An Assessment of the Knowledge Processing Environment in an Organisation - A Case Study

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Abstract

Knowledge Management is associated with organisational initiatives in response to the demands of a knowledge-based economy in which the potential value of knowledge as a source for competitive advantage is recognised. However, the lack of a common understanding about knowledge itself, its characteristics and how it is constructed has led to diverse approaches about how to "manage" it. This study presents a critical overview of traditional and contemporary KM approaches.

The main focus of this study was to discover and apply a suitable methodology for assessing an organisation's knowledge processing environment. This includes an analysis of the current practices and behaviours of people within the organisation relating to the creation of new knowledge and integrating such knowledge into day-to-day work. It also includes inferring from the above practices those policies and programmes that affect knowledge outcomes. This research makes extensive use of the Knowledge Life Cycle (KLC) framework and the Policy Synchronisation Method (PSM) developed by advocates of the New Knowledge Management movement.

A case study approach was followed using a range of data collection methods, which included personal interviews, a social network survey and focus group discussions. The selected case is the small IT department at the East London campus of Rhodes University.

Evidence from the case suggests that the knowledge processing environment within the IT department is unhealthy. The current knowledge processing practices and behaviours are undesirable and not geared towards the creation of new knowledge and the integration of such knowledge within the business processes of the IT department. There is little evidence of individual and organisational learning occurring and the problem solving process itself is severely hampered by dysfunctional knowledge practices. The study concludes that the above state of affairs is a reflection of the quality and appropriateness of policies and programmes in the extended organisation. Equally, the local definition of rules, procedures and the execution thereof at a business unit level is mostly lacking.

The study illustrates that a systematic assessment of the knowledge processing environment provides the organisation with a sound baseline from where knowledge-based interventions can be launched.

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Report Outline

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List of Abbreviations

ACM	Association for Computing Machinery
CAS	Complex Adaptive Systems
EIS	Executive Information Systems
EKMF	European Knowledge Management Forum
FGKM	First-Generation Knowledge Management
IT	Information Technology
KLC	Knowledge Life Cycle
KM	Knowledge Management
KOS	Knowledge Operating System
KPPP	Knowledge Policies, Programmes and Practices
MKCI	Knowledge Management Consortium International
PSM	Policy Synchronisation Method
SGKM	Second-Generation Knowledge Management
TNKM	The New Knowledge Management

CHAPTER 1

1. Background to the Study and Problem Statement

1.0. Introduction

This research is concerned with the emerging area of study referred to as knowledge management (KM). The researcher's specific interest in the area is threefold. Firstly, there is a desire to understand KM's underlying premises; what it is, what it stands for and where it comes from. Secondly, the researcher is eager to discover if and how knowledge management can make a difference to organisational life and business results. Thirdly, there is an active interest on the part of the researcher to make a personal investment in this field, in terms of time, effort and intellectual value.

Knowledge management is exciting, both as an area of academic study and for application in business. The discourses taking place among the academic and business communities are challenging and stimulating. Though the term knowledge management might disappear sooner or later, it is believed that its fundamentals will always remain, to surface in various forms.

This chapter commences by providing the context in which the research is taking place and providing an overview of the knowledge management field. The specific purpose of the research is then stated together with the questions that will be researched. This is followed by an overview of the research methodology used to conduct the case study research. The chapter concludes with an outline of the organisation of this research report.

1.1. Research Context

Knowledge and its meaning has been a topic of debate for many centuries. Two knowledge types feature prominently in the literature, namely explicit and tacit knowledge. The former refers to knowledge that can easily be captured, articulated and communicated in the form of text, computer output, the spoken or written word, or through other means (Nonaka, 1994 cited in Alavi and Leidner, 1999). In contrast, tacit

knowledge or personal knowledge, refers to information processed in the mind of individuals, and is therefore difficult to capture, store, articulate and distribute (Polanyi, 1966 cited in Alavi and Leidner, 1999).

Although a uniform definition of knowledge management (KM) has yet to emerge, the characteristics of knowledge described above feature prominently in the following definition: "a systematic and organisationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that others may make use of it to be more effective" (Alavi and Leidner, 1999 cited in Spiegler, 2000 p.7).

There is growing interest in the subject area of KM, despite its "faddish" stigma (Ubogu, Amanoo and Azubuike, 2001). According to Stewart, Baskerville, Storey, Senn and Long (2000), the reason for this interest can be traced back to the phenomenon referred to as the knowledge economy and the notion that intellectual capital constitutes the only resource through which an organisation can gain and sustain a competitive advantage in an uncertain environment. Since Peter Drucker's coining of the term, "knowledge economy", during the late sixties, the increasingly important role of knowledge as a corporate asset, started to surface in the literature and at international conferences (Stewart et al., 2000). However, Karl Wiig was the first to coin the term "Knowledge Management" at a European management conference held in 1986 (Wiig, 1997).

Current literature offers compelling reasons for adopting KM. For authors like Malhotra (2002), KM is concerned with the organisation's adaptation, survival and competitiveness in a rapidly changing environment, while Nonaka (Nonaka cited in Atefeh, McCamble, Moorhead and Gitters, 1999) emphasises the unique property of knowledge to ensure and sustain a competitive advantage. Other claims (Atefeh et al., 1999) relate to the role of KM in facilitating internal and external communications, ensuring improved efficiency throughout the supply chain, resulting in larger financial returns, increased savings and targeted marketing efforts.

However, a number of critics have raised important questions about KM, some of which are briefly noted. It was stated earlier that no uniform definition of KM exists. As a result, some authors refer to KM as a tool or theme (Martennson, 2000), while others

regard it as a philosophy (Wiig, 1997). Neef (1999) prefers the notion of a technique or policy. Yet other critics view KM as a new paradigm, or part of the larger paradigm of organisational theory (McAdam and McCreedy, 1999). As part of the ongoing KM debate, the epistemological basis for KM is questioned (McAdam and McCreedy, 1999; Firestone and McElroy, 2003a). McAdam and McCreedy (1999) explore the two extreme ends of how knowledge is constructed, namely through scientific means or through social construction. A number of critics believe that tacit knowledge cannot be managed and that KM is really an oxymoron. In addition, it is argued that the IT centric focus of many KM initiatives occur at the cost of the human element and has damaged the reputation of KM as a paradigm of substance (Smit, 2000).

Despite the criticism levelled at KM, many organisations have embarked on initiatives to manage knowledge within their enterprises, some at great cost to the companies concerned. Despite the fact that many of the above KM initiatives have consumed substantial financial resources and effort, Malhotra (2002) reports that a large number of these initiatives have failed. The failures referred to are not surprising, given the critique referred to earlier and the evidence that will be led by this research.

Hylton (2002), a prominent consultant in the knowledge management field, argues that many of the knowledge management failures can be traced back to organisations failing to undertake a thorough investigation into the firm's current knowledge health status. There is ample support in the literature for the need to conduct a knowledge audit before starting a knowledge management initiative (Davenport and Prusak, 1998; Liebowitz and Beckman, 1998; Tiwana, 2000; Hylton, 2002; Sunassee and Sewry, 2002).

An emerging KM school, known as second-generation Knowledge Management (SGKM) and its variation, "The New Knowledge Management" (TNKM), has been particularly severe in its criticism of traditional KM thinking (McElroy, 2000; 2003a; Firestone and McElroy, 2003a; 2003c). Led by its chief architects, Firestone and McElroy, and supported by the influential Knowledge Management Consortium International (KMCI), TNKM has started to build a strong case in favour of KM, albeit in a new form. The school argues that traditional KM approaches have a fixation with the codification, sharing and distribution of knowledge, hence the emphasis on technology (Firestone and

McElroy, 2003a; 2003c; McElroy, 2003a). The above TNKM proponents (Firestone and McElroy, 2003a; 2003c; McElroy, 2003a) argue, constitutes supply-side KM based on the assumption that knowledge already exists in the organisation. TNKM advocates an approach to KM in which both the production of new knowledge (demand-side KM) as well as the integration of such knowledge (supply-side KM) is considered. Drawing from the science of complexity and literature about organisational learning, McElroy (2000) argues that knowledge is produced and integrated by individuals and groups in a self-organising manner exhibiting pattern-like behaviour. This pattern mirrors the organisational learning process in which individuals and groups collectively learn by engaging in problem solving. The learning process is triggered by epistemic problems experienced by people in the day-to-day execution of work. Much of the thinking of TNKM is embodied in the Knowledge Life Cycle (KLC) framework adopted by the movement - the KLC is attached as Appendix B.

The researcher asserts that SGKM and TNKM are attempts to take KM "back to basics", and what has emerged so far, promises to put KM on a sound theoretical footing from where practical KM initiatives can be launched.

1.2. Goals and Objectives of the Research

By using the Knowledge Life Cycle (KLC) developed by Executive Information Systems, Inc. and McElroy (2003b) and endorsed by TNKM as a framework, this research attempts to conduct an assessment of an organisation's knowledge processing environment. According to TNKM the knowledge processing environment comprises two key knowledge processes, namely knowledge production and knowledge integration. These processes are clearly depicted in the KLC (Appendix B) and will be discussed in greater detail.

In order to arrive at the stated purpose of assessing the knowledge processing environment of the organisation, the following research questions will be answered:

- *Why is it important for the organisation to assess its knowledge processing environment?*

This question relates to the notion that, for an organisation to be truly competitive, it should transform itself into a knowledge-based organisation. Knowledge management initiatives are seen as a response to the challenges posed by the knowledge economy. It follows then that organisations contemplating KM interventions, require some type of baseline information that will feed into the design of such interventions.

- *How can the organisation go about conducting such an assessment?*
  The response to the above question is guided by relevant literature. Much has been written about the rationale for and methods used to conduct knowledge audits (Liebowitz and Beckman, 1998; Davenport and Prusak, 1998; Bukowitz and Williams, 1999; Tiwana, 2000). By comparison, much less has been published about assessments of the knowledge processing environment, because the concept originates from the TNKM school, and as a result, is relatively new.

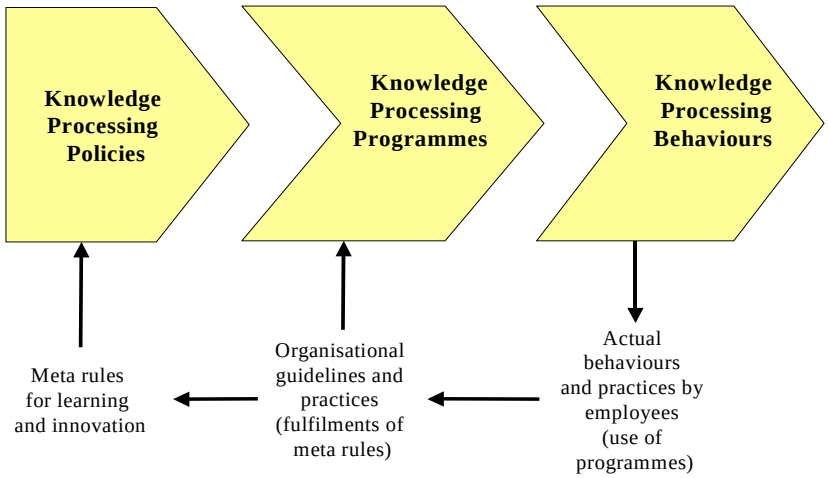
- *How do current knowledge processing policies and programmes account for the knowledge processing behaviours and practices in use?*
  This question is concerned with the extent to which the organisational policy environment supports the production of new knowledge and facilitates the integration of such knowledge within the business processes of the organisation. Policy is not always expressed in an explicit manner and sometimes has to be inferred from actual practices and behaviours. It is thus a requirement for the research to explore actual knowledge behaviours and practices since these reflect underlying policies and rules. When considering a KM intervention, it is the policies and related programmes that should be altered that in turn will affect behaviours.

- *How does the makeup and quality of knowledge processing behaviours support business processing and to what level of satisfaction and effectiveness?*
  Referring to the work by McElroy (2003a), a distinction is made between the organisation's knowledge processing and business processing environments. Of particular interest is the ability of individuals and groups in the organisation to solve

problems that occur in the normal course of events (e.g. during the execution of business processes) and the learning that occurs as a result. The research will point out how epistemic gaps that exist in the business processing environment are viewed by members of the organisation and the processes followed to correct such gaps.

TNKM (McElroy, 2003a) states that a business process can be equated with knowledge in use, being an expression of procedural (Know-how) knowledge. In complex human organisations, individuals, groups and other forms of collective behaviour influence business results and outcomes. In turn, rules and policies designed and executed by management affect behaviour. The culture that prevails in the organisation affects policies and rules. This causal relationship is depicted Figure 1.

Figure 1: Influence of Policies and Programmes on Knowledge Practices



(Source: Macroinnovation Associates LLC, 2003, htttp://www.macroinnovation.com)

1.3. Scope of the Research

This research is thus an attempt to give an account of knowledge-based policies, programmes and practices within an organisation. To do so, the study examines the practices and behaviours evident in performing the processes referred to by TNKM as

knowledge production and knowledge integration. The underlying policies and programmes supporting these processes were inferred from the practices. From the above a better understanding is gained about how and to what extent learning occurs in the organisation as a result of the execution of the above knowledge processes. Overall, it is envisaged that this research will add to the growing knowledge management body of knowledge, particularly pertaining to KM research in the South African context.

The research does not discuss the design and implementation of knowledge management interventions. Although the researcher is aware of the fact that technology plays an important role in facilitating the transfer and integration of knowledge, this does not form part of the research. The dynamics associated with culture and its influence on knowledge practices is recognised but not discussed.

1.4. Research Approach

A **case study** approach was followed in order to discover and assess knowledge policies and practices in a real life context. This strategy was considered to be appropriate, given the purpose of the research and the nature of the research questions, particularly since it presented an opportunity to gain an in-depth insight into knowledge processes in an organisation. The research therefore has a strong descriptive and interpretive character and provides for information rich content.

The **case** itself is the small IT department at the East London campus of Rhodes University. The choice of both the case, the specific division and the particular business process, is determined by what the researcher considers to offer a good learning experience and which is convenient and accessible (Stake, 2000). The case is therefore not necessarily typical or representative. The case itself was considered secondary, providing the context for the study.

The research comprises a critical analysis of existing literature within the KM body of knowledge. The purpose of the **literature study** is to gain a thorough understanding of the theoretical foundations and premises of knowledge management, including tools and methodologies proposed for conducting an assessment of knowledge processes in the organisation. The specific approaches associated with the various schools within

knowledge management will also be studied. Based on the literature research, the researcher developed and adapted several data collection instruments.

A large repertoire of **data collection methods** are available to the case study researcher, however, the research data is predominantly qualitative. The case study design included the administration of *questionnaires* and semi-structured *interviews* to all staff members in the IT department. In order to elicit and visualise the relationship of key knowledge processes associated with a selected business process, the case study design included the facilitation of one *focus group discussion* with staff members, employing business process mapping techniques to elicit details regarding a specific business process. Being associated with the university as members of staff, and as a result with the IT department, *direct observations* made by the researcher prior and during the research process proved useful.

Given the size of the case and nature of the research questions and associated theoretical propositions, the study did not lend itself to the use of statistical methods for purposes of **data analysis**. The researcher took advice from the literature, namely Yin (1994) and Harrison (2002), to explore the use of pattern-matching, theme building and categorisation to analyse data.

1.5. Structure of the Research Report

The report is organised into eight chapters. Chapter One provided an overview of the emerging field of knowledge management. In addition, the purpose of the research was stated and four research problems identified. A case study was selected as preferred research strategy and an outline of the methodology is provided. Next, an outline of the full research report is provided.

The literature study extends over three chapters. In Chapter Two the foundations of knowledge as a construct is explored as well as the phenomenon referred to as the "knowledge economy". This discussion, though at times abstract in nature, is critical in order to make sense of the emerging knowledge management "discipline". It is against this background that organisations are rethinking their position. The views of prominent scholars such as Drucker are discussed. Chapter Three provides an overview of

traditional knowledge management, its basic premises, components and processes. The literature study reflects on the work by prominent scholars that have helped to shape the status of KM. In Chapter Four, a discussion of the prominent schools of academic debate that influence current thinking about knowledge management is provided. Special attention is given to the emergence of the new school of KM thought, known as second-generation Knowledge Management (SGKM) with its emphasis on demand-side knowledge management, and its variation, the New Knowledge Management (TNKM), led by the Knowledge Management Consortium International (KMCI). It is the latter part of the literature survey that provides the basis for the case study.

Chapter Five provides a detailed discussion of the case study strategy and methodology followed. The findings of the case study are presented in Chapter Six, followed by a detailed discussion of the findings in Chapter Seven. Chapter Eight concludes the report with a summary of the main findings. Recommendations for further research are also proposed.

CHAPTER 2

2. Knowledge and its Value to the Organisation

"How you define knowledge determines how you manage it"

(Allee, 2002 cited in Firestone and McElroy, 2003a p. xxi)

"Knowledge is the only instrument of production that is not subject to diminishing returns"

(Clark, 1927 cited in Liebowitz and Beckman, 1998 p.47)

2.0. Introduction

Before the study considers approaches to knowledge management, it is important to revisit the very essence of it, namely knowledge. Firstly, the researcher motivates why it is important to study and understand knowledge. This is followed by a number of knowledge typologies identified and developed by various authors. Next, an overview is provided of attempts to construct a uniform definition of knowledge. For knowledge management to develop into a paradigm of substance, it is important to distinguish between data, information and knowledge. This matter received attention from several authors and their views are provided.

After attending to knowledge as a construct, the second part of this chapter is devoted to a discussion of the phenomenon referred to as the "knowledge economy".

2.1. The Theory of Knowledge

Our understanding of knowledge is mainly rooted in philosophical enquiry, particularly enquiries pertaining to three of the four pillars of philosophy, namely metaphysics, logic and epistemology (Chia, 2002). The fourth pillar relates to ethics. *Metaphysics*, according to Chia (2002), is concerned with questions of being and knowing, including questions of ontology; the nature of reality, and if that reality is absolute or in constant flux. The study of *logic* provides us with insight about the methods of reasoning, that is, how we come to make certain knowledge claims, and furthermore, how such claims are

legitimised and validated as being reliable. Thirdly, *epistemology* deals with how and what is possible to know, reflecting on the methods and standards by which knowledge is verified as being reliable. Ethics deals with moral evaluation and judgement.

Wainwright (2001) notes that our understanding of what constitutes knowledge and how it is constructed, depends on our philosophical orientation and outlook. It goes without saying that where one finds opposing viewpoints regarding knowledge and knowledge practices, such viewpoints can be traced back to an individual or group's assumptions as influenced by the differences traditions of philosophical thinking.

Given the highly abstract nature of knowledge, Davenport and Prusak (1998) suggest that discussions about knowledge are best left to the epistemologists and that one should take care not to mine too deeply into the epistemological "well". The above authors (Davenport and Prusak, 1998 p.5) suggest that one can rely on "intuitive sense" of what knowledge is. Firestone and McElroy (2003a) warn against this, stating that such approaches amount to side-stepping the very building blocks of KM. Failing to confront these fundamental issues explains the inability on the part of KM practitioners and scholars to provide clarity about what knowledge management is and what it stands for.

2.1.1. Classification of Knowledge

Before considering definitions of knowledge, it is useful to consider some the characteristics of knowledge as defined by the literature. Citing various authors, Martennson (2000) identifies some of the attributes of knowledge:

- Knowledge cannot easily be stored (Gopal and Gagnon, 1995 in Martennson, 2000)
- Information has little value and will not become knowledge unless processed by the human mind (Ash, 1998 in Martennson, 2000)
- Knowledge should be studied in context (Davenport and Prusak, 1998, Kirchner, 1997, Frappaolo, 1997, Allee, 1997 cited in Martennson, 2000)
- Knowledge depreciates in value if not used (Davenport and Prusak, 1998, Sveiby, 1997 in Martennson, 2000)

Snowden (2003b) adds, stating that "knowledge can only be volunteered, it cannot be conscripted", "I only know what I know when I need to know it" and "we always know more than we can say, and we will always say more than we can write down"

Alavi (2000) asserts there are different kinds of knowledge and each kind requires a different approach when it comes to knowledge management interventions. Alavi (2000) suggests that different knowledge taxonomies help to develop our understanding regarding the complexity of knowledge as a construct. In light of this, various authors, refer to two of the most popular knowledge taxonomies, namely that of Polanyi and Nonaka (Polanyi, 1966 and Nonaka, 1995 cited in McAdam and McCreedy, 1999; Martennson, 2000; Alavi, 2000; Firestone and McElroy, 2003a).

Polanyi makes the distinction between *tacit* (personal) knowledge and *explicit* (codified) knowledge. Polanyi understood tacit knowledge to mean "committed belief", embedded in context and difficult to express, sometimes inexpressible (Polanyi, 1958, 1966 cited in Firestone and McElroy, 2003a p.20).

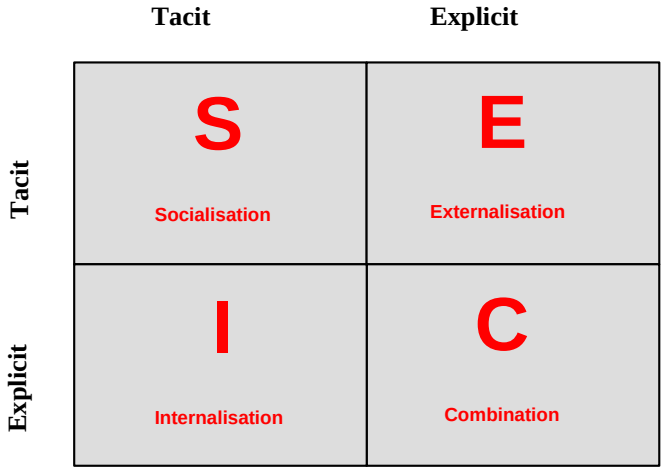
Referring to the seminal work by Polanyi, Nonaka expanded on explicit and tacit knowledge in great detail (Polanyi, 1968 cited in Nonaka, 1991). According to Nonaka (Nonaka and Tekeuchi, 1995 cited in Martennson, 2000), explicit knowledge is documented and is public, structured and can be captured and shared through information technology and other means; tacit knowledge resides in people's minds, behaviour and perception and evolves from social interactions. Alavi (2000 p.7) notes that Nonaka's model views organisational knowledge creation as a "social and collaborative process involving a continual conversion between tacit and explicit knowledge and a growing spiral flow as knowledge moves through individual, group and organisational levels."

In constructing his model (see Figure 2 below), Nonaka (1991 p.98) identified four patterns or modes for knowledge conversion in the organisation, namely:

- From *Tacit to Tacit;* through social interactions and shared experiences, e.g. apprenticeship and mentoring

- From *Explicit to Explicit;* through the combination of various explicit knowledge forms, e.g. merging, categorising and synthesising
- From *Tacit to Explicit*; through externalisation, e.g. articulation of best practices
- From *explicit to tacit;* creation of new knowledge from explicit knowledge through internalisation, e.g. learning

Figure 2: Nonaka's Model of Knowledge Creation (SECI- Model)



(Source: McAdam and McCreedy, 1999 p.95)

Another model that supports Nonaka and adds meaning to the discussion of the different types of knowledge is Boisot's knowledge category model depicted in Figure 3 (Boisot, 1987 cited in McAdam and McCreedy, 1999).

Figure 3: Boisot's Knowledge Category Model

Codified	Proprietary Knowledge	Public Knowledge
Uncodified	Personal Knowledge	Common Sense
	Undiffused	**Diffused**

(Source: Boisot, 1987 cited in McAdam and McCreedy, 1999 p.97)

Boisot uses the term *codified* to refer to knowledge that is easy to capture and transmit, while the term *uncodified* refers to knowledge that cannot readily be transmitted, e.g. experience. The term *diffused* is used to refer to knowledge which can be easily shared, and *undiffused* refers to knowledge not easily shared (McAdam and McCreedy, 1999). There are obvious similarities between Nonaka's and Boisot's models.

Authors like Firestone and McElroy (2003a) have questioned Nonaka's interpretation of Polanyi's distinction, arguing that Nonaka, and many others, have misunderstood Polanyi's notion of tacit knowledge, and particularly that part of tacit knowledge that is inexpressible or "ineffable". Referring to an earlier work of Polanyi's, the same authors (Firestone and McElroy, 2003a p.22) asserts that Nonaka has also overlooked yet another category of knowledge, namely *implicit knowledge*, referring to "cognitions and beliefs that, while not focal or explicit, are expressible, given the environmental conditions effective in eliciting them".

Tsoukas (2002 p.15) argues that tacit knowledge cannot be externalised, i.e. "converted" or "transformed" into explicit knowledge because "tacit and explicit knowledge are not the two ends of a continuum but the two sides of the same coin; even the most explicit kind of knowledge is underlain by tacit knowledge". Al-Hawamdeh (2002) agrees, but explains that tacit knowledge consists of a technical, as well as a cognitive aspect. It is this technical aspect, or "know-how", which Al-Hawamdeh (Al-Hawamdeh, 2002) believes Nonaka was referring to when he refers to tacit knowledge, and how it is possible to make this type of knowledge explicit.

Having explored the three types of knowledge, namely tacit, implicit and explicit, Firestone and McElroy compare and contrast Polanyi's classification with Karl Popper's World 1, World 2 and World 3 knowledge typology (Popper, 1994 cited in Firestone and McElroy, 2003a). Finally, the authors (Firestone and McElroy, 2003a) present their own version of a knowledge typology:

- World 1 (material) knowledge
- World 2 (situational, tacit, implicit, or potentially explicit) knowledge
- World 2 (pre-dispositional) knowledge

- World 3 (explicit) knowledge; 24 types are listed by the authors
- World 3 (implicit) knowledge; potentially 24 types but dependent on derivation from explicit types

The last typology that is considered is that of Zack (Zack, 1998 cited in Alavi, 2000). He (Zack, 1998 cited in Alavi, 2000) identifies five knowledge types, namely declarative knowledge (know-about), procedural (know-how), causal (know-why), conditional (know-when) and relational (know-with). Zack (1999 p.133) himself prefers a taxonomy that is useful for shaping business strategy, hence his focus is the uniqueness of knowledge for competitive advantage. Following this line of thought, Zack's classification includes knowledge that is *core* (minimum knowledge required to play the game), *advanced* (knowledge allowing organisations to be competitively viable) or *innovative* (knowledge to lead industry). This taxonomy is key to Zack's well-known strategic knowledge map and framework (Zack, 1999). Since this relates primarily to strategy that does not fall within the scope of this research, Zack's framework will not be discussed.

Having reviewed some of the characteristics of knowledge, the study considers the attempts by various authors to define knowledge.

2.1.2. Defining Knowledge

Spiegler (2000 p.9) refers to knowledge as "that slippery and fragile thing or process we have a hard time defining. It has the curious characteristic of changing into something else when we talk about it". The Concise Oxford Dictionary (1951 p. 658) refers to knowledge as a "familiarity gained by experience", a "theoretical or practical understanding of [a] subject, language, etc". Citing the work by Huber and Nonaka, Alavi attempts a working definition of knowledge: "[a] justified belief that increases an entity's potential for effective action" (Huber, 1991 and Nonaka, 1994 cited in Alavi, 2000 p.4).

Firestone and McElroy (2003a) cite a number of definitions in the knowledge management literature, including some that have been mentioned above. A list of definitions identified by the authors including each definition's origin, follows:

- "justified true belief" (Goldman, 1991 and Nonaka and Tekeuchi, 1995 cited in Firestone and McElroy, 2003a p.3)
- "information in context" (Aune, 1970 cited in Firestone and McElroy, 2003a p.4)
- "understanding based on experience" (James, 1907 cited in Firestone and McElroy, 2003a p.4)
- "experience or information that can be communicated or shared" (Allee, 1997 cited in Firestone and McElroy, 2003a p.4)
- "while made up of data and information, can be thought of as much greater understanding of a situation, relationships, causal phenomena, and the theories and rules (explicit and implicit) that underlie a given domain or problem" (Bennet and Bennet, 2000 cited in Firestone and McElroy, 2003a p.4)
- "knowledge can be thought of as the body of understandings, generalizations, and abstractions that we carry with us on a permanent basis and apply and interpret and manage the work around us…we will consider knowledge to be the collection of mental units of all kinds that provides us with understanding and insights" (Wiig, 1998 cited in Firestone and McElroy, 2003a p.5)
- "composed of and grounded solely in *potential acts* and in those signs that refer to them" (Cavaleri and Reed, 2000 cited in Firestone and McElroy, 2003a p.5)
- "the capacity for effective action" (Argyris, 1993 cited in Firestone and McElroy, 2003a p.5)

One of the more popular definitions frequently cited in the literature comes from Davenport and Prusak (1998 p.5) "Knowledge is a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating, and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organisations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms"

Taking the lead from Popper's three-Worlds taxonomy, Firestone and McElroy (2003a) group all the above listed definitions, including that of Davenport and Prusak, under "World 2" and "World 3" definitions. Firestone and McElroy state (2003a p.6):

- "World 2 knowledge – [refers to] beliefs, and belief predispositions (in minds) about the world, the beautiful, and the right that we believe have survived our tests, evaluations, and experiences
- World 3 knowledge – [refers to] sharable, linguistic formulations, knowledge claims about the world, the beautiful, and the right, that have survived testing and evaluations by the individual, group, community, team, organisation, society, etc.) acquiring formulating, and testing and evaluating the knowledge claims"

The distinguishing feature between World 2 and World 3 knowledge types is the notion that the first category comprises knowledge beliefs and belief predispositions, that is in essence personal, non-sharable and by implication, subjective. The authors (Firestone and McElroy, 2003a) claim that such knowledge is fallible, despite attempts to subject knowledge claims to tests and evaluation. World 3 knowledge however, refers to knowledge claims that exist outside those that create it, are sharable with others, evaluated by others and by implication, constitute objective knowledge.

Referring to the above (and other) attempts to define knowledge, there is no single view or definition of knowledge, which partly explains the difficulties experienced by knowledge management scholars and practitioners to develop a uniform approach. However, serious work has been generated by the TNKM school in particular, making a significant contribution towards a better understanding of knowledge in organisations.

Next, the researcher explores the ongoing debate between what is data, information, and knowledge.

2.1.3. Data, Information and Knowledge

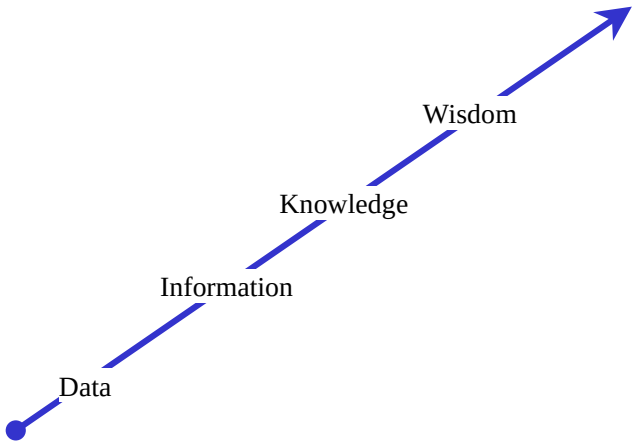
By scanning the various literature sources, the study identified various attempts by different authors to explain knowledge by contrasting it to concepts such as data and information. Some attempts go no further than merely stating that knowledge is not data.

Drawing a distinction between information (meaningful data) and knowledge is more complex. The researcher asserts that the apparent failure to draw clear distinctions between knowledge and information has a major impact on the chance of KM to advance as a discipline. Unless this is done, knowledge management will forever be confused with information management. This apparent dilemma is explored below.

Denning (1998), the well known author and knowledge management consultant to the World Bank, asserts that the distinction between information and knowledge has become blurred as a result of theoretical objections raised by post-modernists concerning the concept of truth and the particular views held by the positivist school regarding the concept of reliability. Denning (1998) further states that the problem is also evident in how societies (Western rationalism vs Asian *yin* and *yang*) view the status of intuitive and rational knowledge.

A popular approach has been to explain the difference between knowledge and information and data by referring to knowledge as a higher order of information – see Figure 4.

