UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

An Institutional Perspective on Change Management:

A Case Study of an Open Source Enterprise Content Management (ECM) System in the South African Public Sector

by

Lizette Weilbach

(89825978)

2013

Submitted in partial fulfilment of the requirements for the degree
Philosophiae Doctor (Information Technology)

in the
Department of Informatics

of the
Faculty of Engineering, Built Environment & Information Technology
University of Pretoria

Supervisor: Dr Elaine Byrne

DECLARATION

I declare that this thesis,

An Institutional Perspective on Change Management: A Case Study of an Open Source Enterprise Content Management (ECM) System in the South African Public Sector,

which I hereby submit for the degree PhD (Information Technology) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

Lizette Weilbach
November 2013

Signed: 

ACKNOWLEDGEMENTS

- To my supervisor, Dr Elaine Byrne: You are an amazing woman whom I respect not only as a great researcher, but also as a woman with dedication and courage. Thank you for your valuable guidance and willingness to assist me throughout this study. Your support was unfaltering and I appreciate you more than what you can imagine.
- To my husband, Francois, and my children, Friedrich and Jan-Ernst: Thank you for your love and support. Without your motivation and help I would not have been able to complete this study. Thank you for always taking care of our kids and the domestic tasks when "Mommy had to work". Thank you for always being there for me, and for sharing all my frustrations when there was no one else to talk to.
- To my parents, Willem and Betsie Crafford: I am so privileged to still have both of you in my life. Without your continuous support this would not have been possible. Thanks for always praying for me and for looking after my children when I had to focus on this thesis. Thanks Mom, for sharing your desk with me and for serving me with coffee and food while I wrote up my research, so that I could spend maximum time in front of my laptop.
- To the late Prof JD Roode: Thanks for believing in me and my academic potential. It was you who initially motivated me to do my PhD. You have had a profound influence on my life and have shaped my thinking about information systems to a great extent. I will never forget you!
- To my family and friends: Thanks for your support throughout my journey and for understanding that I "was busy."
- My gratitude is also extended to all my colleagues, and specifically to Prof Carina de Villiers and Prof Alta van der Merwe: Thanks for your motivation and for allowing me to take some study leave to complete this research.
- To the people from the Government department who allowed me access to the project reported on in the case study of this research and

who gave of their time in the interviews and meetings: your willingness to assist is greatly appreciated.

- In God I find my strength. He has throughout this research journey provided me with several promises and messages of inspiration and hope of which the following are two examples:
    - Fear not [there is nothing to fear], for I am with you; do not look around in terror and be dismayed, for I am your God. I will strengthen and harden you to difficult times, yes, I will help you; yes, I will hold you up and retain you with My [victorious] right hand of rightness and justice. [Isaiah 41:10]
    - He gives power to the faint and weary, and to him who has no might He increases strength [causing it to multiply and making it to abound]. [Isaiah 40:29]

  He made me achieve what seemed to be the impossible and gave me wings when I was looking for inspiration late at night and early in the morning. To Him all the glory!

ABSTRACT

An Institutional Perspective on Change Management: A Case Study of an Open Source Enterprise Content Management (ECM) System in the South African Public Sector

L. Weilbach

Ph.D. Thesis, Department of Informatics, School of Information Technology, University of Pretoria

ICT development and deployment and supporting policies take place within a fiercely contested globalised political economy. For organisations there is a pervasiveness of change processes, often externally imposed, which are rising with these globalising effects. This not only implies that the context in which organisations are situated is continuously changing, but also that the nature of the organisation itself is subject to change (Van Tonder, 2004). However, the external influences imposed on an organisation are often heterogeneous and make the management of adapting to the external environment extremely complex.

This thesis explores such an externally imposed change on an organisation around the implementation of a contentious national policy. This entails not only dealing with the more usual dimensions of change in an organisation, but also the implications of the national debate and contentions around the national policy playing out in the local setting of the organisation. In this thesis the change explored is within a government department from a proprietary Enterprise Content Management (ECM) system to an open source ECM system. An interpretative approach was followed, using a longitudinal case study.

Two main aspects of this change process are explored. The first is the impact of the national open source policy on government departments - an externally imposed change of mission, vision and values. The second is how internally the government department changed its internal work processes and

information systems to comply with that policy. These two aspects are intertwined. Alignment of the organisation mission, values and objectives, with the proposed technological innovation and change management models emerges as a necessary condition for managing change. However, what emerged as a more challenging issue was whether internal organisational changes can be aligned with contentious national policy imperatives. The Human Environment conceptual model (HEM) of Du Plooy (1998), as well as two theoretical lenses are used to explore this contentious issue: the improvisational change management model of Orlikowski and Hofman (1997); and institutional theory as it applies to Information Systems.

The improvisational change model of Orlikowski and Hofman (1997) in combination with Du Plooy's (1998) HEM model, was used to understand the change process unfolding in the implementation of an OS ECM system in a Government department in SA. The result of this application is some practical recommendations for government officials on future OS implementations, as well as a theoretical add-on to extend the change management model applied. The researcher found that models can increase our understanding and reveal how one can 'cultivate' the human environment within which technology is to be implemented. However, the process of developing an understanding of how national policy was developed and the rationale for it was also found to be important, as is developing an understanding of the rationale of this particular department for choosing to implement the OS ECM system. By adding to, or expanding on Orlikowski and Hoffman's (1997) model to include a fourth element, indicating the external forces in the environment, such as government regulations; government policy; and the debate on global and national FOSS versus PS, highlights the need for this external alignment as well as prevents the focus on internal alignment only.

Institutional theory was consequently applied in an attempt to unpack the organisational and change management dimensions of the change model, aiming at understanding the institutional forces which legitimates or contradicts the technical/rational ideas and actions of the change. The findings were threefold. Firstly, the role played by IS as an institutional

process in and of itself and the way in which this could have affected the implementation of the new OS ECM system was discussed, pointing to the possibility that the new system was not necessarily being implemented to streamline the work practices, but rather due to its institutional status of being a 'rational myth'; something which had to be done as 'it's just the right thing to do."

Secondly, OSS and PS were argued to be different 'types' of institutions. Using the institutional pillars it was argued that OSS and PS were driven by different institutional forces, with PS leaning towards the regulative pillar and OSS being more in line with the normative pillar. These two institutions were found to mainly differ with regard to their basis of compliance and the logic behind them. The insights offered by this argument revealed that when changing from OSS to PS, it would be very valuable to recognise that OSS and PS are two different 'types' of institutions, and to not only understand that the new system could therefore change the organisational processes when it is implemented, but to also acknowledge the change which will take place within the IS/IT institution itself – moving from the regulative to the normative. The change should thus be understood both within the two different IS innovations themselves, and in how these two innovations interact.

Lastly, the research in this thesis went beyond the technical/rational actions of the stakeholders, and included an in depth analysis of the institutional forces at play in the broader social context of the Government department. It explained the institutions which were at play on the international, national and organisational levels, pointing out which of these forces worked in favour of or against the technical/rational actions, and in the process contributed to the unexpected outcome of the new OS ECM implementation process.

November 2013

KEYWORDS

Information technology (IT) and Social Context;
Information Technology (IT) Adoption and Diffusion;
Open Source Software (OSS);
Open Source Software (OSS) Adoption;
Public Sector;
Information Technology (IT) Change Management;
Improvisational Change Model;
Emergent change;
Institutional Theory

"Writing (a thesis) is not a sterile phase at the end of the research - it is an active struggle by the researcher with his or her material and what it is that needs to be said." (van der Blonk, 2003)

Table of Contents

TABLE OF FIGURES

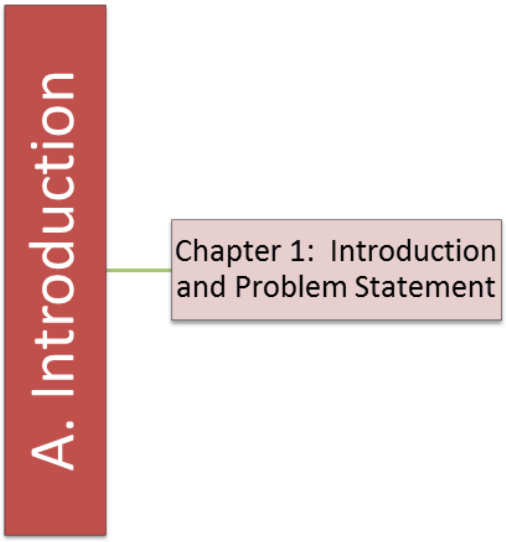
INDEX OF TABLES

ACRONYMS

Acronym / Abbreviation	*Description*
ACM	Association for Computing Machinery
AD	Active Directory
BPM	Business Process Management
BPR	Business Process Re-engineering
BSD	Berkeley System Distribution
CCP	Change Control Proposal
CEO	Chief Executive Officer
CSIR	Council for Scientific and Industrial Research
CIO	Chief Information Officer
DHCP	Dynamic Host Control Protocol
CV	Curriculum Vitae
DPSA	Department of Public Service and Administration
DGs	Director General(s)
DM	Document Management
ECM	Enterprise Content Management
FLOSS	Free/Libre Open Source Software
EJIS	European Journal of Information Systems
FOSS	Free and Open Source Software
FreeBSG	Free Berkeley Software Distribution
GITO	Government Information Technology Organisation
GPL	General Public License
GNU	GNUs not Unix
GITOC	The Government Information Technology Officers Council
IBM	International Business Machines Corporation
HEM	Human Environment Model
ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronic Engineers
IFIP	International Federation for Information Processing
IS	Information System
IP	Intellectual Property
IPRs	Intellectual Property Rights
ISJ	Information Systems Journal
IT	Information Technology
JAD	Joint Application Design

Acronym / Abbreviation	Description
JBoss	Java Boss
KM	Knowledge Management
LGPL	Lesser General Public License
MIOS	Minimum Interoperability Standards
MIT	Massachusetts Institute of Technology
MPL	Mozilla Public License
NACI	National Advisory Council on Innovation
NGO	Non-Governmental Organisation
OS	Open Source
OSD	Open Source Definition
OSI	Open Source Initiative
OSL	Open Source License
OSS	Open Source Software
PCI	Perceived Characteristics of Innovation
PCs	Personal Computers
PNC	Presidential National Commission
POC	Proof of Concept
PM	Project Manager
PS	Proprietary system
RFP	Request for Proposal
RFQ	Request for Quotation
RM	Records Management
SA	South Africa(n)
SC	Standing Committee
SCSL	Sun Community Source License
SLA	Service Level Agreement
S-T	Socio-Technical
SUSE	“Software und System Entwicklung’ (German)
TAM	Technology Acceptance Model
TCO	Total Cost of Ownership
TCP/IP	Transmission Control Protocol/Internet Protocol
TQM	Total Quality Management
UNIX	Uniplexed Information and Computing System

SECTION A: INTRODUCTION



This chapter outlines the justification for the research and provides the motivation for studying the research problem. The research questions are presented and the expected contribution of the research is described. The chapter concludes with an overview of the content of thesis.

Chapter 1:
Introduction and Problem Statement

1.1 Introduction

Castells (2000a;b) describes in voluminous detail the impact of globalisation on the economy where the new form of business operates through the networked economy, largely facilitated through Information and Communication Technology (ICT). ICT development and deployment and supporting policies take place within this fiercely contested globalised political economy. For organisations there is a pervasiveness of change processes, often externally imposed, which are rising with these globalising effects. This not only implies that the context in which organisations are situated is continuously changing, but also the nature of the organisation itself is subject to change (Van Tonder, 2004). However, the external influences imposed on an organisation are often heterogeneous and make the management of adapting to the external environment extremely complex.

This thesis explores such an externally imposed change on an organisation around the implementation of a contentious national policy. This entails not only dealing with the more usual dimensions of change in an organisation, but also the implications of the national debate and contentions around the national policy playing out in the local setting of the organisation. In this thesis the change explored is within a government department moving from a proprietary Enterprise Content Management (ECM) system, herein after referred to as the proprietary system (PS), to an open source ECM system, herein after referred to as the open source (OS) system.

Two main aspects of this change process are explored. The first is the impact of the national open source policy on government departments - an externally imposed change of mission, vision and values. The second is how internally the government department changed its internal work processes and information systems to comply with that policy. These two aspects are

intertwined. Alignment of the organisation mission, values and objectives, with the proposed technological innovation and change management models emerges as a necessary condition for managing change. However, what emerged as a more challenging issue was whether internal organisational changes can be aligned with contentious national policy imperatives. Three theoretical lenses are used to explore this contentious issue: the HEM model of Du Plooy (1998); the improvisational change management model of Orlikowski and Hofman (1997); and institutional theory as it applies to Information Systems.

1.2 Justification of the topic and motivation for studying the problem

Wilson & Howcraft (2002), argue that, in information systems (IS) development research, attention should be directed away from the development of more tools and techniques to ensure successful IS development, implementation and use, toward an understanding of the social context thereof, and that practitioners should be made aware of the potential for almost any project to be vulnerable to the attribution of failure and hence must acknowledge the highly political and social process surrounding IS development and implementation. Hence the focus of this research is on the process of innovation and not the innovation itself.

Van Tonder (2004) refers to the open debate on whether change can be managed, and although some researchers might argue that it's not possible to 'manage' change, there is a proliferation of models and theories in this respect, but there are few practical cases of how change in IS innovation is managed in the public sector and whether change management theories are applicable in this context.

The main rationale for this research is summarised in the following research question:

To what extent are change management models used and of use in practice in the context of Information Systems (IS) innovation in an organisation?

To explore this question a particular case study was used as it would not be feasible to investigate this matter in every given organisation. One of the major public debates which took place at the time of the initiation of this research was on the issue of moving/migrating from proprietary software (PS) to Free and Open Source Software (FOSS) in the public sector in South Africa. The South African government had just accepted their policy on FOSS and the researcher took this opportunity to be part of a first pilot migration implementation, to investigate the process from a change management perspective.

1.3 Research Questions

1.3.1 Primary research question

To what extent does change management theory explain the process of migrating from proprietary software (PS) to Free and Open Source Software (FOSS) in the South African Government?

1.3.2 Secondary research questions

To address this primary question, a number of secondary questions needed to be addressed. These include:

1. What was the South African Government's rationale for moving from PS to FOSS?
2. How was change managed in migrating from PS to FOSS?
3. Do change management models help to explain this change?
4. Can other theories provide a different interpretation or understanding of the change process?

1.4 Significance of the research and key contributions

It is important to note that this study is not aimed at contributing to the field of IS in developing countries, or to that of public sector management. It is rather

aimed at making contributions to the field of IS management, in three main areas:

1.4.1 Methodologically

The case study described in chapters 8 and 9 of this study is a longitudinal study. Orlikowski and Baroudi (1991) found that less than five per cent of all published IS articles in the 1980s made use of such case studies, making such studies quite rare. Although more of these studies have been published in the interim, they stay unusual due to the prolonged time needed to execute such studies. Nandhakumar & Jones (1997) point to the advantages of longitudinal case studies or extended research engagements in their study on IS research articles in the 1990s and argue that long term engagements could reveal aspects such as hidden weaknesses; character flaws; collective mysteries; and contentious practices of the context researched. Extended interaction could also provide detail on local meaning; the prevailing perceptions existing, as well as the tacit knowledge, which actors typically find difficult to define or explain.

1.4.2 Practically

Initially it was not the intention of the researcher to become part of the IS implementation process, but when it became evident that the evaluation of the implementation was planned to be purely technical (focussed on determining whether the new OS system contained at least the required functionality of the old PS system, the researcher stepped in to provide assistance in warning the project team that for the successful adoption of the new OS system, the implementation should also be socially acceptable to the end users. In this way the researcher contributed in a practical way to get the team to also reflect on the social aspects of the system implementation.

1.4.3 Theoretically

This study made a theoretic contribution to Orlikowski and Hoffman's (1997) Improvisational Change Management model in that a fourth environmental dimension was added to the model. This expansion of the model allows for not only focussing on the alignment of the internal dimensions of the change

management process, being technology, change model and organisation, but also aligning it with the external forces at play in the organisational environment. These forces could for instance include, amongst others, government regulations; national policy and the global debate on OSS versus PS.

An Institutional theory perspective was also adopted to assist in understanding why the implementation of the OS ECM Project was still deemed to be a success, even though there was no formal change management processes in place. It was pointed out that the change management model of Orlikowski and Hoffman (1997) seems adequate to use as an overview, but that it needs to be unpacked in terms of its dimensions, especially the change model and the organisation components of it. It became obvious that 'the organisation' as described the model, is no unified group with a common vision, which leaves the question as to who or what should one then align to.

An institutional analysis of the case study (refer to chapter 6 where institutional theory is discussed and chapter 11 where institutional theory is applied to the case study) revealed OSS and PS to be two very different 'institutions', driven by different institutional forces. Moving from PS to OSS would therefore complicate the change process and requires the change agent to also understand the change that is due to take place within the IS institution itself.

To date the following papers directly related to the research for this PhD have been published:

1. BYRNE, E. & WEILBACH, L. 2008. A Human Environmentalist Approach to Diffusion in ICT Policies. *In:* AVGEROU, C., SMITH, M. L. & VAN DEN BESSELAAR, P. (eds.) *Social Dimensions of Information and Communication Technology Policy.* Pretoria, South Africa: Springer.
2. WEILBACH, L. & BYRNE, E. 2009. Aligning National Policy Imperatives with Internal Information System Innovations: A Case

Study of an Open Source Enterprise Content Management System in the South African Public Sector. In: BYRNE, E., NICHOLSON, B. & SALEM, F., eds., Proceedings of the 10th International Conference on Social Implications of Computers in Developing Countries, Assessing the Contribution of ICT to Development Goals. Dubai, UAE. (ISBN-13:978-0-903808-05-7)

3. WEILBACH, L. & BYRNE, E. 2010. A Human Environmentalist Approach to Diffusion in ICT Policies: A Case Study of the FOSS Policy of the South African Government. *Journal of Information, Communication & Ethics in Society,* 8, 1, 108 - 123.
4. WEILBACH, L. & BYRNE, E. 2011. Implementing Open Source Software to conform to National Policy. *Journal of Systems and Information Technology*, 3, 3, 286-302. **Received a 2012 Emerald Outstanding Paper Highly Commended Award** (see: http://www.emeraldinsight.com/authors/literati/awards.htm?year=2012&journal=jsit&PHPSESSID=91k3mfr6p1s0tsme25vs6uv4v6)

1.5 Overview of the thesis

The thesis is structured in seven sections:

- **Section A** 'sets the stage' and starts off with t**his chapter** providing an introduction to the thesis, describing the problem context, rationale for the research, and the outline of the thesis.
- **Section B** is dedicated to a review of the literature. **Chapter 2** reports on Open Source Software (OSS) and elaborates on what OSS is; the benefits and barriers of adopting OSS; the available approaches to adopt OSS; as well as the adoption of OSS by the public sector. In **chapter 3** the literature on IS and social systems is discussed, elaborating on the importance of taking a social-technical perspective on IS implementation.
- **Section C** provides a discussion of the conceptual and theoretical models used in the thesis. In **chapter 4** innovation and diffusion models are discussed with emphasis on their shortcomings, after which a more holistic view on IT adoption and diffusion, explicitly focusing on the social context or human environment of IS adoption and use, is

argued for. **Chapter 5** expands on the theory of change management and change management models, explicitly in relation to IT and change management. In **chapter 6** Institutional Theory is reviewed, focussing on the application thereof on ICT.

- In **Section D**, the research approach followed and methodology applied in this thesis, as well as the data collection and analysis methods are described in **chapter 7**.
- **Section E** is dedicated to the longitudinal case study done in this thesis. **Chapter 8** provides the background and details of the Free/Libre Open Source Software (FOSS) Policy of the South African Government and the environmental context of the case study, while **chapter 9** provides details on the OS ECM Project and the phases the project went through.
- **Section F** provides interpretations of the case study. **Chapter 10** provides a change management perspective on the case study, applying the improvisational change management model of Orlikowski and Hoffman (1997), while **chapter 11** uses institutionalism as a lens to understand and shed light on the outcomes of the case study, that could not be explained using only the change management perspective.
- **Section G** concludes the thesis with **chapter 12** in which the researcher reflects on the research questions posed in **chapter 1** of the thesis. It also describes the contributions made to the field of IS and lists some topics for future research.

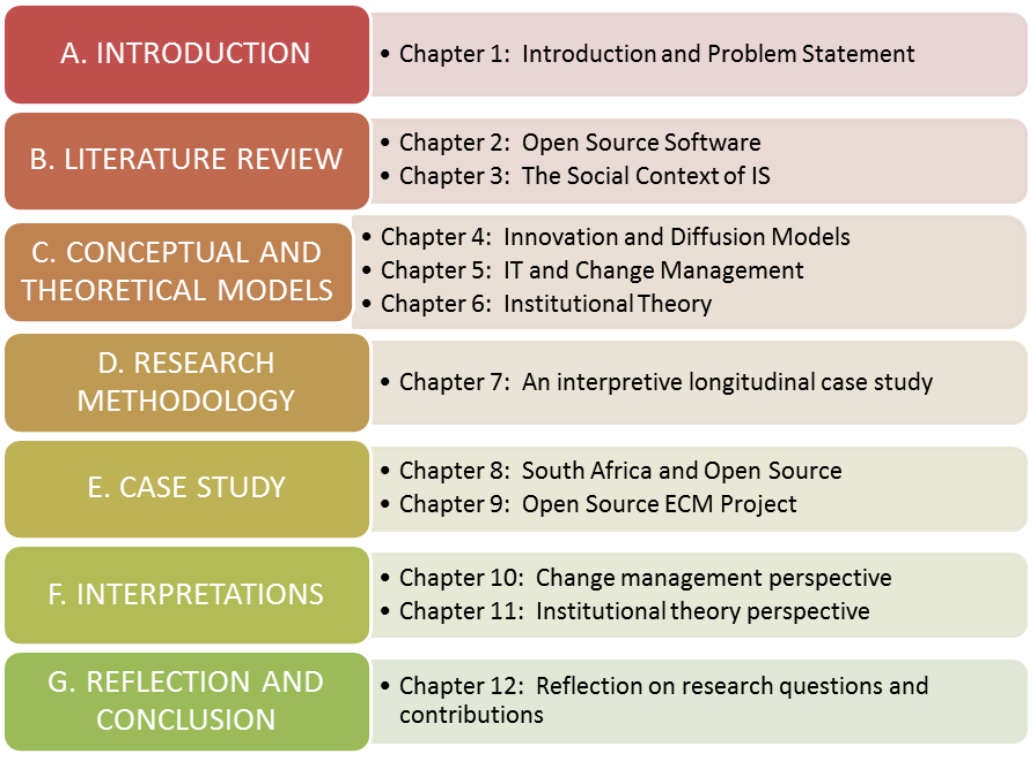
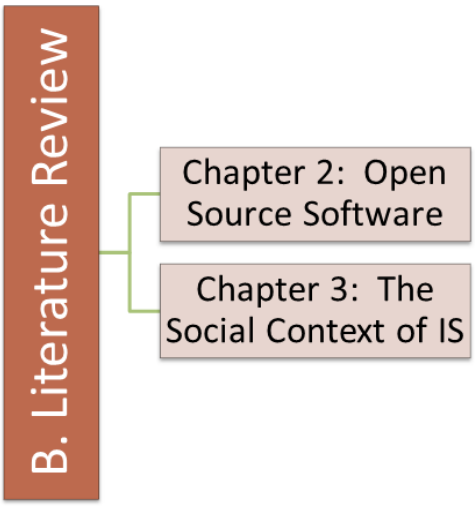


Figure 1: A road map of the thesis

SECTION B: LITERATURE REVIEW



The next two chapters will provide a literature overview of OSS (chapter 2) and the Social Context of IS and Innovation (chapter 3). Chapter 2 provides the context on what OSS is and its history of development; what the advantages and disadvantages are of adopting and implementing OSS; as well as the rationale for and how governments adopt OSS. This is required to shed some light on the first research question of this thesis, aimed at understanding the reasoning behind the South African (SA) Government's decision to move to OSS.

Chapter 3 covers the social context of information systems. The chapter commences with an explanation of the difference between the technical-rational and socio-technical stances on IT/IS, arguing for the importance of understanding the social context of information systems when implementing IS in organisations. Details on what comprises social context are also provided.

Chapter 2:
Open Source Software (OSS)

2.1 Introduction

The purpose of this chapter is to provide a background and overview on OSS with the objective of covering the main debates and issues in the adoption of OSS, in particular by the public sector. This chapter is divided into two main sections. The first part (section 2.2) offers a review of the OSS[1] literature aiming at describing and defining OSS; elaborating on the history of OSS, OSS typologies and OSS licensing. Section 2.3 focuses on the adoption of OSS, expounding on arguments for OSS, the challenges or barriers to OSS adoption and the OSS adoption strategies available in general, as well as particularising the debate for the adoption of OSS in the public sector.

2.2 Open Source Software (OSS)

2.2.1 Defining OSS

OSS is in principle software of which the "underlying source code is 'open' and available for others to access and review", (St.Amant and Still, 2007). Users of OSS can copy the source code, study the inner workings of it and customise it to suit their unique needs. This means that the original source code of OSS could be edited or radically changed or enhanced to perform functions different to its initial intention – possibly resulting in an entirely new program. The rationale behind OSS is that of collaboration and co-creation. Individuals share their knowledge to enhance progress and to facilitate the development of better software (Kumar and Singh, 2009). In many cases OSS is also free or has weaker intellectual property rights (IPRs) if one compares it to PS (Gastrow and Parker, 2009).

[1] Other acronyms such as FOSS or FLOSS are sometimes used for OSS to place an emphasis on the fact that OSS is 'free' representing 'freedom' as in 'free market' and not zero cost. Although there are minor differences between open source software (OSS), free software, and free (libre) open source software (FOSS/FLOSS) they will be treated as synonyms in this thesis as these differences are beyond the scope of this thesis.

2.2.2 History of OSS

OSS originated in the US academia in the early 1970s due to a cultural attitude opposing the limiting nature of exclusive rights echoed by intellectual property laws. It materialised into the mainstream in the 1990s, after which it became broadly used in the 2000s (Kemp, 2009). Kemp reports that the latter was due to a combination of circumstances described as: the readily downloadability of OSS modules from the Internet; the generational shift in the software industry from the traditional 'software as a licence' to remote and service based computing; the appeal of OSS being the affordable choice, leading to the increment of competitive pressures to reduce software costs; and the 'tipping point' acceptance when Gartner reported in November 2008 that from the 300 users they surveyed, 85% of them were using OSS.

The Free Software Foundation (FSF) is a non-profit body devoted to the development of Free Software, and was founded in 1985 by Richard Stallman. The FSF enabled software developers to use and modify FSF items and only stipulated that individuals, who made use of FSF items as a foundation, should make their resulting items freely available to others. The objectives of the FSF were to oversee the GNU Project[2]; hold the copyright in the software created for it; and to enforce the licences. For software to be considered 'free' it had to conform to four types of freedoms (Kemp, 2009:570). These were, the freedom:

- to run the software for any purpose;
- to study the inner workings of the software and adjust it to suit different needs – this makes the availability of the source code a pre-condition;
- to redistribute the software without any restrictions; and
- to make some enhancements/improvements to the software and to make these available to the public for the benefit of the OSS community.

Many individuals, especially those from outside the FSF community of programmers, understood the word 'free' to mean that one is not allowed to

[2] The GNU project was a mass collaboration aimed at creating a full operating system to replace UNIX

charge anything for developing, modifying or maintaining such software and therefore that no profit is to be made from such development (St.Amant and Still, 2007). It is important to note though that Stallman was not against the selling of software, but rather against the restrictions imposed on users who bought the software. What Stallman meant by the concept of 'free' was that the software seller should not forbid the users to share or modify the bought software (Vainio and Vaden, 2007).

Consequently, some parts of the OSS community found the ideology and concepts of the FSF to be hindering the extensive take-up of OSS (Vainio and Vaden, 2007). This led to the establishment of the Open Source Initiative (OSI) by Bruce Perens and Eric Raymond in 1998 (Kemp, 2009). Eric Raymond describes the disagreement between the OSI and FSF (or between "open source" and "free software") not to be because of different principles, but because of different tactics and rhetoric. The OS movement believes the creation of software to be a useful venture of collaboration based on individual needs: "Every good work of software starts by scratching a developer's personal itch", (Raymond, 1999).

2.2.3 Licensing of OSS

The aim of the OSI was to endorse OSS on practical grounds. A general misconception about OSS, is that it is in the public domain (Cassell, 2008). Some software code such as the Transmission Control Protocol/Internet Protocol (TCP/IP), which is used to network computers through the Internet, is public domain, but OSS, like PS, enforces legal conditions through licensing. The OSI became the overseer of the Open Source Definition (OSD) which includes 10 criteria to determine whether a software license is open source or not. These criteria are described in detail in Table 1 on the next page.

	Requirement	Explanation
1	Free Redistribution	Redistribution of software without payment.
2	Source Code	Distribution of software with the source code or well-publicised access to it.
3	Derived Works	Allow for the modification of the software and distribution of changed results.
4	Integrity of author's source code	Distribution of "patch files" for recreation (rather than full source code) to be permitted.
5	No discriminations against persons or groups	Software to be eligible for use by everyone everywhere.
6	No discrimination against fields of endeavour	Should for example not be limited to non-commercial purposes.
7	Distribution of Licence	No need to execute extra licences for redistributed software.
8	Licence must not be product specific	Licence rights not to depend on the software being distributed with other specified software.
9	Licence must not restrict other software	The licence must not place restrictions on software distributed with the licensed software.
10	Licence must be technology neutral	The licence must not be biased towards any technology.

Table 1: Criteria for Open Source Software Licence (Source: Kemp, 2009:571)

The OSI examines and approves licenses which correspond to the OSD. Kemp (2009) states that there are many OSS licences conforming to the OSD. Of these, the most prevalent and broadly used one is the FSF's GNU General Public Licence (GPL). The GNU GPL accounts for about half of the OSS used in the world and guards the four freedoms of the FSF (Kemp, 2009:573). Other principle FOSS licenses include the Lesser GPL (LGPL); the Artistic License; the Berkeley System Distribution (BSD); and the Mozilla Public License (MPL), which is more commercially orientated (Fitzgerald, 2006) – see Table 2 on the next page for more details.

	Type of License	Examples
1	Reciprocal	GPL, LCPL, Open Source License (OSL)
2	Academic Style	Academic Free License, Apache License, BSD, Massachusetts Institute of Technology License (MIT)
3	Corporate Type	MPL, Qt Public License, Sun Public License, International Business Machines (IBM) Public License, Apple Public License, Eclipse Public License
4	Non-Approved (e.g. Shared Source family)	Microsoft Shared Source Initiative Licenses: Microsoft Community License and Microsoft Permissive License, Sun Community Source License (SCSL)

Table 2: A Typology of OSS 2.0 Licenses (Source: Fitzgerald, 2006:593)

According to the GNU GPL, anyone is free to use, modify and redistribute a program with a GNU GPL on the condition that the same freedom applies to the program when modified or redistributed. In this sense, the GNU GPL is referred to as a 'copyleft' license as it gives the user (not only the author) the permission to use and modify or enhance the 'copylefted' work (Vainio and Vaden, 2007). The best example of the GNU GPL is the GNU/Linux operating system.

As an alternative to the GNU GPL, other OSS licenses do not force the subsequent licensing condition, which makes the user thereof free to access and modify the source code and then sell the modified code as proprietary. These type of OSS licenses are referred to as 'non-copyleft' and the best example of such an license agreement is the Apache web server (Cassell, 2008).

Figure 2 below is adapted from Lessig (2002) and shows a graphical representation of software categories, distinguishing between software in the public domain, FOSS and PS.

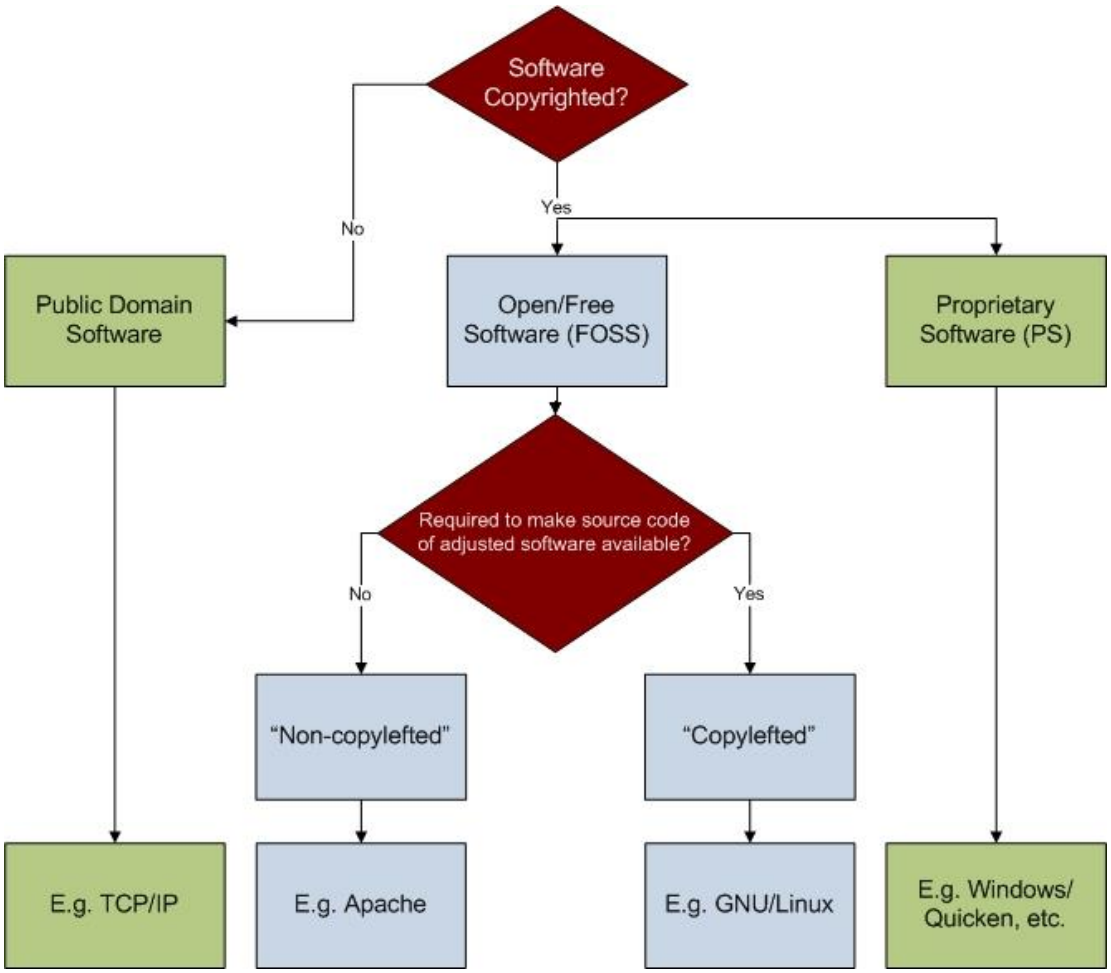


Figure 2: Categories of Software (adapted from Lessig, 2002:55)

2.2.4 The adoption of OSS

To understand why organisations adopt OSS, one must first consider what the benefits/enablers of OSS are? According to literature, OSS has many benefits, but Ven, Verelst and Mannaert (2008) suggest that managers approach the adoption of OSS in a precocious way and they warn that doing it for the wrong reasons could cause detriment to the organisation. Not adopting OSS might on the contrary lead to missing out on substantial opportunities. For Reddy and Evans (2003) the advantages and disadvantages of OSS and PS respectively are the mirror images of each other. In this sense, the advantages of OSS in many cases reflect the disadvantages of PS.

The benefits of OSS are discussed under the headings of economic, technical and philosophical arguments and explained in more detail in the following sections.

2.2.2.1 Economic arguments

According to Ellis and Van Belle (2009) the cost of ICT is important to most organisations, especially those who see software as an enabler. Most developing countries are consumers as opposed to producers of software and are forced to import PS from developed countries, which impacts negatively on foreign country reserves (Kumar and Singh, 2009). The adoption of OSS therefore assists developing countries, in particular, to preserve their foreign currency reserves so that it could rather be directed to other important projects, such as the development and nurturing of local IT skills, and other obligatory highly specialised software (Mtsweni and Biermann, 2008).

The total cost of ownership (TCO) is a term used to refer to the direct and indirect costs associated with the use of an ICT component. This term includes licensing fees, as well as all other expenses contributed towards support and staff training with regards to the component, and is calculated over the lifespan of the ICT project (Bruggink, 2003). The TCO is a contentious issue in the OS debate, where OS supporters assert that the TCO of OS is lower in spite of the fact that it requires more expertise, due to no licensing fees and minimal acquisition costs (Chonia, 2003; Titterton, 2003; Drozdik, Kovács and Kochis, 2005; Nagy, Yassin and Bhattacherjee, 2010). This makes it ideal for adoption by developing countries such as South Africa, which are expected to pay international commercial license fees (Wong, 2004; Ellis and Van Belle, 2009; Kumar and Singh, 2009). According to Dedrick and West (2007) TCO is directly dependable on the skills and resources available to an organisation and Bruggunk (2003) warns that due to the lack of qualified personnel, the cost of technical support could be more for OSS than for the commonly used PS. In research done by Morgan and Finnegan (2007) in 13 companies in Europe, OSS was found to have a low cost in terms of reduced license fees, upgrade costs, virus protection and TCO (including software and service costs). Ven *et al.* (2008) emphasise the fact that organisations should

perform a formal TCO study in the environment they wish to adopt the OSS and that the results of a TCO study could not be generalised to other environments. Switching from one platform to another also adds the costing of data migration and personnel retraining to the TCO, which is difficult to measure and directly influenced by the experience of employees (ibid.).

What makes OSS even more attractive for developing countries, is that the costs spent on development and maintenance could be fed back into the local economy (Drozdik *et al.*, 2005). The adoption and implementation of OSS, could be used to establish a local software industry, creating small businesses to install, configure, deploy and provide OSS support services to institutions running OSS-based systems and applications, which could contribute positively to the economy of developing countries (Chonia, 2003; Ellis and Van Belle, 2009; Kemp, 2009). Furthermore, Thakur (2012) states that the diffusion and availability of OSS in most countries results in more competition leading to lower prices, increased productivity and innovation in the software market.

According to Kemp (2009) the availability of OS source code makes it possible for developers to adjust the software to operate on new hardware components as and when available and in the same way ensures that it is still available if required to be operable on old fashioned hardware. It furthermore yields ideas and inspires technical innovation (Morgan and Finnegan, 2007) while providing organisations with the opportunity to access and modify the software to suit individual needs, without having to re-invent the wheel. For routine, lower level tasks, the source code availability also shortens the software development life cycle, cutting down significantly on the software's development cost, and consequently freeing up the organisation's internal resources to focus more on the development of strategic software that could give the organisation a competitive advantage (Kemp, 2009).

2.2.2.2 Technical arguments

Supporters of OSS describe the software to be highly secure as users relish the opportunity to build in better security into their code (Cassell, 2008) and the availability of the source code also reduces the threat of viruses, as they are perceived not to contain hidden features (Morgan and Finnegan, 2007; Ven *et al.*, 2008). Furthermore, as the OSS software passes through a large community of users and developers who collectively assist in identifying and fixing bugs, it gets extensively peer-reviewed and as a result of this process the quality of the software is enhanced (Spinellis and Szyperski, 2004; Cassell, 2008). The access to source code likewise makes the turnaround time on OSS bug fixing much shorter, as many developers are able to assist with these immediately. Krishnamurthy (2003) also highlights that the ability to tailor software to fit the specific demands of an organisation, makes it more attractive than the 'one-size-fits-all' scenario of PS. According to Dedrick and West (2007) the ability to modify source code is only viewed as an advantage by organisations with in-house technical expertise, while others see it as a risk to system stability. Ven *et al.* (2008) report that in cases where organisations adopt highly mature infrastructure software, such as Linux and Apache, they rarely use the source code, as even experienced programmers are not able to modify the code of highly matured OSS.

According to Kshetri (2004) a high proportion of developing countries have previously used/donated and old computers to work on. Linux (an OSS operating system) is less resource intensive than PS operating systems such as Windows, and is able to run successfully on older/slower machines, making it the preferred choice of developing countries (James, 2003). Ellis and Van Belle (2009) state that OSS code could also be adjusted to attend to expandability matters, which cuts the need to expand the existing ICT infrastructure.

A huge debate in the national-security game is on the effects that high technology has on national security. As developing countries are the software export countries, countries such as China fear that other high-tech countries

might have built in programs for bullying, attacking and disruption into the high-tech arms they sell (Kshetri, 2004). To them the hidden protocols of PS is perceived to be a national security thread. In contrast to this, OSS has no hidden IP secrets to protect, which makes it the security wise choice. Due to the respect earned by the OS movement in the software industry, it also receives a smaller number of Internet-based security attacks (Rogers, 2002).

2.2.2.3 Philosophical arguments

Allen and Geller (2012) highlight the capability of OSS to allow for experimentation, customisation and the launching of new applications with less or no restrictions, as one of the key factors leading to an increase in the speed of business innovation. For them the low cost advantage of OSS alone chases a replacement-logic (exchanging a proven PS package with an unproven OSS replacement), and is not adequate for grasping the organisational effect of OSS in challenging organisational contexts. OSS should also have the capability to solve the business's problems rapidly. Consequently, this could lead to long-suffering IT departments forming a more positive and proactive view of themselves, resulting in improved relationships with IT users.

OSS allows organisations to escape from vendor lock-ins by facilitating freedom of choice. It gives the organisation a sense of power, freeing it from private vendors (Waring and Maddocks, 2005; Morgan and Finnegan, 2007). According to Allen and Geller (2012) the customisable platform of OS can be used to fulfil an organisation's innovation needs. It provides the freedom to experiment with new products at no significant cost and aids organisations to improve their customer relations and enhance their self-image.

Collaboration and knowledge sharing between organisations is encouraged by OSS. It facilitates joint product development and results in the sharing of expenses, which is beneficial to all partaking parties (ibid.Morgan and Finnegan, 2007). Ven *et al.* (2008) warn that choosing OSS will not inevitably make organisations fully independent of software vendors as they might still,

to some degree, be dependable on OSS vendors who provide configuration and support services.

As OSS operating systems (such as Linux) are much more flexible in that it can run on many different platforms, in many different contexts, such as mainframes, PCs, and palm-top devices (e.g. Play Stations), the users thereof are less dependent on only one vendor or platform and many organisations and governments find this benefit appealing (Bloor, 2003).

The customisability of OSS is noted as one of the factors that makes it a very attractive option. According to Von Hippel (2001), the probability of FOSS to customise and personalise the source code, provides the end users with greater control. Manufacturers of software cannot know what users need to the same extend that the users know this themselves and Von Hippel (ibid.) refers to the saying “If you want something done right, do it yourself”, when he argues that users will perform well in developing their own software if the advantages that come with their innovation exceeds the costs to it. When the costs of revealing an innovation are low (as is the case with OSS development), a low level of reward such as an improved reputation, prestige or status in the community of programmers, or expected mutuality, seems to be sufficient (Applebe, 2003; Mustonen, 2003). According to Krishnamurthy (2006) the motivation for OSS development is multi-faceted and he argues that OSS developers make use of both implicit (driven by fun; learning; the desire to solve problems) and explicit (driven by financial reward and better future job prospects) controls. As OSS is information (rather than a physical product) the producers can easily distribute it freely on the Internet and the diffusion thereof can take place without investing large amounts in the reproduction and distribution thereof.

2.2.5 OSS adoption barriers

There are however a number of obstacles that hinder or prevent OSS adoption. These include barriers related to: skills, legacy systems, costs, political pressures and technical compatibility. Each of these barriers are explained in more detail in the following sections.

2.2.3.1 Skills (of users, developers and implementers)

Paré, Wybo and Delannoy (2009) confirm that a shortage of skills, required to support and maintain OSS products once implemented and operational, is found to be a barrier to OSS adoption. Negash, Carter, Chen and Wilcox (2007) also assert a lack of technical skills to contribute to the slow uptake of OSS, leading most organisations to avoid or stop mass migration to OSS.

According to Drozdik *et al.* (2005) most organisations concur that users 259tend to be the most challenging facet of migrating to OSS. User skills and the possible discomfort they will experience during the migration process are tough to quantify and additional money disbursed on training may not meaningfully increase the users' comfort and skills with the new system.

2.2.3.2 Legacy systems

As OSS is a fairly new phenomenon which only started to emerge around the 1990s, many organisations who profoundly invested in PS legacy systems before this time will have to write off large amounts of prior investments when adopting OSS. These costs are referred to as 'sunk costs' by Nagy *et al.* (2010) and they state that many organisations are unwilling to do this, which hampers them to adopt OSS on an enterprise wide scale.

Furthermore, companies fear to move their legacy systems to OSS due to the absence of a third party to provide the necessary support and maintenance and who accepts a contractual responsibility to evolve the software over time, managing the development activities thereof (Paré *et al.*, 2009). These fears might be due to a lack of information or knowledge about the availability, immaturity or relevance of OSS (Paré *et al.*, 2009; Nagy *et al.*, 2010), as Fitzgerald (2006) declares the description of the OS phenomenon being one of "a collective of supremely talented developers who volunteer their services to develop very high-quality software by means of a revolutionary new approach", to be an outdated myth, and illustrates how the new OSS, which he labels OSS 2.0, has emerged as a more mainstream software phenomena, which is commercially a more worthwhile option. This 'new' OSS 2.0 phenomenon includes more purposeful analysis and design and OS

developers are more and more getting paid for their OSS development work. Customers of OSS are also more willing to pay for support services which are provided by a network of interested parties that, as a whole, provide complementary services (ibid.). To overcome the knowledge barrier, organisations need to monitor open source archives and train their internal staff on OSS (Nagy et al., 2010). Ven *et al.* (2008) concur that the availability of external support is an important adoption factor, and emphasises the fact that services such as the installation, configuration and maintenance of OSS could be outsourced.

Paré et. al. (2009) indicate the lack of salespeople to provide information on, references for, and product demonstrations of OSS as an adoption barrier. Furthermore, they identify internal (e.g. from a conservative CIO) and external (e.g. from the government or the general population) political pressures, as well as 'anti-sharing' cultures to have a negative effect on the adoption of OSS. If there are contracts in place and well sorted relationships established with PS vendors, these could hamper or discourage the adoption of OSS. In the same way, conservative IT decision makers consider the trust in their relationships with well-established and matured PS software venders to be much more attractive than OSS of which they normally have less experience and which they suppose offers less support and a lot more uncertainty (ibid.;Goode, 2005).

2.2.3.3 Economic/costs

Many potential adopters of OSS consider it to have several hidden costs (Paré *et al.*, 2009). Although the source code is available, they believe that the use of OSS still requires one to have knowledge of it, to maintain it, to upgrade it if necessary, and to train the users of it. All of this is needed on an on-going basis and has to be done by either external consultants or internal staff. According to Ayala, Cruzes, Hauge and Conradi (2011) these hidden costs could also include licensing costs to advance OSS functionality; costs for support services needed to select or integrate the software; as well as legal expenses needed to grow a marketable strategy.

2.2.3.4 Internal and external political pressures

According to Paré *et el.* (2009) little has been shared in the literature on the role played by political pressures on the adoption of OSS. In many cases already existing projects and personal agreements between the organisation's management and PS software vendors, internally prohibit the adoption of OSS and forces organisations to stay with the current commercial vendor. Cassell (2010) confirms this aspect as he states that Government IT relates to high income figures for consulting companies, and that any change in favour of OSS will be strongly opposed or bombarded with cynicism and disbelief.

This could also be true for political pressures from the outside. It will be difficult to make an internal case for the adoption of OSS if Ministries or the Government do not support it.

2.2.3.5 Technical (compatibility)

According to Cassell (2008) the major challenge to migrate to OSS lies at the connection between desktop operating systems and software applications. He confers that many governments have moved over to OSS to manage their computer networks, but moving to an OSS operating system has been a tough decision, resulting in technical issues of compatibility, since many popular applications are designed to run on PS operating systems only. This incompatibility between OSS and PS platforms can discourage organisations to migrate from PS to OSS products, and makes for a lot of personnel challenges with regards to training and adjusting to new systems and processes (Kshetri, 2004). Nagy *et al.* (2010) suggest that organisations make use of middleware solutions to assist them in connecting to their existing legacy systems.

2.2.6 OSS adoption strategies and approaches

Dedrick and West (2007) distinguish between conceptual and pragmatic approaches to OSS adoption. Conceptual factors refer to the value of OSS due to the openness of its code, and the availability thereof to modify the code to fit specific needs. These factors are important to the OSS developing community and one of the main reasons for its existence. Pragmatic factors

refer to features such as the low cost of OSS and the freedom from vendor lock-in. The research done on the adoption of OSS intriguingly shows that the pragmatic factors seem to overpower the ideological factors when users consider the adoption of OSS (Fitzgerald and Kenny, 2004; Dedrick and West, 2007; Spinellis and Giannikas, 2012).

It is imperative to note that government intervention on the adoption of OSS could play an important role, as OSS developers typically have few or no resources or incentives available to invest in the marketing and advertisement of their products. There are three ways in which government/public policy could support OSS: public agencies, schools and universities could be forced through mandatory adoption policies; information providing (promotional) campaigns could be run to alert the uninformed about the existence and characteristics of OSS; and potential consumers could be offered a subsidy on their adoption of OSS (Comino and Manenti, 2005). Other incentive examples on adopting OSS are the government of Singapore who offers tax incentives to companies that adopt Linux as operating system; and the German government who struck a deal with IBM to provide discounts on computers being sold with Linux as installed operating system (ibid.).

Ven *et al.* (2008) state that organisations will have diverse attitudes towards the advantages and barriers of OSS, and they advise decision makers not to merely accept the various claims made on the adoption of OSS in the literature, or simply follow the example of other organisations who migrated to OSS. Organisations should instead take care to first consider their own specific local context. This would assist them to make decisions on 'if', 'how' and 'when' to adopt OSS. Furthermore, new-comers to OSS should at first only adopt mature OSS infrastructure software for which ample external support is available, to gain hands-on experience, before moving on to other OSS (ibid.). Organisations should also make use of so called 'early adopters' of OSS within their current staff population, which they could utilise for the evangelism of OSS and to assist with OSS adoption projects (Kavanagh, 2004).

The findings of Huge, Ayala and Conradi (2010:1137) who did research in software-intensive organisations (private or public organisations that develop or make extensive use of software), describe a number of ways in which OSS was adopted by these organisations. These ways or approaches are summarised as: (1) deploying OSS products in the organisation's operational environment, e.g. Linux, OpenOffice and Apache HTTP server; (2) using OSS CASE tools to support the development of software; (3) integrating OSS components into other products or systems by modification, extension or wrapping; (4) participating in the development of OSS products controlled by someone else; (5) providing their own OSS products and relating to their surrounding communities; and (6) using OSS development practices in their own software development e.g. code sharing and peer reviewing. The conclusions made by Huge *et al.* (ibid.) echo that of Ven *et al.* (2008), in that they advise organisations to not blindly follow the success of other OSS adopters, as 'one size does not necessarily fit all'. Organisations should instead analyse their opportunities and shape their adoption of OSS accordingly.

Table 3 illustrates the six ways in which organisations can approach OSS adoption (in order of increasing impact on the business strategy), listing the common motivations for choosing the specific approach, as well the types of organisations who would typically adopt the specific approach (Ayala *et al.*, 2011).

OSS adoption approach	*Common motivations*	*Adopting organisation type*
Using OSS CASE tools to support software development	Lower-cost; standardised development tools	Private sector (start-up companies) and academia
Deploying OSS products in the operational environment	Reduced costs from savings on license fees or hardware requirements; compliance with standards; and freedom from vendor lock in	Public sector
Using development practices often associated with OSS communities	Improved transparency and collaboration between development teams throughout an organisation or a consortium	Private sector (small, medium, and large companies)
Integrating OSS products into other software products or systems	Increased software re-use through reduced license and upgrade costs and development time	Private sector (small, medium and large companies)
Participating in existing OSS product development communities	Reduced maintenance of systems that integrate OSS products from an existing community. Influence over the community's development tasks based on system needs.	Private sector (medium and large companies)
Providing OSS products and establishing communities to support them	Accelerated product development through community feedback, bug reports, bug fixes, feature requests, and added functionality	Private sector (large companies)

Table 3: Six ways different organisations adopt OSS (Source: Ayala et al., 2011:96)

According to Nagy *et al.* (2010) organisations need a multi-faceted approach to adopting OSS. Starting with a deliberate search for OS applications that will fit their requirements, they need to train their staff on the installation, use

and customisation of OSS and hire people who are familiar with OSS to internally extend the awareness thereof. If organisations experience a lack of manpower or internal capability, they can outsource the implementation and support functions to outside consultants, while sending their key users to professional conferences and subscribing to trade magazines, in an attempt to overcome the OSS knowledge barriers and keep up with the latest trends.

According to Woods and Guliani (2005) organisations wanting to adopt OSS should firstly be willing to invest considerably in the development of OSS skills, and secondly accept the added responsibility and control over its IT infrastructure. This is necessary as OSS products typically lack third-party vendors offering both operational support and maintenance. Key aspects identified as important to organisations considering the adoption of OSS are (Woods and Guliani, 2005:81) :

- Obtain an understanding of the organisation's current IT skills: organisations should run a complete audit of the available in-house OSS IT skills, while they also determine the skills required for the successful adoption and institutionalisation of the OSS. Consequently the necessary arrangements should be made to address this gap, before embarking on the adoption of OSS. Kavanagh (2004) states that both development and administrative skills are essential to enhance the success of OSS adoption.
- Try-out the OSS in a safe environment: organisations should create a safe environment where their technical IT personnel and end-users can experiment with the desired OSS products, to test the functionality and features of it. Kavanagh (2004) labels OSS labs as critical as they can assist in the discovery of new information on OSS which could draw the attention of decision makers; they can offer a training platform which could be used for the enhancement of OSS skills; and they can as a result facilitate the OSS evaluation and selection processes.
- Slowly and progressively build the skills needed to find and evaluate OSS products; and to install, configure and operate these in live environments.

