An investigation into engineering knowledge management: A petrochemical organisation as a case study

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Abstract

Modern organisations are increasingly seen as knowledge-based business ventures in which proactive knowledge management is important for competitiveness. The interest in knowledge management seems to have surged across world.

In the increasingly competitive and global marketplace, firms are especially keen to integrate and capitalise on the knowledge of their employees and make it available when and where it is needed. In addition, many firms realise the need to educate and indoctrinate new hirelings into the organisation quickly due to the scarcity of global resources and an aging workforce (Teicholz, 2004). As a result, many organisations implement knowledge management initiatives in an attempt to combine and exploit their knowledge assets.

It is therefore necessary to critically evaluate Sasol on these terms. How the knowledge management strategy supports organisational processes is investigated along with collective learning and collaborative decision making within the organisation.

An in depth literature study was conducted to gain insight into KM concepts and strategies. It also provided a reference to current best practices. Above all, the literature study helped to gain perspective on the complexities of measuring a phenomenon like KM in an organisation. Performance measurement techniques are discussed and reference made to the eras of knowledge management.
A short section makes reference to another organisation considered to be a global leader in integration of knowledge management systems.

The research design method that was chosen to authenticate the research objectives is qualitative. The interpretive methods employ an inductive approach that starts with data and tries to derive a theory about the phenomenon of interest from the observed data.

Results were obtained from a combination of two methods. Published and available secondary data mainly obtained from Sasol resources. The second was structured interviews conducted from a criterion based sampling strategy conducted on employees to obtain primary data.

Sasol employees are supportive of the Sasol KM systems and are (to some extent) using it. Many believe that Sasol is a learning organisation and therefore benefitting from the systems in place. However, the people of Sasol are generally not aware of the full functionality of the deployed systems. Therefore the current state of the Sasol KM system integration is the consequence.

Organisational Knowledge, unlike personal knowledge, is only of value if it is shared with others who need it (KMI, 2010). In order to enhance collective learning, learning organisations establish specific learning processes that become embedded in work processes. This is the basis of the outcomes and the recommendations of this research.

Key Words

Organisational performance, knowledge sharing, knowledge management, community of practice, organisational learning, continuous learning organisation, explicit knowledge, tacit knowledge, information management, intellectual capital, collaboration, performance measures and levels of maturity.

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Acronyms and Abbreviations

SKM	Sastech Knowledge Management
CoP	Communities of Practice
KM	Knowledge Management
KPI	Key Performance Indicator
GTL	Gas to liquid
CTL	Coal to liquid
MIT	Manufacturing improvement team
IT	Information Technology
IM	Information Management
ECM	Enterprise content management
EDMS	Enterprise document management system
KOL	Knowledge Online
BMS	Business management system (ISO 9000 Quality System)
Sastech	Sasol Technology, a business unit with Sasol PTY Ltd.
SME	Subject matter expert
PD	Process Development

CHAPTER 1: INTRODUCTION

1.1 Background

As the economy is changing, the demands levied on the brainpower of the workforce have increased substantially (Carbaugh, 2006). Increases in the output of the average worker can reflect an improvement in the characteristics that allow workers to accomplish the same tasks in less time to adapt to changing situations with greater flexibility and to become engineers of change themselves.

Nonaka and Takeuchi (1995) state that knowledge has become the source of the highest-quality power and the key to the world's economic *power shift* that lies ahead. They also report on observations that knowledge has gone from being an adjunct of money power and muscle power to being their very essence, and that is why the battle for the control of knowledge and the means of communication is heating up all over the world.

In the business world, the International Data Corp (IDC) published that "Fortune 500 companies lose roughly $31.5 billion a year by failing to share knowledge" (Babcock, 2004, p. 46). The IDC is a Framingham, mass-based market intelligence and advisory firm in the IT and telecommunications industries.

To orientate the reader, it is necessary to introduce Sasol as an organisation through a brief chronicle. These historical events will present a meaningful background and also an introduction to a case where effective knowledge management can have a significant impact.

The importance of knowledge management at Sasol can be traced back to 1927 when a White Paper was tabled in Parliament to investigate the establishment of a South African oil-from-coal industry. Years of research then led to the founding of Sasol in 1950 (Botha, 2006).

Over the following years, Sasol has developed into a world leader in technologies which convert gas and coal into liquid fuels, fuel components and chemicals through their proprietary Fischer-Tropsch processes (Sasol Limited, 2011, p. 3). They (Sasol) mine coal in South Africa and produce gas in Mozambique and oil in Gabon, and have chemical manufacturing and marketing operations in South Africa, Europe, Asia and the Americas.

In South Africa, Sasol refine imported crude oil and retail liquid fuels through their network of retail convenience centres. They also supply fuels to other distributors in the region and gas to industrial

customers in South Africa (Sasol Limited, 2011, p. 3). Sasol is focused on commercialising their gas-to-liquids (GTL) and coal-to-liquids (CTL) technology internationally. In partnership with Qatar Petroleum they started their first international GTL plant, Oryx GTL, in 2007.

Sasol operates in 38 countries across the globe and employs around 33 399 people as at year end 2011. Sasol is listed on the JSE Limited in South Africa and on the New York Stock Exchange in the United States of America (USA) (Sasol Limited, 2011, p. 3). In fact, Sasol was awarded Global leader of the oil and gas super-sector in the international Dow Jones Sustainability Index (DJSI) (Sasol Limited, 2011, p. 53). Appendix 1 shows the milestones in Sasol's history.

Sasol's fuels, chemicals and related products benefit millions of people around the globe. From hot-melt adhesives and car parts to microchip coatings, printing inks, household and industrial paints, cell phone circuit boards, transport fuels, compact discs, medical lasers, sun creams, perfumes and plastic bottles among others. Their hundreds of products made in South Africa, the USA, Europe, the Middle East, Asia and other regions have many thousands of end users (Sasol Limited, 2011, p. 56).

Sasol New Energy (SNE) business unit has further advancements in its activities on energy efficiency, renewable energy, low-carbon electricity, and carbon capture and storage (Sasol Limited, 2011, p. 53).

Much of the successes of Sasol are based on extensive research both internally and externally. For example, Sasol employs about 120 scientists in Sasolburg to research catalysts. Sasol further finances additional work in this at the University of Cape Town and at Rand Afrikaans University in Johannesburg, and will extend this support to St Andrews University in Scotland (Collings, 2002, p. 162).

University researchers are used for other aspects of Sasol businesses. NWU Potchefstroom Campus, for example, is working on separation technology, and there are over 50 postgraduate students at various South African universities being financed by Sasol (Collings, 2002, p. 162).

It is not surprising then that Sasol's strategic agenda is their growth in sustainable stakeholder value which is built on a foundation of developing people and improving assets. Notwithstanding the aim to grow their GTL (gas to liquid), CTL (coal to liquid), upstream, chemicals and new energy business, Sasol looks at achieving this through their technological prowess and through group imperatives that deliver functional, operational and capital project excellence, supported by values-driven Leadership (Sasol Limited, 2012).

Business justification for KM is crucial. According to Milton (Milton, 2005), if you can't clearly articulate the need for KM you should probably not be doing it, because then you will be unclear about why you're doing it. He promulgates that you should be doing it for at least two reasons: reducing the learning curve and bringing everybody up to the benchmark.

Imagine the benefits these outcomes can bring to the bottom line of a company such as Sasol. Even so, it seems that not much investigation or commitment is dedicated to achieving an organisation which strives toward a mature and collaborative knowledge harnessing organisation which facilitates these aforesaid gains.

1.2 Causal Factors

Sasol employs many engineers, technicians and technologists. There is also a significant increase in demand for an experienced work force. This coupled with Sasol's focus on international expansion; Sasol is faced with the challenge of maintaining a vast wealth of knowledge and making this available to the business in such a way that prior knowledge and experience can be leveraged in a sustainable way.

Sasol Technology is a business unit which manages Sasol's research and development, technology innovation and management, engineering services and project management portfolios (Sasol Limited, 2012). It plays a pivotal role in enabling Sasol's growth and sustainability as it directs, acquires, commercialises, installs and optimises technology for the group (Sasol Limited, 2012).

Sasol possesses a large amount of pre-existing content including:

- Business principles, processes and templates
- Prior knowledge and experience produced from projects and plant support or operational activities
- International and external content resulting from research and intelligence scanning activities.

For Sasol to leverage this knowledge effectively, a substantial amount of consideration has to go into implementing a sustainable knowledge management system. In the global economy for example, Japanese companies are an enigma to the Western world in terms of competitiveness. Their manufacturing prowess and optimisation techniques among others all play a role but it's their expertise at "organisational knowledge creation" which has enabled their global success (Nonaka & Takeuchi, 1995).

The question is not how competitive Sasol is but rather how it exploits such a profuse abundance of knowledge.

1.3 Problem Statement

It follows from the background given above that Sasol has invested significant resources in KM. However, the extent and success of KM integration at Sasol is not well understood. **It is therefore**

necessary to critically evaluate Sasol on these terms, to understand how its KM strategy supports organisational processes involving innovation, individual learning, collective learning and collaborative decision making, in an organisation which prides itself on intellectual knowledge and innovation.

The aim of this research was to investigate the knowledge management phenomena, and then to investigate how Sasol as a whole creates new knowledge, disseminates it throughout the organisation, and embodies it into their systems.

This research can benefit Sasol as a whole as it could bring forth higher efficiency, better insights and increased understanding if the knowledge management integration level is considered in a comprehensive way.

1.4 Research Objectives

The specific objectives of this research were as follows:

- It was necessary to determine the knowledge and understanding that employees have of the Sasol KM systems across business units.
- How the Sasol KM strategy supports organisational processes, individual learning, collective learning and collaborative decision making needed to be investigated.
- It was further necessary to gain an understanding of how employees participate in knowledge sharing as well the extent of participation and coactions which the different business units have toward KM.
- Finally, it was necessary to investigate what motivation or incentives the employees would act upon to share knowledge.

1.5 Scope and Demarcation of Study

This research was focused on Sasol as a case study. Primary information was for the most part obtained from business units and sources within South Africa. As very little about KM, its beginnings and current statistics were documented within Sasol, many interviews were conducted to capture the views and opinions of Sasol employees.

This study investigated KM, culture and organisational learning concepts to both understand and then assess the maturity level of Sasol.

Secondary sources of information were obtained from the Sasol intranet and relevant documentation available from Sasol. Additional secondary information was obtained from literature sources such as books, websites, theses and other reliable written works.

The empirical study focused on Sasol sites in Sasolburg and Secunda. The scope included subject matter experts, engineers, technologists, managers and technicians in all engineering or technical functions.

1.6 Division of Chapters

This dissertation is divided into four chapters. Each chapter is aggrandisement to a conclusion, building up from the initial causal factors through concept understanding, and finally a summation.

Chapter 1

The aim of chapter one is to provide insight into why this research was initiated. The causal factors and the problem statement are put forward which forms the basis of this study.

The chapter discusses the research methodology and also the research objectives. These give the reader a well-rounded introduction as to the contents of the following chapters.

Chapter 2 Literature Study

Chapter two contains the literature study and focuses on knowledge management concepts, maturity levels and methods of measuring levels of maturity.

This section further refers to lessons learned by other companies like Fluor Corporation who have been successful implementers of knowledge management. Interesting discoveries are made as these companies progressed along the levels of collaborative maturity.

Chapter 3 Empirical Design

The empirical design is a comprehensive plan which establishes in advance the broad contours of what needs to be found to answer the research question.

The design for the primary and secondary research study is discussed and presented. The process of analysing the data, including the validation of the data process, is covered in this chapter.

Chapter 4 Empirical Results

The findings of the empirical study are presented for both the primary and secondary data. A process of categorisation is applied to the primary data and tabled in the latter part of the chapter.

The secondary data makes up the first part of the chapter and contains topics relevant to support the arguments presented in chapter 5

Chapter 5 Result Discussion and Interpretation

The chapter layout is the headings which are each of the research aims. The processed data from chapter 4 is critically analysed and presented in this chapter.

Chapter 6 Conclusion and Recommendations

A general conclusion in the first part is followed by a discussion of the research objectives. Recommendations are made which discuss the research problem and findings. Recommendations are then made followed by a concluding statement.

1.7 Chapter Summary

Sasol is really an interesting company in terms of innovation and pioneering new technologies. It started from a need to compete in the world arena and throughout its existence continues to perform as a global leader.

Sasol boasts many dimensions of complementary business tributaries to the petrochemical industry, but even more so to the engineering fraternity. Sasol has thousands of employed engineers around the world in an assortment of fields which on a daily basis generate and reference information. This chapter presents the case for a need to document how all this knowledge is harnessed and managed.

The next chapter covers the theoretical investigation on concepts, theories and strategies around knowledge management. Characteristics of learning organisations and how they are formed, managed and measured are also covered. It is essential to understand these topics as they shall form the very bases upon which the objectives of this study are based.

CHAPTER 2: LITERATURE STUDY

2.1 Introduction

There is an old saying which says “It’s easy when you know how”.

As within many sectors of industry, the engineering and construction industries have started recognising the need to share knowledge, diffuse best practices, provide a quick response to customers and reduce re-work (Will, 2008).

Consider the following example of a learning organisation in action; this is an extract from David A. Garvin’s book called Learning in Action (Garvin, 2000, pp. 5-8): Thirty continuous castors, all designed by the same designer were installed at a couple of different steel makers to put into operation. These took widely varying times to reach anticipated production levels. The elapsed times were measured from a unit’s first pouring of steel until it was producing at full capacity. The differences in time ranged from seven and a half months to over six years! The average time was around twenty four months. As a result of these delays, a quick calculation revealed lost revenue of $137 million primarily due to slow and inadequate training as well as a lack of knowledge management.

According to the Knowledge Management Institute (KMI, 2010), KM comprises a range of strategies and practices used in an organisation to identify, create, represent, distribute, and enable adoption of insights and experiences. These insights and experiences make up knowledge, either embodied in employees or embedded in the organisation as resource or referential material.

A survey of firms performed in 2004 in the UK found that approximately 40% of engineering design and construction organisations had a knowledge management strategy, and another 41% planned to have one within that same year (Will, 2008). These figures have surely grown on the back of ever increasing economic competitiveness and the advancements in KM have also surely grown.

To this end this research endeavours to obtain a better understanding of the concepts of KM, organisational learning and the characteristics of successfully collaborating organisations. This is necessary to critically evaluate Sasol as an organisation. It is not aimed at the derivation or evaluation of contrived strategies but rather a summation of general good practices.

The first part of this chapter discusses the building blocks and facets like knowledge creation, sharing and then organisational memory. The latter then looks at examples and critical success factors which are necessary for sustainable knowledge retention.

2.2 Defining Knowledge Management

The significant problems we face cannot be solved at the same level of thinking we were at when we created them." -- A. Einstein

Knowledge Management (KM) is traditionally associated with capturing unstructured information and making it accessible or even searchable to employees (Gurteen, 2012, p. 3). This is therefore a technology driven form of KM as it is enabled by information technology advancements (IT) like organisational intranets, cheaper and larger storage servers, Adobe Acrobat and so forth. The objectives would be to be able to store information and find the right information when needed.

Knowledge management seems to have a number of definitions depending on from whose perspective the definition comes. Nevertheless, KM means getting the right information to the right people at the right time, and helping people create knowledge, share it and act upon it in ways that will measurably improve the performance of the organisation and its partners (Holm, 2008).

It is important to note that KM is the attempt to recognise what is essentially a personal asset buried in the minds of individuals, and leverage it into a corporate asset that can be used by a broader set of individuals (Milton, 2005).

Organisational Knowledge, unlike personal knowledge, is only of value if it is shared with others who need it (KMI, 2010). This means then, that the popular statement of *"Knowledge is Power"* is therefore only true, if it drives appropriate action.

Figure 2.2.1: What is knowledge management? Figure 2.2.1 is a depiction of knowledge management and how the KM processes directly improve organisational processes, such as innovation, collaborative decision-making, and individual and collective learning. These improved organisational processes produce intermediate outcomes such as better decisions, organisational behaviours, products, services and relationships. These, in turn, lead to improved organisational performance (King, 2009).

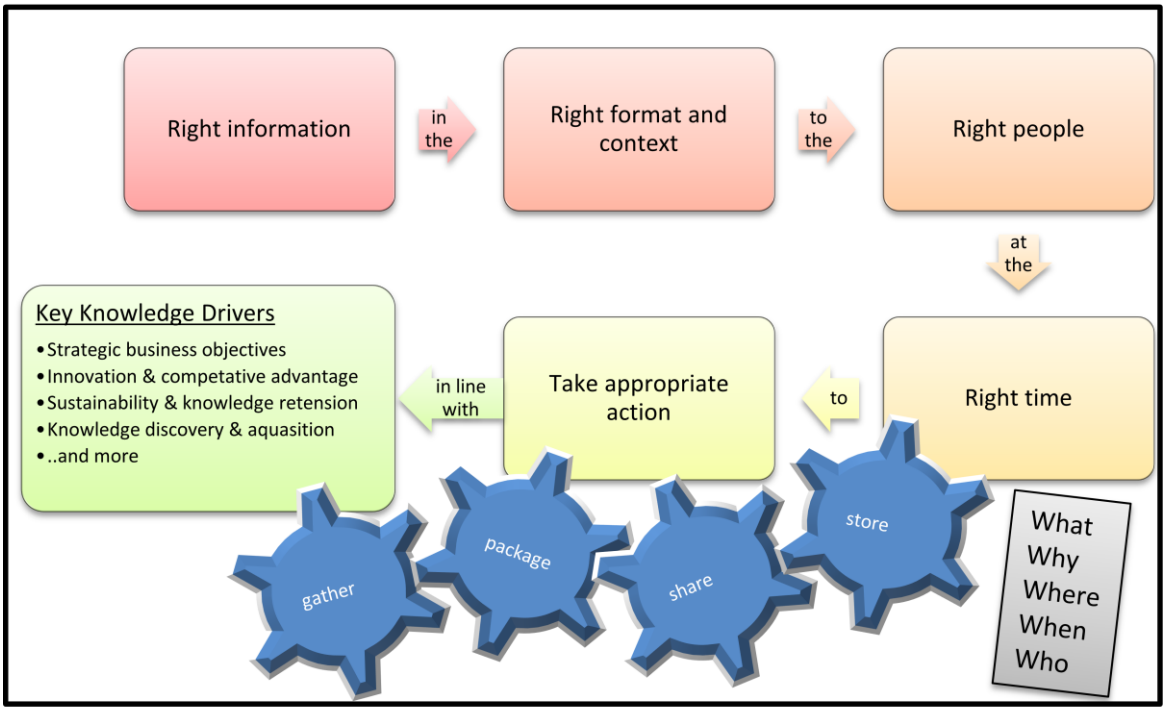

Figure 2.2.1: What is knowledge management? (KMI, 2010)

In spite of the concept of KM having a relatively short life, the general consensus is that it has already undergone at least three eras and is currently entering the fourth (Tryon, 2012, p. 17 et al). It is necessary to examine these eras as they serve as an introduction into how companies can be evaluated or bench-marked in terms of these evolutionary phases.

Gurteen (2012) explains that the first generation KM can be termed the Technology Era which is the leveraging of explicit knowledge. It is essentially driven by corporate executives due to seeing their peers held legally accountable for poor or deceitful recordkeeping. The SOX (Sarbanes Oxley) Act is perhaps a good example where financial and legal records demand enhanced means to capture and store important documents and records.

Dixon (2010) agrees with Tryon (2012) in saying that efforts are indeed made by organisations to capture the organisational best practices and lessons learned. She says that organisations spend large sums of money creating repositories and databases and employees are encouraged, sometimes even badgered, into contributing to them. “The prevailing way of thinking about knowledge management is as a library or a warehouse with inputs and outputs; the more inputs the better” Dixon says.

So alas, vendors have started churning out “capturing technologies” in response to these demands. The problem, as Tryon (2012) explains, is the complexity of implementing this as an organisation-wide initiative. He argues that these systems benefit only a few – like those who are tasked to maintain the system. He says that the consequence is that little of this knowledge trickles down to operational level. These types of systems are generally tolerated but not admired. They tend to be “store it and ignore it”

types of systems. This early version of KM is the way some companies still view it to be done (Tryon, 2012).

The second generation is termed the Service Management Era and leverages experiential knowledge (Tryon, 2012). Tryon explains that the Service Management Era of KM, by definition, focuses on problem resolution. It's typically a system for example where engineering support staff would log information about how they resolved a problem. The aim would be to serve as a reference to anyone who may be looking to resolve a similar problem.

Although such knowledge sharing seems to fit the objective of KM, Nancy Dixon (Dixon, 2010) feels that an organisation's knowledge still actually remains in the heads of the employees. She holds that much of an organisation's knowledge is dynamic and rapidly changing so what is "captured" is soon out-of-date. These logs typically address only a small aspect of a problem. They further may not be current best practice or for that matter, a solution at all. She does however confess that this type of KM system has its advantages in that they can be incrementally improved and managed. That is if this type of system is suitable to your business processes. This shall be discussed in more detail later.

Enter the third generation KM, termed the Deep Knowledge Era according to Tryon (Tryon, 2012).
The third generation KM era is about the intellectual content that leaves the company when an employee resigns or retires. It's about understanding how categories of knowledge fit together to form a total understanding (Tryon, 2012). It is also about making knowledge available to everyone who needs it, any time and boundless. It is the stemming of valuable organisational knowledge erosion by discovery, capturing, organising, using, transferring and retaining.

How this is done is of course the big question. Well, the general consensus among KM experts seems to be that organisations are now inventing processes for collective knowledge sharing and are finding ways to bring the whole organisation to attribute to strategic issues. According to Dixon (2010), processes like Knowledge Café's, Appreciative Inquiry, Project Post Mortems and Search Conferences are examples which bring together all levels of the organisation. The processes used to leverage collective knowledge are conversation based, alternating between small group and large group configurations.

2.3 The Learning Organisation

A learning organisation is one within which individual employees feel empowered to effect change and where individuals understand the organisation's mission, its processes, and how they fit within that organisation. The employees understand how their work contributes to the overall success of the organisation in achieving its mission. A learning organisation is one in which individual employees engaged in self-directed learning as well as team learning (Fillip, 2009).

On the other hand, people tend to be fascinated with competition and inter-departmental rivalry is often encouraged because it is said to stimulate excellence (Senge, 2006, p. 2). Fellow team members compete to be the best.

Although competition can be good, Kofman et al (1995:23) argues that employees often find themselves competing with the very people with whom they need to collaborate. For example, members of management compete to show who is right, who knows more and who is most persuasive.

The point is that like among the tenets of Six-Sigma, the bases of continuous improvement is a culture of learning and indeed, a culture of “learning from mistakes” (Bersin, 2012, p. 1). The U.S. Army’s After Action Reviews (AARs) are an example of a knowledge management system that has helped to build the Army into a learning organisation by making learning routine (Quast, 2012, p. 1).

Collective or group learning is however more than the sum of individual learning. Collective learning requires skills for sharing information and knowledge, particularly implicit or tacit knowledge (Fillip, 2009). According to Garvin (2000), collaborative learning requires the following skill set:

- Systematic problem solving
- Experimenting with new ways of doing things
- Learning from past experience
- Learning from other organisations and communities
- Transferring knowledge throughout the organisation.

In order to enhance collective learning, learning organisations establish specific learning processes that become embedded in work processes. This is the key. The learning process or practices are often unique to organisations or even groups within organisations. They must match a specific need and be a reasonable fit within the existing organisational culture (Fillip, 2009). Examples of such processes are things like lessons learned from projects, communities of practice, wiki sites, etc.

Organisational structure like the degree of centralisation or decentralisation of an organisation can significantly impact on knowledge generation and knowledge sharing (Fillip, 2009). For example, companies which do projects have difficulty in sharing knowledge between projects. This is because the basic learning entity is the project rather than the organisation.

Learning organisations must reach beyond internal organisational barriers to overcome them as a learning impediment (Fillip, 2009). This is made possible by creating a supportive culture where individual and collective learning is facilitated by open dialogue, open communication, transparency, trust and risk taking.

Business leaders of course have a major role to play in stimulating such a culture. In a learning organisation, leaders must set the tone, demonstrate learning behaviour, listen, and ask questions (Fillip, 2009).

2.4 How do we create a learning organisation?

Kofman and Senge (1995) argue that “Learning Organisation” is just a category we created in language like a label and that it actually doesn’t exist. However, according to Senge (2006:6-14), a learning organisation exhibits five main characteristics i.e. systems thinking, personal mastery, mental models, a shared vision, and team learning. Discussions of these characteristics can be found from many sources and are therefore worth some further elaboration.

Systems Thinking: When dark clouds and lightning draw over and a cool wind starts blowing, one can anticipate rain. Many things happen and come together to experience this phenomena. This is an example of what Senge (2006) refers to as a number of forces which together form a system.
This analogy is used to explain how people tend to break down problems into a piecemeal to solve but often end up failing. This is because of the interdependency of the system.

Systems Thinking states that all the characteristics must be apparent at once in an organisation for it to be a learning organisation (Senge, 2006, p. 7). If some of these characteristics are omitted then the organisation may fall short of its goal.

Systems Thinking is therefore a conceptual framework, a body of knowledge and tools that is developed to make the full patterns clearer, and to help us see how to change things effectively and with the least amount of effort (Senge, 2006, p. 8). As Senge explains, it is to find the leverage points in a system.

Personal Mastery: This refers to a special level of proficiency to continually clarify, focus and develop the patience of seeing reality objectively (Senge, 2006). It is simply the commitment of individuals to the process of learning and self-improvement.

Individual learning in these organisations is typically through straight-forward staff training, but the point to be made is that the individuals must want to learn. Also, the organisations must encourage personal mastery. The more and faster organisation’s employees can learn, the better their competitive advantage.

In the absence of this characteristic, Senge (2006) describes how one finds once enthusiastic and driven engineers now simply putting in their time at work to do what matters to them on the weekends. Little energy and commitment is invested into the organisation.

Mental Models: People tend to develop mental perceptions of how they expect things to be. They have deeply ingrained assumptions or images that influence how they understand the world and how to take action. A typical mental model is when someone is seen wearing an overall in town. That person is assumed to be a low grade worker and probably not well educated. Many more examples exist in the organisation where people simply create boundaries and limitations based on their mental models.

Senge (2006) explains that the discipline of working with mental models starts with turning the mirror inward. That is, learning to unearth our internal pictures of our environment, to bring them to the surface and hold them rigorously to scrutiny.

In creating a learning environment it is important to replace confrontational attitudes with an open culture that promotes inquiry and trust. To achieve this, the learning organisation needs mechanisms for locating and assessing organisational theories of action. Unwanted values need to be discarded in a process called ‘unlearning’ (Senge, 2006).

Building Shared Vision. A shared organisational vision involves the skills of unearthing shared "images of the future" that promote genuine commitment and participation, rather than compliance.

Senge claims “If any one idea about leadership has inspired organizations for thousands of years, it’s the capacity to hold a shared picture of the future we seek to create” (Senge, 2006, p. 14).

He (Senge) argues that many leaders have their own visions that never get translated into shared visions that galvanise an organisation. More often than not, a company’s vision revolves around a single leader’s charisma, or around a crisis that aligns everyone temporarily. Building shared vision is about the pursuit of a lofty common goal through the discipline for translating individual vision into shared vision (Senge, 2006, p. 14).

Team Learning: The accumulation of individual learning constitutes Team Learning. This discipline starts with "dialogue", the capacity of members of a team to abandon assumptions and enter into a genuine "thinking together" as Senge (2006) puts it.

The benefit of shared learning is that employees grow more quickly and the problem solving capacity of the organisation is improved through better access to knowledge and expertise. Senge (2006) states that learning organisations typically have excellent knowledge management structures. These structures allow for creation, acquisition, dissemination, and implementation of this knowledge in the organisation.

The point however is that Team Learning requires individuals to engage in dialogue and discussion through open communication, shared meaning, and shared understanding to accelerate organisational learning.

2.5 Communities of practice (CoP)

The Communities of Practice are the primary location for people with similar functions, business objectives or interests to capture, share, improve and apply their collective knowledge (Will, 2008). They are made up of people who possibly share common concerns, problems or passion. They occur naturally within organisations when people are in close enough proximity to meet and share ideas with each other (Dixon, 2007).

According to Dixon (2010), CoPs were first referred to in 1991 by Etienne Wenger in his book Communities of Practice which explained this phenomenon. It began when organisations started to support communities of peers, providing a way for them to ask for and receive knowledge on a just-in-time basis and thus keeping fast changing knowledge up-to-date.

As Wagner (2006) explains, not every community is a community of practice. For example, a neighbourhood is also referred to as a community, but is certainly not a CoP. He states that three characteristics are crucial:

1. The *domain*, which is essentially not a club but rather a shared domain of interest. Membership implies commitment and a shared competence which distinguishes members from other people.
2. The *community*, which means that unless the members don't interact and learn together, they do not form a community of practice. They need to engage in joint activities and discussions, help each other and share information. They build relationships that enable them to learn from each other. Just having a website is not a community of practice.
3. The *practice*, referring to members of a community of practice being practitioners. They (members) develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice.