Figure 4: Data to Wisdom Hierarchy



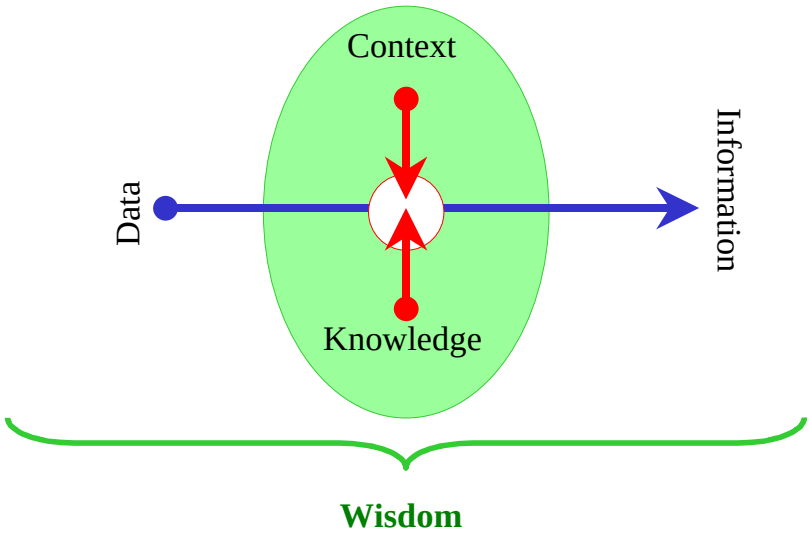
(Source: Snowden, 2003a, Power Point Slides)

Davenport and Prusak (1998) assert that, intuitively, we are able to ascertain that knowledge constitutes something deeper and richer than information and data.

Furthermore, we also have a capacity to sense that someone has that special "knack", something that distinguishes him or her from others. Though we can't always explain it, we know it has something to do with wisdom, intelligence; a higher order of "knowing" gained from past experience.

The above hierarchy or pyramid representation has been criticised by various authors such as Snowden (2003a), who rejects the notion that knowledge is a higher order form of information. The author (Snowden, 2003a, Power Point Slides) argues that knowledge is "the means by which we inform". Snowden's view is presented graphically in Figure 5.

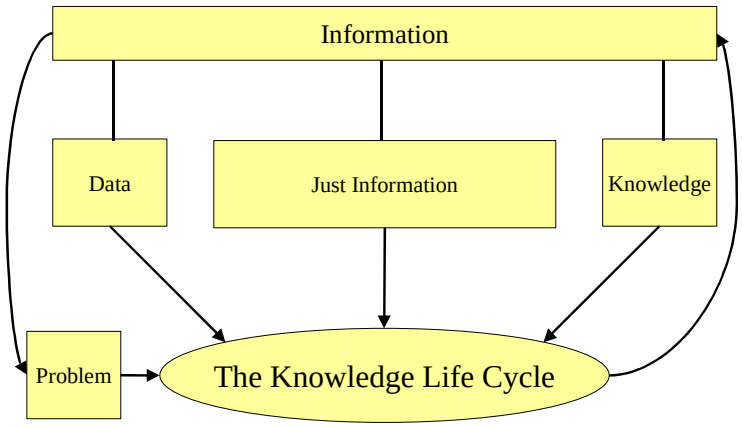
Figure 5: Snowden's view on knowledge and information



(Source: Snowden, 2003a, Power Point Slides)

Firestone and McElroy (2003a) view knowledge as a subset of information that has been subjected to a process of evaluation and validation; knowledge is thus not a superset of information. In Figure 6 data, knowledge and "just information" are types of information and problems are used to produce more information, including new knowledge.

Figure 6: Life Cycle View of Data, Information and Knowledge



(Source: Firestone and McElroy, 2003a p.19)

It should be noted that the ideas of authors such as Firestone, McElroy and Snowden reflect relatively contemporary work done in the area of knowledge management. It is the contention of the researcher that scholars such as Firestone and McElroy have provided significant impetus to the understanding of knowledge management. These authors' ideas will be expanded on in later discussions.

Despite the apparent difficulty in understanding the exact meaning of knowledge, the concept has nevertheless made its way into the jargon of many disciplines. The discussion that follows looks at phenomena such as the knowledge economy, knowledge society and knowledge-based organisation, to name a few. These concepts have gained widespread popularity in the literature and are sometimes used interchangeably. A discussion of such phenomena serves as an introduction to the more detailed discussion about knowledge management, to follow in the next chapter.

2.2. The "Knowledge Economy"

According to Davenport and Prusak (1998), whilst knowledge is not new, explicitly recognising knowledge as a corporate asset and nurturing it, is new. Neef (1999) asserts

that it is only possible to appreciate knowledge management if viewed in relation to the changes occurring in the global economy. To gain some perspective about the dramatic nature and pace of changes in the past two decades, he (Neef, 1999) cites a number of examples, including:

- Breakthrough innovations in medical and drug research
- The transition from mainframe to personal computing
- The emergence and rapid growth of the Internet and an electronic market place driven by the explosion in telecommunications
- Restructuring of organisations and the movement of capital
- Shift in employment patterns
- The emergence of "tiger economies"

Clarke (2001) notes that knowledge based economies are heavily reliant on the production, distribution and use of knowledge and information, all at a rapid rate. He distinguishes between different kinds of knowledge, namely:

- Know-what (referring to the accumulation of facts); this type of knowledge is close to information
- Know-why (refers to scientific knowledge of the principles and laws of nature)
- Know-how (skills and capability to do something); internal knowledge in organisation
- Know-who (who knows what, who knows who to do what); implies special relationships

The same author (Clarke, 2001) suggests that, while knowledge might be expensive to generate, there is little cost to diffuse such knowledge. In addition, knowledge provides increasing returns as it is used; the more it is used, the more valuable it becomes. Clark (2001) identifies key drivers of this new economy, including globalisation and whatever is associated with this phenomenon, information technology, distributed organisational structures including network-type arrangements, and the growing knowledge intensity of goods and services.

In his seminal article, "The new society of organizations", Drucker (1992) argues that knowledge as a resource has dethroned land, capital and labour as primary factors of

production. He (Drucker, 1992 p.97) advocates that change has become the norm and modern organisations must "constantly upset, disorganize, and destabilize the community". In order to organise for continuous change, Drucker (1992) urges management to:

- engage in practices of continuous improvement
- learn to exploit knowledge available within the organisation
- learn to innovate
- decentralise decision making

Because knowledge workers effectively own the means of production (in many cases, knowledge), the traditional relationship between workers and the organisation has been altered dramatically, argues Drucker (1992). Given the emerging importance of the knowledge worker in modern organisations and their empowered status, the above author questions the capacity of organisations to effectively manage such workers. He (Drucker, 1992) states that the modern organisational arrangements must evolve from the traditional boss-subordinate relationships towards a team oriented focus.

Davenport and Prusak (1998 p.14) echo Drucker's sentiments stating that, due to global competition, products are not a basis for competing successfully in global markets and that organisations will "differentiate themselves on the basis of what they know." The convergence of products and service highlights the importance attributed to intellectual capital. Products and services are being copied rapidly and any advantaged is nullified overnight. Product quality and pricing strategies do not guarantee competitive advantage. Knowledge can however provide a sustainable competitive advantage and, unlike other assets, knowledge assets appreciate with use (Davenport and Prusak, 1998).

In their publication, titled "The Individualized Corporation", Ghoshal and Bartlett (2000) advocate an organisation that demonstrates flexibility to understand and exploit the distinctive knowledge and unique skills of employees. They (Ghoshal and Bartlett, 2000) identify three core capabilities inherent to the "individualised corporation", namely:

- the ability to inspire individual creativity and initiative

- the ability to link and capitalise on entrepreneurial activity and individual expertise through the process of organisational learning
- the ability to continuously renew itself

According to Liebowitz and Beckman (1998), a knowledge organisation is one that realises the importance of its internal and external knowledge and transforms that knowledge into its most valuable asset. In order to facilitate this transformation, the same two authors (Liebowitz and Beckman, 1998 p.14) identify what they consider to be three critical areas, namely:

- the maintenance of a "corporate memory"
- the "management of knowledge" within the organisation
- the building and nurturing of a[n appropriate] corporate culture

The above sentiments reflect largely those views held by organisations in the western tradition. Whilst the US and Europe have seen an explosion in the knowledge management literature and scholarly debate, the same excitement is not evident in eastern countries. Tekeuchi (1998) notes that the absence of a visible debate about knowledge management in Japan does not constitute ignorance about knowledge and its value. The resistance to knowledge management rather reflects the distinct views held by Japanese scholars and industry about knowledge (Tekeuchi, 1998). Tekeuchi (1998 p.4) cites three fundamental differences that exist between western and eastern (particularly Japanese) thinking, namely:

- how knowledge is viewed
- what companies do with knowledge
- who the key players are

Nonaka (1991) explains further by referring to knowledge as the only source of sustainable competitive advantage, a prerequisite for innovation. Yet, according to Nonaka, companies, and in particular, Western organisations, pay lip service to the notion of intellectual capital, mostly so because they do not understand what knowledge is and how to optimally use it. While the approach of western organisations has been one of mechanistic-like objective information processing, Japanese organisations in contrast, pay

detailed attention to the tacit and subjective knowledge carried and shared by individuals in the organisation. Nonaka (1991) is of the opinion that Japanese organisations, in contrast to western counterparts, are quite prepared to test such individual insights. Nonaka (1991) also emphasises what he believes is a key principle characteristic to Japanese companies, namely that organisations are viewed as living organisms and not as machines. The excellence demonstrated by Japanese manufacturing firms such as Toyota and Canon bear evidence to the different philosophy evident in Asian societies.

2.3. Conclusion

This chapter attempted to provide a better understanding of knowledge as a concept and how it differs from other constructs such as data and information. It was learned that no common understanding exists about the meaning of knowledge and how it is constructed.

Despite the above, the value of knowledge as a potent resource is recognised and it is therefore not surprising that many scholars and practitioners are participating in the debate about how organisations could exploit knowledge for competitive advantage. It was suggested that knowledge management could provide some of the answers. Chapter 3 highlights the basic premises of the relatively new discipline called knowledge management.

CHAPTER 3

3. An Introduction to Knowledge Management

> "The knowledge management movement is still in its early stages of evolution, and even though there are knowledge managers and chief knowledge officers, what the landscape will eventually look like is uncertain"
>
> (Bukowitz and Williams, 1999 p.8)

3.0. Introduction

Despite the infancy of Knowledge Management as an area of study, its body of knowledge has grown substantially over the past few years. This chapter comprises a selective overview of literature pertaining to the field of knowledge management. This section is not intended to provide an exhaustive view of Knowledge Management. Instead, key concepts and basic premises are discussed, particularly referring to how the field hopes to address the requirements of organisations operating in a knowledge economy. In order to align this discussion with the stated research questions, particular attention will be placed on exploring the views about knowledge management processes.

More recent KM publications, particularly referring to the work of Snowden, McElroy and Firestone, have intentionally been played down in this discussion. In the opinion of the researcher, these authors' work demand a separate discussion, mainly because of their unique stance in relation to KM.

3.1. The Premises and Promises of Knowledge Management

The last two decades of the previous century witnessed the emergence of a number of business improvement philosophies and approaches; examples include Business Process Reengineering (BPR), Total Quality Management (TQM) and Organisational Learning (OL). During mid nineties the Knowledge Management movement started gaining momentum with a rapid increase in its body of knowledge (McAdam and McCreedy, 1999). Martennson (2000) is of the opinion that the growth of knowledge management occurred as a direct result of two major shifts, namely:

- the impact of downsizing strategies of the 1980's and the subsequent loss of human capital as people walked out the door with their knowledge
- the explosion in information and related technologies led organisations to search for ways to cope with the complexity and volumes of information

In Stewart et al (2000) the authors describe a study they conducted in which four basic assumptions underlying knowledge management, were investigated. The key findings of the researchers (Stewart et al., 2000 p.45) have been reproduced and are presented in Table 1.

Table 1: Support for and negations of KM Assumptions

Assumption	Support for assumption	Negation of assumption
Knowledge is worth managing	Recognition of the knowledge economy Knowledge management initiatives in numerous organisations	Much effort spent managing explicit knowledge when most knowledge is tacit
Organisations benefit from managing knowledge	Effective data mining	Business Process Reengineering severely downsizes company which initiates long-term success, despite knowledge loss
Knowledge can be managed	Appointment of Chief Knowledge Office (CKO)	Difficult to transfer best practices
Little risk is associated with managing knowledge	Organisational structures for knowledge management	Tacit knowledge may contain incorrect assumptions

(Source: Stewart et al., 2000 p.45)

The researcher finds the categorisation of findings by the authors somewhat confusing and inconsistent with the parts of the text. Apart from this, some of the findings are also loaded with ambiguity. The fact that many organisations have embarked on KM projects does not indicate whether knowledge is worth managing. Benefits derived from effective data mining do not necessarily indicate a successful KM initiative. Equally so, the

presence of a host of knowledge officers does not indicate that knowledge can be managed. Nevertheless, what emerges from the above are the perceptions and expectations (rightly or wrongly) of organisations about knowledge management.

Martennson (2000), having surveyed a number of literature sources concerning the goals and expected outcomes of KM, lists a number of such outcomes:

- a way to improve an organisation's performance, productivity, competitiveness
- acquiring, sharing and usage of information
- a tool for improved decision making
- a way to capture best practices
- a way to reduce research costs and delays
- a way to become more innovative

In another study among eleven major organisations, including the likes of Arthur Anderson, Chevron, Dow Chemical Company and Texas Instruments, the American Productivity and Quality Centre (APQC) concluded that all these companies mostly valued the transfer of knowledge and best practices in order to improve internal operations or to embed such knowledge in products and services (Martennson, 2000; Monasco, 1996 cited in Atefeh et al., 1999). The study also emphasises the importance of teams, relationships and networks as the basis for knowledge transfer. Specific benefits cited from the introduction of knowledge management projects include operational improvements, money saved or earned (Monasco, 1996 cited in Atefeh et al., 1999). It is a well-known fact that one of the organisations surveyed, Skandia, has for many years published its annual results together with an account of its intellectual capital assets.

The researcher questions the extent to which the successes recorded above can be credited to KM. Is it really possible for KM to directly impact business processes, and if so, how and to what extent? The researcher will attempt to address these questions in the course of this study.

Despite the rapid growth of KM and the euphoria that is apparent when one considers the above findings by the APQC, Wainwright (2001) notes that there is no single definition to

adequately describe knowledge management. Neither is there a comprehensive and unified framework to guide organisations in their knowledge management initiatives (EKMF, 2001). The next discussion is aimed at reviewing some of the definitions, including those by both "classical" and contemporary KM authors.

3.2. Defining Knowledge Management

Throughout this research it was advocated that there is a need to clarify what is understood by knowledge management The fact that activities associated with diverse concepts such as organisational learning, intellectual capital, competitive intelligence, etc. are applied under the KM label, is a clear signal that something is wrong (Martennson, 2000). Following is a discussion of definitions of knowledge management.

The American Productivity and Quality Centre defines knowledge management as "the strategies and processes of identifying, capturing and leveraging knowledge" (APQC, 1996 cited in Atefeh et al., 1999 p.172). To illustrate the inconsistencies and problems referred to earlier, Spiegler cites Kanter's attempt to define knowledge management as "turning data (raw material) into information (finished goods), and from there into knowledge (actionable finished goods)" (Kanter, 1999 cited in Spiegler, 2000 p.6). In the researcher's opinion, such definitions fail dismally to distinguish KM from information management.

McAdam and McCreedy (1999) evaluated several definitions and classifications relating to knowledge management in order to clarify the scope of knowledge management and understand its premises. The above authors, while stating that the definitions evaluated are not necessarily representative, concluded that such definitions and classifications reflect a wide spectrum of viewpoints; from mechanistic type orientations (knowledge as an asset) to approaches that reflect the notion that knowledge is constructed through social relationships. They (McAdam and McCreedy, 1999) identified the following common aspects in the definitions reviewed by them:

- IT is regarded as a useful enabler, but is not regarded as the essence of KM
- People and learning issues are central

- KM has strong multi-disciplinary influences with practitioners holding a wide array of perspectives
- KM and Intellectual Capital (IC) are used interchangeably and there are traces of confusion regarding the two concepts

Having survey the popular Brint website, Firestone and McElroy (2003a) analysed what the they describe as typical definitions by various contemporary KM authors (Malhotra, 1998; Sveiby, 1998; Knapp, 1998; University of Kentucky, 1998; Wiig, 1998; Wenig, 1998; Murray, 1998 and Davenport, 1998). They (Firestone and McElroy, 2003a) assert that the definitions exhibit the following weaknesses (the critique refers to the specific author in parenthesis):

- failing to distinguish between knowledge and information (Malhotra, Knapp)
- technology-centred (University of Kentucky)
- failing to reflect the notion of validation of knowledge claims (Wiig, Davenport)
- failing to demonstrate how knowledge could be managed (Wiig)
- failing to define activities that comprise KM (Wenig)
- viewing KM as a strategy and not a process (Murray)
- failing to adequately treat the concept of "management" in knowledge management

The authors (Firestone and McElroy, 2003a p.70) after firstly, examining information management and knowledge management and secondly, drawing a distinction between information processes and knowledge processes, offer their own definition:

> "KM is a management discipline that seeks to enhance organisational knowledge processing"

Defining the knowledge management process (KMP), the authors (Firestone and McElroy, 2003a p.71) continue:

> "The KMP is an ongoing, persistent, purposeful interaction among human-based agents through which the participating agents manage (handle, direct, govern, control, coordinate, plan, organise, facilitate, enable and empower)

other agents, components, and activities participating in basic knowledge processing (knowledge production and knowledge integration), with the purpose of contributing to the creation and maintenance of an organic, unified whole system, producing, maintaining, enhancing, acquiring, and transmitting the enterprise's knowledge base"

At this point the researcher refrains from adopting a particular definition. As suggested earlier, specific approaches to the management of knowledge are influenced by the various philosophical orientations. This is evident in the definitions discussed above. The next discussion focuses on the approaches towards knowledge management and related models presented in the literature.

3.3. Approaches to Knowledge Management

Wiig (1997), though admitting that there is no general approach to managing knowledge, identifies three divergent approaches:

- firstly, the management of explicit knowledge using technical means,
- secondly, intellectual capital management, and
- thirdly, a broader, more holistic approach covering all relevant knowledge related aspects that affect organisational success

McAdam and McCreedy (1999) identified several KM models and group these into three broad categories, as depicted in Table 2.

Table 2: Comparison of KM Models

Model	Source	Characteristic
Knowledge category models	Nonaka	Mechanistic
	Boisot	Mechanistic
Intellectual capital models	Skandia	Mechanistic
Social constructed models	Demerest	Holistic

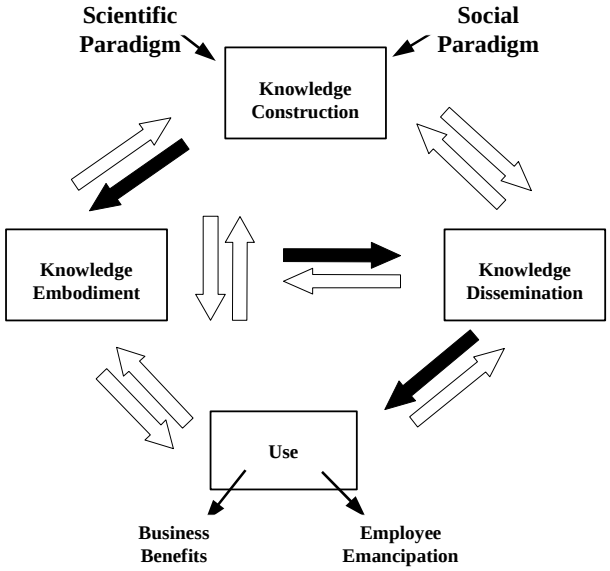
(Source: Adapted from McAdam and McCreedy, 1999 pp.95-98)

Though the authors (McAdam and McCreedy, 1999) refer to these models as KM models, this is not quite accurate; some of these are really knowledge typologies and have been

included in the discussion under paragraph 2.1.1. Nevertheless, they serve as a reminder to "classical" thinking behind certain KM approaches. They (McAdam and McCreedy, 1999) state that a balanced view of knowledge construction is important if KM is to become a significant paradigm. Nonaka's SECI model was covered earlier and will not be discussed here. Particular attention is paid to two other KM approaches identified by McAdam and McCreedy.

Drawing from the work by Demerest, McAdam and McCreedy (Demerest, 1997 cited in McAdam and McCreedy, 1999 p.98) constructed their own "KM model" accommodating both the scientific and social construction paradigms – see Figure 7.

Figure 7: Modified version of Demerest's KM Model



(Source: McAdam and McCreedy, 1999 p.98)

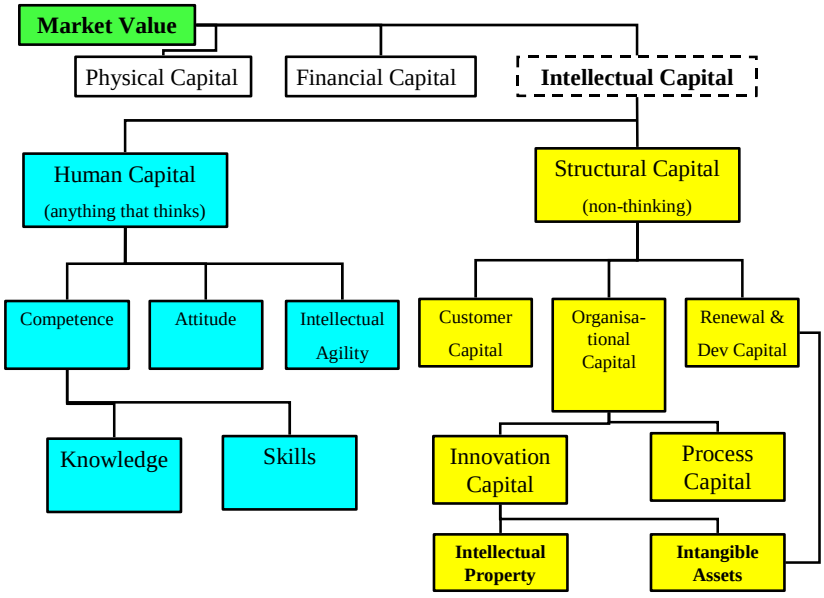
This model emphasises the creation of knowledge within the organisation. This construction is not only dependent on scientific input, but also includes the social construction of knowledge. This constructed knowledge is then embodied within the organisation by explicit means, e.g. codification, and through social interchange (McAdam and McCreedy, 1999). Once the knowledge is embodied in the organisation, it

must be disseminated throughout it. The disseminated knowledge is then used in the production of organisational outputs.

The solid arrows in Figure 7 indicate the primary flow direction, while the plain arrows indicate recursive flows. The recursive arrows show that the flow of knowledge in the organisation is more complex than a simple sequential process (McAdam and McCreedy, 1999). The model shows that knowledge construction is influenced by both scientific (older, rule-based) and social (newer, people-based) paradigms. The "use" element of the model is expanded upon in order to address both business and employee benefits. These issues should be seen as complementary rather than mutually exclusive.

The intellectual capital school of thought (particularly prevalent in the Scandinavian countries) equates knowledge with intellectual capital. Intellectual capital is made up of two main components, namely human capital and structural/organisational capital (McAdam and McCreedy, 1999). This IC school of thought takes a scientific approach to the management of knowledge with a strong emphasis on measuring each intellectual asset in the organisation. Figure 8 represents the views held by the IC school of thought.

Figure 8: Roos's Intellectual Capital Model



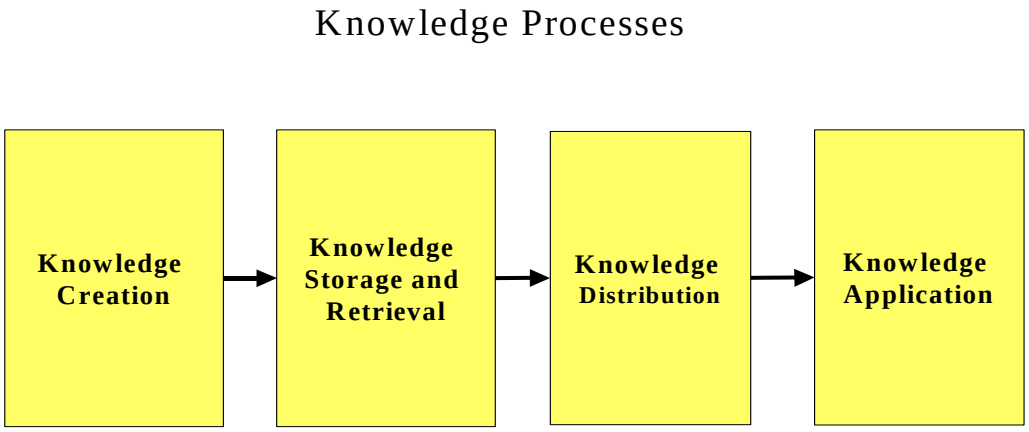
(Source: Edvinson, 1997 cited in McElroy, 2003a p.170)

The next discussion focuses on knowledge management processes as identified by the literature. It is hoped that, by identifying such processes, a coherent framework will emerge to guide knowledge management initiatives.

3.4. Knowledge Management Processes

Alavi (2000) notes that organisations continuously engage in certain knowledge management processes. The above author identifies four processes that are depicted in Figure 9.

Figure 9: Generic Knowledge Management Processes by Alavi



(Source: Alavi, 2000 p.7)

Gauging from an analysis of various knowledge management approaches followed in Europe, the European KM Forum - EKMF (2001), concluded that with few exceptions (Davenport and Nonaka), most approaches have the same basic structure and identifiable modules, stages or phases. Most approaches considered by the EKMF include the phases identified by Alavi above. A comparison of the approaches studied by the EKMF is attached as Appendix A.

Notably, Davenport and Prusak do not describe a knowledge management process (EKMF, 2001). Davenport and Prusak (1998) provide a detailed discussion of knowledge markets, compelling the reader to view knowledge markets as a framework for understanding and improving the transfer of knowledge. Knowledge Management, according to the authors, is an effort to improve the efficiency of such knowledge markets. For Davenport and Prusak (1998), as the organisation interacts with its environment, it absorbs information, turn it into knowledge and takes action based on experiences, values and internal rules. They, (Davenport and Prusak, 1998 cited in EKMF, 2001) highlight knowledge generation, knowledge codification and coordination and knowledge transfer as key focus areas in a knowledge management initiative.

Nonaka, who did not adopt Knowledge Management as an approach in the first place, focuses solely on knowledge creation. However, certain concepts used by Nonaka in his popular SECI model, correspond with some of the knowledge management phases identified by the various other KM approaches in the EKMF study.

Martennson's (2000) research, referred to earlier, revealed results that are consistent with those found by the EKFM study. He identified the following four stages: knowledge acquisition, storage, providing access and knowledge use.

Next, the various knowledge management processes outlined by Alavi and illustrated in Figure 9 are discussed. Where appropriate, attempts are made to complement Alavi's views with those from other sources.

3.4.1. Knowledge Creation

A discussion of knowledge creation will be lacking if it does not consider the contribution of Nonaka. Alavi (2000) draws special attention to the emphasis that Nonaka places on appropriate organisational mechanisms to support and nurture each of the modes of knowledge creation discussed earlier. For the sake of convenience, Nonaka's modes of knowledge conversion are again listed; they are socialisation, externalisation, combination and internalisation (refer to SECI model in Figure 2 on page 13).

Davenport and Prusak (1998 pp.52-67) propose five options available to organisations through which knowledge is created:

- *Acquisition*; refers to knowledge acquired by the organisation from external sources including knowledge internally generated. This is not necessarily new knowledge; it includes knowledge copied from competitors or other industries, also knowledge bought via mergers
- *Rental*; e.g. through an external research unit or hiring a consultant with specific expertise
- *Dedicated resources*; utilising resources exclusively for this purpose e.g. R&D units
- *Fusion*; the deliberate introduction of complexity, diversity and conflict to create new synergy
- *Adaptation*; external changes causes organisation to "adapt or die"; warns against the complacency, "core rigidities" or the tendency to stay on well-known paths. Some organisations sometimes generate a crisis in order to stimulate creativity
- *Networks* – informal, self-organising networks of people that might become formalised, e.g. Community of Practice (COP)

Davenport and Prusak do not explicitly refer to learning as a result of the knowledge creation process. Liebowitz and Beckman (1998) regard learning of the individual, the team and the organisation as an integral part of knowledge creation. The two authors cite Kolb's learning cycle as a framework to understand the effects of participation in new experiences, reflective activity, concept formulation and the development of hypotheses (Kolb, 1983 cited in Liebowitz and Beckman, 1998). Liebowitz and Beckman's arguments show glimpses of second-generation KM thinking when they cite Couger's work on the Creative Problem Solving (CPS) method (Couger, 1996 cited in Liebowitz and Beckman, 1998). The six problem solving steps proposed by Couger are: define the problem, analyse the problem, generate solution ideas, evaluate and select the solution, test and implement the solution and lastly, document and share the results (Couger, 1996 in Liebowitz and Beckman, 1998). The process of problem solving and its relationship with knowledge creation and organisational learning is further explored in Chapter 4.

3.4.2. Knowledge Storage and Retrieval

Alavi (2000) asserts that to create new knowledge is not enough; people and organisations simply forget and mechanisms are needed to store acquired knowledge and to retrieve it when needed. One such mechanism identified by the knowledge management community is "organisational memory" (Alavi, 2000). Organisational memory includes individual memory (individual experiences) as well as shared knowledge and interpretations resulting from social interactions, including organisational culture, work processes and procedures, structure, ecology and archives (Alavi, 2000). It is fair to assume that the organisation that keeps track of its experiences, e.g. by recording and retrieving knowledge about best practices, internal and external to the organisation, stands to benefit as opposed to one that keeps on reinventing the wheel. However, citing the work of Argyris and Schon, Alavi warns about the negative effects associated with organisational memory (Argyris and Schon, 1978 cited in Alavi, 2000). Organisations have to constantly guard against rigidity in terms of structure, capabilities, outlook and current knowledge. A complacent attitude can prevent the organisation from engaging in continuous learning, and innovation as a result of inability to adapt to change.

This above phase of KM has traditionally been fertile ground for proponents of codification strategies, which include, amongst others, efforts to extract tacit knowledge from experts using a combination of elicitation methods and technology systems and to make that knowledge available to the organisation in some form.

3.4.3. Knowledge Distribution

Alavi (2000) is of the opinion that the knowledge distribution process, despite its importance, is under-studied. The author (Alavi, 2000) postulates that the knowledge distribution process is subject to the same influences as the communication process, that is often neglected in organisations. Comparing and contrasting the communications process and the knowledge distribution process, the researcher crudely depicts the parallels in Table 3.

Table 3: Comparison of Communications Model with Knowledge Distribution

Components of the communications process*	Factors influencing knowledge distribution**
Sender (source)	Perceived value of source unit's knowledge stock Motivational disposition of source
Message	Nature of message (tacitness or explicitness)
Receiver	Motivational disposition of receiving unit (willingness to acquire knowledge from the source) Perceived value of source unit's knowledge stock
Channel	Existence and richness of transmission channels
Coding/Decoding	Absorptive capacity of the receiver
* (Source: Krone et al, 1987 cited in Alavi, 2000)	** (Source: Gupta and Govindarajan, 1999 cited in Alavi, 2000)

The distribution of knowledge is arguably where most of the knowledge management activities occurs. It is also in this sphere that technology is playing a significant role, referring to the use of intelligent agents to customise information delivery, email, data mining, Intranets and Web portals (Liebowitz, 2000).

3.4.4. Knowledge Application and Use

According to the knowledge-based theory of the firm, knowledge itself does not constitute a competitive advantage; it is the application and integration thereof with business processes that makes a difference (Alavi, 2000). Grant (Grant, 1996 cited in Alavi, 2000) identifies the following three mechanisms for integrating knowledge into the organisation:

- Directives; sets of rules, standards, procedures and instructions converted from tacitly held specialist knowledge into explicit forms for communication to non-specialists
- Organisational routines; relate to patterns for task performance and coordination, interaction protocols and process specifications
- Self-contained task teams; refer to the creation of teams to attend to tasks where a high degree of uncertainty exists and where group synergy can be exploited. Group problem solving often requires coordination and facilitation of frequent interaction and intense collaboration

Liebowitz and Beckman (1998 p.104) state that "knowledge can be applied by people or machines to perform work" The researcher disagrees with the notion that a computer or some type of machine is able to apply (directly or indirectly) knowledge in a business activity.