- 'Institutionalise' OSS skills: OSS skills should be transferred from those who were trained on them to others who also form part of the team. The OSS skills should be documented and systematically sustained within the organisation. This is critical as it could be dreadfully risky to vest these skills in only a single person or a few individuals in the organisation.
- Increase the adoption of OSS within the organisation as the occasion arises: with the necessary skills in place to find and evaluate OSS, the organisation will be in a better position to identify and manipulate OSS that could add value to the organisation.

2.2.7 The adoption and implementation of OSS in the public sector

The adoption decision plays an important part in the OS adoption literature, implicitly assuming that an organisation makes the adoption decision in its totality. Allen and Geller (2012) refer to the on-going debate in the OSS literature on whether OS is adopted due to its innovation enabling abilities, or purely due to the fact that it is either cheap, or costs nothing. According to Morgan and Finnegan (2007) the cost of OSS does play a role in the adoption decision, but they argue that the quality of the software and the flexibility of its use is more significant. Apart from the adoption barriers mentioned in the previous paragraphs, Schofield (2001) states that government departments don't widely adopt OSS due to factors of 'comfort'. Ministers are labelled 'lazy' and accused of staying with the software that they are used to, while they don't attempt to try out or change to OSS in spite of the potential benefits it offers. In this sense, many governments have still not migrated to OSS. According to Windley (2002) this could be due to a government culture of 'sticking to what you know' or to the fact the government departments have lost their IT skills over the years as a result of outsourcing, leaving them with little or no expertise in software development. He states that few, if any, governments develop their own software. Instead they hire consultants who don't make money selling OSS. They make money customising the software they resell. This is echoed by Waring and Maddocks (2005) who predict the take-up of OSS in this sector to be relatively slow should the IT competencies, which were lost due to large IT outsourcing projects, not be restored rapidly.

To rectify this would though take many years and require massive investments in new IT infrastructure.

According to Cassell (2008), a lot has been said on the benefits and disadvantages of OSS, but with the exception of a few studies, not much research have been done on the process of adoption and the actual implementation of FOSS in the public sector. In a study he did on the adoption and implementation of OSS by four European cities, he found independence from vendors/'lock-ins', greater effectiveness, and financial savings to be the three main reasons for these cities to adopt and migrate to FOSS (ibid.). Factors that influenced the actual implementation of OSS were the organisational structure (the flatter the structure the more successful the implementation); the value attached to the implementation of the software (the extent to which the employees perceived the OSS to be of value); as well as leadership (whether top management backed the decision to implement the software).

Comino and Manenti (2005) state that governments are large purchasers of computer software, spending billions on PS licensing annually. This makes OSS an obvious governmental choice. Results from a study done by Waring and Maddocks (2005) in the UK public sector, also show that migrating to OSS has the potential to expand in this sector because of the overwhelming costing benefits it poses.

Literature shows that a new technology will be embraced by government officials if they are persuaded that the technology will assist them in performing their jobs (Cassell, 2008). A lack of internal capacity is listed by Coffee (2003) as one of the reasons why governments are reluctant to incorporate FOSS. Public officials are furthermore cautious to move to technical solutions if they have had little or no experience with it. For government departments the benefit of scalability also seems to be important (Waring and Maddocks, 2005). Scalability allows for the trouble free roll out of systems to more users after testing it at pilot sites and is essential when taking into account the size of the public sector.

Research done by Ayala *et al.* (2011) illustrates that public organisations normally adopt OSS by deploying OSS products in their operational environment. This is mainly done to reduce costs by saving on license fees or hardware requirements (Applewhite, 2003); to comply with standards; and to establish freedom from vendor lock in (see Table 3 on page 47). Training and support of OSS; licensing costs to improve the software's functionality; and support services to assist with the software selection and integration are listed as possible hidden costs when deploying OSS in the operational environment, while data format compatibility and the difficulty to select the right product is shown to be the technical and managerial issues listed for this category (Ayala *et al.*, 2011).

Evans (2002) calls for governments to choose the best products for their own in-house requirements and not to interfere with preferential treatment in the software market by promoting OSS over PS, as this could lead to the use of OSS when it is not the best alternative. He states that IT specialists in both business and government do not need legislation to force them to choose OSS over PS – they would automatically do this if the former appears to be superior.

Fitzgerald and Kenny (2004) studied the implementation of OSS in a public hospital in Ireland, and report that the support from top management is critical when implementing OSS. One of the problems encountered in the OSS adoption process was the resistance from staff who feared that they faced deskilling due to their adoption of OSS, as this would result in them losing their expertise in popular commercial PS. It also seemed to be imperative to change the staff's attitude toward the new software support model denoted by OSS, as bulletin boards were replacing standard maintenance contracts as the main source of support. Furthermore, they warn that support and maintenance should not be expected at a smaller cost than that available for PS just because the software itself is available at little or no cost.

Government (at all levels) face a funding crisis in the present economic climate (Ward and Tao, 2009), which makes all options to cut on IT operating

costs appealing. Apart from cutting on acquisition costs, the elimination of restrictive licensing, vendor lock-in and high switching costs could also contribute to diminish government IT costs. Ward and Tau (ibid.) report that, in coherence with the findings of Comino and Manenti (2005), 'informed' municipal governments will include the possible value of OSS in their adoption decisions, while the 'uninformed' municipal governments will either overlook the existence of OSS (struggling under false impressions and misperceptions of OSS) or are unaware of PS alternatives.

For municipal governments to adopt OSS, the organisation must change to incorporate and effectively make use of the new technology. According to Ward and Tau (2009) the adoption of OSS is less technical and more organisational. This is echoed by Ayala *et al.* (2011) who state that research reveals the adoption of OSS poses similar challenges to that of PS components, and that these challenges are in most cases organisational in nature. An organisation's IT decision making culture appears to be a significant barrier in OSS adoption and Ward and Tau (2009) state that an organisation with a change embracing culture will more effectively adopt new technology such as OSS, than one with a strong status quo preference. To adopt OSS successfully, on more than just a minutiae level, an organisation needs to have the necessary capability (echoed by Gallego, Luna and Bueno (2008)), discipline and cultural affinity. For Ward and Tau (2009) the main difference between government and the private sector lies in the customer. The private sector is driven by the profit to be made from the product or service provided to the customer, while government is not driven by profit, but rather by directive or law, only requiring the service to be implemented while the quality or level at which it has to be done is sometimes not even indicated.

In a study done by Cassell (2010) on the adoption of OSS by the local governments of three cities in Germany, the following was found to be the lessons learnt:

- Leadership and backing by top management is crucial: if this is the case, the IT administrator will have the freedom needed to make mistakes and try out new things. A 'shepherd' to lead staff through the

adoption process is central and critical. Duties of the 'shepherd' include making the case for the adoption; taking the hammering when a hiccup comes up; and controlling the debate around FOSS by regularly communicating the justification for migration to the public and to parliament.

- Cost savings should not be the primary driving force: it is usually not when extra money is available to try out something new or innovative that the migration to FOSS becomes a possibility, but an unexpected event, such as a new law, in many cases could create the opportunity to redirect an organisation on a different course.
- FOSS is not free: the adoption and implementation of FOSS is pricey and requires substantial investment in training, implementation, service and maintenance. The case for migration to OSS should thus not only be supported by lower costs, but should also be supported by other justifications such as increased cooperation among governments; greater independence from software vendors; more flexibility and better security; and an upsurge in local economic development, should also be used to strengthen it.
- Don't switch over to OSS completely at once: 'soft migration' is recommended, starting off with common software applications such as a web browser, email programme and word processor, moving slowing towards the development of macros, templates and forms in Open Document format, and setting up pilot work stations that run on a OS operating system such as Linux. All of this should be done gradually after initially setting up a clear strategy on how to move forward.
- Practical experience is more important than theory: merely knowing about FOSS is not sufficient and government officials should practically spend time in governments that use FOSS to gain first-hand knowledge from line-employees.
- Organisational culture plays an important role: a fundamental change such as the migration to OSS is reported to be easier with a centralised IT department, as a decentralised IT structure makes for cultural and structural barriers that render a government-wide adoption strategy

challenging. FOSS has the potential to change the structure and culture of an organisation.

Cassell (2008) emphasises that moving from PS to FOSS does not only change organisational processes, but also presents new ideas and ways of thinking about technology. In this sense, migration to FOSS could change the view of government from being an IT consumer to being able to develop, own and share IT with others. Technological change is a function of an organisation's properties, but FOSS has the capability to change the structure as well as the culture of an organisation (Cassell, 2010).

Some governments (such as the governments of France, Germany and China) have implemented policies to insist that their agencies implement OSS. Lessig (2002) states that governments should rather require their agencies to implement software that maximises efficiency, but he warns that the elements which contribute to efficiency for government, are in essence different to those which determine efficiency for the private sector. The most efficient software would be the software that provides the greatest benefits to the organisation at a specified price. In this end, Lessig (ibid.) explains that governments are not competing in the same way that private actors do. In contrast to them, governments would express/voice the benefits they perceive software to have, so that other competitors (other government departments) could mutually share in it.

Fitzgerald, Kesan, Russo, Shaikh and Succi (2011) did several case studies on the implementation of OSS in the public sector in Italy, Spain, Ireland and Massachusetts in the USA. They highlight user specific tailored training and championing as important factors to sustain the adoption of OSS in the public sector. Championing was specifically found to be significant in the case of OSS, as there are no software vendors to promote or market OSS. They furthermore observed that the trialability of OSS (allowing users to experiment with the software at home) enhanced the adoption of OSS and that the use of OSS is driven by the users' ideological conviction. The implementers of OSS therefore need to have an in depth understanding of the "people issues and

the underlying social structures" present in the organisation, before they embark on the implementation process.

2.3 Conclusion

Section 2 of this chapter outlines the evolution of OSS and the many benefits, as well as challenges of adopting OSS. Section 3 illustrated that OSS providers still struggle to compete with their PS counter products particular in the public sector. As stated, there are many reasons why the public sector has not yet fully embraced OSS. Hundal (2012) labels the public sector as "risk averse" and also blames the red tape in government for the slow uptake of OSS in the UK public sector. For the mega-vendors of PS, IT in the public sector represents large amounts of money. This means that they would persistently pull strings and lobby against the public sector's intentions to move to OSS, propagating the myths that OSS is not secure or reliable.

Lee (2006) states that government as software consumer has more trepidations than private consumers in that a government should consider the long-term interests of society when making a choice between PS and OSS, in contrast to business users who are allowed to consider only their own interests as consumers.

As the implementation of OSS has moved from not so visible back-office applications such as operating systems, web servers and file/print servers, to more visible front-office applications, it has become more precarious. This has caused adoption to become a more perilous venture that can turn out to be problematic, especially in the public sector where there are limited resources and a heterogeneity of end-users (Fitzgerald *et al.*, 2011).

Orlikowski and Baroudi (1991) state that the development and use of information systems in organisations is an on-going social process which is situated in its history and context. This is echoed by Harvey & Myers (1995:16) who argue that IS research has time after time shown that the greatest practical problems with IS design, development and application, is caused by the social and organisational contexts thereof. This has

accordingly led to “the realization that all aspects of any information system have a highly complex, and constantly changing, social context”, (p. 16).

When implementing IS (and for that matter OSS) in organisations, it is important to understand the context within which the IS will be implemented. The next chapter provides an overview of the literature starting off with the two opposing viewpoints on IS (IS as technical-rational systems and IS as socio-technical systems) arguing for a social technical perspective on IS implementation, before the social context of an IS is discussed in more details.

Chapter 3:
The Social Context of Information Systems (IS)

3.1 Introduction

The purpose of this chapter is to highlight the importance of the social context within which an information system is implemented. Section 3.2 of the chapter reports on the broader literature describing IS as technical-rational and socio-technical systems respectively, arguing for the latter as the preferred viewpoint when implementing IS in organisations. Section 3.3 provides an in depth discussion of the social context of information systems and claims that although the context is a complex phenomenon, an in depth understanding of it is necessary to understand the forces that drive the change during IS implementation.

Computer systems are more than just mechanical systems. As early as 1987, Finnagan, Salaman and Thompson (1987) have described Information technology as '*… a social phenomenon, analysable through social science insights and methods rather than being left to engineers…*'. This is echoed by Winfield (1991) who states that humans decide on the use of IT; that information is socially created; and that the study of information systems in the organisation therefore clearly falls into the domain of the social sciences.

Having said this, there are still many IS implementers who believe that IS are technological systems applied in organisations for the sole purpose of solving problems. For many years IS developers tried to solve the difficulties and drawbacks in their domain by throwing more technology at it. True to this belief, Ng and Yeh (1990) state that the solution to the ever increasing backlogs in information systems development is to up the productivity levels of software developers, by automating the software development and maintenance processes. Many IS researchers have therefore studied IS as mainly technical-rational systems, while others have believed that IS also

incorporate complex social aspects. These two opposing viewpoints will be discussed in the sections that follow.

3.2 Information Systems as Technical-rational systems

According to Dahlbohm and Mathiassen (1993) the designers of IS often have technologically Utopian views. Computer scientists are trained to emphasise efficiency and effectiveness and focus more on the software engineering aspects of the information systems they develop. They pay little attention to the consequences that the use of their software will have on the organisation within which it is implemented, and believe that 'the system will solve the problem.' These two researchers further argue that scientists tend to transfer the rational expression applicable in the natural world, to the social world, thinking that it is possible to understand the social world in the same rational way. This rational (mechanistic) thinking underpins all of computing and Dahlbom and Mathiassen (ibid.:12) describe rational thinking as:

> *"… the conscious, competent administration of ideas, aided by a method. To rationalize is to rely on rules, to develop methods, write up programs. To rationalize is to follow rules, but also to know and be able to state and defend the rules we are following in our thinking. Before we undertake an action, we formulate the rules; before we develop a system, we formulate our method. The real work lies in choosing, formulating, and motivating the rules, the method. The rest is routine. A machine can do it."*

They go on to explain that when we see something as a machine, we want to unpack it so that we can understand how it fits together and what the rules are, which direct its behaviour. We believe that we will be able to control the machine if we understand the rules (ibid.). This would mean that given the necessary tools, we would be able to solve organisational problems.

From this perspective stems 'technological determinism', which supposes that one can introduce technology in organisations and predict the changes it would bring about with regard to the redesign of jobs, organisational procedures, organisational structure, cultural values, power relations and politics, et cetera. What seems important here is to know how to 'correctly' manage the implementation of the technology in the organisation, so that the most benefits could be reaped from the investment made in IT. These

'aspects to manage' are seen as not being context specific and they have universal validity. One of these 'aspects' is the social dimension of IT, but it is only seen as one variable amid many others (Sprague and McNurlin, 1993; Laudon and Laudon, 1998).

Following this same trend, most IT development methodologies focus on organisational tasks and processes, mostly ignoring the human issues such as communication, culture and ideology (Vickers, 1999). Walsham (1993) states that although information technologists work with computers which are mechanistic devices, the use thereof in organisations cannot be seen as entirely mechanistic as there are other values and aspects, such as people and politics at stake. Organisations and our society are socially constructed and Walsham (ibid.) argues that IT must therefore be subjectively interpreted – what an organisational researcher will describe are not facts, but rather perceptions that depend on the specific researcher.

In 1987 Klein and Hirschheim (1987) reported that society had changed and there had been a shift from efficiency and effectiveness towards social acceptability and appropriateness, as the new objectives of IS and IT. People were more and more demanding the right to have a say in anything that would influence their jobs, of which IT certainly forms a part (Kling and Dunlop, 1993). According to Dahlbohm and Mathiassen (1993) our mechanistic heritage has lead us to believe that IT could be used as a tool to solve organisational problems. Technological determinists would therefore view the adoption and use of IT as a process of engineering in which system engineers play the major role. On the contrary, they state that the implementation of IT in organisations does not solve problems, but rather instigates organisational change.

Postman (1992) argues that organisations are in essence ecologically different because of the introduction of IT. IT rarely solves problems – in many cases it causes new problems which in most instances are soft/human/social problems. To understand these problems, viewing

information systems as social or socio-technical systems could provide a better understanding of IS in organisations.

3.3 Information Systems as Socio-technical Systems

There are many definitions for information systems. Alter (2001) describes information systems as consisting of hardware, software, people and business processes. This idea is matched by the four information system levels suggested by Withworth (2005) being mechanical; information; cognitive; and social. He maps these levels to specific disciplines and provides examples of each. Table 4 explains these levels in more detail. These levels are overlapping views of the same information system and Withworth (ibid.) argues that systems become social-technical when the cognitive and social interaction with the system is facilitated by IT and not by the natural world. The higher levels in the table depend on the lower levels, so a failure in the lower level will cause all the levels above it to correspondingly fail.

Level	*Examples*	*Discipline*
Social	Norms; culture; laws; zeitgeist; sanctions; roles	Sociology
Cognitive	Semantics; attitudes; beliefs; opinions; ideas; morals	Psychology
Information	Software programs; data; bandwidth; memory; processing	Computing
Mechanical	Hardware; computer; telephone; fax; physical space	Engineering

Table 4: Information system levels (Source: Whitworth, 2005)

Other definitions of information systems state that it consists of hardware, software and otherware. Van Steernis (1990) describes otherware as the human part (the owner and users) that uses the hardware and software; the operational procedures followed by these people; their tasks and responsibilities; et cetera. The first two subsystems of an IS are clearly deterministic in that they comprise of machines and coded procedures and

one could succeed in predicting their output, given specific inputs. The otherware subsystem is though not premeditated in the same way as the first two subsystems and is erratic due to unpredictable human behaviour; human shortcomings; et cetera. This makes it non-deterministic, which consequently makes the overall information system non-deterministic. Boland & Hirschheim (1987) support this when they describe an information system as a social system that depends on technology for its working.

The socio-technical approach to information systems therefore acknowledges the social nature of technology and views an information system as both a social system and a political system. According to Kling (1996) information systems form part of a larger social-technical system and should be studied as such and not merely as a component existing by itself. He argues that many computer scientists get thrilled by the potential of IT to change social life, but they are reluctant to observe and report on the problems and issues of such endeavours. IS and IT indeed impact on the life and work of individuals, organisations and society, and this impact is far-reaching. To this extent Susman (in: Vickers, 1999) states that the tacit organisational problems such as the effect that the implementation of IT has on work tasks, are not sufficiently studied. McDonagh and Coghlan (2000) concur that the techniques, methods and tools used by most IT practitioners are technocratic in that they ignore the human and organisational factors that cause most IT related failures and non-performance. Only a few of these methodologies can capture the meaning, assumptions, norms and values which are the undefined qualities of knowledge and human competence (Angell and Straub, 1993). Implementing IT in an organisation means that one intervenes in the normal organisational activities. This intervention could also be forced from top management or from the organisation's environment. According to Dahlbom and Mathiassen (1993) this intervention should be done using a holistic approach to IS development, where developers play the part of consultants and change agents, subjectively being part of the context within which the IS is implemented. This calls for the owners and users of the IS to actively take part and share responsibility in the development process and in the use of the IS (Mumford, 1981;1983). In this sense IS development is

recognised as a political process which cannot be accomplished by providing and following rigidly and precise system specifications.

Galliers and Swan (1997) state that little attention is given to the biased nature of IS when it comes to IS development approaches. They call for a different approach which is supported by pluralist and subjective assumptions as they believe that social actors in organisations have different unitary objectives and that a great deal of the knowledge relevant to the analysis of IS requirements is tacit or socially constructed. This makes it almost impossible to be coded into formal data processing systems.

Socio-technical IT experts claim that they acknowledge social issues and encourage user participation in the process of technology adoption and use. Social systems are emergent and therefore information systems could also be described as emerging systems. The structure of emerging systems changes over time. This takes place through the interaction between the system and its environment. According to Giddens (1984) the relationships that cause the structure over time, also change as the interaction between actors and the structure generate and shape them.

Information systems are not developed or used in seclusion. They are artefacts created by people for the use of people (Orlikowski and Robey, 1991; Vickers, 1999; Du Plooy, 2003). This human involvement and action leads to the technology reflecting the norms and values of the people who designed it (Kling and Allen, 1995) and it determines the format as well as the content of it.

According to Orlikowski and Robey (ibid.) the influence of IT on the organisation is not always very predictable. For it to have an effect, humans must appropriate it, but they could choose not to use it or to use it in a way that it was not intended for. IT could also restrict human activity in that the 'network could be down' or the technology is not capable of performing the job. As humans are non-deterministic in nature, their behaviour is never fully predictable, nor entirely random. Many aspects such as values; subject

expertise; power; culture; etc., influence human behaviour. Humans draw upon these aspects when they interact with IT and consequently either strengthen the institutional structure of the organisation or alter/change it.

Orlikowski (1996) reports on the use of new technology in an organisation, that significant change was enacted over time as users appropriated the new technology in their work place. The deliberate changes brought about by the implementation and use of the new technology lead to emergent changes in the users' practices and inter alia to positive and/or negative unanticipated outcomes. This illustrates the unpredictable outcomes of the implementation of IT in an organisation and shows how IT in most cases lead to emergent change instead of planned change. Following a deterministic approach towards the implementation and use of IS would mean that one believes it would lead to change for which one can plan in advance. Orlikowski (ibid.) argues that it is not possible to determine the changes which will occur, as these take place and 'happen' as the users appropriate and make use of the new technology to perform their tasks.

From this discussion on IS as socio-technical systems, it is clear that the social context within which IS are implemented plays an important role in the adoption and use of IT. This is the position adopted in this thesis. Section 3.4 explores in more details what comprises the content of this social context.

3.4 The Social Context of Information Systems

Information systems are implemented within organisational settings, rather than in a laboratory setting (Avgerou, 2001). In the early 1960s, it was the theory on open systems that changed the standing approaches to organisations in that it made researchers more aware of the importance of an organisation's environment, which was described to have the potential of hampering, moulding, infiltrating and renovating an organisation (Katz and Kahn, 1966). At first an organisation was described as a production system transforming inputs into outputs, while resources followed prescribed task details. It was only in the mid-1970s that organisational researchers discovered organisations were more than this, as they started to comprehend

the social and cultural forces within the organisational environment. Organisations were then defined to be social and cultural systems (Scott, 2008).

What is it then that constitutes the social context within which IS are implemented? The social context of IS is believed to be highly complex and comprises of many intertwined properties (Du Plooy, 1998). Du Plooy's Human Environment (HEM) model was found to be the most comprehensive model describing the social, political and ethical context within which IS are implemented. As his model builds on the diffusion/implementation model of Kwon and Zmud (1987), it is discussed in more detail in chapter 4 of this thesis.

In setting up his HEM model, Du Plooy (1998) argued that people work in an environment where they are constantly influenced by the values, interests, expertise, power, culture, etc. that surround them. When acting, individuals would make use of and reference the knowledge that exists, the resources that are available, and the norms and values which are embedded in themselves and in the context they work in. This is in many cases done intuitively. To elaborate on this 'environment' within which people work, some of the important aspects which are cross cutting in this 'environment' include, amongst others, issues of culture, issues of power and issues of politics. These issues will be reflected on in the next section, but it should though be noted that they will not be discussed and applied in detail, as it would be beyond the scope of this thesis.

3.4.1 Organisational culture

Culture plays a very important part in the individual, group and organisational dimensions of Du Plooy's enhancement of Kwon and Zmud's model, and as it can also act as a carrier of institutions (as will be explained in chapter 6 of this thesis), the researcher will elaborate a bit more on it in the rest of this section.

According to Smircich (1983) organisation and management studies refer to culture as either a *critical variable* (evident in the themes of cross-cultural

management and corporate culture) or a *root metaphor* (evident in the themes of organisational cognition; organisational symbolism; and unconscious processes and organisation). She explains culture as a *critical variable* as something which an organisation *has*, versus culture as a *root metaphor* being something an organisation *is*. Researchers having the former view of culture would view organisations as organisms and use culture as an explanatory variable indicating ways in which it can be shaped or changed and therefore managed. On the contrary, researchers with a root metaphor viewpoint on culture would view organisations as "expressive forms, manifestations of human consciousness", (Smircich, 1983:347). Such researchers would subjectively explore organisations to understand the patterns that enable organised action. True to the concept of culture developed in anthropology, they would epistemologically believe culture to be a system of shared knowledge, shared meaning and a "manifestation and expression of the mind's unconscious operation", (p. 348).

In a review done by Leidner and Kayworth (2006) on culture in IS research, they report that IT and culture is thoroughly interwoven and that culture wields a delicate but powerful influence on people and organisations. According to them many studies have shown that culture plays an important role in human behaviour and strongly impacts on information related behaviour, especially in determining what is believed to be legitimate information (Hall, in: Leidner and Kayworth, 2006).

Schein (1992:12) defines the culture of a group as:

> *"... a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid, and therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems."*

He describes culture to have observable and less observable aspects and uses a three-level model to illustrate this. According to this model, individuals have belief systems towards human behaviour, relationships, reality and truth. These are represented by basic assumptions (on the lowest or first level of

the model) in the form of cognitive structures or interpretive schemes and are used by people in their process of sense making. These assumptions are constructed over time and form the basis of the collective action of a group, as they build strategies to cope with their problems. These strategies are then passed along to new members as they join the group (Van Maanen and Barley, 1985).

At the second level of Schein's (ibid.) model are 'values'. These values reflect the underlying cultural assumptions and explain why people behave the way they do. They are a more visible part of culture as people are more aware of what their values are. The most observable part of culture is though found at the third level of Schein's model. These are the artefacts and creations of the people and include 'things' such as language, rituals, myths, ceremonies, and art and technology.

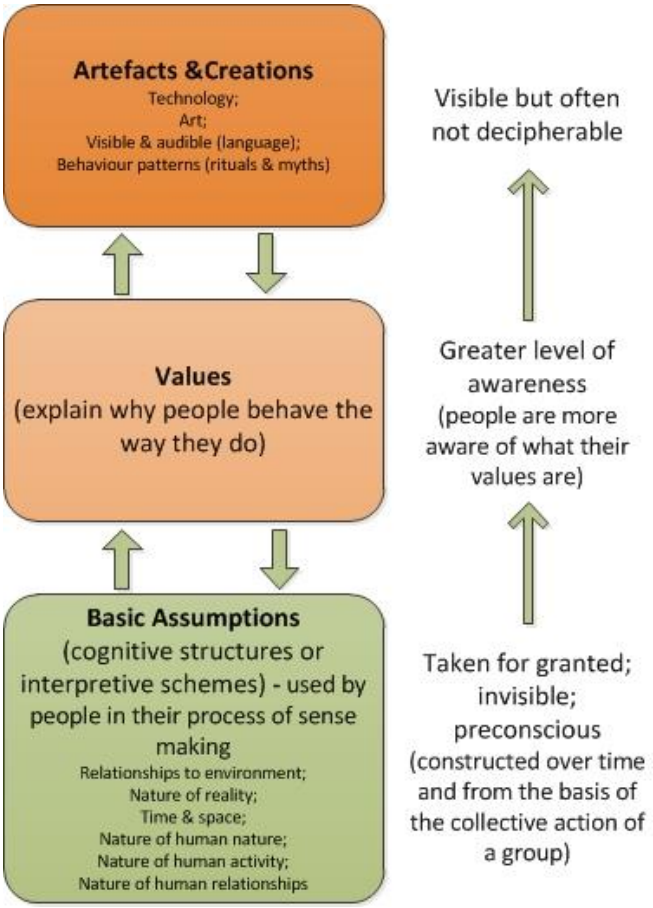


Figure 3: Schein's levels of culture and their interaction (adapted from Schein, 1984)

When studying culture, researchers tend to study the *values* of a group (second level of Schein's model), rather than the *underlying assumptions* (first level) or the *artefacts* (third level). According to Schein (ibid.) this is because the assumptions are not visible and therefore preconscious, while on the other hand the artefacts (although visible) are difficult to decode or interpret. In this sense it seems to be most relevant to study organisational values in an attempt to explain the behaviour of social groups in an organisation when IT is applied in the organisational context (Leidner and Kayworth, 2006).

On a national level, several researchers have made use of Hofstede's cultural values to describe how national culture relates to IT adoption and use (Leidner and Kayworth, 2006). These values include amongst others the following: uncertainty avoidance; power distance; individualism-collectivism; and masculinity-femininity (Hofstede, 1983). In this way De Vreede, Jones and Mgaya (DeVreede, Jones and Mgaya, 1998) for instance found that in a high power-distance culture where minions tend to not question their manager's decision, the adoption of group support systems (GSS) increased as the power distance grew. The opposite was though found in a study by Hasan and Ditsa (Hasan and Ditsa, 1999) who assert that IT adoption tends to be more successful in a low power-distance culture, as IT staff would in such environments be keener to advise managers on the use of IT, leading to a higher adoption rate. To this extend Leider and Kayworth (ibid.) warn that studies on culture and IT adoption should rather focus on understanding the dynamics of IT adoption (such as the adoption time and objective), than on attempting to predict the adoption of IT using cultural values.

Another important factor on culture and IT adoption is the issue of cultural fit. IT is embedded with values, which are entrenched in the work tasks that it instils. Serida-Nishimura (1994) states that the fit between the fundamental assumptions and beliefs of the people in the organisation and that of the technology implemented, will determine the mode of adoption and use. A 'good' fit will lead to more successful adoption and use. In the same way Hill, Loch, Straub and El-Sheshai (1998) found that cultural values such as face-to-face interaction preference; family commitment; the concept of time;

religion; as well as gender relations, either assisted or hindered the transfer of technology in five Arab countries. This is reiterated by Cabrera, Cabrera and Barajas (2001) who state that the successful integration of IT commands either a fit between the IT and the organisational culture, or the shaping of the culture to fit the IT.

According to Leidner and Kayworth (2006) most studies on IT and culture view culture to be stable, steadfast and difficult to change, with only a few reporting on evidence of the impact of IT on culture. Madon (1992) did a longitudinal study in India in which she observed the implementation of IT to lead to the increasing use of it, eventually leading to cultural transformation on a national basis. This transformation included changes in the status, hierarchy and leadership of the Indian people; the reallocation of power between the state and local districts; as well as the increased use of electronic information in rational decision making. On an organisational level a study by Doherty and Perry (2001) shows the implementation of a new workflow management system to have strengthened the organisational culture values of customer orientation; flexibility; a focus on quality; and performance orientation, while a study by Dorethy and Doig (2003) shows that the improvement of the organisation's data warehousing capabilities changed the organisation's customer service; flexibility; and integration values.

Leidner and Kayworth (2006) state that it is only when there is a cultural conflict, that culture becomes noticed. In many cases people are therefore unaware of its existence. They propose a three-way view of IT-culture conflict, in which they define three types of values (group member values; values embedded in a specific IT; and IT values) and three types of conflict (*system conflict*; *contribution conflict*; and *vision conflict*). Different to most studies in IT and culture, their model applies to the levels of sub-units (which could be a structural unit within an organisation or an informal community); organisations; as well as nations. They argue that *system conflict* surfaces when the values embedded in a specific IT, contradict the values of the group of people who use it, e.g. implementing a group decision support system in an organisation where the people have strong individualistic values. *Contribution*

conflict takes place when there is a contradiction between the values of the group of people who use the system and the values they believe IT (in general) to have, e.g. medical doctors who believe that IT in general is about controlling costs, while to them the value of taking medical care is far more important and thus in conflict with cost cutting value. Lastly, v*ision conflict* occurs when there is a mismatch between the implemented system's values and the IT values of the group. This will take place when the group's general perception of IT is for instance that it is time consuming to capture all the necessary data into an IS, while the new IS in the organisation was implemented with the objective of increasing efficiency.

This three-way view on culture conflict could assist in the understanding of why the implementation of IT does not have consistent outcomes in all social contexts. Leidner and Kayworth (2006) furthermore argues that management could attempt to shape IT values in a process to minimise *vision* and *contribution conflict*, which could in turn lead to less *system conflict*. Apart from management intervention it is also proposed that the inherent value conflicts which occur when IT is introduced into a cultural setting will over time result in the reorientation of values and as such lead to a change in culture.

3.4.2 Technological frames of reference

Orlikowski and Gash (ibid.) describe frames of reference to be mental models kept by individuals, but which could be shared amongst individuals should there be a significant overlap of this cognitive content. These frames function in the background and could either facilitate or constrain one's interpretation of organisational phenomena. In this sense, existing frames could therefore inhibit members of an organisation by keeping them in a so called conceptual 'prison', preventing them from 'reframing' to look at old problems in a new way. Although the members of a social group, such as an organisation, have individual frames of reference, there are also some frames which would be collective and shared amongst them, and in way relate to organisational culture, although they are not the same. The sharing can take place through socialising, interacting and negotiation between individuals. The main difference between culture and frames of reference lies in the fact that culture

could be used to interpret a context, while frames of reference focus more on how people make sense of certain aspects in the world they live in. In this sense, the way people make sense of technology is referred to by Orlikowski and Gash (1994:178) as a subset of frames of reference, being 'technological frames of reference', which refer to the 'assumptions, expectations, and knowledge they use to understand technology in organizations."

The frames of reference used by technology designers therefore influence the end product they design, while that used by the end users of the design again influence the way in which the technology would be thought about, and consequently the way in which end users would react toward it. End users' technological frames of reference are 'implicit guidelines' and are gained by interacting with the technology in an attempt to make sense of it. In this process of sense making, end users would gain knowledge and expectations of the technology which over time become taken-for-granted or tacit concepts or beliefs. These would again influence how they go about thinking about the technology and using it. According to Orlikowski and Gash (ibid.), understanding these frames of reference provides valuable insights on how technologies are constructed, used and changed and consequently on the impact that new technologies could have on the organisation. To understand how end users interact with technology, one has to understand how they interpret the technology.

Different stakeholder groups in organisations would have different technological frames of reference which they are not likely to share. Being engineers, technologists would view technology as a design tool which could be used to achieve a specific task; line managers might view it as a tool to facilitate business functions, focussing on how it could be used to increase profits; while end users might view it as an instrument which they could use to help them accomplish a specific day-to-day task (Orlikowski and Gash, 1994). When these frames or cognitions of technology are shared between the members of a group they become congruent and connect to institutional analysis which is discussed in more detail in chapter 6 of this study. While congruent technological frames of reference between groups could assist in

the adoption and diffusion of IT, incongruent frames could stand in the way of adoption and cause a lot of conflict during IS design sessions.

3.4.3 Power and organisational politics

According to Jasperson *et al.* (2002) power is a disorganised concept which is indefinable in that it has both visible and hidden characteristics which are not easily described. Hall (in: Jasperson *et al.*, 2002:399) describes power as the aspect "that has to do with relationships between two or more actors in which the behaviour of one is affected by the behaviour of the other." Foucault (in: Dhillon, 2004:636) argues that "power is a 'technique' that achieves its effects through its disciplinary character, thereby residing in the values, traditions, cultures, and structures of an organisation."

Myers and Young (1997) use Habermas' model of societal development to explain that IS development projects could be deeply entrenched with the hidden agendas, assumptions and power of management. These hidden aspects could to a large extent play an important role in repressing the involvement or participation of the end users.

In the same way Markus (1983) explains that the interaction between the characteristics related to the people and that related to the system could lead to people or groups resisting the IS. In this sense it is neither the system, nor the people who resist the new system, but rather the interaction between them. The political version of the interaction theory holds that resistance is due to the interaction between the design features of a system and the intra-organisational distribution of power, which could be seen as objective or subjective. This implies that there are no tactics which IS implementers can use to minimise or prevent resistance in each and every situation and that the best strategy to implement an IS could only come from a proper and detailed analysis of the organisational setting within which the system is to be implemented. Markus (ibid.) furthermore argues that current IS development methods only allow for analysing and designing the technical functionalities of an IS and that these methods should be expanded on with a social or a political analysis.

Orlikowski (1992) notes that although technologies are designed, interpreted and used in flexible ways, this flexibility is a function of aspects such as the material components of the technology, the institutional context within which the technology is developed and applied, as well as the power, knowledge and interests of the developers, users and managers of it.

Dhillon (2004) claims that power is a force which effects the outcome of an IS implementation, but emphasises that it should not only be considered as a negative force. In the field of IS, many different views of power exist, and the successful implementation of IS is more likely to occur when the power within the resources, processes and meaning is leveraged in an applicable way.

3.5 Conclusion

Avgerou (2001) states that a great deal of IS research has been done on developing 'best practises', conceptual frameworks and normative models to assist IS practitioners with the general implementation of information systems in organisations. Most of these studies do not pay a lot of attention to the different organisational and broader contexts within which these innovative systems are implemented. According to Avgerou (ibid.) general trends, such as total quality management (TQM); business process re-engineering (BPR); and the discourse on globalization, support the rationale that there are standard ways in which information and communication technologies (ICTs) should be used, and there are specific organisational features which ICTs should aim at supporting. Avgerou (ibid.) calls this approach to the exploitation of ICTs 'a-contextual', and warns that it involves high risks of misleading and provoking the local attempts to make sense of and adopt new technologies.

Information systems studies are in essence contextual, as they address a changing entity within its environment (the information system within the organisation). In studying the implementation of an information system in an organisation, one needs to study the technological change brought about (or the '*content'* of change), the way in which the change takes place (the

'*process*' of change) as well as the socio-organisational or environmental conditions under which it happens (or the '*context*' of change). Many researchers have used such a contextualist approach (Madon, 1992; Madon, 1993; Walsham, 1993; Avgerou, 2001). According to Callon & Law (1989) an IT innovation and its context are so entwined that it would be an oversimplification to see the technology as the content and the society as the context. Such a simplification makes it difficult to understand the multifaceted processes in which technology and humans take part to form socio-technical entities. When studying change in the field of IS, one should therefore not only study the IS innovation as the content of change, but rather the change of heterogeneous networks of organisations and people within which these innovations will play a role (Avgerou, 2001).

Information systems studies have mainly been concerned with the organisation as the context of implementation and change. As referenced earlier, authors such as Orlikowski (Orlikowski, 1992; 2000) and Walsham (1993) have applied Giddens' structuration theory to contribute to the understanding of this organisational context, by describing the processes through which ICTs are themselves shaped, while they at the same time contribute to the shaping of the social relations of the organisations within which they are implemented.

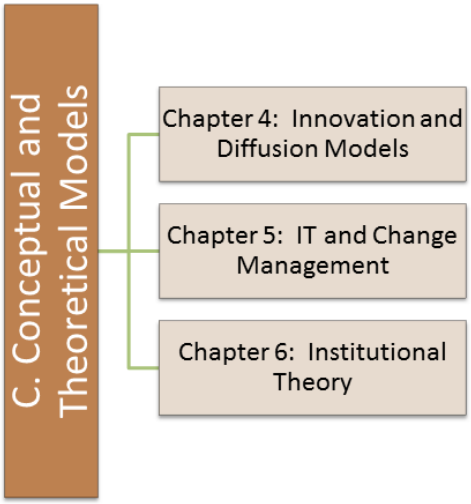
Environmental context forms an essential component in explaining social action (Scott, 1991). According to Pettigrew (1987) the context within which an information system is implemented, should be divided into a set of different levels. The contextual researcher should aim at understanding the way in which these levels are interconnected and should use an applicable theory which could explain how the process of change, brought about by the new implementation, is constrained by its context, while at the same time it also shapes its context.

Pettigrew (1987:655) proposes that a contextual study of a phenomenon, such as the process of IS implementation, should 'draw on phenomena at vertical and horizontal levels of analysis and the interconnections between

those levels through time.' The horizontal analysis refers to the order in which the events took place and the way they relate through time, while the vertical analysis shows how the different vertical levels in which the events unfolded (such as the local organisation, regional/national and international context), depend on each other.

There are many goals or objectives which could be persuaded as reasons to implement IT in organisations. These could be to take the organisation to new heights; to maximise profitability; to gain competitive advantage; etc. This thesis discusses the case of implementing OSS in the public sector, of which the reasons and motivations are discussed in chapters 8 and 9. No matter what these goals are, it is important to note that the implementation of IT in an organisation will change the social milieu within which it is implemented and cognisance should be taken of this milieu if one wants to understand the implementation process.

SECTION C: CONCEPTUAL AND THEORETICAL MODELS



The next three chapters will provide an overview of the conceptual and theoretical models used in this thesis. Chapter 4 provides an overview of the classic innovation and diffusion models. It discusses Rogers' model of innovation diffusion and highlights the shortcomings of his model when applied to IS adoption and diffusion. These models lack the consideration of social interaction, but also over-simplify the innovation process. To address these shortcomings, the Human Environment Model (HEM) of Du Plooy is discussed, arguing for the nurturing of the human environment within which the IS is implemented.

When implementing an IS in an organisation, change is preordained. Not all changes can be planned in advance, as the implementation of IS in many cases have unintended consequences which could lead to new emergent or improvised changes, which were initially unanticipated. Chapter 5 elaborates on the change theories in literature, and their applicability to the management of ICT related change. This will help to shed some light on the research question focussing on the ability of change management models to explain the change to OSS as discussed in chapters 8 and 9 of this thesis.

Institutional theory is used as a lens to further understand the change process in the case study investigated for this thesis and thus chapter 6 explains the origins and main concepts of institutional theory, elaborating on the use of it in organisational studies and IS.

Chapter 4:
Innovation Diffusion Models[3]

4.1 Introduction

The purpose of this chapter is to provide an overview of the classic innovation and diffusion models. Section 4.2 commences with a discussion of Rogers' model of innovation diffusion and describes the attempts of other researchers to enhance this model. The shortcomings of this model and that of its enhanced attempts are highlighted and section 4.3 offers an alternative model - the HEM model of Du Plooy which addresses these inadequacies.

The IS literature usually implies the 'diffusion, adoption, implementation and use' of IT in organisations when using the term 'diffusion' (Prescott and Conger, 1995). These terms are even sometimes interchanged to also read 'adoption and diffusion'. Although in contrast to the classic innovation diffusion models, this is to indicate that with IT, the adoption of the innovation in most cases foreshadows the diffusion. Top management would for instance take the decision to implement the IT first and only then the spreading would take place throughout the organisation (Moore and Benbasat, 1991).

In the late 1980s and early 1990s a lot of research in the field of IS was conducted on IS implementation problems (Moore and Benbasat, 1991). IS implementation research was mainly based on the theories of innovation diffusion, focusing on how the perceptions of the potential users of an ICT

[3] The contents on of this chapter (with specific reference to the framework for the human environment for the adoption and use of IT, by Du Plooy) has been published in the following articles:
a. BYRNE, E. & WEILBACH, L. 2008. A Human Environmentalist Approach to Diffusion in ICT Policies. *In:* AVGEROU, C., SMITH, M. L. & VANDENBESSELAAR, P. (eds.) *Social Dimensions of Information and Communication Technology Policy.* Pretoria, South Africa: Springer.
b. WEILBACH, L. & BYRNE, E. 2010. A Human Environmentalist Approach to Diffusion in ICT Policies: A Case Study of the FOSS Policy of the South African Government. *Journal of Information, Communication & Ethics in Society,* 8, 1, 108 - 123.

innovation influenced the adoption thereof. One of the most cited innovation-diffusion theories is that of Rogers (Prescott and Conger, 1995), which will be discussed in the section to follow.

4.2 Classic diffusion/adoption models

Rogers (1995) defines the 'classic' definition of diffusion of innovation as:

> *"… the process by which an innovation is communicated through certain channels over time among the members of a social system …"*

Rogers' innovation-diffusion model shows that factors which influence the diffusion of an innovation are the characteristics of the innovation, communication channels, and the social system, all interacting over time (see 4).

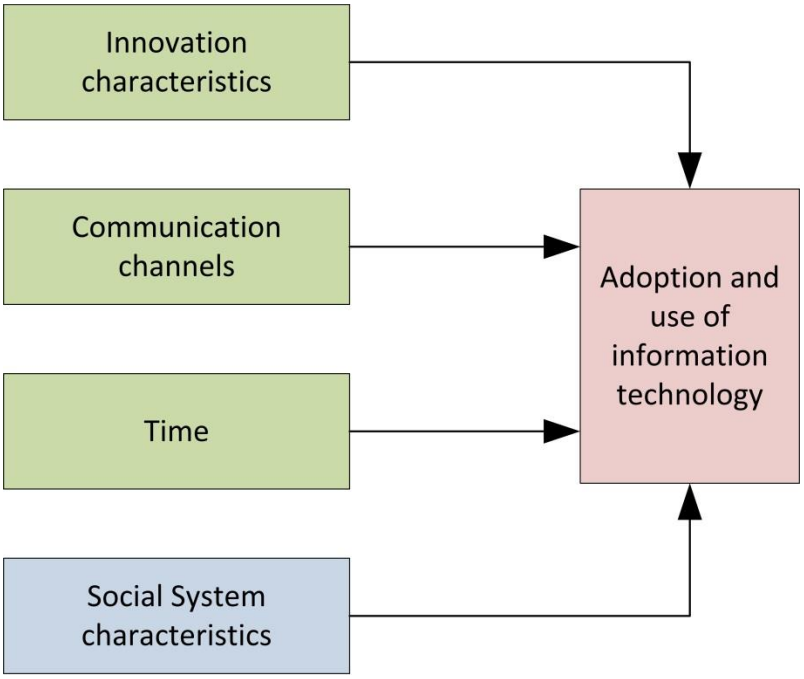


Figure 4: The innovation-diffusion process (Source: Prescott and Conger, 1995)

Consequently, diffusion is comparable to the 'spreading of the word' about a new idea, an innovation or a new technology; which means that the adoption or the rejection of the idea would follow in time. Adopting an innovation again means some kind of change will occur in the social system within which the adoption took place.

The five *characteristics of an innovation* which affect the rate of diffusion of that innovation, are: *(i) relative advantage* (the degree to which the potential adopter perceives the innovation to be better than its forerunner); *(ii) compatibility* (the degree to which the potential adopter perceives the innovation as being in line with his/her existing values, needs and past experiences); *(iii) complexity* (the degree to which the potential adopter experiences the innovation as being difficult to understand); *(iv) observability* (the degree to which an innovation's results are evident to others); and *(v) "trialability"* (the degree to which the potential adopter will try-out the innovation before adoption).

Moore & Benbasat (1991) added two more *innovation characteristics* to the model of Rogers from the context of IT adoption and diffusion, namely: *(vi) image* (the degree to which a potential adopter's image or status is perceived to be enhanced in his/her social system because of him/her using the innovation); and *(vii) voluntariness of use* (the degree to which the potential adopter is perceived to willingly make use of the innovation). They furthermore split *observability* into *result demonstrability* (the degree to which the potential adopter's results of using the innovation are observable and communicable to others) and *visibility* (the degree to which information technology is apparent to the sense of sight). Moore and Benbasat (1991) further pointed out that the key to whether or not an innovation diffuses is not really a result of the potential adopter's perceptions of the technology itself, but rather his/her perceptions of using the technology. They therefore rephrased Rogers' five innovation characteristics to reflect that it is the perceptions about using the innovation rather than the perceptions about the innovation itself which are of concern, and in addition labelled it "the Perceived Characteristics of Innovation (PCI)". Following this argument, someone would therefore use a technology even if s/he dislikes it, but still believes that using it would have a positive outcome.

The *social system's* characteristics referred to in Rogers' model include those of the individuals, groups, the organisation, decision makers, and specific role

players such as champions and senior managers, while the *communication channels* referred to are used to inform the social system of the innovation. These could be internal or external to the organisation and could transfer either formal or informal communication. In this regard the IT industry places a lot of emphasis on 'keeping up' with new technology and some suppliers of technology put in a lot of effort to announce their new or planned products to their customers (Prescott and Conger, 1995).

According to Rogers (in: Prescott and Conger, 1995) the innovation decision process consists of three stages: *adoption*; *implementation and confirmation*. The adoption stage in turn comprises of three sub-stages: knowledge acquisition (gaining knowledge about the idea), persuasion and learning (developing a favourable or unfavourable attitude towards the innovation), and the decision to adopt or reject the innovation (when engaging in activities that lead to making a choice to either adopt or reject). Implementation occurs when the individual starts to use the innovation; while *confirmation* occurs when the individual seeks the reinforcement of the innovation-decision already made (see Figure 5).

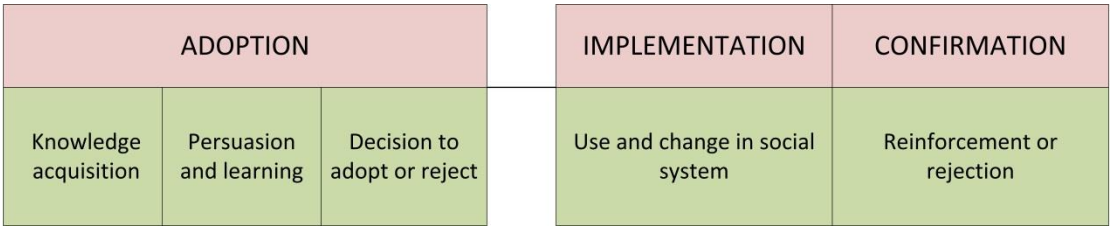


Figure 5: Stages in the innovation-decision process (Source: Prescott and Conger, 1995; Rogers, 1995:163)

In the IS literature, the term 'diffusion of ICT" is habitually used to indicate the diffusion, adoption, implementation and use of ICT in organisations (Prescott and Conger, 1995). For ICT diffusion these stages are in most cases interchanged to read 'adoption' followed by 'diffusion', as the adoption of ICT often precedes the diffusion of it; ICT is mostly first introduced before the use of it spreads through the organisation (Moore and Benbasat, 1991).

Kwon and Zmud (in: Cooper and Zmud, 1990; Dholakia and Kshetri, 2004) came up with a model of ICT implementation which consist of six phases. The six phases are:

- Initiation: finding the 'match' between the found ICT solution and how it would be applied in the organisation;
- Adoption: the organisation has decided to invest some of its resources in the ICT solution;
- Adaptation: the ICT solution is available for use by the intended users
- Acceptance: the ICT solution is used by the users
- Routinisation: the governance systems of the organisation is accustomed to also include the ICT solution
- Infusion: the organisation uses the ICT solution to its completest capacity.

The process of IT implementation is very similar to Rogers' innovation decision process, as according to Kwon & Zmud (1987) IT implementation is the effort put in by the organisation to diffuse a technology within the user community. Kwon & Zmud (1987) combined the diffusion of innovation theory with implementation research such as Leavitt's (1964) Socio-Technical (S-T) model of organisations and as a result ended up with an enlarged diffusion/implementation model. Leavitt's model views organisations as multivariate systems which consist of four components. These components are task, structure, actor and technology. According to Leavitt these components are intensely connected/related/linked, and mutually dependent on each other. This means that changing the one component will have an effect on the others. Following an open system equilibrium notion, it also means that if one of the components have a state which is not compatible with the others, it will cause a 'variation' and the other components (and for that matter the whole system) to malfunction. These variations appear on a continuous base and are unavoidable as it comes from the organisation's environment. The components are therefore constantly changing and the role of management is to control these variations to maintain the system balance. Oscillations are caused by variations which occur for extended time periods or

which appear to be very strong. This will decrease the task ability of the system.

Although this model has amongst others been criticised in the IS literature for its static structure and the fact that it ignores the environment, it was used by Kwon and Zmud (1987) to come up with their enlarged diffusion/ implementation model of innovation. This enlarged model splits Rogers' social system into three sub-systems (individual, the organisation, and the environment) and also includes characteristics for the task component (uncertainty, autonomy, and variety). Additionally it also adds the environmental component which includes characteristics such as heterogeneity, uncertainty, competition, concentration/dispersion, and inter-organisation interdependence (see Figure 6).

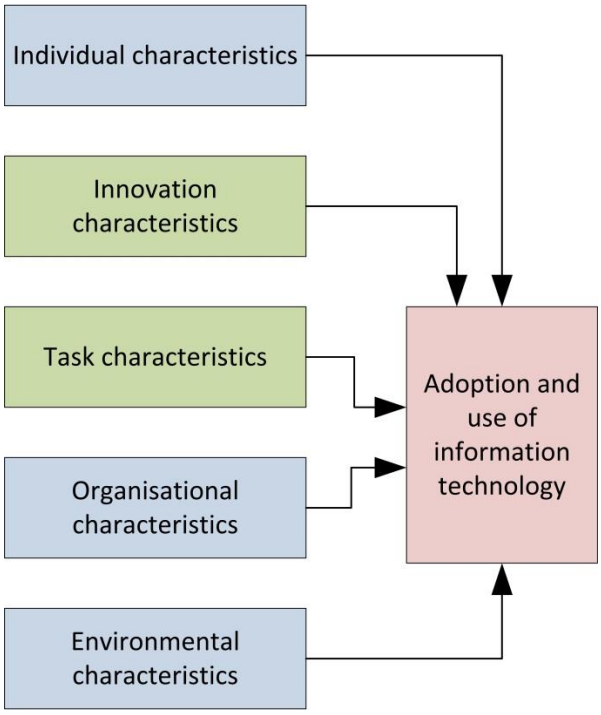


Figure 6: Kwon & Zmud's diffusion/implementation model (Source: Kwon and Zmud, 1987)

All of these innovation diffusion models can be critiqued in a number of ways. As mentioned above, terminology in IT research seems to differ from that used in classic diffusion research, as for the former the adoption of technology

is often a decision taken by a higher authority and, consequently, the IS department gets tasked to diffuse the technology through the rest of the organisation. The decision to adopt the technology is therefore made without consulting all the individuals in the organisation and often doesn't include any of the potential end-users (Bayer and Melone, 1989). Adoption is therefore seen as the decision to use the technology, while diffusion is the process of implementing the decision.

