NPfIT project original timelines were for a period of ten years. Considering the fast paced changes in the information technology space and the complex nature of a project such as this and its environment, there is no doubt that the business requirements or the vision set will be hard, if not impossible, to achieve considering the many deliverables that will be obsolete by the time the projects ends. Hence the project was eventually scrapped before the projected timeline of ten years. It also had a lot of role players and stakeholders because of its scope. Managing it was a tall order, inherently. The FBI triology project saw its cost increase reach 89%. The failure to recognise that business requirements are not stagnant leads to underestimation of efforts, time and costs required, because the complex nature of the project was not taken into consideration in the planning. The change anticipated is usually minimal, resulting in scope, timelines and budget increases exceeding 50% in most cases. FBI Virtual Files Project, Programme Phakama and the NPFIT are evidence of this. If complexity is adequately considered, a high rate of change anticipated and the scopes, timelines and budget sufficiently estimated, the element of surprise will be reduced and the estimates of costs and scope will be much closer to reality. This will tremendously reduce the number of projects that overrun their budget and timelines by high margins. Programme Phakama needs to be applauded for focusing on resolving the current problems with current and correct solutions regardless of the risk of being on the edge of chaos. Every change was afforded the attention it deserved in order to appropriately respond to it. Most of these responses were followed by a re-planning session, and the testimony is the change request, of which only 45 were approved. The respond to the changes led to the project being out of scope, increased budget and delayed timelines.

5.3   The Insurmountable Complexity

An ERP is an enterprise wide system that in many organisations affects almost all employees[89]. It is meant to provide one standard solution to the many challenges an organisation may be facing. Beside the fact that an ERP system consists of various components/modules that interact with one another, it also has to interface and integrate with other internal or external systems in an organisation. The seamless flow of information and processes between and amongst the parts and other systems brings in itself complexity that at many times is beyond the comprehension of those planning for the system. The scope of the implementation of an ERP project will naturally be wide because of the interconnectedness of the problems and the various parts that makes up the solution. This nature or characteristic of an ERP system and the pace of change in its environment does not allow for any project to be implemented without changes being made to the original plan. Complexity theory also requires managers to think and approach organisational challenges differently when pursuing performance improvements. The theory encourages an embracing of change and appropriate responses to the environment as both the organisation and the environment evolves. With these two factors, it is impossible to simplify an ERP solution implementation. It therefore means that complexity, changes, delays, in scoping and budget overruns should be accepted as the norm in ERP solution implementation. Even though they are necessary for control purposes, what is critical is the delivery of a usable solution on project completion. The same is true for the CoJ Programme Phakama, the changes and complexities could never have been correctly estimated. At the end, the project was so fraught with changes resulting from the complex nature of the system itself, the changes posed by the environment in which the system was implemented and the external factors which also played a big role.

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[89] Parr A, Shanks G. 2000. "A model of ERP project implementation". *Journal of Information Technology*, 15 (4): 289–303.

5.4 Knowledge Economy, Sensemaking, Complexity Theory and ERP

The Knowledge Economy is the environment in which productivity is derived from the interaction of knowledge upon knowledge rather than raw material[90]. The key value adding element in the Knowledge Economy is knowledge. This knowledge originates and resides in various sources such as the environment and the organisations. One of the best tools used to collate and preserve this knowledge is by using electronic information sources to embed the knowledge. Another major characteristic of the Knowledge Economy is complexity which is a result of interactions of various parts of a system and other parts of other systems. The pace of change in the KE is fast and it destabilises and puts pressure on organisations and similarly on IT projects. In order to keep up with the change, Complexity Theory is introduced into this equation, seeking to find a way of coping with the complexity that undeniable exists. Complexity Theory is orientated towards improving organisational performance in terms of how well the organisation executes its tasks and responds to changes in its environments. According to the author, this is a reliable weapon to use to achieve this knowledge and managing it well.