Table 2.5.1 represents a few examples of the variety of activities which take place via a CoP. The table is a variation of the example table by Wagner (2006).

Table 2.5.1: Examples of various CoP activities

Problem solving	"I don't know how to solve this. Can we work on this design and brainstorm some ideas"
Requests for information	"Where can I find the latest version of the ASME B31.3 code?"
Seeking experience	"Has anyone applied for a concession to not have to pressure test a glass lined vessel?"

Reusing assets	"I developed a spread sheet which you can use to size orifice plates. You can use it to check if the pressure drop you are using is correct"
Coordination and synergy	"Can we drive to the supplier and do our testing there together?"
Discussing developments	“What did you think of the presentation the new supplier did for us today?”
Documentation projects	"Different people in different areas do not seem to agree on how this is done. Let’s write a procedure which incorporates best practices and get all to agree on it.”
Visits	"Can we come and see how your plant looks now that ."
Mapping knowledge and identifying gaps	"Who knows what, and what are we missing? What other groups should we connect with?"

Initial efforts at managing knowledge had focused on information systems with disappointing results (Wagner, 2006). Communities of practice provided a new approach, which focused on people and on the social structures that enable them to learn with and from each other.

This view is supported by many other knowledge management professionals. As Gurteen (2012:4) explains, techno-centric (I.T. driven) KM is essential and there’s nothing wrong with the idea. It is just that organisations have started to move on and began to rely on softer tools that enable people to share information face-to-face. Examples of such tools are communities of practice, after action reviews and peer assists and knowledge cafes. These are excellent practices and are certainly easy solutions to knowledge sharing. Gurteen (2012) refers to this as the people-centric form of KM which is more about informal learning, collaboration and inter-personal knowledge sharing. The objectives of people-centric KM are improved communication, better decision making, greater creativity and innovation.

CoPs are ubiquitous in communities and provide a way for employees to share their tacit knowledge in response to specific situations. Dixon (2007) states that by 2005 nearly every Fortune 500 Company had established CoPs, acknowledging the growing understanding that knowledge is largely a property of groups of people.

In earlier years and still in some organisations today, it became apparent that knowledge was primarily flowing between peers and that senior and even middle management were not active users of knowledge management processes (Dixon, 2010).

Dixon also points out that the CoPs dealt with existing knowledge and did not help organisations create new knowledge or spur innovation. She further argues that the focus of knowledge management was tactical issues and essentially excluded strategic issues. The consequence was evident in the example of General Motors that although a good KM system was in place, it did little to help them strategise themselves out of bankruptcy (Dixon, 2010).

The thing is that if employees get together for discussions to solve problems or exchange views on new ideas, management would tend to want to let them be. Independent and informal communities have proliferated in recent years with many companies counting on them to deliver solutions and bridge functional gaps (McDermott & Archibald, 2010).

To resolve these issues, the CoPs in businesses today are (and need to be) actively managed as part of the organisation, with specific goals, explicit accountability and clear executive oversight (McDermott & Archibald, 2010). To get members (and experts) to dedicate time to them, companies have to make sure that communities contribute meaningfully to the organisation and also function effectively.

In the past few years technology advancements, globalisation, increased employee demand and other factors have begun to undermine the success of these communities (McDermott & Archibald, 2010). McDermott and Archibald (2012) as an example make reference to a successful informal community which gathered weekly to discuss strategies for designing a new water treatment facility in the United Kingdom. The community was so informative and lively that it drew crowds of onlookers.

The members then gradually gained access to more sophisticated design tools and endless amounts of information via the internet. Increased global connectivity drew more people into the community and into individual projects. It wasn't long before the community began to feel less intimate and the obligations among peers began to fade. The point is that the informality which led to the initial successes was then said to be the very reason that community dwindled.

McDermott and Archibald (2012) refer to Fluor as an example of where communities have successfully become the first and best sources of technical knowledge in that organisation. An excellent example of the power of global communities is where Fluor was tasked to install soil barriers over a nuclear waste contaminated drainage field. Environmentalists mandated them to plug a well first, to avoid contamination of ground water.

Poor historical data made the well impossible to find. Ground penetrating radar also did not work. All they could do was to actually remove vast amounts of contaminated soil which was expensive and risky to do.

The team posted a request for ideas to the knowledge communities and a suggestion soon popped up to try a technology used for a very different application. Well, needless to say the suggestion worked and in fact solved over 100 other well finding cases.

It should then be clear that Communities of Practice are self-organising groups of people who share a common interest – and expert networks – networks that are established to allow those with less expertise to contact those with greater expertise. Such social processes are necessary because while knowledge initially exists in the mind of an individual, for KM to be successful, knowledge must usually be transmitted through social groups, teams and networks (King, 2009).

Therefore, KM processes are quite people-intensive, and less technology-intensive than most people might believe, although a modern knowledge-enabled enterprise must support KM with appropriate information and communications technology (King, 2009)

2.6 Setting up CoPs

Communities require well defined structure. McDermott and Archibald (2010) identified four principles that govern the design and integration of effective communities:

1. Focus on issues important to the organisation

   For communities to be sustainable, they need to tackle real problems defined by senior management. Here is an example of how an organisation puts this into action:

   Pfizer, a pharmaceutical firm has two groups of communities; councils and networks. A council is an elevated form of a network. Pfizer for example have councils which focus on major organs of the body (heart, liver, etc.) or on key issues such as paediatric safety. On average, each of the nine safety councils has about a dozen members with expert knowledge on toxicology, clinical development, disease categories and chemistry. They are tasked with helping project teams make difficult judgement calls on potential safety issues.

   According to Tim Anderson, Pfizer's head of Safety R&D, the communities are the most elevated form of advice giving body on safety. Also, membership in a council is a major recognition of expertise.

   There are many more communities or networks looking at different disciplines or practices. Membership is always open and voluntary. When the demand for advice rises high enough, a network can be elevated to council status.

It is also worth mentioning that data, tests and results among communities can be shared. They essentially function like research services, collecting and distilling timely suggestions of solutions to important problems.

2. Establish community goals and deliverables:

Formal goals and deliverables provide community focus. They are a reason to meet and participate in the communities. Above all, they establish the contribution the communities make to the organisation.

The community goals are set, and aggressively managed, by functional teams which are a group of senior managers tasked with improvement in a certain area. The functional team will establish a community which is then made partially responsible for achieving the goal.

Community goals are not to be confused with team goals. Community goals generally differ in that they are tied to long-term organisational needs.

3. Provide real governance:

To be well integrated into the organisation, communities, like teams, need strong, formal relationships with the organisation's top leadership. The emphasis is on the 'top' of the organisational leadership.
Companies are inclined to appoint a senior manager to sponsor each community. Very often, those tapped for the role don't understand the purpose and value of communities. They often also don't have the information measure required to effectively govern the communities.

Executives therefore need to be highly engaged. They should perhaps meet twice annually with community leaders to review goals, provide feedback and understand the communities' impact and needs.

A practical application of this principle is where a community proposed developing spreadsheets to mine ten years of patient data looking for patterns of biomarker responses. The sponsors suggested a relational database instead and provided resources, funds and project management to assist.

4. Set high management expectations:

The influence of managers on communities is intangible but strong, like in teams. The managers involved with communities must be engaged and active, otherwise the communities dwindle.

2.7 Maximising Communities' impact

Research shows that companies can increase their operational effectiveness of communities in four ways (McDermott & Archibald, 2010, pp. 88-90).

1. Make real time available for participation:

Community leader's biggest complaint is that they don't have enough time to complete their duties. If community leadership is considered a "spare time" activity, it can easily be squeezed out by more pressing priorities.
It is necessary to make community leadership a part of the job description and performance appraisal. It is shown that community management takes about 17% of their time on average. There are companies like the UN's Solution Exchange who consider this a full time job. Some link discretionary bonuses to community contributions.

2. Train community leaders for the role:

In Schlumberger's (an oil fields services company) communities, leaders are elected annually. They undergo a single days training course which covers different aspects like:

- how to find pockets of knowledge and expertise
- how to engage volunteers in activities
- how to grow membership
- how to work with members external to the company and
- how to influence operating groups without direct authority.

Other companies like ConocoPhillips require all new leaders to go on a boot camp which outlines what management expects from them. This training starts by spelling out how business goals and community contributions are connected. Workshops then review community governance, support and expected deliverables and what the company considers critical success factors. Examples are to establish goals, engaging members and setting results metrics.

3. Hold face-to-face events:

Communities of practice include members in different locations. As collaboration software is used to link remote staff, the most effective communities also hold face-to-face meetings. These meetings usually focus on specific goals. Members foster trust and support through asking for help, admitting to mistakes and learning from each other.

Some organisations run competitions in which they reveal which community contributed the most to the company goal according to some or other business specific criteria. This may work in some businesses but could be less effective in others. Fluor for example found that reward led to members

wanting to participate for the sake of getting rewards. They weren't real contributors as such which resulted in garbage making its way into the community discussions (Will, 2008, p. 10).

4. Keep IT simple.

Communities only need simple and uncomplicated functions. Making it too complicated only reduces productivity and sometimes participation. They use a few functions such as discussion forums, document libraries, expertise locators, on-demand teleconferencing and online meeting spaces where members can edit documents as they discuss them.

As Prusak (1997) explains, a fundamental puzzle is that individuals appear to know more than they can explain. That knowledge can be tacit has broad implications for understanding the difficulty of imitating and diffusing competitive skills. This as he says, is a problem. Though the idea of tacit knowledge extensively evoked but rarely defined – as if the lack of definition is itself evidence of the concept, it represents a dramatically different vantage point by which to analyse the capability boundaries by firms.

Today and in the future, the organisations that will truly excel will be the ones that discover how to tap people's commitment and capacity to learn at all levels in an organization (Senge, 2006).

2.8 Social media platforms in knowledge management

The quest to achieve KM objectives and foster collaboration has led to the adoption of emerging technologies which support networked business structures (Gurteen, 2012). Web 2.0 applications support such collaboration which broadly refers to internet services that foster collaboration and information sharing.

A couple of varied phrases in Google and a few social media orientated books don't seem to reveal a clear definition for what Web 2.0 refers to. The consensus is however that Web 2.0 is a platform for improved interaction between users. The collective intelligence of users popularises and encourages further participation (Bebensee, et al., 2012).

It was first termed once the new era of World Wide Web began after the dot-com crash in 2001 (Bebensee, et al., 2012, p. 25). Since then, organisations have started adopting Web 2.0 applications like wikis and social networking for leveraging and improving their core practices. In essence, Web 2.0 is a technology which allows users to 'push' information onto the site as opposed to the traditional Web 1.0 which only 'pull's information (Gurteen, 2012, p. 8).

As an outcome from the popularity of Web 2.0, a rapid development of social software applications and services has taken place. These services include social networking like Facebook, wiki's like Wikipedia, social benchmarking like Del.Icio.Us and blogging such as Tumblr (Bebensee, et al., 2012).

Applying Web 2.0 principles on companies is widely referred to as Enterprise 2.0 (Bebensee, et al., 2012). Tryon (2012) describes these organisations as moving into a fourth generation which he terms the Personalisation Era. In his version, he describes this era as when engineers locally and travelling around the world can now simply login and collaborate in a common location. They have access to experts, both internally and externally who can help solve their problems.

According to research conducted by Bebensee (Bebensee, et al., 2012), asset management, developmental KM, analytical KM and innovation may benefit from the adoption of Web 2.0 applications. It however very much depends on the organisational culture and structure. In some organisations for example, services like wikis don't work because the people just don't want to use them. The research was concluded by saying that the influences of organisational culture and other factors must be further researched to establish the true effectiveness of adopting Web 2.0 applications for KM.

2.9 Assessing Organisations

The purpose of this section is to gain a basic understanding of the protocol for conducting a knowledge assessment. Yet with all control frameworks or measurement systems available, measuring social phenomena remains difficult, if not impossible (Minonne & Turner, 2009). All measurement systems rely on indirect indicators, such as monetary units or other indicators that often bear little resemblance to the actual events being reported.

Nevertheless, in the following sections some models are presented to aid the process of critically evaluating an organisation like Sasol.

2.10 Performance Measures

Some authors use the Fraunhofer IPK (Production Systems and Design Technology Institute) knowledge management model as the basis of corporate analysis to identify the organisational value-creating processes and to test the validity of the model in practice. Frankly, this model appears thorough and elaborate and is perhaps more focused on development of KM systems. The intention of this section was to obtain an overview understanding of methods to evaluate organisations. Not critically evaluate or generate evaluation models per se. On that note, the models are briefly discussed (for the purposes of insight) followed by additional useful concepts to complete this study.

In the Fraunhofer IPK Knowledge Management Model, the core processes of knowledge management are broken down into key activities like the creation of new knowledge, knowledge storage, knowledge distribution, and knowledge application (Mikko, 2002). These are then supported by the definition of knowledge goals, including the identification of knowledge in all areas and level of the organisation. Knowledge-support fields like business processes, information systems, leadership, corporate culture, human resource management, and knowledge control/measurement activities, in turn influence the quality of the core knowledge management stages (Mikko, 2002).

Minonne and Turner (2009) have written extensively on the topic of KM. In their opinion, a strategic change from a traditionally operational approach to KM is that of the knowledge management maturity model (KM^3). KM^3 is based on the ideas that successful KM comprises of four forms of integration i.e. cultural, organisational, procedural and methodical (Minonne & Turner, 2009).

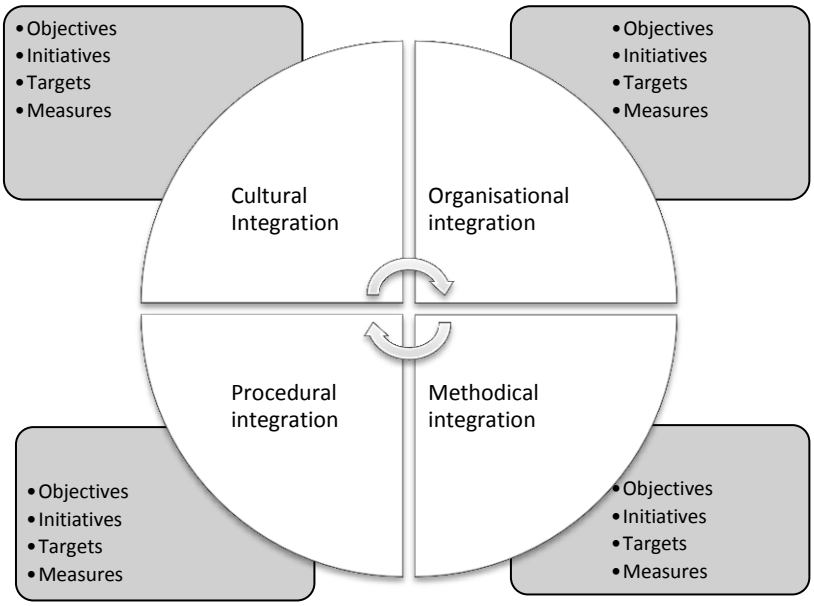

Figure 2.10.1: Knowledge Management Monitor Model (Minonne & Turner, 2009)

Cultural integration is literally when KM becomes part of an organisation's culture. Not just training but the desire and encouragement for the employees to learn. It is for example when organisational information is exchanged via lessons learned dialogue, job rotation and certainly communities of practice (Minonne & Turner, 2009).

Methodical integration is concerned with integrated human and systems orientated KM practices. This essentially refers to knowledge intensive work practices which positively influence organisational performance like productivity, innovation and quality gains. Examples may be mentoring, document management systems and skills inventories (Minonne & Turner, 2009).

Procedural integration aims to integrate KM such that it becomes an integral part of inter and intra-organisational work-flows. Well, specifically looking at business processes throughout the organisation's entire value chain. The expectation of such practices lies in the implementation of continuous business processes, the avoidance of work redundancy and in the reduction of processing time (Minonne & Turner, 2009).

Organisational integration aims at consolidating KM into the organisation management structure. This is achieved through dedicating management to facilitate the organisation's knowledge base. Some

common approaches could be responsibility centres (like cost, capital, profit, etc.), decentralisation and centralisation (Minonne & Turner, 2009).

It must be noted that all the forms of KM integration should be considered in parallel to implement KM in an *integrative* manner. To then measure the performance of KM, key indicators are needed to measure the effectiveness and efficiency of these integration pillars (Minonne & Turner, 2009).

The criterion for the evaluation of KM integration presented by Minonne and Turner (2009) is perhaps not a complete evaluation criterion. As mentioned in the previous sections, KM strategies must be aligned with the business processes and one solution does not fit all. It was therefore necessary to introduce the Prevou and Baxtor (2008) model as an additional appraisal process.

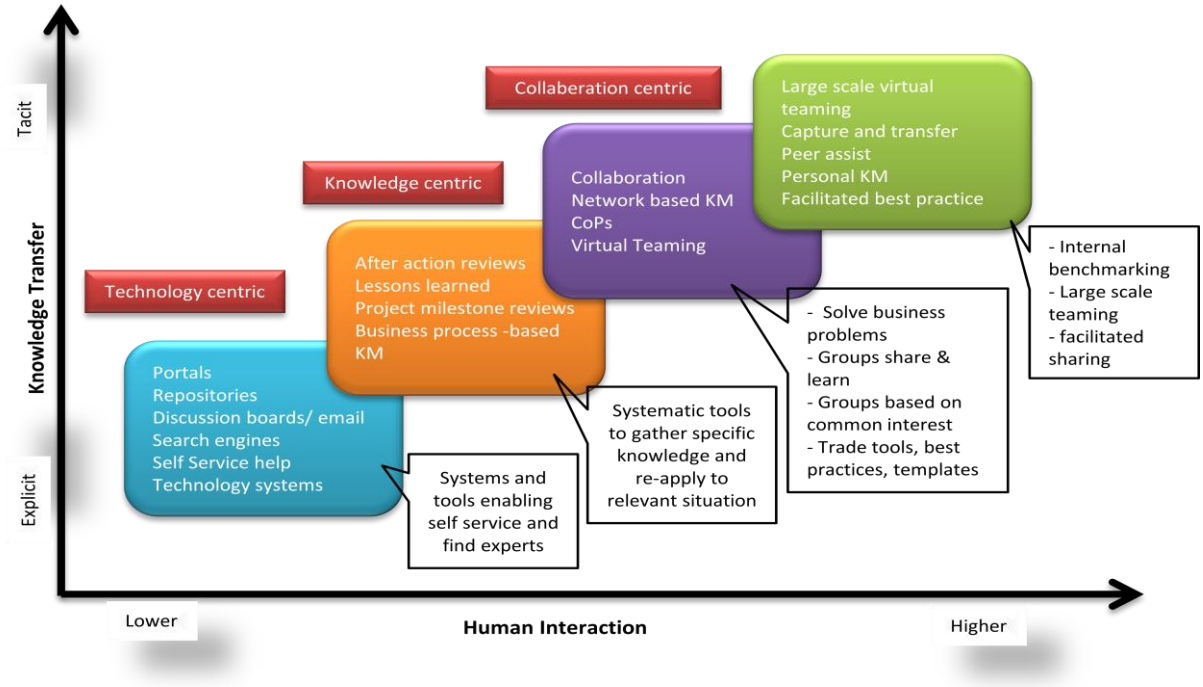

Figure 2.10.2: Knowledge Management Approach (adapted) (Prevou & Baxtor, 2008)

The Prevou and Baxtor Model is plotted on a Cartesian plane with the degree of knowledge transfer being dependent on the human interaction (x-axis). In this model it is clear that an organisation shall have some degree of knowledge transfer moving from explicit to tacit knowledge. This is then plotted against the degree of human involvement. To a large extent, this human involvement again ties up with the forms of integration as previously explained. Figure 2.10.2 is an adapted depiction of the model.

With reference to the KM eras referred to by Gurteen (2012) et al earlier in this chapter; it is clear where these centred focus areas fit in. For example, the technology centric era is where companies have started to create repositories of files and documents. These are not necessarily referential or shared

throughout the company. One will notice that such organisations indeed may find themselves on the lower scale of human interaction and knowledge transfer as is implied by this model.

2.11 Levels of maturity

The two dimensional model in Figure 2.11.1 can be used to show the degree of progression in the development and implementation of a KM strategy. One axis is used to determine the *level of implementation* and the other is to pinpoint the degree to which implementation is managed, in other words the *level of control*.

A company would typically start off by creating an image of what it wants to look like in future, highlighted in the mission statement. They then decide on what changes to make to get there and put tracking and checking systems in place. Because the image of the future is constantly changing with the times, so the control systems must be revised and adapted to pursue the goal (Minonne & Turner, 2009). That is why the level of maturity is dependent on the level of control (x-axis) in the KM maturity model.

This is done by including four essential elements to the system;

- a predetermined set of targets,
- a means of measuring current activity,
- a means of comparing current activity with each target and,
- a means of correcting from the targets (Minonne & Turner, 2009, pp. 585-586).

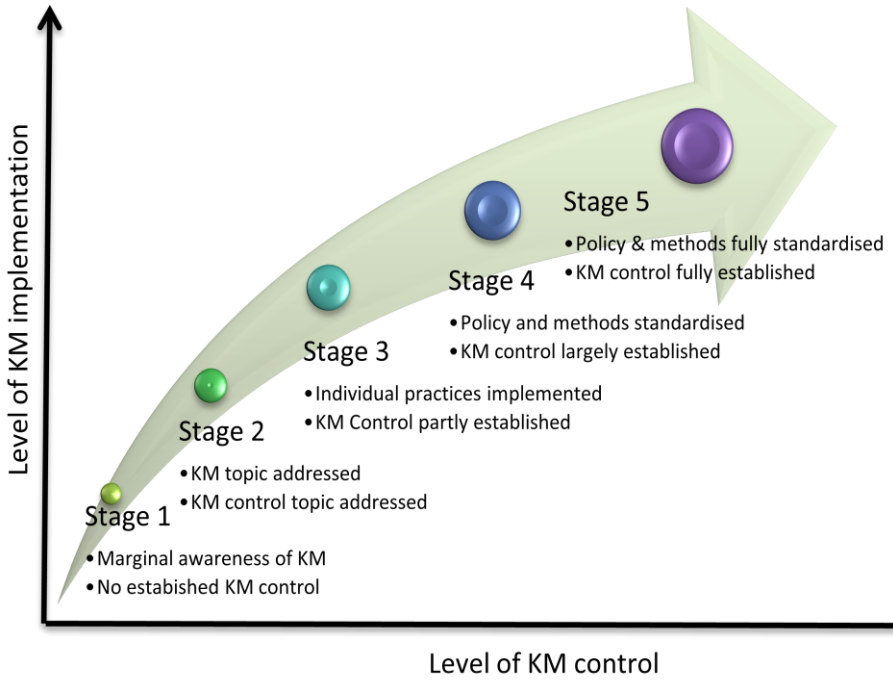

Figure 2.11.1: Knowledge Management Maturity Model (Minonne & Turner, 2009)

To this end, Minonne and Turner (2009) have elaborated on the criteria for the maturity stages in terms of the two handles, namely the level of control and the level of implementation. One shall naturally require some strategic objectives, initiatives and targets around which KPIs can be developed. The KPIs are then essentially the criteria against which an organisational KM system can be assessed. Table 2.11.1 below represents some proposed targets, initiatives and objectives which were selected from a proposed list by Minonne and Turner (Minonne & Turner, 2009, p. 590)

Table 2.11.1: Objectives, Initiatives and Targets (Minonne & Turner, 2009)

Level of implementation	Maturity level	Level of control
• The basics of KM are understood by some • The difference between IT and IM is understood by some • The potential benefits and the use of KM have been discussed in some functional areas	1	• Essentially no KPIs. • Some qualitative assessment in managing knowledge assets may exist.
• No substantial methodical and procedural integration is yet established. • An intermediate level of cultural integration has been achieved. • Organisational integration remains at a low level	2	A few qualitative metrics developed to control efficiency in guiding the implementation of KM strategy towards the future image.
• An advanced level of cultural integration exists and an intermediate level of organisational integration has been achieved. • Only a low level of methodical integration is in place and no meaningful procedural integration is yet established.	3	• Mainly qualitative, • Some quantitative KPIs are developed to monitor efficiency • Some qualitative KPIs to assess effectiveness in the implementation of KM strategy.
• An advanced level of *cultural* and *organisational* integration is achieved. • An intermediate level of *methodical* and *procedural* integration has been achieved.	4	Qualitative and quantitative KPIs are in place to monitor the implementation of an effective and efficient KM strategy to take the organisation in the direction of its perceived future image.
• An advanced level of all forms, cultural, organisational, methodical and procedural integration has been achieved. • The organisation has reached world leading status in KM.	5	• Both quantitative and qualitative KPIs in place to measure changes in the image of the future. • Frequent reassessment of KM strategy to track changes in that image

2.12 Critical Success Factors of Sustainable KM

Babcock (2004) summarises human nature as being a key reason that knowledge doesn't get shared. She refers to a recent survey of 200 mid-level managers which found that team leaders often withhold information and mete it out on a need-to-know basis.

Further findings were that executives ask for collaborative input when they really want a rubber stamp. Managers just don't want to listen to bad news. In addition, some people don't know or trust their fellow employees, and some want power over others. Some fear their ideas will be ridiculed. Some people simply forget, are too busy or don't want more work and responsibility (Babcock, 2004).

There are some obstacles facing organisations that wish to establish an *integrative* and *assessable* KM strategy. The first is the apparent difficulty, the root of which is the pursuit of system oriented practices ahead of human oriented practices, in establishing a KM culture. This results in a leaning towards efficiency rather than effectiveness oriented approaches, which should be the first consideration (Minonne & Turner, 2009).

Companies looking to minimize or even eliminate these responses toward knowledge management can begin by looking at the way they treat both workers and information (Babcock, 2004). An example may be the ability of an organisation to listen to ideas rather than suppressing them. As Babcock (2004) argues, promoting ideas is a critical component of effective knowledge management.

Babcock (2004) quotes Carol Kinsey Goman, the president of Kinsey Consulting Services in saying that "knowledge management is change management, and, if you don't understand people's perspective, all the strategy and technology in the world means very little".

Apart from effective performance measures having to be coinciding with an organisation's strategic objectives, it above all must be easily understood by all employees and should promote intended behaviour within the organisation. There is no prescriptive or unique solution to this problem (Minonne & Turner, 2009).

The uniqueness only comes from the need to have an assessable strategy and this doesn't appear in an instant. It is developed progressively and represents a fundamental paradigm shift from the traditional operational approach to a more strategic involvement in KM (Minonne & Turner, 2009).

A further obstacle tends to be the mere anticipation of difficult implementation of KM. This leads to more system orientated processes rather than people orientated processes. Another is the inability to derive relevant or appropriate information KM targets from the organisational strategy. This is where the forms of integration mentioned above will assist. They help by establishing appropriate measurable targets that inform strategic direction (Minonne & Turner, 2009).

Finally, there is the challenge of performance measurement. In some ways this derives from an inability to set appropriate targets but also arises from an inability to determine appropriate quantitative, preferably, or qualitative key performance indicators (KPIs). Fundamentally, the KPIs that measure

effectiveness and efficiency of an organisation's KM initiatives must come from each of the four forms of integration (Minonne & Turner, 2009).

The objective is then to have the KPIs (key performance indicators) aligned with the four forms of integration and may be either qualitative or quantitative in nature. As is explained in the section on Assessing Organisations, the balanced scorecard concept can be used for this; where the balance of the four forms of integration is the primary consideration.

It is said that a good business economy means good resource management. In many organisations, this translates to good individual and accumulated organisational knowledge (Kaplan & Norton, 1996, pp. 4-19).

This is testament to the next section which takes a look at an AEC (architecture, engineering and civil) organisation as a case study. Fluor Corporation has obtained world renowned accreditation for their progress made as a knowledge managing organisation.

2.13 Fluor Corporation as a case study

Fluor Corporation is a project focused organisation where most individuals are assigned to an individual project until completion and then re-assigned to another project. They decided to formalise their KM processes in 1997 to curb the loss of tacit knowledge about team interaction when new project teams are formed (Will, 2008).

Fluor set out by setting goals which was to link people within communities and provides timely solutions to address project and customer demands. Their large size, scale and global presence meant that they would be fairly technology dependent. They approached a consulting company and expected a "plug-in" type of solution. Fluor quickly realised that using another company's solution was the wrong thing to do (Will, 2008).

Flour learned that they needed knowledge communities that would fit their operations, culture and business processes. So they looked into developing their own software which led to a web based knowledge management platform called "Knowledge Online" (Will, 2008).

Knowledge Online combined social networking and document management to meet their set objectives. The site contained up-to-date processes, procedures and data to ensure employees were using the correct information. In addition, the knowledge management group also added additional features like news, employee profiles, and other content features which made the site not only usable but functional.

