VOLUME 1

THE FUNDAMENTAL BUILDING BLOCKS OF ORGANISATIONAL KNOWLEDGE MANAGEMENT – A STATISTICAL EVALUATION

by

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THESIS SUMMARY

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Abstract

As organisations and managers start to realise the strategic value of knowledge within their organisation, several attempts have been made to implement Knowledge Management (KM) within these organisations. The standard approach, which leads to the failure of KM initiatives, is to view KM as a type of technological implementation while failing to realise that the organisation needs to facilitate a KM-friendly environment. Organisations that have successfully implemented KM within their boundaries, structure and scope have developed unique and organisation-specific KM implementations, making it difficult for the success factors associated with these implementations to be transferred to other organisations. As a result, researchers and authors have attempted to develop an ontological or taxonomical mechanism that would assist in the sharing of knowledge within and across organisational boundaries. Due to the organisational specialisation of these mechanisms, these attempts have for the most part been unsuccessful.

This study presents foundational work that can be used within an organisation to develop KM initiatives. By focusing on the language used by KM researchers and KM practitioners working with and practising KM within organisations, the author identified multiple terms and concepts that represent the fundamental building blocks of KM. If these building blocks are applied appropriately between different organisations, they can assist in the development of a KM initiative. The identified fundamental building blocks offer a starting point for the development of a KM initiative. As the study focuses on organisational KM needs, these building blocks may be used to implement a KM initiative that would satisfy an organisation's KM needs.

The goal of this study is therefore to identify the fundamental building blocks of KM that, when applied constructively, would assist the KM practitioner in satisfying an organisation's KM needs. In order to achieve this goal, the research focused on the following objectives (as reflected in the research question, subquestions and chapter division):

- To identify why there is a need for KM within organisations, and how it has been addressed in research, KM initiatives and organisations.
- To clearly delineate the concepts of Knowledge, Management and KM that can be applied in relationship with the process of organisational management.
- To identify organisational KM needs as linked to a generic organisation that is associated with a system interacting with its environment (gaining or losing knowledge due to the system's nature).
- To identify KM's fundamental building blocks associated with the language used by KM researchers and practitioners.
- To represent the identified fundamental KM building blocks that can be applied to a generic organisation to satisfy organisational KM needs.

As a result of the discussion, review and study conducted for this thesis, the author found specific dimensions pertaining to the fundamental building blocks of KM that satisfy organisational needs.

- It was established that there is a clear need for organisational KM in an effort to retain and manage knowledge resources to the benefit of the organisation. This highlighted the need for organisational KM, outlining possible solutions plus concerns found in previous research. It was found that although there is a need for organisational KM, this need has been poorly addressed thus far.
- Based on the discussion and findings in this thesis, it was found that there is a clear distinction between the concepts of Knowledge, Management and KM and it was found that KM provides support for the day-to-day management processes to which it is aligned. This highlighted the nature of Knowledge, Management and KM by redefining the construct of KM based on core considerations related to the concepts of Knowledge and Management and the critical interaction between the two.
- It was found that due to the systemic nature of an organisation, knowledge dissipates into the organisational environment. KM is essential to minimise this effect. Furthermore, organisational KM needs can be satisfied by applying the fundamental building blocks of KM during the implementation of an organisational KM initiative.
- After analysing the lexicon used by KM practitioners, the building blocks of KM were clearly highlighted by comparing patterns presented within the results analysed for this study.
- The final objective highlights and represents the fundamental building blocks of KM that satisfy organisational KM needs as clearly identified from the language used by KM practitioners.

By extending this study to the language used by KM practitioners as formulated within communities of practice in describing KM, the results of this study link directly to not only what KM theoretically appears to be, but also to how KM is viewed by people who work within the KM and knowledge environment on a day-to-day basis.

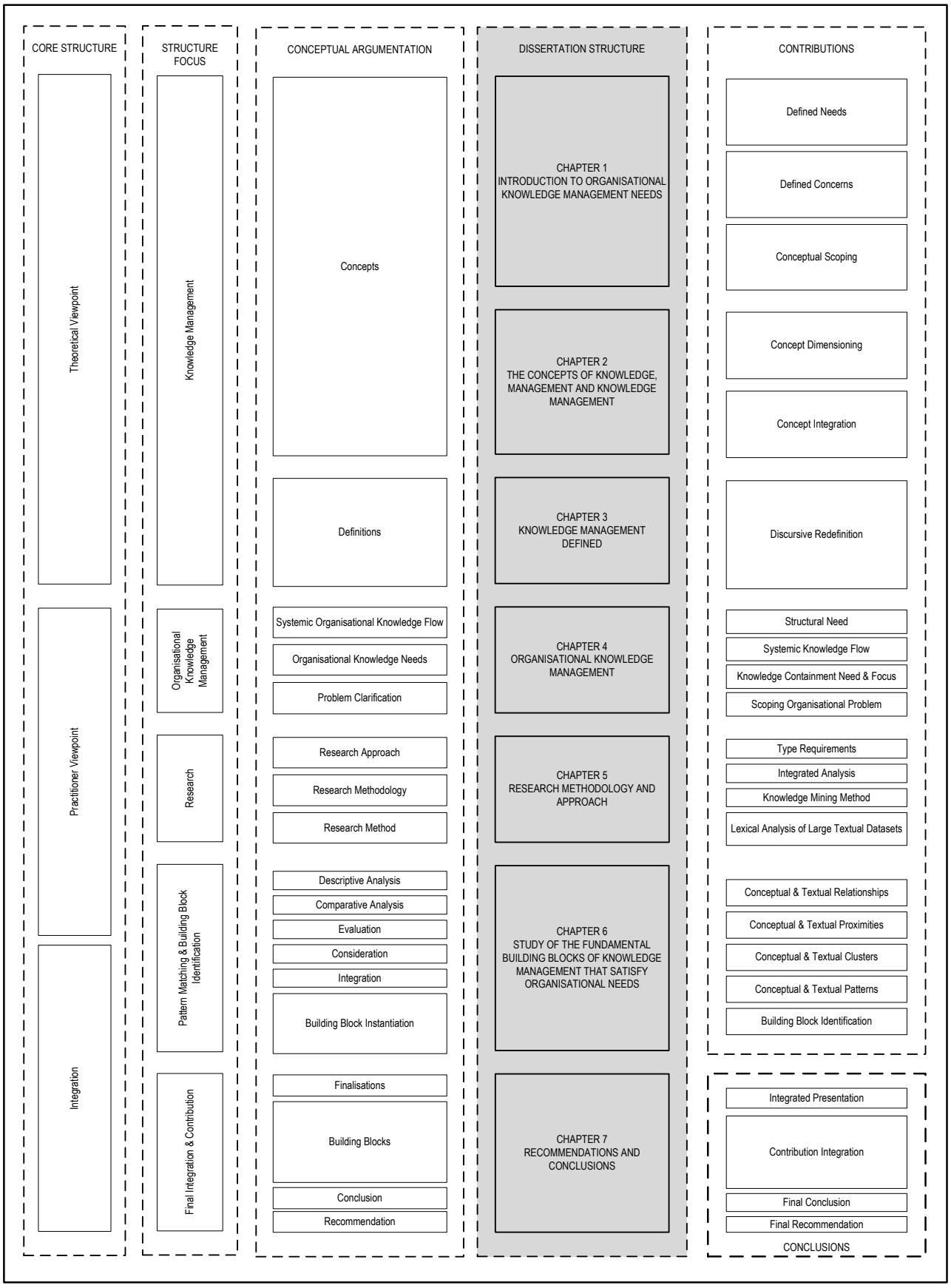
OVERVIEW: MAP OF THESIS CHAPTERS

To support the discussion and flow of argument within this thesis, each chapter is supplied with a chapter map that is a graphical representation of the core constructs presented in that specific chapter. To understand the relationship of the specified graphical representations, the following description will provide an overview of how the chapter maps (or discussion roadmaps) are linked together. The chapter maps are provided as a guide to the core structure, structural focus and conceptual argumentation of this thesis based on the thesis's structure and structural flow. They provide a snapshot of where each chapter fits in the thesis, what is mainly covered in each chapter and the general flow and direction of the argument presented. It should be noted that each chapter map is not listed as a diagram or a figure within the thesis, as the maps do not contribute to the discussion presented in the thesis. The maps are a '*you are here*' guide to assist the reader in the consumption of the research presented to support the final overview, and to gain insight into the nature of the discussions, arguments and presented research and evidence.

As may be seen in Chapter Map 01, the thesis is based on a systematic evaluation and consideration of two of the main dimensions of Knowledge Management (KM). The first dimension of the core structure covers the theoretical viewpoint of KM while the second dimension considers the KM practitioners' viewpoint by analysing the language they use to describe KM and KM-related resources. The thesis ends by adding an integration dimension where the theoretical perspective and practitioners' application of KM, KM terms and terminology and discussions of KM are integrated to identify the fundamental building blocks of KM that satisfy organisational KM needs.

Within the scope and context of the theoretical viewpoint of KM, the structural focus highlights the core concepts covered in KM literature and the problems and concerns leveraged against the identified concepts. It reviews and presents a consideration of the dimensions of KM definitions and how KM has been defined over time when approached from a theoretical perspective.

When referring to the KM practitioners' viewpoint, the thesis focuses on organisational KM by representing and discussing the systematic flow of knowledge within an organisation to highlight the organisational need to '*retain'* knowledge in a useful and usable format. It clarifies the problem that organisations lose knowledge due to the systematic and systemic organisational inflow and outflow of knowledge through the movement and life cycle of knowledge holders. It also highlights the needs that are linked to organisational knowledge flow and focuses these needs on requirements linked to the satisfaction of such needs.



Chapter Map 01: Complete Chapter Map

From the practitioners' point of view, the thesis then provides an integrated discussion of how the '*language'* of KM practitioners was accessed (by means of research approaches, methodologies and methods), to identify language usage patterns through descriptive and comparative analysis.

Reviewing and analysing the practitioners' point of view led into an integrative phase or integration dimension through the evaluation, consideration and integration of the theoretical and practitioners' view of KM. This was done to determine how the instances of KM building blocks manifested as repeating patterns of terminological relationships found in KM theory and the application of KM from a practitioner's point of view. As part of this final integrative discussion, the thesis then finalises the identified building blocks that scope and delineate KM within an organisational, practitioner and theoretical point of view. In essence, the thesis contributes a new way of looking at KM by integrating theoretical expectations with the practitioners' reality, to identify coherent conceptual constructs that, when integrated, represent the scope and context of KM by redefining and reconceptualising the perceived theoretical expectations and the practicality of KM terminology, ideas, practices, resources and concepts.

In the attempt to contribute a new way of looking at KM, the thesis highlights and contextualises organisational KM needs by identifying the core concepts of KM, providing a brief overview of the problems found in KM and then demarcating the focus of the thesis through an overview of the methodological approach followed to identify a sectional and structural framework for the argument followed for this thesis (Chapter 1). Chapter 1 highlights and demarcates the problems of and the need for KM and also defines some of the concerns linked to discussions related to KM. The chapter concludes with a conceptual scoping of the concerns covered in the thesis.

Through further analysis of the core concepts of KM, Chapter 2 provides insight into the main theoretical KM building blocks of data, information and knowledge and relates these building blocks to human knowledge, to highlight how knowledge as a human construct relates to management as a knowledge concept. This theoretical argumentation of KM concepts contributes a conceptual dimensioning of the theoretical treatment of KM and provides an integrated insight into how KM is viewed and presented from a conceptual theoretical perspective.

To elucidate the aforementioned theoretical building blocks, KM is reviewed in Chapter 3 within a theoretical descriptive mode contextualised by the theoretical building blocks of data, information and knowledge related to knowledge as a human construct and management as a knowledge concept, as already established in Chapter 2. Chapter 3 integrates the identified theoretical building blocks with theory and literature, subsequently providing a functional overview of KM. As part of the discussion, Chapter 3 provides an analysis of KM definitions to relate these definitions to discussions of KM found in literature as linked to theoretical KM building blocks. The chapter is

in essence a discursive redefinition of KM based on a critical review of conceptual relationships between data, information, knowledge, human conceptualisation of knowledge and a critical analysis of KM presented in literature and theoretical KM definitions. Chapter 3 therefore redefines KM by including evolutionary changes in the view of KM as presented from a theoretical conceptual perspective through the theoretical building blocks of data, information and knowledge, knowledge as a human construct and management as a knowledge concept, as established in Chapter 2.

In Chapter 4 organisational KM is viewed from a practitioner's perspective, representing systemic organisational knowledge flow and organisational knowledge needs by reviewing the nature of the organisation as a knowledge construct. The chapter integrates views related to the nature of the organisation as it has evolved over time and considers how knowledge flows in and out of an organisation. It stipulates how the flow of knowledge would create a need for organisational knowledge retention, and finally the nature of the need for organisational KM. Chapter 4's main contribution is a representation linked to the organisation's structural need for KM, by establishing that the organisation presents a distinct flow of knowledge due to its systemic nature. As such it establishes that there is a clear and a distinct need to contain knowledge and to focus KM initiatives to contain organisational knowledge. It concludes by presenting a clear picture of an organisation's knowledge needs by delineating the scope of an organisation's problem related to the loss of knowledge and knowledge resources.

After establishing the theoretical view of KM, organisational knowledge flow and the organisational need for KM from a practitioner's viewpoint, the thesis establishes the type of requirements necessary for evaluating how practitioners present KM within the scope and context of an organisation. In other words, Chapter 5 establishes what the requirements are for evaluating how KM practitioners apply KM within the scope and context of an organisation. Chapter 5 contributes a '*type'* requirement in stipulating how a person would be able to gather, prepare and present the '*language'* or lexicon used by practitioners who describe and apply KM within a practical organisational environment. The chapter establishes the approach used to analyse the language used to describe KM and to describe the nature of the KM construct conceptualised by KM practitioners. It indicates an approach to obtaining appropriate resources for evaluating KM practitioners' lexicon by focusing on knowledge mining methods as linked to the lexical analysis of large textual datasets showing how KM practitioners refer to KM within the scope and context of an organisation.

Based on Chapter 5's clarification of a lexical approach to knowledge mining of large textual datasets (representing a practitioner lexicon) and presentation of a systematic approach to the process followed in data collection, preparation and analysis, Chapter 6 presents a systematic

analysis of KM practitioners' description and discussions of practised KM. In Chapter 6 the relationship between terms used in a theoretical and practical environment is explored and evaluated to discover lexical relationships in proximity and distance (how close together or far apart terms are based on how they are used). Chapter 6 explores the subsequent clusters that may be developed when cross-referencing the theoretical and practical approach to KM by cross-referencing term usage, and finally, by focusing on matching patterns to identify repeating patterns of relationships of terms and terminology that describe and conceptualise KM. This evaluation presents a cross-referenced review of how KM is described in theory, referenced and matched against how KM is described and applied in practice. Chapter 6 presents a conceptual and textual relationship between the theoretical expectation of what KM should be and the description of a practised reality of what KM is when applied to an organisation to satisfy its need for knowledge acquisition and retention. Through matching the theoretical expectations and the practical reality, conceptual and contextual proximities and clusters are identified. The conceptual and contextual proximities and clusters contribute to matching patterns in KM, establishing what is useful and what is repeated as KM patterns or building blocks.

At this point the thesis (through discussion, debate and analysis) establishes the fundamental building blocks of KM that satisfy organisational KM needs. This is achieved through matching patterns of language and textual descriptions of KM as applied by KM practitioners, informed by and linked to KM's theoretical treatment, scope and context. This is leveraged against the redefined conceptualisation of KM to establish the building blocks of KM that satisfy an organisation's KM needs.

Chapter 7 concludes the study by integrating and finalising the core relationships between the theoretical and practitioner's view of KM, presenting the main findings linked to the identified patterns reflecting textually verbalised KM building blocks. The chapter contributes a final integrated view by listing and reviewing all the objectives of this study, its main findings, anomalous and interesting results and presenting the fundamental building blocks of organisational knowledge management.

VOLUME 1: TABLE OF CONTENTS

List of Chapter Maps

List of Figures

List of Tables

GLOSSARY OF TERMS

CLUSTER ANALYSIS

'The term Cluster Analysis encompasses a number of different algorithms and methods for grouping objects of similar kind into respective categories' (Hill & Lewicki, 2007: 115).

KNOWLEDGE CODIFICATION

'*Knowledge codification is defined as the process of converting the codifiable tacit knowledge into messages — patents, databases, user manuals, etc. — that can then be processed as information. Thus, the codification process not only modifies the proportions of tacit and explicit knowledge present in the firm but also their location, since this process transfers some of the knowledge from the minds of the workers to the organization's data warehouses*' (García-Muiña, Pelechano-Barahona & Navas-López, 2009: 145).

COGNITIVE PSYCHOLOGY

'*The scientific investigation of human cognition, that is, all our mental abilities – perceiving, learning, remembering, thinking, reasoning, and understanding. The term 'cognition' stems from the Latin word 'cognoscere' or 'to know'. Fundamentally, cognitive psychology studies how people acquire and apply knowledge or information. It is closely related to the highly interdisciplinary cognitive science and influenced by artificial intelligence, computer science, philosophy, anthropology, linguistics, biology, physics, and neuroscience*.' (Lu & Dosher, 2007: 2769).

COGNITIVE SCHEMATA

Cognitive theories describe how an individual might develop cognitive representations of reality, which through experience may be deemed knowledge (Cohen, 1983) in which intelligence is the ability an individual possesses that helps such an individual to adapt to their environment , and how this individual seeks to find a basic equilibrium or balance of existence in this environment (Murry, 1979; Small, 1990). This '*equilibration'* is the balance that the individual finds between what exists in the environment and what exists in the individual's cognitive schemas or mental frameworks, which is also a representation of an individual's current knowledge 'load' or knowledge potential (Bennett, 1993). If information perceived by an individual does not fit within the cognitive schemas, then disequilibria may occur (McShane, 1991); according to Piagetian cognitive theory, they do occur during periods of transition in the existence of the individual, which may be deemed as learning

experiences (Sternberg, 1995). These learning experiences may also be activities in which the individuals were involved, and these activities enrich an individual's field of experience, and therefore the individual's subsequent strategic value to an organisation (Bennett, 1993; Cohen, 1983; Murry, 1979; Small, 1990; McShane, 1991; Sternberg, 1995).

COMMUNICATION

'A process by which participants create and share information with one another in order to reach a mutual understanding' (Steinberg, 1997: 12).

- **Technical definition**: '*Sending and receiving messages – transmission of messages from one person to another*' (Steinberg, 1997: 13).
- **Process definition**: '*Dynamic process of exchanging meaningful messages*' (Steinberg, 1997: 13).
- **Transactional definition**: '*Exchanging messages and negotiating meaning to establish and maintain relationships*' (Steinberg, 1997: 13).

DATA

Data are the bits and bytes produced as part of the abstract reality of the world around us. Each object that exists as part of this abstract reality, has specific data linked to it, and by understanding data, one may understand the object. If, however, an individual does not possess the resources to understand the data relevantly linked to the particular object, then the individual may not be capable of understanding the object itself. Conversely, if an individual possesses the resources to understand a particular object's data through perceptual and cognitive recognition and interpretation, then the data may be interpreted as information (Debons, 1988; Farradane, 1979; Webster, 1995).

DATA MANAGEMENT

'Data Resource Management is the development and execution of architectures, policies, practices and procedures that properly manage the full data lifecycle needs of an enterprise' (DAMA-DMBOK, 2009).

DENDROGRAM

'A branching diagram representing a hierarchy of categories based on degree of similarity or number of shared characteristics especially in biological taxonomy' (The Merriam-Webster Unabridged Dictionary).

EXPLICIT KNOWLEDGE

'*Structured internal knowledge (explicit knowledge), such as product manuals or research reports*' (Laudon & Laudon, 2004: 316).

IMPLICIT KNOWLEDGE

'*Tacit knowledge in the form of mental models can be expressed to a certain degree, even if only in the mind of the individual, makes it expressible knowledge, in other words information*' (Nonaka & Takeuchi, 1995: 63–64).

INFORMATION

Information is something we can make sense of by receiving, recognising and converting data based on personal experience and histographic maturation. This is done by utilising our historical background to make sense of data for adding value by using the stores of information we already have. Data therefore becomes something that informs an individual by adding to the already stored information found in a human being's repertoire or informational cognitive representations (Debons, 1988; Farradane, 1979; Webster, 1995).

INFORMATION MANAGEMENT

'*Information management deals with management of resources such as information media, people, information systems and physical facilities that are required if information as content is to play a role on the corporate strategic, organizational, operational and personal levels*'' (Boon, 1990: 320).

'The regime that oversees the investment in new information systems and the operation of existing systems. Information management requires the deployment of a diverse range of management skills in order to successfully deliver the benefits of information systems investments' (Bytheway, 2003: 2).

INFORMATION TECHNOLOGY

'*All forms of technology involved in capturing, manipulating, communicating, presenting and using data - and data transformed into information*' (Wainright Martin *et al*., 2005:688).

KNOWLEDGE

Knowledge is the practical understanding that develops out of information. Other people and our own experiences mediate knowledge constructions cognitively within our mental repertoires. It is also used to understand data and to transmute or transform data into information (Debons, 1988; Farradane, 1979; Webster, 1995).

KNOWLEDGE MANAGEMENT

'KM is a management process that supports the overall functioning of the organisation by enhancing, managing and leveraging knowledge of individuals as found and constructed in dynamic interaction between individuals in a group relationship, that makes use of supporting functions of IM, so as to assist and facilitate organisational behaviour in achieving the overall goals and objectives of an organisation by supporting organisation management' (Analytically refined by author in the context of this thesis).

LEXICOGRAPHY

'The scholarly discipline of analysing and describing the semantic, syntagmatic and paradigmatic relationships within the lexicon (vocabulary) of a language and developing theories of dictionary components and structures linking the data in dictionaries' (The Merriam-Webster Unabridged Dictionary).

MANAGEMENT

'The act of planning, organising, staffing, leading or directing, and controlling an organisation or a group of one or more entities directed towards a specific effort for the purpose of accomplishing a goal' (Adapted from Robbins *et al*., 1996; DuBrin, 2008 & Lussier, 2008; Kerzner, 2009)

ONTOLOGY

'*Ontology is a discipline of philosophy that studies the categories of things that exist or may exist in a given domain. The product of such study, called an ontology, is a catalogue of those types of things*' (Saito, Umemoto, & Ikeda, 2007: 98).

'Concepts and relationships that are important in a particular domain, providing a vocabulary for that domain as well as a computerized specification of the meaning of terms used in the vocabulary. Ontologies range from taxonomies and classifications, database schemas, to fully axiomatized theories' (Kasabov *et al*., 2007: 496).

ORGANISATION

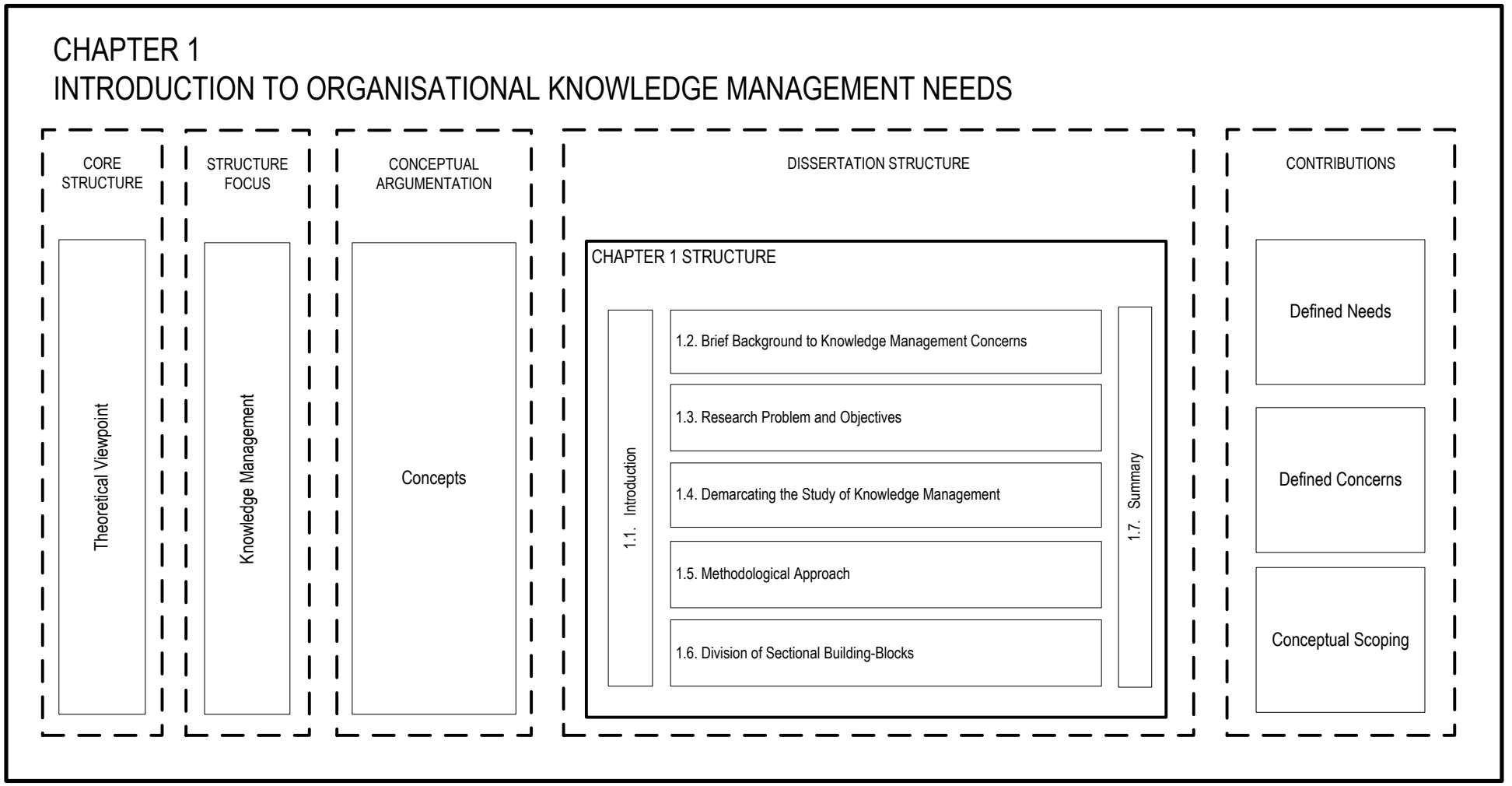
'An organisation is the rational coordination of activities of a number of people for the achievement of some common explicit purpose of goal, through division of labour and function, and through a hierarchy of authority and responsibility' (Schein, 1980: 15).

TACIT KNOWLEDGE

'*Informal internal knowledge, often called tacit knowledge, which resides in the minds of the individual employees but has not been documented in structured form*' (Laudon & Laudon, 2004:316)

TAXONOMY

'A field of science (and major component of systematics) that encompasses description, identification, nomenclature, and classification' (Simpson, 2010: 12)



Chapter Map 02: Introduction to Organisational Knowledge Management Needs

CHAPTER 1: INTRODUCTION TO ORGANISATIONAL KNOWLEDGE MANAGEMENT NEEDS

Table of Contents: Chapter 1

1.1. Introduction

The implementation of Information Technology (IT) has had a significant impact on the way in which an organisation functions and how it relates to an organisation's need for knowledge (Fink & Ploder, 2007, 2009). It has had a clear impact on how organisations manage, store, share, retrieve, distribute, collect and redistribute resources between individuals (Hodgkinson & Healey, 2008 and Laio *et al*., 2008). Subsequently, IT has had an influence on the way in which a business or organisation evolved and how organisational knowledge needs have subsequently evolved.

The organisational evolution brought about by IT has had a direct impact on the way in which knowledge and skills flow in and out of the organisation, based on the changing nature of the organisation (Lytras & Pouloudi, 2006; Fink & Ploder, 2007, 2009). These evolutionary changes not only influenced organisational functioning and the knowledge found in and required by the organisation, it also influenced the skills related to the organisation as a complexity amplifier. Authors such as Hodgkinson and Healey (2008) indicate that technology influences knowledge and behaviour, thereby influencing the way in which individuals experience practical day-to-day working scenarios. The implementation and application of IT impacts business processes and conversely the need for knowledge and IT resources (Nurcan, 2008, ter Hofstede *et al.*, 2009; van der Aalst *et al.,* 2011).

Critical in this IT evolution, the retention of knowledge became of significant importance to the organisation. Knowledge systematically 'walked out of the door' when an individual left the

organisation for various reasons. This in itself created a dilemma for the organisation as knowledge was lost. Systematically, influenced by this evolution of the organisation, knowledge became recognised as a critical resource for organisational competitiveness, innovation and success (Kanawattanachai & Yoo, 2007). For example, Kanawattanachai and Yoo (2007: 783) state that '*an organi[s]ation's ability to create and share knowledge is important for establishing and sustaining competitive advantage*'. Also, for example, Laio *et al.* (2008) indicate that the appropriate application of knowledge could enhance an organisation. This is supported by Holsapple's statement that '*[c]omputer-based technology has transformed the way in which individuals and organisations accomplish knowledge work by amplifying, complementing, leveraging, and (in some cases) improving on innate human knowledge handling capabilities*' (Holsapple, 2005: 47).

Additionally, Laio *et al.* (2008) indicate that the growth in knowledge in an organisation through learning, innovation, and importation or outsourcing of tasks (to make use of other knowledge), has the potential to improve innovation in an organisation. One can deduce from Kanawattanachai and Yoo (2007) together with Laio *et al.* (2008) that knowledge has the potential of improving an organisation's productivity and competitiveness.

For example, Hodgkinson and Healey (2008: 396) state that '*systems and related technologies have the potential to support the development of transactive memory*' within the scope and context of an organisation. Hodgkinson and Healey (2008: 396) focused on work teams and how teams react to technology implemented within the scope and context of an organisation. Within the context of what Hodgkinson and Healey (2008) are referring to, communication systems related to technology have the potential to support knowledge work within an organisation.

Related to the capacity of technology to assist in the development of a transactive memory and bearing in mind that knowledge has the potential of improving organisations' productivity and competitiveness, organisations developed initiatives in which knowledge could be leveraged through the application of technology. However, these knowledge resources were being leveraged as informational resources and not knowledge resources. The informational resources were obtained from within the organisation's employee population by promoting knowledge sharing (Cody *et al*., 2002; Lau *et al*., 2005). In this instance of knowledge sharing or KM, knowledge would be extracted by means of the codification of knowledge that the employees have obtained over a period, or through participation in projects, tasks and activities within the organisation (Markus, 2001; Cody *et al*., 2002; Lau *et al*., 2005; Jabar *et al*., 2010). In short, organisations started to apply IT as a solution for retaining knowledge in the form of information or data by extracting it or obtaining it directly from employees. It was hoped that this extracting process would lead to organisational knowledge retention.

Zhen *et al. (*2010) stipulated that technology that supports KM initiative should be considered very carefully within the scope and context of an organisation. What Hodgkinson and Healey (2008), Laio *et al.* (2008) and Zhen *et al. (*2010) systematically allude to, is that IT could assist but that KM is not just the application of technology. It is the creation of an environment that supports knowledge and knowledge-related initiatives. If technology is applied to a KM initiative, and does not provide sufficient knowledge-related support, then a KM initiative will have a distinct chance of failure, thereby negating the potential advantages of KM and tarnishing the domain.

Hodgkinson and Healey (2008), when reviewing concepts related to cognition, knowledge and organisational functioning (discussing cognition in organisations), indicated that the human factor in an organisation plays a significant role in how individuals interact, and thereby construct knowledge within that organisation. Through various observations of individuals' actions and reactions (including behavioural stimuli), it was found that knowledge and subsequent task-related behaviour was directly influenced by the knowledge structure of the individual. Hodgkinson and Healey (2008) further indicate that within an organisation, that technology has the potential to shape the working environments as a tool, a repository of information and a behaviour adapter due to the impact it has on the individual's way of working and experiencing or accessing stimuli related to knowledge. What Hodgkinson and Healey (2008) stipulated was that studies in organisational knowledge found '*task-specific knowledge*' differed from '*team process knowledge*' and subsequently the types of knowledge-related resources available to an organisation as a whole. These authors further found that the way in which technology was applied in supporting knowledge constructs (representations of knowledge), transfer and usage in an organisation, influenced the nature of individuals' behaviour and how knowledge was behaviourally applied within the scope and context of the organisation. In essence, they indicated that technology influenced behaviour and knowledge application through behaviour modification.

However, according to Zhen *et al*. (2010: 769), '*organi[s]ations still view [KM] as launching some software programs without adequate consideration of their organi[s]ational characteristics to ensure the success of their [KM] initiatives*' or by establishing a knowledge-friendly environment. The concern, however, is that the application of software and technology has the potential of negating the advantages of leveraging knowledge in removing the concept of knowledge from KM and converting knowledge into something other than knowledge.

Based on the way in which technology is acquired and applied within an organisation, technology clearly influences the way in which an organisation produces its own knowledge constructs. If each organisation creates its own knowledge constructs based on the unique characteristics of the organisation itself, then how will knowledge and information resources be shared in, for example,

outsourcing or the creation of a consortium or due to the dynamically changing environment in which an organisation functions? Also, if an organisation's construct of the idea of knowledge or knowledge as a recourse is convoluted due to the organisation's specific view of knowledge as influenced by internal environmental variables and the application of IT and business processes, then how would the organisation know what knowledge to access, codify, store or provide access to if and when required by, for example, a working team? This leads to the questioning of knowledge constructs used in organisations and between organisations as influenced by IT.

Based on the aforementioned argument and overview, it is the premise of this author that KM has lost focus due to the assumption that IT can manage knowledge. Zhen *et al*.'s (2010) assertion that technology is simply applied as a knowledge container that extracts knowledge without understanding the relationship between knowledge and the individual, the individual and the group, and finally the group and the organisation, has led to an impoverished, mechanistic view of KM and its role in managing knowledge resources within the organisation. While it is clear (as discussed in subsequent chapters), that knowledge can be managed, it nevertheless requires focus both on knowledge itself and the container of knowledge. As such one would require a clear understanding of what KM is, and what is included and could be excluded from KM as a management domain.

As such, Chapter 1 will focus on providing a brief overview of how technology concerns have come into being. The chapter will describe how some of these concerns may be dealt with through the clarification of KM and through matching aspects related to a need for KM products and services, and how this match may assist the KM practitioner. After the background to the problem has been provided, a brief description of the problem statement and the research methodology and methods of the study will be provided. This may be referenced when referring to Chapter Map 02: Introduction to Organisational Knowledge Management Needs. This section on the need for KM will conclude with an overview of the chapter sections used within this stipulated study.

Chapter 1 will conclude with a summary of the disconnection between KM demand and KM needs plus the potential for misunderstanding of KM to support organisational innovation, growth and competition.

1.2. Brief Background to Knowledge Management Concerns

According to authors like Rao (2003) and van den Berg and Popescu (2005), organisations produce large amounts of information or information-related resources that can provide the organisation with potentially valuable content related to their business environment. These resources have the potential to support the organisation in terms of decisions, processes and operations and business behaviour for the purpose of a strategic advantage within the field in

which it functions (Noori & Salimi, 2005; Kanawattanachai & Yoo, 2007). Carneiro (2000) indicated that the application, capturing and representation (graphical, relational or informational) of knowledge by means of IT provides an organisation with a competitive advantage either through innovation within the organisation (borrowing from past experience) or through the formulation of a competitive strategy allowing the organisation to react to environmental changes. What Carneiro (2000), Noori and Salimi (2005), Kanawattanachai and Yoo (2007) also allude to is that even though IT has the potential of supporting KM initiatives in organisation, the process of selection should be considered carefully so that it supports KM and does not usurp KM by changing the focus from KM to IT or Information Management (IM).

Not only does the representation of knowledge resources or organisational information in an organisation have an advantage for the organisation, it also provides the individual and the organisation with an external memory base or storage medium which can either be shared, or extend an individual's or organisation's functional efficiency in terms of the resources that are available. According to Holsapple (2005: 47), '*[c]omputer-based technology has transformed the way in which individuals and organisations accomplish knowledge work by amplifying, complementing, leveraging, and (in some cases) improving on innate human knowledge handling capabilities*'. This implies that computer-based KM and IM has the potential of extending an individual's memory base, base of experience and supporting resources by representing the individual's memory in an accessible format.

According to Lau *et al*. (2005: 87), KM is '*a set of business processes that capture and deliver the collective experience*' of people engaged in an organisation, and sources of information outside an organisation. Subsequently, for this to be an effective endeavour, an organisation is required to develop a Knowledge Management System (KMS) that can effectively control the sources of information required for the business process to function as effectively and efficiently as possible (Lau *et al*., 2005). However, due to the nature of the sources of data and information, it is usually stored in unstructured knowledge repositories that inevitably require a KMS for categorising and sorting the knowledge repository based on user specifications. This would imply that, according to Lau *et al*. (2005), one would eventually require an IT approach to KM or KMS.

For a KMS to function effectively, knowledge needs to be captured, codified and stored so that it can be shared and accessed by anyone within an organisation. This allows for sharing individuals' experience with the organisation, thereby expanding the organisational memory base by contributing to the general pool of intellectual capital (Albino *et al.*, 2004). Cody *et al*. (2002), Rao (2003) and Noori and Salimi (2005) indicated that an organisation has to be able to take advantage of such available information. However, due to the sheer volume of available information and the codification schemes utilised, organisations are investing in technological solutions to extract

actionable information from large volumes of unstructured sources of information and data, without clearly understanding what they are investing in.

Effective management of available resources (structured and unstructured) and the codification of individual knowledge for the purpose of organisational sharing of these informational resources has the potential of giving the individual access to a type of group memory which networks or combines what individuals in the organisation 'know' and what the organisation itself 'knows'. This relates to Giuseppe and Carlo's (1998: 5) view that '*cognitive activities are increasingly being performed in [a] networked contexts*' that create a collective intelligence by means of communicative knowledge-sharing networks. For this collective intelligence to function, it requires a similar linguistic, psychological and sociological model to represent what people know, how they know it and how they share what they know within a technical environment. In terms of a linguistic model, communicated knowledge requires a codified structure which is, in part or as a whole, shared and agreed upon by the knowledge-sharing participants. It requires a shared communication codification structure so that the concepts that the individuals within the organisations share, contains within it the same agreed-upon meaning (Giuseppe & Carlo, 1998; Holsapple, 2005; van Diggelen & Dignum, 2006; Eucker, 2007).

This implies that, for individuals in an organisation to be able to share and subsequently leverage what they 'know' (Thomas, Kellogg & Erickson, 2001), the participants that are sharing their knowledge in a network of individuals, or a network of organisations, require a similar codification scheme or mechanism of codifying, integrating, storing and sharing (van Diggelen & Dignum, 2006). This scheme or mechanism would then, based on the individuals' similar psychological and sociological frameworks and their shared codification scheme, allow them to agree on the collective meaning of the intellectual content being represented in the organisation by the individual (Blackman & Henderson, 2005). For individuals to share meaning through knowledge sharing or collective codification, they require the capacity to network within the organisation or even between organisations so that the content can be functionally shared. In essence, it implies that participants would require a shared conceptual and fundamental understanding of that which is being communicated and shared.

This is supported by Kanawattanachai and Yoo (2007) who have indicated that one of the building blocks of a knowledge-based organisation (in which intellectual content is codified and shared between individuals for the purpose of a collective or organisational advantage) is its capacity to network, allowing communication between teams of people within the organisation. Networking has been one of the drivers necessitating organisations to communicate across geographic boundaries and through organisational and functional barriers to foster collaboration between sites, customers and suppliers (Scott, 1998). Organisations have become more 'virtual' due to their geographic

spread; hence, networking, computer-mediated communication and sharing knowledge resources in the form of codified knowledge by means of technology have become an integral part of an organisation's structure and functioning (Kanawattanachai & Yoo, 2007).

Interoperability, or the ability to have a shared and integrated understanding of concepts being used, is a key issue in sharing codified knowledge between individuals and organisations by means of a network (Lanzenberger *et al.*, 2008). It allows the utilisation of heterogeneous and distributed resources through the sharing of resources, reusing vocabularies of knowledge and features of the resources that are available. The concern in this instance is that the tools that are available cannot solve the task of interpreting semantic differences in the application of the vocabulary used to represent the available resources (Lanzenberger *et al.,* 2008).

Driessen *et al.* (2007) created a framework for the evaluation of knowledge mapping tools, dividing organisational knowledge artefacts into entities, activities, concepts, terms, groups, knowledge items and persons and then placing the components of the framework into a relationship with each other in terms of the class in which the knowledge artefact resides. Though the work of Driessen *et al.* (2007) relates to the evaluation of knowledge mapping tools, it does give an indication that knowledge artefacts can be divided in to related classes that may be grouped in terms of a hierarchical relationship to assist in the evaluation of a specific component of KM based on the codification scheme utilised by the tools involved. The framework itself, however, only relates to knowledge mapping tools, and not the larger field of KM or the limitations involved in implementing such initiatives within and between organisations.

Bonifacio *et al.* (2004) indicate that sharing and managing codified knowledge can only be successful if it allows for a certain degree of heterogeneity and organisational distribution. Though sharing should allow for heterogeneous codified knowledge, the method used to codify the knowledge requires homogeneity, as it should allow the users of the scheme to similarly encode content so that it can be shared (Bonifacio *et al.*, 2004). This yet again emphasises a level of shared understanding and interpretation. As early as 2001, Earl (2001) states that there is a need for a framework, model or methodology that can be used to understand and support knowledge within an organisation, and subsequently support organisational KM endeavours in sharing and codifying knowledge. However, this has never been successfully achieved due to the size and the scope of the implementation initiatives between organisations (Stuckenschmidt *et al.*, 2005).

Saito *et al.* (2007) attempted to employ an ontology[1] as a method to identify the relationship between KM and strategy and to develop a method to categorise KM technology according to the

[1] Kasabov *et al.* (2007: 496) describe an ontology as the '*concepts and relationships that are important in a particular domain, providing a vocabulary for that domain as well as a computerized specification of the meaning of terms used in the vocabulary. Ontologies range from taxonomies and classifications, database schemas, to fully axiomatized theories*'.

identified relationships. Though Saito *et al.* (2007) focused on KM and strategy in general, the framework they developed and the conclusion of their study suggested that KM technology can be better understood within the context of the initiative being pursued by an organisation instead of knowledge processes. In this instance, Saito *et al.* (2007) not only conclude that knowledge codification and management initiatives are limited to the purpose of the knowledge process, but also indicate that due to the limitations of non-shared codification schemes, managing knowledge is a problem as it relates to what the organisation and the individuals in the organisation agree upon as the scheme required to codify and decide on the process required for the codification of knowledge.

Furthermore, according to Stuckenschmidt *et al*. (2005: 481), proposals for the implementation of a KMS '*assume that the system will be used within a single organi[s]ation. As a consequence, the organi[s]ational memory is implemented as a centrali[s]ed system that is controlled and maintained by a corresponding organi[s]ational unit*'. This creates a concern in the sense that cross-organisational knowledge sharing becomes difficult to manage, even non-existent, as organisational knowledge remains within the realm of a single organisation due to structure and the codification scheme used, as influenced by organisational culture. This may be acceptable when an organisation is concerned with keeping what it knows as a proprietary component within the organisation. However, when organisations start to work together, such as in the case of consortia or outsourcing, this creates unnecessary duplication and gaps in organisational knowledge. According to Stuckenschmidt *et al.* (2005), it may also lead to the duplication of resources, negating the usefulness of consortia and function outsourcing in resource optimisation. What Stuckenschmidt *et al.* (2005) proposed was the development of a way to identify the semantic relationships between elements in different sources of information available to an organisation. The most obvious method would be to evaluate the schematic elements used by the organisations involved by means of a linguistic comparison that includes the background knowledge related to the development of the schema (Stuckenschmidt *et al.*, 2005).

Lanzenberger *et al.* (2008: 103) stated that '*[t]he exploration of ontologies could be an efficient and powerful way for organisations or communities of practice to share knowledge*'. Ontologies, which can be defined as 'a discipline of philosophy that studies the categories of things that exist or may exist in a given domain' (Saito, *et al.*, 2007: 98) can assist in this instance as they create a representation of concepts. For example, when knowledge is represented as information and as data to be stored and transmitted through the use of IT, an ontology could potentially assist by providing rules related to the logical structure of the domain to which the key concepts and terms may relate. Essentially, if another person references the data at a later date, the rules attached to the key concepts and terms in an ontological hierarchy would provide a structured method through which meaning may be derived (Saito, *et al.*, 2007).

Kasabov *et al*. (2007) indicate that ontologies are being used in applications for scientific knowledge portals, management integration systems, including the semantic web initiative. An ontology would allow users of these systems to work with similar concepts within the scope of the field of interest. This implies that an ontology constructed as a method of codification could potentially allow organisations to share similar codification schemes that would be capable of improving sharing and participation in initiatives between the organisations involved (Kasabov *et al*., 2007).

It may therefore be concluded that that an intra- and inter-organisationally agreed codification scheme may be required that would be able to support cross-organisational knowledge-sharing processes. As indicated, an ontology would have the potential of assisting in such a codification scheme. However, as yet attempts to complete such an ontology have been organisation-specific. It may therefore be prudent to attempt to construct such an ontology that would be able to assist in the construction of a codification scheme that could potentially be used to support organisations and individuals. It would assist with the construction of representative schemes that are not only relevant to a specific organisation, but could potentially be applied across organisations for the sharing of codified knowledge resources. The constructed ontology can potentially be used in differential environments to allow for collaboration in a variety of endeavours, potentially negating the negative effect of the perception that IT is the sole solution to knowledge retention. Though IT may still be applied as a useful medium and tool, the ontology would assist in codifying and subsequently interpreting knowledge-related resources with and for the user of such a resource.

However, for such an initiative to be successful, one needs to clearly understand the nature and scope of the resources referred to (i.e. knowledge) and how they can be managed. To ensure a clear understanding of the main concepts that relate to KM, one first needs to elucidate knowledge, as well as the mechanisms that support knowledge within an organisation. It would therefore be prudent to understand ‘what is being demanded’ from organisations in terms of knowledge and KM to stipulate the need for KM within organisations.

Constructing an ontology for KM interoperability falls outside the scope of this thesis due to the size and scope of such an endeavour. What would, however, be a step in the direction of developing such an ontology would be the identification of fundamental building blocks that can be applied. For the purpose of this study, the author refers to fundamental building blocks as any terms, words or concepts (lexical construct) that, though its relationship could be used to construct ontological or lexical relationships in meaning and description. As such, these building blocks could be applied taxonomically to satisfy (support and assist, meet expectations, needs or desires) KM

needs within an organisation, and the eventual construction of an ontology that would be able to satisfy organisational KM.

One of the first steps in constructing such an ontology is to elucidate the concept of knowledge within the scope and context of an organisation, and to explain how the concept of knowledge relates to other KM concepts found within the KM domain. As Zhen *et al. (*2010) have indicated, simply throwing technology at KM cannot be a solution to KM if one firstly does not create a clear understanding and definition of KM and how IT can support KM itself.

The following sections will provide the reader with an outline of how one would be able to create a clear foundation for the creation of an ontology for addressing the need for KM interoperability within organisations and organisational units and across organisations. They will describe the process will be that can be followed to construct the fundamental foundational groundwork for a domain-specific ontology.

1.3. Research Problem and Objectives

As indicated in the previous sections, one of the problems of codifying knowledge is the requirement of a shared and agreed-upon codification schema. Knowledge should be codified in such a way that the content being codified can be understood by all who agree upon the said codification scheme. Attempts have been made to develop an agreed-upon codification scheme through creating classification frameworks and by utilising ontologies. However, these attempts had a limited implementation impact (within specific organisations).

One of the clear limitations of an organisation-specific ontology is that it focuses mainly on how a single organisation views knowledge as a resource. In other words, it is not sufficiently generic with a high enough view of knowledge and KM. In this instance, we need to obtain a clear and distinct foundational overview of knowledge, how it can be managed and how it is being managed by means of the types of resources allocated to it. As such, the purpose of this study would be to create fundamental building blocks by reviewing concepts, terms and terminology that can later be used in the creation of an ontology that, owing to the nature of ontology, could have the potential to be implemented within and between organisations. As such, the main concern of this thesis is to answer the following question:

What are the fundamental building blocks of KM that satisfy organisational needs?

To support the main concern of this study, specific subquestions will be used to inform the main research question of the study. These questions are not exhaustive, as additional questions arise in separate chapters. These chapter specific questions are dealt with in separate chapters. The following subquestions are used to inform the main concerns per chapter as pertaining to this thesis:

- How do we delineate knowledge, management and KM?
- Can KM be delineated as a management process?
- Why is there a need for organisational KM?
- What are organisational KM needs?
- What are the building blocks of KM?
- How do KM building blocks relate to organisational KM needs?

The questions allude to the usage of KM by delineating the nature of KM based on the usage of KM building blocks. Eventually, the results may have the potential to focus KM and to assist in further developments within the field of KM through the clear delineation of the domain. To support this study, the research is demarcated as follows.

1.4. Demarcating the Study of Knowledge Management

The purpose of this study is not to investigate the field of KM per se. This domain of interest has been selected as there have been several attempts to define and delineate KM within the field of management (Earl, 2001; Kakabadse *et al*., 2003; Driessen *et al.,* 2007; Jakubik, 2007; Lytras & Pouloudi, 2006; Fink & Ploder, 2009). All the aforementioned authors have indicated that such attempts have only been within specific organisations and cannot be generalised due to the uniqueness of each organisation involved. These attempts have assisted in the creation of domain-specific frameworks and structures relevant to KM, but only for the specific organisations involved. The frameworks, methods and codification schemes related to KM developed by previous authors and researchers have been used to inform this study, but only to the extent of identifying concerns to be addressed or taken into consideration.

Developing an ontology requires a significant amount of foundational and fundamental work to scope the meaning of the terms or terminology applied within a selected domain (Saito *et al.*, 2007). This study lays the fundamental and foundational groundwork for the creation of such an ontology by analysing KM constructs and matching these constructs with various dimensions and perspectives for future ontological developments.

The study is focused on the development of the fundamental and foundational building blocks[2] necessary for the development of a generic model that can be used by organisations to present KM needs more explicitly. The resultant foundation would then have the potential of being applied to the development of an ontology that focuses on the patterns[3] of interaction between knowledge, KM and organisational KM needs.

As with all research, there is a point at which the researcher has to cease collecting material and literature related to the background of the study. For the purpose of this thesis, the author only reviewed material up to the end of 2011, to focus on what has happened in the domain of KM up to that point. No additional material was reviewed or added to this thesis unless it was found useful for transferring and communicating the ideas of the author. Virtually no material past 2011 was sourced for this study. Additionally, the author retrospectively only reviewed core definitions related to KM up to 2006. Clear criteria were set for this study related to the collection and revision of definitions. The criteria may be reviewed in the methodology chapter of this thesis. Based on the criteria, the descriptions of KM found in later literature did not comply with the requirements for this thesis, and were therefore excluded from the study.

Finally, it should be noted that the author only focussed on conceptual knowledge and not procedural knowledge. The author determined procedural knowledge to be outside the scope and context of this study.

In the following section, the author will provide a brief overview of the methodology to contextualise the reader to the approach followed in this thesis. A completed discussion of the methodology, methodological concerns, approaches and methods may be referenced and reviewed in the methodology chapter.

1.5. Methodological Approach

To identify the core concepts related to knowledge, KM and organisational KM needs, this author captured and reviewed a significant amount of textual or unstructured information related to the meaning of knowledge, KM and how KM practitioners view what these practitioners perceive as KM. For the purpose of this study, both qualitative and quantitative research methodology was used. The approach in terms of the methodologies was informed by the work of Benjafield (1994),

[2] For the purpose of this study, the author refers to fundamental building blocks as any terms, words or concepts (lexical construct) that, though its relationship could be used to construct ontological or lexical relationships in meaning and description.
[3] When the author refers to the word “pattern” – the author refer to as meaning a “an observable and discernible regularity”

Berg (1998), Dane (1990), Kerlinger and Lee (2000), Leedy and Ormrod (2001), Mook (2001), Mouton (2001), Newman (1997), Phillips (1985) and Willig (2001).

As stated by Carenini, Ng and Zwart (2005: 11), '*knowledge capture from a large body of text involves two basic tasks. First, it is necessary to extract from the text the most important information. Then such information has to be presented to the user*'. This study makes use of KM concepts, and focuses on the identification of common KM concepts to identify the fundamental building blocks of KM. To achieve this, very large datasets were used to identify commonality and patterns in commonality. These bodies of text needed to be analysed in a presentable and digestible fashion. As such, the material was systematically presented firstly as a theoretically analysed description of KM and organisational KM to contextualise the content, and then presented in a digested and analysed form to present the common building blocks of KM as identified in this study. Content was considered and evaluated in terms of matching to academic treatments of the concept of KM by analysing KM theory, definitions and discussion. As such, large bodies of text representing KM were systematically presented in a digestible format to the reader, to expose the building blocks of KM that would satisfy organisational KM needs.

This study made use of a non-exhaustive yet thorough sampling of definitions describing KM, and two very large convenient samples of practitioner websites maintained online as a KM practitioner's directory of websites used by KM practitioners. More specifically, the websites have been assessed by extracting keywords in context, which have been processed by means of between-group cluster analysis to identify patterns of relationships between the critical terms used to define the scope and context of KM. These terms therefore have a direct relationship to how academics view KM and how two groups of practitioners view KM. This allowed for the extraction of related concepts that can be regarded as the key concepts or fundamental building blocks that KM practitioners view as KM. In essence an academic view was presented alongside a practitioner view so that the two views may be evaluated in parallel to each other.

Both quantitative and qualitative content analysis methods were used. After the content was extracted and the significant domain-related terms identified, the semantic relationships between the terms were extracted. The core focus in this instance is the identification of the concepts and the interrelationship between the concepts.

After the core concepts were revealed, the information was then used to identify domain-specific relationships based on the patterns within the high volume of unstructured information. These relationships would then have the potential of assisting in the identification of the fundamental building blocks that KM practitioners view as KM mechanisms that satisfy organisational KM needs and have the potential of being applied in the construction of a taxonomy and an ontology for KM.

To successfully conclude this study, it was necessary to divide the processes involved in investigating the domain of interest into coherent sections of work. The study made use of the section or chapter divisions described in section 1.6.

1.6. Division of Sectional Building-Blocks

The following is an overview of the work that was required to complete and inform this study. It also briefly summarises the core concepts that have been covered in this thesis.

1.6.1. Chapter 1: Introduction to Organisational Knowledge Management Needs

Chapter 1 examines the core problem as related to the implementation IT and subsequent codification schemes across different organisational boundaries. This chapter provides a brief description of the problem as identified for this study and a general introduction to the various sections of work for the conclusion of this specific study.

1.6.2. Chapter 2: The Concepts of Knowledge, Management and Knowledge Management

In Chapter 2, the core concepts related to KM (i.e. data, information, knowledge, management, data management, information management, information management systems, and knowledge management) have been reviewed to establish the scope and context of KM as viewed by the academic fraternity and academic researchers that addressed KM in literature.

1.6.3. Chapter 3: Knowledge Management Defined

Chapter 3 provides an analysis of definitions related to KM, to establish KM as a subtype of management that is supported by both organisational structures and technological initiatives. The chapter concludes by redefining KM based on characteristics identified in the work of KM theorists. This is essential as it establishes the principal pattern against which results were evaluated.

1.6.4. Chapter 4: Organisational Knowledge Management

This generic organisational structures reviewed within the scope and context of KM are discussed in Chapter 4. It establishes how the general structure of an organisation influences the need for KM within an organisational system and what the organisational need for KM would be.

1.6.5. Chapter 5: Research Methodology

In Chapter 5, the author briefly reviews aspects related to the problems established in Chapter 1, 2, 3 and 4. At this point, a step-by-step overview of how data was collected, prepared, presented and analysed to establish the fundamental building blocks related to KM terms has been presented. The chapter outlines the research process, indicating how patterns of analysis have been constructed, and documented to establish reliable and valid data.

1.6.6. Chapter 6: Research Findings: Fundamental Building Block of Knowledge Management

Chapter 6 describes the patterns identified and the relationships between the patterns. It gives the reader insight into the core concepts of KM and how these concepts are related as viewed by the academic community and KM practitioners. It establishes the relational patterns required to identify KM building blocks as applied in organisations and which are viewed to be related to and included in KM as discussed by KM academics and KM practitioners alike.

1.6.7. Chapter 7: Recommendations and Conclusions

In Chapter 7 the author presents recommendations for further research on the application of the identified concepts. These recommendations can be applied to promote interoperability. They also potentially offer a pattern-based framework that can be applied in the selection and/or filtering of KM vendors to ensure effective KM solution investments and/or acquisition. The author presents the conclusions of the study, giving meaning to the fundamental building blocks of KM.

1.7. Summary

There is a need to understand the core concepts pertaining to KM. Due to the current view that one may resolve some of the concerns of KM by applying software and technology, practitioners attempt to create and establish an environment that is friendly to the needs of KM in an organisation. A fundamental understanding of the core concepts related to KM is required to create a representation, taxonomy or ontology of KM that can assist in the application of KM. This has been attempted before; however, these attempts have focused mainly on individual organisations. These individual instances may provide only an instantiation of KM as viewed from the perspective of the organisation and have the potential of limiting KM initiatives between organisations.

A higher-level view of KM resources, KM needs and concepts from various perspectives needs to be constructed to incorporate a more holistic approach to KM. Such a holistic approach can provide a high-level view of the fundamental building blocks of KM. When constructed, used and reviewed, these building blocks offer the potential for the construction of taxonomies, ontologies or frameworks that can be applied in the implementation, selection and/or identification of KM resources to assist in the effective investment in KM initiatives to assist in the leveraging of knowledge through KM in the promotion of organisational innovation, effectiveness and competition. Although the purpose of this thesis is not the creation of taxonomies, ontologies or frameworks, the fundamental building blocks identified within the scope and context of the data applied in this thesis, have the potential of assisting in the development of these constructs. Taxonomies, ontologies or frameworks constructed from the identified fundamental building blocks inherently have the potential of simplifying KM initiatives and/or KM investments within organisations.

In reference to Chapter Map 02, Chapter 2 contributes to this thesis by stipulating a defined need for KM and defined concerns that describe the factors that influence KM and KM implementations. The chapter provides an overview of the concepts to be covered, and the defined scope of KM and discussion limitations for the thesis. It contributes the following to the domain of KM:

(1) There is a defined need for KM within the scope and context of an organisation. To share knowledge-based resources, organisations need a fundamental understanding of what KM is, and what knowledge may be found within an organisation. This fundamental understanding will allow organisations to share resources through a synergised KM initiative – giving shared access to knowledge and knowledge-based resources. It was indicated that this may be achieved by constructing an ontology that would define the rules and the relationships between the KM resources shared between and within organisations. Before attempting such an ontology construction, one needs a core and fundamental understanding of the concepts or components of an ontology. Earlier in the thesis it was

stipulated that constructing such an ontology could be problematic due to the misunderstanding of various concepts linked to KM and how it is delineated in discussions linked to the KM domain.

(2) Based on the previous point, it was indicated and found that there is a general misunderstanding of what the concept of KM is in terms of what it includes and what it may seemingly exclude. Due to dynamically divergent and convergent ideas linked to KM, it was indicated that a generalised confusion has developed as to what KM entails. As such, it was discussed that one needs to 'go back to the fundamentals' of KM and review what theorists and practitioners say KM would entail.

(3) To achieve the goal of understanding the fundamental units linked to KM, the chapter also provides a conceptual scoping indicating the need for a sequential and systematic approach in the construction of such an ontology. The first step would be to identify building blocks linked to a taxonomy so that the rules and relationships can be identified. After this, the taxonomy may be applied to construct and test such an ontology. This chapter indicates an incremental approach to the construction of an ontology by focusing on the linguistics of the participants in a domain, and then systematically indicating the process that has been followed in this thesis. It was therefore concluded that, to be able to construct an ontology, one should firstly identify the building blocks necessary to create a taxonomy and eventually an ontology. As such, the core objective of this thesis was described as an approach to identifying the fundamental building blocks of KM within the scope and context of organisations so that one may eventually apply these building blocks in such a way as to satisfy the organisational need for KM.