5.4.1 The Benefit of ERP Adoption in Organisation

As much as Complexity Theory seeks to assist organisations in addressing complex problems, its complex holistic solutions such as ERP brings different kinds of problems to that of reductionism. A holistic approach to solving interrelated problems forces organisations to look for holistic solutions which are a challenge to manage. This results in solutions such as ERP that are large in scope, have huge cost and are difficult to manage in the presence of complexity. It can be concluded that the benefits of the holistic approach and its disadvantages creates a unique balance. The impact of turbulence and instability on a holistic solution such as ERP is far reaching and so are the benefits should implementation be

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[90] Cooke P, Schwartz D. 2007. Regional Knowledge Economies: An EU-UK and Israel perspective. *Royal Dutch Geographical Society KPMG* 2008. 2

successful. Using the City of Cape Town as an example, it successfully implemented a usable solution within the set timelines and in less than three years managed to recover the total cost of implementing the ERP solution. In instances where the adoption of ERP fails, the impact is devastating. The organisation also loses confidence. These result in huge financial loss and frustrations in the organisation or project. The Virtual Files project and the UK's NPfIT are classic examples of those projects that started but failed. South Africa has its own unique situation where projects are doomed to failure even before they start, due to supply chain management laws. In these instances, organisations take longer to regain confidence and try again. ERP projects are then shelved for many years, with every aspect of the original plan and budget becoming obsolete.

5.4.2 The Knowledge Economy

The need to adapt quickly to change is the key to success, therefore change will always be a huge component of what organisations are managing in order to be correct and relevant with the solutions being implemented. KE is driven by various factors. According to Becerra-Fernandez et al.[91] it is driven by the following forces:

- Increasing domain complexity
- Accelerating market volatility
- Intensified speed of responsiveness
- Diminishing individual experience

Knowledge Economy is characterised by complexity and it requires knowledge as a tool of trade to address and respond to the complexity and also to interact with the environment for productivity. The tools that are put in place to use knowledge successfully, in order to survive in the KE, are equally complex. A simple solution to the complex problems is inadequate. As a result, the tools that are put in place to enable organisations to benefit from interaction of

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[91] Becerra-Fernandez I, Gonzalez A, Sabherwal R. 2004. *Knowledge Management Challenges, Solutions and Technologies*, 42.

various parts using knowledge are equally complex. Therefore Knowledge Economy can be regarded as = Complexity x Knowledge and the Environment x Complexity (Solutions) = Complexity. The Knowledge Economy is equals to the amount of knowledge required multiplied by existing complexity. The rate or the degree of complexity and the knowledge required to survive the complexity is determined by the Knowledge Economy. Also, the elements that constitute and contribute to the environment equates to the solutions and complexity. Knowledge evolves and exists in harmony with existing complexity, therefore the environment is meaningless if separated from the solution and the same applies to the solution if conceived independently from the environment it is intended to operate in and the complexity it is meant to address. The solution will not survive. Therefore, KE requires intense knowledge in the midst of complex interconnected problems. Similarly, the environment (which is bound and part of the KE) consists of complex solutions resulting in complexity everywhere, i.e. in the problem, in the solution and the environment in which it is implemented. The Knowledge Economy results in complex problems that require knowledge and complex solutions resulting with no simplicity but further complexity. The complexity of ERP implementation will always go beyond the comprehension of the human mind, especially those making the strategic decisions and planning.

5.4.3 Sensemaking Spiral

There is a continuous sensemaking process that takes place in organisations in an effort to understand, find meaning and respond appropriately to the changes and turbulences in the environment in which ERPs are implemented[92]. Sensemaking takes place, necessitated by the changes and the interaction between components that constitutes a system in an ERP project and also environmental factors. Using the equations in 5.4.2 above, Sensemaking is used to find meaning of the overwhelming turbulence and instability. The environment sends messages, changes, instability and turbulence to the organisations and they must perform Sensemaking to determine the meaning and decide which response to make, using the

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[92] Patel NV. (1999). The Spiral of Change Model for Coping with Changing and Ongoing Requirements. *Journal for Requirements Engineering*, *4*, 77-84