In the next chapter the New Knowledge Management school argues that this (referring to codifying, storing, sharing and distributions) is supply-side KM, which typically reflects the approach by classical KM.

3.5. Conclusion

The preceding discussions started with reviewing the basic claims and assumptions by the KM literature about the contribution KM can make to transform the organisation into a knowledge-based organisation. It was also pointed out that there is widespread disagreement about what KM stands for and the fact that there is little agreement on a uniform definition. The lack of a common framework became evident when the approaches to and models about knowledge management were studied. The discussion includes an overview of the knowledge management processes suggested by the "classical" knowledge management literature.

At the same time the discussion provided a crude framework for thinking about knowledge management. However, as a framework that can guide knowledge management initiatives, it is argued that the above views fall seriously short of expectations. The next section will address some of the most pertinent shortcomings of knowledge management, including the emergence of a new school in knowledge management.

CHAPTER 4

4. Second Generation Knowledge Management

> "A knowledge worker sitting at her desk performing a task, then suddenly develops a need for information to complete her work. Where does she turn? Is the knowledge readily available? How long does it take to get it? Does she tap her relationships with other workers? Has technology been effectively placed at her disposal? Is her knowledge source current? Is it complete? Was the task successfully carried out?"
>
> (Source: McElroy, 2000 p.200) on first-generation KM

4.0. Introduction

Having studied what is considered to be conventional KM thinking in Chapter 3, this chapter commences by reviewing some of the unanswered questions in the field. The major focus of the chapter is to present the response of "second-generation knowledge management" (SGKM) and its variation, "the new knowledge management" (TNKM), to scenarios as depicted in the above quotation.

However, the selection of issues for discussion is strongly influenced by the purpose of this research, namely to account for knowledge processes in the organisation. As a result, the researcher presents the views of TNKM on how knowledge is produced and integrated in the organisation. This discussion takes place against the backdrop of the Knowledge Life Cycle (KLC) framework. The attention then shifts to discussing the "identity crisis" the researcher believes KM is experiencing. TNKM's proposed boundaries for KM are reviewed at the same time. Next, the discussion focuses on knowledge evaluation and validation, one of the key sub-processes that separates knowledge from "just information".

Finally, the chapter reviews TNKM's proposed application framework for guiding an organisation's knowledge initiatives. This operational framework is the culmination of

what was discussed so far in the literature, adding a practical dimension that is ultimately applied by the researcher in constructing a research design.

4.1. Reflecting on Key KM Questions

As the volumes written about knowledge management continue to grow, critics from both the academic and business communities are starting to voice concerns regarding the claims of the emerging "paradigm". This section will explore some of the critique levelled against KM. In the process, this research will explore the debate currently raging within knowledge management.

Various authors cited in the previous chapter have expressed concerns about the status of knowledge management. Such concerns range from the absence of a uniform definition (McAdam and McCreedy, 1999; Spiegler, 2000; Wainwright, 2001) to questions concerning the epistemological basis and "shaky" theoretical grounds, often resulting in confusing KM with other related disciplines and paradigms (McAdam and McCreedy, 1999; Stewart et al., 2000; Martennson, 2000). This state of affairs has subsequently led to approaches that are IT centric and not distinguishable from information management (Malhotra, 1998; McElroy, 2003a). Other questions relate to whether the organisation really benefits from knowledge management, and if so, how? (Stewart et al., 2000; Alavi, 2000) An issue that was not addressed in the previous chapter relates to the absence of a common methodology that could anchor knowledge management initiatives in the organisation. Though the generic knowledge management processes discussed earlier (Alavi, 2000; EKMF, 2001; McAdam and McCreedy, 1999), offered some framework, it is the contention of the researcher that it does little to guide knowledge management interventions. Firestone and McElroy (2003c) suggest that, if knowledge management hopes to have a future, it has to answer some of these questions and problem areas.

Next, a brief overview is provided about the basic premises of second-generation knowledge management (SGMK), also referred to as the new knowledge management, (TNKM) through the voices of its main proponents, McElroy and Firestone, and with the backing of the KMCI community.

4.2. Basic Premises of second-generation KM and TNKM

Since 1999, TNKM (McElroy, 2000; McElroy, 2003b; Firestone and McElroy, 2003a; Firestone and McElroy, 2003b; Firestone and McElroy, 2003c; Macroinnovation Associates LLC, 2003) has launched a series of attacks on what it refers to as conventional knowledge management practices, supply-side KM or first-generation KM (FGKM). McElroy (2003a) questions the basic assumptions underlying traditional knowledge management thinking. In order to illustrate the author's misgivings about the state of affairs, he (McElroy, 2003a p.5) cites three phrases that he believes are typical of classical KM thinking: "It's all about getting the right information to the right people at the right time", "If we only knew what we know", "We need to capture and codify out tacit knowledge before it walks out the door".

TNKM asserts that such phrases reflect an assumption that knowledge already exists, and that KM is something that only occurs after knowledge is produced (McElroy, 2003a). McElroy (2003a) attributes the notion of supply-side KM to the emphasis FGKM places on knowledge codification, storage and retrieval, distribution and sharing, or the integration of knowledge.

In contrast, TNKM emphasises the importance of knowledge production as a key knowledge process and advocates what they believe is a balanced approach to knowledge management. TNKM refers to this as demand-side KM, but stresses that both demand-side (knowledge making) and supply-side KM (integration) is needed for effective KM (McElroy, 2003a). In order to appreciate the stance of second-generation thinking, its chief architects make two key assumptions that guide the orientation and approach of the movement towards solving the issues highlighted above. These are:

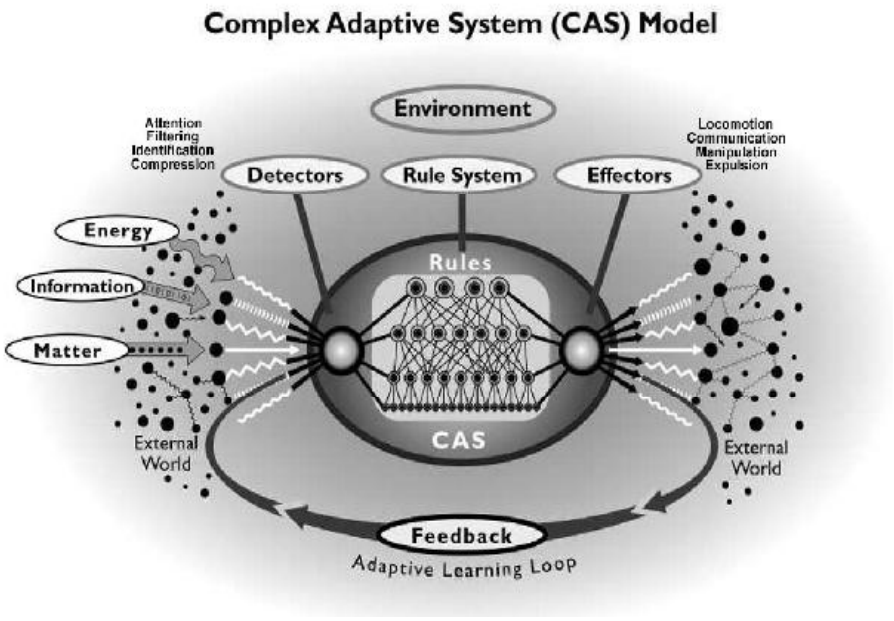
> "That people in organisations tend to self-organize around the production, diffusion, and use of knowledge; and that the collective behaviour they [people] display as they do so have pattern-like regularity to them"

(Source: Macroinnovation Associates LLC, 2003, www.macroinnovation.com)

Frequently citing the work by Stacey and Holland, it is evident that much of the thinking behind TNKM is rooted in complexity theory, and particularly its associated body of

knowledge known as complex adaptive systems theory (CAS). Complexity theory is the "study of emergent order in what would otherwise be disorderly systems" (McElroy, 2000 p.195). According to CAS theory, living systems (e.g. individuals, groups and organisations) are self-organising and they, both individually and collectively, continuously adapt to changes in the environment (Stacey, 1996 cited in McElroy, 2003a). The CAS model is presented in Figure 10.

Figure 10: Complex Adaptive Systems (CAS) model



(Source: New England Complex Adaptive Systems Institute cited in McElroy, 2003a p.36)

In order to adapt and to ensure their continued existence, agents (people) formulate theories and mental models and test such theories and models as part of a problem solving process (McElroy, 2003a). TNKM argues that knowledge (theories and mental models) can be represented by "rules" (beliefs and predispositions) that agents follow in an effort to adapt to their environment (McElroy, 2003a).

In his article titled "Integrating Complexity Theory, Knowledge Management and Organizational Learning", McElroy (2000) offers an exposition of the convergence of

these three "communities". The author (McElroy, 2000) predicts a shift in KM thinking from practices focusing on disseminating knowledge (supply-side KM) towards education and learning, referring to knowledge management as an implementation strategy for organisational learning.

The researcher acknowledges at this point that the preceding discussion does not do justice to the thinking of TNKM about second-generation knowledge management. The ensuing discussion will shed more light on the differences between second and first generation KM, including the stance of TNKM on some of the questions raised earlier in this chapter.

4.3. Key Knowledge Management Issues

The importance of understanding knowledge was discussed in Chapter 1. What remains is a thorough review of those issues that have a direct bearing on the research questions, namely the nature of knowledge processes, defining the boundaries of knowledge management and the concept of knowledge validation. All these aspects are important in the consideration of an application framework for knowledge management interventions, which receives attention under paragraph 4.4.

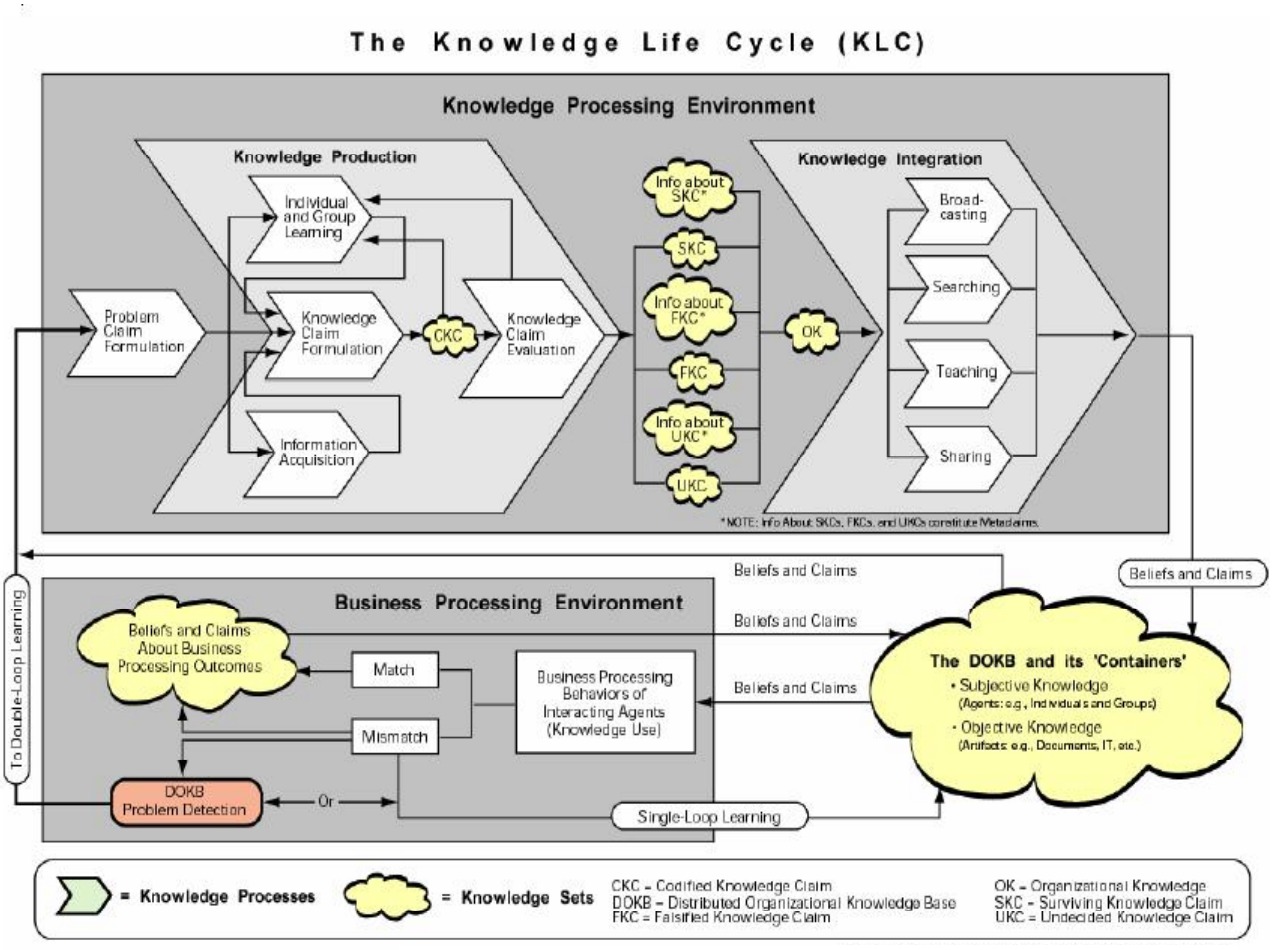
4.3.1. The Nature of Knowledge Processes

Having observed the knowledge management process frameworks proposed by McAdam and McCreedy (1999), Alavi (2000), Martennson (2000) and the European KM Forum (2001) in the previous chapter, certain generic processes common to most knowledge management approaches were presented. The attempt by McAdam and McCreedy (1999) to construct a holistic model (derived from work by Demerest) that incorporates elements from both scientific and social construction paradigms, was also noted. Despite the above efforts, the researcher concludes that a common approach to guide KM interventions is still lacking.

McElroy (2003a), in collaboration with the KMCI, proposes a detailed framework which they label the Knowledge Life Cycle (KLC). A reduced version is depicted in Figure 11 (see Appendix B for full-page view). McElroy (2000 p.7) advises that the KLC is not so

much a model for knowledge management as it is a framework for contextualising other KM models and approaches.

Figure 11: Knowledge Life Cycle (KLC)



(Source: McElroy, 2003a p.39)

Apart from the KLC being regarded as a conceptual framework for understanding how knowledge is produced and integrated in the organisation, the author (McElroy, 2000) notes that the KLC reflects a particular orientation. The latter is described in Box 4-1: Understanding the KLC - Brief Narrative.

Box 4-1: Understanding the KLC - Brief Narrative

- Organizational knowledge is held both 'subjectively' in the minds of individuals and groups and 'objectively' in recorded or expressed form. This is the *Distributed Organizational Knowledge Base* (DOKB) of an enterprise.
- *Knowledge Use* in the *Business Processing Environment* results in outcomes that either satisfy expectations (*Matches*) or fail to do so (*Mismatches*).
- *Matches* reinforce knowledge previously used, thereby leading to its re-use.
- *Mismatches* initially lead to adjustments in Business Processing behavior based on choices made from within a range of pre-existing knowledge in the DOKB – this is *Single-Loop Learning* (Argyris and Schon).
- Successive failures from single-loop learning to produce matches in expected or desired outcomes leads to doubt about and/or rejection of pre-existing knowledge (problem detection), thereby triggering *Knowledge Processing* efforts to produce and integrate new knowledge – this is *Double-Loop Learning* (Argyris and Schon).
- *Problem Claim Formulation*, an attempt to learn and state the specific nature of the detected knowledge gap (or "problem"), is a precursor to *Knowledge Production*.
- New *Knowledge Claim Formulation* follows in response to validated problem claims, with input via *Information Acquisition* and *Individual and Group Learning*, all under the influence of content contained in the current DOKB.
- New knowledge claims are tested and evaluated via *Knowledge Claim Evaluation* using a variety of criteria.
- *Knowledge Claim Evaluation* leads to: (1) *Surviving Knowledge Claims* (i.e., new Organizational Knowledge), *Falsified Knowledge Claims*, or *Undecided Knowledge Claims*, and also produces *information about* each of these outcomes, or *Metaclaims (*altogether, 6 types of outcomes).
- The record of all such outcomes, both the claims themselves and their corresponding metaclaims, become part of the DOKB via several means of *Knowledge Integration*, a mix of 'push' and 'pull' methods, along with the active response of agents to *Knowledge Integration* communications and activities.
- Once integrated into the DOKB, claims and metaclaims become subject to use in *Business Processing*.
- Experience gained from the use of knowledge contained in the DOKB gives rise to new claims and metaclaims regarding knowledge validity and value. The resulting *Beliefs and Claims About Business Processing Outcomes*, in turn, change the DOKB's content and determine its growth.
- The cycle repeats itself endlessly.

(Source: Firestone and McElroy, 2003b, www.macroinnovation.com)

McElroy (2003a) emphasises the need to draw a distinction between the *business processing environment* and the *knowledge processing environment*, clearly depicted in the KLC in Figure 11.

In the business processing environment, according to McElroy (2003a), knowledge is expressed in the day-to-day work performed by people, e.g. business processes. Thus, work can be considered "knowledge in use" or procedural "know-how", informed by declarative, "know-what" knowledge, e.g. strategies and expectations. From time to time,

people at work are faced with problems and/or opportunities, facing uncertainty about what course of action to take. The uncertain state of affairs prompts people to step outside the business processing environment in search of a solution to what is referred to as an epistemic problem. At this point, people who have detected the epistemic problem, effectively gear themselves for learning as they enter the knowledge processing environment to participate in producing knowledge in an attempt to solve the epistemic problem. The learning process thus triggers an iteration of the KLC, starting with problem detection, to problem formulation, into knowledge production (including the sub-processes such as individual and group learning, acquiring information, formulating knowledge claims, evaluating various knowledge claims) and deciding on an appropriate course of action to be integrated into the organisation and its business processes via a range of sub-processes (McElroy, 2003a).

After a comprehensive literature search, the author is convinced that the KLC, as proposed by TNKM is a logical and robust framework, and perhaps the only one that makes sense. It has a sound theoretical basis, anchored in systems theory, and more specifically complexity theory. It has strong ties with organisational learning, intellectual capital, innovation theories and other prominent management and social science theories. Its appeal lies in its simplicity and logic; the KLC is intuitive.

4.3.2. Defining the Boundaries of Knowledge Management

Once the important distinction has been made between the knowledge and business processing environments (see Figure 12), the role and status of knowledge management becomes clear. TNKM (McElroy, 2003a p.10) subsequently defines knowledge management then as:

> "a management discipline that seeks to have an impact on knowledge processing [knowledge production and knowledge integration]".

In light of this, TNKM's view of KM is not one that manages knowledge for its own sake, but to manage those processes that produce and integrate knowledge. To illustrate this point, Firestone and McElroy (2003c p.13) proposes a three-tier KM model, as depicted in Figure 12.

Figure 12: Tree-Tier KM Reference Model

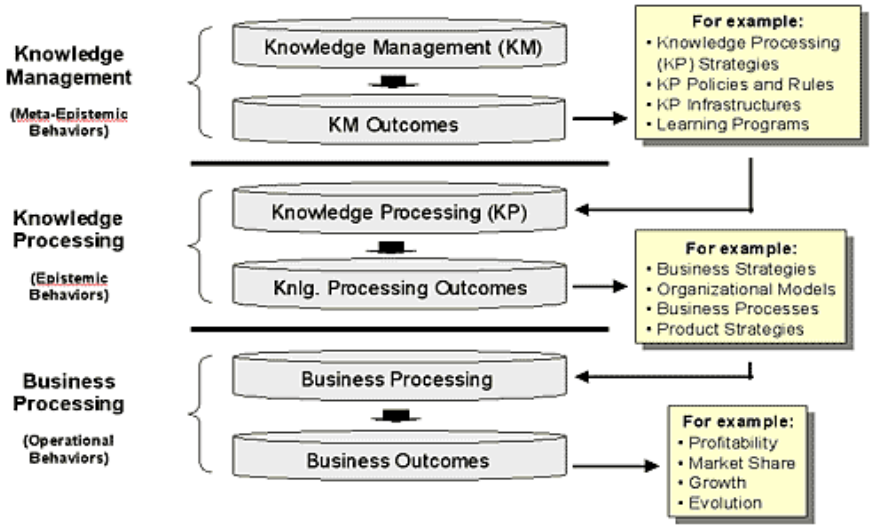


Figure 1 - Three Levels of Behavior in a Firm

(Source: Firestone and McElroy, 2003a:313)

The implications of the reference model in Figure 12 are significant for how we understand knowledge management and where we position it in the organisation. Its underlying assumptions challenge the current status of organisational strategy and the notion that knowledge management is subservient to such strategy. Instead of relying on business strategy as the primary point of reference for knowledge strategy, TNKM views organisational strategy itself as a product or outcome of knowledge processing (Firestone and McElroy, 2003a). This view also challenges current KM literature (Zack, 1999; Tiwana, 2000; Sunassee and Sewry, 2002) which argues for KM strategies and initiatives to fit in with company and business strategy. KM's role, according to Firestone and McElroy (2003a), is to ensure the quality and performance of knowledge processing behaviours, not business processing behaviours.

4.3.3. Validation and Evaluation of Knowledge Claims

The notion of knowledge evaluation and validation refers to questions such as "who makes the knowledge around here?" and "whose opinion matters?" A special area of interest within TNKM, referred to as the "Open Enterprise", explores such matters (McElroy, 2003a). The "openness" of the organisation relates to who participate in the

knowledge production process. Drawing again on complexity theory, McElroy (2003a) notes that, in their basic form, organisations as human systems are essentially open. Many organisations start off politically "open", however, there comes a point where bureaucracy starts to dictate who participates in what. Inevitably, management or other power formations often hijack the knowledge-making process, excluding others.

McElroy cites the work done by Popper in this regard. According to Popper's notions of "open society" and "critical rationalism", all knowledge is fallible and should be open to scrutiny (Popper, 1998 cited in McElroy, 2003a p.21). Notturno (2000), cited in McElroy (2003a p.21), eloquently captures the concept of "openness":

> "We are rational to the extent that we are open to criticism, including self-criticism; and the extent to which we are willing to change our beliefs when confronted with what we judge to be good criticism".

The above concept has direct relevance to the way business is performed. Can employees be truly creative and innovative if there is a good chance their ideas will be summarily dismissed by management? Research conducted over many years by Argyris (1991), indicates that most managers fare poorly when their ideas or knowledge are challenged by others.

In his critique of TNKM, Grey (2003) accuses Firestone and McElroy of idealism and unnecessarily complicating matters, particularly referring to the notion of knowledge claim formulation and validation as being an expensive way of arriving at knowledge where in practice this can be achieved through intuition and "gut feel". He (Grey, 2003) further asserts that the advocates of TNKM equate knowledge with truth, and in doing so, show disregard for the notion that knowledge is socially constructed. Both Firestone and McElroy (2003d) refuted this criticism, stating that the concept of "fallibilism" is well acknowledged in TNKM literature, an observation that the researcher can also verify.

4.4. An Application Framework to Guide Knowledge Initiatives

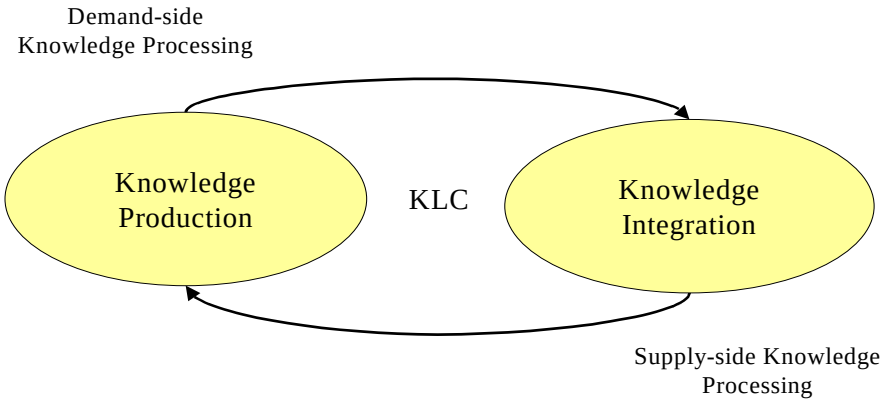
The key to successful knowledge management, or as TNKM sometimes reluctantly puts it, knowledge processing management, lies in the challenge to operationalise it. TNKM

believes it has developed a sound framework in the KLC to steer an organisation's knowledge management initiatives. McElroy (2003a) advocates a number of steps towards operationalising knowledge management. These are discussed below.

4.4.1. Describing the Current Knowledge Processing Environment

Firstly, the organisation has to describe its current knowledge processing environment in order to form an opinion about how well the current cycle is serving the needs of the organisation, including its strengths and weaknesses. Having discussed the KLC elsewhere, this step refers to characterising the present status of knowledge production and knowledge integration. McElroy (2003a) uses an abbreviated KLC to illustrate this, depicted in Figure 13.

Figure 13: Supply-and-Demand-side Knowledge Processing



(Source: McElroy, 2003a p.57)

In order to characterise the knowledge processing environment, McElroy (2003a) suggests that, the current behaviours and practices relating to each of the current knowledge processes, depicted in Table 4, must be explored and documented, including the consideration of background factors (also referred to as structural factors) likely to affect knowledge processing.

Table 4: Knowledge Processes and Sub-processes

Policy Area	Dimension / Practices
Background Factors (Structural factors relating to the make-up of the organisation)	• Ethodiversity (different world views) • Connectedness • Criticalist Attitude in Knowledge Processing • Knowledge Entitlement (Attitudes & Behaviours)
Demand-side Knowledge Processing (Knowledge Production)	• Problem Claim Formulation (including Problem Recognition) • Individual Learning (including Community of Inquiry formation) • Group Learning (including Community of Inquiry formation) • Information acquisition • Knowledge claim formulation • Knowledge claim evaluation
Supply-side Knowledge Processing (Knowledge Integration)	• Broadcasting • Searching/Retrieving • Teaching • Sharing

(Source: Adapted from Macroinnovation Associates LLC, 2003, www.macroinnovation.com)

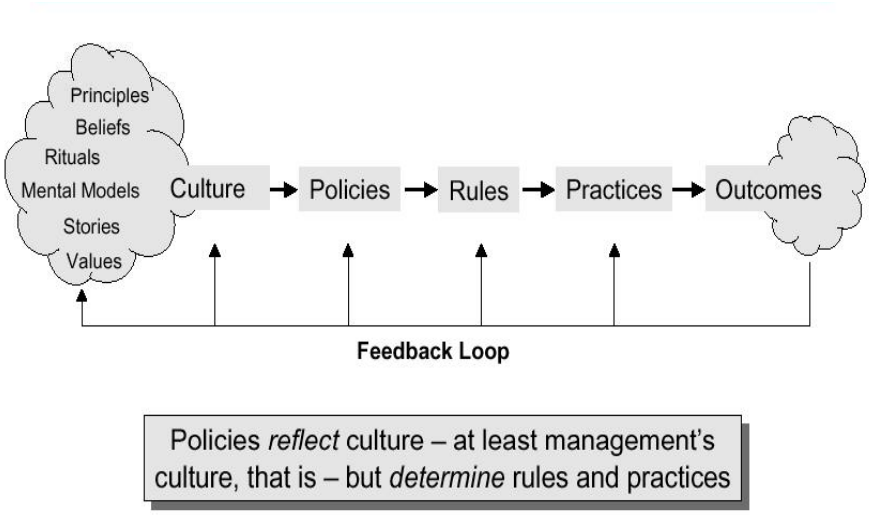
Referring to the contents of the above table, the stages contained in the KLC are evident. The background factors, sometimes referred to as structural factors, do not strictly form part of the KLC but can be regarded as having moderating effects on knowledge processing behaviours, namely the creation and integration of knowledge.

4.4.2. Policies and Rules Affecting Knowledge Practices

Once an understanding of the knowledge practices have been obtained, the underlying policies and rules can then be inferred or discovered. McElroy in association with Macroinnovation (2003a) developed a methodology to assist in this discovery, referred to as the PSM (Policy Synchronization Method). Based on the two assumptions of TNKM referred to earlier, namely that human systems are self-propelled and the notion that they exhibit pattern-like behaviour, McElroy (2003a) asserts that individual behaviour is

positioned “downstream” from an organisation’s culture, which influences policies and rule sets. The relationships expressed here are demonstrated in Figure 14.

Figure 14: How Policies influence Behaviour



(Source: Macroinnovation Associates LLC, 2003, www.macroinnovation.com)

McElroy (2003a), supported by CAS theory, further asserts that, given the self-organising nature of human systems, management is advised to do what they do best, namely identify, design, align and manage policies and programmes with the intention to support what comes naturally (knowledge processing), without management’s involvement .

4.4.3. Develop a Target Knowledge Processing Environment

McElroy (McElroy, 2003a) refers to the first two phases described above as the organisations’s knowledge operating system (KOS). Once this has been mapped, the organisation needs to develop its target knowledge processing environment reflecting the organisation’s views about how its knowledge processing capacity could be improved. Here, McElroy (McElroy, 2003a) embraces the theories behind intrinsic learning and intrinsic motivation, suggesting that people learn what they want to learn because they want to know it, not because management says so. McElroy (2003a) argues that an understanding of intrinsic learning and motivation of people in the organisation is

necessary for crafting policies and programmes that are aligned with such underlying motivations.

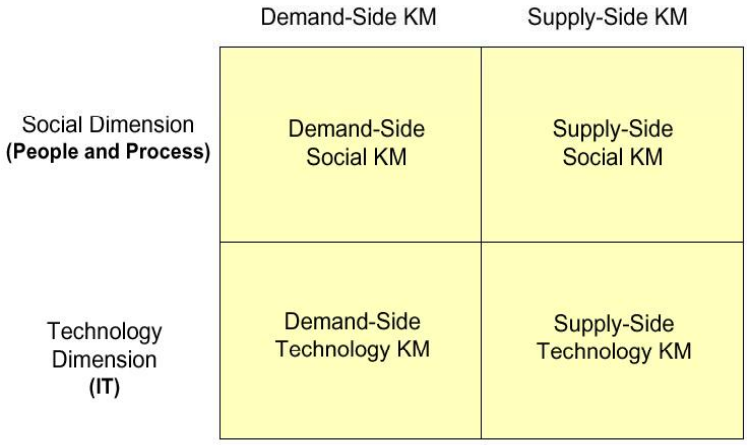
4.4.4. Performing a Gap Analysis

From the preceding discussion, the organisation will have identified gaps that exist between the current and desired (target) knowledge processing environments. These gaps will subsequently feed into the design of a knowledge intervention.

4.4.5. Designing the Knowledge Processing Intervention

Finally, the organisation will have to decide on the kinds of interventions that will bridge the gap identified earlier. Following the KLC as a framework, McElroy (2003a) makes a distinction between supply-side and demand-side approaches to managing knowledge processes. This leads TNKM to draw a further distinction between so-called technology-based and socially oriented interventions. The author (McElroy, 2003a) argues that, knowledge processing is fundamentally a social process that can be supported by technology, where and when appropriate. The matrix, depicted in Figure 15, captures McElroy's views on the above.

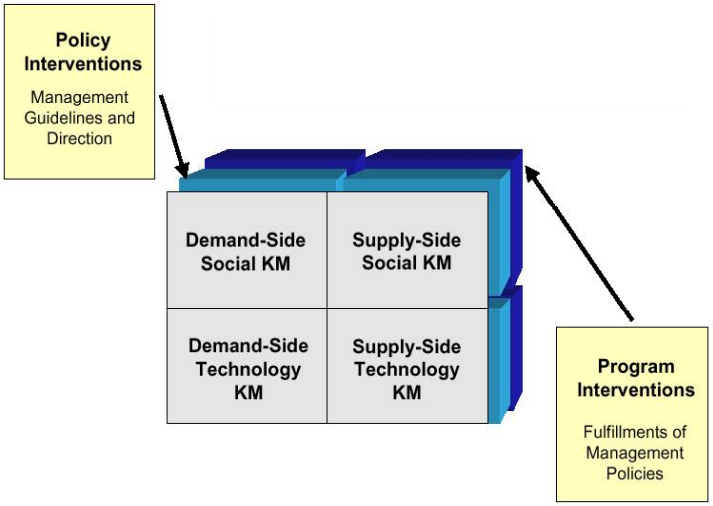
Figure 15: Knowledge Management Strategic Framework



Source: McElroy (2003a p.59)

In order to answer the question: "how can management influence knowledge behaviours and practices in each of the four areas?" as depicted in the matrix, McElroy (2003a) suggests two types of interventions that will have a causal impact on behaviour, namely policies and programmes in both the technology and social dimensions. This is presented in Figure 16.