Furthermore, in the IT field, voluntary decisions to adopt an innovation are not very common and Rogers' model does not address the resentment which is often caused by the enforcement of IT from a higher authority. Bayer & Melone (1989) also argue that the characteristics of "non-diffusion" are of major importance to the IT field, due to the high incidence of IS failure, and that the classic diffusion theory does not explain why innovations are discarded in the same depth as why it is adopted.

The classic diffusion theory also fails to "consider interactions between various social systems" (Bayer and Melone, 1989). Information technologists tend to be more loyal to their discipline than to the organisations that employ them. It is therefore seldom the needs of their organisation that alerts them of a new technology, but rather their contact with other technologists (ibid.). Aspects such as information politics and power bases seems to be important adoption factors and should therefore also be included in the innovation diffusion theory.

The technology acceptance model (TAM) was introduced by Davis (1986;1989). This model was based on the theory of reasoned action by Ajzen & Fishbein (1980), but was adapted to specifically model the behaviour shown by users when utilising computers. It is therefore viewed by many as well-suited to model user computer acceptance. The TAM postulates that the two beliefs of perceived usefulness and perceived ease of use are the most relevant to computer acceptance. This view correlates with that of Rogers (1995) when considering the adoption of innovations in general terms. The key purpose of TAM is to provide a means by which the impact of external

elements on internal beliefs, attitudes and intentions, could be discovered. It is therefore seen to be useful for both predicting and explaining user adoption and use of information technology. Critique against TAM, and the main reason why it was not considered as a theoretical model for this study, is the fact that the model subscribes to Ajzen and Fishbein's viewpoint that human beings are usually rational and that they therefore make systematic use of the information which is available to them. The theory is thus mainly used to predict human behaviour, and this is mostly done in a very positivistic manner. The researcher is not convinced that one could predict someone's behaviour (such as information technology adoption or not) by only summarising the beliefs which led to a specific attitude and the beliefs that might have led to a specific subjective norm, as this would discount all forms of 'irrational' or 'illogical' behaviour. This theory disregards the influence of factors such as organisational culture, politics and power bases, existing as part of the social context of information system, which were described in chapter 3 of this thesis. It therefore offers a very simplistic view of the adoption process which only acknowledges the adopter's subjective norms, intentions and behaviour, disregarding the 'external factors' which could also influence the adopter's beliefs.

According to Du Plooy (1998) the classic diffusion theory and the enhanced model by Kwon and Zmud (1987) also disappoints as it concentrates on the demographic characteristics of the social sub-systems (the individual, the organisation, and the environment) and also makes no explicit mention of the social context or human environment of information systems adoption and use, i.e. it does not provide an understanding of the social, political and ethical context within which IT is implemented, and fails to acknowledge the changes in structure, culture, work processed, power bases of groups and individuals, markets, etc. which the adoption and use of the technology will bring to the organisation.

4.3 The Human Environment Model (HEM) of diffusion

Given the discussion in chapter 3 on the social context of IS, it is apparent that the human environment in which the IS is to be implemented, needs to be

cultivated and nurtured for successful implementation. How people view technology and how they understand the meaning of technology will impact implementation. Classic innovation diffusion models not only fail in their lack of consideration of social interaction, but also because they are overly simplistic (even deterministic) in their view of the innovation process (or, in terms of ICT, of the process of implementation). According to Du Plooy (1998):

> *"they fail to consider the type of social characteristics and dual interaction between information technology and the organisation, specifically with regard to factors and characteristics such as the different world views of the agent of change and the organisation within which the change is implemented; the duality of technology; the technological frames of reference of the agent of change and the organisation; organisational culture; organisational learning and emergence; the power bases of individuals and groups; empowerment/disempowerment of workers through information technology; resistance to change; the non-deterministic aspects of information technology; the determining capability of this technology; the influence of this technology on the values and judgement of an organisation; the influence of this technology on business processes, organisational learning and internal communication; the application of technology in different work situations, e.g. managerial, individual office work, group work; the influence of organisations on information technology; the adaptation of the organisation to the technology; organisational norms and values; etc."*

Du Plooy (1998) therefore argues that the social context within which the adoption and diffusion of IT takes place is much 'deeper' than the pure demographic characteristics described by the characteristics of Rogers' model. Furthermore, Du Plooy (ibid.) argues that making sense of IT also means understanding the changes in structure, culture, work processes, and power bases that the adoption and use of IT bring to the organisation. Du Plooy consequently extended the enhanced diffusion/ implementation model of Kwon & Zmud by adding a sixth dimension to the innovation-diffusion process, namely group characteristics.

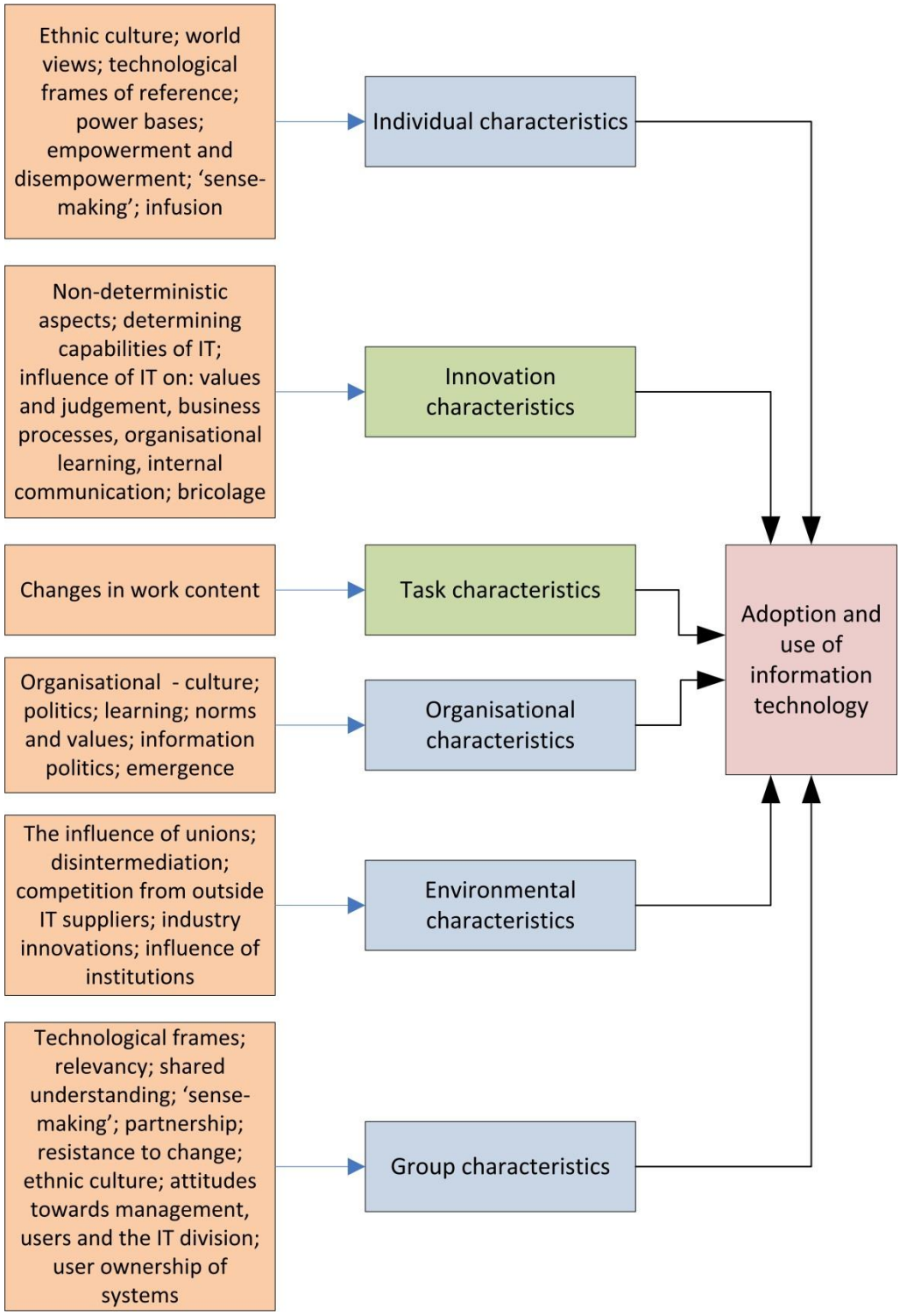


Figure 7: Du Plooy's enhancement of Kwon & Zmud's diffusion/ implementation model (Source: Du Plooy, 1998)

He also added "forces" and "elements" to the other five characteristics which he regarded as of importance to the human environment of IT adoption and use (see Figure 7).

Du Plooy's (1998) enhancement of Kwon & Zmud's diffusion/implementation model is still a deterministic model as it seems to indicate that adoption and use will be successful if one takes the stipulated social factors into consideration when implementing an innovation. Du Plooy (1998), however, believes the mechanistic causal interpretation suggested by the model to be incorrect and inappropriate since information technology is socially constructed and has non-deterministic characteristics. One cannot predict outcomes or determine cause and effect during information technology adoption and use that readily, because of these characteristics.

For more successful adoption and use, one needs to understand the social context of IT diffusion and implementation in its totality. This does however not mean that cultivating all six characteristics will guarantee success, while omitting one of these characteristics will also not necessarily lead to the adoption not being successful. According to Du Plooy (1998) "such determinism cannot be superimposed on a process with so many non-deterministic characteristics." The six characteristics of Du Plooy's human environment of adoption and use framework (see Figure 8) should be viewed as an integrated totality which is not divisible into parts (Du Plooy, 1998):

> *"The six characteristics do not deterministically decide adoption and use. As a whole they are adoption and use in the sense that they constitute the full social context for adoption and use. Taken together they are the very substance of information technology adoption and use."*

The "binding factor" between the various characteristics of the framework is their social contexts. Although each side of the cube points to a different dimension of the social context of information technology adoption and use, these dimensions cannot be isolated and considered on their own. The human environment only makes sense when considered in its totality, as a single environment which interacts recursively with information technology during its implementation and during its use (Du Plooy, 1998).

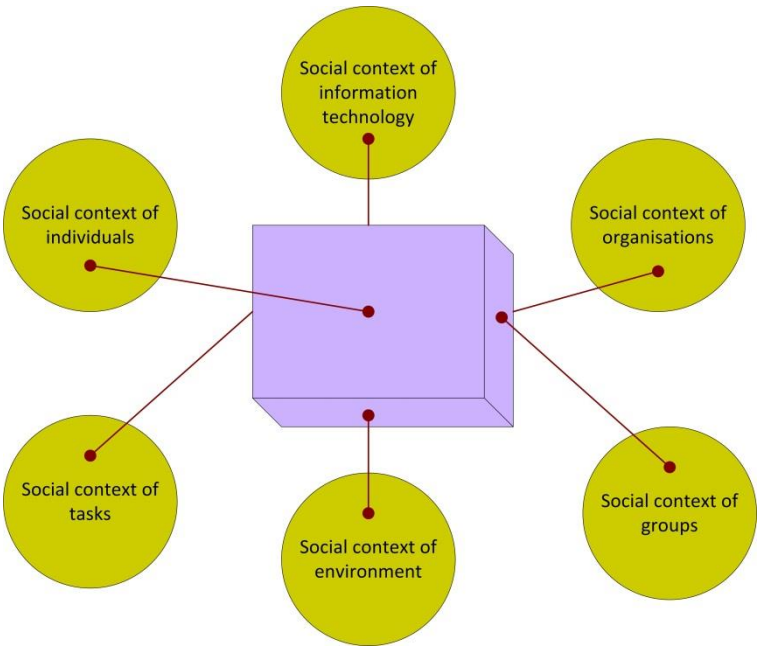


Figure 8: The human environment of IT adoption and us (Source: Du Plooy, 1998)

The recursive shaping of IT and the context echoes structuration theory which describes the processes through which ICT's are themselves shaped, while they at the same time contribute to the shaping of the social relations of organisations within which they are implemented (the duality of technology), (Orlikowski, 2000) - see Figure 9.

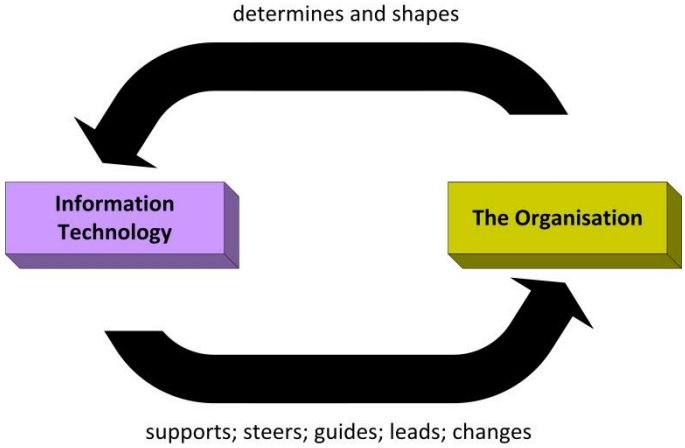


Figure 9: The recursive relationship between information technology and the organisation during the process of adoption and use (Source: Du Plooy, 1998)

The use of Du Plooy's (1998) framework to understand the full social context of information technology adoption and use is best understood when the recursive relationship between information technology and the organisation during the process of adoption and use (as illustrated in Figure 9) is integrated with the human environment framework (Figure 8) to show how the human environment actually encapsulates the process of information technology adoption and use (Figure 10).

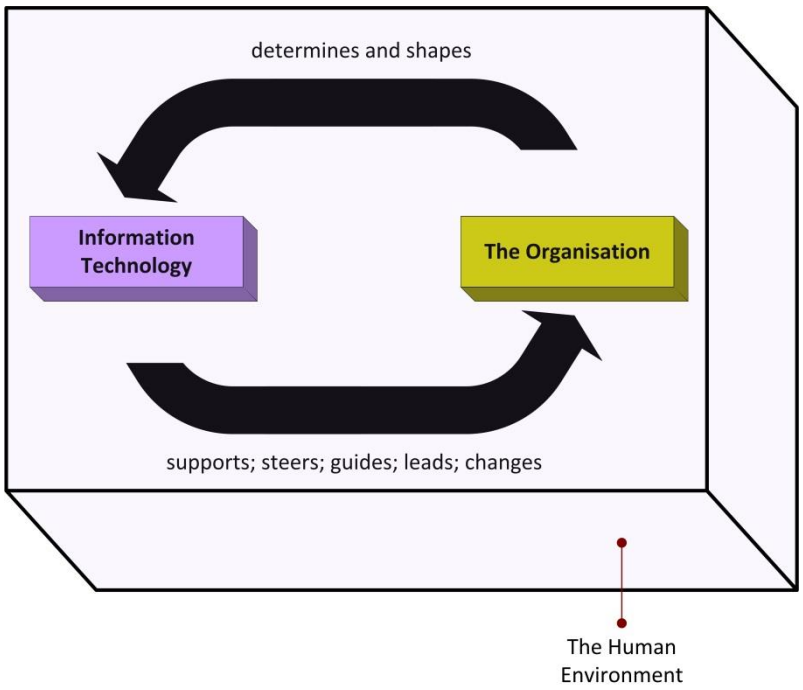


Figure 10: The human environment encapsulating information technology adoption and use (Source: Du Plooy, 1998)

If we therefore understand the interaction between the human environment and the process of IT adoption and use as shown in Figure 10, we are able to make sense of this human environment. Only if we understand the human environment and its interaction with the adoption and use processes will we be able to cultivate and nurture such an environment to facilitate the adoption and use of this technology (Du Plooy, 1998).

According to Du Plooy (1998), it is also important to note that the two dimensions of the adoption and use process shown here are "two sides of the same coin". They are not divisible into two distinct dimensions that can be considered separately because they are both contained and embedded in a

human environment. The upper arrow of Figure 10 shows that information technology is socially constructed, but this model even goes beyond that. Social construction is a term applied to the study of the meanings of technology and how those meanings affect the implementation (the adoption and use) of technology within the organisation (Sahay, Palit and Robey, 1994). This model includes that notion, but also shows that the human environment comprises of various integrated social contexts which transcend the study of meanings to include a large number of non-deterministic aspects that should be considered during information technology adoption and use. The lower arrow shows that information technology may also determine what an organisation is or may become. It does not do so deterministically, but it takes place within a particular human environment. It is the "other side" of the adoption and use "coin" (Du Plooy, 1998).

This duality, however, is not a separation into two things that differ widely from or contradict each other, but it could rather be described as a concept expressed in a different way. Information technology, due to its close interaction with human actors in organisations, has in fact become the relic of modern society. We cannot perform our work in the modern organisation without this technology, but at the same time our organisations and we are changed when we adopt and use this technology (Postman, 1992; Orlikowski, 2000;). These two dimensions are impossible to disentangle or undo. We cannot understand the one dimension unless we also understand the other, and as Du Plooy explains "we can no longer even conceptualise information technology without thinking about its implementation", (Du Plooy, 1998).

4.4 Conclusion

The classic innovation diffusion models illustrate the interaction between an innovation (such as an IS) and its implementation in the organisation, but they have two main shortcomings which are of interest to the research done in this thesis. Firstly, these classic models are deterministic models, being overly simplistic in their view of the implementation process and consequently they fail to describe the iterative duality between the innovation (the IS) and the organisation within which it is implemented.

Secondly, the classic models fail to address the social context or human environment of IS implementation and use in that they don't provide a holistic understanding of the social, political and ethical context within which the innovation (the IS) is implemented. These shortcomings are both addressed by Du Plooy's (1998) HEM model.

In this thesis, the focus is on the implementation of an innovation (an IS) and the organisational environment in which the IS implementation takes place, and thus the dual process of how the IS implementation changes the IS itself and the context in which it is implemented, is of importance to this study. Du Plooy's (1998) HEM model will consequently be used to understand and make sense of the social context within the change process during the implementation of the OS ECM system (described in chapters 8 an 9 of this thesis). The application of his model is described in chapter 10 of this thesis.

When implementing an IS into an organisation, change inevitably takes place. Although this change might initially be planned, the implementation often leads to new emergent or improvised changes, which were initially unforeseen. The process of managing such changes is also of importance to this study. The next chapter will therefore elaborate on the theories available in literature, which could be applied to manage ICT related changes in organisations.

Chapter 5:
Information Technology (IT) and Change Management

When implementing an IS in an organisation, change is inevitable. The purpose of this chapter is to give an overview of change, organisational change and the change management models as they've been applied in the field of organisational studies and consequently in the field of IS. This is done to explain why the improvisational change model of Orlikowski and Hofman (1997) was found to be an applicable model to shed light on the OS ECM implementation process described in the case study of this thesis.

5.1 Introduction

Whether IS researchers follow a technology-driven approach to IS implementation in which the development of IS forms part of planned and formal management, or a softer approach in which IS are seen as a result of social dynamics, they all concur that IT innovation coexists with and supports or underpins organisational change (Avgerou, 2000).

Todnem (2005) confers that the reported change programme failure rate of almost 70 per cent, points to a shortfall of adequate change management frameworks to implement and manage organisational change. Although there are many models or frameworks available, they seem to be unproven, conflicting and perplexing. To shed some light on these, this chapter will focus on defining change and organisational change by elaborating on the different views that exist to explain it (section 5.2). Within these views, the organisational change categories, as described by Todnem (2005), were found to be the most appropriate and are thus described in more detail.

Some of the organisational change models, which fall into Todnem's (*ibid.*) category of 'how change comes about', are consequently explained in section 5.3. This is done as this category seems to be the most in line with the intention of this study, which is to understand the change brought about by the

implementation of an OSS system in the public sector and the way in which it was accomplished. Following this section, the topic of ICT and change management is addressed (section 5.4), as well as the IS change management models which falls into the same category (section 5.5). The researcher finally argues for the use of Orlikowski and Hofman's (1997) improvisational change model as an applicable model to apply to the case study of this thesis (section 5.6).

5.2 Defining change, organisational change and change management

Change could be viewed and defined in many ways and Van Tonder (2004) justly explains that no definition of change is beyond criticism. He expounds that some definitions may be seen as too general while others could again be too specific or discerning, leading to criticism for containing terminology that could be replaced with more expressive, useful or practical terms.

In defining change, some authors emphasise the fact that change produces a new end result. In this regard Van de Ven and Poole (1995:512) state that an organisational entity over time progresses towards a goal or a so called 'end state': "Change, … is an empirical observation of difference in form, quality, or state over time in an organisational entity." Skilling (1996) describes change as a three phase process involving endings; in-between time; and new beginnings, while Porras and Silvers (1991:52) view organisational change as a process, and state that it is "an initiative which alters critical organisational processes, which in turn influence individual behaviours, and which subsequently impact on organisational outcomes."

Consequently, there are a number of frameworks which could be used to categorise change. These include, amongst others, that of Ackerman (1986) who distinguishes between developmental change, transitional change and transformational change; that of Grundy (1993) who differentiates between discontinuous, smooth incremental and bumpy incremental change; that of Tushman, Newman and Romanelli (1986) who describe change as either a

process of converging (fine-tuning or incremental adaptation) or dealing with upheaval discontinuous and frame-breaking changes which are revolutionary in nature; that of Bate (1994) who argues that change is either incremental or transformational; and that of Orlikowski and Hofman (1997) who differentiates between deliberate change and emergent change.

Van Tonder (2004:6) describes change as a dynamic non-discrete process which is time bound. It is evident in the difference in the state and/or the condition within the state of an entity. A change in the condition of an entity will not impact the state of the entity, but a change in the state of the entity will impact on the condition of the entity. Change is 'bounded by its context', and the difference occurring due to the change may be one of magnitude (quantitative); one of nature (qualitative); it may be significant or insignificant; it is likely to be observable; and it unfolds over time. There are numerous dimensions which could be used to explain the primary concepts of change. These could include: complexity; scope; pace; progression or progressive unfolding; degree of control; degree of visibility; role of organisation; and the impact of the change. Moreover, Van Tonder (2004) states that the different types of change could in essence be organised under two primary headings of change concepts. These concepts explain the essence of change and are: "A steady-state, incremental or step-by-step, sequential change..."; and "A major, disruptive, unpredictable, paradigm-altering and system-wide change ..." (Van Tonder, 2004:95).

To conceptualise organisational change, Van Tonder (2004:51) argues that organisations are complex; they are unique and purposeful phenomena, evolving continuously. Organisations possess rational, cognitive, intuitive, unconscious and emotional properties; they are non-linear systems and have dualistic relationships with their environment. There are different stages within an organisation's 'life', which means that organisations change in evolutionary ways, but they could also go through periods of revolutionary, multi-faceted, self-induced or adaptive change. This leads to them growing, thriving, declining or eventually dying. Organisations are led, guided and influenced by leaders and groups; and they use their resources to produce

outputs which are an indication of the quality of their alignment with the environment, as well as their organisational health.

Irrespective of the management theory or the organisational view to monitor and evaluate change within an organisation, there is the need for "a degree of analysis… and an acknowledgement of the social and collective context and content… The alignment between the organisation and its operating context (environment) is at the root of organisational adaptation and survival… and access to appropriate and relevant information, but more importantly the ability to make sense of this information…." (Van Tonder, 2004:51)

According to Van Tonder (ibid.) almost all the theories, models and typologies of organisational change could be categorised within one of the four dominant change paradigms. He differentiates between external typologies and internal typologies. External typologies are ecologically informed and have an environmental deterministic viewpoint of change which implies that the organisation has little to no influence over what happens. Internal typologies refer to organismic change and include life-cycle change where the organisation changes through a cycle from initiation to death; rational-purposive change where changes are purposefully planned and managed through rational and contemplative reasoning; and cognitive change which is not purposefully initiated but still occurs (referred to by some authors as tacit organisational learning) – see Figure 11.

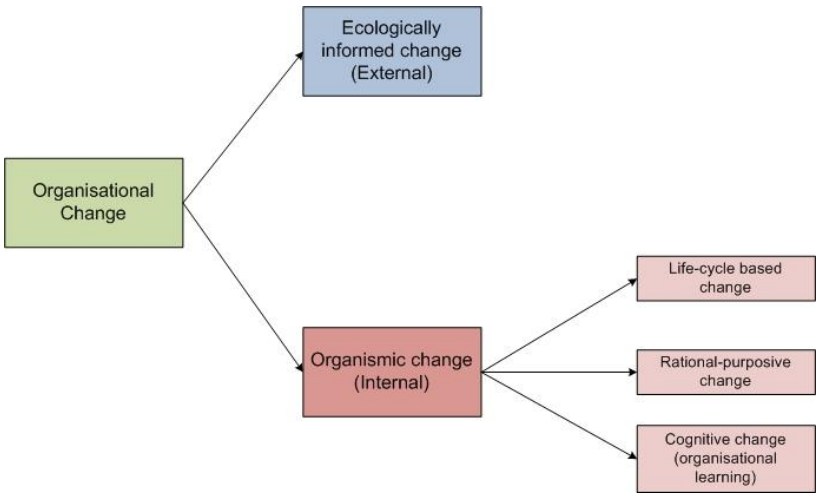


Figure 11: Organisational change according to Van Tonder (2004)

Van Tonder (ibid.) maintains that there is a relationship between the understanding of an organisation and the way in which organisational change is conceptualised and managed. Applying the sociological paradigms of Burrell and Morgan (1979) would then mean that functionalist and interpretive conceptualisations of organisations would view change as undesirable, interrupting the stability in the organisation, while the radical humanists and structuralists would view change as a given. Figure 12 shows how the four different schools of thought influence and determine the 'organisational', and consequently the 'organisational change', view (Van Tonder, 2004).

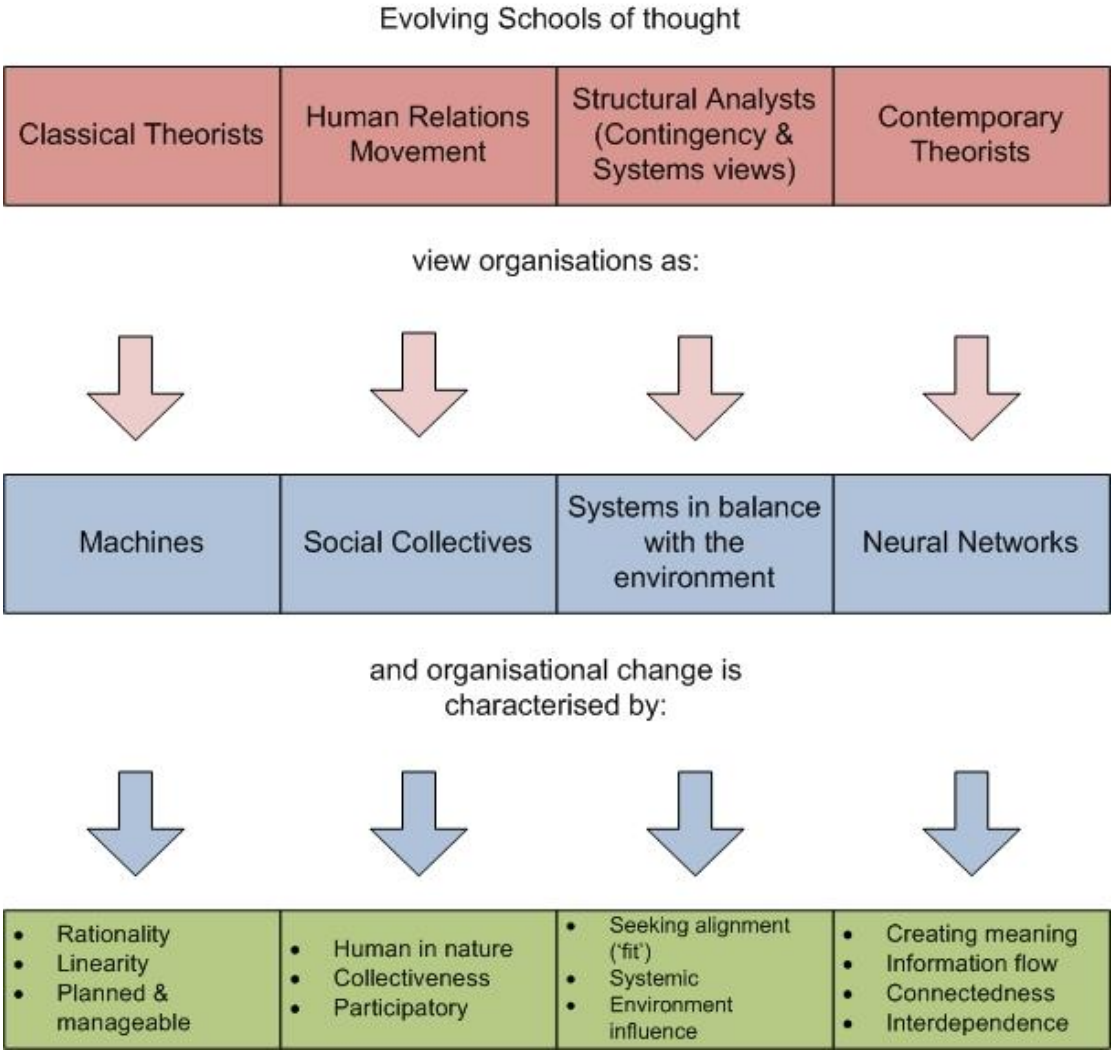


Figure 12: The characteristics of organisational change (Adapted from Van Tonder, 2004, Figure 2.3, P. 49)

In this respect, classical theorists (from the functionalist tradition) view change to be a controllable process. When not performing, the 'machine' could be brought back to its required performance levels, by applying rational analysis and solutions. The human relations movement emphasises the fact that the employee is a social human being. Organisational change from this viewpoint would therefore take place through participation and democratic processes, but this school of thought still believes in 'one best way' of organising and managing, and therefore 'one best change solution'. For structural analysts the organisational environment plays an important role. As the environment greatly influences the organisation, change is very much concerned with aligning the organisational structure with that which is required by the environment it operates in. Contemporary theories view organisations as organic, possessing self-organising abilities (referred to as learning organisations). In this sense less controlled change is needed. It is rather accomplished by increasing the number of relations between potential sources of solutions in an attempt to collectively make sense of the collected information to formulate a change response which is appropriate.

Management theories also fall into the different schools of thought indicated in the top row of Figure 12. The way in which change will be managed, is thus also determined by the way in which organisations are viewed.

Whether change can be managed or not is open to debate and depends largely on what one understands by change management:

> *"Change can't be managed. Change can be ignored, resisted, responded to, capitalized on, and created. But it can't be managed and made to march to some orderly step-by-step process."* (Mintzberg, Lampel and Ahlstrand, 1998 quoted in Van Tonder, 2004:9)

Van Tonder (ibid.) argues that a core premise of his text is "the notion that change is best conceived as something that could be engaged in and influenced to a degree, rather than managed. … we align ourselves with the view that change can be influenced but cannot be directed, controlled, managed or imposed in the absolute sense.", (Van Tonder, 2004:9).

Moran and Brightman (2001) define change management as "the process of continually renewing an organisation's direction, structure, and capabilities to

serve the ever-changing needs of external and internal customers." For them managing change is all about managing the people who are influenced by the change. It is about managing the core activators of workplace performance: purpose, identity, and mastery. People will be positive about change if this change is aligned with what they believe their purpose is; if all possible efforts are directed to maintain personal consistency and change reasons are discussed and motivated openly; and if the gap in mastery (including the necessary skills, abilities and knowledge), which is likely to be brought about by the change, is analysed upfront, setting up a detailed plan of learning opportunities on how to target and minimise it.

Edmonstone (in: Todnem, 2005:370) argues that "many of the organisational change processes over the last 25 years have been subject to fundamental flaws preventing the successful management of change." Although there is an agreement that change in contemporary organisations takes place at a much higher rate, Todnem (2005) claims that the management of such change tends to be re-active, irregular and rather unsuccessful. He consequently appeals that the change literature available to practitioners and academics on the implementation and management of organisational change is very broad and consists of contradictory and perplexed theories and approaches. He therefore adopted Senior's (2002) three categories of organisational change to provide a critical review of current change management frameworks in an attempt to shed some light on the change confusion and to link up the main change theories and approaches. These categories are: change characterised by the ***rate of occurrence***; by ***how it comes about***; as well as by ***scale***. As the researcher found these categories to be the most appropriate in explaining change, each of these will now be discussed in more detail.

5.2.1 Change characterised by rate of occurrence

Discontinuous and incremental change seems to be the main types of change identified by this category. Discontinuous change is triggered internally or externally and is described as fast moves which are caused by strategy,

structure, culture, or all three of these. They are normally events that occur once and which are followed by relatively long periods of stability.

In contrast to this, Burnes (2009) describes continuous change as an on-going effort to continuously adjust in an attempt to keep up with the rapid change tempo. Incremental change is referred to as the process where organisations deal with different problems in a continuous way – one at a time. Incremental change is furthermore divided into smooth incremental change and bumpy incremental change (Grundy, 1993). Smooth incremental change comes about slowly, systematic and predictably, while bumpy incremental change has peaceful times, punctuated by sudden bursts in the change rate. The latter is therefore also referred to as punctuated equilibrium. Continuous change and incremental change is seen to be almost the same, but Todnem (ibid.) differentiates between these two in that continuous change is described as on-going operational changes taking place in the different departments or divisions of the organisation, while incremental change is more concerned with implementing organisation-wide strategies to meet demands from both the external and internal environment.

5.2.2 Change characterised by how it comes about

Change approaches identified by this category are: planned; emergent; contingency; and choice. Of these four approaches, Todnem (2005) highlights planned change and emergent change to have a dominance in the organisational change literature. The planned approach endeavours to explain the process that causes the change and stresses that the organisation goes through a number of different states when moving from an undesired to a pre-defined desired state. Although this approach was seen to be reputable and highly effective over the years, it has been criticised for only focussing on small-scale and incremental change, and thus not being applicable to situations which involve rapid and transformational change. As this approach is built on the assumptions that organisational conditions are stable and that it is possible to pre-plan a move from one steady state to the next, the validity of this approach has been questioned.

In contrast to this Todnem (ibid.) argues that organisations operate in rapid moving environments and that organisational change has become a more undecided on-going process which becomes impossible to manage using pre-set timetables, objectives and methods. The planned approach also does not provide for situations of crisis during which there is no time to consult or involve widespread resources, and it also assumes that there could be an agreement between all stakeholders to implement the change. In contrast to planned change which thus views change mainly as a top-down approach handled by senior managers, emergent change tends to be a bottom-up approach to change.

Emergent change concedes that change cannot be predicted as it arises due to the relationship between many different organisational variables. As the internal and external organisational environment tends to be indeterminate (dynamic and unpredictable), the emergent approach to change seems to have gained a lot of ground. Dunphy and Stace (1993) argue that for organisations to be able to deal with their complex and uncertain environment, they need to become open learning systems. In this sense the development of their strategy and the way in which they change emerges from how they obtain, understand and handle this environmental information. Rather than having pre-planned steps to change, emergent change approaches argue for an in depth understanding of the organisational context and how the different aspects in the context can either facilitate or block the change process.

According to Burnes (1996) there are no ‘good’ or ‘bad’ change approaches, but care should be taken to ensure that the chosen approach is the most appropriate one for the conditions to be addressed. This does though not entail adopting the ‘best practice’ which is seen to be the latest workable approach, but it rather entails the exercising of choice with regards to what needs to be changed; the circumstances under which the change will take place; and the best approach to adopt. Failure to adhere to the option of choice is no different than taking decisions by default, leading to the possible failure of proper management, resulting in detrimental outcomes for the whole organisation. In coherence with exercising the choice described here, Burnes

(1996:14) further explains that if one is to believe that all organisations operate in dynamic and unpredictable environments, to which they on a continuous basis have to adapt, the "'emergent model is suitable for all organisations, all situations and at all times." As this approach is relatively new, it is criticised for lacking consistency and a variety of different techniques. Furthermore, the existing models are rather different and the only aspect, in which they really seem to be similar, is the fact that they are all cynic about the planned approach to change.

Dunphy and Stace (1993) describe the contingency or situational approach to change as another possible way to explain 'how change comes about'. This approach vouches for 'one best way for each organisation' instead of 'one best way for all'. It is based on the fact that an organisation's structure and performance depend on its situational variables, which are different for all organisations. This model shows how to alter change strategies to get to the 'optimum fit' with the changing environment, by modelling the scale of the change which is necessary to make the organisation fit with its environment, as well as the leadership style needed to make the change happen. Critiques of this theory include that it is difficult to relate the organisational structure to its performance. The theory is also criticised because it assumes that the influence and choice of organisations and managers on its situational variables is unimportant and irrelevant.

According to Burnes (1996) it is not necessary for organisations to adapt to their external environments and that they are not always forced to do so. He argues that they have a choice to continue with their internal practices, by influencing their situational variables. This provides them with some choice in their action.

5.2.3 Change characterised by scale

The change falling into this category is identified by four characteristics: fine-tuning; incremental adjustment; modular transformation; and corporate transformation (Dunphy and Stace, 1993). Fine-tuning is also described as convergent change and takes place on departmental level. It involves small

on-going changes in the organisational strategy, processes, people and structure to ensure matching. It is focussed on obtaining individual and group commitment to the organisational strategy, by clarifying roles in policies, methods and procedures, and in doing so, promoting personnel confidence.

Incremental adjustment implies clear-cut alterations to managerial processes and organisational strategies, but excludes fundamental radical or extreme change. It comprises of minor modifications done in small incremental steps. Modular transformation is seen as radical change generally involving only parts of an organisation, such as some departments or divisions, while corporate-wide transformation encompasses the transformation of whole organisations by altering the organisation's strategy, mission, core values or power and status.

The many different views on change have led to many different ways to respond to change, which again has led to many different models on how to manage change (Van Tonder, 2004). As the second and third research questions posed in chapter 1 of this study, is about understanding how the change came about when implementing an OSS system in the public sector, and discovering whether the current change management models applied in IS are sufficient to understand such a change, the next logical step would be to discuss the change management models as they apply to the field of IS, and more specifically, the models that focus on Todnem's (2005) second category ('how change comes about'). It is important to note that the models discussed in the next section (and for that matter in the rest of the chapter) should not be seen as an exhaustive account of all the change management models which fall into this category. Rather their discussion is intended to show what models of this type are useful for, and what they do not take into account.

5.3 Change management models describing how change comes about

Both the models of planned change and emergent change are described by Todnem's (2005) to be the most influential models which fall into the category of 'how change comes about'. Some of these models will now be discussed in more detail.

5.4.1 Models of planned change

According to Macredie *et al.* (1998) most of the models that follow this approach to change, originated from the practice of Organisational Development. These models suppose that the primary source of organisational change are managers, who on purpose start off and implement change as they spot opportunities to enhance the organisation's performance, or to provide a better 'fit' with the organisation's environment (Orlikowski, 1996). Amongst these models are: Lewin's action research model; and Lewin's three step model. These two models will be discussed in more detail in the paragraphs to follow.

5.4.1.1 The action research model of Lewin

This model describes an approach which could be used to solve both social and organisational problems (Burnes, 1996). This approach is based on the reasoning that to effectively manage change, the issues to be solved must be analysed in a systematic rational way (diagnose the need for change i.e. unfreezing the current situation). Thereafter the available theories/ frameworks would be tried out in a real situation (moving), after which it would be evaluated and stabilised (refreeze).

5.4.1.2 Lewin's three step model of change

Many books on change start their discussion by referring to the respected and much referenced model of Lewin (1951). According to Lewin, change comprises of three distinct processes: *unfreeze* the current situation; *change* the situation; and *refreeze* the situation. 'Situation' in this sense is used as a collective noun for a large number of things, such as: changing your

organisational structure; changing your product mix; starting a new business; hiring or firing your employees; etc.

Lewin (1951) based his model on the following assumptions: change involves *learning*; change will occur *by itself*, but needs to be pushed along by someone; change revolves around *people*; change may evoke *resistance*; and the changes that have been realised need to be *reinforced* by the current organisational practices and processes. His model has the philosophy of someone being in control, directing the change process.

By *unfreeze* Lewin (1951) means that attitudes should be unfrozen; a new vision should be created; a motivation to change should be produced; and that plans and strategies should be formulated and put into place. To him this preparation stage is essential for employee participation and support. There should be a general acceptance of the new vision. Employees should be willing to question their assumptions, norms and values – think about what they are doing and why they are doing it. For most people this is not an easy task – they find it quite difficult to transform their established thinking patterns and ways of doing things. They seem to be comfortable and even regimented in what they do and how they think about their work and the organisation they work in. They find it hard to share the new vision, or to see the promised benefits of doing things the new way. They may even be destructive in their attempt to sabotage the new vision by subtle political moves. In this sense Lewin (1951) developed the notion of a force-field analysis. Within all social systems there are driving and restraining forces within which the organisation usually finds some sort of quasi-equilibrium. According to Lewin it is always easier to manage change by reducing the forces against change instead of escalating the forces that push for change. In this way an imbalance is formed, making the situation more open to change.

For Lewin (1951) the next step is to manage the process of transformation. This means that a planned change programme needs to be established and followed in order to achieve the required transformation. In this phase one looks towards learning something new; you aim at finding a fresh way of

looking at things; you introduce new technology or new business processes. This is a continuous and multifaceted progression, and not just a single occurrence. As the whole exercise up to this point could be upsetting and even chaotic to most people, Lewin (1951) suggests that having accomplished the change, one should now sail into calmer waters and *refreeze* the situation in an attempt to aim for a period of stability – a new equilibrium.

On face value Lewin's change model seems to cover the whole change process sufficiently. However, it was rather meant for earlier times when organisations existed in more stable circumstances, in which one could reasonably predict what the government aimed to do next; what plans your competitors would make to counteract your changed business; and even what the reaction of your employees would be – since you knew them well as they resided with your organisation for quite some time.

Contemporary society is however characterised by times of rapid and continuous change: business environments change daily; technological advances require change to cope with it or to utilise it; and employees change their jobs on a frequent basis. We may therefore never reach the so called 'period of stability' which Lewin's model refers to, and it could consequently be impossible to *freeze* the organisation after the change. We should perhaps rather *unfreeze* the organisation and then put it into a frame of mind of continuous change, since *refreeze* may never take place in today's organisations. However, we need periods of stability in any organisation, even if this *freeze* point does not last that long. This is not at all easy to achieve, since the rate of change across an organisation will never be equal, so one part of the organisation could be at a *freeze* point, while the other could be far behind.

5.4.2 Models of emergent change

According to Burnes (1996) the fact that managers require a detailed understanding of the organisational structures, strategies, people and culture, is a key assumption on which emergent change models are based. Todnem

(2005) argues that several supporters of the emergent approach to change provide a suggestion of the sequence in which change actions could be executed. Although most of what they suggest is very abstract and therefore difficult to apply, there are some authors who provide some helpful practical guidance to practitioners. These authors include McKinsey, Kanter *et al.*, Kotter and Luecke. Their models will accordingly be discussed in the next section.

5.4.2.1 McKinsey's 7-S model

This change model is a management model of organisational effectiveness, which could be applied to assess or monitor change (Bryan, 2013). It consists of seven elements, divided into three hard elements (strategy, structure and system) and four soft elements (shared values, skills, style and staff). The hard elements are clear cut and could be directly manipulated by management, while the soft elements are more 'fuzzy' and influenced by the organisation's culture. All the elements of the model are mutually reinforcing one another. The model is centred on the idea that to do well, an organisation needs to have these elements aligned. In the event of non-performance, management can use the model to improve performance, by realigning the elements. The model could furthermore provide an understanding of the wider impact that a change in one specific organisational area could have on the rest of the organisation.

5.4.2.2 The Ten Commandments for executing change by Kanter *et al.*

According to Kanter, Stein and Jick (1992) managers need to include change management at the centre of their organisation's strategy, so that they can manage change as part of everyday life. In this sense they need to be able to anticipate change, create change, and respond effectively to change. Their ten commandments for executing change are:

1. Analyse the organisation and its need for change.
2. Create a shared vision and a common direction.
3. Separate from the past.
4. Create a sense of urgency.

5. Support a strong leader role.
6. Line up political sponsorships.
7. Create an implementation plan.
8. Develop enabling structures.
9. Communicate, involve people and be honest.
10. Reinforce and institutionalise change.

5.4.2.3 Kotter's eight step change model

Kotter's model seems to be attractive to change implementers as it offers more practical guidance to organisations and managers. In an article by John Kotter (1995), he reports on the critical errors change leaders tend to make when introducing change into their organisations. He relates each of these errors to a step in his well-known model. These steps, as well as the accompanying errors which need to be prevented, will accordingly be discussed in more detail, to get an understanding of what his 8-step model entails:

- **Step 1: Establish a sense of urgency**: In this step change leaders are to do research on the market and its competitors to determine existing crises, potential crises, and possible opportunities. This is important as a change or transformational program needs the forceful cooperation of many individuals. Many companies fail to accomplish this, as executives misjudge the effort needed to get people out of their comfort zones. For this to be implemented, real leaders are required in senior-level positions. To change the entire company, the CEO is crucial. To change a division, the division manager is important. "*When these individuals are not new leaders, great leaders, or change champions, phase one can be a huge challenge*", (Kotter, 1995:60).
- **Step 2: Forming a powerful guiding coalition**: This means that a powerful group has to be formed, which could lead the change. This group needs consists of people who are considered to be 'important', i.e. the head of the organisation or the most senior executives need to be at least 'active supporters' of the change. This transformation coalition needs to grow as the change process continues, and should not be led by

a staff executive from human resources, quality, or strategic planning, but rather by a key line manager.

- **Step 3: Create a vision**: The steering coalition created in step 2, has to develop a representation of the future which is easy to communicate and which will appeal to all customers, stakeholders and employees. Without this, a change effort could easily disperse into becoming a list of confusing and mismatched projects. Management should be sure to have a clear vision which is visible, instead of having it buried or too complex or too blurry to be of any use.
- **Step 4: Communicate the vision**: This should not be done by only organising a single meeting or sending out a single message to convey the vision of the intended change. The head of the organisation should also not spend too much time on making speeches to inform the employees, and the behaviour of visible senior executives should not oppose the change vision. Actions are part of communication and are in some instances even more powerful than words. Good executive communicators will therefore also include the change message in their hour-by-hour activities and they will make use of all existing communication channels to get the change message across.
- **Step 5: Empower others to act on the vision**: To change also requires removing obstacles, whether these are real or just existing in people's heads. It is important to deal with these obstacles and to have them removed. Definite action is important to empower people and to maintain the credibility of the change effort.
- **Step 6: Plan for and create short-term wins**: To keep the momentum going, there should be short term goals to meet. Convincing evidence that the change process is producing the expected outcomes within 1 to 2 years is important. "*Commitments to produce short-term wins help keep the urgency level up and force detailed analytical thinking that can clarify or revise visions*", (Kotter, 1995:66).
- **Step 7: Build on change**: Change leaders should consolidate the improvements made and keep on producing more change. Change victory should not be declared too soon. It takes time for the changes to

descend deeply into the organisation's culture. Use the credibility provided by short-term wins to start solving the even bigger problems.

- **Step 8: Institutionalise new approaches**: Change leaders should realise that it is only when new behaviours become part of the organisation's bloodstream (when they are deeply imbedded in the organisation and they become rooted in the social norms and shared values) that they won't degrade when the pressure for change gets removed. People should be demonstrated how the changes (in approaches, behaviours and attitudes) assisted in improving the company's performance. Enough time should be taken to ensure that the upcoming generation of managers would carry on with the new approach. To this extent the successor of the change process champion should also be a change champion and not merely just a change non-resistor.

5.4.2.4 Luecke's seven step change model

Luecke's (2003) seven step model have many similarities with other change models in terms of common steps. The sixth step is his model is though seen to be quite different and useful and entails that management should start the change, but that it should be allowed to filter through the organisation without them pushing it pertinently from the top. The seven steps in his model are:

1. Mobilise energy and commitment through joint identification of business problems and their solutions.
2. Develop vision of how to organise and manage for competitiveness.
3. Identify the leadership.
4. Institutionalise success through formal policies, systems, and structures.
5. Focus on results not on activities.
6. Start change at the periphery, then let it spread to other units without pushing it from the top.
7. Monitor and adjust strategies in response to problems in the change process.

5.4 IS and organisational change

The adoption of IT in organisations has the potential of transforming people's work, business processes and organisational performance in significant ways (Markus and Benjamin, 1997; Markus, 2004). Barrett, Grant and Wailes (2006) state that ICT is responsible for an increasing proportion of planned organisational change, of which the consequences seem to be extensive and in many cases unexpected or unforeseen. They report that very few researchers from the field of organisational studies have published on ICT and change, where they focus directly on the close connection between these two phenomena. In the few cases in which this relation was however examined, the studies tended to not acknowledge the role of human agency, but instead viewed technology as an intangible and physical determinant of work and organisational structure. They consequently appeal for the development of more change frameworks in organisational studies, which pay attention to both the material and social aspects of technology at the same time (Orlikowski and Barley, 2001).

According to a seminal article by Markus and Robey (1988), IT and organisational change is a vital matter in the field of IS. In this article they challenge change models which focus on the rationality of managers to lead the change and on the potential of ICTs to create change in organisational work practices (planned models), by suggesting the development of process-based approaches which could be used to understand emergent changes (Orlikowski, 2000). Process-based approaches have shown to be of specific significance to ICT-related change, as it draws attention to the social context within which the change takes place. This social context includes a range of important factors that could assist in explaining why ICT change initiatives in many cases fail (Barrett *et al.*, 2006). According to Markus and Robey (1988), the emergent perspective to change is better equipped to gain an understanding of the long-term relationship between ICT and organisational change as the impact of ICT on the organisation is said to be dynamic and to continue for quite some time after the implementation thereof. To this extend Constantinides and Barrett (2006:78) explain that "the development and use

of ICTs in organizations is conceptualized as the consequence of a series of decisions and interactions among different interest groups or actors in different roles within the organisation or between organizations and of unintended occurrences including external events."

Benjamin and Levinson (1993:24) also maintain that the change enabled by IT is different from more general types of change caused by other instances in the organisational environment. It is different in the sense that managers of IT-enabled change need to know how to "integrate the technology, business processes, and organisation in order to achieve the goals they expect with the technology." They present a framework for the managing of so-called IT-enabled change, which is based on the model of Lewin (described in section 5.4.1.2 of this chapter). Their model will be discussed in more detail in the section to follow.

Avgerou (2001) states that the change studies done in the field of IS, differ in terms of the change 'content' they address; the explanation of the 'environment' they study; as well as the way in which the 'process' of change is understood, relative to the environment within which it takes place. On the relationship between content and context, she reports that most IS studies focus on technological change, attempting to develop effective technologies and ways in which to manage and use it effectively. Such studies would focus on the environment for the sole purpose of it being a source of opportunities or constraints for the technology implementation, ignoring the unfolding of the organisational and social changes interacting with the technology implementation. Other studies focus on technology as the 'content' of change, and the socio-organisational conditions under which it takes place, as the 'context' of change, thus separating the two. A third group of IS researchers, study IS as 'socio-technical' systems (refer back to chapter 3, section 3.3) and have drawn on several different theoretical and epistemological aspects of the social sciences to highlight the social effects of new technologies, incorporating ideas such as duality of technology; social constructionism; and actor network theory, to study the joint partaking of technology and human actors in forming intertwined socio-technical entities.

Orlikowski (1996) states that studies of technology-based organisational transformation have been influenced by three perspectives: planned change; technological imperative; and punctured equilibrium. The planned models she mentions to have been applied to the field of IS and change are Lewin's force field analysis (Lewin, 1951); contingency frameworks such as that of Dunphy and Stace (1993); and practitioner oriented prescriptions for obtaining organisational efficiency such as that of McKinsey, Kanter and Kotter (to be discussed in the next section).

The technological imperative opposes the planned models of change in that managers are left with almost no room for decision making (Orlikowski, 1996). These models see technology to be the primary driver of the change (Leavitt and Whistler, 1958) and take a stance which are similar to the technological imperative described in chapter three of this study. Due to the absence of the role of agency in these models, pro-active organisational change is not possible.

The third type of model which Orlikowski (1996) describes to have had an influence on the field of IS, is that of punctuated equilibrium, which assumes change to be rapid, episodic and radical (Romanelli and Tushman, 1994) and which were described in Todnem's (2005) category of 'change categorised by scale'. Such episodic changes could be triggered by adjustments inside or outside the organisation, such as new technology, new regulations or business process redesign. These models, including the hybrid models which elaborated on some of them, (incorporating both punctuated equilibrium and gradual aspects), are based on the presumption of stability or equilibrium as the preferred state in which organisations want to reside in for as long as possible. A new model of this kind, which is also a so called hybrid model, is the punctuated socio-technical IS change (PSIC) model by Lyytinen and Newman (2008), which will (for the sake of being a hybrid model and very new in the field of IS and change) also be described in the next section.

All three of the models described by Orlikowski (1996:65) neglect to address emergent change, which could not be anticipated or planned for in advance, and which could "only be realised in action." Orlikowski and Hofman (1997) accordingly came up with their own improvisational model for change management, to address this gap in the IS literature. This model will be discussed in more detail in the next section.

5.5 IS Change management models describing how change comes about

As the intention of this study is to understand the change brought about by the implementation of an OSS system in the public sector and the way in which it was accomplished and managed, the IS change models which falls into the category of 'how change comes about' (Todnem, 2005), will now be discussed. These models include the framework for managing IT-enabled change by Benjamin and Levinson (1993), which is a planned change model based on the model of Lewin; the improvisational change management model by Orlikowski and Hofman (1997), which is an emergent change model; and the punctuated socio-technical IS change (PSIC) model by Lyytinen and Newman (2008). This model rather falls into the 'change characterised by scale' category (Todnem, 2005), but is also discussed under this section as it is a hybrid model of so-called multi-faceted change, recognising both incremental and punctuated socio-technical change.