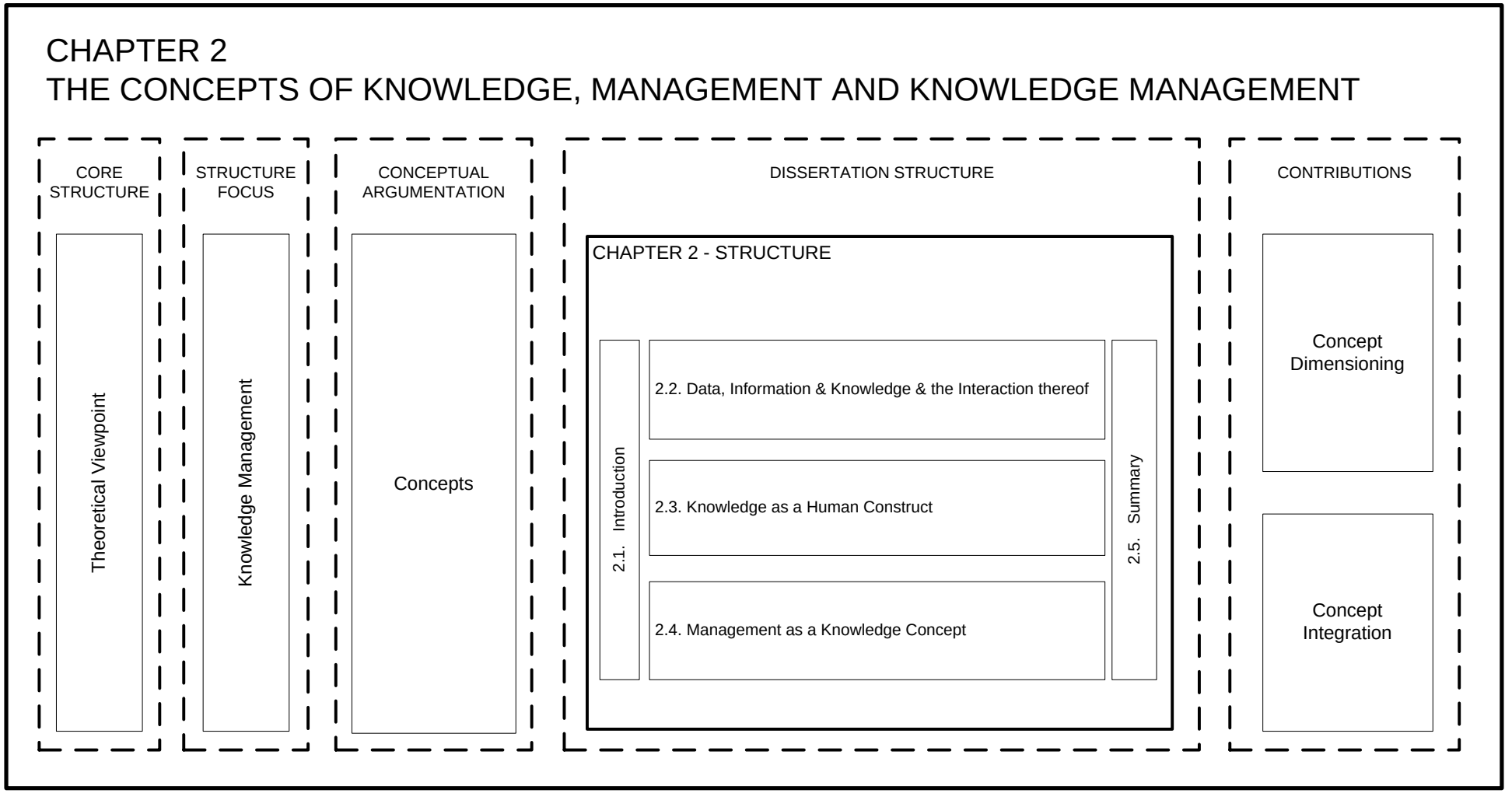
Based on the arguments presented in this chapter, it is clear that one needs to first identify the fundamental components of KM before one would be able to construct such an ontology. In the process one needs to leverage the core concepts theoretically presented and discussed against each other, to articulate the core concepts of KM based on the core concepts, language and the usage of this language within the scope and context of the organised and organisational application of KM.

What this chapter finally achieves and contributes to the domain of KM may essentially be summarised as follows:

- **Defined Need** – stipulating that there is a definite need for KM as articulated by different yet related management domains.

- **Defined Concerns** – defining the concerns when addressing the need for KM. One cannot address KM as a domain without reflecting on some of the main concerns that have the potential to inhibit the development of KM as a domain.
- **Conceptual Scoping** - scoping the concepts applied to define the need for KM as linked to an organisation.

To elucidate the core fundamental building blocks of KM, a generalised understanding of the three core concepts of KM: data, information and knowledge is required. As such, Chapter 2 will provide the reader with a review of current thought on the three main component of KM as applied by both KM academics and KM practitioners.



Chapter Map 03: The Concepts of Knowledge, Management and Knowledge Management

CHAPTER 2: THE CONCEPTS OF KNOWLEDGE, MANAGEMENT AND KNOWLEDGE MANAGEMENT

Table of Contents: Chapter 2

2.1. Introduction

Historically, information and knowledge have been a human construct involving individual human beings interacting with each other (van Dijk, 1999; Scardamalia & Bereiter, 2010). If an individual wished to transfer an idea, concept or message, it could be done by verbal and non-verbal transfer mechanisms such as exemplification or vocalisation (Wells & Hakanen, 1997; Baran *et al.,* 2008). The evolution of media capable of storing information for extended periods as symbolic representations eventually extended the life cycle of the information itself. Individuals could now store a portion of their knowledge as symbols, allowing other individuals to access the meaning behind the idea. However, as time passed, these representations became disjointed from the individual involved in the creation of these symbols. Foucault (2007) indicated that due to the timeframe between knowledge becoming information and then becoming data as symbols, data and the associated interpretive meaning behind it became meaningless to individuals. Still, the development of technology allowed individuals to extend the shelf-life of the information beyond the individuals' own lifetime (Scardamalia & Bereiter, 2010).

Primitive recording technology (i.e. hammer and chisel, pen and paper, ink and printing press) evolved into an electronic medium allowing for the storage and processing of large quantities of data. Individuals could now utilise what they *knew*, synthesise informational representations, and convert it into symbolic representations to be stored, manipulated and controlled by means of an electronic medium. Instead of hieroglyphs on papyrus accessible only to a few who understood the

symbolic representations, the systematic evolution of storage and processing media from archaic information technology types into current types of IT allowed data to be stored and accessed by individuals with specialised skill sets linked to IT (van Dijk, 1999). This technological evolution, associated with social transformation, had an impact on who had access to data, how access could be gained, and how the data linked to IT could be utilised (Castells & Cardoso, 2005). This eventually led to the evolution of Data Management (DM), where data was *controlled and managed* as it became a functional organisational resource supporting decision-making processes (Feather, 2008). Systematically, additional evolutions in IT moved towards the processing of data into representations that individuals could understand and use to make decisions. This was the birth of IM (Amidon, 1997; Owen, 1999; van Halm, 1999; Prusak, 2001), and eventually KM (Nonaka, 1994; van Halm, 1999; Prusak, 2001).

The concern is that knowledge is inherently a human-centred endeavour (Russell, 2009). When knowledge is converted into information for transfer purposes, then the associated connections in personalised meaning related to its being knowledge is mediated by the transfer medium. The true meaning of that which is being transferred resides with the originator of the information (McLuhan, 1960; McQuail, 1987; McQuail & Windahl, 1993). If meaning is further removed from information, and this information is stored without context or relationship to the source, then it subsequently becomes data (Boon, 1992; Zins, 2007).

The evolution of IT-based DM into IM and eventually KM appears to be a natural progression, as data with context and meaning is information, and information with personal impact and practical application in experience is knowledge (Boon, 1992; Zins, 2007). However, this can be deceptive on a textual level. To understand the potentially deceptive nature of this relationship, one has to review '*Data'*, '*Information'*, '*Knowledge'* and '*Management'* (as concepts) related to KM to identify if a coherent relationship between the individual concepts indeed exists. (Chapter Map 03: The Concepts of Knowledge, Management and knowledge Management).

2.1.1. Aim

The aim of this section is to provide an overview of the core concepts of data, information and knowledge as related to the domain of KM.

2.1.2. Scope

In order to achieve this aim, concepts related to data, information and knowledge will be covered in the following topics:

- Data, Information and Knowledge and the interaction thereof.

- Knowledge as a human construct
- Management as a knowledge concept

Chapter 2 will conclude by indicating that KM is indeed the management of knowledge within the scope of a given and identifiable context.

2.2. Data, Information and Knowledge and the Interaction thereof

One of the components required for understanding a discussion of KM, is its relationship to the core concepts of data, information and knowledge as they are interlinked based on meaning and understanding ascribed to components and subcomponents. The author acknowledges that the relationship includes the concept of external or internal '*events to be observed*' and the concept of wisdom (Boon, 1992). However, for the purpose of this discussion, events and wisdom will not be included.

Authors such as Ackoff (1989), Bierly *et al.* (2000), Frické (2009), Jennex (2009) and Bernstein (2009) have reviewed the '*Knowledge Pyramid*' and the hierarchical relationship between data, information and knowledge, where data is systematically transformed into wisdom. According to these authors, the relationship between data, information and knowledge may be viewed as a mechanical, hierarchically structured relationship in which one part of the pyramid has the potential of leading from one component to another component, through perception, processing, transformation, integration and/or interpretation based on levels of meaning as shown in Figure 1. In the following sections, the author will review some of the implications discussed by the various authors, examining the mechanistic nature of how these subunits or subtypes associated with the construction of knowledge relate.

2.2.1. Data

As can be seen in Figure 1, one of the first components of the hierarchical relationship following an observable event or stimulus into a system is data. Data may be viewed as a symbolic representation of a qualitative or quantitative nature that refers to variables or entities of variables. These entities or variables on their own have no meaning to the observer of these entities, as they are decontextualised and represented in their simplest format. Data may be viewed as the lowest level of abstraction of the hierarchical relationship. Without context, the content related to the data units inherently has no meaning on its own as it has been decontextualised (Zins, 2007a; Jennex, 2009). Without links and interlinks between related concepts, data on its own (unprocessed and unrelated) has no meaning to an individual (Ackoff, 1989; Boon, 1999; Zins, 2007a; Jennex, 2009). However, the symbolic representations of data may be converted into information that informs by

means of processing. The processing may relate either to the individual accessing the information and provides meaningful relationships, or by means of IT-based compilation or calculations (Debons, 1990; Bernstein, 2009).

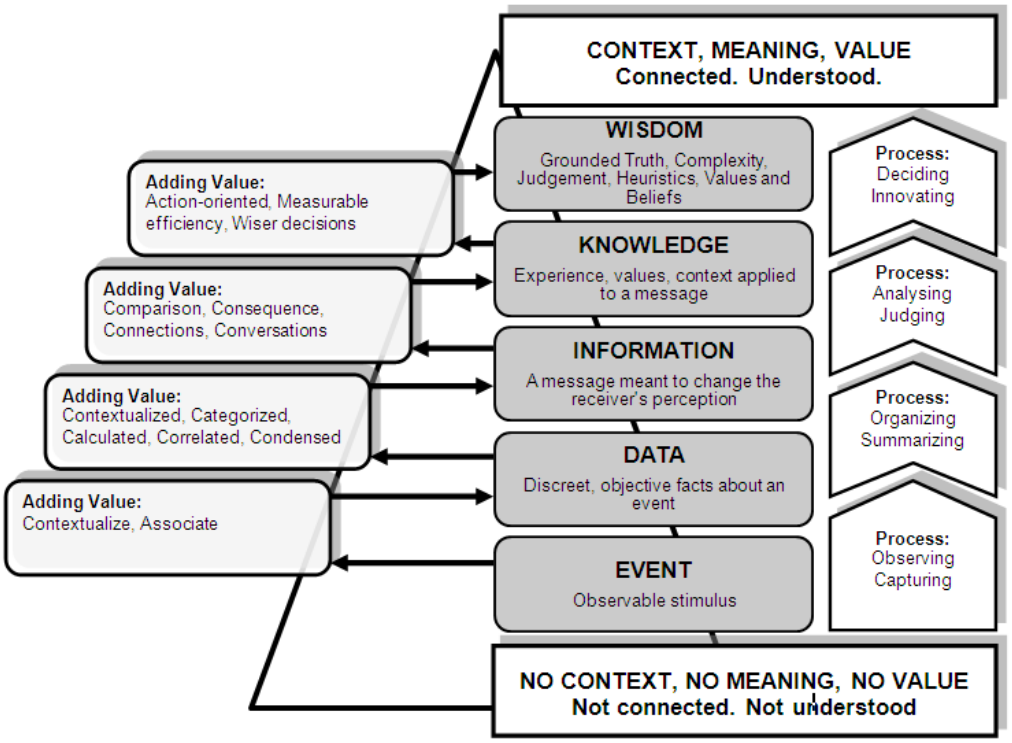


Figure 1: The Knowledge Pyramid
(Adapted from Ackoff, 1989; Boon, 1999; Bierly *et al*., 2000; Frické, 2009; Jennex, 2009; Bernstein, 2009)

By implication, the symbolic representations of data may be converted into information by means of interpretation. Conversely, information may be decontextualised and converted into data by representing the information as understood by the individual, as symbols. These symbols may be socially agreed upon standards; however, it is not required for the conversion of information into data. If a non-standardised mechanism is utilised, then it would inhibit the reconversion into information at a later stage. Therefore, one may indicate that the meaning that could be derived from the data would inherently be lost. If a standardised symbolic scheme is utilised, then the data may be reconverted into information through interpretation (Jennex, 2009; Bernstein, 2009).

However, if data is stored or represented in a symbolic format that is structured in terms of socially acceptable standards, when the data is accessed by an individual, and the data is interpreted, processed and transformed, then the result, based on the Knowledge Pyramid in Figure 1, would subsequently be information.

2.2.2. Information

As can be seen in Figure 1, information as the second mode in this hierarchical relationship may be any type of stimulus into a system that has the potential of influencing the functionality of the system through levels of understanding and interpretation. The concept of information relates to concepts focusing on meaning and interpretation (Ackoff, 1989; Boon, 1999; Bierly *et al*., 2000; Frické, 2009). The main function of information is to inform or to provide an overview of a specific idea or concept to the individual, influencing mental representations and understanding of the stimulus that was introduced into the system (Debons, 1990). In the extreme version of signal theory, information literacy refers to a triggering event that functions as a source of transformational events within a recipient system (i.e. a receiver) (Kotz *et al.*, 1988; Mingers, 1995). In terms of information theory, the concept of information focuses mainly on the conglomeration of a combination of concepts that allows individual to form meaning and understanding (Nonaka & von Krogh, 2009).

Information may potentially be converted by means of a variety of mental and social processes into knowledge, which at the most primitive level of explanation may refer to the information that informs or influences behaviour (Debons, 1990; Boon, 1992; Mingers, 1995; Bernstein, 2009). The implication that an individual understands the information does not by default lead to actionable knowledge. Without environmental factors leading to socialisation and internalisation of that information, the individual will not be able to internalise information to influence behaviour on a practical level (Nonaka & von Krogh, 2009).

If information is understood by and has meaning for the individual accessing it and that individual has the socially transferred capacity to use the information, the result would be knowledge (Figure 1).

2.2.3. Knowledge

When information is useful and understood in action (influencing behaviour and behavioural processes exemplified and presented by the individual), then, as may be observed in Figure 1, information may lead to the creation of knowledge within the individual. Knowledge can also be converted back into information by means of various communication processes (Boon, 1992; Frické, 2009; Jennex, 2009). This can be done by means of a verbal representation that allows the individual to externalise a portion of what they know. Externalisation does not necessarily imply a verbal medium (Boon, 1992; Wells & Hakanen, 1997; Baran & Davis, 2008). An individual may make use of symbolic representations in the externalisation process as well. When the individual makes use of symbolic representations, these representations are required to be in a codified

format based on socialised structures so that other individuals may eventually and potentially understand the symbols being used (Berger & Luckmann, 1967; Holmboe, 1999; van Bruggen *et al.* 2003).

Inherently, the process of converting information into knowledge makes use of three components, as described by Nonaka (1991) and Nonaka and Takeuchi (1995), supported by Marwick (2001) and van Diggelen and Dignum (2006).

The identified components may broadly be described are as follows:

- ***Socialisation***: a socially agreed-upon process and mediated mechanism for the transfer of information between individuals found in a social unit. The conversion process requires a certain degree of similarity between the individuals involved. Without a socially agreed-upon structure, the information presented during the transfer process of socialisation has no meaning and therefore reverts to data. In this instance, it is the individual who is socialised into understanding a concept as exemplified and transferred by the group onto the individual.
- ***Externalisation***: This is the articulation of tacit knowledge and its capture in forms that are easier to understand. Words, images, modelling and reasoning are typically used to translate expert knowledge into a mode which makes it understandable by others (e.g., teaching, presentations, articles).
- ***Combination***: when diverse sources of information are combined and shared between individuals by means of technology or physical transfer. In this instance, various forms of information are combined based upon predefined and structured cognitive schemata related to individuals in a social unit or group. This is closely related to socialisation, as there has to be a common understanding between the individuals involved so that the diverse sources can be combined into a coherent form and so that internalisation of the concept may take place.
- ***Internalisation***: taking the information and incorporating it into predefined or pre-existing cognitive schemata. For information to become useful to an individual, it has to be internalised and combined with that individual's own cognitive framework, so that this framework may be expanded or reorganised.

These concepts (Nonaka, 1991; Nonaka & Takeuchi, 1995; Marwick, 2001; van Diggelen & Dignum, 2006) imply that knowledge can also be converted back into information for distribution and transfer. This occurs when information is converted to a codified informational or data-related symbolic construct. The idea is also supported by authors like Beynon-Davies (2002; 2009), Zins (2007a; 2007b); Bernstein (2009); Frické (2009); Jennex (2009) and Nonaka and von Krogh

(2009). Briefly, the conversion process takes place by means of one or a combination of the following mechanisms:

- ***Externalisation***: synthesising components of the individual's knowledge base into a medium that is acceptable by the social unit or the individual receiving formatted knowledge. In this instance, the author refers to formatted knowledge, as the individual is incapable of transferring all the associated content linked to the knowledge unit within the individual's frame of reference. It therefore has to be formatted in a medium that is useful to individuals who might access the eternised content.
- ***Socialisation***: the social interaction of the individual within a group of people with similar ideas or backgrounds and core concepts. This occurs for the explicit purpose of transferring information generated from knowledge-based content to inform the group by mediating a level of understanding between the units found within the social group, using a socially accepted medium. In this instance, the individual through socially mediated processes transfers what they know to other individuals during their interaction with the group.
- ***Codification***: the conversion of knowledge into a structure which is locally understood within a social unit, either a business unit or people (individuals or groups) with whom the individual relates. Codification requires a symbolic or representative schema that is useful to recipients. However, it is more an instance of converting what the individual knows into something that closely resembles data, rather that information. This distinction can become nondescript, as various authors have various perspectives in terms of codification. Some authors view codification as a direct transfer into data (Markus, 2001; Cody *et al.,* 2002; Lau *et al.,* 2005; Jabar *et al.*, 2010), while others view it as a process of converting knowledge into symbolic representations as a physical exemplified medium that acts as information to others (Stuckenschmidt *et al.*, 2005; Saito *et al.*, 2007). Regardless of the different schools of thought regarding codification, it essentially refers to taking what is known and representing it as a code. The two schools of thought arrive at the same conclusion, namely that information has been codified into socially agreed-upon symbolic representations requiring processing or internalisation for value to be returned to these representations.

The knowledge that the individual obtains by means of engaging with information presented within a socialised environment or a codified informational medium may be internalised, subsequently influencing the individual's understanding of environmental factors, processes or procedures extending or altering the individual's behaviour within that given context (Thomas *et al.*, 2001; Kakabadse *et al.*, 2003; Firestone & McElroy, 2005; Stahl, 2006; Fu *et al.* 2010). It allows an individual to exemplify behavioural changes related to action that can be taken, for example when a task needs to be completed.

One of the potential concerns about this approach is the mechanistic notion of how data is converted into information and information into knowledge, or knowledge is converted into information, and finally information into data. A mechanistic approach does not clearly define the role that the cognitive functioning of the individual plays in terms of the hierarchical transformations.

The process is not hierarchical in nature, but rather cyclical as mediated and controlled by various factors influencing the development of an individual's cognitive representation of knowledge. In the following section the author will review the core concept of knowledge from an informational, cognitive and social perspective. There is one underlying, inescapable concern about knowledge (as presupposed product of data and informational stimulus), namely that knowledge is socio-cognitively based on human endeavour. Inherently, as the reader will note in the following section, knowledge cannot be separated from the individual without its becoming something other than knowledge. To understand where knowledge fits into the process of human endeavour related to KM (as an idea or function within management itself), one has to review that which is to be managed – in other words knowledge (as found intrinsically intertwined within a sentient organism).

2.3. Knowledge as a Human Construct

Before one can conceptualise the scope and context of KM, one should first understand the complexity of knowledge as a human construct, related to the endeavours of the individual involved. It allows one to understand the scope and context of '*that which is being managed*', namely knowledge.

Authors like Baker *et al.* (1997), Shariq (1998), Bender and Fish (2000), and Kalpic and Bernus (2006) view knowledge as a human-driven endeavour in which an individual, through experience, training or unique intellectual innovation, possesses knowledge as a cognitive representation that allows that individual to present unique behaviour related to the associated knowledge possessed.

From an individual perspective, knowledge may be generated within the individual by means of unstructured environmental experimentation, a dynamic interaction between environmental factors leading to the understanding of a causal relationship, structured or unstructured learning procedures, the integration of pre-existing cognitive schemata or structured experimentation (Akbar, 2003; Adelstein, 2007). These processes of environmental or social interaction may lead to the development of what may, by extension of the concept of knowledge, be referred to as *implicit knowledge* by authors such as Nonaka (1991), Nonaka and Takeuchi (1995), Eucker (2007) and Nonaka and von Krogh (2009).

The concept of implicit knowledge (Nonaka & Takeuchi, 1995) as a specialisation of the generalised descriptions of knowledge, may be descriptively defined as that which a person knows internally and subjectively, which cannot necessarily be represented externally or objectively to another individual (Geisler, 2007). The process of creating implicit knowledge is influenced by the process of observing external and internal events. Within the field of information theory, focusing on external events (Nonaka, 1994; Cover & Thomas, 2005) supported by cognitive psychology, and focusing on internal constructs (Paavola, & Hakkarainen, 2005; Scardamalia & Bereiter, 2006), a process by which the individual creates implicit knowledge can potentially be deduced.

In terms of the concepts described within information theory, the individual reacts and responds to stimuli originating outside the specific individual (Boon, 1992; Van Dijk, 1999). Based upon the individual's response, the external stimulus is converted into information that the individual can act upon. The moment and individual can act upon the information as perceived; this information is converted into what can be termed knowledge (Triandis, 2000; Williams, 2006).

According to some of the descriptions found in information theory, that process may be viewed as mechanistic by nature, closely related to the knowledge pyramid. To complement the understanding of the creation of implicit knowledge (a specialisation and focused description of the concept of knowledge), one should take into consideration concepts described in the field of cognitive psychology (McShane, 1991; Nelson, 1996; Corbett, 2005; Stahl, 2006). In this instance, the focus will relate to a process of interaction between the individual and society, as described and extended by social psychology. Within these fields, the production or development of implicit knowledge is mediated by a process in which the individual creates mental representations or internal schemas. These internal schemas are representative of an individual's interpretations, understandings, reactions and responses to internal and external stimuli found in a given context (Pfaff, 2006; Schultz, 2006; Miles & Proctora, 2009). The internal schema map allows the individual to interpret and understand external and internal events that have the potential of influencing behavioural outcomes.

Cognitive theory (related to Cognitive Psychology) describes how the individual might be involved in the creation of mental representations of reality (Cress & Kimmerle, 2008; Chen, 2010). These representations allow individuals to act on and adapt to environmental stimuli that may have a positive or negative effect on an individual. Descriptively, these representations may be represented in terms of mental schemas or mental frameworks that may be interpreted as individual cognitive potential (Lina & Huang, 2008; Fu *et al.*, 2010).

According to authors like Condoor *et al.* (1992), Austin (1997), Holmboe (1999), Akgün *et al.* (2003), van Bruggen *et al.* (2003), and Kim and Baylor (2006), if the information received by the

individual does not fit within the cognitive framework (the dynamically interactive construct representing schemata), the individual will mentally experience a process of transition, required to integrate the new source of information into a schematic representation influencing behaviour. Factors influencing this process, as defined by cognitive psychology, includes but is not limited to maturation (biological maturation and growth in terms of the individual's endocrine and nervous system), experience and practice (experience in behaviour related to a person's subjective relationship to physical stimuli), social interaction and transference (mediated by social content transferred during individual development) and equilibration (a self-motivated process in which cognitive development is influenced by subjective problems that an individual encounters) (Condoor *et al.,* 1992; Austin, 1997; Holmboe, 1999; Akgün *et al.,* 2003; van Bruggen *et al.*, 2003; Kim & Baylor, 2006).

As the individual interacts with the environment and other individuals, the individual may become aware of inconsistencies related to current representations of the physical environment (potentially the internal cognitive environment) requiring the assimilation of new stimuli into the individual's existing schema. As the cognitive structures or schemata influence the way in which the individual functions daily, assimilation of information and its integration into schemata will eventually have an impact upon the behaviour or the practical capacity of the individual (McShane, 1991; Nelson, 1996; Fu *et al.,* 2010). It may therefore be deduced that cognitive environment would have an impact on one's knowledge or knowledge-related practical capacity.

To achieve this, the cognitive functioning of an individual is facilitated by two invariant, omnipresent and unchanging methods, namely organisation or the grouping, adaptation and reintegration of new patterns of thought to be understood, and adaptation or the update of cognitive structures to include new concepts not previously present (Kim & Baylor, 2006; Zaeh *et al.* 2009).

In terms of the preceding discussion, taking into consideration cognitive and information theory and aspects from the knowledge pyramid, knowledge may therefore be created by means of the following process:

- The observation of an external event that has a direct or indirect impact on the individual.
- The observation and interpretation by means of mental filters of this event, and integration, interpretation and organisation of that which is being observed.
- The symbolic association with pre-existing representations of similar events and interpretation of the symbolic associations.
- The manifestation of awareness of the symbolic association or representation.
- A subsequent understanding and integration by means of organisation and adaptation of current representations to create a new understanding that has the potential to lead to action. In other words: new knowledge.

Inherently, the implication of the process described above is that knowledge as a concept has an intensely personal relationship with the individual, who observes, reacts and responds to events, either externally or internally, allowing the individual to produce knowledge.

Authors like Jakubik (2007) attempted to simplify the view of knowledge, by identifying views or categories of the concept of knowledge as found in KM literature (as well as other academic treatments of knowledge).

In the case of Jakubik (2007), the author identified four views related to knowledge:

- ***Ontological***, where knowledge is viewed as an objective or subjective entity that is a representation of modes of existence produced by the individual's mind.
- ***Epistemological***, where knowledge itself is an institutionalised fact that needs to be experienced by the individual.
- ***Commodity***, where knowledge is viewed as a resource or a commodity that can be managed, exported, bought and sold.
- ***Community***, which focuses on communal processes that allow for the creation and/or exchange of knowledge.

The four views identified by Jakubik (2007) can be related directly to an individual's creation of knowledge when viewed from an information theory and cognitive approach. According to these approaches, the individual is the owner of the knowledge produced through his/her interaction with contextualised events. Ontologically, it implies a hierarchical relationship between events that becomes information, filtered into knowledge as related to pre-existing internal constructs. Epistemologically, it implies the individual is experiencing that which relates to the created knowledge. If one takes additional cognitive factors into consideration as influenced by the individual's relationship with social units as defined by Social Constructionism (Berger & Luckmann, 1967; Haslam, 2000), one could argue that knowledge can be created by the individual through social interaction and mediation as part of a community. Sharing this knowledge as a resource therefore allows it to be a commodity related to the functional behaviour of the individual.

This implies that the cognitive creation of knowledge by the individual relates to a social construct that the individual mediates in relationship to a social unit as transferred by means of social interaction, symbolism, event interpretation, and cause-and-effect interpretations. Therefore, in all the instances mentioned above, knowledge is a product of a person's response to factors mediated environmentally, cognitively and/or socially. It may therefore be concluded that '*knowledge is a dynamic schematic symbolic cognitive construct mediated by social and environmental interaction that is uniquely centred within the mind of the individual, therefore based in the individual'*.

This leads to a very specific concern: if knowledge is such a deeply entrenched concept linked to an individual and to human-related constructs/cognitive schemata within the individual's mental framework, how will knowledge (in the purest sense of the word) be managed? If approached from a commoditised viewpoint, where knowledge is viewed as a resource (as human beings may be seen as a resource) that can be codified and shared, one has to review some of the processes responsible for the sharing of knowledge as a human-centred conceptual resource. One of the processes of sharing knowledge is explication or to make explicit. In the context of the preceding discussion, knowledge is therefore a dynamic schematic construct mediated by social and environmental interaction that is uniquely centred within the mind of the individual. Hence, when knowledge is explicated, then in the purest sense of the word, the content being represented can under no circumstances be viewed as knowledge any longer.

The subtype of management function or the supporting function of Human Resource Management (HRM) falls beyond the scope of this thesis. The author is attempting to link the functions of management to the concept of knowledge by focusing on the knowledge concept itself. Although HRM could be a natural conclusion of the discussion, it would be conceptually inappropriate to include it. In the preceding sections, the author elucidated the concept of knowledge as a human construct. One may therefore explicitly conclude that, as already stated, knowledge is a dynamic, schematic, symbolic cognitive construct mediated by social and environmental interaction that is uniquely centred within the mind of the individual. The moment that knowledge is explicated, it becomes information that has to be managed and controlled and enters the domain of IM. Figure 1 clearly shows that knowledge is supported by information. One may therefore also systematically conclude that KM should be supported by IM, and that KM cannot be IM.

The following section reviews the meaning of the concept of management, to understand the core idea behind what it implies 'to manage'. This would allow the individual to identify overlapping concepts focusing on managing knowledge or rather, within the scope and context of this discussion, knowledge management as related to its individual concepts.

2.4. Management as a Knowledge Concept

When referring to the simplest definition of management, one has to take into consideration that it originated within the concepts of command and control. Over a period, the functions of management systematically evolved into subunits related to commanding and controlling individuals to achieve certain goals. The subunits, according to authors like Robbins *et al*. (1996), DuBrin (2008), Lussier (2008) and Kerzner (2009), can be divided into planning, organising,

staffing, leading or directing, and controlling an organisation or a group of one or more entities directed towards a specific effort for the purpose of accomplishing a goal (Figure 2).

As may be seen in Figure 2, one of the first concepts that link directly to the idea of command and control refers to leading or the provision of direction, and controlling or monitoring. Simplistically, it may be described as checking on progress and transformation within the scope of a given plan or sets of plans and providing corrective action or guidance if required (Singh, 2008; Northouse, 2009).

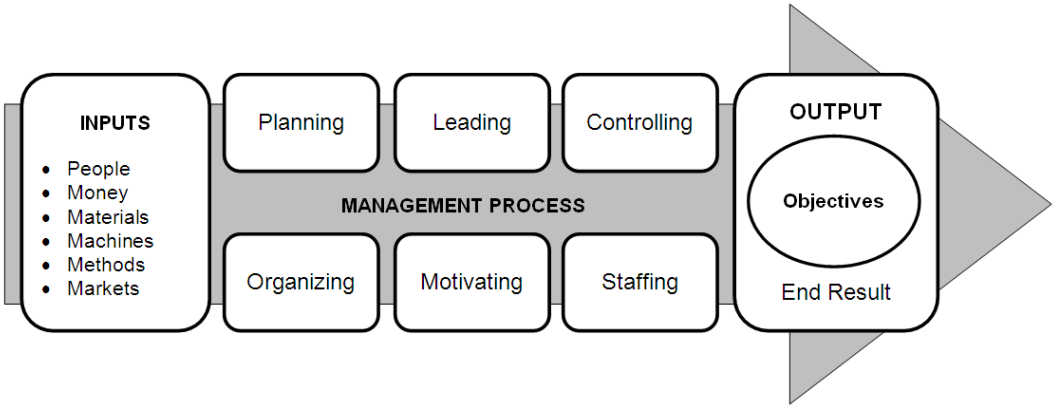


Figure 2: Management Functions
(Adapted from Robbins *et al*., 1996; DuBrin, 2008; Lussier, 2008; Kerzner, 2009)

A potential implication of leadership in this instance is that somebody, an individual or a group of individuals, should be involved in the execution of a plan. Without direction, the individuals will be incapable of fulfilling the vision related to the final purpose of the execution of a plan as held by the leader of an endeavour. The individuals require organisation to finalise tasks and systematically attend to the phases involved in the completion of a specific plan (Bontrager, 2007).

From management theory (Figure 2), one can distinguish the following components related to management:

- ***Planning***: a set of instructions that, if followed, leads to the conclusion and realisation of a set goal. This relates to plans of action that need to be concluded for an envisioned state to be realised (Kerzner, 2009; León-Soriano *et al*., 2010).
- ***Organising***: making use of a variety of resources (time, money, people) within an optimised structure of relationships to effectively and efficiently reach the goal as defined by the plan (Schamp & Deschoolmeester, 1998; Royle, 1999; Kerzner, 2009).
- ***Staffing***: the identification and inclusion of individuals with a unique set of skills that allows the individuals to systematically and effectively complete tasks assigned to them so that the final goal stipulated in the plan may be achieved (Kerzner, 2009, Stewart *et al*., 2010; Warren, 2011).

- ***Leading and directing***: taking leadership and control by determining what needs to be done by individuals to systematically, effectively and efficiently complete tasks related to achieving the final goal as determined by the plan (Schamp & Deschoolmeester, 1998; Royle, 1999; Kerzner, 2009; Stewart *et al*., 2010; Warren, 2011).
- ***Controlling and monitoring***: reviewing the actions taken by individuals assigned to specific tasks related to a plan and taking corrective action if the individuals or the plan start to deviate from the final goal as stated in the main purpose of the plan. Included in controlling and monitoring one would find concepts related to motivation, as motivation can be seen as a type of corrective action providing the impetus to individuals associated with a plan and actions related to the plan (Robbins *et al*., 1996; DuBrin, 2008; Lussier, 2008; Kerzner, 2009).

According to Robbins *et al.* (2000), the abovementioned generic components relate to all types of management. They may be viewed generically as supertypes under which all different types of management can be subtyped into a one-to-many relationship. The implication is that if KM (as a potential management construct) is a subtype of management, one should be able to identify a hierarchical relationship between the processes followed in KM and process components related to management as a generic concept. One would therefore subsequently be able to assume that KM would include aspects of planning, organising, staffing, leading or directing and controlling to achieve a specific goal or objective, as may be seen in Figure 2.

One would be able to indicate at this point that if KM is a subtype of management, then it would fulfil the functions of management. In other words, KM should include the Planning, Organising, Staffing, Leading and directing, Controlling and monitoring of knowledge that is under its care. It has the potential to focus on ‘knowledge of planning’ or ‘planning knowledge’, ‘knowledge of organising’, or ‘organising knowledge’, ‘knowledge of staffing’ or ‘staffing people with knowledge’, ‘knowledge of leading’ or ‘leadership though knowledge’ and finally ‘knowledge of controls and monitoring’, or ‘controlling and monitoring knowledge’. In this section, however, it is unclear and would require a further review of how KM is defined in literature. It may be argued that KM is a type of knowledge and not a type of management but for the purpose of this dissertation the author is focus on KM as a subtype of management.

2.5. Summary

In this section, the author reviewed concepts related to data, information and knowledge as linked to the concept of management. It was found that though there is a perception that data and knowledge have a hierarchical relationship, the relationship is non-linear and focused on the source of knowledge. It was noted that knowledge is inherently a human construct related to the

individual that possesses knowledge. It was concluded that knowledge is a dynamic, schematic, symbolic cognitive construct mediated by social and environmental interaction that is uniquely centred within the mind of the individual, therefore based in the individual. By explicating knowledge, it can no longer be viewed as knowledge and relates more to data than information.

With reference to Chapter Map 03, the contribution of Chapter 2 to the discussion of KM and the KM domain was to identify the general schools of thought within KM literature. It provides an overview of the core ideas of the knowledge pyramid (data, information and knowledge, while still acknowledging the concept of wisdom), and presenting how different points of view relate to the ideas linked to the knowledge pyramid. What was found was a distinction between two schools of thought related to the core structure of KM.

The one school of thought, related to a near mechanistic point of view, links very closely to the ideation of the knowledge pyramid and how the individual concepts are linked to each other as well as to the source of knowledge, information, data and eventually decontextualised and deconceptualised symbolic representations.

The second school of thought links closely to the idea that knowledge is so inseparable from the holder, that the moment it is explicated, it may no longer be considered knowledge. Additional to this, the idea presented conceptually alludes to data, information and knowledge existing in a non-linear yet dynamically integrated relationship closely linked to the holder of the knowledge and the context in which this knowledge holder is found.

After reviewing the concepts in the knowledge pyramid, it was established that knowledge is a human-centred construct that cannot be removed from the knowledge carrier. In other words, if knowledge is made explicit through symbolic representations, then what is being presented can no longer be viewed as knowledge. Chapter 2 in essence presents two main contributions to the argument and the discussion leveraged in this thesis.

(1) The first part of this chapter provides a conceptual dimensioning – in other words, how the individual concepts within the KM domain are linked to each other based on the views and viewpoints of the treatment and discussion of the topic. The first dimension relates to the schools of thought that can broadly be divided into a ‘mechanistic’ point of view, where one would have a structured and sequential relationship between data, information and knowledge. The second point of view is a more human-centred relationship of data, information and knowledge where constructs are dynamically interchangeable based on the scope, context and application of these concepts. Additional to this argument it was found that knowledge cannot be explicated by the individual without being transformed into

something else. The relationships are also non-linear and dynamically interactive as influenced by the nature of the knowledge holder.

(2) In addition to such a dimensioning of concepts to identify the non-linear dynamic and human-oriented dimension of KM, it was also discussed that not only is KM a part of the management domain, but it also presents a case for management being linked to a knowledge domain – inherently implying that management requires a significant level of knowledge to function. This dimension already alludes to the point that KM has the potential to support management as one of the underlying structures facilitating the efficiency of the management domain within the scope and context of an organisation. It was therefore indicated that management includes the concept of knowledge, where knowledge and management would have a bidirectional relationship.

(3) The main contribution of this chapter is to integrate the concepts of knowledge and management, to indicate that knowledge and management, due to their non-linear dynamic human-centred nature, do indeed have a conceptual bi-directional relationship where knowledge needs to be managed and management requires knowledge to function. Although the point may not seem so significant, it does allude to KM being a reality that cannot necessarily be ignored.

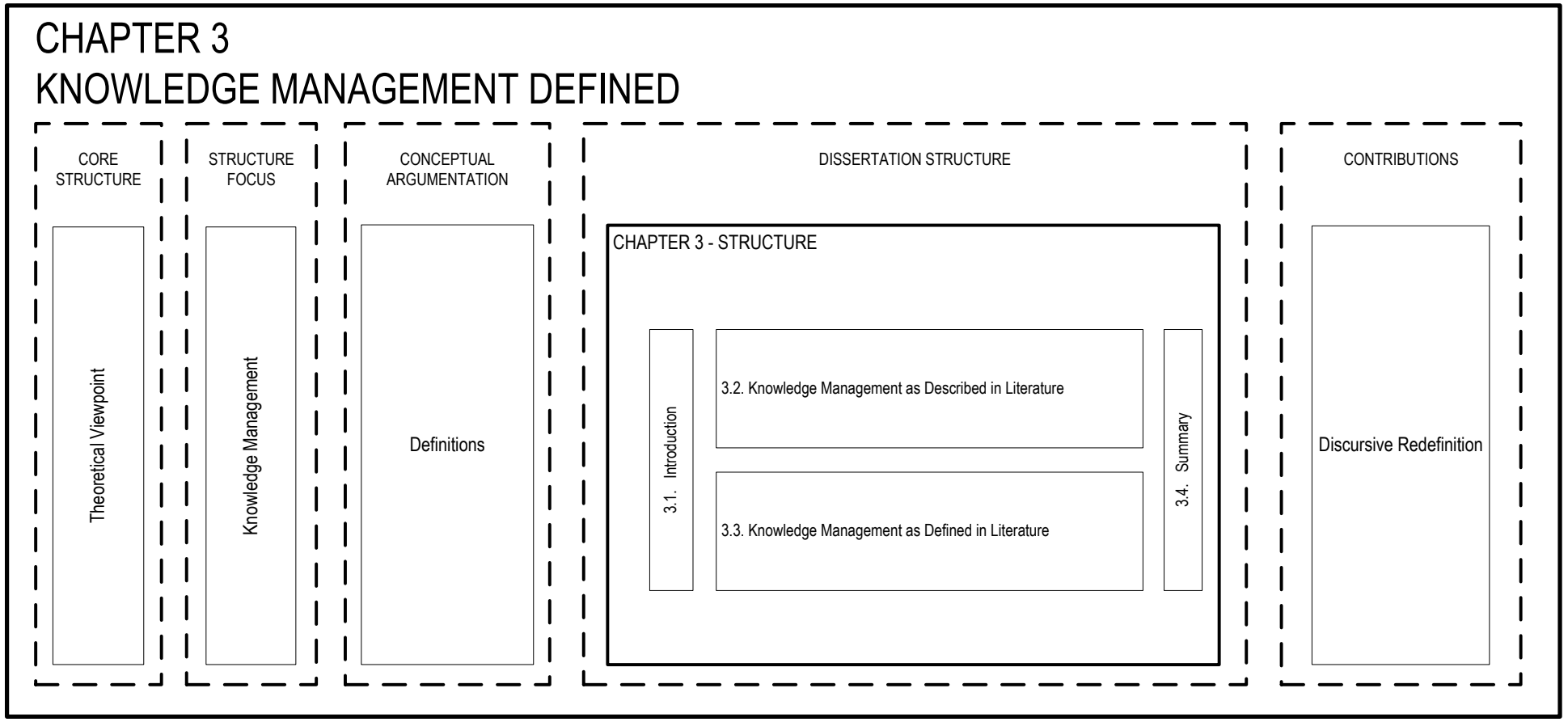
As a result of the review of the fundamental constructs within the KM domain, this chapter therefore presents the following two core contributions:

- **Conceptual Dimensioning** – identifying of the core concepts and their relationships with each other.
- **Conceptual Integration** – stipulating the relationships and importance of the relationships between the concepts traditionally leveraged against KM as a domain.

Additionally, it was noted that knowledge as related to the individual can be managed, in that it is the container of knowledge being managed. When referencing knowledge and management, one finds that KM is a subtype of management and that KM has the potential to refer to ‘knowledge of planning’ or ‘planning knowledge’, ‘knowledge of organising’, or ‘organising knowledge’, ‘knowledge of staffing’ or ‘staffing people with knowledge’, ‘knowledge of leading’ or ‘leadership through knowledge’ and finally ‘knowledge of controls and monitoring’, or ‘controlling and monitoring knowledge’.

There therefore seems to be a clear overlap between knowledge as a human construct and management as a knowledge concept; however, the direction of the overlap is as yet unclear. To clarify the direction of this relationship, KM itself needs to be examined to define it as either a knowledge construct or a management concept.

In Chapter 3 the author will briefly review KM as discussed in literature, after which definitions related to KM will be analysed and discussed. In the process, the author will develop a synergistic definition of KM that would include concepts related to knowledge and those related to management, so that '*Knowledge Management*' may be defined within the scope and context of this discussion.



Chapter Map 04: Knowledge Management Defined

CHAPTER 3: KNOWLEDGE MANAGEMENT DEFINED

Table of Contents: Chapter 3

3.1. Introduction

When referencing the overlap between the concepts of knowledge and management (where KM is a subtype of management) KM has the potential to refer to '*knowledge of planning*' or '*planning knowledge*', '*knowledge of organising*', or '*organising knowledge*', '*knowledge of staffing*' or '*staffing people with knowledge*', '*knowledge of leading*' or '*leadership though knowledge*' and finally '*knowledge of controls and monitoring*', or '*controlling and monitoring knowledge*'. To clarify the direction of this relationship, the general understanding of KM itself has to be refined so that it can be delineated as either a knowledge construct or a management concept. To be able to define the direction of the relationship, we need to construct a working definition of KM as stipulated in literature. It is required to review some of the thoughts and research related to the management of knowledge within an organisation. This review will allow the author to construct a definition that will cover concepts and core topics related to knowledge and how it may be managed. Subsequently, a brief review of literature related to KM will be conducted, whereafter the author will analyse and critique some of the definitions that could be identified. This section does not provide an exhaustive overview of KM literature. It does, however, provide the reader with a background to the arguments related to KM and indicates how the definitions may eventually be critically analysed and reviewed within the context of the thesis. The purpose of this section is to develop a synergistic definition of KM that would include concepts related to '*Knowledge*' and those related to '*Management*' to focus KM as '*Knowledge Management'*. It would subsequently assist in the identification of the scope of KM that would be utilised in the analysis of the fundamental building blocks of KM necessary to satisfy organisational needs. To achieve this, the author will provide a brief discussion of how KM is viewed in terms of literature, and then review, critically analyse and discuss definitions as found and presented in literature and research related to KM (Chapter Map 04: Knowledge Management Defined).

3.1.1. Aim

The aim of this section is to provide an overview of the core concepts that relate to the domain of KM as described and defined in KM literature.

3.1.2. Scope

In order to achieve this aim, concepts related to data, information and knowledge will be covered in the following topics:

- Delineating Knowledge Management
- Defining Knowledge Management

Finally, Chapter 3 concludes with a constructed definition of KM that provides a more synergistic view of the relevant concepts.

3.2. Knowledge Management as Described in Literature

Authors like Rao (2003), van den Berg and Popescu (2005) have indicated that organisations produce large amounts of information or information-related resources within the scope and context of organisational functioning. These informational resources have the potential of providing an organisation with valuable content related to its business environment, allowing the organisation to proactively or reactively respond more efficaciously within a functional business environment.

Functional informational resources not only have the potential to support the organisation in terms of decisions, processes and operations, but also to influence business behaviour for the purpose of strategic advantage within the field in which it functions (Noori & Salimi, 2005; Kanawattanachai & Yoo, 2007). If an organisation proactively harnesses these resources, it can benefit the business. As indicated in Chapter 2, information has the potential for influencing the construction of knowledge. Subsequently, if information is harnessed within the organisation, it would potentially have an impact on how knowledge is constructed or applied by the individuals found in the organisation.

For example, Carneiro (2000) has indicated that the application, capturing and representation (graphically, relationally or informational) of knowledge by means of IT provides an organisation with a competitive advantage either through innovation within the organisation (borrowing from past experience) or through the formulation of a competitive strategy allowing the organisation to react to environmental changes. What Carneiro (2000), Noori and Salimi (2005), Kanawattanachai and Yoo (2007) are alluding to in no uncertain terms is that harnessing knowledge within the scope and context of an organisation would provide a clear advantage.

Not only does the representation of informational resources as potentially related knowledge constructs within the organisation have an advantage for the organisation, it also provides the individual and the organisation with an external memory base or storage medium that can be shared, or extend an individual's or organisation's functional efficiency in terms of the resources that are available. According to Holsapple (2005: 47), '*[c]omputer-based technology has transformed the way in which individuals and organisations accomplish knowledge work by amplifying, complementing, leveraging, and (in some cases) improving on innate human knowledge handling capabilities*'. This implies that computer-based KM has the potential of extending an individual's memory, experience and supporting resources by externalising the individual's memory in an accessible format.

According to Lau *et al*. (2005: 87), KM is '*a set of business processes that capture and deliver the collective experience*' of people engaged in an organisation, as well as sources of information outside an organisation. Subsequently, for this to be an effective endeavour, an organisation is required to develop a KMS that can effectively control the sources of information required for the business process to function as effectively and efficiently as possible. However, due to the nature of the sources of data and information required, it is usually stored in unstructured knowledge repositories that inevitably require the KMS to be capable of categorising and sorting the knowledge repository based on user specifications.

For KM to function effectively, knowledge needs to be captured, codified and stored in such a way that it can be shared and accessed by anyone within an organisation. This implies that the externalisation of knowledge is therefore, in the purest sense of the word, capturing, codifying information so that it may be stored as accessible data. This allows for accessibility and sharing of individuals' experience with the organisation, thereby expanding the organisational memory base by contributing to the general pool of intellectual capital within the limited scope of the organisation's natural and semi-permeable boundary (Alibino *et al.* 2004). Cody *et al*. (2002), Rao (2003) and Noori and Salimi (2005) have indicated that an organisation has to be able to take advantage of data and information originating from within the organisation either through business processes or knowledge work. However, due to the sheer volume of available information and the codification schemes utilised, organisations are investing in technological solutions to extract actionable information from large volumes of unstructured sources of information and data.

Effective management of available resources (structured and unstructured) and the codification of individual knowledge for the purpose of organisational sharing of these informational resources have the potential of giving the individual access to a type of group memory which networks or combines what individuals in the organisation 'know', and what the organisation itself 'knows'. This relates to Giuseppe and Carlo's (1998: 5) view that '*cognitive activities are increasingly being*

performed in [a] networked contexts' that creates a collective intelligence by means of communicative knowledge-sharing networks. As already stated earlier in the thesis, at the base of such a network this collective intelligence requires similar linguistic, psychological and sociological models to represent what people know and how they know it. These linguistic, psychological and sociological models also influence how individuals share what they know within a technical environment. In terms of a linguistic model, communicated knowledge requires a codified structure which is, in part or as a whole, shared and agreed upon by the knowledge-sharing participants. These models or structures are required so that the concepts that the individuals within the organisations shares, contains within it the same agreed-upon meaning (Giuseppe & Carlo, 1998; Holsapple, 2005; van Diggelen & Dignum, 2006; Eucker, 2007).

For individuals in an organisation to be able to share and subsequently leverage what they 'know' in the form of codified information or data (Thomas *et al.*, 2001), the participants in the process of sharing their knowledge (a network of individuals or a network of organisations) require a similar codification scheme as agreed upon within a dynamically interactive social environment (van Diggelen & Dignum, 2006). Based on the individuals' similar psychological and sociological frameworks and their shared codification scheme, the scheme would then be able to allow them to, agree on the collective meaning of the intellectual content being represented in the organisation by the individual (Blackman & Henderson, 2005). For individuals to share meaning between participants in the process of knowledge sharing or collective codification, the individuals require the capacity to network within the organisation, or even between organisations so that the content can be functionally shared.

This is supported by Kanawattanachai and Yoo (2007) who indicated that one of the building blocks of a knowledge-based organisation in which intellectual content is codified and shared between individuals for the purpose of a collective or organisational advantage, is its capacity to network. Networking has been one of the drivers necessitating organisations to communicate across geographic boundaries and through organisational and functional barriers to foster collaboration between sites, customers and suppliers (Scott, 1998). Owing to organisations' becoming more 'virtual' due to their geographically dispersed nature, networking, computer-mediated communication and the sharing of knowledge resources in the form of codified knowledge have become an integral part of an organisation's structure and functioning (Kanawattanachai & Yoo, 2007).

Interoperability, or the ability to have a shared and integrated understanding of the concepts being used, is a key issue in sharing codified knowledge between individuals and organisations by means of a network (Lanzenberger *et al.*, 2008). It allows the utilisation of heterogeneous and distributed resources through the sharing of resources, reusing vocabularies of knowledge and the

features of the available resources. The concern in this instance is that the available tools cannot solve the task of interpreting semantic differences in the application of the vocabulary used to represent the resources that are available (Lanzenberger *et al.*, 2008). To harness knowledge and the explicated version of knowledge (information), one needs to interpretatively share these resources within the scope and context of the organisation.

Driessen *et al*. (2007) created a framework for the evaluation of knowledge mapping tools, dividing organisational knowledge artefacts into entities, activities, concepts, terms, groups, knowledge items and persons, and then placing the components of the framework into a relationship with each other in terms of the class in which the knowledge artefact resides. Though Driessen *et al.*'s (2007) work relates to the evaluation of knowledge mapping tools, it does give an indication that knowledge artefacts can be divided into classes of knowledge artefacts related to each other in terms of a hierarchical relationship to assist in the evaluation of a specific component of KM based on the codification scheme utilised by the tools involved. The framework itself, however, only relates to knowledge mapping tools, and not the larger field of KM or the limitations involved in implementing such initiatives in organisations and between organisations. One critique that this author has in terms of endeavours such as the categorisation and classification of knowledge into artefact-related classes, is that it moves knowledge as one of the core concepts of KM further and further away from KM and subsequently converts it systematically into IM.

Bonifacio *et al.* (2004) indicated that sharing and managing codified knowledge can only be successful if it allows for a certain degree of heterogeneity and organisational distribution. Although it should, according to Bonifacio *et al.* (2004), allow for heterogeneous codified knowledge, the method used to codify the knowledge requires homogeneity, because the scheme used to codify the content should allow the users of the scheme to similarly encode content so that it can be shared. According to Earl (2001), there is a need for a framework, model or methodology that can be used to understand and support knowledge within and organisation, and subsequently support organisational KM endeavours in sharing and the codification of knowledge. This has however, never been successfully achieved due to the size and the scope of the implementation initiatives between organisations (Stuckenschmidt *et al.,* 2005).

The authors mentioned in the preceding section appear to agree that knowledge is an asset in terms of the organisation that, if harnessed and communicated by various means, has tremendous value to the organisation. However, this is where the authors doing research in the KM domain start to split into distinct discourse groupings as to how KM would function as related to knowledge. Several of the preceding authors focus mainly on KM as managing and controlling codified knowledge. Other authors like Amatia and Crestini (1999), Zack (1999), Marwick (2001), Cody *et al.* (2002), Rao (2003), Grobelink and Mladenic' (2005), Holsapple (2005), Noori and Salimi (2005),

Tsui (2005), van Diggelen and Dignum (2006), du Plessis (2007) and many more are progressively focusing on extracting knowledge from the owner of the knowledge, to retain what that individual knows within the organisation. Knowledge is 'extracted' or removed from the owner to make it searchable through indexing and automating knowledge in the form of codes, ontologies, taxonomies, decision trees, etc. However, this implies that a critical aspect of knowledge is being ignored. As previously indicated, knowledge is a human endeavour. When knowledge is codified it is decontextualised and removed from the individual and converted into information, and depending on the medium, into data. In this instance the focus of KM would appear to be the management of mechanisms for the explication, extrapolation, processing and storage of knowledge for future usage.

Conversely, others like Nonaka and Takeuchi (1995), Baker (1997), McDermott and O'Dell (2001), Thomas *et al.* (2001), Alvesson *et al.* (2002), Firestone and McElroy (2005), and Nayir and Uzuncarsili (2008) are focusing more on the more organic psychosocial dimensions of knowledge as related to the individual or the group. According to these authors, knowledge is indeed a human component that, in terms of its explication, reverts to information when communicated and transferred. This suggests that when knowledge is extracted through KM, IM would start to play a role. Therefore, it would appear that KM focuses on the management of mechanisms that support the creation of new knowledge as an intellectual asset that promotes the functioning of the organisation as a social unit. If knowledge is explicated, it would be in the domain of IM and not necessarily any longer in the domain of KM, unless the information is used to support the growth of human-centred organisational knowledge.

For the purpose of this discussion, these two distinct discourses can briefly be classified into two areas, namely 'KM as IM' and 'KM as knowledge support'. In the instance of KM as IM, the main views focus on the explication and externalisation of knowledge as a codified construct (symbolic construct), representing these symbols, and processing, indexing, retrieving, representing and finally interpreting them. In the instance of KM as knowledge support, the human factor is supported though skills, learning, community and interaction.

This difference between the two schools of thought as to what KM is and what KM might be may lead to confusion for individuals and practitioners who do not have an intrinsic understanding of the field. Additionally, the two schools of thought have the potential of obfuscating the subject and the domain in which KM practitioners function.

In the following section, this author will review some of the definitions that can be identified in terms of KM. This will finally allow the author to combine some of the aspects referred to by KM authors, concepts related to knowledge and concepts related to management to synergise these concepts

for the elucidation of a critical definition focusing on previously described and reviewed conceptual constructs.

3.3. Knowledge Management as Defined in Literature

After conducting a non-exhaustive yet thorough search of available academic resources related to KM, this author was able to identify 41 explicit definitions related to KM. The characteristics of the definitions are that they are located in a wide variety of sources, ranging from 1992 to 2006. After 2006 it was found that authors started to reuse existing definitions. The author could identify no new, distinct definitions. This does by no means imply that there are no new definitions, merely that the author could not identify any new definitions with the resources at hand. It is critical to note that the definition listed in this instance is by no means all the definitions related to KM as found in academic literature. In the following section, this author will review the definitions outside the scope and context in which they were originally formulated and used, to review the key concepts stipulated in the definitions themselves. It is critical to note that due to the decontextualised nature of the definitions, the context of the individual definitions could have a bearing on describing the meaning of the definition.

In Table 1, one finds a definition of KM as used by Peters (1992). What is critical to note in this instance is that Peters (1992) refers to the psychology of KM, and explicitly indicates that KM is neither information nor technology. Though not explicitly indicated, one finds that there is even a reference to data in a binary format. The author attempts to indicate that in this instance, KM has a more psychological, human concern, rather than a technological, informational concern. However, other authors do not necessarily share this sentiment.

Table 1: Identified KM Definitions for the Year 1992

Peters (1992)	'*The crux of the issue is not information, [IT] ... the answer turns out to lie more with **psychology** and **marketing** of knowledge within the family than with bits and bytes*'.

In Table 2, the sentiment in terms of KM is already starting to change. Though there is still reference to the human aspect of KM, one finds more and more references to the processing of knowledge. De Jarnett (1996), for example, fails to indicate how knowledge will be retained and disseminated. Macintosh (1996), on the other hand, focuses more on the development and improvement of knowledge while Sveiby (1996) refers to KM as an art focusing on something that cannot be physically commoditised while retaining the qualities of a commodity. What is interesting to note is that contrary to Peter's definition (Table 1), the authors in Table 2 do not clearly indicate how people will become aware of knowledge in an organisation. Peter (1992) refers to marketing,

which is an active process of interaction, while the authors in Table 2 refer to processes of usage and distribution.

What is critical to note in terms of Petrash (1996), for example, is that there is a sentiment that knowledge may be viewed in the same light as information. Petrash (1996) refers to a rehashed version of the Debons (1988) description of an integrated view of information science, where Debons (1988: 2) refers to information systems, focusing on the potential of information to solve problems that relate to 'the provision of the right information at the right time to the right person in the right format so that the right decision can be made', on action obtained from information. One should also note that the definitions of De Jarnett (1996) and Macintosh's (1996) have a close resemblance to Vickery's description of the information life cycle (1987), where Vickery indicates that information, as a cognitive process, is generated, used, distributed, retrieved, stored, organised and gathered (restarting the life cycle). It is clear that the main idea behind KM outlined in Table 2, is that KM is IM, and that knowledge is a version of information. This is not surprising, as the Knowledge Pyramid (Figure 1) does indicate that knowledge is an extension of information and that cognitive variables do play a role in extending information into knowledge. It would be easy to assume that KM may also therefore be an extension of IM. The only author to differ from this view is Sveiby (1996), who focuses on KM being intangible and therefore uncontainable.

Table 2: Identified KM Definitions For The Year 1996	
De Jarnett (1996)	KM is '*knowledge **creation**, which is followed by knowledge **interpretation**, knowledge **dissemination** and **use**, and knowledge **retention** and **refinement***'.
Macintosh (1996)	KM '*involves the **identification** and **analysis** of **available** and **required** knowledge, and the subsequent **planning** and **control** of **actions** to **develop** knowledge assets so as to fulfil organisational objectives*'.
Petrash (1996)	KM is '*getting the **right** knowledge to the **right people** at the **right time** so that they can make the best **decision***'.
Sveiby (1996)	KM is '*[t]he art of **creating value** from an organisation's **intangible assets***'.

In Table 3, the idea that KM is an extension of IM is explicitly reiterated by authors like Bassi (1997), Frappaulo and Toms (1997), and Hibbard (1997). These authors focus on concepts related to explication, documentation, processing and distribution. However, the idea that knowledge relates to the individual does have credence in these specific definitions as it focuses on individual knowledge that can potentially be shared between other people. In Table 2, the majority of the authors focus on processing of knowledge as though it is information, but in Table 3, the authors recognise the role of the individual and the knowledge ownership of the individual.