Figure 16: Policy vs Programme Interventions



Source: McElroy (Source: McElroy, 2003a p.228)

Policy interventions reflect management intentions (what management "says") and desires about how knowledge should be created and disseminated throughout the organisation (McElroy, 2003a). Closely aligned with policies are programme interventions; these are "action-oriented" attempts by management to fulfil the policy or intentions (what management "does"). For example, if management desires that all individuals must be knowledgeable about a certain process or technology (policy), management needs to ensure that opportunities are created for individuals to attend training courses, workshops, etc. (the programme), and that the policies and programmes are aligned with each other as well as with the self-organising knowledge behaviours of people in the organisation.

Nowe (2003), having reviewed McElroy's work, states that the application framework, also referred to as the Policy Synchronization Method (PSM), is not that practical and is simply too unrealistic to be of real value to knowledge practitioners. Nowe (2003) asserts that the supply/demand distinction made by TNKM as well as the movement's critique of misguided technology solutions, is nothing new in knowledge management thinking. She (Nowe, 2003) further adds that McElroy's work lacks theoretical grounding. Lichtenstein (2003) disagrees with the above critique, stating that McElroy "connects deep theory with cogent practice, bringing the entire discipline to a new level". In his editorial review, Petzinger (Petzinger 2003 cited in McElroy, 2003a, unnumbered) refers to McElroy as "the new guru of knowledge management", stating that his (McElroy's) work "provides the most coherent framework for understanding how information becomes knowledge". Allee (Allee, 2003 cited in McElroy, 2003a unnumbered) supports Petzinger's sentiments, stating that McElroy "weaves together a solid and comprehensive framework for knowledge management professionals"

4.5. Conclusion

At this stage, it should become clear to the reader that the above ties in closely with the research questions defined in Chapter 1. In the chapter it was proposed that an audit or assessment be conducted of an organisation's **knowledge processing environment and knowledge processes**. This includes understanding how knowledge is created and integrated within the organisation. It is therefore useful to re-visit some of the key points raised in the literature study.

It is widely acknowledged that a company's competitive advantage, particularly in a global setting, lies in its ability to exploit valuable knowledge, both inside the firm and in the market place. To do so, the organisation has to understand what is meant by the term knowledge, and how it is constructed. Knowledge management has been associated with the task of transforming the enterprise into a knowledge-based organisation. This turned out to be a formidable challenge for a discipline that in many respects is still immature.

In the absence of a uniform definition and a framework of substance, the traditional knowledge management school focuses on sharing existing knowledge (supply side KM) making extensive use of technology to capture, codify, store and distribute "knowledge".

By embarking on different projects under the KM label, e.g. data mining, document management, group decision support systems, etc. its advocates often confuse themselves and the business community about what the new discipline has to offer and what it stands for. Conventional knowledge management, the researcher observes, has failed to distinguish between concepts such data, information and knowledge. Traditional KM also assumes that knowledge already exists within the organisation; the right knowledge must be made available to the right individual at the right time (also referred to as JIT Knowledge).

New Knowledge Management thinking on the other hand is concerned with demand-side knowledge creation in addition to supply-side knowledge integration. It is said that to understand the knowledge that exists in an organisation, one has to look at current practices, for example, business processes and procedures such as procurement, marketing, manufacturing, etc. The thinking is that a business process is really an expression of knowledge. Work is therefore referred to as knowledge in use.

Second-generation KM and its variant, New Knowledge Management, has been shaped by work done in the areas of Complexity Theory, Complex Adaptive Systems (CAS), Organisational Learning, Intellectual Capital, and other disciplines. Central to such thinking is the notion that knowledge is created as part of a social process (people talking to each other, testing each other's arguments and knowledge claims.) This all happens automatically, and without involvement from management. In other words, people learn because they want to learn and not because management says so. Thus, knowledge created in the process is created because of problems that persist in the business environment (e.g. business processes), and individuals' eagerness to solve such problems. Individuals form informal groups to share their thoughts with others who have similar passions. Organisations cannot manage such processes; it is self-managed, and it is a social process.

The role of management is therefore to create an environment conducive for knowledge processes to flourish. This occurs through the introduction of policies and programmes by management supporting self-propelled knowledge processes. It is vital that such

programmes and policies are aligned with each other and with the knowledge practices and behaviours of people in the organisation.

Chapter 5 focuses on the specific research approach and methodology followed. Many of the ideas underlying second-generation KM and particularly that of TNKM are incorporated into the design of this research.

CHAPTER 5

5. Research Methodology

> "In spite of healthy warnings, to those of us who are proponents of case study methods, there is no more satisfying or enjoyable way to carry out management research, and there are several clear advantages."
>
> (Source: Harrison, 2002:158)

5.0. Introduction

In Chapter 1 it was noted that the purpose of the study is to conduct an audit or assessment of the knowledge processing environment within an organisation including the key knowledge processes operating within such an environment. Research questions 1 and 2 relate to the rationale for such an assessment as well as the methodology to be followed to conduct such an assessment. In addition, this research attempts to identify those current knowledge practices and behaviours and how these are influenced by policies and programmes. A fourth question is concerned with the relationship between the knowledge processing environment and the business processing environment, particularly how knowledge behaviours support business processes.

The rationale for assessing the knowledge environment was discussed throughout the literature study and is not covered in this chapter. This chapter is mainly concerned with research question 2, namely the methodology followed in conducting the assessment. The ensuing discussion is outlined below.

Firstly, the researcher motivates why a case study was selected as the preferred research strategy. Next, background information is provided about the case itself, and the selection of participants in the study. A detailed discussion follows about the data collection methods used. These include, amongst others, the design and administration of

semi-structured and unstructured interviews to elicit knowledge practices, policies and programmes in the organisation, a survey of social networks, and a focus group discussion to ascertain how the organisation, given a business processing environment, engages in knowledge processes.

Next, the researcher describes the techniques used to analyse data collected, and discusses the problems experienced in this regard. The researcher faced a number of ethical issues and these are noted. Finally, a critique is provided regarding the research methodology followed.

5.1. Research Paradigm

The researcher operates within a hybrid post-positivist/non-positivist paradigm believing that knowledge is primarily socially constructed; all knowledge is fallible; there is no real truth. As a result, the approach is mostly descriptive and interpretive. The researcher believes knowledge constitutes ideas and claims that have been subjected to validation from others and ourselves. Those evaluations are subjective themselves. While the data is mostly qualitative, the flexibility of a case study approach afforded the researcher the opportunity to make use of both quantitative and qualitative methods.

5.2. The Case Study as Research Strategy

A case study approach was used as preferred research strategy. The primary motive in opting for a case study approach is directly related to the nature of the research questions stated above. According to Yin (1994 p.9), a case study is likely to be an appropriate research strategy when "a how or why question is being asked about a contemporary set of events over which the investigator has little or no control". Referring to the research questions above, it ought to be clear that that this research lends itself to a case study approach. The researcher is interested in exploring and understanding how a knowledge process assessment can be implemented within an organisation or business unit, and to understand how policies and rules impact on current knowledge practices and behaviour. Similarly, the researcher has no intentions to intervene or influence either the knowledge processing environment, or the business processing environment with action-oriented strategies.

Both Yin (1994) and Harrison (2002) observe that various research strategies are not mutually exclusive and it is quite possible for a survey to be part of a case study. The researcher opted for a flexible strategy that includes an array of methods such as document scanning, surveys, interviews, focus group discussions and direct observation.

Yin (1994 p.9) offers the following definition: "A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly defined." Harrison (2002 p.158) adds to this, stating that case studies are appropriate where the "theory base is weak and the environment under study is messy". The literature on knowledge management has highlighted the "messy" nature of the discipline. The definitions and basic assumptions of KM are continuously being questioned by the academic and business communities. Despite contemporary claims, the KM community on the whole has been slow to produce a uniform framework grounded in solid theory for initiating knowledge strategies.

5.3. Background about the Case and Selection of Participants

As part of the initial research design, the researcher hoped to conduct the case study research within the Department of the Treasury in the East Cape government. After an initial start, the researcher withdrew from the above project. This however served as a pilot project as discussed later.

The researcher decided to use the small Information Technology department on the East London campus at Rhodes University in East London, South Africa for the purposes of the case study. The IT department is responsible for maintaining the campus infrastructure, including end-user support to students, administrative staff and academic departments.

This choice was largely influenced by convenience factors and a small personal budget (no external funding was available for this research). Given the fact that the researcher is an employee at the same institution, the IT department and its employees are known to

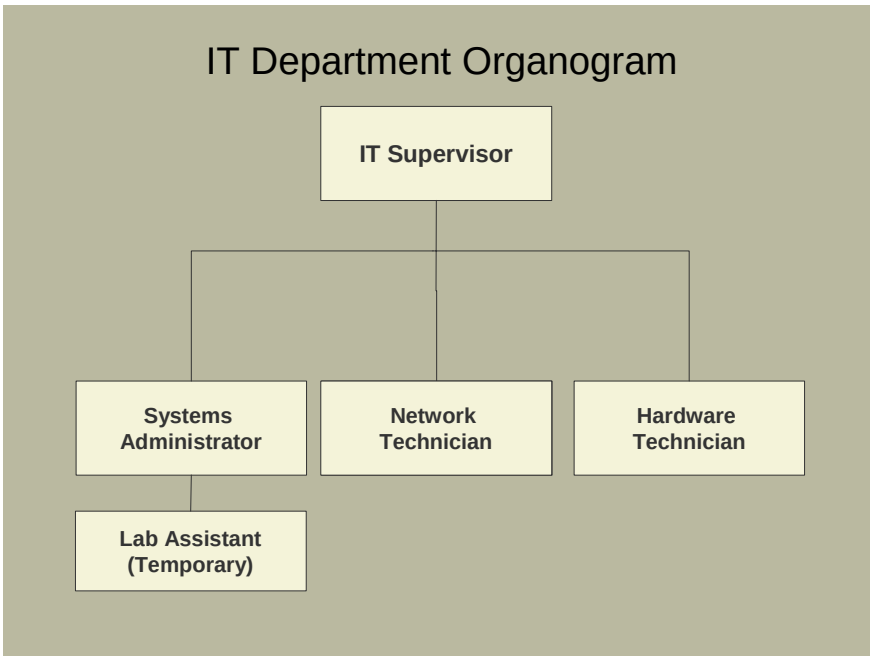
the researcher. Such familiarity has positive as well as negative implications associated with it; positive because of convenience and a degree of familiarity with the work and staff of the IT department; negative because of the associated biases on both sides (researcher and respondents).

As one of the many users of the IT technology infrastructure at the campus, the researcher's familiarity with the IT department's work and its employees was always going to be challenging. Trust is important and the researcher had to ensure that absolute anonymity prevailed. As entry strategy, approval was obtained from management of the IT department and the director of the East London campus. The researcher called a meeting involving all staff members to explain the purpose of the research. Assurances were given to members that all interviews and surveys would remain anonymous and that participation was strictly on a voluntary basis. To manage bias, neutral venues were organised for conducting interviews and focus group discussions. Approval was obtained from all respondents regarding the use of a tape recorder.

It should be stated, firstly, that the researcher did not view the IT department as being any different or distinct from other cases. The selection of the specific case is thus secondary to the research purpose, the latter which is to understand how the knowledge processing environment and related knowledge processes can be assessed. Stake (2000) calls this type of case study where there is no intrinsic interest in the case itself, an *instrumental case study*.

The size of the IT department made it possible for the researcher to involve all employees (depending on availability) in the study. The department comprises of an IT supervisor, one systems administrator, one network technician, and a PC technician. In addition, the department employs the services of a laboratory assistant, who works on a part-time basis during academic terms. The small organisational structure is presented in Figure 17.

Figure 17: IT Department's Organisational Structure



5.4. Data Collection

Insofar as approaches to data collection and data analysis is concerned, Yin (1994:13) regards the case study as a comprehensive research strategy that: "… relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result, benefits from the prior development of theoretical propositions to guide data collection and analysis."

To further emphasize the above sentiments expressed, Yin (1994) constructed the following table (see Table 5) that guided the researcher's decision as to the most appropriate sources of evidence for the case study

Table 5: Sources of Evidence - Strengths and Weaknesses

Source of Evidence	Strengths	Weaknesses
Documentation	Stable, unobtrusive, exact, broad coverage	Retrievability, bias selectivity, reporting bias, access
Archival records	Same as documents Precise and quantitative	Same as documents, accessibility

Table 5: Sources of Evidence - Strengths and Weaknesses		
Source of Evidence	**Strengths**	**Weaknesses**
Interviews	Targeted, insightful	Bias due to poorly constructed questions, response bias, inaccuracy due to poor recall, reflexivity
Direct observation	Reality, contextual	Time consuming, selectivity, reflexivity, cost
Participant observation	Same as direct observations, insightful	Same as direct observation, bias due to researcher manipulating events
Physical artifacts	Insightful into culture, insightful into technical operations	Selectivity, availability

(Source: Yin, 1994, p.80)

The main methods used for data collection are discussed below.

5.4.1. Document Survey

It was hoped that some useful documentation would be available to assist the research process. It was initially hoped that documented evidence would be available on business processes, procedures, technology infrastructure and architecture. Due to a lack of documentation, this proved not to be a feasible option.

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5.4.2. Questionnaires and Interviews

In order to gain an understanding of the health status of the knowledge processing environment, e.g. the policies and programmes that impact the knowledge processing practices and behaviour of its members, it was initially decided to administer a survey questionnaire to:

- elicit information about current policies advocated by management and programmes executed by management for each of the knowledge processing areas in the KLC, including background factors impacting on knowledge processing
- elicit practices in respect of each of the knowledge processes in the KLC, including background factors impacting on knowledge processing

The Policy Synchronization Method (PSM) survey instrument developed by McElroy (2003a) and Macroinnovation Associates (2003) was adapted to suit local conditions. The above method was discussed in Chapter 4 under the heading "An Application Framework to Guide Knowledge Initiatives". The instrument went through various iterations following feedback from colleagues and McElroy. The final structure of the questionnaire, titled KPPP for Knowledge Policies, Programmes and Practices, comprised three policy areas, i.e. Background factors, Knowledge production and Knowledge integration. Each of the three policy areas comprise of a number of dimensions (fifteen), most of which corresponded to the processes and sub-processes depicted in the Knowledge Life Cycle (Firestone and McElroy, 2003b). Apart from defining each dimension, the researcher included attributes that describe the dimension. Care was taken to prevent these attributes from appearing as best practices, thus limiting the possibility that respondents could compare their own situation with best practices.

A five-point Lickert scale ranging from a low 1- "No effort" to a high 5- "Excellent effort" was used to rate each of the fifteen dimensions in terms of:

- What management Says about the policy issue in question?
- What management Does about the policy issue in question?
- What people in the organisation do (actual practices) regarding the issue?
- The satisfaction of the respondent with the current state of affairs

In addition, space was provided for comments regarding current knowledge practices in use by the department. A sample from the questionnaire is provided in Table 6 below. For the complete KPPP questionnaire, see Appendix C.

At the start of each interview, respondents were given an overview of the subject area of knowledge management and the instrument, including its structure and purpose. Respondents were then "walked-through" each of the fifteen dimensions, rating and discussing each dimension at a time. Where appropriate, the researcher offered information to clarify the dimension, or to elicit information that was deemed valuable for purposes of the research or to clarify certain aspects. The interviews ranged between one hour and one-and-a-half hours. Interviews were held with all staff of the IT department

including the temporary laboratory assistant. All interviews were recorded on tape, except one in which case the researcher had to rely on interview notes. The record of the interview held with the laboratory assistant was not considered in the findings, mainly due to the individual's position as a temporary employee and lack of understanding of the internal circumstances.

Table 6: Sample from KPPP Questionnaire

A. Background Conditions (Refers to the organisational structure and make-up to facilitate knowledge processing)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	2	3	4	5
A1. Human Characteristics							
Refers to whether an organisation has implicit and/or explicit policies and programmes in place seeking to promote diversity, trust, problem solving ability	• The extent to which diversity in values and worldviews held by members of the organisation is sought, encouraged and appreciated • The extent to which recruitment policies and programmes reflect diversity of values and demographics • The extent to which the range of perspectives and experiences is available to the organisation as it seeks to detect problems and opportunities, and to search for solutions to solve such problems • The extent to which organisational rules instill trust	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

Experience gained through the initial involvement with the Provincial Treasury department served as a pilot study, though this was not planned as such. The original intention was to administer a diagnostic survey using the PSM instrument developed by Macroinnovation Associates and McElroy (Macroinnovation Associates LLC, 2003) and adapted by the researcher for local conditions. Upon addressing the Treasury's top management on knowledge management and the methodology to be used, the researcher quickly realised that the survey instrument proved problematic to individuals not familiar with KM. The questionnaire was given to senior managers in the organisation to complete with the purpose of determining knowledge-based practices in the work environment as well as policy and programmes that support knowledge processes. Initial feedback from some of the managers indicated that they experienced problems completing the original PSM questionnaire, even in its adapted format. Reasons for this lie in the very nature of knowledge management with its abstract and fuzzy concepts. Following the above feedback, it was decided to abandon the survey approach in favour of semi-structured personal interviews, still using the questionnaire. This approach proved more successful.

5.4.3. Social Network Survey

In addition to the KPPP instrument referred to above, a "Social Network Questionnaire" was designed by the researcher and administered to elicit formal and informal social relationships, information and knowledge flows amongst members of the IT department as well as relationships with other external agents (see instrument attached as Appendix D). The researcher also argued that, by analysing social networks among staff members, a better understanding could be gained regarding the patterns of interaction prevalent in the IT department, including practices prevalent in the execution of the various processes in the KLC. This survey instrument is based on the work done by Cross, Borgatti and Parker (2002). The categories explored, including the rationale for each, are presented in Table 7

Table 7: Social Network Types

Nature of Discovery	Rationale

Nature of Discovery	Rationale
Communication Network: The informal structure of an organization as represented in ongoing patterns of interaction, either in general or with respect to a given issue.	To understand the informal structure. It can be particularly helpful to identify sub-groups or cliques that might represent political problems or individual roles in these networks such as highly central parties, isolates and bottlenecks.
Information Network: Who goes to whom for advice on work-related matters.	Just assessing who communicates with whom does not guarantee that the interactions reflect exchanges of information important to do one's work. Particularly in efforts that require a collective to effectively pool its knowledge (e.g., new product development), it is important to understand the effectiveness with which a group traffics in information.
Problem-Solving Network: Who goes to whom to engage in dialogue that helps people solve problems at work.	Interactions with other people help us think about important dimensions of problems we are trying to solve or consequences of actions we are considering. Strong problem solving networks often ensure that people are solving the right problem thus improving both individual and network performance.
Know Network: Who is aware of whose knowledge and skills.	Awareness of what someone else knows dictates whether and for what problems you are likely to turn to them for help. Strong knowledge networks are an essential basis for strong information networks.
Access Network: Who has access to whose knowledge and expertise.	Just knowing someone has relevant information or knowledge does not guarantee that they will share it with you in a way that is helpful. A strong access network is often critical to ensuring effective information sharing and problem solving in a sufficiently timely fashion.

Nature of Discovery	Rationale

(Source: Cross, Borgatti and Parker, 2002 pp.42-43)

Questions obtained from Cross et al (2002:42) were used to construct the questionnaire. The social network analysis survey containing eleven questions was administered to all members of the IT department. Respondents were instructed to rate their own interactions with each other member of staff on a five-point Lickert scale, ranging from a low 1 "Never" to a high 5 "Always". Communications with external agents were included in the survey. Responses to question 11 were not considered in the results. One completed questionnaire was returned to the original respondent for verification, another was rejected due to erroneous feedback. With the above data available, the researcher was able to map responses.

There is sophisticated software available for representing social network data. However, due to budgetary constraints, the researcher had to rely on what was available at the time, namely graph tools within Microsoft Excel.

How to interpret the social network data?

The responses are depicted using a radar-type chart. Each chart displays values relative to the centre point of the graph, representing the low end of the five-point scale. The scale ranges from 1-never to a 5-always. Each respondent was assigned an alphanumeric code ranging from A to E, including the external source, depicted as "Ext" on the legend. Particular questions are represented as numbers and are combined with the respondent's code. A2 should thus be read as respondent A's response to question number 2. Each respondent's network activity and reach is represented by a different coloured line and points on the grid. The grid itself is depicted in grey. Finally, when evaluating a particular respondent's network communication, the reader should start from the code, e.g. A2 and work down the axis (e.g. scale) to the first intersection of an individual person's coloured line.

5.4.4. Focus Group Discussion

It was important for the researcher to explore the relationship between the knowledge processing environment and the business processing environment. To do so, it was necessary to focus on a business process within the organisation or any prominent form of knowledge and then to apply the KLC to the business process. The researcher was faced with two options, namely:

- firstly, to decide on a suitable business process and then to conduct interviews with staff to elicit knowledge practices in respect of each of the knowledge processing areas pertaining to that specific process
- alternatively, to facilitate a workshop/focus group discussion in which the participants jointly identify a business process before "stepping-through" the KLC for that specific business process

To achieve the above objective, the researcher decided to facilitate a two-part workshop, firstly to identify a suitable business process, and secondly to "walk-through" the Knowledge Life Cycle (KLC) developed by Executive Information Systems and McElroy (2003b). The above provided a framework that allowed the researcher to elicit practices (past, current and future) within the organisation for each of the knowledge processes and sub-processes in the KLC. This exercise must be viewed against the backdrop of the organisational policy and programme environment for it is this environment that determines the knowledge behaviours of the organisation and its members. The method followed at the workshop was inspired by personal advice obtained from McElroy (2003, personal email communications: 8/8; 11/8; 27/8; 1/9; 17/10; 9/12; 11/12; 12/12) and is presented in Appendix F. The proceedings of the workshop were initially recorded on "flip-chart" paper and later transcribed into electronic format.

5.4.5. Observation

Data collected through direct observation constituted a small part of the study. Given the familiarity of the researcher with the case, the researcher could rely on firsthand knowledge and experiences about the functions and environment of the IT department. The researcher observed some of the practices of the IT department over a number of

years, involving dealings with staff on issues relating to laboratory set-up, maintenance matters, and user accounts.

Concluding the discussion on data collection methods, it is argued that the multiple use of collection methods enabled the researcher to cross-check responses. Similarly, the use of the Lickert scale alongside qualitative inputs allowed the researcher to make sense of any large deviations in quantitative data.

5.5. Data Analysis

Yin (1994) proposes that the case study researcher considers the use of four techniques, namely: pattern matching, explanation-building, time-series analysis and programme logic models. As discussed below, not all the suggested techniques were employed.

The size of the case study population made statistical analysis on its own not a feasible option. The quantitative data is thus very sensitive to any bias or even slight deviations in responses. This was a worrying aspect given the complex nature of the questionnaire and the fact that respondents were not familiar with KM concepts. One individual's response impacts strongly on the results, tending to skew overall findings in the data set. The presentation of data in arrays or graphical format did however provide some assistance to identify patterns or trends. Where data is presented in a quantitative fashion, it should therefore not be read in isolation from qualitative data.

All quantitative responses (e.g. Lickert-type scale) were captured in a Microsoft Access database developed for this purpose and analysis was done with the aid of queries and/or pivot table reports in Microsoft Excel. All interviews were recorded with the exception of one respondent. With the aid of the completed questionnaire and field notes each taped recording was played back and individual responses captured in a table using Microsoft Word. The themes used for categorising data were those proposed by the KLC framework, including structural or background factors.

5.6. Quality Issues

Yin (1994) is of the opinion that the four quality tests used in empirical social research, are equally relevant to case study research. These are:

- *Construct validity*; establishing correct operational measures for the concepts being studied
- *Internal validity* (for explanatory or causal case studies only); establishing causal relationships to show that certain conditions lead to other conditions
- *External validity;* establishing the domain to which a study's findings can be generalised
- *Reliability*; showing that the operations, such as data collection procedures, can be repeated

Yin (1994:33) constructed the following table (Table 8) to demonstrate how the case study researcher can employ certain tactics to ensure consistent quality in the research design.

Table 8: Case Study Tactics for Research Design Tests

Quality Test	Case Study Tactic	Research phase used to employ tactic
Construct validity	• Use multiple sources of evidence • Establish chain of evidence • Have key informants review draft case study report	Data collection
Internal validity	• Do pattern matching • Do explanation building • Do time-series analysis	Data collection
External validity	• Use replication logic in multiple-case studies	Research design
Reliability	• Use case study protocol • Develop case study data base	Data collection

(Source: Cosmos Corporation cited in Yin, 1994, p.33)

With the exception of internal validity as a quality measure (relevant for explanatory case study research), the researcher feels confident that the results meet the quality tests proposed above. Having used multiple sources, the three main ones cited above including direct observations, informal interviews and discussions, a sufficient chain of evidence was established. Case study findings for a single case are difficult to generalise, argues Harrison (2002), suggesting that instead, case study findings be generalised to theory.

The researcher is of the opinion that this was achieved. While it is impossible to guarantee replicability in social research, there has to be reliable evidence. In this regard, all evidence collected during the course of the research is available in electronic format. Parts of the draft report were also discussed with some of the participants.

5.7. Ethical Considerations

Various ethical considerations, including taped interviews, the researcher's position in relation to the case study and anonymity were all covered elsewhere in this chapter and will not be repeated here.

5.8. Critique of Research Methodology

The research process was severely hampered by the fact that the researcher had to withdraw from the Department of the Treasury. It has already been mentioned that the selected case, namely the IT department, was small, and ideally the researcher would have preferred a larger population. This made the use of analysis difficult where quantitative analysis techniques were used, albeit for purposes of triangulation.

Concerning data collection methods, the design of the KPPP questionnaire could be improved. Despite improvements to it, the questionnaire in its current form is not very user friendly. It is recommended that the above questionnaire be administered as an aid within an interview situation. The administration of the KPPP questionnaire requires an experienced interviewer to facilitate the process and to supply information to respondents and interviewees when required. It is also recommended that an "importance" rating be added to the KPPP questionnaire allowing the researcher to assess, which issues the respondents regard as important. It would have been helpful if the KPPP questionnaire was administered having a specific business process in mind.

The labels assigned to the Lickert scale and used in the social network survey, need to be redesigned. The descriptions associated with some of the scale values, e.g. "always" and "sometimes" are ambiguous. It is advisable to clearly define what is meant by terms such

as “always”. Does it refer to: three times a week, twice a week, etc? One completed questionnaire was rejected based on the above argument.

Given the problems experienced within the IT department, the workshop worked well when less sensitive issues were discussed, e.g. the mapping of a business process. However, when participants were confronted with issues that related to their specific domains, they were reluctant to provide input. Respondents were, however, quite vocal in the absence of certain individuals.

5.9. Conclusion

Chapter 5 focused mainly on designing a methodology for conducting an assessment of an organisation’s knowledge processing environment; the latter includes the policies, programmes, behaviours and practices evident in the creation and integration of knowledge by the IT department.

The research motivated why a case study strategy was selected. It was argued that the decision to opt for a case study approach was largely influenced by the nature of the research questions. Various data collection methods were considered in the research design. The primary methods used, namely interviews, surveys, focus groups, and to a lesser degree, observation, were discussed. Data collection instruments developed (e.g. KPPP questionnaire) and adapted (e.g. social network questionnaire) by the researcher were presented. In order to analyse the data, the researcher made limited use of quantitative techniques. Most of the data is qualitative in nature and extensive use was made of themes derived from the literature to categorise such data. The researcher has pointed out several shortcomings concerning the specific methodology employed.

The literature survey in Chapters 2 to 4 provided valuable input in the design of this case study. The Knowledge Life Cycle (KLC) adopted by the new knowledge management (TNKM) movement was integrated into the research design. The Policy Synchronisation Method (PSM) by Macroinnovation Associates is closely aligned with the KLC and provided a useful application framework for developing specific data collection instruments and for analysing the data relating to knowledge-related policies programmes and practices within the IT department.

CHAPTER 6

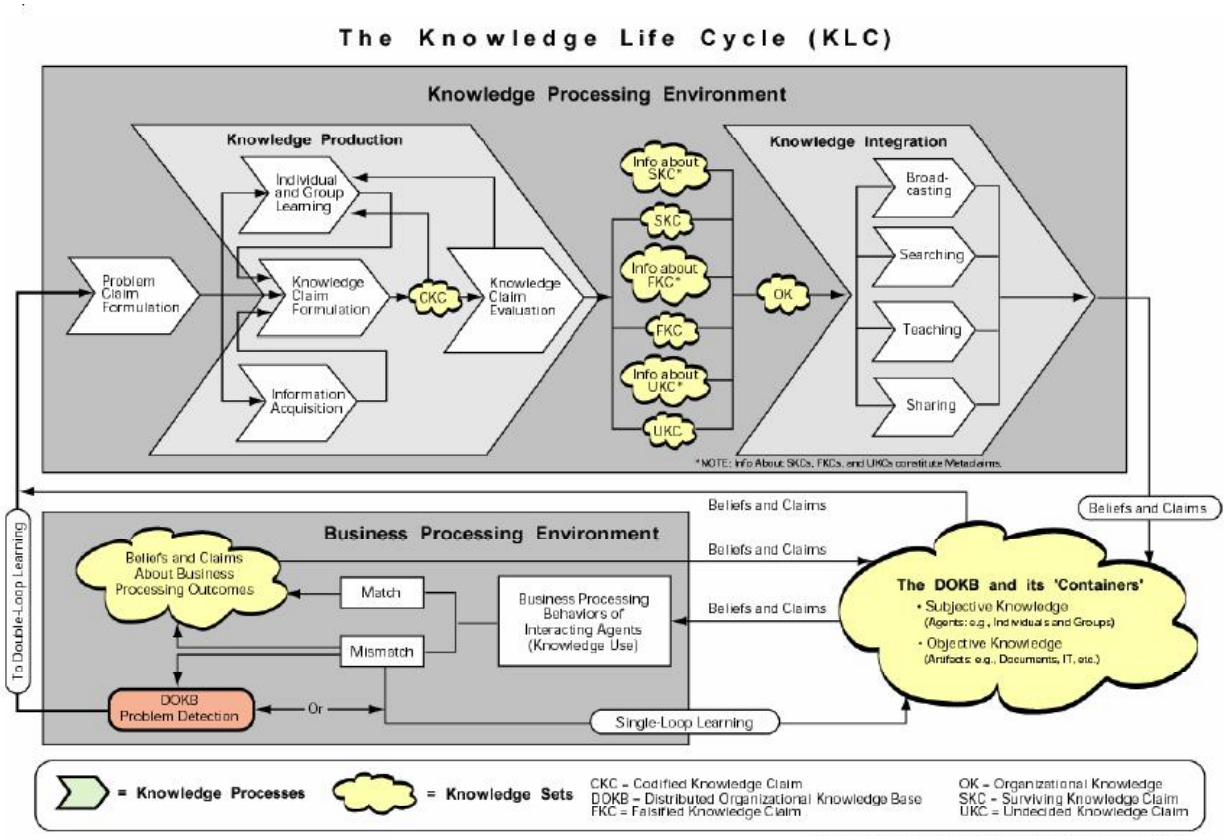
6. Presentation of Case Study Findings

6.0. Introduction

In this chapter the actual knowledge processing practices and behaviours of the IT department are examined. Since this research is particularly interested in assessing how well the department performs at creating new knowledge, in addition to integrating organisational knowledge, the KLC with its various phases serve as a framework. From the above, the policies and programmes affecting such practices and behaviours will be inferred.

In order to provide some kind of structure for the presentation of findings, the KLC referred to earlier is used as a "roadmap" (see reduced KLC in Figure 18).