5.5.1 A framework for managing IT-enabled change

Benjamin and Levinson's (1993) framework for IT-enabled change falls into the typology of planned change models, and consists of eight principles which they believe managers need to consider on making complex IT-enabled changes. These principles are:

1. Develop a systematic process for change: use time-based process models to describe the tasks to be done at each stage;
2. Manage equilibrium and mutual adaptation of organisation, technology, and business process: understand from the start which are all the elements that need to be changed, as well as what

actions and resources are required to get these elements back into a sable state of equilibrium;

3. Determine whether there is enough energy for change: check for technical and operational readiness and ensure a build-up of energy, which is usually obtained through convincing the stakeholders that the change will satisfy the organisation's requirements;
4. Analyse the size of the change effort: will the change involve a paradigm shift, or will it just entail some incremental changes?
5. Analyse and manage stakeholder commitment: do this to determine the current commitment, but also on a regular basis throughout the change process to re-evaluate the commitment;
6. Major change requires a champion – know what one does: the roles of such a champion could include to ensure funding for the project; to provide the needed resources and ensure their commitment; to influence the critical stakeholders through accountability, acquired power or perceived authority; and to provide coaching or counselling to the stakeholders when required;
7. Prototype organisational response: use this in an attempt to expose possible hidden resistance and to test what the organisation's response to the change and the new technology; and
8. Build change reviews into the management process: ensure that the whole process is reviewed on a continuous basis and observe possible hiccups all the way through the change process.

Within these principles Benjamin and Levinson have captured three strong analytic models which could assist managers with IT-enabled change implementation. These include: treating the systematic process of change; dealing with the necessity to mutually adapt technology, the business processes, and the organisational structure; and dealing with the building of coalitions and organisational politics.

5.5.2 Orlikowski and Hofman's improvisational model of change management

Orlikowski (1996) proposes a perspective on change, which she terms 'a situated change perspective'. This perspective opposes the planned change perspective described in the previous paragraphs and explains organisational transformation to be "an on-going improvisation enacted by organizational actors trying to make sense of and act coherently in the world", (Orlikowski, 1996:65). This perspective acknowledges that change in organisations take place on the micro-level as the people in the organisation do what they are expected to do i.e. being perceptively alert to their environments and their professions. Pettigrew and Whipp (1993) agree that to manage emergent change people activities should be linked at all levels of the organisation. This means that organisational change is decentralised or delegated and that the role of the manager accordingly changes from a control role, to that of an enabler.

According to Orlikowski (ibid.) organisations are 'enacted' and members of the organisation reproduce or alter organisational properties as they act. By adjusting, accommodating and improvising in a subtle way (even unplanned or unintended), social changes can over time be 'enacted', which makes change part of the everyday actions in an organisation. Orlikowski (ibid.) offers this perspective to change to complement the existing perspectives on change, as she acknowledges that organisational transformations could take place due to a diversity of reasons, such as managers enacting to implement ICT via planned or punctuated actions, but she stresses the critical role of situated change, which has for long been disregarded in studies on organisational transformation.

Orlikowski and Hofman (1997) describe deliberate change as change of which the outcome is seen to be exactly what the intension of it was on the onset. In this regard, assumptions are made about the nature of the agency, context, technology and change which fit an organisation that presumes stability. Deliberate change therefore ignores 'emergent change'. Emergent change is

described as change which can only be realised in action and which cannot be planned for or anticipated in advance (ibid.). Burnes (2009) describes emergent change as the endless adaption of the organisation to get it aligned with its environment, while Lyytinen and Newman (2008) argues that emergent change models acknowledge that a lot of changes could not be labelled as improvements, and that many changes could not be pre-planned, but they emerge and are unintended. Orlikowski (1996:65) highlight that 'emergent change' is predominantly important in current times as "unprecedented environmental, technological, and organizational developments facilitate patterns of organizing which cannot be explained or prescribed by appealing to a priori plans and intentions". In this sense, contemporary organisational demands of flexibility, responsiveness, and the ability to learn, require organisational practices to deal with on-going change.

Orlikowski and Hofman's (1997) model of change management is based on two major assumptions: change is an on-going process; and not every technological and organisational change can be anticipated in advance. This means that change is seen as a process which continues, it is not an event which starts off, takes place, and eventually stops, allowing the organisation to return to a mode of stability. In contrast to this, it assumes that the organisation is never in a state of stability, but that it is always dealing with some type of change as it learns and carries out its daily activities. The model allows for three types of changes:

- **anticipated changes**: changes which could be planned upfront and take place as was intended (these changes imply intentional action);
- **emergent changes**: changes which are not anticipated or planned for upfront, but which emerges unexpectedly from the organisational context over time (these changes imply no intentional action); and
- **opportunity-based changes**: changes which would not be anticipated up front, but which also implies intentional action done on purpose to counteract certain events or issues or to respond to unexpected opportunities.

Important to note about these changes is that they take place in succession, but in no particular order to be determined upfront, as they interact with each

other and influence each other on the go. Applying this model to an IS implementation (such as the case described in chapters 8 and 9 of this thesis) would mean that one acknowledges that it is not possible to know upfront exactly which changes are going to take affect during the implementation process, but that you accept that unexpected changes could emerge from the organisational context which then has to be responded to, as the new system is used and experience is gained with it. To make use of such a model one should have some mechanisms in place which you can use to firstly distinguish the types of changes as they occur, and secondly, respond to these changes in a successful way.

Orlikowski and Hofman (1997) argue that there are two enabling conditions which are essential, when trying to manage change in the improvisational way. These two conditions are:

i. **aligning the key dimensions** of the change process; and
ii. **devoting resources** to provide continuing support to the iterative change process.

The key dimensions they refer to are (see Figure 13):

- the **technology** which is implemented;
- the **organisational context** (this would include the organisational culture; structure; roles and responsibilities); and
- the **change model** which is used to manage the change.

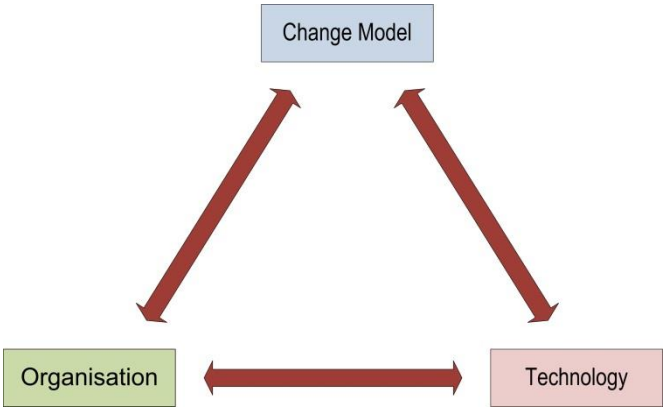


Figure 13: Aligning the key change dimensions (Source: Orlikowski and Hofman, 1997)

Orlikowski and Hofman (ibid.) state that the interaction between these dimensions should be well-matched, and definitely not opposing each other. When considering the relationship between the technology and the change model, the improvisational model seems to be fit for situations where the technology is not well understood, is new and unique, and has an open-ended or adaptable character. Similarly, when considering the relation between the change model and the organisational context, a flexible change model is more suitable in an informal and supportive organisational culture than in a strict control-oriented culture; and finally when contemplating the relationship between the technology and the organisational context, the nature of the technology should be compatible with the organisational culture.

It is important to note that the alignment of the three dimensions does not happen unconsciously, but it requires explicit and on-going assessment and continuous fine-tuning or modification. The lack of interventions or efforts to get these dimensions aligned, could lead to less successful change. This makes the allocation of mechanisms and resources (with sufficient authority, credibility and influence) – and therefore the second condition specified by the model – crucial for continued support of the on-going change process.

5.5.3 A Punctuated Socio-technical IS Change (PSIC) model

Lyytinen and Newman (2008) criticises IS change models as descriptive or prescriptive models explaining the process of change on only a single level. In doing this, these models neglect to describe the interactions that take place between multiple systems and the organisation's environment during the change process. In contrast to this, their Punctuated Socio-technical IS Change (PSIC) model is a hybrid model which could be used to explain multifaceted change. It aims to explain the reasons for (why?) and the way in which (how?) IS change takes place and is an attempt to come up with a guide on how to build "generalizable and localized socio-technical explanations of IS change.", (Lyytinen and Newman, 2008:590) In this regard, IS change is considered to be a complex, socio-technical and episodic phenomenon. The model addresses the following three aspects of IS change: the scope; the nature; and the content. This is done by integrating

three theoretical streams: theories of multi-level systems and punctuated equilibrium; socio-technical systems theory (describing the content of the change); and process theorising. The three aspects of IS change will now be discussed in more details (Lyytinen and Newman, 2008):

i. The scope of IS change: The PSIC model views IS change as being multi-levelled. The levels referred to here are seen as socio-technical systems and include:
   - the work system: this system which is changed by inserting new IT components into it. This system is highly ridged complex and shows characteristics of work habits, fixed ways of performing tasks, and cognitive boredom.
   - the building system: this system incorporates the resources and routines to enact the planned and deliberate change. It needs the necessary power to rectify resistance to the change, to acquire the resources and to justify the change.
   - the organisational environment: the work system and the building system are both rooted in the organisational environment. This environment is split into two parts of which the first is the organisational context (or the inner context, including the resources, authority, culture and politics) and the second is the environmental context (or the outer context including the social, economic, political, regulatory and competitive environments).

   Both vertical and horizontal analysis could be done on the multiple levels. With vertical analysis the interdependencies cross cutting the three levels discussed above is analysed, while horizontal analysis examines the interaction between the work system and the building system and the transformation that takes place in these systems over time. In this sense the model could be used to determine what was done in the building system to bring the change about; what was the effect on the work system and what did actually change; and what was the effect of the environment on both the building and the work systems.

ii. The nature of IS change: The PSIC model is based on theories of episodic change (Gersick, 1991) and views the nature of IS change to have episodes of revolutionary punctuations (or system disorder), followed by periods of stability with only slow moving small alterations.

iii. The content of change: The PSIC model views the content of change as punctuated socio-technical change. It uses the S-T theory of Leavitt (1964) to describe the content and the so-called 'engine' of change. This model views organisations as systems possessing four interacting components: task; structure; actor; and technology. Their motivation for using this model to explain the content of change is that is "simple, extensive, sufficiently well defined, and anchored in the extant theory.", (Lyytinen and Newman, 2008:594).

IS change is therefore viewed as a "subtle interplay between technologies, actors, organizational relationships, and tasks at multiple levels. The change can either be incremental or punctuated and it is co-evolutionary in that it distinguishes multiple separate, but interacting streams of events – the work system, the building system and the organisational environment. Any of these socio-technical systems has the potential to inject gaps that will trigger interventions into the focal systems leading occasionally to punctuations.", (Lyytinen and Newman, 2008).

5.6 Choosing a change model to apply in this thesis

Tsoukas and Chia (2002:568) argue that studying organisational change and the management thereof from the perspective of on-going change rather than stability, enables the researcher to get a "more complete understanding of the micro-processes of change at work". One should allow for 'emergence and surprise', appreciating and acknowledging that organisational change could have consequences and implications beyond those which were imagined and planned from the onset. They also argue that most researchers are not knowledgeable enough about how change is essentially 'accomplished', as researchers in general tend to explain change on a too high level, not reporting on the fine-grained actions of change which took place on the ground level. Change research should rather study the implementation of

initial plans, how they were converted into action, how they got modified, adapted and eventually lead to change.

In the same way Orlikowski (1996) argues that change programs only work if they are fine-tuned and accustomed by the change actors in their specific contexts; if they are changed and adjusted on an continuous basis. "Unless we have an image of change as an on-going process, a stream of interactions, and a flow of situated initiatives, as opposed to a set of episodic events, it will be difficult to overcome the implementation problems of change programs reported on in the literature", (Tsoukas and Chia, 2002:569)

According to Orlikowski (1996), emergent approaches to the management of change evolved out of the need to gain a broader understanding of change management in a complex environment (Burnes, 2009). Prescriptive approaches to change and conceptualisations of change as a linear sequence of events did not appear to be working (Macredie *et al.*, 1998). An emergent approach to change includes a processual or contextualist perspective on change, as described by Dawson (1994), who argues that because change is so unpredictable, it is best to perceive it as a process which is influenced through the interaction of variables such as the perspective of the theorist, and the organisation within which it takes place. As each change context is unique, process oriented theories help understand the underlying nature of the change and encourage an enabling rather than a controlling approach to change management.

Orlikowski and Hofman's (1997) improvisational change model focuses on the ground level actions of change and the continuous interaction and alignment taking place between the organisation, the technology implemented, and the change model applied. Combining this model with Du Plooy's (1998) HEM model, allows for an in-depth understanding of the change content as both the concept of duality/interaction and the social context are important premises on which this thesis is based. This dual model combination is thus used in chapter 10 as a lens through which the case study discussed in chapters 8 and 9 is analysed. It allows for not having an extensive pre-setup and

detailed change plan at hand, before introducing the new IS into an organisation and is particular useful to understand the misalignment in the SA national government and the misalignment within the government department itself (on organisational level), which is the focus of this study. It also allows for studying the fine tuning processes that took place due to emergent changes during the implementation of the OS ECM. Thus, through this lens the researcher could gain an understanding of the extent to which the three dimensions of the model were aligned, as well as the actions taken in an attempt to get these dimensions aligned.

Although the PSIC model of Lyytinen and Newman (2008) would also shed some light on the change process described in the case study, the researcher found this model to be more applicable in situations where there is a need to explain how the outcome of a change developed, rather than explaining how the change is managed in an attempt to ensure alignment. Furthermore, the PSIC model is a punctuated 'stability' model focussing more on episodic change events, assuming that the organisation would at some points in time return to a stable state of equilibrium. The PSIC model also has a rather limited view on the context of IS implementation, as it uses Leavitt's (1964) Socio-Technical (S-T) model of organisations for this purpose. To enhance Leavitt's model, it was combined with the diffusion of innovation theory by Kwon & Zmud (1987) which resulted in an improved diffusion/implementation model. The HEM-model of Du Plooy (which is discussed in chapter 4 of this thesis, an applied in conjunction with Orlikowski and Hofman's improvisational change model in chapter 10), is an extension of the Kwon and Zmud model and therefore offers a much richer representation of the social context within which IS are to be implemented.

5.7 Conclusion

When unpacking the 'organisational context' dimension of Orlikowski and Hofman's (ibid.) model, it is clear that this dimension of the model includes individuals and the sub-groups (such as for example the different units or departments and top management) which co-exist within an organisation (especially large organisations), and which could have different 'cultures',

even though they reside within the same organisation. This poses to be problematic when implementing IS such as the OS ECM system described in the cases study of this thesis, which spans across the whole organisation. Aligning the 'technology' dimension to the 'organisational context' dimension would imply doing multi-level alignment. Who does one align to, and how do you determine who to align to? The dimensions of the improvisational change model therefore needs to be 'unpacked' in order to get a better understanding of it. Institutional theory could provide an understanding of the institutional forces present in the organisational context (both internal and external), which need to be taken into account if one is to understand the forces at play during the change process. This is possible if IT and organisational processes in themselves are recognised as institutions. Consequently institutional theory could also help to explain how the different levels (internal and external to the organisation) interact.

The next chapter therefore provides a detailed discussion on institutional theory and how it applies to IS change management and the field of IS in general.

Chapter 6:
Institutional Theory

6.1 Introduction

Avgerou (2001:50) states that an organisation rarely chooses innovation freely, but it is rather determined by "events, trends, pressures, opportunities, or restrictions in the international or national arena". IS innovation should also be studied as 'a combination of technical/rational and institutional action'. Not only is an IS implementation an intervention which is rationally planned, but several studies have shown that there are subjective, irrational elements of actions within organisations which tend to interfere with the 'rational, planned and methodical actions'.

The purpose of this chapter is to give a literature review of institutional theory and the use thereof in the field of IS, in an attempt to exploit and understand the social, cultural, or cognitive forces which are located within and beyond an organisational setting and which is said to drive the overall organisational performance.

Institutional theory is a theory of social behaviour which could be used to study processes of change within a social environment. Like all theory, institutionalism provides a way of seeing and not seeing (Walsham, 1993), but it is of particular relevance to this research study, as institutionalists focus on the forming of taken-for-granted assumptions within society and organisations, emphasising how they are created, how they could limit possible action, how they grant legitimacy to those who conform and how this conformism in return strengthens the institution in the process. According to Avgerou (2001) we are not able to explain what is taking place in organisations if we only reflect on the 'rational' actions of managers. Institutional theory may assist in studying the 'irrationalities' from the organisational context, which are believed to be driving the introduction of IT

innovations in organisations, independently from the efforts put into organisational change.

This chapter will firstly focus on the definition of an institution, after which institutionalisation and the modern theoretical developments in institutional theory (neo-institutionalism[4]) will be discussed, before attention will be given to the use of institutional theory in organisational studies and IS research. Institutional entrepreneurship and institutional logics fall out of the scope of this study and will therefore not be discussed.

6.2 The Main Components of Institutional Theory

To understand institutional theory and how it is used, the main components of institutional theory are described in this section. Firstly, a description and definition of what constitutes an institution is given (section 6.2.1). Secondly, the importance of understanding institutionalisation as a process is outlined in section 6.2.2. Thirdly, in section 6.2.3 the elements (pillars and dimensions) that constitute an institution are described, and lastly, in section 6.2.4 the systems or carriers of the institution are outlined.

6.2.1 Defining "institutions"

As there is no single, precise, complete and universally agreed upon definition of an "institution" in the institutional school of thought, the researcher will define this term referencing some of the leading researchers in the field of social sciences.

According to Hughes (1943) the term "institution" refers to those aspects of social life which survive biological generations or radical social changes that one might have thought would bring them to an end. More formally Hughes (1943) defines institutions as "any standing, social entity that exerts influence and regulation over other social entities as a persistent feature of social life,

[4] *The term "neo-institutionalism" or "new institutionalism" is used to differentiate the more recent theoretical efforts on institutionalism after the 1960s from the earlier unrefined versions by social gurus such as Parsons and Selznick. Since the new ideas have gained their position in organisational theory, the prefix "neo" or "new" is in many cases omitted in recent publications on institutionalism.*

outlasting the social entities it influences and regulates, and surviving upheaval in social order." Even though one could expect human beings to constantly seek new ways of doing things and to pass these down to generations to follow, Hughes (1943) argues that human beings get set in their ways, give reason to their behaviour, makes a virtue of this behaviour, glorifies this behaviour for its very antiquity, and socially passes it on to succeeding generations.

Sociologists study the processes by which modes of human behaviour are established and changed and according to Hughes (1943) early sociologists (when studying institutions) focussed their attention on the formally established aspects of collective or group behaviour. Before institutions can be institutions, they are institutions in process. They could spring from forms of collective social behaviour such as celebrations, festivals, great days, social movements (strikes, religious and national revivals, reform movements), sects and rackets (Hughes, 1943). According to Hughes the necessary elements for an institution is (1) a set of values or formal rules, or both, which can only be satisfied by (2) people that act together in existing corresponding capacities or so called "offices". The first element referred to here, signifies 'consistency', while the second represents 'concert', 'performance' or 'organisation'.

According to Jepperson (1991:145) "*institution* represents a social order or pattern that has attained a certain state or property." This social pattern discloses a specific process by which it is reproduced. The reproduction does not take place by 'action', but it is fostered by routine reproductive procedures which support and sustain the pattern. In the same way the reproduction could be stopped by collective action or disrupted by environmental shocks. Thus, institutions are rule systems which are socially constructed and reproduced by routine. They are patterned ways of doing things.

For Campbell (2004:1) institutions form the basis of social life. He describes institutions as consisting of: "formal or informal rules, monitoring and enforcement mechanisms, and systems of meaning that define the context

within which individuals, corporations, labour unions, nation-states, and other organisations operate and interact with each other."

However, institutions are more than just rules and enforcement mechanisms. Scott (2001:48) claims that institutions:

- "**are** social structures that have attained a high degree of resilience;
- are **composed of** cultural-cognitive, normative, and regulative elements that, together with associated activities and resources, provide stability and meaning to social life;
- are **transmitted** by various types of carriers, including symbolic systems, relational systems, routines, and artefacts;
- **operate** at different levels of jurisdiction, from the world system to localized interpersonal relationships;
- by definition **connote** stability but are subject to change processes, both incremental and discontinuous."

Institutions are therefore seen to be multi-layered, long-lasting structures, which comprise of symbolic components, social activities and material resources (Scott, 2001). According to Sewell (1992:9), social structures "are 'virtual' and are put into practice in the production and reproduction of social life." Giddens (1984) states that social structures comprise the patterning of social activities, which consists of 'rules' and 'resources'. According to him, the rules of social life are "generalizable procedures applied in the enactment/reproduction of social life" (p. 21)). On the other hand, Giddens (1979:92) describes resources as "anything that can serve as a source of power in interaction." Resources could therefore be human and non-human objects "that can be used to enhance or maintain power" (Sewell, 1992:9). For Giddens (1984) institutions are the types of social structures that include more intensely held rules which are reinforced by more established resources. He describes institutional practices as "those deeply embedded in time and space", (ibid.:13).

Institutions possess the capacity to control and restrict behaviour. They enact limitations by defining legal, moral and cultural boundaries and in doing so

they differentiate between legitimate and prohibited activities. It is also important to note that they, in the same way, also support and empower activities and actors, by providing guidelines and resources on how to act, and bans and constraints on how not to act. Institutions exist to provide stability and order and could therefore be studied as a property or state of a social arrangement, but they could also undergo incremental or revolutionary change and should therefore also be studied as a process of institutionalisation or deinstitutionalisation (Hughes, 1943).

According to Jepperson (1991:147) analysts refer to institutions as 'taken for granted' as they are "standardized activity sequences that have taken for granted rationales … that is, … some common social 'account' of their existence and purpose." Although people might not understand an institution, they will normally know why the practice exists, or they will expect that a clarification for the institution is available should they require it.

For the purposes of this thesis, "institutions" can be summarised as structures based on formal or informal rules, which are intensely held, that could restrict and control or support specific social behaviour, supported by more established resources. They are social patterns which are reproduced and established over time.

6.2.2 Defining "institutionalisation"

According to Scott (1994:81) an institutional perspective focusses "on the cognitive and normative frameworks that provide meaning and stability to social life." Under cognitive elements Scott (ibid.) lists commonly held beliefs and taken-for-granted assumptions that so unintentionally contribute to the frameworks of everyday life routines, as well as more specific, obvious and codified knowledge and belief systems broadcasted by professional and scientific bodies. Under normative elements he lists traditional mores, informal authorised social responsibilities, as well as the rulings of legislate courts and mechanisms of enforcement used by regulatory agents and the police.

According to Scott (1994), most of the institutional analysis studies done, treat institutions as given, and ask questions around how they affect the structures and functions of an organisation. Zucker (1977:728) though states that "institutionalization is both a process and a property variable." In this regard, institutions are sometimes treated as 'entities' (a cultural or social system which is characterised by one or more features or properties), while in other cases the interest lies with the 'process' of institutionalisation, focussing more on how an institution grows or declines over time with regards to its cultural-cognitive, normative, or regulative (explained in section 6.2.3) capabilities to provide some meaning or stability to social behaviour.

On the 'process' of institutionalisation, Zucker (1977) states that individual actors transmit what they believe to be "socially defined as real" (this transmission is a phenomenological process), but simultaneously, at any point in this process, the meaning attached to a specific act (property) could be seen as a taken-for-granted part of the social reality they operate in. These acts are then realised to be both objective and exterior in the sense that they are repeatable by other actors without altering the mutual understanding of it and as stated by Berger and Luchmann (1967:58) they possess "a reality of their own, a reality that confronts the individual as an external and coercive fact." This is echoed by Campbell (2004) who describes institutions as external forces that influence how people make sense of their world and how they go about acting in this world.

Mohr (1982) extended on Zucker's (1977) work, and distinguishes between two types of institutional approaches: variance theory approaches; and process theory approaches. According to Scott (1994) the objective of the inquiry determines which approach will be followed: 'What type of question is being asked about institutionalisation?' Researchers following the variance theory approach would want to address the question: 'Why did the effect which was observed happen?', i.e. what factors influenced the outcomes of that which was observed. Variance studies view institutions as entities; investigate their characteristics; regard them as abstract variables, either independent or dependent; and try to prove their causal relations to other

variables. It would also focus on either explaining why institutions develop, or it would use the identified factors to explain certain features of the social world. Following this approach, researchers will try and discover independent variables and will examine their set of casual relations in an attempt to determine their effect on the dependent variables (outcome). For these theorists the sequence, in which these independent variables occur, does not have an effect on the outcome.

Process studies on the other hand focus more on the processes by which institutional forms are created, generated, reproduced and diffused. They will attempt to answer the question: 'How did that which is observed happen?', i.e. what series of episodes of events that occurred, caused the outcome. The time ordering of the events that took place plays an important role in these studies.

Jennings and Greenwood (2003) summarises the process of institutionalisation as follows: innovation items such as new ideas, schemas, logics, routines, strategies, tools, etc. are created by humans on a regular basis. If this innovation item is concealed in human action, in thinking processes and in language (i.e. if it becomes part of the conscious world), it is objectified. If this objectification diffuses and gets legitimated within a relevant actor set (such as an organisation or a division in an organisation) the objectification gets institutionalised. The diffusion or sharing and therefore the legitimisation of the objectification is critical for the process of institutionalisation, although the rates at which it takes place, or the reasons for the diffusion are unclear and needs to be specified. The permanency or stability of the institution is also unclear and either sedimentation or deinstitutionalisation can take place over time. Scott (2008) refers to this final stage as the stage in which an institution loses its credibility and undergoes change. The process of institutionalisation is illustrated in Figure 14 below.

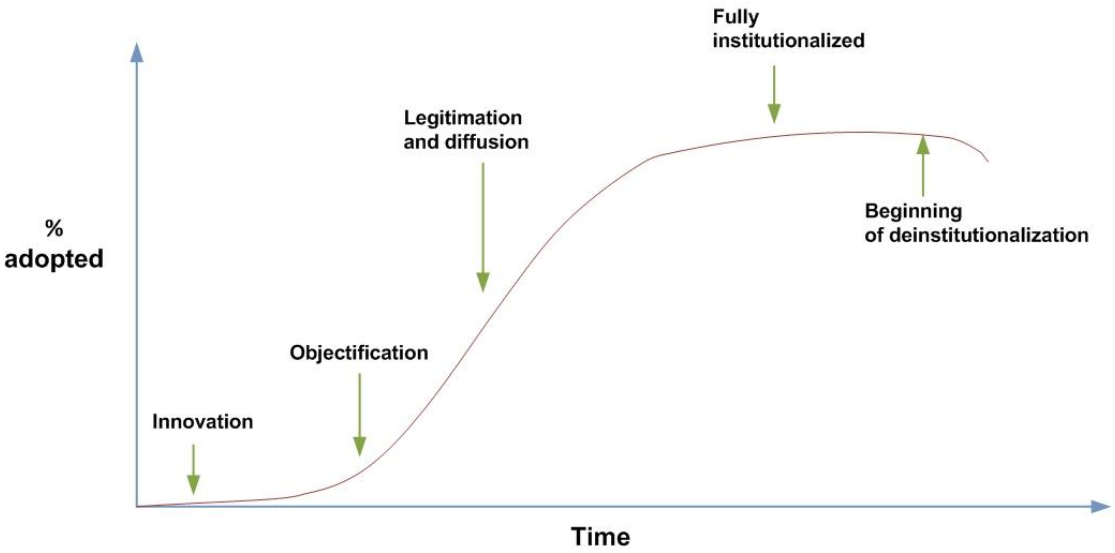


Figure 14: The Institutional Curve (Jennings and Greenwood, 2003)

According to Scott (2004:408) "institutional theory looks at the processes and mechanisms by which structures, schemas, rules, and routines become established as authoritative guidelines for social behaviour." He therefore agrees that this theory is interested in the way in which these arrangements originate, how they diffuse (the 'process' variable of institutions), and also in the role they play to ensure stability and give meaning to social behaviour (the 'property' variable of institutions). It is also cognisant of the way in which these arrangements could again weaken and eventually disintegrate and in how their remains in turn could contribute to the shaping of the replacement structures. Scott (2004) describes institutional theory as a wide-ranging theoretical perspective, much like a family of approaches or an unstructured multiplex of associated ideas.

Scott (2004:408) argues that the one principle that all institutional arguments conform to, is that "institutions matter in accounting for social behaviour". The shared assumptions of institutional arguments are: (1) institutions are structures of authority that represent the rules for social behaviour; (2) groups and organisations that abide by these rules gain legitimacy; which is a condition that contributes to their survival; (3) institutions are apathetic and tend to resist change; and (4) history is vital information and plays a definite role as previous institutional structures limit and guide new arrangements.

In this thesis the researcher is not aiming at investigating the process of 'institutionalisation' in itself. Rather, she tries to discover and exploit the institutions present in the full organisational context of the Government Department, within which the OS ECM system was implemented, in an attempt to explain the subjective, irrational actions of actors within the organisation, which seemed to interfere with the rational planned actions performed by the organisational managers, during the IS implementation process.

As illustrated in the process of institutionalisation in Figure 14, for institutions to survive and prosper in their social environments, "…they need social acceptability and credibility", (Scott, Ruef, Mendel and Caronna, 2000:237). These circumstances are referred to by sociologists as 'legitimacy'. Each one of the three pillars of institutions (described in the next section) postulates a different basis for legitimacy. An institutional perspective on legitimacy defines it not to be yet another type of resource which could be substituted or owned, but rather as a 'condition' that reflects a perceived adherence to the relevant laws and rules, normative support, or the alignment with existing cultural-cognitive frameworks (Scott, 2008). Scott (1998) furthermore describes legitimacy as a symbolic value shown to outsiders in a visible manner rather than an input to be combined or processed in an attempt to produce a new or a different output.

Organisational legitimacy as the degree of cultural support for an organisation (as argued by Meyer and Scott (1983)) entails the support provided by significant cultural and political authorities, who are of course empowered to confer legitimacy. These authorities could include state agents and professional and trade associations. A prime indicator of legitimacy for contemporary organisations appears to be the certification or accreditation by these bodies (Scott, 2008). Meyer and Scott (1983) further argues that the diverse and inconsistent support of different authorities affects the legitimacy of an organisation in a negative way, although many structures continue to exist because well-established authorities regard them as appropriate, even though less authoritative electorates challenge their legitimacy.

6.2.3 Institutional elements: the three pillars and dimensions of Institutional theory

According to Scott (2004) regulative (authority-based), normative (moral) and cultural-cognitive elements are the three fundamental constituents or pillars of institutions, forming the elastic threads that hold together an institution. These elements make institutions resistant to change and transmittable across generations.

To examine the distinctive nature of these pillars, Scott (2004) distinguishes between the principle dimensions along which the assumptions about the pillars differ. Each of these dimensions is explained in Table 5.

Principle dimension of institutional pillar	*Meaning of dimension*
1. Basis of compliance	Why would people comply with the institution? What is the basis of regular behaviour?
2. Basis of order	What brings order to the institution?
3. Mechanisms	Which mechanisms are used to monitor and control/enforce the institution?
4. Logic	What is the logic behind going with or following the institution?
5. Indicators	What are the 'things' that specify the institution?
6. Basis of legitimacy	What makes the institution legitimate?

Table 5: The Six Dimensions of Institutional pillars (Adapted from: Scott, 2008:52)

The three pillars of institutional theory will now be discussed in more details.

6.3.3.1 The regulative pillar

Researchers associated with this pillar place an emphasis on the regulatory features of institutions (rule-setting, monitoring, and sanctioning/authorising activities) and they attempt to design and construct institutional frameworks that support shared action. According to Scott (2008:51), they believe that "institutions constrain and regularize behaviour". To them 'regularize' means

the ability to put down rules, check whether or not others obey these rules, and furthermore make use of rewards or punishments to direct future behaviour. Examples of these include government regulations which are put into place to organise the process of economics (Geels, 2004). On national level these could include government policies, trade laws, contracts, legal systems, etc. These regulations are backed up by sanctions such as the police service and courts of law (North, 1990). Their organisational equivalents could be seen as workplace rules, monitoring scripts and incentives (Adams, Lee and Nissen, 2010).

This pillar is favoured mostly by economists, a lot of political scientists and just a few sociologists. The economist Douglass North (1990:4) summarises the beliefs of this strand well: "[Institutions] are perfectly analogous to the rules of the game in a competitive team sport. That is, they consist of formal written rules, as well as typically unwritten codes of conduct that underlie and supplement formal rules … the rules and informal codes are sometimes violated and punishment is enacted. Therefore, an essential part of the functioning of institutions is the costliness of ascertaining violations and the severity of punishment."

The principle mechanism of control according to this pillar is coercion/pressure/intimidation, while force, fear and expedience are central to this approach and in many cases strengthened by rules, which could be informal mores, or more formal rules and laws. Powerful actors in institutions may use sanctions to inflict their will on others – they could even use incentives to enforce submission (Scott, 2008).

In summary, the rational choice or regulative pillar sees institutions as "a stable system of rules, either formal or informal, backed by surveillance and sanctioning power", (Scott, 2008:54).

6.3.3.2 The normative pillar

Theorists in this camp focus on the ways in which values and commitments, which are created through interaction, can shape, destabilise and supplement

formal and official procedures (Scott, 2004). This pillar is favoured mainly by sociologists and a few political scientists. According to Scott (2008) this element accentuates normative rules that give a prescriptive, evaluative, and compulsory dimension to social life. He describes normative systems as those including both values and norms. Values represent the preferred or the desirable outcomes, while norms indicate how things should be done to reach these desirable goals. Some norms and values apply to all members of the institution, while others only apply to selected types of actors or positions, which leads to different 'roles'. These 'roles' could be conceived in a formal way or they could emerge informally over time through social interaction (Scott, 2008).

People within the same social grouping (be it a nation-state, organisation, culture, religion, family), share the same set of objectives/aims/ambitions (e.g. to dominate the world's economy; to maximise profit; to stay pure; to get salvation; to be educated) and agree on suitable ways to pursue these objectives (e.g. by banning capitalism; by cutting on staff expenses; by banning other cultures; by spreading the gospel; by setting up private schools). They therefore behave in accordance with that which is broadly socially agreed upon and in many cases implicitly expected by the members of their social grouping (Adams *et al.*, 2010).

Norms and values are seen as conceptions of appropriate goals and activities and they become prescriptions/expectations of how the different actors are believed to behave. Normative systems constrain social behaviour, but at the same time also empower/enable social action. They bestow rights, but also responsibilities; freedom, but also duties; licenses, but also directives (Scott, 2008).

6.3.3.3 The cultural-cognitive pillar

The supremacy of this pillar is primarily emphasised by cultural anthropologists and sociologists and is applied by organisational and management pupils. For these researchers the cultural-cognitive elements (conceptions shared amongst members of an institution, which form the

nature of social reality, as well as the frames through which meaning is created) are central to institutions (Scott, 2008).

According to Scott (2004) social reality emerges through social interactions between the individuals of the institution and takes place when they create and share their interpretations of what they believe is going on. This sharing takes place over time on the micro level, leading to the sharing of mutual understandings about the nature of their situation (playground, workplace), which is then passed along to other individuals as they join the group. In the same way, shared symbols (language) and shared understandings (religion, science), created on the macro level, describe social reality, and in doing this, the understandings and cognitive processes of those that participate, are shaped accordingly (ibid.). According to Berger and Luckmann (1967), one needs to understand the historical process during which an institution was produced. They allege that without an understanding of this history, it is impossible to understand an institution sufficiently.

This approach is thus labelled 'cultural-cognitive' as internal interpretive processes are formed/moulded by external cultural frameworks. This is explained in more details by Douglas (1982, in: Scott, 2008) who states that one should "treat cultural categories as cognitive containers in which social interests are defined and classified, argued, negotiated, and fought out."

According to Zucker (1977) social knowledge which has become institutionalised, exist as facts (the moral becomes factual); it forms part of the objective reality and is directly transmittable on that basis. Highly institutionalised acts and 'ways of doing things' is transferred in the social group simply by one individual telling the other 'how things are done'. Individuals are furthermore inspired to comply with these facts otherwise their actions and that of others in the same social system cannot be understood.

The cognitive-cultural perspective, according to Zucker (1983), holds that the relative stability, legitimacy and power of what is believed to be 'common understanding', determines behaviour that has become institutionalised.

These common understandings are rarely explicitly verbalised and are deeply-rooted in the culture of the organisation. Zucker (1987:443) describes them as 'taken-for-granted assumptions at the core of social actions'. These mutual understandings are lenses used by actors to reflect on themselves as part of a social group (Zucker, 1991). They furthermore use these lenses to form their views of the world by establishing categories of structure, action and thought, which are socially accepted. This then leads to behaviour being driven unconsciously by so called classifications, routines, scripts and schemas in the minds of individuals. These three pillars are summarised in Table 6 below.

Dimension	***Regulative (authority-based) pillar***	***Normative (moral) pillar***	***Cultural-cognitive pillar***
1. Basis of compliance	Expedience (the use of methods that bring the most immediate benefits; based on practical rather than moral considerations)	Social obligation	Taken-for-grantedness; shared understanding
2. Basis of order	Regulative rules	Binding expectations	Constitutive schema
3. Mechanisms	Coercive mechanisms such as *force* and *punishment*	Normative	Mimetic (learning, imitation)
4. Logic	Instrumentality *('the rules of the game', to create stability)*	Appropriateness ('how things should be done here')	Orthodoxy *(shared ideas and concepts)*
5. Indicators	Rules; Scripts; Laws; Sanctions	Certification; Accreditation	Common beliefs; Shared logics of action
6. Basis of legitimacy	Legally sanctioned actions	Morally governed	Comprehensible; Recognisable; Culturally supported; conceptually correct
7. Examples	Corporate/workplace rules; laws; sanctions; incentive structures; procedures; protocols; standards; power systems; governance systems; reward and cost structures; monitoring scripts; enforcement charters; legal judgements	Norms; values; job descriptions; role expectations; authority structures; codes of conduct; codes of ethics; codes of best practices; non-formalised norms and values	Beliefs; priorities; heuristics ; jargon/language used; problem solving methods (heuristics) and experience; conceptual frameworks (paradigms)/shared conceptions of social reality; frames of meaning; worldviews

Table 6: The dimensions of the three Institutional Pillars (Source: Scott, 2008:52)

According to Scott (2008), the cultural-cognitive dimension of institutions is the primary distinguisher of new institutionalism in sociology. DiMaggio and

Powell (1991a) state that new institutionalism differs from 'old' institutionalism in four ways: the concepts and language of new institutionalism is less literal than that of old institutionalism; in new institutionalism the mechanisms of change in organisations is specified in a more precise way; new institutionalists connect processes on organisational-level to processes on more macro and more micro levels; and lastly, new institutionalists have reflected on concepts such as sedimentation and deinstitutionalisation.

A definition on new institutional theory is offered by DiMaggio and Powell (1991a:8): "The new institutionalism in organization theory and sociology comprises a rejection of rational-actor models, an interest in institutions as independent variables, a turn toward cognitive and cultural explanations, and an interest in properties of supra-individual units of analysis that cannot be reduced to aggregations or direct consequences of individuals' attributes or motives." New institutionalism views fields and networks of actors (and more specifically organisations) as the 'place' where the action takes place. These fields of action are connected with "both the long-term macro-development of culture, forms, and archetypes, and with the more micro, short-term interactions among actors in the fields, especially as they seek to make sense of it.",(Jennings and Greenwood, 2003). In this sense, new institutionalists have done a lot of research to understand how social worlds are created by social actors, and how these worlds over time again shape action through legitimised rules.

6.2.4 Carriers/repositories of Institutionalism

Scott (2008) differentiates between four types of carriers or sources of institutionalism, being symbolic systems, relational systems, routines, and artefacts. The carriers emphasised when studying institutions, will vary and will relate to the institutional pillar bearing prominence in the research study. Each one of these sources is now described in more detail.

6.2.4.1 Symbolic Systems as Carriers

The symbolic systems referred to here, are symbolic models, classifications, representations and logics, such as culture (Scott, 2008). According to

Jepperson & Swidler (1994) some cultural elements are more interconnected to other cultural elements or are even more taken-for-granted elements, which make them more institutionalised than others. Jepperson (2002) refers to culture as rules, procedures and goals which are not formally presented and therefore lacks monitoring and sanctioning. He describes these rules to be habitual or predictable in character. Swidler (1986:273) states that "culture influences action not by providing the ultimate values toward which action is oriented, but by shaping a repertoire or 'tool kit' of habits, skills, and styles from which people construct 'strategies of action'."

Scott (2008) claims that although symbolic systems encourage uniformity and foster consistency of action, they vary in the extent to which this is done. Swidler (1986) points out that culture will in stable times independently effect action by providing resources (or a repertoire of capabilities) to create assorted lines of action – shaping action only in the sense that the repertoire will restrict the action range available. To the contrary, unambiguous beliefs/principles will directly control action in unstable cultural times, while structural opportunities for action will determine which among competing ideologies will survive in the long run.

Symbolic systems operate in the organisation's environment as broadly held beliefs and laws to take into account, but according to Scott (2008) it is also important to note that they are also carried as ideas or values in the minds of the individuals operating in the organisation.

As illustrated in Table 7, cultural-cognitive theorists will thus study categories, typifications and schemas as symbolic carriers, while normative theorists will focus on values and expectations and regulative theorists will emphasise rules and laws.

In chapter 3 of this thesis (section 3.4.1) culture was described as an important 'ingredient' of the social context within which ISs are implemented. It was argued that researchers who view culture as a root metaphor, being something an organisation is, would in a subjective way use culture as an

exploratory variable to explore organisations to try and understand the patterns that enable the organised action (Smircich, 1983). These patterns are the more visible parts of culture and stem from the lowest or first level of Shein's (1992) model, being the cognitive structures or the interpretive schemes which people use in their sense making, and which are referred to in this chapter as cultural cognitive institutions, carried within the organisation's culture.

6.2.4.2 Relational System Carriers

According to Scott (2008:79) relational systems depend on "patterned expectations connected to networks of social positions." Roles have rules and belief systems encoded into them. Relational procedures which are shared broadly among organisations, could lead to structural isomorphism or similarity. In the same way, forms which are unique to a specific organisation again lead to a distinctive organisational character structure.

Table 7 shows that cognitive-cultural theorists emphasise structural isomorphism e.g. differentiated departments and roles, while normative and regulatory theorists view relational systems as systems of control, and either stress the authority (normative) or the power (regulative) elements of these structures.

6.2.4.3 Routines as Carriers

Institutions are also carried by habits and routines (Scott, 2008). Scott describes routines to be patterned actions that imitate the tacit knowledge contained in the heads of actors, of which the actors may not even be aware. According to Winter (in: Scott, 2008:80) routines are the 'genes' of organisations that range from 'hard' activities (encoded in technologies) to 'soft' organisational procedural routines, and they all involve "repetitive patterns of activity". Routines include a broad variety of behaviour, which is in many cases industry specific and could amongst others also include standard operating procedures, skill sets of individuals, job functions, and assembly line details (Miner, 1991). Routines in many instances result in more stable

organisational behaviour, which in turn leads to more consistent functioning and organisational inflexibilities.

6.2.4.4 Artefacts as Carriers

Artefacts refer to 'items' created by humans in an attempt to assist them with the execution of various tasks. In early times men constructed primitive artefacts such as rocks and sticks, while more complex technologies (such as computer hardware and software) have made their appearance in more contemporary times. According to Scott (2008) researchers initially saw these artefacts to have a one directional effect on the structure and behaviour of organisations. Orlikowski (1992) changes this perspective when introducing the duality of technology. She views technology as an instance of structuration (Giddens, 1984) and explains that technologies are the products of social-political processes, resulting in structures such as rules and resources, being entrenched within the technology. "[H]uman agents build into technology certain interpretive schemes (rules reflecting knowledge of the work being automated), certain facilities (resources to accomplish that work), and certain norms (rules that define the organizationally sanctioned way of executing that work).", (Orlikowski, 1992:410). In a similar fashion DeSanctis & Poole (1994:125) point out the structures built into technologies such as group decision support systems: "…reporting hierarchies, organizational knowledge, and standard operating procedures. … the technology presents an array of social structures for possible use in interpersonal interaction, including rules (e.g. voting procedures) and resources (e.g. stored date, public display screens)."

As is the case with other institutional carriers, artefacts are also associated with and affected by the three pillars of institutions (Scott, 2008). In the interest of safety, some artefacts (technologies) are authorised by regulative authorities, who oversee aspects such as product quality and who sets standards for a wide range of machines and equipment. On the other hand artefacts could also symbolise and signify particular assemblages of ideas and in this sense the symbolic consignment of an artefact could easily overshadow its material substance.

	Pillars		
Carriers	**Regulative**	**Normative**	**Cultural-Cognitive**
Symbolic systems	Conventions, Rules, Laws	Shared values, Normative expectations	Categories, Distinctions, Typifications, Schema
Relational systems	Governance systems, Power systems	Regimes, Authority systems	Structural isomorphism, Identities
Routines	Protocols, Standard operating procedures	Jobs, Roles, Obedience to duty	Scripts
Artefacts	Objects complying with mandated specifications	Objects meeting conventions, Standards	Objects possessing symbolic value

Table 7: Institutional Pillars & Carriers (Source: Scott, 2008:77)

6.3 Institutional theory and organisations

Institutional theory has been used extensively in the study of organisations (Zucker, 1977; DiMaggio and Powell, 1983; Tolbert and Zucker, 1983; Zucker, 1983;1987; DiMaggio and Powell, 1991a; Jepperson, 1991; Meyer and Rowan, 1991; Zucker, 1991; Tolbert and Zucker, 1996). This section introduces in section 6.3.1 how neo-institutionalism is conceptualised as an alternative perspective to the organisation theories which focus on rationality and efficiency. Section 6.3.2 outlines the different layers or levels of organisation to which institutional theory applies.

6.3.1 Introduction

Institutional analysis in organisations appeared as a counterpoint to organisational theories within which organisations and managers are considered to be 'rational actors', and 'efficiency' the driving force behind organisational decision making (DiMaggio and Powell, 1983; Scott, 1994;

Barley and Tolbert, 1997; Avgerou, 2000). Researchers that have adopted this perspective, acknowledge that not everything that happens in an organisation can be explained along this route, and that a means should be found along which the 'irrationalities' of organisational actors could be taken into account (Mignerat and Rivard, 2009). Under this institutional perspective actors 'accept and follow social norms unquestioningly, without any real reflection' (Tolbert and Zucker, 1996), and they would seek legitimacy in their environments to ensure that they are accepted and that they survive in the long term (Meyer and Rowan, 1977). Neo-institutional theory thus focusses on the taken-for-granted nature of forms and practices which reside at the core of social action, and views organisations as 'legitimacy hungry', constantly adapting and not representing the aggregate of individual decisions and desires (Immergut, 1998). Zucker (1983) supports this view by arguing that the rational perspective of organisations, which sees them as functional structures of means and ends, de-emphasizes the political and social nature of the context within which they operate.

Institutionalism offers cognitive and cultural explanations for organisational responses and according to Barley and Tolbert (1997:93) the individuals who produce the decisions and formal organisational structures 'are suspended in a web of values, norms, rules, beliefs, and taken-for-granted assumptions that are at least partially of their own making'. These elements result from the presence of institutions (Mignerat and Rivard, 2009). In this sense institutions constrain the options of individuals, but these constrains could again be changed or modified over time.

6.3.2 Levels/layers at which institutional theory is applied

When applying institutional theory, researchers can choose to focus on either more micro or more macro phenomena (Scott, 2008). Scott (ibid.) identifies six categories of analysis levels: world system level; societal level; organisational field level; organisational population level; organisational level; and organisational subsystem level.

All six of these levels have been used in the study of organisations. The level that poses to be the most significant one in this field is the organisational field level. According to DiMaggio & Powell (1983:143) an organisational field is: "those organisations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products." Organisation fields have shared cultural-cognitive or normative frameworks, and a mutual regulatory system (Scott, 2008).

In line with the levels presented by Scott, Avgerou (2000) affirms that institutional forces could come from various layers of sources, which include international, national, and internal organisational contexts.

6.3.3 Organisations as institutions and institutions affecting organisations

According to Zucker (1983) organisations are the most dominant institutional form in contemporary society. They are everywhere and are universal in their structuring of people's day-to-day activities. As institutionalisation is rooted in conformity, it functions to generate shared understandings of that which could be seen as appropriate and meaningful organisational behaviour. Zucker (ibid.) states that these could, amongst others, include responses to authority and the adoption of what is to be perceived as reasonable task-related practices and procedures. This is echoed by Avgerou (2002:25) who states that "the institutional character of organisations lies in the sustenance and perpetuation of organizational aspects, such as structure, decision making, and work practices, by unconsciously taking-for-granted the ways these aspects are."

6.3.3.1 Institutions within organisations

Apart from organisations themselves being institutions, organisation theorists have also studied many other institutions which sustain or structure the work activities within organisations. These include specific roles or job descriptions generally applicable across organisations; structures of power dissemination;

policy and other authorities which indicate the level of acceptance for organisational output; etc. (Zucker, 1983;1987).

6.3.3.2 Environment as institution and organisation as institution

Institutional theories as they apply to organisations, offer an abounding and complex understanding of organisations (Zucker, 1987). According to Zucker (ibid.) there are two main theoretical approaches to institutionalisation in organisations: environment as institution; and organisation as institution. The first approach focusses on 'reproduction'. In this approach organisations are seen as captives of the institutional environments in which they operate (Tolbert and Zucker, 1983). This is echoed by Meyer and Rowan (1991) who claim that many post-industrial organisations' formal structures do not truly reflect the needs of their work activities. Organisations tend to adopt formal structures and processes not because they are necessarily effective or assist in simplifying complex activities, but because they have become rationalised myths which are taken–for-granted as being efficient (Avgerou, 2002).

The second approach to organisation institutionalisation is the 'organisation as institution' approach, which focuses on 'generation' (Zucker, 1987). According to this approach institutions evolve from within the organisation itself. Zucker states that these institutions are reinforced over time, easily communicable to new members of the organisation, and are highly resistant to change, which means that they contribute to stability in the organisation. Berger and Luckmann (1967:54) affirm that institutions occur whenever there is a shared or mutual "*typification of habitualised actions by types of actors*". These typifications are always available to all the members of a social group and the institution typifies individual actors as well as individual actions. Furthermore, institutions cannot be created instantaneously, but they are the products of their history and merely by existing, they control human behaviour by being predefined patterns of conduct (ibid.).

Institutional factors could therefore either arise from external sources (the organisational environment) such as government, international agencies, professional trade and industry associations, research institutions, etc. or from

within the organisation itself. According to Blacker (1992) these factors include oblivious bases of authority, legal creeds, organisational roles, and behaviour styles, which inspire conformism and are continually reinforced through social acting in concurrence with the legitimacy of the system. In this way, organisations could under some conditions be pressured to conform to standard operating procedures, professional certification and state requirements.

6.3.4 Stability of institutional elements and change

DiMaggio and Powell (1991a) emphasise the homogeneity of organisations as well as the stability of institutional elements, and they argue that the new institutionalism focusses on 'persistence' rather than 'change'. For them the legitimacy requirement functions as a source of unwillingness or disinterest and in their opinion the change of technical factors in the organisational environment are relatively irrelevant sources.

However, it is important to note that the concept of institutionalism does not deny that organisational action is driven by a need to improve efficiency and that it implicates calculated choices by decision makers. Instead, institutionalism supplements the organisation's concerns for efficiency with social, cultural or cognitive elements from the organisation itself and from its environment (Avgerou, 2001). Avgerou states that, the impact of these elements lie in the fact that they, apart from legitimating the organisation's forms and actions, also indicate the aspects to be taken into account when choosing between technical rational actions. What also seems to be significant is that these elements could be contradictory and could cause conflict between the inherent historically shaped institutions and the new upcoming rationalised myths in the organisation's environment.

To this extent, DiMaggio and Powell (1983) argue that under certain conditions and influences from an organisation's environment, the organisation will undergo isomorphic change. By this they mean that organisations will join and homogenise to gain legitimacy and to enhance their chances of survival. They outline the three mechanisms or 'types of

pressure' of isomorphic change which comes from the organisation's environment:

- Coercive Isomorphism: *A result of formal and informal pressures exerted on organisations by other organisations upon which they are dependent and by cultural expectations in the society within which the organisation functions (p. 67).* Examples here could be government mandates such as safety procedures, pollution regulations, and other policies which organisations are bound to conform to.
- Mimetic processes: *Organisations which deal with uncertainty and ambiguous goals model themselves on other organisations that they perceive to be successful or legitimate. This modelling could be unintentionally through employee transfer or turnover; or explicitly by consulting firms or industry trade associations (p. 69).* This process is voluntary with no formal pressure to conform.
- Normative pressures: *Organizations that respond to pressures from two aspects of professionalization: 1. formal education and legitimation lying in a cognitive base produced by university specialists; and 2. the growth and elaboration of professional networks that span across several organisations (p. 70-71).*

Having explained isomorphism, it also has to be stated that the main critique against institutionalism has been that it doesn't explain deviation, but rather only focusses on increasing conformity and isomorphism (Jennings and Greenwood, 2003).