There is also a trend to refer to knowledge as a strategic management activity. Taylor (1997) for example refers to KM as containing a relationship with a 'human resource strategy' and Skyrme (1997) states that KM involves a 'systematic strategy' related to the organisation. One finds more and more mention of management ideas in terms of the definitions referenced in this period. Terms like *manage*, *strategy*, *tactics*, *management objectives* may be found referenced in this period (Table 3). Authors like O'Dell (1997) and O'Dell and Grayson (1997) emphasise understanding knowledge within an organisation. However, O'Dell and Grayson (1997) also refer to the idea of knowledge as an extension of information as found in Vickery's description of the information life cycle (Vickery, 1987).

It is clear that in this period one finds three distinct ideas related to KM (Table 3). In the first instance, there is an extension of the idea that knowledge is an adaptation of information in alignment with the knowledge pyramid (Figure 1), implying that KM is an extension of IM. The second idea is that KM has a relationship with management concerns. The third idea is that KM should support some sort of sharing mechanism either through explication, capturing and sharing of knowledge in the form of information, or by means of other strategic initiatives that process and view knowledge as an organisational asset. In this instance, one finds that the value of organisational knowledge as a commodity or an asset is emphasised and that value has to be obtained from this commoditised organisational knowledge to support the initiatives of the organisation. There is also an inherent reference to the human factor related to knowledge and KM. Quintas *et al*. (1997) for example refer to the acquisition of knowledge assets, while Taylor (1997) refers to 'human resource strategy' in obtaining appropriate knowledge for the extension of organisational functionality.

Table 3: Identified KM Definitions for the Year 1997	
Bassi (1997)	KM is the '***process*** *of* ***creating***, ***capturing*** *and* ***using*** *knowledge to enhance organisational* ***performance***. *KM is most frequently associated with two types of activities. One is to* ***document*** *and appropriate* ***individuals'*** *knowledge and then* ***disseminate*** *it through such venues as a companywide* ***database***. *KM also includes activities that* ***facilitate*** ***human*** ***exchanges*** *using such tools as groupware, email and the internet*'.
Brooking (1997)	KM is the '***activity*** *which is concerned with* ***strategy*** *and* ***tactics*** *to* ***manage*** ***human centred assets***'.
Frappaulo & Toms (1997)	KM is '*a tool set for the* ***automation*** *of deductive or inherent relationships between* ***information objects***, ***users*** *and* ***processes***'.
Greiner, Böhmann & Krcmar (1997)	KM '*includes all the* ***activities*** *that utilize knowledge to accomplish the* ***organisational objectives*** *in order to face the environmental challenges and stay* ***competitive*** *in the market place*'.

Table 3: Identified KM Definitions for the Year 1997	
Hibbard (1997)	KM is the '*process of **capturing** a company's **collective expertise** wherever it resides - in databases, on paper, or in people's heads - and distributing it to wherever it can help to produce the biggest payoff*'.
O'Dell & Grayson (1997)	KM is '*a **conscious strategy** of getting the **right** knowledge to the **right people** at the right time and helping people **share** and put **information into action** in ways that strive to improve organisational **performance***'.
O'Dell (1997)	KM '*applies **systematic approaches** to **find**, **understand** and **use** knowledge to **create value***'.
Quintas *et al*. (1997)	KM is '*the process of **critically managing** knowledge to meet **existing needs**, to **identify** and **exploit** existing and **acquired** knowledge assets and to develop new opportunities*'.
Skyrme (1997)	KM is '*the **explicit** and **systematic management** of vital knowledge along with its **associated processes** of **creating**, **gathering**, **organizing**, **diffusing**, **using**, and **exploiting** that knowledge*'.
Taylor (1997)	'*Powerful **environmental forces** are reshaping the world of the manager of the 21st century. These forces call for a fundamental shift in **organisation process** and **human resource strategy**. This is [KM]*'.
van der Spek and Spijkervet (1997)	KM is the '*explicit **control** and **management** of knowledge within an organisation aimed at achieving the company's **objectives***'.

It would appear that one is starting to find a shift more to IM in terms of Table 3. At the same time, however, a distinct shift is taking place towards management of the resources associated with knowledge.

In Table 4, the idea of KM as IM persists to some extent, with the concepts of explication, documentation, processing and technology still prominent in the definitions. However, what is critical in terms of this period is the recognition of knowledge as a clear intellectual asset that has potential value for an organisation. Davenport and Prusak (1998) and Davenport *et al*. (1998) indicate that knowledge is dynamic and that it is related to the individual that knows (the knowledge owner). These authors recognise that it is clearly related to the individual, and that KM is an attempt to leverage more effectively the person in terms of the knowledge associated with them. Snowden (1998) extends this idea by recognising that the individual is not the only party to the creation and usage of knowledge; he states that the community or rather the relationship between individuals also plays a role. This refers to Peters' (1992) view that knowledge should be marketed somehow so that individuals may become aware of the intellectual asset that the individual has.

Table 4: Identified KM Definitions for the Year 1998	
Davenport & Prusak (1998)	'*Knowledge is a fluid mix of **framed experience**, **values**, **contextual information**, and **expert insight** that provides a framework for **evaluating** and **incorporating** new **experiences** and **information**. It originates and is applied in the **minds of knowers**. In organisations, it often becomes embedded not only in **documents** or **repositories** but also in organisational **routines**, **processes**, **practices** and **norms***'.
Davenport *et al*. (1998)	KM is an '*attempt to **do something useful** with knowledge, to accomplish **organisational objectives** through the **structuring** of **people**, **technology** and knowledge **content***'.
Malhotra (1998)	KM '*caters to the critical issues of organisational **adaptation**, **survival** and **competence** in face of increasingly discontinuous environmental change. Essentially it embodies **organisational processes** that seek **synergistic combination** of **data** and **information processing** capacity of **information technologies**, and the **creative** and **innovative** capacity of human beings*'.
Snowden (1998)	KM can be defined as '*the **identification**, **optimization** and **active management** of **intellectual assets**, either in the form of explicit knowledge held in **artefacts** or as tacit knowledge possessed by **individuals** or **communities***'.
Wiig (1998)	KM is the '***systematic**, **explicit** and **deliberate** **building**, **renewal** and **application** of knowledge to maximize an enterprise's knowledge-related **effectiveness** and returns on its knowledge **assets** and to **renew** them constantly*'.

In Table 4, the indicated authors nevertheless still focus on dimensions related to KM as IM, as expressed in the definitions that they present. The biggest difference between Table 2, Table 3 and subsequently Table 4 is that the authors referenced in Table 4 distinctly indicate that there is a relationship between people and knowledge, that knowledge is an asset, and that the value of the asset can be leveraged. In Table 4, knowledge may potentially be leveraged by mechanisms that support KM by means of IM. In this instance, the authors are starting to focus on KM as being supported by IM, and not that KM is an extension of the process of IM.

In Table 5, one finds a shift in the way in which KM is defined and described. There is greater emphasis on the managerial aspects of KM, linking KM to management as a managerial subtype. Harris (1999) for example indicates that KM is a formalised business process for leveraging knowledge captured as information and un-captured as individual knowledge. This implies that the

person in possession of knowledge and the explicated information representations are being managed.

There is still mention of aspects related to the management of knowledge represented as information; however, in these instances there is an attempt to make a clear distinction between individual and communal knowledge versus information. Information is referenced as being that which is distributed in various formats that can be leverage as intellectual assets benefitting an organisation.

One finds terms such as *performance* and *capabilities* (Beckman, 1999), *organisational goals* and *strategy-driven motivation* (Beijerise, 1999), *organisational objectives* (Gurteen, 1999), *actively managing* and *leveraging* (Laudon & Laudon, 1999) and *formalised management* (Harris, 1999) associated with KM. This indicates a strong trend towards management ideas being linked to the concept of KM. One also finds concepts related to *culture*, *character*, *personality*, *feelings* (Beijerise, 1999), the *individual* and *community* (Havens & Knapp, 1999) linked to KM. It does appear that the trend in this instance (Table 5) focuses on managing individuals and groups who are in possession of knowledge, and taking various personal socio-cultural factors into consideration when doing so.

Conversely, one still finds references to IM in this period (Table 5), but it would appear as though the perspective is shifting from KM as being part of IM, while IM supports initiatives in terms of KM. The focus in this period seems to be shifting toward support and cooperation between the two management types, in that people are becoming the focus of KM as defined by the referenced authors (Table 5).

Table 5: Identified KM Definitions for the Year 1999	
Beckman (1999)	KM is '*the formalization of and access to **experience**, knowledge and **expertise** to create new **capabilities**, enable superior **performance**, encourage **innovation**, and enhance **customer value***'.
Beijerise (1999)	KM is '*achieving **organisational goals** through the **strategy-driven** **motivation** and **facilitation** of knowledge workers to develop, enhance and use their capability to **interpret data and information** (by using available sources of **information**, **experience**, **skills**, **culture**, **character**, **personality**, **feelings**, etc.) through a **process** of giving **meaning** to these data and information*'.
Bennett & Gabriel (1999)	KM is '*the process that **creates** or **locates** knowledge and **manages** the **dissemination** and use of knowledge within and between organisations*'.
Gurteen (1999)	KM is '*[t]he collection of **processes** that govern the **creation**, **dissemination**, and **leveraging** of knowledge to fulfil organisational **objectives***'.

Table 5: Identified KM Definitions for the Year 1999	
Gurteen (1999)	KM is '*a **business philosophy**. It is an emerging set of **principles**, **processes**, organisational **structures**, and technology **applications** that help people **share** and **leverage** their knowledge to meet their business **objectives***'.
Harris (1999)	KM is '*a business **process** that **formalizes management** and leverage of a firm's **intellectual assets**. [KM] is an enterprise discipline that promotes a **collaborative** and integrative approach to the **creation**, **capture**, **organisation**, **access** and use of **information assets**, including the **tacit**, **uncaptured** knowledge of **people***'.
Havens & Knapp (1999)	'***Community** is the most significant differentiator between [KM] and [IM]. The spirit of [KM] may be defined as knowing **individually** what we know **collectively** and **applying** it; knowing collectively what we know individually and applying it, and knowing what we don't know and **learning** it*'.
Kanter (1999)	'*The derivation of [KM] emanated from its earlier definition of **capturing**, **storing**, and analytically **processing** the data that resides in the various company **databases** for **decision** making*'.
Laudon & Laudon (1999)	KM is '*the **process** of **systematically** and **actively** **managing** and **leveraging** the **stores** of knowledge in an organisation*'.
Swan *et al*. (1999)	KM is '*any **processes** and **practices** concerned with the **creation**, **acquisition**, **capture**, **sharing** and use of knowledge, skills and expertise*'.
uit Beijerse (1999)	'*Knowledge is seen here as **information**; the **capability to interpret data** and information through a process of **giving meaning** to these data and information; and an **attitude** aimed at **wanting** to do so*'.

In Table 6, the shift appears to be drastic, focusing on sharing and support (Huysman & de Wit, 2000) and deliberate management of knowledge as a strategic resource (Mandl & Reinmann-Rothmeier, 2000). The definitions presented by the authors in Table 6, unlike those in Table 5, do not explicitly indicate factors of management or what is being managed.

The focus in Table 6 is more on sharing for the purpose of organisational efficiency. There is no mention of how knowledge will be managed, or that there is a possible relationship between KM and IM, or even that IM supports the functioning of KM.

Table 6: Identified KM Definitions for the Year 2000	
Huysman & de Wit (2000)	KM is about the '***support** of knowledge **sharing***'.

Table 6: Identified KM Definitions for the Year 2000	
Mandl & Reinmann-Rothmeier (2000)	KM is '*an organisational **method** whose main aim is to use the **strategic resource** knowledge more **deliberately** and more **efficiently***'.

In Table 7, one finds that the author focuses on innovation, responsiveness and efficiency (Pohs, 2001). This view is an extension of the view of Table 5 in which Pohs (2001) states that KM supports the efficiency of an organisation to compete in a competitive environment. In Table 5, authors such as Gurteen (1999) and Laudon and Laudon (1999) indicate that KM supports business functions only when leveraging them, or rather, using them appropriately. Pohs (2001), however, now indicates that this should occur systematically. Taking into consideration views from Wiig (1998) and Pohs (2001), KM is a systematic process leveraging individual knowledge (Table 4 and Table 7). All in all, the period does not provide a lot of descriptive definitions.

Table 7: Identified KM Definitions For The Year 2001	
Pohs (2001)	KM is '*a discipline that **systematically leverages** content and expertise to provide **innovation**, **responsiveness**, **competency**, and **efficiency***'.

What is of importance to note here is that Pohs (2001) does not indicate how knowledge will be leveraged. In terms of Table 8, the authors referenced reiterate the view that KM is indeed a management function. However, one also finds that Dick and Wehner (2002) yet again indicate that KM is an extension of IM by referring to Debons' (1988) view that information systems should provide the right information to the right person in the right format so that the right decision can be made. Not only is KM in other words inherently viewed as an extension of IM, but also as an extension of IM systems. This creates a concern in that, although there has been progression in terms of the view of KM, there is also, as seen in the instances of Table 7 and Table 8, a regression.

The understanding of KM has evolved, but in the cited instances, it has split into two schools or tracks. The one track focuses on the management of people who own knowledge and the second track focuses on the leveraging of knowledge as part of a management function supported by IM. In the second instance, KM is described as IM and IM as IM Systems (IMS) that are managed. This is in itself a problematic shift in that it extends KM not only to KM as IM, KM as supported by IM, but also KM as IMS. This extension clearly shows confusion about the core concept linked to KM, namely knowledge. Authors agree that knowledge is valuable, and that it should be leveraged somehow; however, the split in terms of views seems to indicate that there might be differences in perception in terms of the approaches that need to be followed. There is no clear consensus during this timeframe (Table 8) as to how KM may be approached.

Table 8: Identified KM Definitions for the Year 2002	
Darroch & McNaughton (2002)	KM is '*a **management function** that **creates** or **locates** knowledge, manages the **flow** of knowledge and ensures that knowledge is used **effectively** and **efficiently** for the long-term **benefit** of the organisation*'.
Dick & Wehner (2002)	'*The objective of a firm applying KM is simply to make the **right** knowledge available at the right **time** at the right **place***'.

The definition in Table 9 could be seen as a positive development. Gloet and Terziovski (2004) refer to the promotion of access to knowledge and expertise in their definition. This development is significant because it gives an indication of the value of knowledge to KM by indicating a product, namely 'enhanced customer experience'. It indicates that knowledge, if leveraged by either enhancing it, providing access to sources that support the development of knowledge. Access to experts from whom one may learn in a mentorship relationship provides value in terms of 'customer experience'. This relationship is, however, not clearly indicated or stipulated in the definition.

Table 9: Identified KM Definitions For The Year 2004	
Gloet & Terziovski (2004)	KM is '*the formalization of and **access** to experience, knowledge, and **expertise** that create new **capabilities**, enable superior **performance**, encourage **innovation**, and enhance customer **value***'.

Authors of the definitions listed in the preceding tables have mentioned the power and the value of knowledge, and very rarely also indicate why it is important to an organisation. This has led to the eventual development of the OECD (2005) view of KM (Table 10). It would appear that the OECD's (2005) approach was to review and combine some of the aspects mentioned in terms of KM as IM, KM supported by IM and KM as IMS. It still refers to codification as a concern; however, it is critical to note that it integrates sharing, management, procedures, links, use and usage of knowledge. This is critical in that knowledge influences behaviour (as stipulated by the discussion on knowledge in previous sections, as well as the discussion of Figure 1).

Table 10: Identified KM Definitions for the Year 2005	
OECD (2005)	KM involves '*activities related to the **capture**, use and **sharing** of knowledge by the organisation. It involves the **management** both of **external** linkages and of **knowledge** flows within the enterprise, including **methods** and **procedures** for seeking external knowledge and for establishing closer **relationships** with other enterprises (suppliers, competitors), customers or research institutions. In addition to practices for gaining new knowledge, [KM] involves methods for **sharing** and **using** knowledge, including establishing **value systems** for **sharing** knowledge and practices for **codifying** routines*'.

It would appear that the OECD (2005) recognises the three developing views and attempts to integrate them holistically, based on the usage and impact of knowledge within a managed and controlled environment. Lundvall (2005), on the other hand, extends the views by adding the idea of capabilities and competencies as part of KM. In terms of Lundvall (2006), the perspectives related to KM do not really change as perspectives and views already mentioned by previous authors are extended and echoed by Lundvall (2006) in Table 11.

Table 11: Identified KM Definitions for the Year 2006	
Lundvall (2006)	'*The process of* ***managing*** *organisations' existing knowledge is an ancient phenomenon and not new in the portfolio of management activities. Using employees'* ***competences*** *and combining them into organisational* ***capabilities*** *is a requirement wise managers have always been aware of*'.

After reviewing the definitions by table each year, it is clear that there is a divergent view of KM that developed over the cited period. One would expect that the definitions each year would present a homogenous point of view but this is clearly not the case. What is clear is that even within the same year range, authors have diverse views of KM addressing different dimensions and understandings of KM.

From the definitions listed in Table 1 to Table 11, it has become clear that, according to the authors listed, there is a wide variety of views of KM. What is of importance is that all the authors in these tables indicate the direction of the relationship in terms of knowledge being managed. The authors clearly suggest that KM is not knowledge of management, but that KM focuses on the management of knowledge. If one refers to management as a knowledge concept, it could have been concluded that KM should include planning, organising, staffing, leading and directing, controlling and monitoring of knowledge that is under its care. It could have had the potential to focus on '*Knowledge of Planning*' or '*Planning Knowledge*', '*Knowledge of Organising*', or '*Organising Knowledge*', '*Knowledge of Staffing*' or '*Staffing people with Knowledge*', '*Knowledge of Leading*' or '*Leadership though Knowledge*' and finally '*Knowledge of Controls and Monitoring*', or '*Controlling and Monitoring Knowledge*'.

The analysis of the definitions indicates that, according to the authors listed (Table 1 to Table 11), what is being managed is knowledge, and not knowledge of management. This would lead to a change in terms of the perceived processes of KM as it relates to being a management subtype. In other words, it would inherit functions from management. It would also be pertinent in this instance to indicate that if KM were a function of management, where knowledge is being managed, then the input to KM would be the same as that of management, namely people, money, materials, machines, methods and markets. The main output of KM, as supported by the listed authors, is a

potential advantage for the organisation. It should also be noted that KM is viewed as being part of a process which it should be continuing, and on-going, transforming, interacting, acting and reacting. Taking the idea that knowledge influences behavioural exemplification, actions and practical skills (McShane, 1991; Nelson, 1996; Fu *et al.,* 2010), extending knowledge to an organisational and community level would have a similar effect on a larger scale. Managing knowledge on an organisational level would then have the potential of influencing the behaviour, interactions and reactions of an organisation on a larger, process-driven scale. Figure 3 illustrates a representation of the KM process in which factors related to KM, as defined by the authors in Table 1 to Table 11, would be included.

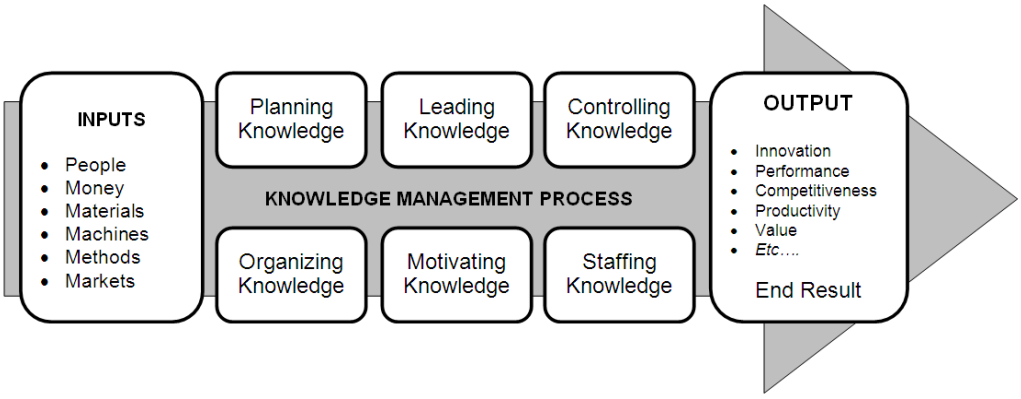


Figure 3: Knowledge Management Functions[4]
(Adapted from Robbins *et al*., 1996; DuBrin, 2008; Lussier, 2008; Kerzner, 2009)

Further analysis of the definitions has indicated that there is a strong relationship between KM and IM. One also finds an additional relationship of KM relating to IMS. However, IMS may be viewed as a subtype of IM. As indicated previously, knowledge is a '*dynamic schematic symbolic cognitive construct mediated by social and environmental interaction that is uniquely centred within the mind of the individual*'. The moment that knowledge is explicated, it becomes information and then it needs to be managed and controlled as information and may therefore inherently become the domain of IM. It therefore allows this author to conclude that contrary to some of the stipulations of authors such as Petrash (1996), Amatia and Crestini (1999), Kanter (1999), uit Beijerse (1999), Zack (1999), Marwick (2001), Cody *et al*. (2002), Dick and Wehner (2002), Rao (2003), Grobelink and Mladenic' (2005), Holsapple (2005), Noori and Salimi (2005), Tsui (2005), van Diggelen and Dignum (2006), du Plessis (2007), ***KM cannot be seen as IM*** [author's emphasis]. The source of

[4] As updated though analysing the definitions from Peters (1992); De Jarnett (1996); Macintosh (1996); Petrash (1996); Sveiby (1996); Bassi (1997); Brooking (1997); Frappaulo and Toms (1997); Greiner, Böhmann & Krcmar (1997); Hibbard (1997); O'Dell and Grayson (1997); O'Dell (1997); Quintas *et al*. (1997); Skyrme (1997); Taylor (1997); Van der Spek and Spijkervet (1997); Davenport and Prusak (1998); Davenport *et a*l. (1998); Malhotra (1998); Snowden (1998); Wiig (1998); Alavi & Leidner (1999); Beckman (1999); Beijerise (1999); Bennett and Gabriel (1999); Gurteen (1999); Harris (1999); Havens and Knapp (1999); Kanter (1999); Laudon and Laudon (1999); Swan *et al*. (1999); uit Beijerse (1999); Huysman and de Wit (2000); Mandl & Reinmann-Rothmeier (2000); Pohs (2001); Darroch and McNaughton (2002); Dick and Wehner (2002); Gloet and Terziovski (2004); OECD (2005) and Lundvall (2006)

information managed by IM is KM, as the explicated knowledge reverts to information that can be managed by IM structures.

This also leads this author to agree with authors like Peters (1992), Nonaka and Takeuchi (1995), Sveiby (1996), Baker (1997), Brooking (1997), Davenport and Prusak (1998), Davenport *et al*. (1998), Snowden (1998), Beckman (1999), Beijerise (1999), Harris (1999), Huysman and de Wit (2000), Mandl and Reinmann-Rothmeier (2000), McDermott and O'Dell (2001), Pohs (2001), Thomas *et al*. (2001), Alvesson *et al*. (2002), Darroch and McNaughton (2002), Gloet and Terziovski (2004), Firestone and McElroy (2005), Lundvall (2006), Nayir and Uzuncarsili (2008) that ***KM is a management process supported by IM*** [author's emphasis]. The implication is that if IM structures are insufficient in terms of an organisation, then KM will not function effectively, as the two work closely together to allow people to access and share knowledge in a conducive environment within an organisation.

When referring to Figure 3, one finds that there are a few components missing in terms of the KM process. Figure 3 refers mainly to KM as a management function. However, KM requires the support of IM so that it may in turn support other management functions to leverage organisational knowledge to support the objectives of this organisation. If IM and the resources responsible for the support of KM go hand in hand with KM, then it is required to update the idea of KM as a management process on its own. Just as knowledge is a '*dynamic schematic symbolic cognitive construct mediated by social and environmental interaction that is uniquely centred within the mind of the individual*', so one can also extend the idea and conclude that KM could be equally dynamically mediated by its environment, processing or transforming organisational inputs into organisational outputs and influencing quality, behaviour, actions and reactions within the organisation through the knowledge being managed.

KM cannot function effectively on its own. It requires support from IM so that it may support the organisation. Part of the supporting functions of KM and the environmental variables related to KM should be included in terms of KM as a management function. One would therefore have to conclude that KM could be illustrated as in Figure 4.

In Figure 4 shows that, based on the previous authors, KM is a process that functions as part of a management process. As a process that transforms and influences behaviour, one would have to assume that there has to be some sort of input and some sort of output. The inputs in terms of KM as a management function would therefore be similar to that of a management function. The main difference in this instance is, as previously indicated, that it includes a knowledge focus. The output in terms of KM would also be similar to that of management; however, through the leveraging of knowledge, for example, enhanced innovation, organisational performance and competitiveness

may be achieved. The process involved in KM would also lead to the creation of new knowledge that can in itself be a new input into KM.

One could in this instance indicate that, if one extends the idea that knowledge is the product of a cognitive function, that knowledge is self-perpetuating and self-enhancing. What it means is that the more knowledge is available and produced, the more knowledge can become available and can be produced. The knowledge that is part of the output of KM as a management function, would therefore be a new knowledge source for input into KM cycling forward ad infinitum (in a perfect and optimised scenario). Although a wide variety of environmental factors would influence this cycle, one would still have the potential of an output of knowledge becoming an input of knowledge.

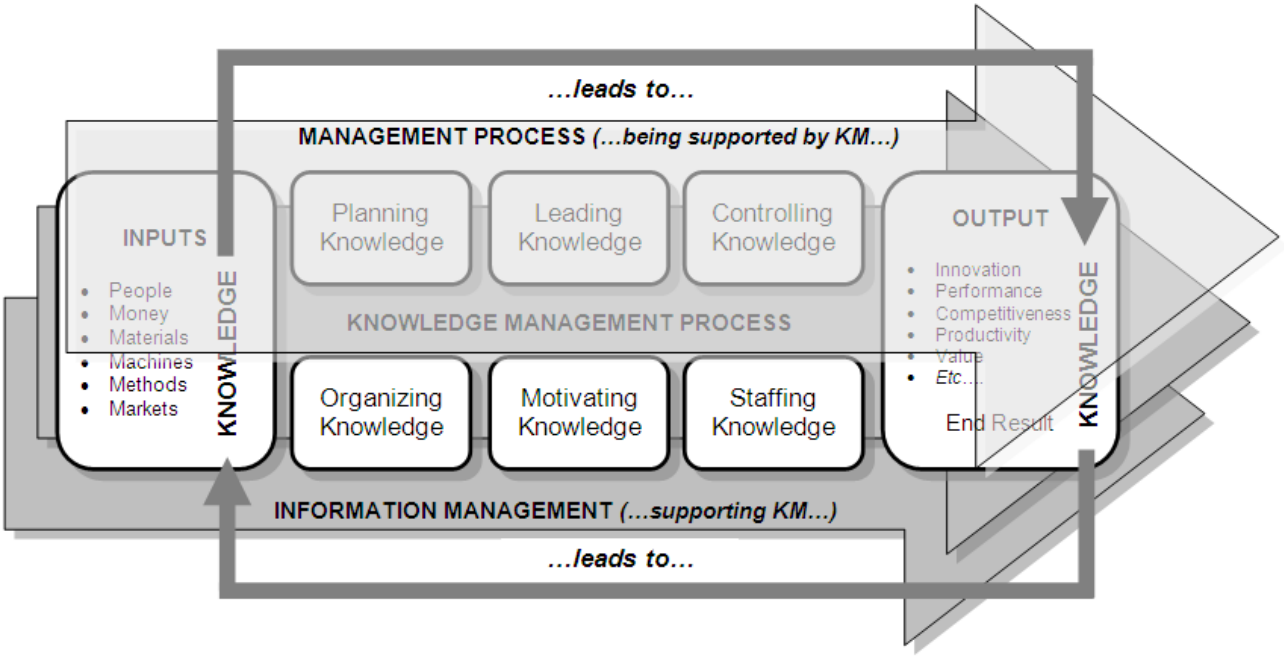


Figure 4: Knowledge Management
(Adapted from Figure 2: Management Functions and Figure 3: Knowledge Management Functions)

Since KM is a process related to the functions of management, one can conclude that the behaviour that KM elicits within the scope of the organisation should support the long-term goals and objectives of the organisation. One would therefore find that if layered, KM would organisationally be a subtype beneath management and management functions. As stipulated earlier, KM is supported by IM. This means that it makes use of the services provided by IM to function. Some of the output of IM will therefore be inputs into KM, and some of the output of KM would also become an input into IM. For the purpose of this discussion, we do not aim to discuss these inputs and outputs. We do however, acknowledge that they exist.

As part of KM (Figure 4), one would also find management functions directed towards the input of knowledge as well as the output and usage of knowledge in support of management objectives and goals.

These management functions extended to relate to KM are as follows:

- ***Planning Knowledge***: As related to management, planning in this instance still refers to the instructions that lead to a given conclusion and the realisation of set goals (Kerzner, 2009; León-Soriano *et al*., 2010). However, contrary to planning in management, planning knowledge would refer to the goal of obtaining and leveraging knowledge that would support the improvement goals of an organisation. This could include developing plans of action that for improving knowledge acquisition, knowledge retention and knowledge sharing within an HR-related context. It can also affect how knowledge when explicated as information may be managed and supported by IM. This would in essence have a close relationship to staffing in that knowledge as a human construct needs to be obtained through recruiting the right people for the right job to improve organisational functionality and productivity. It also relates to ensuring access to knowledge and information resources to support KM as a management function.
- ***Organising Knowledge***: In this instance, organising knowledge also makes use of a variety of management resources (time, money, people) within an optimised structure of relationships to effectively and efficiently reach the goal as defined by the plan (Schamp & Deschoolmeester, 1998; Royle, 1999; Kerzner, 2009). What is critical in this instance is that the knowledge being organised is yet again the source of knowledge (functioning as a self-perpetuating process). It may be an expert, professional or new recruits that own the required type of knowledge. This allows the knowledge owner to be repositioned in the organisation and recognised as the knowledge owner, or providing access to the knowledge owner so that other individuals who do not have the capacity to behave as dictated by the unique set of skills related to the individual's knowledge, can '*learn from the master*' or have access to the source of knowledge. This can also include a process where experts are brought together communally to solve a problem. This scenario applies the strengths and weaknesses of the knowledge owners. After the situation instigating convergence has been resolved, the knowledge convergence is disbanded or diverged to dynamically and organically change and update group relationships based on skills and capacity.
- ***Staffing Knowledge***: Similar to the management function, staffing knowledge includes the identification and inclusion of individuals with a unique set of skills that allows the individuals to systematically and effectively complete tasks assigned to them, so that the

final goal as stipulated within the plan may be achieved (Kerzner, 2009, Stewart *et al*., 2010; Warren, 2011). In this instance, the focus is quite similar to a generic staffing management function. One should obtain the right person for the right task. This occurs to enhance that person's knowledge through interaction and experience (mentorship), to complete tasks more effectively (productivity), or to provide guidance to those who do not have adequate knowledge to complete a task effectively (sharing). The focus would therefore be the enhancement of organisational knowledge through recruitment of the right people with the right knowledge (sourced internally or externally) to complete tasks, or sharing knowledge within a communal relationship so that individuals may gain and obtain new knowledge.

- ***Leading Knowledge***: In this instance, the management function would be adapted to imply the leadership through knowledge as well as leading knowledge owners. Leading knowledge still refers to leadership. One would take up a leadership role in which control is exerted by determining what needs to be done by individuals to systematically, effectively and efficiently complete tasks related to achieving the final goal is determined by the plan (Schamp & Deschoolmeester, 1998; Royle, 1999; Kerzner, 2009; Stewart *et al*., 2010; Warren, 2011). One of the potential implications would be leading through knowledge. A person who is a knowledge leader would take up a leadership role (right person for the right task), and the people around this skill would then be selected to fulfil the requirements of a business objective. It also could imply leading knowledge. The person with the correct and most appropriate knowledge would lead other individuals who own the most appropriate knowledge.
- ***Controlling Knowledge***: To control knowledge as a management function would still imply actions required to rectify possible errors and reward success or innovation. In addition, it implies knowledge leadership. An individual would not be able to direct and guide the knowledgeable, if this individual fulfilling a leadership role did not have the most appropriate knowledge themselves. One would still, as a management function, find concepts related to motivation to provide impetus to individuals associated with a plan and actions related to the plan (Robbins *et al*., 1996; DuBrin, 2008, Lussier, 2008; Kerzner, 2009). Additionally, motivation related to the management of the knowledge holder by the knowledge leader, one would also find motivation towards knowledge improvement and knowledge sharing. If taken into consideration that a group of individuals are in a knowledge relationship and interacting to fulfil the roles of a group, there would inherently be a factor of socialisation, externalisation and subsequent internalisation. Control would mean supporting the impetus for sharing, socialisation, externalisation and internalisation, as well as correcting inhibited sharing, socialisation, externalisation and internalisation. This can be done through facilitating the environment or motivating the group.

- ***Motivating Knowledge***: This process has a close relationship with knowledge leadership and knowledge control. It is in essence an extension of knowledge control as if done effectively; knowledge holders and knowledge owners would share more effectively and support knowledge work and knowledge exchange more readily.

When one includes the notion that KM is supported by IM, and IM supports KM, then one should also include the notion that KM should functionally make use of the inputs from IM, and provides inputs into IM. However, when knowledge is explicated and it becomes information, then information becomes the IM as a management subtype. The knowledge owners can take control of the process by fulfilling a dual role as IM specialist. This means that a knowledge manager would have to have knowledge of IM and the resources available to and provided by IM.

In Figure 4, one would therefore find a more descriptive overview of KM as a process. KM cannot function on its own, and it provides critical input into management so that the final purpose or objective of the organisation as a whole can be supported. In this context, one would be able to make use of these factors to holistically define the scope and content of KM. In the following section, this author will take the factors as indicated in figures 1 to 4, tables 1 to 11 and knowledge as a human construct into consideration to formulate a definition of the field of KM.

3.4. Summary

In the previous section, the author reviewed the knowledge pyramid (Figure 1) and knowledge as a human construct. It was indicated that knowledge is supported by data and information and that these factors influence the construction of knowledge, that knowledge is directly related to a human being and that it has the potential to influence the behaviour of an individual. It was also indicated that knowledge could be shared between individuals by means of a process of interaction within a social unit or group. It was concluded that even though knowledge is contained within the cognitive framework of the individual, it is dynamically and systematically constructed and extended by an individual interacting with other individuals in a social structure, therefore making knowledge not only individual, but also communal.

It was also concluded that the general trend in literature is that knowledge can be explicated, in other words converted into information through externalisation to extend the reach of an individual's knowledge through time and space. Explication extends the life cycle of knowledge beyond the lifespan of the individual, and it extends the reach of knowledge through mechanisms such as networking in which technology enables the distribution of information. However, in terms of this discussion, it was generally concluded that knowledge and information are not the same. Even though information can extend the lifespan of knowledge in lieu of the knowledge owner

(depending on the medium), knowledge is still retained within the individual as related to the dynamic systematic interaction between individuals in a communal relationship.

After reviewing the concepts of management as knowledge construct, the author found that for knowledge to be managed, it should be compliant with the functions of management. Therefore, for KM to exist one should manage knowledge by means of the same functional structures and components to which all other types of management have to comply. KM should subsequently support the final objectives and goals of management as a whole. After evaluating definitions related to KM that developed over a period, this author found that a large number of the definitions allude to management, but do not necessarily specify it as being focused on information or individuals.

Further, when reviewing the various definitions of KM, it was found that KM has certain outputs. All the authors responsible for the various definitions (Table 1 to Table 11) indicated that this output was to the benefit of the organisation as a whole. It improved the functionality of the organisation by providing access to knowledge resources that had previously been unknown or unavailable to the individual functioning in the organisation. It was also found that for KM to function, there has to be certain informational or knowledge-based inputs to the organisation, to provide an output of organisational enhancement based on management function. The KM-related inputs and outputs imply that KM is a continuous process that supports the organisation.

In terms of access to knowledge, one also finds that a knowledge environment requires facilitation and support. For knowledge to be available to other individuals in the organisation, various supporting functions should be available. One of the components that plays a role would be access to information and sources of knowledge. Information has the potential to support knowledge and influence an individual's behaviour based on his/her knowledge, and conversely, knowledge has the potential of becoming information. One cannot have knowledge without a knowledge owner; therefore one should have the correct type of knowledge owner at the right place within the most appropriate position, either temporarily or permanently, to make use of his/her knowledge.

It was also indicated that due to the relationship between information, knowledge and the individual within a group as managed within the organisation, KM requires IM to support it. Knowledge is extended when it is explicated or externalised in the form of information. What one would therefore find is that KM is supported by IM and cannot function on its own. Additionally, it was also concluded that KM supports management as a whole due to the process of taking information and transforming it into behaviour-modifying knowledge. Behaviour-modifying knowledge has the potential of leading to more knowledge that either can be a new source of knowledge, or when

externalised, converted into information. Changes in behaviour allow individuals to act to support the functioning of the organisation and/or the management thereof.

Based on the various conclusions and discussions, as well as Figure 4, one would therefore indicate that KM should be compliant with the following:

- Knowledge being managed is directly related to the individual
- The individual whose knowledge is being managed, also relates to individuals within a group
- Individual knowledge is dynamic – group knowledge is dynamic
- KM should be compliant with management functions within the broader scope of the organisation
- KM should support management functions
- KM functions as a transformative process based on knowledge and information inputs
- KM functions as a transformative process producing knowledge and information outputs
- KM relates to individual behaviour
- KM relates to group behaviour
- KM requires support from IM to function
- KM makes use of IM outputs – KM provides IM inputs

As KM seeks to manage knowledge as well as the owners of knowledge (being complaint with the management function), one has to conclude that one of the critical components of KM is indeed knowledge. Without knowledge, KM would not exist. As indicated, knowledge is a '*dynamic schematic symbolic cognitive construct mediated by social and environmental interaction that is uniquely centred within the mind of the individual'*. Conversely, without management, KM cannot exist; and it requires management functions to be relevant in supporting management and the organisation.

In reference to Chapter Map 04, the main contribution of Chapter 3 is a discursive redefinition of KM as a management domain. The redefining of KM allows for the establishment of a KM scope or domain that assists in structuring further analysis of KM for identifying KM building blocks as applied within the scope and context of an organisation. It also allows for the alignment of KM concepts and constructs through the analysis of the language used by KM theorists and practitioners, placing the scope and context of KM application in the context of an organisation by focusing on what KM theorists expect of KM, and how KM practitioners apply KM within organisations.

Based on the redefinition of KM it was also stipulated that KM functions as an interface between management processes and IM, to functionally assist management in achieving its goals through

the application of supportive and mediated knowledge resources. Based on the core discussions in this chapter, the contributions are:

(1) Evaluating how KM's definition evolved over time to include additional dimensions per evolution iteration as it become clearer that KM plays a significant role within management. However, the role was misunderstood, as the concept was misunderstood. The definitions therefore expanded, including additional dimensions and evolutionary components required for the understanding of KM as it evolved over time.

(2) By evaluating the components of the evolving definitions, it was possible to identify the components linked to KM that support organisational functioning and management processes – thereby clearly indicating that KM functions as a mechanism that supports management processes and through this support, functions as a management domain. KM is therefore indeed a management domain as it has similar, related and cross-relational characteristics that link it to management as a domain of interest and focus.

(3) Associated with point (2), the chapter contributes to the redefining of KM as a management domain by stipulating and providing an inclusive definition that covers evolutionary aspects of KM with management processes – inherently and subsequently redefining KM.

Ultimately, Chapter 3 serves to dimension and to redefine KM as follows:

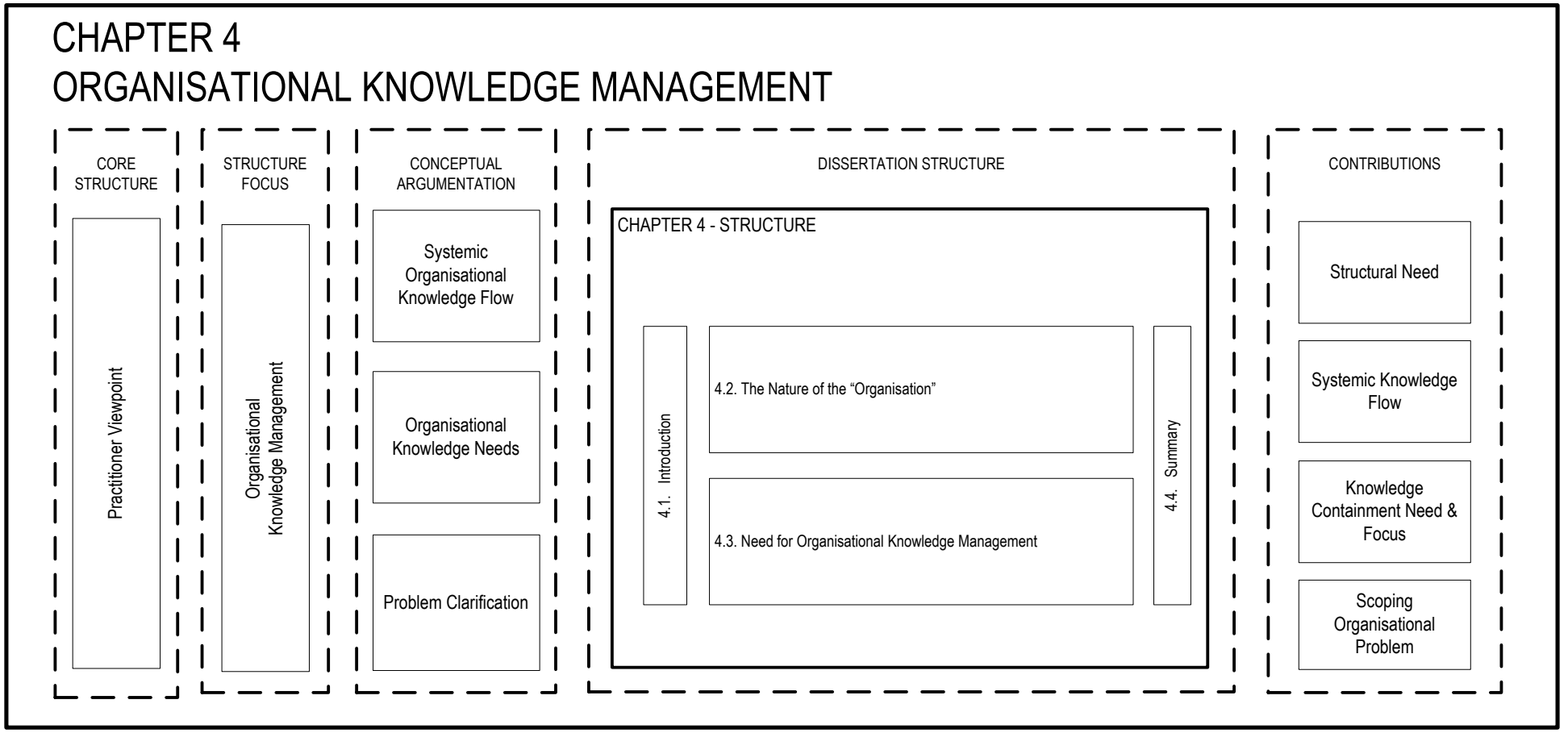
> ***KM is a management process that supports the overall functioning of the organisation by enhancing, managing and leveraging knowledge of individuals as found and constructed in dynamic interaction between individuals in a group relationship, that makes use of supporting functions of IM, to assist and facilitate organisational behaviour in achieving the overall goals and objectives of an organisation by supporting organisation management***.

It defines the scope and context in which KM is applied and how KM may be applied. For KM to function in an organisation, inherently it should provide value to the organisation and address management objectives and outcomes. To do this, it requires and seeks to facilitate the knowledge, skills and the behaviour of individuals in the organisation by providing access to information resources and knowledge resources.

As such, the final core contribution of this chapter is a *discursive redefinition* of KM by including and linking evolutionary changes to recent discourse in KM, and by linking KM directly to management processes stipulating that KM is indeed a domain linked to management.

For KM to function in an organisation, it should provide value to the organisation and address management objectives and outcomes. To do this, it requires and seeks to facilitate the knowledge, skills and the behaviour of individuals in the organisation by providing access to

information resources and knowledge resources. To do this, it has to be integrated and in alignment with the final requirements and goals in an organisation. In the Chapter 4, the author will review the concept of organisational KM and the need for organisational KM as defined by the structure and the nature of the organisation, related to the flow of knowledge into and out of such a structure.



Chapter Map 05: Organisational Knowledge Management

CHAPTER 4: ORGANISATIONAL KNOWLEDGE MANAGEMENT

Table of Contents: Chapter 4

4.1. Introduction

In the Chapter 3, the author reviewed various concepts related to the field of KM, to delineate and define KM as a sub-management type. It was indicated that KM might be viewed as a subtype of management that supports the function of management in that it has the potential for improving knowledge acquisition, distribution and utilisation within an organisation, thereby improving productivity through the process of supporting organisational activities and behaviour. It was indicated that because KM is a subtype of management related to the improvement of management within the organisation, its contextually and situationally appropriate implementation of KM would have the potential of improving management as a whole. This implies that it would also have the potential of improving organisational behaviour.

Taking into consideration that '*KM is a management process that supports the overall functioning of the organisation by enhancing, managing and leveraging knowledge of individuals as found and constructed in dynamic interaction between individuals in a group relationship, that makes use of supporting functions of IM,* to *assist and facilitate organisational behaviour in achieving the overall goals and objectives of an organisation by supporting organisation management*' then, as a type of management, KM would also be compliant to many of the typographical mechanisms that assist in scoping KM within an organisation. The typographical scoping of KM, based on attributes and methods, can assist in creating a KM artefact describing KM as applied in an organisation for satisfying needs for knowledge within an organisation.

To understand the need for KM within an organisation, one needs to understand the nature of the organisation in terms of its general structure, the location of knowledge and how knowledge can be

transferred between the individuals in an organisation. Although the nature of the organisation needs to be reviewed to understand the relationship between KM and the organisation as well as the need for KM, the core focus of Chapter 4 is not to delineate the levels of KM within the structural levels of the organisation, but to understand the value of organisational KM and needs associated with organisational KM (Chapter Map 05: Organisational Knowledge Management).

4.1.1. Aim

The aim of this chapter is to identify the value and therefore the need for KM within the organisation.

4.1.2. Scope

To achieve this aim, concepts related to the nature and structure of an organisation as well as organisational KM will be reviewed in terms of:

- Delineating the nature of the organisation
- The need for organisational knowledge management

Chapter 4 will conclude with a constructed evaluation framework that can be used to evaluate the nature of KM within the scope and context of an organisation.

4.2. The Nature of the 'Organisation'

To delineate the scope of what it means to be an organisation, it would be prudent to review some of the views and perspectives associated with what differentiates an organisation from a random assortment of people presenting a set of distinct behaviours.

There are several viewpoints on what one may use to describe an organisation. A possible definition of an organisation is given by Schein (1980: 15):

> '*An organisation is the rational coordination of activities of a number of people for the achievement of some common explicit purpose of goal, through division of labour and function, and through a hierarchy of authority and responsibility*' (Schein, 1980: 15).

Schein (1980) proposes that for a structure or grouping of people to be viewed as an organisation, there has to be some sort of rationale behind the way in which the individuals in the group function. Schein's (1980) definition focused on the purpose, goals, division of labour, roles and

responsibilities assigned to these roles. This would allow the individuals in the group to know what they should be doing in the group as driven by the group purpose.

To elucidate the methods by which an organisation may be classified as an organisation, Cushway and Lodge (1999) have reviewed the main classification theories assigned to organisations based on an organisation's structures and purpose or its power relationships. Cushway and Lodge (1999) examined the perspectives of authors such as Weber (1964), Blau and Scott (1966), Burns and Stalker (1966), Perrow (1967), Lawrence and Lorsch (1969) Etzioni (1975), Katz and Kahn (1978), Woodward (1980) and Beardshaw and Palfreman (1990). It was found that for an organisation to exist, there are some common aspects that one can take into consideration when classifying an organisation. These aspects are:

- ***Common purpose***: The individuals in the grouping share a common goal or purpose. This purpose is generally known to the individuals who work together to direct the efforts of the individuals to achieve the purpose or the goal of the group.
- ***Structure***: In terms of an organisation, there has to be some sort of structure to direct the efforts of the individuals involved. It helps to avoid duplication in effort and to drive the individuals to systematically achieve the goals associated with the grouping or organisation. Without structure, there would be no direction; without direction, there would be no drive; subsequently, the organisational goal(s) would not be achieved.
- ***Process for coordinating activities***: In this instance, one would refer to the mechanism or activities that assists in directing uniform activities towards a goal. These activities drive individuals to know or understand the roles and responsibilities assigned to them, so that tasks may be directed and controlled by means of organisational feedback together with corrective actions if the overall direction of the individuals in the organisation does not focus on the goal of the organisation.
- ***People with roles and responsibilities***: Within the scope of an organisation, individuals are assigned specific roles that assist in completing tasks designed for and designated to them to systematically achieve the goal of the confluence of individuals.

Fundamentally, it implies that building a structure and driving this structure by assigning roles and responsibilities to individuals for developing processes directed toward a goal results in an organisation. Without structure, without processes or without goals, an organisation would simply be a random assortment of individuals presenting behaviour based on group dynamics.

It is critical to note in terms of the classification and the definition of an organisation that the organisation is intrinsically made up of people. Each individual within the organisation assists in creating the organisation. Simply stated, an organisation is a confluence of individuals with roles and responsibilities that assist them in completing specific tasks and activities within a larger

grouping of individuals. These roles and responsibilities assist in directing the group towards achieving a goal systematically. Fuelled by the purpose of individuals interacting dynamically with each other, the organisation is directed towards achieving its goal.

In Figure 5, one can see that for an organisation to exist there has to be individuals. These individuals are required to work together to achieve an organisational goal. One can say that for example, each individual can work systematically to achieve goals; however, the size and scope of the goal can be simplified when individuals combine their efforts to achieve very large and elaborate goals.

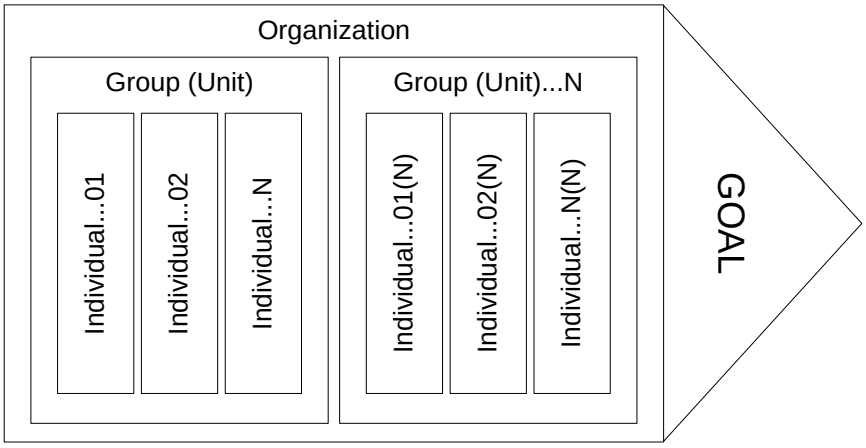


Figure 5: Simplified Organisational Structure
(Derived from Weber, 1964; Blau & Scott, 1966; Burns & Stalker, 1966; Perrow, 1967; Lawrence & Lorsch, 1969; Etzioni, 1975; Katz and Kahn, 1978; Schein 1980; Woodward, 1980; Beardshaw & Palfreman, 1990; Cushway & Lodge, 1999)

What may be observed from Figure 5 is that there are individuals in an organisation and that there is a hierarchy of groups of individuals within such an organisation. Given the different levels of interaction influenced by the scope and context of an organisation, an organisation is inherently a social unit where individuals (up onto any level or number based on the size and scope of an organisation) interact with each other on a group level, in groups, between groups and within the organisation. This social unit is composed of or constructed by a group of people, or groups of people interacting continuously to achieve a commonly understood goal or even a set of goals.

Based on the discussion and review by Cushway and Lodge (1999), one can create a simplified organisational structure. In the following section, a generic structure of the organisation will be built up to establish the nature, structure and scope of what constitutes an organisation.

4.2.1. The Structure of an 'Organisation'

When reviewing the generic structure of an organisation described by the authors referenced in Figure 5 (Weber, 1964; Blau and Scott, 1966; Burns & Stalker, 1966; Perrow, 1967; Lawrence & Lorsch, 1969; Etzioni, 1975; Katz & Kahn, 1978; Schein 1980; Woodward, 1980; Beardshaw & Palfreman, 1990; Cushway & Lodge, 1999), one finds that all types of organisations share several traits or aspects.

In summary, as derived from the authors referenced in Figure 5, some of the aspects that influence the structure of an organisation are as follows:

- ***System***: Organisations function as systems on dynamic interaction. As a system, an organisation has inputs of various forms and formats, it has boundaries that separate the internal facets of the organisation from its environment, there are processes that act and interact, it has components (individuals), controls (governance, performance measures, policies and procedures), and it has outputs directed towards its environment. The boundary of this type of system is permeable and may be influenced by a wide variety of factors (Young, 1968, Dooley, 1997 Cushway & Lodge, 1999; Moan & Lindgreen, 2008).
- ***Hierarchical structure***: Organisation can be decomposed into various hierarchical levels based on individual roles and responsibilities. These roles and responsibilities assist the organisation in achieving its goals through the division of labour (Sales-Pardo *et al*., 2007, Easterby-Smith, 2008; Daft, 2009).
- ***Business processes***: Roles and responsibilities influence business processes and activities. Each of the tasks assigned to individuals may be part of a set of processes that in combination achieves a specific output. This output may be the input to other processes until all processes have been concluded, adding value to whatever task has been assigned to an individual (Nurcan, 2008, ter Hofstede *et al*., 2009; van der Aalst *et al.,* 2011).
- ***Value chain***: Business processes are part of a value chain or value equation in which there are inputs into a process, processes (operations) which transform inputs by adding value to them and in turn produce specific outputs (Smart *et al.,* 2008, Harmon, 2010, Kess, 2010; Shan *et al*., 2010).
- ***Environment***: An organisation does not exist in a vacuum. Each organisation exists within a given context in which it functions. Subsequently, within this context one finds various forces that influence the behaviour of the organisation (Walker *et al.,* 2007; Rhodes *et al.,* 2008).
- ***Behaviour***: Each organisation has a specific behaviour that is informed by practice, developed over a period, has been influenced by the vision of the founder of the organisation and has its own unique cultural aspects. Regardless of how the organisation came into being or how it has been influenced, it will have behaviour. The differences between the behaviour of one organisation versus another organisation is still a type of

> behaviour or behavioural output as informed by environment, internal structure, goals and the sum total of the psychological aspects instilled within the organisations by individuals engaged in dynamic and continuous social transactions (Robbins & Langton, 2003; Hodgkinson & Healey, 2008).

Based on the aspects or facets of an organisation as discussed by Weber (1964), Blau and Scott (1966), Burns and Stalker (1966), Perrow (1967), Young (1968), Lawrence and Lorsch (1969), Etzioni (1975), Katz and Kahn (1978), Schein (1980); Woodward (1980), Beardshaw and Palfreman (1990), Dooley (1997), Cushway and Lodge (1999), Robbins and Langton (2003), Sales-Pardo *et al*. (2007), Walker *et al*. (2007), Easterby-Smith (2008), Hodgkinson and Healey (2008), Moan and Lindgreen (2008), Nurcan (2008), Rhodes *et al*. (2008), Smart *et al*. (2008), Daft (2009), ter Hofstede *et al. (*2009), Harmon (2010), Kess (2010), Shan *et al*. (2010), van der Aalst *et al.* (2011), and Schein's (1980) definition of an organisation, one can therefore deduce that an organisation is a system with an inherent structure linked to business processes that relate to a specific organisation-based value chain, that it exists in an environment and, based on the structure, value chain and environment, exhibits a specific set of behaviour. One can furthermore indicate that the organisation is a construct related to individuals that work in groups to achieve the general goals of the organisation as understood by the individuals in the organisation.

Additionally, taking into consideration the discussion of knowledge and KM in the previous chapters, there are specific knowledge-related aspects that are directly related to the individuals and therefore groups within an organisation. Nonaka (1991), Nonaka and Takeuchi (1995) as supported by Marwick (2001) and van Diggelen and Dignum (2006) have referred to methods of converting information into knowledge and, as indicated in Chapter 2, knowledge into information and/or data. These methods, namely socialisation, combination and internalisation, play a role in how individuals behave in relation to each other within the scope and context of a social environment. As an organisation is a social environment (mediated by a goal and/or a purpose), these methods would have an impact on how individuals share knowledge within an organisation.

It is therefore clear that an organisation is a system structured by individuals functioning in relationship with each other through the application of knowledge that has been obtained, integrated and internalised. The knowledge used by individuals can also be externalised and transferred through social mechanisms such as communication and interaction so that other individuals can also internalise the observed and transferred content, actions and behaviour presented within the social context of the organisation.

As such, one can develop an overview of what a generic organisation may appear like. Figure 6 presents a combined overview of aspects related to current theories, views and viewpoints related

to the structure of an organisation. Figure 6 provides an overview of what a generic organisation may be like (as derived from the stipulated authors) when focusing on the flow of knowledge in and out of the organisation.

To understand the need for KM within the scope and context of such an organisational structure, the author will provide an overview of the flow of knowledge within a generic organisational structure and provide the reader with a description of how these facets interlink to establish KM needs within this structure.

4.2.2. Knowledge Flow in a Generic Organisational Structure

When referring to a generic organisational structure, one needs to recognise some of the aspects related to such a structure. As already established in the preceding discussion, the generic organisation exists within a specific environment; it has a variety of inputs and outputs. The inputs can be in the form of sources of knowledge (individuals, individuals functioning within the scope and context of groups, or individuals functioning within the scope and context of other organisations, as in the instance of corporate takeovers and acquisitions).

As such the individual may be viewed as a knowledge resource that functions as an organisational input that would inherently influence the nature of the organisation. The author recognises that the individual may be an actor related to the flow of knowledge within the scope and context of the organisation. The author however in this case only focusses on the individual as a knowledge resource. It influences the available knowledge and the business processes related to such an organisation. According to Higgins (1987), an individual takes environmental information as perceived within a social context and integrates this into their own frame of reference. This then has the potential to influence the way in which other individuals take cognisance of the environment and sources of information and how these sources of information can be mediated by individuals in a social setting. Higgins (1987) also indicates that the perception of sources of information has the potential to destabilise the way in which the individual processes or reacts to information within the context of his/her own cognitive environment. Therefore, the individual functioning as an input into the organisation could progressively change the organisation in terms of the organisation's 'cognitive behaviour'.

Schneider (1991) has extended this idea by referring to how individuals relate to other individuals and cognitively integrate sources of information to extend their own knowledge construction. Schneider (1991) indicated that the identification of behaviour can be used to ascribe or assign a trait to a person, group, situation or context by identifying these traits through accessible categories or a person's pre-existing sources of knowledge or representations.

Hodgkinson and Healey (2008) have built on the work of Higgins (1987) and Schneider (1991), reviewing the impact that the integration of new structures into an organisation has on how individuals interact, perceive and function within the scope of the organisation. What Hodgkinson and Healey (2008) stipulated, was that integrating new facets into the nature and structure of the organisation would have the potential of changing the organisation for the better (improving) or negatively influencing the organisation.

What is clear from Higgins (1987), Schneider (1991) and Hodgkinson and Healey (2008) is that when individuals, groups or organisations are integrated as input into an organisation, the social constructs required to mediate the process of knowledge integration between individuals, groups and organisation do not necessarily match. This could have the potential of destabilising knowledge mediation processes through social cognition and social perception. Until the content being added to the organisation is integrated in line with the nature of the organisation, or a middle ground is found through the integration of the sum of the two units, the potential source of knowledge in support of organisational behaviour and/or task completion cannot necessarily be effectively accessed. Figure 6 provides an integrated view of how knowledge would flow in and out of an organisation based on individual knowledge owners mediated by group dynamics.

By integrating the views of these authors and focusing on the inputs and outputs of the individuals, linked to group dynamics and organisational theory, one can derive Figure 6 as a representation of the flow of knowledge into and out of the organisation. When referencing Figure 6, the types of inputs that exist in this structure (when referring to an organisation as a system), include but are not limited to knowledge and resources. The knowledge added to the organisation would refer to the different types of knowledge that an individual would bring to the organisation based on previous experience.