knowledge they already possess. The author refers to this Sensemaking process as the spiral of Sensemaking. It is a continuous process that takes place every time there is a change and the response to the change feeds back to the environment which then creates a new change. This is reflected in the diagram below.
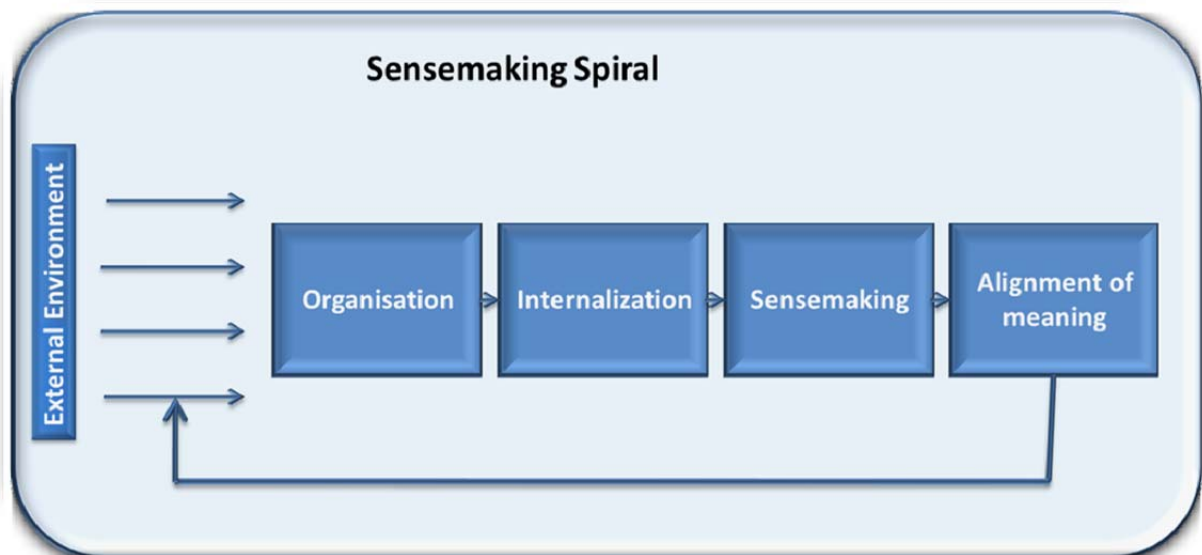

Figure 8: The Spiral of Sensemaking (Author's Formulation)

The change can originate from the internal or external environment of the project. During the implementation of Programme Phakama, the Property Rates Act was promulgated and the compliance to this Act could not be avoided or ignored. It directly impacted the billing process for the municipal services which was the core of the SAP implementation. Adequate response by the organisation and in particular Programme Phakama to the Property Rates Act brought new angles or challenges as the response was fed back to the environment. Suddenly the Land Information System became a new requirement because the successful implementation and compliance to the Property Rates Act depended on the availability of reliable land information. The Geographic Information System's (GIS) importance and priority in the project was elevated as its relationship to the land information is crucial. Programme Phakama also experienced changes or turbulences that have their origin in the internal environment. The Social Development department approved the City's plan to assist

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households that are child-headed, where pensioners are the sole breadwinners and those that earn below a certain threshold. The assistance was in the form of pre-determined percentage discount per household. This brought with it new challenges and dependencies for the billing component of the programme.

In essence the interconnectedness of both the problems and the solutions result in complexities and a continuous need for sensemaking that never ends, resulting in changes to the plan, scope, budget and timelines. The re-planning sessions, changes in system implementation approach, scope, timelines and budget are a direct result of the changes in the internal and external environment and the responses to those changes. As the project and the organisation internalise the changes that originate in the external environment, it necessitates certain responses that changes the risk profile, dependencies and inevitably the ERP implementation plan and approach. As a result, the delays and inflated costs and timelines are not due to poor project management and governance. No project can plan for or anticipate changes in leadership and that the new leadership will restructure the organisation which affects the project deliverables. The original Programme Phakama plans were made based on the decision that a new entity will be established to manage the revenue and customer services department. When the new leadership changed this to a department instead, the project had to re-plan and accommodate the new change and the variables brought by it.

During the sensemaking process, once a change is internalised, meaning is developed. Understanding and action, therefore depend upon the meaning assigned to any set of events[93]. The challenge in the City of Johannesburg is that the meaning was only aligned within a level or a group of individuals. It is unfortunately a reality that the sensemaking process takes place individually and alignment of meaning is level / group bound. Because of the hierarchical nature of the public sector it is difficult to align meaning throughout an organisation or project. These will result in various meanings attained at various levels for the same

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[93] Gioia D A, Chittipeddi K. 1991. "Sensemaking and sensegiving in strategic change initiation". *Strategic Management Journal,* 12(): 433–448.