As a means to encourage participation and information sharing, Fluor, like other companies, used recognition and promotion for people who learn, teach and share (Babcock, 2004). Also, Fluor for example believes that they should continuously educate their employees on the benefits of Knowledge Online (Will, 2008). Their focus started out with simply trying to obtain participation and eventually moved to adding value to the company.

In 1999, Fluor developed two knowledge communities around the existing functional and business lines as a test run. Because these two communities fitted in with the company's social structure so well, they were soon well supported and utilised. In fact, within just one year they had generated thirty two communities with four thousand members enrolled in Knowledge Online. By 2008, Knowledge Online had a membership of 26000 members and 43 communities including everything from functional lines (e.g. electrical, structural, civil and architectural) to business needs (for example engineering, strategy, corporate security and business intelligence).

The process for deploying a community includes the preparation of a community charter by the community leadership and a series of readiness assessment meetings by the KM Team and with the Community Leadership. During this phase, the community has to prove that they have an existing network of people who have business objectives that would benefit from using Knowledge Online. They also need to have community leaders willing to participate, executive support and resources.

The preparation for community deployment is said to be a detailed process that can take 6 months to complete. Meetings are held to kick-off the community, create the community structure, identify and collect priority content and prepare a launch strategy. During these meetings, the KM team critiques the community's charter (Will, 2008, p. 14).

Users can initiate a discussion topic by "Asking a Question". The question is then automatically mailed to the community's mail boxes. The mail then contains a link back to the forum discussion.
For each user which contributes to a forum, there is a link to that user's profile. The profile can then be browsed to evaluate that user's submission by looking at their experience and past projects.

Fluor reports that one of the most used features is the "search" function. Once a searched topic is found, the site then lists a host of selections for that topic e.g. "All Results", "Subject Matter Experts", "Forum", etc. (Will, 2008).

A lesson learned by Fluor on these communities is that they must be intricately managed and monitored. Incentives for participation were soon stopped because the KM group found that people submitted anything for the sake of earning an incentive. The result was "garbage in" which led to "garbage out".

Furthermore, they examine the factors encouraging the continued use of the program. These include the alignment of the program with the existing Fluor Corporation culture, the consistent and continued maintenance of the program, social influence factors and a changing external environment.

Today, opening and participating in Knowledge Online seems to have become a habituated routine for many of the workers. The knowledge management team religiously update the programs in order to remove barriers and encourage use. This will come from continued communications and education as well as updates with the latest advances in technology (Will, 2008, p. 15).

Finally, companies need to realise that knowledge management is not something that can be "plugged in" and left to run itself. It is an ongoing, continuous program that involves the commitment of staff time and effort to ensure that communities are performing and adding value and that the knowledge is up-to-date (Will, 2008).

2.14 Summary

Lisa Quast (2012) gives three key reasons why actively managing knowledge is important to a company's success. These are that it facilitates decision-making capabilities, builds learning organisations by making learning routine, and ultimately stimulates cultural change and innovation.

Furthermore, there are two distinct knowledge management solutions which have been identified in past research. These are *codification* which revolves heavily around IT technology tools. These tools are aimed at connecting people to reusable, explicit knowledge (Will, 2008).

The second is *personalisation* which relies primarily on socialisation techniques, such as linking people, to share tacit knowledge. Although the IT (information technology) tools enable employees to respond quickly to questions from colleagues, Fluor Corporation noted that additional iteration and communication were often needed to provided context and more "tacit" knowledge (Will, 2008).

Learning organisations are where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration are set free, and where people are continually learning how to learn together (Senge, 2006).

At the heart of a learning organisation is to answer questions like why we create controlling bureaucracies when attempting to form visionary enterprises. Why we derive self-esteem from knowing and not learning and criticise before understanding (Kofman & Senge, 1995, p. 18).

Quast (2012) explains that the success stems from creating a culture where everyone continuously assesses themselves, their units, and their organisation, looking for ways to improve. In the US Army for

example, teams review assignments to identify successes and failures, and seek ways to perform better the next time after every important task or event (Garvin, 2000, p. 106). This approach to capturing learning from experience builds knowledge that can then be used to streamline operations and improve processes.

Research shows that companies which adopt “formalised informal learning” programs like coaching, on-demand training and performance support systems outperform those that focus on formal training by 3 to 1 (Bersin, 2012, p. 1). In these companies the corporate training team doesn’t just train people, it puts in place content and programs to help employees quickly learn on the job. They do this through developing training in small, easy-to-use chunks of content and making it easy to find as needed.

Indeed, many knowledge-sharing programs actually make it harder, not easier, for people to do their jobs because they fail to take into account the user’s time and ability. It is best to make the systems as easy and convenient to use as possible (Babcock, 2004).

Corporate learning and development increased by 9.5% from 2011 to 2012 (Bersin, 2012). This is a major shift in corporate HR spending considering Forbes puts training expenditure at around $135 billion (Bersin and associates, 2012). Companies now realise that they simply cannot find the skills they need in the workforce and have to reinvest heavily in corporate training.

Like Apple, IBM and Google, Fluor Corporation is one such company which has taken the necessary steps and embraced the concepts of knowledge management and are succeeding. This success is based on KPIs set out by the organisation to measure the performance against their objectives (Babcock, 2004).

There were some additional factors which contribute to the success of Fluor’s knowledge management practices. These factors include the alignment of the program with Fluor Corporation’s culture, the continued maintenance and ease of use of the program, social influence, and external changes that together evolved the knowledge management program into a well-used, highly regarded and award-winning program around the world.

2.15 Conclusion

There are many ways to build a learning organisation but they all get back to management. If a company can succeed in building a culture which gives employees time to reflect, develop and share expertise, and learn from mistakes, it will likely outdistance its competition and thrive in the face of huge market change.

Informal employee communities or communities of practice (CoPs) and networks are inexpensive and efficient ways for experts to share knowledge and ideas (Gallaugher, 2009). The important thing though is that the CoPs work best if they have clear accountability and management oversight. Essentially, they address real problems for senior management. Simply put, CoPs are like teams but focused on the long term.

Technological advancements make global knowledge sharing and collaboration possible, but successful communities also depend on human systems i.e. focus, goals and management attention which integrate them into the organisation (Gallaugher, 2009).

With a greater awareness of the four forms of KM integration employed to manage and leverage human oriented and system oriented KM practices, and an appreciation of the optimum proportion of each, organisations should be better placed to create a performance measurement system that accounts for the *integrative* management of an organisation's knowledge assets (Minonne & Turner, 2009).

Instead of purchasing an “off the shelf solution”, businesses should consider their specific company culture and create a strategy aligned to their practice and existing networks. In addition, they should identify a set of natural communities within the company, and then choose leaders who exemplify knowledge sharing behaviours and who are well-liked members of those communities to encourage participation. In order to obtain leader’s continued commitment, the leaders should voluntarily and verbally state their commitment and involvement to the program (Will, 2008).

In the next chapter, the blueprint or design for the empirical study is unpacked.

CHAPTER 3: EMPIRICAL DESIGN

3.1 Introduction

Theories and best practices are outlined in chapter 2 as well as reference to a case study. Numerous sources indicated that there are factors in the workplace that promote or hinder the effective management of knowledge and organisational learning. In this chapter, the focus is on the experimental design used to help meet the research objectives as laid out in Chapter 1.

The word "**empirical**" is derived from the Greek word for "experience". It is concerned with that which can be measured or observed (Brown, 2000). The empirical design is therefore a comprehensive plan which establishes in advance the broad contours of what needs to be found to answer the research question (Bryman, 2012, p. 12). It expresses both the structure of the research problem and the plan of investigation used to obtain empirical evidence on the problem statement.

The preliminary phases of research design were difficult to decide on because the scope or the extent of the research problem scope was essentially unclear. Further research into the domain of KM was necessary to better understand and formulate an empirical research approach. The fact is that there are many aspects of KM and not one all-encompassing answer to how successful an organisation is at implementing KM.

3.2 Research method

The method is essentially a “blueprint” for empirical research and is aimed at answering the research questions. An effectual design requires that at least the following three processes must be specified (Bhattacherjee, 2012):

1. the data collection process,
2. the instrument development process, and
3. the sampling process

Bhattacherjee (2012:44) explains that data collection can be broadly grouped into two categories namely positivist and interpretive. The positivist methods such as survey research are aimed at theory testing and employ a deductive approach. The interpretive methods employ an inductive approach that starts with data and tries to derive a theory about the phenomenon of interest from the observed data.

The Chapter 2 literature study revealed that a few different theories, KM strategies and success stories are documented and accessible. This presented an opportunity to test these theories against Sasol's position within the KM arena. A positivist design approach was therefore followed which would encompass survey research and secondary data analysis as an appropriate plan for attack.

Within these categories, there are two main methods of obtaining data for research, namely quantitative and qualitative research. Quantitative research deals with quantifiable outcomes like facts and figures, in other words 'how many'. Qualitative research deals with opinions and attitudes. This type of research aims at explaining 'why' (Brown, 2000).

An interpretive data collection approach is employed where existing information and systems at Sasol are reviewed and theories or interpretations are inferred. As is characteristic of this approach (Bhattacherjee, 2012, p. 35), a qualitative data type method was used in this research. This included interviews, observations of patterns or practices and the likes to gather sufficient data to achieve the research objectives.

Many avenues for secondary data were explored to obtain reliable, trustworthy and relevant information. Secondary sources were obtained from primarily within Sasol systems in the form of Sasol intranet, Sasol Website, the Sasol KM system, Sasol records, studies and research papers, Sasol procedures, databases and official works presented to Sasol by consultants.

The external validity of this research was to observe associations or general applicability of findings to both the literature study and other organisations. As this research relies heavily on interviewing and secondary data, where data is sourced from a wide variety of individuals, units of analysis or company records, it tends to have a broad generalisability (a.k.a. external validity).

The construct validity examines how well a given measurement scale or instrument is measuring the theoretical construct that it is expected to measure (Bhattacherjee, 2012). To improve or assure this key research attribute, the interviews were designed with reference to the guidelines set out by Turner (2010). These guidelines include the preparation for the interview, the constructing of effective research questions and the actual implementation of the interviews.

The steps which were followed during this research project were:

a. A pilot study was conducted to evaluate and validate the need for this research project. A select few Sasol employees were approached in an informal interviewing fashion. The aim was to determine how mature the KM systems at Sasol already are. Also, who the leaders in this field are within the organisation and to elicit information in support of solving the research problem.

b. Based on the information gathered from the pilot study, a conceptual framework for this research project was developed. This framework included the approach and criteria on which the targeted participants shall be based.

c. An in depth literature study was conducted to gain insight into KM concepts and strategies. It also provided a reference to current best practices. Above all, the literature study helped to gain perspective on the complexities of measuring a phenomenon like KM in an organisation. For example, during the pilot study phase someone answered the research problem statement with a rhetorical question; “What is it you are going to base your assessment criteria on? If it is the theoretic steps of maturity model, then you may find we as Sasol are failing.”

   What this brought to light was that every organisation has its own challenges and dynamics and that one may not necessarily be able to compare two organisations purely on face value. This shall be elaborated on in the findings of this research.

d. The research design was then worked out based on the literature findings as well as the outcomes of the pilot study.

e. Potential research participants were identified through a process of referrals, job functions and reputation. They were contacted via telephone and e-mail and were explained what was expected of them. They were also scrutinised for suitability based on the qualifying criteria. Each one was also given an opportunity to decline if they did not want to participate. If the potential participants agreed to take part, some of their demographic information was recorded.

f. The research participants were booked via the Sasol internal meeting booking system and given an introductory letter (see Appendix 2: Introductory Letter). The letter outlined the reason for the research and also gave some background information for the prospective participant to peruse.

g. The interviews were then conducted with each of the participants. The interviews were done individually and mostly at the participant’s place of work. The interviews were digitally recorded although notes were taken during the interview. The notes assisted with follow-on questions and also a means to start summarising key expressions for later investigation.

h. The data collected was captured and coded. Some of the participants were asked for a follow-on interview to assist in evaluating the findings and clarify certain points. Only those with exceptional

knowledge and understanding of the topic were contacted for a follow-on interview. This also served as an opportunity to verify and triangulate the interview data.

i. Finally, all the information gathered from the literature study and empirical study were reviewed and evaluated. The findings were evaluated to allow for the compilation of conclusions and recommendations.

3.3 Measurement Instruments

Many avenues for secondary data were explored to obtain reliable, trustworthy and relevant information. Secondary sources were obtained from primarily within Sasol systems in the form of Sasol intranet, Sasol Website, the Sasol KM system, Sasol records, studies and research papers, Sasol procedures, databases and official works presented to Sasol by consultants.

Primary data was obtained in the form of interviews. Interviews are a method used in surveying investigations. A research question i.e. the problem statement, is there to communicate what the purpose of an investigation is. A questionnaire question is one of many questions posed that will help shed light on and answer one or more research questions (Bhattacherjee, 2012).

The interviews were done in a combination of two formats in terms of the interview design. These formats are based on Turner's guidelines (Turner, 2010, p. 755) which are the general interview guide approach and the informal conversational interview.

The general interview design approach is a fairly structured format but allows for some flexibility in the way the interview is conducted. The interviewer can adapt the questions to ask follow-up or probing questions based on responses to pre-constructed questions (Turner, 2010, p. 756).

The strength of this approach is that although the questions are structured, the outcomes are to ensure that the same general areas of information are collected from each interviewee. This provides more focus than the conversational approach, but still allows a degree of freedom and adaptability in getting information from the interviewee (Turner, 2010, p. 756).

The ways that questions are potentially worded has an obvious impact on the way the questions are answered or understood by the interviewee. Therefore, one of the foremost issues with this type of interview is the lack of consistency in the way research questions are posed.

On the other hand, the advantages present a strong case for this approach. For example, by rephrasing questions, one might be able to have more information or less information answered simply because of

the way the interviewee interprets the questions. In this way the interview can be adapted to suit the person being interviewed.

The informal conversational interview is one where questions were spontaneously generated to allow for a natural interaction. This type was particularly useful when the interview took place in an ad hoc environment and where subjects (interviewees) are users and not necessarily drivers of the organisation's KM. It allowed for flexibility in the nature of the interview (Turner, 2010, p. 755).

The risks of using this approach, is that there are inconsistencies in the interview questions, thus making it difficult to code data (Turner, 2010, p. 755). In lieu of this constraint, this method proved to be extremely productive as it tended to allow the interviewee to elaborate on the topics which they felt most comfortable and proficient in, without much need to carefully consider the structured questions.

3.4 Units of analysis

Consideration for the units of analysis form part of the planning and preparation phases of the interview design process. This entailed selecting the right candidates to interview. A criterion based sampling strategy was followed in order to obtain qualified candidates that would provide the most credible information to the study. This criterion was the following:

1. Selecting participants who will be willing to openly and honestly share their "story" and information.
2. The candidates shall need to be directly involved with KM. This could be as a mere contributor or user of the available systems or any other involvement.
3. The candidates shall be employed by Sasol.

This qualitative inquiry focuses on a smaller but in-depth sample.

3.5 Research Sample

Prospective interview participants were identified by referrals within the businesses, reputation or through past associations. They were initially approached by telephone conversation which included the confirmation of the participation criteria. Once the prospective participants proved suitable and agreed to participate, the participant was then booked for the interview via the internal appointment booking system.

For investigating the core objectives, additional supportive information was required. This included demographic and contextual information. The perceptual information was then that which was taken

during the interviews. This was collected during the first telephone conversation or the subsequent interview.

Demographic	Gender
	Age
Contextual	Business Unit
	Job level
	Number of employees in that business unit
	Hours spent on KM

A total of twelve (12) structured interviews were conducted across ten (10) Sasol business unit departments. Nine (9) of the participants were from the Sasolburg area, two (2) from the offices in Johannesburg (Rosebank and Bryanston) and only one (1) from Secunda. Three candidates who agreed to participate in the research interviews did not attend the interview.

In four (4) cases, the participants actually worked between two areas. These were between Sasolburg and Johannesburg and Johannesburg and Secunda areas. This means that the information gathered from them represented more than one business unit area each.

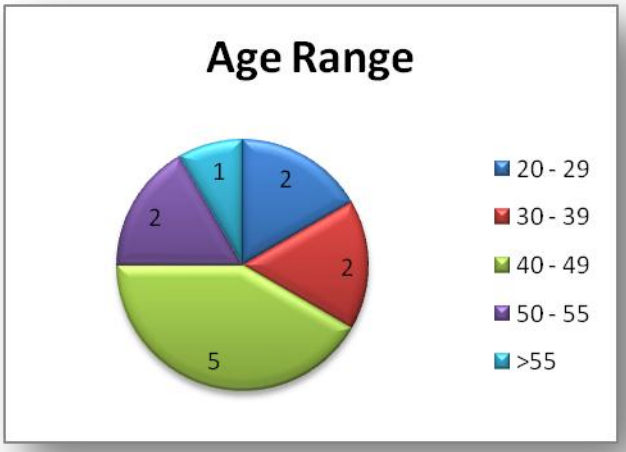

Figure 3.5.1 Age Ranges of interviewed participants.

The age range distribution was not specifically considered as criteria on which the study was based. There were no participants below the age of twenty and unfortunately only one over the age of fifty five years old. This data does not necessarily represent the age distribution within Sasol or any of the business units.

The majority of the participants in this sample were female. This did not form the basis of the sampling criteria but was captured for supporting information. This result was also not representative of the willingness to participate. Refer to Figure 3.5.2 below.

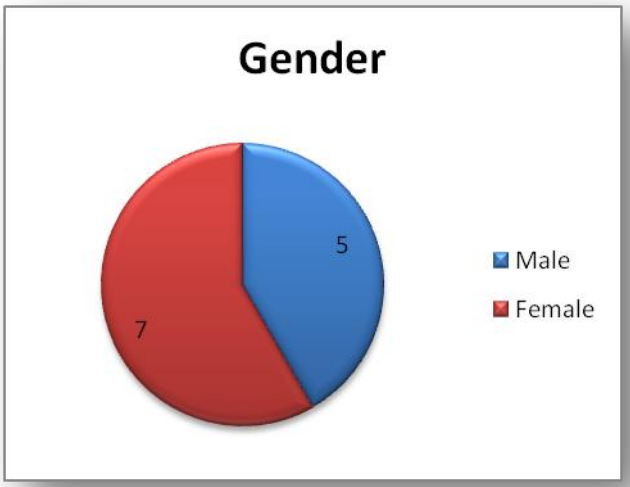

Figure 3.5.2: Participant gender distribution

In South Africa, Sasol consisted of a number of business units which in turn were made up of a couple of departments. At the time the research was being conducted, Sasol were undergoing a change in structure. Entire business units were being consolidated with the aim to create “one Sasol”. The result was that the research sample no longer spread across five business units but finally only three. Table 3.5.1 shows the participants per department across the three business units on completion of this study.

As explained in the design of the empirical study, an assumption made is that the interviewed participants would be indicative of the greater department in which they worked. This assumption was based on the understanding that departments share the same criteria or touchstones. To get an understanding of the measure of represented population these individuals stood for, the total employees per business unit was captured.

Knowledge Optimisation, Sastech	1
Information Management, Polymers	1
Project Implementation, ChlorVinyls	1
Global Learning, Polymers	1
Control Group, ChlorVinyls	1
Communications, ChlorVinyls	1
Development, ChlorVinyls	2
Polyolefins, Polymers	2

Sasol Infonet, Sastech	1
Knowledge Management, Sastech	1

Table 3.5.1: Departments

These participants were therefore seen to represent a normal probability distribution. Refer to Figure 3.5.3: Employees per business unit (for participants) which graphically represents the population spread across the different business units.

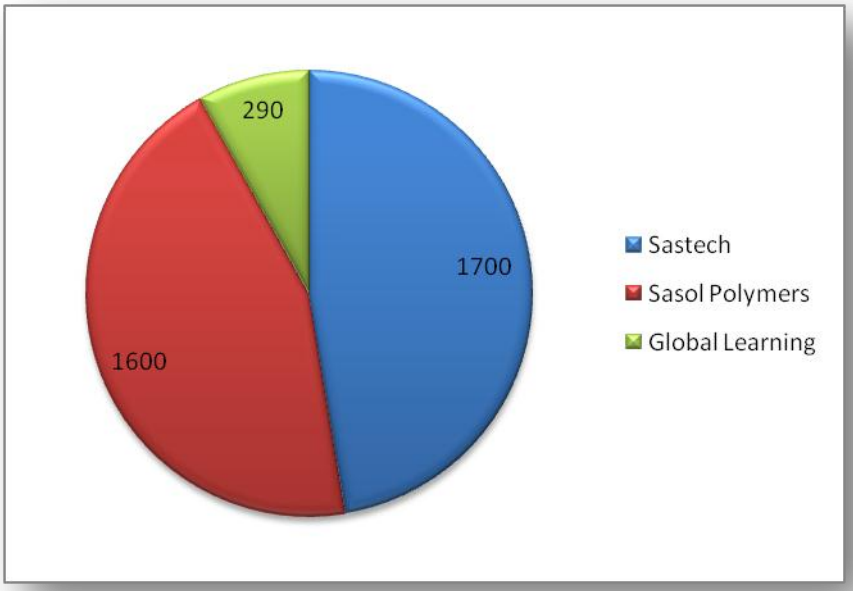

Figure 3.5.3: Employees per business unit (for participants)

The Sasol job grading is based on the Hay System where level 1 is the highest and 10 much the lowest. As was found in the theoretical research, leadership buy-in is essential to KM implementation success. These results give an indication of at what level of experience, company contribution and skill KM participation takes place. Figure 3.5.4 reveals that the majority of participants fall within the level 5 spread. As an indication, Level 5 is a middle management position and engineers typically fall within this level.

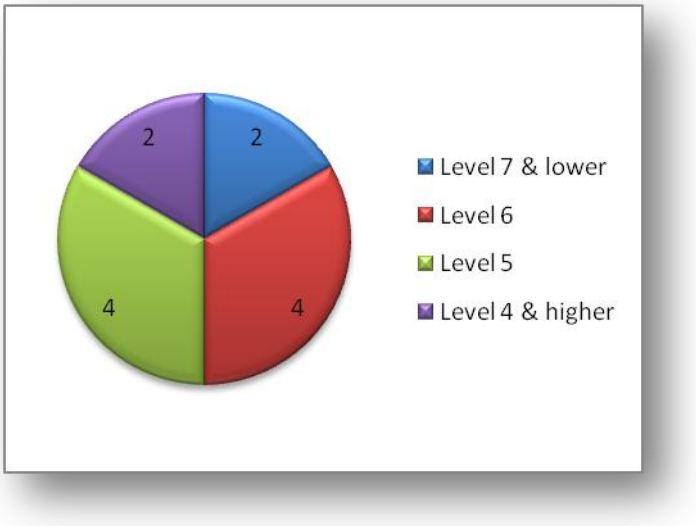

Figure 3.5.4: Job levels distribution of the participants

3.6 Interview questions

The constructing of the research questions was essential in order to gain maximum knowledge or experience from the interviewee. According to Turner (Turner, 2010, p. 758), the questions must be worded clearly, open-ended and as neutral as possible.

The interview questions were designed to obtain the following information:

- The employee's awareness and opinion of knowledge sharing
- To understand how its KM strategy supports organisational processes, individual learning, collective learning and collaborative decision making
- The methods of knowledge sharing and knowledge transfer
- To establish under which conditions employees will be motivated to share knowledge.

The questions used in the interviewing process were the following:

1. Where would you go to access lessons learnt, best practices or expert advice within the Sasol domain.
2. Garvin (Garvin, 2000, p. 51) defines a learning organisation as an organisation skilled in creating, acquiring, and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insight.
    a. Based on the definition above, would you agree that Sasol could be considered as a learning organisation?
    b. Do you consider your co-workers to be predominantly knowledge-sharers or knowledge-hoarders?

    c. What motivates individuals to contribute their knowledge to a KM system?
3. The Communities of Practice are the primary location for people with similar functions, business objectives or interests to capture, share, improve and apply their collective knowledge (Will, 2008). As Wagner (2006) suggests, not every community is a community of practice. Communities require well defined structure.
    a. What, in your opinion, are the critical success factors of the communities of practice at Sasol
4. Would you say that Sasol uses KM to provide strategic advantage?
5. New ideas cannot by themselves create a learning organisation; it must be applied to the company's own activities and therefore translating new knowledge into new ways of behaving.
    a. In your opinion, would you agree that Sasol succeeds in applying new knowledge?
    b. How often do you form part of a Community of practice to transfer knowledge?
6. McDermott and Archibald identified four principles for setting up effective CoPs:
    I. Focus on issues important to the organisation
    II. Establish community goals and deliverables
    III. Provide real governance
    IV. Set high management expectations.
    a. What in your opinion are the strengths and shortfalls of the KM system at Sasol?
    b. How best to design and develop a collaboration system for Sasol

3.7 Interpreting the data

Once data was collected, it had to be analysed and categorised to derive meaning and understanding. The qualitative process of data analysis is an inductive one, in which the data is examined from a "bottom-up" approach (Mills, 2007). The specific data was therefore examined to identify more general themes which were used to gain understanding and meaning of the data.

The analysis process started with getting familiar with the information collected. This includes both the primary and secondary data. In terms of the empirical data, the interview recordings were played back a couple of times and transcribed. These notes were read and re-read. The strategy was to get a sense of what the data was trying to reveal. That is, there was repetition of phrases, concepts and even words which led to the coding of the data.

The formal system for data analysis was derived from a combination of two references: A journal by H. O'Connor and N. Gibson and a book on the topic by Geoffrey E. Mills.
These systems involve the following steps:

Step 1: Organise the data. According to O'Connor et al (2000), the best way to organise the data was to go back to the interview questions and identify the topics this research wanted answered. As the interview recordings, transcripts and data were reviewed a couple of times, themes started to emerge from the data.

If any data or information was found to be ambiguous or unclear, the interviewee was contacted for a follow-up interview. The follow-up interviews could take place over the phone, via e-mail or in person.

Step 2: Find and organise ideas and concepts. Identifying prominent themes, recurring ideas or beliefs over and above the main research objectives was challenging. Notations were made to record ideas that the researcher identified while reading the data.

During the organising process, the ideas were organised into codes or categories (Mills, 2007). Topics and key phrases were highlighted from the interview responses to form potential categories. Table 3.7.1 shows an example extract from the transcribed research findings and formation of categories.

Table 3.7.1: Categorising Ideas

Question	Response	Category
Do you consider your co-workers to be predominantly knowledge-sharers or knowledge-hoarders?	I would say that my co-workers are predominantly *protective of their skills and knowledge*. With the rate at which *youngsters are obtaining degrees* these days, one can never know *how secure your job is*. Also, Sasol is always talking about optimising and *restructuring*. No one wants to give away all their legerdemains at the risk of being considered "dead wood"	Protect skills and knowledge. Concern that young qualifications threatens experienced employees. Sasol frequently restructuring
How often do you form part of a Community of practice to transfer knowledge?	Well, that's kinda hard to say. I often peruse CoPs just to see what people are saying. *I am a member* of only two CoPs. They are new and they *don't seem to be drawing much interest*. I must also add that CoP participation does not *form part of my KPAs*. It's something *I find great value* in though. If only there were more people who felt that way. In terms of hours per day...well, I guess I spend on average an hour a day on CoPs.	Membership and participation rate. KM as part of KPAs. The value in KM

Step3: Build main themes. Each of the response categories has one or more associated themes that give a deeper meaning to the data. Different categories can be collapsed under one main over-arching

theme (O'Connor & Gibson, 2000). An example of a prominent theme which surfaced was “Fear”. This included the fear of

- not being seen as valuable
- young qualified employees appearing more attractive employees
- documenting tacit knowledge to benefit others but not getting benefit in return

Step 4: Ensuring reliability and validity in the data analysis and in the findings. Validity is accuracy with which a method measures what it is intended to measure whereas reliability is the consistency of the research findings (O'Connor & Gibson, 2000). So, to ensure reliability, diligent efforts and commitment was put into the consistency throughout interviewing, transcribing and analysing of the findings.

Furthermore, the validation of this research was achieved through triangulation. This was possible by interviewing more than one person in a single business unit (instances) and confirming that the findings were dependable. A further method to triangulate the findings was to compare findings across different business units for categories which should be synonymous across Sasol.

Step 5: Interpreting the findings. This started by summarising the findings and the themes. The data was then reviewed within the themes or categories, and an understanding of each theme was reached. Notes were made on whether the findings were expected or surprising. These findings were compared to the literature review information which formed a crucial part of this research.

Sometimes one can learn from the research participant’s perceptions, attitudes, and feelings about something simply by noticing the words they use to express themselves (O'Connor & Gibson, 2000, p. 69). These underlying topics were of particular interest and elaborated on in the empirical findings.