Authors like Baker *et al.* (1997), Shariq (1998), Bender and Fish (2000), and Kalpic and Bernus (2006) view knowledge as a human-driven endeavour in which an individual, through experience, training or unique intellectual innovation, possesses knowledge as a cognitive representation that allows the individual to present unique behaviour related to the associated knowledge processes. When considering that a group or an organisation is a set of individuals with different levels of mediated knowledge, one finds that the knowledge added to the organisation inherently refers to the knowledge of a set of individuals that needs to be integrated with the knowledge of the current organisation that receives knowledge input from its environment.

As may be seen in Figure 6, the resources that can be added to the organisation as part of the types of input that can be received by the system include but are not necessarily be limited to

information resources, data-related resources and artefacts (with data or information attached to them). These inputs are based on individual usage, access and understanding. The resources have to be adapted for integration to allow these resources to conform to the needs of the organisation for processing.

Within the organisation itself, one finds as knowledge components the individuals that are in a hierarchical relationship (Figure 6). These individuals have a variety of roles and responsibilities, defined by the position or place they find themselves in within the context of the organisation. Individuals interact according to task specifications and needs and through their interaction create groups and finally through group interaction create the organisation. Any knowledge or resources added to the organisation would be processed by the individuals in the organisation to serve the primary purpose or the goal of the organisation (Sales-Pardo *et al*., 2007, Easterby-Smith, 2008; Daft, 2009).

When referencing Figure 6, the internal environment of an organisation is important in terms of the levels of processing of knowledge content presented within the organisation itself. For example, on an individual level, one finds that aspects related to the individual inherently relate to the psychology of the individual. The nature of these facets is that it is individual in nature. However, this does not appear to be the relationship on any level of interest, What is critical, is that on an individual level everything related to knowledge being added to and used by the organisation is centred on the nature of the individual. As stipulated in Chapter 4, knowledge is associated with the individual. The further one moves away from the individual in an organisation, the further away from the source of knowledge one starts to move. This is in line with knowledge being a human construct intrinsically linked to the individual knowledge owner.

Brand (1998) and Hirst (2002) have indicated that the further one moves away from the individual, the further one moves from the knowledge that is part of that individual's cognitive environment. The concern that Brand (1998) and Hirst (2002) highlight is that when an individual leaves an organisation (as an output from the organisation), then the knowledge leaves with the individual (Figure 6).

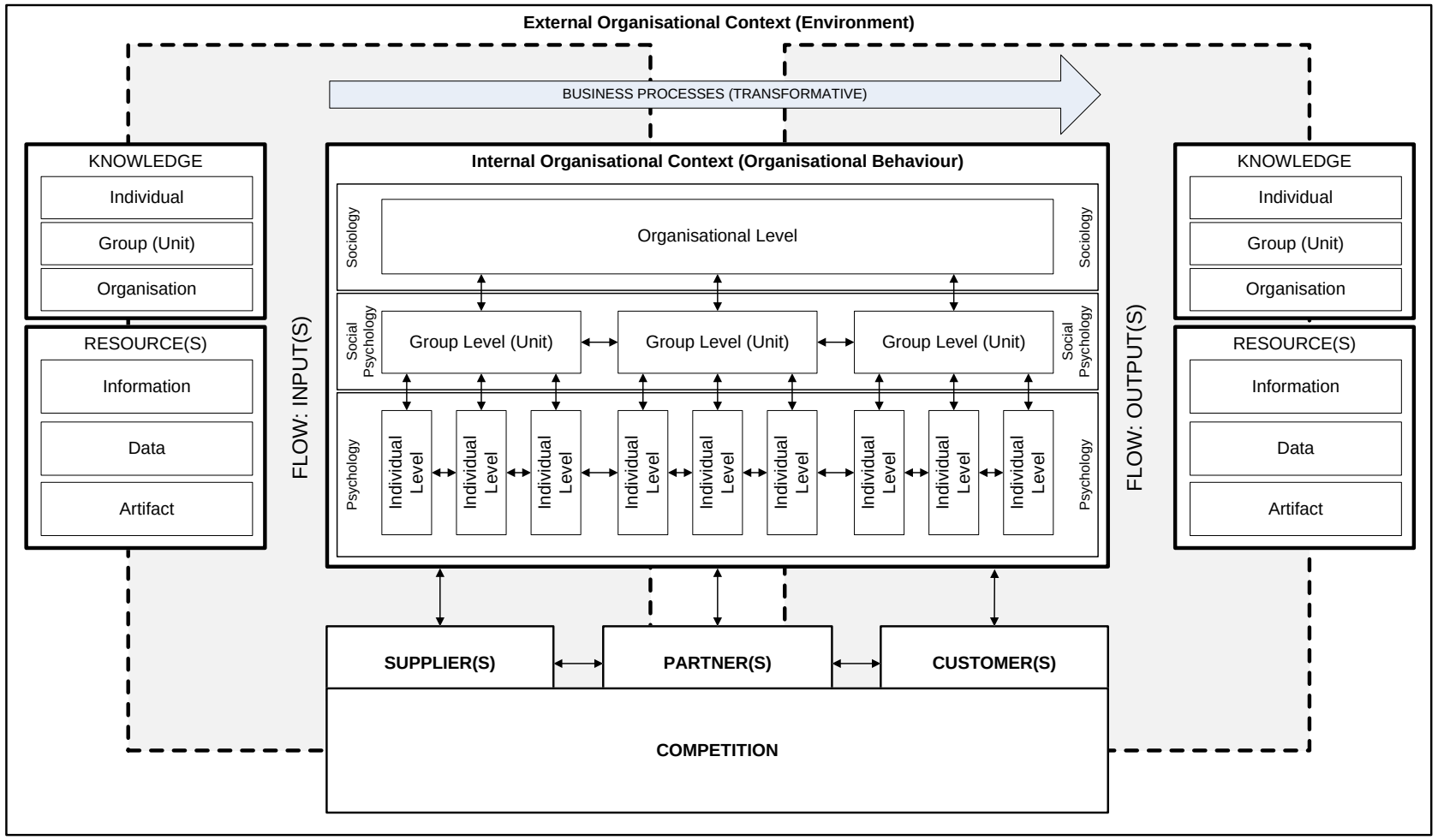


Figure 6: Generic Organisational Structure[5]

[5] Figure 6 is adopted and adapted from Weber, 1964; Blau & Scott, 1966; Burns & Stalker, 1966; Perrow, 1967; Young, 1968; Lawrence & Lorsch, 1969; Etzioni 1975; Katz & Kahn, 1978; Schein, 1980; Woodward, 1980; Beardshaw & Palfreman, 1990; Dooley, 1997; Cushway & Lodge, 1999; Robbins & Langton, 2003; Sales-Pardo *et al.,*. 2007; Walker *et al*., 2007; Easterby-Smith, 2008; Hodgkinson & Healey, 2008; Moan & Lindgreen, 2008; Nurcan 2008, Rhodes *et al*., 2008, Smart *et al*., 2008, Daft, 2009, ter Hofstede *et al*., 2009, Harmon 2010, Kess, 2010, Shan *et al*., 2010, van der Aalst *et al*., 2011; as well as Schein, 1980. It represents an integrated overview of the aforementioned theorists' work on the nature of the organisation as well as the flow of resources and organisational knowledge. Figure 6 is discussed in the following pages.

The challenge is to capture this knowledge through interactive processes so that other individuals can benefit from it, so that the organisation as a whole would eventually be able to benefit from the knowledge resources that the individual brings to bear on a given situation or task. Wurst (2006) has indicated that the loss of knowledge creates the need for a distributed knowledge environment that supports individuals in a group relationship, to avoid the loss of knowledge, where information and knowledge can be created independently and then subsequently shared with the group or unit with which the individual is directly related. This independent distribution can then potentially retain knowledge as information in the organisation.

When referring to the group or unit level, the quality of the knowledge being presented in the organisation starts to dissipate. Various mechanisms in communication change the quality of the content being presented, and one has to use various mechanisms to formulate and codify knowledge into a structure that allows it to be understood by several individuals. This has the potential of changing the meaning of the knowledge present at this level within the organisation itself (Figure 1 and Figure 6).

To assist in the mediation of knowledge through various communication mechanisms, information is the most appropriate mechanism for transferring knowledge. Information itself has the inherent ability to transcend time and space in that it can easily be transformed into data to be transmitted and/or stored (Green, 2002). It is up to the individual to package their knowledge in an informational representation that can be converted, stored and/or transmitted. In the process, the knowledge presented by the individual becomes disintermediated from the individual into an artefact[6] that would have to carry some sort of value for the user of that artefact. Authors like Cowan and Foray (1997), Davenport and Prusak (1998), Hall (2006) and Edvardsson (2008) indicate that this can only be done by means of codifying knowledge as information and finally data to be stored for easy access by those who need to use it. Zhen *et al*. (2010), however, have indicated that if a knowledge-facilitating environment is not created beforehand, codification through software implementation would fail in that the artefacts (information and data repositories) created for usage would be inadequately structured and constructed.

Subsequently, the methods and the attributes of the artefact required in this instance would have to allow information to be contained in such a fashion that the representative data associated with the artefact would be accessible, transferable, and in a format that could be understood by the user of the artefact. It would require that the artefact have a social, utilitarian nature that is convenient to the user, to prevent socio-cognitive dissonance leading to individuals' being distanced from the

[6] When referring to an artefact in this instance, the author is referring to any type of store that has the capacity to contain information either as a codified schematic construct, or through a symbolic representation. These constructs or representations would have to be based on a normative, socially agreed-upon standard that, within the context of its creation, can be accessed without limiting the user of that artefact's understanding of the content represented within the confines of the artefact or constructs.

artefact itself. If individuals distance themselves from a utilitarian artefact, then firstly, the individual will neither use the artefact as a mechanism to present or represent their knowledge, nor will they access the artefact if it contains symbolically represented information in the form of data[7].

When individuals do make use of such utilitarian artefacts to represent and present their knowledge in a symbolic form, it allows for group accessibility in terms of the content attached to an artefact. However, one requires social norms, social cognitive processes and social perception processes to allow individuals in a group context to access and use the content presented on the artefact (Hodgkinson & Healey, 2008).

In a homogenous group, the way in which the individuals symbolically structure their environment allows for simple access when required. Negotiated and mediated facilitation between group members is based on the meaning and nature of the representations that they are using. Within the construct of an organisation (Figure 6), it is a self-regulated process defined by the structure of the organisation, as defined by group behaviour mediated by organisational norms.

On an organisational level, this becomes tremendously convoluted as the meaning within a small conclave of individuals becomes difficult to transfer (Figure 6). A small group of individuals can function homogenously within a framework or an environment. However, when more individuals are added in between groups for the construction of the organisation, more and more opportunities arise for the homogenous nature of the individuals in a unit, conclave or group to become heterogeneous.

The more heterogeneous a group is, the more sociological group dynamics start to influence the nature of the group and the meaning of content presented by individuals within an organisation (Hodgkinson & Healey, 2008). To allow other individuals to understand en masse, the content needs to be formulated in such a way that it allows greater support for dimension and space. To support this, knowledge coded as information and represented as data would have to be managed more effectively to allow for transfer and long-term storage (Hodgkinson & Healey, 2008). Because knowledge is dynamically and inherently involved with an individual, information can be used in small groups. At its core, however, information has a level of meaning linked with the artefact used in the group (Hodgkinson & Healey, 2008). When the group is extended further, additional heterogeneous aspects linked to larger groups needs to be taken into consideration to support the needs of these groups, so the content being symbolically represented would require further simplification in an attempt to transfer as much meaning related to the content with as little effort as possible. Again, aspects such as access and utilitarianism play a role, but on a much larger scale and influenced to a greater extent by considerations related to time and space. An additional

[7] This is in line with Figure 1, knowledge being a human construct and the review of the KM definitions.

aspect is the position of the individual within the network of actors that socially construct the nature and behaviour of the organisation (Hodgkinson & Healey, 2008, Kalyanaraman & Shyam Sundar, 2008, Kashima, 2008; Devers *et al*., 2009).

If the individual has little or no influence on the nature of the organisation, based on how peers in the organisation view the individual, then the message formulated by the individual would have little to no value for the rest of the organisation. If the individual's role within the organisation however, ascribes additional attributes linked to the value in directing the organisation towards its goal, then this individual's message formulated to transfer content would have greater value, sometimes overshadowing the value of others (Kalyanaraman & Shyam Sundar, 2008, Kashima, 2008; Devers *et al*., 2009).

On a sociological level within the nature of and as related to the behaviour of the organisation, the content presented in this instance would appear to be at a lower density, as the distance from the individual is greater (Figure 6).

Because knowledge becomes information, information is converted to data and then transmitted or stored (transmitted over time), and then accessed by the individual for later use, the organisation that created the representation and the individuals who make use of this representation are not similar in nature. Over time, changes in cognitive faculties, changes in behaviour and changes in input occur due to a variety of processes within the organisation. In Figure 6, these processes may be referred to as business processes, or the transformation that occurs to day-to-day business within the organisation on the way to the organisational goal (Nurcan, 2008, ter Hofstede *et al*., 2009; van der Aalst *et al.,* 2011). These processes have an inherent transformative nature; they systematically change the organisation over time. If the content presented is accessed within a short period, then it may still be relevant. However, if the content is accessed after a long period within the structure and the nature of the organisation, then it may lose its meaning as the mechanisms used to construct the content and the mechanism used to interpret the content on an individual psychological, group social psychological and organisational sociological level have changed. This occurs due to the nature of organisation. Human beings continuously change, therefore the organisation that is dependent on the nature of the individual as summed and normalised over the expanse of the organisation also changes. As Foucault (2007) has indicated, the time lag between knowledge becoming information becoming data as symbols, data and the associated interpretive meaning behind makes it meaningless to individuals. Still, the development of technology has allowed individuals to extend the shelf life of the information beyond the individuals' own lifetime (Scardamalia & Bereiter, 2010), even though not indefinitely (Foucault, 2007).

When referencing Figure 6, one also finds, based on various economic or environmental factors, pressure placed on an organisation by means of suppliers (primarily providing input), partners (sharing input, output and processes) as well as customers (primarily users or recipients of output) (Burton-Jones & Gallivan, 2007).

All these components provide a critical understanding of an organisation as a system. Understanding the structure of an organisation as part of a system is critical for understanding as it provides us with insight into how individuals behave within an organisation. Though Burton-Jones and Gallivan (2007) have critically evaluated the way in which system usage research was conducted in previous studies, they have nevertheless summarised the way in which previous studies have identified different levels of system usage and what types of behaviour occur on each level.

What Burton-Jones and Gallivan (2007) and the authors referred to in Figure 6 are pointing out, is that an organisation is a system. It complies with the characteristics of a system and this system is not static. Given the changes and dynamics in the sociological constructs related to knowledge owners, the organisation continuously changes. The way in which knowledge is acquired and applied within the scope and context of the organisation changes continuously due to the dynamic nature of human social interaction, social cognition, communication and relationships. This implies that the knowledge available to the organisation also continuously changes. One of the facets that influences the system is the knowledge that flows into it, is transformed by it through processes, and which then eventually flows out of it when individuals leave the organisation.

Figure 6 indicates that the nature of the organisation can be influenced on different levels based on knowledge, information and data input (from people and utilitarian artefacts or resources), and that these sources of input are modified and adapted by the unique nature of the organisation, and the goals driving this organisation.

What is of critical importance of Figure 6 and the systemic nature of an organisation is that the organisation produces an output. In the traditional sense, based on the value chain of the organisation, products are delivered to a market. Keeping in mind that an organisation is a system (Burton-Jones & Gallivan, 2007), and that knowledge, information and data are added as input to the organisation (as a resource) then it is logical to state that transformed knowledge, information and data would be produced as a system output. Tangible and intangible products and services are not the only output that the organisation produces. Knowledge and utilitarian artefacts (as information or data containing resources), are also delivered to the organisation's environment. This implies that even though an organisation obtains knowledge as one of its many inputs (through the addition of people either as individuals, groups or separate organisations), the

transformed knowledge (as people are transformed due to organisational processes) also has the potential to leave the organisation as a transformed product. The organisation therefore needs to retain the knowledge that it has acquired or transformed.

Because knowledge is linked to the individual, knowledge flows out of the organisation when the individual is no longer part of the organisation (Figure 6). This is of concern to the organisation as the business processes unique to the organisation have shaped the individual's knowledge through experience obtained in the organisation itself. Codified knowledge can be retained through artefacts and various types of stores; but the content has been decontextualised from the originator's internal mental processes. Therefore, the knowledge dimension, which influences the behaviour of the individual, no longer exists associated with or assigned to the artefact of the information/data (depending on perspective).

As Zhen *et al*. (2010) have indicated, a knowledge-friendly environment can help improve organisational effectiveness. The effective application of KM affects organisational facets such as innovation (Brand, 1998) and strategic advantage (Hirst, 2002). However, the value derived by the organisation is transient for the very reason that knowledge is attached to the individual. Subsequently, the trend in KM is to codify knowledge through extrapolation mechanisms (documentation, knowledge mining and knowledge systems).

This creates a need for organisational KM in which the organisation is required to retain knowledge and provide access to utilitarian artefacts so that knowledge can applied to the promotion of goal-driven task completion, competition and innovation. In the following section, the need for organisational KM and the affirmation of this need will be briefly explored. Now that we know how knowledge flows in and out of the organisation, we can focus on the processes of organisational knowledge and the need for organisational KM to retain knowledge and if possible prevent knowledge from flowing out of the organisation, while ensuring that it flows into the organisation as efficaciously as possible.

4.3. Need for Organisational Knowledge Management

In the discussion of KM literature in Chapter 2 and Chapter 3, authors have indicated that KM provides an organisation with an advantage. This advantage is recognised by managers and organisations when referring to knowledge as an organisational asset that one needs to leverage (Cody *et al*., 2002; Rao, 2003; Noori & Salimi, 2005; Diaz *et al*., 2006; Bowman & Swart, 2007; Kanawattanachai & Yoo, 2007). Authors such as Carneiro (2000) have stipulated that the application, capturing and representation of knowledge by means of IT provide a competitive advantage to an organisation, either through innovation within the organisation (borrowing from

past experience) or through the formulation of a competitive strategy allowing the organisation to react based on environmental changes.

Authors such as Hirst (2002) indicate that an organisation gains a strategic advantage when there is an association between knowledge assets, resources and the core capabilities of an organisation. Kanawattanachai and Yoo (2007) state that an organisation's ability to create, share and store knowledge has become an important part of establishing and maintaining a competitive advantage within an ever-changing business environment.

Apart from the fact that the application of KM in an organisation holds an advantage, the literature also stipulates a need for KM. According to Herschel and Jones (2005) and Abeysekera (2008), the need for knowledge-based products integrating various organisational business functions is increasing due to changes in global markets and aspects such as globalisation.

Fink and Ploder (2007 & 2009) reviewed the literature related to how an organisation's need for KM is being satisfied. Based on Fink and Ploder (2007 & 2009) review, four processes have been identified that can support organisational KM initiatives. The processes are set out in Figure 7.

Figure 7: Knowledge Methods
(Adopted from Fink & Ploder, 2007 & 2009)

In Figure 7, Fink and Ploder (2007 & 2009) focus on methods that have been applied within organisations as part of organisational KM initiatives. After identifying the individual mechanisms, Fink and Ploder (2007 & 2009) grouped the activities into individual processes that focus on KM. The processes that Fink and Ploder (2007 & 2009) incrementally identified by analysing KM tools and mechanisms are as follows:

- ***Knowledge identification*:** To obtain value from sources of knowledge within an organisation, these sources should firstly be identified. Several tools (Figure 7) have been used to identify such sources so that they can be leveraged. In this instance, the leveraging of the source of knowledge would then be to identify that which the organisation would have to retain to ensure its competitive advantage in relationship to the external organisational environment or context in which it functions. It would also limit the amount of knowledge lost to the external environment by means of employee retention initiatives within the scope and context of the organisation's internal environment. When specific sources of knowledge are identified, then the organisation can apply these knowledge sources more effectively to specific projects. This organisational need links closely to the externalisation of knowledge so that it may be identified within the scope and context of the organisation.
- ***Knowledge acquisition*:** When new sources of knowledge enter the organisation, then they can be identified and the appropriate source of knowledge applied to an appropriate project. The mechanisms or processes for acquiring knowledge would also refer to scanning the internal and external environment of the organisation. Internally, new sources of knowledge can be applied to the distribution of this knowledge so that other individuals in the organisation can acquire it from the identified source. It could also refer to the identification of external sources of knowledge that can be acquired through training or acquisition. This organisational need links closely to knowledge transfer through socialisation (interaction for the acquisition of knowledge), internalisation (converting messages that has been communicated or codified and internalising it for behavioural application related to task completion) and combining internalised content so that it can be applied in the cognitive sphere of an individual functioning within the scope and context of an organisation's internal environment.
- ***Knowledge distribution*:** After knowledge has been identified and/or acquired, it must be distributed. It can be by means of mentorships or training programmes, or by providing access to sources of knowledge or utilitarian artefacts that are in a format that allows easy access, internalisation and integration based on previous knowledge. This organisational need relates closely to processes of socialisation of externalised content. The knowledge content can be distributed in a codified, symbolic format associated with a utilitarian artefact, or through processes related to social cognition.
- ***Knowledge preservation*:** In this instance, the preservation of knowledge is one of the major concerns of organisations. When knowledge is acquired or transformed by means of internal organisational processes, it needs to be retained to service the needs of the organisation to ensure advantage by means of the knowledge native to it. Knowledge can easily be lost. It is transient and does not survive the passage of time. This need identified by Fink and Ploder (2007 & 2009) requires the preservation and extension of the survival rate of internal organisational knowledge. It relates closely to the internalisation and

combination of knowledge content or utilitarian artefacts so that they extend beyond the lifetime of the individual who originated the knowledge.

Though Fink and Ploder (2007 & 2009) focused on IT artefacts and processes linked to these artefacts, it does provide insight into the need that organisations have for KM. As previously stipulated, KM is a process closely related to knowledge associated with the individual. Based on the work of Fink and Ploder (2007 & 2009), it can also be said that KM relates to processes attached to individuals functioning in close correlation with artefacts within an organisation, and that there are distinct processes that have evolved in relationship to these artefacts.

When referring to work done by Lytras and Pouloudi (2006), one can see that several attempts have been made to associate the need for organisational KM to various processes or locations of knowledge within the organisation. Figure 8 identifies various domains in which knowledge can be contained or used within the scope and context of the organisation. What is important in the framework of Lytras and Pouloudi (2006), as presented in Figure 8, is that Lytras and Pouloudi (2006) have identified various places, domains, or locations where knowledge is presented and represented either as unadulterated knowledge, or attached to a utilitarian artefact in the format of socially agreed symbols. Though Lytras and Pouloudi (2006) focused mainly on KM within the scope and context of learning, one can extend this framework through the work done by Fink and Ploder (2007 & 2009) to represent an organisation's KM needs.

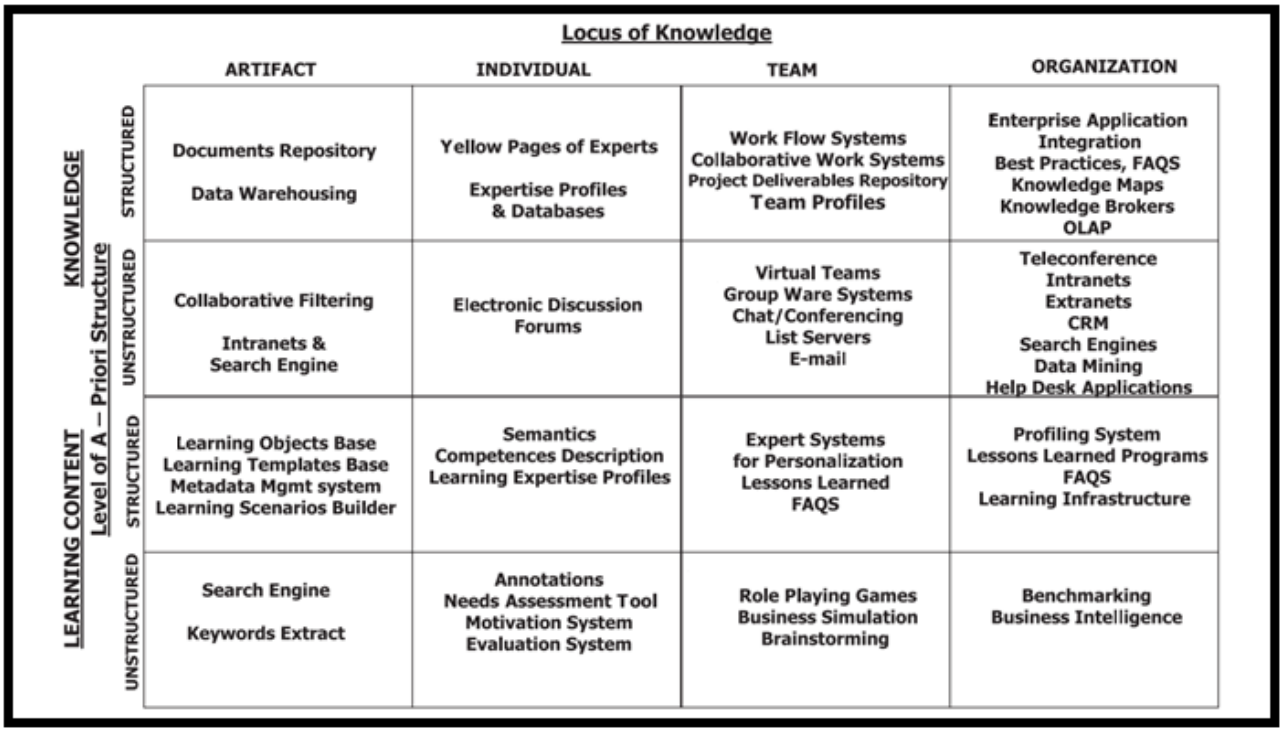


Figure 8: Framework For KM Support From A Learning Perspective
(Adopted from Lytras & Pouloudi, 2006)

Lytras and Pouloudi (2006) stipulate that the locus of knowledge within an organisation can be either structured or unstructured. It can be content that needs to be acquired through learning or it can be knowledge associated with an individual, unit or organisation that can be internal or external to the individual. The source of knowledge can be associated with an artefact, an individual, team or group, or an organisation itself.

One can integrate the framework presented by Lytras and Pouloudi (2006) and the representation by Fink and Ploder (2007 & 2009) of organisational KM needs to provide a richer picture of such needs within the scope and context of knowledge flowing in and out of an organisation. Extending the work of Lytras and Pouloudi (2006) and Fink and Ploder (2007 & 2009) leads to the following representation of organisational KM needs in Table 12.

Table 12 provides an overview of the core KM needs present in an organisation. Bearing in mind that when knowledge is added to an organisation, and that organisation dynamically changes based upon external and internal forces, knowledge retention and extension play a critical role to ensure that as much value as possible can be leveraged from knowledge. This knowledge can be obtained, transformed, or before knowledge dissipates due to scope and lifetime, be distributed within the scope and context of the organisation. Apart from the need to retain knowledge, knowledge must also be used where it is most needed for effective and efficient task completion.

Table 12: Organisational KM Needs[8]	
ARTEFACT	Identification, acquisition, distribution and preservation of structured/unstructured artefacts related to knowledge.
INDIVIDUAL	Identification, acquisition, distribution and preservation of individuals with specific knowledge.
TEAM	Identification, acquisition, distribution and preservation of teams that provide a desirable practice (application of knowledge with group context).
ORGANISATION	Identification, acquisition, distribution and preservation of structured representations of knowledge that can be applied within the scope and context of an organisation.

[8] Adopted and Integrated from Lytras and Pouloudi (2006) as well as Fink and Ploder (2007 & 2009).

The core needs associated with knowledge and subsequently KM in an organisation stem from the organisation's functioning as a dynamic system where knowledge flows in, is transformed by processes and finally flows out. This leads to the organisational need. The organisation needs to identify, acquire, distribute and preserve knowledge associated with artefacts, individuals, teams and the organisation itself. The question is how these needs are being met.

4.4. Summary

In Chapter 4, the author indicated that the need for KM exists due to the inflow and outflow of knowledge from an organisation.

When taking into consideration all the dimensions presented by the various authors referred to in Chapter 4, one can see that the need for KM within an organisation relates closely to the potential loss of knowledge. This occurs due to the nature of an organisation. It functions as a system that transforms knowledge according to the unique nature of the organisation and its subcomponents. Any loss of knowledge would therefore mean that the organisation loses a valuable resource which ensures the effectiveness and efficiency of the organisation in the promotion of its competitiveness within the scope and context of its external environment. This is why the retention of organisational knowledge is necessary.

Lytras and Pouloudi (2006) and Fink and Ploder (2007 & 2009) focused only on utilitarian IT-related artefacts. This creates a concern in the sense that KM, according to Zheng *et al* (2010), is more than just the application of IT to a given problem and subsequently naming it KM. As stipulated in Chapter 2 and Chapter 3, KM is more than just IT. It is a holistic process that facilitates the flow of knowledge within the organisation while retaining it within the scope and context of the organisation, minimising knowledge loss. There is a need for KM within an organisation to prevent knowledge from being lost as an outflow of the organisational system. This need relates to the meaning of artefacts, knowledge linked to the individual, specialisation related to teams and on an organisational level overall. The need further relates to the identification, acquisition and retention of knowledge related to artefacts, individuals, teams and the organisation as a whole. There is therefore a clear need for organisational KM related to artefacts, individuals, teams and the organisation to ensure the relevant inflow of knowledge and the minimising of the knowledge loss through knowledge retention.

When referencing Chapter Map 05, to achieve the aims and objectives of this chapter, the scope and context of an organisation needed to be clearly delineated. If one focuses on the 'generic organisation' to be able to generalise from this thesis, one needs to understand the general scope and context of such a 'generic organisation' or organisational construct. It is clear that the

organisation is a system and that it presents characteristics of a system. Due to the nature of an organisation, the general structure is influenced by the knowledge contained in such an organisation as linked to the knowledge holders that constitute the organisation. Without such knowledge holders, such an organisation would inherently not exist.

Due to the systemic nature of an organisation, it was also stipulated that there are various knowledge streams leading to the acquisition and transformation of knowledge and its eventual loss. This then leads to the need that an organisation has for KM in that the organisation needs to manage the knowledge life cycle in such a way as to extend knowledge beyond the natural life span of a knowledge holder. The specific needs of the organisation are linked to the retention of knowledge in the form of artefacts and individuals, and team-based and organisational knowledge.

Even though such knowledge would no longer be considered knowledge if retained in a format other than the knowledge holders' inherent understanding of such knowledge, knowledge-linked resources can at the very least assist in the retention of some of the content that would otherwise be lost. Based on the core discussions in this chapter, the contributions are:

(1) Clearly describing the characteristics of an organisation as a system, in which knowledge flows in, is transformed over a period and finally flows out as a result of organisational evolution. Based on this it was established that an organisation has a structural need for knowledge retention as it goes through the process of acquiring, transforming and losing knowledge resources. Therefore, there is a subsequent structural need for KM which would allow an organisation to integrate knowledge after it has been acquired in various forms and/or formats, and subsequently to retain it to avoid the loss of such knowledge as linked to the knowledge holder, even if it requires explicating it in an incomplete symbolic format as linked to artefacts or a representational artefact.
(2) Based on the aforementioned point, it became clear that the organisation functions as a knowledge system on its own with different levels of knowledge application and knowledge usage. As a contribution, one would therefore be able to refer to an organisation as a knowledge structure or a knowledge system. Though it may not appear a significant contribution, one should bear in mind that the organisation cannot exist without people and the application of knowledge. In itself, it reaffirms the necessity of the right knowledge for the right position, as this would have different effects on different positions within the organisation as to where it is applied.
(3) When referring to the organisation as a knowledge system and accepting this dimension, one would also have to accept that knowledge flowing in is required for the rejuvenation and life of such an organisation. One would also have to accept that knowledge would flow out of the organisation. This would in essence reaffirm the need for knowledge retention

and, structurally, knowledge containment and focusing of knowledge based on relevance in its application within the scope and context of a given application-based scenario.

(4) The final main contribution of this chapter is therefore to focus KM on the organisational problem – indicating that an appropriate understanding and application of KM within the scope and context of the organisation is required to ensure that it experiences as little loss of knowledge as possible. By implication it focuses KM on the scope and context of organisations' losing knowledge and reaffirms the need for an appropriate understanding of KM and a coherent application of KM as a management domain.

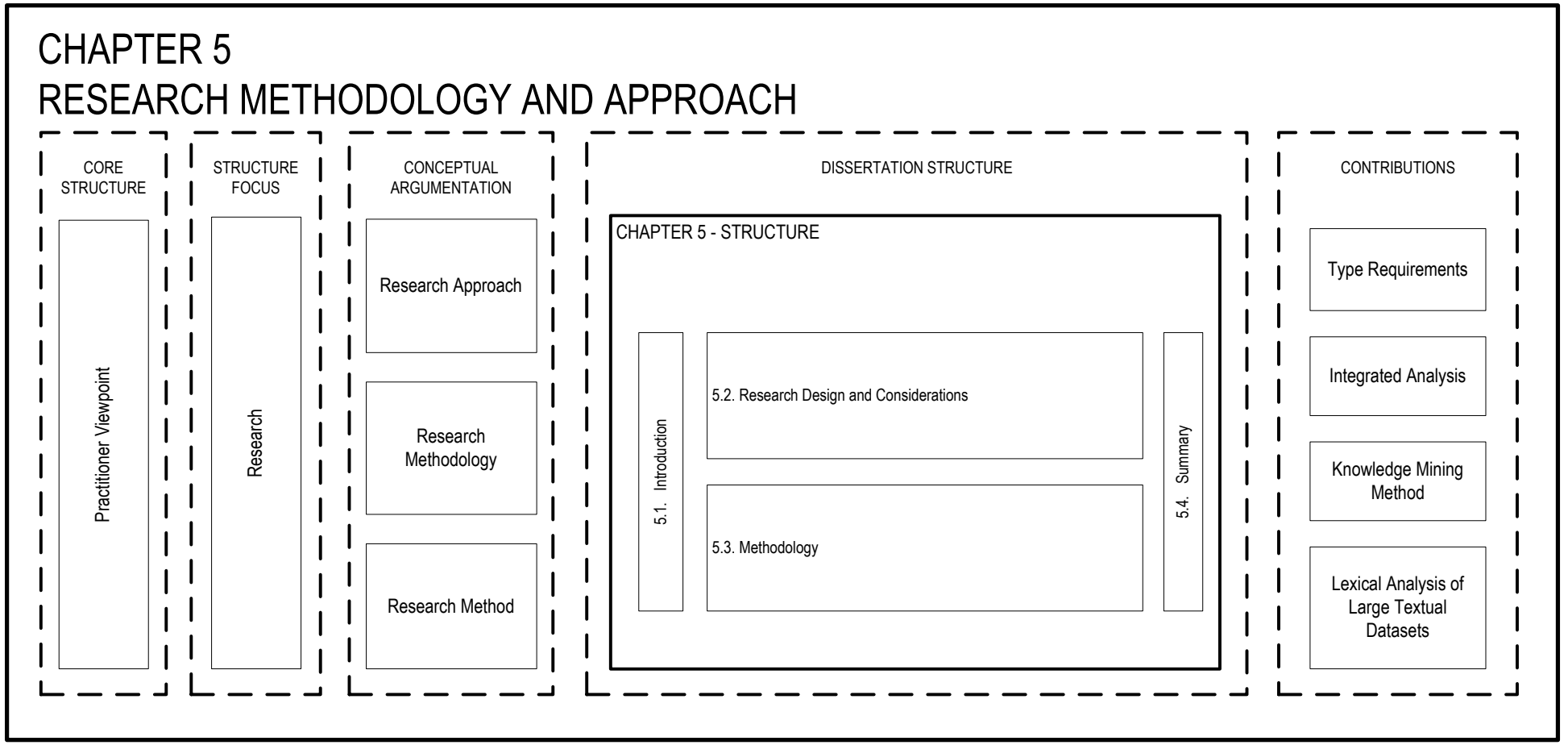
In the context of the review and an integrated discussion and argument elevating the concept of an organisation to the level of a knowledge system, Chapter 5 therefore presents the following core contributions:

- **Structural need** – based on the permeable nature of an organisation, there is a definite structural need for KM within the scope and context of an organisation.
- **Systemic knowledge flow** – all organisations present a characteristic of knowledge flowing in, being retransformed and subsequently, due to its nature as a knowledge system, flowing out of such an organisation/knowledge system.
- **Knowledge containment need and focus** – based on the flow of knowledge, organisations would therefore have a real need to obtain and retain knowledge and to effectively minimise the loss of knowledge as far as possible.
- **Scoping organisational problem** – regardless of how an organisation engages in KM and knowledge retention initiatives, knowledge will be lost to an organisation's environment. There is therefore a need for KM to address the problem of knowledge loss to retain as much knowledge as possible in a viable format for access and application if and when required. The alternative is systematic organisational 'memory loss' and by taking the liberty to coin a term, the potential of 'Organisational Alzheimer's Disease' where an organisation will forget what it once knew.

The question is now how these organisational KM needs are being met. What are the building blocks of KM that, if applied to an organisation, can satisfy organisational needs related to identifying, acquiring, distributing and preserving knowledge through the dynamic process of KM to facilitate organisational behaviour in achieving its overall goals, objectives and supporting management in the process of ensuring the success of an organisation?

Simply stated: ***What are the fundamental building blocks of KM that satisfy organisational KM needs?***

To answer this question, it is important to identify how practitioners of KM approach KM and what these practitioners consider KM to be. In Chapter 5, the methodology of identifying these building blocks are presented. By focusing on what practitioners view to be KM, or that which supports KM, the fundamental building blocks of KM, that satisfy organisational KM needs, will be presented.



Chapter Map 06: Research Methodology and Approach

CHAPTER 5: RESEARCH METHODOLOGY AND APPROACH

Table of Contents: Chapter 5

5.1. Introduction

In Chapter 1, the author provided a brief overview of some of the core problems related to addressing KM needs. The author addressed concerns related to understanding the core concepts of KM and concerns about applying software and technology to the problem of KM and practitioners' attempts to create and establish an environment that is friendly to the needs of KM in an organisation. Chapter 1 also established the core concern to be covered in this thesis, in that one needs to first identify the fundamental building blocks related to KM before KM can be effectively scoped and/or implemented in an organisation. In Chapter 2 and Chapter 3, the author provided an overview of the core concepts of KM, and considerations related to scoping KM based on definitions that have been used over a period within KM. What was found was that the definitions used by several authors do have a systematic and in some cases coherent nature. Based on the dimensions, facets and core concepts of these definitions, there are several differences in the authors' approaches to these definitions. Chapter 3 culminated in a core working definition of KM that focuses on business processes and KM as a mechanism supporting business processes and organisational functioning. The chapter delineated KM and refocused KM back on the process of managing knowledge.

In Chapter 4, the author indicated that KM, as a subdomain of management within the scope and context of the generic organisation, expresses specific KM needs within an organisation. In Chapter 4, the author indicated that the need for KM in an organisation exists because organisational knowledge has a propensity to dissipate into the organisation's business

environment along with system-based outflow of knowledge into the organisation's environmental context. The organisation therefore needs to identify, acquire, distribute and preserve knowledge that can support the functioning of the organisation as a whole. The chapter also reiterated the core problem associated with the research for this thesis, namely the identification of the fundamental building blocks of KM that can satisfy an organisation's KM needs.

Chapter 5 reviews the methodology, methodological concerns, methods and approaches, indicating how the author accessed, analysed and interpreted data to find an in-depth answer to the following question: **'*What are the fundamental building block of KM that satisfy organisational KM needs?*'**

The results of this approach will then be linked in Chapter 6 and Chapter 7 to identify and simply represent the identified building blocks that address KM needs as identified within the scope and the context of the data collected and analysed for this study (Chapter Map 06: Research Methodology and Approach).

5.1.1. Aim

The aim of this section is to review the methodological concerns related to conducting research related to the identified problem.

5.1.2. Scope

In order to achieve this aim, concepts related to the problem and the research approach followed will be covered in the following topics of concern:

- Research Design and Considerations.
- Methodology
    - Sample and data collection
    - Data preparation
    - Data presentation
    - Analytical approach

Chapter 5 concludes with a representation of analytical considerations when reviewing core concepts related to text analysis techniques applied for the answering of the main question stated for this thesis.

5.2. Research Design and Considerations

When evaluating the fundamental building blocks of KM that satisfy organisational KM needs, the author has to objectively evaluate the concepts used by KM academics and practitioners. One side finds an academic perspective that provides a theoretical exposition of KM, while on the other side, one finds a community of practice or practitioners' perspective in which authors and practitioners evaluate concerns related to the day-to-day management of knowledge. In this instance, authors may or may not make use of concepts related to epistemology as a basic principle in the meaning of the term 'knowledge', or they may review the concept within the context in which it is used. This is not the focus of this author. What is being focused on is what is being stipulated conceptually by these authors and practitioners. In essence, this author wishes to identify what the academic community and communities of practice stipulate KM to be in terms of the fundamental core concepts that can be ascribed to an organisation with KM needs.

To clarify, from the perspective of this author, the language that an individual uses to describe a term, concept or idea has the potential of exposing the understanding of that term, concept or idea. This view is supported by lexicographical research methods. What the methods strive to do in very simple terms is to expose the meaning of the word or a set of related words (Church *et al.*, 1991) by analysing the frequency in which a specific term is used, through its relationship with other terms, concepts or ideas.

In accordance to lexicographical research theory, language has the ability to describe a term, concept or idea, and the potential of exposing an understanding of that idea[9]. Techniques in lexicographical research can therefore be used to develop domain-specific lexicons that can identify the scope and context of a specific domain due to the correlations between the frequency of terms used in a particular domain or area of interest (Avancini *et al*., 2006).

This is due to the relationships in correlation, closeness or distance between the frequency of terms used in a particular domain (or area of interest). It determines how terms used within the scope and context of an area of interest have the potential of exposing relationships that can be used to define a domain. This is done by reviewing the frequency of specific terms used in relationship to other terms based on a pattern of usage. In this case, when the author refers to the word "pattern" – the author refer to as meaning a "an observable and discernible regularity". In other words, the lexicon, and the relationship of the terms and terminology can expose the building blocks, or discernible regularity of a domain by delineating the language that is pertinent to that particular domain.

[9] The lexicographical methods analyse the frequency in which a specific terms is used, though its relationship with other terms, concepts or ideas, to expose the meaning of the word. A definition within the scope and context of a lexicon is expected to be a concise meaning of a word or a concept (Bergenholtz, Nielsen & Tarp, 2009).

This technique is unique in evaluating what KM academics and KM practitioners view as KM because it makes use of a linguistic technique to analyse linguistic relationships as applied by individuals working with KM. The technique does not focus only on term definition as in the case of lexicography, but on domain delineation by evaluating terms used by KM practitioners who conceptually function within the KM domain. These individuals have selected the language being used through experience and application; therefore, their language has the potential of exposing the language of KM.

According to authors such as Nasukwa and Nagano (2001), data mining to extract meaning from text can be applied to text analysis, but it is critically hindered by the limitation that text by its nature is unstructured. Data mining techniques require structure in the way in which the content is organised and represented against known fields. This is supported by authors such as Alexa and Zuell (2000) when they state that one may lose information during the application of standard encoding methods as it would be near impossible to represent elements of standard text structurally. In pure text analysis as used in lexicography, the structure of text is not a concern. What is of concern in text analysis is that the terms used by individuals to define and describe an idea or concept should be used coherently by individuals who make use of such terms linguistically (Church *et al.,* 1991).

An alternative to the application of data mining techniques to analysing large sets of unstructured information or text has been indicated by Church *et al.* (1991). They propose a systematic and structured way one may use to analyse large volumes of text. What was lacking, however, was that it did not address the co-occurrence of large volumes of terms used within the text itself. It only addressed aspects related to the correlation of single instances of terms used. Church *et al.* (1991), used the two words ‘strong’ and ‘powerful’ as an example. Church *et al.* (1991) made use of a t-test to show how the two terms overlapped when used within a corpus of text. It suggests that one may make use of relationships between occurrences of usage to stipulate a relationship. Although the work presented by Church *et al.* (1991) was not directly used in structuring this thesis’s research approach, it did inform the author on dimensions and concepts that need to be taken into consideration while applying lexicographical techniques to analyse text (to identify relationships and categories of relationships) related to the application of text and words.

An interesting phenomenon of the application of lexical techniques in analysing the relationship between concepts is that the general solution to this problem is discussed in literature related to extracting actionable information from large sets of information as discussed within KM itself. It is important to note in this instance, that the authors in general focus on visualising and retrieving information or codifying it in such a way as to allow for easy retrieval from a database. The authors

focused on tagged and precategorised text, and not unstructured text applied by individuals within a given domain. For example, Rao (2003) indicates that information may be extracted by means of matching linguistic patterns amongst words and entities under investigation.

This approach is limited, however; Rao (2003) indicated that one would require a focused taxonomy as a matching source when extracting such information. In other words, Rao (2003) stipulates that a document needs to be precategorised by means of a taxonomy to allow one to extract information from within the category. This is limiting in that a categorical mechanism related to the needs of an organisation is required. In relationship to Rao (2003), Amatia and Crestani (1999) have indicated that documents can be filtered by means of weighted keywords that have been classified into different classes. These classes can then be used to selectively disseminate information based on a user's specific needs. The critical weakness identified by Amatia and Crestani (1999) is that the identification of relationships is clearly dependant on adding a weight to the available information.

Even in automated information extraction, authors focus on weighing terms and filtering words through predefined structures to identify relationships between concepts. For example, Grobelnik and Mladenic' (2005) indicate that one needs a structured and adaptive algorithm to identify relationships.

Neshati *et al.* (2007) has indicated that to find actionable information, one needs to extract semantic relationships between the terms used, ether by focusing on knowledge-rich methods (hierarchical relationships in co-occurrence of terms and terminology), or knowledge-poor methods (extracting semantic similarities between sources of words). Using a knowledge-rich approach is dependent on intelligent interpretation of term relationships. However, according to Langera *et al.* (2006), it creates the need for an intelligent agent that can autonomously and intelligently interact with the information that is available. This in itself creates the need for artificial intelligence that can process information-related data (Tsui, 2005). Unfortunately, artificial intelligence in linguistic processing has not yet developed sufficiently to support this process as it cannot intelligently differentiate between the meaning of the word as applied within the context or how the word is used by a user (Tsui, 2005).

What the authors in the previous section did allude to is that one may make use of statistical methods to indicate relationships between terms. They added that one can, through the co-occurrence of words, identify information resources and relationships. This is one of the facets of Natural Language Processing as used in the field of Information Retrieval applied by search engines. However, what is missing in this approach are multiple levels of co-occurrence. For example, if one counts the number of times the terms 'knowledge' and 'management' occur in a

document, then one would assume that the document addresses the idea of 'knowledge management'. If the terms are found directly next to each other in a document, such as in the case of 'knowledge management', the confidence would increase that a source of information addresses KM. This is, however, a fallacy. To fully address KM, related terms should be present within the document. A semantic relationship of co-occurring terms and terminology would have to be present.

To elucidate the concept, the author will make use of the classic example used to explain the limitations of the Bayesian Inference process used to identify relationships on a weighted scale. For example, if one searches for a word, in this case 'penguin', is the person trying to identify a flightless bird, or is she/he trying to identify a villain that is a thorn in the side of Batman? The only way that one would know in terms of Bayesian Inference would be to have a significant co-occurrence of either 'penguin' AND 'bird' or 'penguin' AND 'Batman'.

If the terms used in the above example do not co-occur, then according Bayesian Inference and correlation rules related to co-occurrence, word distance or proximity, one would not know. This creates a problem. How does one identify relationships between weighted words?

We can find the solution in lexicographical research techniques related to clustering and/or grouping terms to the point of term extinction, or distant terms. Cluster analysis functions in terms of sets and subsets of relationships in which patterns or relationships are identified. The technique is usually applied to fields related to machine learning, data mining, pattern recognition, information retrieval and for example genetics. It is used primarily when the author needs to identify categories and linkage between categories and is uncertain as to whether or not categories exist and/or if these categories are linked to each other. It is also used in instances where the author is presented with textual data that cannot logically be coded to numerical data other than counting the number of times text occurs within an unknown or complex sequence (Church *et al.*, 1991).

Amatia and Crestani (1999), Rao (2003), Grobelnik and Mladenic' (2005), Tsui (2005), Langera *et al*. (2006) and Neshati *et al*. (2007) all stipulate directly through weighted scales, taxonomies, frameworks or any other predefined categorisation mechanism, that before one can analyse any semantic relationship, one needs to have the context in which a document or a source of information is found. What lexicographical analysis as a research technique requires, is the context in which a term is used and the coherent application of the term. When a term's context has been identified, it can be used to identify relationships through the co-occurrence and distance between terms within the scope and context of a source of text or corpus. Cluster analysis assists by assigning patterns of co-occurrence. One can apply a pattern of co-occurrence to define the scope, content and meaning of concepts in relationship to each other when the context is known.

Simply stated, if a context can be identified, for example the scope and context in which terms are used most frequently, then cluster analysis can be used as a methodological approach to indicate the relationship between the words used within the context, based on the pattern in which they occur. Alternatively, the terms used within the context can then be used to define the scope and context of the language used in that context. One can therefore identify the context, and the most frequent pattern of words used in relationship to each other in that specific context. If words used in a related context co-occur, one would find an overlap or a match. If words in another context are used, then one would have dissimilar patterns and the two contexts will not match. One can therefore state that if an unknown context makes use of similar patterns of words, then the context would be similar. If an unknown context makes use of dissimilar patterns of words, then the context would be dissimilar. This leads to the following set of rules that one can apply through pattern recognition, related to context or to a domain of interest.

Rule 1

- A ***known context*** yields a ***specific set of words***
- A ***specific set of words*** co-occur in a ***specific frequency***
- A ***specific frequency*** of words yields a ***specific pattern of relationships***
- A ***specific pattern of relationships*** of words yields a ***known pattern of relationships***
- Therefore a ***known context*** may yield a ***known pattern of relationships*** in words

Rule 2

- If a specific ***known context*** may yield a ***known pattern of relationships*** in words
- Then a ***known pattern of relationships*** may indicate the ***known context***

Rule 3

- If a specific ***unknown context*** yield a ***known pattern of relationships*** in words
- Then a specific ***unknown context*** may indicate the specific ***known context***

Rule 4

- If a specific ***unknown context DOES NOT*** yield a ***known pattern of relationships*** in words
- Then a specific ***unknown pattern of relationships*** may ***NOT*** indicate the ***known context***

Rule 5

- If a specific ***unknown context*** yields an ***unknown pattern of relationships*** in words
- ***Then the unknown context*** may ***NOT*** indicate the ***known context***

These rules, through the application of lexicographical analytical techniques and cluster analysis, will therefore be used to analyse and identify the fundamental building blocks of KM that satisfy organisational KM needs.

In the following section, this author reviews methods in statistically clustering samples of data that through word and term extinction (cluster analysis and proximities) indicate which aspects or facets of the different views and viewpoints of KM correlate closely with each other, as well as aspects related to data collection, data presentation and data analysis as used for this study.

5.3. Methodology

In this section, the author elucidates the methodological approaches followed to gather, present and analyse data collected from KM definitions and two communities of practice that focus on KM and the application of KM. This section reviews sampling and data collection methods, data presentation and expression in terms of form and format, as well as the analytical approaches followed to review the meaning of the collected data in terms of both a qualitative and a quantitative approach.

For the purpose of this study, it was required to make use of both qualitative and quantitative research methodological approaches. The methodology approach used for this study is informed by the work of Phillips (1985), Dane (1990), Church *et al.* (1991), Kerlinger and Lee (2000), Benjafield (1994), Newman (1997), Berg (1998), Leedy and Ormrod (2001), Mook (2001), Mouton (2001) and Willig (2001). To be able to identify the core concepts related to knowledge, KM and the fundamental building blocks of KM, this author captured and reviewed a significant amount of textual or unstructured information related to the meaning of knowledge, KM and how KM is used to satisfy organisational KM needs.

As stated by Carenini, Ng and Zwart (2005: 11): '*[k]nowledge capture[d] from a large body of text involves two basic tasks. First, it is necessary to extract from the text the most important information. Then such information has to be presented to the user*.' As such, in this instance, this study makes use of a non-exhaustive sample of definitions describing KM and two convenient samples of practitioner websites for KM communities of practice used by other KM practitioners when referring to KM tools and techniques as applied in organisations. For this purpose the author selected two communities of practice known to the author. Both communities of practice maintain an online reference and repository of documentation, discussions, references and links to resources. KM practitioners manually maintain both communities of practice and only material that is useful in explaining KM to support KM endeavours and initiatives are added to the online referenced material. Due to the fact that the communities included discussions, descriptions and

useful resources, the author thought it to be a good reflection of what KM practitioners believed to be useful when addressing KM.

The approach followed in terms of the preparation, presentation and analysis of the textual data associated with the samples of data related to KM is informed by Church *et al*. (1991), Kuehl (2000) and Kerlinger and Lee (2000).

5.3.1. Sample and Data Collection

Data was collected by conducting a non-exhaustive search of academic and scholarly literature related to KM in which 41 explicit definitions were identified spanning a period of 11 years from 1992 to 2006. The population of articles in which definitions were found, was explicitly defined as N = 41. This implies that 41 articles were sourced as the analytical population from which definitions were sourced. These years represent the first use of KM through the estimated apex of the terms' usage. The characteristics of the definitions are located in diverse academic journals and publications. If the definitions were cited or referenced in an academic journal, then they were included in the sample of definitions.

When conducting a generic search for KM definitions, one finds extensive search results and lists of definitions represented on the Worldwide Web. The focus of this research is academic material, and therefore such Internet articles were omitted from the sample collected. Additionally, the author focused on clear, explicit definitions cited by other authors in academic literature. For example, if a definition originated in non-academic publications, yet was cited or referenced in academic publications, then the definition was considered academically valid and included in the definition list. After 2006, the author could not identify additional definitions that did not refer to those of previous years, or simply made use of the stipulated definitions. However, the definitions applied in this thesis were identified by means of a non-exhaustive search; there may be additional definitions that the author could not necessarily access.

It is critical to note that the definitions listed are by no means all the definitions related to KM as found in academic literature. The definitions are reviewed outside the scope and context in which they were originally formulated and used to review the key concepts as stipulated in the definitions themselves. It is also critical to note that the definitions were decontextualised and that their individual context could have a bearing on describing the meaning of a definition. Furthermore, the way in which a definition was formulated was not probed or questioned. A simple rule was used to collect the definitions: if the author of an academic article presented a definition and the definition could be clearly distinguished as a definition, then the definition was harvested for analytical purposes.

Data related to the definitions was collected in three phases. The first phase was conventional searching to identify academic journal publications in which KM was defined. In the second phase, after an academic journal publication article was identified, the article was reviewed to identify the definition listed in the article. If the definition was explicitly expressed in the article, then the definition was harvested. If the definition was only referenced in terms of alternative, secondary sources pertaining to the collected article (in other words, only referred to or referenced), then the article was removed from the sample. The data requirement was that the definition had to be explicitly expressed as a definition within the scope and context of the article from which it was harvested. The third phase was to list and group the definitions per year according to authors.

After completing and conducting the data collection for the definitions as described in literature, the author collected data from two groups of online directories maintained by KM practitioners as a practitioner's view of what refers to KM.

Figure 9 provides a brief overview of the data collection process. After the definitions were collected, the author collected two additional datasets related to KM. The dataset of definitions was collected manually to identify the relevance of the definitions found within the KM literature. The datasets from the two communities of practice were collected by using a WebCrawler (WinWebCrawler v2.0) to automatically harvest the data from these two sets of samples. In both instances focusing on KM practitioners' online directories, the WebCrawler collected data from the sample datasets over a 24-hour period.

All automated datasets were collected by crawling complete websites and remaining within the websites list. For example, if a website named http://www.listofwebsites.com was in the list of sites to be collected, then it would remain within that specific website. Each subpage associated with that particular website was also browsed, crawled and subsequently harvested. If we assume a Universal Resource Locator (URL) list related to the stipulated example, with individual subpages linked to the example website, then all the subpages were crawled and subsequently collected within the 24-hour collection window.

In all instances of crawled sites harvested automatically, the software used to collect the data (WinWebCrawler v2.0), was set to follow external links associated with the stipulated site. In other words, not only did the crawler harvest data from all the pages associated with the primary page, main URL and those particular subpages, it also followed links located in the primary page to subsequent pages. For each automatically collected website and link to other pages within the given dataset in total, the crawler was allowed to collect data for a 24-hour period per dataset.

Due to the interlinked nature of the Worldwide Web, it would have been nearly impossible to collect all the linked pages if the collection process was set to run indefinitely. The crawler was set to firstly collect all the pages linked primarily to the main dataset of interest. After the pages linked to the main dataset of interest were collected, the crawler followed the external links found per page to a depth of one page. In other words, the crawler harvested the pages and the subpages linked to the main dataset of interest, and then collected the first page of the pages hyperlinked to the collected pages. In all instances, the crawler was set to collect a maximum of 5 000 words per page. If a page contained less than 5 000 words, then the entire page were harvested before the crawler moved on to the next page. This resulted in approximately 25,000 records per dataset of interest with each record being harvested as to one page on a website. The author harvested 28,071 records from CBEL (http://www.cbel.com/knowledge_management/) and 25,699 records from BRINT (http://km.brint.com) totalling 53,770 records. The author decided to remain within the domain-referenced link to ensure that as much material deemed valuable by the related communities might be harvested. If the author collected all linked references then any and all hyperlinked material would have been collected and this would have included any and all potential material listed and hyperlinked in-between and across domain links and references

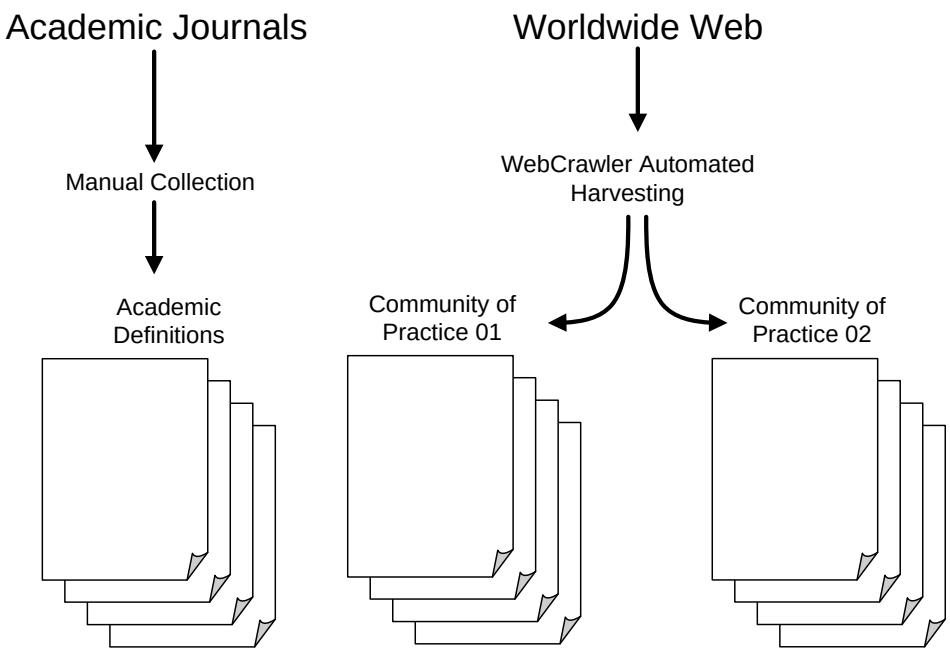


Figure 9: Data Collection Process

An additional main characteristic of the automated datasets is that each record had the potential of including metadata and the body text of the page that was harvested. However, in many instances, several pages contained flash videos and images and not text. Several of the records also excluded metadata. Only pages with textual content were selected and retained in the analysed dataset. There are also instances where the datasets included records related to social media such

as Twitter, Facebook and MySpace. As these sites focus mainly on social interaction and not necessarily the core concepts related to KM, due to their unique and personalised nature, the author eventually decided to exclude these records. By removing the records per dataset that related to social media, the total number of records per dataset were significantly reduced.