phenomena. The misalignment in meaning throughout various levels results in a discord in the appropriate responses to phenomena and mainly in the evaluation of the ERP adoption. The misalignment is caused by lack of communication and information flow between the political and the administrative management levels. The administrative management further consists of other levels such as the strategic level, senior management level and the operational level. The misalignment and the difference in the meaning is due to the fact that the people in the various groups or levels uses different cues and frameworks to arrive at a meaning. One such example is the many changes in the system implementation approach, full bang and the phased approach. It is stated therefore that, project management and the operational staff are closer to complexities than the political/strategic and the planning levels. Refer to figure 9 below that illustrates the difference in complexities at various levels.
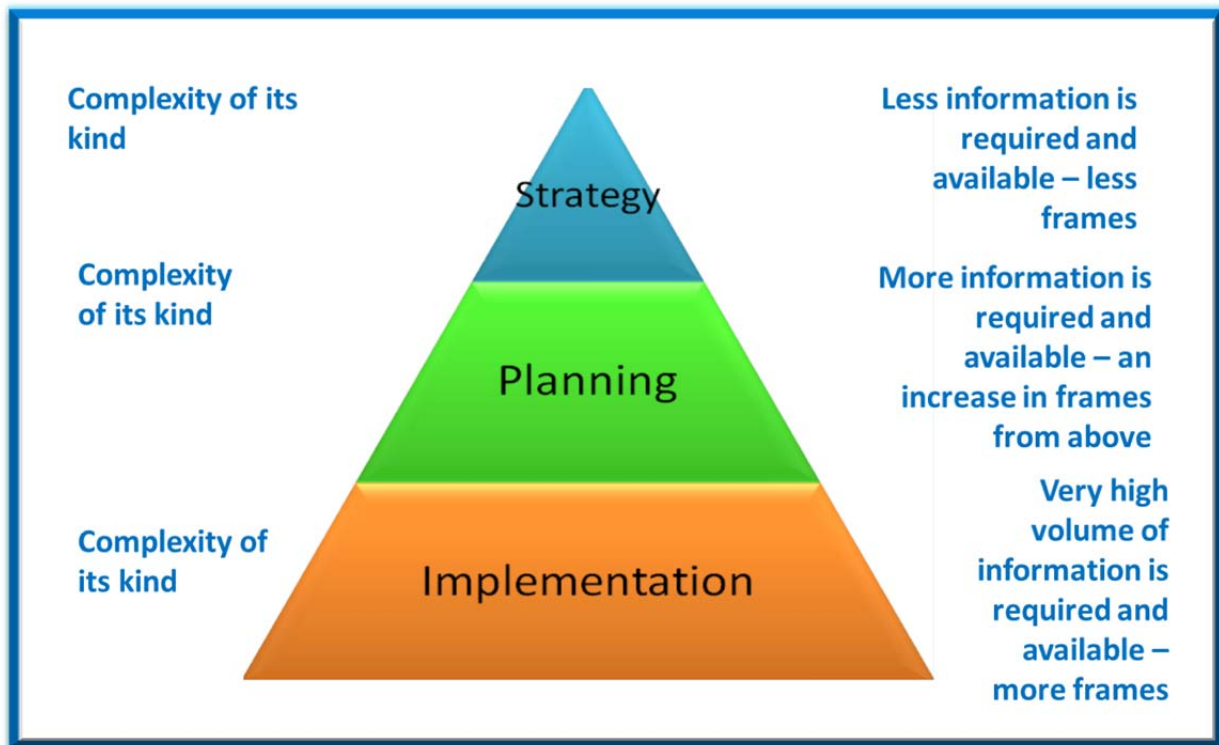

Figure 9: Complexity in Various Levels of the ERP Project (Author's Formulation)

Complexities, changes and actions are driven by real issues at operational level whilst the other groups are led by the political and strategic interests that apply different pressures. The

strategic level is concerned with the fact that a system must be implemented within a particular time and the approved budget whereas the operational level is concerned with implementing a system that is usable, addresses the real operational issues and improves the services regardless of how long it takes and how much it costs. According to the author, this replicates itself during ERP project evaluation in general. There are different kinds of complexities for the same phenomena in the same environment. As a result it is unavoidable that different cues and frames will be used arriving at different meanings, causing misalignment and confusion. Considering the number of changes Programme Phakama experienced, the amount of misalignment and confusion from sensemaking of the many occurrences will be high