Later work by Scott (1995) state that these pressures, or forces of change, should rather be viewed as the 'pillars' which institutions are built on (refer back to section 6.2.3). It is also argued that researchers, who wants to gain an understanding of the process of institutionalisation, should investigate these 'pillars' together and independently from each other (Jennings and Greenwood, 2003).

According to Meyer and Rowan (1991) a developing set of rationalised patterns, models and cultural schemes establish organizational action building

blocks (actors and their roles; structures and goals; etc.) as social entities. Organisations do therefore not simply evolve as disconnected rational computations, but could rather be seen as 'social entities, embedded in complex networks of beliefs, cultural schemes and conventions that shape their goals and practices', (Hasselbladh and Kallinikos, 2000:698).

Having focussed on institutions and the role they play within and between organisations, the next section will focus on institutional theory and the use thereof in the field of IS.

6.4 Institutional Theory and Information Systems

6.4.1 Introduction

In 2001 Orlikowski and Barley (2001) advised IT researchers to make more use of developments in organisation theories. One such development is institutionalisation. Before 2001, only a few IT researchers (e.g. Barrett and Walsham, 1995; Avgerou, 2000) studied the impact of institutions on the design and use of technologies in and across organisations and little research was done on the influence of regulative processes, normative systems, and cultural frameworks on these aspects.

Avgerou (2000) offers an institutionalist perspective on IT and organisational change and concurs with the view of neo-institutionalists, that the 'rational' actions of managers and technological experts could not solely explain the happenings in organisations. She argues that institutionalism in this regard provides a theoretical platform to also address the 'irrationalities' emerging from the organisation's context and the cultural systems entrenched in organisations. Zucker (1983) affirms that an innovation gets adopted and diffused in part for its 'technical merits' and in part because of the impact of 'powerful actors'. Later, these aspects become irrelevant, as through the process of institutionalism, such an innovation gets adopted and maintained due to its attained legitimacy – it becomes taken-for granted and its validity is no longer challenged.

6.4.2 IS/ICT as an institution

According to Avgerou (2000:237) IT 'has become an institution in its own right', as it has obtained its own collected meaning. To this extent it has become an 'invisible hand of domination' in organisations (Jennings and Greenwood, 2003). Avgerou (ibid.) recognises the following institutional elements of IT:

- a common belief that IT is 'something' that adds value to contemporary society has been established (it is common knowledge that if you add IT, you add value).
- there is an existing network of industries built around IT, ranging from hardware manufacturers to service providers, software producers and consultants;
- there exists a toolkit of professional expertise for IT development and application use;
- there are regulations in place for IT development and use (such as codes of conduct, copyright legislation; data protection acts; etc.); and
- the standards of technology and practice is propagated by professional societies such as the ACM and IFIP.

IT is a universal technology that impacts organisational performance and has the potential to change the socio-economic position of nations and regions (Castells, 2000b), but according to Avgerou (2000:237) the dissemination of IT is, apart from the value it contributes, continued because it has "captured the hopes and fears of people in their professional roles as well as in their personal lives". Avgerou (ibid.) adds that nobody really challenges the wisdom of deploying the use of computers in ever more organisational activities, which confirms that IT has become taken-for-granted fixtures or 'rational myths' (Meyer and Rowan, 1991) in today's organisations to such an extent that one cannot imagine an organisation without it.

Avgerou (2000:234) argues that "IT innovation cannot be adequately explained as an enabler to organizational objectives or as a contributor to situated processes of organizational change." Both 'IT innovation' and

'organisational practice' are institutions in their own right. They both have their own mechanisms and elements which make them legitimate. The more IT gets implemented in organisations, the more the institutionalisation of IT as innovation and 'good practice' gets reinforced. At the same time the organisational practice within which it is implemented gets de-institutionalised as the established structures and work practices get changed or replaced. Avgerou (ibid.) therefore describes organisational change as an uncertain process of de-institutionalisation, rather than a set of actions aimed at sufficiently legitimating organisational structures and work practices. Avgerou (2000:234) states that "technology innovation is itself a process combining technical-rational and social forces, neither driving, nor subsumed in the forces of organizational change, but interacting with them." She illustrates this in a case study, showing that IT innovation has still been implemented and continuously invested in, in spite of failed organisational change efforts, or the fact that it did not make any considerable contribution to the change of the organisation within which it was implemented. The OS ECM project described in chapters 8 and 9 of this thesis seems to mirror these outcomes and details on these aspects are described in chapter 11, section 11.2.

In cases where the objective of organisational change is unclear or indefinite, all efforts to utilise IT for organisational change seems to be inconsistent or unpredictable. Avgerou (ibid.) concludes that although she believes that IT innovation could not be held accountable for organisational transformations, it does tend to intensify these efforts.

6.4.3 The use of institutional theory in the IS discipline

Institutional theory has inter alia been used by IS researchers to examine IT innovation, IS development and implementation, and IT adoption and use, of which the latter is of importance to this study. Mignerat and Rivard (2009) researched 53 articles which made use of institutional theory in IS and reported that there are mainly two kinds of processes which IS researchers examine in institutional theory. These are institutional effects, which point to the way in which institutions effect other institutions or organisations (as described by Scott (2004) and reported on in section 6.3.2; and by DiMaggio

and Powell (1983) and reported on section 6.3.4); and institutionalisation (as described by Jennings and Greenwood (2003) and by Tolbert and Zucker (1996) and reported on in section 6.3).

The study by Mignerat and Rivard (2009) found that 43 of the 53 articles (of which 31 were empirical studies) assessed the effect of institutional pressures during the innovation process, mainly focussing on the organisational level of analysis; and 10 studies describing the process of institutionalisation of a specific practice or system, mainly done on the industry level.

One of the articles examined by Mignerat and Rivard (*ibid.*) on the process of institutionalisation is that of Avgerou (2000), which is discussed in section 6.4.1 and 6.4.2 of this thesis. In another article by Avgerou (2001), she uses institutional theory in the contextualist approach she follows to shed light on the reasons why IS innovation had limited value in the industrial re-organisation conducted in Cyprus. She confers that the content of change studied in the field of IS, "should not be IS innovation, but the change of heterogeneous networks of institutions and people within which ICT is called to play a role." To this extent she uses institutional theory to explain the 'irrationalities' that happen due to the institutions embedded within the organisation and its context. Important to note is that institutional theory doesn't deny that IT decisions are technical/rational actions made by actors who are driven to improve efficiency in the organisation. Avgerou (*ibid.*) studied technical/rational ideas and actions as well as the institutional forces which make these actions legitimate, on the international, national and organisational level. She argues that most IS specialists try to 'fit' the technology they implement in organisations to the organisational context they implement it in, and she claims that a 'fit' in such a case is not applicable, as "a fit defies the policy objectives new technology is expected to serve, as the desirable objective is 'change'."

In an article by Orlikowski and Barley (2001) they argue that the use of an institutional lens in IT research could assist researchers to develop a more structural and systematic understanding of how technologies are rooted in

multifaceted mutually dependent social, cultural, and political networks, and how they are accordingly moulded by such broader institutional powers. They consequently encourage IS researchers to make more use of this lens. In applying it to for instance the digital economy, they maintain that it could be studied as "an emergent, evolving, embedded, fragmented, and provisional social production that is shaped as much by cultural and structural forces as by technical and economic ones. … rather than focussing only narrowly on technical design, economic imperatives, of psychological impacts, thus missing important social, cultural, and political aspects of electronic commerce.", (Orlikowski and Barley, 2001:154). In this sense researchers could maybe, by applying institutional theory, have discovered that the fact that telecommuting remains a rare phenomenon could rather be the result of institutions existing about 'how work is done'. As these institutions have been around for a very long time, they would be highly institutionalised and difficult to change.

Barrett, Grant and Wailes (2006) report that institutionalism rejects the view that the outcome of an IT implementation can be directly gained by examining the inputs. It rather acknowledges that the context, within which the implementation decisions are made, has a strong influence on the nature of the decisions made. They refer to the work of DiMaggio and Powel (1983) on isomorphism and further argue that most of the research done on institutions and the context of organisations, tend to highlight stability and persistence due to the institutions present. They consequently call for more research on investigating the relationship which exists between agency and structure, and more particular on the role of agency in the 'shaping, reinforcing and remaking' of institutions in an attempt to address organisational change.

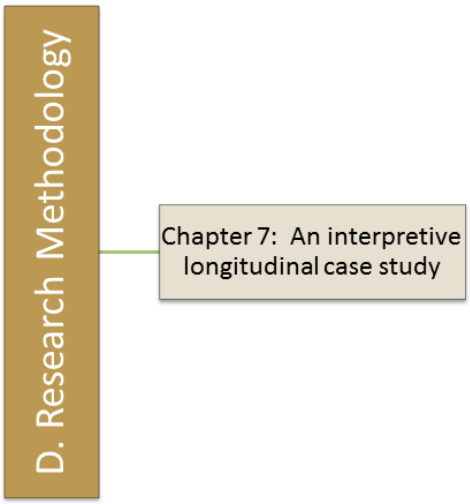
6.5 Conclusion

From what was reported on in this chapter, institutional theory seems to be a very useful theory in the field of IS, in that it could be used to unpack the organisational context in an attempt to understand the process of change and change management. Section 6.4.3 has described the use of institutional theory in the field of IS. In this regard it should be noted that the research

done in this thesis is aimed at using institutional theory in the field of IS change management in an attempt to gain an understanding of the management of the process of institutionalisation and de-institutionalisation.

The broader national (and subsequently international) context of the organisation described in the case study of this thesis, is thus presented in chapter 8, while the details pertaining to the internal organisational context within which the system was implemented, is narrated in chapter 9. Institutional theory and how it applies to these three levels, is accordingly explained in chapter 11, which provides an institutional perspective on the case study.

SECTION D: RESEARCH METHODOLOGY



This section of the thesis provides details on the research methodology followed. It starts off with a discussion on interpretivism as the chosen research paradigm, after which the research strategy, that of a longitudinal case study, is described. The research design is accordingly elaborated on, providing important details on the data collection methods and the process of data collection during the two different phases of the case study. The method for data analysis is then discussed and the details of the ethics statement are presented.

Chapter 7:
An Interpretive Longitudinal Case Study

7.1 Introduction

This chapter describes the research paradigm and strategy used in this study. It also describes the research design in terms of the way in which the research was conducted. Details are provided of the methods used to collect the data during the different phases of the case study, as well as the way in which the data was analysed.

7.2 Research Paradigm

In this section the researcher explains the research philosophy followed in the execution of the study, by describing the existing philosophies residing in the field of IS, and arguing for the interpretive philosophy to be the best fit for the phenomenon under discussion.

According to Myers (n.d.), following Orlikowski & Baroudi (1991), research can be classified as positivistic, interpretative or critical, based on the philosophical assumptions adopted by the researcher. The differences between interpretative and positivistic approaches can be made more explicit if one considers the epistemological (assumptions made about the types of valid knowledge that could be obtained about a phenomena) and ontological (underlying assumptions made about the essence of the phenomena under study) stances thereof.

Epistemologically, Archer (in: Walsham, 1995b) defines positivism as the position that considers facts and values to be distinct, and according to this stance scientific knowledge therefore purely consists of facts only. In contrast to this, the interpretative position could be either non-positivistic or normativistic. The non-positivistic position sees facts and values to be entangled and hard to separate and both facts and values are therefore involved in scientific knowledge. The normativistic approach takes on the view

that scientific knowledge is socio-political and unavoidably favourable to specific sets of social ends.

Ontologically, the positivist position is one of 'external realism', which sees reality as existing independently of one's construction of it, while the interpretative position could be either 'internal realism' (reality is viewed as an 'inter-subjective construction of the shared human cognitive apparatus', (p. 75)) or 'subjective idealism' (everyone constructs their own reality), (Archer, in: Walsham, 1995b).

Positivistic studies are therefore based on the presence of known or assumed unchangeable relationships within the phenomena under study and usually make use of structured instrumentation. Positivistic research in IS usually shows evidence of formal propositions, quantifiable measures of variables and hypothesis testing, done on representative samples of a specified population (Orlikowski and Baroudi, 1991). These approaches assume that the relationship between social reality and humans is independent and objective (they are invariably of the cause-effect type).

Numerous reviews of IS research literature shows that positivistic research is very popular in the IS domain. Orlikowski and Baroudi (1991) studied 155 IS research related articles published between 1983 and 1988 and found a clear preference for a single set of philosophical assumptions or world view regarding the underlying nature of the phenomena studied – that of positivism. In a similar fashion Walsham (1995a) studied IS papers published between 1992 and 1993 and Nandhakumar & Jones (1997) studied papers published between 1993 and 1996 – they all reported the same trend – a lack of non-positivistic research in the IS field. In a study done in 2004, on research paradigms and methodologies used in the field of IS, Chen and Hirschheim (2004) found positivistic research to still dominate the published empirical research in this field, although qualitative research did gain some ground. Their study also showed that case studies obtained more recognition as a strategy employed by researchers to gain real world scientific knowledge.

In 2008, two highly rated journals in the field of IS, namely the *European Journal of Information Systems* (EJIS) and the *Information Systems Journal* (ISJ), both published articles in which they report on surveys done on the research approaches, inter alia, being used in their journals (Avison, Dwivedi, Fitzgerald and Powell, 2008; Dwivedi and Kuljis, 2008). The result surprisingly showed that more articles which used an interpretative approach were published by these two journals, followed by studies using a positivistic approach, with critical studies still dragging behind, although used more frequently in the latest issues of these journals. This report could be seen as pointing to the upcoming of interpretive research as a mainstream philosophy in the field of IS. It furthermore also showed that qualitative case study research used in interpretive studies, were the most used research strategy in the EJIS (Dwivedi and Kuljis, 2008).

Taking into account that a positivistic research approach is a-historical and a-contextual, makes it unsuitable to discover the context and history of an IS implementation, which is of crucial importance to this study. An interpretative approach on the other hand, claims that social phenomena must be understood within the social contexts in which they are constructed and reproduced through their activities. The interpretive paradigm is therefore characterised by a need to understand the world as it is, not as a fixed set of objects, but rather as a process that socially develops, being a subjective experience (Burrell and Morgan, 1979). Interpretive studies assume that humans create, recreate and associate their own subjective and inter-subjective meanings in their interaction with the world surrounding them. The social world is therefore not seen as fixed, but it is constructed and strengthened by people through their actions and exchanges. Interpretive researchers will therefore try to understand certain phenomena by accessing the meanings that the people participating, allocate to them, and will discard the so called objective or factual explanations of events and situations. They will, as an alternative, pursue a relativistic or shared understanding to the phenomena (Orlikowski and Baroudi, 1991).

Interpretavists attempt *"… to understand the inter-subjective meanings embedded in social life … [and] to explain why people act the way they do"*, (Gibbons in: Orlikowski and Baroudi, 1991:14). They will accordingly not seek generalisation from a specific research setting to a whole population, but will try to understand the deeper or hidden structure of the phenomenon, which could then be expended to also inform other research settings. Both the collection and analysis of data involves the researchers' own subjectivity and according to Walsham (1995b) interpretative researchers do not report on facts, but they report their own interpretations of other people's interpretations, and they therefore have to describe the detail of how they arrived at their 'results'. Orlikowski and Baroudi (1991) concur with this as they state that the interpretive schemes used by the researcher always interfere with the research, causing the researcher to create part of the reality s/he studies him/herself, through the constructs s/he uses to look at the world.

Human actors ascribe subjective meanings to technology in the context within which it is implemented and used. These meanings are emphasised by interpretative research, which makes it an appropriate approach to study the implementation and use of IS in organisations. An interpretative approach, using a single longitudinal case study (Walsham, 1993; Barrett and Walsham, 1995; Walsham, 1995b) was thus used in this study to gain an in depth understanding of the dynamics present during the process of rolling out an OS ECM system in one of the national Government departments in South Africa.

According to Walsham (1993) a researcher doesn't necessarily have to choose the 'correct' theory when doing interpretive research, but should follow theoretical paths that will shed some light on the appealing parts of the research questions, in an attempt to create a conceptual perspective applicable and suitable for the specific question.

7.3 Research Strategy: Case Study Research

In this section the researcher motivates case study research as the research strategy chosen for this study. The case study itself and the background to it, is described in detail in chapters 8 and 9 of this thesis. A summary of the time

frame of the case study, being longitudinal, is also provided in chapter 9, section 9.6, Figure 16.

The most common qualitative strategy used in the field of IS, is case studies (Orlikowski and Baroudi, 1991). This strategy is particular useful for studying IS in organisations, where the aim is to understand the IS in its context (Myers, n.d.). Eisenhardt (1989) describes a case study as a research strategy which focuses on understanding the undercurrents and dynamic forces extant within single research settings. According to Yin (2002) case studies could consist of single or multiple cases and could be analysed on many different levels, such as on an inter-organisational or an intra-organisational level. Case studies could furthermore be aimed at either offering a description for understanding, or at testing or generating a theory (Eisenhardt, 1989).

Yin (2002) defines a case study as an empirical inquiry that investigates a contemporary phenomenon within a real-life context, especially when the boundaries between the phenomenon and the context are not clear. According to Yin (2002):

> *"The case study allows an investigation to retain the holistic and meaningful characteristics of real-life events such as individual life-cycles, organisational and managerial processes, neighbourhood change, international relations and the maturation of industries."*

The case study as a research strategy therefore proves to be very useful in situations where the context within which the events take place, is critical and where the researcher doesn't have any control over the events as they unfold. This allows the researcher to gain an understanding of a phenomenon in its context, rather than seeking general laws about it.

In information systems research, case studies could be classified as positivistic, critical or interpretive, depending on the epistemological and ontological assumptions adopted by the researcher. Given the interpretive stance adopted in this study, and the advantages of a case study to create novel and profound insights into the rich social and cultural context of an

organisation, the researcher believes that the case study approach is an appropriate strategy for this research topic.

7.3.1 Principles of interpretive case study research

In this study, the seven principles for interpretive field studies by Klein and Myers (1999) were not applied mechanistically, but were rather used as tools to make sense of the problem studied as a whole. The fundamental principle of 'the hermeneutic circle' of human understanding implies a constant move between the whole and its parts, in that the understanding of the whole is influenced by an understanding of the different parts and how they relate. This understanding of the parts consequently leads to an understanding of the whole. The other six principles expand on this hermeneutic circle and will accordingly be discussed.

The principle of 'contextualisation' calls for taking the background and history of the case setting into account when attempting to interpret the current situation. This is necessary to inform the intended research reader of the way in which the investigated case emerged. The assumptions about the context are though that it is dynamic; is not possible to be predicted; and the actions taken by the researcher can have an influence on it.

The principle of 'interaction between the researcher and the subjects', holds that a critical reflection of the research data or material construction is to be done. This is important as the interpretive researcher subjectively interprets the data and the way in which the research participants view the researcher and are influenced by the research process itself.

According to the principle of 'abstraction and generalisation', the information collected needs to be conceptualised as described by the first two principles. In doing this, the researcher can make use of theories or theoretical frameworks to shed light on certain aspects and to draw conclusions.

The principle of 'dialogical reasoning' requires the researcher to continually revisit the assumptions made at the start, which led to the use of specific

theories or to the way in which the research was designed. This is expecially important if the initial choices appear not to be supported by the findings of the study.

According to the principle of 'multiple interpretations' the researcher is required to actively look for more than only one viewpoint, clearly stating why they exist and whether and why they possibly contradict each other. This could lead to richer and possibly new interpretations of the case.

The principle of 'suspicion' is the last principle listed by Klein and Myers (*ibid.*). IT encourages the researcher to be on the lookout for data inconsistencies and to question the responses of participants, in an attempt to discover falsifications which could be due to the personal agendas of the participants. This principle is though not required by the authors, as it is generally accepted that interpretive research needs not be critical.

In Walsham's (1995b) article on interpretive case studies in IS research, he uses Geertz's (1973) view of the data collected in anthropology to describe the data gathered in an interpretive case study. Such data are "*constructions of other people's constructions of what they and their compatriots are up to*", (p. 75). The constructions of interviewees are called first-order data, while that of the researcher is called second-order concepts (Van Maanen, 1979). The latter is not provided only by in-depth data, but rests upon good theory and wise analysis.

Another important aspect of interpretive research is addressed by Walsham (1995b), who states that the researcher's role needs to be clarified as either being an outside observer or an involved researcher. Interpretive researchers are normally subjectively part of their research and are therefore seen to be involved. Walsham (ibid.) mentions that it is quite impossible for an interpretavist, who does an in-depth case study over some time, not to influence the interpretations of the people who form part of the case study. Even though researchers might want to view themselves outside the case study, they are to a certain extend influencing the outcomes of the research,

even if this entails only interpreting and sharing the concepts with the people in the case study.

The case study strategy usually integrates different data collection methods such as verbal reports, interviews, questionnaires, archives, and observations, and the data reported on may be of a qualitative, or quantitative, nature or even of both (Eisenhardt, 1989; Yin, 2002). Walsham (1995b) argues that interviews could be seen as the primary data source for interpretive case studies, as it allows the researcher to access the interpretations of participants on the actions and events taking place.

The traditional understanding about cases study research states, inter alia, that theoretical (context-independent) knowledge is of more value than concrete, practical (context-dependent) knowledge, and furthermore, that one cannot generalise from an individual case, which infers that a single case study cannot contribute to scientific development (Flyvberg, 2006). Flyvberg corrects these misunderstandings by pointing out that one cannot find predictive theories and universals in the study of human affairs, and as such concrete context-dependent knowledge is more valuable that the pointless search for 'predictive theories and universals'. He furthermore argues that generalisation should be seen as just one of many ways in which people gain and accumulate knowledge. In cases where knowledge cannot be formally generalised, such knowledge can still contribute to the collective knowledge generation process in a given field, adding toward scientific innovation. This is confirmed by Walsham (1993:15) who states that *"…the validity of an extrapolation from an individual case or cases depends not on the representativeness of such cases in the statistical sense, but on the plausibility and cogency of the logical reasoning used in describing the results from the cases, and in drawing conclusions from them.*"

Walsham (1993) also discusses four ways of generalising from a single case study: development of concepts; generation of theory; drawing of specific implications; and the contribution of rich insight. The misconception on the generalisation of a single case should therefore be adjusted to read that "*one*

can often generalise on the basis of a single case, and the case study may be central to scientific development via generalisation as supplement or alternative to other methods, but formal generalisation is overvalued as a source of scientific development, whereas 'the force of example' is underestimated", (Flyvberg, 2006:228).

7.3.2 The format of the case study

Writing up a case study forms a very important part of the research study. Van der Blonk (2003) states that writing in itself is not a bare simplistic process, but it is rather a "*struggle by the researcher with his or her material and what it is that needs to be said.*" The case study, as presented in chapter 9 of this thesis, is a chronology as described by Van der Blonk (2003). The historical context of the case is described in chapter 8, elaborating on the pre-implementation events of the SA Government's adoption of the FOSS policy, the policy itself, as well as the details pertaining to the context within which the OS ECM was implemented. In this regard the researcher has elaborated on the structuring of the national Government department, as well as on the OS and PS software used and implemented by the department. The case is presented in two phases: phase one describes the pilot project implementation; while phase two describes the roll out of the system to the rest of the department. Throughout the chronology different themes are highlighted as they emerged through the questions which guided the research.

7.3.3 The time frame of the case study: Longitudinal

The implementation of the OS ECM system case as described in chapters 8 and 9 of this thesis, started off in November 2007 when the Request for proposal (RFP) was issued. The aim was to have the first phase of the project (the pilot implementation) completed by May 2008. The OS ECM service provider was only appointed in January 2008 and the researcher joined the project in March 2008 when it officially kicked off. The pilot phase ended in February 2009.

Initially the CIO of the Government department requested that the RFP for the second phase of the project (the roll out to the rest of the department) be send

out in the middle of the pilot phase. Although it was agreed upon by all stakeholders, this did not happen. The RFP for the second phase was only sent out in September 2009, with the phase only officially starting in April 2010. The project was roll out to the rest of the department, but a second roll out was needed (see chapter 9 for details) and the second phase was planned to end in February 2013 when the new OS ECM system was to be re-launched. For more details on the project events of the two project phases, and the times on which they commenced, see Chapter 9, Figure 16: A timeline of the events within the two project phases section 9.6, Figure 16.

7.4 Research Design

According to Walsham (1995b) the interpretative researcher should not only report on the product of the research, but should make sure to report in detail on: the research sites chosen; the reasons for this choice; the numbers interviewed; the hierarchal or professional positions of the interviewees; all other data sources used; as well as the period over which the research was conducted.

In this section the researcher will therefore elaborate on the data collection methods used in this study. The research site and the process during which the data was collected will also be detailed.

7.4.1 Data Collection Methods

According to Myers (2009), data collection methods which usually supplement case studies, are interviews and documents, while Yin (2002) lists six major sources of case study evidence: documents; archival records; interviews; direct observation; participant observation and physical artefacts.

The data collection methods used to gather the empirical data for this study, were document analysis; qualitative interviews; and direct observations, with note taking. The data collected was mainly qualitative. Each one of these collection techniques will accordingly be discussed after which the way in which they were applied will be reviewed.

7.4.1.1 Document Reviews/Analysis

According to Rapley (2008) "*documents produce specific realities and the realities they produce have effects.*" During the OS ECM implementation, the researcher made use of documentary evidence from both primary and secondary sources. Primary sources of data included meeting minutes which were sent out after the weekly project meetings, and which were on a regular basis compared to the observation notes taken by the researcher during these meetings.

Secondary sources included the NACI report; the Government Information Technology Officers Council (GITOC) strategy document; the document in which the recommendations were made to the PNC; the GO-Open Task Team strategy document; the South African FOSS policy document; and the South African MIOS document. Details on the reasons why these documents were studied, are presented in section 7.4.2.2, Table 8.

7.4.1.2 Qualitative Interviews

According to Myers and Newman (2007) the qualitative interview is the most used data gathering method in qualitative research, but they argue that this method is not as straightforward as it might seem. Most IS researchers that report on their use of interviews, only state the number of interviews conducted, by whom they were conducted, and who the interviewees were. Myers and Newman (2007:4-5) point out the potential problems and pitfalls of the qualitative interview to be:

- the possibility that the interview could be artificial, as one could interrogate a complete stranger; and the fact that you expect interviewees to provide their opinion under time pressure, could have an effect on the content of their answer;
- the lack of trust the interviewee might have in the interviewer; the interviewee could accordingly choose not to reveal 'sensitive' information which could be important for the research;
- the lack of time to perform the interview could lead to incomplete data, or interviewees could be pressured to offer opinions quickly, resulting

in opinions which was never held strongly to start off with – this could again lead to non-reliable data;

- the level of entry in the organisation could be wrong, as entering too low could possibly prohibit access to important senior managers at a later stage;
- having a bias towards the elite and only interviewing people with a high status could be a problem; this could lead to not fully understanding the broader context;
- the Hawthorne effect could apply, where the interviewer, being subjectively involved in the interview, could influence the interactions and in this sense intrude with the behaviour of the people;
- the interview could be a process during which new knowledge is constructed, as interviewees could be required to respond on interview questions of which they have no clue or to reflect on issues they have never before considered so openly;
- the possibility that the ambiguity of language could lead interviewees to not fully understand the questions asked, hence they will not be able to produce suitable answers to it; and
- the possibility that Interviews can go wrong in that interviewees could unintentionally be offended or insulted by the interviewer.

Qualitative interviews could be categorised as structured; unstructured or semi-structured; and group interviews. A complete structured script leaving no room for improvisation differentiates the structured interview from the unstructured or semi-structured interview. Although the researcher can prepare some questions beforehand, semi-structured interviews give leeway to improvisation, and are normally done by the researcher him/herself. In group interviews two or more people are interviewed at once by one or more interviewers and it could be either structured or unstructured.

Myers and Newman (2007) proposes a model for the qualitative interview, where the interview is seen as a drama, containing concepts such as the stage (organisational settings and social situations); actors (the researcher as an interested interviewer and the interviewee as a knowledgeable

organisational employee); the audience (the researcher as an intent listener, the interviewee listening to the questions and answering them properly, and the readers of the research produced from the interviews); the script (a more or less partially developed script to present to the employee for guiding the conversation); entry (dressing up or down depending on the situation); the exit (leaving and possibly preparing for a next performance perhaps as part of a longitudinal study); and the performance (produced by all the previous aspects – it influences the quality of the discovery and that of the data).

Due to the latitude provided by semi-structured interviews (as described above), the researcher made use of these to collect some of the data reported on in chapters 8 and 9 of this thesis. The researcher had access to the stakeholders due to her role as observer on the project. Though being an outsider on the project, no resistance was felt coming from the different stakeholder parties, as all of them were always willing to assist with providing the necessary information or insight when requested. More details on who were interviewed, when and for what reason they were interviewed, is provided in section 7.4.2 (Table 8), which describes the details of the data collection process.

7.4.1.3 Observations

Direct observations (Oates, 2006) with note taking were done during the weekly project/stakeholder meetings held at the Government department. During these meetings the researcher jotted down short observation notes made on the interactions that took place between the different stakeholders; the reactions of stakeholders; and the body language of the participants. These observation notes were extended into analytical memos which were longer versions of the notes, done directly after each meeting, with the main purpose of adding some subjective interpretations of what the researcher observed during the meetings.

7.4.2 The process of data collection

During the two phases of the OS ECM system implementation, the above mentioned data collection methods were applied. The details on when and how this was done will be discussed in the next section.

7.4.2.1 During phase 1: The Pilot OS ECM Project

For this phase, the collection of data took place from the 26th of March 2008 to the 22nd of August 2008. As an observer, the researcher formed part of the project team. A total of 10 project/stakeholder **meetings** were held throughout this period on a weekly basis. The meetings were held at the Government department's premises and were aimed at keeping all stakeholders informed on the progress of the pilot project. The actions to be taken in the upcoming week were also discussed. About twelve people attended these meetings when the project started. Parties involved were: the Government department (where rollout would happen); GITO; and the external OS Service Provider (who would be responsible for setting up and implementing the new OS ECM system during this phase). The meetings were chaired by a representative from GITO.

Throughout the project, data was collected by means of **direct observations** made during the weekly meetings and through regular visits to the Government department to observe the change process. Though initially designed as overt non-participatory observations, the skills of the researcher were sought during the process for support in designing the evaluation of the change to the OS ECM system and thus were covert to some extent.

Semi-structured qualitative interviews were conducted with end-users of the pilot project after the implementation and training. These included the Deputy Director and two assistant administrators in the DG's office. Each interview lasted about an hour and was tape recorded. The interviews were transcribed, read through and verified by listening to the tape recordings on another occasion. The topic guideline was built around the change management aspects of Orlikowsi and Hofman's (1997) improvisational change model, discussed in section 5.5.2 of this thesis. Given the paucity of

published documents on FOSS within the South African Government, most of the details on FOSS were obtained through an in-depth **interview,** with a key government official, which was transcribed and supported where possible with unpublished written documentation.

All **meetings were minuted** and the minutes were approved in the next meeting. As already stated the researcher also documented the meetings separately in **observation notes** and after the meeting extended into **analytical memos** to describe the meeting situations and to identify possible patterns and tentative explanations for these patterns as the case study unfolded. Themes emerged from the interview transcripts, observation notes and the analytical memos. These themes, in conjunction with concepts from the innovation and diffusion literature (described in chapter 4) and the change management literature (described in chapter 5), were used to write up the case study.

7.4.2.2 During phase 2: The roll out of the OS ECM Project

During 2010 one of the researcher's Masters students revisited the department, amongst others, to determine what the reasons for the slow uptake of OSS in the South African Government were. The OS ECM project manager (PM) was interviewed and documents such as the proof-of-concept report for the piloted OSS project were analysed.

The researcher then revisited the department in October 2012 and had a further three hour in depth interview with the OS ECM manager, as well as a discussion on the presentation which the PM presented at a Government conference in September 2012, to consequently extend her data to include details on the roll out of the project and the current state of it. The aim was to get an understanding of the extent to which the OS ECM system was rolled out and used, and the obstacles and issues which were encountered during the roll out of the system.

Finally, the project manager of the pilot and roll out phase of the project was interviewed to get his views and feedback on the project.

PHASE 1: The Pilot OS ECM Project		
Method	***Item***	***Details***
1. Document reviews	*(i) NACI report*	Studied to get an in depth overview of : • the reasons NACI used to motivate the enforcement of the use of Open Standards by the SA Government; • the aspects mentioned in the report which were eventually not incorporated in the SA FOSS Policy.
	(ii) The Government Information Technology Officers Council (GITOC) strategy document	Studied to get an overview of: • the potential benefits OSS held for the SA Government with regards to OSS efficiency and effectiveness; • the details of the proposed SA FOSS Policy.
	(iii) Recommendations to the PNC	Studied to understand: • what the SA Government was to do regarding the slow uptake of OSS and how the SA FOSS Policy could be given some "teeth".
	(iv) Go-Open Task Team strategy document	Studied to understand: • which FOSS Policy recommendations emerged from the work of this task team.

PHASE 1: The Pilot OS ECM Project		
Method	***Item***	***Details***
	(v) South African FOSS Policy	Analysed to get an understanding of: • the reasons the policy was developed; • what the policy expected from Government departments; • the extent to which Government departments were forced to comply with the policy and standards; and • the details on the related policies and the standards the policy was based on.
	(vi) MIOS standards document adopted by the SA Government.	Analysed to get an overview of: • the SA Government's e-Government programme; • the role that interoperability had to play in this programme supporting the strategic goal of the Government to adopt and migrate to open standards
2. Structured interviews	*(i) Interview with senior civil servant*	To provide: ▪ contextual information on the environment and time period in which the government documents (mentioned under the documents analysis section) were produced; ▪ details on the development and implementation process of the FOSS policy, which were not included in the written documents studied.

PHASE 1: The Pilot OS ECM Project		
Method	***Item***	***Details***
	(ii) Interviews with Deputy Director of the implementation department and two assistant administrators in the DG's office	To get details: ▪ on the training process done after the pilot implementation; ▪ on the implementation process and feedback on their experience with the new system.
3. Observations	Meetings (10)	To observe: ▪ stakeholder reactions; ▪ body language; ▪ personal agendas; and ▪ the contributions made by the attendees.

PHASE 2: The role out of the OS ECM Project		
Method	***Item***	***Details***
1. Structured interviews	*(i) Interview with OS ECM PM by researcher's MIT student*	To get details on: ▪ the constraints; and ▪ the facilitators of the OS ECM Project roll out.
	(ii) Interview with OS ECM PM by researcher self	To get details on: ▪ the roll out of the project to the rest of the department, and ▪ the current state of the project.
	(iii) Interview the OS ECM Project Manager (PM)	To get details on: ▪ his perspective /interpretation of the OS ECM Project

Table 8: A summary of the data collection methods used in this thesis

7.5 Mode of Analysis

When reporting on the data analysis done for an interpretive study, the researcher has to elaborate on how the field interviews and other data were recorded; how they were analysed; how the iterative process between field data and theory took place and how all of this evolved over time (Walsham, 1995b).

Myers (n.d.) state that there is no clear distinction between the data collection and the data analysis tasks when performing qualitative research, as the assumptions held by the researcher will influence the data gathering (directing the questions asked to the participants), while the data gathered will again affect the analysis thereof. Qualitative data analysis is therefore rather referred to as 'mode of analysis'.

All modes of qualitative analysis are primarily text based (Myers, n.d.). This thesis made use of hermeneutics as a mode of analysis. The fundamental principle of hermeneutics is that the structure of understanding or interpretation is circular. The phenomenon under study (the whole) always comprises of parts or details which relate to each other and to the whole. In trying to understand the whole, the researcher will loop to the parts of the whole, trying to interpret them in relation to the other parts of the whole, and to the whole itself. This is done until the phenomenon is understood and so called 'ready-to-hand' (Butler, 1998).

The process of data analysis went through four stages: familiarisation with the data; the development of themes; the mapping or linking of these themes; and the interpretation of these mapped/linked themes. In analysing the data gathered for phase 1 of the case study, the researcher 'familiarised' herself with the data by reading through all the data collected (minutes and observation notes; interview transcripts; and internal documents) and made use of analytical memos to describe situations and to identify possible patterns and tentative explanations for these patterns as the case unfolded.

Thematic analysis was used to discover the 'themes' which emerged inductively from the data. These themes were mapped or linked to get to grouped themes which could be listed on a higher level. For phase 1 of the project, these themes included, amongst others: unfamiliarity with the new OS ECM system; insufficient communication to end-users on the change to the OS ECM; insufficient training of end-users on the new system; positive attitude towards the reliable OS ECM system implementer; discontent about the duplication of and change in work processes; and uncertainty about the capabilities of the new OS ECM system. Themes which emerged from phase 2 of the project included, amongst others: vendor appointment and timeline shift; change management efforts to promote the new OS ECM system; OS application software versus PS application software; changing the OS ECM vendor; technical challenges; technology for the sake of technology; the role of GITO; involving the users more; restructuring the OS ECM PM's role; and rating the success of the project.

To provide a rich context to the OS ECM project and the significant events which pre-ceded the implementation, such as the events which led to the adoption of the SA FOSS Policy, and the details pertaining to the Government department's structure, IT skills, and IT infrastructure, which emerged from the data, were written up and reported on in chapter 8 of this thesis. The details on the OS ECM project itself were consequently written up in a chronological order explaining the events as the Government department went through the different phases of the OS ECM project implementation. In each of these phases, the themes which emerged from the data were also written up in detail and presented in chapter 9 of this thesis.

To interpret the findings of the case study, the researcher used a combination of three methods which include reflecting on the analytical memos constructed throughout the data collection process; discussing the details of the case study with other interested people; and using three different theories to shed light on different aspects of the case study. According to Walsham (2006) the role of theory in research is a key matter and could be used to highlight or understand some of the key aspects of a specific situation. He does though admit that

choosing a theory is always a subjective process and suggests that researchers choose a theory with which they personally feel comfortable, although he does emphasise that there needs to be some basis on which to motivate the use of it.

Eisenhardt (1989) argues that there are three uses of theory in research. She describes these as (i) theory being used as an initial guide to structure the research design and the collection of data; (ii) theory used in conjunction with the iterative process of collecting and analysing the data; and (iii) theory used as a final result or product constructed through the research done (arriving deductively or inductively at explanations or causal links).

This thesis makes use of theory in the third sense as described above. The theory on IS adoption and diffusion, and more specifically the HEM model of Du Plooy (1998), (described in chapter 4 of this thesis), and the improvisational change management Model of Orlikowski and Hofman (1997), (described in chapter 5 of this thesis), were applied to the case study and the findings were written up in chapter 10 of this thesis. Consequently institutional theory, as it applies to the field of IS and organisations, was also applied to the case study to try and understand the parts which were not explainable by the first two theories. The details and findings of this application were documented in chapter 11 of this thesis.

A summary of how the theories were used to interpret the data; the purpose of their use; as well as the value which they contributed to the research is, provided in Table 9 below.

	Theory used		
	HEM Model of Du Plooy (1998)	***Improvisational change management model of Orlikowski and Hofman (1997)***	***Institutional theory as it applies to the fields of IS and organisations***
How was the theory used?	The dimensions of the model were used to analyse the social context within which the change management process took place.	The dimensions of the model were used to analyse the change process that took place in migrating from the OS ECM system to the PS ECM system.	It was used in three ways: • The characteristics of IS/IT was used to view it as an institution in and of itself; • The institutional pillars were used to describe OSS and PS as different 'types' of institutions; and • The institutional forces at play on international, national and organisational level were used to gain a better understanding of the drive for and against the change process.
What was the purpose of the theory's use?	To understand the different aspects of the social context or human environment within which the OS ECM was implemented, and the way in which they contributed to or worked against the OS ECM implementation.	To address research question 3: Do change management models help to explain this change?	To focus on the organisational dimension of the change model applied in chapter 10, and addresses the fourth and last research question of this thesis: Can other theories provide a different interpretation or understanding of the change process?
What value did the theory contribute to the research	It helped to gain an in depth explanation of the social context within which the new OS ECM was implemented.	It assisted in providing a good understanding of the change management process in migrating from the old PS ECM to the new OS ECM.	It assisted in explaining the eventual implementation of the new OS ECM, even if it was deemed to be abandoned.

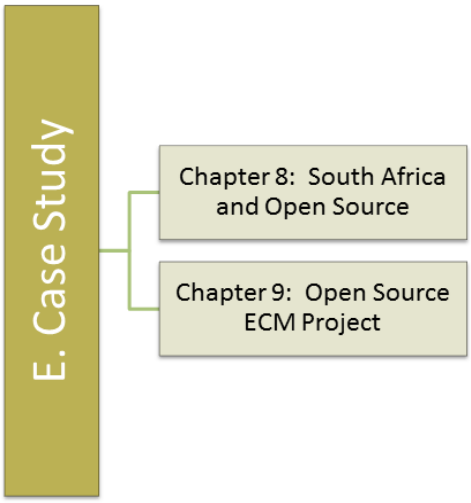
Table 9: A summary of the theories used to interpret the data in this thesis

7.6 Ethics statement

The University's ethical clearance procedure was followed and consent forms were gained from the respondents interviewed. The identity of these participants was protected, in that pseudonyms were used where necessary. The Government department's name, vision, mission, corporate values and programmes were also not revealed and details on the names of the old PS ECM system and the new OS ECM system, with which it was replaced, were not disclosed due to the same reasons.

The next two chapters contain the case study of this research, being the end result of applying the underlying research philosophy, strategy, data collection and analysis methods, explained in this chapter.

SECTION E: CASE STUDY



This section of the thesis is assigned to the case study. Chapter 8 provides the broader case of OSS in South Africa, providing important details on the background and history that led to the adoption of the FOSS policy by the South African Government. It elaborates on the details of the SA FOSS policy and furthermore describes the government department within which the case study was done (the organisation), providing details on the background of the organisation and the reasons for their migration decision. This chapter addresses research question 1: What was the South African Government's rationale for moving from PS to FOSS?

In chapter 9 the researcher describes the aspects pertaining to the rollout and implementation of the OSS ECM system by the organisation. Details pertaining to the three phases of the case are elaborated on as the case unfolded. This chapter addresses research question 2: How was change managed in migrating from PS to FOSS?

Chapter 8:
South Africa and Open Source

The purpose of this chapter is to sketch the broader case of OSS in South Africa, depicting the events that led to the adoption of the SA FOSS policy. Details and background on the government department (the organisation) within which the case unfolded, is also provided, setting the scene for the case described in chapter 9.

8.1 Introduction

The case presented in this thesis takes on a chronological format (van der Blonk, 2003). In the first part of this chapter the researcher provides details on the background and main historical events which led to the adoption of the South African FOSS policy. The second part of the chapter is dedicated to the history of the department within which the OS ECM system was implemented, extending on the department's background, the organisational context with regards to the IT infrastructure of the government department, as well as the issues experienced by the department's human resource unit.

8.2 The South African Government and FOSS

8.2.1 Background

The South African government policy regarding the use of FOSS has evolved over a relatively short space of time. Table 10 shows the documents representing the key events in the unfolding process which are discussed in the text below.

Report	Date
NACI report	2002 (updated in 2004)
The Government Information Technology Officers Council (GITOC) strategy document	2003 (updated in 2006)
Recommendations to the PNC	2004
Go-Open Task Team strategy document	2005
FOSS policy	2007

Table 10: South African FOSS policy documents reviewed

These documents are also supported by information provided by a senior civil servant during an in-depth interview. This interview provided contextual information on the environment and time period in which the documents were written. Furthermore, aspects of the process of the development and implementation of the FOSS policy were provided by the informant, which were not included in these written documents.

The South African Government's journey on the adoption of FOSS started in 2001 when the Presidential International Advisory Council raised issues on FOSS and consequent questions were asked in Parliament. Perhaps the single most important catalyst for development of policy in this area was the National Advisory Council on Innovation's (NACI) report[5] (2002). NACI formulated the use of Open Standards to be an enforced base for ICT in the public sector as, according to their study, FOSS would promote interoperability and universal access to the South African government's online services without exorbitant costs, restrictions because of licensing, or other related obstacles. It would also reduce the risk of being 'locked-in' by specific vendors of ICT commodities and services, and this would in turn drop the entry barriers for local software developers who are able to offer ICT solutions to the public sector.

[5] *The National Advisory Council on Innovation (http://www.naci.org.za/) is a body set up by the South African Act of Parliament to advise the then Minister of Arts Culture Science and Technology, as well as Cabinet as a whole, on science and technology issues.*

The report also identifies a number of important broader developmental and societal aspects to the arguments presented. Apart from arguing that FOSS provides a "useful tool to allow developing countries to leapfrog into the information age", the report also indicates how the "arrival" in this information age is not only more viably achieved using FOSS (a cost argument), but also that the use of FOSS fundamentally effects the nature of this information age.

Byrne and Jolliffe (2007) note that the arguments made in the NACI report, which are habitually ignored or downplayed in the policy and strategy documents to follow, are:

1. the threat propounded by broad software patents to the development of FOSS and how to fight this threat;
2. relating the right to free software usage and development to freedom of expression and the free exchange of ideas, and;
3. the acknowledgement that individuals, academia, businesses and NGOs already make use of FOSS, not because they are forced to do so by means of a policy, but because they have the freedom to do so.

It is significant to note that the NACI report uses the terminology 'Open Software', instead of 'Open Source' or 'Free Software'. This was done as NACI considered the use of the term 'source' to be too technical and they wanted to emphasise the importance of the non-technical arguments they were presenting (Byrne and Jolliffe, 2007).

IT officers in government were asked to respond to the NACI document. A Standing Committee (SC) consisting of Government Department Chief Information Officers (CIOs) was formed to address what the Government was to do about FOSS (Otter, 2002). In 2002 the SC held its first meeting which was attended by 3 people. Perception and awareness on FOSS in Government was investigated as an initial first step in the development of a FOSS strategy. The findings indicated that there was little awareness on FOSS and a perception existed that FOSS was unthinkable in Government systems as this would imply using software that was unreliable, without

support and developed by a group of people doing their own thing. Interestingly, in 2001, in terms of infrastructure, such as internet relays, web servers, DNS servers and web proxies, most of Government's systems were already running on Open Source Platforms. This could be attributed to the fact that it was much easier to just download and use the appropriate software, than to go through the whole government procurement process which was very lengthy. Alternatively (or additionally), it could point to a lack of FOSS awareness of users of Government's systems and what systems they are using.

In January 2003, the then Department of Arts and Culture, Science and Technology, made a second FOSS submission to Cabinet. The document focused on raising awareness of the benefits of FOSS to Government (GITOC, 2003). This submission, which encouraged the utilisation of FOSS in Government, was a proposed FOSS policy for Government (Cabinet Memorandum No. 29 of 2003) and was fully backed by the Government Information Technology Officers Council (GITOC) (2003). The GITOC submission borrowed extensively from the NACI report, but did not include all the richness of the original reasoning and mainly concentrated on arguments of OSS efficiency and effectiveness, as reflected in the title which talks explicitly of OSS (Byrne and Jolliffe, 2007).

The basic strategy in the policy was stated as:

> *Government will implement OSS where analysis shows it to be the appropriate option. The primary criteria for selecting software solutions will remain the improvement of efficiency, effectiveness and economy of service delivery by Government to its citizens (GITOC, 2003:24).*

Whereas the familiar benefits to society are outlined, the primary emphasis is on finding solutions to the challenge of IT deployment in Government. Where that challenge can be met with FOSS it is to be encouraged. If proprietary software is "more appropriate" then it should continue to be used.

The apparent lack of enforceability in the GITOC report was picked up by another report, this time commissioned by the Presidential National

Commission (PNC) on Information Society and Development in January 2004[6]. The PNC report (Levin, Ackermann, Dingley, James, Kgapola, Miller, Modipa, Neville and Rakoma, 2004) notes the slow progress towards implementation of the GITOC strategy and makes a number of recommendations aimed at enhancing the existing strategy. In particular the basic policy foundation quoted above is expanded with the provision that:

> *When OSS is not implemented, then reasons must be provided in order to justify the implementation of proprietary software (Levin et al., 2004:4)*

Besides the policy enhancements aimed at providing teeth to the existing policy, the report reasserts the responsibility of Government to impact on and facilitate the wider use of FOSS in society, i.e. it can and should do more than simply work on Government becoming a model user of FOSS.

The PNC report reflected frustration at the slow pace of implementation of the existing FOSS strategy within government. Many of its findings and recommendations made its way into the next significant attempt to shape government policy - the Go-Open Source Task Team Conference of August 2005, Johannesburg (Levin, Ackermann and Neville, 2005). The Go-Open campaign was a joint initiative aimed at promotion and awareness rising around FOSS in South Africa. It was supported by the Shuttleworth Foundation[7], the Meraka Institute of the Council for Scientific and Industrial Research and Hewlett Packard. The policy recommendations which emerged were substantially similar to those of the PNC report, including a timeline for concrete implementation proposals and projects.

In 2005 and 2006 several civil society organisations petitioned the Minister of Public Services and Administration, asking her to make sure that Government implemented the FOSS policy. The civil society organisations were of the

---

[6] *"Open Source Software and the Information Society – Policy and strategy recommendations to the Presidential National Commission of the Republic of South Africa", July 2004 available from http://www.gissa.org.za/special-interest-groups/open-source/foss-documents/open-source-software-and-the-information-society/view*

[7] *The Shuttleworth Foundation is an organisation set up in South Africa by Mark Shuttleworth, creator of the Ubuntu Linux distribution.*

opinion that if Government, which was the biggest procurer of IT products in South Africa (around 60% of money spent on IT), adopted FOSS it would result in better FOSS skills and better FOSS support. This would make it easier for civil society organisations to also adopt FOSS. By 2006 it was evident that the tide was beginning to turn. In his speech during Software Freedom Day - a yearly international celebration of free software - the Director General of South Africa's Department of Science and Technology, said that lack of technology access due to insufficient funds and infrastructure is the primary challenge in Africa and that FOSS seemed to be ideal to solve this problem (DST, 2006).

In 2006 and 2007 Cabinet requested the SC (comprising the Governments' CIOs) to report on the implementation of FOSS in Government. The SC submitted a reworked policy to Cabinet (DPSA, 2006). The new policy mandated three things: Open Source, Open Standards and Open Content. This policy aimed at an entire open philosophy to be developed in Government. According to this, all new systems developed by Government should be based on FOSS. The policy contains a clause that allows people to use proprietary software for valid reasons such as privacy or security issues (mainly needed by the Department of Defence). The policy contains three statements: firstly, FOSS will be used unless there is a valid or justifiable reason that it shouldn't; secondly, FOSS methodologies will be used in a collaborative open licensed way and everything should be Open Content, unless there is a valid reason, such as security or privacy issues; and thirdly, that Government will not only use FOSS but will also encourage the use of FOSS and Open Content (DPSA, 2006).

The South African Cabinet approved a FOSS policy and strategy on 22 February 2007 and agreed that all future software developed for government would be based upon open standards and that Government would migrate its current software to FOSS (DPSA, 2006).

8.2.2 The South African FOSS Policy

The revised FOSS policy is as follows (DPSA, 2006):

1. "The South African Government will implement FOSS unless proprietary software is demonstrated to be significantly superior. Whenever the advantages of FOSS and proprietary software are comparable, FOSS will be implemented when choosing a software solution for a new project. Whenever FOSS is not implemented, then reasons must be provided in order to justify the implementation of proprietary software.
2. The South African Government will migrate current proprietary software to FOSS whenever comparable software exists.
3. All new software developed for or by the South African Government will be based on open standards, adherent to FOSS principles, and licensed using a FOSS license where possible.
4. The South African Government will ensure all Government content and content developed using Government resources is made Open Content, unless analysis on specific content shows that proprietary licensing or confidentiality is substantially beneficial.
5. The South African Government will encourage the use of Open Content and Open Standards within South Africa."

Table 11 summarises the revised FOSS policy (DPSA, 2006) in terms of 'policy statement themes'.

Policy Statement Theme	*Policy Wording*
1. Implementation	The South African government will implement OSS unless proprietary software is demonstrated to be significantly superior. Whenever the advantages of OSS and proprietary software are comparable, OSS will be implemented when choosing a software solution for a new project. Whenever OSS is not implemented, then reasons must be provided in order to justify the implementation of proprietary software.
2. Migration	The South African government will migrate current proprietary software to OSS whenever comparable software exists.

Policy Statement Theme	Policy Wording
3. Development	All new software developed for or by the South African government will be based on open standards, adherent to OSS principles and licensed using OSS licence where possible.
4. Open Content / licensing	The South Africa government will ensure that all government content and content developed using government's resources is made Open Content, unless analysis on specific content shows that proprietary licensing or confidentiality is substantially beneficial.
5. Promote the wider use of OSS	The South African government will encourage the use of Open Content and Open Standards within South Africa.

Table 11: The South African FOSS Policy (Source: Gastrow and Parker, 2009:22)

Important to note from this policy is that South Africa has adopted a preferred OSS strategy. A preferred OSS strategy is very different to a mandating OSS strategy, as the latter is a more radical approach in that it commands the use of OSS systems throughout Government, which implies replacing the entire existing proprietary infrastructure. Such a strategy entails large implementation and training costs and is quite clear in terms of what government departments are required to do - change all existing proprietary software to OSS, and only procure OSS in future (Wong, 2004).

8.2.3 Implementation of the FOSS Policy

Government departments were to include FOSS in their planning. A project office was to be established by the Government Information Technology Organisation (GITO[8]), with the Council for Scientific and Industrial Research (CSIR). GITO was tasked to ensure the smooth implementation of the FOSS policy throughout South Africa. A SC to implement the policy, consisting of the DGs of the Department of Science and Technology, Public Service and Administration and the CEO of GITO, was formed, and subsequently a

[8] *Name of organisation changed due to ethical conduct.*

Programme Office at GITO was established. This committee was tasked to play an oversight role of the Programme Office at GITO, which was tasked to ensure the implementation of FOSS in all Government departments. The responsibility of implementing the policy was positioned with the CIOs of every national Government department due to the unique nature of each department's systems. Synergies between departments were to be coordinated by GITO.