The dataset was also reduced where empty records, in other words pages without text, were taken out during the data cleaning procedures. In the flowing list, the reader may refer to the main explicit characteristics that were found per dataset. The list of characteristics refers to both the manually and the automatically collected sets of data. This is done to clarify the raw data as collected by this author for this study.

Characteristics of Dataset: Academic Definitions

- **Source:** Academic Journals.
- **Source Description:** The journals are characteristically diverse in nature and focus on various treatments of KM. The definitions have already been reviewed as part of the literature of Chapter 3 of this thesis.
- **Collection Tool:** Manual collection through visual assessment.
- **Period of Collection:** Five days of review and collection.
- **Total Filtered Results:** Forty-one definitions. In this instance, the definitions have been filtered by means of review.
- **Reference List:** Appendix 1.1 (page 4 to page 9).

Characteristics of Dataset: Community of Practice 01

- **Source:** http:// km.brint.com.
- **Source Description:** Brint.com is a community of business practitioners that provide free information and services to registered users of the website. The information provides descriptions, discussions, guidelines, case studies etc. of a specific business concept. One of the sections of Brint.com, namely km.brint.com, focuses only on KM within the scope and context of a business environment. The subsection provides an overview and clear discussion of concepts related to KM and its application within the scope and context of case studies.
- **Collection Tool:** WinWebCrawler v2.0.
- **Period Of Collection:** 24 hours.
- **Date Collected:** 2011/08/02 – 2011/08/03.
- **Total Unfiltered Results:** 25 129 records (where a record is equal to a document).
- **Total Filtered & Cleaned Results:** 120 records (where a record is equal to a document).
- **Example Reference List:** Appendix 2.1 (page 26 to page 33).

Characteristics of Dataset: Community of Practice 02

- **Source:** http://www.cbel.com/knowledge_management/.
- **Source Description:** The starting URL referenced above had 1 358 websites hyperlinked to the source page that have been manually selected by KM practitioners. The list of URLs includes vendors, tools, papers, information, case studies and information the KM practitioners believe would be useful and valuable in terms of a KM initiative and/or practice. In this instance, crawling and harvesting data from the total list of websites provided an overview of how the practitioners perceive KM.
- **Collection Tool:** WinWebCrawler v2.0.
- **Period Of Collection:** 24 hours.
- **Date Collected:** 2011/07/25 – 2011/07/26
- **Total Unfiltered Results:** 28 070 records (where a record is equal to a document)
- **Total Filtered & Cleaned Results:** 147 records (where a record is equal to a document)
- **Example Reference List**: Appendix 3.1 (page 459 to page 463)

The two datasets collected through WinWebCrawler refer to raw data that had to be cleaned and prepared for data analysis. In the following section, the author describes the process that has been followed in cleaning and preparing the datasets for the purpose of analysis. The review of the cleaning process is necessary to indicate that a clear set of repeatable rules have been used to prepare the data for analysis.

5.3.2. Data Preparation

The preliminary phase in preparing data for analysis was to clean data in preparation for analysis. This may be viewed as one of the first analytical phases, as the author had to delve into the data and become acquainted with the nature of the data that has been collected. The author therefore became aware of the nature of the data itself. Figure 10 provides a brief high-level overview of the process in which data was prepared.

In terms of the definitions, the definitions were reviewed and it was found that several of the definitions included acronyms that needed to be converted into full terms and terminology. For example, if the author found acronyms referring to KM, they were converted into their original terms based on the context of the paper and the definition. For example, if an author of the original paper referred to '*KM*' within the definition, it was converted to '*Knowledge Management*'. In this instance, the author only made used of whole words and did not allow acronyms or abbreviations to be expressed within the context of the definition.

A similar procedure was followed for the body text used by documents found in the two KM practitioner datasets. Firstly, if the practitioners' website records referred to any type of social media, it was removed and cleaned up as the author deemed it necessary to remove media that change dynamically based on the mood, feelings and the social relationships presented in these media. Secondly, after ensuring that all online records were free from social media structures and relationships, data was cleared of any empty records referring to flash media and videos that did not refer to textual data. Finally, any duplicate records were systematically removed. Duplicate records were removed firstly by means of an automatic duplicate check procedure built into Microsoft Excel 2010, and then by assessing the records manually to ensure that duplicates were no longer present.

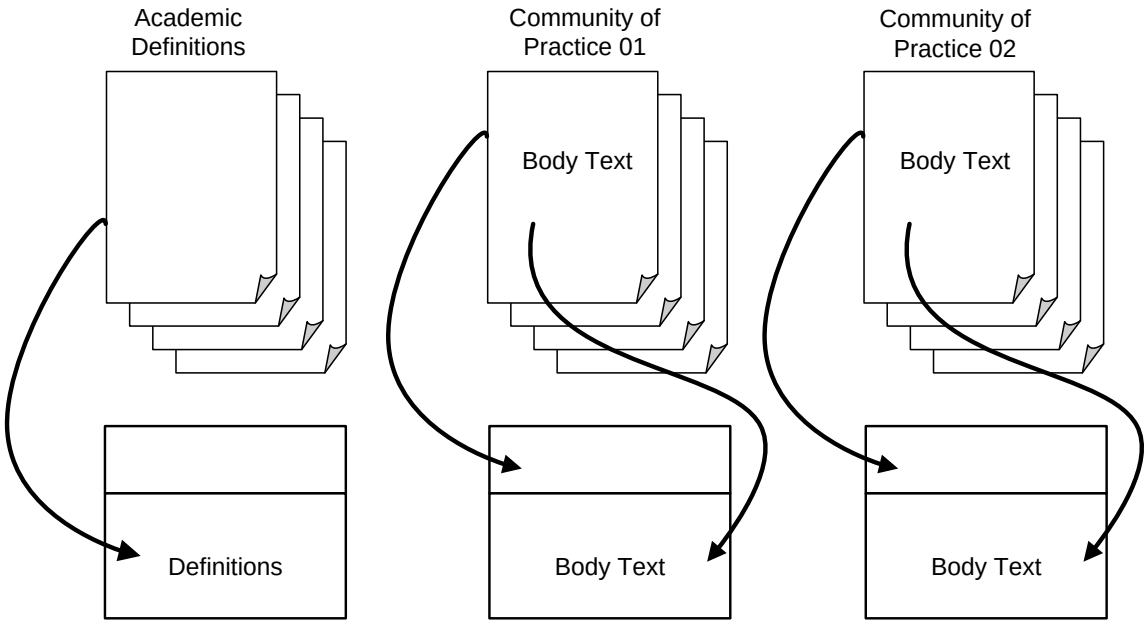


Figure 10: Data Clean-up and Preparation

Generally, all three datasets collected, separated and presented are clearly textual in nature. The harvesting of the definitions decontextualised the definitions from any preceding and post-definition discussions related to the formulation of the definitions. The harvesting of the two practitioner datasets also decontextualised these datasets from the inherent relationships present within pages located on the WWW due to its hyperlinked nature. The data in terms of the definitions is devoid of all context related to the descriptions used to elaborate or elucidate the meaning behind the definitions presented by the authors, and the data located in the harvested web samples is devoid from current relationships related to the interconnectedness found on the WWW. The definitions reviewed as part of this study thus far were subsequently analysed for the purpose of literature review and later text analysis mechanism.

For the purpose of analysis, the definitions were kept as is (post acronym and abbreviation clean-up) so that the author might review them in terms of concepts related to literature. Key terms within the definitions were highlighted and reviewed within the context of the definition as related to literature referring to KM. No alteration was made to the definitions other than converting the acronyms and abbreviations, and identifying individual terms that could have a potential significant meaning within a qualitative context. The significance of the identified words was interpretivistically identified by evaluating the terms within the context in which it was expressed by the promoter of the definition.

In terms of the web-related datasets, acronyms were cleaned up and the author delved into the content of the dataset to ensure the validity of the data pertaining to KM. This was to ensure that the author developed a personal grasp and contact with the data collected. Consequently, even though the data was collected by means of an automated agent, the author had an understanding of the text presented. This was deemed necessary as the cluster analysis techniques described later in this thesis require full decontextualisation, word counting, and proximity analysis to create patterns of relationships. These patterns of relationships, however, imply that all text has been structurally decontextualised and all textual and interpretive meaning has been lost. By understanding the text before analysis, the author deemed it prudent to understand the text before further transformation was conducted. The author recognises that structural decontextualization may have an impact on the relationships of words and terms. The magnitude of such a change is an unknown that would require further research a comparative studies. This is however outside of the scope of this thesis.

For the purpose of cluster analysis, the definitions and the web samples were filtered and words extracted based on the number of times these words occurred within a particular definition. This was done automatically though the application of TextStat and Textanz. TextStat and Textanz count words and then present the user with a list of words and the number of times that these words occur within the sample of text. This left the author with lists of word count definitions, and a list of word counts per webpage record body text set. The lists of words could then be analysed by means of hierarchical clustering using the Euclidian distance of these words within groups, to identify the relationship, proximity (closeness and distance) of these terms' occurrence within the list of word counts.

To be able to cluster this textual data, the author followed a method to prepare the text for the calculation of the Euclidian distance to identify the average linking between groups of words. The procedure for cleaning the text for calculation of Euclidian distance consisted of four phases.

The first phase was to filter the text from all three datasets word for word by identifying the count or number of times the individual words were expressed within each set. In terms of the definitions, this was done per year, and the terms were continuously grouped per year in which these definitions were expressed by authors. This was done to test the procedure on each manually collected definition, as it is much simpler to test data preparation, presentation and analysis on smaller datasets. After the author was satisfied that the procedure yielded similar results based on similar procedures, the data for the definitions were then presented as a total and analysis as totals for terms expressed in the collected definitions. In terms of the web data, a similar process was followed. However, due to the fact that creation dates of the pages linked to the web data were unknown, this was done per web dataset. By this point in time, the author was satisfied with the results that the procedure for this study presented; therefore there was also a higher level of author confidence that the process would yield relevant results. After this phase, the author was presented with an alphabetised list of words per year for the definitions and the count of words for the web dataset. This provided the author with the number of times words were expressed within each dataset.

The second phase was to remove counted stop words from the lists of words (Appendix 4, page 1237 to page 1238). Stop words on their own have no real meaning, as they are short function words that are primarily used to weave linguistic concepts together. After filtering stop words such as, '*a*', '*across*', '*the*', '*will*', *'and',* as well as '*with'* out of the word list, the author was presented with adjectives, nouns and verbs.

The third phase was to evaluate all the words individually and to convert these words from plural to singular terms. The alteration from plural to singular was a mechanism used to ensure that all terms were in a similar format. In this instance, if the conversion from plural to singular changed the word count of individual groups of word, then the words were merged. For example, if '*managers*' became '*manager*', and there was already a word count associated with the two expressions of both '*managers*' and '*manager*', then after converting the plural '*managers*' to the singular term '*manager*', the two groups of words were merged into one word count for the singular '*manager*'.

In considering how to merge words based on the usage of the words within the scope and context of all datasets, the author reviewed how the words were used within the context in which they were originally presented. Table 13 provides an example of how the keywords were evaluated based on the context in which it has been found. In this case, it is a continuation of the words '*management*', '*manager*' and '*managing*'. In terms of Table 13, the word was the core focus and as such, the table was sorted alphabetically during data preparation. The position is the position in which the words were found within the set of definitions. The context may be derived based on the terms

used before and after the selected word. This consideration in simplifying words from plural to singular was also applied in considerations related to the fourth phase of data preparation.

Table 13: Example Keyword In Context (Concordance)

Position	Before word (context)	Word	After word (context)
4236	derivation of knowledge	management	emanated from its
4645	the portfolio of	management	activities
5808	Knowledge	management	involves activities related
5929	It involves the	management	both of external
6265	new knowledge, knowledge	management	involves methods for
6869	and efficiency Knowledge	management	is the process
7060	Knowledge	management	is the explicit
7102	explicit and systematic	management	of vital knowledge
7318	optimization and active	management	of intellectual assets
7878	This is Knowledge	management	
8120	explicit control and	management	of knowledge within
7736	world of the	manager	of the 21st
4771	a requirement wise	managers	have always been
1126	locates knowledge and	manages	the dissemination and
1378	or locates knowledge,	manages	the flow of
4461	systematically and actively	managing	and leveraging the

Examples of how the keyword in context was evaluated per dataset may be found in the following appendices:

- KM Definitions – Appendix 1.2 (page 10 to page 13).
- Community of Practice 01 (KM Network; Brint) – Appendix 2.2 (page 34 to page 37).
- Community of Practice 02 (CBEL) – Appendix 3.3 (page 464 to page 467).

The fourth phase in preparing data for clustering was to group similar concept-carrying words together. In Figure 11, the author presents an example of how words were grouped into super- and subtypes of terms or words. This was done by referring to a singular instance where authors referred to the idea or concept of a '*business*' or an '*organisation*'. Taking into consideration the variations of terms and terminology that can be used to describe an organisation, the author in this instance grouped these words together. This was done in several instances to ensure that all instances of words used in the definitions and the web-harvested datasets presented by the authors were coherent in nature. For example, '*enterprise'* was converted into '*organisation'*, and the word count linked to enterprise was subsequently added to that of organisation, thereby increasing the count of words used to refer to instances of the word organisation within the context of the definitions.

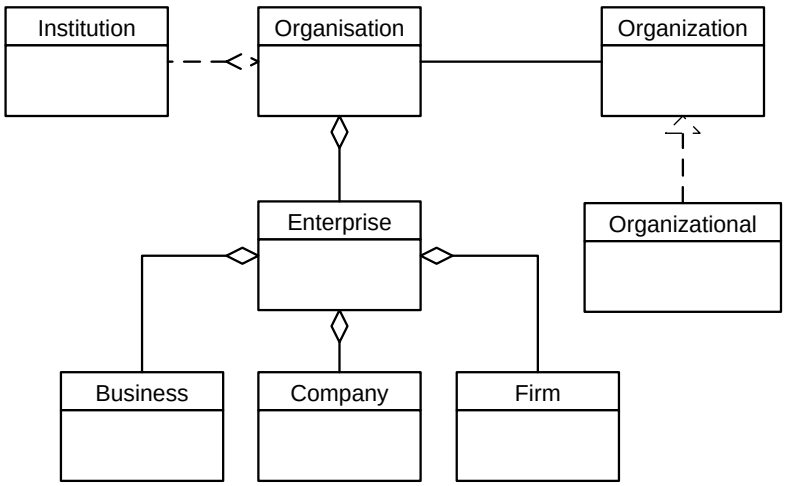


Figure 11: An Example of Word Grouping (Organisation)

Another example is the idea of sharing knowledge or information between individuals. In each instance, when one of the words, within the context of the datasets, alluded towards the '*share*' of knowledge as well as the process of '*sharing*' either though '*dissemination*' or '*fluidic flows*' of knowledge, then these words were grouped together as '*share*' and the associated word counts linked to the individual words were added to the word count of the word '*share*' (Figure 12).

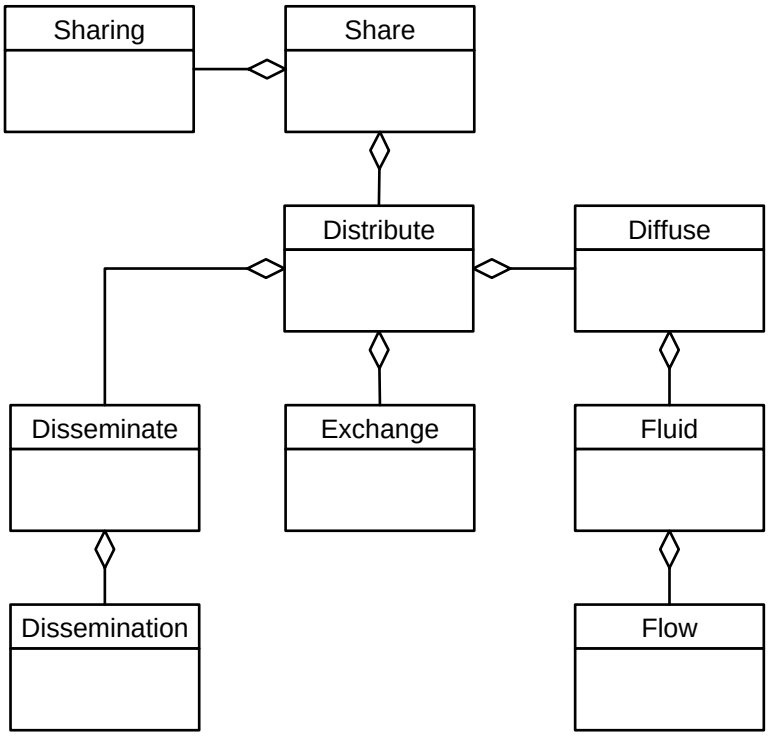


Figure 12: An Example of Word Grouping (Share)

The grouping done in phase four ensured that instances of words and realisations of those words within the context of the datasets could be grouped. This was done to ensure further coherence in

how the individual words relate to each other based on the numbers and frequency in which they occur and are used in relationship to each other (Table 13). Each word was then re-evaluated based on the context in which they occurred and regrouped. After the fourth phase, the author considered the words grouped and cleaned and ready for analysis and interpretation.

5.3.3. Data Presentation

Table 14 provides the reader with an overview of the final dataset that the author was presented with in terms of the list of definitions. In terms of how the data was presented in all instances, the core focus was the total word count. The definitions were viewed as a special case as it provided the author with an academic view of how KM could possibly be interpreted. The word lists for the web datasets were simply listed in terms of total word count. The main difference in this instance is that the definitions were reviewed in terms of years, and the web datasets were reviewed in terms of total gross numeric values. In terms of the definitions, any empty values were filled with a zero to ensure that empty values were not present. A total was calculated for comparison purposes post cluster analysis.

The raw word count for the definitions was reviewed in terms of a simple graph for visual inspection. The web datasets were also visually inspected in terms of a simple graph. All dataset word counts included a list of terms, and a total for the times these terms occurred within the text it was presented. Though the example of Table 14 only refers to the words collected from the definitions, the only difference between the example of Table 14 and the other datasets is that the web datasets did not have word counts per year, but only presented a word count in total per individual word.

Table 14: Raw Word Count Data (Post Clean-up)

TERM	COUNT1992	COUNT1996	COUNT1997	COUNT1998	COUNT1999	COUNT2000	COUNT2001	COUNT2002	COUNT2004	COUNT2005	COUNT2006	ALLTOTAL
access	0	0	0	0	2	0	0	0	1	0	0	3
acquire	0	0	2	0	1	0	0	0	0	0	0	3
action	0	1	5	0	2	0	1	0	0	1	1	11
analyse	1	1	0	0	1	0	0	0	0	0	0	3
artefact	0	0	4	3	4	0	1	0	0	0	0	12
asset	0	1	3	2	2	1	1	0	0	0	0	10
attitude	0	0	1	3	6	0	1	0	1	1	0	13
capacity	0	0	0	2	5	0	0	0	2	0	1	10
codify	0	0	3	7	4	0	0	0	0	2	1	17

Table 14: Raw Word Count Data (Post Clean-up)												
TERM	COUNT1992	COUNT1996	COUNT1997	COUNT1998	COUNT1999	COUNT2000	COUNT2001	COUNT2002	COUNT2004	COUNT2005	COUNT2006	ALLTOTAL
community	0	0	1	1	5	0	0	0	0	0	0	7
competency	0	0	0	1	0	0	1	0	0	0	0	2
competition	0	0	1	0	0	0	0	0	0	1	0	2
context	0	0	3	0	0	0	0	0	0	2	0	5
create	0	1	3	0	5	0	1	1	1	2	0	14
data	2	0	0	1	5	0	0	0	0	0	0	8
decision	0	1	1	0	2	1	0	0	0	0	0	5
definition	0	0	0	1	3	0	0	0	0	0	0	4
effective	0	0	0	1	1	0	0	1	0	0	0	3
efficient	0	0	0	0	0	1	1	1	0	0	0	3
embody	0	0	0	2	0	0	0	0	0	0	0	2
enhance	0	1	3	3	4	0	0	0	1	0	0	12
explicit	0	0	2	2	0	0	0	0	0	0	0	4
formal	0	0	0	1	2	0	0	0	1	0	0	4
frequent	0	0	1	0	0	0	0	0	0	0	0	1
information	2	0	2	4	8	0	0	0	0	0	0	16
innovation	0	0	0	2	1	0	1	0	1	0	0	5
justify	0	0	0	1	1	0	0	0	0	0	0	2
knowledge	1	10	22	7	26	4	0	5	1	8	1	85
learn	0	0	0	0	1	0	0	0	0	1	1	3
leverage	0	1	8	2	12	1	1	1	0	2	1	29
manage	0	2	6	0	3	0	0	1	1	0	1	14
management	0	3	14	4	11	2	0	2	0	3	1	40
marketing	1	0	0	0	0	0	0	0	0	0	0	1
meaning	0	1	0	2	0	0	0	0	0	0	0	3
mind	1	0	2	1	4	0	0	0	0	0	0	8
opportunity	0	0	1	0	0	0	0	0	0	0	0	1
organisation	0	1	8	6	12	1	1	1	0	4	1	35
performance	0	0	2	0	1	0	0	0	1	0	0	4
person	0	1	16	5	9	0	1	0	2	2	2	38
process	0	0	7	4	12	1	2	1	0	4	1	32
produce	0	1	2	0	1	0	0	0	0	0	0	4
relation	0	0	3	0	0	0	0	0	0	2	0	5
require	0	1	0	0	0	0	0	0	0	0	1	2
seek	0	1	2	0	0	0	0	1	0	1	0	5
share	0	1	4	1	4	1	1	1	0	4	0	17

Table 14: Raw Word Count Data (Post Clean-up)												
TERM	COUNT1992	COUNT1996	COUNT1997	COUNT1998	COUNT1999	COUNT2000	COUNT2001	COUNT2002	COUNT2004	COUNT2005	COUNT2006	ALLTOTAL
skill	0	0	0	1	5	0	0	0	0	2	0	8
strategy	0	1	6	2	4	0	0	1	0	0	0	14
structure	0	0	0	1	1	1	0	0	0	1	0	4
tacit	0	0	0	3	2	0	1	0	1	0	0	7
technology	1	0	6	2	1	0	0	0	0	0	0	10

The complete list of words that the author was presented with after data clean-up may be found in the following appendices:

- KM Definitions – Appendix 1.3 (page 14 to page 15).
- Community of Practice 01 (KM Network; Brint) – Appendix 2.3 (page 38 to page 46).
- Community of Practice 02 (CBEL) – Appendix 3.3 (page 468 to page 479).

In Figure 13 one may see that after data clean-up, the author made use of between-group clustering techniques (by means of IBM SPSS version 17), to create proximity matrices and clusters of the individual data sets. The definitions and the two practitioner web samples were clustered in terms of the total words.

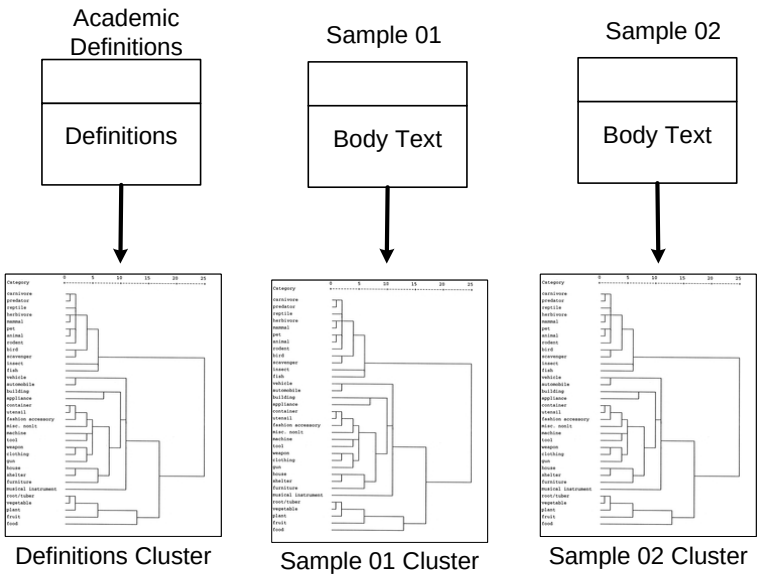


Figure 13: Data Clustering and Pattern Extraction

The dataset presented in this instance is the complete dataset with which the author was presented after collecting, cleaning, sorting and preparing data for analytical purposes. In the

following section, the author presents the analytical approach used to transform the data for analysis.

5.3.4. Analytical Approach

After the words were grouped and cleaned, the author was presented with a list of terms that, according to the author, provided a count of how many times these word were used over a period to define or describe KM. The analytical approach was subsequently conducted in two phases. The first phase involved a descriptive analysis of the terms by graphically representing terms as a simple word count graph. This provides an overview of term usage and how many times these terms have been used. The second phase was to conduct a hierarchical cluster analysis between groups by means of calculating the Euclidian distance of the words based on how the individual words relate in terms of the number of times these words are used. Cluster analysis is usually used to organise observations into groups to predict relationships between the individual groups.

The following is a very simple example of how cluster analysis would function. For the purpose of this example, we have a list of words and the numbers these words occur within a set piece of text (Table 15). In this instance, we do not know how these words would be grouped based on the number of times that these words occur in a given piece of text.

Table 15: Worked Example Data

EXAMPLE WORD	WORD COUNT	PERCENTAGE TEXT
Word_01	11	5.64%
Word_02	11	5.64%
Word_03	13	6.67%
Word_04	18	9.23%
Word_05	18	9.23%
Word_06	21	10.77%
Word_07	23	11.79%
Word_08	23	11.79%
Word_09	25	12.82%
Word_10	32	16.41%
TOTAL	**195**	**100.00%**

To understand how the words presented in Table 15 would be grouped, one would then make use of a hierarchical cluster analysis. The first part of a hierarchical cluster analysis is to calculate the proximity of the words based on the distance of the words.

Table 16: Example Proximity Matrix										
Case	**01:Word_01**	**02:Word_02**	**03:Word_03**	**04:Word_04**	**05:Word_05**	**06:Word_06**	**07:Word_07**	**08:Word_08**	**09:Word_09**	**10:Word_10**
01:Word_01	0	0	2	7	7	10	12	12	14	21
02:Word_02	0	0	2	7	7	10	12	12	14	21
03:Word_03	2	2	0	5	5	8	10	10	12	19
04:Word_04	7	7	5	0	0	3	5	5	7	14
05:Word_05	7	7	5	0	0	3	5	5	7	14
06:Word_06	10	10	8	3	3	0	2	2	4	11
07:Word_07	12	12	10	5	5	2	0	0	2	9
08:Word_08	12	12	10	5	5	2	0	0	2	9
09:Word_09	14	14	12	7	7	4	2	2	0	7
10:Word_10	21	21	19	14	14	11	9	9	7	0

A proximity matrix provides an overview of the distance between categories. The further a word is away from another word, the greater the distance is between words. Subsequently, words are grouped or clustered together to link between groups of words.

To produce a proximity matrix, the words are placed into a grid relationship and the distance is calculated between the words. This presents the author with a dissimilarity matrix which is known as a proximity matrix (Table 16). The proximity matrix is grouped based on cases. Each case presents an overview of the distance between words.

After the conclusion of a proximity matrix, the matrix can be used to manually produce what is known as a heat map. A heat map provides an overview of how individual terms relate to each other based on potential groups and categories. It is one of the potential methods that can be used to provide an overview of how categories of data relate to each other in proximity. Figure 14 provides an example of a heat map as presented for this example.

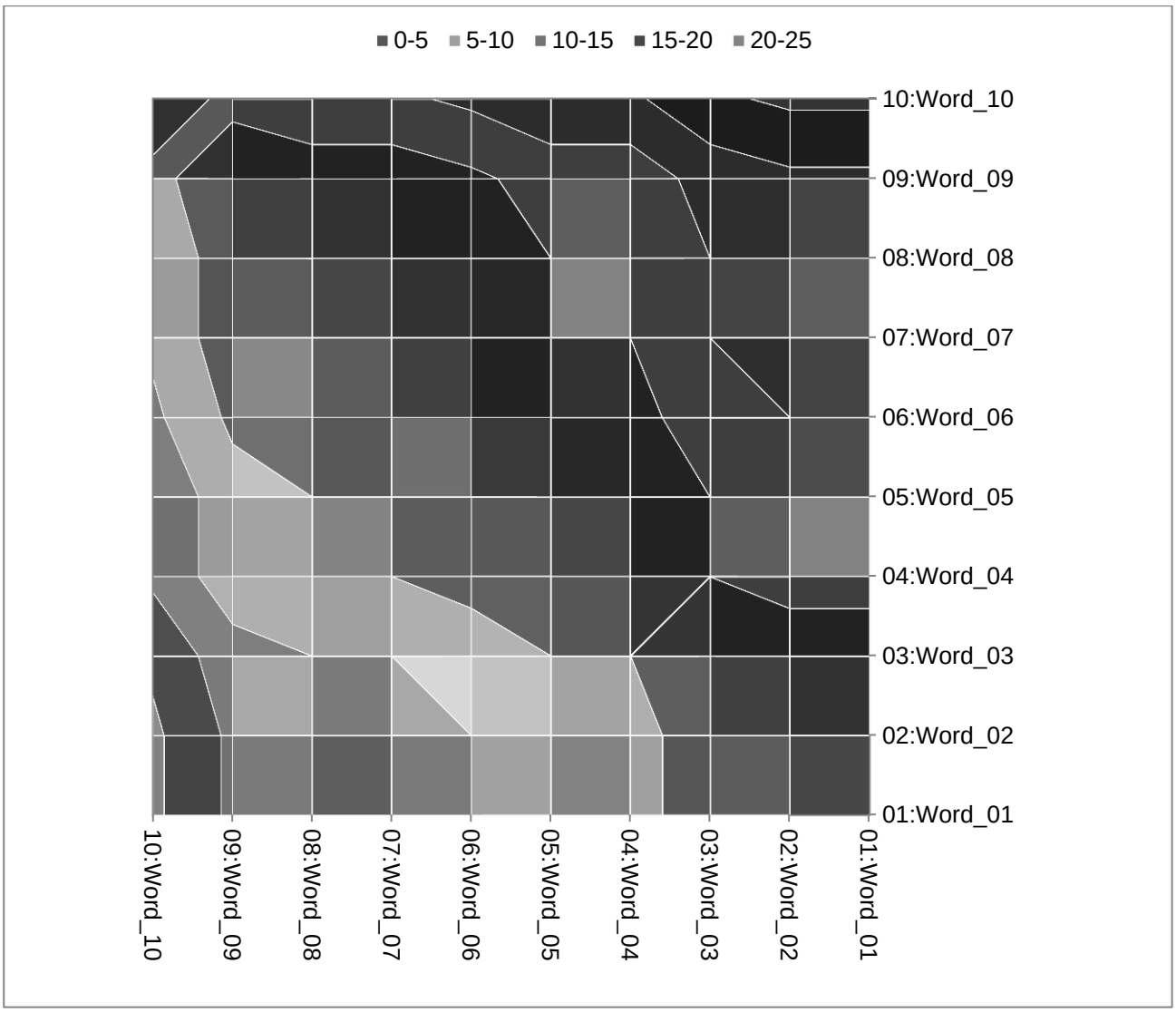


Figure 14: Example Heat Map

When referring to the heat map, the colours refer to how closely or distantly terms are based on the range of similar of different colours assigned to them. The selection of colour is arbitrary and can be any colour whatsoever. What is of importance is that the range in colour should be similar or different in nature. For example, lighter colours would refer to closeness in terms of the range of light colours surrounding cells. Darker colours would refer to greater distance from lighter colours. When referencing the proximity matrices, colours are assigned based on the value found in the cells in proximity. When referring to the colours in the heat map one should consider that the colours refer primarily to ranges that allow visual inspection of closeness and distance. The colour itself is not the point of the map. The heat map allows a visual inspection of otherwise large datasets. The closer the colours are in terms of the range of colour assigned to them, the closer the terms would be based on the proximity calculation. In other words, darker colours would pool around darker colours, and lighter colours would pool around lighter colours. The purpose is to identify pools of similarity based on how close or how far terms are from each other as identified in the heat map.

After a proximity matrix is presented, then the stipulated proximities are used create a dendrogram using linkage between groups. The dendrogram in Figure 15 provides an example of how a typical dendrogram would appear after all clusters have been identified and grouped together to provide an overview of how terms or words link together. Within the dendrogram one can then identify clusters, relationships and individual groups of linkage.

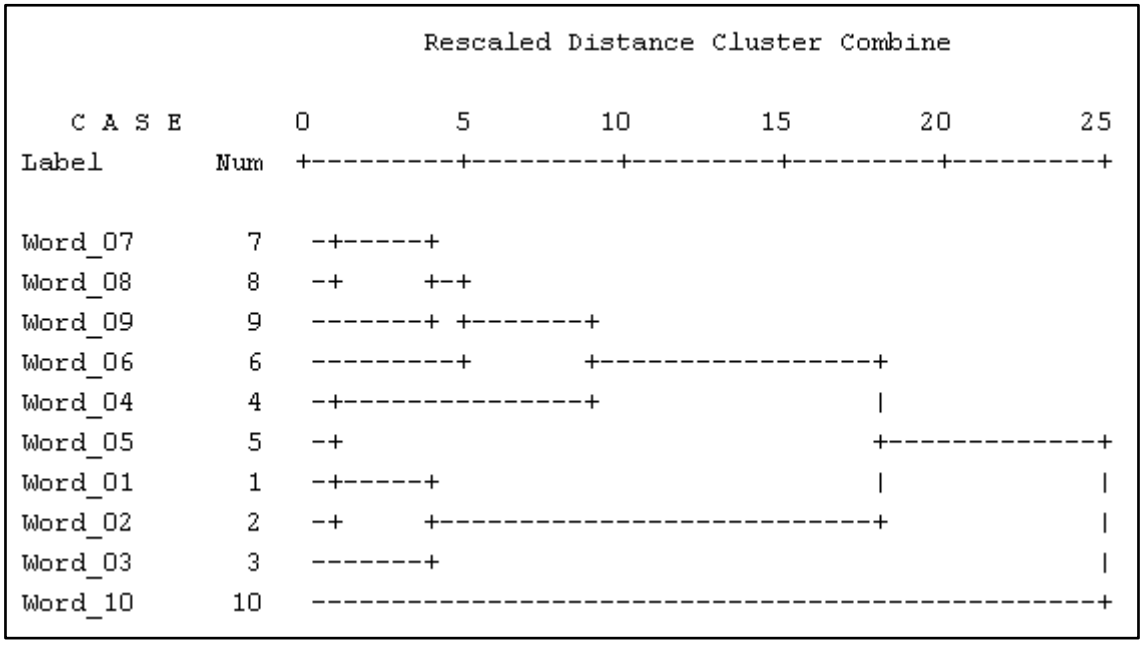


Figure 15: Example Clusters

Considering that hierarchical cluster analysis helps to group concepts or results into defined similarities based on frequencies of occurrence (and to more and more concepts by combining them into larger and larger clusters), the resultant dendrogram assists in presenting a visual representation of closeness and/or relational similarities between groups of words or terms in this instance. Figure 15 provides an example of how identified clusters would appear.

All the datasets proximity matrices, heat maps and dendrograms may be referred to in the appendices. Due to the size and scope of the data used for this study, the proximity matrices had to be split into individual groups of cases for presentation purposes. The appendices provide the reader with a complete overview and presentation of all results statistically calculated, produced and presented.

All the proximity matrices can be found in terms of the Appendices for this thesis:

- KM Definitions – Appendix 1.5 (page 17 to page 22).
- Community of Practice 01 (KM Network; Brint) – Appendix 2.5 (page 48 to page 449).
- Community of Practice 02 (CBEL) – Appendix 3.5 (page 481 to page 1227).

The complete heat maps for the complete proximity matrices can be found and reviewed here:

- KM Definitions – Appendix 1.6 (page 23).
- Community of Practice 01 (KM Network; Brint) – Appendix 2.6 (page 450).
- Community of Practice 02 (CBEL) – Appendix 3.3 (page 1229).

In the above-mentioned instance, the heat maps presented included all data for the given study. Due to the size and scope of the content, the total and complete heat map for each of the proximity matrices will not be discussed. Specific relationships will be identified and discussed for this study.

The complete between-group cluster dendrograms produced for this study may be referenced and viewed in the following appendices:

- KM Definitions – Appendix 1.7 (page 24).
- Community of Practice 01 (KM Network; Brint) – Appendix 2.7 (page 451 to page 457).
- Community of Practice 02 (CBEL) – Appendix 3.7 (page 1229 to page 1236).

In Figure 16 one finds an example overview of how the individual patterns were evaluated and correlated to compare individual patterns. Based on the rules stipulated earlier in Chapter 5, the patterns were reviewed and correlated to identify how KM may be scoped based on the number of times and the frequency of words used within a given pattern.

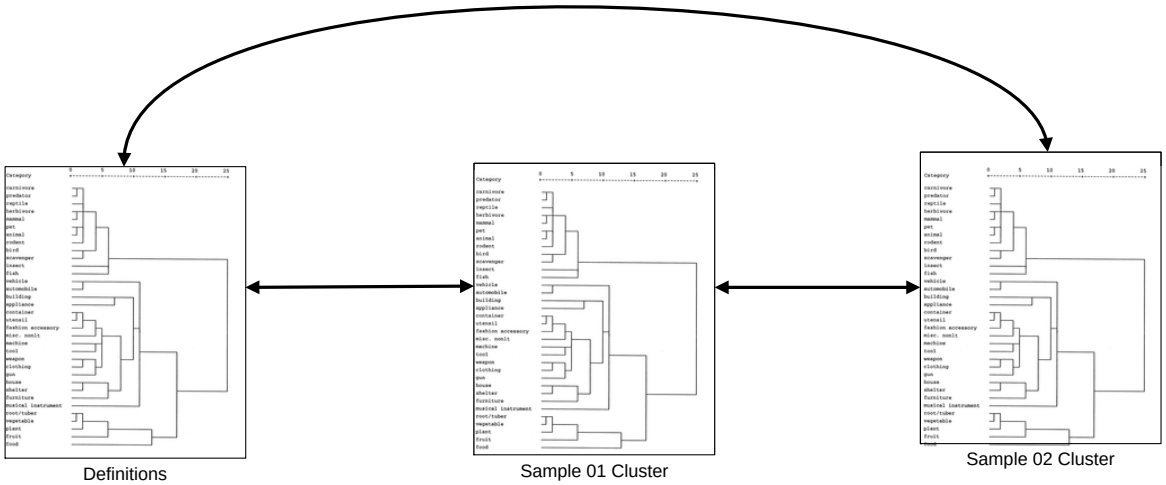


Figure 16: Dendrogram Pattern Comparison

All the information presented, the proximity matrix, specific heat maps and dendrogram patterns can then be used to identify how key terms within the sample data link in relationship to each other to identify the fundamental building blocks that satisfy organisations KM needs.

5.4. Summary

In Chapter 5, the author provided an overview of how data was collected, prepared and presented. It also provided the reader with an overview of main considerations and concerns pertaining to designing research for text analysis. It indicates the main processes followed in analysing the data. Several of the processes followed by the author in this instance were automated; however, several of the processes required manual, subjective interaction with the data that was collected. The author recognised in these instances when and where manual and subjective human intervention was required for the preparation of data.

It is hoped that through this recognition, that the level of trust in the processes followed would be sufficient in identifying relationships available in the data. In conclusion, Chapter 5 indicated that for the generation of the patterns required for between-sample comparison, the author made use of word counts as presented within various sources of text, that the word counts have been decontextualised, thereby removing subjective personal interpretation when an individual accessed text, and that the word counts were used to, firstly create simple graphs for descriptive review and analysis, and secondly for cluster analysis by means of dendrograms. Cluster analysis for the construction of dendrograms was conducted by means of between group cluster analysis to identify relationships, categories or clusters of relationships.

As may be noted in Chapter Map 6, one of the main contributions of this chapter is to present a sequentially structured linguistic method to analyse the relationship between what KM theorists believe KM should be, how KM practitioners describe KM when discussing and explaining it, and how these two spheres can be matched and related to each other to find the middle ground between the two. This chapter takes two points of view about KM and integrates it by linking the two areas of interest to find what overlaps between the two.

Additional to this, this chapter reviews KM primarily from an organisational point of view to identify what the commonalities are between the theoretical and practical point of view as filtered through an organisational dimension. In essence it allows one to identify the core fundamental building blocks of KM that is applied within organisation that make use of KM as applied by KM practitioners within said organisations. The chapter also provides an approach that may be applied for knowledge mining and knowledge discovery as leveraged against the KM domain itself.

In simple terms, it applies linguistic analysis, text analysis and knowledge mining approaches coherently and sequentially to the domain of KM as described by theorists and practitioners to scope KM's building blocks. As these building blocks are related to the organisational environment – organisations where KM is applied by KM practitioners – the language used most frequent in

relationship with each other therefore identifies the fundamental building blocks that, when applied, satisfy an organisation's KM needs.

Based on the aforementioned, several components, approaches and methods had to be integrated and sequenced to structure data collection, data cleaning, preparation and analysis from a methodological perspective to address the core topic of this thesis. As such, methodologically, the following contributions were made:

(1) To be able to holistically and interactively analyse the KM theorists' and KM practitioners' language, specific requirements obtained from linguistic analysis had to be leveraged against KM and the way in which theorists and practitioners describe KM to each other. As such language type requirements were identified and structured to link these requirements to the KM domain. As such the contribution in this case was to identify 'type requirements' necessary to conduct linguistic and lexical analysis in a specifically focused domain. In simple terms the construction was to identifying rules or 'type requirements' necessary for analytical requirements to analyse linguistic patterns in a specifically focused domain of analysis.

(2) The second contribution in this instance was to develop and integrate analytical techniques linked to integrate and analyse different perspective or points of view from a linguistic perspective. This allowed a set of criteria that would link KM theory and KM practice together to be able to identify the points of overlap. These points of overly would then provide the points of similarity in theory and application that would inherently provide the fundamental building blocks of KM that, when applied would be able to satisfy an organisation's needs linked to KM and KM practice. The integrated analysis requirements have the potential to be applied in different domains of interest based on linguistic analysis and the domain being focused on. It also provides a method for the identification of linguistic relationships that has the potential for the identification of objective classes of objects or artefacts that can be applied to the construction of ontologies.

(3) Based on the aforementioned linguistic rules for type requirements and the subsequent relationship to linguistic analysis integration, these requirements was applied as a knowledge mining process – inherently through the integration and sequencing of tools and techniques, presenting a new coherent and integrated method for knowledge mining where knowledge mining is applied to KM itself. This contribution has the potential to change the way in which one approaches large volumes of information to integrate it based on linguistic pattern based rules to synthesise the large volume of information into useful sets of relational representations.

(4) As a final contribution in this chapter, the sequencing, integration and validation of the various techniques into a rule based pattern matching linguistic analysis technique provides a method for integrated lexical analysis of large textual datasets. This method has the

potential to support a wide variety of analytical procedures where a researcher has to deal with large volumes of text to identify cross-document relationships, similarities and content to link concepts to identify relational patterns providing insight into an instance of a case being investigated for whatever purpose deemed relevant.

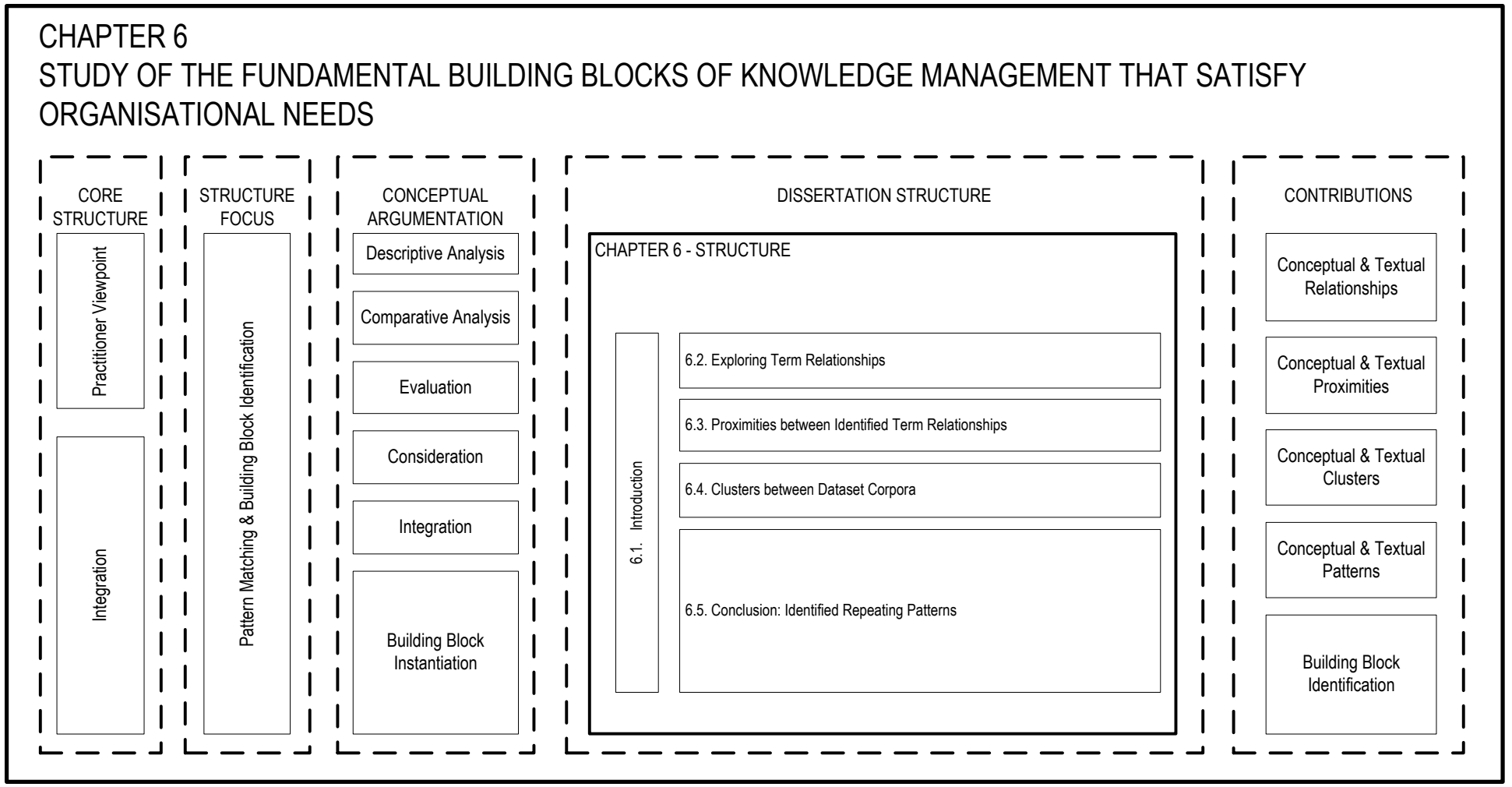
As a result of the review and an integrated discussion and argument developing and structuring various related techniques in analysis together and producing a structured method in analysing KM text, the contributions of this chapter may be summarised as follows, namely:

- **Type Requirements** – coherent type requirements in matching patterns in lexical analysis were identified an applied as instrumentation for this thesis. The type requirements originated from diverse text analysis techniques and was synthesised into one source that may be applied in differentiated scenarios.
- **Integrated Analysis** – techniques in text and lexical analysis was integrated with cluster analysis to construct an integrated text analysis technique to match patterns identifying building blocks in differentiated scenarios.
- **Knowledge Mining Method** – a method in mining knowledge was inherently constructed from different perspectives and methods that may be applied to identify building blocks in differentiated scenarios.
- **Lexical Analysis of Large Textual Datasets** – when all is integrated and discussed the main contribution of this chapter is to stipulate a lexical analysis technique that can be applied to analyse large textual datasets in various scenarios. It stipulates type requirements, integrated analytical components and pattern techniques linked to knowledge mining and extrapolation as textual symbolic representations.

In Chapter 6, the author will provide detailed descriptive analysis, and presentation of the data used for descriptive analysis. The author will also conduct interferential analysis and present the relational patterns, and provide the reader with interpretations (from the perspective of this author), of how these patterns correlate.

The description and analysis of the data collected and presented as both descriptive and interferential data would then be used to answer the question as to what the fundamental building blocks of KM are that could be used to satisfy organisational KM needs. In terms of these related patterns in proximity the author will then derive the fundamental Building Blocks that can then, in later research, be used to potentially construct, an ontology that would be able to supporting KM between organisations, and to simplify the process of vendor selection based on the way in which KM resources is presented. It is the hope that this framework would assist in simplifying investments in KM within organisations in the promotion of competitiveness, innovation and resource conservation.

In the following section, the thesis will provide a step-by-step analysis, overview and integration of all the relationships, proximities and clusters identified to eventual construct a pattern of matching relationships necessary to identify and to elucidate the fundamental building blocks of KM that satisfy organisational KM needs.



Chapter Map 07: Study of the Fundamental Building Blocks of Knowledge Management That Satisfy Organisational Needs

CHAPTER 6: STUDY OF THE FUNDAMENTAL BUILDING BLOCKS OF KNOWLEDGE MANAGEMENT THAT SATISFY ORGANISATIONAL NEEDS

Table of Contents: Chapter 6

6.1. Introduction

In Chapter 1, the author concludes that there is a need for a fundamental understanding of the core concepts of KM to assist in the application of KM. Further, there is a need to understand the fundamental building blocks of KM that can be applied in a wide variety of ways in satisfying KM needs. Though these building blocks can be used to satisfy KM needs in most situations, develop taxonomies, ontologies or even assist in the creation of a framework that can support KM decision-making processes, the focus in this instance is delineated by the need that an organisation would have for KM. Chapter 1 also indicates that a clear understanding of the nature of KM needs to be explored before one would be capable of building such blocks.

In Chapter 2 and Chapter 3, the author indicates that a confounding factor associated with KM is that knowledge, the core facet of KM, is linked to the individual in which knowledge resides. How

the individual and the knowledge associated with the individual are managed was explored. One of the major points of discussion is that KM supports management, and that DM and IM facilitates and supports KM. It also concludes that **'*KM is a management process that supports the overall functioning of the organisation by enhancing, managing and leveraging knowledge of individuals as found and constructed in dynamic interaction between individuals in a group relationship, that makes use of supporting functions of IM, so as to assist and facilitate organisational behaviour in achieving the overall goals and objectives of an organisation by supporting organisation management*'.**

In Chapter 4, the author reviews why there is a need for KM within an organisation. There is a brief overview of the nature of an organisation, finding that an organisation functions as a dynamic system. Due to this system-related aspect, organisational knowledge has a tendency to dissipate into the organisational environment as part of the outputs that a system produces. This indicates that the core needs that an organisation has for KM focuses on the identification, acquisition, distribution and preservation of knowledge in the form of artefacts, knowledge associated with the individual, team and the organisation as a whole. The author further questioned how these needs are being met and what the building blocks are as applied by KM practitioners in satisfying these needs.

In Chapter 5, the author examines how the fundamental building blocks of KM that satisfy stipulated organisational needs can be identified by referring to language, or in this instance, text, used by KM academic and KM practitioners. In Chapter 5, the author refers to how data was sampled, collected and prepared for presentation purposes. The author also describes how analysis of the data was approached for the purpose of presenting the fundamental building blocks of KM that satisfy organisational needs. In so doing, the author stipulates how data was handled and prepared for presentation purposes.

In Chapter 6, the author will present the results of this study. The author will present aspects associated with the description and content of the results, as well as identify and present KM building blocks that KM academics and KM practitioners refer to when focusing on how KM is applied within a given context. Due to the expansive nature of the results (as may be seen in the accompanying Appendix to this study), only specific aspects will be focused on. These aspects will refer to knowledge, management and the organisation as such (Chapter Map 07: Study of the Fundamental Building Blocks of Knowledge Management That Satisfy Organisational Needs).

6.1.1. Aim

The aim of this section is to review the results of this study by focusing on knowledge, management and organisation as the core concepts of this study.

6.1.2. Scope

In order to achieve this aim, results will be reviewed based on the following core concepts:

- Exploring Term Relationships
- Proximities between Identified Term Relationships
- Clusters between Dataset Corpora
- Identified Repeating Patterns

Finally, Chapter 6 will conclude with a representation of the core and fundamental building blocks associated with KM that satisfy KM organisational needs.

6.2. Exploring Term Relationships

When working with textual data, more specifically terms and the frequency a particular term occurs within a given set of text, one of the major concerns associated with analysing text is that one cannot conduct a clear descriptive analysis in terms of textual data. For example, if one would like to conduct a frequency analysis of observations, counts or ranges, then one needs to literally count the number of times a specific concept has been observed. In this instance, the number of times a word has been counted already refers to the frequency with which that word has occurred. Therefore, referring to the word count as a frequency is an accurate indication as the word count refers to the number of times, or the frequency, with which that word has occurred in a given set of text.

Another facet associated with working with lexical data is that one cannot make calculations associated with strings. One would for example be able to count the length of a word; however, this would yield meaningless analytical results.

What can be done in reviewing word counts is to review the occurrence of words. Therefore, one may refer to the number of times particular words occur within a given piece of text. As previously stipulated, this does not give an indication of the meaning of the word in context, however, it does indicate how often particular sets of words occur in conjunction with each other. If the broader context of the words being used is known, then we can say that the co-occurrence of specific words in that context can provide meaningful rational results.

An additional possibility in describing the nature of the text and how often words in text occur simultaneously is that one would be able to graph the data for visual assessment. This does however, becomes a problem when working with extremely large datasets of recurring words. If one for example refers to the appendices, all the data for all the datasets were graphed by means of a bar chart.

If one refers to the indicated bar charts then specific characteristics can be observed. Bar charts appear in the following appendices:

- KM Definitions – Appendix 1.4 (page 16).
- Community of Practice 01 (KM Network; Brint) – Appendix 2.4 (page 47).
- Community of Practice 02 (CBEL) – Appendix 3.4 (page 480).

One of characteristics that one can notice in terms of the listed bar charts is that the distribution between individual words is quite large. The data presented by the words have a wide dispersion in terms of range. Words with low values in count are crowded out by words that present high values in word count. In other words, all the words that co-occur with a very high count change the ratio of the chart to such an extent that one would find it difficult the review relationships clearly. Thus for the purpose of all three datasets in the following section, the author will focus on the 50 highest occurring words so as to review how these words occur within the scope and context of the text in which they are found.

Only the 50 highest co-occurring words within each dataset will be descriptively evaluated. This will allow the identification of reoccurring words found within all three datasets collected for this study. The author will in description focus on the 50 highest terms as, after recoding, the list of terms present in the KM definition list ended up being exactly 50 terms. This number occurred coincidentally after cleaning, recoding and integration. The author views the definition of KM as the benchmark against which the other terms will be evaluated.

6.2.1. KM Definition List Terms and Words

When referring to Figure 17, there are a few characteristics that can be identified in terms of the words and concepts used to define KM. One of the first characteristics that can be identified by simply visually inspecting the bar chart is that there is a general tendency to repeat terms focusing on ***Knowledge***, ***Leverage***, ***Management***, ***Organisation***, ***Person*** and ***Process***. It is possible that there is an association between these first order terms in that all the definitions focus mainly on repeating the indicated terms as associated with KM.

Clearly, when referring to KM, the terms ***Knowledge*** and ***Management*** would co-occur most frequently; however, what is interesting to note is that in this first order assessment, the concept of ***Information*** is not clearly repeated as frequently as one might expect. What is repeated more frequently is the aspect of ***Leverage***, or rather, leveraging value out of an associated concept or construct. One can surmise that ***Person*** and ***Process*** are linked to ***Knowledge*** and ***Management***. This can be surmised as in Chapter 2 and Chapter 3 it was indicated that KM is associated with processes in which knowledge is managed. And as knowledge is linked to the individual, one can indicate that the person to whom knowledge is ascribed would be valued in the language associated with defining KM.

As may be seen in Figure 17, some of the terms that are used frequently, but not to the same extent as the clearly visible repeated words and terms, are words such as ***Codify***, ***Create***, ***Enhance***, ***Information***, ***Manage***, ***Share*** and ***Strategy***. One would expect that ***Information*** would be a major concept associated with ***Knowledge***; however, as concurrent and continuously repeated terminology, it would appear that ***Information*** is not of such a high concept when working with knowledge itself. In the second order words, one does find aspects associate with ***Management***. These terms are for example, ***Share***, and ***Strategy*** and ***Manage*** (the process of management).

One would have expected that these terms would have a higher order or rank when reviewing how many times words are repeated. Contrary to what one would expect, this does not occur.

What is interesting to note in terms of the appearance of the terms used frequently in defining KM, is that concepts associated with ***Technology*** does not manifest as frequently as one would expect. The three main terms that are found to refer to ***Technology*** when reviewing the nature of KM definitions are ***Artefact***, ***Data*** and the term ***Technology*** itself. Other than these three, the terms and terminology of ***Technology*** are few and far between. One could argue that the term ***Codify*** would also refer to technology. ***Codify*** is, however, a deceptive term. When an individual symbolically represents an idea and verbalises it, then one can state that the idea is being codified (refer to Chapter 2 and Chapter 3). When reviewing the terms used by the authors to define KM, one finds that the terms used refer to processes, artefacts, people and concepts associated with knowledge. Terms such as ***Access***, ***Acquire***, ***Action***, ***Analyse***, ***Create***, ***Decision***, ***Enhance***, ***Justify***, ***Learn***, ***Leverage***, ***Manage***, ***Seek*** and ***Share*** imply that several of the aspects associated with defining KM refer to processes.

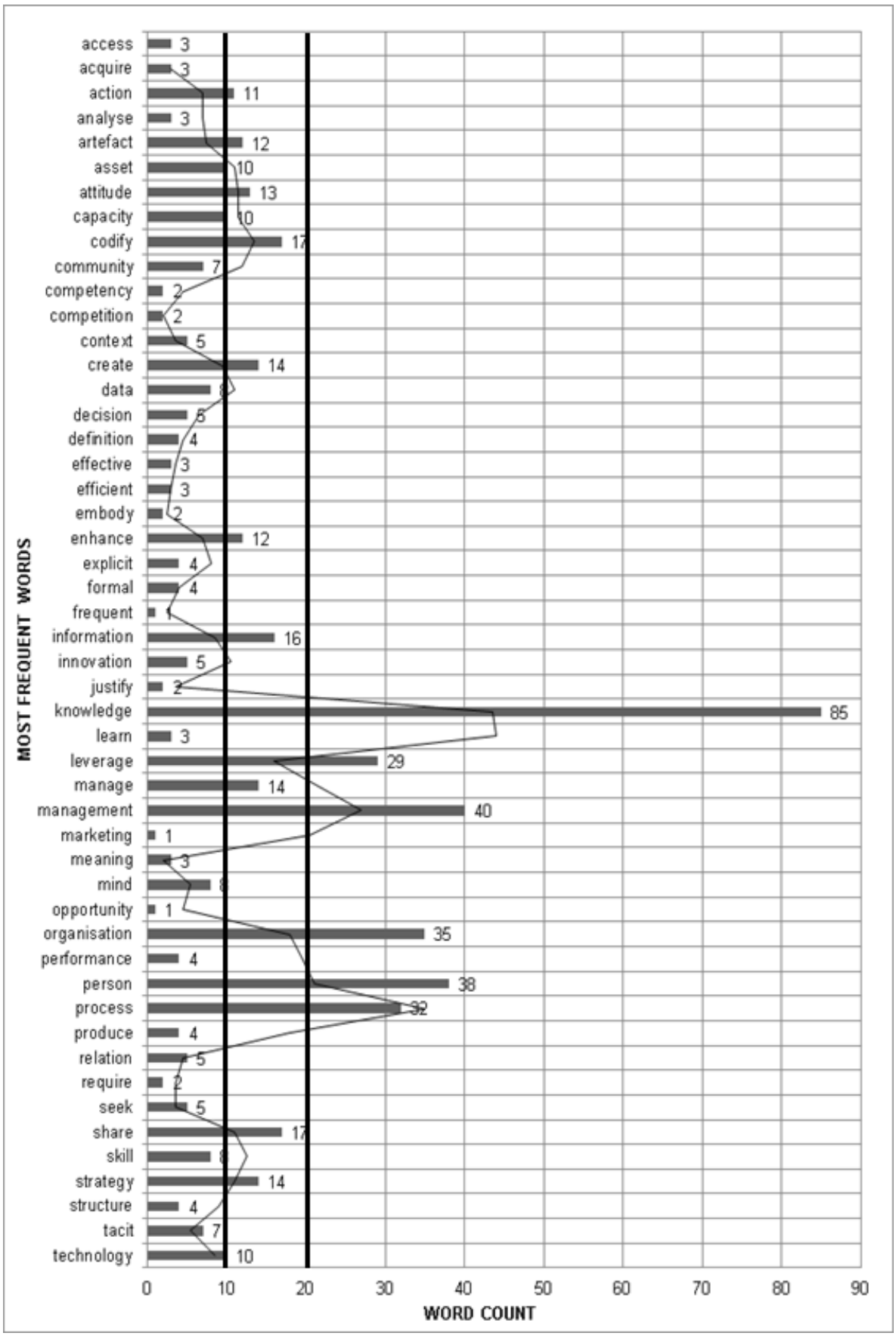


Figure 17: Most Frequent Words – KM Definition List[10]

[10] Separation line on word count added at word count number 10 and 20 to emphasise the difference in values related to terms. Lines added for visual assessment.