5.5 Strategy versus Importance of Implementation

One concerning issue that riddles most of the ERP projects, including the CoJ Programme Phakama is the priority and the importance that, according to the author, is misplaced. The local government is naturally politically driven. The reason for introducing and implementing a change is always politically motivated first before it is operationally relevant. Even for those that are operationally motivated first, falls prey of the fact that political reason usually steals the lime light. The problem with this approach is that, operational decisions become politically driven, limited and bounded to the political domain. This approach completely disregards the importance of correctly implementing the strategy and politics and political intent erodes the importance of strategy. This forces ERPs systems to be delivered regardless of whether they address the real business requirement. The problem is perpetuated by the complexities that vary in scale in all the levels and different cues, whereas different frames are used to arrive at a meaning in both the operational and the strategic and political levels. In order to address this, there is a need for constant communication and information flow between the levels in order to understand how and why the other level reached a certain meaning and took a certain action. This can be done through a representative of each level being part of the decision making process at each level, to bring synergies and appreciation of the cues, framework and subsequent meaning and actions taken. An operational expert will be part of the strategic engagements and a strategist and a planner be represented at

operational engagement. This is a tall order for a bureaucratic organisation such as local government, however it is by all means achievable if the commitment is there. If this is done and an appreciation of the different thinking, assumptions and complexities experienced by each level attained, it will be possible to evaluate correctly and to understand the decisions and actions each level take and alignment of meaning and responses to change becomes possible.

5.6   Evaluation

During implementation, strategy informs planning and implementation of ERP projects. However the error made in most, if not all, of ERP project evaluations, is that the same sequence is followed when evaluating project implementation. The author states that, for the purpose of successfully adopting an ERP, priority and importance needs to be on strategy giving direction during implementation. However evaluation needs to follow the reverse pattern. Following the same sequence of importance for both implementation and evaluation encourages the rigidity of plans and budgets. It also encourages the delivery of a system based on the original obsolete business requirements while endorsing an inflexible strategy. The process leading to the decision and implementation of an ERP system can be divided into three layers; the strategic, planning and the implementation layers, all of which are exposed to the same changes, however differently, using different cues and frameworks and arriving at different meanings. Refer to figure 10 below:
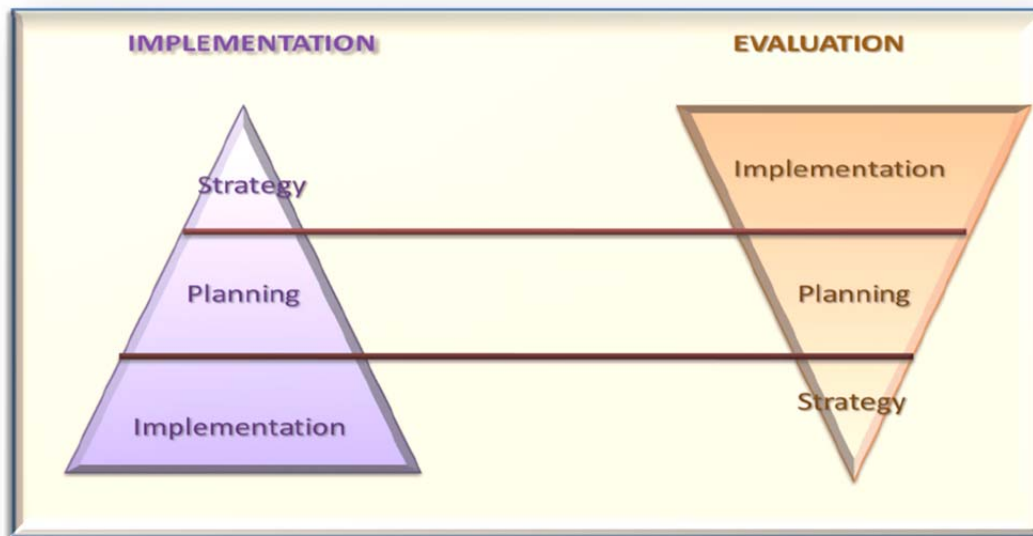
Figure 10: ERP Project Evaluation Approach (Author's Formulation)

For evaluation to be correct and relevant, priority needs to be afforded to the implementation components of the ERP solution. Using Figure 2 (page 47) as a reference, the changes with regards to budget, scope and timelines viewed in relation to the environmental changes and turbulences in the KE requires more responses and actions from the implementation level than from other levels. Therefore success depends on the level. In many instances the strategic level regards a project as successful whereas the implementation level regards it differently. At the implementation level is where the functionality and the operations take place. This is a true reflection of the difference in perspective and meaning to phenomena in the levels. This will enable appreciation of the different complexities that exist throughout the levels and allow the flow of communication and information. The achievement of strategy is only momentary if the system delivered did not review business requirements, address the internal and external organisational challenges and adjusted the scope, budget and timelines accordingly. However implementation that considered all factors result in a system that will be used and a strategy that is achieved beyond momentary. The findings suggest that evaluation needs to be a two phased approach, a focus on political and strategic elements and another focus on the operational/implementation level. This is in order to accommodate the

complex nature of the environment, the solution and the misaligned meaning from sensemaking.