Figure 18: Knowledge Life Cycle



(Source: Firestone and McElroy, 2003b p.300)

The results of various sources of evidence, e.g. interviews, the social network survey, the focus group sessions and observations by the researcher are all presented in this chapter. In the previous chapter the researcher discussed both the benefits and shortcoming of the methods of analysis used in the research design. Particular reference was made to the dangers associated with applying quantitative analysis techniques to a small case study population.

Firstly, serving as orientation and background, findings of the focus group discussion held with members of the IT department are presented. A particular business process (as performed in the business processing environment) is examined under paragraph 6.1. This allows the researcher to provide a context for other findings.

Secondly, evidence will be presented about those knowledge practices performed and behaviours demonstrated by the IT department staff in the execution of the key knowledge processes, namely knowledge production (6.2.1) and knowledge integration (6.2.2), starting with the recognition and formulation of a problem, the acquisition of information, through the cycle until new knowledge is integrated into the work processes of the organisation.

Thirdly, findings relating to those knowledge practices that deal with human characteristics, connectedness, critical attitude, and knowledge entitlement receive attention in 6.2.3. The findings of the social network survey are integrated with other findings where appropriate.

Finally, as suggested earlier, behaviours and practices are influenced by policies and programmes. Relevant policies will be inferred from the practices identified in the discussion. The findings relating to policies and programmes are presented in 6.3.

6.1. Business Processes in the IT Department

The findings of the two-part focus group discussion held with three respondents of the IT department (one staff member was on vacation at the time), is presented here. In essence, the session covered the following components:

- Identification of a business process in the IT department, the problems associated with that business process and the mapping of the identified business process (in order to understand the business processing environment)
- Stepping through the KLC with the business process in mind, attempting to ascertain the knowledge behaviour of the IT department when confronted with problems in the normal course of events (to understand the relationship between the knowledge processing environment and the business processing environment)

The identification of a business process proved to be a challenge. Having asked respondents explicitly during each interview what business process they would recommend for analysis, in each instance respondents struggled with the concept, "business process". It was only after deliberate prompting and by using examples that respondents started to provide meaningful input. Because of the importance of exploring a business process in relation to the knowledge processing environment, this became a central issue and one that had to be dealt with.

6.1.1. Identifying Current Problems in the IT department

It was felt that an exercise in business process mapping, though secondary to the research question, would assist in clarifying what a business process is in order to ensure that all understood the issue at hand. The researcher facilitated a brainstorming exercise to elicit problems experienced by the IT department. Problems identified by participants are presented in Box 6-1.

Box 6-1: Problems identified during Workshop

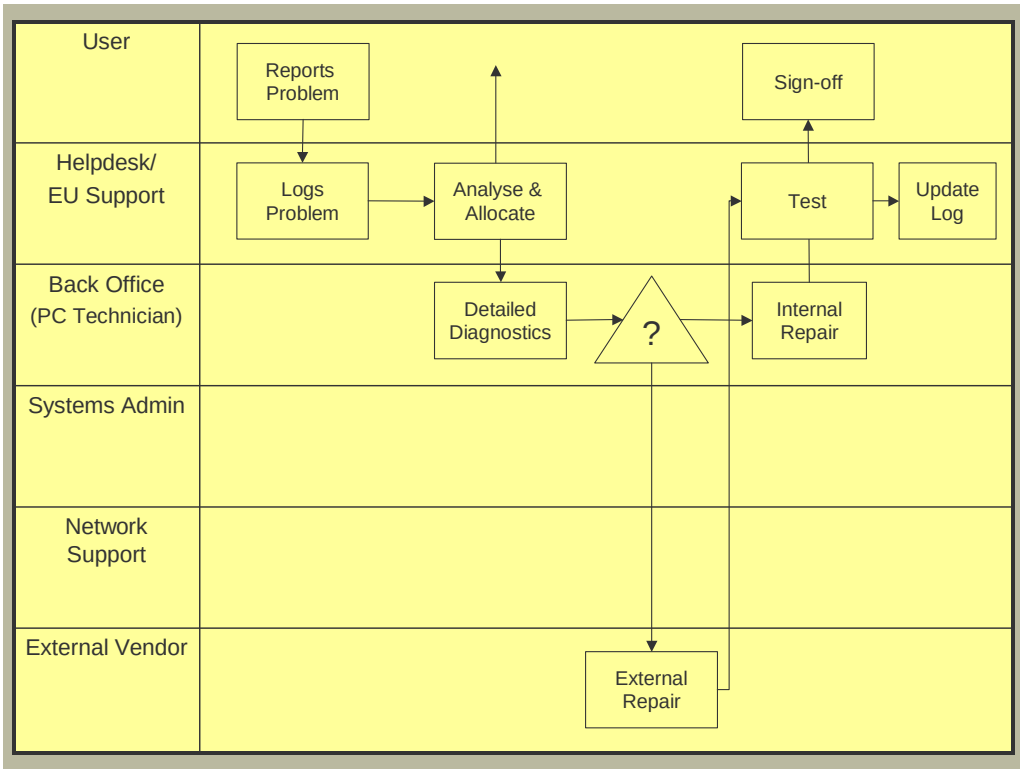
- Lab maintenance (User dissatisfaction due to downtime in Labs)
- E-Mail access/Internet access – intermittent problems, e.g. problems with retrieving lost email
- User ignorance/ education due to lack of training
- Data storage/ access problems due to faulty storage devices, e.g. storage disks
- Telephones (extensions often dead)
- Printers (general maintenance – we outsource repairs, poor service at times)
- Old equipment breakdowns (an ongoing issue)
- Lack of staff (shortage) – impacts on maintenance function & quality of general service levels.
- Lack of funding
- Lack of staff development
- Management stress; effects total service delivery
- Service levels could improve.

Following the above exercise, business processes started to surface. One prominent matter identified during the interviews and again confirmed through the brainstorming exercise, related to activities including processing user requests, error detection, fault tracking and repairs.

6.1.2. Mapping the Business Process

After consensus was reached to explore the above issue further, the researcher facilitated a brief session on business process mapping, using order processing as an example of a business process. Participants were asked to use the mapping methodology explained and to prepare a business process map overnight, to be presented during the second session of the workshop. Two of the three participants, including the researcher, prepared crude process flow diagrams. The diagram depicted in Figure 19 was used to guide the discussions.

Figure 19: Business Process Map – Query/Fault Detection and Error Tracking



To the members of the IT department, a problem constitutes something that is triggered by:

- a user (academics, students and administrative staff) who reports a problem via the automated email-based WebRT system,
- more personal channels such as phone calls or face-to-face interaction, verbal, electronic or written reports by the lab assistant about faulty equipment in the PC labs

In the opinion of the IT department members, a specific problem can often be traced back to user ignorance, lack of IT training, malicious intent by a user, or a genuine fault with the user's PC hardware and software, telephone or other parts of the IT infrastructure, including communications hardware or software. IT staff members are expected to periodically check the WebRT email inbox for any new "jobs". Everyone in the IT department has access to the electronic log of the WebRT system, and depending on the nature of the problem, or the schedule of the member at the time, individuals will attend to a specific query. Each member attending to a query is expected to update the repair log in order to track progress. A daily meeting was instituted to coordinate jobs and schedules and to assign a "job" to a certain individual who will then attend to a particular query. The participants stated that, in 95% of cases, problems identified are solved internally (local knowledge and the skills that exist within the IT department or other departments on campus), without involving an external vendor (e.g. for printer and monitor repairs).

6.1.3. Processes Followed by the IT Department to Solve Current Problems

In order to ascertain the particular processes followed by the department to solve problems relating to the above business process requires applying the KLC to the business process. This was achieved by eliciting problems currently experienced in executing the business process identified above and by stepping through each life cycle stage determining how the organisation solves its problems. Similarly, by asking participants how the process came about, and how is it likely to change, insight (who, how, what, why) was gained about specific practices relating to knowledge creation in the organisation.

Additional findings regarding the business process were extracted from the workshop report (attached as Appendix F) and are presented in Box 6-2.

Box 6-2: Workshop responses relating to a Business Process

- Is the current business process working?
    - Most jobs (95%) can be scheduled internally
    - Competency exists, except for printers & monitors that experience regular breakage and repairs are outsourced
    - A matter of balancing effort, time and cost
    - Balance required between service/maintenance and development/research
- Are you satisfied with the current process?
    - Has been in operation for about five years
    - Generally satisfied:
    - Sometimes equipment supposedly repaired by vendors, but returns faulty?
    - Communication/feedback to user 1 day late, 2 days, etc.
    - WebRT log not always completed by members of department
    - Daily meetings a good idea (but consider the problems referred to elsewhere)
- What did previous process look like then?
    - Phone based
    - Personal contact.
    - No electronic component
    - When out of office, could not take user calls
    - Technology was different.
- Why did previous process change?
    - To become more efficient (e.g. easing load on staff, reduce person-to-person queries)
    - More staff acquired (workload spread)
    - Repairs attended to locally now – previously equipment send to Grahamstown. Now fixed internally or by local vendor
- How will the current process change?
    - Strong management will change status quo
    - Campus expansion as a result of merger with Fort Hare (additional infrastructure, more labs, bigger LAN, etc)
    - More users (anticipating huge growth in numbers of users)
    - Different user profiles (user and staff demographics, needs)
    - Equipment (additional equipment needed or "stretch" current equipment
    - More laboratories – new equipment
    - Staff (likely to get more IT Staff given the changes)
- What are the persistent problems?
    - We experience intermittent problems with logging on to old server - (for no reason); some of us suspected bottlenecks with network
    - Denial that there are problems with network – others blamed server. Ad hoc discussions between two individuals
    - Network issues never gets discussed

The WebRT system serves as a main error detection mechanism, though the department regularly engages with users on a person-to-person basis. The latter, however, is problematic for the department in the sense that this type of communication consumes a

lot of time and is not systematic, compared to WebRT, where faults are logged electronically.

Attending to basic faults and user requests constitute a significant part of the work done by the department. A large part of this relates to operational problems that are often low-level and mundane in nature, but leave little time for self-development and attending to other more serious problems.

Having explored a business process within the department, and keeping in mind the findings extracted from the above, attention now shifts to presenting the combined input from the various sources of evidence.

6.2. Knowledge Practices in the IT Department

6.2.1. Knowledge Production

Firstly, following the flow of the KLC, findings are presented concerning the six areas that affect the production of new knowledge (Macroinnovation Associates LLC, 2003). The six areas are:

- *Problem recognition and problem claim formulation*; refers to the extent to which people participate in problem or opportunity recognition and the articulation of such claims as apposed to adopting a "wait-and-see" approach
- *Individual learning*; concerned with how individuals learn and their freedom to pursue learning agendas of their own choice
- *Group learning*; refers to the extent to which individuals who share common interests and passions are freely forming groups or communities, the latter which enjoy support from the organisation
- *Information acquisition*; concerns the extent to which individuals and groups are afforded access to external information sources as part of the problem solving process
- *Knowledge claim formulation*; refers to the extent to which individual and groups generate new ideas in response to problems and their level of participation in the knowledge processing affairs of the organisation

- *Knowledge claim evaluation*; concerns how new ideas are tested and evaluated in the organisation and whether it is an inclusive and transparent process – "who gets to make the knowledge"

Respondents were asked to discuss and rate their actual practices in each of the six sub-processes of knowledge production. These six processes are clearly depicted in the KLC. The dataset in Table 9 contains the rated responses from individuals pertaining to each sub-process.

Table 9: Knowledge Production - Everyone's actual PRACTICES

Knowledge Production		Everyone's actual PRACTICE					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
B1	Problem Recognition and Problem Claim Formulation		3	1			4
B2	Individual Learning			4			4
B3	Group Learning	1	1	2			4
B4	Information Acquisition		1	2		1	4
B5	Knowledge Claim Formulation		1	2		1	4
B6	Knowledge Claim Evaluation	1	2	1			4
Grand Total		2	8	12		2	24

Relying mostly on qualitative data gathered (Appendix H), the findings pertaining to each process outlined above is discussed.

6.2.1.1. Problem Recognition and Problem Claim Formulation

The IT department relies heavily on the WebRT system, an email-based fault reporting system for error detection, however, faults and problems are also channelled through more conventional means such as telephone and face-to-face feedback from users. There is an expressed preference for most fault reporting to be channelled through the WebRT system as this allows all requests to be logged and communicated to technicians. Despite this, feedback from respondents indicates inconsistencies regarding log reporting and updating by members. Also, no or little trend analysis is performed on the data generated by the WebRT system.

In Table 9, most respondents have indicated that the IT department's general performance in the area of problem recognition and problem claim formulation is poor, a state of

affairs referred to by one individual as a "not-my- problem attitude" (Table 31); yet, in Table 27, some respondents described their ability to detect problems as "good". Responses in Table 27 refer to practices relating to some of the key functions and processes performed by the IT department, namely providing support for the IT infrastructure on the campus. Issues relating to user queries, fault detection and the resolution of such problems dominate the input. The WebRT system features strongly, leading the researcher to believe that the IT department views the above system as the main mechanism for problem detection.

Respondents cited the daily meetings which was scheduled to "detect problems" identified via the automated WebRT system and the routing of such problems to relevant technicians. Not everyone attends the meetings. Some of the respondents stated that Grahamstown IT division effect changes without informing the East London IT department. It was alleged that some individual in the IT department make changes without informing the other staff within the department.

6.2.1.2. Individual Learning

Even though the issue of individual learning was explained to all respondents, it is possible that some respondents confused the concept of individual learning with formal training initiatives or workshop attendance (Table 28). Explicit reference was made to lack of finance, time constraints and lack of staff as factors that inhibit individual learning and growth.

All respondents rated individual learning practices in the IT Unit as "fair" (Table 9). None of the respondents are currently registered for any course, irrespective of the course being aligned with organisational objectives or with the individual's own development needs. Staff members who did manage to "get away" and attended workshops or visited projects are appreciative of the opportunity afforded. The visit by two staff members to Natal University was cited as such a learning opportunity. During an informal interview, the value of such visits was emphasised. One individual stated that, because of the exposure to other laboratories, the East London campus is hoping to introduce similar technology that would allow laboratory machines to perform "self-healing".

There are few indications of individuals pursuing a learning agenda of their own choosing. One respondent noted that, due to the frequency of user problems, and the interruptions as a result, staff members get little time to attend to other less mundane aspects of the work, such as development and planning. The same individual remarked: "sometimes I have to lock myself up to do some work…[there is] no helpdesk [to channel or handle user requests]". The absence of a helpdesk suggests that certain individuals are inundated with personal queries from users. Though two other staff members challenged the notion of a staff shortage, the researcher observed that, due to the peculiar, scattered office arrangement, there might well be justification for an individual to "lock [himself/herself] up to do some work".

One staff member expressed an active interest in fibre optic technology, but finds it difficult or not important to share that passion with others in the department. During an informal interview, it was learned that the individual concerned has taught himself how to fix damaged optic fibre cabling. This was mostly achieved through research done on the Internet and as a result of working together with a colleague from the Grahamstown It division in a mentoring-type arrangement. All this has enabled the individual to resolve a cabling problem recently experienced on campus.

Reference was made to individuals participating in isolated communities of practice, e.g. telephone user groups, but such communities are mostly externally based. Despite the small size of the department, not enough exchange of ideas is taking place. Opportunities to learn are missed regularly, e.g. daily formal meetings and committee meetings, including minutes and workshop reports. Mentoring is not used optimally; certain individuals turn to external sources for information that is available internally.

One respondent disapproved of people "fiddling" with technology while there are user requirements to attend to, also citing that such "fiddling" takes place in a live production environment. This observation could be interpreted in various ways. The fact that "fiddling" happens in a production environment is problematic, and should be managed. However, the fact that experimentation happens at all is positive; it points to practices that individuals engage in to satisfy own learning needs, a practice the researcher believes ought to be encouraged.

6.2.1.3. Group Learning

Observing the data presented in Table 29, there are few indications of individuals who share similar interests and passions. There is hardly evidence pointing to the existence of informal groups, or communities of practice (COP). According to the members interviewed, practices in the area of group learning are rare and the COP phenomenon is almost non-existent. Some individuals feel that the department is simply too small for that. Another stated that there is "no common interest". Evidence suggests that there is a general lack of awareness of what others know, their aspirations and interests. Few members have common interests, and if there is any commonality, members do not share those interests with one another.

There is evidence of individuals participating in external networks and communities, and that such communities serve both organisational and individual needs. Low trust levels inhibit group learning.

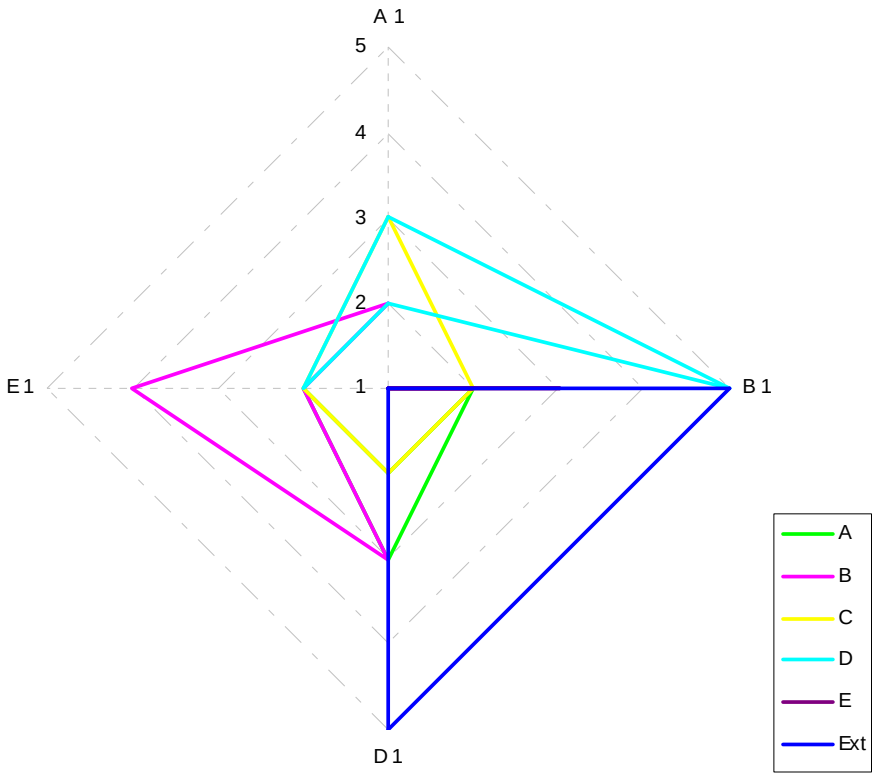
6.2.1.4. Information Acquisition.

Referencing Table 30, one respondent indicated that external liaison is assumed without it being actively promoted by management. Thus, management has no problem with staff contacting external sources. Overall, it appears as if a fair amount of interaction occur between staff and sources outside the department. Sources include virtual discussion groups, Internet usage and personal contacts.

There is ample evidence suggesting that certain members of the organisation regularly reach out to external agents who prove to be important information sources. Certain staff members indicated that they regularly contact external agents for assistance and information. One example noted refers to the results following exposure of two members of staff to projects at other tertiary institutions, and the possible introduction of some of those practices at the East London campus. This suggests that either epistemic problems exist (where current problems cannot be solved by existing knowledge available in the organisational knowledge base) and/or that certain individuals deliberately ignore current knowledge sources that exist in the organisational knowledge base.

This creates a problem for the researcher about either the validity and reliability regarding some of the responses during focus group discussions, or the perceptions among staff about their own performance. Respondents commented that they were fairly happy with the general maintenance function, including the query/fault detection and error tracking process. If it is true that the department can solve 95% of its problems internally, the question can be posed: why is there a need to consult with external agents regarding problems that are not really epistemic in nature? This observation is confirmed by referring to the social network diagram illustrated in Figure 22 on page 94 and again depicted below in Figure 20. Question 1 explicitly refers to the process under discussion, eliciting from individuals who they would talk to, and how often, about the very same process (see Chapter 5, page 65 for instructions on how to interpret social network data).

Figure 20: Communications of staff concerning general IT maintenance, query detection and error tracking



The point made by the researcher is that the need for respondents B and D to "always" communicate with external agents on general maintenance and supposedly low-level problems, is suspicious in the sense that participants in a process that is supposedly

healthy, feel the need to regularly step outside the normal course of events to acquire external inputs.

Nevertheless, external information acquisition is standard practice for at least some of the members in the organisation.

6.2.1.5. Knowledge Claim Formulation

Regarding initiatives that support individuals and groups to actively participate in problem solving and knowledge generation (see Table 31), one individual's comment is noted: "I problem solve myself. The unit sucks – [we] don't debate issues". Another response refers to the state of affairs as "not my problem attitude". Gauging from other responses, there appears to be a perception among certain respondents that some staff do collaborate, and present obstacles in the problem solving process. Responses indicate the absence of policies, procedures and initiatives to support active participation by individuals and groups in solving problems confronted by the department.

There is reason to believe that the IT department has for years found itself out of the natural learning cycle, particularly given the department's relationship with the main campus in Grahamstown. Against this backdrop, and given the current processes and the stated problems, there is little evidence to suggest that active, healthy debates are regular occurrences in the department. The comment by one individual, "We don't debate issues" perhaps summarises the state of affairs. There is evidence suggesting that epistemic problems exist in the department and ideas are generated by staff in an effort to solve such problems. However, inputs by other members of staff are often purposefully excluded denying some an opportunity to learn.

Respondents made reference to a virus incident that was considered by members of the IT department to be an example of a good team effort. There were conflicting views about the efficiency with which the virus incident was handled by the department, but individuals felt that the incident created an opportunity for members of staff to pool and discuss different viewpoints towards a common solution. It constituted an exercise in problem solving in which virtually all the phases of the KLC were followed. This matter is discussed in more detail later on in this chapter.

As a general observation and with specific reference to the proceedings of the focus group discussion, the researcher found that individuals were reluctant to challenge each other's viewpoints and deliberately avoided talking about certain issues raised. This is however not uncommon in open forums like a workshop or other organisational settings. Actual practices employed include extensive "behind the scene" deliberations about other peoples' behaviour.

6.2.1.6. Knowledge Claim Evaluation

Knowledge claim evaluation refers to the transparency and openness with which the department approaches solutions to problems (see Table 32 for responses).

Some alarming comments were made by one individual about a persistent problem relating to a certain part of the IT infrastructure. The respondent speculated that, after confronting another staff member about the problem and possible causes, the concerned individuals PC's became targets for alleged sabotage.

Evidence collected by the researcher suggests that knowledge claims are not tested against set and agreed upon criteria, and certainly not with the full input of others. One respondent described the situation as "[its] not happening". Many knowledge claims are mostly viewed with suspicion, not because they are "weak" claims, but because they are associated with a particular individual. Comments by respondents like "I problem-solve myself" and "not getting enough input – [its like having] a table with [only] two individuals participating" confirm the researcher's observations.

The implications of not participating in knowledge claim formulation and joint knowledge making is that the department cannot bargain on the commitment from various individuals in the department.

6.2.2. Knowledge Integration

Knowledge integration is another integral part of the organisation's knowledge processing environment. Traditionally, the focus of "old school" KM approaches, and referred to by contemporary thinking as technology oriented, supply-side knowledge management,

knowledge integration comprises of the following sub-processes (Macroinnovation Associates LLC, 2003):

- *Broadcasting*; concerns tools and methods for distributing organisational knowledge
- *Searching and Retrieving*; refers to the use of tools for finding and extracting organisational knowledge
- *Teaching*; refers to the extent of and impact of teaching and training programmes in disseminating organisational knowledge
- *Knowledge sharing*; concerns the strategies used by the organisation to distribute organisational knowledge.

Combined responses about practices relating to the four knowledge integration processes are depicted in Table 10. The department's performance was mostly rated as poor or non-existent.

Table 10: Knowledge Integration - Everyone's actual PRACTICES

Knowledge Integration		Everyone's actual PRACTICE					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
C1	Broadcasting	2	1	1			4
C2	Searching and Retrieving		3			1	4
C3	Teaching	3	1				4
C4	Knowledge Sharing		2	2			4
Grand Total		5	7	3		1	16

Each of the four areas is discussed below.

6.2.2.1. Broadcasting

When asked how the IT department communicates internally, one respondent referred to the general email that is broadcast to all staff on a regular basis by campus administration or campus management (Table 33). No explicit mention was made of extensive use of email to communicate internally. Though some respondents credited management for sending out minutes of the campus IT committee, it was stated that these meetings have been irregular. Again, reference is made to the lack of communication in the department.

The above results may seem somewhat puzzling since the unit is not only small, but departmental members control access to IT for the whole campus, while internal

communication appears to be problematic. In a department the size of the IT department, backed by a fairly sophisticated technology infrastructure, including Internet connectivity, email, and servers, one would not expect the distribution of information and knowledge to be problematic. This, however, appears to be the case. Neither technology, not traditional forms of communications are effectively used in this case.

The scheduled daily meetings referred to earlier, are supposed to provide an opportunity to discuss problems and allocate jobs according to expertise available. This also represents an opportunity for knowledge dissemination and learning. Though considered a potentially useful forum, it does seem to be effective.

6.2.2.2. Searching and Retrieving

This refers to the ease with which both explicit knowledge (in hard copy or electronic form) and tacit knowledge can be identified and accessed. An example would be practices to store knowledge or information within a notebook instead of a file server. Another example would be the use of filtering agents to search for information. Table 34 contains feedback from respondents regarding the storage and retrieval of important information in the organisation. Most participants felt that the actual efforts in this regard were poor with some indicating, "you won't find it". Another respondent was of the opinion that matters were "well organised", referring to the fact that critical information is kept on the file server, accessible to all members of staff. There is some evidence of documents that have been placed on a server to which everyone has access, but evidently not all individuals were aware of its existence, or used such information.

One would assume that change management is an important aspect in an IT department, a process that is normally accompanied by extensive documentation. One would further expect such documentation to be available to whoever is authorised to access it. Lack of documented procedures and a general failure to record system changes, including passwords, makes searching and locating codified forms of knowledge difficult. Despite setting up a knowledge base on the server, containing FAQ's regarding Microsoft products, nobody seems to be using it.

6.2.2.3. Teaching

It is fair to assume that in a fast-paced environment, technology is a major driver of change, and that continuous exposure to new technology would be important to an organisation such as the IT department.

Contrary to this, most staff members indicated they have not recently attended a training course, other than isolated workshops (Table 35). One respondent described the current state of affairs as follows: “no training done”. Another respondent indicated that a “little bit of training” occurs. There is hardly information available that led the researcher to believe that training is treated as a priority. Where individuals have attended workshops or visited projects, some individuals have submitted reports to management, yet this feedback is not broadcast or disseminated throughout the department.

The IT department has not made use of training opportunities to distribute knowledge. This is particularly worrying with new staff members joining the department. Some mentoring is taking place, but even this practice is not systematic and specific. The result has been that, due to the perceived inaccessibility of certain staff members, new employees tends to seek information and assistance outside of the department. This will be clearly illustrated in the discussion dealing with social networks.

6.2.2.4. Sharing

The issue concerning knowledge and information sharing has been partially noted in a number of findings relating to other knowledge practices discussed. Responses in Table 36 regarding actual sharing practices in the department, ranged from fair, “trying as best we can”, to poor. One respondent felt that it should be the individual’s prerogative to decide what needs to be shared.

This apparent lack of a sharing culture was also confirmed throughout the findings. The daily meetings, scheduled to facilitate sharing, are not successful. The social network analysis survey points out that some individuals, supposed to be working together on the same process, simply do not communicate with each other. The lack of sharing among departmental members, communicated via the interviews, was also evident during the workshop.

Knowledge Production in Action - Solving an epistemic problem

The focus group discussion did not adequately explore epistemic problems related to the business process identified earlier. Instead, the researcher opted for an example to illustrate knowledge processing behaviour where individuals or groups are confronted with more serious problems.

One such a serious problem mentioned by most respondents during interviews, relates to a virus crisis experience during 2003. The researcher decided to initiate further enquiries about the particular incident referred to by most respondents as one instance where the IT department worked together as a team. The researcher was interested to know what made the difference, particularly because the problem, according to the researcher, constituted an epistemic problem, a deviation from normal day-to-day routine and one where the solution to the problem was not obvious, and the knowledge not available in the organisational knowledge base; one that triggers people to step outside the business processing environment and into a problem solving mode.

During the course of 2003, the Welchia virus hit the campus and for one week threatened to severely cripple not only IT operations but also the work of several academic departments. This particular incident and subsequent procedures followed to solve the problem, is described in Box 6-3.

Box 6-3 : Solving the Welche Virus crisis

After 08:00 on that day, the IT department received various complaints from users that they could not access their email or browse the Web. The department could not get on the Web to search for a "fix". Grahamstown IT division was phoned and it was learned that they experienced similar problems. In the meantime, the East London IT department phoned a local support vendor, First Technology, who provided a "fix". However it turned out to be a "fix" for another virus. By that time, Grahamstown IT division indicated that they had since discovered the details regarding the virus and that they were continuing their search for a "fix". Richard (a support person from another department) went home and managed to download the relevant patches from his home PC, which he (Richard) subsequently provided to the IT department. After about three hours since detecting the virus, a meeting was called with all members of the IT staff. The department, assisted by

Richard, divided into teams and started the cumbersome process of deploying the "fix" on all computers, in order of priority. Each team had a two-way radio and communicated regularly. Progress meetings were held every couple of hours to monitor progress. Within one week, the department managed to isolate and control the virus.

Upon asking the individual what made the handling of the Welchia virus incident stand out from others, the answer was: "Teamwork – all pulled together".

The above example serves to illustrate what happens when an organisation, or individuals and groups in the organisation, engage in double-loop learning as opposed to single-loop learning and normal operational behaviour. This aspect will be elaborated on in the next chapter.

6.2.3. Background Factors

Findings are presented concerning the five background or structural factors that influence the knowledge processing environment (Macroinnovation Associates LLC, 2003). Though not explicitly depicted in the KLC, these factors relate to the makeup of the organisation. The background factors are:

- *human characteristics*; referring to issues associated with diversity, trust and the problem solving ability of the organisation
- *connectedness*; refers to the degree to which members in the organisation participate in interaction
- *critical attitude*; concerns the openness and freedom to criticise each other's viewpoints and claims, including management
- *Knowledge entitlement*; refers to attitudes that exist regarding knowledge ownership and actual behaviour in this regard

Regarding knowledge integration practices, the responses in Table 11 indicate a fair to poor effort on the part of the department and staff.

Table 11: Background Factors – Everyone's actual PRACTICES

Background Factors		Everyone's actual PRACTICE					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
A1	Human Characteristics		3	1			4
A2	Connectedness		3	1			4
A3	Critical attitude	1	1	2			4
A4	Knowledge entitlement (Attitudes)	1	1	2			4
A5	Knowledge entitlement (Behaviours)	1	1	2			4
Grand Total		3	9	8			20

6.2.3.1. Human Characteristics

For McElroy (2003) the concept "ethodiversity" (derived from the concept ethos which is more encompassing than ethnic) refers to the diversity that exists in the organisation in terms of different worldviews and attitudes, including demographics. Though there clearly is a mix of race and gender in the IT department, and its value is recognised, the value of diversity in terms of it being an important resource in problem solving (as a result of different viewpoints, orientations and outlook) did not surface. The researcher was left with the impression that individuals don't really know each other in order to be able to capitalise on the strengths of certain individuals. The issue of trust (or lack thereof) did surface prominently, an issue that the researcher became aware of throughout the contact sessions.

Referring to race and gender issues, the IT department employs one female and one black staff member, hence the observations by some respondents that the diversity issue is important, particularly given the mix in the student population, who are primary IT users. One respondent was quite vocal about trust, stating that the respondent does not trust anyone in the department. Having prompted respondents about the importance of diverse values and worldviews for problem solving, none of the respondents made explicit reference to this aspect.

6.2.3.2. Connectedness

Data in Table 24 suggests a degree of despondency prevalent among certain members of staff. Though one respondent explicitly commented of the benefits of connectedness and described current efforts as "fair", others felt that, despite management's awareness about problems that exist in this area, the current efforts will do little to solve the problems.