Regardless of the processes that can be identified in terms of the words associated with defining KM, it is clear that there is an underlying process-driven nature in terms of the words used by authors who define KM. Though at this stage one cannot draw clear conclusions from the terms presented without reviewing the proximities of these terms, one can state that one of the most prominent aspect of the terms used in Figure 17 is that the terms focus on the processes, people, and artefacts associated with knowledge that can be associated with the organisation.

In the following section, the author will review some aspects of the terms associated with the KM Network, otherwise referred to as Brint. What one should make clear in this instance is that the KM definition corpus is the reference corpus, while the Brint and CBEL corpora will be compared to the core concepts included in the KM definition corpus.

6.2.2. KM Network (Brint) Terms and Words

The complete distribution of all the repeating words associated with the Brint corpus may be reviewed in Appendix 2.3 (page 38 to page 46), and the complete graphed corpus may be reviewed in Appendix 2.4 (page 47). When reviewing the complete corpus, one finds that the terms that continuously re-occur within the Brint corpus range far and wide with a total of 370 repeating terms. In this instance, the author has deemed it necessary for analytical purposes to focus on the 50 most frequently occurring words.

When focusing on the 50 most frequently occurring terms within the KM Network (Brint) corpus, one should note that the terms represented for evaluation purposes represent 13.51% of the total corpus, while 86.49% of the corpus is not represented in this discussion. The terms that are excluded in this section will be dealt with as part of the hierarchical Cluster Analysis. In this instance, we are only referring to the most frequent terms that are applied by the Brint community.

When reviewing the Brint corpus presented as part of this discussion, one also finds that terms that are used most frequently are terms such as ***Knowledge***, ***Management*** and ***Organisation***. What is interesting, however, is that '*to manage*' or '*manage*' also appears in prominence in Figure 18.

In addition, ***Information*** can also be seen to play a more important role as associated with the terms applied by the community of practice that maintains the Brint online documentation, discussions and forums. This can be ascribed to the association between ***Knowledge*** and ***Information*** found in the knowledge pyramid. However, the prominence of ***Information*** is not as high as the process of ***Manage***.

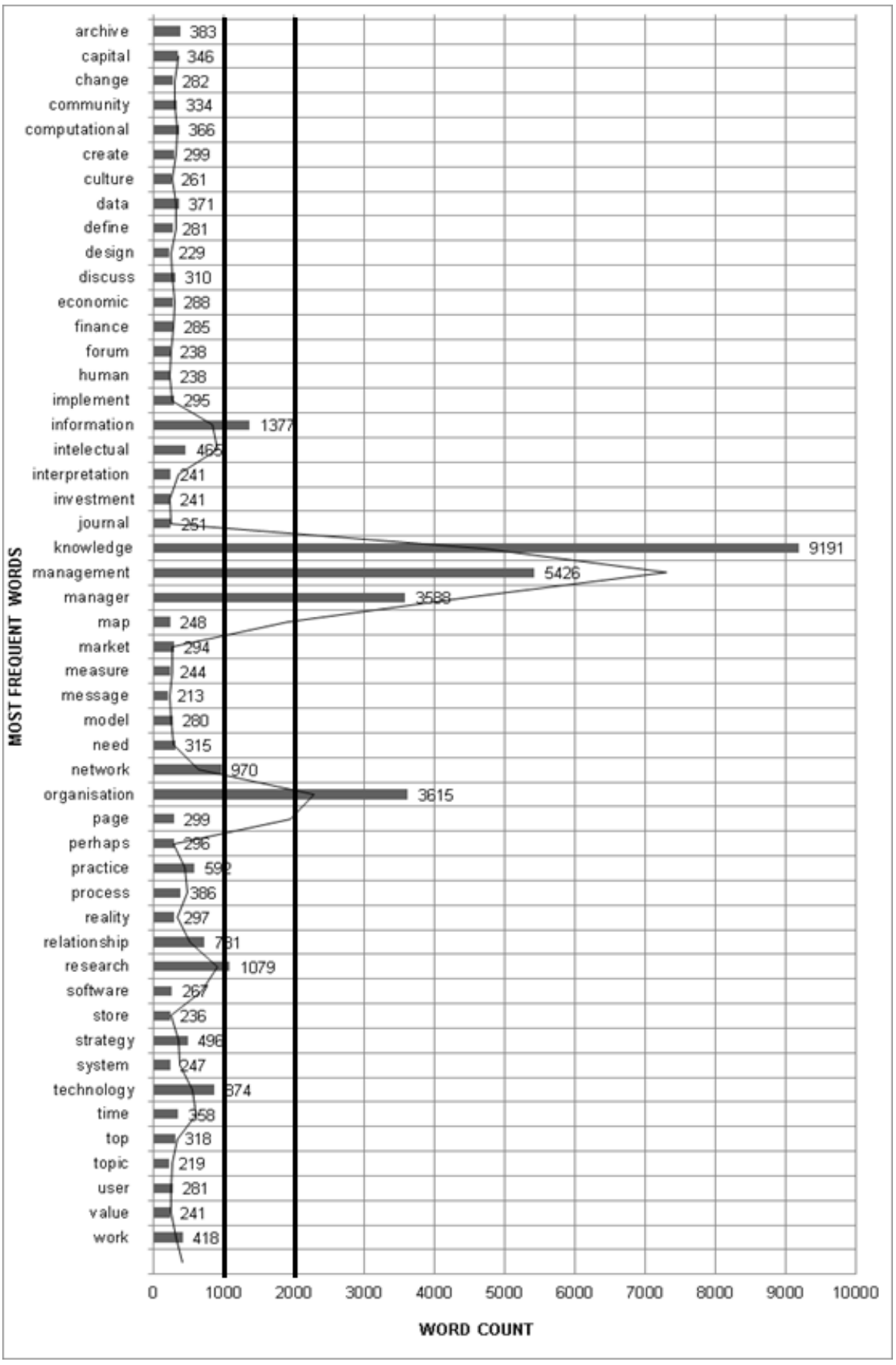


Figure 18: Most Frequent Words – KM Network (Brint)[11]

[11] Separation line on word count added at word count number 1000 and 2000 to emphasise the difference in values related to terms. Lines added for visual assessment.

What is of prominence of the Brint corpus is that, other than the few outrides found in the dataset, the distribution of terms appears somewhat flat. Terms such as ***Strategy***, ***Data***, ***Codify*** and others that are usually associated with the processes linked to KM do not appear to be of such high importance within the given corpus. What are of prominence are ***Knowledge***, and its association with the ***Organisation***, the domain of ***Management*** and to process of ***Manage***. There is no clear distinguishing factor that could stipulate how these terms may be associated with additional processes.

When reviewing the Brint corpus stipulated in Figure 19, one does find that there are still numerous references to processes. It appears that processes play an important role when associated with ***Knowledge***, ***Management*** and ***Organisation***.

When reviewing the corpus, one does find clear references to ***Technology***. Terms that refer to technology are for example ***Computational***, ***Map***, ***Software***, ***Network*** and ***System***. It would appear that ***Technology***, though not playing such a significant role, does play a role within the Brint community.

An additional aspect that starts to become more evident is the mental aspect associated with the terms and terminology that the Brint community ascribes to KM. When referring to the Brint corpus graphed in Figure 18, one finds terms such as ***Intellectual*** and ***Interpretation***. There are also aspects associated with individual human structures such as ***Culture*** and ***Community***.

There is also a clearly commoditised dimension when referring to the Brint corpus, with references to the concept of trade and finances (***Money***). Terms such as Capital, Economic, Finance and Investment can be found in the 50 most frequent words presented by the Brint community. It would therefore appear that the community ascribes to the idea that knowledge is either a form of investment, or that financial gain can be obtained from knowledge.

What is interesting is that there is an unknown degree of uncertainty within the Brint KM community. This can be surmised by the term ***Perhaps***. This uncertainty is not as prominent in magnitude as, for example, the concept of research present in the list of terms. The word ‘perhaps’ does indicate that there are potential instances of possible uncertainty.

Though at this stage one cannot draw clear conclusions from the terms presented without reviewing the proximities of these terms, one can state that one of the most prominent aspects of the terms used in Figure 18 is that though the corpus does focus on processes, people, and artefacts associated with knowledge associated with the organisation, there are additional

dimensions of information, technology and the idea of finances involved in the corpus presented by the Brint community.

6.2.3. CBEL Terms and Words

The complete distribution of all the repeating words associated with the CBEL corpus may be reviewed in Appendix 3.3 (page 468 to page 479), and the complete graphed corpus may be reviewed in Appendix 3.4 (page 480). When reviewing the complete corpus, one finds that the terms that continuously re-occur within the CBEL corpus range far and wide with a total of 502 repeating terms. In this instance, the author has deemed it necessary for analytical purposes to focus only on the 50 most frequently occurring words. Though Figure 19 only refers to the 50 highest occurring terms in the CBEL corpus, there are additional ranked terms that were not included in this description. The CBEL corpus is quite expansive and includes a total of 502 frequently repeating words. The 50 most frequently repeating words represents only 9.96% of the total corpus terms, while 89.84% of the corpus is not included in the descriptive review of the CBEL corpus. Terms present in Figure 19 provide a more distinct differentiation between concepts associated with KM as harvested from the CBEL directory. The highest ranked terms found in the CBEL corpus includes ***Information***, ***Knowledge***, ***Management*** and ***Organisation***. It is the first instance in the three datasets where ***Information*** is so highly ranked and co-occurs so frequently with the term ***Knowledge.***

It is also the first instance where the domain of ***Management*** and the process of ***Manage*** are not so close in their level of co-occurrence. ***Management*** does occur quite frequently in the corpus; however, it is not as close in co-occurrence to ***Knowledge*** as found in the previous data sets.

A clear distinction between the CBEL corpus versus the KM definitions and the Brint corpus is that different types of KM tools and technology are clearly present in the CBEL corpus. Terms such as ***Classification***, ***Map***, ***Network***, ***Ontology***, ***Software***, ***System***, ***Visualisation*** and ***Web*** are highly ranked within this corpus. One could surmise that technology and KM tools play an important role within the CBEL community.

When referring to the complete corpus, additional terms referring to tools and technology are also present. If all these terms were added into a technology superclass, technology would seem to be quite highly ranked within the CBEL corpus. However, due to the descriptive nature of this review of the corpora, one can deduce only that technology types are more frequently present in the 50 highest co-occurring and ranked words used terminologically to describe KM within the CBEL community.

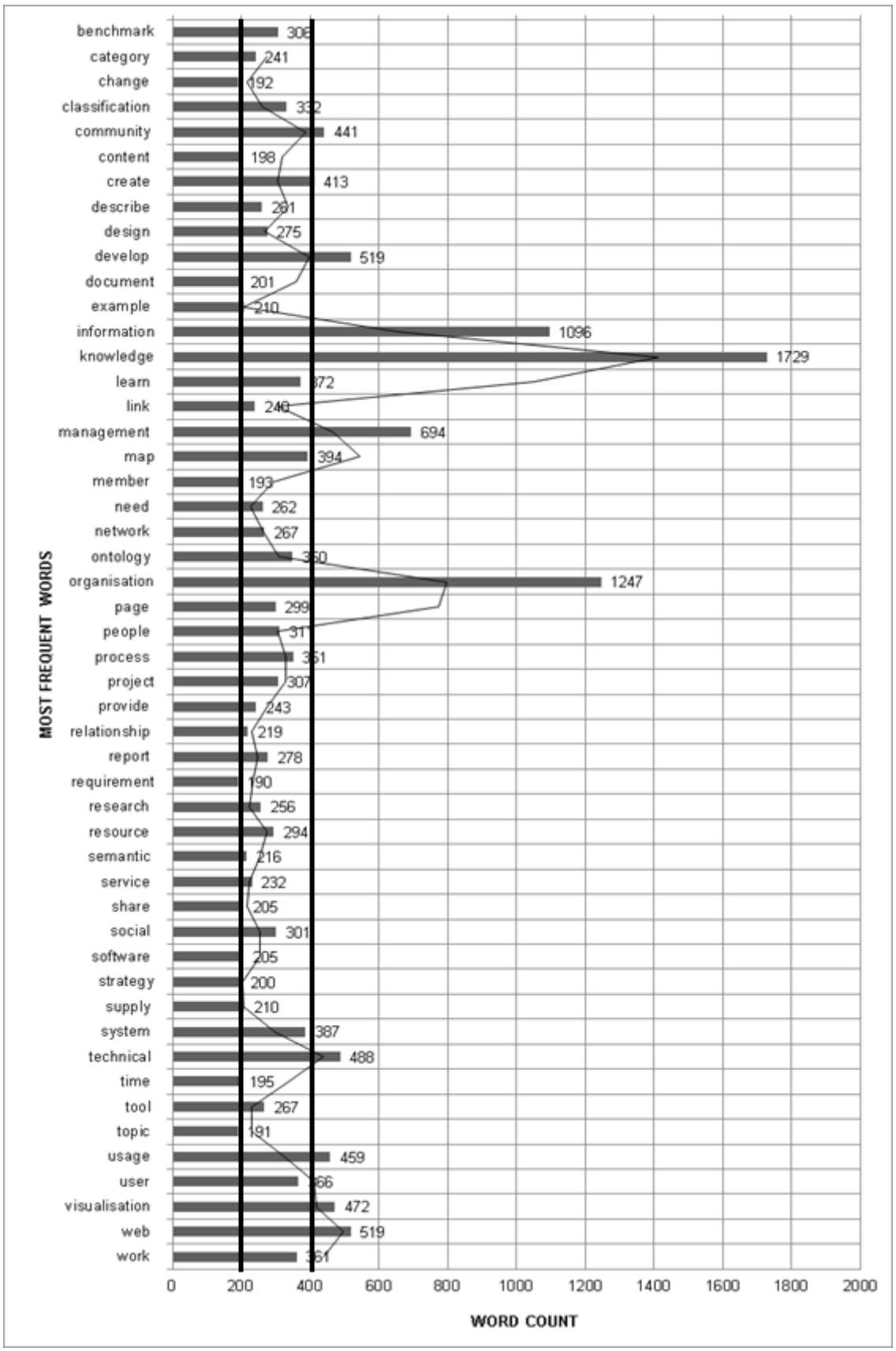


Figure 19: Most Frequent Words – CBEL[12]

[12] Separation line on word count added at word count number 200 and 400 to emphasise the difference in values related to terms. Lines added for visual assessment.

Similar to the KM definition and the Brint corpora, within the CBEL corpora there are terms that clearly refer to concepts such as processes. One additional distinction between the CBEL corpus and the KM definition and Brint corpora is that one finds additional terms explicitly referring to artefacts that could contain symbolic representations of information as obtained through knowledge explication. These terms are words like, for example ***Content***, ***Document***, ***Page***, ***Report*** and even ***Web*** (which may be viewed as a technological concept containing symbolic explications).

There is also a clear subset of terms within the CBEL corpus that refers to the individual or person, which may be a reference to the owner of knowledge; this includes terms referring to ***Community***, ***People***, ***Person***, ***Individual***, ***Member*** and processes associated with acquiring and distributing knowledge such as ***Learn*** and ***Share***.

Though at this stage one cannot draw clear conclusions from the terms presented without reviewing the proximities of these terms, one can state that one of the most prominent aspect of the terms used in Figure 19 is that though the corpus does focus on processes, people, and artefacts associated with knowledge that can be associated with the organisation, there are also clear references to technology and tools that could be applied within the KM domain.

6.2.4. Relationship between Identified Terms

When referring to the KM definitions, Brint and the CBEL corpora, there are a few characteristics that can be identified. Firstly, all three corpora refer to ***Knowledge***, ***Management***, and ***Organisation*** and to a lesser degree, ***Information***. This was to be expected as all three corpora focus on KM and the application of KM within an organisation. This provides an indication that all three corpora do indeed have a direct link and relationship with KM. In terms of the KM definition corpus, this is reasonable as the corpus clearly originated from definitions linked to KM. In terms of the Brint and CBEL corpora, there is a distinct pattern of ***Knowledge***, ***Management*** and ***Organisation*** based on the way in which the terms are repeated.

Secondly, all three corpora include processes associated with the ***Individual***, ***Management***, and ***Knowledge***. All three corpora also have associations with ***Data*** and ***Information***. Even though the terms ***Data*** and ***Information*** do not co-occur as often within all three corpora, they are nonetheless recurring terms.

In Chapter 5 the author stipulated the following rule of evaluation in identifying and comparing patterns within clusters:

Rule 1

- A ***known context*** yields a ***specific set of words***
- A ***specific set of words*** co-occur in a ***specific frequency***
- A ***specific frequency*** of words yields a ***specific pattern of relationships***
- A ***specific pattern of relationships*** of words yields a ***known pattern of relationships***
- Therefore a ***known context*** may yield a ***known pattern of relationships*** in words

Rule 2

- If a specific ***known context*** may yield a ***known pattern of relationships*** in words
- Then a ***known pattern of relationships*** may indicate the ***known context***

Rule 3

- If a specific ***unknown context*** yield a ***known pattern of relationships*** in words
- Then a specific ***unknown context*** may indicate the specific ***known context***

Rule 4

- If a specific ***unknown context DOES NOT*** yield a ***known pattern of relationships*** in words
- Then a specific ***unknown pattern of relationships*** may ***NOT*** indicate the ***known context***

Rule 5

- If a specific ***unknown context*** yields an ***unknown pattern of relationships*** in words
- ***Then the unknown context*** may ***NOT*** indicate the ***known context***

In association with Rule 1, the known context refers to the data collected in terms of the KM definitions. As such, we know the context to be KM and we therefore know that the pattern that is produced by the KM definitions would therefore refer to the domain of KM.

In terms of Rule 3, the Brint and the CBEL community corpora produce patterns similar to that of the KM definition pattern of terms associated with defining KM as the known context. Therefore, due to the nature of the similarity of patterns, it would therefore be safe to state that the three corpora, based on the similarity of patterns in association with the known pattern identified in the KM definition corpus, address KM.

Though it was clarified in Chapter 5 that all three samples refer to the domain of KM, the reoccurrence of patterns solidifies and qualifies the validity of the samples. This indicates that all

three corpora do indeed address KM, as the Brint and the CBEL corpora have similar repeating patterns as associated with the KM definition corpus. This indicates that one would be able to conduct a comparison between the patterns that are present within the text sampled and collected for this study. In Table 17 there are 26 terms in the KM definition corpus and the 50 most re-occurring terms in the Brint and CBEL corpus occur in all three corpora.

When taking Rules 1, 2 and 3 into consideration, it is clear that if all three of the corpora provide similar patterns, and based on the overlap of the patterns found in the three corpora, one can start to identify similar characteristics. In other words, one can state that even though the Brint and the CBEL corpora do not have a 100% similarity to the KM definition corpora, the patterns that have been identified imply that these corpora are an elaboration of KM. When comparing the terms that overlap, one would therefore be able to identify similarities, and therefore one would be able to identify additional terms that could applied in scoping KM.

Table 17 indicates that in terms of the KM definition, Brint and CBEL corpora, there are specific terms found within all three corpora. The KM definition corpus shares 12 terms with the Brint and CBEL corpora. Of these 12 terms, the KM definition corpus shares eight terms between all three corpora. These terms are ***Community***, ***Create***, ***Information***, ***Knowledge***, ***Management***, ***Organisation***, ***Process*** and ***Strategy***. There are also several terms that are shared between the KM definition corpus and alternatively, the Brint or the CBEL corpus.

The words shared with the Brint corpus are ***Data*** and ***Technology***, while the words shared with the CBEL corpus are ***Learn*** and ***Share***. Between the Brint and the CBEL corpora, there are terms that are not shared with the KM definition corpus. However, due to the fact that Rule 3 indicates that similarity in patterns implies similarity in context, these terms do indeed refer to KM. The terms that are shared between the Brint and the CBEL corpus, i.e. not located in the KM definition corpus, are terms such as ***Change***, ***Design***, ***Map***, ***Need***, ***Network***, ***Page***, ***Relationship***, ***Research***, ***Software***, ***System***, ***Time***, ***Topic***, ***User*** and ***Word***.

The difference between the overlapping corpora stems from the difference in focus between the three sets of data. It is already established that the definitive corpus focuses on a description of KM without focusing on the tools and mechanisms applied within KM itself. The Brint and the CBEL corpora focus on the application of KM within an organisation. It would therefore be safe to indicate that the KM definition corpus has a descriptive nature, indicating what KM is, while the Brint and the CBEL corpora not only describe KM but also state how KM would be applied.

Table 17: Repeating Word Overlap						
OVERLAP TERM	**KM DEFINITIONS**		**BRINT WORDS**		**CBEL WORDS**	
	COUNT	**PERCENTAGE**	**COUNT**	**PERCENTAGE**	**COUNT**	**PERCENTAGE**
change	0	0.0000%	282	0.71574%	192	1.04037%
community	7	1.2727%	334	0.84772%	441	2.38960%
create	14	2.5455%	299	0.75888%	413	2.23788%
data	8	1.4545%	371	0.94162%	0	0.00000%
design	0	0.0000%	229	0.58122%	275	1.49011%
information	16	2.9091%	1377	3.49492%	1096	5.93877%
knowledge	85	15.4545%	9191	23.32741%	1729	9.36873%
learn	3	0.5455%	0	0.00000%	372	2.01571%
management	40	7.2727%	5426	13.77157%	694	3.76050%
map	0	0.0000%	248	0.62944%	394	2.13492%
need	0	0.0000%	315	0.79949%	262	1.41967%
network	0	0.0000%	970	2.46193%	267	1.44676%
organisation	35	6.3636%	3615	9.17513%	1247	6.75698%
page	0	0.0000%	299	0.75888%	299	1.62016%
process	32	5.8182%	386	0.97970%	351	1.90192%
relationship	0	0.0000%	731	1.85533%	219	1.18667%
research	0	0.0000%	1079	2.73858%	256	1.38716%
share	17	3.0909%	0	0.00000%	205	1.11081%
software	0	0.0000%	267	0.67766%	205	1.11081%
strategy	14	2.5455%	496	1.25888%	200	1.08372%
system	0	0.0000%	247	0.62690%	387	2.09699%
technology	10	1.8182%	874	2.21827%	0	0.00000%
time	0	0.0000%	358	0.90863%	195	1.05662%
topic	0	0.0000%	219	0.55584%	191	1.03495%
user	0	0.0000%	281	0.71320%	366	1.98320%
work	0	0.0000%	418	1.06091%	361	1.95611%

This explains why the Brint and CBEL corpora refer to terms that include a subset that describes core technological or structural terms that would assist in the application of KM within an organisation. It would also provide an overview of what would be necessary to satisfy KM's organisational needs. The terms stated in Table 17 refer to the most common overlapping terms and terminology between the definition of KM, as well as the most frequently used terms found in the Brint and CBEL communities. It is clearly not a complete set of relationships comparing the three sets of data, but contains the most frequently appearing terms as selected by this author. Additional relationships may exist; however, for the moment these relationships fall outside the scope of the patterns that have been identified, as well as the fields of data selected for

comparison within this thesis. In the following section the author will review individual relationships between the terms presented within the corpora so as to provide an overview of the individual relationships that have been identified within the three corpora. For the purpose of this section, the author will review firstly relationships where there is a comparison between the terms that are present between the KM definition list, Brint and CBEL. After the fully overlapping relationship is reviewed, individual relationships between the three corpora will be reviewed.

a) Relationship: KM Definitions, Brint and CBEL Corpora.

Table 17 indicates a complete overlap between the terms ***Community***, ***Create***, ***Information***, ***Knowledge***, ***Management***, ***Organisation***, ***Process*** and ***Strategy*** within the three corpora. When focusing only on the stipulated terms and the percentage value of each corpus, one can present the results as found with Figure 20. In Figure 20, there is a greater emphasis on ***Information*** within the corpus, and a slightly lower emphasis on ***Knowledge***. This also holds true in terms of the terms referring to ***Knowledge***. If there is a higher preference for the term knowledge, then one would find a lower preference for the term ***Information***. The potential exists that if a corpus focuses more on ***Information***, then there would be a decreased focus on ***Knowledge*** and vice versa. The possibility also exists that a higher emphasis on ***Information*** indicates that the authors responsible for the corpus recognise that ***Information*** and ***Knowledge*** have a shared relationship within an organisation. As stated in Chapter 2 and Chapter 3 and then reiterated in Chapter 4, when content is removed from the individual, it is presented as information, and as such supports the functioning of knowledge within the organisational environment in concert with individual human relational constructs.

In addition to this, as the focus of the three corpora is indeed how to manage knowledge within an organisation, it would be natural that the terms ***Organisation***, ***Knowledge*** and ***Management*** would be found in such a high proportion in Figure 20 as referenced from Table 17. What is interesting in terms of this, however, is that the CBEL corpus has a slightly higher valuation of the term ***Organisation*** than the KM definition and Brint corpora when the three terms are placed next to each other. When referring to ***Knowledge***, ***Management*** and ***Organisation***, then one finds that the pattern indicates a reduction in focus (refer to the terms in Figure 20). However, in the CBEL corpus, there is a reduction in focus between ***Knowledge*** and ***Management***, yet an increased focus on the term ***Organisation***. It is clearly based on the change in term focus that CBEL emphasises ***Organisation*** above ***Management***. Structure appears to have a greater emphasis than how the structure in managed.

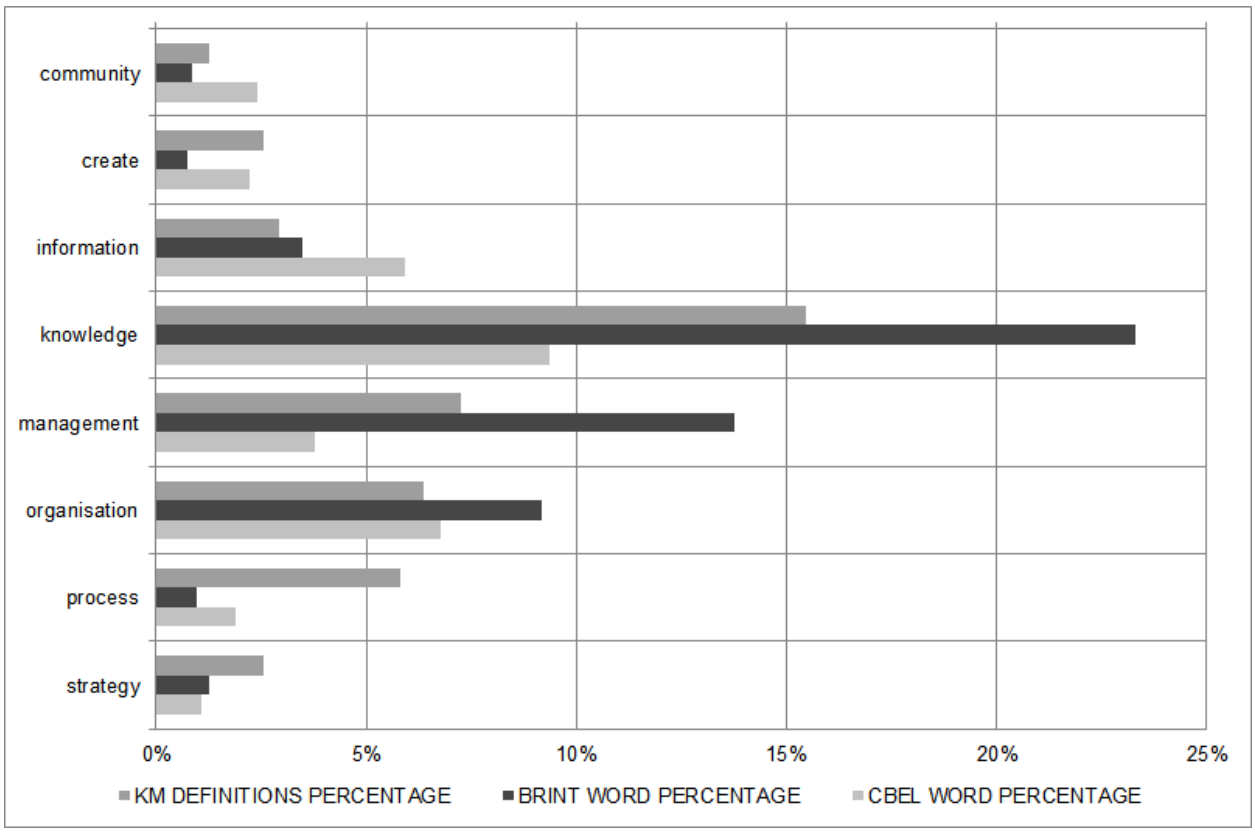


Figure 20: Most Frequent Overlapping Words – All Corpora

Additional terms of importance are ***Change***, ***Community***, ***Process*** and ***Strategy***. The term Strategy could be linked with ***Create*** and ***Process*** in that, Chapter 2 and Chapter 3 describe KM as a process that complies with management processes within the structure of an organisation. A process is a means to an end – either focused on achieving a goal or a task, or as a subset of activities associated with the completion of a task that is directed towards objectives and goal. Thus the term ***Strategy*** would refer to the approach that will be followed in achieving such a goal. This focuses on the how and why of achieving the final goal of an organisation. Interestingly, as KM does not focus on the management of an organisation, but the knowledge within the organisation or as acquired by such an organisation, one can state that KM either has its own ***Strategy*** or that it focuses on supporting the organisational ***Strategy***. What is glaringly missing in the fully overlapped terminology is the term ***Innovation*** or ***Competition***. So the direct focus of strategy as a goal driven aspect of management is not stipulated in associated terms and terminology.

What is clear in terms of Figure 20 is that community plays a role when referring to knowledge. As stated in Chapter 4, an organisation is inherently and structurally a community of individuals sharing knowledge. In all three corpora, one can therefore say that a ***Community*** acknowledges the relationship between knowledge, management and organisational aspects described in the three corpora.

What is clear is that although a relationship does exist, the nature of this relationship can only be verified and explored when reviewing the proximity of the terms listed above.

b) Relationship: KM Definition and Brint Corpora.

In Table 17 there is a partial overlap between several terms found in the KM definition and Brint corpora. When focusing only on the stipulated terms and the percentage value of each corpus, one can present the results as found with Figure 21.

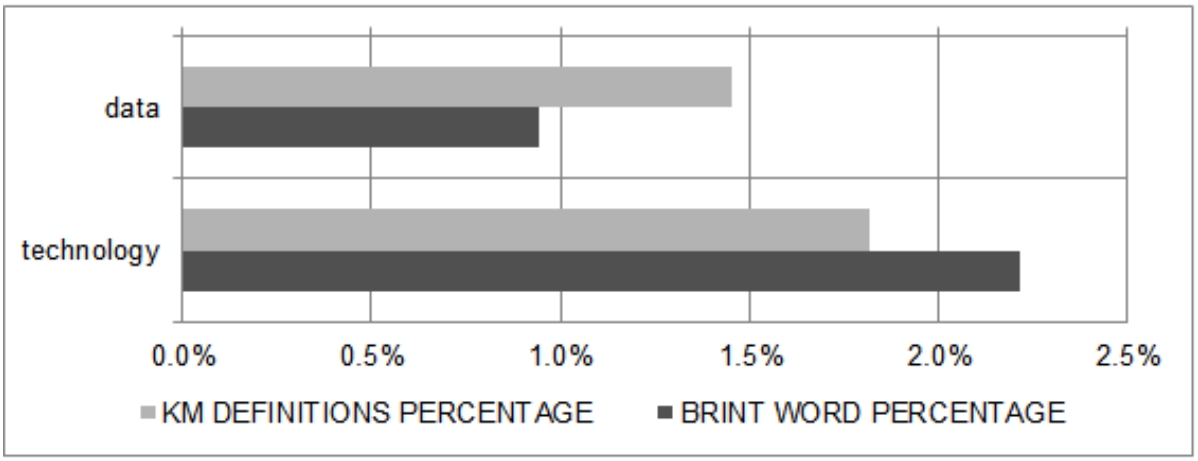


Figure 21: Overlapping Terms – KM Definition and Brint Corpora

Though there are only two words that overlap the KM definition and the Brint corpora, these two words have a natural relationship with each other. ***Technology*** functions on the premise of computational ***Data***, while ***Data*** is associated with ***Technology***. According to the knowledge pyramid (Chapter 2 – Figure 1), data relates to information which relates to knowledge and requires processing to be transformed as such. In addition, as described in Chapter 2 and Chapter 3, a socially agreed, utilitarian, symbolic schema or mechanism is required to convert and transfer data. ***Technology*** is thus identified as one of the primary mechanisms that facilitate the life of ***Data*** in the relationship between data and information via a codification schema relevant to the nature of the associated data.

What is apparent in Figure 21 is a growing relationship between ***Data*** and ***Technology***. Data is perceived as an ordinal lower than technology in both corpora, and vice versa. The magnitude of the relationship between ***Data*** and ***Technology*** cannot be clearly stated. On visual assessment, one can however, identify in Table 17 and Figure 21 that in each instance the valuation of ***Data*** is lower than the valuation of ***Technology***. It could indicate that ***Technology***, though associated with ***Data***, has a greater focus. CEBL, for example, does not explicitly reference ***Technology*** as a super type, but identifies subtypes of ***Technology*** in referencing individual types of ***Technology***,

indicating that there is a greater focus on ***Technology*** types when reviewing individual communities with a practical focus versus a theoretical evaluation. Brint and CBEL refer to different types of ***Technology*** individually (as will be seen later in Chapter 6), however, between the KM definition list and the Brint corpora, ***Technology*** is acknowledged at a higher valuation than one would expect it to be. By implication, although ***Data*** is of importance, ***Technology*** has a greater importance as medium, as ***Technology*** has various limitations associated with it. What is clear is that a relationship does exist, however, the nature of this relationship can only be verified and explored when reviewing the proximity of the terms listed above.

c) Relationship: KM Definition and CBEL Corpora.

In Table 17 there is a partial overlap between several terms found between the KM definition and CBEL corpora. When focusing only on the stipulated terms and the percentage value of each corpus, one can present the results as found with Figure 22. When referring to Figure 22, the magnitude and order in which ***Learn*** and ***Share*** are found between the stipulated corpora is not very clear. One cannot state for example that there is an equal magnitude in order of preference between the two corpora.

The relevance of the overlapping terms referenced in Figure 22 is that ***Learn*** refers to the process of learning, and as such there is a relationship between learning and ***Share***, or rather, the process of sharing. As found in Chapter 3, there are processes involved in transferring knowledge. These processes are for example externalisation, socialisation and internalisation. In a social environment (community or organisation), knowledge would be shared through externalisation, socialisation, and then dynamically through the interrelationships between externalisation and socialisation, then by internalising that which is transferred and shared.

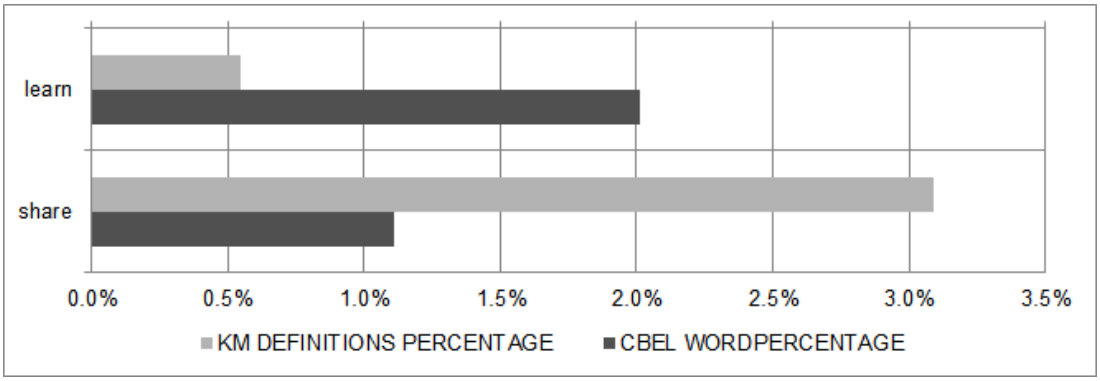


Figure 22: Overlapping Terms – KM Definition and CBEL Corpora

What is clear is that a relationship does exist, however, the nature of this relationship can only be verified and explored when reviewing the proximity of the terms listed above.

d) Relationship: Brint and CBEL Corpora

Table 17 illustrates a partial overlap between several terms found in the KM definition and CBEL corpora. When focusing only on the stipulated terms and the percentage value of each corpus, one can present the results as found with Figure 23.

When referring to both Table 17 and Figure 23, the first thing that one notices is that the term technology is not present. There are, however, different types of technology referenced in the list of terms. Terms found in the list of relating terms between the Brint and the CBEL corpora are for example ***System***, ***Software*** and ***Network***. As stated in Chapter 4, an organisation is a system, and as such the associated structural aspects of a system should be present within an organisation. The term ***System*** in this instance could refer to both a system in the sense of general systems theory, or a system in the sense of being technologically related. Both instances would be equally valid when referring to the concept of a system in KM and to an organisation.

The term ***Network*** also has a potentially dual meaning. The first interpretation of the term could refer to a social relationship (which could have a link to the term relationship within the overlapping corpora), and it could refer to a technological construct. Both instances would be equally valid when referring to Chapter 1 (individuals functioning in a networked relationship), Chapter 2 and Chapter 3 (knowledge being socially constructed), and Chapter 4 (a technological structure that can assist in the distribution of data). There is a similar magnitude between the terms ***Relationship*** and ***Network*** in Figure 23. If the term ***Relationship*** has a high occurrence in the one corpus, then the term ***Network*** would have a higher order of preference in the other. Both corpora present this type of relationship between the terms ***Relationship*** and ***Network***.

Alternatively the term ***Software*** can only refer to what it is – a technological construct as per the definition of the word, and a direct reference to a type of technology associated with the term ***Technology***. The type of ***Software*** however, is not clear or stipulated in this dataset of co-occurring terms and terminology. What is critical to note about the relationship between the corpora is that one does not find a close relationship in order of preference. For example, when referring to the relationship of terms between all three corpora, one finds that the greater emphasis there is on ***Information***, the lower the emphasis on ***Knowledge***.

The same type of relationship cannot be clearly identified between the Brint and CBEL corpora regardless of how the terms between the stated corpora are sorted or ordered. What is however, noticeable is that both corpora focus on the term ***Research***.

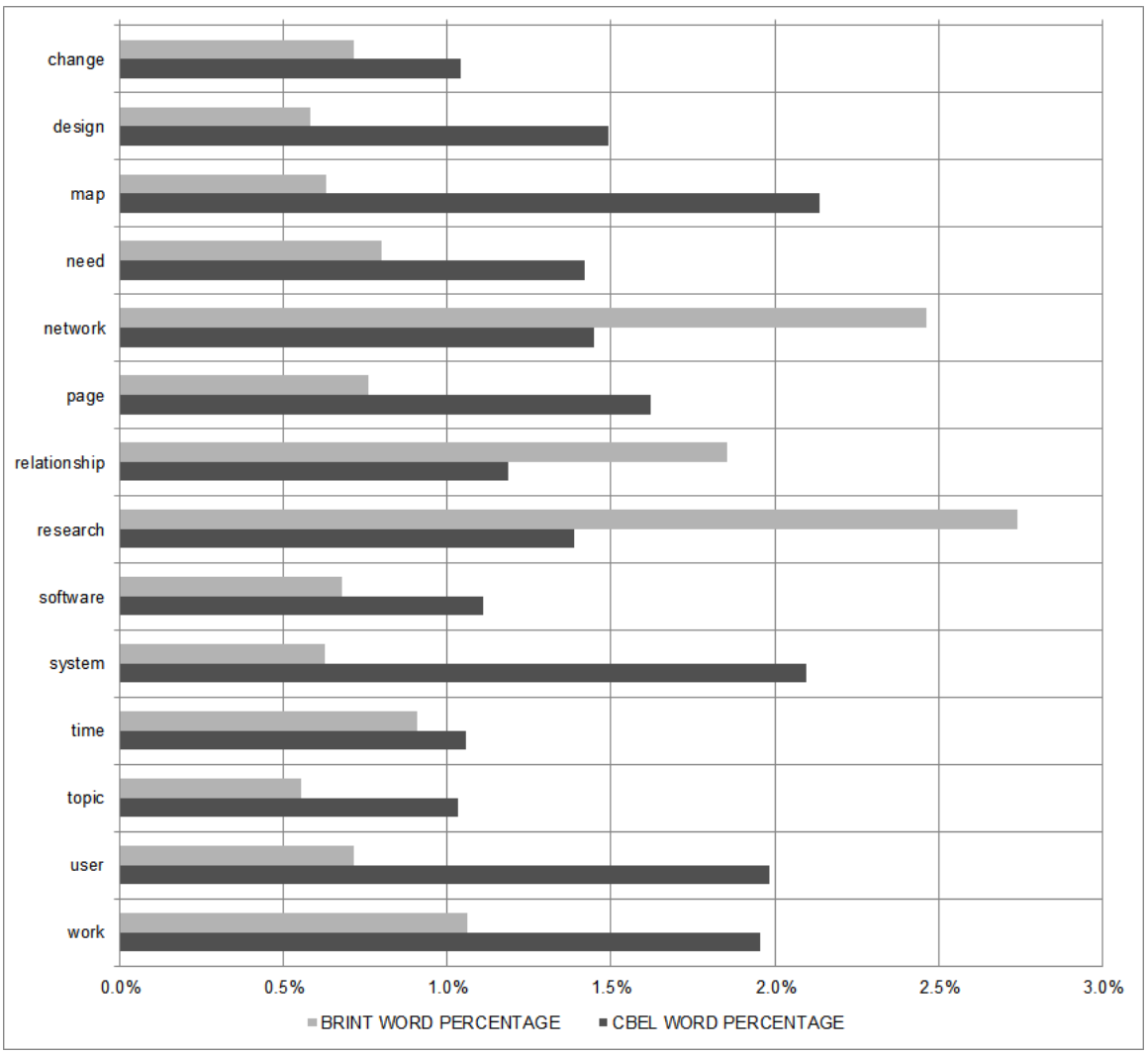


Figure 23: Overlapping Terms – Brint and CBEL Corpora

What is clear is that a relationship does exist; however, the nature of this relationship can only be verified and explored when reviewing the proximity of the terms listed above. In the following section the author extracted the identified terms from the proximity indexes of all three samples. Due to the nature of a proximity matrix and index, the process of extracting the individual terms as identified in the aforementioned section will have no effect on the proximity indexes whatsoever.

6.3. Proximities between Identified Term Relationships

When we look at the individual proximity indexes and matrices as stipulated in the appendices and attachments (Appendix 1.5, page 17 to page 22; Appendix 2.5, page 48 to page 449 and Appendix 3.5, page 481 to page 1227), we find that all the proximities are listed. The listed proximity matrices and indexes refer to all the relevant terms as extracted, identified and merged based on the occurrence and the relationships of the terms and terminology per dataset.

Though there are several instances of proximities related to different terms in these matrices and indexes, the author will focus only on the individual overlapping terms that are presented in each corpus as identified in Table 17. The author acknowledges that there is a significant potential for additional relationships between the individual words; however, these relationships are beyond the scope of this study. In the following section the author will review the proximities generated by extracting the '*Number: Case*' associated with the overlapping terms as found in Table 17. The '*Number: Case*' refers to the position of the individual cases or terms per proximity matrix. For example, as can be seen in Table 17, not all the terms in Table 17 can be found within the KM definition corpus. Thus only the terms associated with the corpus, their number or position in the proximity matrix and the terms are referred to. The identified proximities are then used to construct a heat map. When referring to '*Number: Case*', the term '*Number*' refers to the position of the terms in the proximity matrix, whist the term '*Case*' refers to the term associated with the corpus. Under normal circumstances heat maps do not have internal contours. The author added internal contours to identify how the between-range averages move between individual proximities that would refer to the difference between individual cells in the map.

When referencing the complete proximity matrix per corpus, one would find that the Euclidian distance as presented in the proximity matrix was applied as is. Due to the nature of how a Euclidian distance is calculated, extrapolating this information would have no effect on the nature of a proximity matrix. When referencing a proximity matrix's heat map, one needs to keep in mind that a proximity matrix refers to the distance between terms as associated with its co-occurrence in a corpus.

Finally, what is quite critical about the proximities as stipulated in the heat map is that this provides a visual representation of potential interaction between terms for the identification of clusters. This is an essential part of evaluating clusters in that it allows one to identify pools on a qualitative level that would assist in the supplementation of clustered representations provided on a quantitative level of analysis. Each heat map provides the reader with a segmented overview of not only the distance identified in the proximity matrix, but the striation patterns or contours applied to the heat map indicate changes in in-between proximity averages. The striation pattern is quite similar in nature to an elevation map indicating distance above sea level. It provides an overview of how quickly the between proximity averages change between individual proximities. Though not calculated as found in the appendices and attachments, it does provide an indication of change in distance between individual proximities. For example, if striations are very close to each other, this stipulates a quick change in in-between proximity averages. A large number of closely packed striations indicate a quick and sudden change, while a small amount of striations with great distance between the striation lines represents a slow and systematic between proximity change in averages. Striation of contour patterns was added automatically during the generation of the maps

and it assists, during visual inspection, in the identification of potential pools where terms are close, indicating linkage, or where the terms are distant, providing emphasis in co-occurrence and repetition in application in textual usage.

6.3.1. Proximity Indices: KM Definition List Terms and Words

When referring to the KM definition corpus found in Table 17 as referred to in Figure 20, the overlapping terms found in the KM definition corpus '*Number: Case*' (Appendix 1.5, page 17 to page 22) is as follows:

Table 18: KM Definition Corpus Proximity 'Number: Case'		
10:community	14:create	15:data
25:information	28:knowledge	29:learn
32:management	37:organisation	40:process
45:share	47:strategy	50:technology

When referencing the proximities of the referenced terms in Table 18 against only the proximities of the terms ***Knowledge***, ***Management*** and ***Organisation***, one finds that the striation contours level out towards ***Organisation***.

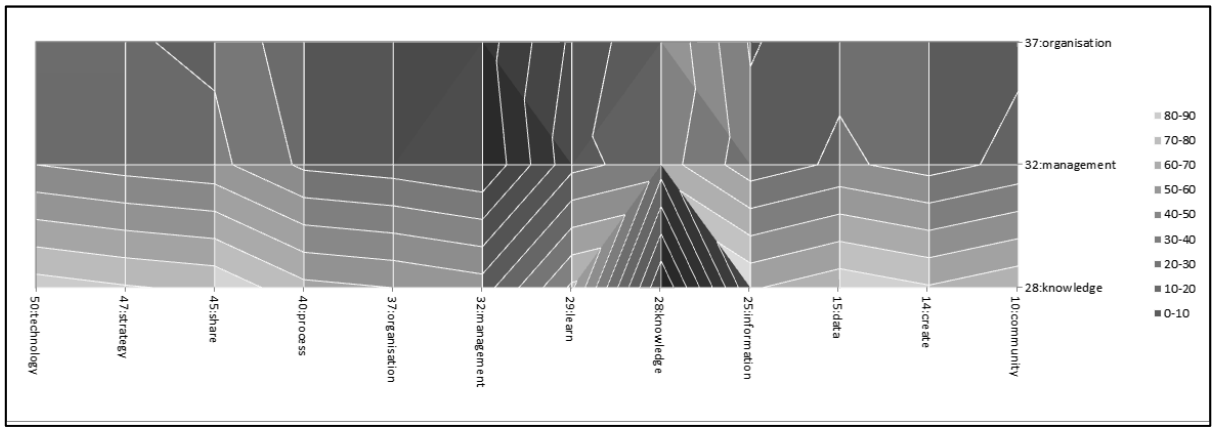


Figure 24: Proximity Heat Map – Shared KM Definition Terms (A)

By implication, when reviewing the striation pattern in Figure 24, the terms listed in Table 18 are closer to the term ***Organisation*** than for example the term ***Knowledge***. Though the core focus of the KM definition corpus is KM, and there would be a higher co-occurrence of the term ***Knowledge*** in the corpus, the distance and elevation as implied in the striation indicate that ***Knowledge*** has a higher level of repetition within the corpus. This in itself is not significant. What is significant is that the striation pattern indicates a contoured pattern that leans towards the term ***Organisation***.

On closer inspection of Figure 24, the contour pattern found in the striation suggests that the terms ***Organisation*** and ***Management*** are closer in this instance than, for example ***Knowledge*** and

Management. Though the term KM has a 50/50 relationship between ***Knowledge*** and ***Management***, it is clear that knowledge as a term occurs much more frequently in the KM definition corpus than KM. In terms of closeness, it would appear that ***Organisation*** and ***Management*** are closer in relational usage than ***Knowledge*** and ***Management***.

In addition, one finds that the terms ***Strategy*** and ***Technology*** are closer to ***Organisation*** than to ***Management*** or ***Knowledge***. This would appear to be a natural relationship in that an ***Organisation*** would apply ***Technology*** as one of strategic components used to provide an organisation with an advantage. There also appears to a pool where ***Management***, ***Organisation*** and ***Process*** are linked by their proximity. A final set of relationships that can be visually identified by referring to the striation patterns is the case terms ***Community***, ***Create*** and ***Data***.

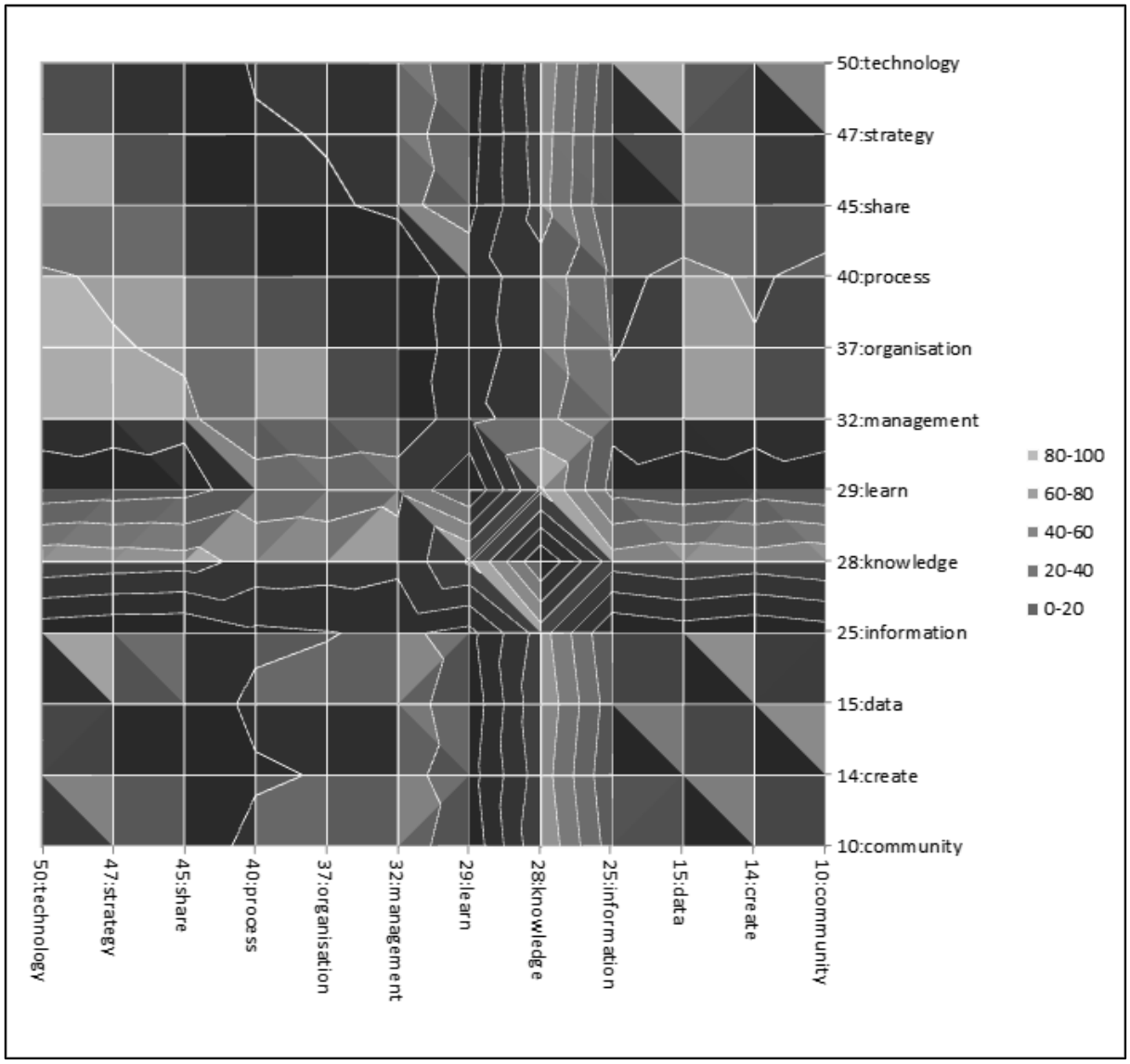


Figure 25: Proximity Heat Map – Shared KM Definition Terms (B)

There are clearly three pools of closeness based in the proximity striation patterns that link more closely to ***Organisation***, and which is of greater distance in elevation to ***Knowledge*** and

Management. These three pools refer to the corpus case terms ***Strategy***, ***Technology***, ***Community***, ***Create*** and ***Data***. This creates the possibility that these terms are a set of building blocks associated with organisation and the needs that an organisation would present when referring to organisational knowledge.

There is further evidence to support this in Figure 25 - a complete proximity matrix heat map referencing all the '*Number: Case*' terms listed in Table 18. When one visually inspects Figure 25, one can identify at least four pools of proximity within the map. Taking into consideration that patterns are repeated over a diagonal (Figure 26), the patterns identified above and below the diagonal produce the exact same pattern. Instead of four patterns visible in the striations, there are three contour patterns visible in the striations. This can be more clearly identified in Figure 26 where the pools and patterns have been identified by means of the addition of simple line primitives (ovals and circles).

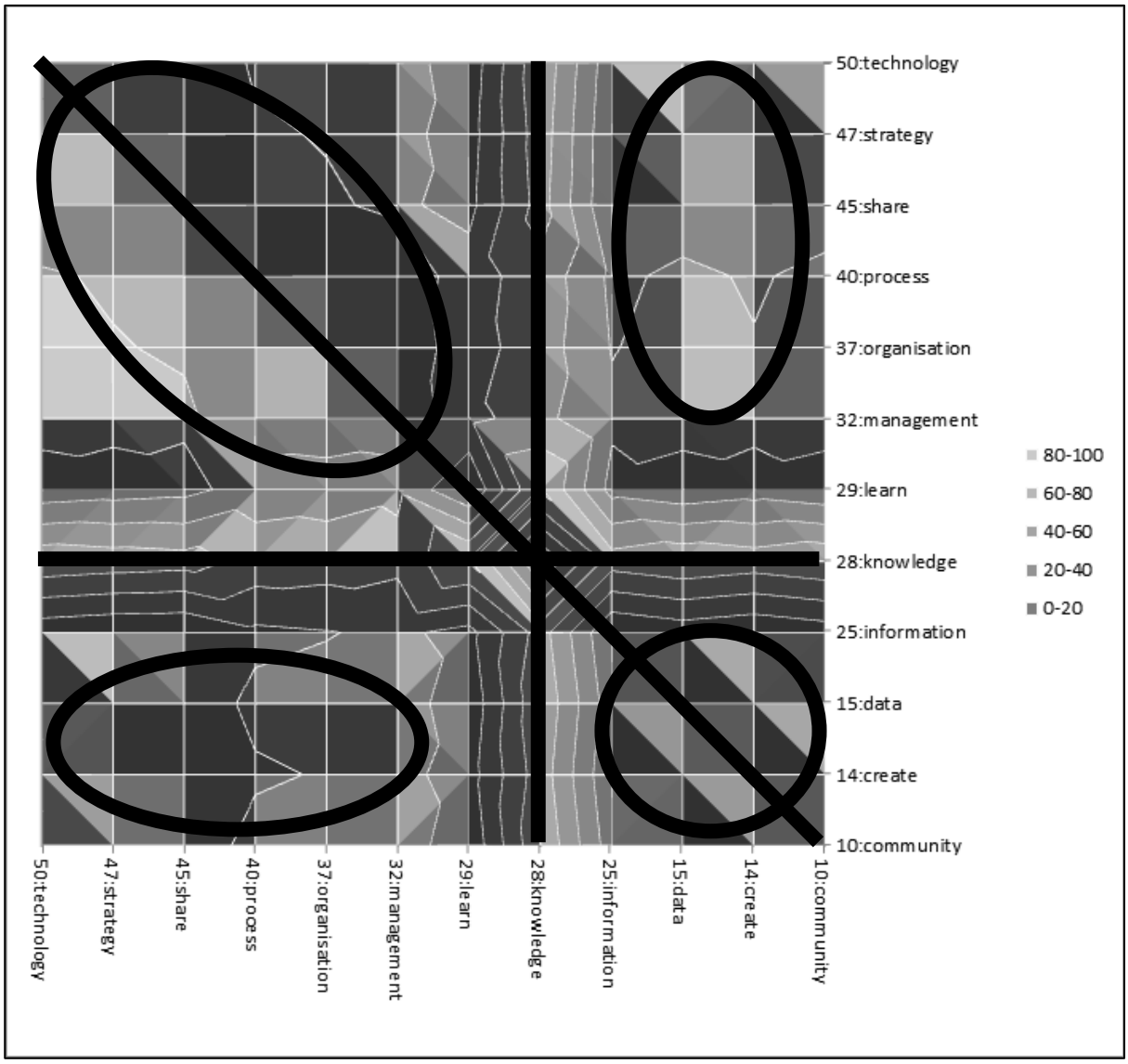


Figure 26: Proximity Heat Map – Shared KM Definition Terms (C)

After the addition of the diagonal indicating the point of pattern mirror duplication, and the simple line primitives, the individual pools become clearer. The pools are divided into quadrants due to the great distance in proximity between the case term ***Knowledge***, and the other terms found in the proximity case term list (Table 18). On closer inspection, the contours of the striations in Figure 26 provides us with an indication that the case terms ***Technology*** and ***Strategy*** are close to the case terms ***Share*** and ***Process***. There is also an indication that the case terms ***Community***, ***Information***, ***Data*** and ***Create*** are close to each within the scope and context of Figure 26. All of these terms are pooled around ***37: Organisation***.

What the visual inspection, striation and contours imply, is that around the concept of ***Organisation***, there are several terms that exist in closeness as categories associated with ***Organisation***.

The case terms in Table 18, Figures 24, 25 and 26 provide us with an overview of related terms and terminology that would preliminarily suggest core terms linked to KM as found within the KM definition list. What the case terms in Table 18, Figure 24, 25 and 26 provide us with is the following:

- In this instance, the core focus on the KM definition list is the case term organisation.
- Though ***Knowledge*** is the core focus of the KM definition corpus, the terms in Table 18 is closer to ***Organisation*** than to ***Knowledge***.
- The case term ***Organisation*** appears to be an intermediary pooling term that would link additional terms to the core term – ***Knowledge***.
- Critically identified terms linked to ***Organisation***, are terms such as ***Technology***, ***Strategy***, ***Share***, ***Process***, ***Community***, ***Information***, ***Data*** and ***Management***.

What Table 18, Figure 24, 25 and 26 provide is a list of preliminary building blocks associated with KM. One should at this point keep in mind that the terms listed in this instance only refer to the patterns to be identified within the KM definition corpus as associated with the academic community. Additional patterns are required to confirm or refute the stipulated building blocks.

Reviewing the striation patterns identified in Figure 26, we can identify potential building blocks.