5.7   Political Influence

Decisions for operational efficiency are made by politicians and then made to fit operationally. This misplaces the drive of ERP implementation. Their need to justify ERP implementation first politically then operationally adds to the inherent challenges of ERP projects. Politicians must provide only the agenda, the strategist provides direction and guidance whilst operations in a municipal context need to determine and drive the tools and methodologies to achieve the latter. It is unfortunate that the political level and the strategic level have fused and that the decisions on tools and methodologies are made at these levels. This hinders project success as there will always be meddling because the tools and methodologies decisions were made at the political and strategic levels. The consequence of this is that the realistic cost is often inflated whereas efforts are underestimated and timelines unrealistic. ERP adoption needs to be operationally relevant, then strategically and politically justified. ERP adoption is not strategy but a means to achieve the strategy. This also affects the evaluation of ERP implementation because it focuses on the political success of the project and disregards the actual implementation at base level which is usually riddled with system malfunction.

5.8   Conclusion

Implementation of ERP is a difficult and very challenging task. The larger the scope, the higher the rate of change in a project which results in insurmountable complexity. Any good tools, methods and best practices available do not guarantee success and at times become a hindrance that has the potential to derail implementation. At the heart of it all is that in an organisation various meanings are given to a single phenomenon because throughout an organisation different cues and frames are used in the various levels. As a result each level within the organisation responds to the changes using independent cues and frames resulting in confusion and chaos.

Chapter 6

Perspectives on Management Challenges

As indicated in the methodology, this chapter focuses on developing alternative management understanding that can provide effective solution to ERP implementation. Based on the ERP implementation projects presented in this study, the inherent complexity is evident. This is mainly due to the size, holistic approach and the infinite number of people that interact and can be affected by ERP systems implementation and operation. The complexity is further infused by ERP systems not being exclusively internally based and focused but also externally focused and based. ERP systems are also aimed at external relations[94]. From various angles of interactions in the system, those involved use different cues and frames to arrive at different meanings for the same phenomenon. Sensemaking asserts that frames do not merge and are mutually exclusive. Frames are influenced by and have origin from the individual, the level the individual is operating at, the point of interaction with and in the system and the scale of the environmental influence and responsiveness of the individual making sense of the occurrence. This leads to various meanings for the same phenomenon and as such creates a problem for management. It therefore becomes critical for organisations implementing ERP systems to share assumptions and thinking which will help address the

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[94] Davenport T. 2000. *Mission critical: realizing the promise of enterprise systems.* Harvard Business School Press. 42

misalignment. This chapter will focus on the three main concepts that contribute to solving the management problem experienced during the adoption of huge IT solutions such as the ERP system.

6.1   Complexity

The interlinked problems the ERP system is meant to resolve requires a solution that can address the relationships holistically. Managing the whole has proven unsuccessful in many projects, i.e. the failed NPFIT in UK, the triology project by the FBI in the USA and the Programme Phakama by the City of Johannesburg to a great extent. The projects were characterised by overwhelming complexity which inherently can never be reduced. They were riddled with misaligned meaning from all those involved in the projects. The solution to this could be lying in the ability to identify the leverage points that exist and are sparsely populated in the web of the interlinked relations. Once identified, the leverage points can be explored for the best result of the project, thus bringing stability and order.
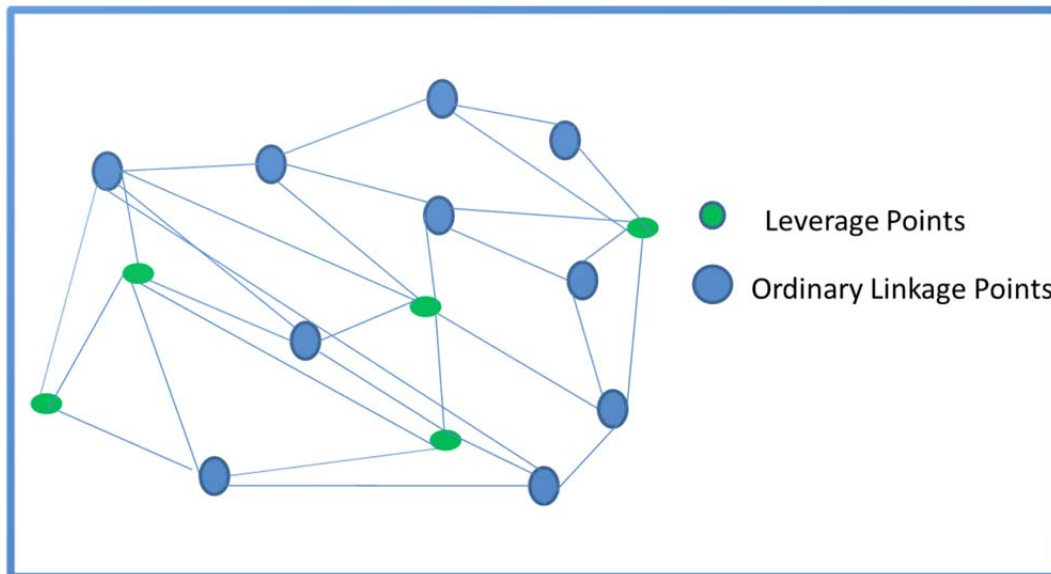