3.8 Conclusion

A deductive, qualitative approach within the category of a positivist paradigm was followed with this research project. Interviews were used with the aim of collecting primary data from a sample of a population which would then help in answering the research problem.

Good research generates trustworthy data if the correct research methodologies are used to achieve the research objective (Brown, 2000). Needless to say that research can be valuable and important to organisations especially when in pursuit of that competitive advantage.

This chapter discussed the methodological processes and issues which go along with it. This then paves the way for the next chapter in which the results shall be discussed.

CHAPTER 4: EMPIRICAL RESULTS

4.1 Introduction

Data and information used in this chapter was gathered from both primary and secondary sources. These sources ranged from interviews, official Sasol documentation and literature from the Sasol intranet. All the information used in this chapter was from working Sasol documents or papers written for Sasol, by consultants with reputable references.

For the interviews, all participants were Sasol employees ranging in job description and level of seniority. The criteria used for the participant selection (and of course the interview questions) are made plain in the previous chapter.

This chapter is arranged such that the literature is presented first to obtain background information and an understanding of Sasol terms. This arrangement also intends to assist the reader with understanding the scope of terms which is referred to by the participants in the interviews.

As a starting point to this chapter, it must be understood that Sasol is a diverse company with a distributed work force, and an agenda which encourages global competitiveness through competency. From the literature study it shall become clear that organisations of this nature are becoming increasingly reliant on people networks, knowledge collaboration technologies and databases to enable continuous people development and expert support environments.

Sasol leadership understands that these highly interactive environments are becoming the primary development mechanism for new knowledge workers. These people are isolated from “one-on-one” conversations and working across multiple time zones (Sastech Wiki, 2010).

With a significant increase in demand for an experienced work force, as well as a focus on international expansion, Sasol is faced with the challenge of maintaining a vast wealth of knowledge and making this available to the business in such a way that prior knowledge and experience can be leveraged in a sustainable way (Sasol Intranet, 2010).

4.2 The early days of Sasol KM

For almost twenty years after the pilot plant in Sasolburg was established, Sasol focused on developing their F-T (Fischer-Tropsch) and mining technologies. It was only during the commissioning of the Sasol

Two Plant in Secunda that the critical need to create and transfer knowledge became apparent (Botha, 2006, pp. 2-3).

For example, the construction of the Sasol Two plant in 1976, and the fast-tracking of the construction of the Sasol Three Plant involved more than 30 000 workers from 39 nationalities, speaking 30 different languages working on the project, which was completed in June 1982 (Sasol Limited, 2000, p. 14). The dispersion of these workers took with them a host of skills.

According to Botha (2006), further "encouragement" for KM emerged as critical for Sasol's continued expansion and global success due to:

- The need to protect its intellectual assets,
- The importance of capturing and sharing both explicit and tacit knowledge,
- The valuable knowledge involved with the building of Sasol One, Two and Three were retiring (and taking knowledge with them) and,
- The white employees, who feared losing their jobs in the employment equity drive, became less willing to share their knowledge.

KM essentially became formalised when the then Sasol CEO appointed a group KM sponsor in 1998. A lot of investigative work and development took place over the following years to get KM going. Although focus and progress was limited to one or two business units, a great deal of structuring and strategising was achieved. Table 4.2.1 shows the KM milestones "achieved" from 1998 to 2005 when KM arguably suffered a blow when a key employee left the organisation.

Table 4.2.1: KM Milestones 1998-2005 (Botha, 2006, p. 23)

1998	**Sasol KM sponsor appointed (Executive Director)**
	Sasol KM steering committee with representatives from functions established
1999	**Focus on people and the culture of sharing**
	First KM competitions to reward knowledge sharing
	First full-time KM coordinator appointed for Synfuels (Marina Hiscock)
2000	**Focus on implementing and rollout of the Sasol KM process**
	First full time knowledge officer appointed for Sasol (Marina Hiscock)
	Knowledge coordinators appointed by most Sasol companies
2002	**Focus on establishment of CoPs**
	More than 150 CoPs in Sasol
2003	**KM Pyramid of Excellence Model developed & accepted for**

	Sasol
	Deliverables & focus areas identified (people, processes, technology)
2004/2005	**Identified & develop knowledge management toolbox**
	Practical application of KM tools throughout Sasol

.

The achievements referred to Sasol as a whole but in reality, outside of Sastech, there were few (if any) other such initiatives in the organisation. This implied then that the milestones included Sasol as an organisation as opposed to individual business units.

Following on from 2005 in the KM arena was a whole new management structure and by implication, approach. The remaining portion of this research captured and focused on the status of KM as from 2005 onwards.

4.3 Adoption of KM Technologies

The selection of the right technology is crucial to knowledge management practices and a means to enable effective knowledge management within an environment. If the technology is not suited to the user and if it is not user friendly, it would not be used (Sasol Intranet, 2010).

According to SKM (Sastech Knowledge Management) and Sastech IM (information management), it was substantially difficult to find a compromise between “best in class” versus “enterprise integration”. The outcome is a list of considerations and criteria listed as follows (Sastech Wiki, 2010):

1. User friendly: the user must be able to use technology and interact with content without much training and effort.
2. Site administration friendly: The content owners must be able to manage their sites and content with minimal involvement of an IT (information technology) specialist (e.g. HTML/web developer). One must be able to create and change sites quickly and easily.
3. Technology integrity and support: The user must trust the system to be available and accessible, and have a disaster recovery plan which will restore content in the event of an incident. System support such as: speed, ability to fix technical problems, etc. are essential to build user confidence.
4. Integrate with and accommodate all unstructured content types: The system must be able to accommodate and integrate all knowledge and unstructured content types e.g. documents, blogs, forums, HTML, wikis, etc. Site Owners want to manage as much content or object types as possible in one system to reduce administration. The administration must also not be hampered by permissions and access, yet retain security defences. One system and permission

management also reduces chances of users not having access to knowledge they are entitled to. This is essential for effective search.

5. Effective search capabilities: Users must be able to “Google” for content. That is, one point of search and find all knowledge and information they want. The system must have good indexing and advance search capabilities to retrieve all content or item types e.g. search for “distillation columns” yields results in documents, wiki pages, forums, blogs and experts relating to distillation columns.
6. Sasol enterprise wide access: Everyone in Sasol must have access to the content and be able to interact with it. Access to external parties is not essential as organisations do not normally allow access to knowledge systems to external parties. The systems are designed to be “open” by default and would thus give access to intellectual property.

In addition to these criteria, the system development teams prescribed extra functionality in the form of the following points:

1. Voluntary Subscription: User must be able to subscribe to items and receive email notifications of new and changed content. These subscriptions must be voluntary.
2. Forced subscription to topics: Site owners must be able to subscribe users to “mandatory” topics on their behalf.
3. Spell Checker: The ability to spell-check the content prior to posting.
4. Easy Contribution: As users in Sasol are already conversant with Microsoft Outlook, it must be possible for them to interact with (post, comment and read) content via Outlook.
5. Permission and security control: Good permission control is required to prevent unauthorised changes and access to content.
6. Audit trail: An audit trail or version management system is required to recover previous versions and to monitor who did what in system.
7. Easy Formatting: Easy formatting of content – preferably “what you see is what you get” formatting.

The expectation is that the knowledge management process will be practiced within all business areas and at every level of the organisation. As the SKM Team resides within Sastech, it shall be regarded as business critical for the Sasol Technology core value chain to subscribe to the processes. The value chain includes Develop Technology, Acquire Technology, Commercialise Technology, Install Technology and Optimise Technology functions.

4.4 Knowledge Management Process Strategic Intent

The strategic intent of the KM process is to enable and accelerate continuous improvement. It also strives to ensure competency development (learning) of individuals, groups and the organisation as a whole. The latter shall be achieved through capturing, sharing and safeguarding knowledge and using knowledge as a means to improve productivity and innovation (Sasol Intranet, 2010).

The Sasol Knowledge Management Process drives the creation of intellectual capital. This term refers to the total collection of knowledge and intellectual value that resides in people (human capabilities and skills), documented knowledge (research reports, quality management systems, process descriptions, etc.) and knowledge in information technology (blogs, forums, wiki's, etc.) (Sasol Intranet, 2010).

Through this intellectual capital, Sasol (and in particular the Sastech business unit) are enabled to sustainably deliver on its vision which is "To be recognised for consistent excellence, innovation and delivery of cleaner technologies, enabling Sasol's growth and sustainability" (Sasol Limited, 2012)

Within the Sastech business unit, the strategic focus areas are determined by the Sasol Technology annual strategy processes. The essential knowledge documents are determined by functional management and adhere to the specific criteria listed in the Key Knowledge Documents Directive. However, the intent is still to manage these documents or sources in a well governed document management system that adheres to these principles:

1. The content shall be verified as correct and relevant on initial submission and on regular intervals thereafter by the respective knowledge owners.
2. The content must be safeguarded against loss, unauthorised access and wrongful exploitation by applying appropriate measures such as permission management and data loss protection.
3. Content shall be easily accessible and retrievable through means of browsing and searching.
4. Document Management folder structures, administrative processes and supporting people structures shall be designed to optimise scales of economy, improve high cost labour productivity, and must be robust to withstand organisational structure changes (functional and people changes).
5. Allow for easy integration with other knowledge enabling technologies in order to effectively retrieve all forms of knowledge objects, i.e. documents, blogs, forums, experts, etc.

The strategic intent is the purpose for the knowledge management processes to exist and why it will continue to exist. It gives a picture about what must be achieved in order to achieve the vision. It motivates the people. The strategic intent also helps management to emphasise and concentrate on the priorities which are clearly set out by SKM. A well expressed strategic intent, as Sasol has, is therefore extremely important to define (Babcock, 2004).

4.5 Process and technology integration

The SKM Group emphasises the need and the importance of making sure that employees can use the KM tools effectively and efficiently. The requirement is for them to be easy to use and uniform across the board. This is a criteria decided on as part of the technology selection (Sastech Wiki, 2010).

The description of when and how the collaboration technology is to be used was by describing it in the context of business processes. Examples are a quality management system or a model which the employee uses to do his/her work like a PD (process development) model, QMS (quality management system) document, and so on (Sasol Intranet, 2010).

Knowledge management processes directly improve organisational processes, such as innovation, collaborative decision-making, individual and collective learning. These improved organisational processes produce intermediate outcomes such as better decisions, organisational behaviours, products, services and relationships. These, ultimately lead to improved organisational performance (King, 2009).

In order to determine where an employee would typically want to perform tasks like “search” or “ask” for knowledge, a reviewing of processes was required. The reviews were done of the group’s processes, QMS and models. It was further necessary to analyse where contributions such as lessons learnt, experience gained and suggested best practice during (or after) the task is completed (Knowledge Online, 2013).

Sastech Knowledge Management Group has linked each of the identified opportunities to items such as documents, forums, blogs, wiki’s, etc. Examples of such opportunities are:

- To encourage the use of existing knowledge, learning and experiences, the following statement was inserted into the process which describes the planning of a framing session:

  Refer to the “Framing Forum (linked)” for the latest best practices and recommendations on the subject of Framing

- To encourage the posting of experiences gained, lessons learnt, making suggestions to improve, one can add the following statement into the process step after the framing session has been held:

  Please post your learning, improvement suggestion or best practices you might have gained during or after the Framing process on the “Framing Forum (linked)”

The integration of available knowledge management technologies, concepts and methods into organisational business processes is a challenge. Practitioners in the areas of business process and knowledge management alike seek solutions that aid the flexible alignment of knowledge management efforts to an organisation's most value generating activities (Strohmaier & Lindstaedt, 2005).

The advantages inherent in such efforts are significant. The execution of business processes is supported from a knowledge perspective, the economic benefit of knowledge management can be illustrated more easily and knowledge management activities become awakened because of the integration in business processes, which in turn vigorously grows business performance (Strohmaier & Lindstaedt, 2005).

4.6 KM processes

Early in 2009, the SKM had brainstorming sessions around the philosophies and tools for improving communities and the Functional Knowledge Management Strategy. In these sessions (as well as operations meetings), they were forced to come up with a more holistic approach in developing the KM solution. Up until then, much of the emphasis was placed on CoP solutions (Oosthuizen, 2009).

Oosthuizen (2009) reported the result of the strategising to be a stepped approach that can be applied to both a function and a community to develop a KM strategy and implementation plan. The approach requires that the business objectives first be unpacked. The business objectives referred to are typically those which serve as the basis for creating policy and evaluating performance.

The second step requires solutions to be found on how the KM tools and technologies could really add value to address the business objectives. These solutions need to be realistic and a pragmatic approach to the problem (Oosthuizen, 2009).

Once this exercise was done, the facets of KM evolved and grew rapidly over the next couple of years. SKM were also learning and maturing, technology was improving and more referential literature became available. To this end, many interventions were put into place over this time. It was these interventions which then needed to be prioritised according to which added the most value (Oosthuizen, 2013).

Although SKM monitored and measured progress, they needed to revise these measures. They then developed specific targets based on their new measurement handles. They (SKM) shuffled and re-allocated roles and responsibilities to help achieve these objectives.

Sasol Technology developed and adopted a process model which is used to describe the core processes and knowledge object relationships. The knowledge objects referred to here are essentially the four main practices of the knowledge management processes namely (Sastech Wiki, 2010):

- People to knowledge bases knowledge transfer – This is when people contribute their knowledge into knowledge bases;
- Knowledge bases to people knowledge transfer - Knowledge bases provide people with essential knowledge;

- People to people knowledge transfer - People share their knowledge with each other and
- To ensure that the knowledge remains relevant, accessible and safeguarded.

The following process model is used to describe the Knowledge Management Core Processes and Knowledge Objects relationships:

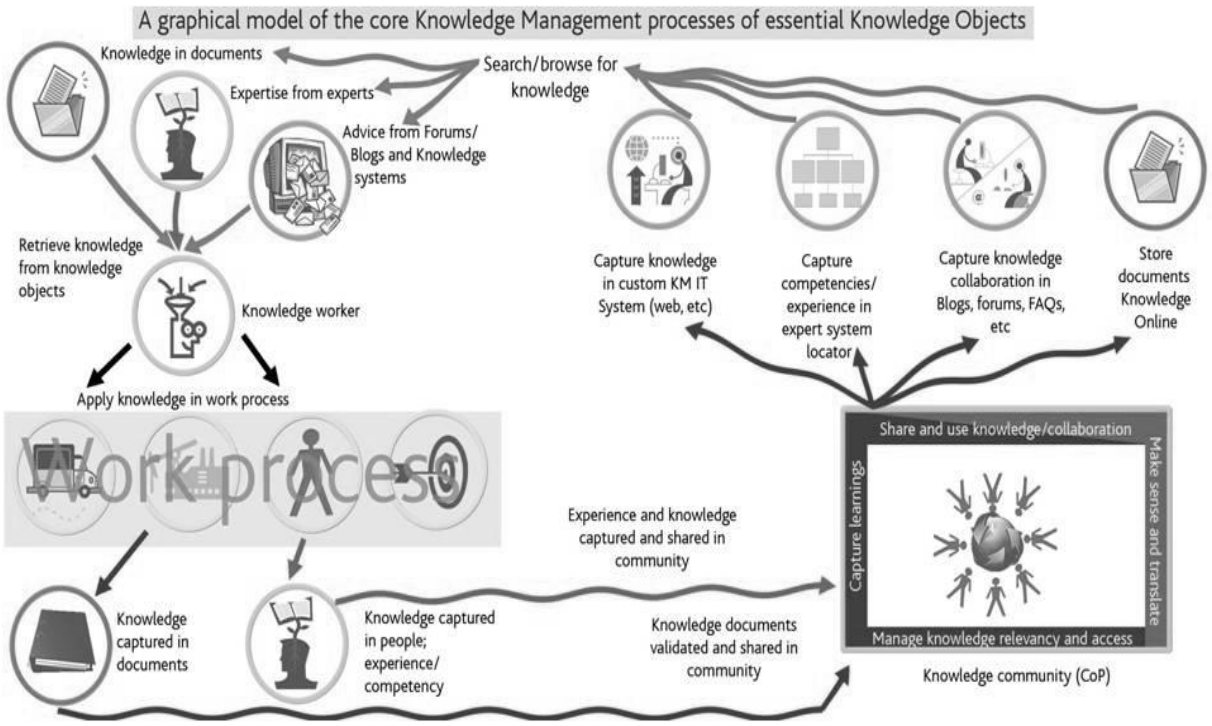

Figure 4.6.1: A graphical model of the core KM processes of essential knowledge objects (source: SKM Brochure)

This model clearly illustrates the inter-dependency of KM processes. In brief, knowledge from different sources can be administered by a KM worker; for example using collaboration technologies. Users can then access this information at any stage to learn from or use. As the people collaborate, they share information and learn from each other. Such a medium can typically be via a CoP or blog as is illustrated in the model. The key is that the knowledge must somehow be captured, stored and administered. This is where the process must fit in to the business processes and of course be easy and convenient for users. Accessing the captured information is the key objective to KM. After all, if everyone made use of such repositories or forums, one can only imagine the extent of the benefits (Sastech Wiki, 2010).

The essential processes to ensure predictability, repeatability and sustainability of the Knowledge Management Core Processes are the following (Sasol Intranet, 2010):

- To lead and direct knowledge management by providing direction and focus via the KM strategy.
- To facilitate delivering on KM by ensuring the necessary enablers i.e. people, processes and technologies are in place to deliver on KM.
- Continuously measure, analyse and improve on KM.

On the back of these essential processes, the KM process principles can be summarised within two main points. The first being to capture and safeguard the essential knowledge documents within a well governed and sustainable knowledge database.

The second principle is to enable a CoP on an integrated and sustainable collaboration technology. Although this may not seem complex, it includes a number of necessary requirements which can be explained in these short points (Sasol Intranet, 2010):

- Making knowledge explicit through capturing and then sharing (promoting) of knowledge on IT objects including blogs and forums.
- Identifying topic experts is expected to stimulate knowledge exchange between people.
- Relevant knowledge topic profiles shall reduce the knowledge and information overload of knowledge workers.
- The creation of a dynamic and virtual knowledge network (virtual university) consisting of topic experts that continually improve their own and collective competencies; and support each other across time zones, geographical and organisational boundaries.
- Very important is the entrenchment culture of knowledge sharing and continual improvement at all levels, especially at grass roots level.
- The identification and creation of knowledge owner groups accountable for the practices and other knowledge objects relating to the community.
- The planned and agreed improvements are to be managed through to its full lifecycle. This must then include formal recognition and feedback to originators of learning, ideas and improvement suggestions.

To support the KM process and achieve the principles set out, SKM and the Knowledge Management Function defined their roles as responsibilities as follows:

- Lead and direct KM practices in Sasol Technology
- Enable KM practices to take place in business.
- Deliver KM services and practice KM.
- Transfer knowledge from people to knowledge bases
- Transfer knowledge between people (person to person interaction)
- Manage access (security), relevancy and safeguarding of knowledge
- Improve and govern the practice of KM and the knowledge of Sasol

Sastech Knowledge Management decided to visit Fluor in June 2009 to study and benchmark against their (Fluor's) Knowledge Online. The SKM team reported back saying their KM System i.e. people, processes and technology is impressive (Sasol Intranet, 2010).

Fluor was considered one of the front runners as far as the successful integration of KM into an organisation goes (McDermott & Archibald, 2010). Their study of the company found that global communities had replaced the company's distributed functional structure. The project teams were found to be the primary organisational unit with 44 discipline and industry focused communities and over 24000 active members. They (McDermott et al) reported that Fluor provided all functional services like creating guidelines for work practices and procedures, technical documents, expert advice and help. These communities were arguably the first and best source for technical knowledge at Fluor (McDermott & Archibald, 2010).

Sastech determined that Fluor's communities are the pillars of their knowledge management. The CoPs are the custodians of knowledge with near fulltime Knowledge Managers looking after the community knowledge and a number of subject matter experts supporting people in the community (Sasol Intranet, 2010).

A further finding was that each community is sponsored by a very senior manager as the CoP is the "centre of excellence". There are a number of community types, most are around disciplines and some are around "industry lines" e.g. construction, power generation. The bottom line is that the community types are not limited to one type (Sasol Intranet, 2010)

A significant finding is that the Sasol KM technologies of Knowledge Online Library and Knowledge Online CoPs are more than adequate to do what Fluor is doing. Sastech's conclusion is that technology is important but it was the ten additional years of maturing culture which make the difference. Flour's maturing organisational culture means that their people and processes are well established (Sasol Intranet, 2010).

SKM concluded their findings by reporting that Sasol is on the right track. They recognise that the senior management support is crucial and although lacking, that they will line up sessions with senior management to drive the same "competency" custodianship in Sasol Technology (Oosthuizen, 2009).

4.6.1 Value and benefit of the KM process

According to SKM (Knowledge Online, 2013), the value and benefits of the KM process is to enable learning from current and past experiences. They argue that this is possible by embedding a process and culture of continuous capturing, sharing and use of that knowledge. This knowledge must be drawn from across projects, functions and groups and enable individuals, groups and the organisation to learn. They will benefit by avoiding making the same mistakes, improving processes and systems and improving the skills and competencies of Sasol employees.

Listed in point form, SKM have named the following points for specific benefits within the Sasol Technology environment (Sasol Intranet, 2010):

- *Increase research and development efficiencies and innovation*, by leveraging previous research experience and expertise;
- *Improve viability of new business concepts*, through knowledge of markets, economics, politics, competitors, alliances and suppliers;
- *Improve cost and schedule efficiencies of business implementation*, through systematic re-use of previous technical and technological knowledge;
- *Improve predictability and repeatability of all business processes* through improvement and usage of work method and best practice knowledge;
- *Improve Sasol Technology's capability for informed decision making* by leveraging existing knowledge and expertise;
- *Improve Operations Productivity Improvement* through knowledge of existing Sasol businesses;
- *Improve human competencies* by enabling networks of knowledge collaboration across time zones, geographical and organisational boundaries; and
- *Safeguard Sasol Technology's knowledge* against loss and irresponsible application.

Actively managing knowledge within the organisation is a means to stimulate cultural change and innovation by encouraging the free flow of ideas. It all starts with realising the benefits. As they are clearly stated, management development, leadership and focused groups must open up dialogue, instil corporate values and stimulate cultural change to begin to realise these benefits (Garvin, 2000, p. 125).

4.7 Training

SKM argue that it is important for employees or users to be aware of the KM technologies available and what people can expect (functionality) from them. An employee who is trained is better able to participate and benefit from these systems. They become more aware of correct practices and proper procedures for basic tasks. The training may also build the employee's confidence as they will have a stronger understanding of the systems and understand their responsibilities or roles better. They need to be trained in the tools they are expected to use to do their work (Sasol Intranet, 2010).

SKM have put forward the following points to familiarise employees and to "advertise" the technologies and concept of KM (Sasol Intranet, 2010):

- Users must be made aware that CoP and a wiki has been created. What they can find on it and what role it will play in their lives must be made known.
- The Site Owner, Manager and Coordinator must be trained in CoP technology and their leadership or support role in CoP
- Users must be trained in CoP and when to use it

- It is suggested that CoP or Wiki is part of new employee induction.

To address these points, SKM have developed CoP training material to cater for all the stakeholders. The training material ensures consistency in the presentation of the training and naturally in the information being distributed in this regard. A major advantage is that all the training information on skills, processes, and other information necessary to perform the tasks is together in one place. Training manuals will support the training objectives (Sasol Intranet, 2010).

SKM have developed help files which are easily accessible and contain relevant, up-to-date help. The help files are a documentation component of a software program that explains the features of the program and helps the user understand its capabilities.

For ongoing training purposes, the CoP forum is mandated to provide continuous support and distribute best practices. These best practices are methods or techniques that have consistently shown results superior to those achieved by other means, and that is used as a benchmark. In addition, a "best" practice can evolve to become better as improvements are discovered (Sasol Intranet, 2010).

To keep employees aware and alerted, promotional banners or links of CoPs are inserted on various main user sites e.g. Sasol Intranet, Line Management Tool, etc. The intent is to bring the awareness of the user or employee back to the CoPs (Sasol Intranet, 2010).

As these training interventions may seem adequate, there are however a couple more tiers and points of access which are not covered sufficiently in terms of training. The role of KM consultants and Business Owners must also be defined (Oosthuizen, 2013).

According to the Knowledge Online Wiki site (Sastech Wiki, 2010), the KM consultant will for the CoP do the following:

- Provide the necessary training for stakeholders
- Communicate (self or via business owner) general “launch” awareness mail to all users explaining purpose of site and how to use it.
- Communicate specifically to topic owners and subject matter experts regarding their roles and provide necessary support in getting them started
- Continuously communicate to users about new features and best practices
- Continuously support leader, coordinators and subject matter experts in their specific roles

The Business Owners are those individuals who have decision making abilities and are responsible for successful business operations. It is expected of them to (Sastech Wiki, 2010):

- Make time available for training themselves, management and employees.

- Ensure that new employee induction includes training and awareness of the site.
- Continue to communicate importance and purpose of the COP
- Continue to find ways to embed the COP or wiki use within the work processes and culture of the group.

In an interview with the Sastech Knowledge Manager (Oosthuizen, 2013), he said that employees cannot be expected to simply logon to a site and be proficient without training. “Although the sites are specifically designed to be user friendly and easy, there still needs to be some orientation training. We must address the behaviours that drive the results. By modifying the behaviours used in the workplace, the results change. This also increases the ability to provide the on-the-job coaching necessary for overall performance improvement” he said.

4.8 LiveLink

Most enterprises employ a number of document libraries but strive to deploy a single repository for documents. In reality, this is unlikely due to geographical limitations or historical values and so a number of document bases will most likely exist. This of course limits the value of a corporate knowledge library (Jenkins, et al., 2005).

At Sasol, group governance has positioned both ECM (enterprise content management) and SAP technology in the document management space. The ECM system supports collaborative work while SAP caters for business process documents like invoices, contracts, etc. This separation posed some difficulty for Sasol in deciding what belongs in which system (Jenkins, et al., 2005).

A single enterprise portal called the SAP Enterprise Portal was established as the primary user interface for all significant applications, information streams and collaboration initiatives within Sasol. It is however still considered unsuccessful as many disparate systems exist through which access to information is obtained e.g. Intranet, wiki, Livelink, SharePoint. These are essentially 3 different sites (Jenkins, et al., 2005).

Sasol was one of the earliest adopters of Livelink (Botha, 2006). Livelink is a web-based system that indexes the content of an organisation’s unstructured information. Document formats like MS Word, MS Excel and PDF documents are just some of the document types that can be managed by Livelink.

Additional capabilities are available via optional and third party modules and include things like Records Management, Imaging Solutions, Contract Management and integrations with leading applications like SAP and Sharepoint. Sasol makes use of the additional capabilities all of which are fully integrated into the organisation.

In 2004, OpenText acquired German based IXOS AG, which consolidated with Livelink records management and collaboration solutions (content from SAP, Lotus Notes, Microsoft SharePoint and Outlook). The long term preservation of knowledge created through collaboration activities was used to ensure business continuity within organisations (Dobbin, 2004).

The Sastech Knowledge Management and the Sastech IM team acted in response to the technology considerations by opting for Livelink Document Management. This meant that the Livelink Document Management Module, Communities Module and Wiki Modules formed the integrated solution for content and site administration which addressed all the important technology considerations (Sastech Wiki, 2010).

Sasol developed the Livelink database structure such that it is scalable and indexable. That is, a filing structure that has a logical filing hierarchy which can easily be expanded to include any form of expansion. This structure is referred to by Sasol as the Enterprise structure (Oosthuizen, 2013).

Access to Livelink in Sasol is a problem due to business unit's licensing decisions. In fact, a lack of Sasol group governance has resulted in a number of document management and alternative collaboration systems being approved in Sasol. Most of these are technically inferior to Livelink or simply difficult to integrate with other systems (Oosthuizen, 2013). As a result, not all people in Sasol can access the Livelink system due to these licensing issues. The problem then is that Sasol have businesses which are isolated from the enterprise filing structure on Livelink.

SKM insist that if Sasol do not do a good job in designing the enterprise information architecture (not the IT but the information), then some business unit solutions will end up as islands of information and knowledge. The consequence would be that these islands will be difficult to access and to maintain.

Aspects such as the corporate look and feel, templates and documents (content types) are some of the aspects referred to. These are thought to be huge concerns as no-one in Group IM was integrating or aligning the various EDMS and KM business members to develop such information architecture philosophy for Sasol (Sasol Intranet, 2010).

Sastech Knowledge Management are still negotiating and influencing a number of Livelink support improvement initiatives on Group level (Sastech Wiki, 2010). Improvement to indexing, searches and new functionalities are some of their successes.

4.8.1 What is Knowledge Online?

Knowledge Online (KOL) is a folder structure within Livelink. The front-end consists of pages and applications to present and put data or relationships into context (see Figure 4.8.1: Sasol Knowledge

Online). SKM see Knowledge Online as a source of actionable and relevant knowledge documents. An interface that allows employees to effectively search and retrieve knowledge documents from a well-governed, permission controlled location in the Livelink document management system (Sastech Wiki, 2010).