- Technology >> Create, Data, Process, Share, Strategy
- Strategy >> Community, Create, Data, Information, Organisation, Process, Share
- Share >> Create, Data, Information, Management, Organisation, Process
- Process >> Community, Create, Data, Information, Management, Organisation, Share
- Organisation >> Community, Create, Data, Information, Management
- Management >> Create, Data
- Learn >> Create, Data, Information

- Information >> Create, Data
- Data >> Community, Create
- Create >> Community

These building blocks need to be reviewed in comparison between all three datasets prepared for this study. At present one cannot conclusively state that the aforementioned terms and relationships are relevant without integrating components identified between all three corpora. The aforementioned building blocks are, in this instance, relevant only to the KM definition corpus and need to be confirmed and expanded upon based on the patterns located in the Brint and CBEL corpora. In the following section, the author will review the '*Number: Case*' terms to be associated with the KM Network (Brint). With Brint focusing on the practical application of KM within an organisation, additional patterns in pools can be seen through the striations and contours.

6.3.2. Proximity Indices: KM Network (Brint) Terms and Words

When referring to the KM Network (Brint) corpus found in Table 17 as referenced in Figure 20, the overlapping terms found in the Brint corpus '*Number: Case*' (Appendix 2.5, page 48 to page 449) is as follows:

Table 19: KM Network (Brint) Corpus Proximity 'Number: Case'		
52:change	65:community	90:create
95:data	99:design	183:information
210:knowledge	225:management	227:map
244:need	245:network	252:organisation
254:page	277:process	297:relationship
302:research	329:software	336:strategy
343:system	351:technology	356:time
359:topic	363:user	371:work

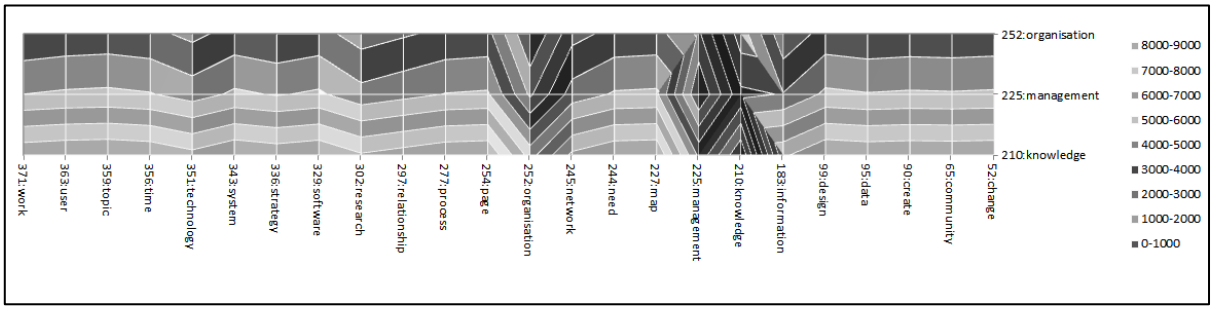


Figure 27: Proximity Heat Map – Shared Brint Terms (A)

When comparing the proximities of the referenced terms in Table 19 against only the proximities of the terms ***Knowledge***, ***Management*** and ***Organisation***, one finds that the striation contours provide a steep incline directed towards ***Organisation***. Yet again, as in Figure 24, there is a pooling around ***Organisation***.

In Figure 27 the rapid transition in in-between averages presented by the contours in the striation pattern appears to represent sudden transition. Based on striation contours, the between-group averages change rapidly from ***Knowledge*** to ***Organisation***. The change in in-between averages associated with ***Management*** and ***Organisation*** is not as steep as for example that of ***Knowledge*** and ***Management***, however, the contour still implies a rapid change in in-between group averages.

Figure 27 indicates four pools of terminology that are close to ***Organisation***. The first clearly visible pool in Figure 27 includes the case terms ***Change***, ***Community***, ***Create***, ***Data*** and ***Design***. The second clearly visible pool in Figure 27 includes ***Map*** and ***Need***. The third such pool in Figure 27 includes ***Page***, ***Process***, ***Relationship*** and ***Research*** while the fourth clearly visible pool includes ***System***, ***Technology***, ***Time***, ***Topic***, ***User*** and ***Work***.

There are, however, two additional pools that can be identified when referring to the direction of the contours visible in the striation of Figure 27. In the middle of Figure 27, the contour pattern indicates a systematic, though steep, incline-oriented relationship based on the in-between averages. The lowest point in this pool would be where ***Organisation*** and ***Organisation*** cross on the x- and y-axis. The natural distance between these two terms would be zero. The following terms associated and linked through distance would hierarchically be ***Management***, and then finally, through the systematic between-group averages, the final term would be ***Knowledge***. This provides an indication of the sequence. The first order would be the case terms linked to ***Organisation***. Then ***Organisation*** would be linked to ***Management***, and then finally ***Management*** would be linked to ***Knowledge***. This provides us with an indication of sequence of linkage based on the proximities of the case terms linked to ***Organisation***, and the case terms ***Organisation*** linked to ***Management*** linked to ***Knowledge***.

There is further evidence to support this in Figure 28 (a complete proximity matrix heat map containing all the '*Number: Case*' terms listed in Table 19). On inspection there are at least nine pools of proximity within the map. Taking into consideration that patterns are repeated over a diagonal (Figure 29), the patterns identified above and below the diagonal repeat the exact same pattern. Instead of nine patterns visible in the striations, there are six contour patterns visible in the striations. This can be more clearly identified in Figure 29 where the pools and patterns have been identified by means of the addition of simple line primitives (ovals and circles).

After the addition of the diagonal indicating the point of pattern mirror duplication, and the simple line primitives, the individual pools become clearer. The pools are divided into quadrants due to the great distance in proximity between the case term ***Knowledge***, ***Management*** and to a lesser extent the case term ***Organisation***. The composition of the pools around the case terms ***Knowledge***, ***Management*** and ***Organisation*** (Figure 28 and Figure 29) are characterised by small irregular deviations in proximity distance. For example, in the furthest top right quadrant in Figure 29 there are three small pools. The first pool refers to the case terms ***Work***, ***User***, ***Topic***, ***Time*** and ***Technology***. The second pool refers to the case term ***Technology***, ***System***, ***Strategy***, ***Software***, and ***Research***. The third pool in this quadrant refers to the case term ***Research***, ***Relationship***, ***Process*** and ***Page***. All three the aforementioned pools group together by means of its distance in proximity to the case terms ***Change***, ***Community***, ***Create***, ***Data*** and ***Design***. Within these three pools, there are overlapping case terms. These case terms are ***Technology*** and ***Research***. What this implies is that even though there are three ranges within the stipulated pools, these ranges are linked together by means of the two overlapping case terms of technology and research.

An additional pattern where the case terms technology and research overlap is where the pools in the top right quadrant of Figure 29 overlap with additional case terms. The case terms in this instance are ***Map***, ***Need*** and ***Network***. Based on proximities and distances it would appear that there is a relationship between terms associated with technology and the application of a task (work being done).

There is also a relationship between the case terms ***Network***, ***Need*** and ***Map*** as well as the case terms ***Change Community***, ***Create***, ***Data*** and ***Design***. What the visual inspection, striation and contours imply, is that around the concept of organisation, there are several terms that exist in closeness as categories associated with ***Organisation***.

The case terms in Table 19, Figure 27, 28 and 29 provide us with an overview of related terms and terminology that would preliminarily suggest core terms linked to KM, as found within the Brint corpus. These terms provide us with the following:

- In this instance, the core focus on the Brint corpus is the case term ***Organisation***.
- Though Knowledge is the core focus of the Brint corpus, the terms in Table 19 are closer to ***Organisation*** than to ***Knowledge***.
- The case term ***Organisation*** appears to be an intermediary pooling term that would link additional terms to the core term ***Knowledge***.

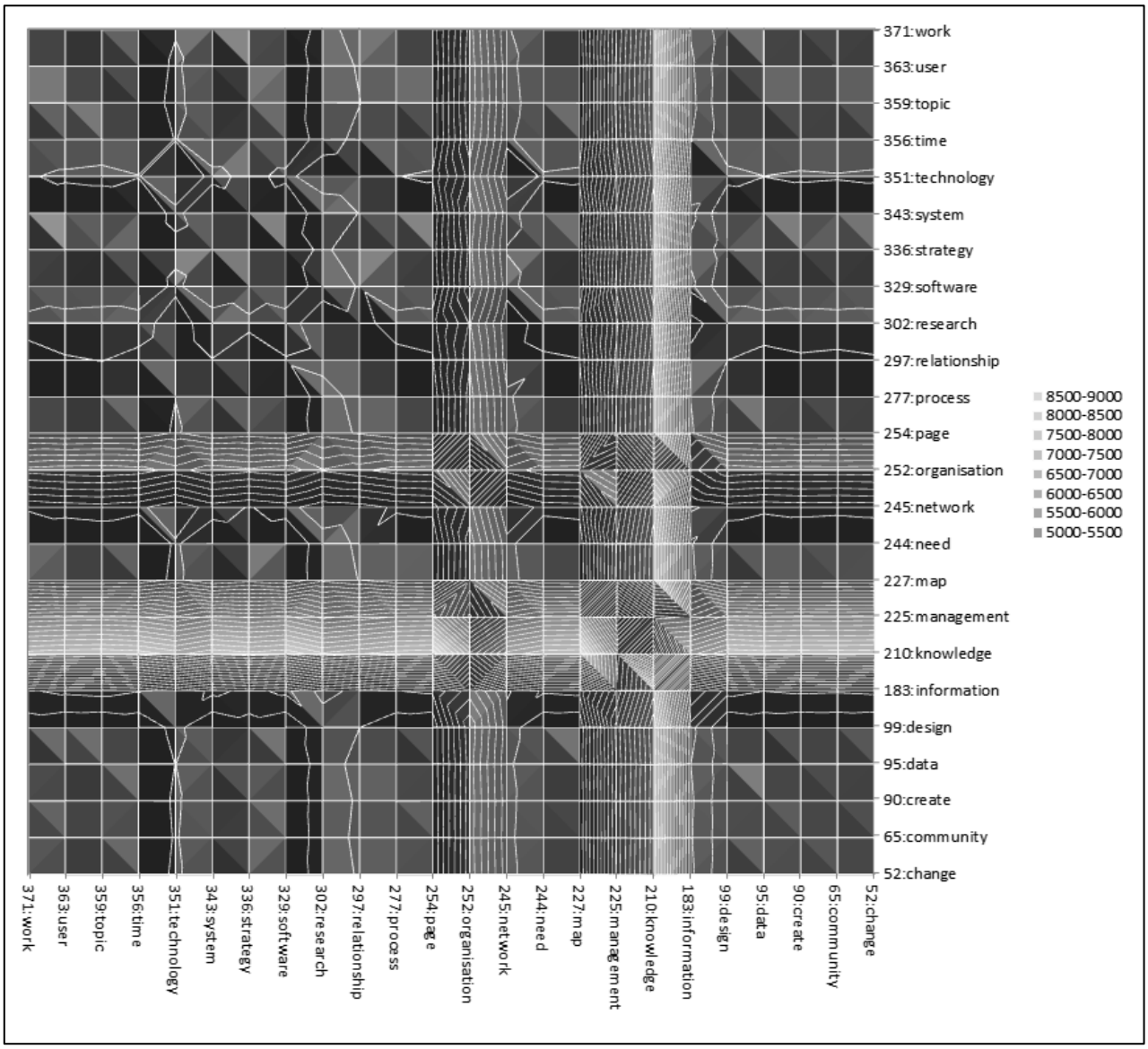


Figure 28: Proximity Heat Map – Shared Brint Terms (B)

- Critically identified terms linked to ***Organisation***, are case terms such as ***Change***, ***Community***, ***Create***, ***Data***, ***Design***, ***Page***, ***Process***, ***Relationship***, ***Research***, ***System***, ***Technology***, ***Time***, ***Topic***, ***User*** and ***Work***.
- A directional relationship between ***Knowledge***, ***Management*** and ***Organisation*** appears to exist. In this instance ***Organisation*** is directionally linked to ***Management***, and finally ***Management*** is directionally linked to ***Knowledge***.

What Table 19, Figure 27, 28 and 29 provide is a list of preliminary building blocks associated with KM. One should at this point keep in mind that the terms listed in this instance refer only to the patterns identified within the Brint corpus as associated with the KM Network (Brint) community that apply KM within the scope and context of an organisation.

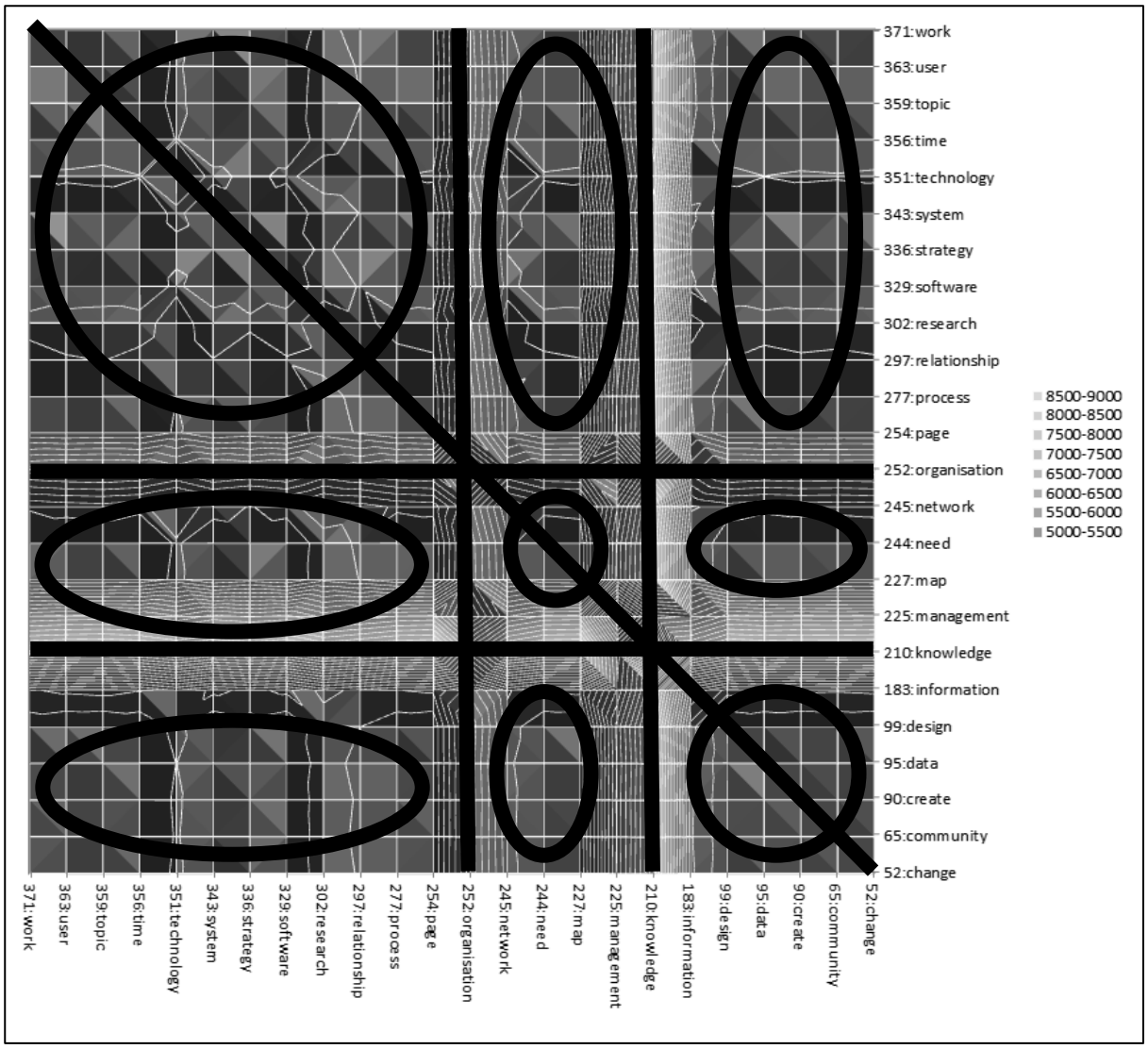


Figure 29: Proximity Heat Map – Shared Brint Terms (C)

Additional patterns are required to confirm or refute the stipulated building blocks. Reviewing the striation patterns identified in Figure 29, we can identify potential building blocks.

- Work >> Create, Data, Need, Strategy, System, Technology
- User >> Community, Create, Data, Map, Need, Network, Research, Software, Strategy, System, Technology, Time
- Topic >> Community, Create, Data, Design, Map, Need, Network, Relationship, Research, Software, Strategy, System, Technology, Time
- Time >> Create, Data, Design, Map, Need, Network, Process, Relationship, Research, Software, Strategy, System, Technology
- Technology >> Community, Create, Data, Design, Map, Need, Network, Process, Relationship, Research, Software, Strategy, System
- System >> Community, Create, Data, Design, Map, Need, Network, Process, Relationship, Research, Software, Strategy

- Software >> Community, Create, Data, Design, Map, Need, Network, Process, Relationship, Research
- Research >> Community, Create, Data, Design, Map, Need, Network, Process, Relationship
- Relationship >> Community, Create, Data, Design, Map, Need, Network, Process
- Process >> Create, Data, Design, Map, Need, Network
- Network >> Community, Create, Data, Design, Map
- Map >> Community, Create, Data, Design
- Information >> Create, Data, Design
- Design >> Community, Create, Data
- Data >> Community, Create
- Create >> Community

These building blocks need to be reviewed in a comparison between all three datasets prepared for this study. One cannot conclusively state that the aforementioned terms and relationships are relevant without integrating components identified between all three corpora. The aforementioned building blocks are, in this instance, relevant only to the Brint corpus and need to be confirmed and expanded upon, based on the patterns located in the KM definition and CBEL corpora.

In the following section, the author will review the '*Number: Case*' terms to be associated with the CBEL corpus With CBEL focusing on the practical application of KM within an organisation, additional patterns in pools can be identified through the striations and contours in Figure 30.

6.3.3. Proximity Indices: CBEL Terms and Words

When referring to the CBEL corpus found in Table 17 as referred to in Figure 20, the overlapping terms found in the CBEL corpus '*Number: Case*' (Appendix 3.5, page 481 to page 1227) are as follows:

Table 20: CBEL Corpus Proximity 'Number: Case'		
62:change	80:community	112:create
131:design	250:information	268:knowledge
272:learn	285:management	287:map
309:need	312:network	325:organisation
331:page	373:process	399:relationship
406:research	433:share	441:software
452:strategy	462:system	480:time
482:topic	490:user	499:work

When referencing the proximities of the referenced terms in Table 20 against only the proximities of the terms ***Knowledge***, ***Management*** and ***Organisation***, one finds that the striation contours level out towards ***Management***.

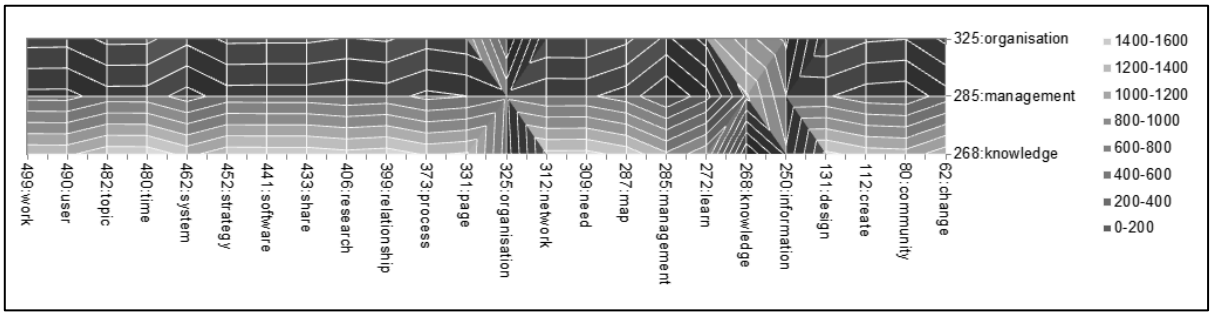


Figure 30: Proximity Heat Map – Shared CBEL Terms (A)

When reviewing the striation patterns found in Figure 30, the in-between average changes indicate that there is a steep incline or change in values from the case terms ***Knowledge*** to ***Management***, and a steep incline change from the case terms ***Organisation*** to ***Management***. What this indicates is that though there is an overwhelming emphasis on the case terms ***Knowledge*** and ***Organisation***, in the instance of CBEL the case term ***Management*** is closer in distance to the associated overlapping terms identified in Table 17. When inspecting the case terms' associations based on the contours located in the striation patterns, one finds that there are five pools where the case term ***Organisation*** and additional case terms come close to each other.

The first pool of close association refers to the case terms ***Change***, ***Community***, ***Create*** and ***Design***. The second pool of close association refers to the case terms ***Learn***, ***Map***, ***Need***, and ***Network***. The third pool of close association refers to the case terms ***Page***, ***Process***, ***Relationship***, ***Research*** and ***Share***. The fourth pool of close association refers to the case terms ***Strategy***, ***System*** and ***Time***. The final pool of close association refers to the case terms ***Topic***, ***User*** and ***Work***.

The level of complexity in identifying the relationships between these pools increases radically when comparing Figure 30 with Figure 31. Though there is a tendency for the case terms to lean towards the case terms ***Management*** (contrary to the KM definition and CBEL corpora case terms which was directed towards ***Organisation***), when referring to Figure 31 one can see that the case term creates a striation rift similar to ***Information***, ***Knowledge*** and ***Management***. The magnitude of this rift is not as extreme (based on the in-between average contour changes), however, it is visible.

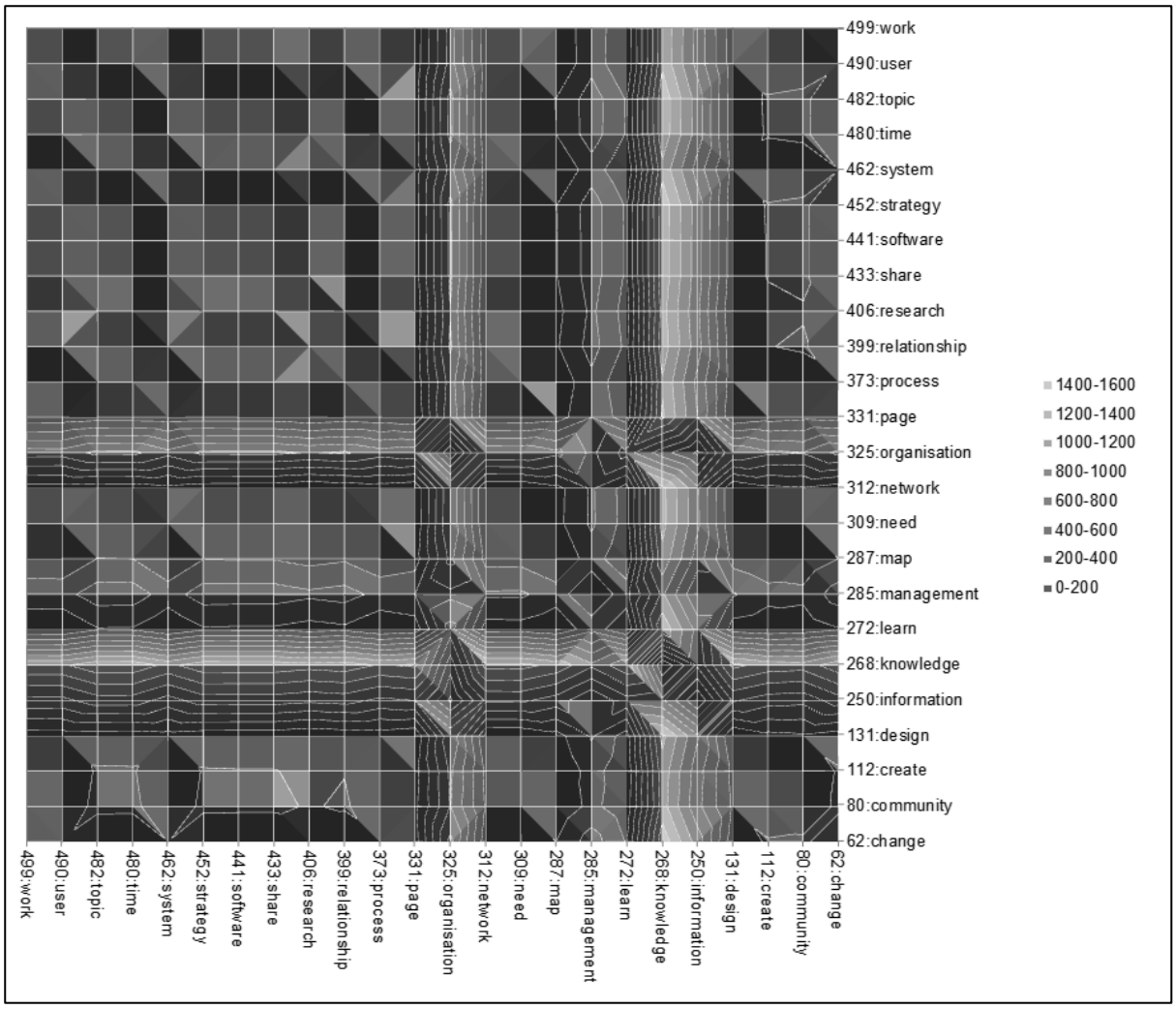


Figure 31: Proximity Heat Map – Shared CBEL Terms (B)

When comparing Figures 30 and 31 (a complete proximity matrix heat map containing all the '*Number: Case*' terms listed in Table 20), one can identify a change in linking relationship. In Figure 24, the case term ***Organisation*** related to ***Management*** with an increase in distance between the case terms ***Management*** and ***Knowledge***. In Figure 27 a similar pattern of striation was visible as in Figure 24; however, an additional pattern indicated a close proximity between the case terms ***Organisation***, ***Management*** and ***Knowledge***. In Figure 30 the focus is on the case term ***Management***; however, when referencing Figure 31, the case term ***Information*** also creates a striation rift. Based on the in-between average striation lines, the contour produced indicates that case terms ***Information*** and ***Knowledge*** are close in proximity to each other.

This could imply that the CBEL community views ***Knowledge*** and ***Information*** as interlinked and that the two case terms are mutually linked. In this instance one can create a partial relational building block that states the following:

- Knowledge >> Information
- Information >> Knowledge

When one inspects Figure 30, one can, as in Figure 31, identify at least nine pools of proximity within the map. Taking into consideration that patterns are repeated over a diagonal (Figure 32), the patterns identified above and below the diagonal repeats exactly the same pattern. Instead of nine patterns visible in the striations, there are six contour patterns visible in the striations. This can be more clearly identified in Figure 32 where the pools and patterns have been identified by means of the addition of simple line primitives (ovals and circles).

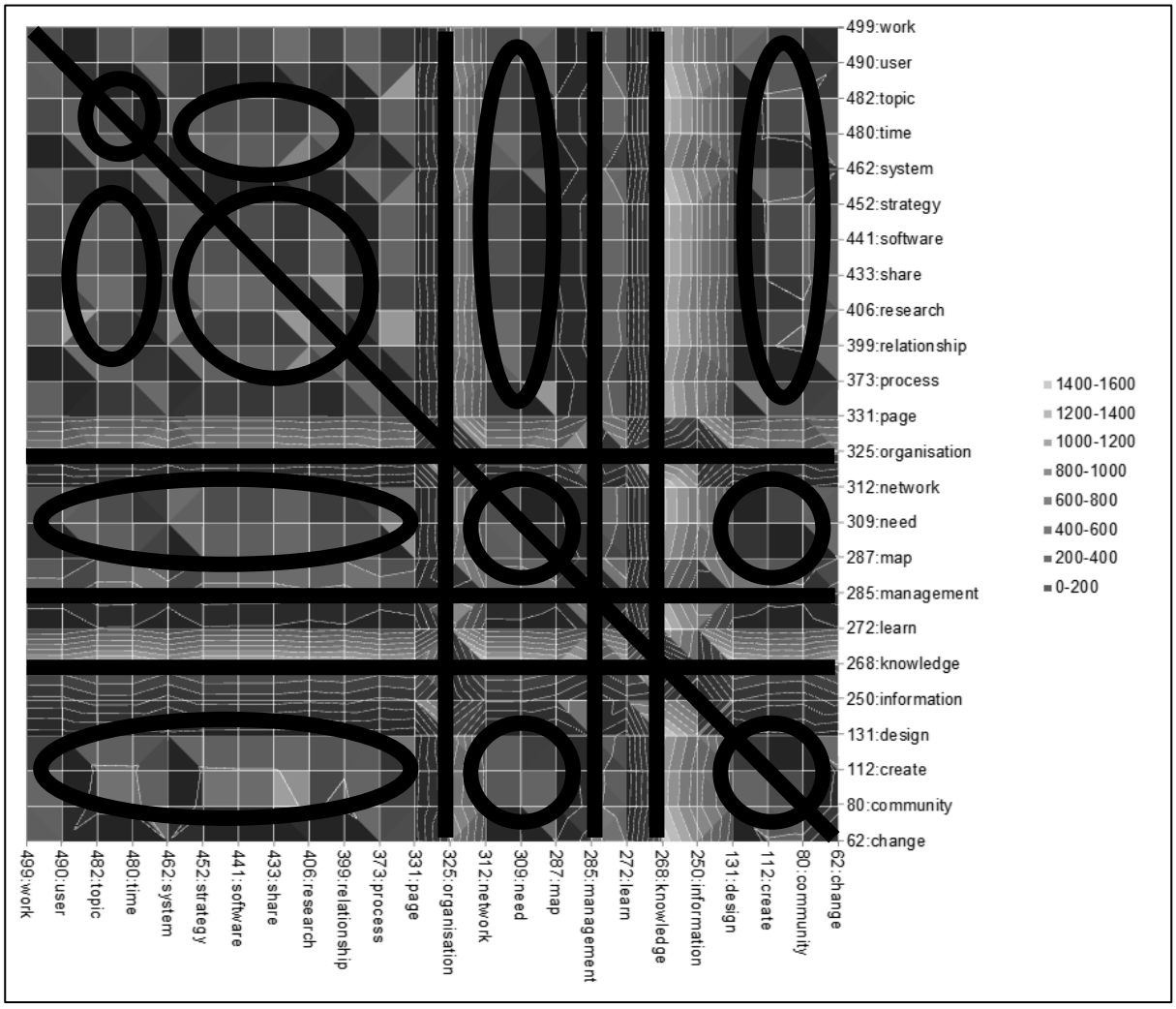


Figure 32: Proximity Heat Map – Shared CBEL Terms (C)

After the addition of the diagonal indicating the point of pattern mirror duplication, and the simple line primitives, the individual pools become clearer. The pools are divided into quadrants due to the great distance in proximity between the case terms ***Knowledge***, ***Information***, and ***Management*** and to a lesser extent the case term ***Organisation***. The composition of the pools around the case terms ***Knowledge***, ***Information***, ***Management*** and ***Organisation*** (Figure 31 and Figure 32) are characterised by small irregular deviations in proximity distance. When reviewing the patterns one find that the pools or groups presented in Figures 31 and 32 become very complex. However, on closer inspection and a comparison of both Figure 28 and 29, while comparing them with Figures

31 and 32, similar patterns in relationship start to present themselves. The greatest deviation is that the pools identified in the contours are smaller and more focused. However, some of the in-between average range changes are quite visible, they do occur in ranges and can therefore be grouped – but with caution.

The case terms in Table 20, Figure 30, 31 and 32 provide us with an overview of related terms and terminology that would preliminarily suggest core terms linked to KM, as found within the CBEL corpus. What the case terms in Table 20, Figure 30, 31 and 32 provide us with is the following:

- The case terms ***Information*** and ***Knowledge*** are closely linked due to the striation and contours as found in the in-between average contours.
- There is a tendency that leans towards favouring the case term ***Management*** above the case terms ***Organisation*** and ***Knowledge***.

What Table 20, Figure 30, 31 and 32 provide is a list of preliminary building blocks associated with KM. Also, the terms listed in this instance refer only to the patterns to be identified within the CBEL corpus as associated with the CBEL community that apply KM practically within the scope and context of an organisation. Additional patterns are required to confirm or refute the stipulated building blocks.

Reviewing the striation patterns identified in Figure 32, we can identify potential building blocks:

- User >> Community, Create, Need, Network
- Topic >> Community, Create, Map, Network, Process, Relationship, Research, Share, Software, Strategy, System, Time
- Time >> Community, Create, Design, Map, Need, Network, Process, Relationship, Research, Share, Software, Strategy, System
- System >> Change, Community, Create, Design, Map, Need, Network, Process, Relationship, Research, Share, Software, Strategy
- Strategy >> Change, Community, Create, Design, Map, Need, Network, Process, Relationship, Research, Share, Software,
- Software >> Change, Community, Create, Design, Map, Need, Network, Process, Relationship, Research, Share,
- Share >> Change, Community, Create, Design, Map, Need, Network, Process, Relationship, Research
- Research >> Change, Community, Create, Design, Map, Need, Network, Process, Relationship
- Relationship >> Change, Community, Create, Design, Map, Need, Network, Process
- Process >> Change, Community, Create, Map, Need, Network
- Network >> Community, Create, Design, Map, Need

- Need >> Community, Create, Design, Map
- Design >> Community, Create
- Create >> Community

These building blocks need to be reviewed in relation to all three datasets prepared for this study. One cannot conclusively state that the aforementioned terms and relationships are relevant without integrating components identified between all three corpora. The aforementioned building blocks are, in this instance, relevant only to the CBEL corpus and need to be confirmed and expanded upon based on the patterns located in the KM definition and Brint corpora. Accordingly, in the following section the author will review some of the network of relationships identified within the terms found to be linked though contour striation and pooling.

6.3.4. Relationship between Identified Proximity Indices

In the previous section, the author reviewed the contours and the relationship between case terms found in the three datasets for this study. All identified terms have a relationship with the case terms ***Knowledge*** and ***Management***. When we add the terms ***Knowledge*** and ***Management*** to the list of case terms relationship, we can use the resultant information to develop network diagrams. The network diagrams, as in Figure 33 to Figure 37, provide an overview of how terms are linked with each other. Each network diagram represents a merging of duplicate terms as identified in the previous section. What the network diagrams represent is a simplified view of case term relationships grouped together. When including all relationships between terms as stipulated and identified in the previous section, then we find a network relationship as described in Figure 33.

When referring to Figure 33, there is no particular reason for the location of the terms or for any visible changes of colour (if at all visible). It has been noted that the network presented may appear to have different colour intensities when in print. This is purely a visual effect and not part of the network itself. The network diagrams derived from Figure 33 have been systematically filtered to highlight differences in term relationships, as the deviations in line crossings create a situation that makes it difficult for the reader to review the network relationship. For the sake of simplicity, the terms are filtered and moved around in the pre-existing networked relationship for visibility and legibility. In Figure 33, there is a close-knit relationship between all the terms identified thus far. A few exceptions may be identified after integrating all the term relationships.

For example, the identified case terms of ***Change***, ***Information*** and ***Learn*** do not have nearly as many connections in the network diagram as for example the three core terms of ***Knowledge***, ***Management*** and ***Organisation***.

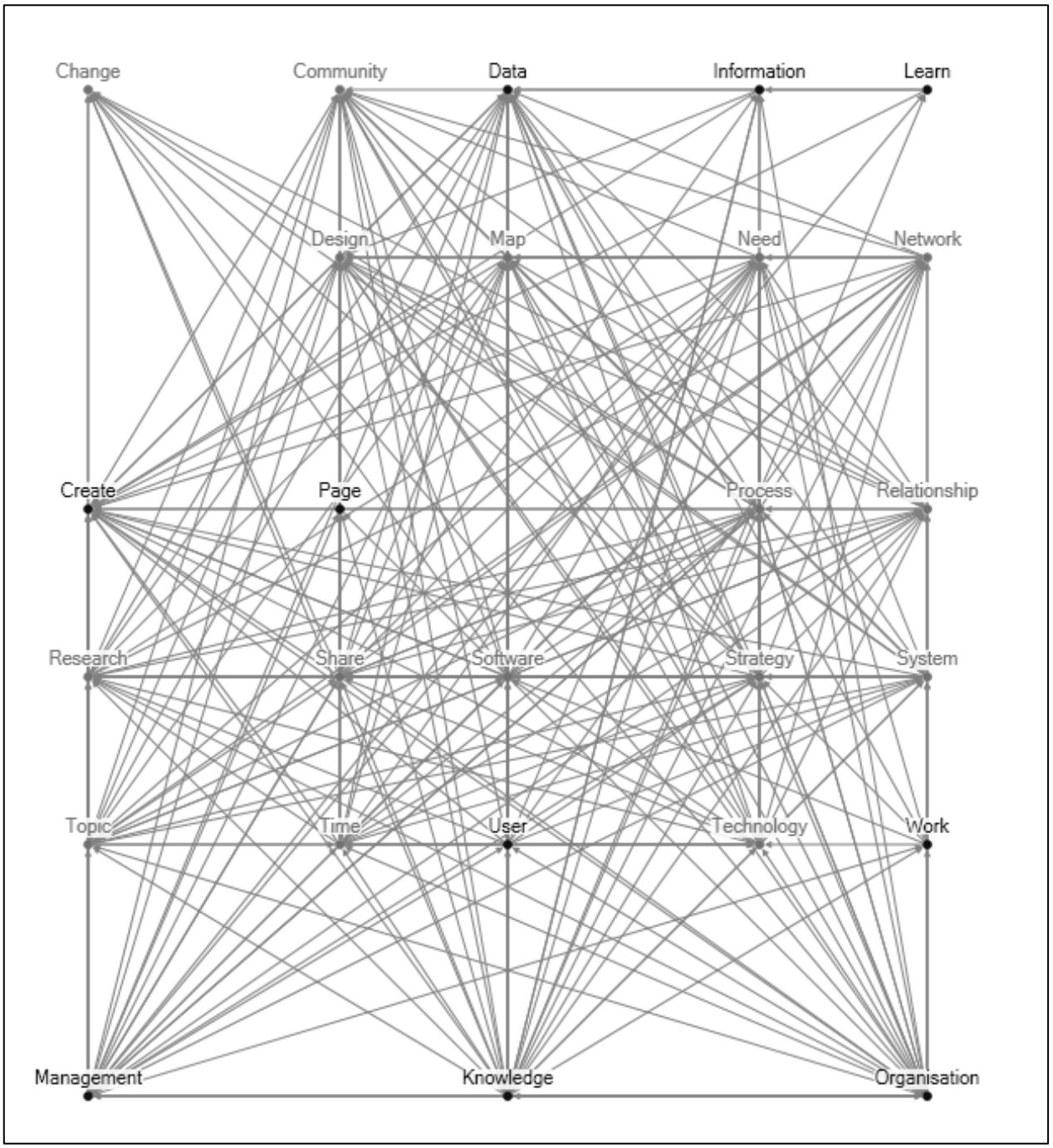


Figure 33: Critical Term Relationships – All Terms

Due to the core focus of this study, and filtering out additional extraneous relationships, we can therefore focus on the terms ***Knowledge***, ***Management*** and ***Organisation***. In Figure 33, we firstly find a relationship between core concepts of ***Knowledge*** and ***Management***. By simply focusing on the main terms of ***Knowledge*** and ***Management*** in this instance, we find that for example, based on term relationships, there is no overlapping relationship between ***Information***, ***Knowledge*** and ***Management***.

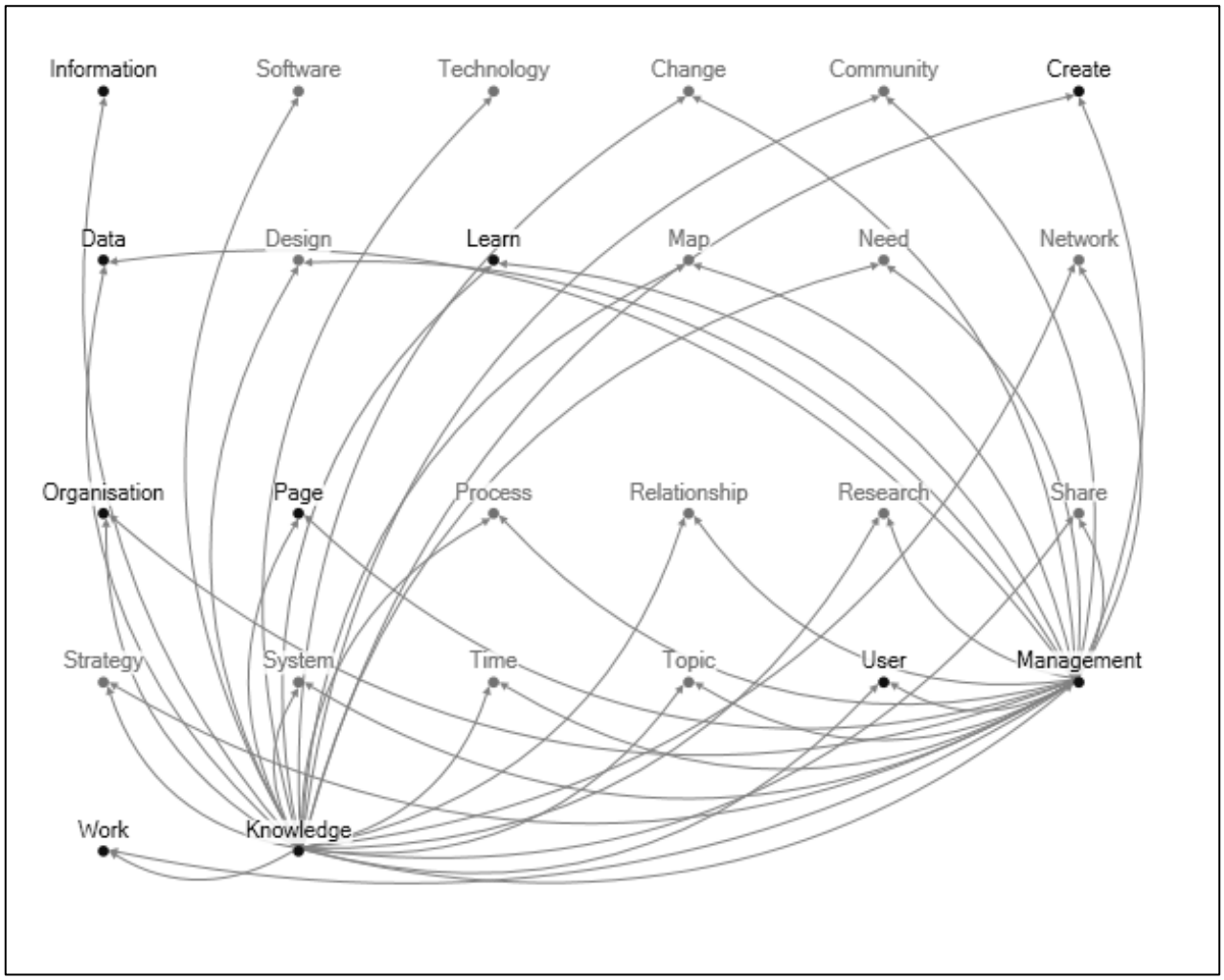


Figure 34: Critical Term Relationships - Knowledge AND Management

By reviewing these term relationships we can see that there are exclusive terms and mutually exclusive terms. In this instance, the mutually exclusive terms that relate directly to the core case terms ***Knowledge*** and ***Management*** provide us with a preliminary pattern. The preliminary pattern linked to ***Knowledge*** and ***Management*** is as follows:

Knowledge AND Management

Change, Community, Create, Data, Design, Learn, Map, Need, Network, Organisation, Page, Process, Relationship, Research, Share, Strategy, System, Time, Topic, User, Work

NOT Knowledge AND Management

Information, Software, Technology

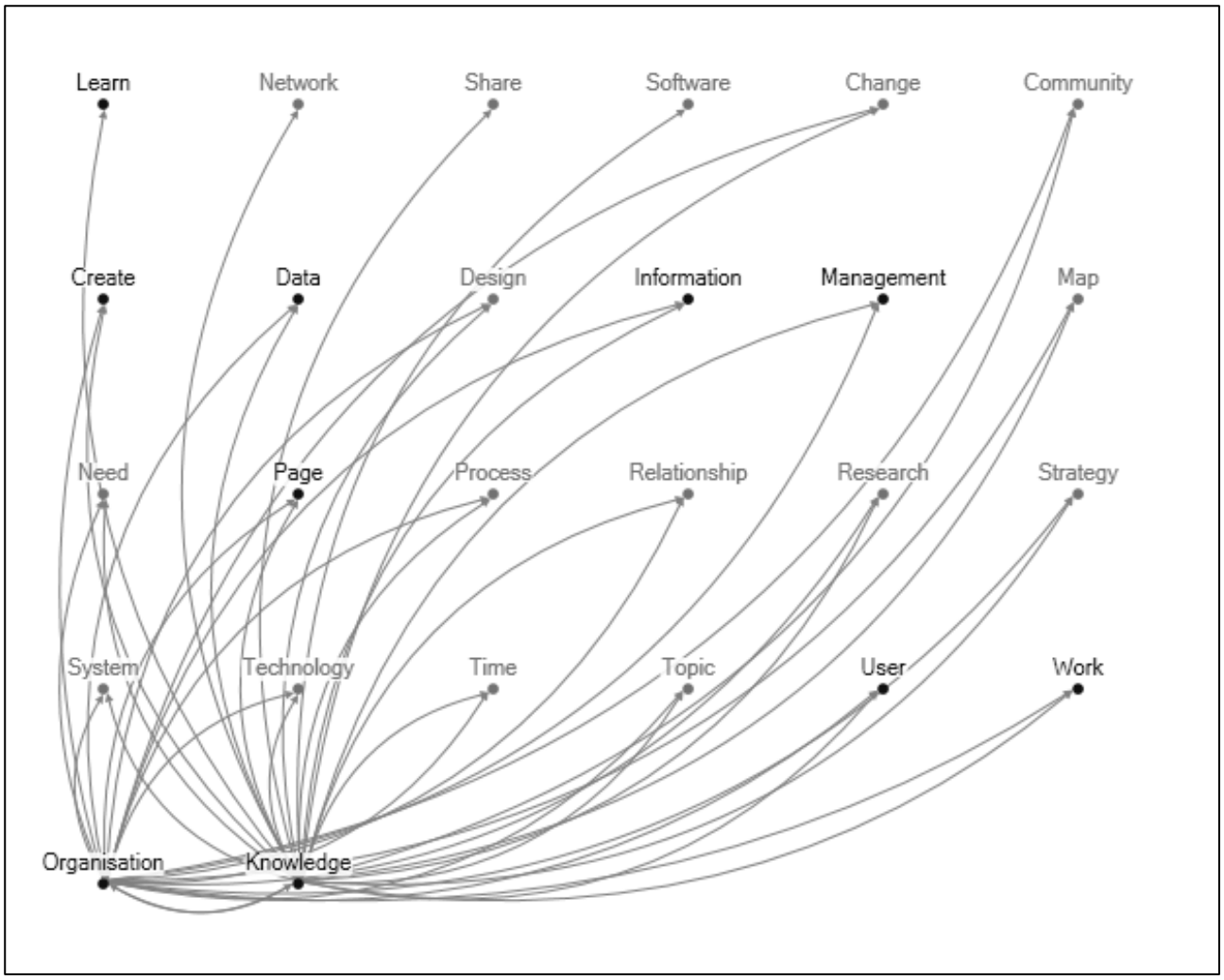


Figure 35: Critical Term Relationships - Knowledge AND Organisation

The identified pattern can be extended by focusing on the networked relationship of the core case terms of ***Knowledge*** and ***Organisation***. When filtering the networked relationship as found in Figure 33 and focusing on the core terms of ***Knowledge*** and ***Organisation***, we find a networked relationship as stipulated in Figure 35. By reviewing these term relationships we find that there are exclusive terms and mutually exclusive terms. In this instance, the mutually exclusive terms that relate directly to the core case terms ***Knowledge*** and ***Organisation*** provide us with a preliminary pattern. The preliminary pattern linked to ***Knowledge*** and ***Organisation*** is as follows:

Knowledge AND Organisation

Change, Community, Create, Data, Design, Information, Management, Map, Need, Page, Process, Relationship, Research, Strategy, System, Technology, Time, Topic, User, Work

NOT Knowledge AND Organisation

Learn, Network, Share, Software

The identified pattern can be extended even further by focusing on the networked relationship of the core case terms of organisation and management. When filtering the networked relationship as found in Figure 33 and focusing on the core terms of ***Organisation*** and ***Management*** we find a networked relationship as stipulated in Figure 36. By reviewing these term relationships, we can also see that there are exclusive terms and mutually exclusive terms. In this instance, the mutually exclusive terms that relate directly to the core case terms ***Organisation*** and ***Management*** provide us with a preliminary pattern. The preliminary pattern ***Organisation*** and ***Management*** is as follows:

Organisation AND Management

Change, Community, Create, Data, Design, Map, Need, Page, Process, Relationship, Research, Strategy, System, Technology, Time, Topic, User, Work

NOT Organisation AND Management

Learn, Network, Share, Information, Knowledge

The identified pattern can finally be merged to include the three core terms associated with this study. When combining the three core terms of ***Knowledge***, ***Management*** and ***Organisation*** by filtering the networked relationship as found in Figure 33, we find a networked relationship as stipulated in Figure 37.

By reviewing these term relationships we can see the overlap in terms that are exclusive and mutually exclusive. In this instance, the mutually exclusive terms that relate directly to the core case terms ***Organisation*** and ***Management*** provide us with a preliminary pattern. In this instance, the preliminary pattern provides us with an overview of the core terms that can be found in clear relationship when the terms ***Knowledge***, ***Management*** and ***Organisation*** overlap.

By reviewing Figure 37, one finds that a term in this networked relationship should have three connections. Each connection refers to a link to the core terms. If these terms do not have three connections, then one can state that the identified terms do not have a similar relationship to all three core terms of ***Knowledge***, ***Management*** and ***Organisation***, and therefore do not link to the focus of this thesis.

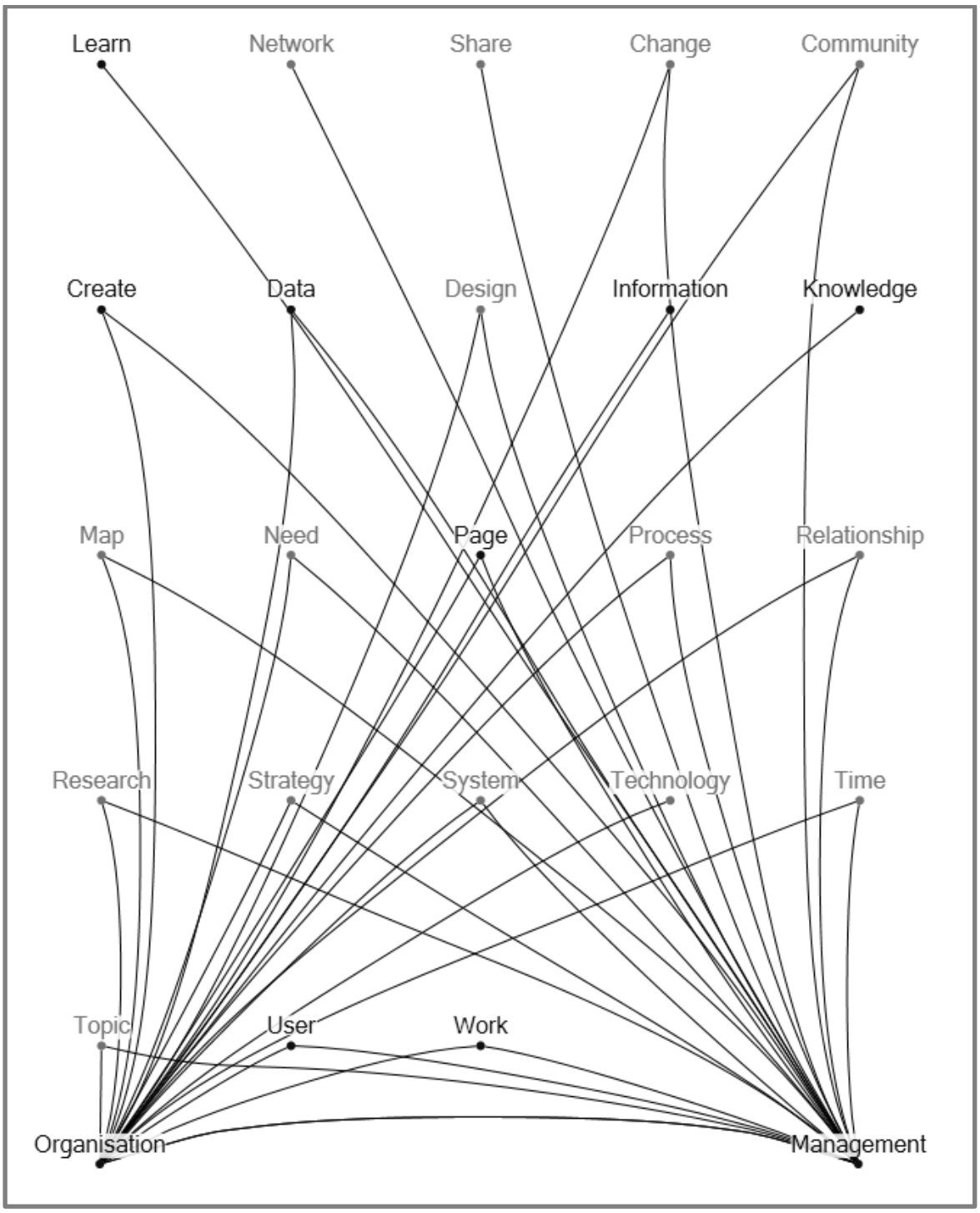


Figure 36: Critical Term Relationships - Organisation AND Management

The preliminary pattern that included the core terms is as follows:

Knowledge AND Organisation AND Knowledge
Change, Community, Create, Data, Design, Map, Need, Page, Process, Relationship, Research, Strategy, System, Time, Topic, User, Work
NOT Knowledge AND Organisation AND Knowledge
Software, Information, Technology, Learn, Network, Share, Time

The preliminary patterns provide only an overview of overlapping terms identified through visually inspecting proximities and the maps generated from these proximities. One cannot state clear conclusions from these preliminary patterns before reviewing the automated clusters generated though SPSS' evaluation of the proximities. When reviewing these clusters (or identified categories) the author will refer back to the final pattern of terms focusing on the core terms of ***Knowledge***, ***Management*** and ***Organisation***.

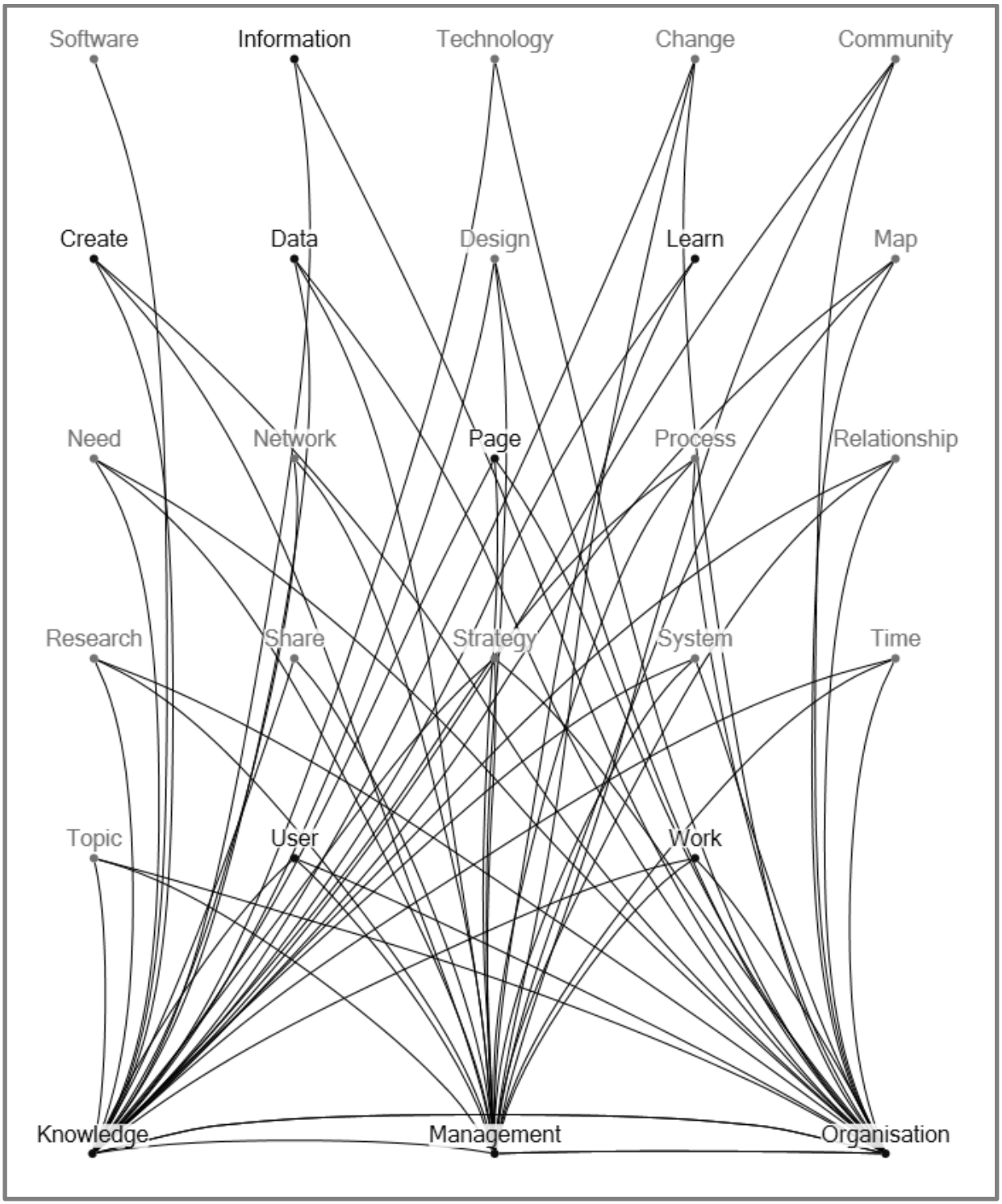


Figure 37: Critical Term Relationships - Knowledge AND Management AND Organisation

In the following section the author will review the clusters that were constructed by SPSS version 17. These clusters include all the terms in all three corpora. What the author will focus on in this instance is to confirm the patterns of relationships that have been identified in the aforementioned section of review.

6.4. Clusters between Dataset Corpora

When reviewing clusters, one of the core aspects that should be taken into consideration is that clusters identify categories or groups.

In the previous section, the author identified potential relationships of terms by visually inspecting terms and terminology, and how closely these terms are based on tendencies in contour striation patterns. Based on these contour striation patterns, and the overlapping of terms in a networked relationship, the author identified terms that can be considered close to the core terms of ***Knowledge***, ***Management*** and ***Organisation***. Based on this preliminary pattern, the author will in the following section review the nature of the clusters that have been identified through between-group clustering which will be reviewed to refine the patterns identified in the previous section. As a result, the author will review each dataset's cluster individually in comparison with the preliminary patterns identified.

In the following section, the author will refer to the dendrograms produced by SPSS for the complete datasets.

- KM Definitions – Appendix 1.7 (page 24).
- Community of Practice 01 (KM Network; Brint) – Appendix 2.7 (page 451 to page 457).
- Community of Practice 02 (CBEL) – Appendix 3.7 (page 1229 to page 1236).

6.4.1. Clusters: KM Definition List Terms and Words

When reviewing the KM Definitions Cluster in Appendix 1.7 (page 24) it is apparent that the majority of the terms in this cluster need to be categorised to link to the core term of Knowledge. The term Knowledge co-occurs with the other terms in this dataset so frequently that all the other terms need to be clustered together to link to this term.

When reviewing the clusters, one finds that there is a clear linkage between specific terms. Identifiable clusters or grouping categories are as follows:

Cluster 1: A cluster associated with community, action and the individual (***Action***, ***Community***, ***Tacit***, ***Mind***, ***Skill***, ***Data***, and ***Codify***).

Cluster 2: A cluster associated with managing informational artefacts (***Information***, ***Artefact***, ***Enhance***, and ***Manage***).

Cluster 3: A cluster grouping community action and the individual with managing information artefacts to organisational strategy (***Strategy***, ***Create***, ***Attitude***, ***Marketing***, ***Opportunity***, ***Frequent***, ***Justify***, ***Require***, ***Competency***, ***Competition***, ***Embody*** and ***Relation***).