Figure 11: The Leverage Points (Author's Formulation)

Leverage points can be defined as locations within a complex system where a small change in one part can produce substantial changes throughout the system[95]. Leverage points are not easy to identify, therefore not every manager in an ERP implementation project will be able to point to them. The ability to identify leverage points is developed over a period of time through constant involvement in ERP system implementation and also in applying the principles of complexity theory. As events unfold, frames solidified and cues developed, managers will realise that there are leverage points and will identify them. Managers will determine that trying to manage and explore every link in the interrelated solution and problems will lead to failure rather than success. Figure 11 above presents the reality of the many interrelated entities and that leverage points do exist amongst them. Represented by the red dots, they are not many but have far reaching value and benefit if identified and capitalised. In order to address the inability to manage the whole it becomes necessary to manage by only concentrating on the identified leverage points.

There are various parts that make up the whole ERP system and its implementation also involves various stakeholders to enable the system to function fully and optimally. Some of the links, interconnections and the relationships are more crucial than others. Identifying and concentrating more on the leverage points provides added advantage rather than attempting to manage the whole. i.e. having an eye to identify those elements that are critical for ERP implementation in the CoJ from the model used by the Cape Town project Ukunthinga and focusing less on other elements instead of copying the entire model can be regarded as a leverage point. The problem however is that, the leverage points are not always obvious, and it takes skilled leaders or visionary people in the organisation to recognise the leverage points. Once the leverage points are identified and more efforts are channelled to them, the capacity to cope with complexity increases and so does the chances for the project to succeed rather than when trying to manage the whole. This links to what is referred to as ordinary and extraordinary management. According to Jonathan Rosenhead and Stacey, extraordinary

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[95] Olson M M, Raffanti M A. 2006. Leverage Points, Paradigms and Grounded Action: Intervening in Educational Systems. *World Futures; 62. 533 - 541*

management is what an organisation is required to do in order to be able to transform itself in situations of open-ended change[96], [97].

6.2   The Prominence and Variety of Frames in Sensemaking

For individuals and organisations to make sense and develop meaning for an occurrence, frames and cues are used. In reality, ERPs are so large in scope and are in themselves complex that they cannot be put in a single frame. The occurrences during ERP systems implementation too, cannot be put into a single frame. Therefore, people in various levels in the organisation use various frames for the many parts and occurrences in the ERP system implementation. It becomes impossible to put ERP system implementation into a single frame or to align frames in the public sector because of its hierarchical structure and also the clustering of staff in the organisation into political, strategic and operational teams. Various frames exist for each level in the hierarchy whiles the availability of and use of cues varies for each level. A typical example of misalignment is when those in the strategic level and top management regard an ERP system to have been successfully implemented in an organisation whereas those in the operational level and customers regards the implementation as a failure in the same organisation. In many instances this misalignment is usually contained and down played until the external environment identifies it. Only at this point does the alignment of frames take place and a mutual plan to move forward created. Therefore, the external environment plays a crucial role in aligning frames. What is crucial is for organisations to understand this and acknowledge that the frames cannot merge and exist mutually exclusive of each other. Once this understanding is attained, it becomes possible to appreciate the frames that other levels use and to endeavour to bring synergy in the organisation. This requires conscious and constant efforts before occurrence of a major setback to make it work.