Sasol Technology (Sastech) is mandated to ensure that Sasol's technology advantages are optimised and maximised for the benefit of all Sasol businesses. It manages Sasol's research and development, technology management and innovation, engineering services and project management portfolios. Sasol Technology plays a vital role in enabling Sasol's growth and sustainability as it directs, acquires, commercialises, installs and optimises technology for the group (Sasol Limited, 2012).

This overload of data makes knowledge management increasingly more important (Quast, 2012). SKM created Knowledge Online in 2003 in an attempt to have a well governed, trusted, secure and "one version of the truth" Knowledge Document repository for Sasol Technology. Knowledge Online is positioned as the official workspace in which the documented knowledge of Sasol Technology is hosted, managed and safeguarded (Sastech Wiki, 2010).
To date, there are more than 55 000 documents within Knowledge Online. This includes the following document types:

- All Research related documents e.g. Reports, Memo's, etc. These documents are permission controlled.
- All Work Methods – ASAM (accounting standards and authorisation management), QM'Ss, internal rules, etc.
- All Sasol Specifications, Standard Drawings, Border Files, etc.
- All Contracts and Agreements which are permission controlled
- Business Intelligence reports and News Briefs

According to SKM (Sasol Intranet, 2010) Knowledge Online knowledge documents are:

- Verified as correct and relevant
- Actionable (usable)
- Safeguarded against loss, unauthorised access and wrongful exploitation
- Easily accessible and retrievable through browsing, searching and custom views
- Knowledge Online is designed to outlive the functional structures and ownership changes that may result in a large number of knowledge documents being lost or hidden away in local functional or personal folders/databases
- Knowledge Online content administration is done by the KM Function to free up business capacity. This makes it more cost effective because the admin staff free up valuable time of the engineers and scientists.

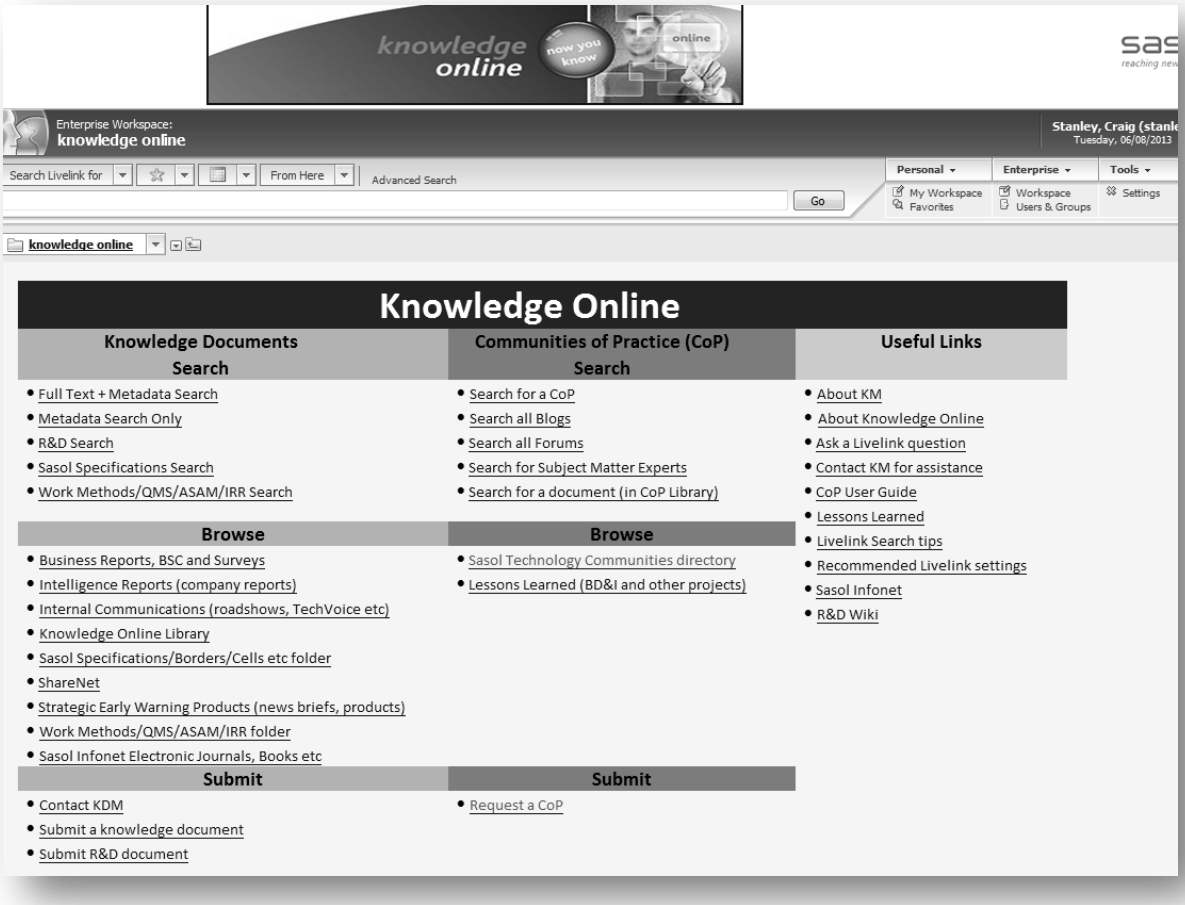

Figure 4.8.1: Sasol Knowledge Online home page

Information is retrievable from Knowledge Online through browsing or search functionalities. When browsing, the user can navigate through the folder structure to get to the documents required. Knowledge Online Library consists of folder structures and allows one to scan through a number of documents at once (Sastech Wiki, 2010).

When using the searching functionality, Knowledge Online has different search screens for searching of content. There are namely three different search screens that search specific types of documents. The first is the Contract Search which searches for contract documents. The second is the Quick Search which searches across all folders in Knowledge Online. The third search option is the R&D Search. This search has the ability to search for specific documents across all folders of Knowledge Online. Typical examples for this search include research reports, pilot plant reports, journal publications, etc. (Sastech Wiki, 2010).

Although the essence of this (or any) site lies in the design of the back-end filing structure, there are more considerations that were taken into account. They are listed as follows:

- There is a consistent visual appearance across all sections of the intranet

- The intranet has a clear and effective brand identity
- The visual design of the intranet is clearly distinguished from the public website
- There is a clean and effective page layout
- Page length is appropriate for context
- Fonts are appropriate and legible
- Graphics are used appropriately to support content
- Page weight is appropriate for the connection speed of staff
- Page layouts display correctly at all relevant resolutions
- Page layouts, design and coding are accessible for impaired and disabled users
- Pages can be printed
- Pop-up windows are used appropriately

It is these aspects and this depth of consideration which has an impact on whether or not sites or even systems are optimally utilised. Furthermore it is necessary to incorporate custom layouts for each user group to personalise or establish a sense of ownership. An example is to have pre-defined searches (Sastech Wiki, 2010).

SKM are equipped with the necessary expertise and know-how to develop such sites and administer them effectively (Oosthuizen, 2013).

4.9 Sastech Wiki

The Livelink Wiki Module was one of the modules not approved by Sastech IM (information management) Department (Sasol Intranet, 2010). Users in dire need of a Wiki technology then opted for DokuWiki which is being piloted in the Sastech Research and Development Department.

DokuWiki is Open Source wiki software that doesn't require a database. It is simple to use and highly versatile software, especially the large number of plug-ins it can be integrated with. This software also comes with built in access control lists which makes administration very easy (Gohr, 2013).

The DokuWiki software was maintained and supported by Sastech R&D scientists but this was later migrated to a server which is supported by Sasol IT Support Group (Oosthuizen, 2013).

The Wiki search capability is not integrated with Livelink due to the current filing structure. It links to wiki pages which are embedded and presented primarily on the CoP pages. This is to facilitate quick access to the wiki content (Sastech Wiki, 2010).

The format of this site is certainly simple and resembles that of the popular Wikipedia. It is evident that these pages require minimal user training and help functionality.

Notable is the banner on the top of the page bearing the important notice. It warns anyone with access to these pages to consider intellectual property as they may contain sensitive information. This notice is based on one of the major concerns relating to security and information protection, which is elaborated on later in this chapter.

SKM are trying to get all their current policies, procedures and interfaces for ISO 9000 Quality System moved to a Wiki environment. The Quality System is actually referred to as a BMS (business management system) in Sasol Technology. This is not progressing well although SKM are continuing to advocate this without much success in Sasol Technology (Sastech Wiki, 2010).

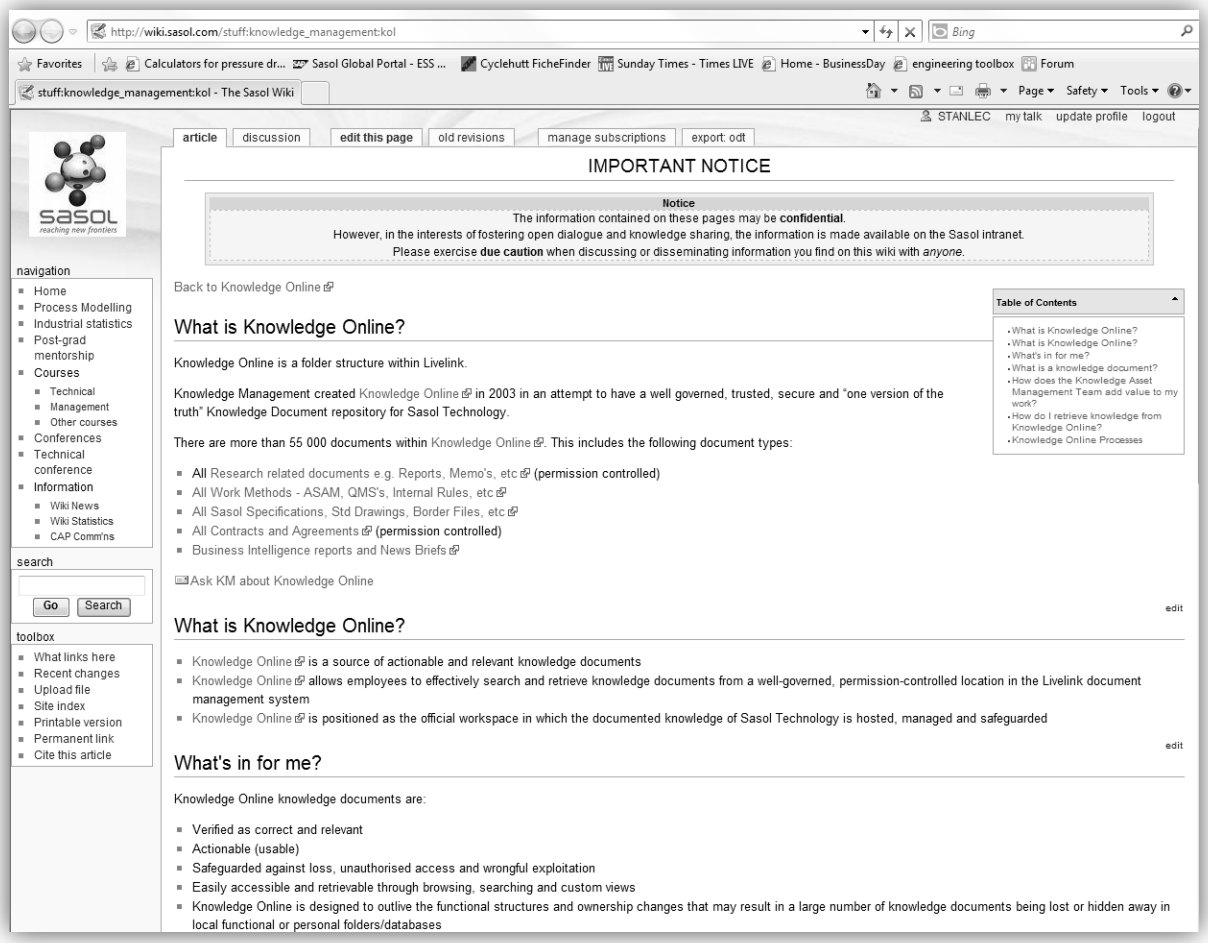

Figure 4.9.1: Sastech Wiki Page (Sastech Wiki, 2010)

Another division of Sasol called Sasol Polymers have started to investigate a similar course of action. A Sasol Polymers group developed a strategy for an easily accessible "knowledge source". Also, they implemented blogging sites which they called communities of practice. The idea was to get conversation going around key areas of the business. This is elaborated on more in section 4.11. A point to be made is however the implementation arguably showed better success than was seen in Sastech. The reason

was one main crucial attribute. That attribute was that their senior management was driving it and demonstrating the correct behaviour (Oosthuizen, 2013).

4.10 Community of Practice

Over the last decade, Sasol have been exploring a few approaches to successful collaboration. Individual business units are also trying to find ways to test solutions to the challenge of how to effectively collaborate (Oosthuizen, 2009).

As a result, different solutions with varying degrees of success have been initiated among business units. It may well be construed as a lack of governance, but an example where standalone systems originated is the implementation of a software solution called Sharepoint (Oosthuizen, 2009).

A project team requested a means to access data from outside of Sasol. The risk was that if anyone from outside accessed this source, they may well have access to Sasol IP (intellectual property). The Sasol IM department then proposed a Sharepoint interface which had its own filing system and allowed for remote access. It would be a standalone system, totally separated from the rest of Sasol's "knowledge". The project team could then copy information into and out of that directory and in such manner share information safely.

This worked well. In fact, a number of other business units liked the facility and had their own systems implemented. The result is a scenario where the knowledge systems across businesses are not integrated. Also, the technology has size limitations and the development and maintenance is a lengthy and specific skill demanding task. After six months of trying, the KM team still has not been able to get the same functionality visual appeal in a SharePoint CoP site compared to a Livelink CoP site (Oosthuizen, 2013).

The Livelink CoP modules were eventually implemented in 2007. It was found that the integrated content solution provided by Livelink addressed all the important considerations as defined by Sastech Knowledge Management as referred to in the sections above (Sasol Intranet, 2010).

SKM have a clear understanding of what defines a CoP and what is required to make it work. They argue that useful and relevant content is a very important element of successful collaboration. Users need to be able to find what they are looking for quickly and easily, and what they find must be useful. It is therefore necessary to offer a user alternative ways to find content i.e. by navigation (browsing), search and direct links (URL, Shortcuts) from menus and custom graphics (Sasol Intranet, 2010).

SKM defines the following as important considerations for collaboration content (Sastech Wiki, 2010):

- Useful and relevant topics and content: Users want content that is relevant and useful to them. The content must relate to their current accountabilities and tasks.
- Clear descriptions of topics: For “topic driven” items such as Blogs and Forums, ensure the item descriptions are well defined and states clearly what topic or subject matter is covered (and not covered) in each item. If it is not clear, users will either not make a contribution or contribute in wrong area.
- Limit topics and complexity: With “topic driven” items such as Blogs and Forums, it is necessary to limit the topics on the CoP. This is to lower the (perceived) complexity of the CoP for the new users.
- Correct tool or item for the content: Although any form of capturing and sharing is better than none, there are IT items or objects that are better suited to enable certain user needs than others. Selecting the wrong tool can create a negative user sentiment and hamper user adoption. The general guideline for IT item or content types is described below
- Be flexible with content management: Be flexible and allow for changes in items and to move content around. New CoPs and groups will take some time to structure and optimise their topics and content. Good scoping and planning can however shorten this period.

SKM have made major advancements over the last three years in the way they scope prospective CoPs (Oosthuizen, 2013). The CoP scoping and framing methodology both establishes if a real need for the CoP exists and permits common understanding of what will be implemented. This scoping phase is normally completed in no longer than two to three hours.

The scoping and framing phase of CoP establishment aids the business owner to (Sastech Wiki, 2010):

1. Clearly define the objective and purpose (value add) of the CoP and CoP site
2. Clearly identify the useful and relevant topics
3. Define clear item or topic descriptions
4. Identify topic owners
5. Identify supporting subject matter experts
6. Define interest groups and how they will be made aware or subscribed to topics
7. Identify the useful information and knowledge resources or useful links relevant to that group.

Sastech Knowledge Management uses the CoP scoping information to create the topics and use the correct IT item to enable the collaboration. Choosing the correct IT item to enable the collaboration is important and the following IT types are used in general (Sastech Wiki, 2010):

- **Blog**: An item primarily used as a one way communication tool for general newsletters and news communiqués. Users can comment on post (default = allow comments) but this is not the IT item to use for brain storming or for major debates. Blogs are “topic” specific and thus require proper scoping of the topic or description. One can “syndicate” blog content from one CoP into another

CoP and as such follow other CoP's conversations. Users can voluntary subscribe to topics or be automatically subscribed by the CoP coordinator. It is currently difficult to move content between Blogs.

- **Forum**: Primarily used for discussions, brainstorming, debates, suggestions, proposal and asking or answering questions. It can be moderated (default = not). Forums are "topic" specific and thus require a proper topic or description. Forums content cannot be syndicated into other CoP's. Users can freely subscribe to topics or be automatically subscribed by CoP coordinator. It is however possible to move content between Forums.
- **FAQ** (Frequently asked Questions): A Livelink specific item used to construct frequently asked questions and answers sets. Users can subscribe to FAQ's.
- **Q&A** (Questions and Answers): Also a Livelink specific item to ask and receive questions. A Q&A can be used to build FAQ's. This more often confuses users as one can ask question in a Forum as well. The Knowledge Management Group feel that it is best to limit the use of Q&A items.
- **User Profile and Expert tags**: Items in which a user profile is created with picture and expertise areas. A short user profile is shown wherever a user has made a contribution.
- **Library**: This is normal folder in which documents and other items can be created and managed.
- **Wiki**: The best description is a "collaborative WordPad". It is used to define or describe items such as processes, concepts, methodologies, definitions, etc. A wiki page presents an alternative to writing a concept in a Word document, switching on the document track changes, and sending it around for stakeholders to comment on. Someone defines the concept in a wiki page, informs the people about it (posting it on the Forum / Blog) and then invites stakeholders to add/change the content (if they have permission). One can see the final version or any of the previous versions and also who made what changes. The Wiki is not yet available in Livelink.

The scoping is aimed at concisely explaining or defining the purpose of the community. It is the means to determine the basis of the decisions made by the requesting group for why the community exists, what problems are which the group will address and what the members will achieve by joining (Sastech Wiki, 2010).

All the CoP scoping information is gathered to configure a site which offers the users quick access to relevant knowledge in the form of forums, documents, blogs and wikis. The sites aim to encourage collaboration points and give users access to subject matter experts (Oosthuizen, 2013).

SKM found it crucial to the success of building a community to address four challenges. These included (Knowledge Online, 2013):

1. Management Challenges:
    a. Find a well-respected community member to coordinate the community.
    b. Focus on topics important to the business and community members.
    c. Make sure people have time and encouragement to participate.

   d. Build on the core values of the organisation.
2. Community challenges:
   a. Build personal relationships among community members.
   b. Get key thought leaders involved.
   c. Develop an active (passionate) core group.
   d. Create forums for thinking together as well as systems for sharing information.
3. The third factor is the technical challenge. It must be easy to contribute and access the community's knowledge and practices.
4. The last critical factor is identified as the personal challenge. That is to create real dialogue about cutting edge issues.

These items are those which SKM focuses on resolving when developing CoP. Specific problems are tackled with definitive solutions rather than to completely overhaul the full span of challenges.

Explicit focus on strategic execution as the driver of technology configurations reconciles many of the above problems. The evolving paradigm of technology architectures to on-demand plug-and-play inter-enterprise business process networks is expected to facilitate future realisation of KM value networks (Gurteen, 2012).

4.11 Polymers Knowledge Management

Polymers Knowledge Management (as it is currently known) is probably the newest and most up-and-coming initiative in the knowledge retention arena for Sasol. Although still in the early phases of development and implementation, the team responsible have gained remarkable progress within one short year of initiation (Oosthuizen, 2013).

Figure 4.11.1: Polymers Knowledge Management Site

Driven and sponsored by the Sasol Polymers General Manager, the advancements behind the Polymers Knowledge Management Site are wielded by a governing team. The team members mainly comprise of IM, Business Intelligence and Communications related employees. At this stage, all initiatives and solutions are generated and managed internally (van Wyk, 2013).

The governance team is divided into two focus areas charged with providing facilities to capture, store and enable searchable information of all sorts. The first is the Projects Group which focuses on new initiatives, roll-outs and development. Examples of the latest initiatives are the PolyPedia (Wiki) and MySite. MySite is a “Facebook” type of site.

The second group within the governing team is the Maintenance Group. They focus on resolving problems, licensing and the general running of the implemented systems (van Wyk, 2013).

The Polymers Knowledge Management Site main page (Figure 4.11.1) appears clean and easy to navigate. It is not littered with news briefs, thousands of links and flashing media. It has a search function and a couple of menu type options on the top of the page.

The site has three main areas of navigation which are the three main areas upon which the “system” is based. Access (or links) to all three of these areas is possible from the main page. The star type navigation interface in the middle of the page resembles a knowledge tree (see Figure 4.11.2). This is the first of the three areas classified as the Polymers Processes and Systems. This area contains links to a host of information, reports and general information (Sasol Polymers, 2013).

Figure 4.11.2: Expanded view of the star type navigation

Also part of the Polymers Processes and Systems area is The Sasol Polymer’s Way Survival e-Guide. This link is the Dr Paul Lemur character which is the personality used to popularise and communicate the Polymers Knowledge Management Site. Clicking on the character link launches a virtual booklet which can be paged like at real book. The book can be browsed and the contents on each page are live links to the topic material (Sasol Polymers, 2013).

This interface is a solution to overcome the almost impossible task of locating a plethora of information hidden across multiple platforms. The novelty of using a virtual book is also new to most and in itself incentive for people to give it a try (van Wyk, 2013).

The second area is the Controlled Documents area. This area can be accessed via the blue triangle on the top left side of the main page. This link (once clicked) reveals a hierarchical pyramid of categorised documents like procedures, policies and the likes (van Wyk, 2013).

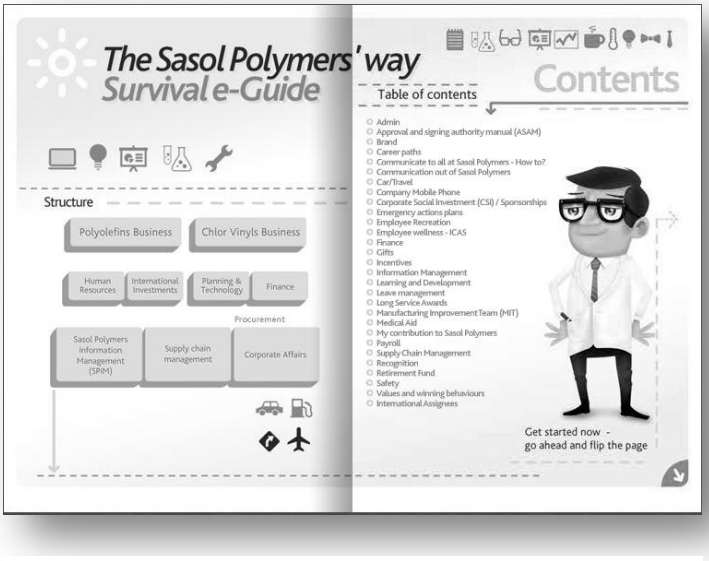

Figure 4.11.3: The Sasol Polymer’s way

Links to PolyPedia and conversations form the third area upon which the Polymers Knowledge Management System is based. These are where users are able to store tacit knowledge relating to a wide range of topics (van Wyk, 2013).

MySite as a corporate social tool also forms part of this area. It is essentially a “Face book” technology which allows users to have a personal wall which is visible to others within the organisation (access permitting).

In addition to the collaboration technologies, the Polymers Knowledge Management Site has a facility available for people to save information like steady state trends, documents of interest, tools or articles. In fact it can be anything that is seen as valuable or useful to others. This manages to capture those documents which engineers would typically store on their laptops and which others may not normally have access to (van Wyk, 2013).

The measurement tools and reports for the Site are not yet at a stage where actual contributions or rates of activity are accurately measured. That being said, the amount of interest and the sense of curiosity (from the Sasol Polythene plant in particular) indicate that there is a need and willingness to share. Conversation topics and newly captured information sprout almost irrepressibly from all nooks of the site (van Wyk, 2013).

At this stage, none of the Polymers Knowledge Management Site tools are moderated or administrated. The principle is much the same as Wikipedia on the internet. It is managed by users in that the topics (articles) can be edited by anyone. This may well be necessary when the system matures and the rate of participation requires it (van Wyk, 2013).

4.12 KM performance measures

As Odom put it, “Winning is fun; in order to win you have to keep score, and the way you keep score defines the game” (Odom & Starns, 2003). This is with reference to measuring the performance of a KM system. This system is typically expected to contribute to the goals of an enterprise while enhancing the performance (and satisfaction) of each user.

It has already been established that Knowledge management performance within an organisation must be measured against the knowledge management strategy adopted. To do this, SKM have adopted the Balanced Scorecard as a strategic control tool, which is quite famous all around the world. Its principle objective is to articulate planning decisions with control narratives using non-financial indicators (Knowledge Online, 2013).

Measurable elements within that strategy, such as participation in knowledge-sharing on CoPs, may be included in a balanced scorecard to arrive at a measure of knowledge management performance. An indispensable fact is that these elements must be customised and relevant to the organisation (Odom & Starns, 2003).

The balanced score card consists of four main handles. The first is the belief that a fundamental cause for strategic success has to do with people. Innovation and creativity of people provide a source for long term competitiveness. It is believed that every other aspect of an organisation can be duplicated by

others (Odom & Starns, 2003). These measures are hinged around how a learning culture prevails, fostered both by formal and informal learning and by abundant internal communication in all media.

The balanced score card's second measure is the aspect of a learning and growing organisation. This is measured through analysis of training data, increased relevant collaboration activity and surveys. This allows management to assess the potential for long term success.

SKM appreciate that improved processes save time and ameliorate performance, then this explains the third aspect of the balanced score card which measures throughput by focusing on customer satisfaction (Knowledge Online, 2013).

Finally, improved customer satisfaction leads to loyal customers. This happens in terms of technology robustness, ease of use and adequate training (among others). Loyal stakeholders in the case of KM at Sasol could imply patron participation and therefore growth. It is ultimately growth which any organisation strives for. Growth within KM can be interpreted as the maturity of the organisation and also "growth" into a learning culture.

In terms of these points, the SKM Group along with management and other functions have formulated reports covering these measures. They are not cast in stone but must be continually adapted (and therefore adaptable) to add real value for all the facets of KM (Oosthuizen, 2013).

The potential success of a functional area for CoPs is measured by CoP Consultants according to three elements. These elements are therefore used to determine or measure the growth of a CoP (Sastech Wiki, 2010):

1. The Subject Matter Experts (SMEs) must be identified for the CoP. They also need to be active and will need to lend value to the CoP.
2. CoP must operate as a Portal (to documents and resources). A CoP home page should be configured as a main knowledge portal. All the documents and resources required to do work must be hosted in the CoP site. The interface should have links to relevant resources inside and or external to the CoP and they should be visible from the CoP home page for easy access.
3. Collaboration:
    a. Blogs – Blogs identified, created and auto-subscriptions enabled. Meaningful blog contributions in the form of blog posts and comments should be evident.
    b. Forums – Forums identified, created and auto-subscriptions enabled. Meaningful forums discussions in the form of (topics and replies) should be evident.

The developmental stages of a CoP and how it is performing in relation to guideline criteria, purpose and objectives are measured according to three categories. These are struggling, developing and achieving potential.

A CoP classified as struggling implies that there is little or no meaningful activity. In other words, some or all of the elements are not met. None of the elements are utilised to an acceptable degree. An example is when the contributions are deemed irrelevant to the CoP like birthday wishes or having no bearing to the topics (Oosthuizen, 2013).

A developing CoP has at least three of the above mentioned elements utilised. It is achieving potential or its maturity state when all three of the elements of a Knowledge Community are met for a CoP. SMEs must be identified and defined. CoP created as a Portal. Activity level relates to members of a CoP. Meaningful knowledge contributions are evident on a three monthly weighted average.

Important to note is that although the guidelines and classification criteria is clear, CoPs are in fact treated on a case by case basis. The KM Consultants use a review process in addition to the criteria to determine the success of the CoP (Sastech Wiki, 2010).

It is particularly important for a CoP to achieve its purpose and objectives. There are instances where SMEs do not need to be defined for the CoP to achieve potential.

The value of a KM CoP Consultant is to analyse all these elements on a 3 month weighted period.
A CoP should be constant for 3 months in achieving its purpose, objectives and meaningful contributions. “This is not necessarily ideal. We will need to lengthen the periods to get a more realistic average.” as Oosthuizen explains (Oosthuizen, 2013). He (Oosthuizen) says that there are “slower” periods like December and January and “busy” periods toward financial year end which skew the measures. The experts should never-the-less in most cases be active to be deemed as achieving potential.