Particular reference was made to the apparent failure of daily staff meetings, initiated with the purpose of improving communication in the department. One respondent voiced a number of concerns, stating that some members of staff don't talk to others. Often, certain members prefer to communicate with external parties.

The frequency and quality with which people interact with each other, and with groups in the organisation, is a good indication of the velocity of information flow, argues McElroy (2003a). It was therefore useful to assess the degree of connectivity, that exists between individuals in the IT department, and to understand any protocols that regulate such interactions. Overall, the department rated their own practices in this regard as poor. The department is aware of the state of affairs, but there is little evidence to suggest that something concrete is being done to address the issue. The daily meetings (if that was a proposed solution) are clearly not working. Regarding technology, apart from the WebRT system, technology such as Internet and email is in place to support communications if there was a need for that type of support.

The issue of connectedness is further explored below under the heading, Social Networks.

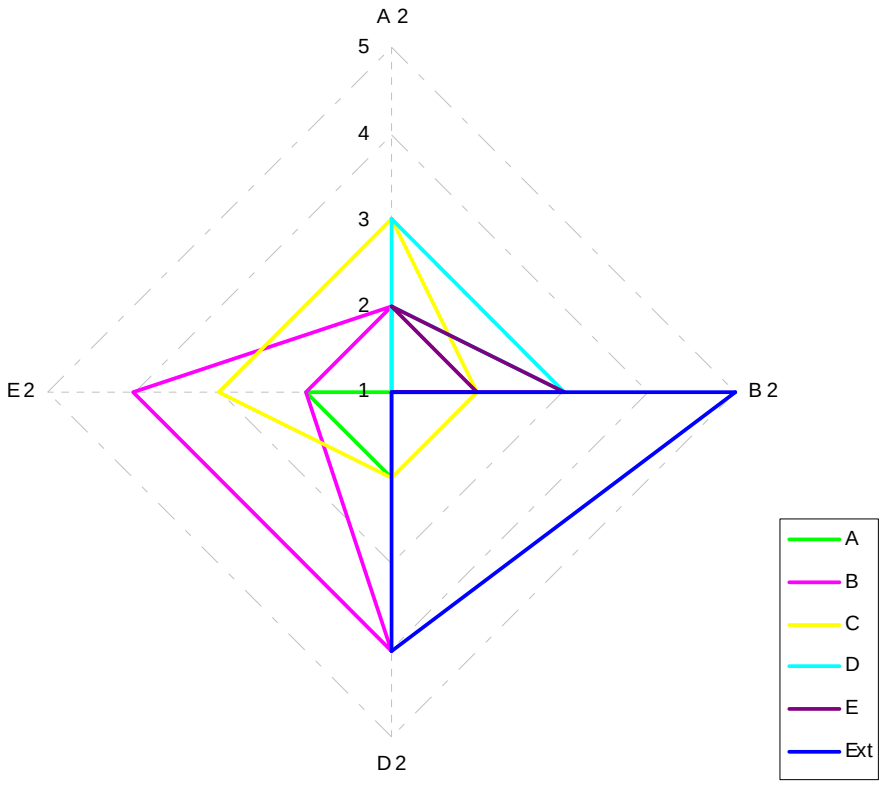
Social Networks

In order to gain deeper insight into the connectivity and interaction patterns of the staff in the IT department, the results of the social network survey are presented here. The method for interpreting the graphs was discussed in Chapter 5, page 65.

Communication with certain individuals relative to others

Respondents were asked in Question 2 of the survey, to indicate how often they communicate with each person in the group, relative to others in the group, including external agents. The response for this question is depicted in Figure 21. It ought to be clear that respondent B communicates more with external agents, relative to others in the department. B prefers not to communicate with A. Similarly, respondent A communicates regularly with internal staff, namely respondents C and D, but only sometimes with respondents E and B. A never communicates with external agents.

Figure 21: Frequency of communication - Question 2



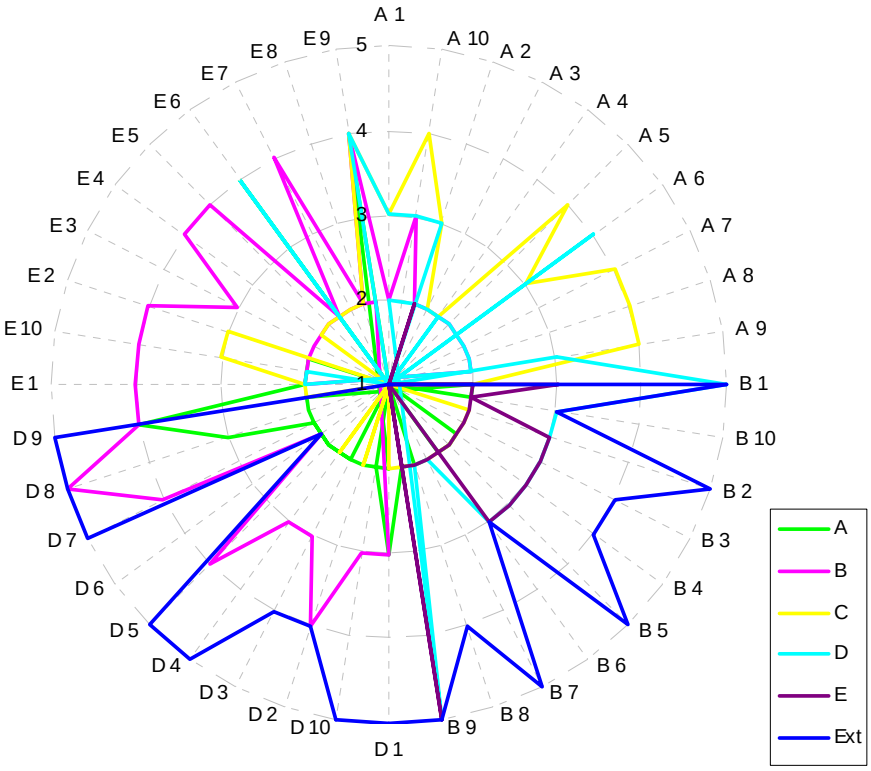
All communications by respondents

Though the survey questionnaire covered various aspects relating to social networks, the researcher combined all responses in one graph, hoping to:

- identify general patterns in communications, and
- explain some of the findings referred to earlier under the KPPP discussion, particularly concerning issues such as connectedness, individual and group learning and knowledge sharing.

This combined view is depicted in Figure 22.

Figure 22: Illustration of Frequency of Interactions (All Questions)



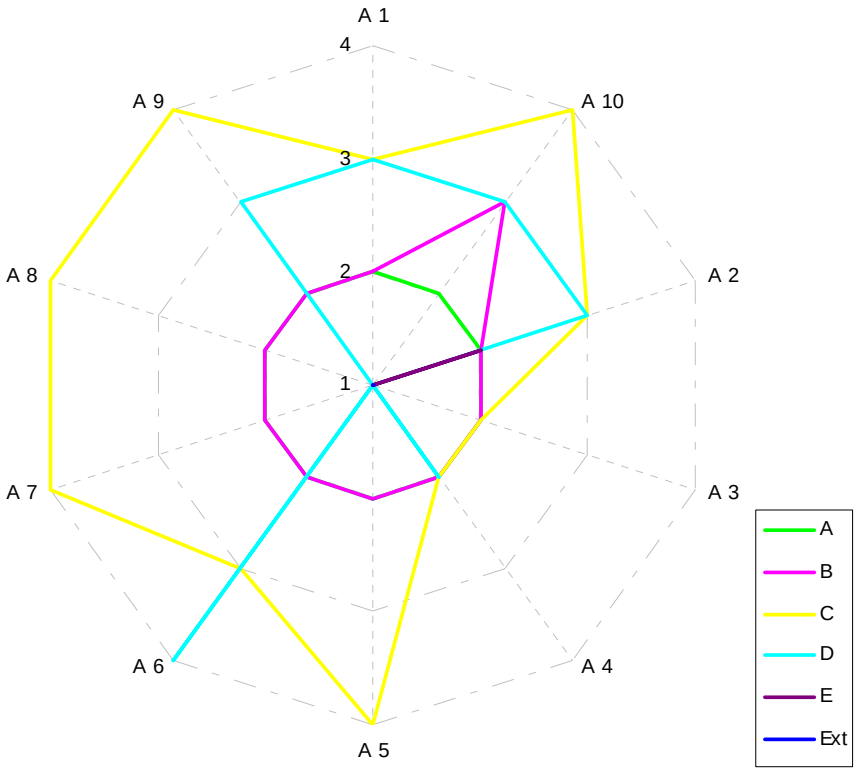
A prefers communicating with C, when seeking advice and for purposes of problem solving. A supplies D with information on a regular basis, yet D does not reach out to A when confronted with problems. A often communicates with C, but hardly ever with B; one exception being on fault management. Both respondents B and D communicate extensively with external agents. This matter was verified with both individuals concerned and the external agent. Both respondents D and E often communicate with respondent B. D always approaches both B and Ext (External source) in problem solving situations. Both D and E hardly ever disseminate information, which is an entirely logical conclusion; one is new in the department, the other is a temporary lab assistant. D indicated that he/she never has contact with E, and questioned E's existence. Person E however, indicates frequently supplying D with information.

Social networks of individual respondents

The following figures illustrate the individual communication preferences from randomly selected responses, irrespective of the particular question at hand. Despite the fact that each illustration should be regarded as crude, it nevertheless reveals quite distinct patterns

of interaction among the respondents, both in terms of reach and frequency of interaction. Respondents A, B, and C's distinct network patterns are shown in Figure 23, Figure 24 and Figure 25 respectively.

Figure 23: Interactions of Respondent A with Others



Question 7 of the survey relates to joint problem solving. Person C is inclined to only ask C for assistance. Regarding information flow to C, the responses from questions 3 and 4 indicate that C hardly receives information that the respondent considers to be useful for purposes of performing work related activities. It is quite clear that C communicates with only one person in the department. The only exception relates to C's interactions as an information supplier to D. Similarly, inferences can be drawn from interactions of B and D below.

Figure 24: Interactions of Respondent B with others

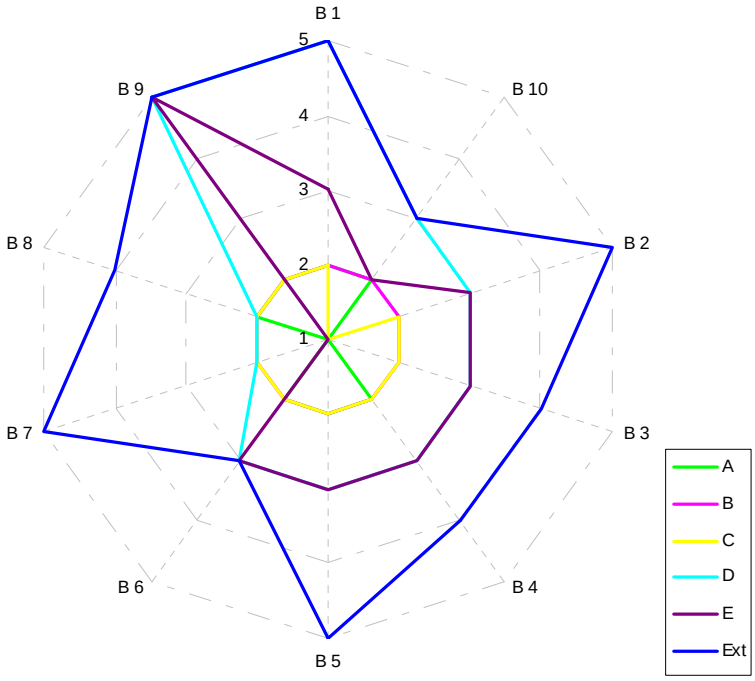
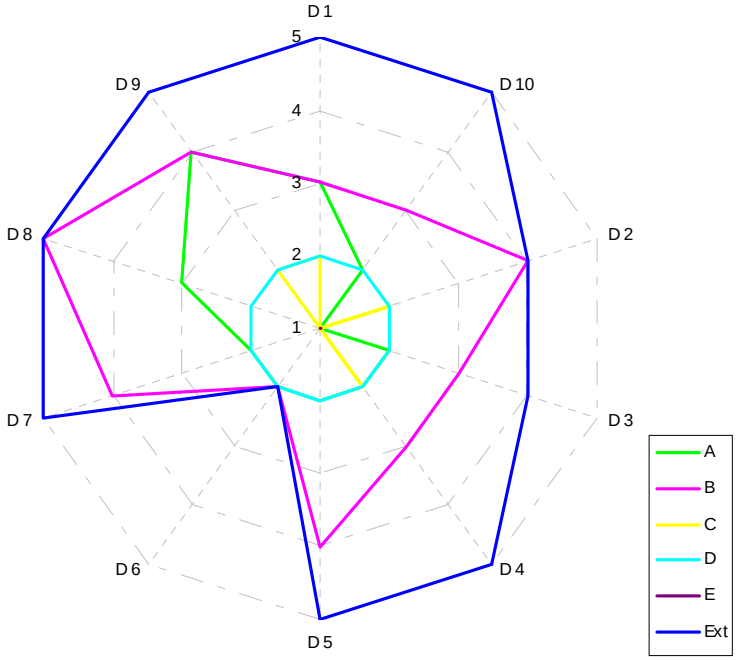


Figure 25: Interactions of Respondent D with others



The social network data depicted above provides a useful view of interactions among individual in the IT department. The evidence confirmed that there are no visible signs of strong connectivity that results in group formation such as Communities of Practice (COP).

6.2.3.3. Criticalist Attitude

The data presented in Table 25 should not be confused with criticism aimed at management and the department. Respondents were asked to evaluate the extent to which healthy debates are prevalent in the department. Part of such debate might well include criticising others' (including management's) ideas and claims. Some responses indicate attempts by management to invite criticism but data presented in Table 25 suggests otherwise. No apparent forum exists for airing problems and disagreements. In some cases, people tend to talk behind others' backs.

6.2.3.4. Knowledge Entitlement

In Table 26, responses refer to how people feel and behave with regard to knowledge ownership and the distribution of such ownership.

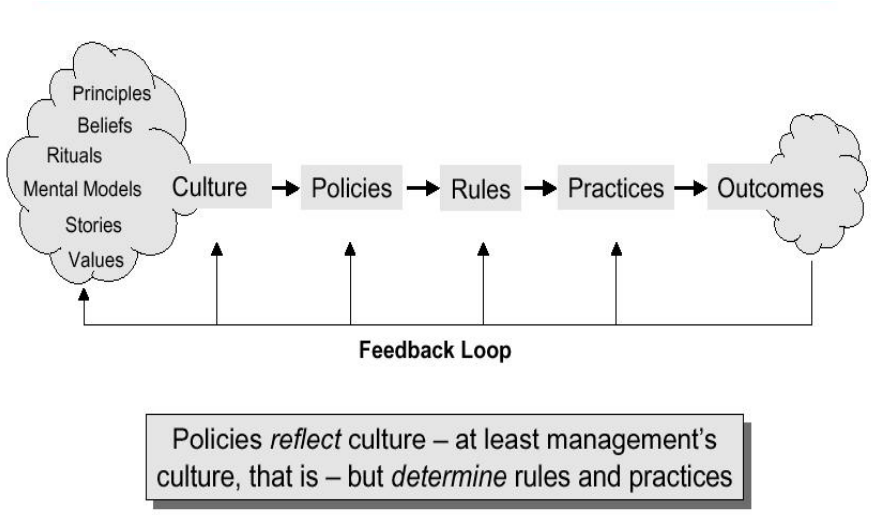
Most respondents made an automatic connection (rightly or wrongly) between knowledge ownership and rewards, particularly financial rewards. This possibly points to a perception that exists, namely that "knowledge is power". This possibility is implied by another respondent who stated that a particular "individual has ownership of knowledge, not the department". Some individuals have received merit awards. However, this does not necessarily refer directly to the knowledge behaviours of an individual, but rather to the individual's performance in the department and might include owning valuable knowledge. Regarding specific behaviours relating to knowledge entitlement, one respondent hinted at the possibility that certain individuals deliberately withhold information from others and the department in order to strengthen their position.

6.3. Policies and Programmes Accounting for Knowledge Behaviour

Having presented the findings relating to knowledge practices insofar as knowledge production and knowledge integration is concerned, it is critical that those policies and programmes accounting for such practices be reviewed. Figure 26 illustrates the causal

relationship between policies, programmes (rules) and knowledge practices as suggested by McElroy (2003a).

Figure 26: Relationship - Policies, Programmes and Practices



(Source: Macroinnovation Associates LLC, 2003, www.macroinnovation.com)

This discussion reflects on the data gathered from the KPPP questionnaire. Respondents were asked to indicate the extent to which efforts are made by management to support knowledge production and knowledge integration processes through policy and programmes, using the phrases "What management SAYS" and "What management DOES" respectively. The qualitative survey data is presented in Appendix H, Table 23 through to Table 36. The rated responses are presented in Table 12 (for policy) and Table 13 (for programmes) respectively.

The evidence in Table 12 consistently indicates a lack of policies or awareness that such policies exist. This is true for fourteen out of fifteen dimensions in the three areas, Background/Structural factors, Knowledge production and Knowledge integration. The one exception concerns the issue of connectedness where most respondents indicated that management is making good to excellent efforts "talking" about it. With reference to the

three areas, a relatively large proportion of responses suggest that there is no effort , i.e. no policies exist.

Table 12: Management's "Talk"

Background Factors		What management SAYS					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
A1	Human Characteristics	2	1	1			4
A2	Connectedness			1	2	1	4
A3	Critical attitude	1	1	2			4
A4	Knowledge entitlement (Attitudes)	3		1			4
A5	Knowledge entitlement (Behaviours)	3		1			4
Grand Total		9	2	6	2	1	20
Knowledge Production		**What management SAYS**					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
B1	Problem Recognition and Problem Claim Formulation	1	2		1		4
B2	Individual Learning	2		1	1		4
B3	Group Learning	2		2			4
B4	Information Acquisition			3		1	4
B5	Knowledge Claim Formulation	1	1	1	1		4
B6	Knowledge Claim Evaluation	1	2		1		4
Grand Total		7	5	7	4	1	24
Knowledge Integration		**What management SAYS**					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
C1	Broadcasting	1	1	1	1		4
C2	Searching and Retrieving	1	1	1		1	4
C3	Teaching	2	1			1	4
C4	Knowledge Sharing	2		1	1		4
Grand Total		6	3	3	2	2	16

Concerning the introduction of programmes that would support the policies, responses indicate a fair to poor effort by management. Again, a large proportion of responses indicated that no efforts have been made by management to introduce programmes to support related knowledge practices (see Table 13). Management appears to have done more in the area of information acquisition and connectedness compared to most other areas. Most respondents rated management's efforts in these two areas as fair (see Table 13).

Table 13: Management's "Walk"

Background Factors		What management DOES					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
A1	Human Characteristics	2	1	1			4
A2	Connectedness	1		3			4
A3	Critical attitude	2	1	1			4
A4	Knowledge entitlement (Attitudes)	1	1	1	1		4
A5	Knowledge entitlement (Behaviours)	2		1	1		4
Grand Total		8	3	7	2		20
Knowledge Production		**What management DOES**					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
B1	Problem Recognition and Problem Claim Formulation	2	1		1		4
B2	Individual Learning	2		1	1		4
B3	Group Learning	2	1	1			4
B4	Information Acquisition			3		1	4
B5	Knowledge Claim Formulation	1	1	2			4
B6	Knowledge Claim Evaluation	1	2		1		4
Grand Total		8	5	7	3	1	24
Knowledge Integration		**What management DOES**					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
C1	Broadcasting	2			2		4
C2	Searching and Retrieving	1	2			1	4
C3	Teaching	3			1		4
C4	Knowledge Sharing	3			1		4
Grand Total		9	2		4	1	16

The evidence presented above shows a general absence of, or lack of awareness about the existence of policies, general rules and programmes that could direct or render tangible support to current knowledge practices.

A quick scan of the university's Intranet (Rhodes, 2004) revealed fairly comprehensive information about the values, vision and mission of Rhodes University as an institution. Policies, programmes and procedural guidelines exist in a number of the areas normally associated with knowledge processing. One such area the researcher investigated was the university's reasonably comprehensive staff development policy and associated procedural document. To use one example, the above policy clearly states that training and development is voluntary, but linked to career prospects in the university.

The following is an attempt by the researcher to infer from the practices discussed under items 6.2, likely values, policies and programmes that support or inhibit such knowledge practices:

- The mission of the university promotes, among others, shared values about human rights, collegiality, well-trained staff at all levels, research excellence and innovation, general excellence in all activities.
- Staff development policies are in place and are reasonably progressive but programmes are mostly oriented towards formal training initiatives. Staff development programmes that are aimed at self-development apply mostly to academics who are granted funding and support for attending conferences. Academic leave and research grants constitute such programmes. Generally, different rules apply to different job classifications and status within the university's hierarchy. While academics are granted "official" time to consult, it is unlikely that administrative and support staff will be afforded the same concessions. Implementation of staff development programmes happens in accordance with the discretion of departments, and the prerogative often rests with the departmental head.
- Though the university prides itself on being open, participation on various forums is exclusively run by occupational classes. By nature, the university is run, or seen to be run, by academics. Like many bureaucracies, professional staff often enjoy a higher status, compared to support colleagues.
- The remuneration policies and programmes of the university are clearly geared towards acknowledging qualifications, and openly support the notion that "knowledge is power".
- The university by nature is an institution of individualists attracting many people who want to pursue their own passion in life, do their research, present their paper, publish their book, etc. The need to share these private interests with others is evident, but mostly limited to academics.

The above list is by no means exhaustive, but does serve to highlight underlying values and beliefs that impact on policy formulation and programmes that support knowledge processes.

6.4. Conclusion

In this chapter, the researcher introduced the findings of the research conducted. The responses recorded from the focus group discussions held with members of the IT department were presented. The findings from interviews held using the KPPP questionnaire were grouped to focus on the KLC, including the findings from the social network survey. The discussion concluded with a presentation of the findings pertaining to policies and programmes that support the knowledge practices in the IT department.

In Chapter 7 these findings will be discussed in detail, specifically in relation to the research questions formulated in Chapter 1.

CHAPTER 7

7. Discussion of Case Study Findings

7.0. Introduction

The purpose of this research is to conduct an assessment of the knowledge processing environment in the organisation. In addition, the following research questions were formulated.

- *Why is it important for the organisation to assess its knowledge processing environment?*
- *How do current knowledge processing policies and programmes account for the knowledge processing behaviours and practices in use?*
- *How does the makeup and quality of knowledge processing behaviours support business processing and to what level of satisfaction and effectiveness?*
- *How can the organisation go about conducting such an assessment?*

By relying on the literature study as well as the case study data presented in Chapter 6, these questions are answered in the ensuing discussions.

Firstly, the rationale behind and methodology for conducting a knowledge assessment receives attention. The discussion that follows draws conclusions about the knowledge processing behaviours and practices evident in the IT department. Thirdly, the researcher evaluates the affects of knowledge policies and programmes on the knowledge behaviours and practices. Finally, the researcher expresses an opinion about the relationship between the knowledge processing and the business processing environment, particularly as it relates to a specific business process.

7.1. Why is a Knowledge Assessment Necessary?

This question was partly answered by the literature study in Chapter 2, reflecting the needs of organisations to nurture knowledge assets in the context of an increasingly competitive environment. In order to satisfy the requirements of a knowledge economy,

Chapter 3 discussed the premises and approaches of the knowledge management movement as a response to such requirements. Second-generation KM and its variation, TNKM, were discussed in Chapter 4. There it was pointed out that the business of knowledge management is one of managing the knowledge processing environment, particularly the key processes, knowledge production and integration.

It then follows logically that, in order to begin to plan any knowledge management intervention, the organisation needs to start from a baseline. That baseline is the output of a knowledge processing assessment. To arrive at a point where management can start implementing policies and programmes that can support the knowledge practices and behaviours, the organisation needs to understand what the current knowledge practices in each of the key areas are. The KLC was used as a roadmap to identify the operational areas where behaviours and practices are self-organising and emergent. In addition, an assessment of this nature is interested in the policies and programmes affecting the current practices in each of these processes. The above is what McElroy (2003a) and the TNKM school describe as the Knowledge Operating System (KOS) of the organisation. This is also the point at which this assessment ends. Naturally, knowledge managers would be interested in designing and implementing interventions to influence and support the KOS, however this falls outside the scope of this research.

7.2. How to Conduct a Knowledge Assessment?

The methodology for conducting an assessment or audit of the knowledge processing environment received detailed attention throughout this research report. The theoretical foundations were discussed in Chapter 4 and the application framework by TNKM was adopted in part. The chapter on research methodology provided a detailed overview of how the researcher went about designing the assessment. The findings were presented in Chapter 6.

The researcher does not claim that the above represents a complete assessment. Depending on specific objectives, an assessment could include details about the technology support infrastructure, a map of who has what knowledge and where such knowledge is located, and in what format. The PSM methodology referred to earlier goes

on to identify desired policies and programmes and the gap between the latter and the current state of affairs (Macroinnovation Associates LLC, 2003).

7.3. Assessing the Knowledge Processing Environment

The two key processes in the organisation's knowledge processing environment are knowledge production and knowledge integration and the results of the case study findings are discussed under these separate headings. In addition, the research also included practices that do not strictly fall into the two processes, but influence these processes. These are referred to as structural or background factors, relating to the makeup of the organisation and include human characteristics, connectedness, critical attitude, and knowledge entitlement. In addition the status of policies and programmes that impact on these knowledge behaviours also needs to be analysed.

In order to judge the health status of the IT department's knowledge processing environment, some of the literature cited earlier is revisited and new sources added, where appropriate.

7.3.1. Assessment of Knowledge Behaviours and Practices in the IT Department

By applying the various knowledge processes of the KLC to the knowledge practices followed by individuals, an image emerges about the behaviours endemic to the IT department's knowledge processing environment. Once again, the same arrangement is followed as in the previous chapter, starting with reviewing the status of knowledge production, then moving on to knowledge integration practices, and finally, drawing conclusions about the behaviours pertaining to the structural aspects of the knowledge processing environment.

7.3.1.1. The Ability of the department to create knowledge

The six areas relating to knowledge production are listed again. These are: problem recognition and problem claim formulation, individual learning, group learning, information acquisition, knowledge claim formulation, and knowledge claim evaluation.

7.3.1.1.1. Problem Recognition and Problem Formulation

It was noted that the tasks currently performed are often routine and low-level in nature. Upon being made aware of the existence of problems, the standard practice is to simply "plug" the gap by means of existing knowledge that is available in the organisational knowledge base. This includes consulting both subjective knowledge (what is in peoples minds) and objective knowledge (in codified form, e.g. documents, artefacts, etc.) that exist in the DOKB or distributed organisational knowledge base (McElroy, 2003a), distributed because it is spread across both the East London and Grahamstown campuses, and in different departments.

It appears as if the IT department follows a wait-and-see approach to problem recognition and problem solving. In other words, "if it ain't broke, don't fix it". This "don't-go-and-look-for-problems" attitude could well be justified if the claims that the department is under-staffed are indeed valid. It could also point to an underlying issue, namely that the knowledge and technical competencies do not really exist in the department to initiate innovative solutions to complex problems.

To support the above observation, an example is used from the focus group discussion. Following a question posed by the researcher: "What are the persistent problems?", the following responses were provided by two staff members: "We currently experience intermittent problems with the […] (for no reason)…some of us suspected bottlenecks with the […]. [Person X] denies that there are problems with the […] blaming the […] Ad hoc discussions took place between two individuals [X and Y]. […] issues never get discussed"

Based on individual interviews held and the researcher's experience and observations over a number of years, is the fact that the East London IT department is really an extension of the larger, and more powerful IT department based on the main campus in Grahamstown. Apart from one member of staff, none of the other respondents were around at the time when several of the current processes under discussion were designed or altered. Over the years, though, the East London IT department has been heavily dependent on Grahamstown IT department's innovations, technical expertise, financial support and goodwill. This, it could be argued, has over the years eroded the innovation

and problem solving abilities of the local IT department. Currently, there is a natural inclination to "do what we do and know best", and those are often mundane support activities. Many of the current business processes and systems are thus inventions of the Rhodes Grahamstown IT department.

7.3.1.1.2. Individual and Group learning

Given the background and history of the IT department, specifically its position and status relative to the main campus, individuals in the IT department have mostly been out of the learning and problem solving cycle. Individual learning is limited to attendance of sporadic workshops and few instances where individuals have consulted the Internet. Experimentation sometimes happens at the expense of service delivery and within a live environment. Though this presents problems in itself, "fiddling" should be managed and its value appreciated. There are not enough technology "toys" available for staff to experiment with.

Learning, according to Argyris (1991) is often too narrowly defined as problem solving and the author advocates an approach where managers and employees reflect critically on how they go about defining and solving problems since this can be a source of problems in itself. He (Argyris, 1991) further asserts that effective learning is not so much about motivation, attitudes and commitment, but rather about how people think; the cognitive rules of reasoning used by people to design and implement actions. Argyris (1991) found that many successful and highly motivated individuals and managers are unable to reflect critically on their own performance, and typically engage in defensive reasoning, often projecting the blame away from themselves. The researcher found ample evidence of blame and projection, e.g. staff shortage claims, blaming Grahamstown IT division for changing configurations, blaming colleagues for the state of affairs.

The absence of Communities of Practice (COP) and the fact that group learning does not happen in the department could possibly be attributed to the size of the department, yet the lack of awareness about each other's interests and passions indicates something else, poor communication. The "attraction factors" among people to which CAS theorists and Firestone and McElroy (2003a) allude to, are not easily detectible in this case.

Stacey (2000), one of the prominent complexity theorists, argues against mainstream thinking, that tacit knowledge is stored in the minds of people and that it can only become an asset to the organisation once that knowledge is extracted and codified through a process of externalisation. He (Stacey, 2000 p.37) argues that knowledge is "the act of conversing" and new knowledge is produced through people's conversations and relationships.

The implications of the above is that, if the IT department continues to avoid active communication practices, knowledge will not be produced, at least not at a rate that meets the demands of a changing campus environment.

7.3.1.1.3. Information Acquisition

Evidence suggests a heavy reliance on external information sources, at least by some members of staff. It was pointed out that despite claims that the processes under discussion were supposedly satisfactory, certain individuals still seek advice from such sources. This concerns the way in which people normally go about solving epistemic problems. Alternatively, such practices could point to the fact that individuals prefer to seek out individuals outside to share common ideas, a substitute practice for poor communication that exists within the organisation. The problem however remains, if large-scale involvement of other staff is not sought, and externally generated knowledge not validated by others, the chances of successful problem solving are limited.

7.3.1.1.4. Knowledge Claim Formulation and Knowledge Claim Evaluation

Concerning the validation of knowledge claims and the openness regarding "who makes the knowledge around here", it was found that knowledge claims, despite its inherent merits, is viewed with suspicion, mainly because of the fact that ideas are linked to a person. It was also found that knowledge production is mostly driven by the Grahamstown campus.

The general reluctance among staff to engage in debate and to challenge each others' ideas, points to what Stacey (1996) describes as an inclination of people seeking to occupy a comfort space, migrating away from the messiness and turbulence posed by changes occurring near the edge of the system's boundary. Organisations as human

systems are non-linear and are creative; they learn in complex ways by operating at the edge of system disintegration. The moment such systems move into comfort zones, they cease to learn, Stacey (1996) asserts. At the edge of destruction, creative processes are messy and paradoxical; they involve conflict, competition, emotions, power, etc.

The researcher believes that the environment the IT department operates in constitutes relatively low risk for the individuals concerned as well the department. It becomes too convenient to hide from challenges and real problems. The department does not appear to be "stretching" its competencies and goals.

7.3.1.2. The Ability to Integrate Knowledge

Next, conclusions are drawn regarding knowledge practices relating to broadcasting, searching and retrieval, teaching and knowledge sharing.

7.3.1.2.1. Broadcasting

There is a sound infrastructure in place to support most of the knowledge distribution needs of the department. Though the researcher did not include an inventory of infrastructure as part of the knowledge assessment, the obvious technology components include access to the Internet, email facilities and servers. Apart from its relationship with Grahamstown, the IT department does not have a distributed arrangement and all staff are in close proximity to each other. The current practices point toward a general lack of communication, irrespective of technology being available.