8.2.4 Conclusion

It is imperative to mention that there isn't unanimous support for the FOSS Government policy. Government departments, with the exception of a few, seem to be rather unwilling to jump onto the FOSS bandwagon. Although GITO was given the task to set up an Open Source Programme Office to ensure and coordinate the implementation of FOSS in all Government departments, the FOSS policy had by June 2008 not even been implemented in GITO itself.

8.3 The SA Government's Minimum Interoperability[9] Standards (MIOS)

In line with the South African Public Service Act, the SA Government has adopted MIOS (SITA., 2011). The Government is focussed on the on-going improvement of public service delivery. With this aim in mind, ICT leaders in Government have committed to an e-Government programme in 2001. Interoperability plays and important role in this programme. It forms one of the five values that the programme guarantees to the Government's ICT environment. This is to ensure that information systems and the IT infrastructure setup by Government allows for interconnection and data exchange. Interoperability was set as one of the Government's long term goals and the Government's IT officers are expected to comply with these standards when implementing and managing ICT in Government. These standards typically indicate the standards on data formats necessary to make the exchange of data between departments possible; and the technical

[9] *Interoperability refers to the fact that two or more information systems or technology components are able to connect with each other to share data.*

standards needed to allow for interconnection, access and exchange of data amongst the Government's ICT infrastructure.

The Government's MIOS supports its strategic goal to adopt and migrate to open standards (as indicated in the FOSS policy) and implies that only products which are considered to be MIOS compliant should be allowed in the Government's IT infrastructure. Setting up MIOS is an international trend and so called 'best practise' in the field of IS and the SA Government's MIOS is based on the MIOS of the United Kingdom.

8.4 The Organisation

8.3.1 Background

The case study was conducted in the public sector at one of the Government departments of South Arica, of which the name and functionalities will be kept private to adhere to the confidentiality agreement between the department and the researcher. The department is headed by a Minister, who is assisted by a Deputy Minister. The Director General (DG) reports directly to the Minister and has a Chief Operations Officer (COO) and five Deputy Directors (DGs), each heading a specific Programme in the department, reporting to him. See
Figure 15 on the next page for an organogram of the department.

The Minister and CIO of this department were in favour of FOSS and were strong supporters of the new national FOSS policy. The case study depicts the process followed in changing from a proprietary ECM system to an OS ECM system.

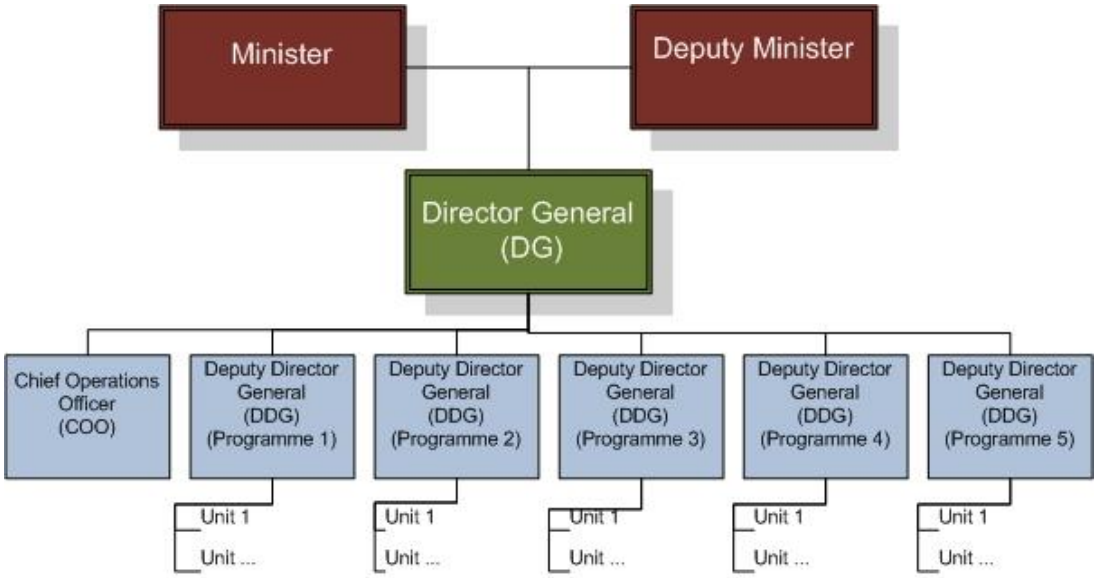


Figure 15: Organogram of the Government Department

For ethical reasons and to protect the identity of the Government department, their vision and mission is not stated in this thesis.

The department's official corporate values are stated as: professionalism (to provide quality products and services and to be innovative in their strive for effectiveness and efficiency); competence (faithfulness and honesty through the provision of timely services to the advantage of all citizens in the country); integrity (using public funds in a responsible way); and transparency (allow and accept access to all information except if protected by law).

8.3.2 Reasons for migrating to OSS

The drivers of the OS migration process were threefold. Firstly, the department had an urge to comply with the Government's new FOSS policy, as they were part of the team responsible for the new policy. In the words of the OS ECM system PM: "*If we don't comply, people would say that we wrote the law (FOSS policy), but we are not abiding by it, which would not be acceptable.*"

Secondly, the department wanted to migrate to software which was supported by multiple platforms, seeing that there were several different operating systems operational in the department. An example of such OSS is the

Mozilla Firefox web browser, which can run on Linux, Windows and Mac systems.

The third reason for moving to OSS was that of saving money on the IT budget. Feasibility studies showed that they could cut millions in terms of software costs if they for instance migrated to the OS ECM system (described in chapter 9), and because OS was likewise not that technology intensive, they would also in the long run be able to cut on hardware costs.

8.3.3 Staff capabilities and IT infrastructure of the Government department

The number of IT users in the department ranges between 400 and 500. Linux (an OS operating system) forms the basis of about 95% of the IT infrastructure services in the department. These include Dynamic Host Control Protocol (DHCP), used to automatically allocate IP addresses to network hosts; the proxy server facilitating internet connection; and web servers hosting the department's internal and external web pages. For back-end computing, the department is reported to still make use of hybrid environments. In this sense, the Windows-based Active Directory (AD), supporting the legacy Microsoft Exchange Server (with features such as electronic mail, calendaring, contacts and tasks), is still used to authenticate users – soon to be replaced by the OS mail server ZIMBRA (an OS server and client software for messaging and collaboration); and the Free Berkeley Software Distribution (FreeBSG) (a free Unix-like operating system descended from AT&T UNIX via BSD UNIX) is used as gateway and firewall, implementing IT network security. The application servers run by the department are the OSS servers Java-Boss (JBoss) and Tomcat. These servers are used to run the OS ECM system reported on in chapter 9, as well as an OS contract management system which was developed in-house. Other OSS used in the department includes the library management system and the telephone switchboard system. The department's desktops are mainly running on the PS Windows XP operating system, while the IT department dual boots the Linux based operating systems, Ubuntu (an OS operating system based on the Debian Linux distribution, using its

own desktop environment) and OpenSUSE (a general purpose operating system built on the Linux kernel, developed by the community-supported OpenSUSE Project and sponsored by the German company 'Software und System Entwicklung' (SUSE) and a number of other companies). See table Table 12 on the next page for a summary of the department's IT infrastructure.

	Government department IT infrastructure			
	Proprietary Software		***Open Source Software***	
	Type	***Use***	***Type***	***Use***
Operating System	Windows XP	• Desktops of users in the department • IT unit	Ubuntu	IT unit
			OpenSUSE	IT unit
Application Servers			JBoss Tomcat	To run OS ECM System (and in-house developed Contract Management System)
Services			Dynamic Host Control Protocol (DHCP)	To allocate IP addresses to network hosts
			Proxy Server	Facilitating internet connection
			Web servers	Hosting departmental web site and intranet
	Windows based Active Directory (AD)	Supporting Microsoft Exchange Server (email, calendar, contacts and tasks)		
			FreeBSG	Gateway and firewall

Table 12: A summary of the IT infrastructure of the Government department

8.5 Discussion

When reflecting on the details of the Government department as pertained to the most common barriers to OSS adoption, the following issues on the implementation of OSS (as discussed in chapter 2 of this thesis) are apparent:

8.4.1 IT skills

The staff in the IT unit of the department seems to be skilled in and familiar with both PS and OS operating systems, platforms, services and some software applications, and prove to have a wide variety of skills ranging from technically assembling the computers and networks, to installing OSS and PS for users, and writing code to develop in-house OSS applications.

On the other hand, the users in the different units of the Government department were up to the roll-out of the OS ECM System (discussed in chapter 9) only formally exposed to using PS application software and had little to no, knowledge of or experience with OSS.

Although, as discussed in the literature review of this thesis (chapter 2, paragraph 2.2.3.1), Paré, Wybo and Delannoy (2009) assert that the shortage of skills to specifically support and maintain the implemented OSS products are in many cases a barrier to the adoption of OSS, the skills of the IT guys in the IT unit of the Government department, with regards to the operating systems and servers employed by the department, seems to be sufficient and in place. The same could though not be said of their skills with regard to the OS ECM system (discussed in chapter 9), as an external service provider had to be contracted in to configure and implement the new OS ECM system.

On the contrary the users in the different units of the department were only skilled in the use of PS applications systems and they lacked knowledge of and experience with OSS. This is thus in line with the findings of Drozdik *et al.* (2005) (referenced in the literature review, chapter 2, paragraph 2.2.3.1) that user skills and the uneasiness users will experience during the migration process from OSS to PS, are difficult to determine in advance and exploiting

the users to additional training may not significantly increase their comfort and skills with the new OS system. As will be discussed in chapter 9, this was one of the most challenging aspects of migrating to the new OS ECM system.

8.4.2 IT infrastructure

In contrast to what literature says about the unwillingness and hesitance of organisations to adopt OSS (chapter 2, paragraph 2.23.2), due to sunk costs and the scarceness of third parties to provide support and maintenance, the IT unit of the Government department was willing and in favour of implementing the FOSS policy, and were actually the ones pushing for the implementation of the new OS ECM system. The users in the other department units were though not that convinced that migrating to OSS was such a good idea, but the details on this are discussed in chapter 9.

8.4.3 Costs

The hidden costs of OSS (as described in chapter 2, paragraph 2.2.3.3) as well as the fact that the IT unit knew the users would have to be trained on the new OS ECM system, did not at all hamper the department's decision to migrate. For them the cost analysis they did, showed that they would after all still save extensively on the licensing costs they had to pay for the PS ECM system, by migrating to the new OS ECM system.

8.4.4 Loyalty to PS vendors

In contrast to what literature warns about (chapter 2, paragraph 2.2.3.4) the Government department's IT unit had no treasured relationships with PS vendors which they were scared to sacrifice. Their CIO at that stage was in favour of saving the costs on the PS licence fees and was driven by this idea, as well as by the fact that he truly believed that the new FOSS policy was the way to go.

8.4.5 Technical compatibility

The issue of technical compatibility between software applications and the operating systems they ran on as stated by Cassell (2008) (chapter 2, paragraph 2.2.3.5), was overcome by the IT unit of the Government

department, in that they ran dual operating systems: Windows XP for application PS software, used mainly by users in the rest of the department's units; and Ubuntu and OpenSUSE for OS application software used by the IT unit.

8.6 Conclusion

This chapter provided an overview of the events that led to the adoption of the SA Government's FOSS policy. It also discussed the content of the policy, highlighting the preferred strategy adopted by the SA government. The organisational structure of the Government department, within which the OS ECM system (discussed in chapter 9) was implemented, was consequently expounded on, also providing details on the skills of the department's staff and the hardware and software currently in use by the department. The researcher has also reflected on the OSS adoption barriers as discussed in chapter 2 of this thesis, and indicated how they apply to the case study.

The issues on the social context within which the OS ECM system was to be implemented, as partly described in this chapter, will be elaborated on in chapter 9, and reflected on in more detail in chapters 10 and 11. In chapter 10 the researcher will use the improvisational change model of Orlikowski and Hofman (1997) in combination with Du Plooy's (1998) HEM model to reflect on the organisational context and its environment, within which the OS ECM system was implemented, while chapter 11 will shed light on understanding the institutional aspects of this context and its environment, in an attempt to understand the outcome of the implementation process.

The next chapter elaborates on the details of the case study as it unfolded throughout the two phases of the project.

Chapter 9:
The Open Source (OS) Enterprise Content Management (ECM) Project

The purpose of this chapter is to narrate the longitudinal case on the rollout and implementation of the OSS ECM system by the Government Department referred to as the organisation in chapter 8. Details pertaining to the two phases of the case are discussed as derived from the data collection methods set out in Table 8 of chapter 7.

9.1 Introduction

The term Enterprise Content Management (ECM) System[10] was introduced by the Association for Information and Image Management (AIIM) and is defined as:

> *"the strategies, methods and tools used to capture, manage, store, preserve, and deliver content and documents related to organisational processes. ECM tools and strategies allow the management of an organisation's unstructured information, wherever that information exists."*

ECM systems are seen as part of an organisation's IT architecture and provides an integrated system from which all types of content, whether structured or unstructured, could be searched for, accessed, processed, collaborated on and archived if applicable (Kunstová, 2010). The main benefits offered by ECM systems are that they increase productivity; they eliminate inefficient activities, and they improve the organisation's business continuity and operational flexibility. This means that, amongst other benefits, ECM systems assist organisations to comply with legal regulations; they allow for smooth recovery in case of disasters; they allow for less copying or printing; and they assist personnel to do more work with the same effort, or the same work with less effort. (Kunstová, 2010). According to Kunstová

[10] *http://www.aiim.org/What-is-ECM-Enterprise-Content-Management.aspx*

(ibid.) the barriers preventing organisations to invest in ECM is a lack of financial, technological and personnel resources.

As OS ECM products are much cheaper, they offer organisations the ideal opportunity to improve their productivity by sharing information across the organisation.

9.2 The initial PS ECM System

The acquiring of the PS ECM system by the Government department in 2003, was primarily driven by a need to create a paperless environment. Before purchasing the system, the IT unit did not compile a formal business requirements document, which denotes that the users were never consulted to determine their real needs. The PS ECM system included modules for business process management (BPM) and document management (DM).

The processes configured and used in the BPM module of the system included the:

1. ministerial process: this process runs between the Minister's office and the DG's office and entails a request sent from the Minister's office to the DG's office. It could include something like a request to: prepare a speech for the Minister; or to respond to a question that has been asked by some experts around. The DG's office would then decide whom the request needs to be sent to and would consequently roll out the request to the rest of the department.
2. submission process: this process involves the procedure by which individuals in the department would respond on the request(s) from the Ministry's Office via the DG's office, to submit whatever they've compiled in response to the ministerial request.
3. contract management process: this process can be used by any employee in any unit of the department to request the legal unit to draft them a project contract with a potential outside entity/client.
4. leave application process: this process is used by employees to apply for leave. The application would be routed to the employee's specified direct head and approval would be sent back to the applicant.

5. performance management process: this process allows the different employee heads to score their followers with regards to their individual performance/achievements on the up-font grounds set out to be evaluated.

Important to note is that the department had no official ECM strategies, policies or guidelines in place when they decided to move over to the OS ECM system.

Also important to note is that the PS ECM Specialist in the first phase was appointed as the PM of phase 2 of the OS ECM project.

9.3 Reasons for choosing the OS ECM project as a pilot project

The main reasons for going open source and choosing to migrate to an OS ECM system as a first OS pilot project, given in the interviews with the CIO and other staff at this Government department, were that the current document management system solution was very costly and the OS implementation would make a significant difference on the department's software budget. The PS ECM system used by the department was bought over by a large software corporation who focussed on producing and distributing software applications designed to enable ECM solutions for large organisations across all industries. The technical support that the department got for the PS system after the take-over was also considered inadequate and the department wanted to move towards complying with the Government's new FOSS policy (see Chapter 8 paragraph 8.2.2) and MIOS (see chapter 8, paragraph 8.3). However, who constituted the 'department' was not elaborated upon, but as the case progressed it was obvious that the people unhappy with the technical abilities were not the users of the PS ECM system, but rather top and middle management in the IT unit of the Government department.

9.4 The purpose of the OS ECM project

The OS ECM system was to replace a current PS ECM system and the pilot project was initiated as an attempt by this department to start with the implementation of the Government's policy on FOSS.

The CIO of the department appointed the current ECM PS specialist to lead the new OS pilot project. The plan was to evaluate the implementation on completion, and if found to be a proper replacement, the department were to embark on rolling out the OS ECM system to the rest of the department as a second phase of the project. The initial aim was to accomplish this by the end of 2008.

9.5 The parties involved in the OS ECM project

The parties involved in the pilot project were: the IT unit of the Government department; users of the OS ECM throughout the different units in the Government department; GITO (the body responsible for all government IT implementations and deliveries, mandated by the Cabinet to put up a Programme Office which had to coordinate the rollout of OSS in all Government departments); and the external OS Service Provider (who would be responsible for configuring and implementing the new OS ECM system).

9.6 The phases of the OS ECM Project

The OS ECM Project will now be described in two phases. The first phase details the events that took place during the pilot phase of the project, while the second phase provides the details as they pertain to the roll out of the system to the rest of the department. Specifics on the time lines of these two phases are summarised in Figure 16 on the next page.

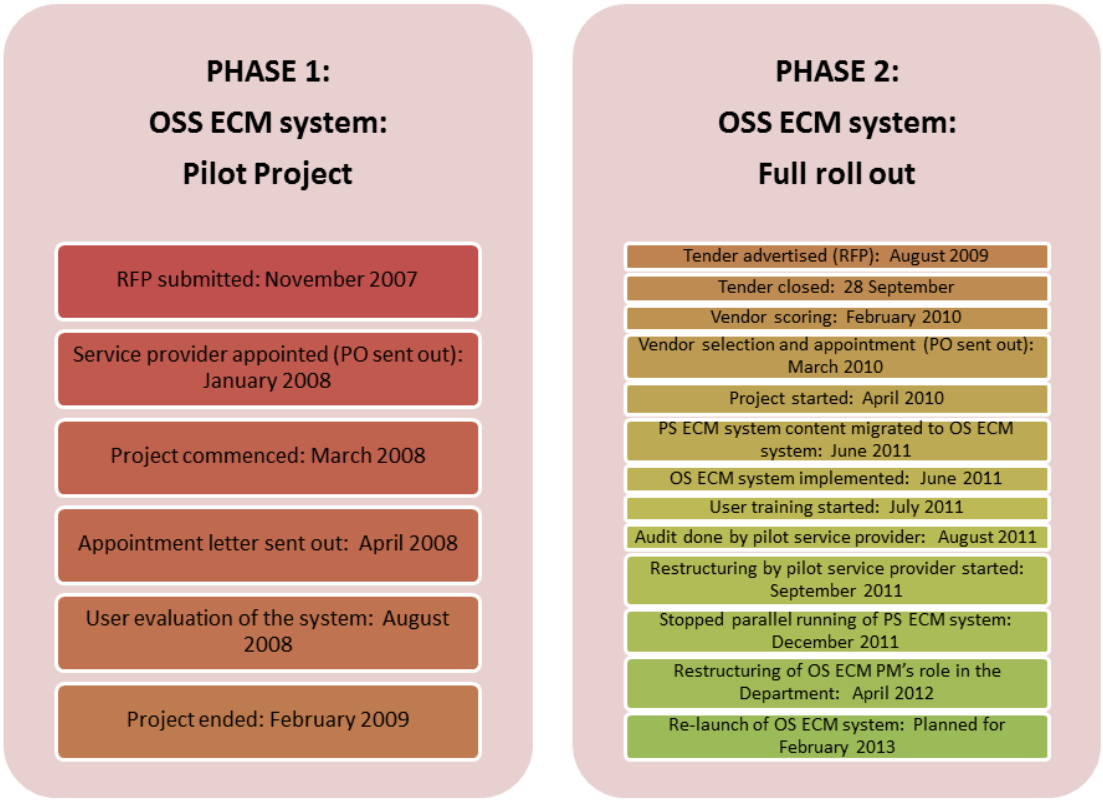


Figure 16: A timeline of the events within the two project phases

9.6.1 Phase 1: OS ECM system: Pilot Project

The RFP for the pilot project was issued in November 2007, with the aim to be completed by the end of May 2008. The researcher joined the project in March 2008, when the project officially commenced. The ministerial process as part of the BPM module of the OS ECM system were to be piloted, but only the part of the process ran in the Minister's office. However, what emerged in terms of the boundaries of the pilot project was different. The exact location and boundaries for the pilot project were called into question in an informal meeting attended by the ECM PS specialist; the external OS service provider; the researcher; and two of the ECM users in the Minister's office. The two users noted that it would be difficult to confine the pilot project to the Minister's office. There were only two to three document requests per month which were handled solely by the Minister's office – the rest of the requests were sent down as workflow to various other people in the department, who had to respond to the requests and who had to provide feedback on their actions to the users in the Minister's office. One suggestion was that the pilot project

could be narrowed down to a particular workflow of documents at all levels in the department over the next 3 months. This would have the implications that more users would need to be trained and that the old and new ECM would need to be run in parallel, resulting in an increased workload for the users. A further meeting between the ECM PS specialist, the external OS service provider, and the supervisor of the users in the Minister's office, agreed that only the ministerial process between the Minister's Office and the DG's office would form the pilot project. Consequently the duplication of the two systems would be restricted to the Minister's and the DG's offices, resulting in the DG office users also being in need of training.

The anticipated plan was to evaluate the implementation on completion of the pilot phase, and if found to be successful, the department would embark on rolling out the OS ECM to the rest of the department as a second phase of the project. To circumvent any time delays in the commencement of the second phase of the project - the roll out to the rest of his department – the CIO applied for a RFP for the second phase alongside the implementation of the first phase (see below for further details on RFP). All of this was to be accomplished by the end of 2008. The CIO of the Government department appointed the current ECM PS specialist to lead the new OS pilot project.

There were two main communication mechanisms initiated. The first mechanism was the weekly meetings of the stakeholders involved in the project. This comprised: from GITO: the project chair person; the secretary, and other representatives; from the Government department: the CIO (when available), the ECM PS specialist, a representative from the Minister's office (a super user), and representatives from the IT section; from the OS ECM vendor: the person responsible for rolling out the new OS ECM; and from an outside company: the researcher as independent observer. The meetings took place at the premises of the Government department. The minutes of the weekly project meetings were generated and distributed by GITO. The format in which the minutes were written created a concern by the Government department. In keeping with the FOSS policy the representative of the Government department, namely the CIO, argued that all project

communication, e.g. minutes of project meetings, should be done using FOSS. However, though GITO was the implementing office for the FOSS policy, it still was in a transition phase to migrate to FOSS and as this was only scheduled to happen in June/July 2008, GITO felt that they could not comply with this request. The CIO of the Government department mentioned that the project members should not wait for the entire GITO to migrate to FOSS. The PM then requested the CIO of the Government department to write a letter to GITO to request that all the team members get Open Office installed on their computers to facilitate the request by the CIO.

The second communication mechanism was through agreement and signing off on a number of official documents. These included:

- ***Request for Proposal**:* An RFP is a document published by a Government department when services from outside vendors are required. In this case GITO was responsible to publish a RFP for OS ECM software and supporting services from outside vendors or service providers. As noted above, the CIO suggested starting the RFP process for the second phase of the project – the roll out to the rest of the department – alongside the pilot project. During the first weekly meeting the CIO accused GITO of holding up the phase 2 process, as the RFP for the pilot project was submitted to GITO in November 2007, but the service provider was only appointed in January 2008 – a process which should only take 2 weeks. The PM (from GITO) requested that a business case be built for procurement of the second phase. He suggested that they try and get the phase two tender out in the middle of this pilot project, so that the Minister's office would not be hindered by the further roll out and delays in commencing the second phase. In hind sight this did not happen, as the RFP for the roll out of the project to the rest of the department was only sent out in September 2009 (see phase 2 of the project).
- ***Purchase order**:* On receiving the proposals from outside vendors or service providers, GITO evaluates these in conjunction with the Government department and then issue a purchase order to the chosen provider.

- ***Appointment letter***: Before embarking on any service delivery in Government, the service provider needs to be in possession of an appointment letter. GITO therefore had to issue an appointment letter to the chosen OS ECM vendor. At the first weekly project meeting it was quite obvious that the Government department's CIO was unhappy with GITO in relation to the issuing of this appointment letter. The CIO claimed that the OS Service provider only received a purchase order. GITO was of the opinion that an appointment letter was unnecessary in this particular case. The department's CIO insisted on a letter as his department wanted GITO to ensure that there was no risk in accepting the OS service provider's appointment.
- ***Project charter***: The project charter is a document that describes the intended project. It includes details on the stakeholders, their responsibilities, project boundaries, project deliverables, and project time lines. There was yet again disagreement on this document. In the first meeting, one of the Government department employees complained that some of the paragraphs in the project charter were 'loaded'. The chairperson of the meeting (who was from GITO) suggested that the meeting went through the project charter to identify such phrases, so that they could be restructured. While this was done, the CIO of the Government department also pointed out that he could not see GITO's responsibility towards the project explicitly outlined in the project charter. He wanted to know what in the project charter would show him whether GITO has performed or not and suggested that GITO's responsibility be added to the charter in a separate clause.

Although there were several suggested changes to the project charter, the chairperson (from GITO) suggested that the charter was signed by the Government department as it was, and that the issues with the charter would then get minuted. He would then obtain a Change Control Proposal (CCP) from GITO so that the project would not be delayed again – according to him if they changed the proposed charter, it would take another two weeks to go through language editing. The CIO agreed to sign, but was not convinced that the changes would be incorporated by GITO if he signed the incomplete

version. The PM then suggested that he signed "subject to changes as minuted". This was agreed upon.

Once agreement had been reached on the timeframe and boundaries of the pilot project, all necessary documents were signed, albeit with caveats attached to some. However, other conflicts arose between GITO and the Government department. At one meeting the Government department's CIO raised the problem of a competing proprietary ECM system which was currently available to other Government departments for purchase and supported by GITO. The CIO was of the opinion that this would lead to confusion in Government departments with respect to promoting the governments' FOSS policy, that is, how could GITO be seen to be supporting a PS simultaneously with an FOS system which had the same functions, and still be viewed as promoting FOSS? He further indicated that he knew of other departments rolling out this other PS and that they were able to do so without a proof of concept i.e. without any evidence that the system is viable and capable of solving the departments' particular problems. He therefore said that they would want the pilot project's FOS ECM system to be as flexible, in terms of procurement and functionality, as the proprietary ECM, in that it would fit all the current processes of Government departments. In this way the FOS ECM system would be as acceptable as the proprietary one.

Another debate which arose in the first meeting was the issue of evaluation of the pilot project. GITO was tasked to come up with an evaluation 'tick-list' to evaluate the project after implementation and was to make use of the evaluation criteria used for a previous Government tender (the so called 'Tender 398') or the New Zealand Government specification. Concerns were raised over the timeframe for the evaluation metrics to be developed (CIO of the Government department); alignment of the metrics with the request for quotation (RFQ) (OS service provider), and; the inclusion of a user perspective in the evaluation which was currently focusing only on a technical evaluation (the researcher).

During the project several incidents caused the completion date to be extended. One of the main delays was in conducting the training. During the first meeting the ECM PS specialist noted that the training would not be able to take place at the times as stipulated in the proposed project plan. The trainees would be out of the office on official business during this period. The project schedule had to be changed accordingly. The Government department's CIO added that he wanted an extra day's training to be included on Open Office, as he believed that it would add to the success of this pilot. The new OS ECM would require users to manage documents and these documents were, because of Government's OS policy, soon to be only OS documents, and the users were not yet familiar with this either. In a later meeting the external service provider raised a concern in this regard. He was afraid that the users might give the new OS ECM system a bad evaluation, as they might perceive the change to the generation of documents in OS to be part of the new ECM system.

User training proved problematic in terms of lack of commitment of users (they left the training to attend to other office business), separate one-to-one training being scheduled, and the DGs office cancelling training and being unavailable for the month of June 2008. Apart from this having financial implications for the project, it hampered the project schedule, as the Minister's office started to populate the document management system, but the workflow part of the system could not be utilised before the training of users in the DG's office was completed.

Other setbacks included delays in providing the external service provider with the necessary workflow so that the system could be set up accordingly, and; defining the scope of the pilot project, i.e. determining which offices in the department would be involved in the project. The user evaluation, which was the final project task to be completed, was conducted on the 22nd of August 2008. Feedback from the PS ECM specialist at the end of February 2009 indicated that the pilot project had been completed, although the final report from GITO was still outstanding. The Government department's top

management had though approved the second phase to roll out the OS ECM to the rest of the department.

9.6.2 Phase 2: The roll out and current state of the OS ECM project

During 2010, the Government department was revisited by one of the researcher's Masters students, who researched on the reasons for the slow uptake of OSS by the South African government. The student interviewed the OS ECM PM of the project reported on in this case study. The findings the Masters student reported on, as well as the findings from an interview which the PhD researcher had with the OS ECM PM in October 2012 (on a follow-up visit to the Government department) are reported on here.

9.6.2.1 Vendor appointment and timeline shift

As mentioned, the roll out of the new OS ECM system to the rest of the Government department was initially planned to start directly after the pilot phase. This did not happen as envisaged, and the project was mainly extended due to a departmental restructuring that took place; a departmental information audit which had to be done; time taken to benchmark what the rollout to the department would cost; and time taken to secure funds for the project.

The roll out project was only first advertised in the Government Tender Bulletin on the 3rd of August 2009 (5 months later). Consequently the RFP was also advertised in *The Sowetan* newspaper (8 August 2009); and, *The Sunday Times* newspaper (9 August 2009), with the briefing session planned for the 17th of August 2009. The latter though only took place on the 30th of August 2009. The initial closing date for the vendor proposals was set for the 11th of September 2009, but was then extended to the 28th of September. The vendor scoring process consisted of the evaluation of the proposals and the shortlisting of the most promising proposals (scheduled for the 21st of September 2009, but done only on the 2nd of October); the presentation of the

short list to the Government department's BID committee[11] (scheduled for the 5th of Oct 2009, but done only on the 9th of Oct 2009); and the making of a recommendation for the vendor (scheduled for the 16th of September 2009, but done only in February 2010). The final phase of the vendor selection process involved the notification sent to the successful vendor (planned for 19 October 2009); and the Service Level Agreement (SLA) with the formal letter of appointment sent to the appointed vendor (planned for 30 October 2009) – both these tasks were done only in March 2010). See Figure 17 for a summary of the timeline shift.

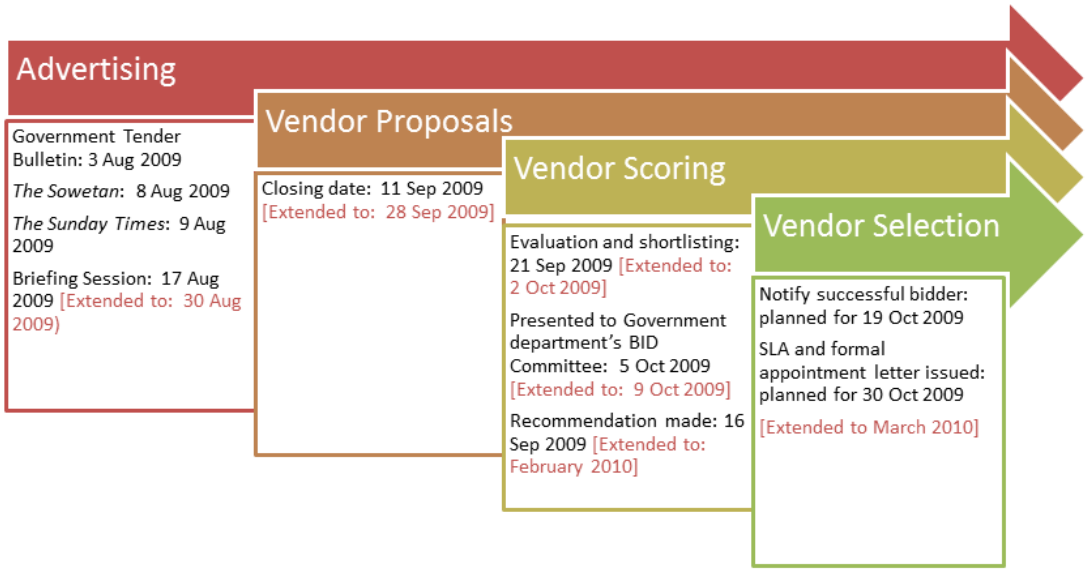


Figure 17: The 'roll out' vendor appointment timeline shift

Important to note here is that phase 2 of the project was not assigned to the same vendor who was responsible for phase 1 (the pilot phase), in spite of the pilot phase vendor's representative expressing his fear that they could be excluded from the roll out phase, as they were too involved in the pilot phase of the project. This concern was counteracted by the chairman of that meeting (from GITO) as he reassured the vendor that this would not be the case.

According to the OS ECM PM of phase 2, the initial vendor did submit a proposal for phase 2, but their documents were not even opened, and they

[11] A BID committee is a Government departmental structure established to handle procurement of goods and services

were disqualified as they were seen to have an advantage due to their involvement in the proof of concept.

9.6.2.2 System implementation

The new OS ECM system took 15 months to implement by the new service provider. The implementation process was done in four phases:

i. Analysis phase: During this phase Joint Application Design (JAD) sessions was run to get input from the users as to what they wanted from the new system;
ii. Design phase: In this phase the documentation on the user requirements was finalised and the Functional Specification was completed.
iii. Building phase: the new OS ECM system was adjusted and changed (developed), installed, configured and tested, and the existing content was migrated with the new system. The migration happened in June 2011.
iv. Delivery phase: The new system was installed for end users across the different units of the Government department and user training commenced in July 2011. The training part included: creating a training plan; compiling training manuals; training the trainer; training the support staff; and training the department's users.

The new OS ECM system ran for about six months until the end of 2011, but there were many complaints from the users who were not satisfied with it. Their complaints were mainly because of the differences between the old PS ECM system and the new OS ECM system. The old system functioned in an ad hoc way and expected the users to define the business process, by choosing the person they wanted to send their request or document to. In the new system these business processes were pre-setup and defined, which meant that the system automatically determined whom the request or document were to be sent to, depending on who the user was who sent it, e.g. in the leave approve module the system would automatically know who the user's line manager is, and send the leave request to him/her as soon as it is submitted. These differences between the old and the new systems were

never communicated to the users and therefore caused most of the user problems.

An important part of the new OS ECM system was the so called 'Dashboard' functionality which allowed managers to get instant reports on what was going on. As the business processes was defined in the new system, this functionality allowed the managers to easily spot where a document was in the process of submission (i.e. who is holding up the process); which contractual requests were still outstanding; who's performance management was not finalised yet, etc. etc.

It is important to note is that the old PS ECM system was never removed from the users' desktops and throughout the implementation of the new OS ECM system, it was still installed and running in parallel with the new system in all units of the department. The parallel running carried on until the end of 2011, when it was stopped and the whole department had to move over to the new system. According to the PM there were though still some users who used the old PS ECM system as it was not physically removed from the users' desktops. This caused some confusion as some of the users asked the PM at times: "*What system are we now using? Are we using physical red folders with printed documents; the old PS ECM system; or the new OS ECM system?*" The old PS ECM was kept in place and ran in parallel with the new OS ECM "*in case the new one that we are using was not really 100%, then we've got something to fall back onto.*"

On asking the PM whether they are not going to force all users to switch to the new OS ECM system, he replied that the old PS ECM system was not compatible to the new Windows 7 desktop operating system, which would soon be installed on all the users' PCs. The department was not going to buy a new license for the old PS ECM system. The users were therefore going to be given the choice of moving from Windows XP as operating system to Windows 7, and in the process the IT unit will explain to them that if they choose to move over, they would lose access to the old PS ECM system.

The PM envisaged that it would not take too long before the old PS ECM system "*would be gone*".

9.6.2.3 Change management and efforts to promote the new OS ECM system

To manage the change to the new OS ECM system, the Government department made use of their Intranet and the large electronic screens they have throughout the building, to advertise the open training sessions scheduled for the new system. Users were also invited via Microsoft Outlook's appointment functionality (their current email application which is still PS) to attend the scheduled training sessions. The problem with these invites was that most of the users did not have sufficient skills in Outlook and did not know how to accept the invitation. They would therefore be invited and either would not arrive for the training because they did not know how to accept the invite, or they would not accept the invite and still arrive for the training.

The training sessions were run by the OS ECM system PM himself, who tried to handle only a few basic functionalities (normally three to four) per session, which would be relevant to all users, plus one advanced feature, which would generally not be in the beginners training. In his words: "*The approach we took was that I'll have certain topics and I will explain: This is how you do this and this is how you do that. Very simple.*"

According to the PM, these training sessions were not well attended. Users who fulfil management roles in some of the units in the department especially did not attend as they would not want to sit in the same training room with the people who work for them. As a result of this, most 'manager users' were not trained and the PM reported situations where a specific document in the submission process would find its way to the final stage and last signoff, when the manager would command his personal assistant to print out the document "*as the OS ECM system is not working*". He would then sign the document by hand and send it along the process manually.

Since the implementation of the new OS ECM system, the PM, CIO and DDG of the Government department have scheduled two meetings per week to discuss the progress of the project. This could be described as a type of top-down approach taken to emphasise the importance of the new system, showing that top management supports it. A new Minister was also appointed in October 2012 as head of the Government department and according to the PM he is very interested in the new OS ECM system as it seems to be "*the talk of the 'corridors'*." He has never formally supported or announced his support for the project, but "*this is just something that everybody knows*". Compared to the previous Minister he is very IT informed and involved and is one of the few politicians who are active on social media such as Twitter[12]. Moreover, to inform the rest of Government departments in South Africa about the new OS ECM system, the PM had a presentation on the new system's implementation during the annual GovTech conference[13].

The HR unit had also, since the pilot project, established a change management unit, which provided some input on the change management aspects of the project. This unit was not setup for the OS ECM project per se, but according to the PM "*it came in good timing*". The unit's assistance was only asked in June 2011 when the rollout by the new vendor started. On a question as to why they were only called in at that point, the PM replied: "*The change management is quite tricky, because if you report to someone that doesn't understand the importance of it, it's difficult. My manager doesn't think it's important to inform the people and I first have to convince him that it is.*"

The change management unit also suggested that an OS ECM change management work group be setup with stakeholders (system users) from every unit in the department, with the main aim of being the eyes and ears of the project. At the time of the interview in October 2012 this group was not

[12] *Twitter is an online social networking service that allows its users to send and read text-based messages known as 'tweets'.*
[13] *The GovTech conference is South Africa's premier conference for all stakeholders involved in the public sector and is seen as SA's leading public sector ICT knowledge-sharing and learning event.*

yet functional. Furthermore, the change management unit advised that super users be trained, to assist users when they struggle with the new system, instead of them having to log a call with the helpdesk. The electronic advertisement boards, present throughout the walkways of the building of the Government department, were also loaded with some general day-to-day functionalities of the new OS ECM system to inform the employees about the ways in which the new system could support them in their everyday jobs, e.g. "*Did you know that you can route a submission with the new OS ECM*[14] *system?"; and "Get notifications via the new OS ECM system for your tasks!*"

Since the managers in the DG's office (the Deputy Director Generals) were the main resistors of the new OS ECM (two of the five were not using the system), as they would always be the ones asking their personal assistants to print out the documents, the PM setup some two-hour training sessions which were specifically for them, and they were invited personally. In spite of this, these sessions were still not attended as there has always been "*an excuse – you know – such as: I've got a meeting here… I've got something to attend to… and there's just never a time that suits them.*"

The two-hour training sessions were then shortened to thirty minute sessions, but the managers still did not attend. "*They never came. And I mean in thirty minutes I only show you what you need to do. That is: how you would receive a document; how you would open the document; how you'll save it back to the system; and how you'd approve or reject it. That's it. You don't need to know all these other Nitti grit ties, and so on.*"

Finally, it was decided on a meeting with the PM's DDG that a communication was to be sent out in September 2012 to inform all the users of the changes that have been made in the OS ECM system, and to update them on all the success factors that have been accomplished. This was a last attempt to

[14] *OS ECM is used as the name of the software installed during the project, to protect the Government department according to the ethical agreement between the researcher and the department.*

convince the users (especially the three DDGs who were not yet using the system) that the OS ECM system was now almost sorted out and ready to go.

9.6.2.4 OS Application software versus PS Application software

In the pilot phase of the project, the OS ECM vendor raised a concern in one of the stakeholder meetings (refer back to section 9.6.1 of this), with regard to the then CIO of the Government department who wanted the users to also move to Open Office as desktop application and suggested to just add another day to the training to provide users with the necessary skills for this as well. The OS ECM vendor was afraid that the users might (because of this) give the new OS ECM system a bad evaluation, as they might perceive the change to Open Office to be part of the new OS ECM system. This was because the OS ECM system would be used to forward and comment on documents which were to be done in Open Office, of which the users did not have the required skills. This was taken note of, but ignored in that the IT unit continued with the implementation of Open Office on the users' desktops.

The OS ECM system PM reported that exactly that had happened. On rolling out the system to the rest of the department, users would log several OS ECM system errors, and on closer investigation the helpdesk would find that the errors logged were due to Open Office documents. Users would work with an Open Office document in the new OS ECM system, "*and they would want to align or format it, and in the process struggle with it. They would not know that they are actually struggling with Open Office which they are indirectly working on, and they'd think it was the new OS ECM system giving them problems.*" The new icons on their desktops (due to the installation of Open Office) were also associated with the new OS ECM system, and not with Open Office, "*so they'll not say: We don't like Open Office! Instead, they'll just say: The new OS ECM system is not working for us!*"

Furthermore, the OSS ECM PM also reported that another reason why users were resisting the Open Office software suite, were that they were of the opinion that it was mediocre to the software they were used to, namely the Microsoft Office suit. "*It doesn't have the same touch and feel, and things are*

not in the same place. You for example get used to the print button being in the top right corner, and now it's no longer there. It also just looks not as nice if one had to compare it to Microsoft Office."

A lack of end-user basic computer skills was also mentioned as a challenge to migrate. On a question as to whether the users were not trained in the desktop packages they had to use, the PM reported that it was difficult to determine whether users have the necessary skills to effectively make use of the desktop packages installed. One would assume they have and a user would for instance indicate on his/her curriculum vitae (CV) that s/he does have the required skills, "*but it is only when s/he is required to actually perform some tasks that one finds out that these skills are maybe too limited*". In this sense the mere moving between the different versions of the same software, also posed problems for the end-users. "*One would expect that users would be able to teach themselves the differences between the previous and the new version. This does not seem to be the case, and it has affected the whole uptake of the new OS ECM system. You see, for instance, people cannot use Outlook, so they cannot respond to training reminders of the new OS ECM system. Besides that you send somebody an Open Office document in the new OS ECM system, and it launches, and it opens up, and they go, OK what is this now? Or they'll get MSOffice 2010 documents with a .pptx extension and they'll go – what is this now? I can't open this document. So then helpdesk comes and they upgrade their MSOffice to 2010 and when the document opens, they are in MSOffice 2010, which they don't know and they go, wow, what is this now? My computer has completely changed.*"

On asking the PM whether there is training available to users to update their basic computer skills, he replied in the affirmative, but stated that users don't attend these sessions, because "*it's one of those pressures a user feels – why should I go for training if others are not going for training? They are afraid to exploit that they actually need training in the basics.*"

9.6.2.5 Change of OS ECM vendor

According to the OS ECM system PM, the service provider appointed for phase 2 of the project had the necessary experience in the ECM sphere, as well as proof of sufficient skills and experience within the OS industry. These were the reasons they were awarded the tender. In terms of the implementation of the specific OS ECM system they were to roll out, they did however not have any previous experiences. Because of this, they did not do everything according to best practise. When users started to ask for functionalities which were not implemented by the service provider, they asked for an extension of their contract to attend to the additional scope. The decision was then taken by the Government department to call in the service provider who was responsible for phase 1, to do an audit of the system implemented by the new service provider. The audit was done in August 2011 and the results of the audit showed that the implementation was not done according to industry practise, and the service provider who did the audit was then appointed (without sending out a tender) to 'fix' the system implemented.

The way in which the phase 2 vendor configured the OS ECM system, did not allow for easy upgrades of the new system. The new service provider, who took over the project implementation in September 2011, took it upon themselves to reconfigure the entire system in such a way, that whatever the customised configuration done by the Government department is, one is able to pull it out, do an upgrade of the OS ECM software, and put it back again.

9.6.2.6 Technical challenges

The OS ECM PM stated that the IT unit experienced the delivery of the OSS ECM software product as a major challenge. The fact that the features of the OSS ECM system were not well documented complicated the migration process. Furthermore, the deployment and automatic installation of OSS across networks were found to be more complex than that of PS, as most OSS products are not packaged for easy mass network deployment through a directory service such as, for example, the Windows-based AD.

9.6.2.7 Technology for the sake of technology

Since the pilot phase of the project, a new CIO has been appointed in the department. The PM reports that things had totally changed because of this. "*IT just pushes for an upgrade because there's an upgrade available. The question must be: Is there a need or not? So if we've got licenses lets chill with what we have, there's no need to upgrade. So now you are upgrading somebody from Windows XP to Windows 7 and it's a big difference.*" Upgrades like these, were reported to also effect the uptake of the new OS ECM system, as not all users had the basic computer skills to be able to deal with these changes: "… and what happens now is that technology gets prioritised over and above the knowledge factor. The way I see it is, the stuff that the IT department should be doing, is providing the tools to enable knowledge management, but unfortunately it doesn't work like that. It's always technology first – it's not about what it is that we need to support (the management of knowledge) in the department, it's more about: Do we have the latest and the greatest."

9.6.2.8 The role of GITO

According to the PM, their cooperation with GITO offered yet another challenge. He described GITO as a profit-oriented organisation, who added a mandatory 10% profit margin to all IT services acquired through them for solely placing the order. He stated that his department was trying to save costs and as GITO did not add any value to the ordering process, they were sidestepping them in the process.

The PM confirmed that GITO was not part of phase 2 of the project. They had in the meantime started a lab in which they have employed some of their existing people as developers of the new OS ECM software, but the PM reported that this was still in the teething phase and that they were aiming (in the long run) to roll out the new ECM system to other Government departments, but in such a way that it addresses their specific needs i.e. not a one size fits all approach. This was though progressing very slowly, because "*as you know, with ECM, it's not a one year thing, it takes some time.*"

9.6.2.9 Involving the users more

During the analysis phase of the first roll out to the department in April 2010, the users were invited to attend JAD sessions to determine their needs for the new system. The users used their knowledge and experience with the PS ECM system "*and told us what frustrated them with the PS ECM system. So there was that assumption that we would take over the good things about the PS ECM system and better the frustrating things they have experienced with it. So we were just focussing on the frustrating parts and we never focussed on the good parts of the PS system.*"

After the initial roll out to the department and the take-over by the new OS ECM vendor (in September 2011), the whole department (about 300 users) were once again invited to attend JAD sessions. These sessions were arranged to get feedback from the users on the implemented OS ECM system. In the initial JAD sessions (in April 2010), the users were only asked to reflect on what they did not like about the old PS system, "*so the users were complaining saying: 'But you didn't bring this part over, which is good.' And we were like, oops, yes. We should have also asked them about what it was that they liked in the PS ECM system – and not only what they didn't like. We basically asked what do you want and what don't you like – we didn't ask what do you like.*" So the main feedback received was small usability differences between the old PS ECM system and the new OS ECM system and included things such as: "*the search functionality does not include author from the share interface; a document's number is editable; the sorting of documents is not possible; 'version nr' is used instead of 'revision nr' – you see that? It's nothing major if you look at it.*

The new development team tried to sort out the issues that the users had with the system, because "*the small things are the things that create the resistance. So we need to eliminate all these – once these are eliminated, we can say, so why are you still not using the system? You can stand on your feet and ask why they are not using it.*"

Although the almost 300 users of the OS ECM system were invited to the JAD sessions, the PM reported that only about 20 users arrived and were eventually involved in setting up the new/changed requirements. Other challenges that later occurred, during the building phase, was that not the same users, which were involved in the analysis phase, were involved in the testing phase. This again led to new needs from these users, which the development team also had to address.

9.6.2.10 Restructuring of the OS ECM PM's role

In April 2012 the position of the OS ECM System's PM was restructured. He kept his position as PM of the OS ECM project, but got added responsibilities, now also being appointed as the PM of Knowledge Management (KM) and the PM of Records Management (RM), reporting directly to the DDG of one of the five departmental programs, as indicated in Figure 15 (chapter 8). (Previously the PM reported to the CIO.) This means that the PM's attention is now divided as he is no longer exclusively focussing on the implementation of the OS ECM system. "*So what I'm actually saying, is that there's no longer one person who purely just supports the OS ECM system as was the case previously. I'm still preaching to the boss to get a solely OS ECM supporter back, because I now have much more on my plate.*"

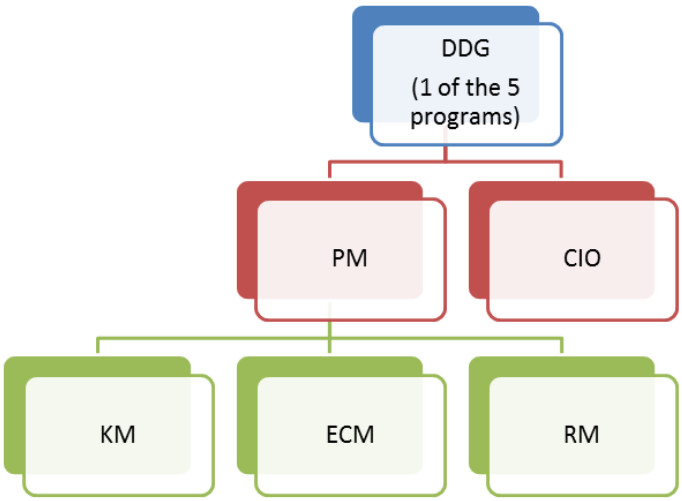


Figure 18: The new role of the OS ECM PM

9.6.2.11 Rating the success of the project

On asking the PM whether he thinks the rollout of the project was a success, he replied that it was not yet 100% successful, but that they were getting there. His thinking around this was based on the number of users using the new OS ECM system. He stated that everyone in the department was using the new system except three of the DDGs in the DG's office. When the documents reach the DG's office, they get printed out, and signed manually, "*so the process never gets completed. And the DG's office is the main people. If they get to use the system, we're done. Then the rollout was a success.*"

9.7 Discussion

When reflecting on the details of the case study as it relates to the OSS adoption strategies and approaches described in Chapter 2, paragraph 2.2.4, and the adoption and implementation of OSS in the public sector (Chapter 2, paragraph 2.2.5), the follow pertains:

Rationale for move: economic and freedom from vendor lock in

- The pragmatic factors of low costing and freedom from vendor lock-in have also been the Government department's main drive to move to the OS ECM system (refer to paragraph 9.3). This is in line with the research done by Fitzgerald and Kenny (2004), Derick and West (2007), Cassell (2008), and Spinellis and Giannikas (2012) who state that the pragmatic factors seem to overpower the ideological factors when organisations decide to move to OSS.
- According to Cassell (2008), cost savings should not be the main driving force to migrate to OSS, but events such as a new policy or law could also create the opportunity to redirect an organisation on the OS route. This was exactly the situation which the Government department found them to be in. The IT unit could support their decision to implement the OS ECM system with the Government's policy on preferred FOSS, which states that whenever the advantages of FOSS and proprietary

software are comparable, FOSS should be implemented when choosing a software solution for a new project (refer back to paragraph 8.2.2).

Operating system deployment

- The Government department's move to OS started off with the deployment of OSS in their work environment (refer back to chapter 8, Table 12) in that they installed OS operating systems (Ubuntu and OpenSUSE), application servers (JBoss and Tomcat) and services (DHCP; an OS Proxy server; an OS web server; and FreeBSG), apart from also implementing the new OS ECM system. This is according to the research done by Ayala *et al.* (2011) who state that the public sector would deploy OSS products in their operational environment to reduce costs, save on license fees or hardware requirements; comply with standards, and obtain freedom from vendor lock ins.

Outsourced support

- In line with what Nagy *et al.* (2010) suggest, the Government department outsourced the implementation and support of the OS ECM system to an outside vendor, due to a lack of internal skills. Important to note though the difficulty they had to find an appropriate vendor, as the department appointed a vendor who had appropriate experience in the field of OS, but lacked the required skills in the specific OS ECM software. This caused them a 'redo' to make sure that their implementation complied with best practices (refer back to paragraph 9.6.2.5).

Resistance to change

- According to Cassell (2008) public officials are reluctant to move to technical solutions if they have had little or no experience with it. In the OS ECM case study, the users were using the PS ECM system before moving to the OS system, but their limited basic computer skills indirectly hampered their adoption of the new OS ECM system, as they were not able to easily adjust to the new versions of operating and application software that were installed with the new OS ECM system (refer back to paragraph 9.6.2.4).

- Another problem which was encountered in the OSS adoption process was that staff were hesitant to move to OS counterparts, as they feared that they faced deskilling (Fitzgerald and Kenny, 2004). In almost the same way the users in the Government department found the Open Office software to be inferior and to not "*have the same touch and feel … it also just looks not as nice if one had to compare it to Microsoft Office*."