To ensure the objectives of the sites (e.g. improvement / development of people / creating a centre of excellence, etc) are achieved, management must measure progress and performance. The measurement must be used to define and drive corrective measures (Sastech Wiki, 2010). The important measurement considerations are:

- KM Consultants and Coordinators are to measure short and medium term objectives set during the CoP scoping session
- KM Consultants and Coordinators must measure CoP contributions of management, subject matter experts and members.
- Management must measure if the site is achieving its purpose and intention. This measurement is defined using the information and analysis provided by the KM Consultant and Coordinators.
- Corrective actions must be identified, assigned to responsible parties and driven to completion.

SKM has developed a report to extract all CoP contributions and other statistics. These statistics can be (and are) formulated to derive any phenomenon which the analyser may be interested in. Table 4.12.1 below contains two columns of criteria which are produced from the CoP statistical report (SKM, 2013).

Table 4.12.1: SKM Group CoP report statistics (SKM, 2013)

DataID	Total # Forum Topic Contributors
Community Name	Total # Forum Replies Contributors
Community Type	Total # Blogs
Date Created	Total # Blog Posts
Owned by	Total # Blog Comments
Community Properties	Total # Blog Posts & Comments
Total # Community Members	Total # Blog Posts Contributors
Total # of contributors	Total # Blog Comment Contributors
Total # Forums	Total # FAQ
Total # Forum Topics	Total # FAQ Entries
Total # Forum Replies	Total # FAQ Contributors
Total # Forum Topics & Replies	

Typically, the recorded data is used to

- Analyse CoPs entries to identify problems or opportunities
- Develop recommendations which are communicated to the Business Owner
- Meet regularly with the Business Owners to agree on corrective actions, timelines and responsibilities
- Provide high level coordination of corrective actions

Several standard reports are generated on a monthly basis based on site statistics. These reports are available to anyone, although accessible from the Knowledge Online Site or from the Livelink file browsing interface. The standard reports are listed in Table 4.12.2.

Table 4.12.2: Sastech KM standard CoP statistical analysis reports (SKM, 2013)

COP - Forum Activities per Community per Month
COP - Blog Activities per Community per Month
COP - FAQ Activities per Community per Month
COP - Popular Posts per Month
COP - Library Activities per Community per Month

COP - Library Activities per Community Detail per Month
COP - Summary Roll Count
COP - Newly Added Communities per Month
COP - Expert Tags per Community
COP - Deleted objects in KOL Communities per Month
COP - Moved objects in KOL Communities per Month

The business owners are expected to account for the site success and drive corrective actions within their teams. This can be facilitated through participation and commitment to the management report and the agenda. They must use these tools to identify improvement actions and drive them to completion (Oosthuizen, 2009).

Another important management measure done by Sastech is that of knowledge management strategic intent and its overall success. The achievements will be measured as follows (Oosthuizen, 2009):

- Periodic surveys testing business area perception and various levels of the organisation.
- The monthly measurement by the Knowledge Management Function of Key Result Areas, as defined by the annual Knowledge Management Strategy, and reporting results in the Sasol Technology's Balance Scorecard and the Knowledge Management detailed Balance Scorecard.
- Specific case KM reviews or assessments on business areas by the Knowledge Management Function. These audits are performed using audit criteria relating to the knowledge management principles as prescribed by the SKM Group.
- Business area reports measuring and reporting on KM within their respective business areas

Some aspects of the strategy, such as the attitude toward knowledge sharing, may not be easily quantifiable because they are based on subjective judgment. These types of measures are achieved by staff surveys or questionnaires (Oosthuizen, 2013).

The result computed by means of a balanced scorecard may give an indication of the successful implementation of a knowledge management strategy, and progress may be indicated by an increase in the score over time. As knowledge management objectives evolve over time, the knowledge management performance measure must be adapted to changes in corporate strategy (Sastech Wiki, 2010).

Quantifiable measures of knowledge management performance may include a wide range of measures. The Sasol Technology Knowledge Functions refer to the number of knowledge-sharing communities arising, the number of topics discussed on collaborative sites, the number of staff ideas deemed to be useful or the level of awareness of knowledge management strategies among the staff of the organisation (Sastech Wiki, 2010).

Management of knowledge from external sources can be measured by the number of reports or entries to the knowledge database from staff attending seminars and conferences, the amount of knowledge-sharing links with outside organisations or the amount of knowledge sharing resulting from examination of trade journals or specialist websites (Sastech Wiki, 2010).

SKM profess that the measurement of knowledge management performance could be made more results-oriented. This could be done by quantifying the number of best practices identified, the number of suggestions resulting in improvements to processes or the contributions that have led to securing new business. These are the types of statistics and information that can be found in the strategy discussions and in some of the KM Function reports (Sastech Wiki, 2010).

4.13 Collaboration Challenges

The Sastech Knowledge Management Group Leader made an article available to his team on how Fluor as an engineering company, embedded KM. He noted that their point of departure for KM within Sasol was the same. That is, many of the points discussed in the article are in fact embedded within the current community and document management methodologies.

By way of the KM blogging site, the KM Leader requested his team to peruse the article and to respond on why they believe the existing system does not work as well as expected.

The team members followed different approaches in a pursuit to best answer the question. It was as though each was determined to find that special ingredient missing from a perfect recipe. Some arranged interviews while others sought after literature (Knowledge Online, 2013).

The responses that were submitted seem to encompass all the crucial aspects. This can be deduced because the same items could be found in pretty much every one of the responses. One respondent in particular listed these items as the following (Tsiloane, 2013)

1. Engineers need information at their fingertips. If the source is not fast, trustworthy and active, they pick up the phone and phone an expert.
2. If the tool does not work the first time, they do not use it.
3. Some old school thinking exists in the culture. Some people are not used to using such platforms and don’t seem interested either.
4. Engineers are very busy and want instant answers. If the response time is slow or tedious, they will use another medium
5. Expert and colleague listings are not assigned to specific owners in Sasol Technology and therefore not easily maintained. The data on the system is sometimes very outdated. It should be linked to individual and line manager level for changes in a unified format.

6. Engineers are finding other ways to collaborate. An example is a weekly technical forum which is captured on camera and distributed for viewing. Sessions are recorded on Podcasts on Livelink.
7. The “Renaissance Project” which is aimed at getting people on to one domain has recently kicked off. Sasol Technology is tasked to match the best platform and migrate to a standardised format which could be Sharepoint, Jumla, Jive or Livelink.
8. Ineffective tools for collaboration. That refers to the restraints around collaboration due to the fact that there is not a standardised and shared global platform.
9. Difficult to navigate and no search facility. The search functionality is of particular importance and cause for frustration.

Prior to the above enquiry, Sastech Knowledge Management made a white paper available which (among other things) has listed all the collaboration problems. The table lists the impact on users and also the company for every one of the problem items. See Table 4.13.1: Collaboration Problems for a summation of these items.

Although this list may seem extensive or a lost cause for KM in Sasol, it instead shows that knowledge is being pro-actively managed. Lisa Quast (2012) argues that proactive management of this sort can help companies step-up their chances of success. It helps by facilitating decision-making, building learning environments by making learning routine, and stimulating cultural change and innovation.

Table 4.13.1: Collaboration Problems (Knowledge Online, 2013)

Problem	Impact on user	Impact on the company
Knowledge resides in many systems. Various systems for same “object type” and/or all knowledge “item types” are not in “one system”.	Difficult to search, find and retrieve knowledge. Need to be proficient in multiple IT tools. Problematic system and content access (license and permissions). Not sure what knowledge is available (re-invent the wheel/same mistakes) Users not sure which system to use.	Multiple (duplicate) licensing costs. Multiple systems admin and support cost. Middleware / integration cost. Maintain multiple permission profiles.
Irrelevant / out dated / many versions of knowledge	Risk of using outdated version. Many results (overload) but mostly useless (time / frustration).	Cost to host mostly outdated content.
Obligation to continuously share learning and use knowledge are not embedded in	Not sure what or how to share (except for documents and training sessions).	Slower: competency development, continuous improvement, excellence

process, rewards and culture	Creates perception that it is not important (for management). I don't because I am not rewarded. It's not part of my job. It's not part of our team culture (to share outside of the team). I don't have the time. Considered stupid if I ask.	Higher: costs, incidents, repeated mistakes, Lower: customer satisfaction, employee engagement, employee satisfaction,
Attempts to make knowledge capturing and sharing part of process/reward/culture and thwarted by technology enablers	Multiple knowledge systems. Vast amounts of useless data. Cannot share with all Sasol. Cannot share with global Sasol employees.	Slower: competency development, continuous improvement, excellence Higher: costs, incidents, repeated mistakes, Lower: customer satisfaction, employee engagement, employee satisfaction,
Attempts to enable collaboration with technology are thwarted by lack of user IT skills / training. +50% of users inadequately trained in Livelink (collaboration technology)	Cannot share knowledge Cannot find knowledge	Slower: competency development, continuous improvement, excellence Higher: costs, incidents, repeated mistakes, Lower: customer satisfaction, employee engagement, employee satisfaction,
Attempts to enable collaboration with technology are thwarted inadequate IT infrastructure investment and priority support. **Knowledge collaboration is not regarded as "strategic" priority/system (lack of Group Executive support / Group Ownership).**	Avoids use of collaboration technology (Livelink in Sasol Technology); unreliable, slow, no Sasol wide access, no Global access. Business owners (KM, Site owners) frustrated with slow / inadequate y skilled IT support.	Slower: competency development, continuous improvement, excellence Higher: costs, incidents, repeated mistakes, Lower: customer satisfaction, employee engagement, employee satisfaction,
Attempts to enable collaboration across BU's are foiled by lack of Sasol content management standards across BU's (Lack of Group "Business" Owner for Collaboration and Content Management)	Vast amounts of useless data in multiple systems. Cannot share with all Sasol. Cannot share with global Sasol employees.	Multiple BU "unique" standards; system duplication and proliferation, duplication of design and roll out efforts, lack of enterprise (Sasol Global) integration. If no Group standard, IM compelled to address BU "unique" standard.

		Multiple systems for same “object type”; Forum/Doc in Livelink, SharePoint, SAP, Joomla, Risk in: IP, data loss, compliance to record retention. Duplication in “operational” costs and “centres of excellence”.
Lack of experience or skill in collaboration creates Sasol Collaboration leadership gap. “Don't know what you don't know” results in difficulty to create vision and set Sasol wide standard.	Early adaptors and visionaries and new generation users are frustrated and held back by laggards who control the decision / investment decisions.	Lagging as “learning organisation” which is an essential element in becoming a “global technology” company

A risk which is not listed among the challenges but which SKM have raised is intellectual property. They argue that with every new employee joining the business, Sasol stands a real risk of small groups going outside of the firewall and discussing sensitive issues in the public domain. This risk is more prevalent as Sasol deploys employees globally. As Oosthuizen (Oosthuizen, 2013) put it, “The threat of discussing sensitive information on a global platform is real if we do not provide them with a Sasol wide enterprise social business platform.”

Managing these challenges by implementing (knowledge management) systems will help companies re-write the old saying, “Change is inevitable, growth is optional” to “Change is inevitable, growth is *intentional*” (Quast, 2012).

4.14 Critical success factors

From the previous sections, it is clear that IT alone is not enough for successful knowledge management systems and implementation thereof. Although the technologies play a fundamental part, they are really the means to enablement or a platform to support the goals (Knowledge Online, 2013).

Effective CoPs, and knowledge management (KM) in general, provides purposeful opportunities to organisations. This has been established many times over. There are also many factors identified in research findings that have varying influences on the successes of organisational KM integration and practices.

Sasol Technology has identified a number of critical success factors for successful KM within Sasol. These are based on the experiences gained from a number of years in trying to get KM adopted into the organisation. It is worth mentioning that these factors are not finite, nor absolute. They are likely to vary

and mature as the organisation advances toward a more collaborative and KM driven culture (Sasol Intranet, 2010).

People accountability is the first notable point. It is a wide scope and includes a number of factors. It involves essentially two aspects; the first is the development of organisational and social structure which supports learning in the enterprise. Similarly, but not quite the same is the establishment of an organisational culture which supports knowledge sharing in the enterprise (Sasol Intranet, 2010).

SKM (Sastech Knowledge Management) state that organisations are dynamic and complex social systems. The changing means of interaction combined with the continually changing work demands presents a challenge to the “knowledge facilitators” and site members alike. It is understood that the social system effectiveness within the organisation is not considered only through business activities and performance, but through a combination of business activities and learning (Sasol Intranet, 2010).

SKM insist that it must be very clear to all stakeholders involved in CoPs and Wiki sites what their respective accountabilities are. Sastech KM team have listed the stakeholder groups to include (Sasol Intranet, 2010):

- Business Management (Management Support)
- Technology support (Technology Selection and Design)
- Employees / members / users
- KM team

Business owners are the single most important consideration for successful adoption. Sasol Technology has accredited all the Wikis and successful CoP stories to their respective manager support. In affirmation of this, Sastech KM Team claim that CoPs fail quickly due to the absence of manager support (Sasol Intranet, 2010).

It is on the back of this point that it is considered that business managers and next tier managers must publically support the sites or initiatives. This means that they must continuously communicate the intent (purpose) and value (importance) of this. Employees do not change their behaviour if it is not supported and encouraged by management (Knowledge Online, 2013).

Business managers (and next tier managers) are expected to personally demonstrate their commitment by actively being involved in the KM sites. There are a handful of individuals who understand this and are enlightened such that they regularly post and communicate on the KM sites. These are the most successful sites because the entire organisational functions use them to communicate, discuss, share and collaborate (Sasol Intranet, 2010).

They (managers) must ensure that their own employment contract including their subordinate contracts are updated to measure site contributions. The standard Sasol employee pipeline contract already requires contribution to knowledge capturing and sharing. It is simply a matter of putting measurement manoeuvres in place to effectively measure the performance areas (Sastech Wiki, 2010).

Another critical requirement identified by SKM for CoP (and Wiki) success is that the business managers must ensure the sites actually fit in with the group's functions or performance measure (balance scorecard). That is, to make certain that the site objectives or intent is part of the team function. This measurement will also help management and employees alike to focus on activities important to site access (Knowledge Online, 2013).

To address the management support challenges, the SKM Group has developed a guideline for managers and employees to update their performance contracts. Each of the pipeline contracts have generic references to elements such as knowledge capturing, sharing and building functional excellence (or centres of excellence). With having the knowledge management sites, it becomes easy for management to define the measurable "job specific measures" for pipeline contracts. (Knowledge Online, 2013). An example is to demonstrate through leadership on a specific subject, like optimal P&ID (Piping and Instrumentation Diagram) control on CoP or Wiki.

To make statistics available, SKM have made use of the collaboration technology's reporting functions. These reports or statistics include member participation and contributions on a per month basis. This makes it easy for management to include it into their basic score card performance reporting (Sasol Intranet, 2010).

SMEs (Subject Matter Expert) or Topic Owners must ensure that they understand their roles and responsibilities too. SMEs must be contracted to contribute and answer questions in their field of expertise. Their contracts must include job specific measure and they must take responsibility as leaders (Knowledge Online, 2013).

The organisation's KM Group must ensure that they are contracted to each CoP. That is, that they govern and maintain the sites. It also means that a member must monitor the sites to make sure that problems are speedily sorted, requests are responded to quickly and that sites are continually adapted where necessary to ensure member's continued ease of use (Knowledge Online, 2013).

The CoP scoping template created and used by the SKM Group assists with defining where the various items and topics will be used (context). This already gives good indications where the items fit into the business process. The SKM Group also has the technical skills to provide the technical support to link to content and create searches to improve retrieval of relevant topic specific knowledge (Knowledge Online, 2013).

4.15 Interview Questions

As describe in the previous chapter, interview questions were compiled to help in establishing the construct validity of the research method. That is, to help in determining if the theoretical construct of the research is measuring what it is expected to be measuring.

Table 4.15.1: Interview CategorisationTable 4.15.1 presents the key findings which emerged from the interviews. The qualitative process described in the design section has been applied to the interview answers. The inductive analysis approach reveals the general themes which are shown in the third column of the table. These themes are used in the analysis of the results to gain understanding of the data found and shall be further discussed in the next chapter.

Pseudonyms are used to ensure participant confidentiality. A summary of the interviews is attached as Appendix 5: Contact Summary. Each question has each answer prefixed with a number which corresponds to the same person in every question. For example, “A1” refers to the answer recorded from Participant 1 in each of the questions.

Table 4.15.1: Interview Categorisation

Question		Participant answers summary	Key words
1. Where would you go to access lessons learnt, best practices or expert advice within the Sasol domain.	**A1:**	Knowledge Online & directly to experts and my network.	Experts, Knowledge Online, Find Knowledge Owner, Unaware, Livelink, R&D, Managers, Specifications, Difficult to access, Own networks, No central place
	A2:	Usually find the knowledge owner to determine where data is stored. Search on Livelink. In the IM domain I find that a lot of knowledge is undocumented	
	A3:	Know How on ESS	
	A4:	R&D, SME’s, project leaders, managers	
	A5:	I would go to the Sastech page that covers the Sasol specifications of my field and go to the Sasol specifications.	
	A6:	I would find out who the expert is and phone him/her or send them an email.	

	A7:	If there is one (CoP) that exists then I am definitely not aware of it! It is indeed very difficult to access lessons learnt (if in fact they do exist somewhere), the benefit of such would be great though. Best practices, I usually refer to the Sasol specs first. Expert advice – here again not sure if it exists somewhere. I usually rely on my own network of contacts to track down an expert to provide advice in whatever area I am looking into.	
	A8:	Livelink which contains specifications, guidelines and CoPs. A new knowledge portal exists but I rarely use it since it isn't up to date. Information regarding projects, investigations and technology is also found on the shared server.	
	A9:	In our business the aim is that all will go to the Knowledge Management portal for lessons learnt, still a very new system and still in the development stage.	
	A10:	Knowledge Online.	
	A11:	Sasol Polymers Knowledge Portal - Instead of recreating information we reference to current process/system put in place. E.g. MOC data or PDA outcomes	
	A12:	There is no central place in Sasol. Sastech attempted to create a Lessons Learned Report library in Livelink area of Knowledge Online. For communities or functional expertise, there are also no places. Their info is scattered across Livelink and the web, and lately in SharePoint. One can obtain expertise via a known expert – but you have to know who the expert is.	
	A1:	No	

2a. Based on the definition (of a learning organisation), would you agree that Sasol could be considered as a learning organisation?	**A2:**	Yes	Primarily yes to being a learning organisation, Lack ability to transfer knowledge effectively, Transfer medium lacking.
	A3:	Sasol gives you the facilities but the systems are difficult to understand and find.	
	A4:	It could certainly be, looking at the high technology being applied in the group. However, I am not sure if a map of knowledge repositories within a company, accessible by all, exists in the group. Linked to expert directories to enable knowledge seekers to reach the experts and if it is properly managed and if all potential users are aware of it.	
		Inter-project knowledge transfer - keep in mind that proximity & architecture (the physical situation of employees) can be either conducive or obstructive to knowledge sharing.	
	A5:	Not fully. Sasol does not have the ability to transfer knowledge in a structured way.	
	A6:	Yes	
	A7:	Based purely on the definition above, I would say NO. We are particularly lacking in the transfer of knowledge from those learned individuals that exit our business and take away with them years of valuable experience, that have not been transferred to other younger individuals. I have experienced this myself. What to me is lacking, is a proper “transfer medium”. Maybe we need to find the best way in which knowledge could be transferred, and then this may not be such an issue. But it definitely creates a gap when the experienced individual leaves. Another gap would be modifying	

		behaviour to reflect new knowledge and insight. This usually takes a long time, if at all!	
	A8:	I don't think the definition holds true for the entire organisation, although from my experience I have seen some attributes of a learning organisation implemented at varying degrees.	
	A9:	Absolutely, Sasol can be considered a learning organisation	
	A10:	50% of the time	
	A11:	Yes, although we have rigid information silos that has its own challenges	
	A12:	We create, acquire and transfer knowledge. We are just not skilled as an organisation doing this at a low level of excellence	
2b. Do you consider your co-workers to be predominantly knowledge-sharers or knowledge-hoarders?	**A1:**	50/50	Have a culture of sharing, mostly knowledge sharers, hoarders prominent, give only when asked
	A2:	Knowledge hoarders	
	A3:	90% sharers	
	A4:	No. The sharing of knowledge constitutes a major challenge in the field of knowledge management because some employees tend to resist sharing their knowledge with the rest of the organisation. Technology constitutes only one of the many factors that affect the sharing of knowledge in organisations, such as organisational culture, trust, and incentives	
	A5:	I would go with knowledge-sharers	
	A6:	I think most people will not have a problem to share their knowledge. The people just need to start using the KM system to share their knowledge.	

	A7:	I consider my co-workers to be predominantly knowledge sharers. We have created a culture within our technical groups (across Vinyls) to share new information that comes our way so that it could benefit everyone. I also have not had an issue with Production personnel regarding knowledge sharing. This isn't a major issue in our environment. However, as always considering continuous improvement this could be worked on.	
	A8:	Knowledge sharers	
	A9:	Knowledge hoarders - that is then the reason for the portal	
	A10:	In Sasol Technology: Yes. Less in other B.U.'s	
	A11:	Predominantly sharers. Hoarding comes with time without having moderation on the system. We have a star rating system to grade the quality of information.	
	A12:	The culture is sharing – a recent survey showed an 85% perception of open sharing. But on asking more questions one find the culture as being "share when asked". Thus they do not share freely, but will give you needed info when needed. The survey also showed that there is an undertone on knowledge is power, as Sastech is about consultants that are rewarded for their expertise.	
2c. What motivates individuals to contribute their knowledge to a KM system?	**A1:**	Acknowledged experts, building a knowledgebase for all, make critical content easy to find	Acknowledged experts, finding critical content, management, relevant insight,
	A2:	Usually by management order. It depends on the type of information, ease of use of the system, user training. Change management is often neglected	

		with the implementation of a KM system	acknowledgement, included in performance agreement, change way we communicate
	A3:	Just motivation from management.	
	A4:	Managing business environments and allowing employees to obtain relevant insights and ideas appropriate to their work. Solving intractable or wicked problems and managing intellectual capital and intellectual assets in the workforce by the expertise and know how possessed by key individuals. Acknowledgment of a task well done, more complex projects, etc.	
	A5:	I would say the need to improve the whole team's understanding of the items being shared, but there will be people that share information to market themselves in their environment.	
	A6:	If people understand what value it adds to the company, it will motivate them to contribute.	
	A7:	Motivation is key to most things. Somehow this has been a challenge in our business, individuals tend to be de-motivated and this stunts their behaviours. It would be important to get their buy-in to the KM system, and make them understand and see the benefits of it, maybe then they would be more keen or willing to participate. I think that in an environment where knowledge sharing is entrenched or the "usual", this may not be so challenging as in others.	
	A8:	Motivation may be personal fulfilment- some individuals enjoy sharing knowledge and developing others. Knowledge sharing may also be a	

		requirement in the individual's performance agreement.	
	A9:	At the moment we are still promoting this, however the fact that it is easy to access is a very big plus point for us	
	A10:	This is the problem: a lot of time and effort goes into this "creating awareness" of the advantages. Possibly better results if it forms part of ones KPA	
	A11:	Structure information: Topic/Problem based forums and meetings that generate information into systems such as Meridium. Little KM motivation required. Tacit knowledge: Starting conversations on forums rather than emails. Again, little KM motivation. Mostly a paradigm shift on method of communication	
	A12:	Very little motivation exists. Performance contracts require sharing, but this is not rated during evaluation – doing the work is higher priority than improving / learning (self and others). Those that go the extra mile are not acknowledged.	
3. What, in your opinion, are the critical success factors of the communities of practice at Sasol	**A1:**	Leaders setting example, Technology platform, easy to use, changeover of generations some people will not change easily so good change management and good case for change.	Leadership example, technology, ease of use, change management, willingness to share, sufficient support structures, common goal, governance,
	A2:	Willingness to share, no silo mentality, sufficient support structures and technology, a common goal for all participants	
	A3:	I can't really say.	
	A4:	Governance, visibility, intranet, etc.	
	A5:	The factors are: · Clear defined boundaries of what	

		aspects the community covers. · A governing body of senior community members. · Events to share information and interact with fellow community members. · A tool or system to record and retain information and to make this information easily accessible by the whole community. · Senior community members to keep the tool or system topics up to date and accurate.	visibility, senior member participation, proper tools.
	A6:	Important knowledge and experience are not lost when people leave. Less time is wasted on doing the same things that people have already done, tried and tested before.	
	A7:	Definitely as mentioned structure is extremely important. I am aware of COP's within Sasol, but do not actively participate or use them, except in dire need. There needs to be visibility, accessibility, and once momentum is gained in getting the COP kicked off, it needs to be maintained in order to be successful and value-adding. This is lacking. Usually the early introductory stages are energetic (typical), but this doesn't seem to be sustainable. Sasol COP's need to be more interactive, perhaps have sessions or workshops to keep people engaged and enlightened on new developments, etc. At the moment, they have been formed, but I fail to see the true benefits.	

	A8:	The existence of the CoP must be known to all who may use or contribute to it (especially true for new starts in the organisation). It should also be easily accessible to all and user friendly. Subject matter experts who are willing to contribute should be identified and possibly incentivised/dedicated to do so.	
	A9:	Well defined structures	
	A10:	The drive should come from the top: from Top Management's buy in. This is not the case.	
	A11:	I do not know of an active CoP in Polymers that is currently beneficial or key to success to the business.	
	A12:	A clear purpose, good senior management support, stable technology, integrated with work process, part of personal contract, training / support for members, part of management review BSC and unit strategic discussion, acknowledgement and communication of success stories	
4. Would you say that Sasol uses KM to provide strategic advantage?	**A1:**	Not yet but emerging awareness is there	Mostly not using KM (yet), moving in this direction, great possible benefit, GTL as proof
	A2:	Not yet – but the move is in the right direction.	
	A3:	We learn from our mistakes	
	A4:	I should think so but I am not too sure how it is managed, communicated and how visible it is.	
	A5:	No, not in all of its environments. The Operations environment can have a great benefit from a system like this.	
	A6:	Yes	
	A7:	Definitely not. Not right now any way, and not in our business.	
	A8:	No- the tacit knowledge of the individuals may provide strategic advantage, but not	

		the knowledge management system.	
	A9:	No.	
	A10:	Sasol should : but this is not the case	
	A11:	No but might be the outcome. In Polymers our main focus is direct benefits. Some examples could be, to reduce replication of errors, idea generation and capture historical problem finding	
	A12:	Yes, but we can achieve so much more if we excel in KM. GTL technology and other successes reflect knowledge management at work in the past – we just got left behind and others got better at KM than Sasol. We are 13 years behind in this practice.	
5a. In your opinion, would you agree that Sasol succeeds in applying new knowledge?	**A1:**	Uncertain of this	Mostly yes but not well enough, innovation hampered by governance and processes, newsletters, R&D.
	A2:	Sometimes – innovation is often hampered by governance and processes	
	A3:	In our group, we do it for sure. Sasol communicates enough information in newsletters, factory general notices and so on.	
	A4:	I would think so. Studies are conducted before, during and after project implication, we have R&D researching complex projects etc.	
	A5:	Yes	
	A6:	Not yet – we still need to capture all the knowledge in the KM system.	
	A7:	This is a challenge and not a success area. Something new is always ”feared” and that could be why this is a struggle to introduce new things and apply it	
	A8:	Yes	
	A9:	Yes	

	A10:	Infonet (ex Library) continually feeds through latest trends, ideas, etc. As far as Technology is concerned, most certainly Sasol applies new knowledge	
	A11:	Almost all of our knowledge is from analysis being applied to the company's activities.	
	A12:	Yes, but at low levels	
5b. How often do you form part of a Community of Practice to transfer knowledge?	**A1:**	Often	Generally not often
	A2:	Not often	
	A3:	never	
	A4:	Before, during and after projects. Ops (operations) studies, etc.	
	A5:	Not currently.	
	A6:	Hardly ever	
	A7:	Not at all	
	A8:	Not often	
	A9:	never	
	A10:	Weekly	
	A11:	I am a taking part but the CoP has not added any value in my opinion	
	A12:	All day and every day – for my own function and helping others to get going in COP's	
6a. What in your opinion are the strengths and shortfalls of the KM system at Sasol?	**A1:**	KM system in Sasol Technology not always supported by leadership because of lots of change in leadership over two years	Leadership do not support, too many systems - not well thought through, mind-set change required, a lot of information available, KM not fully utilised, still new to many,
	A2:	Strengths: The sheer amount of knowledge available is astounding, correct use and management of this can be ground breaking for taking the company forward	
		Shortfalls: there are too many systems and versions, archiving is not handled properly, there are many different views and definitions of knowledge management and what it really is, KM is	

		not just the storage of data, There needs to be a mind-set change in the correct use of systems and the sharing of knowledge,	lack in operations
	A3:	I am not part of a community and cannot answer this.	
	A4:	The intranet and internet is available, procedures in place, etc.	
	A5:	Strengths would be:	
		· Diverse inputs.	
		· Focuses on issues important to the business.	
		· Set high management expectations.	
		Weaknesses would be:	
		· To establish realistic community goals and deliverables.	
		· Governance falls on the way side once there is pressure to complete a task on a tight deadline.	
	A6:	It is still a new KM system and not familiar to everybody so it is not being well-used as yet.	
	A7:	Management expectations may be high, and all things need management support to be successful. We are not good at this at CV. Implementations of plans are a shortfall. Perhaps not thoroughly and properly thought through.	
	A8:	Knowledge management is not utilised fully in the operations environment (shortfall). It is not something that is actively encouraged and engrained into the culture of the organisation	
	A9:	A strength will be to focus on important issues however my feeling is that we spend too much time on it and then lose focus. Goals and deliverables is a very good positive for the Business.	