7.3.1.2.2. Storage and Retrieving

Practices pertaining to the storage of information and retrieving such information when required falls short of expectations. Individuals mostly follow their own instincts about "what goes where". Concerning hard and electronic copies, there is no systematic filing or document management system in place, hence the fact that individuals often find it hard or impossible to locate such information. Where some efforts have been made, not all individuals are aware of the arrangement and as a result, do not benefit from it.

7.3.1.2.3. Teaching

The department does not take training and education seriously, and as a result, are missing out on opportunities to disseminate knowledge to both experienced and new staff. Reasons for this are attributed to the lack of staff, time and financial resources. The visits by staff to other IT projects are considered to be healthy practices. Best practices can add to individual and organisational learning but there are many pitfalls associated with adopting best practices. One pitfall is that it can easily create a dependency on external knowledge, or it can lead to a false sense of belief that other knowledge is good. Knowledge is created in a social setting and transferring such contextual knowledge is difficult, and at times impossible. Also, heavy reliance on external knowledge prevents the organisation from engaging in healthy problem solving practices and as a result, failing to exploit potential learning opportunities.

7.3.1.2.4. Sharing

Knowledge sharing practices within the IT department appear to be in a poor state with individuals opting not to communicate with others. Any new employee joining the department will bear the brunt of this.

7.3.1.3. Structural or Background Factors

According to McElroy (2003a), management can have a deterministic influence on those factors relating to the makeup or structure of the knowledge processing environment. CAS theorists (Holland, 1995 and Stacey, 1996 cited in McElroy, 2003a) endorse the significance of diversity, connectedness through relationships, freedom to self-organise and living with turbulence and disagreements (Stacey, 1996), It follows then that such practices be considered here.

7.3.1.3.1. Diversity (ethodiversity)

Diversity goes beyond demographics such as gender, age and race differences. It concerns the way people view their reality and includes their efforts to make sense of their world. The research found evidence that most individuals in the department support the narrow definition of diversity, referring to the need for a race and gender mix in the department. Various respondents could identify the link between diversity and service delivery. However, the research did not manage to extract evidence supporting the notion of having

people around that "thinks and act differently". This is not to say that there is no diversity in the organisation. There is a fair demographic mix within the department, and by all accounts, people with different viewpoints. The fact remains, the department and its members do not seem to explore and embrace such inherent creative sources.

7.3.1.3.2. Connectedness

The various sources of evidence suggest a low density in connectedness between members in the department. For McElroy (2003a) connectedness is an important step towards innovation. The real knowledge asset, Stacey (2000) asserts, lies in the patterns of relationships that exist in the organisation. When those patterns are broken, the knowledge asset is destroyed in the process. Both the authors make a connection between the degree of connectedness or communications and the velocity of information flow through the system. This is clearly absent in the case considered.

7.3.1.3.3. Criticalist attitude

A criticalist attitude implies that people in the organisation are motivated and willing to challenge and question organisational knowledge and rules. It is equally important for management to display a degree of tolerance towards such challenges, and to encourage such criticism. Though there is some indication of individuals challenging management, these appear to be isolated instances.

Various authors (Senge, 1990; Argyris, 1991; 2002; Stacey, 1996; Firestone and McElroy, 2003a) have dealt with the above aspect. Whereas Stacey (1996) draws attention to the utility of active debate and disagreement occurring at the "edge of destruction", Argyris (1991; 2002) notes that most people struggle to deal with criticism, including constructive disagreement.

7.3.1.3.4. Knowledge Entitlement (Attitudes and Behaviour)

This issue deals with practices such as the intrinsic motivation of individuals to contribute to organisational knowledge and the equitable sharing of ownership of such knowledge. There were some intriguing remarks made during data collection, including "I get recognition from management. [but] Not from others in unit" "[the] Individual has ownership, not department". On the whole, this issue was understood by respondents to

mean financial rewards for contributions, which indicates that very little happens in this sphere. Much of the literature consulted in the course of this research made reference to the desirability of rewarding people on the basis of what they know (the notion of "knowledge is power") as apposed to "what they share" and contribute to organisational learning. This was clearly evident in the case of the IT department where some individuals are perceived to be working towards making themselves indispensable.

The practices and behaviours to create and integrate knowledge were noted in the above discussion. The ensuing discussion explores the role that policies and programmes play in shaping the above practices.

7.3.2. The Impact of Policies and Programmes on Knowledge Behaviour

Given the current status of the knowledge processing behaviours, the logical question is, "How can such behaviours and practices be altered?" McElroy (2003a) suggests that management can directly influence such processes through two types of interventions, namely policies (the intentions and desires of management) and programmes (action-oriented attempts to fulfil policies). The researcher emphasises that this research is interested only in policies and programmes that influence knowledge production and knowledge integration practices within the knowledge processing environment rather than business processes or procedures in the business processing environment.

With reference to the literature study, and in particular the thinking associated with complex adaptive systems theory as cited in McElroy (2003a p.62), the researcher once again draws attention to the notion that knowledge is "socially constructed", that knowledge processing is "self-organising" in nature and that patterns of behaviour are "emergent"; the exact behaviours cannot be predicted. The pattern, McElroy (2003a p.62) argues, is the same pattern that is depicted in the KLC; one that cannot be managed in traditional ways. In a nutshell, managers wishing to influence knowledge processes, do so by firstly, accepting the self-organising nature of the system (system here refers to the department, sub-systems, or a business process), and secondly, understanding the prevalent patterns of the system and, thirdly, to design and implement policies and programmes that support the pattern (McElroy, 2003a). Originally, the author (McElroy, 2003a) proposed two sets of interventions, namely those that deal with the structure or

make-up of the system, and secondly with the operational side, referring to the manner in which people interact with each other to produce and integrate knowledge.

While management can be prescriptive in influencing the makeup or structure of the system (e.g. introducing more/less diversity, facilitate connectedness and sharing through technology, explicitly recognise joint knowledge ownership), learning and problem solving behaviours are emergent and management is advised to embrace and support such behaviours. TNKM proponents advocate that it is the management of policies and programmes that influences knowledge behaviours.

The above notion that management should not and cannot directly determine operational knowledge behaviours prevalent in the system (those practices in the KLC), because they are emergent, is potentially problematic. What if these knowledge practices are non-existent or weak? Certainly management cannot embrace what is considered to be sub-standard practices. However, one should not confuse the attempts of management to influence behaviour with attempts to determine behaviour. The outcomes of management's interventions on knowledge behaviour cannot be certain, because those behaviours are emergent.

Firstly, it must be understood that policies are often a reflection of the culture, e.g. values and principles that prevail (McElroy, 2003a). Secondly, policies do not determine behaviour or practices directly, only loosely. Individuals or groups of individuals at various levels of the organisation redefine policies in the form of rules that apply to that level. Using the example on hand, policies at Rhodes University are derived from prevailing values and principles. The policy represents the governing rules according to McElroy (2003a) but there are many different ways in which a policy gets implemented, depending on the policy-based rules applied by different departments in the organisation. Following this argument, local behaviour would then be more directly impacted by whatever policy-based rules are applied by a specific department, e.g. the IT department, Accounting department, etc. It is at this level where the real interest of this research lies, not forgetting the underlying guiding policy, including the values and principles underpinning such policies.

The position of the IT department has to be considered in relation to the Grahamstown IT division and within the context of the university as an institution, including the management of the East London campus. In its vision and mission statement the university claims to promote democratic principles, openness, freedom of speech, innovation and the development of staff. These claims come in the form of various explicit policies that have been published on the university's Intranet (Rhodes, 2004). These policies generally reflect a spirit of "openness" and are reasonable progressive and conducive for certain knowledge practices. There is evidence of programmes that are in place that support the policies referred to above, but on the whole it is left to individual divisions and business units to formulate the policies into executable programmes. It would be fair to argue that the Rhodes Grahamstown IT division has been the main initiator of such programmes for and on behalf of the East London IT department over the years. It would also be fair to say that general policy would have to be redefined by the IT department as local policy rules. It was however difficult to identify sufficient evidence about local policy rules relating to most of the knowledge processing practices.

As an example, the university states explicitly in one of its policies that all new employees must undergo intensive training as part of an induction process. There are formal courses in place that new employees can attend with no cost implications to a department. The question has to be asked, why does the department prefer not to make use of such opportunity? Is it because there are no locally defined rules in place to guide the proper induction of new staff into the system? A possible explanation is that management or supervisors are simply failing in their duty. It would be unrealistic to expect that organisational policies and programmes should be in place to cater for all the knowledge processing requirements. After all, it will take time and persuasion for organisations to become convinced of the merits of knowledge management

But in the absence of general policy, what then becomes the guiding rules that dictate behaviour? McElroy (2003a) argues that this could possibly be found in the values and culture of the organisation. The researcher believes that organisational values that are pervasive throughout the organisation serve as a basis for formulating local rules in the absence of policy. This is the job of management. Do people and groups of people make these rules, or does management? If we argue that human systems are self-organising,

then people will formulate such rules in accordance to perceived needs and desires. We cannot accurately predict their behavioural responses because such behaviours are emergent.

7.4. Knowledge Processing Behaviours and Business Results

It was noted in Chapter 4 that a distinction should be drawn between the knowledge processing environment and the business process environment. Knowledge management does not profess to directly affect business results. KM ensures the quality and effectiveness of producing and integrating knowledge that feeds into business processes. However the above link is best described by referring to the problem solving and learning processes that individuals and groups engage in when confronted with a real business problem.

Chris Argyris, who coined the terms "double loop" and "single loop learning" asserts that organisational success depends on how well the organisation learns, yet most organisations are poor at mastering it (Argyris, 1991). Single loop learning occurs when problems are detected in executing an action and where that action is corrected without a modification of the underlying rules that govern that action. This appears to be the case with a major part of the work done by the IT department. A problem is registered via the WebRT system, initial diagnostics are made, passed on to the relevant technician, and fixed. In the majority of cases, individuals follow this route. There is no change in the procedures that guide the process or action.

In double-loop learning, however, the governing rules are changed after detecting an error and before altering the action. By using his well-known analogy, Argyris (2002) equates single loop learning to a thermostat that is preset to turn the temperature on or off if certain temperatures are reached. If the thermostat was to ask why it is programmed to measure temperature, and then adjusted the temperature itself, that would be double-loop learning.

Referring to the case itself, an individual, after receiving several queries concerning the same problem, and having made several attempts to correct the problem by using her experience and skills and by consulting the DOKB (including manuals, colleagues, etc)

realises that there is no “fix” for the problem. The technician decides to research the problem in detail and suspects that the problem lies with the configuration of the image ghosted on various machines. Since there is nothing documented in the organisation regarding this matter, and other colleagues are equally in the dark as to what action to take to solve the problem, the individual enters a problem solving and learning phase. Various concerned individuals interact with each other and obtain information from external sources. Potential solutions are formulated and debated. The group decides on criteria for accepting a solution, and test each possibility against the agreed criteria. One surviving solution is accepted and this new knowledge gets integrated throughout the organisation using an array of distributed channels and strategies. The new knowledge is then applied to the appropriate activity where the deviation originated in the first place. The organisational knowledge base is updated accordingly. As new problems arise, the cycle repeats itself.

The above scenario demonstrates that problems arise in the business environment as a result of mismatches between business results not meeting expectations or standards. These epistemic problems are, however, not solved in the business environment. The quality and effectiveness of the processes that facilitate knowledge making and learning affect the business processing environment, albeit in an indirect way.

The research found very little evidence of double loop learning in the department. Problems are mostly dealt with on an *ad hoc* basis and in an uncoordinated manner.

7.5. Conclusion

In this chapter the research questions were answered. It was concluded that the output of knowledge assessment provides the organisation with a baseline from where an intervention can be planned. The researcher argued that the methodology used throughout this research provides a sound framework for conducting such an assessment.

The research findings were presented, starting with an evaluation of the quality of knowledge production and integration practices within the IT department. It was found that such practices were generally undesirable. By inferring from the knowledge processing practices and by considering the knowledge policies and programmes, the

researcher concluded that the policy and programming environment is not conducive to quality knowledge processing behaviours. There is an urgent need for guiding rules and interventions that could reverse the current trend.

The overall conclusion is that the poor practices evident in the IT department is largely a reflection of the poor and inadequate knowledge-based policies and programmes within the wider organisation, and particularly how such policies and programmes are defined at a local business unit level. Apart from a few isolated cases where individuals have attempted to "problem solve on their own", there is little evidence of innovation and sound learning practices in the department. Specific reference was made to the nature and impact of the relationship that exists between the IT department and its mother division, located on the main campus. It is felt that the dependency relationship contributed to the marginalised position of the IT department.

CHAPTER 8

8. Summary and Conclusions

8.0. Introduction

This chapter concludes this research project. Having drawn conclusions from the case study findings in the previous chapter, the main findings are highlighted, followed by a review of the methods used to conduct the assessment of knowledge processing environment in the IT department. Despite an earlier statement by the researcher that the case itself is secondary to the research process, recommendations are made to the IT department for perusal and possible action.

The researcher also recommends possible areas for further research. Finally, the chapter concludes with a critical overview of the study, including its limitations and strengths.

8.1. Summary of Main Findings

Given the various sources of evidence presented in Chapter 6, it would be reasonable to state that the IT department exhibits knowledge behaviours that are ineffective, if not dysfunctional. The unit under-performs in the area of knowledge production. When problems arise in the course of normal work, they are dealt with on an *ad hoc* basis. The quality of knowledge claims is questionable. Similarly, those practices aimed at integrating knowledge fall short of average. Very little sharing takes place among staff members. There are serious hindrances that prevent effective personal and non-personal communication.

The practices in the four areas (background/structural factors) can only be described as poor. The department does little to nurture or explore diversity as a resource and one could hardly refer to the organisation as a "well-connected" unit. A critical attitude exists but it is based on mistrust, often associated with people rather than their ideas. Knowledge ownership has sometimes more to do with financial rewards than with a joint sharing of individual and organisational knowledge. The "remote-control" arrangement

between the East London campus and the main campus in Grahamstown means that the IT department has been largely disconnected from knowledge production processes. This has left the department in a marginalised position, cut off from the core learning environment, which is located elsewhere.

The researcher is thus left with the general impression of an environment with a low knowledge processing performance, that can be attributed to a policy and programming environment not conducive to deep learning and quality problem solving. Individual perceptions indicated that there are hardly any directives in the form of explicit and/or implicit policies and programmes that support the creation and integration of knowledge. Some of these perceptions are indeed valid. However, secondary sources provided evidence that contradict some of the claims that no policies or programmes are in place. Though some blame for undesirable behaviour and practices could be attributed to the absence of or inadequacy of policies and programmes, the local definition of general policy is equally to blame. Not having a general policy is no excuse for not having rules locally. Such rules could be derived from general values and principles. Proactive practices are largely absent in the case of the IT department.

8.2. Evaluating the Methodology Used to Assess the Organisation's Knowledge Processing Environment

This research was strongly influenced by the thinking of The New Knowledge Management movement (TNKM). The Knowledge Life Cycle (KLC) as advocated by proponents of TNKM served as a theoretical framework for the design of the assessment of the organisation's knowledge processing environment. It is the researcher's contention that the KLC, despite criticism levelled against it, is the product of a wide range of insights from various disciplines about how knowledge is constructed and how knowledge practices and behaviours can be managed in the organisation.

The Policy Synchronisation Method (PSM) is closely aligned with the KLC and is a proposed application framework for knowledge management interventions. This research, and thus the assessment, focussed only on part of the method, namely what McElroy (2003a) refers to as the Knowledge Operating System (KOS). The KOS in essence is a baseline of, firstly, the organisation's knowledge practices that are evident in

the production of new knowledge and the integration of such knowledge in the business processing environment. Secondly, the baseline includes policies and programmes that affect, and in some cases determines, knowledge processing practices and behaviours. The strength of the PSM is its close link with the KLC, and by implication, the theory behind it. From an application perspective, the PSM is intuitive and in the opinion of the researcher, adequately facilitates efforts to reveal knowledge processing practices, or lack thereof, in the organisation. However, the method does not provide sufficient guidance to infer policies from existing knowledge processing practices.

Given the scope of the research, the researcher is not in a position to express an opinion about that part of the PSM method that deals with knowledge interventions in the organisation. However, and outside the scope of the research, the researcher proposes recommendations for the benefit and possible consideration by the IT department.

8.3. Recommendations to the IT Department

Given the state of the organisation's knowledge processing environment, the recommendations proposed here refer to possible actions that should be considered in order to expedite the process of getting the unit on the knowledge track. The researcher believes that undesirable behaviours need to be corrected, and there appears to be only one way of doing so. The way forward is to adopt and enforce policies and programmes that would direct behaviours towards what is considered to be of value to the organisation. What will be of value has to be decided initially. This study provides ample examples in this regard. It must be understood that one would not be in a position to accurately predict the outcomes of such policies and programmes. The organisation cannot tell what decisions individuals will make. However, by deliberately intervening in a direct (non-deterministic) manner it is hoped that the natural self-organising process, given an initial "push", will gain momentum by itself along the way. There are some tough challenges to confront, including the following:

- Decide what knowledge processing practices would be valuable to the organisation. Possibilities might include securing financial assistance for formal training, including attendance at workshops and conferences, scheduling of individual and group

learning sessions, scheduling meetings for the year, scrapping others that did not work in the past, arranging guest speakers, etc.

- Decide and formulate the desired policies and programmes to render impetus to those practices that are considered to be of value. The intent must be made clear and should be realistic, e.g. all staff will be encouraged to engage in limited self-directed learning with the support of management. To fulfil this intention, management could be specific, e.g. allowing three hours per week on self-development with no questions asked. It must be emphasised that programmes and policies need to be aligned.
- It would be helpful to work from some sort of baseline. That baseline has been provided by this study. TNKM refers to it as the Knowledge Operating System (KOS). The difference between the desired policies and the current ones, represents the gap that must be bridged by the planned intervention.
- Policies at the meta level do not happen overnight. The same could be said about programmes and resulting behaviours the organisation is attempting to influence. In the absence of formal policies, infer policy rules from the prevailing values and culture of the organisation. There is a risk associated here for those that are spearheading the intervention. The business unit's local rules might not correspond with organisational policies. That is a challenge in itself, and an opportunity to influence organisational policy from the bottom up.
- Decide on the key high-impact areas that will be targeted and implement such initiatives.

8.4. Recommendations for Further Research

This research explored how organisations go about producing and integrating knowledge. Practices and behaviours endemic to the knowledge processing environment were assessed, including the policies and programmes that influence such behaviours.

In conducting this research it became obvious that there are areas that this particular knowledge assessment was unable to cover. One relates to the issue of culture as a determining factor of policies. This research did not include an assessment of the technology infrastructure that supports knowledge processing. Another relates to the distinction between a knowledge audit advocated by much of the literature and an audit of

knowledge processing. The business community remains unconvinced about the real impact and benefits of KM. For this reason the researcher considers the measurement of knowledge management and knowledge processes to be a fertile area of exploration. In general, the researcher was left with the impression that not much KM related research was forthcoming from South Africa.

8.5. Strengths and Limitations of this Research

It is hoped that this research has contributed to the general research in the field of knowledge management. There are many examples in the literature of knowledge audits conducted mostly in line with traditional KM thinking. The attempt at conducting an assessment of the knowledge processing environment in an organisation is new, mainly due to the contemporary nature of TNKM movement. The researcher is not aware of many attempts in this regard, at least not from scholars outside the inner circle of the KMCI. The researcher believes that this work is fresh in the sense that the research process grew together with the literature and practical applications of the process. The personal advice from Mark McElroy, one of the chief architects of the New Knowledge Management paradigm has added substance to the research in more that one way (McElroy, 2003 personal email communications, 8/8; 11/8; 27/8; 1/9; 17/10; 9/12; 11/12; 12/12 and 15/1/2004).

Very little evidence was found in the literature of reputable peer reviews and critique regarding the viewpoints of McElroy, Firestone and other proponents of TNKM. A possible reason for this relates to the fact that most of these authors' work on TNKM are recent. As a result, this research displays a degree of bias in favour of TNKM thinking. At times such bias was inevitable, given the many shortcomings in conventional KM thinking. The researcher admits that the inspiration for this research was derived from the published work by those authors mentioned.

As far as the findings are concerned, the selected case placed several restrictions on the research. In hindsight, it was not the ideal case, mainly because there is no explicit intention by the department to regard itself or to be regarded as a knowledge-based organisation. This increased the complexity of inferring policies and programmes from a dysfunctional knowledge processing environment. It was however pleasing to be able to

conclude that the poor quality of knowledge processing policies perfectly matches the poor quality of knowledge processing behaviours and outcomes.

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Appendices

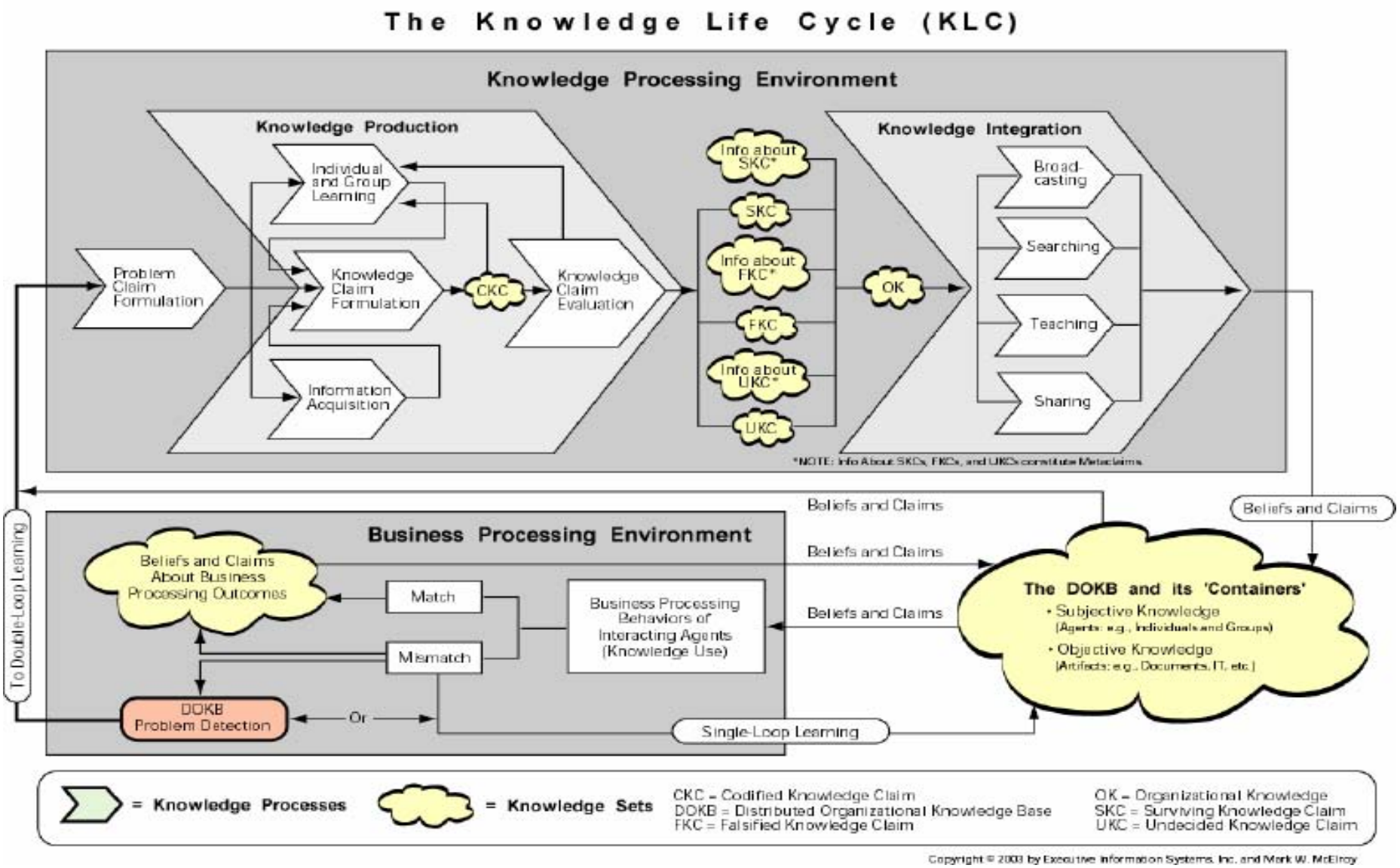
Page

Appendix A: EKMF Survey Findings - Comparison of KM Models and Processes

KM Phase / Model	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7
Nonaka / Takeuchi	create						
Weggeman	determine	develop	Inventory	share	apply	evaluate	
"le manageur"	capture	organise	learn	apply	evaluate		
Probst/Romhardt	identify	acquire	develop	share/disseminate	use	preserve	evaluate
Bukowitz / William	get	use	learn	contribute	assess	build/sustain	divest
APQC	create	identify	collect	organise	share	adapt	use
Kee/Daly/Khan/ Young/Robson	create	capture	validate	structure	store	share	
Greenwood	create	clarify	classify	communicate	comprehend	create	
Davenport/Prusak	generate	codify/co-ordinate	transfer				
Newman/Conrad	create	retention	transfer	use			
Hjelmervik/Kirkemo	capture	create	deliver	use			
Promote®	target	identify	develop	distribute	use	store	evaluate
VTT	coordinate	need determination	share	create	collect / store	update	

(Source: EKMF, 2001 p.29)

Appendix B: Knowledge Life Cycle:



Brief Narative:

- Organizational knowledge is held both 'subjectively' in the minds of individuals and groups and 'objectively' in recorded or expressed form. This is the *Distributed Organizational Knowledge Base* (DOKB) of an enterprise.
- *Knowledge Use* in the *Business Processing Environment* results in outcomes that either satisfy expectations (*Matches*) or fail to do so (*Mismatches*).
- *Matches* reinforce knowledge previously used, thereby leading to its re-use.
- *Mismatches* initially lead to adjustments in Business Processing behavior based on choices made from within a range of pre-existing knowledge in the DOKB – this is *Single-Loop Learning* (Argyris and Schon).
- Successive failures from single-loop learning to produce matches in expected or desired outcomes leads to doubt about and/or rejection of pre-existing knowledge (problem detection), thereby triggering *Knowledge Processing* efforts to produce and integrate new knowledge – this is *Double-Loop Learning* (Argyris and Schon).
- *Problem Claim Formulation,* an attempt to learn and state the specific nature of the detected knowledge gap (or "problem"), is a precursor to *Knowledge Production*.
- New *Knowledge Claim Formulation* follows in response to validated problem claims, with input via *Information Acquisition* and *Individual and Group Learning*, all under the influence of content contained in the current DOKB.
- New knowledge claims are tested and evaluated via *Knowledge Claim Evaluation* using a variety of criteria.
- *Knowledge Claim Evaluation* leads to: (1) *Surviving Knowledge Claims* (i.e., new Organizational Knowledge), *Falsified Knowledge Claims*, or *Undecided Knowledge Claims*, and also produces *information about* each of these outcomes, or *Metaclaims (*altogether, 6 types of outcomes).
- The record of all such outcomes, both the claims themselves and their corresponding metaclaims, become part of the DOKB via several means of *Knowledge Integration*, a mix of 'push' and 'pull' methods, along with the active response of agents to *Knowledge Integration* communications and activities.
- Once integrated into the DOKB, claims and metaclaims become subject to use in *Business Processing*.
- Experience gained from the use of knowledge contained in the DOKB gives rise to new claims and metaclaims regarding knowledge validity and value. The resulting *Beliefs and Claims About Business Processing Outcomes*, in turn, change the DOKB's content and determine its growth.
- The cycle repeats itself endlessly.

(Source: Firestone and McElroy, 2003b p.300)

Appendix C: KPPP Questionnaire

KPPP* Questionnaire

This survey asks for your opinion about policies and programmes that relate to knowledge practices and knowledge processes in your organisation. Since the researchers are interested in your judgment, there are no right or wrong answers. Sometimes people are tempted to answer survey questions in the way they think is expected.

Please respond based on your own judgment, regardless of what you think others expect or what is socially acceptable. Your responses will be held in strict confidence; we guarantee complete anonymity.

**Based on the patent pending Policy Synchronisation Method (PSM) by Macroinnovation Associates, LLC, 2003.*

This document comprises two parts, namely:

- The *KPPP questionnaire* (Knowledge Policies, Programmes and Practices) is based on the PSM method (Policy Synchronisation Method), developed by Knowledge Management Consortium International (2003) and Macroinnovation Associates (2003). The PSM itself is based on the Knowledge Life Cycle (KLC) framework developed by Executive Information Systems Inc. and McElroy (2003). The questionnaire (Appendix A) comprises questions that relate to the prominence of policies and programmes in three main areas associated with knowledge processing, namely: *Background conditions*, dynamics associated with *Knowledge Production*, and dynamics associated with *Knowledge Integration*.

- *KPPP Survey Questionnaire: Personal Details* (Appendix B)

How to complete the KPPP questionnaire?

1. Study each policy dimension and the related policy areas and knowledge practices associated with a policy area (See Appendix A).

2. Rate each of the policy areas according to the following criteria (take care to select a value between 1 (no effort) and 5 (excellent effort) for a specific policy area):

   - What Management SAYS about the policy area (Policies)
   - What Management DOES about the policy area (Programmes)
   - What organisational members actually do in PRACTICE
   - Your satisfaction with the current state of affairs; the *status quo*

3. Review each policy area and record details regarding specific knowledge practices that occur in your organisation/business unit. Use the space provided in Appendix A to record your views.