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[96] Rosenhead J. 1998. *Complexity Theory and Management Practice.* A paper written by Jonathan Rosenhead. Available: http://www.human-nature.com/science-as-culture/rosenhead.html
[97] Stacey R. 1996. *Complexity and Creativity in Organizations*. 53

6.3   The Value of Information and Communication

Once an understanding that there are various frames that exist in an organisation for the same occurrence is attained, it becomes crucial and rewarding to share the assumptions and thinking in order to channel and drive the multiple frames and cues towards alignment. This can be achieved through continuous flow of information and constant communication. Both informal and formal communication mechanisms needs to be used in order to reach all levels of employees in an organisation and stakeholders in all perspectives of their involvement in the ERP system, i.e. user perspective, social context perspective, economic/financial context perspective, customer perspective, etc. The various communication channels such as: brainstorming exercises, formal meetings, brochures, broadcast messages and reports can be used to harness the full benefit of the communication and information flow. Nonaka states that, what makes sense in one context can change meaning or lose its meaning when communicated to people in a different context[98]. This is further supported by Donnellon who states that communication enables people to create equifinal meaning from which organised action can follow[99].

Formal communication usually works effectively for top and strategic levels in many organisations whereas informal communication works better for those in operational levels. In order to foster the development of associated frames and cues in ERP system implementation, the same messages or information needs to be disseminated using various channels and mechanisms in the organisation. The informal meetings usually yield more and better results than the formal and structured meetings. An informal community, which may range from public to secret in their profile, provides a rich and fertile source of knowledge and learning[100].There are various informal methods that can be used fruitfully for all levels,

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[98] Nonaka I. 1991. Knowledge-Creating Company. *Harvard Business Review*. 96-104

[99] Donnellon A, Gray B. Bougon M G. 1986. "Communication, Meaning, and Organized Action". *Administrative Science Quarterly*, 31(1):43-55.

[100] Kurtz C F, Snowden D J. 2003. The new dynamics of strategy: Sensemaking in a complex and complicated world. *IBM Systems Journal*, 42(3): 462 – 483. **See Also:** Thomas J B, Clark S M, Gioia D A. 1993. "Strategic
Sensemaking and Organizational Performance: Linkages among Scanning, Interpretation, Action, and

such as credos, broadcast messages, information sharing sessions and brainstorming sessions, this will also ignite dialogue amongst and within the various levels. From a Knowledge Management perspective, the best lessons to draw from in this regard are from the Japanese companies such as Honda, Sharp and Canon. They provide a useful solution to address the management problem posed by overwhelming complexity.

According to Nonaka, these Japanese companies used figurative language as a tool to exchange and communicate tacit knowledge successfully by simply using amongst others, metaphors and slogans[101]. The slogans and metaphors, which can be generally referred to as informal communication, can be used to align meaning in ERP projects throughout all levels. It therefore suffices to state that if tacit knowledge is effectively used to transform tacit knowledge to explicit, the same can be achieved in the alignment of meaning, since both Sensemaking and knowledge have their origin from the cognitive dimension. The communicated information informs the frames and cues in Sensemaking and as such can facilitate aligned meaning. The actions and achievements of success by these Japanese companies accurately reflect the ability to identify leverage points that many will fail to recognise. Management needs to welcome disorder as a partner and use instability positively by using figurative language. The frequent dialogue and communication helps create common cognitive grounds thus facilitating the alignment of meaning, even though it will not change the fact that different people, groups or levels will continuously use different frames and cues. Channelling effort to only those elements that provide far reaching benefit is important in ERP system implementation. The dialogue will cause considerable but healthy conflicts and disagreements but such result in aligned meaning. The communication and information flow needs to be held continuously beyond project completion, i.e. ERP adoption. The reason for that is that a solution to a problem creates another problem. Problems are interconnected and so are the solutions to those problems.

Outcomes". *The Academy of Management Journal,* 36(2): 239-270.
[101] Nonaka I. 1991. Knowledge-Creating Company. Harvard Business Review. 96-104

6.4 Conclusion

The true measure of success in complexity is alignment. The fact is, complexity can never be avoided nor ignored in the knowledge driven economy. Thus an organisation that builds its capacity to identify the leverage points and channels more efforts into them, will succeed in the KE and survive the turbulent implementation of an ERP system. At the same time, communication is important and the continuous flow of information will assist organisations to align meaning whilst sharing insight, and frames which can be used to interpret the changes.

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