Importance of leader/change agent

- Support from top management (Fitzgerald and Kenny, 2004), together with leadership and an OS 'shepherd' (Cassell, 2010) to lead the process, seems to be critical for the migration to OSS. In the OS ECM project the PM was a clear 'shepherd' dedicated to lead his flock through the adoption process. Adding the support from the PM's DDG and the positive attitude of the Minister to the implementation of the system, assisted the PM in the adoption process, giving him the backing he needed. This is echoed by Fitzgerald, Kesan, Russo, Shaikh and Succi (2011) who emphasise the importance of user specific tailored training and championing as important factors to sustain the adoption of OSS in the public sector.

9.8 Conclusion

The PM of the OS ECM project was asked to provide feedback on his views of the OS ECM project. In his interview he reported that after attending the GovTech conference which took place in September 2012, it was clear that other Government departments were not really forced to implement OSS. He reported that a few of the departments were though "*pushing*" and that many of them already had OS firewalls in place. Furthermore, he stated that "*more than half of the Government departments have actually gone the OS route as far as their web sites are concerned - the coding of the web sites, and so on.*"

Most of the departments were though still running Microsoft Outlook[15] as their email and personal information manager. This was reported to be the case as "*the OS mail software don't have these nice features of making appointments and synchronising your calendar with your mobile device – it's just minor things – we're trying to migrate to OS, but the personal assistants came back and said, listen, I always had access to my manager's calendar and I always synchronise his calendar with his phone, so when he's out he can stay up to date with his appointments. So it's just such minor things that keep us from migrating that.*"

The Government department described in the case study of this thesis has up to the date of publication also been the only department which had migrated to an OS ECM system.

When asked about lessons learned from the implementation of the OS ECM system, the PM reported that they initially (during phase 1 of the project) did the basics wrong. "*There was no needs analysis done. The main reason we wanted to implement the OS ECM system was to go paperless as a technology department and we would save millions in software costs. We managed to go paperless, but at the end of the day – you know – what did our users want? When we went into the rollout phase we started analysing what our users wanted – I mean, that was the perfect life cycle approach. In the pilot we did very un-effective change management and little communication – we never communicated to users about our approach – we wanted to get rid of the PS ECM system. What were the reasons why we wanted to? We just went out there as IT and said we need to go the OSS route, look for an ECM system that is compatible and that meets our needs as IT (on behalf of the whole department – and that was the wrong approach) – and we went out there and got a system in, and we never communicated that. We only told the users that, listen, you are going to be trained on the new system - the other system will be phased out. The people did not come to the analysis phase –*

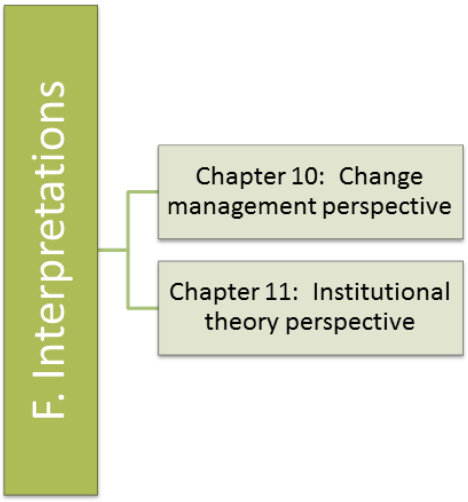
[15] *Microsoft Outlook is an e-mail client and personal information manager that's available as part of Microsoft's Office suite.*

do you understand – they were not involved right from the start – it was just a report back. And it did not work well. We should have started communicating from the time that we were advertising - in fact even from the proof of concept we should have communicated that we are phasing out the PS ECM system, because of this, that and that and we're going to do a proof of concept. We never communicated it to the users. When we did the proof of concept we just went to the Minister's office and we said we want you guys to be part of this. So what I will do differently next time is to definitely get the users involved at a much earlier stage."

This chapter described the case of OSS migration from a PS ECM system, to an OS ECM system in one of the Government department in South Africa. It provided details of the case in two phases: the pilot phase (phase 1); and the roll out to the rest of the department (phase 2). In the discussions section of the chapter the researcher has reflected on the OSS adoption strategies and approaches as described in Chapter 2, paragraph 2.2.4, and the adoption and implementation of OSS in the public sector, as described in Chapter 2, paragraph 2.2.5 of this thesis, and has indicated how these aspects apply to the case study.

The next two chapters will apply the literature and theories as discussed in chapters 3 to 6 on the social context of IT, and more specifically the HEM model of Du Plooy (1998), the improvisational change model of Orlikowski and Hofman (1997), and institutional theory as it applies to the fields of IS and organsiations, to understand the findings of the case study as presented in chapters 8 and 9 of this thesis.

SECTION F: INTERPRETATIONS OF THE CASE STUDY



In chapter 10 the theory on change management, and more specifically Orlikowski and Hofman's improvisational change model (1997) in conjunction with the HEM model of Du Plooy (1998) were used to interpret the findings of the case study as described in chapters 8 and 9 of this thesis. This chapter addresses research question 3: Do change management models help to explain this change?

Chapter 11 uses institutional theory to focus on the organisational dimension of the change model applied in chapter 10, and addresses the fourth and last research question of this thesis: Can other theories provide a different interpretation or understanding of the change process?

Chapter 10:
A Change Management Perspective on the Case Study[16]

The purpose of this chapter is to apply the improvisational change model of Orlikowski and Hofman (1997) in combination with Du Plooy's (1998) HEM model, to shed some light on the change process as it unfolded in the implementation of the OS ECM system (described in chapters 8 an 9 of this thesis). The result of this application is some practical recommendations for government officials on future implementations, as well as a theoretical recommendation to extend the change management model applied.

10.1 Introduction

From the case study it is quite evident that changing from the PS system to the OS system was an on-going process, as one change inevitably led to another. All changes couldn't be anticipated in advance and managing these changes in an improvisational manner seemed to be crucial for the adoption of the new OS system. Furthermore, both enabling conditions as pointed out by Orlikowski and Hofman's improvisational change model (1997) (refer to chapter 5, paragraph 5.5.2) seem to be important as the allocation of specific resources to the change process (such as the PS ECM PM in phase 1 and the OS ECM PM in phase 2) without the alignment of the three key change dimensions, meant that the change from the PS system to the OS system would be difficult to implement. These three key dimensions of the improvisational change model will be elaborated on in the following sections.

[16] *The content of this chapter was published in the Journal of Systems and Information Technology and received a 2012 Emerald Outstanding Paper Highly Commended Award (see: http://www.emeraldinsight.com/authors/literati/awards.htm?year=2012&journal=jsit&PHPSESSID=91k3mfr6p1s0tsme25vs6uv4v6):*
WEILBACH, L. & BYRNE, E. 2011. Implementing Open Source Software to conform to National Policy. Journal of Systems and Information Technology, 3, 3, 286-302.

10.2 Change Management Strategy

Throughout phase 1 of the project, the phrase "change management" was merely used in the minutes to address issues regarding the training of the new OS ECM system's users. The broader question of change management was raised by one of the representatives of GITO when he asked the PS ECM specialist what change management had been done on the project. He replied that the department organised a session with users from the Minister's and DG's office during which they were informed about the Government's FOSS policy and given the reasons for moving to the new OS ECM system. During this session they were also notified about the user evaluation which would be done at the end of the pilot, as well as the dates which were set to train them on both Open Office and the new OS ECM system. The GITO representative replied that change management had to be included formally and properly during the second phase of the project, as he believed the success of the second phase would depend on it. The content or process of the change management was not detailed. Though a training plan was developed, there was no plan to evaluate the possible impact of the change; to include a fully-fledged communication blue print; or to come up with a stakeholder management plan. Thus, in terms of Orlikowski and Hofman's model, there was little included in the change management strategy to ensure alignment of the vision of the department, GITO, and the users, with that of the national vision.

However, there were even some concerns on the training and orientation sessions which were included under the change management banner. During the interviews the users in the DG's office complained that the training they received on the new system was insufficient in the sense that they didn't have enough time to learn and implement what they learned on the new system.

> *I did attend the training, but after I came back from the training, I didn't have enough time to practise what I've learned.* ***Respondent 1***

As a result they didn't find the new system easy to use. The fact that they had to run the old PS and the new OS systems in parallel increased their work

load, and this added a lot of stress to their jobs. Because of this, they didn't have time to update both systems one after the other (as one would expect them to), but some of them sent the document via the old system and would only duplicate it on the new system the following day.

All the users agreed that the support they got from the PS ECM Specialist, who assisted them whenever they needed it, was invaluable and was what kept them going on the new system.

> *I'm satisfied with the support that I'm getting, because the person that is helping us is always there.* ***Respondent 1***

> *I think the training time was too short, but maybe we are too privileged to have 'the PS ECM Specialist' – he will come in and give us some lessons whenever we need it.* ***Respondent 2***

It was therefore clear that the PS ECM specialist acted as a 'champion' for the project and one has to deduce that his dedication and support contributed immensely to achieving the end result, which could otherwise have been very different. This also echoes one of Orlikowski & Hofman's (1997) enabling change conditions - that of "dedicated resources to provide on-going support for the on-going change process."

The change management done in phase 2 of the project was yet again not pre-planned, but rather opportunity-based, and the PM reported that "*if you report to someone that doesn't understand the importance of it (change management), it's difficult. My manager doesn't think it's important to inform the people and I first have to convince him that it is.*" It was only when the system was implemented, that the department advertised the open training sessions scheduled and used the meeting functionality of MS Outlook to invite users to the sessions, without taking into account their lack of skills using this functionality of MS Outlook.

It is also reported that apart from the users not attending these sessions due to their basic computer skill inadequacy, the users in management positions were reluctant to attend the training with their followers. Not surprising then that it was these managers who, fairly close to the end of the project, still

resisted the use of the system, by having their personal assistants printing out the document for a manual signature. Even when separate training sessions were scheduled specifically for them, they still did not attend, using mediocre excuses such as "*I've got a meeting here… I've got something to attend to in that time….*" Could the reason for this be power play, or was it due to mistrusting the OS ECM system?

Although the HR unit had since the pilot project established a change management unit, it was not done because the project team, rolling out the OS ECM system, requested it. It just "*came in good timing*". This unit was only asked for help once the new vendor took over. Their suggestions to train some super users to relief the helpdesk, and the 'awareness campaign" advertising the OS ECM system functionalities seemed to be helpful, but their proposal on the formation of a change group to act as the 'eyes and ears' of the project was not implemented until the second roll out. In the end the project team decided to take a top-down approach in which they involved top management, to try and convince the users that they had to move over to the new system.

We can conclude that there was no official plan or blue print for change management right from the start of the project and the process followed fits well with the Trukese way[17] of open sea navigation as discussed by Orlikowski and Hofman (1997). It was apparent from the project meetings during the pilot phase and the improvised change management actions of the PM that change management was viewed as no more than training and informing the employees about the new system. Only on one occasion had the proposed users been informed of the FOSS policy and the planned changes which were to take place.

[17] "*The Trukese navigator commences the journey with an objective and navigates the open sea in an ad hoc manner in pursuit of the objective. The Trukese navigator responds to the sea and weather conditions during the journey. This distinguishes the Trukese navigator from the navigator who uses a plan devised before the journey starts to navigate the open sea", in:* ORLIKOWSKI, W. & HOFMAN, D. 1997. *An Improvisational Model for Change Management: The Case of Groupware Technologies.* Sloan Management Review, 38, 2, 11 - 21.

10.3 Internal External Organisation

In phase 1 of the project, the political play surfaced throughout the change process between the Government department and GITO (refer to chapter 9, section 9.6.1). This was apparent in the accusations made by the Government department's CIO that GITO wasn't committed to contribute to the success of the pilot project and that he couldn't find their responsibility towards the project in the project charter. It is also clear that there were serious trust issues between the Government department and GITO, with the CIO of the Government department accusing GITO of delaying the whole process from the start. This was also evident in his initial unwillingness to sign the original project charter without the words "subject to change as minuted".

At the organisational level there was clearly tension between GITO who did not appear to embrace the FOSS policy and the CIO of the Government department who was keen to do so. Cabinet commanded GITO to ensure that FOSS was rolled out and coordinated in all Government departments, but GITO's commitment to this process was questioned by the CIO, as GITO had not even transformed their own IT policy to correspond with Government's FOSS policy. This resulted in GITO not being involved at all during the second phase of the project.

However, even within the Government Department, where there was top management commitment to the process, there was no attempt to align the various actors to the Governments' FOSS policy. Information sessions on the rationale which led to the Government's FOSS policy and the reasons why the CIO of the Government department was pushing so hard to implement the new OS ECM system, would have been useful for cohesion of that vision for the people involved in the move in that department. Additionally, a forum in which this vision was discussed with GITO might have provided GITO with the opportunity to explain their reservations in the FOSS migration process before the project even started.

10.4 Technology

At the individual level greater effort could have been put in to understanding, for example, the technological frames of reference of the users before implementation (Du Plooy, 1998) (refer to chapter 3, paragraph 3.4.2). Few of the users were even familiar with computers and the software used in this particular context, never mind the difference between OS and PS. In the second phase of the project the users were confusing the problems they experienced with the new OS ECM system, with the difficulty they had to use basic computer applications, such as the MS Office desktop application. One would normally assume that a computer literate person has these skills, but their general unfamiliarity with and perceptions of technology were not addressed. They were even expected to easily work with the OS version of MS Office, while they couldn't even master a newer version of the same software.

Although the new system did not seem to change the reporting structure in the department, it seemed to have an influence on the power play (Du Plooy, 1998), (refer to chapter 3, paragraph 3.4.3) as some of the users described how the new system shows exactly where a document is, who has to work on it, and what has been completed on it.

> *… she'll (my boss) send me a document and she can still see whether there was action done on the document, or not. Now I'm going to be productive – like you know, I'll know that this document – by looking at the urgency of the document – it has to go somewhere and my boss can check whether I've sent it on.* ***Respondent 1***

During both the first and the second phases it was difficult to determine whether the new system would increase/decrease the users' productivity, as the increased workload in duplicating their actions on both the OS and ECM systems, perplexed their ability to evaluate this.

> *It's not a difficult process, but at the moment, you know, it actually takes a lot of our time, because you have to save your document in 'the PS system', then export the document to 'the new OS system' – stuff like that.* ***Respondent 1***

When asked during phase 1 of the project to compare the new system with the old one, and to elaborate on the new system's ease of use, it was clear that the users had not worked with or seen most of the new system's functionalities, such as document tracking, security, etc.

> *I can think the new system has everything it needs. I haven't seen it all, but they told me so…* ***Respondent 1***

> *At the moment it's used only for document management – I don't really know what else it can do.* ***Respondent 2***

This raises a concern, as one of the aims of the pilot project was to determine whether the new system would be considered a sufficient replacement of the old PS system and the interviews clearly showed that this could not be determined. In spite of this the system was still rolled out to the rest of the department during phase 2.

Although the new system seemed to have all the functionality of the old ECM system, some of the users during phase 1 mentioned that the old ECM system used a document number to identify a document uniquely, and that they found the new system to be lacking in this regard. As the users used this document number to refer to a document habitually, the lack of its existence in the new system reveals an important overlooked change in the existing work process which could lead to user resistance.

> *What I like about 'the PS system' is the document numbers – like after saving the document you'll get a number – say like 1, 2, 3, 4 or 5 – so you can only use that number in your diary – then you know those are the documents that you've been sending through and which you need to track. 'The new OS system' does not have these numbers to refer to a specific document loaded onto the system.* ***Respondent 1***

In the second phase of the project it was also clear that the new OS ECM system was different to the old PS ECM system. Users complained about the new system in that the business processes were pre-setup and defined juxtaposed to the way it was in the PS system they were used to. This was in line with management's objective to get the department's business processes defined, and also gave them more control over the system, in that they would now know that the documents and requests would be channelled to the right

people, and that the users were forced to follow the correct procedures, but in the process the users were left with less control and a lot of changes in their normal way of performing their tasks.

Furthermore, when asking the users what they didn't like about the new OS system, they pointed out several usability differences between the OS ECM system and the PS ECM system. These included aspects such as: "*the search functionality does not include author from the share interface; a document's number is editable; the sorting of documents is not be possible; 'version nr' is used instead of 'revision nr'.* In this sense the users did not experience the new OS ECM system to be a 'better' alternative to the PS system and many of them chose to rather stick to the old PS system. It was only after these issues were revised and changed with the new service provider that more of the users started to use it.

10.5 Discussion

Orlikowski's and Hofmans' improvisational change model (1997) with Du Plooy's human environment model (in: Weilbach and Byrne, 2010), assist in understanding the complex human environment in which technologies are used, and reveals how one can 'cultivate' this human environment within which technology is to be implemented. Such an approach to change could, for example, highlight key activities which should have taken place in the above case study. For example, looking at the philosophy behind the national policy and getting buy-in at departmental level may have been advisable before proceeding with the implementation of the new OS ECM system.

Many of the challenges raised are common oversights in change management literature, such as inadequate consideration for the social context in which the change was to take place. However, what makes this case different to the standard change management case is that one of the main challenges arose from the alignment of internal organisational change to a national policy which did not seem to have the full support of the agency which was tasked with implementing it. It is hard to see how the key challenge to the implementation of the new system could be addressed within

the organisation – a contentious national policy will be a contentious internal policy if representatives of the same stakeholders are involved at both levels.

Practically, a lot of value could have been added to enhance the possible adoption of the new system, if special attention was paid to nurturing or cultivating the social context, as described by Du Plooy (1998) (refer to chapter 4, paragraph 4.3), within which the system was to be implemented. Gaining an in-depth understanding of the organisational culture (discussed in chapter 3, section 3.4.1) and politics (discussed in section 3.4.3), and acting perceptively could have prevented the DG's office from cancelling their scheduled training at the last minute. The implementers could have pre-empted this if the culture of the group, relevance of the new system to the users, users' knowledge and perceptions of IT and their attitude towards management were investigated earlier. Additionally, in phase 1 of the project, there was an inherent assumption that the users were a homogenous group of people in terms of IS adoption and a 'one-size-fits-all' training was designed and planned. Furthermore, when trying to address the resistance by the users who were managers, and who were exhibiting it by refusing to use the system, the real reason for their resistant behaviour was not investigated.

Specifically, some of the recommendations for government practitioners emerging from this case study are:

- Compose a formal change management strategy and plan before embarking on similar projects, i.e. ensure alignment of the vision of the department, other partaking government agencies or departments, and the users, with that of the national vision.
- Be sure to have a project champion on board (a dedicated resource to provide on-going support for the on-going emergent change process)
- Study the organisational culture and politics of all partaking institutions and agencies to gain an in-depth understanding in order to act wisely.
- Gain an understanding of the relevance of the new system to the users, users' knowledge and perceptions of IT (their frames of reference) and their attitude towards management before embarking

on such a project. This understanding should inform the change management plan.

On a theoretical level: Can changes in internal organisational practices therefore be effectively aligned with contentious national policy imperatives? Models can increase our understanding and reveal how one can 'cultivate' this human environment within which technology is to be implemented. However, the process of developing an understanding of how national policy was developed and the rationale for it is important, as is developing an understanding of the rationale of this particular department for choosing to be a pilot site. Perhaps by adding to or expanding on Orlikowski and Hoffman's (1997) model to include a fourth element, indicating the external forces in the environment, such as government regulations; government policy; and the debate on global and national FOSS versus PS (see Figure 19), may highlight the need for this external alignment as well as prevent the focus on internal alignment only.

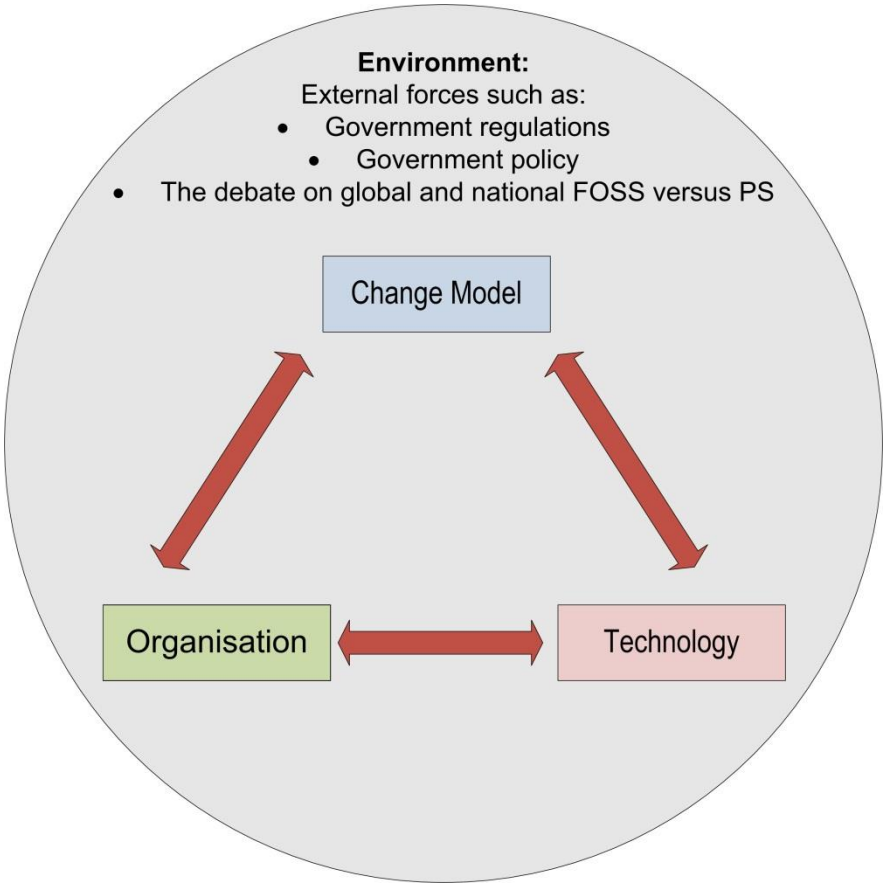


Figure 19: Adapted model of alignment of key dimensions of change

What emerges from this study is a caution that there is not a sole voice within government. The internal dynamics and differences of government departments are inadequately understood, especially considering the huge changes which the Government of South Africa has undergone since independence in 1994. In a multi-levelled and multi-sectoral organisation there exist many different rationalities. Alignment of these rationalities within an organisation is a prerequisite for alignment of the organisation, the change management strategy and the technology. Certainly this case illustrates with many examples where the lack of alignment caused many emergent changes to occur, which could have been prevented if greater focus on alignment had initially been provided. The researcher's conclusion is that an awareness of the broader social context of the organisation and the environment in which it is to be implemented, might at least provide an understanding of what the contention is about, if not the solution on how to address it.

10.6 Conclusion

From the above discussion it is clear that there was tension between the different parties on the implementation of the policy, which mirrored the tension in the development of the Government's FOSS policy (as discussed in Chapter 8, section 8.2 of this thesis). Part of this was due to the division between the individuals and the groups of individuals e.g. GITO and the department in which the OS ECM system was implemented, but also between the top management of the department and the users of the OS ECM system.

We can therefore adopt Orlikowski and Hofman's (1997) model and furthermore try and unpack the 'organisation' dimension of it. Institutional theory, as discussed in chapter 6 of this thesis, might help to shed some light on the inter- and intra-organisational tensions which existed during the implementation of the OS ECM system. In the next chapter we will apply institutional theory in an attempt to explain these.

Chapter 11:
An Institutional Perspective on the Case Study

As concluded in chapter 10, in order to explain and understand the efforts expended in the introduction and implementation of IT/IS in an organisation, an investigation and awareness of the organisational change efforts in aligning the three dimensions of change in Orlikowski and Hofman's (1997) model is necessary, but is not sufficient in understanding the change process. The institutional forces inside the organisation and its environment need closer examination. The purpose of this chapter is to analyse the case study described in chapters 8 and 9 of this thesis by using the concepts of institutional theory as discussed in chapter 6, in an attempt to provide more insight on the inter- and intra-organisational aspects that exist and that influence the adoption or change process.

11.1 Introduction

The static analysis of the change process done in the previous chapter focused primarily on aspects such as: the absence of a change management strategy; the absence of proper business process re-design and an extensive needs analysis before embarking on the project; the insufficient basic computer skills of the users and their managers; as well as insufficient communication to the stakeholders. All of these inadequacies should without any doubt have led to the failure and even the abandonment of the OS ECM project described in chapter 9 of this thesis, as the new system did not provide evidence that personnel in the Government department were more effective or more efficient in performing their tasks, nor did it assist in simplifying their work activities, as one would expect it to do, for it to be adopted. It is thus clear that we need another explanation of why the OS ECM system was still implemented and regarded 'successfully' implemented by the PM of the OS ECM project.

In this chapter institutional theory will be applied for this purpose. The first section will focus on IT/IS as an institutional process in and of itself,

highlighting the role such an institution could play in the adoption of the new OS ECM system. The second section will focus on PS and OS being different institutions and the effect this could have had on the OS ECM project implementation, while the last section of the chapter is dedicated to exploit the forces of institutionalisation stemming from the different levels (as discussed in chapter 6, section 6.3.2) to re-analyse the case study described in chapters 8 and 9 to gain additional insight into the implementation process.

11.2 IT/IS as an institutional process in and of itself

Through the process of diffusion or sharing, an objectification attains legitimacy, gets adopted, becomes an institution and is maintained (refer back to chapter 6, section 6.2.2). Avgerou (2000) describes an 'IT innovation' as an institution in itself. As argued in chapter 6, paragraph 6.4.2, IT is a universal technology implemented in organisations, because it has become a 'rational myth' - it is inevitable that all organisations need technology to progress. In the same way, Avgerou (*ibid.*) describes 'organisational practice' (structures and work activities) as an institution in its own right. But, according to Avgerou (*ibid.*) these two institutions are not sustained to the same extent.. She therefore challenges the classical view that sees IT innovation as an enabler of organisational change or that views it to be an instrument of improvisation used by organisational actors. She feels that it is not the case and that there are actually two processes of institutionalisation happening in such situations. The first is the institutionalisation of the IT innovation, and the second is the institutionalisation of the 'new' or rather the de-institutionalisation of the 'old' organisational practise (the organisational effect of the change). These two processes of institutionalisation can overlap. IT innovation is therefore seen as a self-sustained process, which is neither driving nor included in the dynamics of organisational change, although it interacts with these change forces. This means that the implementation of IT is able to continue in organisations, in spite of:

- hindrances or the ineffectiveness of organisational change efforts; and
- the fact that it may not even contribute to the transformation objectives set out at the start of the implementation process (which also seems to be the case for the OS ECM project).

In the case study described in chapters 8 and 9 of this thesis, three examples are given that illustrate the institutional character of IT:

i. ***Technology for the sake of technology***:

In the roll out of the project, the power of the IT department with the support of the new CIO enshrines IS as an institution. As illustrated in chapter 9, section 9.6.2.7, the PM clearly states that it is not the needs of the end users or the functionality needed to perform their jobs, which determine the roll out of new software by the IT unit of the Government department. Instead, new versions are rolled out because they exist and because it is taken for granted that 'one always has to have the latest software version, as a new version is always a better version'. In the words of the PM:

"IT just pushes for an upgrade because there's an upgrade available. The question must be: Is there a need or not? So if we've got licenses lets chill with what we have, there's no need to upgrade. So now you are upgrading somebody from Windows XP to Windows 7 and it's a big difference."

Substantial challenges, such as users lacking the basic computer skills, and potential barriers, such as the features of the OSS ECM system not being well documented, existed and complicated the migration process. Furthermore, the deployment and automatic installation of OSS across networks were found to be more complex than that of PS, as most OSS products are not packaged for easy mass network deployment through a directory service. All of these obstacles did however not hamper the implementation of the new OS ECM system (refer back to chapter 9, section 9.6.2.6). As explained by the PM:

"And what happens now is that technology gets prioritised over and above the knowledge factor. The way I see it is, the stuff that the IT department should be doing, is providing the tools to enable knowledge management, but unfortunately it doesn't work like that. It's always technology first – it's not about what it is that we need to

support (the management of knowledge) in the department, it's more about: Do we have the latest and the greatest."

ii. ***Vision of paperless system or avoiding vendor lock-in**:*

The IT unit of the Government department's plan with the implementation of the OS ECM system had very little to do with the organisational work practices. It was mainly driven by the rationalities of cost saving; escaping vendor lock-in; and the desire to comply with minimum interoperability standards and the Government's FOSS policy (refer back to chapter 9, paragraph 9.3). The decision makers did initially not consider the needs as exercised by the users in the different units across the department, and was also not driven by the question on which software would be in line with, and acceptable to, the organisational context within which it was to be implemented. No attempt was made to get a clear understanding of the complex social context within which the system was to be implemented. In the process they provided insufficient structures to support the change that the implementation of the new system would bring to the work practices and to the thinking of the users.

In the pilot project users were merely invited to attend an information session in which they were informed about the move to the OS ECM system, and furthermore they were advised to attend the scheduled training sessions on it. The fact that the users for instance perceived OSS as inferior to PS, (refer back to chapter 9, paragraph 9.6.2.4) was not considered important:

"There was no needs analysis done. The main reason we wanted to implement the OS ECM system was to go paperless as a technology department and we would save millions in software costs." (OS ECM PM)

Still, the OS ECM system was rolled out to the whole department and the users will eventually have no other choice but to use the system. Thus, in spite of weak or disputed organisational change efforts exercised by the

project team, the OS ECM system was still implemented in the department.

iii. ***Persistence of IS despite obvious failings in pilot phase**:*

One of the main objectives of the pilot project was to determine whether the new OS ECM system would be considered a sufficient replacement of the old PS system (refer back to chapter 9, paragraph 9.4). In the interviews held with the users at the end of the pilot project, the users clearly indicated that this could not be determined as they were not even exposed to the whole OS ECM system (refer back to chapter 10, paragraph 10.4). During the pilot project no business processes were defined in the new OS ECM system, so even the workability of this could not be determined during the pilot phase. This seemed to have been quite an important difference between the OS ECM system implemented during the pilot phase of the project and the one implemented during the roll out to the rest of the department, as the users expressed their distress with this new way of doing things during the second phase. In spite of this, the OS ECM system was still rolled out to the rest of the department during phase 2. This is once again an indication that IT in itself is an institution. Even though there was no official proof that the new OS ECM system would be an appropriate replacement for the current PS ECM system, the system was still rolled out to the rest of the department.

11.3 OSS and PS as different institutions

An innovation such as IT/IS gets adopted and diffused due to its technical qualities and because of the power of influential actors. Through its required legitimacy it gets institutionalised, and once this has happened, it gets maintained and taken-for granted irrespective of whether or not it produces the promised technical value and without relying on powerful actors (Avgerou, 2000). In this sense many rational accounts for the significance of IT/IS in organisations is said to have become rational myths.

In section 6.2 it was argued that IT/IS is an institution in itself. In this section the researcher will make use of the institutional pillars, as described in chapter

6, section 6.2.3, to argue that not only are PS and OSS institutions in themselves, but they also prove to be different types of institutions, driven by different institutional forces. When reviewing the dimensions of PS and OSS as institutions, Table 13 shows that PS as an institution tends to be more in line with what Scott (2008) identifies as a regulative pillar (or a regulative institutional force), while OSS as an institution seems to be more in line with the dimensions of a normative pillar (or a normative institutional force). As indicated in Table 13, the main difference between the two institutions lies in the basis of compliance and the logic behind it.

Dimension	*Proprietary Software (PS) (in line with the regulative pillar)*	*Open Software (OS) (in line with the normative pillar)*
1. Basis of compliance	• Everybody uses it; • it's acknowledged to be the standard in many cases; • it's reliable; people have become used to how it works and where the functionalities are; • it has become part of the way in which day-to-day tasks are performed.	• It is built by passionate communities of developers; • it ensures no vendor lock-ins; • the rate of innovation is supposed to be faster; developers cannot hide behind their bad code, they are proud of what they do, so they do a good job which is open for everyone to see; • the code is written to be extended; • the sharing of source code is possible; • the freedom to adjust the source code to fit ones needs; • lower licensing costs.
2. Basis of order	• Source code to be kept a secret; • pay for use of product not to own it; • not allowed to make copies of software; • not allowed to reverse engineer and infringe on any copyright and patents that the code may contain.	• OS made available under a GPL that allows one to make copies, distribute the software and improve it by developing patches for bugs and widgets that provide extra features; • Some OS licenses either allow or require the user to make the source code available publicly while other licenses allow you to keep the source code private.
3. Mechanisms	• Adhere to license agreement	• Adhere to GPL which is much more lenient than PS licenses; • access to code is open so nobody would want to reveal their bad coding skills.
4. Logic	• Functionality needed, PS provides it, you pay for the use of it – you don't own it.	• Morally being against vendor lock-in and exorbitant high costs for software; • believing that the code is better as it is open; • easier to get hold of OS as it can just be downloaded from the Internet.
5. Indicators	• License agreement	• General Public license agreement; • source code available to everyone.

Dimension	*Proprietary Software (PS) (in line with the regulative pillar)*	*Open Software (OS) (in line with the normative pillar)*
6. Basis of legitimacy	• Iterative use of the software as part of the daily work life – to perform expected tasks such as taking inventory, writing docs, streamlining company functions.	• The fact that it's morally right to support the passionate OS coders who write brilliant code at very low costs.

Table 13: The dimensions of PS and OSS as different institutions

It is clear from the case study that the users were of the opinion that the OS Open Office suite which were to be implemented simultaneously with the new OS ECM system, was mediocre to the software they were used to, which was the PS MSOffice suite. In the words of one of the users*: "It doesn't have the same touch and feel, and things are not in the same place. You for example get used to the print button being in the top right corner, and now it's no longer there. It also just looks not as nice if one had to compare it to Microsoft Office.", (refer back to chapter 9, section 9.6.2.4).*

The same applied with regards to the new OS ECM system, where users were unhappy with the way in which the system functioned. In the words of the PM: "*the search functionality does not include 'author' from the share interface; a document's number is editable; the sorting of documents is not possible; 'version nr' is used instead of 'revision nr'….* The new development team tried to sort out the issues that the users had with the system, because "*the small things are the things that create the resistance.", (refer back to chapter 9, section 9.6.2.9).*

For the users of the OS ECM system, the PS MSOffice suite was an institution, which was legitimate due to the fact that almost everybody in business uses it; it was acknowledged to be the standard software package to be used universally; it was perceived to be reliable; they had become used to how it works and where the functionalities were situated on the screen; and they considered it to be a part of their lives without which they were not able to perform their day-to-day duties. On the contrary, the counterpart OS package (the Open Office suite) did not at all have the same basis of

legitimacy. For those to whom OS was an institution (mainly the staff in the IT unit) the legitimacy lied in the fact that it was morally the right thing to rather use software which was built by passionate communities of developers; which ensured no vendor lock-ins; for which the rate of innovation is supposed to be faster; where developers cannot hide behind their bad code and where they are proud of what they do, which leads to them doing a good job open for everyone to see; the code is written to be extended; sharing of the source code is possible; the freedom to adjust the source code to fit ones needs exists; and which has lower licensing costs.

In changing from the PS to the OS, it would be important to recognise that the intended change would be from an institution driven by regulative forces (the PS), to an institution driven by normative forces (the OS). To ensure proper change, or de-institutionalisation of the regulative institution (the PS) the change agents could search for ways in which to convince the users of reasons which would make the OSS a legitimate institution for them, working on the internalisation of the OS, versus ignoring the difference between the two 'types' of institutional forces, and merely facilitating the replacement of the PS OS ECM first and the PS Office Suite later (as was suggested by the OS ECM vendor (refer to chapter 9, section 9.6.2.4). By not recognising that OSS is a different 'type' of institution, driven by different institutional forces, due to a different basis of compliance and legitimacy, the change process is made more complex.

What this means is that to understand the change from the old PS ECM system to the new OS ECM system, one cannot only focus on the changes which took place in the organisational processes, but one also needs to understand the change which took place in the IS innovation itself. It is thus important to explore the change both in the two different IS innovations, as well as in how they interact.

11.4 Using institutional theory to study a process of socio-technical change

Avgerou's (2001) contextualist approach to study the process of socio-technical change, which is referred to in Chapter 6, paragraph 6.4.3, has three principles:

1. the objective or focus of the study should be the ICT-supported social activity of an organisation or a network of organisations;
2. in studying the process of socio-technical change, both the technical/rational and the institutional actions that exist should be studied; and
3. the socio-technical process should be studied on the international, national, and organisational levels.

As illustrated in chapter 10 of this thesis, change management models are useful when doing a static analysis of the change process, pointing out the several clear omissions in the change process. Although valid observations could be contributed due to the application thereof (as indicated in chapter 10, section 10.5), it did not explain why the new OS ECM system was still implemented in spite of the identified oversights. It therefore offers limited value in understanding the interventions needed to effectively introduce the change. To further understand this process of socio-technical change which took place in the case study described in chapters 8 and 9, the combined technical/rational actions of the key role players, and the institutional forces which were at play in the broader social context, will be discussed on three levels, namely international, national and organisational. This will be done to expose their influence on the change process.

a. ***Technical/rational ideas and actions at the international level***: International trends on the adoption of Open Standards and Governments all over the globe moving or migrating to FOSS, had a mayor influence on the case reported on in this thesis. It included many success stories, including that of the Governments of Denmark, France, Spain, New Zealand and Venezuela, and emphasised

numerous advantages to the adoption of FOSS on Government level, especially for developing countries (refer back to chapter 8, section 8.3). In the NACI report presented to the SA Government, the appointed committee summarised these success stories and elaborated in detail on the advantages the adoption of Open Standards could have for the SA Government.

In the same way MIOS became another important international 'best practice' which eventually influenced the SA Government's FOSS Policy, allowing for interoperability and universal access. The adoption of FOSS would also promote interoperability and universal access to the SA Government's online services (with many added advantages such as low costing; no vendor lock-ins; and dropping the entry barriers for local software developers). In this sense the idea of also incorporating MIOS made a lot of sense. The new SA Government (since their takeover in 1994) were focussed on the on-going improvement of their service delivery to the nation, and the MIOS would allow for the interconnection, access and exchange of data amongst the Government's ICT-infrastructure. In this regard the MIOS of the United Kingdom had the greatest influence.

b. ***Institutional influences at the International level***: Mimetic forces (refer back to chapter 6, section 6.3.4) played a role in the adoption of the international trend on Open Standards, in that the NACI report detailed the success stories, as well as the potential advantages which could be gained by going this route. These forces could also be seen as normative, as it was internationally believed to be the right thing to do. This eventually convinced the Government to follow in the footsteps of their international counter parts in adopting Open Standards as an enforced base for ICT in the public sector, resulting in the SA Government's FOSS Policy.

In the case of the MIOS being an international 'best practice', informal coercive forces were at play, as for the Government to obtain their goal

of committing to the on-going improvement of service delivery, they were informally under pressure to adopt this 'best practice'.

It is important to note that there was conflict between the international forces to adopt OS, and the internal forces in the SA Government which pointed to be against the adoption thereof. The SC, appointed by the SA Government to address what Government was to do around FOSS, initially investigated the perception and awareness which existed in the SA Government departments on FOSS. They found that most Government departments perceived FOSS to be unreliable software offered without any support and developed by a group of people 'doing their own thing'. Consequently the use thereof was unthinkable by most of the departments and these forces were directly opposing the mimetic forces on FOSS implementation from the international context. These internal forces were historically constructed and legitimated by their social acceptability and credibility (refer to chapter 6, section 6.2.2).

Furthermore it is also important to note that OS in terms of 'technical software', such as internet relays, DNS servers and web proxies, were in 2001 already used almost throughout all the Government departments. The reason provided for this, was that it proved to be much easier to just download and use the needed software services (which was for free), than to go through the whole government procurement process which was very lengthy. As these technical service systems are not very visible to application software users, it might be that these users were not even aware that some of the application software they were using, ran on OS services. It seemed to be only the IT units of the different departments that were really aware and in favour of this. This points to the existence of different groupings within the Government departments. The IT units of the departments were mostly in favour of OS, whereas the users in other units perceived it to be inferior and they were therefore opposing it.

c. ***Technical/rational ideas/initiatives at the national level***: On national level the SA Government adopted the SA FOSS Policy, which instructed Government departments to include FOSS in their software planning. To implement the policy GITO was to establish a project office to ensure the smooth implementation of the policy throughout all Government departments. The responsibility of implementation was given to the CIOs of the different departments, as each department had a unique situation with regards to the IT infrastructure and systems used. GITO was to coordinate the synergies between the departments (refer back to chapter 8, section 8.2.3).

Important to note is that there was a conflict in the national rationalities, between the corporate sector, who preferred PS, and the Government's FOSS policy. Furthermore, the reluctance of GITO to move to OS (even in their own institution – refer to chapter 9, section 9.6.1), was also conflicting with the policy initiative. It has to be emphasised though that this policy did not adopt a mandating strategy, but rather a preferred OSS strategy, which meant that it lacked teeth in forcing all Government departments to comply with it.

Also important to note was that the CIO of the Government department (which is reported on in the case study) and the PM of the project also had rational arguments in favour of OS. These were in line with the national rationality of moving to OS as suggested by the FOSS policy.

d. ***Institutional influences at the national level***: Formal coercive forces played a role through the adoption of the FOSS policy and strategy by the SA Government. Government departments were to implement OSS when new IS were sorted, and migrate to OSS if an equivalent software package existed. It would maybe not be wrong to rather qualify these forces as being 'informal coercive', as the FOSS policy seemed to lack some teeth and many departments used the loop hole in the policy to bypass the implementation and migration to OS. Hence the slow uptake thereof in the Government as a whole. Furthermore,

although there was a coercive pressure to adopt the policy, it was very difficult to do so, as there were no additional guidelines presented by Government on how to go about adopting OS.

In the Government department within which the OS ECM system was rolled out, and which is reported on in this study, the CIO (who was according to parliamentary instructions responsible for the implementation of the FOSS policy in his/her department) (refer back to chapter 8, section 8.2.3) and his whole IT unit was in favour of the implementation of OSS and consequently of the FOSS policy in general. He saw OSS as an opportunity to save on his IT budget and was (as a IT person) much in favour of the normative pressures which made OSS the better choice of software, due to the freedom of choice and low costing, versus the vendor lock-ins and high licenses fees of its PS counterparts. In this sense the implementation of the FOSS policy was on organisational level seen as a desirable process.

Another strong institutional aspect was GITO, who was reluctant in the uptake of the FOSS policy, and acted as an impediment to the national vision. To overcome this, they were dropped in the second phase of the project (refer back to chapter 9, section 9.6.2.8).

e. ***Technical/rational action at the organisational level***: There were many technical/rational actions on organisational level with regards to the implementation of the new OS ECM system. There was strong leadership and a drive to implement the FOSS policy and the OS ECM project was planned by the CIO of the Government department (reported on in the case study). The external vendor would be 'insourced' to implement the system, with the PM appointed to run the project from the department's side. GITO was involved in the process as they had, according to Government instructions, to be involved in the migration process in all Government departments. There was training planned to get the users familiar with the new system, and the

project was planned to be executed in a pilot phase, followed by a full roll out to the rest of the department.

There was also technical action taken by the new vendor to define the Government department's processes in the new OS ECM system and to activate the Dashboard functionality of the system (refer to chapter 9, paragraph 9.6.2.2) to provide management with more control.

f. ***Institutional influences at the organisational level***: Although the implementation of the new OS ECM system and its normative forces were acceptable to the IT unit, who believed that OSS was truly the way to go, and who had experience with the latest OSS, as they had been implementing several OS servers, operating systems and services (refer to chapter 8, paragraph 8.3.3), it was in conflict with the regulative forces of the PS institution, used by the rest of the users in the other units of the department. These users were not even sure what OSS is and for most of them OSS seemed to be inferior in that it didn't 'look' as nice as the PS (Open Office); looked different to what they were used to; and didn't have all the functionality they required (OS email software). They were not up to date with the latest OS products available, lacked basic computer skills, and believed, from what they knew that OSS was not comparable to PS.

Defining the Government department's processes in the new OS ECM system and activating the Dashboard functionality of the system was in conflict with the traditional way of doing things in the Government department. Users were not used to being monitored to the extent that the new OS ECM allowed for. This was most probably why the users in managerial positions also refused to use the new OS ECM system.

11.5 Conclusion

This chapter provided details on the institutional forces which were at play in the Government department and the broader social context within which the new OS ECM system was implemented. It offers an explanation of the

reasons why the new system was still implemented and rolled out to the rest of the department, in spite of the fact that it seemed to be have been deemed from the start.

The first section described the role played by IT/IS as an institutional process in and of itself and the way in which this could have affected the implementation of the new OS ECM system, which pointed to it not necessarily being implemented to streamline the work practices, but rather due to its institutional status of being a 'rational myth'.

The second section of this chapter focussed on OSS and PS to be different 'types' of institutions. Using the institutional pillars described in chapter 6, section 6.2.3, it was argued that OSS and PS were driven by different institutional forces, with PS leaning towards the regulative pillar and OSS being more in line with the normative pillar. These two institutions were found to mainly differ with regard to their basis of compliance and the logic behind them. When changing from OSS to PS, it would therefore be very valuable to recognise these differences, and to not only understand that the new system could change the organisational processes when implemented, but to also understand the change which will take place in the IS institution itself – moving from the regulative to the normative. The change should thus be understood within the two different IS innovations themselves, as well as in how these innovations interact.

The third and last section of this chapter went beyond the technical/rational actions of stakeholders, and included an in depth analysis of the institutional forces at play in the broader social context of the Government department. It explained the institutional forces which were at play on the international, national and organisational levels, pointing out which of these forces worked in favour of or against the technical/rational actions, and in the process contributed to the unexpected outcome of the new OS ECM implementation process.

In the next chapter the researcher will reflect on the research done in this study, by answering the research questions posed in chapter 1; highlighting the contributions made by the study; and providing the final conclusions.

SECTION G: REFLECTION & CONCLUSION

This section comprises the last chapter of this thesis. In this chapter the researcher reflects on the research questions posed in chapter 1 of the thesis and answers these with reference to discussions form both the literature review done in chapters 2 and 3, as well as the conceptual models and theories discussed in chapters 4, 5 and 6, which were consequently applied to interpret the case study as described in chapters 8 an 9 and reflected upon in chapters 10 and 11. The practical, methodological and theoretical contributions made in this thesis are also summarised, after which the researcher presents some interesting topics for future research.

Chapter 12:
Reflection on Research Questions and Contributions

12.1 Introduction

This chapter will reflect on the research done in this study. The rationale for the research, as described in chapter 1 will be revisited, after which each of the research questions posed in the same chapter, will be answered. Finally the main research question will be addressed and the contributions made by the study will be discussed.

12.2 Revisiting the research problem

The main problem or rationale for this research was to determine the extent to which change management models were used, or of use, in explaining the introduction of an IS innovation in an organisation. As one of the public debates at the commencement of this study was the moving/migrating from PS to FOSS in the public sector of South Africa, and the South African Government had just adopted their FOSS policy, this study was directed at investigating one of the first migration pilot projects in a Government department to which the researcher was granted access.

In the next section the research questions, as formulated in chapter 1 of this study will be revisited in an attempt to answer them.

12.2.1 Secondary research questions

12.2.1.1 Question 1: What was the South African Government's rationale for moving from PS to FOSS?

This question was answered in chapter 8 of this thesis where it is explained that the South African Government had after a short but intensive research process (between 2001 and 2007) and several in depth studies, decided to adopt a 'preferred' FOSS policy. The most important catalyst in this study was the NACI report (in 2002) (refer back to chapter 8, section 8.2.1), which indicated that the use of Open Standards was to be enforced as it would

promote interoperability and universal access to the South African government's online services without exorbitant costs; restrictions because of licensing; or other related obstacles. It would also reduce the risk of being 'locked-in' by specific vendors of ICT commodities and services, and this would in turn drop the entry barriers for local software developers who are able to offer ICT solutions to the public sector.

The report also identified a number of important broader developmental and societal aspects to the arguments presented. Apart from arguing that FOSS provides a "useful tool to allow developing countries to leapfrog into the information age", the report also indicates how the "arrival" in this information age is not only more viably achieved using FOSS (a cost argument), but also that the use of FOSS fundamentally effects the nature of this information age.

The GITOC strategy document, first submitted to Parliament in January 2003, focussed on the benefits of FOSS to Government and encouraged the utilisation thereof, although it did not include all the richness of the original reasoning and mainly concentrated on arguments of OSS efficiency and effectiveness.

The basic strategy in the policy was stated as:

> *Government will implement OSS where analysis shows it to be the appropriate option. The primary criteria for selecting software solutions will remain the improvement of efficiency, effectiveness and economy of service delivery by Government to its citizens (GITOC, 2003:24).*

In January 2004, the lack of enforceability of OSS in the GITOC report was picked up by the PNC on Information Society and Development, who noted the rather slow progress on implementing the GITOC strategy and made some recommendations on enhancing the strategy. This enhancement included and expansion to the strategy which stated:

> *When OSS is not implemented, then reasons must be provided in order to justify the implementation of proprietary software (Levin et al., 2004:4)*

The frustration of the slow uptake led to the Go-Open campaign in 2005, and consequently to the DG of the South Africa's Department of Science and Technology, who stated publically that the lack of technology access due to insufficient funds and infrastructure is the primary challenge in Africa and that FOSS seemed to be ideal to solve this problem.

The SC was consequently requested to submit a report on the progress made on the implementation of FOSS in Government. They submitted a reworked policy to Government aimed at an entire open philosophy to be developed by Government, mandating Open Source, Open Standards and Open Content. The policy contained three statements: firstly, FOSS will be used unless there is a valid or justifiable reason that it shouldn't; secondly, FOSS methodologies will be used in a collaborative open licensed way and everything should be Open Content, unless there is a valid reason, such as security or privacy issues; and thirdly, that Government will not only use FOSS but will also encourage the use of FOSS and Open Content.

The policy was approved by the SA Cabinet on 22 February 2007 and stated that all future software developed for government would be based upon open standards and that Government would migrate its current software to FOSS.

12.2.1.2 Question 2: How was change managed in migrating from PS to FOSS?

This question was answered in chapter 10 of this study which provides a detailed discussion on the case study described in chapters 8 and 9, in terms of change management. In chapter 5 the improvisational change model of Orlikowski and Hofman (1997) was argued to be applicable to apply to the case study presented in this thesis, while details on HEM model of Du Plooy's (1998) were provided in chapter 3. These two models were consequently used in combination to shed some light on the change process as it unfolded in the implementation of the OS ECM system project.

It was argued that changing from the PS system to the OS system was an on-going process, as one change inevitably led to another. All changes couldn't

be anticipated in advance and managing these changes in an improvisational manner seemed to be crucial for the adoption of the new OS system. Furthermore, both enabling conditions, as pointed out by Orlikowski and Hofman's improvisational change model (1997) (refer to chapter 5, paragraph 5.5.2), seemed to be important as the allocation of specific resources to the change process (such as the PS ECM PM in phase 1 and the OS ECM PM in phase 2) without the alignment of the three key change dimensions, meant that the change from the PS system to the OS system would be difficult to implement.

With regard to the change management strategy followed, the conclusion made was that there was no official plan or blue print for change management right from the start of the project and the process followed fitted well with the Trukese way of open sea navigation as discussed by Orlikowski and Hofman (1997) (refer back to chapter 10, section 10.2). It was apparent from the project meetings during the pilot phase and the improvised change management actions of the PM that change management was viewed as no more than training and informing the employees about the new system. Only on one occasion had the proposed users been informed of the FOSS policy and the planned changes which were to take place.

Political play surfaced throughout the change process between the Government department and GITO (refer to chapter 9, section 9.6.1), and there were some serious trust issues between these two parties (refer to chapter 10, section 10.3), but there was no attempt to align the various actors to the Governments' FOSS policy. Information sessions on the rationale which led to the Government's FOSS policy and the reasons why the CIO of the Government department was pushing so hard to implement the new OS ECM system, would have been useful for cohesion of that vision for the people involved in the move in that department. Additionally, a forum in which this vision was discussed with GITO might have provided GITO with the opportunity to explain their reservations in the FOSS migration process before the project even started.

The technological frames of reference of the users before implementation, was not considered, and only a few of them were even familiar with computers and the software used in this particular context, not to mention the difference between OS and PS. Their general unfamiliarity with and perceptions of technology were not addressed. Some other issues which were also not managed were the changes in the work processes and the usability differences between the old and the new system.

12.2.1.3 Question 3: Do change management models help to explain this change?

It was argued in chapter 10, section 10.5 that Orlikowski's and Hofmans' improvisational change model (1997) with Du Plooy's human environment model (1998), could assist in understanding the complex human environment in which technologies are used, as it reveals how one can 'cultivate' this human environment within which technology is to be implemented. Such an approach to change could, for example, highlight key activities which should have taken place in the case study described in chapters 8 and 9 of this thesis. In this sense, for example, looking at the philosophy behind the national policy and getting buy-in at departmental level may have been advisable before proceeding with the implementation of the new OS ECM system.

Many of the challenges raised in the discussion of the case study in chapter 10 were common oversights in change management literature, such as inadequate consideration for the social context in which the change was to take place. However, what makes this case different to the standard change management case is that one of the main challenges arose from the alignment of internal organisational change to a national policy which did not seem to have the full support of the agency which was tasked with implementing it. It was difficult to address the key challenge to the implementation of the new system from within the organisation, as a contentious national policy will be a contentious internal policy if representatives of the same stakeholders are involved at both levels.