4. Complete the Section: RESPONDENT PERSONAL DETAILS (Appendix B) and return the form to:

   Danie. Vlok
   P.O. Box 7426, East London, 5200
   eMail: d.vlok@ru.ac.za
   Phone: 0829272748 or 043-7047000

KPPP* Questionnaire

A. Background Conditions (Refers to the organisational structure and make-up for facilitating knowledge processing)			No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort
			1	**2**	**3**	**4**	**5**
A1. Human Characteristics							
Refers to whether an organisation has implicit and/or explicit policies and programmes in place seeking to promote diversity, trust, problem solving ability	• The extent to which diversity in values and worldviews held by members of the organisation is sought, encouraged and appreciated • The extent to which recruitment policies and programmes reflect diversity of values and demographics • The extent to which the range of perspectives and experiences is available to the organisation as it seeks to detect problems and opportunities, and to search for solutions to solve such problems • The extent to which organisational rules instill trust	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

A. Background Conditions (Refers to the organisational structure and make-up for facilitating knowledge processing)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
Refers to whether an organisation has implicit and/or explicit policies and programmes in place seeking to promote connectivity among people in the organisation and with external stake holders	• The extent to which frequency and quality of interactions between people impacts the velocity of information flow • The degree of connectivity that exists between individuals and groups in the organisation • The extent to which technology infrastructure facilitates connectedness, including support for social communities or social networks • The extent to which protocols regulating internal and external communication are well developed. • The extent to which formal and rigid lines of communication have been replaced by more flexible arrangements or practices e.g. "open-door" policies	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

A. Background Conditions (Refers to the organisational structure and make-up for facilitating knowledge processing)			No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort
			1	**2**	**3**	**4**	**5**
A3. Critical Attitude							
Refers to whether an organisation has implicit and/or explicit policies and programmes in place seeking to promote a critical attitude among organisational members	• The extent to which people in the organisation are motivated and willing to question organisational knowledge and to participate in organisation-wide problem solving • The extent to which management displays tolerance towards individuals and/or groups who frequently question the knowledge *status quo*. • The extent to which members in the organisation engage themselves in problem solving	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

A. Background Conditions (Refers to the organisational structure and make-up for facilitating knowledge processing)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
A4.1 Knowledge Entitlement (Attitudes)							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how people feel about ownership and distribution of knowledge	• The extent to which people in the organisation believe that benefits associated with knowledge production should be shared with employees and other stakeholders who contribute to knowledge production • Refers to how strongly people in the organisation feel about recognition of individuals and group contributions to organisational knowledge • Refers to perceptions that exist regarding joint ownership of knowledge between individual and the organisation • The extent to which the organisation is aware of intrinsic motivation at the level of individuals and groups, and the degree to which this is explored	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

A. Background Conditions (Refers to the organisational structure and make-up for facilitating knowledge processing)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
A4.2 Knowledge Entitlement (Behaviours)							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how knowledge ownership and benefits is distributed	• The extent to which benefits associated with knowledge production is shared with employees and other stakeholders who contribute to knowledge production • The extent to which individuals and group contributions to organisational knowledge is recognised by the organisation • The extent to which ownership of knowledge is shared between individuals and the organisation	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

B. Knowledge Production (Refers to the dynamics of knowledge creation)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
B1. Problem Recognition and Problem Claim Formulation							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on the extent to which people participate in problem recognition and articulation of knowledge claims	• The extent to which individuals and groups are able to anticipate and spot deviations from the norm/rule (identify knowledge gaps) • The extent to which individuals and groups exhibit a willingness to question the very norm/rule itself – recognition that knowledge is fallible. • The extent to which efforts are made to enlist or energise employee participation in enterprise-wide, distributed problem recognition • The extent to which there is persistent matching of knowledge in use with expectations or outcomes • The extent to which individuals are taken seriously when they identify and formulate a genuine problem.	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

B. Knowledge Production (Refers to the dynamics of knowledge creation)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
B2. Individual Learning							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how individuals learn, including the extent to which individuals are free to pursue learning agendas of their own choosing	• The extent to which efforts are made to encourage self- directed learning for employees, or community of practice or inquiry formation • The extent to which a balance exists between self-motivated individual learning and prescribed training • The extent to which the organisation is open to the idea that employees know what learning today will have an impact tomorrow • The extent to which the organisation encourages individuals to pursue learning of their own choosing e.g. instances of self-motivated research and study • The extent to which the organisation engages the creative thinking of individuals • The extent to which promising ideas are supported through budgetary and financial assistance	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

B. Knowledge Production (Refers to the dynamics of knowledge creation)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
B3. Group Learning							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how individuals share similar passions and interests, are free to form groups or learning communities, and to engage in group learning with full organisational support	• The extent to which efforts are made to encourage self- directed group learning for employees, or community of practice or inquiry operations • The extent to which the organisation acknowledges the value of groups and communities • The extent to which the organisation encourages groups (formal and informal) to pursue learning agendas of their own choosing • The extent to which the organsiation engage and leverage the creative power and synergy of groups • The extent to which promising ideas by groups are supported through budgetary and financial assistance	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

B. Knowledge Production (Refers to the dynamics of knowledge creation)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
B4. Information Acquisition							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how people in the organisation are afforded access to external information sources to solve problems	• The extent to which efforts are made to encourage or enable identification and use of information from sources outside the organisation • The extent to which the organisation considers practices by other units, other sectors in industry, other industries • The extent to which external information is accessible to members of the organisation	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

B. Knowledge Production (Refers to the dynamics of knowledge creation)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
B5. Knowledge Claim Formulation							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how individuals and groups generate new ideas in response to problems, and the extent to which employees are permitted to participate in knowledge production	• The incidence of conjectures, assertions, arguments and theorising about potential actions that will solve identified knowledge gaps • The extent to which efforts made to encourage and enable employee involvement in innovation affairs of the firm • The extent to which the individual / groups are free to bring knowledge claims to the table to be tested against prevailing practice • The degree of transparency and openness about the owner(s) of knowledge	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

B. Knowledge Production (Refers to the dynamics of knowledge creation)			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
B6. Knowledge Claim Evaluation							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how new ideas are tested and evaluated, and how transparent and inclusive the processes are	• The extent to which efforts are made to encourage and enable employee involvement in criticism of organisational knowledge claims • The extent to which detailed information exists about successful knowledge claims as well as unsuccessful claims (meta claims) • The extent to which criteria exists for the evaluation of knowledge claims • The degree of transparency and openness about knowledge moderators	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
		Your satisfaction with the status quo?	①	②	③	④	⑤
What does your organisation do to implement this practice?							

KPPP* Questionnaire

C. Knowledge Integration			**No Effort**	**Poor Effort**	**Fair Effort**	**Good Effort**	**Excellent Effort**
			1	**2**	**3**	**4**	**5**
C1. Broadcasting							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how broadcasting tools and methods are used for distributing organisational knowledge	• The extent to which a technology infrastructure and architecture exists for supporting knowledge broadcasting • The extent to which the technology infrastructure and architecture actually supports knowledge broadcasting • The extent to which organisational knowledge gets around the organisation in an efficient and effective manner	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

C. Knowledge Integration			No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort
			1	**2**	**3**	**4**	**5**
C2. Searching and Retrieving							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how searching and retrieval tools and methods are used to distribute organisational knowledge	• The extent to which the organisation has well developed tools and methods for searching and retrieving organisational knowledge • Refers to the efficiency and effectiveness for searching and retrieval efforts • The extent to which explicit knowledge (in hard-copy or electronic forms) are easily identifiable and accessible; refers to habits and protocols in place to improve accessibility • The extent to which tools such as filtering and other intelligent agents assist members and stakeholders to access the Distributed Organisational Knowledge Base (DOKB)	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

C. Knowledge Integration			No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort
			1	**2**	**3**	**4**	**5**
C3. Teaching							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on how teaching and training programmes are used for distributing organisational knowledge	• The extent to which teaching and training tools and methods exist for distributing organisational knowledge • The extent to which formal training is provided on demand • The extent to which the contribution of formal training and educational content are evaluated and assessed in terms of real value added to the organisational knowledge base • The extent to which meta knowledge claims are integrated into educational content as part of the learning and problem solving process • The extent to which mentoring is practised	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP* Questionnaire

C. Knowledge Integration			No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort
			1	**2**	**3**	**4**	**5**
C4. Knowledge Sharing							
Refers to whether an organisation has implicit and/or explicit policies and programmes impacting on the strategies for sharing organisational knowledge	• The extent to which efforts are made to encourage sharing or other forms of knowledge diffusion or distribution • The extent to which individually held and organisational knowledge is accessible to stakeholders who may want or need it • Refers to the frequency and quality of knowledge diffusion in the organisation • Refers to how well organisational knowledge is integrated within the business processing environment (e.g. processes) • The extent to which a technology infrastructure and architecture exist for supporting knowledge sharing • Refers to the rate at which the distributed organisational knowledge base (DOKB) is "refreshed"	What does Management SAY?	①	②	③	④	⑤
		What does Management DO?	①	②	③	④	⑤
		Everyone's actual PRACTICES?	①	②	③	④	⑤
What does your organisation do to implement this practice?		Your satisfaction with the status quo?	①	②	③	④	⑤

KPPP Survey Questionnaire: Respondent Personal Details

1	**Organisation:**	
	Personal Details:	
2	Surname:	
3	Firstname:	
4	Daytime Contact Phone	
5	e-Mail	
6	Job Title/Rank:	

Your Management Status (Mark with X)**:**

	Senior Management	Middle Management	Junior Management	Other (Specify)
7				

Your Highest Educational Qualification (Mark with X)**:**

	Phd / Masters	Honours	Degree / Diploma	Other (Specify)
8				

This survey is being completed for (specify division and/or business unit)**:**

	Total organisation	Division	Business Unit	Individual level
9				

10	**Number of Employees in your Unit**	
11	**Date:**	
	Signed:	

Appendix D: Social Network Questionnaire

Questions	Kindly supply your First Name below:	Response				
		Never	Sometimes	Regularly	Mostly	Always
		1	2	3	4	5
1. How often do you talk with the following people regarding the topic below?	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤
2. How much do you typically communicate with each person relative to others in the group?	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤
3. How frequently have you acquired information necessary to do your work from this person in the past month?	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤

4. Information I receive from this person is useful in helping to get my work done.	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤
5. Who do you typically seek work-related information from?	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤
6. Who do you typically give work-related information to?	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤

7. Who do you typically turn to for help in thinking through a new or challenging problem at work?	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤
8. How effective is each person listed below in helping you to think through new or challenging problems at work?	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤
9. How well do you understand this person's knowledge and skills?	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤
10. When I need information or advice, this person is generally accessible to me within a sufficient amount of time to help me solve my problem.	Wesley	①	②	③	④	⑤
	Nola	①	②	③	④	⑤
	Les	①	②	③	④	⑤
	Maditz	①	②	③	④	⑤
	Loretta	①	②	③	④	⑤
	Other (Please specify name of contact)	①	②	③	④	⑤

11. How would you describe your and others' information role(s).	(Mark with a X in the appropriate cell)	Central link	Link un it to other networks	Information Broker	Specialist	Other Role
	Wesley					
	Nola					
	Les					
	Maditz					
	Loretta					
	Other (Please specify name of contact)					

Appendix E: Methodology - Focus Group Discussion

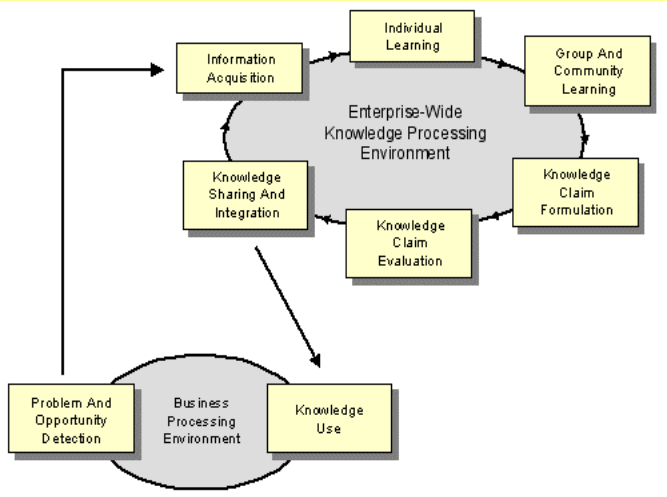
Methodology for Workshop - Applying the KLC to a Business Process

Objectives of the workshop:

- Identify the processes followed by the organisation that enable employees in the organisation to solve epistemic (knowledge related) problems that occur in the normal execution of events e.g. during a business process
- Investigate the makeup and quality of knowledge processes (e.g. knowledge creation and knowledge integration) and how such processes serve and support organisational and business processes (e.g. procurement, budgeting, etc.)
- Determine the extent to which organisation has progressed towards its stated aim of being a learning organisation
- Discover local knowledge processing rules in addition to policies, programmes and practices

Workshop Method:

- Explain the simplified KLC (see diagram)



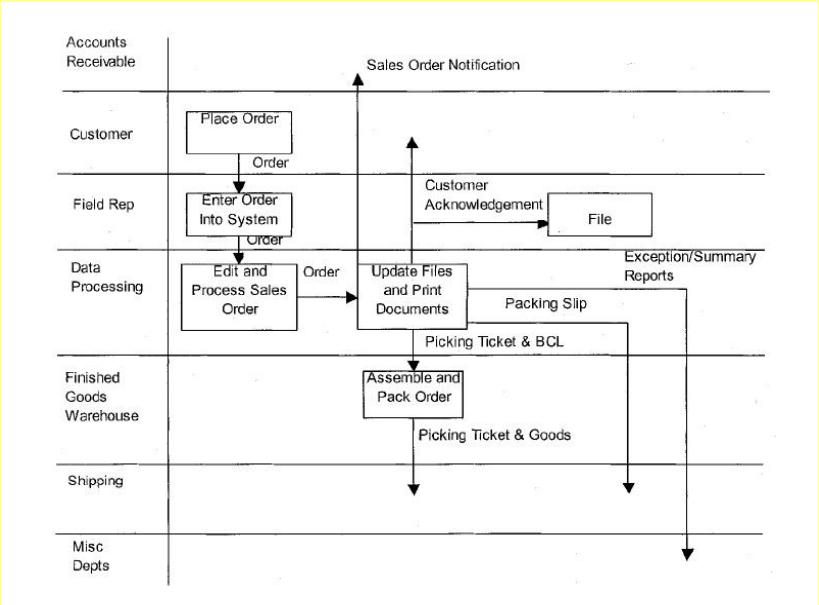
- Explain the important distinction between knowledge processing and business processing environments
- Explain concept of knowledge containers i.e. codifications of various kinds. Distinction between declarative and procedural knowledge. Much of a firm's organisational knowledge are expressed in the form of declarative (know-what) and procedural (know-how) rules held in various container types (McElroy,

Containers of Knowledge		
	Declarative Knowledge (*Know-what*)	Procedural Knowledge (*Know-How*)
Business Strategies	x	
Products and Services	x	x
Business Processes		x
Organisational Structures	x	
Policies and Procedures	x	x
Culture and Values	x	x
Information Systems	x	x
Individuals and Teams	x	x

Includes electronic, hard copy and other knowledge artifacts

(Source: McElroy, 2003a p.73)

- Think of a well defined business process in the organisation / business unit e.g. order processing, procurement, case management, budgeting, etc, something with a clear workflow associated with it. (This constitutes procedural knowledge expressed in practice by patterns of work that people collectively follow).



(Source: Lancaster, 2001 pp.266)

- Trace back to declarative knowledge/rules. Also look at knowledge containers i.e. procedure manuals, training programmes, etc. Note the two components to improve organisational learning e.g.
    - Clearly express knowledge containers (stock-take)
    - Profiling Knowledge processes - healthy life cycles needed through which knowledge is crated and integrated (profile these).

Step through each of the following:

1. *Problem Recognition & Problem Claim Formulation (PCF)*
    - 1.1. Identify a problem (e.g. in a business process) and explain how the problem was solved
    - 1.2. relate to strategy/ beliefs and expectations e.g. measures & business results
    - 1.3. Identify gaps between desired results and actual business operation (use of knowledge)
    - 1.4. matching/mismatching
    - 1.5. relate to Distributed Organisational Knowledge base (Subjective & Objective knowledge)
        - 1.5.1. what is the status of the organisational knowledge base
        - 1.5.2. where is it kept
    - 1.6. Refer to a current process / conspicuous knowledge
        - 1.6.1. What does it look like
        - 1.6.2. Is it working – how well?
        - 1.6.3. who's involved?
    - 1.7. Refer to a current process / conspicuous knowledge and *trace back* its origins e.g.
        - 1.7.1. How did new process / conspicuous knowledge come about?
        - 1.7.2. What did it look like?
        - 1.7.3. Why did it change
        - 1.7.4. How did the system cope
        - 1.7.5. How did it change
        - 1.7.6. Who were involved
    - 1.8. Refer to current process/conspicuous knowledge and *trace forward* e.g.
        - 1.8.1. will it change/modified/replaced
        - 1.8.2. why will it change / be modified/ replaced

1.8.3. how does present system cope with imperfections

1.8.4. how will it change (the process)

1.8.5. who will be involved

2. *Individual and Group Learning* (The extent to which individuals and groups are free to pursue learning agendas of their own choosing; impacts rate and quality of organisational innovation)
   - 2.1. How does individual learning take place (e.g. say an individual wants to pursue his/her studies in a particular field)
   - 2.2. Is it supported by the organisation / supervisors?
   - 2.3. The process involved say the individual has a problem
   - 2.4. How much time will be allocated with individual learning
   - 2.5. Any impact on other groups or people (organisational knowledge)
3. *Information Acquisition*
   - 3.1. Sources of knowledge (external)
4. *Knowledge Claim Formulation*
   - 4.1. Who formulates knowledge claims (How, What, etc)
5. *Knowledge Claim Evaluation*
   - 5.1. The process followed
   - 5.2. Who decides when/what something is knowledge
   - 5.3. What happens to ideas / other claims thrown out (meta claims)
6. *Knowledge Integration / Knowledge Sharing;* The extent to which individual and organisational knowledge is accessible to stakeholders who may want or need it, as well as the quality of knowledge diffusion in the organisation – impacts business-level knowledge use and performance, and the capacity of stakeholders to recognize and detect problems. Supporting tech infrastructure

Appendix F: Focus Group Discussion Report

Report of a research workshop held with

Rhodes East London IT Department staff:

(18 & 19 December 2003)

Facilitator: D. Vlok
Present: W. Appel, N. Summer, Maditz,
Apologies: L. MgGregor

The following information was captured from Flip-chart sheets used during the workshop

What are the business outcomes/results?

- Functionality (IT) – estimated at 95%
  - E-Mail access and Internet access
  - Network (Printing and File Sharing)

What are the business expectations by users e.g. user requirements from senior management, Clients: e.g. students, academic departments

What to do?

- Source information (WebRT.)
  - Problems recorded via WebRT
- Spares and tools
- Knowledge
  - Problems via WebRT
  - solutions (previous)
  - problem solving (how?)
  - equipment (HW/SW)
  - exports/other

- **Where is knowledge kept? - Location**
  - Via Internet
  - With Specialists
  - On library
  - Knowledge Bases (FAQ's)
  - Documents File servers or desktop

  - Problem Tacit/Implicit - How do we retain knowledge
    - Via Documentation
    - Via Sharing

[First tried process – then problems]

- **Problems identified via brainstorming:**
  - Lab maintenance (User dissatisfaction due to downtime in Labs)
  - E-Mail access/Internet access
  - Problems with retrieving
  - User ignorance/ education due to lack of training
  - Data storage/Access due to faulty storage devices e.g. stiffies
  - Telephones (dead)
  - Printers (general maintenance)
  - Old equipment break-downs (an ongoing issue)
  - Lack of staff (shortage) – impacts on maintenance function & quality of general service levels.
  - Funding
  - Staff Development/Management stress; effects total service delivery
  - Service levels could improve.

Heavy focus on maintenance issues - No toys – no budget; should be a balance between job requirements and individual desires; don't fiddle with production environment

- **List of Processes identified** (from problems & brainstorming**)**
  - Order equipment
  - Change of User Passwords
  - Job reporting (Labs & staff) – both via WebRT
  - Leave approval
  - Printer (repairs)
  - Provision of) Services e.g. Internet
  - User Development & Education
  - Equipment maintenance
  - Problem detection by using IT e.g. e.g. WebRT and user feedback
  - Problem analysis using IT e.g. e.g. WebRT and user feedback

  - To provide service acceptable levels, Functions e.g. Maintenance & Service Management needs to be working. How to do that?

  - Via Processes e.g. User Education/ Fault Management:

▪ identify needs ▪ analyse needs ▪ prioritise ▪ training (internal/outsource)	▪ error detection ▪ reporting ▪ Recording ▪ Analysis ▪ Response ▪ feedback

Prevention Maintenance / Development vs. Reactive Maintenance

- Mostly Reactive Maintenance
- H/Desk: All Share this responsibility to assist Lab maintenance
- Interruptions from staff and students prevents development work / time for self-improvement
- Stick to job descriptions; don't fiddle in a production environment

Business Process:
What does it looks like? (activities, inputs, outputs)

- See Process map - response when?
  - Activities:
    - Web access
    - Contact with Grahamstown
    - Monitor configuration of changes
    - What has happened with merger will affect the process?
    - Feedback / Notifying user regarding changes
    - Meetings, daily at 8:30 to facilitate process of fault/user management
      - everyone should be involved
      - duration dependent on backlog
    - What about logs from WebRT (analysis of reports to determine history)

Who's involved in business process?

- Who manages business process? - Les responsible a supervisor
  - Decisions/Delegate (supposed to) to appropriate person (subject to skill required and nature of query)
  - Overall management & monitoring
  - Telephone issues (Certain pin codes)
  - Ordering of equipment
  - All Other staff
  - Check/refresh WebRT regularlty (no pattern though) throughout day checking & responding if free
  - Nobody is dedicated to check and monitor
  - All check & respond if can - Same for all – all check WebRT and respond when they can

Is current business process working?

Most jobs (95%) of can be scheduled internally

- Competency exist
- Except: Printers & Monitors – regular breakage
- Effort
- Time
- Cost
- Balance required between Service and Development/Research

Are you satisfied with current process?

- Generally satisfied:
- Sometimes equipment supposedly repaired by vendors turns faulty?
- Communication/feedback to user 1 day late, 2 days,etc
- Log not always complete
- Daily meetings a good idea

How long have we been doing this process

- 5 years

What about previous process? – what does it look like? why changed?

- Phone based
- person contact.
- No electronic element
- Out of office (cannot take calls)
- Technology was different.
- IT Committee complaints registration slow
    - Need to meet regularly to discuss policy issues - focus on policy and strategic issues
    - Don't discuss minutes of IT Committee minutes - need feedback from IT committee

Why did previous process change?

- To become more efficient.
- more staff acquired
- repairs attended to locally now – previously to GHT

How will the current process change?

- Strong management will change status quo
- Campus expansion
    - More users
    - Diffferent profiles (user and staff)
    - Equipment
    - Different users
    - More laboratories – new equipment
    - Staff/ IT Staff

Error Detection

- User complaints picked up via Web RT
- Non attendance at staff meeting
    - Missing out on sharing opportunities
    - Orders not processed
- Job description needed

Next:

- Get information
- Internal diagnostics.
- Phone Richard.

What problems are Persistent? -
Sometimes problems are experienced with logging on to old server. Problem is intermittent (for no reason); its campus wide, some people suspecting bottlenecks. There is denial by […] that problem lies with […]. Some argues problem lies with server. Ad hoc discussion taking place, Network issues never discussed.

Appendix G: KPPP Interviews - Data (Quantitative)

Table 14: Background Factors – What Management SAYS

Background Factors		What management SAYS					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
A1	Human Characteristics	2	1	1			4
A2	Connectedness			1	2	1	4
A3	Critical attitude	1	1	2			4
A4	Knowledge entitlement (Attitudes)	3		1			4
A5	Knowledge entitlement (Behaviours)	3		1			4
Grand Total		9	2	6	2	1	20

Table 15: Background Factors – What Management DOES

Background Factors		What management DOES					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
A1	Human Characteristics	2	1	1			4
A2	Connectedness	1		3			4
A3	Critical attitude	2	1	1			4
A4	Knowledge entitlement (Attitudes)	1	1	1	1		4
A5	Knowledge entitlement (Behaviours)	2		1	1		4
Grand Total		8	3	7	2		20

Table 16: Background Factors – Everyone's actual PRACTICE

Background Factors		Everyone's actual PRACTICE					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
A1	Human Characteristics		3	1			4
A2	Connectedness		3	1			4
A3	Critical attitude	1	1	2			4
A4	Knowledge entitlement (Attitudes)	1	1	2			4
A5	Knowledge entitlement (Behaviours)	1	1	2			4
Grand Total		3	9	8			20

Table 17: Knowledge Production – What management SAYS

Knowledge Production		What management SAYS					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
B1	Problem Recognition and Problem Claim Formulation	1	2		1		4
B2	Individual Learning	2		1	1		4
B3	Group Learning	2		2			4
B4	Information Acquisition			3		1	4
B5	Knowledge Claim Formulation	1	1	1	1		4
B6	Knowledge Claim Evaluation	1	2		1		4
Grand Total		7	5	7	4	1	24

Table 18: Knowledge Production – What management DOES

Knowledge Production		What management DOES					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
B1	Problem Recognition and Problem Claim Formulation	2	1		1		4
B2	Individual Learning	2		1	1		4
B3	Group Learning	2	1	1			4
B4	Information Acquisition			3		1	4
B5	Knowledge Claim Formulation	1	1	2			4
B6	Knowledge Claim Evaluation	1	2		1		4
Grand Total		8	5	7	3	1	24

Table 19: Knowledge Production – Everyone's actual PRACTICES

Knowledge Production		Everyone's actual PRACTICE					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
B1	Problem Recognition and Problem Claim Formulation		3	1			4
B2	Individual Learning			4			4
B3	Group Learning	1	1	2			4
B4	Information Acquisition		1	2		1	4
B5	Knowledge Claim Formulation		1	2		1	4
B6	Knowledge Claim Evaluation	1	2	1			4
Grand Total		2	8	12		2	24

Table 20: Knowledge Integration – What management SAYS

Knowledge Integration		What management SAYS					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
C1	Broadcasting	1	1	1	1		4
C2	Searching and Retrieving	1	1	1		1	4
C3	Teaching	2	1			1	4
C4	Knowledge Sharing	2		1	1		4
Grand Total		6	3	3	2	2	16

Table 21: Knowledge Integration – What management DOES

Knowledge Integration		What management DOES					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
C1	Broadcasting	2			2		4
C2	Searching and Retrieving	1	2			1	4
C3	Teaching	3			1		4
C4	Knowledge Sharing	3			1		4
Grand Total		9	2		4	1	16

Table 22: Knowledge Integration – Everyone's actual Practices

Knowledge Integration		Everyone's actual PRACTICE					
Question ID	Question Description	No Effort	Poor Effort	Fair Effort	Good Effort	Excellent Effort	Grand Total
C1	Broadcasting	2	1	1			4
C2	Searching and Retrieving		3			1	4
C3	Teaching	3	1				4
C4	Knowledge Sharing		2	2			4
Grand Total		5	7	3		1	16

Appendix H: KPPP Interview Data (Qualitative)

Table 23: Background Factors - Human Characteristics

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Human Characteristics	Best person for job No policy in place No policy in place Never discussed Never heard of No, probably management is not aware of requirements Nothing – yet it is critical. We have a mixed environment	[The IT department] appoints people who's best for job Not really applied diversity issues Poor effort by management	Room for improvement Some too proud to ask for help [refer to Problem Solving] Lack of staff – gender and race could solve some problem solving issues – improve mix Trust is critical – we are a powerful department and could cripple the campus I don't trust anybody (only some)	Important but [IT] field is specialised and such skills are not easily obtainable [referring to blacks and females]. Historically, IT was male's domain. Race mix important to service students in Xhosa language

Table 24: Background Factors - Connectiveness

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Connectedness	I like idea of connectedness Management has attempted, however nothing will ensure that it happens; only after a crisis has developed	Management aware of problem and some effort on their part, but personalities involved	Daily meetings initiated by me but nobody is accountable. Failure in delegating work. A way to force everybody to get together and keep in touch. Started off well – now people do not attend; possibly because it was my idea. No discipline/no accountability People not at work on time There is division – some don't talk to others Selective communication Very poor – factions e.g. one is more comfortable asking external parties for help	Fair effort Very dissatisfied Can't force people to communicate

Table 25: Background Factors - Critical Attitude

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Critical Attitude	Encourage criticism – its good for growth I say that in meetings Maybe not stressed enough Management has encouraged criticism after several complaints	The issue not stressed enough Door supposedly "open" but it stops there	People come and criticise e.g. B and I respect B for that Problems by staff, but not taken seriously No forum to voice concerns Talk behind people – Management not aware Some staff new and would not challenge Critical but not constructive attitude – too much anger	Lots of criticism, sometimes warranted From certain users e.g. clean labs, ghosting People don't know what's required We work hard (some of us) Written complaints referred to Management for action Some verbal complaints Many staff complain – a very unhappy department

Table 26: Background Factors - Knowledge Entitlement (Attitudes and Behaviour)

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Knowledge Entitlement (Attitudes)	Not really an issue here. I acknowledge when its due e.g. promotions or merit awards Management not aware Not being spoken about; therefore not addressed	Management recognise my efforts	Person B got merit award I get recognition from Management but not from others in unit Certain people quite willing to work together One member spoils the team approach	Some people not prepared to give out any info – desiring power not in interest of department New staff comes to me for help Some not prepared to give credit Individual has ownership of knowledge, not the department
Knowledge Entitlement (behaviours)	Not really an issue here	I acknowledge when its due e.g. promotions or merit awards No policy Management recognises my efforts	Some not prepared to communicate No documentation Management have not realised it	

Table 27: Knowledge Production - Problem Recognition and Problem Claim Formulation

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Problem recognition & Problem Claim Formulation	Issue not promoted No real policy – people might wait for months Not say or do anything	Daily meetings to address routine issues Hardware: no spares and have to wait	Web RT helps to identify problems Ability to detect problems quite good WEB RT as practice provides log of problems – everyone has access No reports to identify persistent issues Most staff realise people dependent on PC's I do that but not the unit Morning meetings suppose to detect problems – not all attend No necessity to We all know system – know where to look Sometimes people make changes without telling others Shared directory for department – own internal help desk (don't think people use it) Most problems hardware related e.g. switches	Solve problems based on experience e.g. Fibre optics Informal sharing - share with friends at home Lots of problems from poor communications from Rhodes Grahamstown – they make changes not informing us

Table 28: Knowledge Production - Individual Learning

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Individual learning	Invite staff to go on course but time is problem Budget for this Good effort - telling people Not promoted, not discussed Won't complain too much about that – Staff shortage prevents this from happening Not hugely promoted but will be allowed to go if there is money	I would send somebody on training course Little bit happening Fair	Fair practice – people do get away e.g. Person B & Person C to Durban; Person a & Person D to PE Nobody currently registered for a course We have to learn as individuals Some attendance – should be better with UFH I have contacted others Border and PE Tech I get irritated when people fiddle Person C but not if there are problems to attend to	Reasonably satisfied – my initiative that we went to Durban Sometimes I have to lock myself up to do some work - Users unhappy when this happens No helpdesk

Table 29: Knowledge Production - Group Learning

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Group learning	Nothing said Never discussed	Nothing to support group learning	Aware of some members discussing passions with others e.g. Person A's [interests] My own connections with telephone and Philips user groups No groups – we are too small for group learning No common interest Discuss a little between ourselves e.g. sometimes with Person C and Person D No group learning internal Not aware of Person A's interests e.g for [specific technology] – It was not discussed in the department or disseminated	Not particularly satisfied Hoarding of info

Table 30: Knowledge Production - Information Acquisition

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Info acquisition	Not actively promoted – assumed. If external info sought, Management no problem with that Actively encouraged	Encourage staff to talk to outsiders Nothing to prevent people [from talking]	Get info from participation in user groups externally e.g. Telephone Users and Philips and Novell - Use email when I have a problem We follow best practice of our companies Speak to people outside when we cant solve problem Fair effort External relations happens frequently Access to web / other parties	All aspects good PE and Border Tech helpful with automating user accounts

Table 31: Knowledge Production - Knowledge Claim Formulation

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Knowledge Claim Formulation	No part by Management	No procedure	I problem solve myself [Concerning problem solving], the Unit sucks – we don't debate issues Thorough analysis [of problems] done – no formal procedure (info travels between two people only) Not my problem-attitude Very little dissemination – dependent on goodwill of person Mostly people admit they have a problem – most willing to help Experience assist in solving issues Most quite cooperative [All Staff] need to realise people depend on them – it becomes a moral issue Virus problem was a good example of people sharing experiences and expertise – only time that we worked together	

Table 32: Knowledge Production - Knowledge Claim Evaluation

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Knowledge Claim evaluation	No	No at all	Not happening Only two people qualified to work on network Not getting enough input – [its like having] a table with [only] two individual participating Complaints re tech problem e.g. traffic (configuration of network) Person would not acknowledge problem We had the "plug pulled" on us – myself and [another person]" – suspecting sabotage We need consultant [to address this] but money is a problem [Yet], does not have to be a problem of money if personalities are sorted out	

Table 33: Knowledge Integration - Broadcasting

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Broadcasting	yes	Minutes of IT No communications at all	Most important stuff e.g. IT minutes Person C send out minutes Could be more communication Only via general staff [all Rhodes staff] email No communications	Tell everybody

Table 34: Knowledge Integration – Searching and Retrieving

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Searching and retrieving	No policy Some policy exists e.g. passwords to be kept in sealed envelop in safe	No programme No procedure, no formal channels	Web RT used Documents and software procedures stored on the server, Passwords and password changes are kept in safe You won't find it Poor effort Meetings not successful I have set-up a Microsoft knowledge base e.g. FAQ's - not sure if used by others [IT staff] 1st – phone someone within unit -quicker 2nd knowledge base Not documenting changes No documentation Software tips and FAQ's on server	Rely on Richard Well organised Finding minutes

Table 35: Knowledge Integration - Teaching

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Teaching			I write report on workshop but not diffused to others Little bit of training happens [In all the time here] I attended one training course which I HAD TO PAY FOR No training done Staff shortages a problem [when people goes away on training] No formal feedback happens after training	Teach everybody else

Table 36: Knowledge Integration - Sharing

Policy Area	What Management SAYS	What Management DOES	Everyone's Actual PRACTICES	General Remarks
Sharing	In general, we have no policies Nothing formal		Trying as best we can Sometimes people slack off [I think that] sharing depends on what needs to be shared Daily meetings suppose to do that [facilitate sharing], but is not effective Jobs allocated according to strengths and expertise of individuals	