		Sometimes the feeling is that management expectations are just too impossible to achieve. SHORTFALL : Governance, I do feel that is not adhered to as it changes too often, and more than often systems/governances are so complex that in practice it just cannot work. Keep it simply should be the number one rule.	
	A10:	The strength is most certainly the sterling KM team in Sasol Technology. The shortfall is that the buy in should be filtered down from top-management of the organisation. This is sadly not so. KM's mandate should be more visible. Incentives should be part and parcel of the KM system until fully imbedded.	
	A11:	It is pushed upon users instead of lured into. Sasol's strategy is to enforce it by adding it to your performance contract which might only work on a small portion of workers. In Polymers we have a different approach.	
	A12:	Refer to the CoP principles listed before (given as part of the question) – they apply to KM in general.	
6b. How best to design and develop a collaboration system for Sasol?	**A1:**	Not able to answer this but standardisation of system and method from Group IM is critical	standardisation of systems, make it easy, single points of entry, too many legacy systems, blogs and wikis, performance agreement, training,
	A2:	Make it user friendly – create one single point of entry. There are too many legacy systems. Proper change management is crucial. Take some tips from Social media – needs to be closer to what users like and understand.	
	A3:	Blog or Wikipedia – if we have the appropriate training on how to use it.	
	A4:	If in place already ensure it is visible	

	A5:	It would be difficult to get a collaboration system in place if most people do not get involved. To get most of the currently employed personnel involved one would need to consider changing some aspects.	awareness.
		1. Would need to develop an information gathering system (possibly web page based), but information should be downloadable if needed offline.	
		2. Information / knowledge input into the system must be part of the employee's performance agreement. (depending of the seniority of the employee in the specialist field should determine his / her level of input)	
		3. A dedicated system administrator who is a subject matter expert must be used to maintain and improve the collaboration system.	
	A6:	The KM system, as far as I know, has the facilities for a collaboration system – the people just need to be informed and trained to use it. Possibly small workshops need to be held (awareness sessions) where the system can be demonstrated and the opportunity allowed for people to "play" with it, and once they are familiar they will use it more.	
	A7:	Don't know.	
	A8:	Not sure.	
	A9:	This is one of the questions with two answers however my feeling is the latter part is the most important. 1. See what management want. 2. Speak to the people on the floor via MIT or sessions and see what they really want and need. That is the only time such	

		a massive system will work and be used.	
	A10:	Regrettably I do not have the expertise to supply a meaningful reply	
	A11:	Identify the different needs, get approval of senior managers, have a flexible or a wide range of technologies that will suit all the shapes of information. Small victories will keep employees interested and motivated.	
	A12:	IT has to come from the GEC (General Electoral Committee) as new way to do work, supported by global IT technology platform that has yet to be decided on since 2009.	

Further insight and interpretation shall be done in the following chapter. It is however worth pointing out that the interviews that were conducted were done with a relatively small sample of participants. Nevertheless, these participants make up a large population in terms of the business units they represent.

At first glance, it is easy to recognise that the key words taken from the participants may be familiar in terms of the literature study of this research. This may well be an instance of where theory meets reality.

4.16 Conclusion

From the early beginnings of Sasol, the need for knowledge management spawned alone with the developments of new technologies and facilities. Although it never propagated into full swing, many man hours have been devoted to this goal. This is evident in the amount of literature, procedures and application of world standards which this research has established.

The integration of available knowledge management technologies, concepts and methods into organisational business processes is a challenge. From the literature it is clear that the strategic intent

drives the total collection of knowledge and intellectual value that resides in people, documented knowledge and knowledge in information technology.

The integration of KM into organisational processes leads to improved performance. These improved organisational processes produce intermediate outcomes such as better decisions, organisational behaviours, products, services and relationships. This can then ultimately be considered to be the competitive advantage which the global market place demands from organisations such as Sasol.

Actively managing knowledge can help companies increase their chances of success by facilitating decision-making, building learning environments by making learning routine, and stimulating cultural change and innovation (Quast, 2012). This is understood by most but the challenges and critical success factors around achieving this were discussed as part of the findings. Simply put, it does not appear to be easy to implement.

Many best practices and challenges were discussed in this chapter. The interviews found supporting evidence of the complexities of knowledge management integration. Knowledge management systems don't so much fail but rather they fail to meet their potential (Babcock, 2004).

The next chapter shall provide insight and interpretation of the empirical findings and compare these to the literature study material. Based on the findings, recommendations shall be made followed by the concluding arguments in the last chapter.

CHAPTER 5: RESULT DISCUSSION AND INTERPRETATION

5.1 Introduction

The previous chapter is a presentation of the results of both secondary and primary data findings. The primary data was captured in the form of interview questions which were designed to measure specific criteria as set out in the empirical design.

As a qualitative approach for the primary data analysis was an inductive one, the data was summarised and key phrases taken as to identify common attributes as well as capturing the essence of the results for further analysis.

The secondary data was obtained from numerous sources and publications within Sasol. These information sources consisted of reports, surveys, Sasol Intranet publications and the like, which were necessary for this research.

This chapter presents the analysis of the key findings that have emerged from the research data described. Each of the research aims forms a section in this chapter. The data results are analysed under each of these sections and the essential assertion offered as evidence to that aim.

5.1.1 Employees awareness and opinion on knowledge sharing

Question 1 is directed at determining how the participants attempt to access information within the Sasol domain. The responses highlight the level of participant knowledge sharing awareness.

Questions 2a and 2b test whether participants consider Sasol to be a learning organisation and if co-workers can be considered knowledge sharers or hoarders. Responses to these questions are aimed at testing the opinion of the participants.
Question 5b draws a quantitative measure of how much time individuals spend on a KM system. This is not limited to any specific technology but rather tests whether individuals knowingly or actively participate. This shall be used to validate whether those who are aware and support KM, actually do so.

Based on the all the responses to Question 1, it is clear that there is no common or sole location for knowledge seekers to access information within Sasol. This is concluded based on the differences in approach each of the participants described where they would go to search for information. This is confirmed by Participant 12 who stated there is no central place in Sasol but also added that for communities or functional expertise, there is no central place either.

Out of the twelve participants who were interviewed, only 2 (<17%) had little to no idea about knowledge sharing. These respondents would either look for information on ESS (Employee Self Service) which is

an HR tool or search through Sasol Specifications Documents. Although these sources are indeed sources of information, they do not demonstrate the awareness of knowledge sharing or systems.

The majority of the participants (75%) mentioned sources like Sastech KOL, Livelink, CoPs, KM portal, etc. This result shows not only the awareness of KM and knowledge sharing systems, but also the major repositories and tools available in Sasol. If employees are aware of the KM systems, it is necessary to determine the perceived extent of this awareness in terms of benefits. Question 2a asks the participants if they believe Sasol to be a learning organisation.
An overwhelming 10 out of 12 participants (83%) confirm that Sasol is indeed a learning organisation (Question 2a). This is based on Garvin's definition (2000:51) of a learning organisation being an organisation skilled in creating, acquiring, and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insight.

Question 2b results coincide with the results of Question 2a, as 9 (75%) participants consider their co-workers to be knowledge sharers. This is consistent because a learning organisation (according to the given definition) requires that employees must want to share information. These results prove this to be the case.

It is taken into account that the participants for this research originate from different businesses. The learning processes or practices are often unique to businesses or even groups within businesses. They must match a specific need and be a reasonable fit within the existing organisational culture (Fillip, 2009).

This means that the participants are not necessarily representative of the business in which they work. For that to be tested accurately, a far larger sample per business is required with specific sampling criteria. For the purposes of this study, these results shall suffice as an indication of the business being represented.

Participation is tested by Question 5b which examined how many individuals knowingly and deliberately participate on a CoP to transfer knowledge. Actual participation is a method to verify the extent of awareness. From the sample, 6 participants (50%) claimed to be involved to varying degrees. This indicates that 60% of those who named KM system have or are in fact using the systems.

In summary, the results of the questions reveal that employees are mostly aware and supportive of the KM systems in Sasol. Among this small sample, 7 (seven) different sources and systems were identified. The overall opinion is in favour of knowledge management. This is based on 60% of the sample actually participating or contributing. The favourable opinion of KM is supported by the findings that co-workers are seen as knowledge sharers and Sasol as a learning organisation.

Interestingly, Participant 12 reported on a recent survey conducted on Sastech by Sastech Knowledge Management. The findings showed an 85% perception of open sharing. However, on further questioning it was found that the culture was “share when asked”. This means that they do not share freely, but will give information when requested. This has a close correlation to the 75% result obtained from this research sample which is smaller and more geographically spread.

5.1.2 How Sasol’s KM strategy supports organisational processes, individual learning, collective learning and collaborative decision making

Both Questions 3 and 6a are the critical success factors which are expected to highlight the shortcomings of the Sasol KM system.

One of the objectives of KM is to provide a competitive and strategic advantage. Question 4 tests the participants whether Sasol uses KM to provide strategic advantage.

Strategic advantage is possible when employees are able to benefit from captured knowledge to enable new opportunities. Question 5a tested if the participants concurred with the idea that Sasol succeeds in applying new knowledge.

Question 6b examined what criteria the participants would use to design and develop a collaboration system for Sasol. The expectation is that the participants will consider their own environment along with the existing systems in place and suggest alternatives. This could result in repetition of the critical success factors listed as part of another question. The test however differs in that the participant is not bound to criticise the existing system but has an opportunity to suggest a new technology.

The information obtained from Sasol (in the previous chapter) revealed that the strategic intent of the KM processes is to enable and accelerate continuous improvement. Also that it strives to ensure competency development of individuals, groups and the organisation as a whole (Sasol Intranet, 2010).

The strategy is achieved through capturing, sharing and safeguarding knowledge and using knowledge as a means to improve productivity and innovation (Sasol Intranet, 2010).

With reference to the responses to Question 1, 92% of participants named at least one captured, safeguarded and accessible information source such as KOL, LiveLink, Sastech repositories, etc. Given that the participants reside in different areas, each have different processes and needs. This may be a reason for the different knowledge sources named.

From a total of 10 questions posed to participants, there are 17 instances where the responses include a lack of awareness as a shortfall. From Question 3 alone (which asked for critical success factors), 4 responses (33%) explicitly stated that awareness and training is a shortfall.

This finding contradicts the previous finding which concludes that 75% of participants already use a KM system. With this being the case, the only explanation is that there are two forms of awareness. The first is the knowledge of the existence of a system, including limited use of its functionality. An example may be a document controller using LiveLink as a document management system only. No awareness of other or more advanced functionality.

The second awareness is to exploit additional functionality like searches and queries. Perhaps this may be a tool like KOL where users have one page providing a range of facilities like:

- Document storage and retrieval capabilities
- Search and query capabilities
- Discussion forums
- Auto generated mailing system triggered by documents containing key words
- Etc.

Being aware of a system but not benefiting from its functionality are two different things.
The secondary findings of this research include a section on training and awareness. SKM have listed a host of interventions to aid awareness. Amongst others, it is a Sasol documented requirement for new employees to undergo training and awareness of KM systems as part of their induction (Sastech Wiki, 2010).

The understanding and commitment success of new recruits after induction training is not specifically measured. If at least a third of the sample group specified awareness as a KM system shortfall, then this gap needs to be addressed.

The Sastech Knowledge Manager responded to this by saying that indeed employees cannot be expected to simply logon to a site and be proficient without training. “Although the sites are specifically designed to be user friendly and easy, there still needs to be some orientation training. We must address the behaviours that drive the results” he said (Oosthuizen, 2013).

SKM keep employees aware and alerted by using promotional banners or links to CoPs which are inserted on various main user sites e.g. Sasol Intranet, Line Management Tool, etc. The intent is to bring the awareness of the user or employee back to the CoPs (Sasol Intranet, 2010).

Question 3 tested what participants consider to be critical success factors for communities of practice. Six (6) participants (50%) cited governance or proper structure as critical success factors. Participant 5

stated that a clear boundary of what aspects a community must cover is a requirement. This participant further stated that a governing body of senior community members is critical. Participant 7 concurred by stating that structure is extremely important but that this is lacking. Participant 9 identified well defined structures to be the only critical factor.

The implication of this finding is that although there are systems deployed and working, it is the degree of governance which is lacking. Governance refers to a body for the purpose of administering the KM systems.

A lack of governance implies a lack of order. If there is no order in the system, people using the systems will not benefit fully which leads to abandonment of the system. Total abandonment is certainly not the case as is proven in the previous section.

For organisation learning to take place, the KM strategy must sufficiently fit and support the businesses processes. Question 5a interrogated participants to determine if they agree that Sasol succeeds in applying new knowledge. The results show 75% of the participants claimed that Sasol succeeds in applying new knowledge. Not included in this total are two participants (Participant 1 and 6) of which one claimed “not yet” and the other was not sure. This leaves only one participant who answered negatively. This means that the greater part of the sample group can attest to Sasol benefitting from the Sasol KM system in spite of the shortcomings.

The basis of continuous improvement is a culture of learning and indeed, a culture of “learning from mistakes” (Bersin, 2012, p. 1). Question 4 tested this by asking if participants believe Sasol employees use KM for strategic advantage. Only 3 participants (25%) agreed that this is the case. The remaining 9 (75%) argued that Sasol would derive great benefit from practicing effective KM. This result establishes that while Sasol succeeds in learning from new knowledge, participants believe that Sasol does not provide KM for strategic advantage.

The objective is to determine how the Sasol KM strategy supports organisational processes and learning. Up to this point, a lack of system functionality awareness has been established. This indicates that users are not benefitting fully from the systems and procedures already in place.
A second finding is that users are experiencing a lack of system governance. In the context of lacking awareness, one could argue that users are bound to experience a lack in governance if they can’t make sense of how the system works. Perhaps this could to a large extend be resolved through training. SKM have a number of training and awareness strategies in place as is documented in this research.

The strengths and shortfalls of the Sasol KM systems are tested by Question 6a. These are listed in Table 5.1.1.

Strengths	Shortfalls
Sheer amount of available knowledge can be ground-breaking for company advancement	Not always / insufficiently supported by management (including top management)
Intranet and procedures which are in place	Lots of change in leadership over recent years
Diverse inputs	Too many systems and versions
Focus on issues important to the business	Realistic goals and deliverables must be established for communities
High management expectations	KM system is new so it is not well used yet
Goals and deliverables are good	Implementation plans are insufficient
Sastech Knowledge Management team	KM is not utilised fully in the operations environment
	KM is not engrained into the culture
	Governance is not adhered to because it changes too often and is too complex
	Participation incentives are required until fully embedded
	Pushed upon users instead of luring them (forced participation e.g. inclusion in KPAs)

Table 5.1.1: Summary of strengths and shortfalls

Management related issues are cited from a staggering 6 participants (50%). This problem was also identified by SKM and is listed in Table 4.13.1 as collaboration shortcomings. The impact on users as identified by SKM is that new generation users are frustrated and held back by laggards who control the investment decisions.

Actively managing knowledge within the organisation is a means to stimulate cultural change and innovation by encouraging the free flow of ideas. It all starts with realising the benefits. As they are clearly stated, management development, leadership and focused groups must open up dialogue, instil corporate values and stimulate cultural change to begin to realise these benefits (Garvin, 2000, p. 125).

Implementation shortfalls are also identified in 6 instances (50%) of participant responses. Naturally, with all the fine systems in place, a poor implementation execution just won't bring a system to its full potential. In this instance, the lack of awareness again plays a role. It seems un-reasonable to isolate implementation measures from user awareness. In other words, implementation of a system without training and awareness means the implementation is not done correctly. This was expressed by Participant 2 by stating that proper change management is crucial when developing a collaboration system (response to Question 6b).

In summary, the strategic intent of the KM process is to enable and accelerate continuous improvement. It also strives to ensure competency development of individuals, groups and the organisation as a whole. The latter is achieved by using knowledge as a means to improve productivity and innovation (Sasol Intranet, 2010).

Apart from effective performance measures having to coincide with an organisation's strategic objectives, it above all must be easily understood by all employees and should promote intended behaviour within the organisation. There is no prescriptive or unique solution to this problem (Minonne & Turner, 2009).

The benefits of KM in Sasol are being realised as is determined in this section. It is however the culture of continuous capturing, sharing and use of knowledge that helps to avoid making the same mistakes. It also improves the system processes and people skills of Sasol employees. This is how the Sasol KM strategy supports organisational processes and organisational learning.

5.1.3 The methods of knowledge sharing and knowledge transfer

Knowledge Management (KM) is traditionally technology driven because of the association with capturing unstructured information and making it accessible or even searchable to employees (Gurteen, 2012, p. 3).

It is however necessary to understand that CoPs are self-organising groups of people who share a common interest. This is essentially a network that is established to allow those with less expertise to contact SMEs (King, 2009). King (2009) further argues that such social processes are necessary. That is because while knowledge initially exists in the mind of an individual, for KM to be successful, knowledge must be transmitted through social groups, teams and networks.

Therefore, KM processes are quite people-intensive, and less technology-intensive than most people might believe. That is even though a modern knowledge-enabled enterprise must support KM with appropriate information and communications technology (King, 2009).

Responses to Question 1 and 6b produced a listing of 12 technologies or KM processes for knowledge sharing and transfer within Sasol KM. Seven of these are claimed to be used by this sample of participants.

- KOL
- Contact experts directly
- Personal networking
- Know How
- R&D, SMEs, Managers
- CoP
- LiveLink
- Polymers Knowledge Management Portal

- Sharepoint
- Sasol Intranet

Each of these has been extensively researched and documented in the literature review and the empirical results of this research.

Additional items referred to by Participant 3 for Question 6b are blogs and wikis. These are IT items to enable collaboration. A Blog for example is an item primarily used as a one way communication tool to comment on posts. They are “topic” specific.

A wiki is a page where someone defines a concept, informs the people about it (posting it on the Forum or Blog) and then invites stakeholders to add or change the content. The Wiki is not yet available in Livelink although some development has been done by SKM.

There are many more such technologies available at Sasol like forums, FAQs, Q&As, Libraries, and user profiles amongst others.

An entire section in the previous chapter is dedicated to LiveLink. This in brief, is a document management system which complies with the technology considerations set out in section 4.3. This system includes the Livelink Document Management Module, Communities Module and Wiki Module. These constitute the integrated solution for content and site administration and address all the important technology considerations (Sastech Wiki, 2010).

MySite is a new introduction to the Polymers environment. It is a corporate social tool which is integrated into many other KM systems as well as EMSs, LiveLink and SAP. It is essentially a “Face book” technology which allows users to have a personal wall which is visible to others within the organisation (access permitting). It is currently in the process of being developed by Sastech and Sasol Polymers.

The knowledge management system for Sasol Polymers is being developed within the Sasol Polymers environment. Although currently seen as another stand-alone solution, the governing team are working closely with SKM with the aim to integrate all Sasol systems as far as possible. The role out of the first phase of Sasol Polymers Knowledge Portal is complete which includes the migration of information from standalone sources into a proper LiveLink structure.

In correlation with the Polymers Knowledge Portal, the “Renaissance Project” which is aimed at getting people on one domain across Sasol, has recently kicked off. Sasol Technology is tasked to match the best platform and migrate to a standardised format which could be Sharepoint, Jumla, Jive or Livelink (Knowledge Online, 2013).

The selection of right technology is crucial to knowledge management practices and a means to enable effective knowledge management within an environment. This is identified by 3 participants and also documented by SKM. If the technology is not suited to the user and if it is not user friendly, it would not be used (Sasol Intranet, 2010).
As organisations become increasingly aware that knowledge is among their most valuable strategic assets, they will be forced to re-evaluate the way in which they engage with the source of that knowledge to underpin their sustainable development. This will create a fundamental change to established practice; a change that results in a paradigm shift from the traditional operational approach to a more strategic involvement in knowledge management (Minonne & Turner, 2009).

This is exactly the approach Sasol Polymers are taking. As van Wyk (2013), a developer of the KM system explains, the focus is on observations, findings and experiences that engineers want to capture. "We don't for example want people to access a Wiki and use a search result as part of a new design". He refers to this as a "pull" philosophy to get people to contribute rather than forcing them via a KPA approach.

Readily observable focus on strategic execution as the driver of technology configurations reconciles many of the problems and critical factors discussed in previous sections. The evolving paradigm of technology architectures to on-demand plug-and-play inter-enterprise business process networks is expected to facilitate future realisation of KM value networks (Gurteen, 2012).

5.1.4 Conditions employees will be motivated to share knowledge

Question 2c tested what would motivate individuals to contribute to their knowledge management system. The key phrases captured from the responses included the following:

- Acknowledged,
- Finding critical content,
- Management involvement,
- Awareness
- Relevant,
- Included in performance agreement (KPA),
- Change in the way we communicate

These points shall be interpreted and elaborated on to satisfy this objective. Responses to Questions 3, 5b, 6a and 6b provide supporting arguments as they are centred on the strengths and shortfall of the Sasol KM systems.

The first point in the above list refers to acknowledgement for contributions. This is cited from 4 participants (33%) as motivation to share. This mainly refers to rewards or remuneration for the “extra mile” people go beyond their normal functions. Participant 8 stated that motivation can come from personal fulfilment as some individuals enjoy sharing knowledge and developing others.

Fluor has come to the same conclusion when they found that a material rewarding system didn’t work (Will, 2008). People participated purely for the sake of benefiting from the reward, resulting in “garbage in”. Also, Will (2008) argues that from prior knowledge management efforts, peer to peer recognition is found to be more effective than financial incentives.

Participant 1 required the ability to find critical content as an incentive to use the KM technology. This is a core and fundamental intent for KM systems. It is documented in this research that Sastech Knowledge Management has listed such search capabilities as criteria for the adoption of technologies (Sastech Wiki, 2010). They state that the system must have good indexing and advanced search capabilities to retrieve all content or item types. For example, a search for “heat exchangers” yields results in documents, wiki pages, forums, blogs and experts relating to heat exchangers.

From a total of 120 responses that were documented from participants, 20 (16%) referred to management and leadership involvement as an essential motivation to actively contribute to KM systems. This is identified as a shortfall by 4 participants (33%) in response to Question 6a. This sentiment is supported by McDermott and Archibald (2010) who argue that the influence of managers on communities is intangible but strong, like in teams. The managers involved with communities must be engaged and active, otherwise the communities dwindle.

Of significance is that the CoPs work best if they have clear accountability and management oversight. Essentially, they address real problems for senior management. Simply put, CoPs are like teams but focused on the long term (Gallaugher, 2009).

The finding on awareness is covered in the first two sections of this chapter. Although 83% of the participants are using KM systems, there were still 4 responses (33%) which identify awareness and training to be a shortfall. Two participants required training (amongst other things) as motivation to contribute to the existing KM system.

Participant 1 and 4 responded to Question 4 stating that employees must be able to obtain information relevant and critically appropriate to their work. This raises the point that every employee may require information specific to their business or environment. As is documented in this research, almost every business unit in Sasol produces unique products, using unique processes and have staff which may be considered specialised to that type of business.

With this in mind, it can be none other than the employees of Sasol themselves that can make this a reality. It is the responsibility of each individual to make contributions to a system which in turn will enable the availability of critical and relevant information.

Nevertheless, SKM agree that useful and relevant content is a very important element of successful collaboration. Users need to be able to find what they are looking for quickly and easily, and what they find must be useful (Sasol Intranet, 2010).

Chapter 4 contains a process model developed by Sastech which describes the core processes and knowledge object relationships. The knowledge objects are essentially the four main practices of the knowledge management processes of which one is to ensure that the knowledge remains relevant, accessible and safeguarded (Sastech Wiki, 2010).

Performance contracts are those agreements put in place between the employee and line manager for the year. Merit ratings are done by evaluating the employee's performance against the agreed deliverables or KPAs (key performance areas). Three of the participants (25%) specified KM participation should be included as a KPA for employees. The literature study shows that this approach is necessary, but that it is not participation that adds value, rather contribution. Employees must not feel that they are forced to use a system for the sake of it.

The performance contracts requirement is directly related to management support discussed above. Participant 12 argues that there are indeed performance contracts which include KM participation. The reservation is that it doesn't carry as much weight as getting the job done. Doing the work has a higher priority than improving or learning oneself and others.

To address the management support challenges, the SKM has developed a guideline for managers and employees to update their performance contracts. Each of the pipeline contracts have generic references to elements such as knowledge capturing, sharing and building functional excellence included in them (Knowledge Online, 2013).

Participant 11 stated that a paradigm shift on methods of communication will motivate people to use the KM systems. This supports the opening paragraph in the first chapter by saying that people must accomplish the same tasks in less time to adapt to changing situations with greater flexibility and to become engineers of change themselves. In fact, SKM have identified (as a critical factor) that knowledge consultants must continually adapt where necessary to ensure member's on-going ease of system use (Knowledge Online, 2013). This also implies communication.

These changes and adaption are typically small and should be fairly easy. Examples are to use forums instead of e-mails, CoPs instead of phoning and internal wikis instead of browsing the internet.

5.2 Verification of results

Validity is accuracy with which a method measures what it is intended to measure whereas reliability is the consistency of the research findings (O'Connor & Gibson, 2000). So, to ensure reliability, diligent efforts and commitment was put into the consistency throughout all the steps of interviewing i.e. interview, transcribing and analysing of the findings.

Furthermore, the validation of this research was achieved through triangulation. This was possible by interviewing more than one person in a single business unit (2 instances) and confirming that the findings were dependable. This proved difficult as most of the questions drew on opinion and own experiences. However, Participant 7 and Participant 8 correlated their answers in three instances although not being interviewed at the same time.

A further method to triangulate the findings was to compare findings across different business units for categories which should be synonymous across Sasol. The identified technologies, some success factors and of course awareness of technologies were found common across business units.

The secondary data collected contained many instances of correlation with the primary data. The most prominent were the shortcomings and critical success factors listed on both fronts.

Another is the findings of a SKM survey which showed an 85% perception of open sharing across a large sample. A finding from the analysis of primary data in this chapter showed a 75% result for a similar test. This can be considered to be close correlation of the results and indeed verifies the finding.

It is on these grounds then that one proves triangulation in the research construct validity. The research information found from the literature study and empirical findings literature, are therefore validated by the findings produced by the responses taken from the interview questions. The specific purpose of the research questions were to help prove this key research attribute which seems to have been achieved.

5.3 Conclusion

Good research generates trustworthy data if the correct research designs are used to satisfy the research problem.

This chapter considered three sources of information captured in the previous chapters to provide discussions around the research aims. The literature study, primary and secondary research data each required particular research means to obtain the right collection of facts. Each of these sources was added to discuss the aims of the research question.

The significant findings were that people are aware of KM systems and technologies in Sasol. Some are being used by most of the sample group on an ongoing basis. However, this awareness is limited to certain items of KM systems but a full understanding is lacking.

As a likely result, people do not know how the systems are supposed to work and therefore fear using them (or more of them). The data revealed that a large percentage of people cite governance and management participation as lacking on these systems. When the analysis technique was applied across larger portions of data, it was found that these problems were really consequences of awareness.

The main motivators identified by the research participants to use the KM systems were incentives and management. The benefits and shortcomings of incentives were discussed but proven from literature to not be a good idea. People tend to participate purely for reward resulting in garbage capturing. Benefits were also discussed and compared to a more forceful approach like performance contracts. This is when individuals are required to contribute based on their KPAs and managed by line management.

The next and final chapter shall include the final conclusions to this research. The problem statement will be presented with findings to the aims of the problem statement.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 General Conclusion

A significant gap exists between the operations environment and SKM whom are seen to drive KM throughout Sasol. They (SKM) have gone to great lengths to document their knowledge but this knowledge seems limited to them.

Much effort is spent on KM awareness but the results clearly demonstrate that it is a major problem throughout Sasol. This is documented by SKM, it is repeatedly found in surveys and again proven in this research. Without proper awareness, much of the critical success factors they have documented cannot be realised. This includes management participation, isolated solutions, silo mentality, etc.