On a practical level the two models which were applied to the case study showed that a lot of value could have been added to enhance the possible adoption of the new system, if special attention was paid to nurturing or cultivating the social context, as described by Du Plooy (1998) (refer to chapter 4, paragraph 4.3), within which the system was to be implemented. Gaining an in-depth understanding of the organisational culture (discussed in chapter 3, section 3.4.1) and politics (discussed in section 3.4.3), and acting perceptively, could have prevented the DG's office from cancelling their scheduled training at the last minute. The implementers could have pre-empted this if the culture of the group; relevance of the new system to the users; users' knowledge and perceptions of IT and their attitude towards management, were investigated earlier. Additionally, in phase 1 of the project, there was an inherent assumption that the users were a homogenous group of people in terms of IS adoption and a 'one-size-fits-all' training was designed and planned. Furthermore, when trying to address the resistance by the users who were managers, and who were exhibiting it by refusing to use the system, the real reason for their resistant behaviour was not investigated.

Applying the two models to the case study made it possible to make some recommendations for government practitioners. These were:

- Compose a formal change management strategy and plan before embarking on similar projects, i.e. ensure alignment of the vision of the department, other partaking government agencies or departments, and the users, with that of the national vision.
- Be sure to have a project champion on board (a dedicated resource to provide on-going support for the on-going emergent change process)
- Study the organisational culture and politics of all partaking institutions and agencies to gain an in-depth understanding in order to act wisely.
- Gain an understanding of the relevance of the new system to the users, users' knowledge and perceptions of IT (their frames of reference) and their attitude towards management before embarking on such a project. This understanding should inform the change management plan.

On a theoretical level the applied models appeared to increase the researcher's understanding of the change process and revealed how one could 'cultivate' this human environment within which technology is to be implemented. However, the process of developing an understanding of how national policy was developed and the rationale for it is important, as is developing an understanding of the rationale of this particular department for choosing to be a pilot site. By adding to or expanding on Orlikowski and Hoffman's (1997) model to include a fourth element, indicating the external forces in the environment, such as government regulations; government policy; and the debate on global and national FOSS versus PS (see chapter 10, Figure 19), the need for this external alignment is highlighted, and the focus on internal alignment only, is prevented.

12.2.1.4 Question 4: Can other theories provide a different interpretation or understanding of the change process?

The static analysis of the change process done in chapter 10 of this thesis pointed out some important change issues which were neglected during the case study described in chapters 8 and 9 of this thesis. These include, amongst others: the absence of a change management strategy; the absence of proper business process re-design and an extensive needs analysis before embarking on the project; the insufficient basic computer skills of the users and their managers; as well as insufficient communication to the stakeholders.

Considering all of these inadequacies one could argue that the OS ECM system implementation project should have been an outright failure or at least been abandoned at some point in time, as the new system did for instance not proof to make the officials in the Government department more effective or more efficient in performing their tasks; neither did it assist in simplifying their work activities. It is thus clear that another explanation was needed of why the OS ECM system was still implemented and, with only the last three DDGs to come on board, regarded 'successfully' implemented by the PM of the OS ECM project.

In this thesis institutional theory was applied for this purpose. The application of this theory shed some additional light on the change process, which enriched the researcher's understanding of the whole process. It has to be stated here that the researcher acknowledges that this theory is not the only theory which could possibly be used to enhance this understanding, and that other theories might also prove to be useful in this regard.

In chapter 6 of this thesis an overview of institutional theory and the use thereof was provided, while the application of the theory to the case study was done in chapter 11. Applying institutional theory showed that institutional forces were at play in the Government department and the broader social context within which the new OS ECM system was implemented. Firstly, the role played IT/IS as an institutional process in and of itself and the way in which this could have affected the implementation of the new OS ECM system was discussed, pointing to the possibility that the new system was not necessarily being implemented to streamline the work practices, but rather due to its institutional status of being a 'rational myth'; something which had to be done as 'it's just the right thing to do."

Secondly, OSS and PS were argued to be different 'types' of institutions. Using the institutional pillars described in chapter 6, section 6.2.3 of this thesis; it was argued that OSS and PS were driven by different institutional forces, with PS leaning towards the regulative pillar and OSS being more in line with the normative pillar. These two institutions were found to mainly differ with regard to their basis of compliance and the logic behind them. The insights offered by this argument revealed that when changing from OSS to PS, it would be very valuable to recognise that OSS and PS are two different 'types' of institutions, and to not only understand that the new system could therefore change the organisational processes when it is implemented, but to also acknowledge the change which will take place within the IS/IT institution itself – moving from the regulative to the normative. The change should thus be understood both within the two different IS innovations themselves, and in how these two innovations interact.

Lastly, the research in this thesis went beyond the technical/rational actions of the stakeholders, and included an in depth analysis of the institutional forces at play in the broader social context of the Government department. It explained the institutions which were at play on the international, national and organisational levels, pointing out which of these forces worked in favour of or against the technical/rational actions, and in the process contributed to the unexpected outcome of the new OS ECM implementation process.

It is therefore argued that the application of institutional theory (as done in chapter 11 of this thesis) could enhance the understanding of the change process, as described by Orlikowski's and Hofmans' improvisational change model (1997) accompanied by Du Plooy's human environment model (1998) (in chapter 10).

12.2.2 Primary research question

To what extent does change management theory explain the process of migrating from proprietary software (PS) to Free and Open Source Software (FOSS) in the South African Government?

In this thesis it was argued that change management models (and specifically the improvisational change management model of Orlikowski's and Hofman (1997)), could indeed be used to gain a good understanding of the process of migrating from PS to FOSS (as explained in chapter 10) - even more so when it is combined with a model which could provide an in depth explanation of the social context within which it is implemented, such as Du Plooy's human environment model (1998). The latter is useful as it reveals how one could 'cultivate' this context within which the new system was to be implemented.

What did though prove to be a shortcoming of the model of Orlikowski and Hofman (1997) is that it seems to neglect the external or broader environment within which IS are to be implemented. The model was therefore expanded on in this thesis by adding a fourth environmental element to it. This element was necessary to understand the forces at play in the environment, such as

government regulations; government policy; and the debate on global and national FOSS versus PS. In doing this, the need for external alignment was highlighted, preventing the focus to only be on that which happens internally in the organisation.

A further important finding of this study, with regards to the model of Orlikowski and Hofman (1997), is that it seems to be necessary to unpack the dimensions of the improvisational change model, and more specifically the change model and organisational components of it. The reasons for this were that the 'organisation' as described by these, is no unified group with a common vision, which leaves the question as to who or what one should then align to.

The models of Orlikowski and Hofman (1997), together with Du Plooy's human environment model (1998) also showed some inadequacy in explaining why the OS ECM project (described in chapters 8 and 9 of this thesis), was still implemented and, with only the last three DDGs to still come on board, regarded as 'successfully' implemented by the PM of the OS ECM project. All of this in spite of some obvious reasons which should rather have led to its abandonment. This called for another explanation.

Adding an institutional analysis to the case study enriched the findings of this research in that it exposed the role played by IS/IT as an institution in and of itself, justifying the eventual implementation of the new OS system, even if it was against all odds deemed to be abandoned. Describing OSS and PS to be two different 'types' of institutions revealed that moving from the one to the other required not only an understanding of the change process itself, but also that the two technologies are in essence very different, being driven by different institutional forces - PS leaning towards the regulative pillar and driven by a regulative forces, and OSS leaning towards the normative pillar and driven by moral forces. The insight provided by this finding could assist to not only acknowledging the change process itself, but to also consider the change which takes place within the implemented IS institution itself when migrating from PS to OSS. The application of institutional theory also

enriched the understanding of the migration process, in revealing the institutional forces which worked in favour of and against the technical/rational actions of the stakeholders on an international, national and organisational level.

12.3 Contributions

The contributions made by this study will now be discussed under the headings of practical, theoretical and methodological.

12.3.1 Practical contributions

When embarking on the case study described in chapters 8 and 9 of this thesis, the researcher did not initially want to become part of the IS implementation process as she didn't want the research outcomes to be biased. When it though became evident that the evaluation of the implementation was planned to be purely technical, the researcher did provide some assistance in warning the project team that the implementation should not only be evaluated using pure technical criteria, but that the it should also incorporate a process in which the social acceptability of the system could be determined. The researcher therefore contributed practically to the project in getting the team to think about how the new system would affect the lives of the end-users of the new OS ECM system and assisted with constructing the criteria which were to be used to determine the social acceptance of the project.

12.3.2 Methodological contributions

Methodologically two main contributions were made:

- Firstly, numerous studies in the field of IS development, management, and strategy have focussed only on technological change, neglecting the interaction between technological change and socio-organisational change (Avgerou, 2001) and mainly aiming at the successful development of IS; the effective management of IS; and the efficient utilisation of IS, by only focusing on the organisational environment as either a source of opportunity or an aspect limiting or restricting it. There are only a few studies such as the study done in this thesis, on which the organisational

and social change unfolding in interaction to the technical innovation forms part of the phenomenon studied.

- Secondly, this study made use of a longitudinal study. Even though a longitudinal approach is a recommended research approach (Nandhakumar and Jones, 1997), one still finds very few of these studies, as it is relatively time consuming and only really makes sense if there is long term collaboration.

12.3.3 Theoretical contributions

Three main theoretical contributions were made in this thesis:

- Firstly, this study has theoretically contributed in that it expanded the Improvisational Change Management model of Orlikowski and Hoffman (1997) by adding a forth element of external environment to it. This element indicates the external forces at play in the environment, which could include aspects such as government regulations; government policy; and the debate on global and national FOSS versus PS (see chapter 10, Figure 19). By adding this element to the model it highlights the need for external alignment during the change management process and in doing this, prevents the focus to be on the internal alignment of technology, organisation and change model only.
- Secondly, as the improvisational change management model of Orlikowski and Hofman (1997) could not explain why the implementation of the OS ECM Project was still deemed to be a success, even though there was no formal change management processes in place. This study found that their model needed to be unpacked in terms of its dimensions, especially the change model and organisation components of it. The reasons for this were that the 'organisation' as described by them, is no unified group with a common vision, which leaves the question as to who or what should one then align to.
- Thirdly, an institutional analysis of the case study was done which exposed OSS and PS to be two different 'types' of institutions. This is an important contribution of this study as it implies that moving from the one to the other requires not only an understanding of the change process itself, but also that the two technologies are in essence very different,

being driven by different institutional forces - PS leaning towards the regulative pillar and driven by a regulative forces, and OSS leaning towards the normative pillar and driven by moral forces. Moving from one 'type' of institution to another 'type' complicates the change process, requiring the change agent to not only acknowledge the change process, but to also consider and understand the change which is to take place within the IS institution itself when migrating from PS to OSS.

12.4 Research limitations

The limitations of this research were twofold. Firstly, the extent to which one could generalise from a single case study could be seen as a limitation, but is addressed and justified in chapter 7, section 7.3.1 of this study. Secondly, the fact that the researcher had to an extent have relied on people's interpretations of the case study described in chapters 8 and 9 of this thesis could be viewed as a limitation. As this is a typical critique against interpretive research it was explained and addressed in chapter 7, section 7.2 of this thesis.

12.5 Possible future research

12.5.1 Extension of the theories applied

The researcher has drawn strongly on the improvisational change model, HEM and institutional theory to understand and shed light on the case study described in this thesis. Little feedback has though been provided to the latter two theories and this study has not really contributed to the extension, adaptation or customisation of the two theories. Future research could be directed towards aiming specifically on doing this.

12.5.2 Extending on the findings by applying other theories

Some authors such as Latour and other ethno methodologists argue that there is no such thing as context, or that context does not matter when implementing IS. This, as well as other views on change management, such as approaches arising from complexity and actor network theory, were not

considered in this thesis and could be interesting aspects to reflect on in future studies.

12.5.3 IS professional skills

For IS professionals to be successful in the implementation of ISs they require more skills than just how to implement ISDLCs. Currently the teaching of such professionals focus on transferring the normative professional practices (Avgerou, 2001). The changing context within which ISs are implemented requires skills to account for the change processes across all the layers of context as described in chapter 11 of this thesis. What should these skills be and how does one go about teaching these? Further research is needed to understand what needs to be taught to IS professionals to equip them with the capability to do a proper contextual analysis before implementing a new IS.

REFERENCES

ACKERMAN, L. S. 1986. Development, Transition or Transformation: The question of change in organizations. *OD Practitioner,* December, 1-8.

ADAMS, A. A., LEE, J. G. C. Y. & NISSEN, M. E. 2010. Tacit Knowledge Flows and Institutional Theory: Accelerating Acculturation. *In: Proceedings of the 43rd Hawaii International Conference on System Sciences*.

AJZEN, I. & FISHBEIN, M. 1980. *Understanding attitudes and predicting behaviour*, Englewood Cliffs: Prentice Hall.

ALLEN, J. P. & GELLER, D. 2012. Open source deployment in local government. *Information Technology & People,* 25, 2, 136-155.

ALTER, S. 2001. Which life cycle: Work system, information system, or software? *Communications of the AIS,* 7, 17, 1-52.

ANGELL, I. O. & STRAUB, B. H. 1993. Though this be Madness, yet there is Method in't. *In: Proceedings of the First European Conference on Information Systems*. Henley-on-Thames.

APPLEBE, B. 2003. The future of Open Source Software. *Journal of Research and Practice in Information Technology* 25, 4, 227-236.

APPLEWHITE, A. 2003. Should governments go open source? *IEEE Software,* 20, 4, 88-91.

AVGEROU, C. 2000. IT and Organizational Change: An Institutional Perspective. *Information Technology & People,* 13, 4, 234-262.

AVGEROU, C. 2001. The significance of context in information systems and organizational change. *Information Systems Journal,* 11, 1, 43-63.

AVGEROU, C. 2002. *Information Systems and Global Diversity,* Oxford, Oxford University Press.

AVISON, D. E., DWIVEDI, Y. K., FITZGERALD, G. & POWELL, P. 2008. The beginnings of a new era: time to reflect on 17 years of the ISJ. *Information Systems Journal,* 18, 1, 5-21.

AYALA, C. P., CRUZES, D. S., HAUGE, O. & CONRADI, R. 2011. Five Facts on the Adoption of Open Source Software. *Software, IEEE,* 28, 2, 95-99.

BARLEY, S. R. & TOLBERT, P. S. 1997. Institutionalization and Structuration: Studying the Links Between Action and Institution. *Organization Studies (Walter de Gruyter GmbH & Co. KG.),* 18, 1, 93.

BARRETT, M., GRANT, D. & WAILES, N. 2006. ICT and Organizational Change: Introduction to the Special Issue. *The Journal of Applied Behavioral Science,* 42, 1, 6-22.

BARRETT, M. & WALSHAM, G. 1995. Managing IT for Business Innovation: Issues of Culture, Learning and Leadership in a Jamaican Insurance Company. *Journal of Global Information Management,* 3, 3, 25 - 33.

BATE, A. P. 1994. *Strategies for Cultural Change,* Oxford, Great Britain, Butterworth-Heinemann.

BAYER, J. & MELONE, N. 1989. A critique of diffusion theory as a managerial framework for understanding adoption of software engineering innovations. *Journal of Systems and Software,* 9, 2, 161-166.

BENJAMIN, R. I. & LEVINSON, E. 1993. A Framework for Managing IT-enabled Change. *Sloan Management Review,* Summer 1993, 34, 4, 23-33.

BERGER, P. L. & LUCKMANN, T. 1967. *The Social Construction of Reality,* New York, Doubleday.

BLACKLER, F. 1992. Information Technology Design and Planned Organization Change: Applying Unger's Theory of Social Reconstruction. *Behaviour & Information Technology,* 11, 3, 175-183.

BLOOR, R. 2003. Linux is the Only Option for Standardization. *Computer Weekly,* October 28, 18.

BOLAND, R. J. & HIRSCHHEIM, R. A. 1987. *Critical Issues in Information Systems Research,* New York, John Wiley and Sons.

BRUGGINK, M. 2003. *Open Source in Africa: Towards Informed Decision-Making* [Online]. Available: http://www.iicd.org/files/Brief7.pdf [Accessed 1 July 2011].

BRYAN, L. 2013. *Enduring Ideas: The 7-S Framework* [Online]. [Accessed 11 July 2013].

BURNES, B. 1996. No such thing as ... a "one best way" to manage organizational change. *Management Decision,* 34, 10, 11-18.

BURNES, B. 2009. *Managing change: A strategic approach to organisational dynamics,* New Jersey, Prentice Hall.

BURRELL, G. & MORGAN, G. 1979. *Sociological Paradigms and Organizational Analysis,* London, Heinemann Educational Books.

BUTLER, T. 1998. Towards a hermeneutic method for interpretive research in information systems. *Journal of Information Technology,* 13, 285-300.

BYRNE, E. & JOLLIFFE, B. 2007. Free and Open Source Software – Development as Freedom? *Proceedings of the 9th International Conference on Social Implications of Computers in Developing Countries*. São Paulo, Brazil, May 2007.

BYRNE, E. & WEILBACH, L. 2008. A Human Environmentalist Approach to Diffusion in ICT Policies. *In:* AVGEROU, C., SMITH, M. L. & VANDENBESSELAAR, P. (eds.) *Social Dimensions of Information and Communication Technology Policy.* Pretoria, South Africa: Springer.

CABRERA, A., CABRERA, E. F. & BARAJAS, S. 2001. The Key Role of Organizational Culture in a Multi-System View of Technology Driven Change. *International Journal of Information Management,* 21, 3, 245-261.

CALLON, M. & LAW, J. 1989. On the construction of socio-technical networks: content and context revisited. *Knowledge Society,* 9, 57-83.

CAMPBELL, J. L. 2004. *Insitutional Change and Globalization,* Princeton, NJ, Princeton University Press.

CASSELL, M. 2008. Why Governments Innovate: Adoption and Implementation of Open Source Software by Four European Cities. *International Public Management Journal,* 11, 2, 193-213.

CASSELL, M. 2010. The Status of Free/Open Source Software among Local Governments: Lessons from three German Cities. *In:* SHULMAN, S. W. & SCHWEIK, C. M., eds., *Proceedings of the 2nd Annual Journal of Information Technology & Politics Thematic Conference on 'Politics of Open Source'*. Amherst, MA: University of Massachusetts, 220-237.

CASTELLS, M. 2000a. *The Information Age: Economy, Society and Culture. The Power of Identity,* Malden, Mass., Blackwell Publishers.

CASTELLS, M. 2000b. *The Information Age: Economy, Society and Culture: The Network Society*, Blackwell Publishers.

CHEN, W. & HIRSCHHEIM, R. 2004. A paradigmatic and methodological examination of information systems research from 1991 to 2001. *Information Systems Journal,* 14, 3, 197-235.

CHONIA, G. H. 2003. Free and Open Source Software in Africa. *In: Proceedings of the 2003 Round Table on Developing Countries Access to Scientific Knowledge*. The Abdus Salam ICTP, Trieste, Italy, 25 - 29.

COFFEE, P. 2003. Answering Open Source Questions. *eWeek,* January 27, 2003.

COMINO, S. & MANENTI, F. M. 2005. Government Policies Supporting Open Source Software for the Mass Market. *Review of Industrial Organization,* 26, 2, 121-147.

CONSTANTINIDES, P. & BARRETT, M. 2006. Large-Scale ICT Innovation, Power, and Organizational Change: The Case of a Regional Health Information Network. *The Journal of Applied Behavioral Science,* 42, 1, 76-90.

COOPER, R. B. & ZMUD, R. W. 1990. Information Technology Implementation Research: A Technological Diffusion Approach. *Management Science,* 36, 2, 123-139.

DAHLBOM, B. & MATHIASSEN, L. 1993. *Computers in Context: The Philosophy and Practice of Systems Design,* Oxford, NCC Blackwell.

DAVIS, F. D. 1986. *A Technology Acceptance Model for Empirically Testing End-User Information Systems: Theory and Results.* Doctoral Dissertation, Sloan School of Management, MIT.

DAVIS, F. D. 1989. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly,* 13, 3, 319-340.

DAWSON, P. 1994. *Organizational Change: A Processual Approach*, Sage.

DEDRICK, J. & WEST, J. 2007. Movement Ideology vs. User Pragmatism in the Organizational Adoption of Open Source Software. *In:* KRAEMER, K. L. & ELLIOT, M. (eds.) *Computerization Movements and Technology Diffusion: From Mainframes to Ubiquitous Computing.* Medford, NJ: Information Today.

DESANCTIS, G. & POOLE, M. S. 1994. Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science,* 5, 2, 121-147.

DEVREEDE, G., JONES, N. & MGAYA, R. J. 1998. Exploring the Application and Acceptance of Group Support Systems in Africa. *Journal of Management Information Systems,* 15, 3, 197-234.

DHILLON, G. 2004. Dimensions of Power and IT Implementation. *Information & Management,* 41, 635-644.

DHOLAKIA, R. R. & KSHETRI, N. 2004. Factors Impacting the Adoption of the Internet among SMEs. *Small Business Economics,* 23, 4, 311-322.

DIMAGGIO, P. J. & POWELL, W. W. 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review,* 48, 2, 147-160.

DIMAGGIO, P. J. & POWELL, W. W. 1991a. Introduction. *In:* POWELL, W. W. & DIMAGGIO, P. J. (eds.) *The New Institutionlism in Organizational Analysis.* Chicago & London: The University of Chicago Press.

DIMAGGIO, P. J. & POWELL, W. W. 1991b. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *In:* DIMAGGIO, P. J. & POWELL, W. W. (eds.) *The New Institutionalism in Organizational Analysis.* Chicago & London: The University of Chicago Press.

DOHERTY, N. F. & DOIG, G. 2003. An Anlysis of the Anticipated Cultural Impacts of the Implementation of Data Warehouses. *IEEE Transactions on Engineering Management,* 50, 1, 78-88.

DOHERTY, N. F. & PERRY, I. 2001. The Cultural Impact of Workflow Management Systems in the Financial Services Sector. *The Services Industry Journal,* 21, 4, 147-166.

DPSA. 2006. *Policy on Free/Open Source Software use for the South African Government* [Online]. Available: http://www.doc.gov.za/index.php?option=com_docman&task=doc_view&gid=49 [Accessed 30 October 2008].

DROZDIK, S., KOVÁCS, G. L. & KOCHIS, P. Z. 2005. Risk Assessment of an Open Source Migration Project. *In:* SCOTTO, M. & SUCCI, G., eds., *Proceedings of the First International Conference on Open Source Systems.* Genova, Italy.

DST. 2006. *Speech by the Director-General of the Department of Science and Technology (DST), Dr Phil Mjwara, at the Software Freedom Day, DST offices* [Online]. Available: http://www.info.gov.za/speeches/2006/06101115151001.htm [Accessed 27 February 2009].

DU PLOOY, N. F. 1998. *An analysis of the human environment for the adoption and use of information technology.* PhD Unpublished Thesis, University of Pretoria.

DU PLOOY, N. F. 2003. Information Systems as Social Systems. *In:* CANO, J. J. (ed.) *Critical Reflections on Information Systems: A Systematic Approach.* Hershey, PA: Idea Group Publishers.

DUNPHY, D. & STACE, D. 1993. The strategic management of corporate change. *Human Relations,* 46, 8, 905-918.

DWIVEDI, Y. K. & KULJIS, J. 2008. Profile of IS research published in the European Journal of Information Systems. *European Journal of Information Systems,* 17, 6, 678-693.

EISENHARDT, R. K. 1989. Building Theories from Case Study Research. *Academy of management Review,* 14, 4, 532-550.

ELLIS, J. & VAN BELLE, J. 2009. Open Source Software Adoption by South African MSEs: Barriers and Enablers. *In: Proceedings of the Annual Conference of the South African Computer Lecturers' Association*. Eastern Cape, South Africa, 29 June - 1 July, 2009. ACM Digital Library.

EVANS, D. S. 2002. Chapter 3: Politics and Programming: Government Preferences for Promoting Open Sources Software. *In:* HAHN, R. W. (ed.) *Government Policy toward Open Source Software.* Washington DC: AEI Brookings Joint Centre for Regulatory Studies.

FINNAGAN, R., SALAMAN, G. & THOMPSON, K. 1987. *Information Technology: Social Issues,* London, Hodder and Stoughton.

FITZGERALD, B. 2006. The Transformation of Open Source Software. *MIS Quarterly,* 30, 3, 587-598.

FITZGERALD, B. & KENNY, T. 2004. Developing an information systems infrastructure with open source software. *Software, IEEE,* 21, 1, 50-55.

FITZGERALD, B., KESAN, J., RUSSO, B., SHAIKH, M. & SUCCI, G. 2011. *Adopting Open Source Software: A Practical Guide,* Cambridge, MA, MIT Press.

FLYVBERG, B. 2006. Five Misunderstandings about Case-Study Research. *Qualitative Inquiry,* 12, 2, 219-245.

GALLEGO, M. D., LUNA, P. & BUENO, S. 2008. Designing a forecasting analysis to understand the diffusion of open source software in the year 2010. *Technological Forecasting and Social Change,* 75, 5, 672-686.

GALLIERS, R. D. & SWAN, J. A. 1997. Against Structured Approaches: Information Requirements Analysis as a Socially Mediated Process. *In: Proceedings of the Thirtieth Hawaii International Conference on IS*. Wailea, HI, 7 - 10 January 1997. 179-187.

GASTROW, M. & PARKER, S. 2009. How much is free? Quantifying Open Source Software Development in South Africa. *African Journal of Science, Technology, Innovation and Development,* 1, 1, 167 - 189.

GEELS, F. W. 2004. From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy,* 33, 6–7, 897-920.

GEERTZ, C. 1973. *The Interpretation of Culture,* Chicago, University of Chicago Press.

GERSICK, C. J. G. 1991. Revolutionary Change Theories: A Multilevel Exploration of the Punctuated Equilibrium Paradigm. *The Academy of Management Review,* 16, 1, 10-36.

GIDDENS, A. 1979. *Central Problems in Social Theory: Action, Structure and Contradiction in Social Analysis,* Berkeley and Los Angeles, University of California Press.

GIDDENS, A. 1984. *The Constituion of Society,* Berkerley, University of California Press.

GITOC. 2003. *Using Open Source Software in the South African Government – A proposed strategy by the GITOC* [Online]. Available: http://www.oss.gov.za/docs/OSS_Strategy_v3.pdf [Accessed 29 October 2008].

GOODE, S. 2005. Something for nothing: management rejection of open source software in Australia's top firms. *Information & Management,* 42, 5, 669-681.

GRUNDY, T. 1993. *Managing Strategic Change,* London, Kogan Page.

HARVEY, L. & MYERS, M. 1995. Scholarship and Practice: The Contribution of Ethnographic Research Methods to Bridging the Gap. *Information Technology & People,* 8, 3, 13-27.

HASAN, H. & DITSA, G. 1999. The Impact of Culture on the Adoption of IT: An Interpretive Study. *Journal of Global Information Management,* 7, 1, 5-15.

HASSELBLADH, H. & KALLINIKOS, J. 2000. The Project of Rationalization: A Critique and Reappraisal of Neo-Institutionalism in Organization

Studies. *Organization Studies (Walter de Gruyter GmbH & Co. KG.),* 21, 4, 697.

HAUGE, Ø., AYALA, C. & CONRADI, R. 2010. Adoption of open source software in software-intensive organizations – A systematic literature review. *Information and Software Technology,* 52, 11, 1133-1154.

HILL, C. E., LOCH, K. D., STRAUB, D. & EL-SHESHAI, K. 1998. A Qualitative Assessment of Arab Culture and Information Technology Transfer. *Journal of Global Information Management,* 6, 3, 29-38.

HOFSTEDE, G. 1983. The Dimensions of National Cultures in Fifty Countries and Three Regions. *In:* DEREGOWSKI, S., DAIUTAWIEC, S. & ANNIS, R. C. (eds.) *Explications in Cross-Cultural Psychology.* Lisse, Netherlands: Swet and Zeitlinger.

HUGHES, E. C. 1943. Institutions. *In:* PARK, R. E. (ed.) *An Outline of the Principles of Sociology.* New York: Barnes & Noble, Inc.

HUNDAL, N. 2012. *Fist Open Government Summit Challenges UK Public Sector to Expand its Aoption of Open Source* [Online]. London. Available: http://opengov2013.zaizi.com/first-open-gov-summit-hosted-by-zaizi-challenges-uk-public-sector-to-expand-its-adoption-of-open-source/ [Accessed].

IMMERGUT, E., M. 1998. The Theoretical Core of the New Institutionalism. *Politics and Society,* 26, 1.

JAMES, J. 2003. Free software and the digital divide: opportunities and contraints for developing countries. *Journal of Information Science,* 29, 1, 25-33.

JASPERSON, J. S., BUTLER, B. S., CARTE, T. A., CROES, H. J. P., SAUNDERS, C. S. & ZHENG, W. 2002. Review: Power and Information Technology Research: A Metatriangulation Review. *MIS Quarterly,* 26, 4, 397-459.

JENNINGS, P. D. & GREENWOOD, R. 2003. Contructing the Iron Cage: Institutional Theory and Enactment. *In:* WESTWOOD, R. & CLEGG, S. (eds.) *Debating Organization - Point and Counterpoint in Organization Studies.* Malden, MA USA: Blackwell Publishing.

JEPPERSON, R. L. 1991. Institutions, Institutional Effects, and Institutionalism. *In:* POWELL, W. W. & DIMAGGIO, P. J. (eds.) *The New Institutionalism in Organizational Analysis.* Chicago and London: The University of Chicago Press.

JEPPERSON, R. L. 2002. The Development and Application of Sociological Neoinstitutionalism. *In:* BERGER, J. & ZELDITCH, M. J. (eds.) *New Directions in Contemporary Sociological Theory.* Lanham, Maryland: Rowman & Littlefield Publishers, Inc.

JEPPERSON, R. L. & SWIDLER, A. 1994. What properties of culture should we measure? *Poetics,* 22, 4, 359-371.

KANTER, R., STEIN, B. A. & JICK, T. D. 1992. *The Challenge of Organizational Change,* New York, The Free Press.

KATZ, D. & KAHN, R. L. 1966. *The Social Psychology of Organizations,* New York, John Wiley.

KAVANAGH, P. 2004. Open Source Software: Implementation and Management. Amsterdam; Boston: Elsevier Digital Press. Available: http://0-

www.sciencedirect.com.innopac.up.ac.za/science/book/9781555583200.

KEMP, R. 2009. Current Developments in Open Source Software. *Computer Law and Security Review,* 25, 6, 505-602.

KLEIN, H. K. & HIRSCHHEIM, R. A. 1987. Social Change and the Future of Information Systems Development. *In:* BOLAND, R. J. & HIRSCHHEIM, R. A. (eds.) *Critical Issues in Information Systems Research.* New York: John Wiley & Sons.

KLEIN, H. K. & MYERS, M. D. 1999. A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems. *MIS Quarterly,* 23, 1, 67-93.

KLING, R. 1996. Computers as Tools and Social Systems: The Car-Computer Analogy. *In:* KLING, R. (ed.) *Computerization and Controversy: Value Conflicts and Social Choices.* San Diego, CA: Academic Press.

KLING, R. & ALLEN, J. P. 1995. Can Computer Science Solve Organizational Problems? The Case for Organizational Informatics. *In:* KLING, R. (ed.) *Computerization and Controversy: Value Conflicts and Social Choices.* San Diego, CA: Academia Press.

KLING, R. & DUNLOP, C. 1993. Controversies about Comuterization and the Character of White Collar Worklife. *The Information Society,* 9, 4, 1-29.

KOTTER, J. P. 1995. Leading Change: Why Transformation Efforts Fail. *Harvard Business Review,* March-April 1995, 59 - 67.

KRISHNAMURTHY, S. A. 2003. *A Managerial Overview of Open Source Software, Business Horizons, Sep-Oct 2003* [Online]. Available: http://ssrn.com/abstract=649903 [Accessed 7 July 2012].

KRISHNAMURTHY, S. A. 2006. On the Intrinsic and Extrinsic Motivation of Free/Libre/Open Source (FLOSS) Developers. *Knowledge, Technology & Policy,* 18, 4, 17-39.

KSHETRI, N. 2004. Economics of Linux adoption in developing countries. *Software, IEEE,* 21, 1, 74-81.

KUMAR, S. K. A. & SINGH, P. J. 2009. Open Source Policy. *Proceedings of the International Conference of Academia Libraries (ICAL) 2009 - Technology, Policy and Innovation*. Delhi, India, 5-8 October 2009.

KUNSTOVÁ, R. 2010. Barriers and Benefits of Investments into Enterprise Content Management Systems. *Organizacija,* 43, 5, 205-213.

KWON, T. H. & ZMUD, R. W. 1987. Unifying the fragmented models of information systems implementation. *In:* BOLAND, R. J. & HIRSCHHEIM, R. A. (eds.) *Critical Issues in Information Systems Research.* New York: John Wiley & Sons.

LAUDON, K. C. & LAUDON, J. P. 1998. *Management Infromation Systems: New Approaches to Organization & Technology,* New Jersey, Prentice Hall.

LEAVITT, H. J. & WHISTLER, T. L. 1958. Management in the 1980s. *Harvard Business Review,* 36, 41-48.

LEAVITT, J. J. 1964. Applied Organization Change in Industry: Structural, Technical, and Human Approaches. *New Perspectives in Organizational Research.* Chichester: Wiley.

LEE, J. 2006. Government Policy toward Open Source Software: The Puzzles of Neutrality and Competition. *Knowledge, Technology & Policy,* 18, 4, 113-141.

LEIDNER, D. E. & KAYWORTH, T. 2006. Review: A Review of Culture in Information Systems Research: Toward a Theory of Information Technology Culture Conflict. *MIS Quarterly,* 30, 2, 357-399.

LESSIG, L. 2002. Open Source Baselines: Compared to what? *In:* HAHN, R. H. (ed.) *Government Policy toward Open Source Software.* Washington DC: AEI-Brookings Joint Centre for Regulatory Studies.

LEVIN, A., ACKERMANN, K., DINGLEY, R., JAMES, T., KGAPOLA, M., MILLER, J., MODIPA, K. I., NEVILLE, M. & RAKOMA, K. 2004. *Open Source Software and the Information Society: Policy and Strategy Recommendations to the Presidential National Commission of the Republic of South Africa* [Online]. Available: http://www.pnc.gov.za//images/stories/Reports/OSS_Report.pdf [Accessed 7 July 2006 2006].

LEVIN, A., ACKERMANN, K. & NEVILLE, M. 2005. *Go Open Source Task Team Conference Report* [Online]. Available: http://radian.co.za/fossconference/GOSS_TTC_final1p14.pdf [Accessed 14 July 2006].

LEWIN, K. 1951. *Field Theory in Social Science,* New York, Harper and Row.

LUECKE, R. 2003. *Managing Change and Transition,* Boston, Massachusetts, Harvard Business School Publishing.

LYYTINEN, K. J. & NEWMAN, M. 2008. Explaining information systems change: A punctuated socio-technical change model. *European Journal of Information Systems,* 17, 589-613.

MACREDIE, R. D., SANDOM, C. & PAUL, R. 1998. Modelling for Change: An Information Systems Perspective on Change Management Models. *In:* MACREDIE R., P., R., ANKETELL, D., LEHANEY, B. & WARWICK, S. (ed.) *Modelling for Added Value.* Springer.

MADON, S. 1992. Computer-based Information Systems for Development Planning: The Significance of Cultural Factors. *Journal of Strategic Information Systems,* 1, 5, 250-257.

MADON, S. 1993. Introducing administrative reform through the application of computer-based information systems: a case study in India. *Public Administration & Development (1986-1998),* 13, 1, 37.

MARKUS, M. L. 1983. Power, politics, and MIS implementation. *Commun. ACM,* 26, 6, 430-444.

MARKUS, M. L. 2004. Technochange management: using IT to drive organizational change. *Journal of Information Technology,* 19, 1, 4-20.

MARKUS, M. L. & BENJAMIN, R. I. 1997. The Magic Bullet Theory in IT-Enabled Transformation. *Sloan Management Review,* 38, 2, 55-68.

MARKUS, M. L. & ROBEY, D. 1988. Information Technology and Organizational Change: Causal Structure in Theory and Research. *Management Science,* 34, 5, 583-598.

MCDONAGH, J. & COGHLAN, D. 2000. Sustaining the Dilemma with IT-related change: The Fortuitous Role of Academia. *Journal of European Industrial Training,* 24, 5, 297-304.

MEYER, J. W. & ROWAN, B. 1977. Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology,* 83, 2, 340-363.

MEYER, J. W. & ROWAN, B. 1991. Institutional Organizations: Formal Structure as Myth and Ceremony. *In:* POWELL, W. W. & DIMAGGIO, P. J. (eds.) *The New Institutionalism in Organizational Analysis.* Chicago & London: University of Chicago Press.

MEYER, J. W. & SCOTT, W. R. 1983. Centralization and the Legitimacy Problems of Local Government. *In:* MEYER, J. W. & SCOTT, W. R. (eds.) *Organizational Environments: Ritual and Rationality.* Beverley Hills, California: Sage.

MIGNERAT, M. & RIVARD, S. 2009. Positioning the institutional perspective in information systems research. *Journal of Information Technology,* 24, 4, 369-391.

MINER, A. S. 1991. Organizational Evolution and the Social Ecology of Jobs. *American Sociological Review,* 56, 6, 772-772.

MOHR, L. B. 1982. *Explaining Organizational Behaviour,* San Francisco, Jossey-Bass.

MOORE, G. C. & BENBASAT, I. 1991. Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research,* 2, 3, 192-222.

MORAN, J. W. & BRIGHTMAN, B. K. 2001. Leading organizational change. *Career Development International,* 6, 2/3, 111-119.

MORGAN, L. & FINNEGAN, P. 2007. How perceptions of Open Source Software influence adoption: An exploratory study. *Proceedings of the 15th European Conference on Information Systems (ECIS)*. St. Gallen, Switzerland.

MTSWENI, J. & BIERMANN, E. 2008. Challenges affecting the OSS adoption rate in the South African Government. *In: Proceedings of the Academic Track of the 2008 Free and Open Source Software for Geospatial (FOSS4G) Conference, incorporating the GISSA 2008 Conference*. Cape Town, South Africa, 29 September - 3 October 2008. 400 - 409.

MUMFORD, E. 1981. Participative Systems Design: Structure and Method. *Systems, Objectives, Solutions,* 1, 5-19.

MUMFORD, E. 1983. *Designing Human Systems for New Technology: The ETHICS Method,* Manchester, Manchester Business School.

MUSTONEN, M. 2003. Copyleft—the economics of Linux and other Open Source Software. *Information Economics and Policy,* 15, 99-121.

MYERS, M. D. 2009. *Qualitative Research in Business and Management,* London, Sage Publications.

MYERS, M. D. n.d. *Qualitative Research in Information Systems* [Online]. Available: http://www.qual.auckland.ac.nz [Accessed 25 June 2012].

MYERS, M. D. & NEWMAN, M. 2007. The Qualitative Interview in IS Research: Examining the Craft. *Information and Organization,* 17, 2-26.

MYERS, M. D. & YOUNG, L., W. 1997. Hidden agendas, power and managerial assumptions in information systems development: An ethnographic study. *Information Technology & People,* 10, 3, 224-240.

NACI. 2002. *Open Software and Open Standards in South Africa – A Critical Issue for Addressing the Digital Divide.* [Online]. Available: http://www.naci.org.za/pdfs/oss_v_1_0.pdf [Accessed 14 July 2006].

NAGY, D., YASSIN, A. M. & BHATTACHERJEE, A. 2010. Organizational adoption of open source software: barriers and remedies. *Communications of the ACM,* 53, 3, 148-151.

NANDHAKUMAR, J. & JONES, M. 1997. Too close for comfort? Distance and engagement in interpretive information systems research. *Information Systems Journal,* 7, 2, 109-131.

NEGASH, S., CARTER, M. S., CHEN, C. C. & WILCOX, M. V. 2007. Open Source Software for Economically Developing Countries: A Free IT Solution for Success? *In:* WEISTROFFER, H. R. & HAMDAN, B., eds., *Proceedings of the 2007 Southern Association for Information Systems Conference*. Sea Turtle Inn, Atlantic Beach, Florida.

NG, P. G. & YEH, R. T. 1990. *Modern Software Development: Foundations and Current Perspectives.,* New York, Van Nostrand Reinhold.

NORTH, D. C. 1990. *Institutions, instituional Change, and Economic Performance,* Cambridge, UK, Cambridge University Press.

OATES, B. J. 2006. *Researching Information Systems and Computing,* London, SAGE Publications Ltd.

ORLIKOWSKI, W. 1992. The Duality of Technology: Rethinking the Concept of Technology in Organizations. *Organization Science,* 3, 3, 398-427.

ORLIKOWSKI, W. 1996. Improvising Organizational Transformation Over Time: A Situated Change Perspective. *Information Systems Research,* 7, 1, 63-92.

ORLIKOWSKI, W. & BAROUDI, J. 1991. Studying Information Technology in Organisations: Research Approaches and Assumptions. *Accounting, Management and Information Technologies,* 1, 1, 9-42.

ORLIKOWSKI, W. & HOFMAN, D. 1997. An Improvisational Model for Change Management: The Case of Groupware Technologies. *Sloan Management Review,* 38, 2, 11 - 21.

ORLIKOWSKI, W. & ROBEY, D. 1991. Information Technology and the Structuring of Organizations. *Information Systems Research,* 2, 2, 143-169.

ORLIKOWSKI, W. J. 2000. Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. *Organization Science,* 11, 4, 404-428.

ORLIKOWSKI, W. J. & BARLEY, S. R. 2001. Technology and Institutions: What can Research on Information Technology and Research on Organizations learn from each other? *MIS Quarterly,* 25, 2, 145-165.

ORLIKOWSKI, W. J. & GASH, D. C. 1994. Technological frames: making sense of information technology in organizations. *ACM Trans. Inf. Syst.,* 12, 2, 174-207.

OTTER, A. 2002. *Government advisory body recommends open source* [Online]. Available: http://www.itweb.co.za/sections/computing/2002/0209091122.asp?A=ITG&S=ITinGovernment&O=E [Accessed 30 October 2008].

PARÉ, G., WYBO, M. D. & DELANNOY, C. 2009. Barriers to Open Source Software Adoption in Quebec's Health Care Organizations. *J. Med. Syst.,* 33, 1, 1-7.

PETTIGREW, A. M. 1987. Context and Action in the Transformation of the Firm. *Journal of Management Studies,* 24, 6, 649 - 670.

PETTIGREW, A. M. & WHIPP, R. 1993. Understanding the Environment. *In:* MABEY, C. & MAYON-WHITE, B. (eds.) *Managing Change.* London: Open University/Paul Chapman Publishing.

PORRAS, J. L. & SILVERS, R. C. 1991. Organizational Development and Transformation. *In:* ROSENZWEIG, M. R. & PORTER, L. W. (eds.) *Annual Review of Psychology.* California: Annual Reviews.

POSTMAN, N. 1992. *Technopoly: the surrender of culture to technology,* New York, Vintage Books.

PRESCOTT, M. & CONGER, S. 1995. Information technology innovations: A classification by IT locus of impact and research approach. *DATA BASE Advances,* 26, 2 & 3, 20-41.

RAPLEY, T. 2008. *Doing Conversation, Discourse and Document Analysis,* University of Newcastle upon Tyne, Sage Publications Ltd.

RAYMOND, E. S. 1999. *Shut up and show them the code* [Online]. Available: http://www.catb.org/~esr/writings/shut-up-andshow-them.html [Accessed 7 July 2012].

REDDY, B. J. & EVANS, D. S. 2003. Government Preference for Promoting Open-Source Software: A Solution in Search of a Problem. *Michigan Telecommunicaations and Technology Law Review,* 9, 2, 313-394.

ROGERS, E. M. 1995. *Diffusion of Innovations,* New York, The Free Press.

ROGERS, J. 2002. Public Sector IT chiefs welcome Whitehall's Open Source stance. *Computer Weekly,* August 1, 6.

ROMANELLI, E. & TUSHMAN, M. L. 1994. ORGANIZATIONAL TRANSFORMATION AS PUNCTUATED EQUILIBRIUM: AN EMPIRICAL TEST. *Academy of Management Journal,* 37, 5, 1141-1666.

SAHAY, S., PALIT, M. & ROBEY, D. 1994. A Relativist Approach to Studying the Social Construction of Information Technology. *European Journal of Information Systems,* 3, 4, 248-258.

SCHEIN, E. H. 1984. Coming to a New Awareness of Organizational Culture. *Sloan Management Review,* 25, 2, 3-16.

SCHEIN, E. H. 1992. *Organizational Culture and Leadership (2nd edition),* San Francisco, Jossey-Bass Inc.

SCHOFIELD, J. 2001. The Old ways are the best? The durability and usefulness of bureaucracy in public management. *Organisation,* 8, 1, 77-96.

SCOTT, W. R. 1991. Unpacking Institutional Arguments. *In:* DIMAGGIO, P. J. & POWELL, W. W. (eds.) *The New Institutionalism in Organizational Analysis.* Chicargo, IL: University of Chicargo Press.

SCOTT, W. R. 1994. Istitutional Analysis. *In:* SCOTT, W. R. & MEYER, J. W. (eds.) *Institutional Environments and Organizations: Structural Complexity and Individualism.* Thousand Oaks, California: SAGE Publications, Inc.

SCOTT, W. R. 1995. *Institutions and Organizations,* Thousand Oaks, CA: Sage.

SCOTT, W. R. 1998. *Organizatiions: Rational, Natural, and Open Systems,* Englewood Cliffs, NJ: Prentice Hall.

SCOTT, W. R. 2001. *Institutions and organizations,* Thousand Oaks, California, Sage Publications.

SCOTT, W. R. 2004. Institutional Theory. *In:* RITZER, G. (ed.) *Encyclopedia of Social Theory.* Thousand Oaks, CA: Sage.

SCOTT, W. R. 2008. *Institutions and Organizations: Ideas and Interests,* Thousand Oaks, CA, Sage Publications.

SCOTT, W. R., RUEF, M., MENDEL, P. J. & CARONNA, C. A. 2000. *Institutional Change and Healthcare Organizations: From Professional Dominance to Managed Care* Chicargo, University of Chicargo Press.

SENIOR, B. 2002. *Organisational Change,* London, Prentice Hall.

SERIDA-NISHIMURA, J. F. 1994. An Organizational Culture Perspective for the Study of Group Support Systems. *In:* DE GROSS, J. I., HUFF, S. L. & MUNRO, M. C., eds., *Proceedings of the 15th International Conference on Information Systems*. Vancouver, Canada, 14 - 17 December 1994.

SEWELL, W. H., JR. 1992. A Theory of Structure: Duality, Agency, and Transformation. *American Journal of Sociology,* 98, 1, 1-29.

SITA. 2011. *Minimum Interoperability Standards (MIOS) for Government Information Systems* [Online]. Pretoria. Available: http://www.sita.co.za [Accessed 10 July 2013].

SKILLING, D. 1996. Beyond the quick fix: how to manage more effectively in the heart of change. *Industrial and Commercial Training,* 28, 4, 3-7.

SMIRCICH, L. 1983. Concepts of Culture and Organizational Analysis. *Administrative Science Quarterly,* 28, 3, 339-358.

SPINELLIS, D. & GIANNIKAS, V. 2012. Organizational adoption of open source software. *Journal of Systems and Software,* 85, 3, 666-682.

SPINELLIS, D. & SZYPERSKI, C. 2004. How is Open Source Affecting Software Development? *IEEE Software,* January/February 2004, 28-33.

SPRAGUE, R. & MCNURLIN, B. 1993. *Information Systems Management in Practice,* London, Prentice-Hall.

ST.AMANT, K. & STILL, B. 2007. Preface. *In:* ST.AMANT, K. & STILL, B. (eds.) *Handbook of Research on Open Source Software: Technological, Economic, and Social Perspectives.* New York: Information Science Reference.

SWIDLER, A. 1986. Culture in Action: Symbols and Strategies. *American Sociological Review,* 51, 2, 273-286.

THAKUR, D. 2012. A limited revolution: The distributional consequences of Open Source Software in North America. *Technological Forecasting & Social Change,* 79, 244-251.

TITTERTON, G. 2003. Users reveal benefits of Open Source. *Computer Weekly* [Online].

TODNEM, R. 2005. Organisational change management: A critical review. *Journal of Change Management,* 5, 4, 369-380.

TOLBERT, P. S. & ZUCKER, L. G. 1983. Institutional Sources of Change in the Formal Structure of Organizations: The Diffusion of Civil Service Reform, 1880-1935. *Administrative Science Quarterly,* 28, 1, 22-39.

TOLBERT, P. S. & ZUCKER, L. G. 1996. The Institutionalization of Institutional Theory. *In:* CLEGG, S., HARDY, C. & NORD, W. R. (eds.)

Handbook of Organization Studies. London, Thousand Oaks, New Delhi: Sage.

TSOUKAS, H. & CHIA, R. 2002. On Organizational Becoming: Rethinking Organizational Change. *Organizationa Science,* 13, 5 (Sep-Oct 2002), 567-582.

TUSHMAN, M., NEWMAN, W. H. & ROMANELLI, E. 1986. Convergence and Upheaval: Managing the Unsteady Pace of Organizational Evolution. *California Management Review,* 29, 1.

VAINIO, N. & VADEN, T. 2007. Free Software Philosophy and Open Source. *In:* ST.AMANT, K. & STILL, B. (eds.) *Handbook of Research on Open Source Software: Technological, Economic, and Social Perspectives.* New York: Information Science Reference.

VAN DE VEN, A. H. & POOLE, M. S. 1995. Explaining Development and Change in Organizations. *The Academy of Management Review,* 20, 3, 510-540.

VAN DER BLONK, H. 2003. Writing case studies in information systems research. *Journal of Information Technology (Routledge, Ltd.),* 18, 1, 45.

VAN MAANEN, J. 1979. The Fact of Fiction in Organizational Ethnography. *Administrative Science Quarterly,* 24, 4, 539-550.

VAN MAANEN, J. & BARLEY, S. R. 1985. Cultural Organization: Fragments of a Theory. *In:* FROST, P. J., MOORE, M. R., LOUIS, M. R., LUNDBERG, C. C. & MARTIN, J. (eds.) *Organizational Culture.* London: Sage Publications.

VAN STEERNIS, H. 1990. *How to Plan, Develop and Use Information Systems: A Guide to Human Qualities and Productivity,* New Yourk, Dorset House Publlications Co.

VAN TONDER, C. 2004. *Organisational Change. Theory and Practice,* Pretoria, South Africa, Van Schaik.

VEN, K., VERELST, J. & MANNAERT, H. 2008. Should You Adopt Open Source Software? *IEEE Software,* 25, 3, 54-59.

VICKERS, M. H. 1999. Information Technology Deelopment Methodologies: Towards a Non-positivistic, Developmental Paradigm. *The Journal of Management Development,* 18, 3, 255-272.

VON HIPPEL, E. 2001. Innovation by User Communities: Learning from Open-Source Software. *Sloan Management Review,* Summer 2001, 82-86.

WALSHAM, G. 1993. *Interpreting Information Systems in Organisations,* London, Johna Wiley and Sons.

WALSHAM, G. 1995a. The Emergence of Interpretivism in IS Research. *Information Systems Research,* 6, 4, 376-394.

WALSHAM, G. 1995b. Interpretive Case Studies in IS Research: nature and method. *European Journal of Information Systems,* 4, 2, 74 - 81.

WALSHAM, G. 2006. Doing Interpretive Research. *European Journal of Information Systems,* 15, 320-330.

WARD, D. J. & TAO, E. A. 2009. Open Source Software Use in Municipal Government: Is full immersion possible? *In: Proceedings of the World Congress on Engineering and Computer Science, Vol II, WCECS, 20-22 Ocotber 2009*. San Francisco, USA.

WARING, T. & MADDOCKS, P. 2005. Open Source Software implementation in the UK public sector: Evidence from the field and implications for the future. *International Journal of Information Management,* 25, 5, 411-428.

WEILBACH, L. & BYRNE, E. 2010. A Human Environmentalist Approach to Diffusion in ICT Policies: A Case Study of the FOSS Policy of the South African Government. *Journal of Information, Communication & Ethics in Society,* 8, 1, 108 - 123.

WEILBACH, L. & BYRNE, E. 2011. Implementing Open Source Software to conform to National Policy. *Journal of Systems and Information Technology,* 3, 3, 286-302.

WHITWORTH, B. 2005. Socio-Technical Systems. *In:* GHAOUI, C. (ed.) *Encyclopedia of HCI.*

WILSON, M. & HOWCROFT, D. 2002. Re-conceptulising Failure: Social Shaping meets IS Research. *European Journal of information Systems,* 11, 236 - 250.

WINDLEY, P. 2002. *Barriers to open source in government* [Online]. Available: http://www.windley.com/archives/2002/07/barriers_to_ope.shtml [Accessed 10 June 2013].

WINFIELD, I. 1991. *Organizations and Information Technology: Systems, Power and Job Design,* London, Blackwell Scientific Publications.

WONG, K. 2004. *Free/Open Source Software – Government Policy,* New Delhi, India, Elsevier.

WOODS, D. & GULIANI, G. 2005. *Open Source for the Enterprise: Managing Risks, Reaping Rewards,* Sebastopol, California, O'Reilly.

YIN, R. K. 2002. *Case Study Research, Design and Methods*, Sage Publications, Newbury Park.

ZUCKER, L. G. 1977. The Role of Institutionalization in Cultural Persistence. *American Sociological Review,* 42, 5, 726-743.

ZUCKER, L. G. 1983. Organizations as Institutions. *In:* BACHARAH, S. B. (ed.) *Research in the Sociology of Organizations.* Greenwich: JAI Press.

ZUCKER, L. G. 1987. Institutional Theories of Organization. *Annual Review of Sociology,* 13, 443-464.

ZUCKER, L. G. 1991. The Role of Institutionalisation in Cultural Persistence. *In:* POWELL, W. W. & DIMAGGIO, P. J. (eds.) *The New Institutionalism in Organisational Analysis.* Chicago: University of Chicargo Press.