Cluster 4: A cluster that focuses on organisation (***Organisation***, ***Leverage***, ***Process***)

Cluster 5: A cluster focusing on managing organisations (**Cluster 4** and ***Management*** and ***Person***).

Cluster 6: An all-inclusive cluster grouping all terms together and linking it together with ***Knowledge***.

Clusters 1, 2 and 3 indicate that there is a close relationship between the actions of individuals and a community in the management of data and information associated with artefacts. Cluster 4 indicates that there are strategic opportunities to use the information and data assigned to individuals in a community, and that should therefore be managed. Cluster 5 focuses on the management of processes and people in an organisation to leverage knowledge. Linking Clusters 1, 2, 3, 4 and 5 together creates a relationship with knowledge.

What the pattern found in the dendrogram for the KM Definitions Cluster in Appendix 1.7 (page 24) indicates in this instance is as follows:

- People and the mind of the individual in terms of tacit content relate to the codification of data.
- Information and artefacts containing information need to be managed.
- There is a strategic advantage in managing people, communities, information and data.
- The processes of people in an organisation need to be managed.
- When all of the above are satisfied, then the organisation can gain access to the value of organisational knowledge.

6.4.2. Clusters: KM Network (Brint) Terms and Words

When reviewing Community of Practice 01, KM Network (Brint), in Appendix 2.7 (page 451 to page 457) one finds that the level of complexity in terms of the clusters present escalates. As found in the previous section, all the terms need to be clustered together to link to the term Knowledge.

From page 451 to page 454 of Appendix 2.7, there are no unique groupings other than that all terms need to be grouped to link to the term Knowledge. Only on page 455 of Appendix 2.7 is there the first indication of categorisation and grouping. In this instance, the dataset presents a flat cluster implying that most of the terms found in the cluster are related to each other and to Knowledge.

Two clear clusters that can be found on page 457 relate to management terminology:

Cluster 1: A cluster that focuses on ***Information***, ***Technology*** and ***Research***.

Cluster 2: A cluster that focuses on the ***Person***, ***Manager***, the field of ***Management*** and the construct of the ***Organisation***.

What this indicates is that the core focus in this instance is the application of technology to information and to gaining an understanding (research). In other words, one can state that the application of information is linked to technology to engage in research. The Brint corpus also focuses on ***Management*** of the ***Organisation*** as one of the core aspects within the clusters or the categories.

What the pattern found in the dendrogram for the Brint Cluster in Appendix 2.7 (page 451 to page 457) indicates in this instance is as follows:

- There is a clear focus on the application of technology.
- Information is linked to technology and there is no clear distinction between data and information when linked to technology.
- Organisational management is linked to the role of the manager.

6.4.3. Clusters: CBEL Terms and Words

When reviewing the Community of Practice 02, CBEL, in Appendix 3.7 (page 1229 to page 1236) one finds that the level of complexity in terms of the clusters escalates even more. As found in the previous section, all the terms need to be clustered together to link to the term Knowledge. However, more distinct clusters can be identified in the CBEL corpus than can be identified in the Brint corpus.

From page 1229 to page 1230 of Appendix 3.7, there are no unique groupings other than that all terms need to be grouped to link to the term Knowledge. Only on page 1231 of Appendix 3.7 does one find the first indication of categorisation and grouping. This cluster and grouping ranges from

page 1231 to page 1236; but it does, however, link to a primary cluster on page 1236, and it encompasses a wide variety of terms and terminology.

When focusing on clusters that are close to each other, indicating closeness in proximity and representing a category, the following clear clusters can be identified:

Cluster 1: A cluster focusing on requirements, terms and terminology, solutions, subjects, standards and publications. Though a cluster representing close associations, this cluster in itself is quite flat and does not represent a clear trend or tendency.

Cluster 2: A cluster that focuses on representations (***Develop***, ***Web***, ***Usage***, ***Visualisation*** and ***Technical***).

Cluster 3: A cluster that focuses on people, social aspects, and resources as well as links. This would appear to be a community related cluster (***People***, ***Page***, ***Social***, ***Resource***, ***Category***, ***Link***, ***Provide*** and ***Service***).

Cluster 4: A cluster combining Cluster 3 and technology and tools focusing on work. It would appear that Cluster 4 indicates an enabling cluster in which tools and mechanisms are related to enable the social component to be able to function within a working environment (***Ontology***, ***Process***, ***User***, ***Work***, ***Learn***, ***Classification***, ***Benchmark***, ***Project*** and **Cluster 3**).

Cluster 5: A cluster that combines **Cluster 2** and **Cluster 4**. What Cluster 5 focuses on is, in other words, that representations enable people in the work that they do.

Cluster 6: A cluster that combines ***Information*** with the ***Organisation***.

Cluster 7: A cluster that combines **Cluster 6** with ***Management***. In other words this cluster indicates a relationship between the organisational information and management.

Cluster 8: A cluster that combines **Cluster 7** with ***Knowledge***. In this instance the cluster indicates a relationship between the management of organisational information and knowledge.

What these clusters indicate is that CBEL focuses more on enabling and facilitating people to conduct their work though the provision of resources. Additionally, to ensure effectiveness in the process of providing these resources, organisational information resources need to be managed in such a way as to facilitate knowledge transfer. CBEL therefore indicates that knowledge can be transferred if the environment is based on the type of resources applied. What the pattern found in

the dendrogram for the CBEL Cluster in Appendix 3.7 (page 1229 to page 1236) indicates in this instance is as follows:

- There is a focus on enabling people by means of tools, resources and technology.
- There is recognition of the social aspect of resources related to knowledge.
- Representations are acknowledged as one of the potential methods that can be used to facilitate knowledge work.
- The relationship between information and the organisation is linked to knowledge.

6.4.4. Relationship between Identified Clusters

Though the KM Definition corpus cluster is clearly the most coherent clustered dendrogram in this study, there is a set of relationships that can be derived from all three case dendrograms.

The relationships are as follows:

- The role of the individual is acknowledged.
- There is an emphasis on the community and the relationship between people within a community.
- There is a link between artefacts representing data and information as a resource that assists in work or task completion.
- The facilitation of an environment in which work can be linked to knowledge and knowledge resources is presented.
- Resources in the form of tools and utilities (technology and representations) are acknowledged though not emphasised.
- Information and data are linked to technology and to a social or communal environment.
- The role of management within the organisation is indicated. In other words, if management is inappropriately aligned to the organisation, then KM cannot be facilitated.
- There is recognition of the link between information, the organisation's ownership of information, organisational processes and knowledge linked to the organisation.

All of the aforementioned relationships provide us with an overview of the relationship between the three corpora. They also provide the author with a method of extending the preliminary patterns identified in Chapter 6. In the following section, the author will review these patterns and link these patterns together so as to establish the fundamental building blocks of KM that satisfy organisational KM needs.

6.5. Conclusion: Identified Repeating Patterns

When reviewing the patterns that are presented in Chapter 6 based on the KM Definition, Brint and CBEL corpora, one finds that there are terms and relationships that are continuously presented. The most frequent terms that co-occur in all instances are ***Information***, ***Knowledge***, ***Management*** and ***Organisation***. Although there is no clear relationship in direction and magnitude assigned to these terms, the definition terms, and both communities of practice view these terms with significance as they are repeated most often within the context of all three corpora.

The KM Definition corpus and the Brint corpus share a relationship with the case terms of ***Technology*** and ***Share***. This becomes more significant when one reviews the relationship between the KM Definition corpus and the CBEL corpus where the two corpora share a relationship in terms of the case terms ***Learn*** and ***Share***. Linking the terms together one finds a relationship between the terms ***Learn***, ***Share*** and ***Technology*** (with ***Share*** being the common term). When comparing the Brint and CBEL corpora, one finds numerous ***Technology***-related constructs and terms linked together with ***Relationship***, ***Word*** and ***User***. What this implies is that as part of the emphasis on ***Information***, ***Knowledge***, ***Management*** and ***Organisation***, there is an emphasis on ***Technology*** facilitating work and facilitating sharing.

This is further acknowledged when one combines the repeating terms as found in the proximity and heat maps into network diagrams. The preliminary pattern that comes to light when combining the relationship between the three significant terms (***Knowledge*** AND ***Management*** AND ***Organisation***) includes several technology constructs. These terms in preliminary patterns can be reviewed in Figure 37. In reality there is an emphasis on several constructs. The constructs being emphasised are ***Organisation*** (which may refer to the structure of the organisation), ***Technology*** constructs (including various types of technology, tools and mechanisms that assist in the facilitation of a knowledge environment), ***Processes***, ***Relationships***, ***Community***, ***Data*** and ***Change***.

When reviewing the patterns identified in the dendrogram for all three corpora, one finds that a similar pattern emerges. Individuals in a community and relationships are emphasised, the nature of the organisation is highlighted, the role of information is linked to the organisation, and management is linked to aspects of the process '*to manage*'. Yet again there is an emphasis on the technological resources that can assist in the organisation environment that is linked to information, data and knowledge. Based on the aforementioned sections and the repetition of patterns, one can state the following about the fundamental building blocks of KM that satisfy organisational KM needs, namely:

- The individual is clearly emphasised.
- The relationship between individuals in a community is clearly emphasised.

- The importance of technology as a facilitator is emphasised.
- The type of technology that can assist in facilitating KM is diverse.
- Data is not emphasised; however, the relationship between information, the organisation and management is emphasised.
- The role of management is emphasised.
- Processes within the organisation are emphasised.
- The relationship between the organisation and management is emphasised. In other words, if the organisation is not managed appropriately, then KM will not succeed. This in itself implies the creation of an environment that facilitates KM.
- The relationship between knowledge, management, the organisation and change is emphasised.
- Sharing is emphasised.
- Learning is emphasised.
- Relationships are emphasised. This includes the relationship between individuals, the relationship within communities, a relationship to the organisation, and a relationship between individual constructs.

Based on the aforementioned statements, the exposition and review of the patterns identified within this chapter, the author presents repeating patterns related to KM in in Figure 38. Though not a representation of all the results of this study, it does represent the pattern as acquired from the KM Definition corpus as compared to the 50 most frequent terms found in the Brint and CBEL corpora.

When reviewing Figure 38, there are several critical considerations. Figure 38 was derived from analysing three corpora. Corpus 1 was extracted by reviewing and analysing definitions that describe KM from an academic perspective. This perspective presents what KM is, a concise definition from an academic perspective as to the expectation of what KM is and/or should be. Patterns obtained from Corpus 1 can be referred to as the primary comparative patterns that represent an expectation of the nature of KM. Corpus 2 was derived from a community of practice (KM Network more commonly referred to as Brint) that focuses on the application of KM within an organisation. Similarly, Corpus 3 was derived from a community of practice (referred to as CBEL) that focuses on the application of KM within an organisation. Both Corpus 2 and Corpus 3 represent discussions and reviews of how KM practitioners apply KM within an organisation so as to satisfy organisational KM needs.

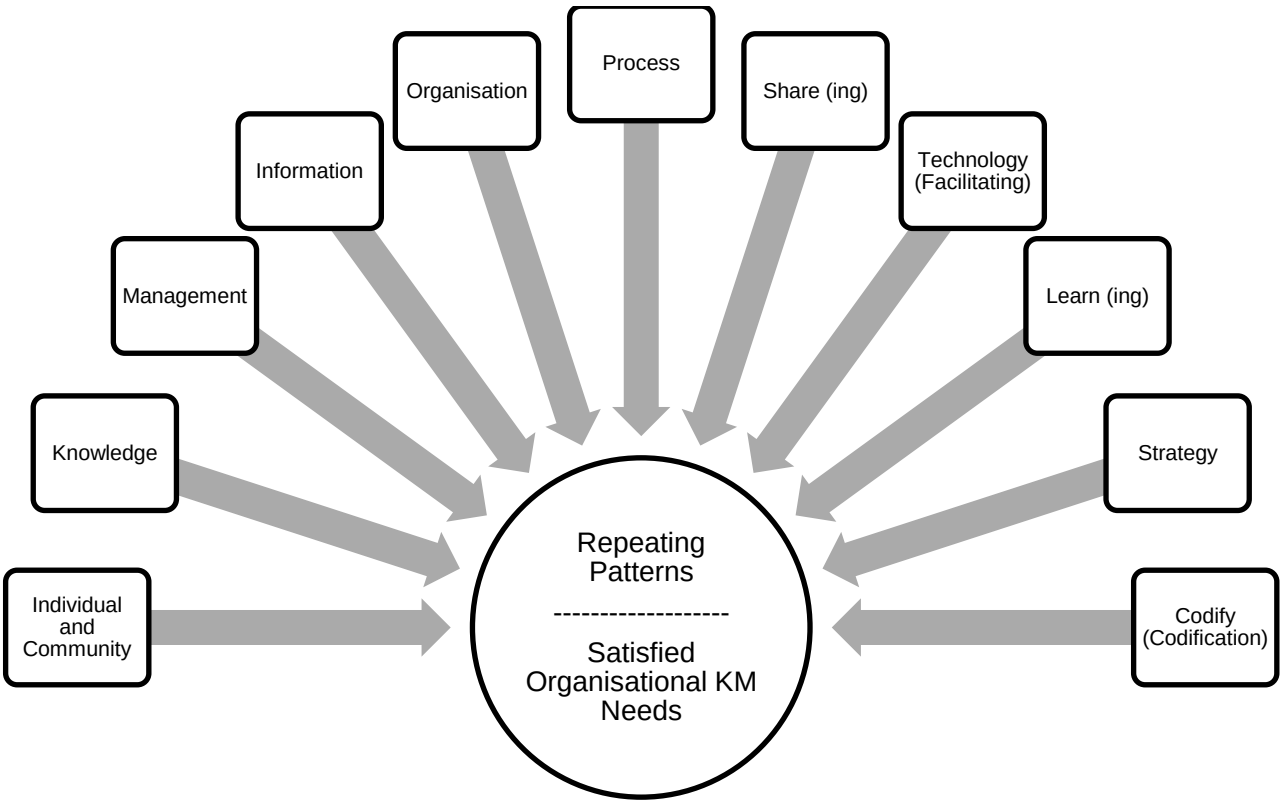


Figure 38: Repeating Patterns of KM[13]

One can therefore clearly state that Corpus 1 represents the expectation of what KM should be, while Corpus 2 and Corpus 3 represent what KM is when applied within an organisation so as to satisfy organisational KM needs. Considering the rules that this author has set for matching patterns, the patterns identified in Corpus 1, 2 and 3 represent the critical components of KM and Corpus 2 and 3 represent the critical components of KM as applied within an organisation. In conclusion, one can therefore state that the identified repeating patterns lead to the construction of Figure 38 which represents the identified **fundamental building blocks of KM that satisfy organisational KM needs**.

When referring to literature covered for this thesis, the schools of thought, ideas and discussions found between various sources of literature as well as the terms identified for Figure 38, one can state the following.

The ***Individual*** (the source of knowledge) and ***Communal*** (the relationship between individuals) is the source of knowledge, as the individual is the holder and the carrier of knowledge. As described in Chapter 2, it was concluded that knowledge is a human-based construct that originates from human sources and links directly to human beings. Knowledge cannot be removed from the individual, either singular or communal, without knowledge being converted into something related

[13] In Figure 38 the arrows has no meaning other than to indicate a relationship

to knowledge – either verbal, symbolic or a representation of some sort. In Chapter 3 it found that there are different points of view in defining KM, however one of the core components that were regularly found was the person or the individual. As described in Chapter 4, the individual as found in a hierarchical relationship constructs the organisation and though systematic input and output (moving in or leaving the organisation), leads to the flow and transformation of knowledge. This links to the socialisation, explication, codification and internalisation of knowledge in terms of the individual, between individuals, inside of groups and between groups. As such, it would be reasonable that both the academic perspective and practitioner perspective would view the individual or the communal relationship between individuals as a core component that, in the simplest sense, would support KM.

When investigating ***Knowledge*** (that which the individual cognitively possesses and which the person can apply), it would be surprising that the core construct would not be knowledge. As such, it is somewhat obvious that knowledge is of importance in KM. What is of interest here however is that different points of view of knowledge were considered and discovered. In Chapter 2 we found that there are two main schools of thought related to knowledge. The first school considered knowledge as something that may be mechanistically and sequentially constructed whilst another school of thought considered knowledge part of a greater cyclical process. In Chapter 3 it would found that there are numerous points of view of knowledge. Within Chapter 3 it was eventually concluded that knowledge can be managed and supported by facilitating factors in the environment. In Chapter 4 we found that knowledge can flow in an out of an organisation and that there is a clear concern as related to knowledge gain and growth versus knowledge loss.

When referencing ***Management*** (the process that facilitates a goal–driven environment in support of KM), we found that this is a set of processes that supports the functioning of the organisation. We also found within the scope and context of Chapter 2, 3 and 4 that there is a clear concern in the management of knowledge. It was additionally concluded in Chapter 4 that there is a need for organisational KM in that organisations need to manage resources associated with knowledge. Specific Organisational KM needs was found linked to the management of knowledge and knowledge resources (as discussed in Chapter 4).

When referencing literature and content reviewed for KM, it is of no surprise that **Information** (utilitarian representation of knowledge that is easily accessible) plays a role in KM. According to authors referenced in the aforementioned chapters, information and knowledge exists hand-in-hand. It was found that the management of information supports the management of knowledge. Without appropriate IM to facilitate and support KM, KM would be inadequately supported.

The whole of Chapter 4 focussed on how the ***Organisation*** (the structure) makes use of knowledge and how knowledge flows in and out of the organisation. It was found that there was a

relationship between different types of organisational needs linked to knowledge to ensure that the organisation retain knowledge in some form or another. This links to the concerns of ***Process*** (transformation) and ***Share*** or ***Sharing*** (actively participating). With knowledge being managed and supported (though facilitation) within the scope and context of the organisation, it isn't at all surprising that transformation and participation (***Process*** and ***Share***) plays a role within the organisation. The two terms Process and Share may be directly linked to Organisational KM Needs in that Artefacts are produced, Individual, Teams, Organisations Share, and use Artefacts attached to knowledge retention. This links to the construct of ***Technology*** (facilitation without technology being the focus) – which in itself is an artefact as well as facilitating medium, ***Learn*** or ***Learning*** (acquiring new knowledge that can be applied) in which knowledge is socialised in a ***Codify*** or ***Codification*** (a utilitarian and easily understood mechanism to convert knowledge into an easily accessible representation) format.

If one takes all the aforementioned in to consideration, as discussed from Chapter 1, 2, 3, 3 and found in Chapter 5 and 5, ***Strategy*** (an approach that needs to be set and followed) plays a role in this instance, as it provides direction and guidance to the organisation.

What should be clearly stated in this instance is that the strength and magnitude of the relationships between the terms are unclear at this moment and further research will be required. What the author can state however is that there is a direct relationship between the following terms as applied by both academics and practitioners alike (as within the scope and context of this thesis).

In conclusion, one may be able to state the following:

- There is a defined **Need for Organisational KM**. This objective highlights the need for organisational KM, stipulates possible solutions and highlights concerns in previous research. As may be observer in Chapter 1, this need has been poorly addressed thus far.
- As may be found in Chapter 2, one needs to **Delineate the Concepts of Knowledge, Management and Knowledge Management** to be able to highlights the nature of knowledge, management and KM by focusing on the description of the hierarchical and human–centred nature of KM. It was stipulated and found that there is a clear distinction between the concepts of knowledge, management and KM, and that KM provides support to day–to–day management processes to which it is aligned.
- As may be found in Chapter 3, one needs to **Delineate the Understanding of KM** to highlight the nature of knowledge, management and KM by redefining the construct of KM based on core considerations related to the concepts of knowledge and management and the critical interaction between the two.
- As described in Chapter 4, for the purpose of this study the author needed to identify

Organisational KM Needs. This objective highlighted that due to the systemic nature of an organisation, knowledge dissipates into the organisational environment. This leads to clear organisational needs for KM to minimise the effect. Organisational KM needs that can be satisfied by the application of the fundamental building blocks of KM may be applied during the implementation of an organisational KM initiative.

- In chapter 5 and 6, the author systematically investigated the Building Blocks of KM from both an academic and practitioner perspective to highlight the building blocks as presented by KM by comparing patterns presented within the results as analysed for this study. KM Building Blocks and Organisational KM Needs. This was conducted against the backdrop of a defined Need for KM, an understanding of Organisational KM Needs, the Concepts of Knowledge, Management and Knowledge Management and finally a review and delineation of the meaning of KM as defined in literature.

When one considers all the aforementioned factors, one can now state that:

The identified fundamental building blocks of KM that satisfy organisational KM needs are:

- ***Individual*** (the source of knowledge) and ***Communal*** (the relationship between individuals)
- ***Knowledge*** (that which the individual cognitively possesses and which the person can apply)
- ***Management*** (the process that facilitates a goal–driven environment in support of KM)
- **Information** (utilitarian representation of knowledge that is easily accessible)
- ***Organisation*** (the structure)
- ***Process*** (transformation)
- ***Share*** or ***Sharing*** (actively participating)
- ***Technology*** (facilitation without technology being the focus)
- ***Learn*** or ***Learning*** (acquiring new knowledge that can be applied)
- ***Strategy*** (an approach that needs to be set and followed)
- ***Codify*** or ***Codification*** (a utilitarian and easily understood mechanism to convert knowledge into an easily accessible representation)

As may be noted in Chapter Map 7, one of the main contributions in this chapter is to stipulate and bring together all the components applied in this study. It indicates the application and analysis of the textual units identified and the conclusions of this study by cross-referencing and analysing patterns identified in text obtained from the theoretical perspective of KM and the more practical description of KM. In essence, this chapter elucidates the building blocks of KM that, if and when applied in an integrated fashion, would have the potential to support KM initiatives and satisfy an organisation's KM needs. Some of the contributions of this chapter may be summarised as follows:

(1) Several conceptual and textual relationships were identified and leveraged against each other to create a view in which the theoretical KM domain and the practical KM domain were compared. Based on this comparison, several concepts were identified that overlap in between the two domains. These concepts link to the fundamental building blocks of KM that satisfy organisational KM needs.

(2) After evaluating the conceptual and textual relationships, the conceptual and textual proximities (in closeness and distance) were identified and leveraged against each other to create a view in which the theoretical KM domain and the practical KM domain were compared. Based on this comparison, several identified concepts were clarified that overlap between the two domains. These clarified concepts link to the fundamental building blocks of KM that satisfy organisational KM needs.

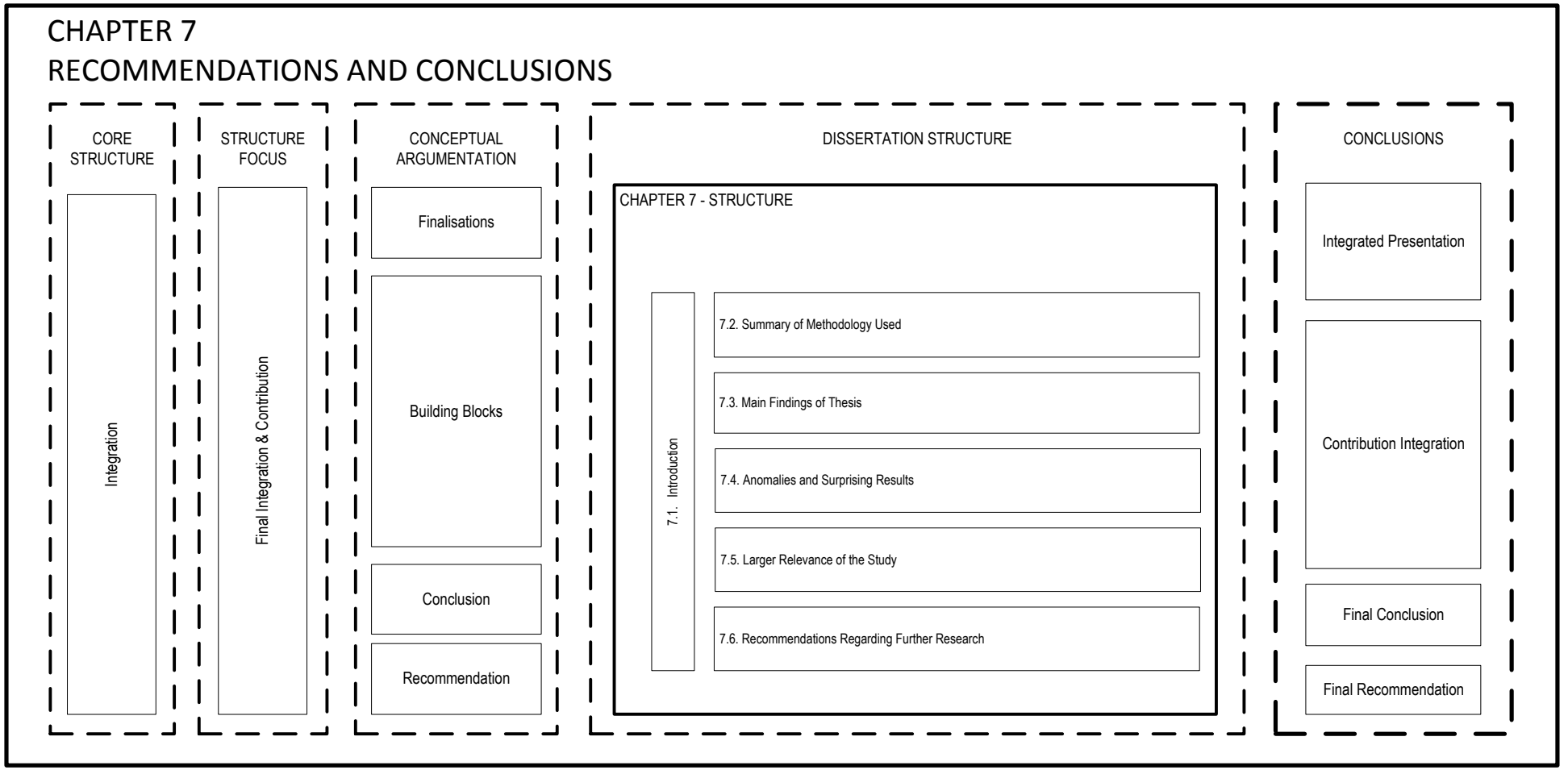
(3) After evaluating the conceptual and textual relationships, the conceptual and textual proximities (in closeness and distance), clusters or categories of relationships were identified and leveraged against each other to create a view in which the theoretical KM domain and the practical KM domain were compared. Based on this comparison, several identified concepts were validated to be overlapping these two domains. These clarified and validated concepts link directly to the fundamental building blocks of KM that satisfies organisational KM needs.

(4) Additional to the aforementioned, patterns of relationships between the relationships, proximities and clusters were compared to each other to ensure that the patterns that are exposed are coherent and relevant. These patterns need to comply with the strict requirements stipulated in Chapter 5 to ensure that the identified building blocks may be as coherent and complete as possible. As such the final contribution of this chapter was to clearly identify the fundamental building blocks of KM that satisfy an organisation's KM needs.

As a result of the review and an integrated cross-referencing of patterns identified in relationships, proximities, clusters and reassessment of patterns, this thesis subsequently identifies the fundamental building blocks of KM that satisfy an organisation's KM needs. These units can then be later applied and cross-referenced and validated during taxonomy construction and eventual ontology construction linked to rules of relationships and additional research to follow. Finally the contributions of this chapter may be summarised as follows, namely:

- **Conceptual and Textual Relationships –** the identification of relationships between terms and terminology used by KM theorists and KM practitioners matching overlap and coherent usage.
- **Conceptual and Textual Proximities –** the identification of proximities (closeness and distance) between terms and terminology used by KM theorists and KM practitioners matching overlap and coherent usage.

- **Conceptual and Textual Clusters -** the identification of clusters (groups and categories) of terms and terminology used by KM theorists and KM practitioners matching overlap and coherent usage.
- **Conceptual and Textual Patterns -** the identification of patterns of usage of terms and terminology used by KM theorists and KM practitioners stipulating overlap and coherent usage.
- **Building Block Identification –** the identification and presentation of subsequent fundamental building blocks of KM that satisfy an organisation's KM needs.



Chapter Map 08: Recommendations and Conclusions

CHAPTER 7: RECOMMENDATIONS AND CONCLUSIONS

Table of Contents: Chapter 7

7.1. Introduction

The effective use of knowledge within an organisation has clear and distinct advantages in ensuring success in task completion and providing a competitive advantage. However, due to the diverse sources of knowledge, gaining and losing knowledge through the systemic nature of an organisation, an effective method is needed for the capture or sharing of knowledge in support of the organisation. One of the methods that can assist in this endeavour is the implementation and application of organisational KM.

To be able to effectively implement KM within an organisation or even between organisations, an appropriate and utilitarian codifications scheme or set of rules (ontology or taxonomy) is necessary to assist in the implementation of intra– or inter– organisational KM. One needs to identify and define fundamental KM building blocks that can be applied within or across organisations to assist in the implementation and application of KM. These building blocks would assist in sharing similar codification schemes and constructs representing KM and its content. Previous attempts to construct such a schema or representation have been limited to single instances of organisations, leading to representations of KM tailored to their specific needs. This extraordinary level of specialisation in the application of KM made it nearly impossible for organisations to share KM initiatives other than lessons learned, or to transfer KM from one organisation to another. It has been suggested that ontologies or taxonomies can be applied in the development of a scheme for implementing KM. However, these attempts have been equally specialised, focusing on either technology, tools, utilities or mechanisms assigned to KM.

The aim of this study is to identify generalised components or fundamental building blocks of KM that would satisfy organisational KM needs by focusing on the language used by academics and practitioners. Thus KM may be defined within the scope and context of its content, referencing and describing the nature of KM. By combining the theoretical expectations of KM (the academic perspective) with the practical application that satisfies organisational KM needs (practitioners' perspective), this thesis focuses on identifying generic high–level building blocks relating directly to KM as applied in practice by organisations.

By drawing together the main results from previous chapters, findings will be summarised, highlighted and presented in this final chapter. Clear relationships and final conclusions will be presented and summarised in this chapter (Chapter Map 08: Recommendations and Conclusions).

7.1.1. Aim

The aim of this section is to conclude the study, summarise final results and present recommendations for future research.

7.1.2. Scope

In order to achieve this aim, results will have to be reviewed based on the following core concepts:

- Summary of Methodology Used
- Main Findings of Thesis
- Anomalies and Surprising Results
- Larger Relevance of the Study

Chapter 7 will conclude by presenting recommendations regarding further research whereby this study may be extended and/or enhanced.

7.2. Summary of Methodology Used

Due to the nature of the sample selection, data collection, data preparation, data presentation and analytical approach followed for this thesis, the author made use of both qualitative and quantitative approaches. In Chapter 1, 2, 3 and 4 the author reviewed and analysed literature in order to understand and elucidate concepts related to the reasons why problems exist in the application of KM and the sharing of knowledge within organisations. Literature, through argumentation and discussion, provided insight into the nature of KM, and the manner in which the

generic systemic structures of the organisation leads to a need for organisational KM. In other words, literature assisted in illuminating the following concerns:

- To successfully implement KM within an organisation, one needs a primary and fundamental understanding of KM. Due to the uniquely specialised implementations of KM within organisations and the subsequent varying methods, no two organisations use the same representations required for knowledge sharing. To be able to share knowledge between organisations, one requires a fundamental representation of the essential features of KM that can be applied between organisations (Section 1.7).
- KM is more than the application of technology and the implementation of DM and IM. It is a management process that is supported by DM and IM, and due to its very nature, finally supports organisational management (Section 2.3 and Section 2.5).
- KM is a management process that supports the overall functioning of the organisation by enhancing, managing and leveraging the knowledge of individuals as found and constructed in dynamic interaction between individuals in a group relationship; that makes use of supporting functions of IM so as to assist and facilitate organisational behaviour in achieving the overall goals and objectives of an organisation by supporting organisation management (Section 3.2).
- The organisation structure presents components referring to a permeable system that can lead to the loss of knowledge (Section 4.2)
- Due to the systemic nature of an organisation, knowledge is obtained that needs to be integrated based on the structure of the organisation. For the same reason knowledge is lost into the organisational environment creating an organisational need to identify, acquire, distribute and preserve structured and unstructured knowledge. Knowledge can be identified, acquired, distributed and preserved as utilitarian artefacts that relate to the training of individuals with a specific and unique knowledge capacity. Maintaining teams that can coherently apply knowledge may lead to producing a desirable practice and, finally, to representations of knowledge that can be applied within the scope of the organisation (Section 4.3).
- To satisfy organisational KM needs, one must identify the fundamental building blocks of KM that can be generically applied within an organisational structure (Section 1.7; Section 3.1 and Section 4.4).

In Chapter 5 the author states a case for and indicates an approach to constructing a representation of KM that can generically and fundamentally describe the core constructs of KM. By focusing on the language (in the form of text) as applied by academics (representing the expectation of what KM should be through the evaluation of concise KM definitions) and practitioners (how KM is applied and discussed by KM practitioners within the scope and context of diverse organisations interested in leveraging organisational knowledge). The author suggests

making use of a combination of data mining, unstructured information mining, lexicography and linguistic analysis to identify the core constructs required and stipulated by academics and applied by practitioners in the scoping and delineation of the fundamental building blocks that would satisfy organisational KM needs (Section 5.2).

In order to identify these building blocks, the author harvested text from three sources of data (Section 5.3.1). The data was consistently, systematically and coherently prepared for analysis and then presented (Section 5.3.2) in the form of clear word counts reflecting terms and terminology frequently used within the three data sets (Section 5.3.3). Procedurally, all data sets obtained from sampling, collection, preparation, presentation were systematically analysed and the results presented as such (Section 5.3.4).

The word counts were explored and analysed by means of a simple overview of bar charts and graphs to identify possible trends (Section 6.2). Trends were identified and the data was subsequently used to construct proximity matrices and indices. These matrices presented the distance between terms in usage. Proximity indices functionally assist in the identification of groups and clusters (through the identification of possible categories). The proximity matrices were visually inspected by converting these into heat maps. The heat maps included contour lines and striation patterns that indicated rapidity in change between group averages. The heat maps were visually inspected to identify terms that were closely related within the matrices. The results were presented as preliminary relational patterns (Section 6.3).

The preliminary relational patterns were merged to develop network diagrams that presented overlapping relationships between the application of terms. The three core terms or concepts of this study (knowledge, management and organisation) were placed in a networked relationship against each other. Terms in the preliminary relational pattern that overlapped with all three core terms were included as preliminary building blocks that would potentially describe the nature of KM as applied within an organisation (Section 6.3).

To confirm the preliminary building blocks, the complete dendrograms of all three data sets were analysed and compared (Section 6.4). Based on this analysis patterns of relationships were identified, and components stipulated in the preliminary building blocks were confirmed to be present and true. Based on the nature, focus and approach applied in this study, the pattern identified was concluded to be the generic and fundamental building blocks of KM that, if applied coherently, would satisfy organisational KM needs (Section 6.5).

Based on the thesis approach, the following section provides an overview of the main findings and the manner in which these findings relate to the objectives of the thesis, linking the chapters used to structure this thesis.

7.3. Main Findings of Thesis

Chapter 1 provides the reader with an overview as to why knowledge sharing as a core aspect of KM has difficulty in being realised across organisations. It provides the reader with possible solutions in the application of either ontologies or taxonomies to be applied during the creation or implementation of a KM initiative within or across organisations. If such an ontology or taxonomy could be developed it would simplify the process of inter– and intra–organisational collaboration. To be able to do this, one needs to obtain a clear understanding of the main concepts related to KM and the manner in which KM is applied within the scope and context of an organisation. As Zhen *et al. (*2010) indicated, simply throwing technology at KM cannot be a solution without a clear understanding and definition of KM, and the manner in which IT can support KM. Due to the scope of fundamental work required to construct an ontology, the author concludes that the primary function of the research presented in this thesis is to identify the fundamental building blocks of KM that satisfy organisational KM needs. Additional research after the conclusion of this study would be required to build such an ontology or taxonomy. To achieve the aforementioned concerns, Chapter 1 focuses on the following objective:

Objective 1: The Need for Organisational KM

The objective highlights the need for organisational KM, stipulates possible solutions and also highlights concerns in previous research. This need has been poorly addressed thus far.

Chapter 2 provides an overview of how KM is viewed in literature and several of the concerns found in literature. Section 2.2 provides a clear overview of the manner in which data, information and knowledge interact. It presents arguments for both a mechanistic and more organically dynamic view of this interaction. In Section 2.3 the author stipulates that knowledge is not a mechanistic construct and in this instance applies cognitive psychology and facets of sociology and social cognition to present this argument. This chapter also states that management functions as a knowledge concept and that a clear interaction exists between organisation structures, DM, IM, KM and Organisational Management (Section 2.4 and Section 2.5). Chapter 2 concludes by taking into consideration that there is a clear overlap between knowledge as a human construct and management as a knowledge concept; however, the direction of the overlap is unclear in this instance.

Objective 2: Delineating the Concepts of Knowledge, Management and Knowledge Management

This objective clearly highlights the nature of knowledge, management and KM by focusing on the description of the hierarchical and human–centred nature of KM. It was stipulated and found that there is a clear distinction between the concepts of knowledge, management and KM, and that KM provides support to day–to–day management processes to which it is aligned.

The aim of Chapter 3 is to provide an overview of the core concepts that relate to the domain of KM as described and defined in KM literature. This was discussed in terms of the manner in which KM is described (Section 3.2) and defined (Section 3.3) in relationship with knowledge as a human construct and considering that KM is supported by DM and IM and support management. Based on the aforementioned considerations, the integrated result is a redefinition of KM as a human–based supportive and facilitative management process supporting organisational management (Section 3.4). To achieve the aforementioned concerns, Chapter 3 focuses on the following objective:

Objective 3: Delineate Knowledge Management

This objective clearly highlights the nature of knowledge, management and KM by redefining the construct of KM based on core considerations related to the concepts of knowledge and management and the critical interaction between the two.

Chapter 4 focuses on the nature of the organisation to identify generic attributes of the manner in which the organisation relates to knowledge. Based on this, the author delineates the nature of a ‘generic’ organisation with a knowledge focus and stipulates that the flow and transformation of knowledge and related resources function as a system (Section 4.2).As such, the transformative processes that exist within the organisation would provide a representation of organisational KM needs. This allows the author to adopt the views of Fink and Ploder (2007 & 2009) and to adapt it by referencing Lytras and Pouloudi (2006) so as to construct a representation of organisational KM needs. To achieve the aforementioned concerns, Chapter 4 focuses on the following objective:

Objective 4: Organisational KM Needs

This objective clearly highlights the following: Due to the systemic nature of an organisation, knowledge dissipates into the organisational environment. This leads to clear organisational needs for KM so as to minimise the effect. Organisational KM needs that can be satisfied by the application of the fundamental building blocks of KM can be applied during the implementation of an organisational KM initiative.

Chapter 6 focuses on the analysis of data collected as stipulated through Chapter 5. Chapter 6 presents the results of the data collection and preparation process and proffers a discussion of results by firstly describing the data through reviewing potential relationships in terms and terminology (Section 6.2). After exploring potential relationships, the proximities (closeness and distance) of the terms are reviewed (Section 6.3) to identify preliminary patterns of relationships. Patterns of relationships have been confirmed by reviewing the categories and relationships of all terms as stipulated by the clustered results presented as dendrograms (Section 6.4). To achieve the aforementioned concerns, Chapter 6 focuses on the following objective:

Objective 5: Building Blocks of KM

The objective clearly highlights the building blocks as presented by KM by comparing patterns presented within the results as analysed for this study.

In addition to Objective 5, the author indicates that due to the nature of the data sets, the identified patterns of terms relationships can be used to represent the fundamental building blocks of KM that satisfy organisational KM needs (Section 6.5). As stated in Chapter 6 (Section 6.5), Corpus 1 (KM Definition corpus) represents the expectation of what KM should be, while Corpus 2 (KM Network – Brint corpus) and Corpus 3 (CBEL corpus) represent what KM actually is when applied within an organisation so as to satisfy organisational KM needs. Considering the rules that this author has set for matching patterns, the patterns identified in Corpus 1, 2 and 3 represent the critical components of KM and Corpus 2 and 3 represent the critical components of KM as applied within an organisation. One can therefore state that the identified repeating patterns leading to the construction of Figure 38 (Section 6.5) represent the fundamental building blocks of KM that satisfy organisational KM needs. Based on this statement, one can therefore interpret Figure 38 to be representing the fundamental building blocks of KM that satisfy organisational KM needs (Section 6.5).

Objective 6: KM Building Blocks and Organisational KM Needs

This final objective highlights and represents the fundamental building blocks of KM satisfying organisational KM needs that have been identified in this study.

In compliance with Objective 6 and the research question, the author identifies the following as the main terms (or core concepts) that need to be understood, implemented, facilitated and applied within the structure of an organisation to satisfy organisational KM needs.

Consider the following:

- There is a need for fundamental analytical work that identifies the preliminary components of a KM ontology that can be applied within and across organisations (Chapter 1).
- KM is based on a clear human–centred construct linked to knowledge – which may be viewed as '*a dynamic schematic symbolic cognitive construct mediated by social and environmental interaction that is uniquely centred within the mind of the individual, therefore based in the individual*' (Chapter 2).
- '*KM is a management process that supports the overall functioning of the organisation by enhancing, managing and leveraging knowledge of individuals as found and constructed in dynamic interaction between individuals in a group relationship, and makes use of supporting functions of IM, so as to assist and facilitate organisational behaviour in achieving the overall goals and objectives of an organisation by supporting organisation management*' (Chapter 3).
- An organisation needs to identify, acquire, distribute and preserve knowledge related to and contained in artefacts, individuals, teams and the organisation as a whole (Chapter 4).
- The building blocks of KM were derived from what KM is considered to be theoretically, and also from the manner in which it is applied in practice as derived from the language of two communities of practice (Chapter 6).

One can now state that:

The identified fundamental building blocks of KM that satisfy organisational KM needs are:

- ***Individual*** (the source of knowledge) and ***Communal*** (the relationship between individuals)
- ***Knowledge*** (that which the individual cognitively possesses and which the person can apply)
- ***Management*** (the process that facilitates a goal–driven environment in support of KM)
- **Information** (utilitarian representation of knowledge that is easily accessible)

- ***Organisation*** (the structure)
- ***Process*** (transformation)
- ***Share*** or ***Sharing*** (actively participating)
- ***Technology*** (facilitation without technology being the focus)
- ***Learn*** or ***Learning*** (acquiring new knowledge that can be applied)
- ***Strategy*** (an approach that needs to be set and followed)
- ***Codify*** or ***Codification*** (a utilitarian and easily understood mechanism to convert knowledge into an easily accessible representation)

7.4. Anomalies and Surprising Results

The author could not identify clear anomalies. What was surprising, however, was the relationship between the terms and terminology where the case terms overlapped when presented in a relationship or a network. When considering that ***Data***, ***Information*** and ***Knowledge*** are generally placed in a relationship with each other during discussions of KM (Section 2.2), ***Data*** did not present itself as prominently as one would expect. When linking ***Data*** with ***Technology***, one finds that an inherent relationship exists between the case terms ***Information***, ***Data*** and ***Technology***. However, when the three core case terms of ***Knowledge***, ***Management*** and ***Organisation*** are placed in a networked relationship, ***Data*** does not present as an overlapping term. It would appear that within the KM practitioners' discussion, ***Data*** is dealt with within the confines of and as related to ***Technology***.

7.5. Larger Relevance and Contribution of the Study

The following summary and conclusions are made with a link to the larger relevance of the study presented for this thesis. The primary relevance of this study is that it identifies building blocks for KM that can be applied within the scope and context of an organisation. If and when an organisation starts or implements KM initiatives, the organisation may start by focus on the identified building blocks. This would clearly simplify the process. Instead of focusing on too many variables in the implementation of KM so as to leverage and obtain a competitive advantage from organisational knowledge, KM practitioners can focus on the identified components by defining these within the scope and context of their organisation. Clearly one cannot assume that all organisations are the same. The purpose of a similar starting point may however present just that – a starting point. As found in this thesis, there are diverse views of KM and as such it is difficult to start with KM or to reconcile different views of KM. Having a point to start with may be helpful and may assist in the long term. This needs to be tested in long terms studies but that is outside of the

scope of this thesis as the thesis focussed on discovering overlaps between the points of view in academia and practice.

If all organisations start from the same point of view, it may simplify the process of adapting KM when integrating organisations and sharing knowledge across organisations.

In addition to a shared starting point, each of the fundamental building blocks can be used to translate between organisations when referencing each other's KM activities. If used correctly and diligently, these building blocks, focusing on terminological concepts, can simplify the application of KM within an organisation. This has the potential of reducing the expense of KM implementation by reducing trial and error, or by focusing on technology as the main outcome of a KM initiative rather than a complementary and supporting outcome.

The author has presented a new definition of KM that descriptively outlines many of the core aspects of KM. The author submits that, if an initiative does not comply with the definition of KM, it cannot be viewed as a KM initiative. In the following sections the contributions will be listed by chapter as covered in this thesis. These contributions, linked to the larger relevance of this study, have already been listed and reviewed by chapter and are merely information already presented.

7.5.1. Chapter 1: Introduction to Organisational Knowledge Management Needs

As may be noted in Chapter Map 1 to Chapter Map 8, after completing this chapter, the following were achieved as contributions with a link to the larger relevance of this study. The contributions already mentioned and discussed within the summary/conclusion of each chapter are as follows:

(1) **Defined Need** – stipulating that there is a definite need for KM as articulated by different yet related management domains. This section indicates a defined need for KM within the scope and context of an organisation. For organisations to share knowledge-based resources there should be a fundamental understanding of what encompasses KM, and also the knowledge that may be found within an organisation. This fundamental understanding will allow organisations to share resources through a synergised KM initiative –sharing access to knowledge and knowledge-based resources. This may be achieved through the application of ontology construction which would define the rules and relationships between KM resources shared across and within organisations. As part of an ontology construction, one would be required to have a core and fundamental understanding of the concepts or components of an ontology. Constructing such an ontology could be problematic due to the misunderstanding of

various concepts linked to KM and the manner in which these are delineated in discussions linked to the KM domain.

(2) **Defined Concerns** – defining the concerns when addressing the need for KM. One cannot address KM as a domain without reflecting on some of the main concerns that have the potential to inhibit the development of KM as a domain. Based on the aforementioned point, it was indicated and found that there is a general misunderstanding of the concept of KM in terms of what is included and what may seemingly be excluded. Due to dynamically divergent and convergent ideas linked to KM, a generalised confusion developed as to what KM entails. One needs to 'go back to the fundamentals' of KM and review what theorists and practitioners say about KM and what it would entail.

(3) **Conceptual Scoping** – scoping the concepts applied to define the need for KM as linked to an organisation. To achieve the goal of understanding the fundamental units linked to KM, the chapter also provides a conceptual scoping indicating the need for a sequential and systematic approach in the construction of such an ontology. The first step would be to identify building blocks linked to a taxonomy so that the rules and relationships can be identified. The taxonomy may then be applied to construct and test such an ontology. What this chapter achieves is to indicate an incremental approach that may be followed in the construction of an ontology by focusing on the linguistics of the participants in a domain, and then systematically indicating the process that can be (and has been) followed in this thesis. It was therefore concluded that to construct an ontology, one would have to first identify the building blocks necessary to create a taxonomy and eventually an ontology. The core objective of this thesis is described as an approach to identifying the fundamental building blocks of KM within the scope and context of organisations so that one may eventually apply these in such a way as to satisfy the organisational need for KM.

7.5.2. Chapter 2: The Concepts of Knowledge, Management and Knowledge Management

On completion of this chapter, the following was achieved as contributions with a link to the larger relevance of this study. The contributions already mentioned and discussed as such within the summary/conclusion of each chapter are as follows:

(1) **Conceptual Dimensioning** – identifying the core concepts and relationships with each other. The first part of this chapter provides a conceptual dimensioning – in other words, how the individual concepts within the KM domain are linked to each other based on the views and

viewpoints of the treatment and discussion of the topic over a period. The first dimension relates to the schools of thought that can broadly be divided into a 'mechanistic' point of view, where one would have a structured and sequential relationship between data, information and knowledge. The second point of view is a human-centred relationship of data, information and knowledge where constructs are dynamically interchangeable, based on the scope, context and application of these concepts. Additional to this argument it was found that knowledge cannot be explicated by the individual without transforming it into something else. The relationships are also nonlinear and dynamically interactive as influenced by the nature of the knowledge holder. Additional to the aforementioned dimensioning of concepts to identify the nonlinear dynamic and human-oriented dimension of KM, it was also discussed that not only is KM a part of the management domain; it also presents a case for management being linked to a knowledge domain – inherently implying that management requires a significant level of knowledge to function. This dimension already alludes to the point that KM has the potential to support management as one of the underlying structures facilitating the efficiency of the management domain within the scope and context of an organisation. It therefore indicates an articulation of management being a knowledge concept where knowledge and management would have a bidirectional relationship.

(2) **Conceptual Integration** – stipulating the relationship and its importance between the concepts traditionally leveraged against KM as a domain. The main contribution of this chapter is to integrate the concepts of knowledge and management to indicate that the nonlinear dynamic human-centred nature does indeed have a conceptual bidirectional relationship where knowledge needs to be managed and management requires knowledge to function. Though this is not a significant contribution, the point does allude to KM being a reality that cannot be ignored.

7.5.3. Chapter 3: Knowledge Management Defined

On completion of this chapter, the following was achieved as contributions with a link to the larger relevance of this study. The contributions already mentioned and discussed within the summary/conclusion of each chapter are as follows:

Discursive Redefinition – KM has been redefined to include the systematic and evolutionary change of the views and viewpoints over several years, and the differentiated schools of thought. The definition presented therefore integrates systematically diversifying views of KM and reconceptualises it by integrating all of the related and coherent concepts leveraged against KM

over several years. As such KM has been redefined within the scope and context of this thesis as follows:

> '***KM is a management process that supports the overall functioning of the organisation by enhancing, managing and leveraging knowledge of individuals as found and constructed in dynamic interaction between individuals in a group relationship, making use of supporting functions of IM to assist and facilitate organisational behaviour in achieving the overall goals and objectives by supporting organisation management***'.

7.5.4. Chapter 4: Organisational Knowledge Management

On completion of this chapter, the following was achieved as contributions with a link to the larger relevance of this study. The contributions already mentioned and discussed as such within the summary/conclusion of each chapter are as follows:

(1) **Structural Need** – based on the permeable nature of an organisation, a definite structural need exists for KM within the scope and context of an organisation. Clearly describing the characteristics of an organisation as a system, where knowledge flows in, is transformed over a period and finally flows out as a subsequent result of organisational evolution, it was established that an organisation has a structural need for knowledge retention as it goes through the process of acquiring, transforming and then, additionally, losing knowledge resources. Therefore, based on the structure of an organisation, a subsequent structural need exists for KM which would allow an organisation to engage in knowledge integration after it has been acquired in various forms and/or formats, and also the subsequent retention to avoid the loss of such knowledge as linked to the knowledge holder, even if it is required to explicate knowledge in an incomplete symbolic format as linked to artefacts or representational artefacts.

(2) **Systemic Knowledge Flow** – all organisations present a characteristic of knowledge flowing in, being retransformed and subsequently, due to its nature as a knowledge system, flowing out of such an organisation/knowledge system. Based on the aforementioned point, it becomes clear that the organisation functions as a knowledge system on its own with different levels of knowledge application and knowledge usage. As a contribution one would therefore be able to refer to an organisation as a knowledge structure or a knowledge system. Though it may not appear to be a significant contribution, one should bear in mind that the organisation cannot exist without people and the application of knowledge. This reaffirms the necessity of the right knowledge for the right position since this would arguably have different effects on different positions within the organisation where it is applied.

(3) **Knowledge Containment Need And Focus** – based on the flow of knowledge, organisations would therefore have a real need to obtain and retain knowledge and effectively minimise the loss of knowledge as much as possible. When referring to the organisation as a knowledge system and in accepting this dimension, one would have to additionally accept that knowledge flowing in is required for the rejuvenation and life of such an organisation. One would also have to accept that knowledge would subsequently flow out of the organisation. This would in essence reaffirm the need for knowledge retention and structural knowledge containment, focusing on knowledge based on relevance in its application within the scope and context of a given application–based scenario.

(4) **Scoping Organisational Problem** – regardless of the manner in which an organisation engages in KM and its knowledge retention initiative, knowledge will be lost to an organisation's environment. Therefore a need exists for KM to address the problem of loss of knowledge as far as possible to retain as much knowledge in a viable format for access and application if and when required. The alternative is systematic organisational 'memory loss' and, to coin a term, the potential for 'Organisational Alzheimer's Disease' where an organisation will forget what it once knew. The final main contribution of this chapter is therefore to focus KM on the organisational problem – indicating that an appropriate understanding and application of KM within the scope and context of the organisation are required to ensure as little loss of knowledge as possible. In other words, by implication it focuses KM on the scope and context of organisations losing knowledge and reaffirms the need for an appropriate understanding of KM and a coherent application of KM as a management domain.

7.5.5. Chapter 5: Research Methodology

On completion of this chapter, the following was achieved as contributions with a link to the larger relevance of this study. The contributions already mentioned and discussed as such within the summary/conclusion of each chapter are as follows:

(1) **Type Requirements** – coherent type requirements in matching patterns in lexical analysis were identified and applied as instrumentation for this thesis. The type requirements originated from diverse text analysis techniques and were synthesised into one source that may be applied in differentiated scenarios. To be able to holistically and interactively analyse the KM theorists' and KM practitioners' language, specific requirements obtained from linguistic analysis had to be leveraged against KM and also the manner in which theorists and practitioners describe KM to each other. As such language type requirements were identified

and structured to link these requirements to the KM domain. The contribution in this case was to identify 'type requirements' necessary to conduct linguistic and lexical analyses in a specifically focused domain. In simple terms the construction was that of identifying rules or 'type requirements' necessary to analyse linguistic patterns in a specifically focused domain of analysis.

(2) **Integrated Analysis** – techniques in text and lexical analysis were integrated with cluster analysis so as to construct an integrated text analysis technique to match patterns identifying building blocks in differentiated scenarios. The second contribution in this instance was to develop and integrate analytical techniques linked to different perspectives or points of view from a linguistic perspective. This allows a set of criteria that would link KM theory and KM practice to be able to identify the points of overlapping. These points of overlapping would then provide the points of similarity in theory and application that would inherently provide the fundamental building blocks of KM that would be able to satisfy an organisation's needs linked to KM and KM practice. The integrated analysis requirements have the potential to be applied in different domains of interest based on linguistic analysis and the domain being focused on. These requirements also provide a method for the identification of linguistic relationships that have the potential to objectively identify classes of objects or artefacts to be applied to the construction of ontologies.

(3) **Knowledge Mining Method** – a method for mining knowledge was inherently constructed from different perspectives and methods that may be applied to identify building blocks in differentiated scenarios. Based on the aforementioned linguistic rules for type requirements and the subsequent relationship to linguistic analysis integration, these requirements were applied as a process of knowledge mining – through the integration and sequencing of tools and techniques, presenting a new coherent and integrated method for knowledge mining applied to KM itself. This contribution has the potential to change the way in which one approaches large volumes of information for integration based on linguistic pattern–based rules to synthesise the large volume of information into useful sets of relational representations.

(4) **Lexical Analysis of Large Textual Data Sets** – when all information is integrated and discussed, the main contribution of this chapter is to stipulate a lexical analysis technique that can be applied to analyse large textual data sets in various scenarios. It stipulates type requirements, integrated analytical components and pattern techniques linked to knowledge mining and extrapolation as textual symbolic representations. As a final contribution in this chapter, the sequencing, integration and validation of the various techniques into a rule-based pattern matching linguistic analysis technique provide a method for integrated lexical analysis of large textual data sets. This method has the potential to support a wide variety of analytical

procedures where a researcher has to deal with large volumes of text to identify cross–document relationships, similarities and content to link concepts in order to identify relational patterns providing insight into an instance being investigated for whatever purpose deemed relevant.

7.5.6. Chapter 6: Research Findings: Fundamental Building Blocks Of Knowledge Management

On completion of this chapter the following was achieved as contributions with a link to the larger relevance of this study. The contributions already mentioned and discussed as such within the summary/conclusion of each chapter are as follows:

(1) **Conceptual And Textual Relationships –** the identification of relationships between terms and terminology used by KM theorists and KM practitioners, matching overlaps and coherent usage. Several conceptual and textual relationships were identified and leveraged against each other to create a view in which the theoretical and the practical KM domains were compared. Based on this comparison, several concepts were identified that overlapped between the two domains. These concepts are linked to the fundamental building blocks of KM that satisfy organisational KM needs.

(2) **Conceptual And Textual Proximities –** the identification of proximities (closeness and distance) between terms and terminology used by KM theorists and KM practitioners, matching overlaps and coherent usage. After evaluating the conceptual and textual relationships, these proximities (in closeness and distance) were identified and leveraged against each other to create a view in which the theoretical and the practical KM domains were compared. Based on this comparison, several identified concepts were clarified that overlapped between the two domains. These clarified concepts are linked to the fundamental building blocks of KM that satisfy organisational KM needs.

(3) **Conceptual And Textual Clusters —** the identification of clusters (groups and categories) of terms and terminology used by KM theorists and KM practitioners, matching overlaps and coherent usage. After evaluating the conceptual and textual relationships, these proximities (in closeness and distance), and the clusters or categories of relationships were identified and leveraged against each other to create a view in which the theoretical and the practical KM domains were compared. Based on this comparison, several identified concepts were validated to be overlapping between the two domains. These clarified and validated concepts are linked directly to the fundamental building blocks of KM that satisfies organisational KM needs.

(4) **Conceptual And Textual Patterns –** the identification of patterns of terms and terminology used by KM theorists and KM practitioners, stipulating overlapping and coherent usage. Additional to the aforementioned, patterns of relationships between proximities and clusters were compared against each other to ensure that the patterns that are exposed are coherent and relevant. These patterns needed to comply with strict requirements as stipulated in chapter 5 to ensure that the identified building blocks may be as coherent and complete as possible. The final contribution of this chapter is to clearly identify the fundamental building blocks of KM that satisfy an organisation's KM needs.

(5) **Building Block Identification –** the identification and presentation of subsequent fundamental building blocks of KM that satisfy an organisation's KM needs.

7.5.7. Chapter 7: Recommendations and Conclusions

The main contribution of this chapter is to present all the findings of this thesis as well as contributions, anomalies and interesting results, the larger relevance of this study and finally recommendations for further research. This chapter therefore finalises this study.

In the following section, the author provides a brief overview of recommendations regarding further research linked to this study.

7.6. Recommendations Regarding Further Research

When referring to Volume 2, Appendices and Attachments, one finds that there are several dimensions that have not been reviewed within this thesis. For example, one can review the relationship between leadership and KM, or even Project Management and KM. The number of dimensions that can be extracted by focusing on groups of terms is nearly endless.

In addition to the numerous dimensions present, the methodology and methods applied within this study can be applied to other cases of interest by collecting and sourcing text (unstructured data) from recognised domain sources. For example, if one would like to identify the relationship between the case terms information, data, technology and management (as well as the various combinations), these terms can be studied from a KM perspective through the presented data and results or, if a researcher collects data from a recognised source that covers the aforementioned case terms, the methodology and method used in this study can be applied to such a study as well.

One can also make use of additional research and fieldwork to test the identified terms, words and concepts identified. This in itself opens up several possibilities for future research in that the method applied in this thesis may be refined based on practitioner feedback and review. To support this, the author would have to engage in comparative studies focussing on the variance produced by decontextualizing text terms and lexicons. Simply stated, multiple comparative studies would be required in future research iterations related to data cleaning, the impact it has on identified patterns and how practitioners then perceive the patterns.

Strength between terms could not be taken into consideration as the tools available for such a study cannot yet measure strength. But iterative revision, review and comparison in relationship with fieldwork, interviews and questionnaires the strength in relationship between terms might eventually determine strength in relationship.

Above and beyond the numerous opportunities for delving into and mining unstructured data, the results can be tested against whatever relevant environment the author chooses to measure, evaluate, confirm or refute as presented in this study or subsequent studies.

Finally, one can use the results of this study to develop a taxonomy that can be extended through descriptive logic into an ontology to be applied within and across organisations for the implementation of organisational KM.

The opportunities in the application of available data, the results of the data and the application of the methodology will in all likelihood span several years and could include numerous domains (areas of interest), multiple dimensions and additional role–players to extend the results and the methodology as obtained and applied within this thesis.

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