It may therefore be concluded that the specific research aims were met by the results presented and by the validation of data applied in the previous chapters. The recommendations which follow in this chapter may be worthy or desirable to Sasol if heeded.

6.2 Research Objectives

The aim of this research was to investigate the knowledge management phenomena and then to compare how Sasol as a whole creates new knowledge, disseminates it throughout the organisation, and embodies it into their systems.

It was necessary to critically evaluate Sasol on these terms, to understand how its KM strategy supports organisational processes involving innovation, individual learning, collective learning and collaborative decision making, in an organisation which prides itself on intellectual knowledge and innovation.

The research was done to present findings that could benefit Sasol as a whole. The findings could bring forth higher efficiency, better insights and increased understanding to the organisation if the current knowledge management integration level results are considered for its intention.

The specific objectives were:

- To determine the employee awareness and opinion of knowledge sharing
- To understand how Sasol KM strategy supports organisational processes, individual learning, collective learning and collaborative decision making
- The methods of knowledge sharing and knowledge transfer

- To establish under which conditions employees will be motivated to share knowledge.

The study revealed that employees are mostly aware and supportive of the KM systems in Sasol. Further investigation revealed that although some employees are active on the KM systems, around 75% of the sample cited awareness as a shortcoming.

This contradiction revealed that although the majority of the research sample was using aspects of the KM system, they were not aware of how to fully exploit the systems and also did not necessarily understand the benefits and advantages of those systems.

Sastech include knowledge management systems training as part of new recruit induction. This generally does not happen in any other business units. The understanding and commitment success of new recruits after induction training is not specifically measured. If at least a third of the sample group specified awareness as a KM system shortfall, then this gap needs to be addressed.

The Sasol KM systems support of the business processes was investigated by testing to see if employees are benefitting from it. Two results were obtained. The first showed that 75% of the participants claimed that Sasol succeeds in applying new knowledge.

The second was on the basis of continuous improvement being a culture of learning and a culture of learning from mistakes. The results of the question testing this showed that only 25% of the participants believed that Sasol uses KM for strategic advantage.

This proves that if businesses are using and benefitting from the KM systems, it must be suited to the business processes. It is clear that not all employees or groups are benefit equally. This may be due to the individual nature of the business units. Sastech for example depends more on knowledge than other businesses may. This is the likely explanation why only a quarter of the sample group agreed that Sasol uses KM for strategic advantage.

Within the Sastech business unit, the strategic focus areas are determined by the Sasol Technology annual strategy processes. The essential knowledge documents are determined by functional management and adhere to the specific criteria listed in the Key Knowledge Documents Directive.

The sample group listed 12 (twelve) different KM systems and technologies of which 7 (seven) were being used. These correlated with the technologies listed and described in the secondary data findings. The extent of understanding around the functionalities and further benefits of these technologies once again proved to be a shortfall among the sample group.

As motivation, 33% of participants wanted some form of acknowledgement. Remunerative acknowledgements were discussed but reference was made to the Fluor Corporation which followed that course during the early stages of KM implementation. They found that this lead to large amounts of garbage being captured for the sake of reward.

Literature shows that peer to peer recognition is found to be more effective than financial incentives. This was also the findings of the Fluor Corporation. They eventually abandoned the financial rewarding system and relied on status recognition. Sasol on the other hand do not have any real incentives in place at this stage. This is also the sentiment of the Sastech Knowledge Manager.

Although a small number of other motivations were discussed, the second major one was management involvement. This point was cited from 16% of all the responses taken from the interview sample group. A constituent of 25% suggested KM participation be included in employee and management performance contracts. This is currently not the case at Sasol although SKM have been advocating this for years.

Coming to an understanding of these aims and objectives has paved the way for recommendations to be made. Following the recommendations is a note on the limitations of this research and concluding thoughts.

6.3 Recommendations

Unfortunately, while estimates vary, it appears that most (over 50%) knowledge management systems implemented in practice fail to achieve their original goals (Akhavan et al. 2005). As Argote et al (2003) have noted, more attention has gone into identifying knowledge as a source of competitive advantage than in realising how organisations can actually acquire, integrate and share their knowledge.

The recommendations are as follows:

- Revise the strategic intent of knowledge management as a solution for Sasol. Good systems and understanding have already been instilled within small pockets of the organisation. Expand by starting with a systematic inclusion of the already established (but isolated) sharing cultures within businesses.
- Create a knowledge sharing culture through awareness. Most of the findings in this research showed that the employees are ready to share, but when obliged. The systems are already being used but due to a lack of training, the learning and sharing is limited.
- Promote systems fit for the purpose. Adopting the success stories of other organisations probably will not fit Sasol's processes and needs. Each business unit in Sasol has unique characteristics, features and even culture. Making unique solutions available for each business is not necessary,

but training them on those systems which will be most suited to them will achieve excellent results.

- Ease the business units into becoming a learning organisation. Collaboration Systems are synonymous with experts, exposure of expertise and reliable sources. Perhaps, as a consequence, people may fear personal shortcoming being exposed across the organisation. Start introducing people to these systems by encouraging the capturing of experiences and intuitive understanding. This is likely to stimulate discussions and facilitate attitudes and behaviour that are characteristic of coactions.

6.4 Limitations and future work

According to the Knowledge Management Institute (KMI, 2010), KM comprises a range of strategies and practices used in an organisation to identify, create, represent, distribute, and enable adoption of insights and experiences. These insights and experiences make up knowledge, either embodied in employees or embedded in the organisation as resource or referential material.

In order to enhance collective learning, learning organisations establish specific learning processes that become embedded in work processes. Fillip (2009) argues that this is key. The learning process or practices are often unique to organisations or even groups within organisations. They must match a specific need and be a reasonable fit within the existing organisational culture.
The experimental work in this research was designed to analyse the Sasol KM systems on only a few of these aspects to obtain an overall understanding. This is also at far too high a level to really know the challenges and dynamics faced by the Sasol knowledge practitioners. It is understood that the integration of these systems must be extremely complicated as they deal with the complexities of human attributes - behavioural, temperamental, emotional and mental.

This study can therefore be considered to be one part of a larger order of investigations that are needed to establish the ultimate answer to the perfect Sasol knowledge management system.

6.5 Concluding thoughts

Ongoing research is valuable and important for organisations as it produces new views, fresh insight and perhaps even considerations to bring about change.

This research has highlighted how many years it has taken Sasol to get to the point it is today. Throughout these years, global demands of the company change, environments change and even the management within the organisation alter direction.

It is on these terms that the accomplishments of initiatives like knowledge management are tested relentlessly. Once the initial implementations are brought in to action, there are only improvements that

lie ahead. It is not likely that the systems of such magnitude can be erased and others deployed to suit the times.

Credit is given to Sastech Knowledge Management for the advancements they have made in Sasol. It is disappointing that Sasol senior management do not respond to the advocating of the need for their support.

Perhaps the challenge lies at the feet of every employee to defy the need for top management to do the driving. Through mass participation, it can work. It does for Facebook and Twitter. It’s just that the right trigger is needed. After all, a veldt fire starts with a mere spark.

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Appendix 1: Sasol Historical Milestones

1950	Formation of Sasol to commercialise coal-to-liquids (CTL) technology in South Africa
1955	Original CTL complex starts producing synthetic fuels and chemicals at Sasolburg, South Africa
1971	Joint venture Natref oil refinery begins production at Sasolburg
1979	Sasol privatises and lists on the JSE, South Africa
1980	Construction of Sasol Two synfuels and chemicals complex in Secunda completed
1990	Launch of polymer production and first international chemical marketing office at Birmingham, UK
1993	First full scale Sasol Slurry Phase Distillate Fischer-Tropsch reactor commissioned at Sasolburg
1994	Formation of Polifin joint venture with AECI – now Sasol Polymers
1995	Formation of international wax business – now Sasol Wax
2001	International Condea chemical business acquired; first agreement signed for developing our first GTL plant, Oryx
2002	Sasol Mining wins Platts/Business Week Global Energy Award for coal company of the year
2003	Sasol lists on the New York Stock Exchange in the USA
2004	Start of natural gas production in Mozambique's Temane field; Sasol Oil merges with Exel Petroleum and enters the South African fuel retail market
2006	Launch of major Black Economic Empowerment (BEE) deals for Sasol Oil and Sasol Mining
2007	First international GTL plant, Oryx, starts production in Qatar
2008	Commissioning of Arya Sasol Polymer Company facilities in Iran; Sasol concludes landmark R24 billion Sasol Inzalo broad-based black economic empowerment (BEE) transaction
2010	SPI signs agreement with Talisman Energy to acquire 50% stake in their Farrell Creek shale gas assets in British Columbia, Canada; Ixia Coal transaction concluded, in line with black economic empowerment strategy
2011	Sasol lists its Sasol BEE ordinary shares on the JSE in South Africa

Source: (Sasol Limited, 2012)

Appendix 2: Introductory Letter

Research into engineering knowledge management: Sasol as a case study

Foremost, I would like to thank you in anticipation for your assistance. I realise that these questions do not have short answers and that they may be tedious to elaborate on.

Sasol commits to the development and empowerment of high-performing, values-driven employees (Sasol sustainable development report 2012). Sasol in 2012 has spent more than R650 million on skills and development (Nicholas Maweni, managing director, Black Management Forum). Sasol also has a diversity of rare skills. It is a domain where a range of technological attainments are commonplace.

In 2006, the then acting knowledge management (KM) officer for Sasol Limited André Botha, faced considerable challenges. In 1998, Sasol had embarked on a KM journey, championed by KM officer Marina Hiscock. In 2000, the group had adopted a global KM strategy to extend KM to all strategic business units (SBUs) throughout the group. While some SBUs had implemented KM successfully, in others implementation had progressed slowly.

In April 2006, Hiscock had resigned and the task of taking KM forward in the Sasol Group fell on Botha, an engineer who had successfully introduced KM at Sasol Mining. In July 2006, it was time for Botha to take stock of what KM had achieved and consider what Sasol should do next (WBS, 2006).

Since then, not much has been documented on the progress made on the KM front. It is therefore on the back of this that the extent and success of KM integration at Sasol must be investigated. It is therefore necessary to critically evaluate Sasol on these terms, to understand how its KM strategy supports organisational processes involving innovation, individual learning, collective learning and collaborative decision making, in an organisation which prides itself on intellectual knowledge and innovation.

Your assistance as a participant in the interviewing process will be greatly appreciated and paramount to this investigation. You shall be subjected to a set of KM related questions which will take no longer than one hour and shall be recorded. You shall remain anonymous in the documentation of this research.

I encourage you to speak freely and openly during the interview. I hope to let you do all the talking.

You may withdraw from participating in this research study at any time.

Kind regards,

Craig.

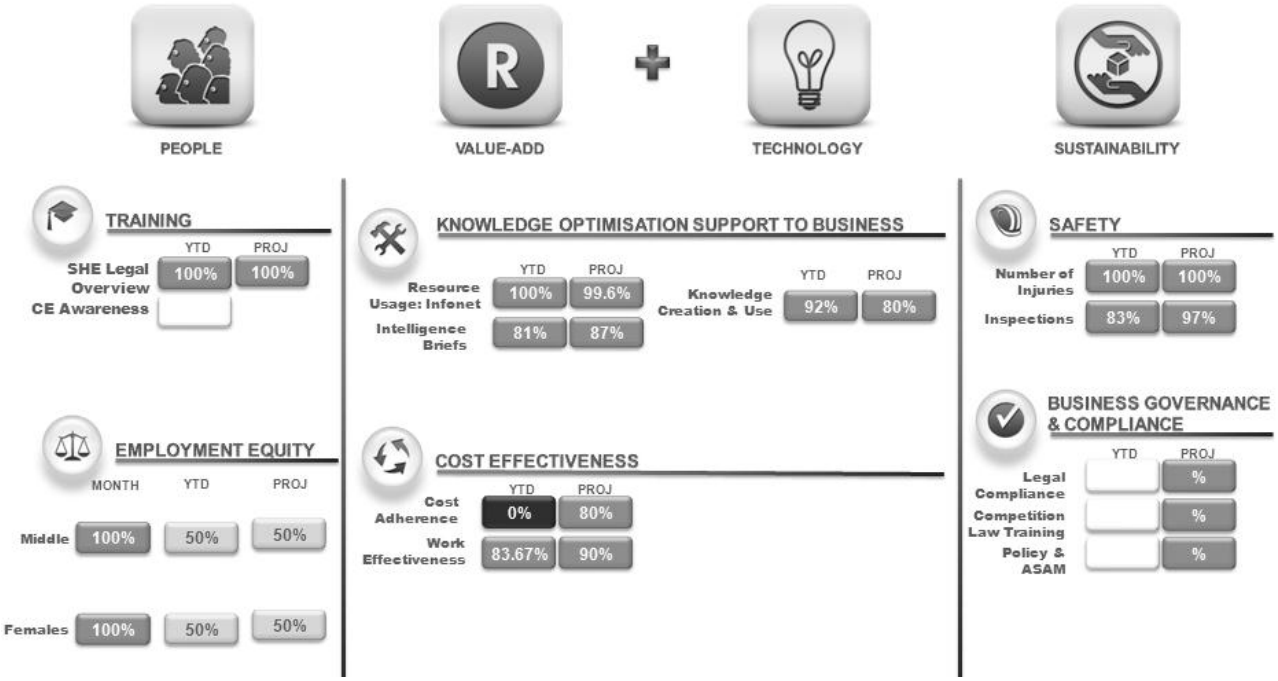
References:

Sasol sustainable development report 2012. 30 June 2012. http://www.sasol.com/sasol_internet/downloads/SASOL_SDR%202012_1353934690274.pdf Date of access: 2January 2013

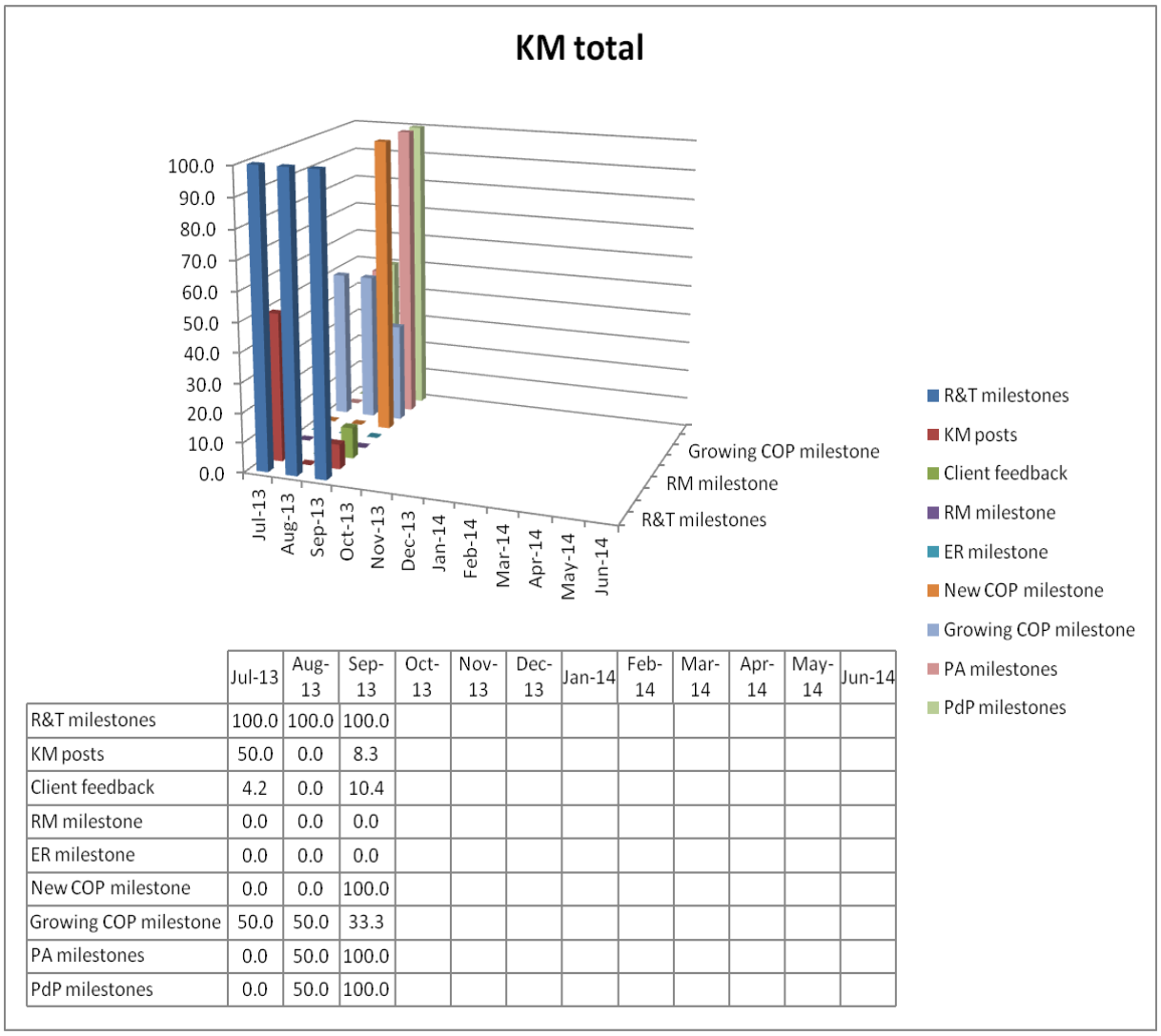
Wits Business School, 2012. Knowledge Management at Sasol. P.24. http://www.wbs.ac.za/speciality_courses/case_centre/info_knowledge_management/991908.htm Date of access: 3 January 2013

Will, A. J., 2008, The Institutionalization of Knowledge Management in an Engineering Organization. Working Paper #40. http://crgp.stanford.edu Date of access: 4 December 2013

Appendix 3: SKM KO Dashboard



Appendix 4: Knowledge Management Focus Areas



	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
R&T milestones	100.0	100.0	100.0									
KM posts	50.0	0.0	8.3									
Client feedback	4.2	0.0	10.4									
RM milestone	0.0	0.0	0.0									
ER milestone	0.0	0.0	0.0									
New COP milestone	0.0	0.0	100.0									
Growing COP milestone	50.0	50.0	33.3									
PA milestones	0.0	50.0	100.0									
PdP milestones	0.0	50.0	100.0									

Appendix 5: Contact Summary

1. **Where would you go to access lessons learnt, best practices or expert advice within the Sasol domain.**

A1: Knowledge Online & directly to experts and my network.

A2: Usually find the knowledge owner to determine where data is stored. Search on Livelink. In the IM domain I find that a lot of knowledge is undocumented

A3: Know How on ESS

A4: R&D, SME's, project leaders, managers

A5: I would go to the Sastech page that covers the Sasol specifications of my field and go to the Sasol specifications.

A6: A: I would find out who the expert is and phone him/her or send them an email.

A7: Honestly, there isn't a site that I can say that immediately comes to mind when reading the above question. If there is one that exists then I am definitely not aware of it! It is indeed very difficult to access lessons learnt (if in fact they do exist somewhere), the benefit of such would be great though. Best practices, I usually refer to the Sasol specs first. This may not necessarily be "best practices", but it is a starting point for me. Expert advice – here again not sure if it exists somewhere, I am aware of a PER forum but that is due to a project that I was busy with and then stumbled across it. I usually rely on my own network of contacts to track down an expert to provide advice in whatever area I am looking into.

A8: Livelink which contains specifications, guidelines and CoPs. A new knowledge portal exists but I rarely use it since it isn't up to date. Information regarding projects, investigations and technology is also found on the shared server.

2. **Garvin (Garvin, 2000, p. 51) defines a learning organisation as an organisation skilled in creating, acquiring, and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insight.**

    a. **Based on the definition above, would you agree that Sasol could be considered as a learning organisation?**

A1: No

A2: Yes

A3: Sasol gives you the facilities but the systems are difficult to understand and find.

A4: It could certainly be, looking at the high technology being applied in the group. However, I am not sure if a map of knowledge repositories within a company, accessible by all, exists in the group. Linked to expert directories to enable knowledge seekers to reach the experts and if it is properly managed and if all

potential users are aware of it.

Inter-project knowledge transfer - keep in mind that proximity & architecture (the physical situation of employees) can be either conducive or obstructive to knowledge sharing.

A5: Not fully. Sasol does not have the ability to transfer knowledge in a structured way.

A6: Yes

A7: Based purely on the definition above, I would say NO. We are particularly lacking in the transfer of knowledge from those learned individuals that exit our business and take away with them years of valuable experience, that have not been transferred to other younger individuals. I have experienced this myself. What to me is lacking, is a proper "transfer medium". Maybe we need to find the best way in which knowledge could be transferred, and then this may not be such an issue. But it definitely creates a gap when the experienced individual leaves.
Another gap would be modifying behaviour to reflect new knowledge and insight. This usually takes a long time, if at all!

A8: I don't think the definition holds true for the entire organisation, although from my experience I have seen some attributes of a learning organisation implemented at varying degrees.

b. Do you consider your co-workers to be predominantly knowledge-sharers or knowledge-hoarders?

A1: 50/50

A2: Knowledge hoarders

A3: 90% sharers

A4: No. The sharing of knowledge constitutes a major challenge in the field of knowledge management because some employees tend to resist sharing their knowledge with the rest of the organisation. Technology constitutes only one of the many factors that affect the sharing of knowledge in organisations, such as organisational culture, trust, and incentives

A5: I would go with knowledge-sharers

A6: I think most people will not have a problem to share their knowledge. The people just need to start using the KM system to share their knowledge.

A7: I consider my co-workers to be predominantly knowledge sharers. We have created a culture within our technical groups (across Vinyls) to share new information that comes our way so that it could benefit everyone. I also have not had an issue with Production personnel regarding knowledge sharing. This isn't a major issue in our environment. However, as always considering continuous

improvement this could be worked on.

A8: Knowledge sharers

c. What motivates individuals to contribute their knowledge to a KM system?

A1: Acknowledged experts, building a knowledge base for all, make critical content easy to find

A2: Usually by management order. It depends on the type of information, ease of use of the system, user training. Change management is often neglected with the implementation of a KM system

A3: Just motivation from management.

A4: Managing business environments and allowing employees to obtain relevant insights and ideas appropriate to their work. Solving intractable or wicked problems and managing intellectual capital and intellectual assets in the workforce by the expertise and know-how possessed by key individuals. Acknowledgment of a task well done, more complex projects, etc.

A5: I would say the need to improve the whole team's understanding of the items being shared, but there will be people that share information to market themselves in their environment.

A6: If people understand what value it adds to the company, it will motivate them to contribute.

A7: Motivation is key to most things. Somehow this has been a challenge in our business, individuals tend to be de-motivated and this stunts their behaviours. It would be important to get their buy-in to the KM system, and make them understand and see the benefits of it, maybe then they would be more keen or willing to participate. I think that in an environment where knowledge sharing is entrenched or the "usual", this may not be so challenging as in others.

A8: Motivation may be personal fulfilment- some individuals enjoy sharing knowledge and developing others. Knowledge sharing may also be a requirement in the individual's performance agreement.

3. The Communities of Practice are the primary location for people with similar functions, business objectives or interests to capture, share, improve and apply their collective knowledge (Will, 2008). As Wagner (2006) suggests, not every community is a community of practice. Communities require well defined structure.

a. What, in your opinion, are the critical success factors of the communities of practice at Sasol

A1: Leaders setting example, Technology platform, easy to use, changeover of generations some people will not change easily so good change management and good case for change.

A2: Willingness to share, no silo mentality, sufficient support structures and technology, a common goal for all participants

A3: I can't really say.

A4: Governance, visibility, intranet, etc.

A5: The factors are:

- Clear defined boundaries of what aspects the community covers.
- A governing body of senior community members.
- Events to share information and interact with fellow community members.
- A tool or system to record and retain information and to make this information easily accessible by the whole community.
- Senior community members to keep the tool or system topics up to date and accurate.

A6: Important knowledge and experience are not lost when people leave. Less time is wasted on doing the same things that people have already done, tried and tested before.

A7: Definitely as mentioned structure is extremely important. I am aware of COP's within Sasol, but do not actively participate or use them, except in dire need. There needs to be visibility, accessibility, and once momentum is gained in getting the COP kicked off, it needs to be maintained in order to be successful and value-adding. This is lacking. Usually the early introductory stages are energetic (typical), but this doesn't seem to be sustainable. Sasol COP's need to be more interactive, perhaps have sessions or workshops to keep people engaged and enlightened on new developments, etc. At the moment, they have been formed, but I fail to see the true benefits.

A8: The existence of the CoP must be known to all who may use or contribute to it (especially true for new starts in the organisation). It should also be easily accessible to all and user friendly. Subject matter experts who are willing to contribute should be identified and possibly incentivised/dedicated to do so.

4. Would you say that Sasol uses KM to provide strategic advantage?

A1: Not yet but emerging awareness is there

A2: Not yet – but the move is in the right direction.

A3: We learn from our mistakes

A4: I should think so but I am not too sure how it is managed, communicated and how visible it is.

A5: No, not in all of its environments. The Operations environment can have a great benefit from a system like this.

A6: Yes

A7: Definitely not. Not right now any way, and not in our business.

A8: No- the tacit knowledge of the individuals may provide strategic advantage, but not the knowledge management system.

5. **New ideas cannot by themselves create a learning organisation; it must be applied to the company's own activities and therefore translating new knowledge into new ways of behaving.**

   a. **In your opinion, would you agree that Sasol succeeds in applying new knowledge?**

A1: Uncertain of this

A2: sometimes – innovation is often hampered by governance and processes

A3: In our group, we do it for sure. Sasol communicates enough information in newsletters, factory general notices and so on.

A4: I would think so. Studies are conducted before, during and after project implication, we have R&D researching complex projects etc.

A5: Yes

A6: Not yet – we still need to capture all the knowledge in the KM system.

A7: This is a challenge and not a success area. Something new is always ”feared” and that could be why this is a struggle to introduce new things and apply it

A8: Yes

   b. **How often do you form part of a Community of practice to transfer knowledge?**

A1: Often

A2: Not often

A3: never

A4: Before, during and after projects. Ops (operations) studies, etc.

A5: Not currently.

A6: Hardly ever

A7: Not at all

A8: Not often

6. **McDermott and Archibald identified four principles for setting up effective CoPs:**

   V. **Focus on issues important to the organisation**

   VI. **Establish community goals and deliverables:**

   VII. **Provide real governance:**

VIII. Set high management expectations:

a. What in your opinion are the strengths and shortfalls of the KM system at Sasol?

A1: KM system in Sasol Technology not always supported by leadership because of lots of change in leadership over two years

A2: Strengths: The sheer amount of knowledge available is astounding, correct use and management of this can be ground breaking for taking the company forward

Shortfalls: there are too many systems and versions, archiving is not handled properly, there are many different views and definitions of knowledge management and what it really is, KM is not just the storage of data, There needs to be a mind-set change in the correct use of systems and the sharing of knowledge,

A3: I am not part of a community and cannot answer this.

A4: The intranet and internet is available, procedures in place, etc.

A5: Strengths would be:

- Diverse inputs.
- Focuses on issues important to the business.
- Set high management expectations.

Weaknesses would be:

- To establish realistic community goals and deliverables.
- Governance falls on the way side once there is pressure to complete a task on a tight deadline.

A6: It is still a new KM system and not familiar to everybody so it is not being well-used as yet.

A7: Management expectations may be high, and all things need management support to be successful. We are not good at this at CV. Implementations of plans are a shortfall. Perhaps not thoroughly and properly thought through.

A8: Knowledge management is not utilised fully in the operations environment (shortfall). It is not something that is actively encouraged and engrained into the culture of the organisation

b. How best to design and develop a collaboration system for Sasol

A1: Not able to answer this but standardization of system and method from Group IM is critical

A2: Make it user friendly – create one single point of entry. There are too many legacy systems. Proper change management is crucial. Take some tips from Social media – needs to be closer to what users like and understand.

A3: Blog or Wikipedia – if we have the appropriate training on how to use it.

A4: If in place already ensure it is visible

A5: It would be difficult to get a collaboration system in place if most people not get involved. To get most of the currently employed personnel involved one would need to consider changing some aspects.

1. Would need to develop an information gathering system (possibly web page based), but information should be downloadable if needed offline.
2. Information / knowledge input into the system must be part of the employee's performance agreement. (depending of the seniority of the employee in the specialist field should determine his / her level of input)
3. A dedicated system administrator, who is a subject matter expert, must be used to maintain and improve the collaboration system.

A6: The KM system, as far as I know, has the facilities for a collaboration system – the people just need to be informed and trained to use it. Possibly small workshops need to be held (awareness sessions) where the system can be demonstrated and the opportunity allowed for people to "play" with it, and once they are familiar they will use it more.

A7: Don't know.

A8: Not sure.